

Tin Lizzie 18_{LS}

Your Affordable Longarm Quilter



Owner's Manual

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January 2008

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Tin Lizzie 18.

Dear Tin Lizzie 18^{LS} Owner,

Welcome to the FLOYD SEWING MACHINE Family. Since 1948, Bill Floyd has been designing and improving industrial sewing machines. The Tin Lizzie 18^{LS} is one of many specialty sewing machines that he has been instrumental in designing and manufacturing. Now, he is passing down the knowledge, passion and tradition to his son Ernie. Together they are co-owners of the Tin Lizzie 18 L.L.C. Ernie has been in the sewing industry since 1972. In 2005 their shared vision of an affordable long arm quilting machine for the home quilter became reality. Today the Tin Lizzie 18 is in homes all over the world.

The Tin Lizzie 18^{LS} comes with a one year complete warranty. We will always stand behind our product and any warranty issues will be fixed at no charge. Our warranty on parts is five years and covers the sewing machine head, motor, electronics and frame.

Customer satisfaction is our number one goal. If you are not happy then we are not happy. Our dealers are selectively chosen, using our criteria of customer service and professional integrity.

Sincerely,

A handwritten signature in dark ink, appearing to read 'William Floyd', written in a cursive style.

William Floyd
Tin Lizzie 18 L.L.C.

A handwritten signature in dark ink, appearing to read 'Ernie Floyd', written in a cursive style.

Ernie Floyd

Warranty

We believe that we have designed and are manufacturing the best longarm quilting machine available. As you unpack your machine be sure to keep the box and packing materials designed to protect the machine during shipping. Should it become necessary for you to return the machine for warranty work please call us for specific instructions for packing and shipping your machine.

- Your Tin Lizzie 18Ls has a full labor warranty for one year from the day you receive your machine. We guarantee the machine parts for five years.
- The machine must be cleaned and oiled regularly according to the instructions in this manual. Failure to properly maintain the machine will void this warranty.
- Your Tin Lizzie 18Ls must be plugged into a surge protected electrical outlet. We highly recommend using an Uninterrupted Power Supply (UPS) also known as a Battery Backup. This helps to ensure that you are getting a regulated 110 volts into your machine. See photo below of UPS Battery Backup.
- Should we mutually decide that your machine cannot be repaired using normal communications we will arrange for call tags to be sent to you for pick up of the machine.

How to Contact Us

Should you have a problem with your machine, first call the dealer that sold the machine to you. If for some reason your dealer is unable to resolve your concern, please call (801)255-4130.



Attaching the Square tubing to the top of your Tin Lizzie 18_{LS}

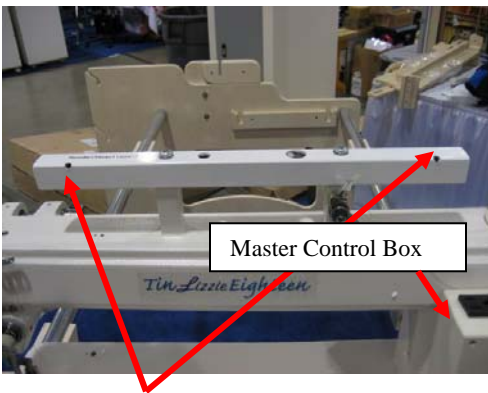
The following are instructions for attaching the square tubing to the top of your Tin Lizzie 18_{LS}. This tubing is used to hold the light, thread stand, and handles.



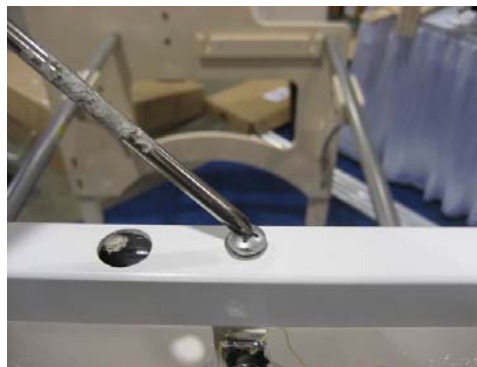
You will need the square tube and the Two Phillips head screws with washers. (screws & washers are packed in the acc. bag)



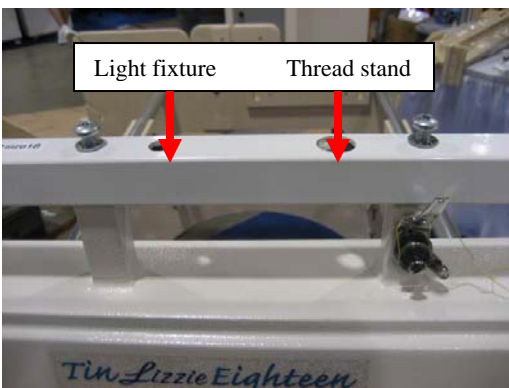
Position the square tube over these uprights



These screw holes should be pointing towards the master control box side of machine



Phillips screw insert screws and tighten



This picture indicates which holes house The light fixture and thread stand.



Completed assembly view. Notice the Black knobs are on the side of the machine With the master control box.

Your Light Fixture

To add your light fixture to your machine, first remove the nut and washer from the base of the light fixture.



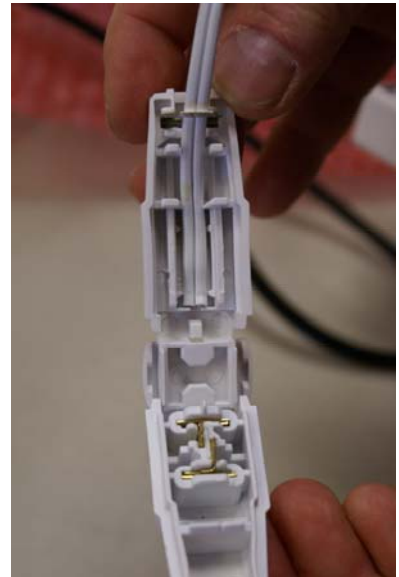
Feed the cord and base of the light fixture through the small hole on top of the machine. Add the washer followed by the nut to the base of the light fixture and tighten against the machine so that your light fixture is secure.



Your light fixture came with a long cord. At this time you can trim the cord so that it will reach the outlet on top of the power box. This outlet is also where you will find the plug for your Lamp.

Open your plug by pulling on the silver tab and open the plug. Trim the wires flush with enough to reach the outlet on the top of the power box. Lay the wires in the space provided in the plug and close the plug.

Caution before you close, make sure that you do not have any wires crossed as this will create a short.



Plug in and enjoy light as you quilt.

Your Thread Stand

Your Tin Lizzie 18ls comes with a two spool thread stand. Some assembly required.



A: This is the base of the thread stand. This is where the spool holders attach.

Remove the nut and washer from the bottom of one of the part C pieces and route through one of the B parts with the felt in place and through the hole in A. Replace washers and nut and tighten. You will do this again for the 2nd spool holder. Now place D over C and push down to the base.

Remove the black top of F and place A with all attached to the bottom of F and tighten screw found on piece A. Place E on F, replace the black top, and position E at the base of the black top tightening screw to secure in place.



With thread stand assembled place base of thread stand F without nut and washer through the big hole on the top of your Tin Lizzie 18ls.

Once in place replace the washer and nut and tighten into place.

Connecting your Tin Lizzie 18_{LS} to your Carriage Assembly (Deck) and Controls on the Handles

Your Carriage Assembly (Deck) comes with the cable already connected to the encoders on the bottom of the carriage assembly (deck) pieces. This cable is route to the power box of your Machine and plugged into the receptacle on the back of the power box.



This is looking at the back of your machine. You can see the four connecting receptacles in the back of the machine. The bottom one is for your Carriage Assembly (deck). The next one up is not used at this time. The third one up is for your controls on the handles. The top one is not used at this time.

Your controls on your handles have a cable that runs through the handle to connect the two controllers. You will need to use the supplied cable to connect your controllers to the Control connector on the back of the power box.

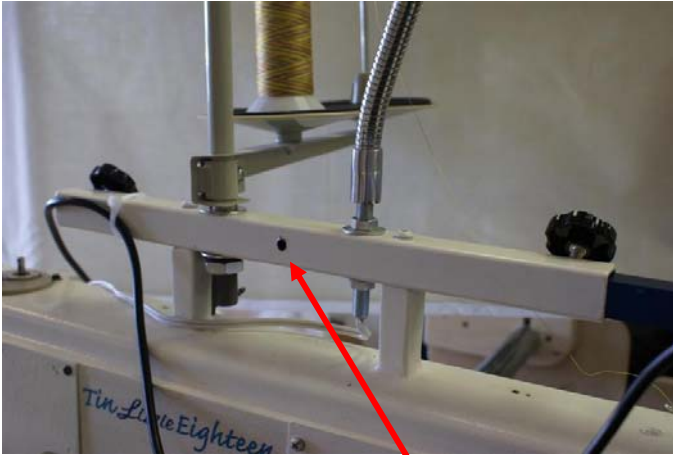


The Handle Bar cable(9pin)

Your Cable connects to the Controller on the Left handle.
You will note that this connector will only fit in one side.



Attaching your Laser to your Tin Lizzie 18_{LS}



Your laser light will attach to the hole you see above in the square tubing with the attaching hardware that comes with the laser light.



Your Laser light will be attached as above.
For further details see instructions in box.

What is the Tension Release Lever?

The tension release lever raises the hopping foot and releases the tension on the thread.

You can watch the tension disc plates open as you lift the lever.

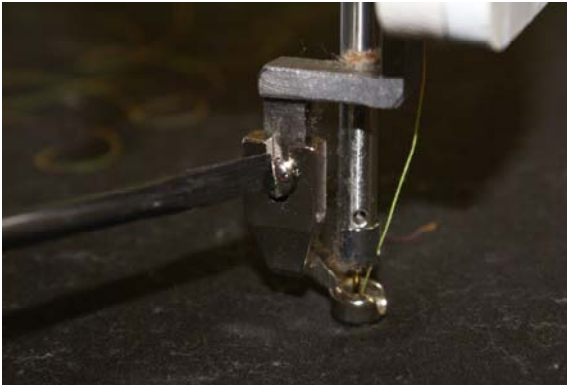
NEVER start sewing with the lever up.

Because there is no tension on the thread the bottom stitches will be huge loops.



How Do I Adjust the Height of the Hopping Foot for Thicker or Thinner Batting?

This is where you adjust the hopping foot for thicker or thinner batting. Simply loosen the screw and adjust the foot to the level that clears the fabric when moving the machine around. You need to have about 1 thin dimes worth of space between the bottom of the foot and the fabric or base of the machine.



You also have the ability to adjust the walking of the machine. The walking of the machine is how much movement is in the foot.

Routine Cleaning and Oiling

Routine cleaning and oiling is very important to the longevity of your quilting machine. Brush out the fuzz from around the hook and foot. Change your needle regularly to avoid thread breakage, tension problems and needle breakage. A worn needle can mean skipped stitches, shredded thread and a weakening of the needle itself. These things can lead to stitch quality issues.

Lint has a tendency to build up in the bobbin case. A tiny amount of lint can cause poor stitches. Check the bobbin case each time you change the bobbin to keep it clean. We suggest using a soft bristle brush to wipe out the bobbin case and the bobbin area. Canned air only blows the lint around. By using a soft bristle brush you collect the dust on the brush. Occasionally, place a drop of machine oil on a cotton swab to wipe out the bobbin case.

Keep your table clean of dust and oil. Clean the bars and carriage deck regularly for smooth movement.

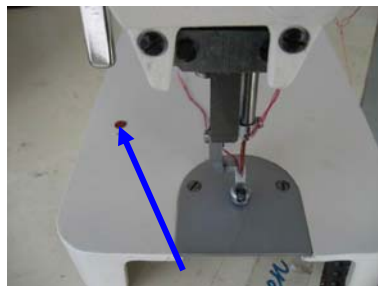
Oiling is extremely important to the longevity of your quilting machine. Failure to oil your machine regularly can void your warranty.

The one oiling spot marked with red arrow is marked with red paint on your machine. An oil bottle is included with your machine. The one oiling spot marked with a blue arrow contains a dip stick. Remove the dip stick by lifting it up with a finger nail or screw driver. Place drops of oil in this hole.

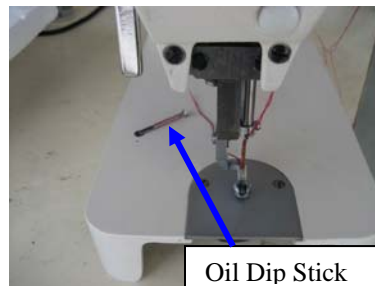
Recommended oiling: After every finished quilt place 3 to 4 drops of oil in the indicated spot. At this time make sure oil is present on dip stick. If not add 3-4 more drops of oil. Run machine to lubricate. For correct oil, when you are out of oil please purchase from Tin Lizzie 18. (Note: the machine pictured here is before complete assembly from factory; your machine has more components attached.)



Oil point top of machine



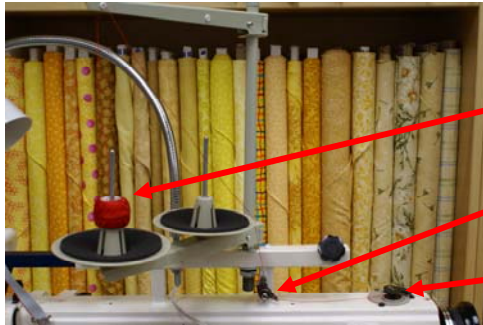
Oil Reservoir with dip stick



Oil Reservoir with dip stick removed

Bobbin Winder and Bobbins

A bobbin winder is included with your machine. The thread on a properly wound bobbin should be snug and have even layers of thread. A sloppy or mushy wound bobbin will result in poor stitch quality.



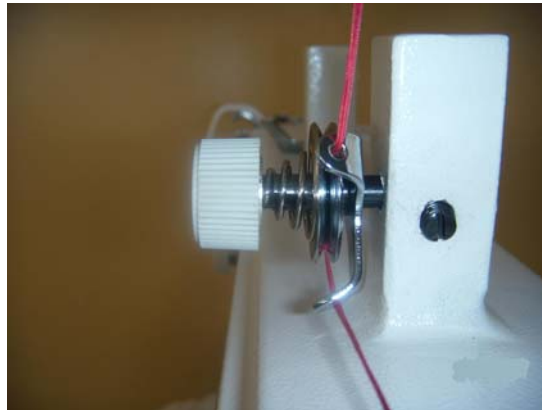
Bobbin Thread

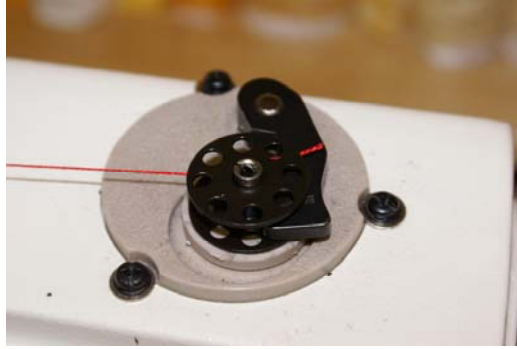
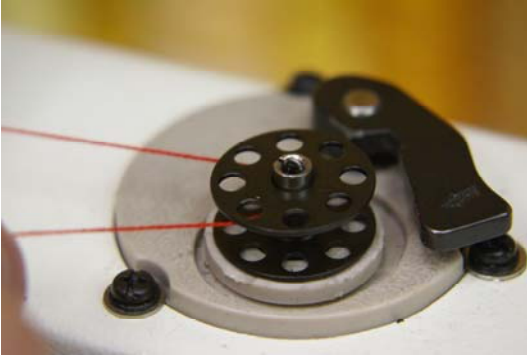
Bobbin Thread Guide

Bobbin Winder

How do I wind a Bobbin?

1. Insert an empty bobbin on the bobbin winder spindle.
2. Place a cone of thread on the holder.
3. Bring the thread up through the guide over the cone of thread.
4. Insert the thread through the top guide hole then around the tension disk and through the bottom thread guide.



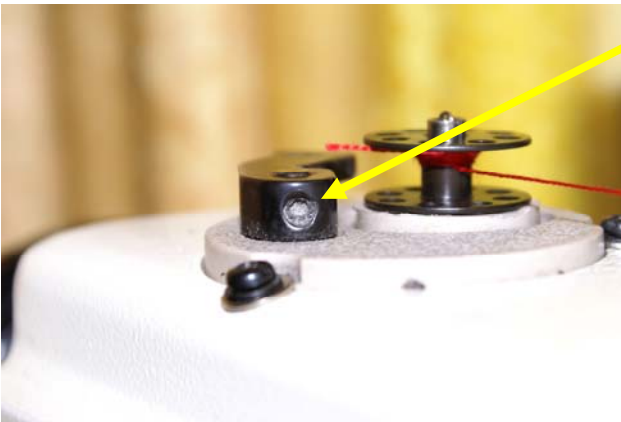


5. Wrap the thread around the bobbin clockwise three or four times
6. Push trip mechanism forward until it snaps into position
7. Bobbin winder will start winding the bobbin once you press the start/stop key. You can quilt while your bobbin is winding once it is full it will stop.
8. If you wind your bobbin only (***When not quilting***) ensure that you do not have thread in the needle to prevent jams. Also remove the bobbin and bobbin case to prevent damage.

The bobbin will fill until the trip mechanism is pushed out by the thread. It will then disengage the wheel. The bobbin should fill to just below the rim. Having the bobbin too full will cause tension problems.

Bobbing Fill Mechanism

This picture is provided for your reference should you need to make an adjustment to your bobbin fill mechanism. Never adjust unless you are told to do so by our technicians.



Check the tension of the bobbin by holding the loaded bobbin case in one hand. With one hand under the bobbin case, hold the tail of thread and thread flows out of the bobbin case. A should cause the bobbin case to slide thread. If the thread slides out of the pick it up, it needs more tension. If it down the thread or doesn't move at all, it tension.

Use a small screwdriver to turn the screw on the bobbin case to adjust



watch as the slight bounce down the case as you barely moves needs less

largest set tension. Make very, very small adjustments. Be very

careful not to remove the screw as it is very small and difficult to find if lost. Remember, righty (clockwise) tighty, lefty (counter clockwise) loosey.

To place the bobbin into the machine:

1. Insert the bobbin into the bobbin case.
2. Holding the bobbin case pull the thread through the slot.
3. Draw the thread down and under the spring, making sure the thread is in the highest position of the bobbin case.
4. Place the bobbin case in the machine. Always listen for the pop as it engages in the machine.

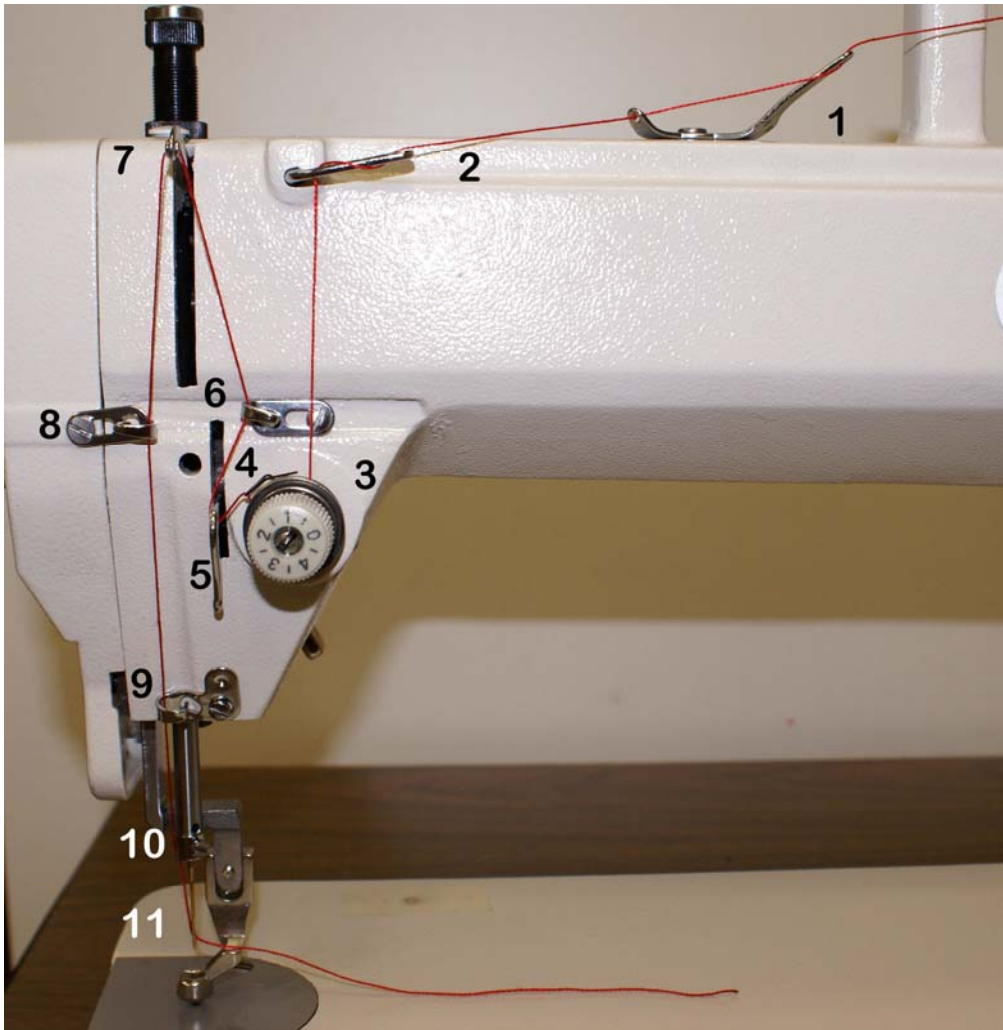


We suggest using a soft bristle brush to wipe out the bobbin case and the bobbin area. Canned air only blows the lint around. By using the soft bristle brush you collect the dust on the brush.

Each day before you start quilting, unthread your machine past the take up lever and remove the bobbin case, place a small drop of oil in the bobbin hook area before you begin quilting. This will clean out the fuzz and lint. Place a drop of oil in the bobbin hook area. Turn your machine on to run at the slowest setting.

TIP: Lint has a tendency to build up in the bobbin case especially with cotton threads. A tiny amount of lint can cause a huge headache! Check the bobbin each time you change it to keep it clean.

Machine Part Names



(Please note: the takeup lever guard has been removed for a clear view for pictures only. Never run the machine without the guard in place, extreme head injury may occur. This guard is not a handle do not place your hand in this area your fingers will get pinched)

This is a diagram of the side of your longarm machine. The front of the machine faces the belly bar. The back of your machine has the electrical outlet and stitch regulator plugs. The numbers have been assigned in threading order.

- | | |
|----------------------------------------------------------------|------------------------------------|
| 1. Upper Thread Guide
(note some machines do not have this) | 7. Take Up Lever |
| 2. Three Hole Thread Guide | 8. Thread Guide |
| 3. Tension Disc | 9. Thread Guide |
| 4. Check Spring | 10. Thread Eyelet Above the Needle |
| 5. Silver Angle Bracket | 11. Needle |
| 6. Thread Guide | |

Tin Lizzie 18.

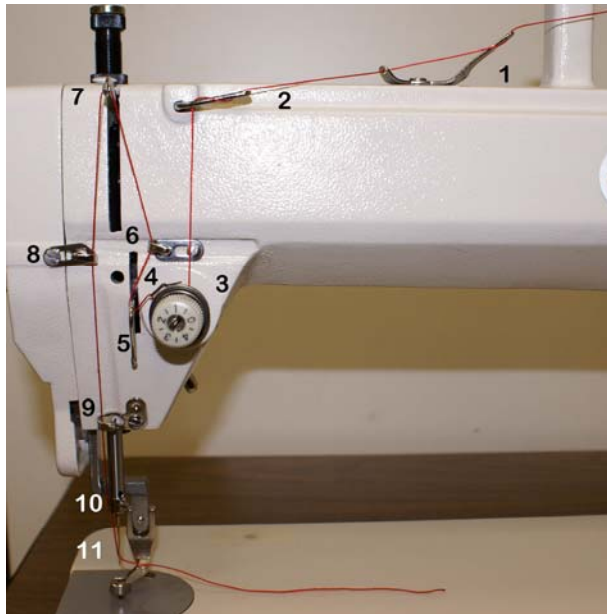


The Control Unit

The control unit is shown here. To activate the Lizzie Stitch Press the Lizzie Stitch Button and ensure that the light under the button is on. Now to start press the start/stop button this can be found on either controller. As the machine is moved movement is detected and the speed of the machine will adjust to keep the stitch length constant. The dial on the left side is for the stitch length adjustment. To activate the manual stitch, press the manual stitch button and ensure that the light under the button is lit. Now press the start/stop button on either controller to start. This keeps the machine speed constant. The dial on the

right controller sets the machine speed. **YOU ONLY USE ONE MODE OR THE OTHER.** The needle position sets your machine to stop with the needle up or down. To stop with your needle up have the switch pointed up, and to stop with your needle down have the switch pointed down. This switch is also how you take a single stitch. Toggle the switch down to put the needle down and up to bring it back up for the single stitch. Taking this single stitch is also the method used to bring up the bobbin thread. All you need to do is hold the top thread while you take a single stitch then pulls the top thread to bring up the bobbin thread.

Threading Overview



Please note: the takeup lever guard has been removed for a clear view for pictures only. Never run the machine without the guard in place, extreme head injury may occur. This guard is not a handle keep your hands clear as you will get pinched if your fingers get in this area.

How Do I Thread the Machine?



Figure 1

1. Place a cone of thread on the thread holder. *Figure 1*
2. Pull thread through eyelet above the cone of thread. Make sure the eyelet is directly above the thread cone. *Figure 1*

3. Thread upper thread guide as shown in picture. *Figure 2*

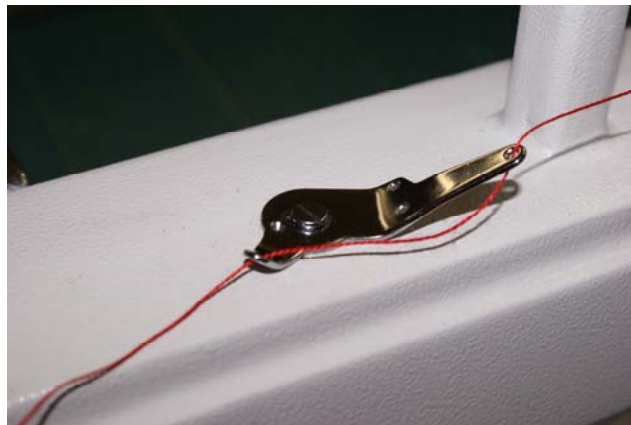


Figure 2

4. Weave thread as shown on three hole thread guide. *Figure 3*



Figure 3



Figure 4
details. *Figure 4*

5. Take thread between the two tension discs from back to front all the way around. Up and over the check spring. Be sure the thread is going between the discs and go far enough to catch the check spring. The check spring should come down as you pull thread. Pull thread tightly to ensure the thread is in the tension disk. *Figure 4*

6. Thread runs under silver angle bracket. See picture for

7. Bring the thread up through the thread guide just above the check spring. *Figure 4*
8. Take thread through the take up lever from back to front. *Figure 5*
9. Bring the thread down through the two thread guides on the left side.



Takeup lever guard removed for photos only. Never run the machine without the guard in place, extreme head injury may occur. This guard is not a handle keep your hand clear as your fingers can get pinched.

Figure 5

TIP: Use a dental floss threader to thread the guide directly above the needle. The threader will also thread your needle.

10. Bring the thread through the thread eyelet directly above the needle. *Figure 6*
11. Thread the needle front to back. *Figure 6*



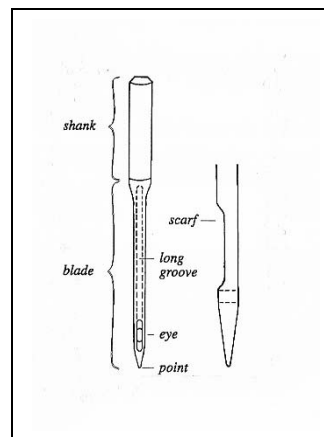
Figure 6

How Do I Change the Needle?

A 134RSAN needle (size 18) will be installed on your Tin Lizzie 18Ls from the factory. When it is time to replace the needle you can easily install one. Be sure the power switch is off on the machine. Remove the bobbin case.

To remove the needle use the smaller teal colored screwdriver included with your machine. Loosen the screw just above the thread guide on the needle bar; the needle should fall out as you loosen the screw.

Look closely at the needle. Your home sewing machine needle shank (top of the needle) has a flat side. The top of the longarm machine needle is round. On the point end of the needle there is a scarf, or notch, in one side. **The scarf must face the back of your machine. The long groove at the eye of the needle faces you as you insert the needle.**



Why does the scarf go to the back of the machine?

When the needle goes down through the fabric into the bobbin case, the hook comes around behind the needle to pick up the thread. The scarf has to be there to provide a way for the hook to get between the needle and the thread in order to pick up the thread.

Place the new needle up in the slot, making sure the needle is up in the needle bar as far up as it will go. Make sure the scarf is facing the back of your machine. Tighten the screw on the needle bar while holding the needle up.

TIP: Use the old needle to hold the new needle in place while you tighten the screw. By placing the point of the old needle into the eye of the new needle you can see how straight you are placing the scarf of the needle.

Before you turn your machine on go to the back of the machine and turn the hand

wheel a complete turn making sure the needle goes down in the center of the throat plate and the hook in the bobbin area rotates with the needle smoothly. Put the needle down as far as possible. In the bobbin area, you should be able to see you the eye of the needle. When the hook rotates it picks up the thread at the back of the needle then the top thread pulls the bobbin thread up to create a stitch. The scarf must face the back of your machine.

How Do I Make Adjustments to Make the Perfect Stitch?

Understanding how your longarm machine makes a stitch will help you make the proper adjustments to make the perfect stitch. The technique all longarm machines use to make a stitch is basically opposite of the home sewing machine. The home sewing machine is designed to press together two layers of fabric and sew while the fabric is held in place by the presser foot. Longarm machines are designed to press and sew multiple layers together while the machine head is moving. The difference is that there is practically no needle deflection on a standard sewing machine and a large amount of needle deflection on the longarm. The higher the tension, the more the needle will deflect. Another cause for the needle to deflect on a standard machine is the type of fabric being sewn. A tightly woven fabric tends to force the needle in different directions as it penetrates the fabric. This type of deflection depends greatly on the type of needle and type of point you use, such as a ball point or sharp point.

Needle deflection, what is needle deflection? What causes needle deflection? How is needle deflection related to the stitches on my quilt?

On a longarm quilting machine a stitch is mechanically created the same as a home sewing machine except the quilter is the feeddog moving the machine head over the fabric. The hopping foot presses the fabric together tighter and quicker than a home sewing machine presser foot because the fabric must be able to slide between the foot and the needle plate as the machine is sewing. This means that the machine is moving while the needle is in the fabric. The worst thing for a needle is to be in the fabric while the machine is moving which bends the needle, creating needle deflection.

Good stitches will interlock in the batting between the quilt top and backing. In real life, this goal is rarely achieved. For this reason, you need to be aware that you will have “pokies” if you use different colors of thread on top and in the bobbin. Pokies are where you can see tiny dots of the contrasting thread where the bobbin catches the top thread. If there is slightly more tension on the top than on the bottom, then you will see the pokies on the top side of the quilt. If the greater tension is on the bobbin, then you will see the pokies on the back of the quilt. If the pokies are objectionable to you, use the same color thread on both top and bottom.

Tip: *A general rule of thumb is that if the stitch looks bad on the top it is the bottom tension. If the stitch looks bad on the bottom is the upper tension. The upper and lower threads play tug of war with each other.*

Tension, tension, tension... This probably causes more problems than anything else. You need correct tension on the top and bottom threads but you also must have correct tension on the quilt held between the bars. You should be able to gently rock the belly bar where the backing fabric is attached. This allows enough movement of your quilt layers for the needle to penetrate and make good stitches.

Before you start making adjustments to your machine ask yourself, “What changed?” If your machine was stitching great and all of a sudden it has loopies on the back or puckers, “What changed?” Did you just change the bobbin? Did you just lift the take up bar? Did you lower the take up bar after finishing your last quilt? Did you recently change the needle? Did you just roll the quilt?

If the take up bar with the quilted portion of your quilt is too high, it will result in poor stitch quality. You need a finger tip space between the quilt and the machine bed. Higher will result in poor stitch quality. Lower and the quilt will create a drag on your machine’s movement.

Look at your bobbin, a sloppy wound bobbin will not create a good stitch. Make sure that the threads on the bobbin are snug and evenly wound. Check to see if there is a piece of lint in the bobbin case.

Tension Trouble shooting checklist

- ◆ Is the side tension lever down?
- ◆ Have I oiled my machine regularly?
- ◆ Is the quilt too tight on the frame?
- ◆ Is the thread coming off the cone freely?
- ◆ Has your thread jumped out of the tension discs?
- ◆ Check your threading. Has anything been missed or has the thread flipped itself around something, increasing your tension?
- ◆ Is the hopping foot too high or too low?
- ◆ Is your take up bar too high? Did you lower the take up bar after your last quilt?
- ◆ Do you need to change your needle?
- ◆ Is your needle in properly?

Top Thread Breaking

- ◆ Check to see that your thread is coming off the spool freely. The thread guide is centered over the spool and has not developed any burrs or catches.
- ◆ Check to see if the thread has looped itself around the spool pin.
- ◆ Check to see if the needle is in correctly, with the scarf facing the back of the machine.
- ◆ Have you recently changed the needle? Is it as high as it will go in the needle bar?

The Stitch Regulator does not keep up with me? Just like driving your car you need to make controlled starts and stops, practice being consistent in your movements.

Eyelashes

Eyelashes on the back of the quilt can be caused by too little top tension. Turn the thread tension disk clockwise ¼ turn. Make small adjustments. Repeat until stitch quality is good. Remember the upper and lower thread play tug of war with each other.

Loose Top Stitch

Is the tension lever handle down? It lowers the hopping foot and applies the tension disk.

Is the bobbin thread inserted in the slot of the bobbin case?

Adjust the tension disk small turns clock wise. Repeat until stitch quality is good.

Quilt Top Puckers

Is your backing fabric stretched too tight? While the backing fabric needs to lie flat and without wrinkles, stretching it too tight can make the quilt top pucker. After stitching and releasing the backing fabric the top will pucker.

The top tension is too tight. Adjust the tension disc small turns counter clockwise. Repeat until stitch quality is good.

Stitches are Skipped

Skipped stitches leave needle holes without thread while large and small stitches in regulated mode means the encoders are not picking-up the signal of your movements because of lint or thread stopping or slowing the reading.

First, check to see that your machine is threaded correctly. Look at the check spring, does the thread lay in the check spring? When properly threaded the check spring will move up and down as the machine is stitching and the thread is flowing freely.

Check the needle. Be sure it is all the way up into the shaft and the scarf is toward the back. If it has been used for some time, replace the needle. A blunt needle will make a popping sound as it penetrates the quilt sandwich.

Machine Drags Making it Difficult to Move

Check to make sure the quilt on the take up bar is not dragging on the bed of the machine. A finger tip distance between the take up bar and the bed of the machine is all that is necessary. Elevating the take up bar too high can cause loopies on the back. Look for lint or thread that might be snagging as you move the machine.

Difficult to Control the Movement of the Machine

Check for lint or other debris on the track and bars. Sometimes the smallest pieces of thread create the biggest headaches.

Check spring replacement/Tension Knob

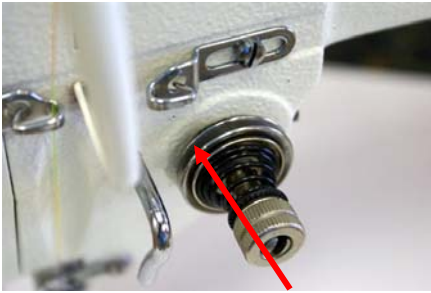


Fig 1: Tension Assembly with broken Spring (old tension knob)

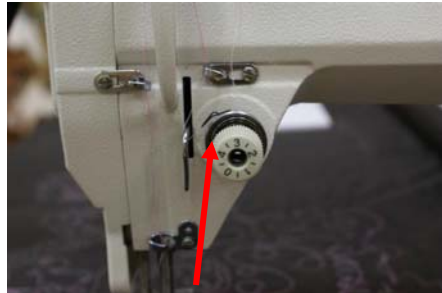


Fig 2: Tension Assembly with good spring (new Tension knob)



Fig 3: Screw on inside of machine loosen only **DO NOT REMOVE**



Fig 4: Remove assembly from machine. Be careful of release pin (see fig 6)



Fig 5: Machine with tension assembly removed



Fig 6: Tension assembly out of machine **DO NOT LOOSE PIN**

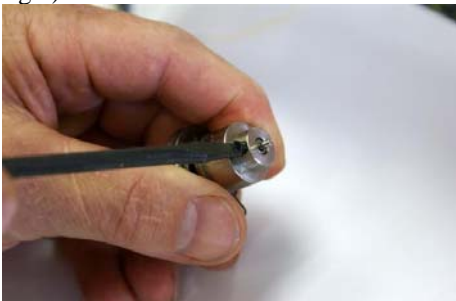


Fig 7: Loosen screw only **DO NOT REMOVE**



Fig 8: Remove tension assembly from barrel

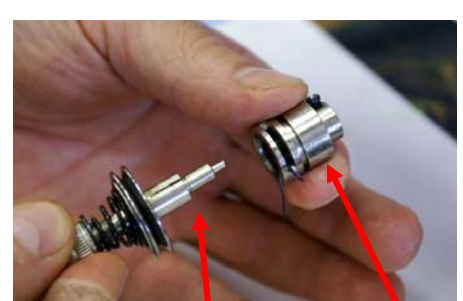


Fig 9: Tension assembly, Barrel



Fig 10: Remove spring



Fig 11: Spring removal



Fig 12: Spring removed

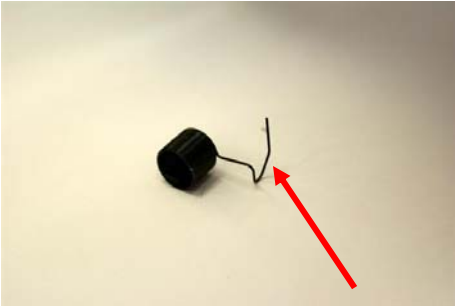


Fig 13: New Spring, This is what was broken

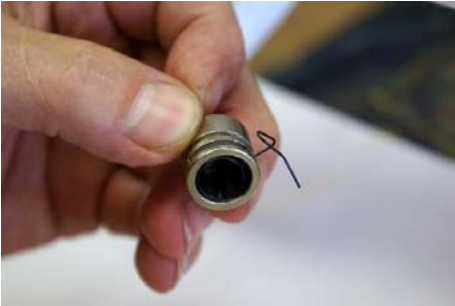


Fig 16: New spring in place



Fig 19: give the tension assembly a twist until you feel resistance on the check spring



Fig 22: Once in ensure that your check spring is at 11:00 (*refer to fig 26 for correct placement*)



Fig 14: Insert New Spring



Fig 17: Insert the tension assembly back in barrel

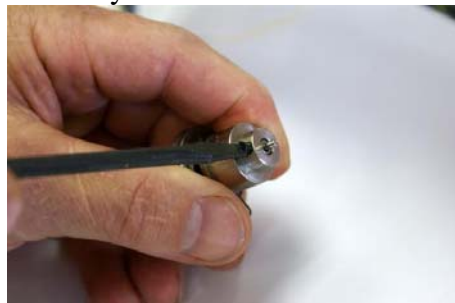


Fig 20: Tighten screw. Make sure pin is still there



Fig 23: Press in and notice the tension disk opens



Fig 15: Twist while inserting new spring



Fig 18: Insure that you are all the way in



Fig 21: Place the assembly back into your machine



Fig 24: Release and the disk will close; this is the proper place for your tension assembly



Fig 25: Tighten screw on your machine.

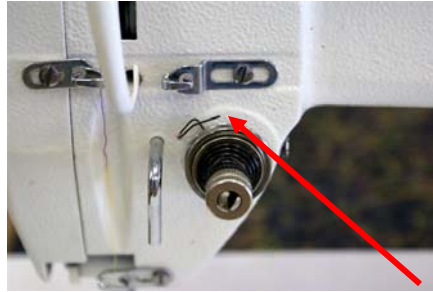


Fig 26: Tension assembly back in place with new check spring at 11:00



Fig 27: For fine adjustment of check spring insert screwdriver turn clockwise for more tension

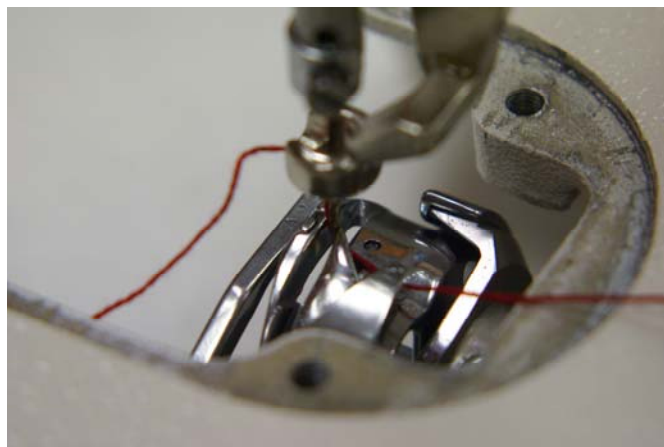
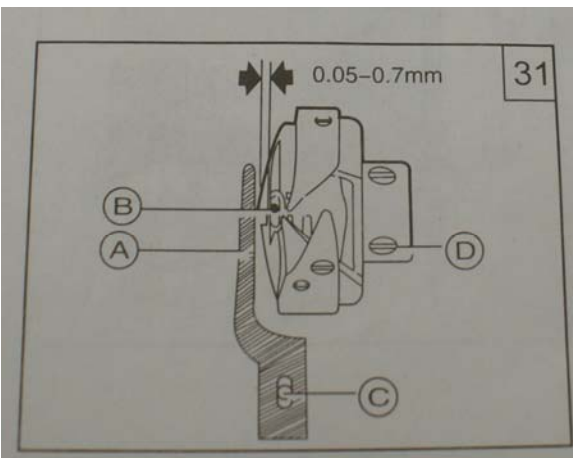
Timing between needle and rotating hook



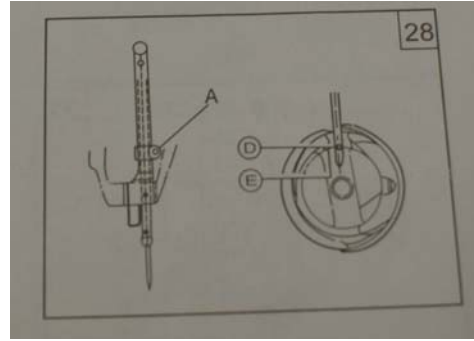
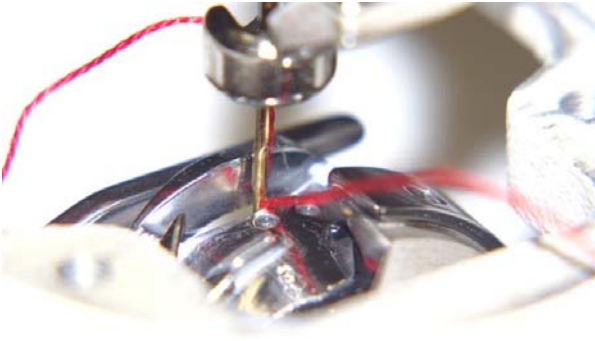
Remove the two needle plate screws from your machine.



You will also need to remove the three Face plate screws

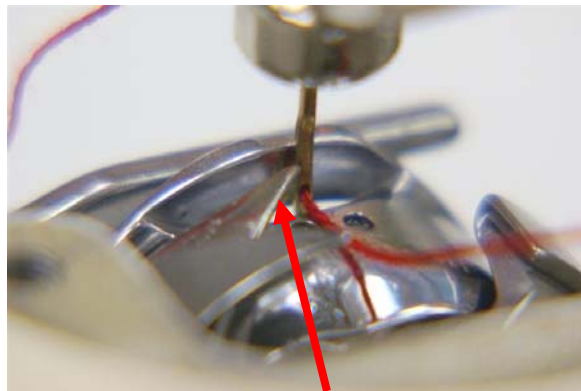
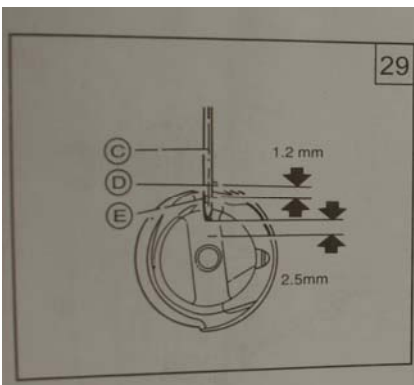


The protecting flange of the position bracket A should be engaged in the notch B of the bobbin case holder. D is set screw to adjust hook timing. (Photo on the right is actual machine as shown in Drawing)
Drawing and photo show correct timing.



Turn the hand wheel to locate the needle at its lowest position. Note: correct needle position is when you can see a small portion of the eye of the needle. This picture shows correct location.

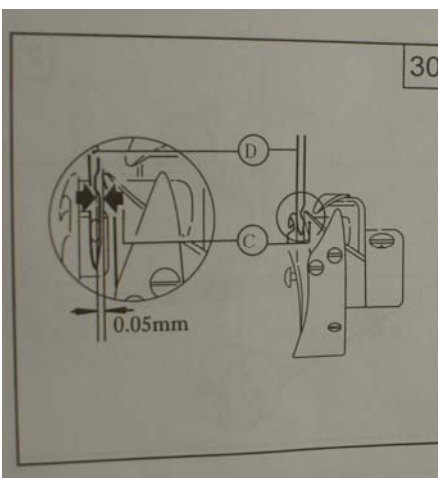
Loosen Needle bar connecting screw A. This will allow you to raise and lower needle bar for correct location. Note: Check all photos before making any adjustments



Hook Point

Adjusting rotating hook point timing with needle
Turn the hand wheel counter clockwise to locate needle to its lowest position. At lowest position turn hand wheel to raise needle 2.5 mm (1/8") Hook point should be just above eye of needle.

This picture shows needle bar and hook point at the proper location. After needle bar rise. Note if hook point is not in this location reference drawing 31 loosen screw D there are three screws. At this point the rotating hook can be moved freely On its shaft. To locate proper timing.



When adjusting the rotating hook point timing also note that clearance between notch bottom of needle D and hook point C must be maintained. Hook can not rub against needle. Also see drawing 31 for better view.

Tin Lizzie 18.