Gammill Quilting Machine Company

Service Manual

Version 1.0

January 31, 2005

Gammill Quilting Machine Company
1452 W. Gibson
West Plains MO 65775
(417) 256-5919 or (800) 659-8224
Fax: (417) 256-5757
Email: info@gammill.net
Website: http://www.gammill.net

Table of Contents

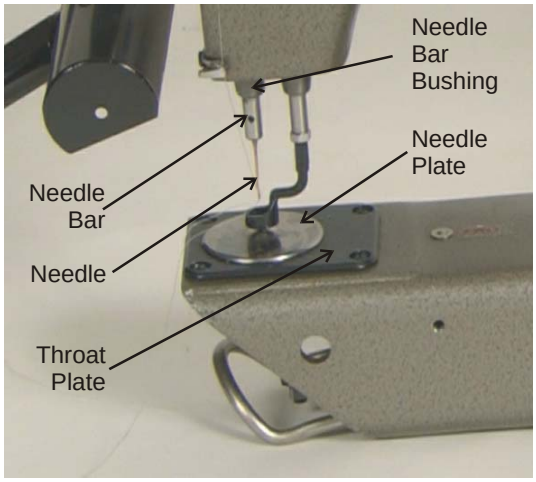
1. Quilting System Features

This chapter briefly describes the features of your Gammill Quilting System.

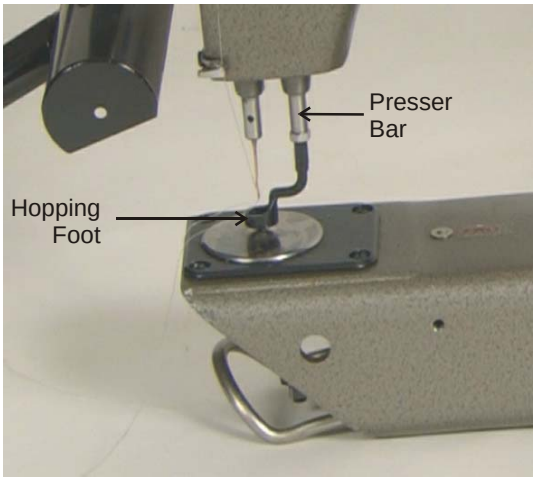
Sewing Head Features

Gammill quilting machine heads use industrial needles with round shafts. The needle is inserted into the needle bar which moves up and down to form the stitch. This bar can be adjusted up or down to the proper machine timing height.

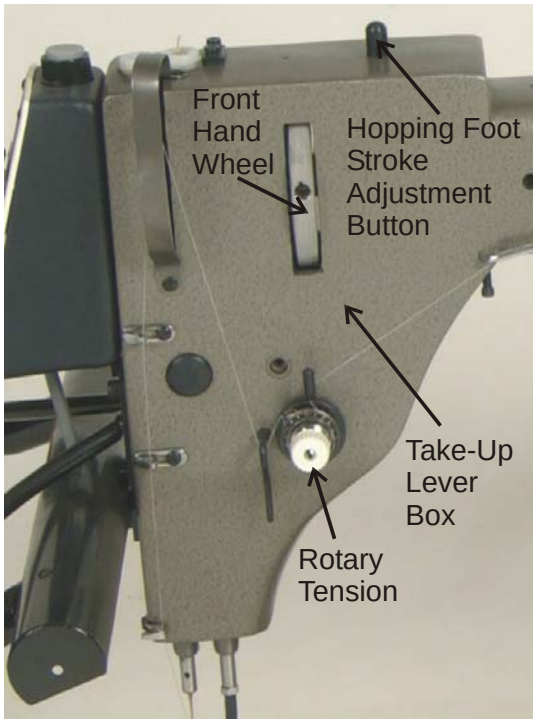
The round needle plate is attached to the top of the square throat plate. The small hole in the needle plate restricts movement of the thread as the stitch is formed. Three of the four screws on the throat plate can be removed and the throat plate rotated off the machine for access to the rotary hook assembly for cleaning or timing.



Attached to the presser bar, the hopping foot raises and lowers with the movement of the needle to press and release the fabric as the stitch is formed. The hopping foot is designed to be used with rulers and templates and the height can be adjusted for proper stitch formation.

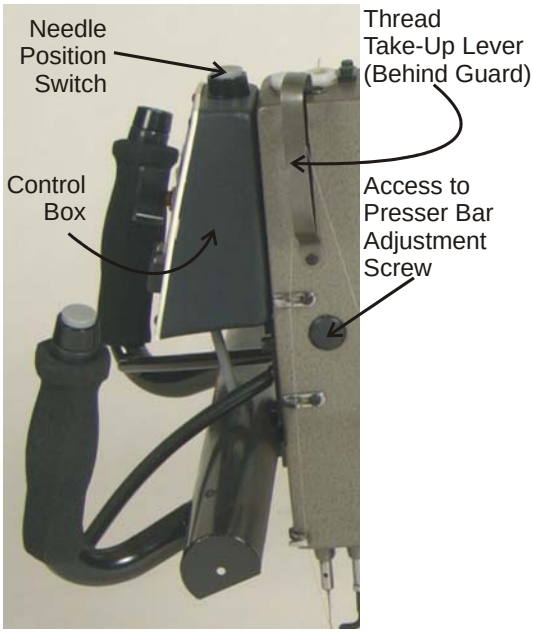


The front hand wheel is used to manually raise or lower the needle. The take-up lever box houses the take-up lever (see Take-Up Lever below). The rotary tension device is used to set top thread tension. Generally this tension is set one time and fine adjustments are made with the Auxiliary Intermittent Tension device. The hopping foot stroke adjustment button is used to adjust the hopping foot.



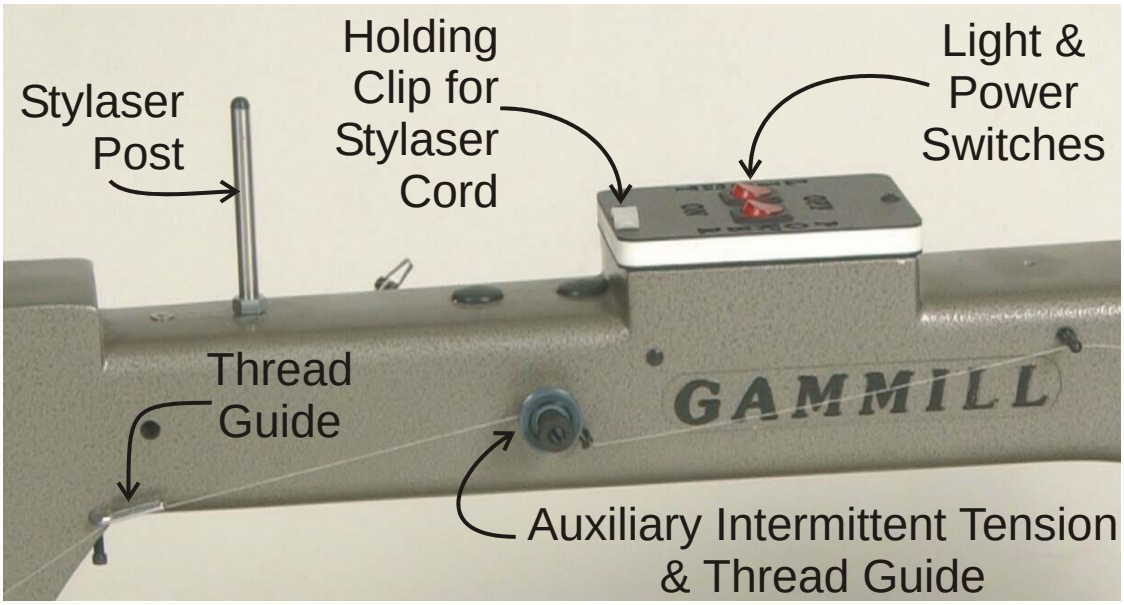
The control box contains the buttons and/or dials for controlling most functions of the sewing head. On machines not equipped with Plus stitch regulation but with the Needle Position option, the Needle Position Switch is located on top of the control box.

The thread take-up lever is located behind a guard and is used to eliminate the slack in the top thread as the stitch is formed. Adjustments to the presser bar are made via the presser bar adjustment screw.

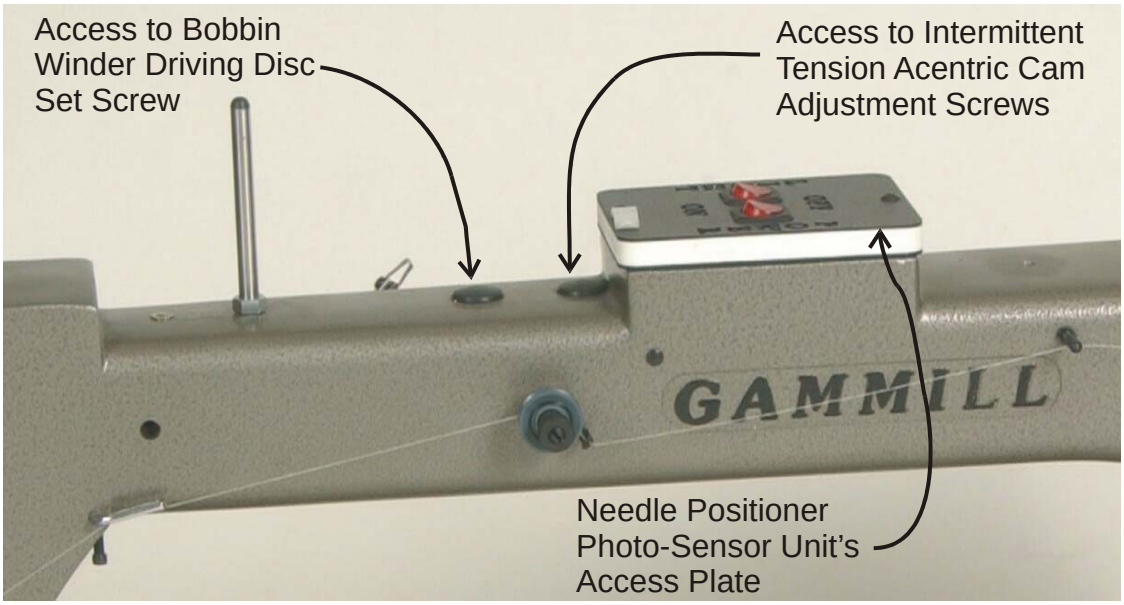


The Stylaser post is used to mount the Stylaser to the upper arm and the cord is held out of the way via the holding clip. The light and power switches are located atop the Needle Positioner Photo Sensor Unit's Access Plate (see below).

The auxiliary intermittent tension is used to set the top thread tension and its thread guide directs the thread into the discs.

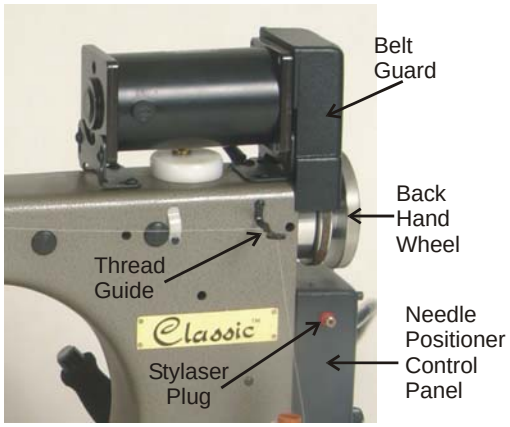


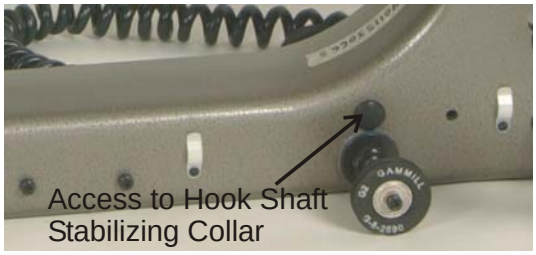
The picture below shows the access locations for the bobbin winder driving disc set screw, the intermittent tension acentric cam adjustment screws and the needle positioner photo sensor.



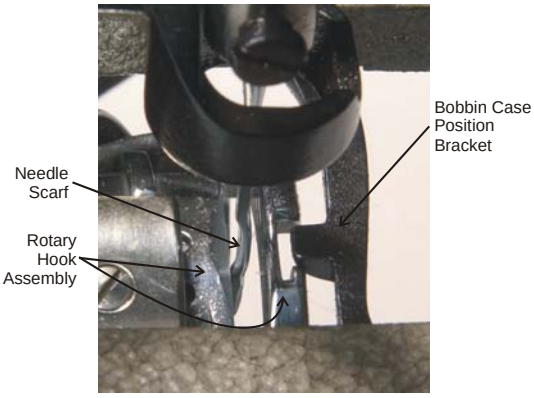
The belt guard shields fingers, hair, jewelry and other objects from becoming caught in the motor belt. The back hand wheel is used to manually raise and lower the needle.

The first thread guide is located just above the cone and is threaded from the bottom up then from back to front. The Stylaser plug is located just under the back hand wheel on the side of the Needle Positioner Control Panel. Its switch is located just to the right in the picture below.



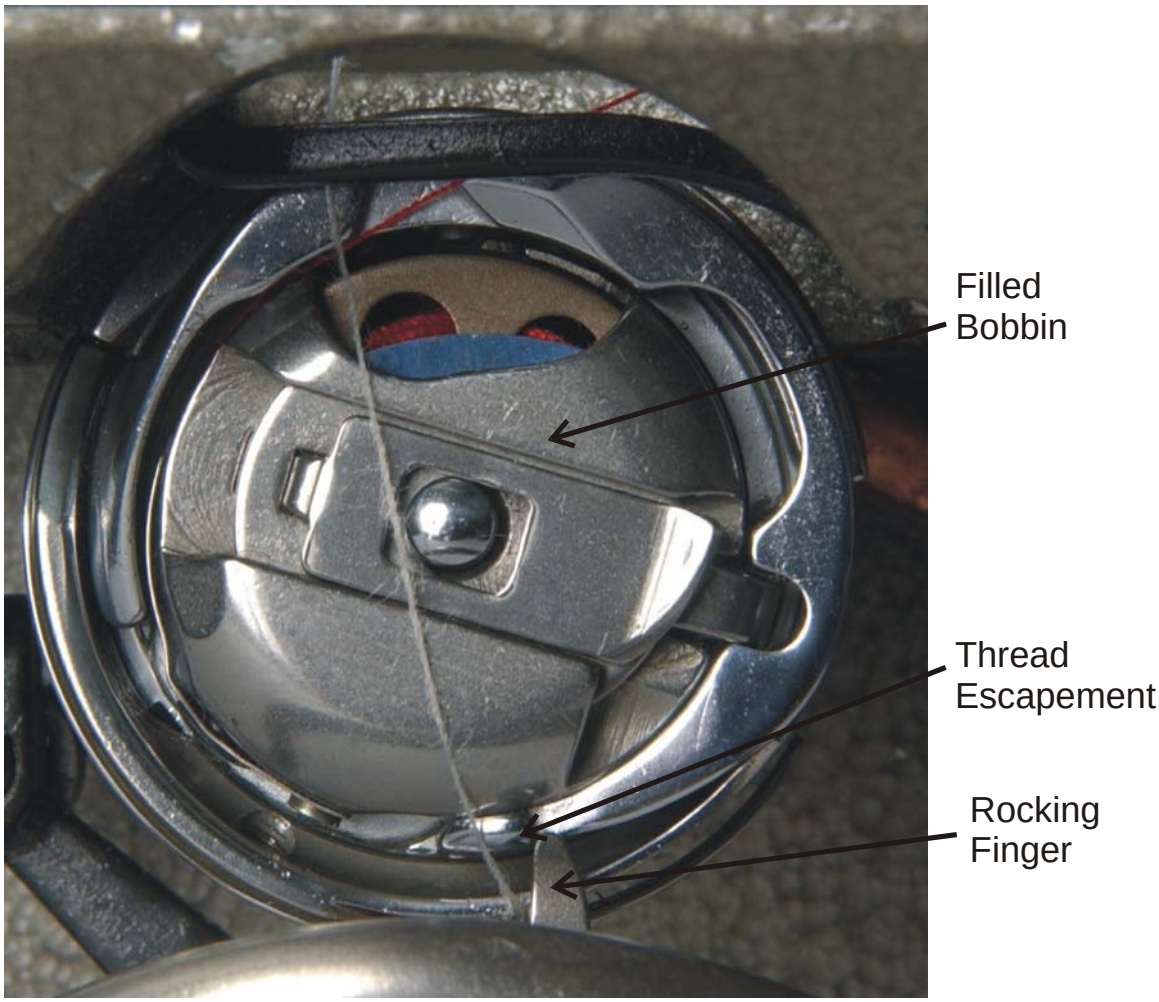


The close up picture below shows the throat plate removed. The bobbin case position bracket holds the bobbin case in position as the stitch is formed.



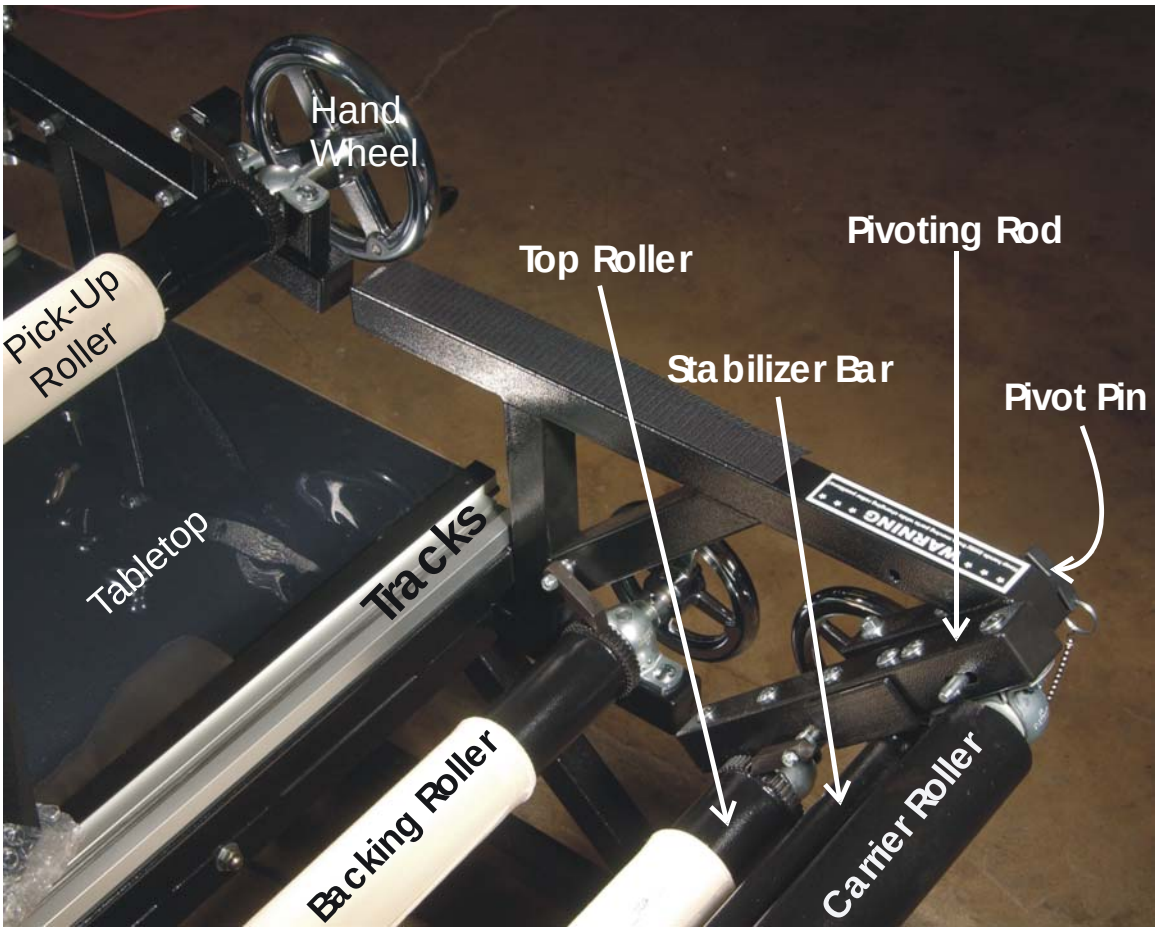
The rotary sewing hook rotates around the bobbin case and is timed to the movement of the needle bar to form a stitch. At the timing point the hook is positioned directly behind the needle and close to but not touching it.

As the rotary hook rotates around the bobbin case, the rocking finger controls the tilt of the bobbin case. The picture below shows the rocking finger / bobbin case relationship. The thread escapement is where movement of the rocking finger allows the thread to pass through. The bobbin case houses the filled bobbin.



Quilting Stand Features

The picture below shows the major features of the Gammill Quilting Stand. Each of these features is described in the table on the following page.



Top Roller	Holds the quilt top for quilting.
Backing Roller	Holds the backing fabric for quilting.
Pick-up Roller	Holds the completed portion of the quilt during quilting. This roller is located inside the throat of the machine.
Carrier Roller	Holds the quilt layers up and even with the pick-up roller during quilting.
Stabilizer Bar	Located on the pivoting rod between the Carrier and Top rollers.
Fabric Leader	This thick canvas fabric is attached to the top, pick-up and backing rollers and is used to pin the quilt layers to the rollers.
Hand Wheel	Attached to one end of the pick-up, backing and top rollers and used to quickly turn the rollers.
Pick-up Roller Lifter (Not pictured)	As the completed quilt is rolled onto the pick-up roller the thickness of the completed quilt causes drag on the sewing head. Turn this crank to lift the pick-up roller off the sewing head for smoother movement.
Tabletop	Used to hold and position patterns. It is equipped with gear teeth for using the WorkStation™ (included) and Design Center (optional).
Tracks	Set of two tracks used for holding and guiding the Crosstrack along the length of the table.
Pivoting Rod (2)	On the Pivotal Access system, these rods hold the Carrier Roller, Top Fabric Roller and the Stabilizer Bar.
Pivot Pin	Holds the Pivotal Access in place during quilting. This pin is pulled out to allow the top roller and stabilizing bar to pivot for access to the batting.

Selecting a Location for Your Quilting System

Quilting systems are large, bulky pieces of equipment and the operator must have access to at least three sides of the system. You should have adequate space to locate and efficiently use your quilting system.

Length

The standard lengths for quilting systems are 12 and 14 feet. The hand wheels attached to the side of the rollers add another 6 to 8 inches of length. Add another 18" to each side for space to walk around. For the length of a 12 foot table the ideal space is 12' + 6" + 18" + 18" = 186" or 15 ½ feet. A 14' table requires 17 ½ feet.

If this space is not available you might consider placing the side without the hand wheels against a wall. This would allow you to walk around three sides and reduce the length requirement to 14 ½ feet and 16 ½ feet for the 12 foot and 14 foot tables respectively.

Width

In addition to the actual width of the table with rollers attached, and the space needed to stand on both sides, you need to add the space required when the needle of the machine is moved as close to the pick-up roller as possible. For the Premier and Classic models we recommend 8 feet in width and for the Optimum you will need 8 ½ feet.

If your location does not meet the width requirement you might consider adding casters to the table legs. Casters make it easy to move the machine around so it can be moved out of the way against a wall when not in use.

Floor

The floor should be level if possible; however the table legs have level adjustments on each leg. If the floor is uncarpeted you might consider adding thick pieces of rubber under each leg to dampen vibration and/or noise.

For your comfort and for longer quilting sessions, you might consider adding mats designed for those who stand for long periods of time. Usually these mats are rubber or similar cushioned material and can be purchased at large home improvement stores.

Power Requirements

In the United States you will need a 110 grounded power supply. In Europe you will need a 220 power supply. If an extension cord is needed choose one labeled **Heavy Duty** and make sure it is grounded. A separate breaker is not required.

To be prepared for unexpected power surges it is recommended to purchase a surge protector. Even with a surge protector, when the machine is not in use it is a good idea to unplug it.

Lighting

Your quilting machine is equipped with a fluorescent light located just above the needle. This is perfect for lighting the immediate working area; however, you will need additional room lighting as well. Overhead fluorescent lights and floor lamps provide the extra light needed to comfortably work. As we age we require more light than we needed when we were young. A sixty-year-old can need as much as ten times the light as a normal twenty-year-old to perform the same visual task with equal speed and accuracy.

2. The Quilting Stand

The quilting stand is the largest part of your quilting system and consists of legs, batting holder bar, pick-up roller, backing roller, pivotal access assembly and table top. The standard stand for all models is the GS1-PA for the Classic and Optimum and the PS1-PA for the Premier. Both of these stands include Pivotal Access™. This feature allows you to gain access to the underside of the quilt top during the quilting process. Often you will need to remove stray threads or other objects, adjust seams or smooth out batting.

Assembly Instructions

Your complete quilting system is shipped in three crates: table/roller crate, leg crate and sewing head crate. Make sure you have all the parts listed below:

In the Table/Roller Crate:

- Table top frame (1).
- Three rollers with fabric leaders attached. These are marked Top Fabric, Backing and Pick-Up.
- Carrier roller (1), 2 1/2" diameter.
- Stabilizer Bar (1), 1 5/8" diameter.
- Pivoting Rod (2) these are the 14" square tubing with pillow block bearings attached.
- Bolt, washer, nut sets (8) these were used in the crating process.
- Two-piece pattern board.

In the Leg Crate:

- Legs (2).
- Gam Guide™ and accessory kit.
- WorkStation™.

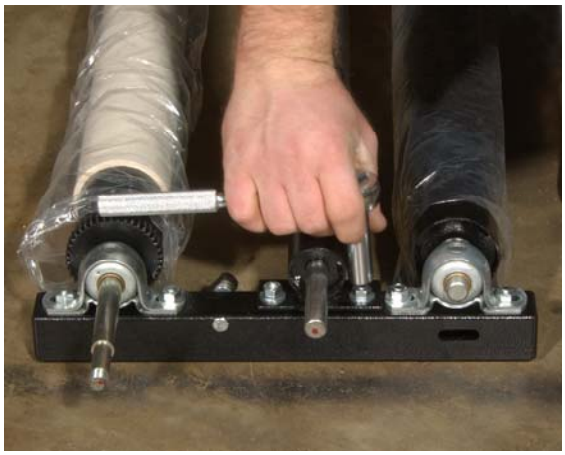
In the Sewing Head Crate:

- The sewing head.
- Cross-track carriage.
- Parts and accessories box.
- Instruction manual.

Prepare and Assemble Rollers

1. On each of the fabric leaders you should mark approximate centers after assembly. These center markings are used later when loading the quilt. Use a fabric or permanent marker to mark a single line at the center point of the fabric leader.

2. Assemble pivoting bracket consisting of top fabric roller, stabilizer bar, carrier roller and the two pivoting rods.



Attach Legs and Tabletop Frame

1. Attach legs to table top frame using three long and one short bolt on each leg.

On each leg the roller supporting brackets will need to be adjusted before attaching the pivotal access frame you assembled above. The adjustments are needed to accommodate the size of the quilting machine you purchased. Loosen the two locking bolts found on each leg and slide out roller supporting brackets an equal distance on both legs.

The approximate distances for each machine are listed below:

Premier	0
Classic	½”
Optimum	4 ½”

2. On table top frame, peel off paper to expose the foam part of tape located on steel pattern board support.

3. Install two-piece pattern board.

Attach Casters to Table Legs

If you purchased the optional casters for your quilting system, you install them by simply unscrewing and removing the level adjusters and replacing them with the casters.

Attach Pivoting Bracket to Frame

1. Install backing roller to roller supporting bracket using pillow-block bearings located closest to stand top.

2. With collars on each end of stabilizer bar, install assembled pivoting bracket in pillow-block bearings located on vertical part of roller supporting brackets.

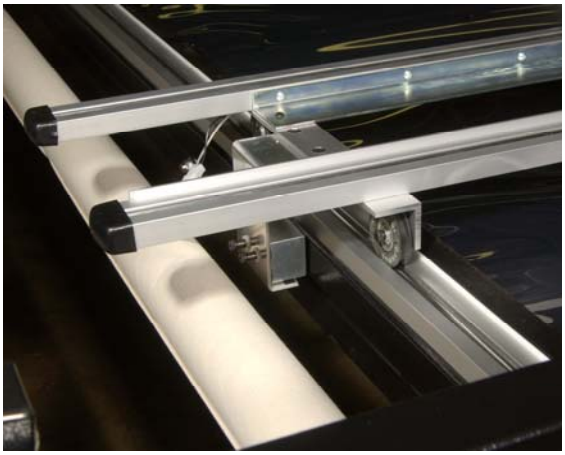
3. Install locking pin through hole in roller supporting bracket and pivoting bracket to properly align before completely tightening pillow-block bearings. Use collars to remove end play and to hold pivoting bracket centered between roller supporting brackets.

Crosstrack Carriage and Pick-up Roller

1. Set the crosstrack carriage on the table top tracks. The side of the carriage with one set of wheels is placed on the tracks at the front of the table. The side of the carriage with two sets of wheels is placed on the tracks at the back of the table.

Note: The inner wheels at the back of the carriage should not touch the track. These wheels are used to "park" the sewing head at either end of the table. When an outer wheel extends off the track the inner wheel supports the carriage.

2. If you have the channel lock feature follow the Channel Lock instructions at this time. Connect channel lock plug from the cross track to the channel lock bracket.



3. Set the sewing head on the crosstrack carriage.

Caution: At this point you have not installed the pick-up roller within the machine throat. This means that the sewing head can roll off the track and fall onto the floor.

4. Install the pick-up roller through the sewing head throat.

5. Attach connecting arm to pipe on crank end and tighten allen screws.

6. Position other end of pick-up roller at same height and attach connecting arm to other end of pipe and securely tighten allen screws.

7. Align roller gears with ratcheting pawls and hold in alignment with collars on outside of each pillow-block bearing on the roller supporting bracket and also pick-up roller bracket.

8. Install 8" wheel on pick-up roller and 6" wheels on backing and top fabric rollers using woodruff keys and acorn nuts to stabilize wheels as shown in the pictures below.

Fitting Machine Wheels to Crosstrack Carriage

You may need to fit the machine wheels to the crosstrack carriage for smooth movement. All wheels must set into the track groove without binding against either side of the groove. The wheels are approximately 1/32" narrower than the groove in the track.

The wheels on the rear axle can be adjusted in or out along the axle by using spacer washers between the wheel and axle. The wheels on the front axle are adjusted by loosening the two set screws in the acentric cam and sliding the axle in or out to get the proper wheel/track fit.

An example of correct wheel to track adjustment is if the wheel on one side of the axle touches the left wall in one track groove, the other wheel on the same axle must touch the left wall of its track groove.

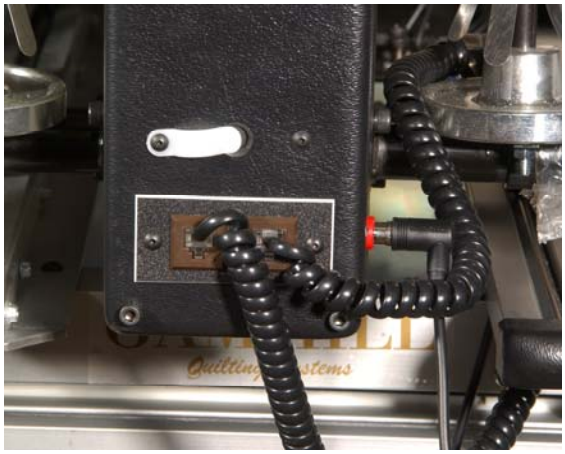
An example of incorrect wheel to track adjustment is if the wheel on one side of the axle touches the left wall in one track groove and the wheel on the other side of the axle touches the right wall in its track groove.

Complete the Assembly

1. For Plus models you will need to connect the encoders. There are two encoders used to regulate the stitches in Stitch Regulation mode. One encoder keeps track of movement in the Y direction and is located on the back right wheel on the crosstrack carriage.

The other encoder keeps track of movement in the X direction and is located on the back right side wheel that rides on the tabletop track.

2. Plug in the coiled encoder wires as shown below.



The plug on the right is connected to the Y encoder on the crosstrack carriage wheel and the plug on the left is connected to the X encoder on the tabletop track.

3. Attach small spool holder just behind the top inspection plate.

Note: On Premier the small spool holder attaches to the top inspection plate. Attach Stylaser post in existing threaded hole as shown below.

4. Plug in Stylaser and attach to top post or horizontal "T" bar pin (WorkStation™ Guide Pin see Chapter 14.)

5. If you are using an extension cord to provide power to your machine, you will need one marked "Heavy Duty". Be sure that it also has a ground plug. Bring the end of the extension cord to the middle of the stand by laying it on top of the round rail connecting bars under the pattern board. Wrap cord around center bar and allow it to hang down to within three inches of the floor at the center back of the stand.

6. Attach the 2" x 13" self adhesive "hook" Velcro® to top of each roller support bracket starting approximately 1" from the end. These are for use with edge stabilizer clamps.

Tabletop

The tabletop consists of two pieces of high density polymer with a clear plastic pattern shield attached. Registration marks used to aid in pattern placement are etched on the tabletop. The outer edges of the tabletop have notches cut out to allow for the posts that hold the pick-up roller. To install the tabletop simply place each piece on top of the table with the cutouts facing outward.

Fabric Leaders

The fabric leaders are thick canvas material affixed to the pick-up, backing and top fabric rollers. The fabric is thick and new with sizing added in the manufacturing process. You will notice it is stiff and it might be a little difficult at first to pierce the fabric with pins as you attach the fabric layers. Corsage pins are long with a thick, strong shaft and hold up to the thicker canvas fabric. As you complete quilts you will notice less stiffness and the pins should be easier to place.

Zippers

Zipper leaders are a set of zippers that allow you to remove a quilt from the frame by simply zipping it off the canvas leaders. The zip ends are zipped off and the fabric layers are basted or pinned to the edge. After all the edges have been basted to the leaders you simply zip them back on, roll the fabric onto the rollers and the quilt is loaded. If you use your home machine to baste, consider using wash away thread in the top or bobbin. Once the quilting is complete you simply spray water on the basting and it dissolves away…no ripping out.

Zipper leaders allow you to take an unfinished quilt off the frame if you need to start another project or if someone else wants to use the machine. If you have trouble standing and pinning the fabric to the leaders, the zipper leaders can be zipped off and the fabric basted to them as you sit at your sewing machine. Some quilters with arthritis in their hands find this helpful and less painful as well.

You could simply pin the fabric to the leaders or you can use your sewing machine. If you are using your sewing machine to baste the fabric to the leader you should pin baste first to be sure the fabric is not stretched. Start at the center and work out to each side. Once the pin basting is complete you can use the sewing machine to baste. This is an extra step but the advantages are that the fabric will not be stretched and you will not have sharp pins to deal with as you zip the leaders on/off.

As you prepare to baste the fabric to the leaders take care to keep the loading orientation in order for both top and backing fabric. Take special care if the backing and top fabrics are directional. Jotting down a quick diagram can help you keep track of all the directions and edges.

Tip: Mark the canvas with the notation "Fabric Side" so that the proper orientation and direction is achieved.

The steps for loading a quilt using zipper leaders are:

1. Check that the quilt top and backing fabric are both square. You will need perfectly straight and square edges to baste or pin to the straight edges of the leaders.

2. Unzip the top fabric leader. Baste the lower edge of the quilt top (the edge that will be quilted last) to the leader.

3. Zip the top fabric leader back on and roll the quilt top onto the roller.

4. Unzip the backing leader. Baste the lower edge of the backing to the leader.

5. Unzip the pick-up leader. Baste the upper edge of the backing to the leader. At this point you will have leaders basted to two edges of the backing.

6. Zip the backing leader to the backing roller and roll the backing onto the roller.

7. Bring the remaining unzipped leader with attached backing up and over the stabilizer bar and zip onto the pick-up roller. Roll the pick-up roller until the backing is taut between the pick-up and backing rollers.

8. Place the batting on top of the backing.

9. Bring the top edge of the quilt top up and over the stabilizer bar and place on top of the batting. Baste across the top edge of the quilt top to hold it in place.

If you ordered zipper leaders with your quilting system they were installed at the factory. If you are replacing the standard leaders with new zipper leaders from Gammill Quilting Machine Company you will need to install them yourself.

1. Before removing the old canvas leaders mark a placement line for the new leaders. Use the edge of the old leaders as your guide to draw a straight line across the roller.

2. Remove the old leader. You will have some residue from the old glue. Use sandpaper to rough up the old glue so the new glue can adhere better.

3. Apply Elmer's Glue to the new leader and glue it to the roller using the marked line as a guide. Once you have the leader properly positioned, use duct tape to hold it in place. Allow 24 hours for the glue to dry before loading a quilt.

Hand Wheels

Hand wheels are attached to the pick-up, backing and top fabric rollers and are used to quickly and easily turn the rollers. The pick-up roller handle wheel also has a handle for even faster rolling. Hand wheels not only speed up the rolling process but they reduce repetitive motion in your wrists and hands. Over time the nut that holds the wheel to the roller might loosen. If this happens, simply tighten the nut.

Pick-up Roller Lifter

As the quilt is completed and rolled onto the pick-up roller it fills the area inside the throat. As the quilt becomes thicker around the pick-up roller it begins to create drag on the sewing head. This makes it difficult and sometimes impossible to move the machine.

Your Gammill quilting system includes a one step pick-up roller lifter. You need only turn a crank on one side of the table to raise or lower the pick-up roller evenly across the table. The crank is located on the same side as the hand wheels.

The distance between the pick-up roller and the sewing head should be the thickness of your fingers.

Tip: If your machine is hard to move, check your pick-up roller / quilting machine clearance, adjust as required.

Tip: If the quilt layers bounce as you quilt, the pick-up roller is too high. Turn the handle to lower the pick-up roller to the desired height.

Cleaning the Carriage, Tracks and Table

Dust, lint and oil can fall onto the table, tracks, carriage and wheels. With an accumulation of dust on the tracks or wheels, you might hear a "thump, thump" as you move the machine from one end to the other. It is important to clean these areas daily to prevent build up of dust and lint.

Use a soft brush in the tracks on the table and carriage. Other ways to clean inside the tracks is to use a vacuum cleaner, air compressor or scraps of batting or fabric. It is important to clean the table area before a quilt touches it. Often this means that you need to clean the area before loading the quilt and again before unloading the quilt.

Swivel Casters

This set of four, heavy duty swivel casters are affixed to the legs of the table. If you need to move your machine around the room, these casters make it easy for one person to do the job. The casters do add about four (4) inches to the height of the table so you might need to adjust the table at the proper height for you. Two of the casters lock in position to prevent the table from rolling during quilting.

Adjusting Stand Height

The table legs include height and level adjustments. At the bottom of the legs you can set the desired height by placing screws in pre-drilled holes. To make finer adjustments in height and/or to level the table there is a level adjustment at the bottom of the leg. Turn the level adjuster until the desired height is reached.

To help make adjusting the height easier, use small car jacks on each side to raise the table to the proper height. Be sure that the jacks are stable and then adjust the height adjustment and leveling screws to the height of the jacks. Carefully remove the jacks after the adjustments are made.

Parking the Sewing Head

As you are servicing or cleaning the sewing head you want it to remain still. As you load/unload a quilt you want the sewing head to be out of the way. The back of the carriage includes two outer and two inner wheels. The carriage rides on the outer wheels while the inner wheels do not touch the carriage.

To park the sewing head at either side of the table the outer wheel rides completely off the track while the neighboring inner wheel catches the track.

Note: Parking the sewing head can only be done when the pick-up roller is installed inside the sewing head throat. If the pick-up roller is not installed, the sewing head could roll backwards and fall off the table.

3. Supplies

Spare Parts

Occasionally mechanical parts wear out or break and you will want to have some spare parts on hand to prevent any loss of work while waiting for an ordered part to arrive. We recommend that you have the following spare parts on hand:

- Run/Stop and Needle Position Switches
- Needles
- Rotary tension check spring
- Encoder O-Ring (for Plus models)
- Bobbin winder O-Ring
- Bobbin winder spindle spring
- Bobbin case
- Bobbin case anti-backlash spring
- Bobbin case spring
- Main power rocker switch
- Needle set screw
- Fuse

Batting

If you are in the business of professional quilting you will probably want to carry one or more types of batting for your clients. Purchasing batting in bulk on rolls is economical.

Your quilting system has a built on batting holder located under the table. This batting holder spans the length of the table and has a design similar to that of a paper towel holder. It easily lifts off the braces holding it in place. Insert the holder into the cardboard tube in the center of the batting and replace the holder. The batting can now be dispensed from under the table.

To easily measure and cut the desired length of batting:

1. Use your long measuring tape to measure the length, being careful not to stretch the batting.

2. With scissors, make a snip about 1" long to indicate where to cut the batting.

3. From the back of the machine and with the machine parked off to the side, bring the portion of the batting you will cut off, up and over the pick-up roller. Place the snip along the track on the table and smooth out the batting.

4. Use the track as a guide to cut the batting straight across.

The most common batting size on a roll is 96" wide and generally comes folded and rolled. This makes the roll of batting about 48" wide. If you have a 12 foot table you can store two of these rolls underneath it. A 14 foot table can store three of these rolls.

Notions

Most of the usual sewing notions are needed for quilting as well so you probably have many of them on hand.

Pins

Pins are needed to attach the quilt layers to the fabric leaders and in some cases to pin baste certain areas of the quilt as it is being stitched. One example is pinning the sides of the top to hold it in place.

Since the leaders are made of thick canvas fabric you will need long, strong pins to pin the layers to the leaders. The longer pins mean that it takes fewer pins for each quilt, resulting in less time to complete a quilt. Corsage or hat pins have a nice large head that is easy to grip and a long, thick shaft to hold up to frequent use.

A pin cushion that is handy and easy to work with might also be needed. If you are using the longer pins be sure the pin cushion is thick enough that the points of the pin do not extend beyond the bottom of the pin cushion.

Scissors

Two types of scissors are recommended: one pair of long, sharp scissors for cutting bating and one pair of small, blunt end scissors for clipping threads as you quilt.

The long blade scissors make quick work of cutting batting and the small, blunt end scissors are easy to use when clipping threads near the quilt. The blunt end lessens the chance that the fabric will be cut while trimming threads.

Measuring Tape

A long, 120" measuring tape is faster and easier to use when measuring large quilt tops, backings and battings.

Machine Oil

Oil for the machine should be made for sewing machines and should be clear. Sometimes this oil is called "White" oil even though it is clear. Oil that is yellow should be discarded.

There is no need to purchase oil in large quantities. Instead, purchase the small bottles available from your dealer or any fabric or sewing machine store.

4. Loading the Quilt

If the quilt layers are properly prepared before loading the quilt you will find that quilting is a pleasant task producing beautiful results. A little patience and planning before jumping into the quilting will prevent mistakes further down the line.

Pieced Top

Probably the single greatest ingredient in a beautiful quilt is a well pieced top. If you are a professional quilter you will receive everything from wonderfully pieced, flat quilt tops pressed to perfection to poorly pieced scraps of inferior grade fabrics.

If a quilt is out of square, no amount of quilting will make it square. However, poor quilting techniques can skew a well pieced quilt top out of square. Try to identify and correct potential problems before loading the quilt. Some ideas for identifying potential problems are listed below.

Does the quilt lie flat? -- Often when we hold or fold a quilt top it appears to be relatively flat. However when that quilt top is laid on top of the batting we can immediately see that the edges are wavy or there is fullness in the interior. Some fullness can be quilted out but trying to quilt an area with a large amount of fullness often results in puckers and pleats in the quilt top. Some parts of the quilt top may need to be ripped out and re-pieced or you and/or your client should be willing to accept some amount of puckers and/or pleats. If possible, try to lay the quilt top flat on a large floor area while customer is present. Measure the width and length in several places to compare each measurement to the next.

Are the seams pressed correctly? Most quilt makers press their seams as they piece the top, however sometimes there are problems in how the pressing was done. If the seams are pressed open it will be difficult, if not impossible, to stitch in the ditch because there is no ditch. If the seams are pressed to one side, often the ditch starts on one side but the pressing changed direction and the ditch ends up on the other side. If you are stitching in the ditch you will need to follow the ditch to which ever side it goes.

Wavy Borders – Some quilts have an hourglass shape where the top part is a certain width, then the middle section of the quilt is not as wide and the bottom part becomes wide again. This is usually due to the way the borders are pieced. If a strip of border fabric is attached to the quilt and the excess clipped off, this usually means that the fabric was stretched as it was sewed making the border strip longer than the side of the quilt to which it is stitched. Wide borders can be especially prone to becoming wavy as well as heavily pieced borders or borders with bias edges.

A quick way to check for wavy borders is to lay the top on a hard, flat surface and take a look at it. Measure the edge of the border then measure the seam line where the border meets the quilt interior. If the outside measurement is larger, you will have waves. Small waves in solid borders can generally be "quilted out" by meander stitching in the area. Straight line quilting, such as grid work, is harder to "quilt out" fullness and, indeed, you might get puckers by quilting straight lines. If the borders are significantly wavy then the quilter has three choices: have the customer remove the borders and piece them correctly, pay the quilter to remove the borders and piece them correctly, or agree that the quilt will most likely have puckers.

Backing Fabric

Backing fabric should be pressed and the selvedge edges should be trimmed off. For machine quilting, especially custom quilting you will have many starts and stops. Encourage your clients to choose busy backing fabrics that will hide the starts and stops stitching over previous stitches, and changes in thread color.

Check the location of the seam and check to see if the design is directional so the top of the quilt is the same on both sides. Backing seams that are perpendicular to the rollers may form puckers. To prevent this always check the backing seam by running your hand against the back of the quilt after advancing the quilt. A backing seem that was not properly pressed tends to form pleats along the seam. You can smooth out any excess fabric and clamp the sides to keep the backing flat.

If the backing seam is parallel to the rollers then the tension of the layers between the rollers is generally enough to smooth out any puckers along the seam line.

Batting

Your quilting machine is capable of stitching through a variety of batting materials and thicknesses. Always choose batting that is recommended for machine quilting. Battings made for hand quilting are generally thinner and are difficult to work with on the quilting machine.

Packaged battings will have areas that are stretched out a little from the folding and should be fluffed in the dryer before loading onto the quilt. Read the manufacturers instructions for proper care. Open the package, unfold the batting completely and toss it in the dryer along with a damp wash cloth for a little moisture. Tumble for 10 to 15 minutes. The batting will now lay flat in the machine. Batting that is stored on a roll generally does not need to be fluffed before use.

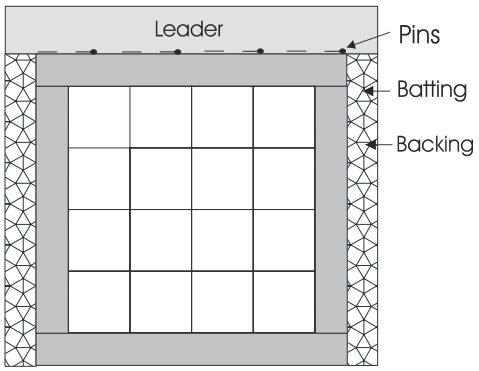
Determine Loading Direction

Before loading the quilt, determine the best loading direction. Most quilts are rectangular, so they are narrower than they are long. If possible, always pin the longer edges to the roller, as this will require the least number of advances and the maximum quilting space.

Pinning the long sides to the rollers means that you can work a little longer without having to advance the quilt, and you may have anywhere from one to four less stops to advance the quilt before it is complete. In professional quilting, you want to work as efficiently as possible, and loading quilts like this will accomplish that goal.

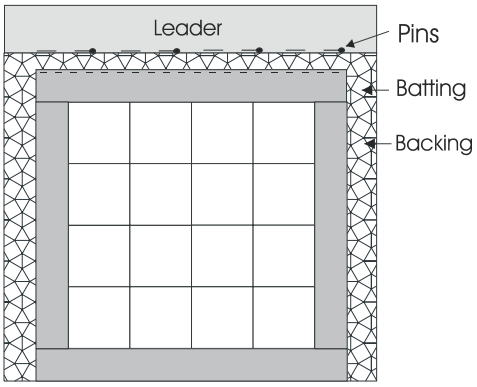
Pinning vs. Floating the Top

There are two methods for loading a quilt: pinning the top and floating the top. For the pinning version the edge of the quilt top is pinned to the pick-up roller canvas along with the batting and backing layers as shown below.



This type of quilting works well for stitching allover, edge-to-edge patterns. However if you are using rulers or templates and you want to stitch completely off the edge of the quilt top, the pins are in the way of not only the stitching but the rulers and templates as well.

To solve the problem of getting the pins out of the way you can float the quilt top as shown below.



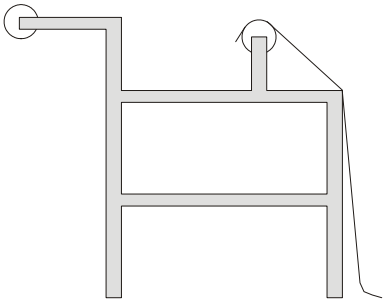
Instead of pinning the quilt top to the pick-up leader, it is basted to the backing and batting. Because the quilt top is floating on top of the batting and backing and away from the leader, you are free to stitch right off the edge of the quilt top. The opposite edge of the quilt top is pinned to the top roller or you may choose to completely float the top. If you have a quilt top with irregular edges such as Grandmothers Flower Garden or Double Wedding Ring, floating the top makes loading the quilt easy.

In the instructions that follow we will use the pick-up roller to help hold the top and backing as we load the quilt. The quilt top is loaded first then the backing and finally the batting. As you read through the instructions you can choose which method to use to load your quilt. If you plan to float the top completely, without pinning any edge to the top roller, start the instructions at Load the Backing below.

Load the Top Roller

1. The quilt top is loaded first. Find the center of the long edge and mark it with a pin.

2. From the back of the machine, lay the quilt top, right side up, over the pick-up roller with the marked edge facing front. Smooth out the quilt top along the pick-up roller and let it drape over the table and onto the floor. The pick-up roller helps keep the top flat as you pin and/or roll it onto the top roller.



3. At the front of the machine bring the top roller leader up and over the stabilizer bar. Use one clamp from each side to hold the leader as you pin. Use the Velcro to hold the clamps to the frame and to pull the leaders taut.

4. Line up the pinned center of the quilt top with the marked center of the leader and pin it in place. Moving from the center out toward the right side, pin baste every 6-8" until you reach the end. Repeat for the left side.

5. Pin the remaining areas of the quilt top to the leader by pinning halfway between two pins. Continue dividing spaces in half until the entire edge of the quilt top is pinned to the leaders. You might need to ease in the fabric for some areas, but take care not to stretch the fabric. You will notice that the pinned edge of the fabric folds over itself slightly when it is rolled onto the roller.

6. Remove the clamps and roll the quilt top onto the top roller, making sure the quilt top remains smooth as it is rolled.

Load the Backing

1. Measure and mark the center of the backing as you did for the quilt top. From the back of the machine, lay the backing fabric, wrong side up over the pick-up roller, with the pinned center edge facing the front of the machine.
2. Smooth out the backing along the pick-up roller and let it drape over the table and onto the floor as you did for the quilt top.
3. At the front of the machine, pull the backing leader up and over the stabilizer bar and hold it in place with the clamps.
4. Pin the backing to the backing leader.
5. Remove the clamps, set the backing roller ratchet so it moves in one direction and begin rolling the backing onto the backing roller. Roll until about 8" of the backing is hanging towards the back, over the pick-up roller.
6. Place the edge of the backing fabric along the edge of the pick-

up roller leader. Pin the backing to the leader as close to the edge as possible. If you will be pinning all three layers, you should pin baste the backing to the pick-up roller at this point. To pin baste simply place the pins about 3-5" apart instead of head to tip. When the backing is rolled between the rollers, the pinned edge of the backing folds over itself where it is pinned to the leaders.

Float the Top

1. Unroll the pick-up roller "pick-up roller" until the pinned edge is about 3" away from the roller and set the ratchet so the roller does not turn.

2. Lay the batting on top of the backing fabric.

3. Lay the quilt top on top of the batting.

4. Pin baste the top and batting to the backing fabric every 8".

5. Baste across the top edge of the quilt top. Continue with Preparing the Layers for Quilting below.

Pin Three Layers

1. Place the batting over the backing fabric and over the pick-up roller and having the backing and batting edges even. If you prefer, you can pin paste the batting and backing to the pick-up leader, however it is not necessary.

2. Unroll enough of the top fabric to place it on top of the batting with the edges even with the batting/backing edges. Starting from the center and working out, pin all three layers to the leader.

3. Unroll the pick-up roller until the pinned edge is about 3" away from the roller and set the ratchet so the roller does not turn.

4. Roll the backing roller until the backing is taut.

5. Smooth out the backing then roll the top roller until the top is taut. Continue with Preparing the Layers for Quilting below.

Preparing the Layers for Quilting

Once the top, backing and batting are loaded and before quilting begins the layers should be properly adjusted so they lay flat. This means that they should be taut between the rollers and clamped at the sides. Once adjusted the rollers and clamps hold the layers flat and even for proper stitch quality and even quilting.

Adjusting the Rollers

When adjusting the rollers, do not stretch the fabric extremely taut. A lightly taut fabric allows a small amount of shift in the fabric as the needle moves in and out of the layers. This slight shifting helps avoid needle deflection which reduces broken needles and torn fabric. Stretching the fabric between the rollers can lead to poor stitch quality and/or skipped stitches as well as distortion of the completed quilt.

Clamping the Sides

Included with your Gammill quilting system are two sets of side clamps with Velcro™ straps. These clamps are used to hold the sides of the layers as you quilt them together.

After the rollers are adjusted to the correct tautness, place two clamps on each side of the quilt layers clamping the batting and backing fabric only. It is recommended that the top fabric not be clamped. This allows you to stitch completely to the end or off the quilt top without having the clamps in the way. Secure the Velcro straps to the sides of the table frame without stretching the fabric.

Tip: Cut your batting and backing fabric 8” larger than your top. This allows plenty of excess and keeps your fabric clamps away from your machine.

Note: The sides should be clamped before stitching begins. To prevent puckers or fullness at the sides, you should complete all the quilting inside the working surface before basting the sides.

Stabilizing the Quilt

If you are sewing a large amount of custom quilting including stitch in the ditch, outline quilting, patterns in blocks and borders or if you plan to heavily quilt the entire piece, the quilt should be stabilized first. Stabilizing the quilt keeps it flat and square during quilting, which means the finished quilt will also be flat and square. Stabilizing should be the first stitching you do and includes stitch in the ditch around blocks, borders and sashes. In larger areas that you do not plan to stitch in the ditch, you can stabilize by adding basting stitches that are removed later.

Each time the quilt is advanced, stabilize the working surface from the center out. Baste the sides, advance the quilt and continue until you reach the end. Baste the bottom edge. Once the entire quilt is stabilized, the top fabric can be unpinned from the top roller. Now the stabilized quilt is attached to the pick-up and backing rollers only and can be rolled forward and backward to complete all the detailed stitching.

Once the quilt is completely stabilized you can move on to decorative stitching, trapunto, etc. By stabilizing first, you know each block or other area is free of puckers and pleats, and that heavy quilting in some areas won't distort the blocks around it. Here are some guidelines for stabilizing the quilt:

Prevent puckers on the back by making sure the backing fabric is smooth before stitching each area. After you advance the quilt to the next area to be quilted, smooth out the backing with your hand and clamp it so it is taut but not stretched.

Go to the back of the machine and run our hand under the backing fabric to feel for places in the backing that are bunched up. It is not uncommon for bunching to occur at a seam line or on a backing that is not squared up properly. Be especially careful when the backing seam runs perpendicular to the rollers. Visually check the backing from one end of the table by bending over and looking under the layers each time the quilt is advanced and re-clamped.

Tip: Place a mirror on the table or on the floor to quickly view the backing. Inexpensive, full-length wall mirrors can be purchased at discount stores and are thin enough that they do not obstruct operation of the machine.

Baste along the edges of the quilt as you go. Each time you roll the quilt, stabilize the interior sections first and then baste the borders. The edge basting may need to be removed before you can stitch the border designs, but for now, it will keep the edges neat and square.

When numerous thread changes are required, stitch all the areas of the quilt that use the same thread, advancing or reversing the quilt as needed. When stabilizing the quilt, use the thread color or type that is most important or that is used the most throughout the quilt. Then change threads and repeat the process. Some quilting techniques, such as stitching in the ditch or grid work, are completed faster if you can stitch them continuously over the entire, quilt, so plan to change each thread color or type just once. Thread changes are time-consuming but working this way saves you time especially if you are using many different threads on a single quilt.

5. Thread

Thread choices for your new quilting system are numerous. From the basic cottons, polyesters and blends to decorative threads… most can be used for all your quilting techniques and designs. Use the cone holder for larger cones of thread and the horizontal spool holder(s) for smaller spools of thread. You can even use two threads at once for a blended look.

If you plan to try out new threads it is suggested that you test samples first to be sure the thread is strong enough to hold up to industrial use and to the quilting technique(s) you plan to use. Once you are satisfied with the thread's sewing performance and the look that it produces, you can purchase larger quantities.

You will need a convenient place to store the thread and bobbins. Both should be stored away from light to prevent fading and in a drawer, cabinet or other container to prevent dust build up.

Choosing Thread – Types of Thread

Use cone thread for basic quilting such as blending the quilting into the background, stitching borders and blocks or any day-to-day quilting techniques. When purchasing cones of thread, it is a good idea to purchase two cones, one for the machine and one for the bobbin winder.

Whenever possible you should consider using the same type and/or brand of thread in the top as you do in the bobbin. This often results in better stitch quality than if you mixed two different types of thread such as cotton and polyester. The most significant problems occur when the two threads are different thickness and/or weight. However there are exceptions. When using expensive decorative threads in the top you can achieve good stitch quality by using a good cotton or polyester thread in the bobbin. Mixing these threads will save you a little money because you are not using the more expensive thread in the bobbin.

The type of thread you choose is based on how the thread sews and the look of the stitches in the quilt. Each of us has our own personal taste and with the variety of threads available we can easily find the right thread for us and for the quilting techniques we employ.

Thread Weight and/or Thickness

Threads are manufactured in a variety of thicknesses and/or weights so you can choose a thinner thread for one look and a thicker thread for another.

An excellent source for information on thread types, how thread is manufactured and how to read the labels can be found on the website of American Efird (A&E) at http://www.amefird.com. Look for "Technical Information" and you will find a wealth of information on thread

size, thread selection and numerous Technical Bulletins.
Especially of interest to you might be the Technical Bulletin on ***Thread Breakage and Skipped Stitches – How to Minimize*****.**

Often the thread label includes a "Tex" number that indicates thread weight. Sometimes, but not always the Tex number can be in indication of thread strength. The A&E website describes the Tex number as follows:

- The Tex size is a measurement of the gram weight of 1000 meters of greige or un-dyed or finished thread. Examples include: T-18 - T-27 for lightweight sewing; T-30 - T-50 for medium weight sewing, etc.

- The Metric size is the most common system used in Europe and is the number of 1000-meter hanks per kilogram (or number of 496 yd hanks per lb.). Examples include: 180 - 120 for light weight sewing, etc.

- The Yarn size is a measurement used for the number of 840 yd hanks per pound and is many times also referred to as the spun size. The yarn size generally includes both the yarn size and number of ply. Examples include: 46/2 representing 46's cotton count - 2 ply.

Threads such as Mettler's Silk Finish are very thin and silky feeling. When this thread is used for quilting it "melts" into the fabric and appears to become part of the fabric. This thread is perfect when you want an elegant look and when you want the quilting to be part of the background.

Threads such as YLI's Jeans Stitch are just about the thickest thread you can use in your long-arm machine. (You might need a larger needle for this thread.) Jeans stitch thread appears to stand up on top of the quilt to really make a statement. It gives dimension to the stitches and should be used when you want to really draw attention to the quilting.

Tip: Purchase high quality quilting thread and your quilting experience will be more enjoyable!

Cotton

Cotton threads are made from long or short cotton fibers. The long fibers make the thread stronger with less lint than the shorter fibers. Good quality cotton threads are colorfast and non-bleeding. There are several brands of thread manufacturers that produce good quality cotton thread on cones. When using cotton thread in the top use cotton thread in the bobbin. Cotton threads generally produce a lot of lint so be sure to clean out the bobbin area often to prevent lint build up.

Variegated cotton thread on cones is also widely available and these threads look wonderful on scrappy quilts when using an allover, edge-to-edge quilting design. Choose a solid color cotton bobbin thread that coordinates with both the backing fabric and with the variegated colors in the top thread.

Polyester

Polyester threads are strong with a slight elasticity. They are colorfast and non-bleeding. Polyester thread is an excellent choice when you are first learning to use your new long-arm machine because you tend to have fewer thread breaks than learning with cotton thread. Your Gammill quilting system includes two cones of polyester thread to get you started. Polyester threads generally produce less lint than cotton threads.

Poly/Cotton

With the blended polyester/cotton thread you have the strength of the polyester core wrapped with the softness of cotton. An excellent choice of thread for learning to use the machine but it also has a very pleasing look when stitched into a quilt.

Monofilament

Monofilament thread is made from polyester or nylon with the polyester being more heat resistant than the nylon. This means that you can iron the polyester monofilament on a higher heat setting without it melting. Monofilament thread is used when you want to show the effect of quilting but not the stitches or thread. Some quilt shop owners want to concentrate on the fabrics, pattern and piecing techniques to sell supplies but they do not necessarily want to draw attention to the quilting. This would be a time when monofilament thread could be used.

Other times to use monofilament thread are for T-shirt quilts where there can be vastly different colors in the quilt top and different ways to quilt each block. In this case you may wish to use monofilament thread to stitch an allover, edge-to-edge design. The clear thread blends well with any color and the edge-to-edge design gives even coverage of quilting over the entire quilt.

When using monofilament thread in the top, use cotton or polyester threads that blend with the backing fabric in the bobbin. Monofilament thread has a good deal of stretch so you may need to loosen the top thread tension quite a bit to get good stitch quality. This thread also likes to "unsew" itself so be sure to secure the stitching well.

Decorative

Decorative threads include embroidery threads, metallic threads and any other threads used for decoration but not for strength. Often these threads, since they are designed for decorative purposes only, are not as strong as cotton, polyester, blends or monofilament. Therefore, unless the quilt is made for purely decorative purposes such as an art quilt, you should use cotton, polyester or monofilament thread over most of the quilt for strength. After the layers are sufficiently quilted with the strong thread you can then add the quilting with the decorative threads.

Since these threads are made for decorative use you will need to test them in your long-arm machine. Look for threads such as polyester embroidery threads that are made to be used in high-speed embroidery machines. These threads are generally stronger and hold up to

industrial use on the long-arm machine. Rayon threads are often made from short fibers and are therefore prone to breaking so be sure to test a brand before purchasing large quantities.

Fabrics are woven with horizontal and vertical threads and have a bias on the diagonal. When fabric is pulled along the vertical or horizontal threads there is little stretch but when the fabric is pulled along the diagonal line, it has a large amount of stretch. Quilting stitches placed along the vertical or horizontal threads of the fabric give the quilt added strength by reducing the area of the diagonal stretch. However when lines of quilting are stitched along the bias, the stitches are in danger of breaking if there is significant stretch along the diagonal. If you plan to quilt diagonal lines along the bias of a quilt you should plan to include additional stitches in the vertical and horizontal directions as well. Even some of the strongest threads cannot hold up to stretching along the bias.

Choosing Thread Color

Before we talk about choosing thread color you should understand the concept of "pokies". Pokies are dots of thread that poke through from one side to the other such as the top thread poking through to the back and vice versa. No matter how well you adjust the tension for both threads there will be instances where pokies happen. Most often they appear in tight curves or in points. When pokies appear on a quilt, either the front or back, the eye is instantly drawn to them in a distracting way which takes the focus away from the piecing and quilting designs. To minimize the existence of pokies you should always use the same thread color on both the top and bobbin.

Another factor to consider when choosing thread color is the backing fabric. The quilting thread is the only part of the quilt that impacts the look of both sides of the quilt. Often quilt makers choose a backing fabric without consideration of how the quilting looks. Solid muslin is a favorite of many quilt makers but can be a disaster for some types of quilting especially custom quilting consisting of stitch in the ditch and outlining. These techniques require numerous starts and stops. Solid fabrics tend to show every wobble and bump and all the backstitches for securing threads. Consider using a busy backing fabric that coordinates with the top fabrics. The busy backing fabric hides the many starts and stops, wobbles and bumps of custom quilting.

Choosing a thread color can be difficult at times and your first, more obvious, choice can often be completely wrong for the quilt. The best way to be sure you choose the perfect thread color is to compare several choices of the actual thread. Unwind a portion of each of the cones and lay them across the quilt top. Instantly you will see which ones are not right and which ones are possibilities. Begin eliminating threads one by one until the best one is left. That is the thread you should use.

6. Threading the Machine

In this chapter you learn the following:

- Proper threading of the machine including the top and bobbin threads.
- Adjusting the tension for both threads.
- Checking stitch quality.

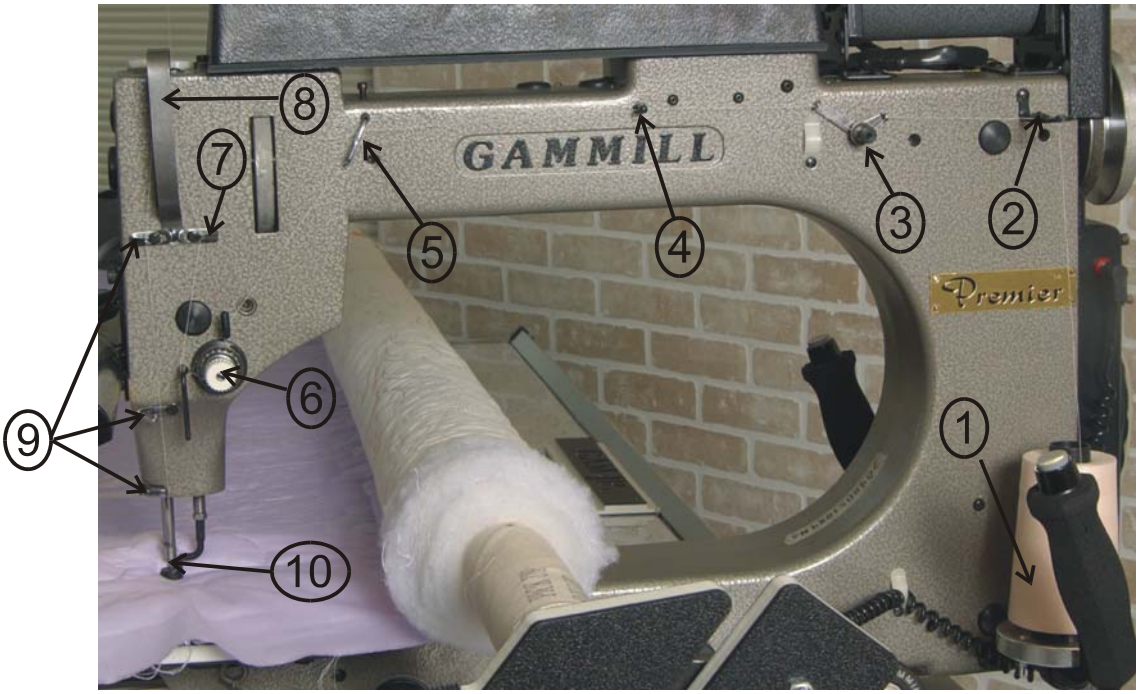
Improper threading of the machine can result in poor stitch quality and broken threads. If you are experiencing numerous thread problems the first thing you should do is check that the machine is properly threaded. Often it is as simple as the thread being out of a single thread guide.

Threading the Top Thread

The top thread is threaded first. Classic and Optimum models are threaded in exactly the same manner and the Premier is threaded a little differently. Additionally, all Plus models have a thread break sensor.

In addition to the different models and/or the Plus feature, there are slightly different thread paths for using cone or spool thread in the top. Diagrams and explanations for the various threading configurations for Plus and regular models follow.

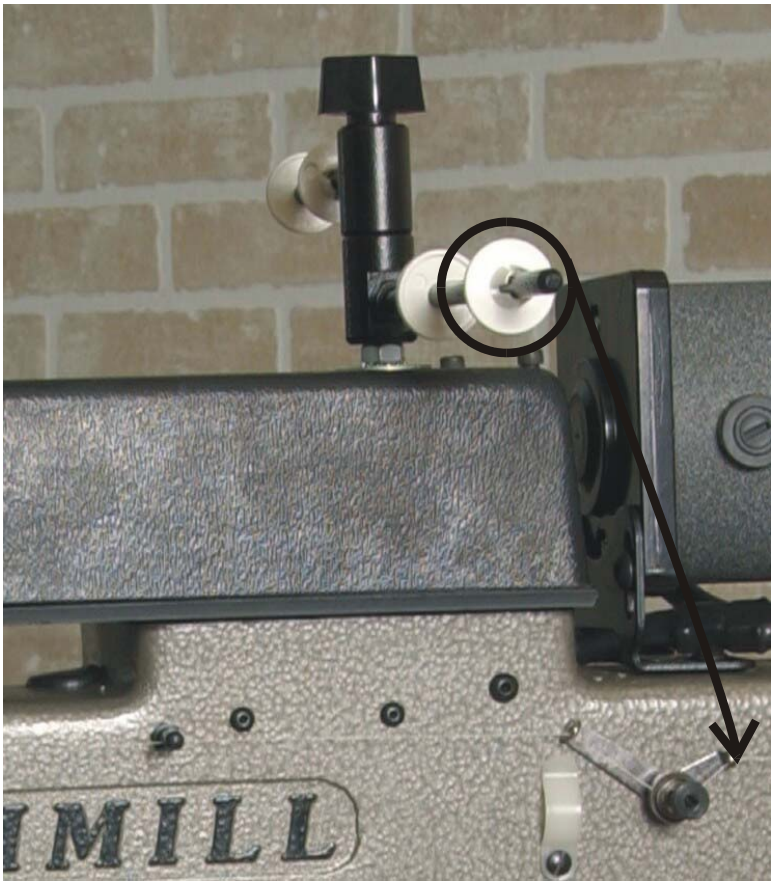
Using Cone Thread – Premier Models



1	Cone	Place the cone on the cone holder as shown. This holder can be rotated about the handle and should be positioned such that the center of the cone is directly below the first thread guide.
2	Thread Guide	This thread guide has two holes. The first hole is parallel to the floor and the second is parallel to the wall. Thread the first hole from bottom to top then thread the second hole from back to front.
3	Intermittent Tension	Thread through the first thread guide then clockwise through the intermittent tension device and finally through the second thread guide.
3A	Thread Break Sensor	**Plus models only** – Thread the thread break sensor clockwise as shown here. 
4	Thread Post	Thread from back to front.
5	Thread Guide	This guide has three holes that are threaded from the top down. It is not necessary to use all three holes. Use the first and last holes only.
6	Rotary Tension	Thread over the first post, clockwise around the rotary tension, over the check spring and under the second post. We recommend that the thread be wound around the rotary tension 1 3/4 times, however good tension is achieved by winding only 3/4 times.
7	Thread Guide	Thread from bottom to top.
8	Take-Up Lever	Thread from back to front.
9	Thread Guides	Thread through all thread guides from top to bottom.
10	Needle	Thread from front to back.

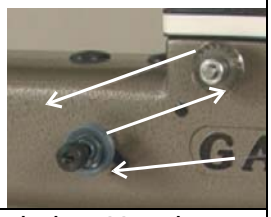
Using Spool Thread – Premier Models

When using spool thread, the spool is placed on the horizontal spool holder. The thread should come off the spool from the bottom so that the spool rotates clockwise when the thread is pulled. Rotate the spool holder so it is perpendicular to the upper arm. Begin threading with the first post leading to the intermittent tension device as shown below.



Continue threading from #3 to #10 as described in the chart on the previous page.

Using Cone Thread – Classic and Optimum Models

1	Cone holder	Place the cone on the cone holder as shown. This holder can be rotated about the handle and should be positioned such that the center of the cone is directly below the first thread guide.
2	Thread Guide	This thread guide has two holes. The first hole is parallel to the floor and the second is parallel to the wall. Thread the first hole from bottom to top then thread the second hole from back to front.
3	Thread Post	Thread from back to front.
4	Intermittent Tension	Thread through the small post before threading counter clockwise through the intermittent tension device, approximately 3/4 of a turn.
4A	Thread Break Sensor	**Plus models only --** Thread counter-clockwise around the thread break sensor, approximately 3/4 of a turn. 
5	Thread Guide	This guide has three. It is not necessary to use all three holes. Use the first and last holes only. The first hole threaded from the bottom up and the third hole is threaded from the top down.
6	Rotary Tension	Thread over the first post, clockwise around the rotary tension, over the check spring and under the second post. We recommend that the thread be wound around the rotary tension 1 3/4 times, however good tension is achieved by winding only 3/4 times.
7	Take-Up Lever	Thread from back to front.
8	Thread Guides	Thread through all thread guides from top to bottom.
9	Needle	Thread the needle from front to back of machine.

Using Spool Thread – Classic and Optimum Models

When using spool thread, the spool is placed on the horizontal spool holder. The thread should come off the spool from the bottom so that the spool rotates clockwise when the thread is pulled. Rotate the spool holder so it is perpendicular to the upper arm. Begin threading with the first post leading to the intermittent tension device as shown below.

Note: In the picture above the horizontal spool holder is NOT properly positioned for using spool thread. The holder should be set perpendicular to the upper arm, not parallel as shown.

Continue threading from #4 to #9 as described in the chart on the previous page.

Thread Guides and Thread Posts

The purpose of these elements of the thread path is to position the thread for other elements such as the tension devices, needle and the take-up lever. Thread guides and posts may seem unimportant, but if one is omitted or improperly threaded you can have as poor stitch quality as you do if the tension is improperly set or the timing is off.

Auxiliary Intermittent Tension

This first tension device is used to add additional tension to the top thread. The additional tension is needed to prevent slack in the thread as the take-up lever moves down. The take-up lever moves up to pull out any slack in the top thread as the stitch is completed. The auxiliary intermittent tension consists of a thread guide just before it and two symmetrical discs. The thread runs between the two discs and the tension is adjusted by a knob which moves the discs closer or farther apart to create or reduce tension on the thread.

Stroke: The proper amount of movement or stroking action of the intermittent tension is achieved by loosening the lock nut located behind the tension disk and screwing the tension shaft clockwise for more stoking action or counter-clockwise for less stroking action. The proper adjustment is approximately 3/32 inch of the stroke or movement. Tighten the lock nut when 3/32 inch stroke is achieved.

Note: It will be necessary to hold the tension thread guide at 4:30 o'clock while tightening the lock nut.

Adjustment of the tension knob is correct when the stitch quality is good.

The intermittent tension is the primary tension adjustment device for the top thread.
Tightening or loosening the pressure between the two discs adjusts the tension.

Thread Break Sensor (Plus Models only)

For the Plus models when you are stitching in either automatic or manual mode, the system will notify you of a thread break. This is especially helpful when stitching patterns since you are not looking directly at the stitching as you sew.

When the top thread breaks the thread break sensor stops turning and sends a signal to the processor that then sends the thread break alarm. The alarm consists of an audible “beep” and the following words displayed on the control center screen:

Main Thread Breakage Detected
M to stop sensing
A to silence alert

To turn off the thread break sensor, press **M** to stop sensing. This turns off the thread break sensor until the power is turned off. If any subsequent thread breaks occur, the alarm will not sound. Once the power is turned back on, the thread break sensor is enabled once again.

To silence the alert, press **A** to stop the beeping. At this point you will want to stop sewing and fix the thread break. If another thread break occurs the alarm will sound again.

Rotary Tension

The rotary tension device consists of a thread post, wheel with adjustment knob, a check spring and finally another post. The thread is placed over the first post, wrapped around the wheel, over the check spring and under the second post. The tension should be adjusted so that, as the thread is pulled from the needle, the wheel turns.

Replacing the Rotary Tension Device

All new quilting systems include the rotary tension wheel, however many older systems still have the disc device. To replace or install the new rotary tension you simply replace the two metal tension discs in the regular tension with the new rotary tension wheel.

1. Remove the thumb nut and all loose tension parts: knurled washer, compression spring, tension spring washer and two tension discs. Set the two metal tension discs aside, since you will no longer need them. It is best to line up the remaining parts in the order they are removed to make sure they are put back in the proper order.

2. Re-install as follows: One felt washer, rotary tension wheel, another felt washer, tension spring washer, compression spring, knurled washer, and thumb nut.

3. After installing the rotary tension, you will need to re-adjust the top tension.

4. **Very important**: Threading of the rotary tension is exactly the same as the regular tension with one exception – you must carry the thread **1 and 3/4** revolutions clockwise around the tension wheel for the thread to make the wheel rotate.

Caution: Be careful the thread does not come out of the wheel's shallow groove.

Adjusting Tension on the Rotary Tension Device

You want only enough tension of the rotary tension wheel to make it rotate. Once the tension is set for this device the only adjustments you make to the top thread tension are done with the Auxiliary Intermittent Tension Device.

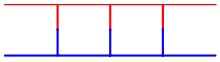
1. Turn the adjustment knob to the right several times until there is no longer tension on the thread. To check this, pull the thread from the needle and watch the wheel. If the wheel does not turn, all the tension is gone.

2. Next you are going to add just enough tension to make the wheel turn. Adjustment of the tension knob is usually correct when the tension knob is even with the end of the tension shaft.

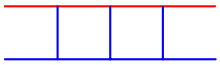
3. Now that the tension has been set for the rotary tension device, you should not have to adjust it again. **Any adjustments that are needed to the top thread are now made with the intermittent tension device only**.

Testing the Tension

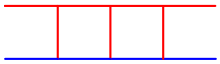
The top and bottom stitches should look the same with the top and bottom thread meeting in the middle of the layers.



Correct Tension



Bottom thread showing on top



Top thread showing on bottom

Top threads should not poke through to the bottom, and bottom threads should not poke through to the top. When this happens, the stitches resemble railroad tracks. Lightly rubbing a fingernail along the stitches makes a popping sound. Smooth stitches make no sound.

There should be no loops on either the top or bottom but this is usually not a tension problem.

To test the tension, use a scrap of fabric, folded once with no batting, and stitch about 5". If you have good stitch quality with thin layers, you will have good stitch quality when the layers are thick. However, the opposite isn't always true. Run the machine at a medium speed and move the fabric away from the needle while holding the machine in place. Check the stitch quality on both the top and bottom by observing the characteristics in the list below:

Adjusting Top Tension.			
Top Stitches	**Bottom Stitches**	**Cause**	**Solution**
Bobbin threads on top	Good Quality	Top tension tight	Loosen top tension
Good Quality	Top threads on bottom	Top tension loose	Tighten top tension

Replacing the Check Spring

The check spring for the rotary tension device is pulled and released each time a stitch is made. This repetitive movement causes the thin material to fatigue and break over time. It is a good idea to have two spare check springs on hand. Check springs are easy to replace and it is not necessary to disassemble the entire tension device to replace it.

1. Using a 1/16 allen wrench, loosen the small set screw located in the edge of the black tension ring at approximately the 3:30 position.

2. Remove the entire tension from the ring and locate the set screw at the backside of the housing that holds the tension shaft in the tension housing. Loosening this set screw allows the removal of the tension shaft and the broken check spring.

3. Replace the check spring by threading the end of the new check spring through the slot in the housing and forcing the coil portion of the check spring back into the housing. Install the tension shaft back into the center of the coils spring and rotate until a part of check spring fits into the groove in the tension shaft. When this is done, the arm of the check spring will move as the shaft is rocked back and forth. The proper adjustment of spring strength is achieved by rotating the shaft clockwise until the arm of the spring rests against the right side of the slot (or notch), then continue to rotate the shaft clockwise approximately 1/10 revolution, which adds the proper strength to the check spring.

4. Tighten the shaft set screw on the housing and install the housing back into the black ring. Set the radial position of the tension so the bottom of the hoop of the check spring is at 10:30 o'clock (halfway between 9:00 and 1200. Caution: do not push the housing so far into the ring as to cause the check spring's arm to touch the black ring. Tighten the allen set screw. The proper adjustment of regular tension is usually with the thumb nut even with the end of the tension shaft.

Note: Many times after a thread break, the thread will wrap itself around the check spring of the rotary tension. Prior to re-threading the machine after a thread break, check that the thread is not wound around this check spring.

Changing Thread

It is not necessary to re-thread the machine each time you change thread. Simply cut the old thread before the first thread guide, leaving the machine threaded. Put the new spool or cone on the machine and tie the end to the old thread that is still in the machine. Unthread just the needle and pull the old thread until the new thread appears. Cut off the old thread and thread the needle with the new thread. The tension should be checked each time a new thread is added.

Needles

Gammill machines are designed to use standard length industrial machine needles in a variety of sizes. For most quilting operations, Singer system 1955 series MR 3.5, MR 4.0 or MR 5.0 are recommended, where the higher the number, the thicker the shaft.

When stitching thick fabrics or tops with thick intersections, the larger, MR 5.0 needle will give better results. The thicker, stronger needle easily penetrates the thicker fabric and reduces needle and thread breaks.

Tip: It is recommended that the needle be changed after each quilt. The points become blunt with use and may cause damage to the fabric or result in poor stitch quality.

Parts of a Needle

The picture below shows a properly inserted needle.

The top part of the needle is called the shank. The shank is inserted into the needle bar and a set screw holds it in place. The area of the needle between the shank and the eye is called the shaft. There is a groove at the front of the needle that runs the length of the shaft and faces away from the machine. The grove provides a space for the thread on its way into the fabric layers. Without the groove, the thread would break as it enters the fabric. So, in addition to having the eye face toward the front of the machine, make sure the side with the groove is facing you, not the machine.

The concave area in the back of the needle is called the scarf. The scarf faces the throat of the machine and provides a place for the thread to form a tiny loop as the needle is raised out of the fabric. The hook on the bobbin race takes this loop of top thread and loops it around the entire bobbin case to form the stitch.

Installation

Unlike home sewing machine needles, the shank of an industrial needle is round. There is no flat edge to ensure proper installation of the needle in the needle bar. Instead, you must check that the eye of the needle is facing straight toward the front of the machine.

1. Loosen the needle bar set screw and insert the shank into the needle bar making sure the needle is inserted as far as it can go.

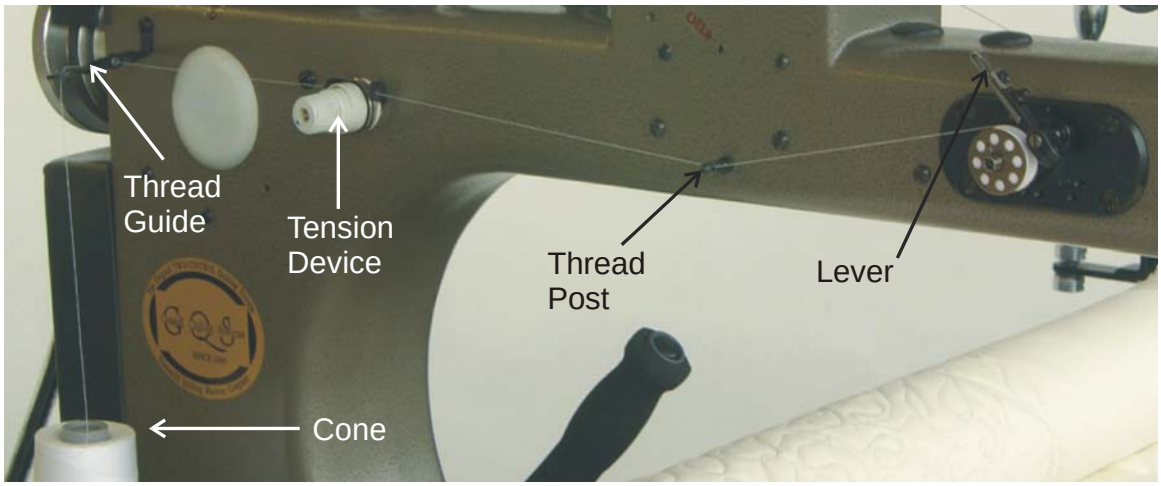
2. Rotate the needle so that the eye is facing directly out to the front of the machine.

3. Tighten the set screw.

Built-On Bobbin Winder

Your Gammill sewing head includes a built-on bobbin winder. The bobbin winder is powered by the motor and winds the bobbin as you sew. When the bobbin becomes full the winder shuts off automatically. You might find it more convenient and efficient to purchase two cones of thread in the same color, one for the needle and one for the bobbin winder. This allows you to take advantage of the automatic bobbin winder as you sew.

Winding the Bobbin



1. Place the cone on the cone holder. The cone holder should be adjusted so the top of the cone is directly under the first thread guide.

2. The thread guide consists of two holes. Bring the thread from bottom to top then from back to front of this thread guide.

3. Next bring the thread to the thread guide just before the tension device and go counter clockwise ½ turn around the discs of the tension device. Be sure the thread is securely between the two discs.

4. Next bring the thread to the thread guide just after the tension device then to the thread guide just before the bobbin winder.

5. Lift the lever and place the bobbin on the winder.

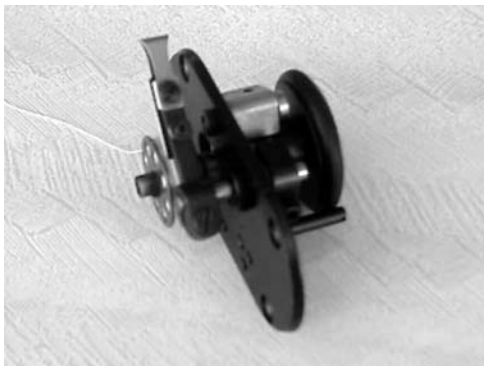
6. Wind the thread clockwise around the bobbin about 8 times.

7. Lower the lever and pick-up lever 1/4" so that bobbin thread will wind evenly. The bobbin will now wind each time the motor is turned on. When the bobbin is full, the lever will release and the bobbin will stop winding.

Maintenance and Repair Built On Bobbin Winder

If the bobbin is unevenly filled, realign the thread guide spindle by loosening the locking nut and screwing the spindle outward or inward to align the spindle hole with the center of the bobbin. Also, make sure there is a moderate tension on the winding thread.

Tip: If the tension device is too tight then the thread will "push" out of discs and the bobbin will wind loose.



To replace a worn rubber O-Ring, remove four screws which hold the bobbin winder to casting. This will allow removal of the entire unit to gain access to the rubber O-Ring.

Roll the worn O-Ring off the pulley and replace it with a new one. If no O-Ring is available, simply turn the O-Ring around as this places the undamaged portion next to the driving disk.

If the bobbin winder driving disk does not make contact with the O-Ring when the winder is turned on, this may indicate the disk needs to be moved closer to the O-Ring. To make this adjustment, locate and remove the rubber plug on top of the upper arm that aligns with the winder.

Using an allen wrench, loosen the two screws on the disk and with the bobbin winder lever turned on, slide the disk until it makes gentle contact with the O-Ring and tighten both screws. If the bobbin keeps turning even though the bobbin winder lever is turned off, move the driving disk a little further away from the O-ring.

Tip: If bobbin winds with less thread in the middle of the bobbin the O-Ring is adjusted too tight to the disc.

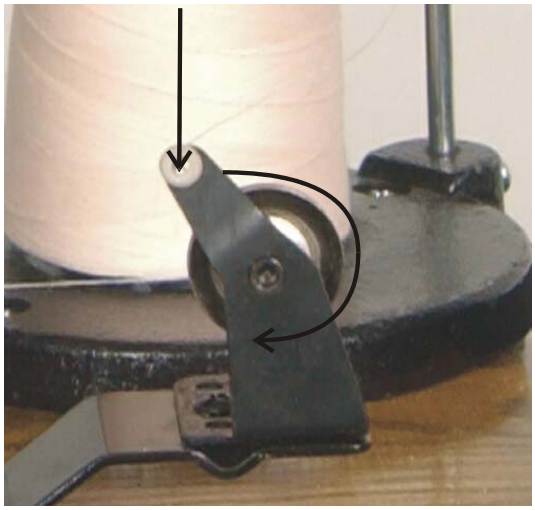
Stand-Alone Bobbin Winder

Instead of using the built-on bobbin winder, many quilters prefer to purchase a stand-alone bobbin winder. This winder consists of a thread holder, tension disc, spindle and motor all attached to a wooden base. A foot pedal controls the electric motor.

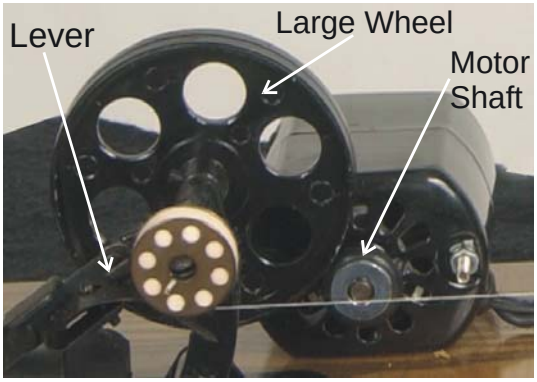
Attached to the spindle is a large wheel. When the bobbin is ready to be wound, the large wheel engages the motor via a lever that the operator manually engages. This lever automatically disengages the motor when the bobbin is full.

1. While standing with the spindle and motor on your left and the thread holder and tension disc on your right, place an empty metal bobbin on the spindle and place the thread on the cone holder. Bring the thread up to the thread guide just above the top of the cone. The thread guide should be positioned directly above the center of the cone.

2. Bring the thread down to the tension disc thread guide then around the tension disc from right to left as shown below.



3. Bring the thread under and around the bobbin in a clockwise direction winding 8-10 times around the bobbin. The picture below shows a full bobbin.



4. Press on the lever until the large wheel engages the motor shaft.

5. Press the foot pedal and wind the bobbin. When the bobbin is full, the lever releases to disengage the motor and the bobbin stops winding.

Bobbin and Bobbin Case

The bobbin supplies the bottom sewing thread. All Gammill quilting machines manufactured today use size “M”, the large size bobbins. Metal bobbins are filled with thread by using either the built-on bobbin winder or the stand-alone bobbin winder.

Bobbin Case

The bobbin case is removed from its shaft and the loaded bobbin is inserted inside it. The thread goes from the bobbin, through the tension slot in the bobbin case, and is caught in the top thread loop to form the stitch.

Insert the bobbin case into the hook assembly. You should hear and feel the click that indicates proper engaging of the case in the assembly. If the click is not heard, remove the bobbin case and reinsert it. An improperly inserted bobbin case can lead to broken needles, timing issues, and damaged bobbins and bobbin cases.

Tension Adjustment

The bobbin tension should be adjusted at the start of each quilt and/or whenever you change from one type of thread to another. Check the bobbin tension first and then adjust the top thread tension to make any further tension adjustments.

Two screws are located on the side of the bobbin case. The largest one is used to adjust the bobbin thread tension. Generally only slight adjustments to the left (loosen tension) or to the right (tighten tension) are needed to adjust bobbin tension.

Follow these steps:

1. Insert the bobbin in the bobbin case. The bobbin should be placed so that when looking at the bobbin it turns clockwise when the thread is pulled.

2. Place the thread into the slot on the side of the bobbin case, then into the tension slot.

3. Bobbin tension should be loose. If you hold the bobbin in your hand and pull the thread, the bobbin should not come off your hand. Keep the bobbin thread loose, because 90% of tension problems are the top thread showing on the bottom of the quilt and loose bobbin thread makes it easier to “pull the stitch into the middle of the quilt”.

Tip: Bobbin tension should be tight enough to pull bobbin to vertical in your hand, but not tight enough to pull bobbin off your hand.

Anti-Backlash Spring

The anti-backlash spring is a thin, blue disc located at the bottom of the bobbin case. The picture below shows the anti-backlash spring with the bobbin in place.

The purpose of the anti-backlash spring is to slow down the spinning of the bobbin as it first begins to sew. This reduces the formation of thread blobs on the back of the quilt. If you hold the bobbin case and gently press on bobbin you should notice a small movement in and out. If this movement is not present, it is an indication that the disc is worn and should be replaced.

Bobbin Case Repair

Sometimes a bobbin case can get damaged slightly if it is dropped. If a bobbin does not rotate smoothly within the bobbin case while pulling the thread, it is most likely because the bobbin case has been bent slightly inward, restricting the bobbin's rotation. Place a bobbin in the case and determine where the contact is causing the restriction. Punching a pointed thin object such as a thin, flat head screwdriver, straight in between the bobbin and the bobbin case, can smooth the bobbin case out. It will need only a slight smoothing so be careful not to pry on it as this could cause more damage to the bobbin case.

7. Stitching Mechanism

How the Machine Sews

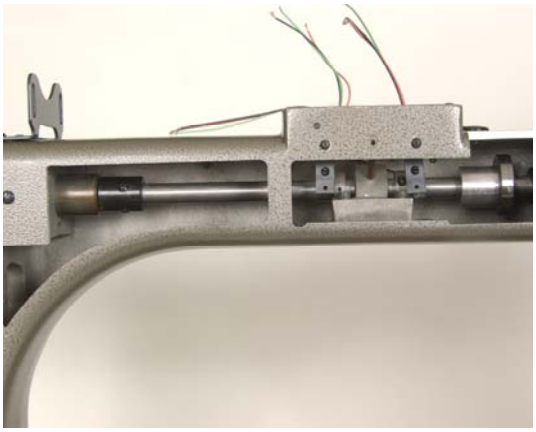
If we understand how the machine actually sews we can quickly diagnose and correct problems and resume sewing faster.

The picture below shows a cutaway view of the sewing mechanism with the motor removed. The orange and yellow colors indicate oil tubes and wicks.

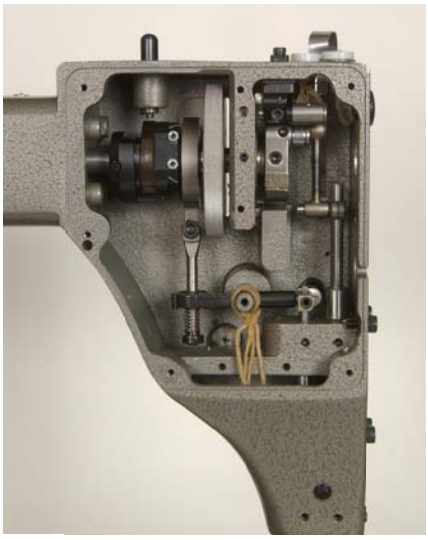
The series of pictures that follow are close ups of the upper arm from the motor to the needle.

The motor turns a belt connected to the crankshaft in the upper arm. Notice how the oil collected in the large, white oil port is distributed to various mechanical components via the orange oil tubing.

The crankshaft spans the length of the upper arm. The electronics for the needle positioner are located at the center of the crankshaft.



The end of the crankshaft is fitted with a lever attached to the needle bar. This lever transforms the circular motion of the crankshaft to the up and down motion of the needle. Notice the two white oil ports and the yellow wick that distribute oil to various mechanical components.



The pictures that follow are close ups of the lower arm from the full cutaway picture shown earlier.

The motor also turns the shaft for the rotary hook assembly, which houses the bobbin case. Notice that the oil tubing continues through the lower arm.

The crankshaft continues to the rotary hook assembly at the end of the lower arm.

If you need to contact your dealer or Gammill Technical Support you will save time and confusion if you learn and use the proper names of machine parts. "Rotary-hook assembly" tells the service technician so much more than "that thingy that spins around the bobbin thingy that comes off with the screws on the inside of the machine."

Motor and Hand Wheels

If the motor belt is too loose, it can slip, causing the crankshaft to start slow when turning. A belt that is too tight causes drag on the motor and cause excessive bearing noise.

The motor can be turned manually by using either of the hand wheels located at the back and front of the machine. When standing at the back of the machine, the motor is turned forward by turning the back hand wheel in the counter clockwise direction. When standing at the front of the machine, the front hand wheel is turned in the clockwise direction to turn the motor in the direction it runs.

Adjusting the Motor Belt Tension

Proper tension on the motor belt is needed for stitch quality. If a motor belt is too loose it will slip on the wheel and cause skipped or incomplete stitches. If the tension is too tight it might cause the motor to overheat. To test for proper tension you should be able to press the belt inward approximately 1/2". If the tension is too loose the motor will need to be raised on its bracket and if the tension is too tight the motor should be lowered.

To raise or lower the motor on the motor bracket:

1. Loosen the two back lower screws. On older machines you may have to remove the belt guard.

2. Use a screwdriver or your hand as a lever to hold the motor in place and tighten the screws.

3. Check the tension on the belt.

Motor Brushes

Motor brushes should be cleaned and inspected every 6 months, and replaced when worn. A new motor brush is 9/16" long and should be replaced when it becomes 5/16" long. The brushes should be installed in the same orientation.

Note: If the motor slows down while sewing or will not start at all, this is an indication that the motor brushes need attention.

To clean motor brushes:

1. Remove them and wipe them off.

2. Blow out the motor brush receptacles with canned air.

3. Reinstall the brushes in the motor in same orientation.

Motor Jams

On rare occasions the motor will become obstructed and jam which is indicated by the motor humming when the run/start switch is pressed. Most likely the jam is caused by a tiny piece of thread embedded between the hook race and the rotary hook. The motor hums but does not rotate.

To clear the jam, go to the back of the machine and turn the hand wheel clockwise until the jam is released. This might take two hands and a much stronger force than normal to accomplish.

Tip: Strap can openers or oil filter wrenches work well for this operation.

Needle Bar

The needle bar holds the needle and provides the up and down motion during stitching. The needle bar should be stable with no side-to-side motion.

Needle Bar Stability

To check needle bar stability, first rotate the hand wheel until the needle bar is in its lowest position. Next, test for excessive side-to-side motion.

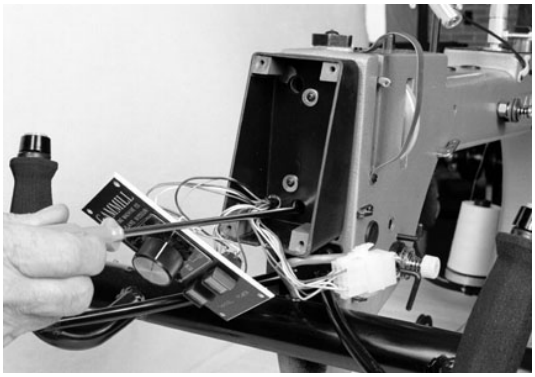
If significant motion exists it may indicate badly worn needle bar bushings and require their replacement. This needle bar bushing replacement should be done by a competent technician or at Gammill's Service Center.

Adjusting the Needle Bar Height

Rotate the hand wheel until the needle bar is in the lowest position. From underneath, looking straight at the sewing hook, the entire needle eye should be visible; however, none of the needle above the needle eye should be visible.

On machines not equipped with Electronic Needle Positioner access to the needle bar adjustment screw (which is located in approximate alignment with the needle bar inside the take-up lever box) is gained by removing the rubber plug from the end of the take-up lever box.

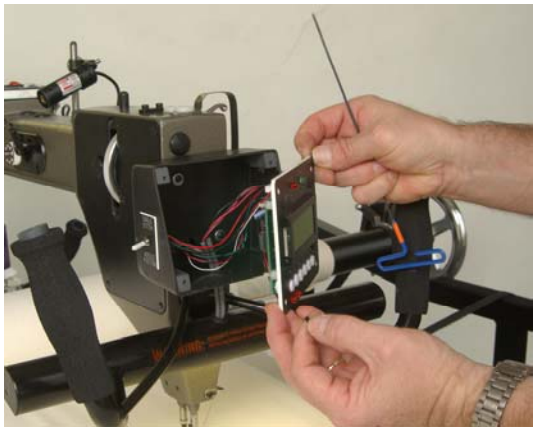
On machines equipped with Electronic Needle Positioner, access to the needle bar adjustment screw is gained by removing the cover plate of the control box.

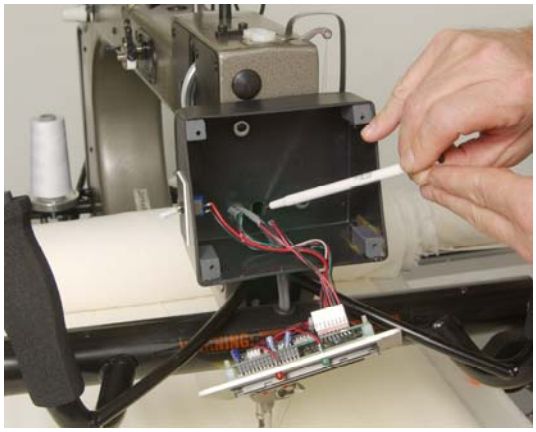


With the needle bar in its lowest position, loosen the set screw visible through the hole and raise or lower the needle bar until the full needle eye is visible. Make sure the needle

bar has not pivoted from its original position and tighten the needle bar set screw securely.

On Plus machines the LCD display cover must be removed to access the adjustment screw.





With the needle bar in its lowest position, loosen the set screw to raise or lower the needle bar until the full needle eye is visible. Make sure the needle bar has not pivoted from its original position and tighten the needle bar set screw securely.

Tip: If the needle bar is set too high or too low it can result in skipped stitches or excessive thread breaks.

Replacing the Needle Bar

Before replacing the needle bar you **must unplug** the machine from the power source. Installing the new needle bar does not require removal or retiming of the sewing hook if the machine is properly timed before installing the new needle bar.

Important: Your needle bar replacement kit contains a nylon thumbscrew for your timing tool (see **Using the Timing Tool** on page 15). Please replace the metal thumbscrew in the timing tool with this new nylon thumb screw to avoid damage to the new needle bar.

1. Remove and save needle and needle set screw from original needle bar for later use.

2. Remove large black inspection plate on backside of take-up lever box and also face plate of control box.

3. Rotate hand wheel until needle bar is in its lowest position. Loosen needle bar clamp screw, visible through hole in back of control box.

4. With fingers or needle nose pliers, slide needle bar up as high as it will rise. Hold needle bar in this position while retightening needle bar clamp screw.

5. Rotate hand wheel clockwise (it will be tight) to make needle bar force white plastic oil unit out of the top of needle bar cylinder. It may be necessary to use the hand wheel at the back of the machine and/or a thin blade type screwdriver to help pry white oil unit out of top of cylinder. **Caution**: In older models (1998-2003), do not loosen the two allen screws in the black unit that the plastic unit sits in.

6. Rotate hand wheel again until needle bar clamp screw aligns with hole in control box and loosen set screw again.

7. With white plastic oil unit removed, slide long needle bar out of top of cylinder.

8. With bottom of shorter needle bar turned downward, install through top of cylinder and place through needle bar clamp having clamp screw align with hole in casting when in its lowest position.

9. Install needle set screw and needle in new needle bar.

10. With needle installed and needle set screw facing opposite tension side of machine, (to keep screw from making contact with thread), lower needle bar to estimated height (usually with needle set screw Just above left side of hopping foot.

11. Rotate the hand wheel until the needle bar is in the lowest point of its travel. Look straight into sewing hook area and move needle bar up or down until the entire needle eye is visible below needle guard of the sewing hook. You should see all of the needle eye but nothing above the eye. One way to be sure that the needle bar is at that correct height and that the needle is straight, is to put a pin through the eye of the needle. Since the needle bar clamp screw is still loose, you can use the pin to set the needle bar height precisely and check that the needle is installed correctly.

12. Tighten needle bar clamp screw securely.

13. Check needle again for proper alignment and reinstall new needle if necessary.

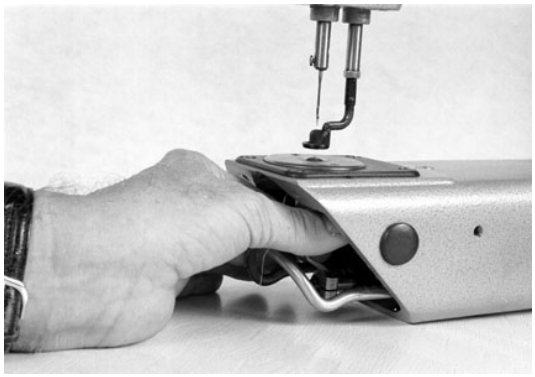
14. Replace black inspection plate, face plate of control box, and white plastic oil unit.

Rotary Hook Shaft

The rotary hook shaft is located in the lower arm of the sewing head. The motor turns this shaft in a counter clockwise direction, which in turn rotates the rotary hook. The rotation of the rotary hook shaft is synchronized with the needle movement.

Stability of Rotary Hook Shaft

There should be little or no end play (no more than 5/1000 inch of end to end motion) in the shaft that drives the rotary sewing hook.



If excessive end play exists, remove the small rubber plug near the rear axle to gain access to a collar. With a 3 mm size allen wrench, loosen the two allen screws in the collar.

With the allen wrench in one screw, move the collar toward the shaft bushing (to the right) while holding the sewing hook outward (to the left). Tighten one screw very slightly then rotate the machine a few revolutions by hand to allow the collar to find its seat before tightening both screws completely.

Caution: Never press the collar extremely tight against the bushing as this could cause the machine to bind and seize.

Rotary Hook Assembly

The rotary hook assembly consists of the hook race, bobbin case and bobbin and is secured to the rotary hook shaft with two set screws. The bobbin is inserted into the bobbin case that is inserted into the rotary hook assembly. The semi-circular hook race spins at high speeds around the bobbin case.

Some of the problems that can occur with the rotary hook assembly include:

Lint and thread buildup around the hook race can cause the race to jam, which in turns jams the motor.

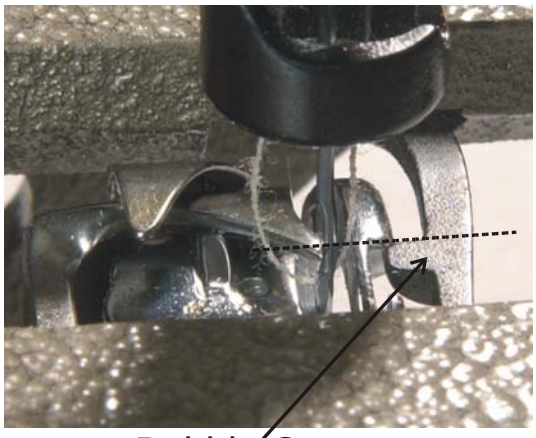
The deflecting needle hitting the hook race causes Burrs, little tiny scratches in the metal. Threads are cut as they glide over these burrs.

Bobbin Case Position Bracket (Finger) Adjustment

The bobbin case position bracket prevents excessive movement of the bobbin case.

With the throat plate removed, rotate the hand wheel until the needle is low enough to view it and the notch in the bobbin case base.

The proper needle/notch relationship is when the center to the right edge of the notch aligns with the needle.



Bobbin Case Position Bracket

It is OK if the right edge of the notch aligns with the needle, but never the left edge. To adjust the bobbin case position bracket:

1. Loosen the set screw that holds it (stationary finger) to the underside of the casting.

2. Move the bracket to left or right to set the proper needle/notch alignment.

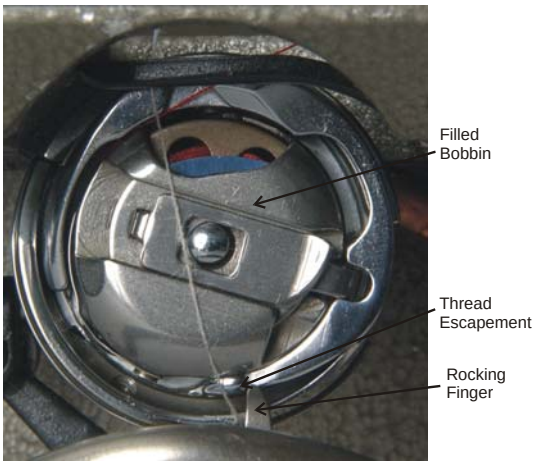
3. It is also necessary to ascertain that the bobbin case position bracket protrudes 1/2 to 2/3 into the depth of the notch.

4. Tighten the bobbin case position bracket set screw.

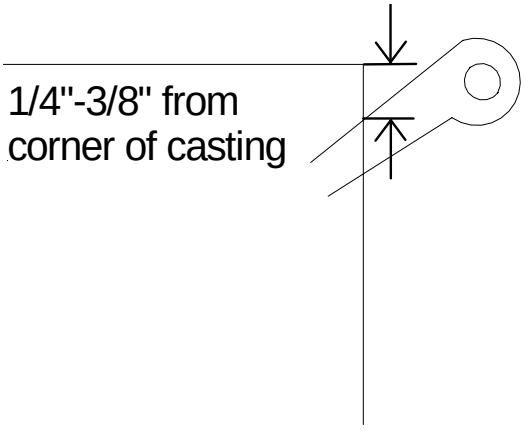
Rocking Finger

The rocking finger is used to slightly tilt the bobbin case base so the top thread passes through the thread escapement without restriction.

An Acentric cam located on the shaft behind the rotary sewing hook controls the rocking finger.



The Acentric cam should be timed to make the rocking finger tilt the bobbin case base very slightly when the top of the take-up lever is slightly above level on its upward stroke as indicated below.



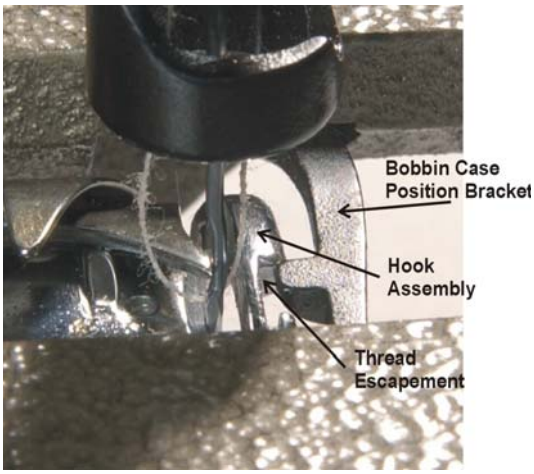
To time the acentric cam, loosen its two allen set screws and turn the hand wheel forward until the top of the take-up lever is 1/4 - 3/8" from corner of casting on its upward stroke. See diagram above. With the take-up lever in this position, advance or retard the acentric cam until the rocking finger reaches its maximum stroke toward the bobbin case base.

Stability - Before tightening the set screws, stabilize the in and out position of the rocking finger by making sure the acentric cam is near but not touching the hook-shaft bushing.

Control To adjust the amount of rocking finger control (effect) on the bobbin case base, loosen the clamping screw and, with throat plate off for visibility, adjust the rocking finger to the right or left until it slightly tilts the bobbin case base, creating equal space on each side of the bobbin case position bracket in the thread escapement as you rotate the hand wheel manually.

Tip: Make sure the position bracket does not hit the left side of the thread escapement.

Before tightening the clamping screw, make sure the contact point of the rocking finger is positioned so it will make its contact at the front edge of the shoulder on the bobbin case base. Tighten the clamping screw only **slightly**, with a small screwdriver.



Caution: Tightening the clamping screw too tight will cause binding of the machine and could break the rocking finger drive mechanism.

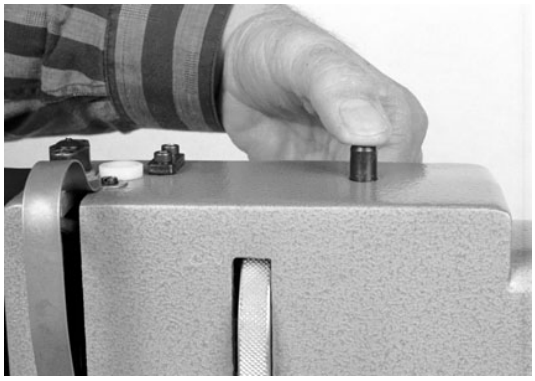
Hopping Foot Adjustment

The hopping foot is attached to the end of the presser bar and compresses the fabric layers as the stitches are formed. If the fabric is not compressed enough, the thread loop cannot be formed for the hook to capture it to complete the stitch. The height of the hopping foot can be adjusted two ways:

1. Adjusting the stroke of the presser bar, or
2. Adjusting the height of the hopping foot.

The stroke of the presser bar is the distance it travels as the stitch is made. Adjusting the stroke of the presser bar moves the hopping foot up or down in larger segments while finer adjustments are made by adjusting the height of the hopping foot.

To adjust presser bar stroke, press down on the spring loaded black button located on top of the take-up lever box as shown below.

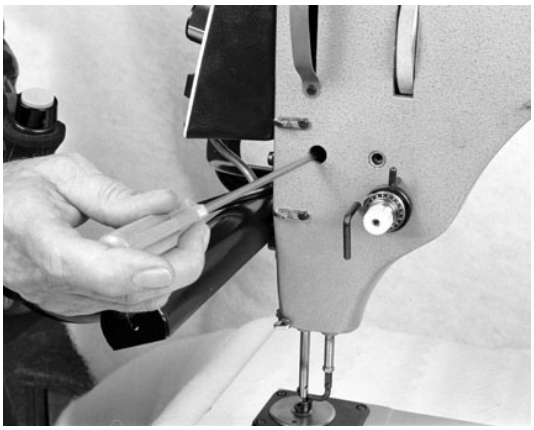


Rotating the hand wheel while holding down the button causes it to drop into a slot. Hold the button in the slot and rotate the hand wheel forward to increase the hopping stroke or rotate the hand wheel backwards to decrease the stroke.

Note the presser bar height should be readjusted after the stroking action has been set.

Tip: Don't adjust stroke too high or it could hop too high and break your rulers.

Height: (all models): Adjusting the space between the foot and the throat plate is accomplished by loosening the set screw seen through the hole located to the left of the main tension.

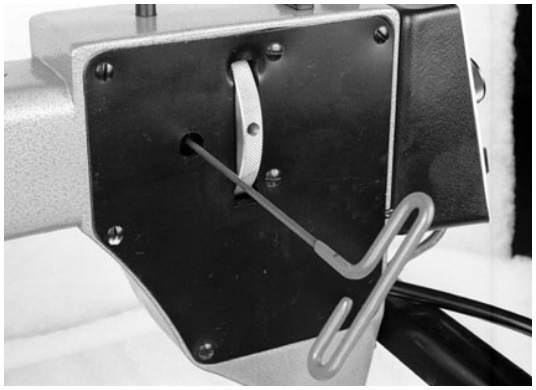


The proper foot height is determined when the foot is in the lowest point of its stroke. Perfect spacing is when the foot gently rests on the fabric, holding it still as the needle starts its rise. The amount of space varies with the different thickness of material being sewn. The proper height should be about the thickness of 3 business cards. Be sure to align the center of the foot with the needle before re-tightening the set screw.

Timing: (all models) Timing of the hopping foot stroke is accomplished by adjusting an acentric cam located in the take-up lever box.

(Models 26-30-36) For the Classic and Optimum models, access to acentric cam screws can be gained through the hole in the inspection plate.

For the Premier, the side cover must be removed to access acentric cam screws as shown below.



To adjust:

1. Locate and loosen the two allen set screws, leaving the allen wrench in the screw that aligns with the access hole when the foot is in its lowest position.

2. Hold the acentric cam with the allen wrench in one screw and with the hand wheel, rotate the machine forward until the needle is in its lowest position.

3. Tighten one set screw and check stroke. When proper stroke is achieved then tighten both set screws.

Generally it is not necessary to adjust hopping foot height for different thickness of batting. If you change from your usual batting to a thicker batting and you are experiencing skipped stitches you may need to adjust the hopping foot slightly higher for that quilt.

Tip: After adjustment and to check timing, the needle should rise 1/4 – 3/8" before the hopping foot should start its upward motion.

The Gam Foot™ is a specially designed hopping foot that allows the use of templates and rulers during sewing. The circular end of the foot, which surrounds the needle, has a raised edge. Rulers and templates that are at least ¼" thick can be held in place against the raised edge of the Gam Foot. Using rulers and templates together with the Gam Foot and the extended throat plate allows you to quilt perfectly straight lines, smooth curves and other shapes with ease. See Rulers on page 11-3.

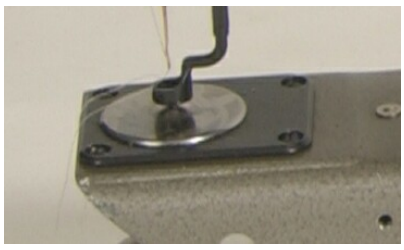
Needle Plate and Throat Plate

The needle plate is the silver, circular disc attached to the top of the throat plate. The needle plate has a small hole to accommodate the needle moving in and out of the fabric. The hole helps to restrict side-to-side movement of the thread as the stitches are formed. The only time the needle plate should need to be removed is to inspect it for burrs or for cleaning.

As the needle moves at high speeds it is deflected. Most often this deflection does not cause problems, however if the sewing head is moved too quickly over the quilt or the fabric is too tight, needle deflection does not have sufficient time to recover. The deflected needle can strike the edges of the hole in the needle plate. This can cause thread breaks and/or burrs in the needle plate.

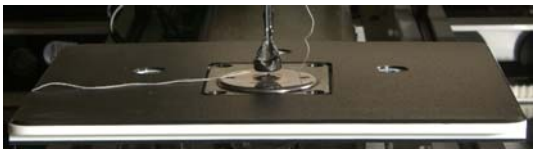
Removing the Throat Plate

The throat plate is the rectangular shaped, black plate affixed to the lower arm of the sewing head. The throat plate is moved out of the way or removed to gain access to the rotary hook assembly. It is not necessary to completely remove the throat plate. Instead, loosen and remove the two upper screws and one of the lower screws. You can now rotate the throat plate out of the way to access the rotary hook assembly.



Extended Throat Plate

The extended throat plate was designed to provide a large surface to stabilize rulers and templates during sewing. The lower arm of the sewing head does not provide sufficient, level surface for resting templates and rulers. The extended throat plate quickly and easily slips on and off the lower arm of the sewing head and includes a hole for oiling which means that it can be left on at all times if needed.



Replacing Handle Switches

Switches in the handles are easily removed and replaced by simply unplugging them. To replace a switch, grasp the handle with both hands and using your thumbs, roll down the rubber padding as shown below.

Unplug and remove the old switch and replace with the new switch.

8. Troubleshooting Stitch Quality Problems

Now that you are familiar with the mechanical parts of the stitching mechanism we will explore how these parts work together to form a stitch. If you are encountering problems with stitch quality, chances are it is occurring somewhere along the thread path.

How a Stitch is Made

The hopping foot compresses the fabric layers as the needle is lowered. The needle enters the fabric, bringing the top thread under the fabric.

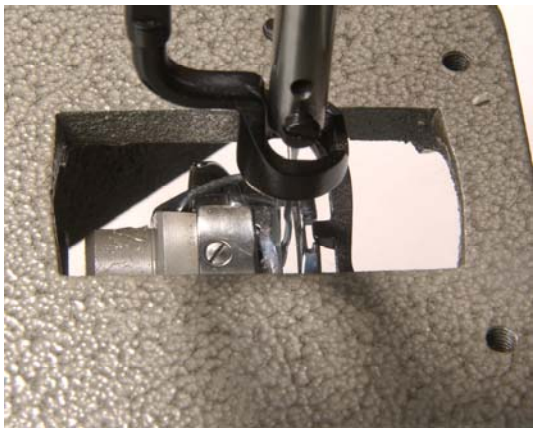
Notice that the eye of the needle, which is slightly flared, is fully visible at this point. The thread travels into the fabric inside the groove at the front of the needle and the flaring of the needle eye helps penetrate the fabric layers to accommodate the thread.

Tip: If you are using a thick thread with a small needle the groove and the needle eye are too small to accommodate the thicker thread and thread breaks can occur.

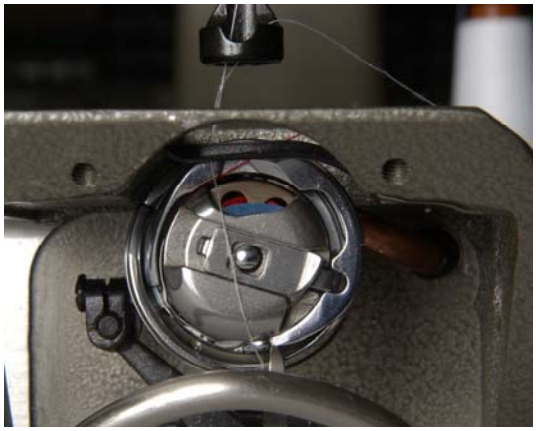
The hopping foot continues to compress the fabric as the needle begins to rise. The friction of the thread against the compressed fabric as the needle rises causes a loop to be formed under the fabric behind the needle.

Note: If the loop is not formed at this point, skipped stitches can occur. Some causes of this are:
The hopping foot is not low enough to sufficiently compress the layers, or the fabric is sticking to the needle such as fabric with heavy paint or a sticky needle.

The hook captures the loop as the needle rises out of the fabric. Proper timing of the machine means that the hook reaches the loop at the exact time and location necessary to form the stitch. If the hook misses the loop, the stitch is not formed.



The hook continues around the bobbin case, taking the top thread with it and completing the stitch.



Any burrs in the hook, race, or bobbin-case area can slice the thread as it is looped around during this step. Also, if the rocking finger is not set correctly, the thread can be caught as it moves around the bobbin case.

At this point, the loop of top thread has excessive slack. The take-up lever pulls the top thread up to release the slack. Improper tension or feeding of the top thread during this point in stitch formation causes problems with the top stitches, such as tightness in the fabric or loops. When the top thread is pulled up, the stitch is complete and formation of the next stitch begins.

Many factors can lead to poor stitch quality; however there are only two places you need look to find the problems. The first place is the top thread path from the cone to the needle and the second is the bobbin, hook and race assembly.

Checking and Adjusting Stitch Quality

Once the quilt is loaded and you are ready to thread the machine, follow these steps:

1. Clean and oil the sewing head.

2. Load the filled bobbin into the bobbin case. Check and adjust the bobbin tension.

3. Load the bobbin case onto the rotary hook shaft. Be sure to listen for the click that indicates the bobbin case is properly secured to the shaft.

4. Thread the top thread and pull the bobbin thread up.

Tip: After pulling bobbin thread up, check to see that the bobbin thread still pulls freely.

5. Test the tension by taking a scrap piece of fabric, folded once with no batting, and stitch about 5". If you can achieve good tension and stitch quality using two layers of fabric without batting, then when batting is added later you know the tension will be correct. Run the machine at a medium speed and move the fabric away

from the needle while holding the machine in placed. Check the stitch quality on both the top and bottom. You should not see any bobbin threads on the top or any top threads on back. Since the bobbin tension has been checked and the rotary tension device has been set, adjusting the intermittent tension makes the only adjustments to the tension.

Tip: Loosen or tighten top tension 1/2 turn at a time until proper tension is achieved.

6. Use the table below to determine how to adjust the top tension.

Top Stitches	Bottom Stitches	Cause	Solution
Bobbin threads on top	Good quality	Top tension tight	Loosen top tension (Intermittent tension)
Good quality	Top threads on bottom	Top tension loose	Tighten top tension (Intermittent tension)

Troubleshooting Thread Problems

Top Thread Frays and Breaks

Probable Cause	Solution
Hesitating too long at point of pattern.	Move more quickly out of point.
Improper stitch size.	Make stitch size consistent and between 8-12 stitches per inch.
Improperly installed or damaged needle.	Replace needle. See Needles on page 6-10.
Restriction along thread path.	• Check for proper threading. See Threading the Machine on page 6-1. • Make sure thread cone points directly toward first thread guide. • Top thread should pull smoothly without jerking. • Do not allow arm or electrical cord to rest against thread cone.
Needle deflected out of alignment with sewing hook.	Use stronger (larger size) needles or use less tautness in fabric.
Improper needle bar height.	Check needle bar height. See Adjusting the Needle Bar Height on page 7-4.
Timing off.	See Timing the Sewing Hook on page 8-6.
Hopping foot too high or stroke out of time.	Adjust hopping foot timing so foot holds fabric still until needle has risen approximately 3/8". See Hopping Foot Adjustment on page 7-9.
Damaged hook point.	Polish back side of point or flange or replace hook.
Damage or burr at needle hole of needle plat or other thread handling part.	Locate damage or burr and polish smooth with crocus cloth or abrasive cord or replace part.
Too small needle for thread being used.	Use larger (thicker) needle.
Rocking finger disengaged, tilting bobbin case base too much or improperly adjusted.	Adjust rocking finger to eliminate stress on thread. See Rocking Finger on page 7-8.

Loops on Bottom

Probable Cause	Solution
Moving machine too fast for needle speed selected.	Synchronize machine movement and needle speed to accomplish 8 to 10 stitches per inch.
Improper threading or restricted top thread flow.	Refer to threading diagram and threading instructions. See Threading the Machine on page 6-1.
Not enough tension on top thread.	Tighten Intermittent tension. Rotary wheel tension should never be so tight as to stop the tension wheel from turning. See Auxiliary Intermittent Tension on page 6-6.
Check spring improperly adjusted.	Adjust check spring. See Replacing the Check Spring on page 6-9.
Hopping foot too low.	Adjust presser bar height so Gam Foot is approximately 3 business cards above needle plate when foot is in lowest point of its stroke. See Hopping Foot Adjustment on page 7-9.
Foot stroke out of time with needle.	Needle should rise approximately 3/8" before foot starts rising. See Hopping Foot Adjustment on page 7-9.
Bobbin case finger too deep in notch.	Finger should be approximately halfway to 2/3 into bobbin case base. See Bobbin Case Position Bracket (Finger) Adjustment on page 6-14
Rocking finger improperly adjusted.	Adjust rocking finger. See Rocking Finger on page 7-8.
Intermittent tension stroke out of adjustment.	Adjust intermittent tension stroke. See Auxiliary Intermittent Tension on page 6-6.

Skipped Stitches

Skipped stitches occur when the rotary hook fails to capture the thread loop at the back of the needle. Top fabric with heavy paint can cause the fabric to rise up with the needle. If this happens the loop is not formed behind the needle. Skipped stitches can also occur when the rotary hook is not properly timed with the movement of the needle. The thread loop may be forming but the hook is not present at the moment the loop is formed. See Timing the Sewing Hook on page 14-2.

"Eye Lashes" or "Railroad Tracks"

When stitches appear as a straight line with dots along either side, these are called eyelashes or railroad tracks because of the obvious resemblance. Eyelashes occur when the machine is moved too fast around curves or if the thread tension is too tight for one of the threads.

If eyelashes appear in curves you should slow down movement of the sewing head while stitching the curve. If the eyelashes continue to

persist then adjust the tension as explained below.

If eyelashes appear on the front of the quilt, either the top tension is too tight or the bobbin tension is too loose.

If eyelashes appear on the back of the quilt, either the top tension is too loose or the bobbin tension is too tight.

Pokies

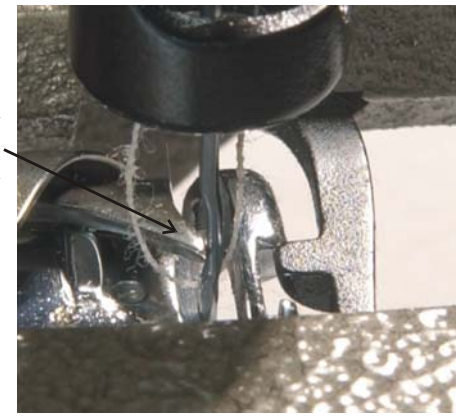
Pokies are little dots of thread showing along the stitch path and generally occur when the top and bobbin threads are different colors. Even with the tension properly adjusted, pokies can and do happen. The best way to prevent pokies is to use the same color thread in the top as you do in the bobbin. Pokies can be less visible if a busy print fabric is used for the backing.

Timing the Sewing Hook

As you learned about forming a stitch above you know that the rotation of the sewing hook must be synchronized to the position of the needle at a certain point in its cycle. This synchronization is called timing and the point of synchronization is called the timing point. Two things at the timing point indicate proper timing:

1. The point and top of the sewing hook should pass the needle in the center or just below center of the needle scarf (notch); and

2. The space between the hook point and the needle should be very close, almost zero clearance, but not deflecting the needle.



If the hook point does not pass through the center of the needle scarf and/or if the space between the needle and the hook point is not correct, the timing needs to be adjusted. Each Gammill quilting system includes a timing device that is helpful to quickly and accurately find the timing point, however it is not required. Instructions for timing the sewing hook with and without the timing device are given below.

Tools: Adequate lighting and flat head screwdriver are required. Magnifying glass and timing tool are helpful.

Note: Before timing the machine without the timing device check that the needle bar height is correct. See ***Adjusting the Needle*** Bar Height on page 7-4.

Note: For machines that have an aluminum needle bar, it is highly recommended that you use a nylon screw in place of the metal screw in the timing device. The nylon screw is less likely to damage the aluminum needle bar if over-tightened.

The timing device shown has been included with your Gammill Quilting System since 2000.

Even with machines that have steel needle bars, the timing device screw should not be tightened too tightly, since it is possible to damage steel needle bars, as well. Nylon timing device screws have been enclosed with all replacement needle bars sent to customers, along with instructions to replace the metal screw in their timing device with the nylon one. If you need a nylon timing device screw, please let us know.

1. Turn off the power and unplug the machine.

2. Unscrew and remove three of the four screws on the throat plate. Loosen the remaining screw and rotate the throat plate out of the way. Take this opportunity to clean lint out of the area under the throat plate.

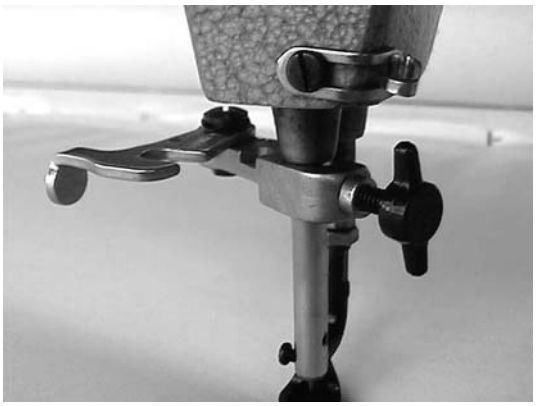
3. Loosen the rotary hook assembly. The rotary hook assembly is secured to its shaft by two set screws located behind the hook race. Loosen one of the set screws then retighten slightly and loosen the other completely so the hook assembly rotates around its shaft but does not spin freely.

Find the Timing Point Using Timing Device

1. Turn the hand wheel forward until the needle is at its lowest point. This point is called "bottom dead center".

2. Place the timing device on the needle bar as high on the needle bar as possible.

3. Tighten the clamp and swing the spacer out of the way. The clamp restricts forward (upward) movement of the needle bar to 3/32".



4. Turn the hand wheel forward until the clamp reaches the machine

housing. This slight turn of the hand wheel raises the needle bar 3/32" from bottom dead center. This raised position is the timing point.

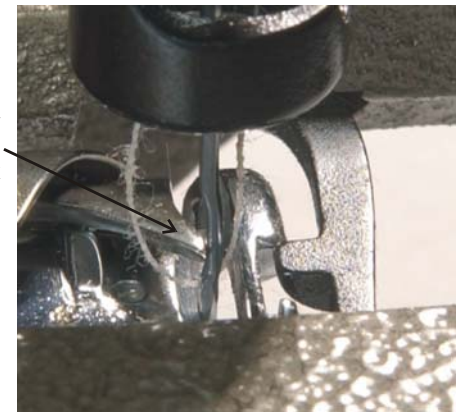
Find the Timing Point without the Timing Device

1. Lower the needle bar to bottom dead center. Place a mark on the needle bar where it disappears into the housing. From this mark, measure down along the needle bar 3/32" (2.5 mm) and mark a second line.

2. Turn the hand wheel forward until the second marked line reaches the machine housing. This slight turn of the hand wheel raises the needle bar 3/32" from bottom dead center. This position is the timing point.

Adjust the Hook Position

1. Keeping the needle bar at the timing point, rotate the hook so its point is even with the needle. The point should be at the center of the scarf or just slightly below it and very close to the needle without touching it.



2. Remove the timing device and tighten both set screws. Check rotation of the sewing hook by turning the hand wheel forward and watching the hook as it spins. The point of the hook should move through the center of the scarf as the needle rises. The point of the hook should not touch the needle or the bobbin case at any time.

3. Retighten screw very tight with large screw driver.

4. Swing the throat plate back into place and replace and tighten the three throat plate screws.

Tip: Lower needle bar into throat plate to make sure the needle is centered in the hole.

Before You Call Tech Support

Here is a small checklist to follow before you call tech support.

Thread Breaks

- Check for proper bobbin insertion.
- Change needle.
- Check for proper needle insertion.
- Check for proper threading of bobbin and top threads.
    - Pull the top thread. Does it pull smooth without jerking? If not, find the restriction and/or loosen the intermittent tension.
- Is needle sized for type of thread? Thicker threads require larger needles.

Skipped Stitches

- Check fabric tension. Stretching the fabric too tight can cause skipped stitches.
- Check hopping foot height.
- Check that top of cone is directly under first thread guide.
- Check for thick paint on fabric or gummy residue on needle.
- Check timing.

9. Using the Sewing Head

Cleaning and Oiling

The industrial sewing head is designed for many years of use with proper maintenance including regular cleaning and oiling. Use only clear machine oil that is not yellow. The yellow color indicates the presence of varnish that will build up on machine parts causing friction as the machine sews. This friction reduces the useful life of the machine.

Since every machine is used differently there are no standard recommendations for the frequency of oiling the machine or the amount of oil used each time. It is important that a small amount of oil is present in the oil ports at all time. However, too much oil may result in the excess dripping of oil from some part of the machine. Because of this, it is a good idea to park the machine away from the quilt when not in use and to wipe down the table and machine before loading, unloading or quilting the quilt.

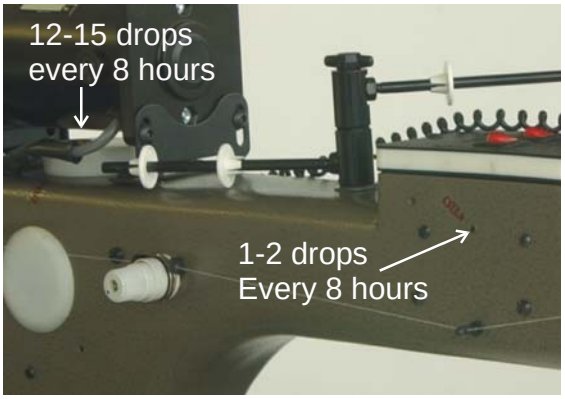
Some indications of the need to oil the machine or bobbin are a change in sound as you quilt or a bobbin and/or bobbin case that is hot to the touch. Some general guidelines are listed below. Start with these guidelines and adjust the frequency or amount of oiling as needed to fit your quilting schedule.

Centralized Lubrication System

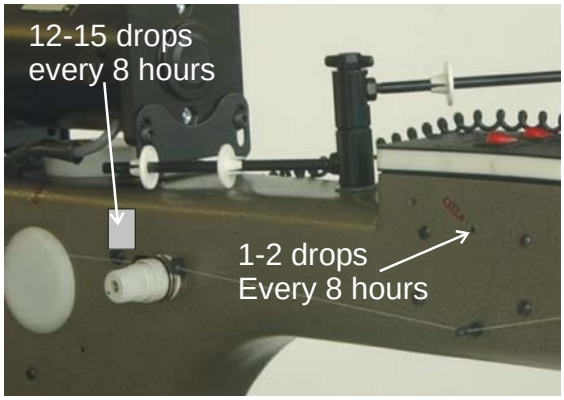
Oil the machine after every large quilt, or after every two (2) lap size quilts, or if the machine hasn't been used in 3 or 4 days. It is suggested that the hook assembly be oiled twice as often as the other lubrication points. If excessive oil drips from the bottom of the machine, then slightly decrease the frequency of oiling.

The pictures below show oiling locations for all models. Two of the oil ports are capped with stainless steel spheres. The container of oil included with your machine has a thin brass tube affixed to the mouth. Use this tube to push down on the sphere to direct the oil into the port.

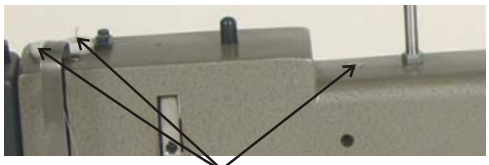
On the bobbin winder side, there are two oiling ports. The picture below shows oiling ports for the Optimum and Classic models.



Premier models do not have the oil port under the motor but instead have a brass oil pot located above and slightly to the left of the bobbin winder tension device as inticated by the gray rectangle in the photo below.

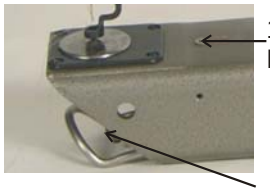


Three oil ports are located on top of the upper arm as shown below.



1-2 Drops
Every 8 hours

One oil port is located on the lower arm just behind the throat plate. The final oil location is in the hook race which houses the bobbin case.



1-2 Drops
Every 8 hours

1 Drop Every
2-3 bobbin changes.
Also when bobbin
is hot or rattling is heard.

The Premier models have most of the same oiling points. Instead of the oiling port underneath the motor there is an oil pot located on the upper arm as shown below.

Draining Excess Oil from the Take-Up Lever Box

Over oiling of the oil wicks located above the needle bar and presser bar causes oil to run down the needle bar or presser bar. To clean out the excess oil, first move the machine off the quilt and place a paper towel or other absorbent material under the drain hole to catch the excess oil.

Classic and Optimum Models

Remove the small drain plug with the O-ring seal located below the inspection plate on the take-up lever box.

Premier Models

Remove the take-up lever box inspection plate (located on the side of the take-up lever box). Remove and squeeze the excess oil from the thick oil pad. Re-install the oil pad and replace the inspection plate.

Light

To light the immediate working area, a small fluorescent light is located between the two front handles and above the needle. The power switch for the light is located on the middle of the upper arm. To change the fluorescent light tube, grasp the ends of the tube and rotate the tube toward you. Insert the new tube and rotate it away from you to click it into place.

Power Switch

The power switch is located at the top of the upper arm, right next to the light switch. This is a rocker switch, meaning that the switch is pressed one way to turn the power off and the other way to turn the power on. This switch turns the power on or off

for all the functions of the sewing head.

Replacing the Power and Light Switches

1. Remove cover by removing two allen head screws.
2. Remove wires.
3. Remove retainer.
4. Remove old switch.
5. Install new switch.
6. Replace retainer.
7. Replace wires.
8. Reinstall cover.

Two Station Electronic Needle Positioner

The needle position function lets you determine the needle position either in or out of the fabric. When you are stitching in the ditch or using templates or rulers you might wish to stop with the needle in the down position to keep the stitching line even.

There are two Needle Position toggle switches and they are each located on the left side of the display box near the hand wheel on both the front and back of the machine.

Each switch is independent of the other, so when you are at the front of the machine, the front switch controls and at the back of the machine the back switch controls.

When the toggle switch is in the up, Single Stitch position and the needle position switch is pressed, the needle cycles one complete time. If the needle is in the down position, it cycles up then down again. If the needle is in the up position, it cycles down then up again. Use the needle position function to take single stitches to secure the threads.

When the toggle switch is in the down position and the needle position switch is pressed, the needle moves either up or down. If the needle is in the down position, it moves up when the needle position switch is pressed. If the needle is in the up position, it moves down when the needle position switch is pressed.

Troubleshooting Needle Position Problems in Non-Regulated Machines

In rare cases the needle will continue to move when the Run/Start switch is turned off. This indicates that the Minimum Speed Potentiometer (Min Pot) switch is probably set too fast.

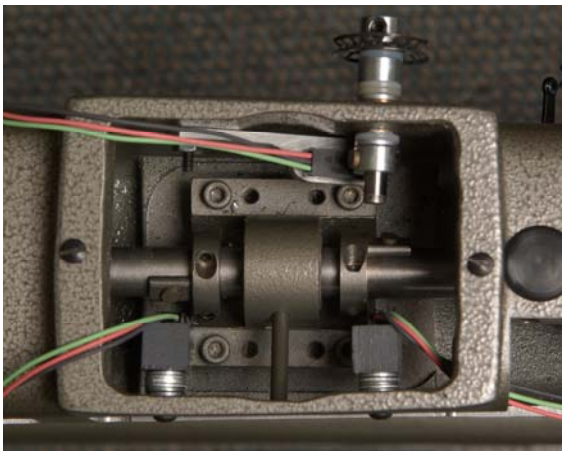
Adjusting Min Pot

1. Remove the cover located under the hand wheel to expose the Min Pot adjustment screw labeled "min".

2. Use a small screw driver to turn min potentiometer very slightly counter clockwise (left). The proper positioning speed should be fast enough but not so fast as to cause the machine to coast past the "stop" signal.

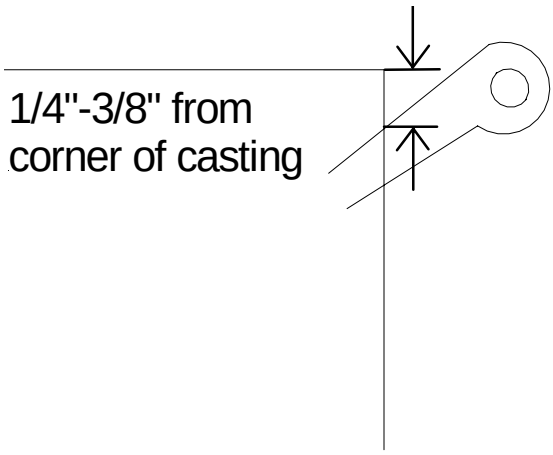
In July of 2000 the photo-cell sensor was replaced by a magnetic sensor, which is not affected by oil.

For machines produced before July of 2000, another cause for the needle to keep operating after the machine is turned off is an oil film on the photo-sensing unit. The sensing unit is located under the inspection plate on top of the upper arm.



Remove the plate and with a tissue or Q-tip, clean the oil from the bottom of the needle positioner sensor to allow the sensor to "see" the stop tab on the signal collar.

It is very important when the needle stops in the "up" position that the thread take-up lever also stops at the "up" position or corner of the casting (above level but not all the way up).



This should position the needle in a proper "up" position and will also have the thread take-up lever complete the stitch in progress and clear the race of thread. If the thread

take-up lever does not automatically stop at the corner of the casting, loosen the two allen screws on the signal collar nearest the needle and advance or retard the signal collar on the shaft until the thread take-up lever stops even with the corner of the casting.

Trouble Shooting Needle Position Problems in Regulated Machines

Go into Set Up Mode and adjust needle up, needle down and single stitch speeds. If the machine over rotates then you should slow the speed down on the needle up, needle down and single stitch speeds. (For example, go from speed 08 to 07).

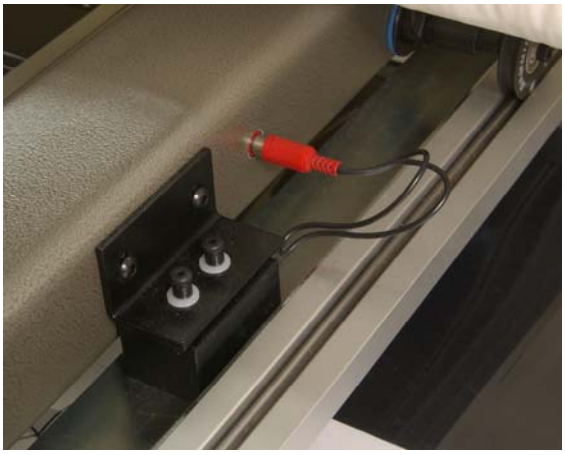
Channel Lock

With the channel lock feature you energize (turn on) a magnet to lock vertical or horizontal movement of the machine.

- If you want to stitch perfectly straight horizontal lines you would use the horizontal lock function to restrict the movement of the machine in the vertical direction.
- To stitch perfectly straight vertical lines you would use the vertical lock function to restrict movement in the horizontal direction.

Horizontal Lock – Adjusting Magnet to Crosstrack

The magnet for the horizontal lock is attached to the lower arm of the machine. When energized this magnet locks to the crosstrack carriage. The magnet should be adjusted close enough to the carriage to lock to the carriage when energized but not so close that it makes contact with the carriage when it is not energized.



1. Make sure all the wheels are properly adjusted to their respective grooves.

2. Loosen the two screws that hold the magnet bracket to the side of the machine's lower arm.

3. Place two business cards under the magnet as spacers and tighten both bracket screws. Remove the business cards.

4. With channel lock **OFF**, move the machine its full length of travel along the carriage to see if the magnet makes contact with the carriage.

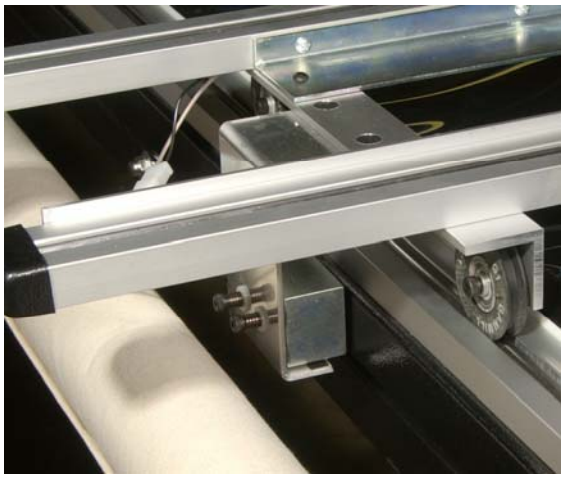
5. If the machine makes contact at some point, loosen the bracket again and, at this same location, place ***one*** business card under the magnet and retighten the two bracket screws. Move the machine again to ensure the magnet makes contact with the metal.

6. If the magnet does not make contact with the carriage, turn vertical lock ***ON*** and ***OFF*** at several locations to see if the magnet locks against the carriage.

Note: It is common for magnets to stay energized a short while after the switch is turned off. It should release with a short movement of the machine.

Vertical Lock – Adjusting Magnet to Table Top

The magnet for the vertical lock is attached to the front of the crosstrack carriage.



When energized, this magnet locks to the table preventing movement of the machine along the length of the table.

1. Loosen the two screws that hold the magnet bracket to the carriage.

2. Place two business cards as spacers between the magnet and the table. Tighten both bracket screws and remove the business cards.

3. With channel lock **OFF**, move the machine its full length of travel along the table to see if the magnet makes contact with the table.

   a) If the magnet makes contact at some point, loosen the bracket again and, at this same location, place ***one*** business card under the magnet and retighten the two bracket screws. Move the machine again to see if the magnet makes contact with the metal.

   b) If the magnet does not make contact with the carriage, turn horizontal lock ***ON*** and ***OFF*** at several locations to ensure magnet locks against the table.

Note: It is common for magnets to stay energized a short while after the switch is turned off. It should release with a short movement of the machine.

10. Basic Sewing Techniques

Bringing Up the Bobbin Thread

To prevent the bobbin thread from forming “rats nest” each time the stitching starts you should bring the bobbin thread up to the top and secure it in place. Two ways to bring up the bobbin thread are described here.

At the Start of Stitching

At the beginning of the stitching both threads are loose and this is a quick way to use the top thread to bring up the bobbin thread. At the end of stitching, the threads are attached to the quilt and this method does not work.

1. While holding the top thread take a single stitch where you want the stitching to start.

2. Continue to hold the top thread and move machine 2-3 inches away then pull the top thread up which will pull the bobbin thread to the top.

3. Move the machine back to start position.

4. Grasp both threads and hold them to the side while making 4 or 5 securing stitches.

Hint: Move the threads slightly when making the securing stitches to ensure you don’t stitch in the same location.

At the End of Stitching

When you reach the end of stitching and after the stitching is secured, use this method to bring up the bobbin thread to cut it.

1. Move the sewing head a few inches away from the stitching.

2. Grasp and hold the top thread then move the sewing head back to the last stitch. It isn't necessary to go back to the precise location of the last stitch but the closer you get, the smaller the thread tail will be after it is cut.

3. While still holding the top thread, take a single stitch then move the sewing head a few inches away.

4. As you pull on the top thread the bobbin thread is pulled up as well. Cut both the top and bobbin threads at the surface of the quilt.

Crossover Threads

As you stitch, especially for custom quilting, you sew a segment in one spot then move over a short distance to stitch another spot. Instead of stopping to cut the threads between these segments and, after you secure your stitches, you can simply move the sewing head to the new location and leave a thread trail connecting them. These connecting threads are called crossover threads.

Note: You will need to secure the stitches **before** and **after** crossing to the new location.

As you complete the stitching in an area you can leave the crossover threads to be cut later. Before

advancing the quilt it is a good idea to clip all the crossover threads in the area on the top of the quilt. The crossover threads on the back of the quilt can be clipped later.

When all the quilting is complete the crossover threads on the top of the quilt will all be cut, leaving the crossover threads on the back. To quickly cut all the back crossover threads, unpin the quilt from the backing roller and go to the back of the machine.

Unroll enough of the quilt to lay on the top of the table. Cut all the crossover threads on the portion of the quilt on the table. After all those threads are cut, unroll more of the quilt and continue cutting crossover threads until the end of the quilt is reached. Unpin the quilt from the pick-up roller.

Securing Stitches

To prevent threads from unraveling, you need to make locking stitches at the beginning and end of each segment of stitching. You can do this by backstitching or by taking tiny stitches. Look for places to hide the locking stitches in places such as the biding seam allowance, busy fabric, or seam lines.

- To backstitch at the start of sewing, start approximately ¼" inside the stitching line. Backstitch to the beginning and then proceed with the stitching. With this method, you are taking three or four stitches on top of three or four other stitches to secure the threads. At the end of stitching, simply backstitch for three or four stitches.
- To lock the stitches with tiny stitches, simply move the machine a little slower to produce very tiny stitches that are not easily removed. Locking stitches in this way is not possible when using stitch regulation since all the stitches are the same length. You can either turn off the stitch regulation or use the needle up/down or single stitch feature.

Note: It is extremely important that stitching be secured at both the **beginning** and **end** of each sewing segment. Monofilament thread requires more securing stitches than cotton or polyester threads. Unsecured stitching **will** unravel.

Ripping Out Stitches

One of the most frustrating, time consuming things to do in long-arm quilting is to rip out stitches. Stitching that takes only seconds to put in, can take hours to rip out. Choose a ripping tool that is small and sharp. You want to be able to lift and cut one stitch at a time while being careful not to rip the fabric.

Start at one end of the quilting stitches to be removed, and clip every third or fourth thread on the top of the quilt. If you are systematic and do this for the entire line of stitches, you will save time in the long run. After you have clipped every third or fourth stitch from the top, reach under the quilt and pull the bobbin thread to release all the stitches.

Another good tool for ripping out stitches is the Gingher Seam Ripper Picker. This tool has a sharp pick at one end and large, chiseled tweezers at the other. The pick can easily go under a stitch to pull it up and the tweezers easily grasp both top and bobbin threads to be ripped out without harming the fabric.

Basting the Edges

As you quilt you should baste the edges of the quilt. Usually you baste the top of the quilt before any other quilting is done, especially when you float the top. Set the speed to low and move the machine quickly to make large stitches. If you have a stitch regulator set the stitches to the lowest number. Walk your fingers over the quilt layers just behind the needle as it sews to prevent fabric layers from shifting or bunching together. The pressure from your fingertips helps ease out the fullness so the top lies flat against the batting as it is stitched.

Tip: If you baste the top of your quilt within 1/4" of the edge then this basting stitch can remain. The quilt binding will cover this basting.

If you have the extended throat plate in place it is difficult but not impossible to baste in this manner. Instead of walking your fingers behind the needle, try placing a ruler on the fabric and against the hopping foot to hold the fabric in place as you baste.

Stabilizing the Quilt

Stabilizing the quilt keeps it flat and free of puckers during quilting and should be the first thing you do each time the quilt is advanced. Once the quilting area is stabilized you can move on to the more decorative stitching for the blocks, borders and sashes.

Allover Designs

If you are quilting an allover, edge-to-edge design it is not necessary to stabilize the quilt. However you may wish to baste the edges to make attaching the binding easier later.

- Set the rollers so the top edge of the quilt is at a comfortable location to baste. Baste the top edge.

- Advance the quilt to set up for the first row of stitching and baste the left edge of the quilt in the stitching area.

- Prevent puckers on the back by making sure the backing fabric is smooth before stitching each area. From the back of the machine, run your hand under the backing to check for possible places it might pucker. Smooth out those places and clamp the sides. When clamping the sides be sure not to pull the backing fabric. If backing fabric is stretched and top fabric is not, the edge of the quilt will curl under as the backing fabric is unclamped.

- Stitch the first row(s) of the allover design then baste the right side. If you are careful, you

can baste the sides first then quilt the row(s). Basting the sides first might cause puckers at the edge where the basting is stitched. If this happens you can remove the basting and smooth out the puckers.

- Continue advancing the quilt, quilting the rows and basting the sides until you complete the last row. Baste the bottom edge of the quilt.

Using Zippers

Zipper systems are used to load quilts onto the leaders without pinning. When a quilt is loaded using the zippers it is possible to unload the quilt before the quilting is complete if the quilt has been stabilized. As long as the zippers are still attached to the unfinished quilt, the quilt can be reloaded onto the machine by simply zipping it back on.

11. Stitching with Constant Motor Speed (Machines without Plus™ Stitch Regulation)

Quilting machines without Plus Stitch Regulation have the control panel shown below:

The dial can be turned from 0 to 100% of the motor speed. The speed can be changed as you stitch if needed. The red square buttons marked **H** and **V** are for the horizontal and vertical channel locks respectively.

Speed Control

When you are first learning to use your machine, run the motor at a medium needle speed until you become accustomed to the feel of moving the machine. Moving the machine too fast with a slow needle speed causes greater needle deflection. Moving the machine too slow with a fast needle speed causes the stitches to be quite small. Your goal is to achieve 8 to 12 stitches per inch.

Starting and Stopping

Start the machine moving at the same instant that the needle switch is turned on, and stop the machine the same instant the switch is turned off. This will avoid too many small stitches concentrated in one area when the machine is turned on, and too much needle deflection when the switch is turned off.

Patterns

When you are quilting patterns with points, do not let the machine rest at the point. Since the needle is working at a constant speed, the machine must make a quick directional change, moving out of the point quickly in order to avoid too many small stitches and possibly broken threads at the point.

Free Motion

Free motion quilting is quilting without a pattern. Many teachers have videos, books and classes on the hundreds of different designs and techniques for free motion quilting. Your dealer carries many of these learning tools.

For free motion quilting with the motor set at a constant speed you will need to first set the speed that is comfortable for you. If you are having trouble with stitch quality such as "eyelashes" or pulled threads, either slow down the movement of the machine or turn up the motor speed. We tend to speed up around tight curves such as loops

and along straight lines. Resist the temptation to speed up at these places and try to keep the movement smooth and even.

Strive to keep the motion smooth and even for nice even stitch length. If you are having trouble with a particular design it often helps to speed up the motor and speed up the movement of the machine. Faster is sometimes better.

Using the Gam Guide™

The Gam Guide™ is used to stitch perfectly straight diagonal lines with your hand-guided quilting machine. It is used with the multi-function quilting foot, the Gam-Foot™ and is a specially designed guide bar, one end of which can be anchored against the pick-up roller. Once anchored, you hold the other end and can pivot the bar from the anchor point to any stitching angle.

After positioning the Gam-Guide™ to the desired angle, the carrier roller is used to hold the Gam-Guide™ in place.

Instructions for Use:

1. Adjust the pick-up roller approximately 1/2 inch above bed of machine to allow room for the bar to fit between pick-up roller and machine.

2. Working from left to right on your quilt, place the needle into fabric near pick-up roller where diagonal stitch-line is to begin.

3. Place guide-bar at desired angle against Gam-Foot's back (shielded on the back side of the needle) side and, while holding bar with left hand, push bat-wing against pick-up roller for the purpose of anchoring that end of guide-bar. Wrapping fingers of left hand completely around bar at point where it crosses carrier roller will make it easy to stabilize this end of bar. It is sometimes helpful to use your thumb to stabilize bar on carrier roller.

Note: Regardless of degree of angle or direction of angle, guide-bar must always be placed against the shielded portion of the Gam-Foot (never on the front (unshielded" side). This means the bar must be switched to opposite side of foot when angle changes to opposite direction.

4. While pressing bat-wing against pick-up roller and with Gam-Foot exerting a light pressure against the bar, turn the machine on with your right hand and glide Gam-Foot along guide-bar.

Tip: For the neatest, sharpest points to your stars, triangles and diamonds always use needle down position. By having your needle automatically stop in the fabric, it will hold the machine at the last stitch while you move the guide-bar to its next position.

Using Rulers and Templates

Rulers are used to stitch straight lines such as grid work, stitch in the ditch or echo quilting. The ruler should be ¼" thick so it can rest against the Gam foot. The extended throat plate should be attached to the lower arm of the sewing head to provide a stable base upon which to rest the ruler.

When using rulers it is best to hold the ruler in place with fingers flat and well away from the needle area. Hold the ruler in place as you stitch along its edge. When you reach near the end of the ruler, stop with the needle down in the fabric and reposition the ruler before continuing along the line.

Templates are various shapes including ovals, circles, animal shapes and more. Just like the rulers, templates should be ¼" thick and should be used in conjunction with the extended throat plate. For templates such as circles that are designed to be stitched completely around, start stitching in the 6 o'clock position and stitch clockwise. This allows you to stitch around the entire template without stopping to change your hand position. If you need to stop in the middle of the template, use the needle down function to hold the sewing head in place while you stop to reposition the template.

12. Plus™ Stitch Regulation

The Gammill Plus Control Center is a custom designed, state of the art stitch regulator system for quilting machines. The system provides two basic operational modes, Manual (constant motor speed) and Automatic (regulated stitch).

Some features of Plus Stitch Regulation are:

- Sensors and alerts for top thread break and/or low bobbin thread.
- Switch selectable ½ stitch and full stitch operations are available in either manual or automatic mode.
- Dual Liquid Crystal Display (LCD) units to operate the sewing head from either front or back.
- Dual channel locks (horizontal and vertical) that can be enabled or disabled while sewing.
- Needle position function to set the needle to stop in the up or down position.
- Safety feature in automatic mode whereby the motor shuts off automatically if the machine is not moved within five seconds.

Controls

A Plus Control Center display unit is located on both the front and back of the machine. Each consists of a 4-line LCD display, several push button switches, and one toggle switch on the left side. In addition to the display unit, there are two buttons on the ends of the machine handles. The left handle has the black Needle Position (NP) switch and the right handle has the red Run/Stop (RS) switch.

The buttons on the front of the display unit include:

H	Enables or disables the Left/Right (horizontal) channel lock
V	Enables or disables the Front/Back (vertical) channel lock
A	Selects automatic (stitch regulation) mode
M	Selects manual (constant speed) mode
+	Increases stitches per inch or motor speed
-	Decreases stitches per inch or motor speed

A toggle switch on the left side of the display unit is for the needle positioner. Use this switch to select either the needle position (1/2 stitch) function or the single stitch (full stitch) function.

The right side handle switch is the **Run/Stop** button. It enables or disables automatic stitching mode or turns the motor on or off in manual mode.

The left side handle switch is the **Needle Position** switch. The function is determined by the setting of the toggle switch on the side of the display unit.

Indicators

Indicators are lights, sounds or messages that indicate the system status and include:

Alert	This is a red LED on the upper middle portion of the display unit. It is illuminated when low bobbin or thread breakage as been detected.
Enabled	This is a green LED on the middle upper portion of the display unit. It is illuminated when the stitch regulation function is activated.
Beeper	An audible beeper is sounded when first entering stitch regulation mode or when low bobbin or thread breakage has been detected.
Display	A four line, 20 character LCD is provided to communicate settings and other information to the operator.
Channel Lock LED	Below the (H) and (V) buttons are red LED's which are illuminated when the channel lock magnets are activated.

Stitch Regulation (Automatic Mode)

In this mode you will set the desired stitches per inch. The stitching does not start until you move the machine head. While stitching in this mode you may change the number of stitches per inch. You cannot switch from automatic mode to manual mode while stitching in either mode.

1. Press **A** to enter Automatic mode. The word "**Regulated**" is displayed on the control center.

2. Press the **+** (plus) or **–** (minus) button to increase or decrease the stitches per inch. You can press these keys while stitching as well to increase or decrease the stitches per inch as you sew.

3. To begin sewing, press and release the right handle switch. Immediately after releasing the switch, an audible beep sounds and the green LED is illuminated on the display unit. If the needle is positioned down, the needle will rise up out of the fabric. The display unit will warn you that automatic mode is enabled and sewing head movement will cause the sewing motor to run.

4. Move the sewing head to begin sewing. While in automatic mode you are free to speed up or slow down movement of the sewing head while still maintaining even stitch length, however, rapid speed changes should be avoided. Moving the machine rapidly or suddenly slowing the machine after rapid movement may result in a variation in stitch length. Smooth machine movement will result in better quality stitching.

5. If you wish to increase or decrease the stitch length as you sew, simply press the **+** (plus) or **–** (minus) button while continuing to move the sewing head.

6. After sewing is complete, press and release the run/stop switch.

   - If the needle positioner was set in the down position before you started stitching, the needle will take a ½ stitch and remain down in the fabric.

   - If the needle positioner was set in the up position, it will stop in the up position.

Constant Speed (Manual Mode)

In this mode you set the motor speed then press the **Run/Stop** switch. This starts the motor running at a constant speed. You must coordinate the movement of the machine with the motor speed*.* To enter Manual Mode, press the **M** button. Set the motor speed by pressing the **+** (plus) or **–** (minus) to set the desired motor speed from 1 to 99% with **+** (plus) increasing the speed and **–** (minus) decreasing the speed. This speed can be adjusted as you sew as well.

To begin sewing, press and release the run/stop switch. The motor starts running immediately after it is turned on so you must be ready to coordinate the movement of the machine with start of the motor. Try to maintain a smooth, even movement of the sewing head which

gives you even stitch length. Slowing down produces smaller stitches and speeding up produces bigger stitches.

To stop sewing press and release the run/stop switch. Immediately after releasing the switch the motor stops. When the motor stops the needle returns to the position in which it was started.

Thread Break Detection

The Plus line of sewing heads includes a thread break sensor wheel. The top thread should be wrapped around this sensor wheel when threading the machine. In either automatic or constant speed mode, if the top thread breaks as you are sewing, the sensor no longer turns and a beeper sounds continuously until the run/stop switch is pressed. The words “Main Thread Breakage Detected” are displayed on the screen notifying you of a thread break.

To stop the beeps, press and release the run/stop switch. The thread break sensor will continue sensing a thread break during the next sewing cycle. To disable the thread break sensor, press the **M** button on the display unit. Sensing is then disabled until the machine is turned off.

Low Bobbin Sensing

The bobbin thread is used up at the same rate as the top thread. A bobbin usage gauge is included in the Plus line of quilting machines. This estimation is based on the bobbin being full and consistently wound. To obtain the most accurate bobbin usage you should clip the top and bottom threads at the same time. If the top thread is cut and the bobbin thread is allowed to spool off when the machine is moved, the bobbin thread will run out before the system alerts you it is low.

When the bobbin gauge determines that the bobbin thread is low the low bobbin alert beeps continuously until the run/stop switch is pressed and released.

To turn off the bobbin sensor press the **M** button on the display. Bobbin sensing will then be disabled until the machine is turned off.

To Check Amount of Bobbin Thread Remaining

Press and hold the **M** button then press and hold the **A** button. Release the **M** button and then release the **A** button. The remaining value of the bobbin thread is displayed. If the value is low, you may wish to insert a full bobbin before continuing. You may wish to have a full bobbin before stitching the next row of an allover design to avoid running out of bobbin in the middle of the row.

If you change the bobbin you will need to reset the bobbin counter by pressing the **+** (plus) button. If you do not change the bobbin press the **–** (minus) button to exit the bobbin counter without resetting it. The bobbin counter should be reset each time the bobbin is changed.

Needle Positioning

The needle position switch provides needle position control. A toggle switch on the side of the display unit selects needle position or single stitch mode. You may choose to take ½ stitches (needle position setting) or full stitches (single stitch setting).

To Position the Needle Up or Down

Flip the switch down to the **Needle Position** setting. Press and release the needle position switch. If the needle was positioned up, it takes a ½ stitch down. If the needle was positioned down, it takes a ½ stitch up.

Each time you stop stitching, the needle positions itself in this setting. To change this position simply press and release the left hand handle switch. There are times when you want the needle to remain in the fabric when stitching is stopped to prevent the needle from wobbling out of the stitch path. These times might include stitching in the ditch or using templates or rulers.

To Take a Single Stitch

Flip the switch up to the **Single Stitch** position.
Press and release the needle position switch. The needle takes a complete stitch returning to its original position.

Slow Stitching

To take a series of slow stitches, such as when securing threads, press and hold the needle position switch. If the toggle is set to **Needle Position** a series of half stitches are taken as the button is held down. If the toggle is set to **Single Stitch** a series of full stitches are taken as the button is held down.

Troubleshooting Encoder Problems

Checking Operation of Encoders

The proper operation of the encoders and encoder cables can be checked without operating the machine:

1. To enter Diagnostic Mode do the following:
   a) Turn the power **OFF.**
   b) Hold down the black, single stitch button and turn the power **ON.**
   c) After a few seconds, release the button.

2. The top line of the diagnostic screen should read "encoder".

3. When either encoder wheel is turned, the word "encoder" should go from small letters to capital letters. This indicates proper operation of the encoder circuit.

4. If the word "encoder" is missing or does not change from small letters to capital letters, then further diagnostics is required.

5. If one encoder is working properly and the other is not working properly, then switch the plugs at the back of the machine.

6. If the problem has switched to the other encoder then the problem is either the encoder cable or the encoder. Most likely it would be the encoder cable.

7. If the problem is still with the "original" encoder then the problem most likely resides in the motherboard.

8. Exit diagnostic mode by turning the power **OFF** then **ON**.

Regulated Stitch Electrical Adjustments

After your Gammill Plus machine has been used awhile there is a possibility some of the electrical values may need to be adjusted slightly. Some indications that adjustments are needed include:

- Needle over rotates.
- Stitch length is different than setting indicates.
- Bobbin counter needs adjustment.
- Needle Up/Down speed needs adjustment.

To make these adjustments you need to enter set-up mode. This is done using the run/stop switch and the control center from either side of the machine. However, once you enter set-up mode you need to make all the adjustments from the same side. While in set-up mode none of the new adjustment values can be tested. You will need to turn the power **OFF** then **ON** to save and test the new values.

To Enter Set-up Mode

1. If power is **ON**, turn it off. Press and hold the run/stop switch while turning on the power and continue holding down the run/stop switch for an additional two seconds after the power is turned on.

2. The display screen now shows the first of 17 functions that can be adjusted or selected. Adjustments to the displayed function are made by pressing **+** (plus) or **–** (minus).

3. Press and quickly release run/stop to advance to the next function. You can only advance to the next function and cannot go back to a preceding function. The last function, number 18, exits set-up.

4. There is no need to cycle through all 17 functions if you only want to change a few of them. However, in order to enter the new adjustment values into the system, you will need to advance to the next function (press run/stop). This can be compared to hitting **Enter** on your computer.

Each function in set-up mode is described below:

Needle Position Range
160 – 200
This number indicates the range of speeds available when adjusting Needle Up Speed (#2) and Needle Down Speed (#3) below.

Needle Up Speed
6 - 10
Adjusts the speed at which the needle rises up when the needle positioner is used. Settings for this function are very sensitive so adjustments should be no more than plus or minus 1. Additionally, movement of the needle bar is coordinated with that of the take-up lever. If the setting is too high, the needle and take-up lever will coast past their proper stopping points. The thread take-up lever should stop at the corner of the casting in its upward motion when machine is automatically positioning the needle upward. If the needle and/or take-up lever are stopping past the proper stopping point, press **–** (minus) once to slow down the needle up speed.

Needle Down Speed
6 – 10
Adjusts the speed at which the needle goes down when the needle positioner is used.

Single Stitch Range
160 – 200
This number indicates the range of speeds available when adjusting Single Stitch Speed (#5) and Single Stitch Time (#6) below.

Single Stitch Speed
6 - 10
Adjusts the speed the needle travels while making a complete stitch when in single stitch mode.

Single Stitch Time
Usually 110
Electrical value needed to allow position sensor time to travel far enough to lose the effect of the position stop switch so machine can complete a single stitch.

Time Out
Usually 02
When in Regulated Stitch Mode if machine is no longer being moved and if run switch is not turned off, the machine will turn itself off automatically after a few seconds.

Regulated Move Count
Always 01
Determines the sensitivity of movement signal supplied to motor with 1 being the most sensitive setting.

Eight Stitches per Inch
Usually 27
Electrical value normally used to achieve 8 stitches per inch. Note: 3 units = 1 stitch per inch. Example – if you go from 27 to 33 you would get 10 stitches per inch.

Nine Stitches per Inch
Usually 30
Electrical value normally used to achieve 9 stitches per inch.

Ten Stitches per Inch
Usually 33
Electrical value normally used to achieve 10 stitches per inch.

Eleven Stitches per Inch
Usually 36
Electrical value normally used to achieve 11 stitches per inch.

Twelve Stitches per Inch
Usually 39
Electrical value normally used to achieve 12 stitches per inch.

Auto Break Delay
Usually 06
In automatic mode, when the thread break sensor stops turning due to a thread break, this function sets the time delay before beeper and alert light are activated.

Manual Break Delay
Usually 04
In manual mode, when the thread break sensor stops turning due to a thread break, this function sets the time delay before beeper and alert light are activated.

Bobbin Count Enabled
Yes or No
If **No** is chosen, the bobbin counter is not active. If **Yes** is chosen, the bobbin counter is active. The Bobbin Multiplier (#16) below will need to be set for the type of thread used.

Bobbin Multiplier
Usually 15
The top thread is wrapped around the signal wheel. This causes the signal wheel to rotate as the thread is used. The number of revolutions of the signal wheel determines when the bobbin is running low. The bobbin multiplier entered is multiplied by 64 to determine when the low bobbin alert is activated. We have determined that 15 x 64 is the most accurate setting when using average thread. If coarse thread is used, you should set the bobbin multiplier at 14 or 13. If fine thread is used you should try 16 or 17.

Exit Screen --This screen tells you that all new values are saved in memory and to turn the power **OFF** then **ON** to resume operations with the new values.

Reset Bobbin Count

You can check the value of the bobbin counter at any time. To access the Bobbin Count Screen Press **M** then **A**, release **M** then release **A**. The number of counts left, if any is displayed on the screen. Each time the top thread rotates the signal wheel; the computer lowers the total count by one number starting with the Bobbin Full Count (BFC).

Example: 64-62-62-61…

When BFC reaches 0 the Bobbin Full Multiplier (BFM) lowers by one number.

Example: 15-14-13-12…

Each time the BFM drops a number the BFC returns to 64 and starts counting down again. When the BFM count reaches 0 an audible alert is sounded and the red light flashes to alert you to check the bobbin thread amount.

Example:
64-63-62…..3-2-1, 14,
64-63-62… 3-2-1, 13….

Each time a full bobbin is inserted in the machine, the bobbin count screen should be accessed and **+** (plus) should be pressed to reset it back to the full count. Failure to reset bobbin count when full bobbin is installed will result in false alarms.

Bobbin count screen can be accessed at any time to check the number of counts remaining even though alerts have not been activated. Run/Stop and Needle Position switches will not operate while bobbin count screen is open. Touch **–** (minus) to exit screen and return to normal operation.

Motor Run-Time Clock

To read the built-in Run-Time Clock, press **M** on the display panel while turning on the power. Hold **M** for approximately two seconds to allow for run time clock to boot up. The hours and minutes shown represent the total time the motor on this machine has run.

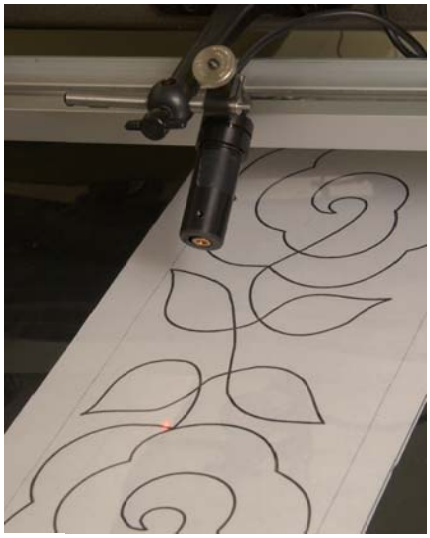
13. Stitching Patterns

Just about any printed pattern can be stitched on your quilting system. Choose patterns for machine quilting. These patterns are sometimes called continuous or labeled for continuous machine quilting. If you trace a continuous pattern your pencil would never leave the paper. Tracing patterns that are not continuous require you to either lift your pencil off the drawing or to trace over a previously drawn line.

Stencil designs made for machine quilting can be drawn directly on the quilt top using your favorite marking method or you can stitch the design using the Stencil Kit that is included with your quilting system.

Pantograph Patterns

Your Gammill Quilting System includes a set of pantograph or rolled patterns. These patterns are about 10 feet long and are positioned on the table surface. Using the laser light you follow the pattern from the back of the machine. The registration lines on the tabletop are used to position the pattern horizontally on the table.



Position the Pattern and Laser Light

Line up the bottom edge of the pattern along the registration marks on the table.

Set the position of the laser by placing the needle about ½" inside the edge of the quilt that is parallel to the pick-up roller. Align the laser so it points to the lowest part of the pattern. Tighten the set screw so the laser does not move from this position.

Check alignment of the pattern by moving the machine along the edge of the quilt, comparing the location of the needle to the position of the laser light. The light should always be shining on the lowest part of the pattern when the needle is ½" inside the edge of the quilt. If it is not, reposition the pattern.

Align the Sides

Because you need to look at the pattern while you are stitching it is hard to know when you reach the sides of the quilt. You can use blue painter's tape to mark the start and finish points of the allover patterns on the plastic overlay. As an alternative, you can use a rotary mat and/or ruler that fits between the tracks on the table to indicate the start and stop positions for allover patterns. Check the starting and stopping point with the laser and lay the mat or ruler over the pattern at the point where you need to start. Repeat with another mat or ruler to mark the stopping point at the other edge of the quilt.

Stitching the Pattern

Start stitching where the pattern begins at the right edge of the quilt. Start in the binding seam allowance so your locking stitches won't be seen after the binding has been attached. Secure the stitches and follow the pattern with the light. Stitch for several inches and stop to check the stitch quality. If any tension adjustments need to be made, do them now before proceeding with more stitching. Continue stitching until you reach the left edge of the quilt. Secure the threads.

At this point, if the pattern is small and you have room to stitch another complete repeat without advancing the quilt, you can reposition the laser light to stitch another row.

Advancing the Quilt

Advance the quilt so the top of the pattern you just stitched is a few inches from the pick-up roller. Look at the pattern on the table to find a place at the top of the pattern where the next row of stitching will interlock with the last. Move the machine so the laser is at this spot and place the needle down into the fabric. Using great care and moving slowly, advance the quilt while watching the light on the pattern.

The needle and sewing head will move from front to back as the quilt is advanced. Stop advancing the quilt when the light reaches the bottom of the pattern. Check the sides and adjust the mat and ruler if necessary. Reposition the laser and stitch the pattern as before.

The Last Row

When you reach the bottom edge of the quilt, go to the front of the machine and baste along the edge, removing the pins from the top roller leader as you go. Baste as close to the edge as possible. You are basting the edge and removing the pins so you can stitch off of and onto the quilt as you stitch the last row. Stitch the last row and secure the stitches.

Preparing Block and Border Patterns

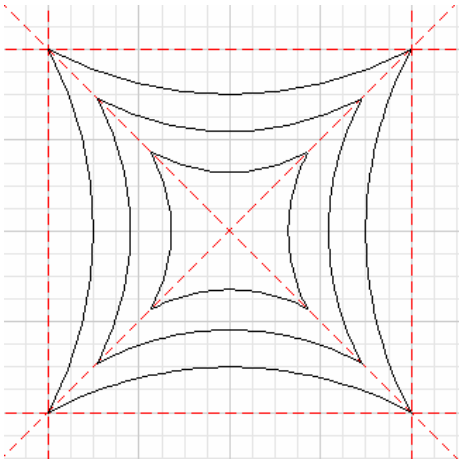
Before a block or border pattern can be stitched it must be prepared with guidelines then sized to fit the space. If you have a set of patterns that you will use often, it is a good idea to use the original pattern as the master pattern. Draw guidelines on this pattern once then use it as the original to make various sizes for later use.

Pattern Guidelines

Guidelines are used to place the pattern within the block or border. Some guidelines you might wish to draw include:

Center and/or diagonals
Outside/inside edges

The dashed lines in the picture below are guidelines.

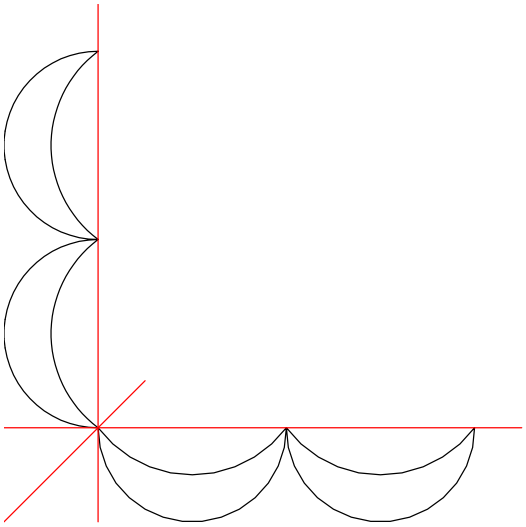


As you can see the diagonals intersect at the center of the pattern. In some cases you might wish to use the center as a reference point. The guidelines for the outside edges intersect to indicate the four corners of the pattern. These guidelines are sufficient for patterns whose basic shape is a square or other multi-sided shape.

For circular patterns the only mark you need is the center. However, if the center is not already marked it might be necessary to draw guidelines for the outer edges and the diagonals to find the center.

Border patterns consist of a border repeat and a corner. For border patterns, draw a straight line along the edge of the design that will face the interior of the quilt. If the border is directional, draw a direction arrow somewhere on the pattern to indicate the direction of the design.

For border corner patterns, draw perpendicular straight lines where the corner pattern meets the border repeat pattern. These lines indicate which part of the corner faces the interior of the quilt. Also, draw a diagonal line from the inside to the outside of the corner.



Once the guidelines have been drawn you need to determine how much to reduce or enlarge the

pattern you have to fit the quilt. A good rule of thumb is to size the pattern so that the outside edges fall to within ½" of the seamlines. A 12" block pattern should be sized to 12" – ½" – ½" = 11".

Resizing Patterns on a Photocopier

If you are using a pattern that is designed by someone else, you should check the copyright statement of the designer before you make copies. Use a photocopier that can resize images by the exact percentage you need. To determine what percentage to reduce or enlarge your pattern, divide what you want by what you have and multiply by 100.

Enlarge: If you want the width of a block pattern to be 11 ½" but the master pattern is only 8", divide 11.5 by 8 and multiply by 100.

11.5 / 8 x 100 = 1.44 x 100 = 144%

In this case you enlarge the pattern to 144% of the original.

Reduce: Use the same formula to find the percentage to reduce the pattern. To size a 12" pattern to fit a 10” space:

10 / 12 x 100 = .83 x 100 = 83.33%

In this case you reduce the pattern to 83.33% of the original.

Use the height measurement of the border repeat to determine the sizing factor. For block patterns and border corner patterns you need only one copy of the resized pattern. This one copy is positioned each time you want to quilt it.

For border repeats you will need enough of the resized pattern to fit the longest side of the quilt. After you have sized the height of the pattern to fit the width of the border, measure the length of the resized repeat and measure the length of the longest side of the quilt. Divide the quilt measurement by the repeat measurement. You can make extra copies if you like so that you will have them later if needed.

Example: Quilt length = 95" and repeat length = 8"

95 / 8 = 11.88

For this quilt you will need 11 copies of the border repeat. The remainder of .88 is used later to fit the 11 pattern repeats between the corners.

Some border repeats are designed to change direction at the center of the border. In this case you will have one master repeat going in one direction and another master repeat going in the other direction. If this is the case, you will need to make half of the copies from one repeat and half from the other.

Remember that you can use the same master pattern with its marked guidelines each time you wish to reduce or enlarge the pattern for any quilt. Since the guidelines are already marked on the master, they are enlarged or reduced with the pattern. Keep master patterns and their associated enlarged or reduced

patterns in a folder to avoid having to copy patterns in the future.

Block Patterns Using the Stencil Kit

When stitching patterns, it is often more convenient to operate the machine from the front (needle side) than from the back. The Stencil Kit is designed to allow you to stitch single patterns from the front of the machine. It consists of one large and one small piece of Plexiglas™. The pattern is sandwiched between the two pieces of Plexiglas™ and the three layers are placed on the quilt top, a comfortable distance from the needle.

The Stylaser is moved from its position on the lower arm of the machine to the top of the upper arm as shown below.

Notice that the cord for the Stylaser is clipped in two places to keep it away from the thread. The first white clip is located just above the name plate (Classic in this picture) and the second is located near the light and power switches.

Note: The white clips should never be used as a thread guide.

Stitch a Pattern with the Stencil Kit

1. Place the paper or stencil pattern between the Plexiglas™ with the smaller piece on top of the pattern.

2. Place the Plexiglas™ layers to the left or right side of and a comfortable distance away from the needle.

3. Install Stylaser on vertical spindle located on upper arm of machine then point Stylaser in the direction of the stencil.

4. On the quilt, locate the center of the circle or block to be quilted and place the needle down in that location.

5. Adjust the Stylaser to point to the center of the pattern as indicated by the guidelines and raise the needle out of the quilt.

6. If the pattern is circular there is no need to check the angle of the pattern. However, if the pattern is

square you will need to check the position of the corners. Move the needle to one of the corners of the block. Look at the pattern and check to see that the laser is pointing to the corner of the pattern. Slight adjustments may need to be made, being careful to keep the center of the pattern in the same location.

7. Check all four corners and check the center again before stitching.

To make the starts and stops less noticeable, start stitching where the pattern forms a point or where two lines cross. Trace the pattern just as you would a pantograph pattern.

If you prefer to stitch the pattern from the back of the machine you will install the Stylaser on the lower arm of the machine and place the pattern on the tabletop. Follow steps 4 - 9 above to position the pattern on the tabletop. The pattern can be placed under the plastic overlay or you can use drafting tape to hold it in place for stitching. Drafting tape will not destroy the paper as it is removed and you can use a single piece multiple times.

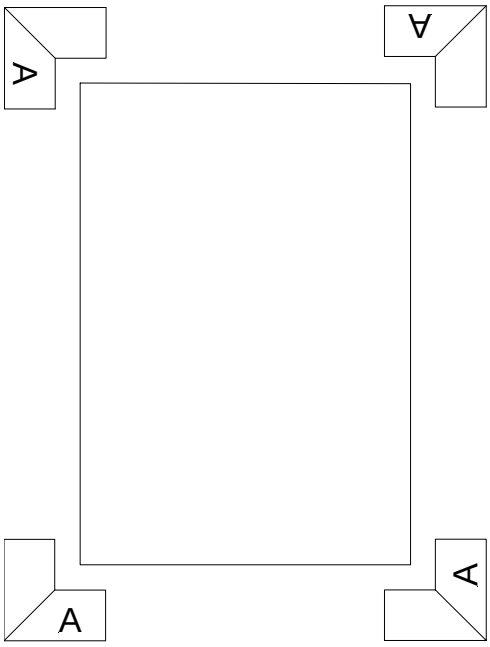
Borders and Corners

Stitching patterns in borders takes several steps including:

1. Size the border repeat and corner patterns.
2. Stitch the top border including the corners.
3. Quilt the interior of the quilt and baste or pin the side borders as you go.
4. Stitch the bottom border including the corners.
5. Unload and turn the quilt.
6. Stitch the first side border.
7. Stitch the second side border.

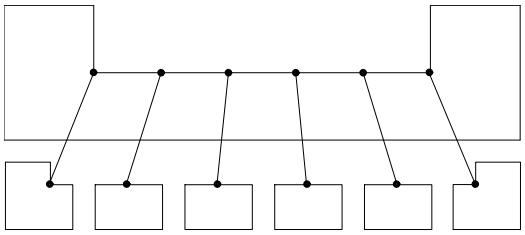
Set the Corner Patterns

The corner patterns are stitched first using the Stencil Kit as described above. You might find it helpful to use chalk or washout marker to mark the corners on the quilt to use as a guide for placing the pattern. The same pattern can be used for all corners by simply rotating it 45 degrees as shown below.



Set the Border Repeats

Instead of taping the border repeats together to form one long pattern, keep the repeat patterns separate and space them as needed on the table between the corners.



Starting at each corner and working toward the center, line up the repeats next to one another. If you place three repeats on the left, then place three repeats on the right. Continue placing the same number of repeats on each side until you have no more space in the center for a full repeat.

At the midpoint of the border, you may need to do a little adjusting if the repeats don't meet exactly. You can leave the center space unquilted or you can stitch a design to connect the two sides. The connecting pattern can be freehand or you may choose to take a design element from the pattern and draw that on another piece of paper. Place the paper in the middle of the space and stitch the pattern as you stitch the border.

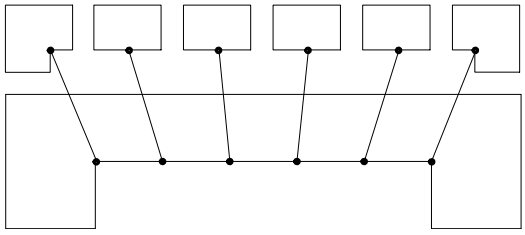
Stitch the Border Repeats

Whichever method you chose to fill in the border repeats, the patterns need to be positioned and secured to the table before quilting. Have one or two pieces of drafting tape ready to each repeat. Tear off the pieces and lightly stick them on the table above or below the patterns for now.

Use the guidelines drawn on the border pattern to align it with the quilt border. Start at one corner and work out to the center then start at the opposite corner and work out to the center. You may need to leave a space between the patterns to fit the repeats in the border. Tape each pattern down as you align it with the quilt top.

When all the repeats have been taped down, check once to make sure the pattern is correctly positioned before stitching. Stitch from the right corner to the left. After completing the first border, quilt the interior of the quilt top. Each time you advance the quilt, baste along the side borders to hold them in place. These side borders will be the last part of the quilt to be quilted.

When you reach the other border you will flip the patterns over so the guidelines for the interior of the quilt now face the interior of the quilt.



Stitch the corners first then position and stitch the border repeats between them just as you did for the first border.

Unload the quilt, turn it and reload it with the unquilted borders pinned to the leaders. Instructions for turning

the quilt follow. Use the same procedure to quilt the remaining two borders. Since all four corners have been quilted you need only position and stitch the border repeats between them.

Turning the Quilt

When a quilt is loaded in the frame, the two borders parallel to the rollers can be stitched continuously from one end to the other. The other borders can be only partially stitched because only part of them is exposed to the quilting area at a time. To stitch continuous designs in these side borders, it is necessary to unload the quilt, turn it and reload it.

As you stitch the interior of the quilt, you will quilt the top and bottom borders. The side borders are basted as you go. The basting prevents the border layers from shifting. Don't be afraid to put lots of large basting stitches in the border because the more basting you have the easier it will be later to properly reload the quilt after turning. If the basting stitches are large they can be easily removed later.

Some quilters prefer to use pins to baste the sides in place. If you choose to use pins place the pins parallel to the rollers so they can be easily rolled onto the pick-up roller.

Unload the quilt and turn it so you can pin the unquilted borders to the leaders. Center the quilt and pin it to the pick-up and backing rollers.

Tips for Stitching Patterns

Start and stop the stitching in a point or corner. This helps hide the securing stitches.

If a pattern takes two or more passes to complete, start at one of the intersections of the passes. This allows you to stitch one pass then immediately stitch the other without stopping. You might want to mark the stitching directions of the intersections to avoid stitching the same portion a second time.
When the starting and stopping points of the pattern are the same don't secure the stitches at the starting point. Instead, as you approach the end of the pattern (which is really the starting point) over stitch the starting point for a few stitches then back stitch for about three stitches. This procedure secures the stitching for the start and stop at the same time, leaving fewer overstitches at that point. The non-technical term for the look of heavy overstitching is "blob".

Ergonomics for Comfortable Quilting

Depending on your individual physical situation, you should be able to quilt for many hours each day. However, you must learn the proper ways to position yourself while using the machine and other ways to minimize stress and injury to yourself.

Correct Posture

When you hold the machine handles, your elbows should be bent at 90°. Stand up straight with good posture. Never quilt for more than two hours at a time. Instead, quilt for 1 to 1 ½ hours, then stop and put your feet up for about 10 minutes. Before returning to the quilting machine, do a few stretching exercises and have a glass of water. You should be refreshed enough to go on for another hour or so. You will be amazed at how several short breaks during the day give you energy and stamina and don't leave you tense and sore at the end of the day.

Wrist and Arm Positions

Relax your grip as much as possible. Too much tension in your grip not only tends to flatten out curves as they are stitched but can cause muscle tightness from your fingers, up your arms and shoulders and into your back. Practice fingertip control with a light grip on the handles. With proper wheel-track adjustment and the balance of the machine, minimum effort is required for its movement.

Keep your wrist straight and aligned with your arm. If this is difficult to do, you might consider purchasing a wrist brace from a drug or discount store. This brace has a rigid plastic support that keeps your wrist in the proper position. Wrist braces are sold by the size of your wrist, so measure your wrist before going to the store.

When using the Needle Position or Run/Stop buttons on the handles, use your index finger, not your thumb. Don't allow your index finger or thumb to rest on the switch while you quilt.

Foot and Ankle Comfort

To help you comfortably stand for long periods of time you should always wear comfortable shoes with plenty of support of feet and ankles. Make sure the laces are not tied too tightly and wear comfortable cotton socks. If your floor is hard, purchase an anti-fatigue mat or other surface made for standing. These can usually be found at your local home-improvement or hardware store.

Never quilt in bare feet. Pins and needles may drop to the floor and out of sight until you find them with your bare feet. Older quilt tops might contain old, rusty pins that can prick you so be sure to keep your tetanus shots up to date.

Eyestrain

Proper lighting is needed to prevent eyestrain. Always use the light on the sewing head for direct lighting as you work. For room lighting choose overhead lights or floor lamps with lighting sufficient enough to prevent shadows in your work area. Fluorescent lights are a good choice.

Hair and Clothing

Long hair should be pulled back, out of the way so that it cannot become tangled in the moving parts of the machine. Avoid dangling jewelry and clothing that can also get caught as you quilt.

14. WorkStation™

The WorkStation™ consists of a base that is positioned on the tabletop and three double-sided discs with shapes etched into them. The tabletop is fitted with grooves along the inside edge. These grooves are used to position and hold the WorkStation™ as it is being used.

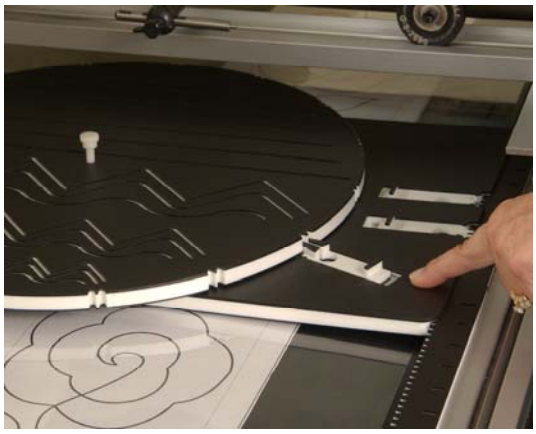
The two parallel white sliders are used to obtain precise positions along the table in increments of one grove. Only one of the sliders is used at a time to achieve the one groove increments.

A removable pin is placed on a post attached to the lower arm. This pin is placed in the various grooves and when the sewing head is moved, the grooved pattern is stitched on the quilt.

The discs are held in place on the WorkStation™ by a center screw. This center screw is also used to center the design in the area to be quilted.

By using each of the sides you are able to stitch various sizes of ovals, wavy or straight lines, circles and rounded corner squares.

The discs can be rotated and held in place by the single white slider to achieve various orientations of the patterns.



Follow these steps to use the WorkStation™:

1. Find the center of the block or other area to be stitched and place the needle down at that location.

2. Slide the WorkStation™ along the table until the pin is directly over the center screw holding the disc to the WorkStation™.

3. Once in place, secure the WorkStation™ by sliding one of the white sliders into the grooves on the table.

If needed, you can rotate the discs and lock them into place using the single slider.

If you are using stitch regulation, press the Run/Start switch and begin moving the machine so the pin travels inside the groove. Continue stitching until you reach the beginning of the stitching and secure the stitches.

If you wish to stitch the same design in a smaller size, simply release the pin and place it in the desired groove.

If you are not using stitch regulation set the speed to a moderate range and begin moving the machine along the groove, stitching completely around the shape. Stop stitching when you reach the beginning of the design. Secure the stitches.

Index