Please read all these safety instructions before using this machine.

**DANGER** - To reduce the risk of electric shock, do not leave the machine unattended when plugged in. Always unplug this machine from the electric outlet immediately after using and before cleaning.

**WARNING** - To reduce the risk of burns, fire, electric shock, or injury to persons:

- Do not allow this machine to be used as a toy. Pay close attention when this machine is used by or near children.
- Use this machine only for its intended use as described in this manual. Use only attachments recommended by the manufacturer as contained within this manual.
- Never operate this machine if it has a damaged cord or plug, it is not working properly, or it has been dropped, damaged, or dropped into water. Return the machine to the nearest authorized dealer or service center for examination, repair, or electrical or mechanical adjustment.
- Never operate the machine with any air openings blocked. Keep ventilation openings of the quilting machine free from the accumulation of lint, dust, and loose cloth.
- Never drop or insert any object into any opening.
- Do not use outdoors.
- Do not operate where aerosol (spray) products are being used or where oxygen is being administered.
- To disconnect, turn all controls to the off position, then remove the plug from the outlet by grasping the plug. Do not pull on cord.
- Keep fingers away from all moving parts. Special care is required around the quilting machine needle.
- Always use the proper needle plate. The wrong plate can cause the needle to break.
- Do not use bent or damaged needles.
- Do not pull or push fabric while stitching. It may deflect the needle, causing it to break.
- Switch the quilting machine off when making any adjustments in the needle area, such as threading the needle, changing the needle, or changing the presser foot, etc.
- Always unplug the quilting machine from the electrical outlet when removing covers, lubricating, or when making any other user servicing adjustments mentioned in the instruction manual.

If using this machine in an area with inconsistent input power, it is recommended the surge protector is connected to a backup battery supply.

Connect this machine to a properly grounded outlet only. See “Grounding Instructions” (next page).

**SAVE THESE INSTRUCTIONS**

**Do not discard box or packaging**
**GROUNDING INSTRUCTIONS**

This product must be grounded. In the event of malfunction or breakdown, grounding provides a path of least resistance for electric current to reduce the risk of electric shock. This product is equipped with a cord that has an equipment-grounding conductor and a grounding plug. Plug the cord from the quilting machine into a surge protector. The surge protector must be plugged into an appropriate outlet that is properly installed and grounded in accordance with all local codes and ordinances.

**DANGER** - Improper connection of the equipment-grounding conductor can result in a risk of electric shock. The conductor with insulation having an outer surface that is green, with or without yellow stripes, is the equipment-grounding conductor. If repair or replacement of the cord or plug is necessary, do not connect the equipment-grounding conductor to a live terminal. Check with a qualified electrician or serviceman if the grounding instructions are not completely understood, or if in doubt as to whether the product is properly grounded.

Do not modify the plug provided with the product - if it will not fit the outlet, have a proper outlet installed by a qualified electrician.

![Grounding Methods Diagram]

This product is for use on a nominal 120 V circuit, and has a grounding pin as illustrated above (A). A temporary adapter, shown in (B) and (C), may be used to connect this plug to a 2-pole receptacle (B) if a properly grounded outlet is not available. The temporary adapter should be used only until a properly grounded outlet can be installed by a qualified electrician. The green colored rigid ear, lug, and the like, extending from the adapter must be connected to a permanent ground such as a properly grounded outlet box cover. Whenever the adapter is used, it must be held in place by the metal screw.

**A qualified electrician should be consulted if there is any doubt as to whether an outlet box is properly grounded.**
Table Of Contents

Important Safety Instructions ............. 2
Machine Specifications ..................... 5
Machine Layout ............................ 6
Ports and Plug-Ins .......................... 8
Included Parts & Tools ...................... 9
Out-of-the-Box Assembly .................... 12
  Installing the Wheels ...................... 13
  Installing the Wheel Covers ............. 16
  Assembling the Handlebars .......... 17
  Connecting the Display .................. 19
  Attaching the Thread Mast ............. 20
  Installing the Upper Encoder .......... 21
  Installing the Lower Encoder .......... 23
  Turning the Machine On/Off .......... 25
Preparing to Quilt ......................... 26
  Choosing Machine Settings .......... 27
  Winding a Bobbin ....................... 29
  Loading the Bobbin Case .......... 31
  Threading the Machine .......... 34
Quilting ..................................... 39
  Using the Handlebar Controls .... 40
  Using the Precise Quilting Mode .... 41
  Using the Cruise Quilting Mode .... 43
  Using the Basting Mode ............ 45
  Using the Manual Quilting Mode ... 47
  Adjusting Thread Tension .......... 49
  Tracking Stitch Count and Run Time ... 51
Maintaining the Machine .................... 52
  Oiling and Cleaning ................. 53
  Changing the Needle ............... 56
  Adjusting the Bobbin Cam .......... 58
  Adjusting the Hopping Foot .... 59
    Height Adjustment ................. 59
    Rotation Instructions .......... 60
Removal Instructions ....................... 62
  Installation Instructions .......... 63
  Reinstalling the Needle Plate .... 64
  Removal Instructions .......... 64
  Installation Instructions .......... 65
  Calibrating the Touch Display .... 66
Repairs and Diagnostics ..................... 67
  Checking the Firmware .......... 68
  Replacing the Encoder Spring ...... 69
  Reinstalling the Hook Holder ...... 71
    Removal Instructions .......... 71
    Installation Instructions .......... 72
  Timing the Machine ............ 74
Appendix ..................................... 77
  Choosing Your Needle ............. 78
  Choosing Your Thread .......... 80
  Choosing Your Fabric and Batting ... 83
  Troubleshooting Guide .......... 84
  Index .................................. 86
Machine Specifications

**Product Dimensions**

**Body:**
- Height: 680.2 mm, or 26.8 inches
- Width: 395.4 mm, or 15.6 inches
- Length: 831.9 mm, or 32.8 inches
- Weight: 15.9 kg, or 35 lbs

**Quilting Arm:**
- Height: 224.8 mm, or 8.9 inches
- Width: 482.6 mm, or 19 inches

**Electrical**
- Input Voltage: 110-220 VAC
- Peak Power Consumption: 300 W

**Features**

1. Adjustable handles for efficient, extended use (page 17)
2. 2.4” Touch Display (page 19)
3. Dual thread mast and stands for quilting and winding bobbin at the same time
4. Built-in bobbin winder (page 29)
5. Dual wheels for stability (page 13)
   - Stitcher per minute (SPM) range of 90 to 2000 stitches
   - Regulated stitching
1. **Hand Wheel**
   Raises and lowers the needle bar.

2. **Bobbin Stand** (page 29)
   Holds the bobbin for winding.

3. **Bobbin Cam** (page 29)
   Starts and stops bobbin winding.

4. **Bobbin Thread Cutter** (page 29)
   Cuts wound bobbin thread.

5. **Bobbin Thread Tensioner** (page 29)
   Tensions thread when winding a bobbin.

6. **Thread Mast** (page 20)
   Guides thread when quilting.

7. **Bobbin Thread Guide** (page 29)
   Positions thread for winding a bobbin.

8. **Thread Stand** (page 34)
   Holds a cone of thread.

9. **Dual Thread Tension Guide** (page 34)
   Positions thread when quilting.

10. **Display Port Cover** (page 19)
    Accesses display ports.
**Hook Assembly (Front View)**

11 **Small Thread Tensioner** (page 34)
Tensions thread when quilting.

12 **Take-Up Lever** (page 34)
Tensions thread when quilting.

13 **Large Thread Tensioner** (page 34)
Tensions thread as adjusted when quilting.

14 **Thread Guides** (page 34)
Positions thread when quilting.

15 **Lamp** (page 27)
Lights up needle area when machine is on.

16 **Needle Bar** (page 56)
Holds the needle when quilting.

17 **Hopping Foot** (page 59)
Presses fabric down when quilting.

18 **Machine Wheels** (page 13)
Rides the bottom carriage rails to move machine up or down on the quilting frame.

19 **Thread Cutter** (page 31)
Cuts excess thread from threading machine.

20 **Hook Assembly** (page 31)
Holds the bobbin case and hooks the top thread to create stitches.

21 **Bobbin Case** (page 31)
Holds M class bobbin and controls bottom thread tension.

22 **Hook Assembly Cover** (page 31)
Covers the hook assembly area.
Ports and Plug-Ins

1. **Power On/Off Switch** (page 25)
   Turns machine on and off.

2. **Encoder Ports** (page 21)
   Connects encoders to machine.

3. **Quilt Motion Tablet Port**
   For optional automation accessory.

4. **USB Connector Port**
   For updating only.

5. **Power Port with Retainer** (page 25)
   Connects and holds power cable to the machine.

6. **Accessory Ports**
   For accessories.

7. **Back Handle Ports**
   For back handle accessory.

8. **Display Cable Port** (page 19)
   Connects display cable to machine.

9. **Display Clip Port** (page 19)
   Connects and holds display.
Included Parts & Tools

Please make sure all pieces are included in your kit.

**Back Wheel Base Assembly**
- SMP-09-14099
- See page 13

**Front Wheel Base Assembly**
- SMP-09-14089
- See page 13

**Back Left Wheel Base Cover**
- SMP-05-12164
- See page 16

**Front Left Wheel Base Cover**
- SMP-05-12166
- See page 16

**Front Right Wheel Base Cover**
- SMP-05-12167
- See page 16

**Back Right Wheel Base Cover**
- SMP-05-12165
- See page 16

**SBHCS Screw M6 x 20 mm** (x2) (x2)
- HDW-03-10088
- See page 13

**Shoulder Bolt M6** (x2)
- HDW-03-12206
- See page 13

**2.4 Inch Touch Display**
- SMP-09-12911
- See page 19

**Thread Stand Assembly**
- SMP-09-14104
- See page 20

**Box 1**

**SBHCS Screw M4 x 8 mm** (x2)
- HDW-03-10012
- See page 20

**Zip Tie (x2)**
- MIS-08-10805
- See page 23

**Zip Tie Mount (x2)**
- SMP-08-10070
- See page 29

**M Class Bobbin (x3)** (two pre-installed)
- SMP-08-10070
- See page 29

**Needle Magnet**
- SMP-09-13837
- See page 56

**Needle Size 16** (x10)
- ACC-01-11024
- See page 56
Included Parts & Tools

**Box 1 (Continued)**

**Needle Size 18 (x11)** (one pre-installed)
- ACC-01-11025
  - See page 56

**Thumb Screw M3** (needle bar spare)
- HDW-03-11736
  - See page 56

**Hopping Foot Screw**
- HDW-03-10966
  - See page 59

**SBHCS Screw M6 x 16 mm (x4)**
- HDW-03-10974
  - See page 16

**Box 2**

**T-handle Allen Wrench 4 mm**
- HDW-03-13114

**T-handle Allen Wrench 3 mm**
- HDW-03-13115

**T-handle Allen Wrench 2.5 mm**
- HDW-03-13116

**Lint Brush**
- SMP-03-10170
  - See page 53

**Flat-head Screwdriver**
- SMP-03-10169
  - See page 64

**Hopping Foot Height Tool**
- SMP-03-12171
  - See page 59

**Timing Spacer**
- SMP-03-11320
  - See page 74

**T-handle Allen Wrench 2 mm**
- HDW-03-13117
Box 3

Upper Encoder (silver spring)
SMP-09-10668
See page 21

Lower Encoder (black spring)
SMP-09-13427
See page 23

Upper Encoder Spring (silver)
HDW-03-10216
See page 69

Lower Encoder Spring (black)
HDW-03-10671
See page 69

Box 4

Power Cord
SMP-02-10845
See page 25

Oil Bottle
SMP-09-13888
See page 53
Out-of-the-Box Assembly

These steps are for assembling the machine when it is first removed from the packaging materials. Your quilting frame should be set up prior to machine assembly.

Installing the Wheels ................................................................. page 13
Installing the Wheel Covers ....................................................... page 16
Assembling the Handlebars ....................................................... page 17
Connecting the Display .............................................................. page 19
Attaching the Thread Mast ......................................................... page 20
Installing the Upper Encoder ...................................................... page 21
Installing the Lower Encoder .................................................... page 23
Turning the Machine On/Off ....................................................... page 25

Tip: For additional help, scan the QR code below with the camera on your iphone to visit our online support videos!

https://www.graceframe.com/en/resources/support/videos
Installing the Wheels

Parts & Tools Needed:

- Back Wheel Base Assembly
- SBHCS Screw M6 x 20 mm (x2)
- T-handle Allen Wrench 4 mm
- Front Wheel Base Assembly
- Shoulder Bolt M6 (x2)
- Tape Measure (not included)

Instructions

The machine wheels move the machine across the bottom carriage. To install the machine wheels:

1. Place the **back wheel base assembly** under the rear of the machine with the **set screws** facing the rear.

2. Screw in place with two **SBHCS M6 x 20 mm screws** and the 4 mm Allen wrench.
Out-of-the-Box Assembly

Installing the Wheels (Continued)

3. Place the **front wheel base assembly** under the front of the machine with the **set screws** facing the rear.

4. Use the 4 mm Allen wrench to screw in the **shoulder bolts**.

5. Place the machine onto the bottom carriage, aligning the wheels with the tracks.
   
   **Tip:** See your frame manual for bottom carriage orientation.

6. Loosen two set screws on one side of the machine (either the right side or left side) with the 4 mm Allen wrench.

7. Slide the machine up and down the bottom carriage tracks. The machine should move smoothly.

8. Check that the machine is centered over the wheels. If needed, shift the machine from side to side.
9. Re-tighten the wheel block set screws with the 4 mm Allen wrench.
Out-of-the-Box Assembly

Installing the Wheel Covers

Parts & Tools Needed:

- Front Left Wheel Base Cover
- Front Right Wheel Base Cover
- Back Left Wheel Base Cover
- Back Right Wheel Base Cover
- SBHCS Screw M6 x 16 mm (x4)
- T-handle Allen Wrench 4 mm

Instructions

1. Locate the label on the inside of each wheel cover.
2. Slide the covers onto the associated leg.
3. Screw each cover into place using an **SBHCS M6 x 16 mm screw** and the 4 mm Allen wrench. Tighten until snug.
Assembling the Handlebars

Parts & Tools Needed:

- Handlebar Assembly
- T-handle Allen Wrench 4 mm

Instructions

Take the following steps to install and adjust the handlebars:

1. With the 4 mm T-handle Allen wrench, remove the handlebar cover screw.

   ![Diagram showing handlebar cover screw removal]

   The handlebar cover (shown in blue) opens.

2. Slide the handlebar assembly into the slot so the clamps are on the top.

   ![Diagram showing handlebar assembly sliding into slot]

3. Press the cover closed and loosely screw in the cover screw. **Note:** The cover will not close fully until tightened.

   ![Diagram showing cover being pressed closed]

   ![Diagram showing cover screw being tightened]
1. Hold the **handlebars** at the desired angle and tighten the **cover screw**.

2. Plug the **color-coded cables** from the handlebars into the machine.

3. Twist the **controls** vertically until they are comfortable to hold and operate.

4. Open the **handlebar levers**.

5. Close the **handlebar levers**.

6. Tip: For micro-stippling, angle the handlebars down toward the fabric in step 4, and leave the controls horizontal in step 7.
Connecting the Display

Parts & Tools Needed:

2.4 Inch Touch Display

Instructions
Take the following steps to install the display:

1. If not already done, plug one end of the ribbon cable into the display. Weave the cable through the display clip.

2. Lift the display cover on the machine.

3. Slide the display clip into the display clip port, and plug the display cable into the display cable port.

4. Close the display cover.

Note: To remove the display, turn off the machine. Then unplug the display ribbon cable. Press down on the clip release and pull out the display.
**Out-of-the-Box Assembly**

**Attaching the Thread Mast**

**Parts & Tools Needed:**

- Thread Stand Assembly
- T-handle Allen Wrench 2.5 mm
- SBHCS Screw M4 x 8 mm (x2)

**Instructions**

The thread stand assembly is installed onto the top of the right side of the machine. Take the following steps:

1. Slide the **thread stand assembly** over the screw holes on the machine.

2. Use the 2.5 mm Allen wrench to screw in two **SBHCS M4 x 10 mm screws**.

   **Note:** It may be necessary to push back the foam on the thread stand for this step.
Installing the Upper Encoder

Parts & Tools Needed:

- Upper Encoder (silver spring)
- T-handle Allen Wrench 4 mm
- T-handle Allen Wrench 2.5 mm

Instructions

The encoders monitor the position of the machine over the frame, allowing for regulated stitching. The upper encoder is installed on the outward-facing, left-rear wheel of the machine. Please take the following steps:

1. Use the 4 mm Allen wrench to remove the **left rear wheel** from the machine.

   ![Left Rear Wheel](image)

   The **wheel screw** will not be needed again, and can be stored with the packaging materials.

   ![Wheel Screw](image)

2. Loosen the **lock collar screw** (shown in blue) on the upper encoder with the 2.5 mm Allen wrench until the **lock collar** turns freely.

   ![Lock Collar](image)

   **Note:** Depending on the encoder, this step may require the 2.0 mm Allen wrench.

3. Slide the wheel onto the upper **encoder screw** so that the **wheel hub** faces away from the encoder.

   ![Wheel Hub](image)

   ![Encoder Screw](image)
Out-of-the-Box Assembly

Installing the Upper Encoder (Continued)

4. Place the encoder screw into the left rear wheel hole so the encoder O-Ring is between the two left machine wheels.

5. Tighten the encoder screw with the 4 mm Allen wrench.

6. Turn the encoder lock collar (shown in blue) to point up and tighten the lock collar screw with the 2.5 mm Allen wrench. Note: Depending on the encoder model, this step may require the 2.0 mm Allen wrench.

7. Plug the encoder cable into one of the encoder ports (shown in blue) on the back of the machine.
Installing the Lower Encoder

Parts & Tools Needed:

- Lower Encoder (black spring)
- T-handle Allen Wrench 4 mm
- T-handle Allen Wrench 2.5 mm
- Zip Tie (x2)
- Zip Tie Mount (x2)

Instructions

The encoders monitor the position of the machine over the frame, allowing for regulated stitching. The lower encoder is installed on the left-rear wheel of the bottom carriage. Please take the following steps to install the encoder onto the bottom carriage:

1. Locate the left rear wheel of your bottom carriage. **Note:** If needed, review your frame assembly manual to determine the front of the bottom carriage.

2. Loosen the **lock collar screw** (shown in blue) on the lower encoder with the 2.5 mm Allen wrench until the **lock collar** turns freely. **Note:** Depending on the encoder model, this step may require the 2.0 mm Allen wrench.

3. Use the 4 mm Allen wrench to remove the left rear **wheel** from the bottom carriage.

On dual-wheel carriages, remove the outward-facing **wheel**.
4. Slide the wheel onto the encoder screw, followed by the wheel spacer.

For dual-wheel carriages, slide the wheel onto the encoder screw with the wheel hub facing away from the encoder.

5. Place the encoder screw into the left rear wheel hole on the carriage so the O-ring is between the rear wheels.

6. Turn the encoder lock collar (shown in blue) to point up. Then tighten the lock collar screw with the 2.5 mm Allen wrench. **Note:** Depending on the encoder model, this step may require the 2.0 mm Allen wrench.

7. Plug the encoder cable into one of the encoder ports on the back of the machine.

8. To prevent the long encoder cable from catching the carriage, use the adhesive zip tie mount and zip tie to fasten the cable to the side of the bottom carriage.
Turning the Machine On/Off

Parts & Tools Needed:

- Power Cord

Instructions

The **power cable port** and **power switch** are located on the back of the machine. To power on the machine, take the following steps:

1. Lift up the **power cable retainer**.

2. Plug the **power cable** into the machine.

3. Press the **power cable retainer** down firmly until it grasps the power cable.

4. Press the **power switch** up to turn the machine on.
Preparing to Quilt

Before quilting, choose the settings for your machine, load the bobbin, and thread the machine.

Choosing Machine Settings ........................................................................................................page 27
Winding a Bobbin ..........................................................................................................................page 29
Loading the Bobbin Case ...............................................................................................................page 31
Threading the Machine ..................................................................................................................page 34
To customize the settings for the handlebar controls, screen buttons, or display appearance, take the following steps:

1. Press the **Settings** icon at the top of the touch display.

The Settings menu opens.
Choosing Machine Settings (Continued)

2 Choose desired settings:

- **Stitch Button:** Choose whether the stitch button on the quilting mode screens will create a half-stitch or full stitch when pressed.
  
  - If “Half” is selected, pressing [ ] on a quilting mode screen (precise, cruise, manual, or baste) will create a half-stitch.
  
  - If “Full” is selected, pressing [ ] on a quilting mode screen (precise, cruise, manual, or baste) will create a single full stitch.

- **Units:** Choose to display machine stitch length in stitches per centimeter (cm) or stitches per inch (in).

- **Reverse Buttons:** Select between handlebar controls for right or left-handed quilters.

- **Screen Settings:** Press to go to the Screen Settings page, where you can choose a color theme for the display by tapping to cycle through the colors.

3 From the settings menu, you can also press the **System Information** icon [ ] to access the System Information screen. This displays the machine’s firmware versions (see page 68) as well as the stitch count and run-time (see page 51).

4 To return to quilting, press the **Home** [ ] icon or the Return to Quilting button on the handlebar controls.
Winding a Bobbin

Parts & Tools Needed:

Bobbin
(Class M Large)

Instructions

Your machine comes with two bobbins pre-wound with 50 weight cotton thread. An empty M-class bobbin has also been provided. It’s important to choose bobbin thread that is similar in type and quality as the top thread. For more information on choosing thread, see “Choosing Your Thread” on page 80.

Note: This machine uses cone-style thread. Unless you have the spool accessory, please use only thread cones for this machine.

The following diagram outlines the path the thread (shown in blue) must take to wind the bobbin.

Preparing to Quilt

For information on adjusting the bobbin fill levels, see page 58.
Preparing to Quilt
Winding a Bobbin (Continued)

1. Run the thread through the **thread mast guide loop** directly above the thread cone.

2. Feed the thread through the back of the hole closest to the thread cone on the **bobbin thread guide**. Then wrap it back over and through the back of the second hole.

3. Pull the thread through the hole in the **tensioner thread guide**. Wrap the thread around the back of the **bobbin thread tensioner**, between the two discs.

4. Tightly wrap the thread clockwise around the **bobbin** a few times to hold the thread in place. Push the **bobbin cam** toward the **bobbin** to start winding.

5. Winding stops automatically when the bobbin is full. Cut the thread with the **thread cutter** near the bobbin cam.

The bobbin thread should appear neat and smooth.

**Note:** Bobbin fill levels can be adjusted (see page 58).
Loading the Bobbin Case

Take the following steps to insert the wound bobbin into the bobbin case and place it in the machine:

1. Check that the needle is up. If needed, rotate the **hand wheel** or press and hold “Jog Needle” on the display to raise the needle.

2. To disable stitching, press the Settings icon on the display to go to the Settings menu.

3. Push in and down on the **hook assembly cover** to open it.

4. Pull on the bobbin case **release lever** to remove the bobbin case from the hook assembly.

5. Place the wound bobbin into the **bobbin case**. Note the direction that the thread is coming off the bobbin in relation to the case.

6. Slip a few inches of thread through the **slot** and out of the **hole**.
Preparation to Quilt

Loading the Bobbin Case (Continued)

**Note:** If the bobbin is installed correctly, it turns clockwise when the thread is pulled.

7. Test the tension of the bobbin case every time bobbin thread is changed; bobbin tension is the foundation for correct thread tension.
   a. Place the bobbin case on its side, on your palm.

   b. Pull up on the thread. The thread should run freely and the bobbin should rise into a vertical position without lifting off your hand.

   - If the bobbin case remains on its side, there is too little tension. Turn the **large screw** (shown below in blue) clockwise.
   - If the case lifts into the air, there is too much tension. Turn the **large screw** (shown below in blue) counter-clockwise.
8 Place the bobbin case inside the quilting machine with the release lever (shown in blue) at the 3 o’clock position. It should click into place. Do not pull on the lever while inserting the bobbin case.

9 Close the hook assembly cover.
Preparing to Quilt
Threading the Machine

Before threading the machine, make sure you’ve selected quality thread for your project. Choosing the right thread for the machine can prevent the thread from breaking or tangling up under the needle plate. Note the following:

- This machine uses cone-style thread, not thread from a spool. Do not use spool thread unless the spool accessory has been installed.

![Correct Cone Style](image1)

![Incorrect Spool Style](image2)

- Choose thread that is strong enough to pass the yank test, and re-test thread as it ages. Thread strength can diminish over time.

  a. Hold the cone in one hand and the end of thread in the other.

  ![Hold Cone and Thread](image3)

  b. Tug on the thread. If the thread snaps easily, it may be too brittle to use for quilting.

  ![Tug on Thread](image4)
Threading the Machine (Continued)

The following diagram outlines the path the thread (shown in blue) must take through the machine.

1. Thread Cone
2. Thread Mast Guide Loop
3. Dual Thread Tensioner
4. Small Thread Tensioner
5. Large Thread Tensioner
6. Check Spring
7. Thread Guide
8. Take-up Lever
9. Bottom Thread Guide
10. Eyelet of Needle Bar
11. Eye of Needle
Preparing to Quilt
Threading the Machine (Continued)

1. Rotate the **hand wheel** or press and hold “Jog Needle” on the display to raise the needle to the top position.

2. To disable stitching and prevent needle movement, press the Settings icon on the display to go to the Settings menu.

3. Place the **thread cone** on one of the cone-style **thread stands**.

4. Pull the thread straight up, through the **thread mast guide loop** above the thread stand.

5. Feed the thread through the top hole of the **dual thread tension guide**. Wrap the thread around to the back of the guide and insert through the bottom hole.

6. Run the thread through the top hole on the **small thread tensioner**. Then slip the thread between the two discs, and through the bottom hole of the **small thread tensioner**.
7. Pull the thread around the **large thread tensioner**, between the tension discs. Wrap the thread over the **check spring**.

8. Next, run the thread under the **thread guide** next to the large thread tensioner.

9. Pull the thread through the hole in the **take-up lever**.

10. Pass the thread down through the **bottom thread guide** on the way to the needle.

11. Now pass the thread through the front of the **needle bar eyelet**, located above the needle.

12. Thread through the **eye of the needle**.
Loop excess thread over the **thread cutter** to cut the thread.
Now that the machine is set up, it’s time to start quilting! This section of the manual describes handlebar control, using the four quilting modes, and tensioning the thread.

**Quilting**

Now that the machine is set up, it’s time to start quilting! This section of the manual describes handlebar control, using the four quilting modes, and tensioning the thread.

**Tip:** While familiarizing yourself with the controls and display of your quilting machine, it’s a good time to test out new quilting materials and practice stitching. Test your thread tension while using the different quilting modes available on the machine.
Using the Handlebar Controls

When first turned on, the machine starts in regulated precise quilting mode and can start quilting right away. Please take a moment to review the handlebar controls used when quilting. While in the Settings menu, System Information screen, or Screen Settings menu, some buttons have a different purpose or do not function (see page 27 for details).

**Note:** Left-handed quilters may prefer to reverse these buttons. This can be done in the Settings menu (see page 27).

1. **Change Quilting mode:** Press to cycle through the quilting modes: regulated precise, regulated cruise, baste, and manual.

2. **Settings:** This button opens the Settings menu.

3. **Single Full Stitch or Half-stitch**
   - Press to create a single full stitch or a half-stitch, based upon settings (see page 27).

4. **Start/Stop Quilting:** Press to start or stop stitching.

5. **Increase:** This button increases the number, size, or speed of the stitching, depending upon the quilting mode. For example, in precise quilting mode, this button increases the number of stitches the machine makes per inch (SPI) or per centimeter (SPC).

6. **Decrease:** This button will decrease the number, size, or speed of the stitching depending upon the quilting mode.
Using the Precise Quilting Mode

The machine defaults to the precise quilting mode when turned on. In this regulated quilting mode, the machine maintains the length of the stitch despite the speed and direction of the quilter’s movements. If the quilter stops moving, the machine stops stitching.

To switch to a different quilting mode, press the next quilting mode icon.

To quilt in the regulated precise quilting mode, take the following steps:

1. Confirm that the stitch length, measured in stitches per inch (SPI), is the desired length.  
   **Note:** To switch to stitches per centimeter (SPC), go to the Settings menu (see page 27).
   - Press to reduce the number of stitches per inch and increases stitch length.
   - Press to increase the number of stitches per inch, which decreases stitch length.

2. Check the needle stop position indicator to see if the needle will stop in the “Up” or “Down” position when stitching is inactive. Pressing the icon will change the stop position.
   - Needle stops in the “Down” position.
   - Needle stops in the “Up” position.
3. Check the **stitch button** icon. When stitching is inactive, pressing this button or the stitch button on the handlebars will create a single full stitch or a half-stitch, depending on the icon displayed. To switch the type of stitch created, go to the Settings menu (see page 27).

- Press to create a full stitch.
- Press to create a half-stitch.

4. Position the quilting machine over the quilt. If needed, use the **needle jog** buttons to move the needle closer or further from the fabric in small increments to help place your first stitch.

- Press to move the needle up or down in small increments.

5. Press the start/stop quilting button on the handlebar to begin (activate) stitching. Move the machine across the quilt to place stitches. Keep the pace slow and even; moving too quickly can prevent stitch regulation. If this happens, a beeping alarm will sound and the **over-speed indicator** on the display will turn red. Pressing the icon mutes the alarm.

- Stitching is not active and alarm is not muted.
- Stitching is not active and alarm is muted.
- Stitching is active and alarm is not muted.
- Stitching is active and alarm is muted.
- Machine moving too quickly for stitching and alarm is not muted.
- Machine moving too quickly for stitching and alarm is muted.

**Note:** While stitching is active, the **stitch button** on both the display and handlebar controls are disabled.

6. To inactivate stitching, press the start/stop quilting button on the handlebars. The needle will move into the **needle stop position** indicated on the display.
Using the Cruise Quilting Mode

In cruise mode, the quilting machine maintains the length of the stitch despite the speed and direction of the quilter’s movements. However, the machine will continue to stitch in place (at the minimum speed) if the quilter stops moving the machine.

To switch to a different quilting mode, press the next quilting mode icon 🔄.

To quilt in the regulated cruise quilting mode, take the following steps:

1. Confirm that the stitch length, measured in stitches per inch (SPI), is the desired length. **Note:** To switch to stitches per centimeter (SPC), go to the Settings menu (see page 27).
   - Press to reduce the number of stitches per inch and increases stitch length.
   - Press to increase the number of stitches per inch, which decreases stitch length.

2. Determine the minimum speed the machine will stitch at when stitching is active but the machine is not being moved. This can be set from 5% to 25% of the machine’s top speed.
   - Decreases the minimum speed.
   - Increases the minimum speed.
3. Check the **needle stop position indicator** to see if the needle will stop in the “Up” or “Down” position when stitching is inactive. Pressing the icon will change the stop position.

![Needle stop position indicator]

- Needle stops in the “Down” position.
- Needle stops in the “Up” position.

4. Check the **stitch button** icon. When stitching is inactive, pressing this button or the stitch button on the handlebars will create a single full stitch or a half-stitch, depending on the icon displayed. To change the type of stitch, go to the Settings menu (see page 27).

![Stitch button]

- Press to create a full stitch.
- Press to create a half-stitch.

5. Position the quilting machine over the quilt. If needed, use the **needle jog** buttons to move the needle closer or further from the fabric in small increments to help place your first stitch.

![Needle jog buttons]

- Press to move the needle up or down in small increments.

6. Press the start/stop quilting button on the handlebar to activate stitching. Move the machine across the quilt to place stitches. Keep the pace slow and even; moving too quickly can stop proper stitch regulation. If this happens, a beeping alarm will sound and the **over-speed indicator** on the display will turn red. Pressing the icon mutes the alarm. **Note:** While stitching is active, the stitch button on both the display and handlebar controls are disabled.

- Stitching is not active and alarm is not muted.
- Stitching is not active and alarm is muted.
- Stitching is active and alarm is not muted.
- Stitching is active and alarm is muted.
- Machine moving too quickly for stitching and alarm is not muted.
- Machine moving too quickly for stitching and alarm is muted.

7. To inactivate stitching, press the start/stop quilting button on the handlebars. The needle will move into the needle stop position indicated on the display.
Using the Basting Mode

Use the basting mode to create loose, temporary stitches to hold layers of fabric together while quilting.

To switch to a different quilting mode, press the next quilting mode icon.

To quilt in the regulated cruise quilting mode, take the following steps:

1. Confirm that the **stitch length** is the desired length (small, medium, or large).
   - Press to reduce stitch length.
   - Press to increase stitch length.

2. Check the **needle stop position indicator** to see if the needle will stop in the “Up” or “Down” position when stitching is inactive. Pressing the icon will change the stop position.
   - Needle stops in the “Down” position.
   - Needle stops in the “Up” position.
Quilting

Using the Basting Mode (Continued)

3 Check the **stitch button** icon. When stitching is inactive, pressing this button or the stitch button on the handlebars will create a single full stitch or a half-stitch, depending on the icon displayed. To change the type of stitch, go to the **Settings** menu (see page 27).

![Press to create a full stitch.](image)

![Press to create a half-stitch.](image)

4 Position the quilting machine over the quilt. If needed, use the **needle jog** buttons to move the needle closer or further from the fabric in small increments to help place your first stitch.

![Press to move the needle up or down in small increments.](image)

5 Press the start/stop quilting button on the handlebar to begin (activate) stitching. Move the machine across the quilt to place stitches. Keep the pace slow and even; moving too quickly can stop proper stitch regulation. If this happens, a beeping alarm will sound and the **over-speed indicator** on the display will turn red. You can press the icon to mute the alarm.

![Stitching is not active and alarm is not muted.](image)

![Stitching is not active and alarm is muted.](image)

![Stitching is active and alarm is not muted.](image)

![Stitching is active and alarm is muted.](image)

![Machine moving too quickly for stitching and alarm is not muted.](image)

![Machine moving too quickly for stitching and alarm is muted.](image)

**Note:** While stitching is active, the **stitch button** on both the display and handlebars are disabled.

6 To inactivate stitching, press the start/stop quilting button on the handlebars. The needle will move into the **needle stop position** indicated on the display.
Using the Manual Quilting Mode

In this quilting mode, the machine produces stitches at a constant speed. It’s up to the quilter to move the machine the distance needed to get the desired stitch length. This mode is useful for small, continuous stippling patterns.

To switch to a different quilting mode, press the **next quilting mode** icon.

To quilt in the regulated cruise quilting mode, take the following steps:

1. Confirm that the **stitch speed** is the desired speed. The stitching speed is displayed as a percentage of the maximum machine speed of 2000 stitches-per-minute.

   - Press to reduce stitching speed.

   - Press to increase stitching speed.

2. Establish your **speed presets**. Selecting a preset adjusts the machine’s speed to the percent indicated. To customize a preset, first set the machine to the desired speed. Then press and hold the preset you’d like to change for three seconds. It will update to the new speed.

   **Example:** In the display shown above, holding down the “10” preset button for three seconds would update that button to “80,” the current stitching speed.
Quilting

Using the Manual Quilting Mode (Continued)

3. Check the **needle stop position indicator** to see if the needle will stop in the “Up” or “Down” position when stitching is inactive. Pressing the icon will change the stop position.

- Needle stops in the “Down” position.
- Needle stops in the “Up” position.

4. Check the **stitch button** icon. When stitching is inactive, pressing this button or the stitch button on the handlebars will create a single full stitch or a half-stitch, depending on the icon displayed. To change the type of stitch, go to the **Settings** menu (see page 27).

- Press to create a full stitch.
- Press to create a half-stitch.

5. Position the quilting machine over the quilt where you want to stitch. If needed, use the **needle jog** buttons to move the needle closer or further from the fabric in small increments to help place your first stitch.

- Press to move the needle up or down in small increments.

6. The **over-speed indicator** shows whether stitching is active or not. Press the start/stop quilting button on the handlebar to activate stitching. Move the machine across the quilt to place stitches. Change the speed of your movements to match the stitching speed of the machine in order to create stitches of the desired length. Moving quickly will create longer stitches, while moving slowly will create shorter stitches.

- Stitching is not active.
- Stitching is not active.
- Stitching is active.
- Stitching is active.

**Note:** While stitching is active, the **stitch button** on both the display and handlebar controls are disabled.

7. To inactivate stitching, press the start/stop quilting button on the handlebars. The needle will move into the **needle stop position** indicated on the display.
Proper thread tension prevents unwanted puckering, poorly-formed stitches, and malfunctions that can damage the fabric. Test your thread tension on extra materials before sewing on a project.

**Tip:** Bottom thread tension is the foundation for proper thread tension. It is addressed in “Loading the Bobbin Case” on page 31.

1. Loosen the **tension knob** on the large thread tensioner to set the tension to “1.” The bottom of the tension knob lines up with the number that the tension is set to.

**Note:** Setting “1” is the lowest tension for the machine. This is an ideal starting place to find the correct top thread tension.
2 Slowly increase the tension while stitching into scrap material similar to your project. When the thread tension is balanced, the top and bottom thread (shown in blue and red) will knot in the middle of the fabric layers.

- If the **bobbin (bottom) thread** (shown in red) is pulled through the top layer of fabric, there is too much top tension. Loosen the tension by turning the large thread tensioner knob toward the setting “1.”

- If the **top thread** (shown in blue) is pulled down through the bottom layer of fabric, there is too little top tension. Increase the tension on the top by turning the large thread tensioner knob toward setting “4.”
Tracking Stitch Count and Run Time

To track the number of stitches your machine has sewn or hours it has run, press the System Information icon from the Settings menu (see page 27).

- **Stitch Count**: Displays the number of stitches since the last reset. Press to start the stitch count back at 0.
- **Hours Run**: Displays the number of hours run since the last reset. Press to start the hour count back at 0.
- **Total Stitches**: Shows the total number of stitches since the machine was purchased. This cannot be reset.
- **Total Hours**: Shows the total number of hours the machine has run. This cannot be reset.

**Tip**: It’s recommended to oil your machine after 20 hours of use. The “Hours Run” counter can help keep track of when your machine is due to be oiled.

1. After cleaning and oiling your machine (see page 53), press **Reset** underneath **Hours Run**. This will set the hour count back to 0.
2. Check the **Hours Run** count regularly. When it reaches 20 hours, it’s time to clean and oil the machine again. Repeat from step 1.
Maintaining the Machine

Keep your machine at peak performance by practicing good machine maintenance habits.

Oiling and Cleaning ................................................................. page 53
Changing the Needle ............................................................... page 56
Adjusting the Bobbin Cam ...................................................... page 58
Adjusting the Hopping Foot .................................................... page 59
Reinstalling the Needle Plate ................................................ page 64
Calibrating the Touch Display ................................................ page 66

This section of the manual covers oiling the machine, changing the needle, adjusting the bobbin cam and hopping foot, reinstalling the needle plate, and calibrating the touch display.
Oiling and Cleaning

Parts & Tools Needed:

- Oil Bottle
- Lint Brush
- Compressed Air Can (optional; not included)

Instructions

Oil and Clean:

<table>
<thead>
<tr>
<th>Machine</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>At the start of a new project</td>
<td>After 20 hours of use</td>
</tr>
<tr>
<td>After 20 hours of use</td>
<td>After sitting without use for more than 30 days</td>
</tr>
</tbody>
</table>

| Bobbin Case                    | Every other bobbin change       |

Tip: The “Hours Run” counter on the System Information page can be used to track hours of quilting time (see page 51).

Take the following steps to clean and oil the machine:

1. Power off the machine.

2. Set the large thread tensioner to “1” to expose the tensioner discs. Use the lint brush or a can of compressed air to clear away lint and thread remnants.

   Note: Lint build-up between the tensioner discs can prevent proper thread tensioning.
3. Clear debris from the spring and discs of the **small thread tensioner**.

4. Press in on the hook assembly cover and push down to open it.

5. Pull the **release lever** (shown in blue) on the bobbin case to remove it from the hook assembly. If the case won’t release, raise the needle with the hand wheel at the rear of the machine.

6. Set the bobbin aside. Clean the bobbin case with the lint brush or compressed air. Be sure to clean the area under the **bobbin tension thread arm**.

7. In and around the **hook assembly**, clear away any lint, cloth, and thread remnants.

8. Rotate the **hand wheel** until the needle is halfway down. This will put the hook in the best position for oiling.
9. Place one to two drops of oil into the hook assembly between the inner part (shown in gray) and outer part (shown in blue).

10. Reload the bobbin case and return it to the machine (for detailed instructions on tensioning the bobbin case, see page 31).

11. Open the display cover.

12. Unplug the display cable. Press down on the clip release and pull on the display to remove it from the machine.

13. Place 1-2 drops of oil down the machine.
Maintaining the Machine

Changing the Needle

Parts & Tools Needed:

Needle Magnet

Instructions

A broken, bent, or burred needle may break thread, damage fabric, or even damage the machine. Always check that the needle is in good repair before starting a new project, and replace the needle after eight hours of use.

To avoid damage to the machine, please choose an approved needle style from the list below:

- 135x5
- DPx5
- 134
- 135x7
- 797
- SY 1955

To change the needle, take the following steps:

1. Power off the machine.

2. Raise the needle to the highest position with the hand wheel.

3. Loosen the needle thumb screw. If needed, use a flat-head screwdriver.
Changing the Needle (Continued)

4 Pull down on the needle to remove it from the needle bar.

5 Insert the new needle all the way into the needle bar. Check the needle bar sight hole above the thumb screw to make sure the needle is inserted all the way.

6 The scarf, a cut-out on the back of the needle, should face the throat of the machine. Place the needle magnet on the opposite side of the scarf.

7 Use the needle magnet as a visual guide. Twist the needle until the magnet points as straight out from the machine as possible. **Note:** Do not attempt to adjust the needle by moving the magnet directly.

8 Hand-tighten the thumb screw. Do not over-tighten if using the flat-head screwdriver.
Instructions

The machine’s bobbin cam is set so the bobbin will wind completely before the winder shuts off. To change how much the bobbin fills before the winding stops, take the following steps:

1. Power off the machine.
2. Place an empty bobbin onto the bobbin stand and flip the bobbin cam toward the bobbin. This will help estimate how far to adjust the bobbin cam.

3. Loosen the set screw on the bobbin cam with a 1.5 mm Allen wrench until the top of the bobbin cam twists freely.

4. Point the set screw toward the bobbin to decrease the amount the bobbin will fill before the winder shuts off. Point the set screw away from the bobbin to increase the fill amount.

5. After choosing the desired distance, tighten the set screw with a 1.5 mm Allen wrench.

Parts & Tools Needed:

- 1.5 mm Allen Wrench (not included)
Adjusting the Hopping Foot

Parts & Tools Needed:

- T-handle Allen Wrench 3 mm
- Hopping Foot Height Gauge

Height Adjustment

When quilting with thick fabric or batting layers, the hopping foot may pressing down on the quilt too tightly and begin to drag. Alternatively, if the hopping foot is set too high, skipped stitches can result. The hopping foot can be raised or lowered to correct these problems. To adjust the hopping foot height, take the following steps:

1. Use the hand wheel to drop the needle bar to the lowest position.

2. With the 3 mm Allen wrench, loosen the hopping foot screw that holds the hopping foot collar to the presser bar.

3. Slide the hopping foot height gauge underneath the hopping foot so that the needle slides into the height gauge groove.

4. Re-tighten the hopping foot screw.

Note: The height gauge prepares the machine for standard sized quilt batting and two layers of fabric. For thicker quilts, stack sheets of printing paper over the gauge to increase room underneath the hopping foot.
Rotation Instructions
The hopping foot can be rotated to improve line of sight. To rotate the hopping foot, please take the following steps.

1. Power off the machine.
2. Rotate the **hand wheel** to lift the needle from the hopping foot.
3. Use the 3 mm Allen wrench to remove the **screw** holding the hopping foot.
4. Slide the **hopping foot** from the presser bar.
5. With the 3 mm Allen wrench, loosen the **collar screw** that holds the **hopping foot collar** to the presser bar.
6. Drop the hopping foot collar below the presser bar and turn it to the desired position.

The hopping foot can be set to two positions:
Adjusting the Hopping Foot (Continued)

7. Lift the hopping foot collar back up to the presser bar, and re-tighten the **collar screw**.

8. Slide the **hopping foot** into the collar and screw in place with the **hopping foot screw**.

9. Double-check that the hopping foot height is correct (see page 59).
Maintaining the Machine

Adjusting the Hopping Foot (Continued)

Removal Instructions
To remove the hopping foot for maintenance or to adjust the hopping foot angle, take the following steps:

1. Power off the machine.
2. Rotate the hand wheel to lift the needle from the inside of the hopping foot.
3. Use the 3 mm Allen wrench to remove the hopping foot screw.

The hopping foot should now slide free from the presser bar.
Installation Instructions
To install the hopping foot on your quilting machine, please take the following steps:

1. Power off the machine.
2. Slide the hopping foot to the slot in the hopping foot collar. Use the 3 mm Allen wrench and hopping foot screw to tighten in place.
3. Adjust height as needed (see page 59).
Reinstalling the Needle Plate

Parts & Tools Needed:

Flat-head Screwdriver

Removal Instructions

To remove the needle plate from the quilting machine, take the following steps:

1. Power off the machine and raise the needle to the highest position using the hand wheel.

2. Use the flat-head screwdriver to remove the two needle plate screws.

3. Slide the needle plate from the machine.
**Installation Instructions**

To install the needle plate onto the quilting machine, take the following steps:

1. **Power off the machine. Raise the needle to the highest position using the hand wheel.**

2. **Align the screw holes on the needle plate with those on the machine.**

3. **Slowly lower the needle with the hand wheel. The needle should slide into the center hole of the needle plate without contacting the plate.**

4. **Place the two needle plate screws (shown in gray) into the plate. Make sure the needle plate is centered around the needle, and then tighten the screws with the flat-head screwdriver.**
If the touch screen on the display is not working properly, the screen may need to be calibrated. Go to the Settings menu and press the Screen Settings icon.

1. Press Screen Calibration to open the Screen Calibration page.
   
   **Note:** For information about the Color Theme option, see page 27.

2. The Screen Calibration page displays with instructions on calibrating the screen. It is best to use the tip of a stylus or another object with a small point when following the instructions.
   
   a. Press the top right corner as close to the edge of the screen as possible.
   
   b. Press the bottom left corner as close to the edge of the screen as possible.

3. When the calibration is finished, the screen will close and return you to the Screen Settings menu.
The instructions in this section should only be taken at the direction of a Grace Company support technician. If you are experiencing problems with your machine, please contact our technical support team:

- **Phone:** (800) 264-0644
- **Email:** support@graceframe.com

**Checking the Firmware** ................................................................. page 68
**Replacing the Encoder Spring** .................................................. page 69
**Reinstalling the Hook Holder** ................................................... page 71
**Timing the Machine** ................................................................. page 74

This section of the manual covers replacing the encoder spring, installing the hook holder, timing the machine, and checking the firmware versions of the machine and display.
The control firmware versions for the machine motor and the touch display are found by pressing the System Information icon from the Settings menu (see page 27).

The following information and options display:

- **Return to Quilting**: Press to leave the System Information page and go back to quilting.

- **Back to Settings**: Press to return to the Settings Menu.

- **Machine Revision**: Shows the latest firmware version for the machine.

- **Display Revision**: Shows the latest firmware version for the touch display.

- **Stitch Count**: Tracks stitches made (see page 51).

- **Hours Run**: Tracks hours that the machine has run (see page 51).
Replacements the Encoder Spring

Parts & Tools Needed:

<table>
<thead>
<tr>
<th>Upper Encoder Spring (Silver)</th>
<th>OR</th>
<th>Lower Encoder Spring (Black)</th>
</tr>
</thead>
<tbody>
<tr>
<td>T-handle Allen Wrench 2.5 mm</td>
<td></td>
<td>T-handle Allen Wrench 4 mm</td>
</tr>
</tbody>
</table>

Instructions

If the encoder spring is over-tensioned, it may break and need to be replaced. To replace the encoder spring, take the following steps:

1. Determine the correct spring to use in the repair:

   **Upper Encoder**: Attached to the wheel on the machine. Use the silver spring.

   **Lower Encoder**: Attached to the wheel on the bottom carriage. Use the black spring.

2. Unplug the encoder cable from the machine.

3. Loosen the lock collar screw with the 2.5 mm Allen Wrench until the lock collar (shown in blue) can twist freely. **Note:** Depending upon encoder models, this step may require a 2.0 mm Allen wrench.

4. Use the 4mm Allen wrench to loosen the encoder screw and remove the encoder and wheel.
5. Slide the **plastic stop**, **wheel spacer**, **washer**, and broken **encoder spring** off the encoder. Leave the **shoulder spacer** on the encoder screw.

6. Place the new encoder spring onto the encoder screw. The **long spring arm** should slide into the hole in the lock collar, and the **short spring arm** should go into the hole on the encoder base.

7. Slide the washer, wheel spacer, and plastic stop back onto the encoder screw.

8. Complete the assembly instructions for the encoder you repaired.

   **For the upper encoder (silver spring) assembly instructions**, see page 21.

   **For the lower encoder (black spring) assembly instructions**, see page 23.
Reinstalling the Hook Holder

Parts & Tools Needed:

- Flat-head Screwdriver
- T-handle Allen Wrench 3 mm

Removal Instructions

The hook holder keeps the hook assembly in place. The following procedure should only be attempted if determined necessary by a Grace Company support technician. If done incorrectly, major machine problems can result. Please call (800) 264-0644 before attempting this procedure.

1. Turn off the machine.

2. Rotate the **hand wheel** to raise the needle to the highest point.

3. Press in on the hook assembly cover and down to open it.

4. With the 3 mm Allen wrench, remove the **hook holder screw** (shown in gray) that attaches the hook holder to the machine.

5. The **hook holder** will slide free of the machine.

Please speak to a Grace Company support technician before attempting these instructions.
Installation Instructions

1. Turn off the machine.

2. Rotate the hand wheel to raise the needle to the highest point.

3. Remove the needle plate using the flat-head screwdriver (see page 64).

4. Remove the bobbin case from the hook assembly (see page 31).

5. Turn the inside part of the hook assembly (shown in blue) so that the positioning guide is at the highest point.

6. Slide the finger of the hook holder into the middle of the hook assembly’s positioning guide.

7. Attach loosely with the hook holder screw. Do not tighten.
8. Align the **hook holder** with the inside edge of the **positioning guide**, as shown below.

9. Tighten the hook holder screw to fasten the hook holder in place. The inside part of the hook assembly should no longer rotate freely by hand.
Timing the Machine

Parts & Tools Needed:
- Timing Spacer
- T-handle Allen Wrench 2 mm

Instructions

Timing your machine aligns the needle and hook assembly so that they are in the correct places during the creation of a stitch. Improper timing can result in damage to the machine and needle, or make sewing impossible. Please consult with a Grace Company support technician by calling (800) 264-0644 before attempting to adjust the timing on your machine.

1. Turn off the machine.
2. Check that your needle is not bent or damaged, and that it is inserted all the way into the needle bar (see page 56).
3. Remove the bobbin case from the hook assembly (see page 31).
4. Remove the needle plate (see page 64).
5. Look into the machine’s timing cut-out and turn the hand wheel. The hook assembly will rotate.
Timing the Machine (Continued)

6 As each of the 3 set screws aligns with the cut-out, loosen them with the 2 mm Allen wrench.

7 The outside part of the hook assembly (shown in blue) now rotates by hand. Turn the outside part of the hook assembly so that the hook is at the top.

8 Carefully rotate the hand wheel to drop the needle (shown in gray) all the way to the lowest point. Continue rotating the hand wheel the same direction. The needle should begin to raise up.

9 Stop raising the needle once the eye is about level with the hook (shown in blue). Do not continue to raise the needle. If the needle reaches the top of its rotation (over the hopping foot), start over at step 8.

10 Slip the timing spacer (shown in blue) into the hook assembly.

11 Turn the hand wheel the opposite direction to bring the needle back down until it rests on top of the timing spacer. Do not let the needle rise to the top before bringing it back down or you will need to repeat steps 8–11.
12 Position the tip of the **hook** (shown in blue) in the middle of the back of the **needle** (shown in gray). This is easier to see from the back of the machine.

13 Push the **hook assembly** inward (toward the rear of the machine) while tightening the **set screw** through the timing cut-out. Watch for bending in the needle and listen for a clicking sound that could indicate the needle is hitting the hook.

14 Remove the timing spacer from the machine.

15 Turn the hand wheel a full rotation to ensure the needle does not hit the hook assembly at any point.

16 Tighten the two remaining set screws through the timing cut-out. The needle plate and bobbin case can be reinstalled.
Appendix

This section of this manual covers additional information on quilting with your machine.

Choosing Your Needle ................................................................. page 78
Choosing Your Thread .................................................................. page 80
Choosing Your Fabric and Batting ............................................. page 83
Troubleshooting Guide ................................................................. page 84
Index ............................................................................................ page 86
Choosing Your Needle

Using the wrong type of needle, or using a needle that is bent, broken, or blunt, can damage the fabric, the machine, and needle. For best results:

- Use the recommended needle style for your machine (see below).
- Use the needle size appropriate for the weight and type of thread you’re using (see below).
- Never use a needle that is dull, bent, burred, or damaged.
- Use multi-directional needles.
- Change your needle after 8 hours of use and at the beginning of each project.

Needle Style

The following are the recommended needle styles for your machine:

- 135x5
- DPx5
- 134
- 135x7
- 797
- SY 1955

Needle Sizes

Choose the size of your needle based upon the thread you’re using. Thicker thread requires a thicker needle. Remember, the thicker the thread, the lower the thread weight (wt.) number.

<table>
<thead>
<tr>
<th>Needle Size</th>
<th>Thread Size and Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>14 / 90</td>
<td>• mono-filament</td>
</tr>
<tr>
<td></td>
<td>• 100 wt. silk</td>
</tr>
<tr>
<td></td>
<td>• 60 wt. polyester</td>
</tr>
<tr>
<td>16 / 100</td>
<td>• mono-filament</td>
</tr>
<tr>
<td></td>
<td>• 60 wt. polyester or cotton</td>
</tr>
<tr>
<td></td>
<td>• 50 wt. cotton</td>
</tr>
<tr>
<td>18 / 110</td>
<td>• 50 wt. polyester</td>
</tr>
<tr>
<td></td>
<td>• 40 wt. cottons and polyester</td>
</tr>
<tr>
<td></td>
<td>• 30 wt. cotton and polyester</td>
</tr>
<tr>
<td>20 / 125</td>
<td>• 30 wt. or heavier of any thread</td>
</tr>
</tbody>
</table>
• **Shank:** Where the needle bar grasps the needle.

• **Shaft:** The long, narrow part of the needle. Needle size is based upon the diameter of the needle shaft.

• **Groove:** Reaching from the top to the bottom of the needle shaft, the groove allows thread to pass through the fabric more easily and without getting damaged.

• **Eye:** Hole near needle point where the needle is threaded.

• **Scarf:** A cut-away on the back of the needle that allows the needle to fit smoothly within the hook assembly when quilting.

• **Point:** The sharp end of the needle. Choose the type of needle point to fit your project, and always replace your needle once the point is dull.
Choosing the best thread for your project is just as important as choosing the correct needle. Good thread is strong and can pass the “Yank Test” (see page 34). It holds its color well over time (colorfast), and uses long fibers (extra-long staple) that resist creating lint.

Thread type and size determines not only which needle size to choose and what the thread tension must be set to on your machine, but also how visible the thread is on the project.

For best results:
- Use a cone-style thread unless you have the thread spool accessory for your machine.
- Test the strength of thread before use with the “Yank Test” (see page 34).
- Practice using new thread on spare quilting materials to find the ideal thread tension. Write this information down and store it with your thread for later reference.
- Keep thread out of sunlight to prevent fading, and do not store near extreme temperatures.
- Select thread that is ideal for the fabric you’re using (see the chart below).
- Use similar thread for top and bottom thread.

**Thread Type Guide**

Threads can be multiple strands, called ply, spun together, or they can be single ply. The fibers that make up the ply can come from many sources, but the most common threads used in quilting are made from cotton, polyester, and silk. The unique properties of each material make some threads better suited for use on some fabrics than others.

<table>
<thead>
<tr>
<th>Thread Type</th>
<th>Ideal Fabric</th>
</tr>
</thead>
</table>
| Cotton      | • Cotton  
              • Linen  
              • Rayon |
| Polyester   | • Knit or Stretch  
              • Woven synthetic |
| Silk        | • Silk  
              • Wool  
              • Basting thread for all fabrics |
Choosing Your Thread (Continued)

Thread Size

The thickness of the thread is called the weight (wt.). This number is usually stamped on the edge of the top or bottom of the thread cone. Notice that as the thread becomes heavier and thicker, the weight decreases:

- 60 weight: Very thin, fine thread that will blend in to the fabric.
- 40 weight: Thicker thread that will show up on the fabric.

**Note:** choose matching weight and thread type when picking top and bottom (bobbin) threads.

**Tip:** Not all manufacturers will have the same sizing method for their thread. Threads can be measured by weight, tex, denier, or scaling that is unique to its brand. Take the time to understand how the sizing works for a brand you’re considering, and keep a few common sewing rules in mind:

- The thicker the thread, the larger the needle required. A needle that is too thin can shred thread.
- The thinner the thread, the smaller the needle should be. A needle that is too large will cause uneven stitching and can leave holes in the fabric.

Thread Processing

Sometimes thread is processed to change its properties. The chart below lists the processes common to cotton and polyester. No extra processing or treatments are typical for silk.

<table>
<thead>
<tr>
<th>Thread Type</th>
<th>Processing</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Cotton</strong></td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>Mercerized:</strong> Treated to improve strength and colorfastness.</td>
</tr>
<tr>
<td></td>
<td><strong>Glazed:</strong> Waxed or coated to give a polished appearance. The coating may rub off and build up in machine.</td>
</tr>
<tr>
<td></td>
<td><strong>Gassed:</strong> Exposed briefly to a gas flame to burn away fuzz and lint, giving a smooth appearance.</td>
</tr>
<tr>
<td><strong>Polyester</strong></td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>Lubricated:</strong> Treated with lubricant to reduce friction. Avoid thread that is oily to the touch.</td>
</tr>
<tr>
<td></td>
<td><strong>Bonded:</strong> Treated with resin to increase strength. This is typically used for heavy-duty applications, such as upholstery.</td>
</tr>
</tbody>
</table>
Our Recommended Thread

Finesse thread is specially-designed for quilting by the Grace Company. It can be used with domestic (sewing) and quilting machines, and comes in 60 colors.

- 100% Polyester, 3-ply thread
- 1,500 yards mini-cone
- 50 wt.

- 110/18 or 100/16 quilting machine needle
- Topstitch 90/14 sewing machine needle

<table>
<thead>
<tr>
<th>Color Code</th>
<th>Color Name</th>
<th>Hex Code</th>
<th>Color Name</th>
<th>Hex Code</th>
<th>Color Name</th>
<th>Hex Code</th>
<th>Color Name</th>
<th>Hex Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>3283</td>
<td>Snow White</td>
<td>#bababa</td>
<td>3293</td>
<td>Charcoal</td>
<td>#333333</td>
<td></td>
<td>2979</td>
<td>Rainbow</td>
</tr>
<tr>
<td>3284</td>
<td>Pearl White</td>
<td>#d9d9d9</td>
<td>3294</td>
<td>Midnight Blue</td>
<td>#222222</td>
<td></td>
<td>2980</td>
<td>Sunny Spring Day</td>
</tr>
<tr>
<td>3285</td>
<td>Light Wool</td>
<td>f5f5f5</td>
<td>3295</td>
<td>Obsidian</td>
<td>#111111</td>
<td></td>
<td>2981</td>
<td>Strawberry Lemonade</td>
</tr>
<tr>
<td>3286</td>
<td>Ice Blue</td>
<td>#b5b5b5</td>
<td>3296</td>
<td>Marigold</td>
<td>#a0a0a0</td>
<td></td>
<td>2982</td>
<td>Pastels</td>
</tr>
<tr>
<td>3287</td>
<td>Pink Rose</td>
<td>#e0e0e0</td>
<td>3297</td>
<td>Leafy Green</td>
<td>#999999</td>
<td></td>
<td>2983</td>
<td>Raspberry Ice</td>
</tr>
<tr>
<td>3288</td>
<td>Lilac</td>
<td>#f0f0f0</td>
<td>3298</td>
<td>Blue Sapphire</td>
<td>#808080</td>
<td></td>
<td>2984</td>
<td>Circus Tent</td>
</tr>
<tr>
<td>3289</td>
<td>Light Sand</td>
<td>#f3f3f3</td>
<td>3299</td>
<td>Magenta</td>
<td>#707070</td>
<td></td>
<td>2985</td>
<td>Twilight Pink</td>
</tr>
<tr>
<td>3290</td>
<td>Thicket Brown</td>
<td>#f6f6f6</td>
<td>3300</td>
<td>Amber</td>
<td>#606060</td>
<td></td>
<td>2986</td>
<td>Mauve Orchid</td>
</tr>
<tr>
<td>3291</td>
<td>Desert Tan</td>
<td>#f9f9f9</td>
<td>3301</td>
<td>Royal Purple</td>
<td>#505050</td>
<td></td>
<td>2987</td>
<td>Blueberries</td>
</tr>
<tr>
<td>3292</td>
<td>Smokey Quartz</td>
<td>#f5f5f5</td>
<td>3302</td>
<td>Ruby Red</td>
<td>#404040</td>
<td></td>
<td>2988</td>
<td>King of Atlantis</td>
</tr>
<tr>
<td>3293</td>
<td>Charcoal</td>
<td>#333333</td>
<td>2979</td>
<td>Rainbow</td>
<td>#222222</td>
<td></td>
<td>2989</td>
<td>Prism</td>
</tr>
<tr>
<td>2980</td>
<td>Sunny Spring Day</td>
<td></td>
<td>2990</td>
<td>Tropical Sunset</td>
<td>#111111</td>
<td></td>
<td>2991</td>
<td>Aurora Lights</td>
</tr>
<tr>
<td>3294</td>
<td>Midnight Blue</td>
<td>#222222</td>
<td>2980</td>
<td>Sunny Spring Day</td>
<td>#111111</td>
<td></td>
<td>2992</td>
<td>Mango Salad</td>
</tr>
<tr>
<td>3295</td>
<td>Obsidian</td>
<td>#111111</td>
<td>2981</td>
<td>Strawberry Lemonade</td>
<td>#a0a0a0</td>
<td></td>
<td>2993</td>
<td>Camp Fire</td>
</tr>
<tr>
<td>3296</td>
<td>Marigold</td>
<td>#a0a0a0</td>
<td>2982</td>
<td>Pastels</td>
<td>#909090</td>
<td></td>
<td>2994</td>
<td>Mountain Jungle</td>
</tr>
<tr>
<td>3297</td>
<td>Leafy Green</td>
<td>#999999</td>
<td>2983</td>
<td>Raspberry Ice</td>
<td>#808080</td>
<td></td>
<td>2995</td>
<td>Desert Flower</td>
</tr>
<tr>
<td>3298</td>
<td>Blue Sapphire</td>
<td>#808080</td>
<td>2984</td>
<td>Circus Tent</td>
<td>#707070</td>
<td></td>
<td>2996</td>
<td>Primary School</td>
</tr>
<tr>
<td>3299</td>
<td>Magenta</td>
<td>#707070</td>
<td>2985</td>
<td>Twilight Pink</td>
<td>#606060</td>
<td></td>
<td>2997</td>
<td>Mojito</td>
</tr>
<tr>
<td>3300</td>
<td>Amber</td>
<td>#606060</td>
<td>2986</td>
<td>Mauve Orchid</td>
<td>#505050</td>
<td></td>
<td>2998</td>
<td>King of Atlantis</td>
</tr>
<tr>
<td>3301</td>
<td>Royal Purple</td>
<td>#505050</td>
<td>2987</td>
<td>Blueberries</td>
<td>#404040</td>
<td></td>
<td>2998</td>
<td>Florence</td>
</tr>
<tr>
<td>3302</td>
<td>Ruby Red</td>
<td>#404040</td>
<td>2988</td>
<td>King of Atlantis</td>
<td>#303030</td>
<td></td>
<td>2998</td>
<td>Green Tea</td>
</tr>
<tr>
<td>3303</td>
<td>Cotton Candy</td>
<td>#303030</td>
<td>3000</td>
<td>Cherry Blossom</td>
<td>#202020</td>
<td></td>
<td>3001</td>
<td>Pomegranate</td>
</tr>
<tr>
<td>3304</td>
<td>Tangerine Punch</td>
<td>#202020</td>
<td>3002</td>
<td>Dusk Rose</td>
<td>#101010</td>
<td></td>
<td>3003</td>
<td>Cotton Candy</td>
</tr>
<tr>
<td>3305</td>
<td>Grapefruit</td>
<td>#101010</td>
<td>3004</td>
<td>Tangerine Punch</td>
<td>#000000</td>
<td></td>
<td>3005</td>
<td>Desert Flower</td>
</tr>
<tr>
<td>3306</td>
<td>Lemon Zest</td>
<td>#000000</td>
<td>3006</td>
<td>Primary School</td>
<td>#999999</td>
<td></td>
<td>3006</td>
<td>Grapefruit</td>
</tr>
<tr>
<td>3307</td>
<td>Light Spearmint</td>
<td>#999999</td>
<td>3007</td>
<td>Lemon Zest</td>
<td>#808080</td>
<td></td>
<td>3007</td>
<td>Green Tea</td>
</tr>
<tr>
<td>3308</td>
<td>Canyon Shale</td>
<td>#808080</td>
<td>3008</td>
<td>Green Tea</td>
<td>#707070</td>
<td></td>
<td>3008</td>
<td>Green Tea</td>
</tr>
<tr>
<td>3309</td>
<td>Flaxen</td>
<td>#707070</td>
<td>3009</td>
<td>Deep Forest Green</td>
<td>#606060</td>
<td></td>
<td>3009</td>
<td>Canyon Shale</td>
</tr>
<tr>
<td>3310</td>
<td>Praline</td>
<td>#606060</td>
<td>3010</td>
<td>Vintage Turquoise</td>
<td>#505050</td>
<td></td>
<td>3010</td>
<td>Mauve Orchid</td>
</tr>
<tr>
<td>3311</td>
<td>Mocha</td>
<td>#505050</td>
<td>3011</td>
<td>Seaside Teal</td>
<td>#404040</td>
<td></td>
<td>3011</td>
<td>Mauve Orchid</td>
</tr>
<tr>
<td>3312</td>
<td>Orange Blossom</td>
<td>#404040</td>
<td>3012</td>
<td>Ocean Wave</td>
<td>#303030</td>
<td></td>
<td>3012</td>
<td>Orange Blossom</td>
</tr>
<tr>
<td>3313</td>
<td>Lotus</td>
<td>#303030</td>
<td>3013</td>
<td>Bright Blue Sky</td>
<td>#202020</td>
<td></td>
<td>3013</td>
<td>Bright Blue Sky</td>
</tr>
<tr>
<td>3314</td>
<td>Daisy</td>
<td>#202020</td>
<td>3014</td>
<td>Lavender Blossom</td>
<td>#101010</td>
<td></td>
<td>3014</td>
<td>Lavender Blossom</td>
</tr>
<tr>
<td>3315</td>
<td>Amethyst</td>
<td>#101010</td>
<td>3015</td>
<td>Amethyst</td>
<td>#000000</td>
<td></td>
<td>3015</td>
<td>Amethyst</td>
</tr>
<tr>
<td>3316</td>
<td>Mountain Mist</td>
<td>#000000</td>
<td>3016</td>
<td>Mountain Mist</td>
<td>#999999</td>
<td></td>
<td>3016</td>
<td>Mountain Mist</td>
</tr>
<tr>
<td>3317</td>
<td>Riverbed Slate</td>
<td>#999999</td>
<td>3017</td>
<td>Riverbed Slate</td>
<td>#808080</td>
<td></td>
<td>3017</td>
<td>Riverbed Slate</td>
</tr>
<tr>
<td>3318</td>
<td>Canyon Shale</td>
<td>#808080</td>
<td>3018</td>
<td>Canyon Shale</td>
<td>#707070</td>
<td></td>
<td>3018</td>
<td>Canyon Shale</td>
</tr>
</tbody>
</table>
Choosing Your Fabric and Batting

**Fabric**
Some fabrics are not recommended for use with your quilting machine. Thick fabrics, such as denim or leather, have a lot of resistance that can bend or snap a needle, and misalign or break internal machinery. When quilting, avoid any fabrics that are difficult to pierce, and take care that the fabric layers of the quilt are well balanced.

**Batting**
To choose the best batting for your project, consider the look and feel of the quilt that you’re making. Batting thickness is measured by its loft. A low loft batting is thinner and lighter, ideal for a quilt with a flatter appearance. High loft batting should be used if a fluffy, full quilt is desired. Typically, wool batting is the thickest batting while bamboo is the lightest. Wool provides the most warmth, followed by polyester, and then cotton.
### Troubleshooting Guide

<table>
<thead>
<tr>
<th>Issue</th>
<th>Cause(s)</th>
<th>Solution</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Machine won’t turn on.</strong></td>
<td>Loose cables</td>
<td>Check that all cables are securely plugged in (page 25).</td>
</tr>
<tr>
<td></td>
<td>Machine is not turned on</td>
<td>Check power button is pressed down correctly (page 25).</td>
</tr>
<tr>
<td></td>
<td></td>
<td>If problem persists, please contact a Grace Company support technician. Call (800) 264-0644.</td>
</tr>
<tr>
<td><strong>Stitches are skipped.</strong></td>
<td>Damaged needle</td>
<td>Check needle (page 56).</td>
</tr>
<tr>
<td></td>
<td>Machine improperly threaded</td>
<td>Check that all tensioners and guides were threaded correctly (page 34).</td>
</tr>
<tr>
<td></td>
<td>Bobbin wound or threaded incorrectly</td>
<td>Check that the bobbin was inserted the correct direction in the case (page 31).</td>
</tr>
<tr>
<td></td>
<td>Incorrect thread tension</td>
<td>Adjust top thread tension (page 49). Adjust bottom thread tension (page 31).</td>
</tr>
<tr>
<td></td>
<td>Hopping foot incorrect distance from</td>
<td>Check distance with height gauge. Reinstall hopping foot if incorrect (page 59).</td>
</tr>
<tr>
<td></td>
<td>needle plate</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>If problem persists, please contact a Grace Company support technician. Call (800) 264-0644.</td>
</tr>
<tr>
<td><strong>Thread is breaking.</strong></td>
<td>Damaged needle</td>
<td>Check needle (page 56).</td>
</tr>
<tr>
<td></td>
<td>Incorrect thread tension</td>
<td>Adjust top thread tension (page 49). Adjust bottom thread tension (page 31).</td>
</tr>
<tr>
<td></td>
<td>Machine improperly threaded</td>
<td>Check guides and tensioners for accidental double-wrapping (page 34).</td>
</tr>
<tr>
<td></td>
<td>Stitching in place too long</td>
<td>Keep machine moving to avoid stitch build-up in one place, or switch to regulated precise quilting mode (page 41).</td>
</tr>
</tbody>
</table>


<table>
<thead>
<tr>
<th>Issue</th>
<th>Cause(s)</th>
<th>Solution</th>
</tr>
</thead>
<tbody>
<tr>
<td>Thread is breaking.</td>
<td>Bobbin inserted incorrectly</td>
<td>Check bobbin is the correct direction in the case and inserted firmly (clicked) into the machine (page 31).</td>
</tr>
<tr>
<td></td>
<td>Debris on tension discs</td>
<td>Clean the machine (page 53).</td>
</tr>
<tr>
<td></td>
<td>Burred bobbin</td>
<td>Check bobbin for sharp edges. Contact your dealer to replace if needed.</td>
</tr>
<tr>
<td></td>
<td>Needle plate is rubbing needle</td>
<td>Check that needle plate is centered and does not hit needle (page 64).</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>If problem persists, please contact a Grace Company support technician. Call (800) 264-0644.</td>
<td></td>
</tr>
<tr>
<td>Machine is running loud.</td>
<td>Machine and/or hook assembly needs oiling</td>
<td>Oil the machine and hook assembly (page 53).</td>
</tr>
<tr>
<td></td>
<td>Bobbin winder is on</td>
<td>Check that bobbin cam is in “Off” position (away from Bobbin stand).</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>If problem persists, please contact a Grace Company support technician. Call (800) 264-0644.</td>
<td></td>
</tr>
<tr>
<td>Thread is bunching up in hook assembly (bobbin case area).</td>
<td>Bobbin wound or threaded incorrectly</td>
<td>Check that the bobbin was threaded correctly and inserted the correct direction in the case (page 31).</td>
</tr>
<tr>
<td></td>
<td>Machine improperly threaded</td>
<td>Check that all tensioners and guides were threaded (page 34).</td>
</tr>
<tr>
<td></td>
<td>Incorrect thread tension</td>
<td>Adjust top thread tension (page 49). Adjust bottom thread tension (page 31).</td>
</tr>
<tr>
<td></td>
<td>Bobbin case has damaged or missing spring</td>
<td>Check inside bobbin case to see spring. Contact your dealer to replace if needed.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>If problem persists, please contact a Grace Company support technician. Call (800) 264-0644.</td>
<td></td>
</tr>
</tbody>
</table>
Appendix

Symbols

2.5 mm T-handle Allen wrench............................. 20, 21, 23
2 mm T-handle Allen wrench............................... 74
4 mm T-handle Allen wrench......................... 13, 16, 17, 21, 23, 69

A
assembly .................................................. 12

B
back left wheel base cover ......................... 16
back right wheel base cover ..................... 16
basting sewing mode .................................. 45
batting .................................................... 83
bobbin cam .............................................. 30
bobbin cam adjustment ................................. 58
bobbin case ............................................. 31
bobbin tension ......................................... 32
bottom thread tension ................................. 32

calibrate display ........................................ 66
cleaning .................................................. 53
color theme .............................................. 28
controls .................................................... 28, 40
cruise sewing mode .................................... 43
defaults ................................................... 27
display .................................................... 19
display cable port ...................................... 8, 19
display clip port ........................................ 8, 19
electrical ................................................... 5
encoder .................................................... 21, 23, 69
encoder (lower) ........................................ 23
encoder port ............................................ 8, 22, 24
encoder spring .......................................... 69
encoder (upper) ......................................... 21

F
fabric ........................................................................ 83
features .......................................................... 5
firmware ........................................................ 68
front left wheel base cover ......................... 16
front right wheel base cover ..................... 16
front wheel support assembly .................. 13

G
grounding instructions .................................. 3
guide loops .................................................. 30, 36

H
half-stitch ..................................................... 28
handlebar assembly ..................................... 17
handlebar controls ....................................... 28, 40
hand wheel .................................................. 6
hook assembly ............................................ 7, 71, 74
hook holder ................................................. 71
hopping foot ............................................... 59
hours run .................................................... 51

L
lamp ............................................................. 7
large thread tensioner ................................. 49
left-handed .................................................. 28
long encoder cable ...................................... 24

M
M4 x 8 mm SBHCS ........................................ 20
M6 shoulder bolt .......................................... 13
M6 x 20 mm SBHCS .................................... 13, 16
machine dimensions ................................... 5
machine layout ............................................. 6
machine settings ......................................... 27
machine specifications ................................ 5
maintaining the machine ......................... 52
metric ....................................................... 28