

Technical manual for the EMT 10/12T embroidery peripheral



- Twelve-Head Embroidery Peripheral
- 10 Needles with automatic color change
- Automatic Trimmers
- Caps, Tubular, Sash Frame
- 

Melco 
Embroidery Systems

A Saurer Group Company

1575 West 124th Avenue
Denver, Colorado 80234
United States of America
E-mail: editor@melco.com

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1. Introduction

Scope Of Manual

The EMT 10/12T Multi-Head Embroidery Machine technical manual is a guide for performing repairs and adjustments that go beyond routine operator maintenance.

These procedures are best understood and performed by professional service technicians in conjunction with specific factory technical training. However, much of the information in this manual may be useful reference for others who might possess appropriate technical aptitude and skills.

If any information in this manual is not fully understood, however, you are advised to contact your local Melco equipment service organization for assistance. You will find they are professional service technicians trained on Melco equipment, who have acquired technical expertise through experience and other general technical training. Additionally, Melco equipment technicians routinely receive up to date servicing information that continually enhances their product knowledge.

This technical manual is presented in five Sections: 1) an overview of general information useful in understanding the manual and various service requirements, 2) service maintenance of all the machine areas except the embroidery heads, 3) embroidery head maintenance (excluding trimmers), 4) service maintenance on the embroidery head trimmer area, and 5) information pertaining to various options used on the machine. Sections 2, 3, 4, and 5 address mechanical disassembly and replacement of major components, and any related adjustments.

Conventions Used In Manual

Throughout this manual abbreviations and specific terms may be used. The following explains some of this terminology:

When speaking of a "printed circuit board," the item may quite often be referred to as a "PCB."

The terms "X Beam", "Y Beam", "Beam", "Carriage", "Carriage Assembly" and "Pantograph" may all refer to the same general area.

Certain procedures in the manual require actions such as pressing a certain key, or typing some letters at the computer keyboard. The following is a list of some of the more commonly used conventions found in this manual.

- To choose one of the on-screen menu choices with the trackball, you will be directed to position the cursor over the appropriate box and press the left trackball control button. This is referred to as either clicking or selecting. For example: "Click on the Control Panel box." or "Select Head Timing."

- To indicate a key on the computer keyboard, the key in question is simply referred to, for example: Press the Enter key to initiate the application.
- A key on the peripheral keyboard is represented by a pictorial of that key.
- Typing with the computer keyboard is referred to in **BOLD** letters, for example: Type: **run** and press Enter to start.
- To indicate that two or more keys must be pressed to obtain a desired result, each key is indicated with commas between them. An example is: Press Shift,8 to type an asterisk (*).

Occasionally in the manual, special attention by the user is required. In this situation, "attention getters" are used to indicate the need for the user to be aware of a situation that is above and beyond the normal or routine. Three standard attention getters are explained below:



WARNING!

This term is used to call attention to the user that the procedure following must be performed with care and accuracy. Failure to use care and accuracy may result in possible damage to property or personal injury to the operator or other persons in the area. This term is also used to announce important regulatory information.



CAUTION!

This term is used when the procedure following it may cause damage to the equipment or other property if not properly performed by the user.

NOTE:

This term is used when additional information is required beyond the normal steps for communicating the information. It may be used to clarify certain portions of text or to call attention to other items previously mentioned or mentioned later in the procedure.

Glossary Of Terms

Several words or terms are used in this manual that are unique or specialized in use with the embroidery industry or Melco embroidery equipment. A glossary of these terms is located in the operation manual.

Maintenance Philosophy

The maintenance philosophy used in this manual, and practiced at Melco, is to isolate potential problems within the system to a "practical" replacement assembly. Components are typically not repaired, but rather, a circuit board or mechanical "assembly" may be replaced. In the process of isolating problems in the machine, the person performing the trouble shooting must also practice good trouble shooting techniques. Good trouble shooting techniques include, but are not limited to: guarding against static electricity causing further damage to machine components, and only replacing one part at a time to enable identification of the defective part after the machine is repaired.

Good Maintenance Practice

The procedures in this manual are guidelines for performing repair maintenance and must be used by personnel practicing good maintenance and repair technique. Good maintenance technique includes, but is not limited to, adhering to all precautions and safety considerations when working on the unit, and using the correct tools for the job being performed.



WARNING! Personal injury may result if proper precautions are not observed. Remove rings, watches, and any other metallic objects from hands and wrists before servicing the machine. Remove metallic articles from shirt pockets to prevent them from falling into the machine. Do not place hands under the needle or needle bar. Do not allow loose clothing to come in contact with moving parts of the machine. Under certain conditions of machine failure the moving parts of the machine may not be controllable by normal means. At these times the machine may operate without notice.

Static Electricity

As with all computerized equipment, the EMT 10/12T Multi-Head Embroidery Machine is sensitive to static electricity. Any time work is performed inside covered areas of the embroidery machine, the person performing the work MUST be using a static grounding strap.



WARNING! Failure to use a grounding strap, or failure to practice other good maintenance/repair techniques may cause damage to the machine and possible harm to personnel.

Grounding Strap Use

A grounding strap must be connected properly to insure that static charge on the person's body is neutralized to the chassis ground level of the embroidery machine when working in the electronic areas under the covers. Proper connection is at any bare (unpainted) metal surface or any other surface (such as a ground screw head) that is known to be an earth ground.

DO NOT attempt to use any grounding strap that is not specifically designed for static use. A "straight-wire" grounding device (one without built-in resistance) will place the operator in danger of exposure to dangerous voltages. It is recommended that the static strap be checked during daily use for proper resistance protection.

Warranty Considerations

Many areas of maintenance in this manual require factory trained personnel to assure proper service. Any service that is improperly performed may cause the warranty to be voided.

Electrical Grounding



WARNING! It is very important that the power cord be plugged into a properly wired electrical outlet. Failure to have a properly wired outlet may result in damage to the equipment and injury to personnel. It is recommended that a licensed electrician be consulted to assure that the electrical outlet is properly wired and grounded.



CAUTION! If a properly wired electrical outlet is not used for the source supply voltage to the System, electrical failures may result.

System Overview

The EMT 10/12T Embroidery Machine is a twelve head machine assembled with Melco's ten needle, cylinder arm embroidery heads. The machine is designed for embroidering on flat goods, as well as with cap frames, tubular hoops, and a sash frame. It is equipped with automatic thread trimmers and under thread controls.

Physical/Functional Arrangement

The EMT 10/12T may be divided into several distinct physical and/or functional areas of description. One of these areas is where all the computerized controls are housed. This area is called the User Station. The user station is located to the far right of the embroidery heads and consists mainly of the computer items such as the monitor, keyboard, disk drive unit, and the controller box containing the various printed circuit boards.

A second distinct section of the EMT 10/12T is the Embroidery Head section. This section consists of each of the 12 embroidery heads, the Z drive system and associated head drive mechanics, the color change system, thread handling system, and other various parts making an operational embroidery head, including trimmer and UTC devices.

Another area, the Carriage section, consists of the X/Y mechanical devices that hold the garments and move them forward and backward (Y axis movement) and left to right (X axis movement). The visible part of the carriage assembly is located just above the table top and positioned under the embroidery head arms. The carriage section also consists of the motors, drive belts, pulleys, and shafts associated with the device, located within or directly under the table top.

The Under Carriage Section is described as that area under the head platform and within the frame support. In addition to various portions of the carriage assembly mentioned above, this section contains the power distribution assembly and the motor amplifiers.

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2. Service Maintenance (except head and trimmer)

General

This section of the manual provides parts replacement procedures and various adjustments required during parts replacement or other service repairs of all areas of the machine except the embroidery heads. Embroidery head service maintenance information other than trimmers is located in Section 3 of this manual. Trimmer service maintenance information is located in Section 4.

These procedures are guidelines for performing repairs and must be used by personnel practicing good maintenance and repair techniques. Refer to the Maintenance Philosophy topics in Section 1 of this manual for discussion of good maintenance and repair techniques, including concerns with static electricity.



WARNING! Failure to practice good maintenance and repair technique may result in injury to personnel performing the work, and damage to the equipment!

NOTE: The Warranty is exclusive of, and may be VOID if, poor maintenance practices have caused damage to the equipment.

EMT 10/12T User Station

The user station section in this manual contains disassembly procedures for such items as the Logic Control Box and its contents, the Keyboard assembly and Monitor, and various PCBs inside the Main Computer (See Figure 2-1).

Keyboard and Monitor

The computer keyboard assembly sits in a pull-out drawer just under the user station table top and connects to the keyboard connector at the rear of the main computer. The Monitor sits on top of the user station table top with its cables also connecting to the rear of the main computer. Both items are easily removed by disconnecting their respective cables and lifting them out of position.

Keyboard Assembly Replacement

The computer keyboard assembly may be easily replaced if worn, damaged, or generally non-functional. There are no parts inside the keyboard assembly to be serviced, therefore it is replaced as a unit if it becomes defective.

1. Turn OFF the power switch to the EMT 10/12T and remove the power cord from the power source electrical outlet.
2. Move to the rear of the main computer box and locate the cable connections from the keyboard assembly.

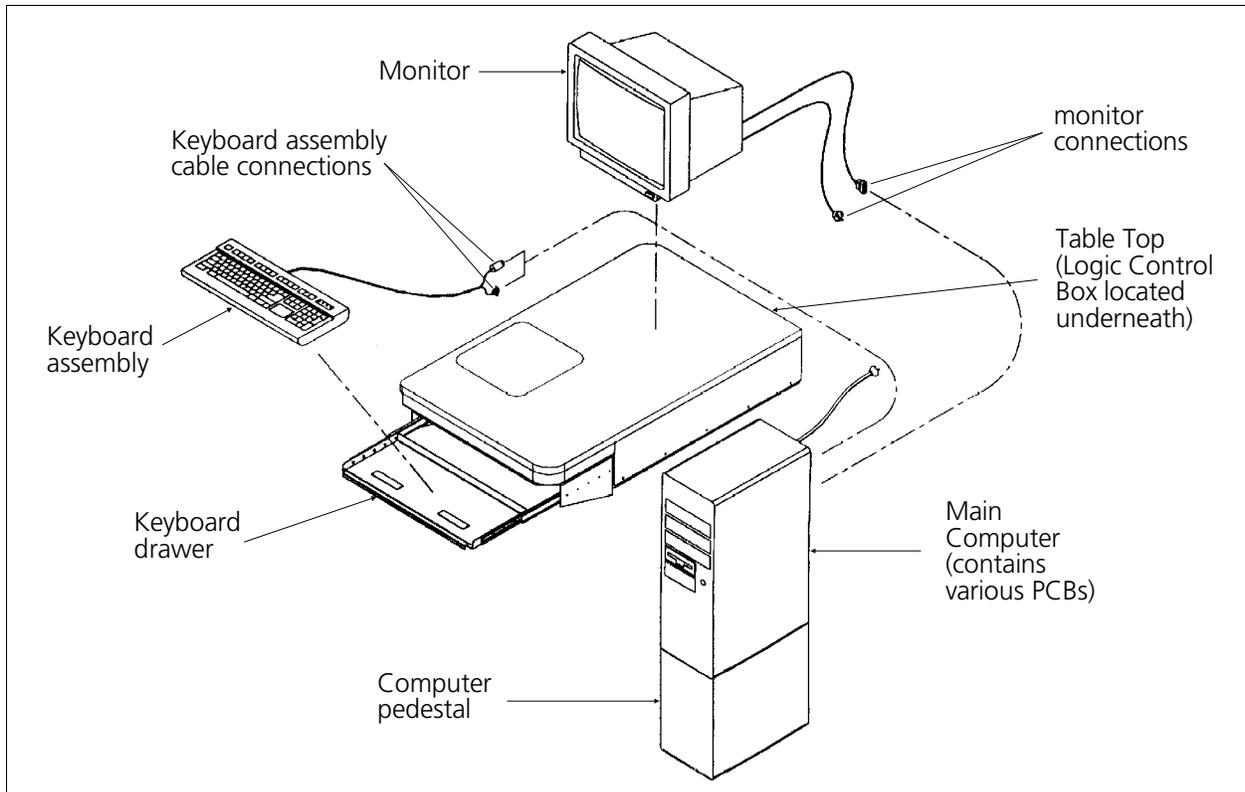


Figure 2 - 1

3. Unscrew the 2 thumb screws and disconnect the mousepad cable from the 9-pin Dsub 'mouse' connector on the outside of the computer box.
4. Unplug the keyboard cable from its location at the rear of the computer box.
5. Route the cable ends through user station and keyboard drawer area to the keyboard assembly.
6. To install a new keyboard assembly, route the cables of the new unit into the logic control box and reverse the steps used for removing the old unit.
7. Reinstall any covers removed during this procedure.

Monitor Replacement

The monitor may occasionally require maintenance or repair. There are no "user-serviceable" parts inside and high-voltage may be present even after the monitor has been fully disconnected. It is therefore advisable to leave any internal monitor repairs to a trained electronic technician.

Main Computer

The Main Computer is the heart of the EMT 10/12T control system. The computer motherboard and much of the embroidery machine control electronics (several upright PCBs) are located inside the computer box (see Figure 2-2). The Main Computer sits on a floor-mounted pedestal to the far right side of the user station.

Replacing Upright PCBs



CAUTION! Failure to use a properly installed static grounding strap may cause damage to the electronics in the EMT 10/12T.

The components inside the computer box are quite sensitive to static electricity, and severe damage may be caused if proper procedures are not followed, such as using the static grounding strap. It is highly recommended that work inside the computer box be conducted by personnel practicing proper static control methods.

Inside the computer box are several printed circuit boards plugged upright into the computer motherboard. The standard PCBs are: the Machine CPU, the Ethernet network PCB, the Disk Drive Controller, and the Video Controller. Refer to Figure 2-2 to identify the specific location of each PCB.

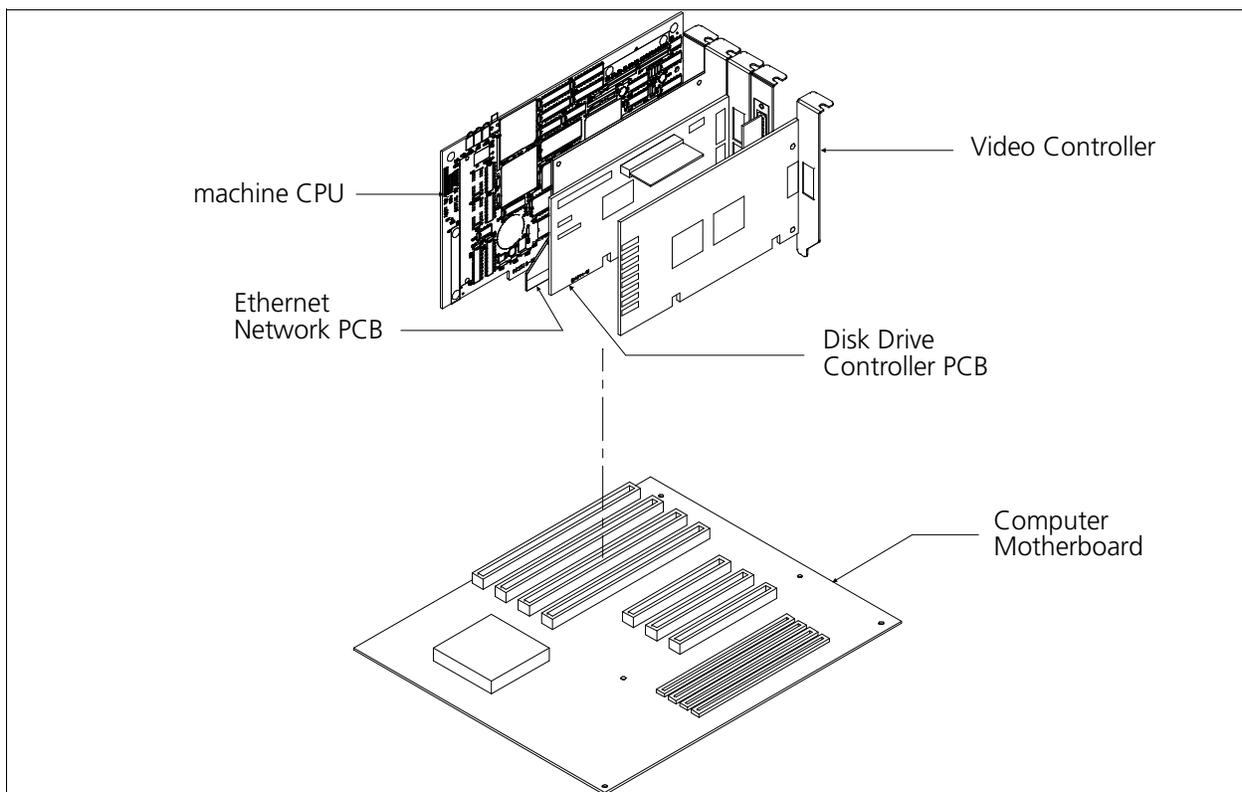


Figure 2 - 2

To replace any of the PCBs plugged into the computer motherboard, refer to Figure 2-2 and following steps:

1. Check that the power switch to the EMT 10/12T is OFF and the power cord is removed from the power source electrical outlet.
2. Remove the computer box outer cover screws and then the outer cover like any standard tower computer cover removal.
3. Install a static grounding strap between the EMT 10/12T and the personnel performing this procedure.
4. Mark the location for reinstallation later, and then remove any and all cables that may be attached to the printed circuit board assembly you are removing.
5. Remove the screw securing the specific PCB end bracket to the PCB bracket support frame.
6. Grasp the PCB at the top outside corners and carefully pull up on the PCB to remove it from the computer motherboard edge connector where it is installed. (Use a gentle rocking motion to make it slightly easier to release the board from the connector.)



CAUTION! Once the printed circuit board is removed, use extreme care in handling it. Portions of the board may be very sensitive to static charges. Any further handling of the PCB must be done with the continued use of the static grounding strap until reinstalled.

To install the PCB assembly, position the board edge connector over the edge connector in the computer motherboard and lower the PCB into the connector, then reverse the order of the other steps used to remove the assembly.

Replacing The Computer Motherboard

1. Turn OFF the power switch to the EMT 10/12T and remove the power cord from the power source electrical outlet.
2. Remove the computer box outer cover screws and then the outer cover like any standard tower computer cover removal.
3. Install a static grounding strap between the EMT 10/12T and the personnel performing this procedure.
4. Remove all the upright PCBs that reside in the computer motherboard connectors (see the section entitled Replacing Upright PCBs).
5. Remove any other various cables and harnesses from the other connectors of the computer motherboard.

6. Remove the screws that secure the motherboard to the base of the computer box.
7. Grasp the computer motherboard at the corners of the board and carefully lift the board up and out of the base of the logic control box.



CAUTION! Once the motherboard is removed from the logic control box, use extreme care in handling it. Portions of this board are very sensitive to static charges. Any further handling of the motherboard must be done with the continued use of the static grounding strap until reinstalled.

To replace the motherboard, perform the previous steps in reverse order.

Logic Control Box

The logic control box contains low voltage controls required for the EMT 10/12T machine. The low voltage driver PCB and logic control interface PCB, as well as the connector I/F PCB are located inside the logic control box (see Figure 2-3). The logic control box is located at the rear of the user station area on the right side of the EMT 10/12T just under the table top (see Figure 2-1).

Removing Logic Control Box Cover

1. Turn OFF the power switch to the EMT 10/12T and remove the power cord from the power source electrical outlet.
2. Remove the monitor from the top of the user station table top.
3. Lift the table top off the user station and locate the logic control box toward the rear of the area.

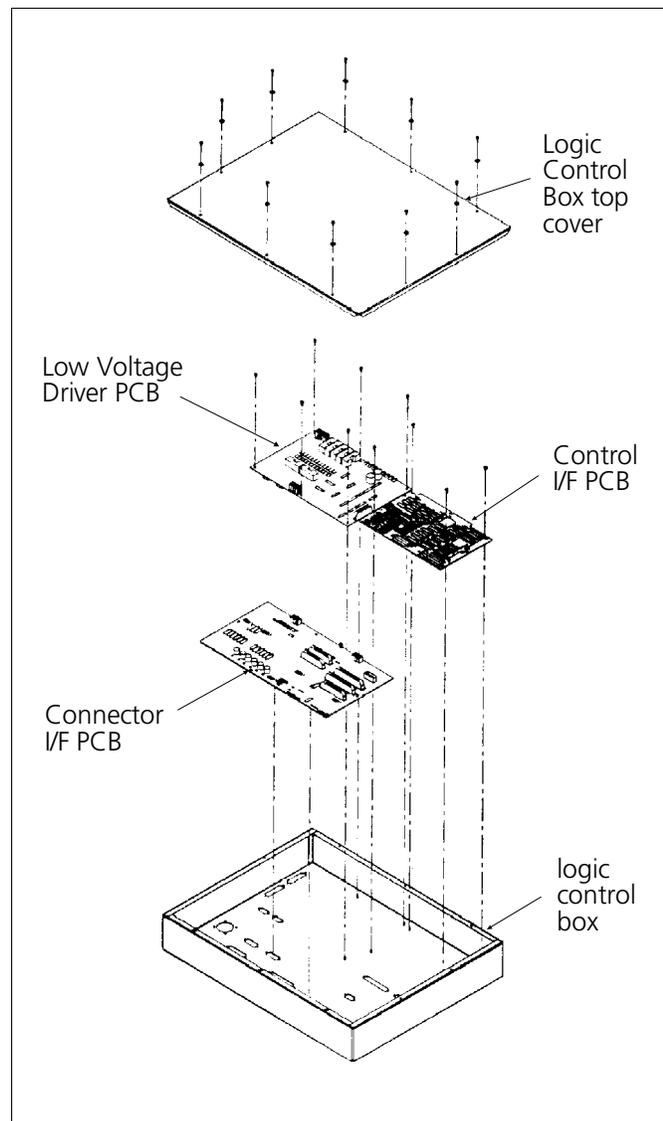


Figure 2 - 3

4. Remove the screws that secure the logic control box cover and carefully lift the cover off the top of the box.
5. Attach a static control strap from yourself to a non-painted portion of the logic control box frame before performing any service inside the box.

Low Voltage Driver PCB Replacement

The Low Voltage Driver PCB is located inside the logic control box. Refer to the following steps to remove this assembly:

1. Turn OFF the power switch to the EMT 10/12T and remove the power cord from the power source electrical outlet.
2. Remove the logic control box cover as previously described.
3. Install a static grounding strap between the EMT 10/12T and the personnel performing this procedure.
4. Remove any cables or harnesses that may be connected to the PCB.
5. Remove the screws that secure the PCB to the base of the logic control box (see Figure 2-3).
6. Grasp the assembly at the corners of the board and carefully lift it up and out of the base of the logic control box.



CAUTION! Once the PCB is removed from the logic control box, use extreme care in handling it. Portions of the board are very sensitive to static charges. Any further handling of the board must be done with the continued use of the static grounding strap until it is reinstalled.

To replace the PCB assembly, perform the previous steps in reverse order.

Replacing Control Interface and Connector I/F PCBs

These PCBs are replaced using the same process as replacing the Low Voltage Driver PCB. Refer to the previous procedure for that information.

Front Panels And Covers

There are several covers and panels attached to the front of the EMT 10/12T. These covers may fill spaces between embroidery head parts and enclose harnesses associated with various devices mounted in this area. They also serve as panels to support and enshroud the devices in this area which include: the 7-button keypad, start/stop switches, emergency stop switches, tensioner brackets, and needle case assemblies.

To remove any of these covers, refer to the applicable step or steps below:

1. To remove any of the lower front covers (between needle cases), remove the 2 screws for each cover. Pull down slightly on the cover to remove the pin in the top of the cover from the hole in the bottom of the upper panel, then remove the cover from the area.
2. To remove any of the device panels or blank panels between the tensioner brackets, you must first remove the lower front cover under the panel you wish to remove.
3. There are screws into the top of all the panels that come into the panels from the top of the tensioner covers. Remove the top screws from the panel you wish to remove.
4. Remove the screws from the front of the panel you wish to remove and remove the panel carefully. When removing the keypad or switch panels, you must disconnect associated harnessing during removal.
5. There are eight covers behind the thread tensioner assemblies, six over the rear of the tensioners and an end cover at head numbers 1 and 12. These covers are secured with screws that are removed to take off the selected cover.

HINT You don't have to remove the tubes (tube clips) attached to the tensioner covers - just position the cover (with tubes attached) back away from the area you wish to access.

To reinstall any or all covers and panels, reverse the associated steps above.

7-Button Keypad Replacement

To replace the 7-button control keypad (see Figure 2-4), follow this procedure:

1. Turn OFF the power switch to the EMT 10/12T and remove the power cord from the power source electrical outlet.
2. Remove the lower front cover between head numbers 1 and 2.
3. Remove the two screws from the top of the keypad panel.

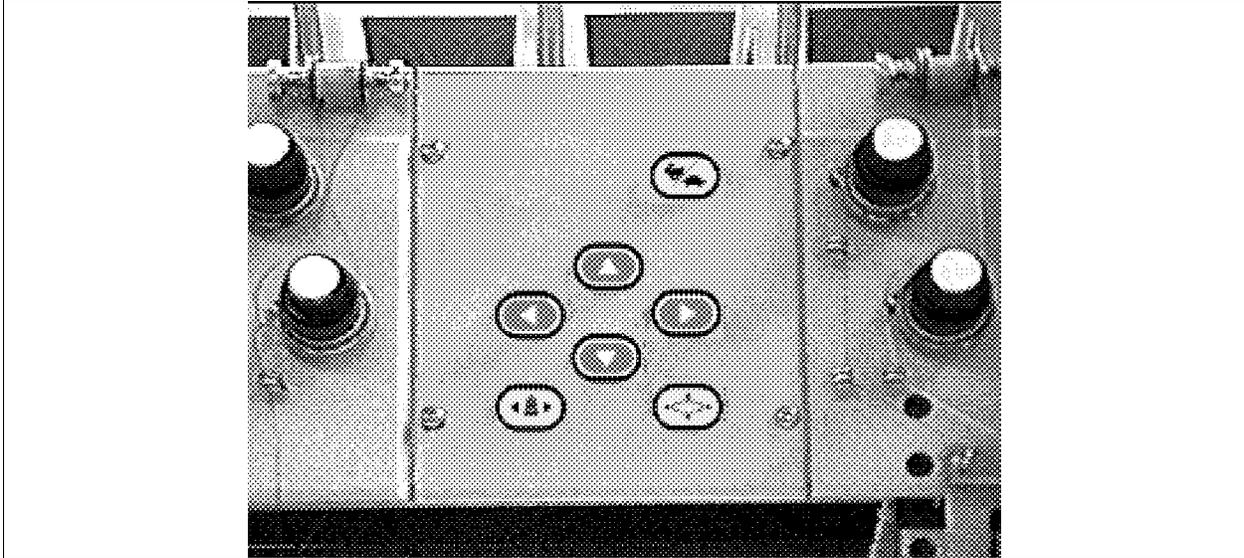


Figure 2 - 4 Keypad Panel

4. Remove the four screws that secure the 7-button keypad panel to the adjoining tensioner assemblies.
5. Disconnect the 12-strand cable from the back of the keypad printed circuit board.
6. With the panel disconnected, remove the four screws that secure the keypad PCB to the back of the panel.
7. Replace the keypad with a new unit and reverse the above steps to re-install.

Replacing Start/Stop/Frame and Emergency Switches

Basic Parts

Each switch set comes with an actuator mechanism and the switch contacts. The actuator mechanism for the emergency stop switch is normally positioned outward; and locks inward when pressed. It is released to come back to the outward position with a clockwise twist. The start, stop, and frame actuators are normally positioned outward; and when pushed inward, only stay in that position as long as they are held there. When the actuator is released, it automatically comes back to the outward position.

Basic Configurations

The start, stop, and frame switches are normally open contacts that are temporarily closed for the specific function. The emergency switch is a normally closed contact that is opened (and held open with a twist-lock type switch actuator).

To replace any of the switches, follow this procedure: (See Figures 2-5 and 2-6.)

1. Turn OFF the power switch to the EMT 10/12T and remove the power cord from the power source electrical outlet.
2. Remove the lower front cover under the panel that has the switch to be replaced.
3. Remove the two screws from the top of the keypad panel.

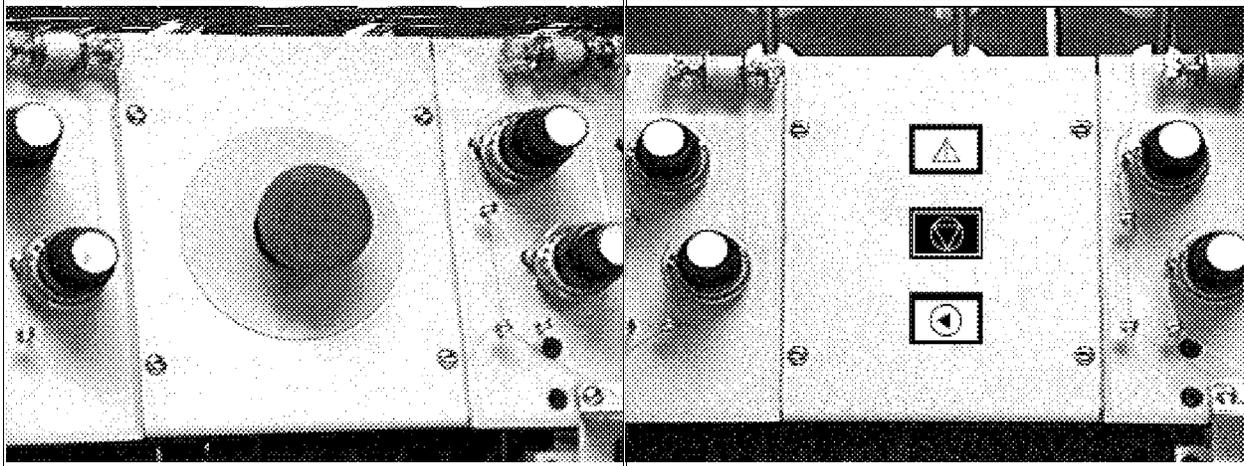


Figure 2 - 5 Emergency Stop Panel

Figure 2 - 6 Start/Stop Panel

4. Remove the four screws that secure the switch panel to the adjoining tensioner assemblies.
5. With the emergency stop panel disconnected, remove the emergency switch contacts from the actuator mechanism by rotating the plastic lever at the junction of the contacts and actuator approximately 1/8 turn counter-clockwise (see Figure 2-7).

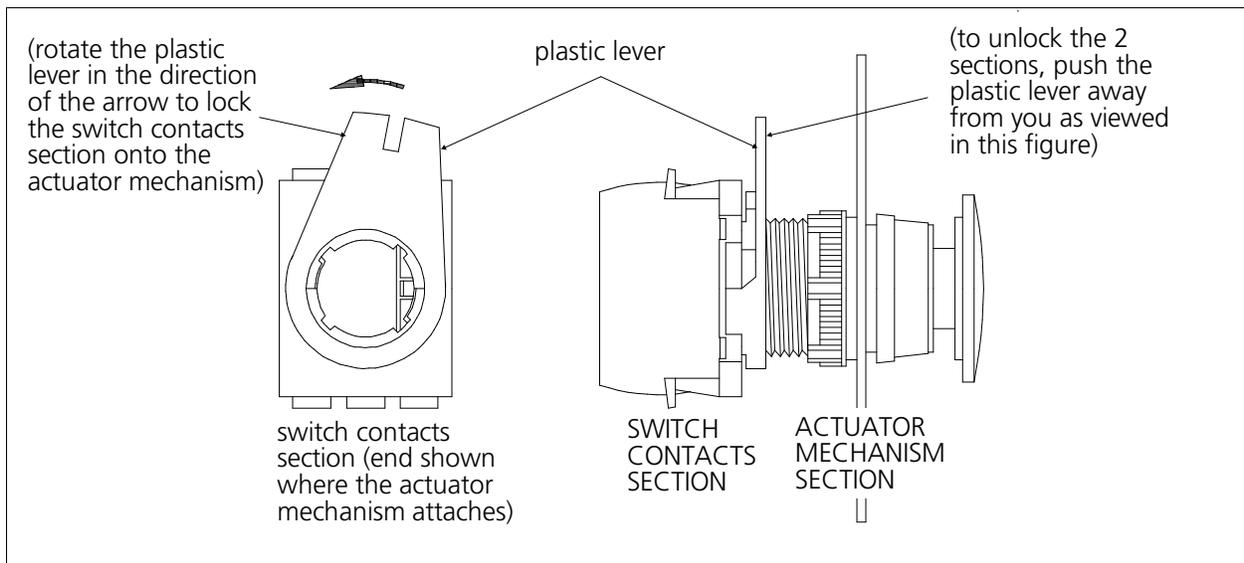


Figure 2 - 7 Separating Switch Contact from Actuator

6. If replacing the switch contacts, loosen the screws holding the switch wire spade lugs in the rear of the defective switch contacts, and transfer the switch wires to the new switch contacts. Refer to the diagram in Figure 2-8 for reattaching the harness connections.

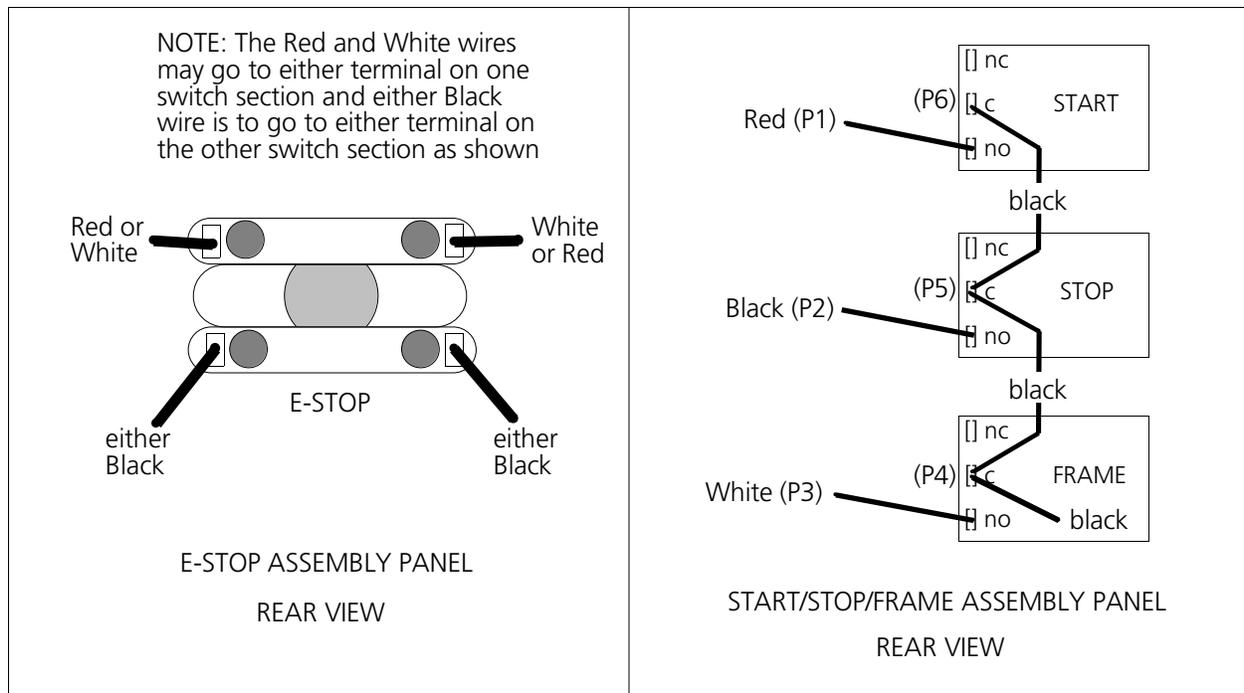


Figure 2 - 8

7. If replacing the actuator mechanism, unscrew the nut on the rear of the panel and remove the positioning keyway washer. Then remove the rest of the actuator and the rubber washer out the front of the panel.
8. When replacing the start, stop, or frame switches, remove the panel and disconnect the various wires from the switch contacts.
9. After removing the wires associated with the defective switch, remove the switch by rocking the switch side to side while pushing it out the front of the panel.
10. After removing the defective switch contact and/or actuator mechanism, replace the parts with new units and reverse the above steps to re-assembly the switch and reconnect the wires to the appropriate terminals. Refer to the diagram in Figure 2-8 for reattaching the harness connections to the various switches in the panel.
11. Re-attach all panels and covers.

Carriage Section

This section consists of the motors, mechanical drive devices, and associated parts for securing and moving the hoops in the x and y coordinates during embroidery.

Sash Frame Removal

Refer to the EMT 10/12T Operation Manual for sash frame removal and adjustment.

Replacing X and Y Drive Belts

"FACTORY SERVICE ADVISED"

The carriage X axis has two drive belts and the Y axis has four drive belts. Special tools are required to properly tension these belts after they are replaced. Improper belt tension adjustments will lead to premature wear of the belts, pulleys and bearings, and may produce diminished embroidery quality.

To replace any of the belts refer to the following procedure:

1. Turn OFF the power switch to the EMT 10/12T and remove the power cord from the power source electrical outlet.
2. Move the sash frame all the way to the rear and to the right mechanical limits.
3. Remove the associated table top section for the Y drive belts or X drive belt cover.
4. Refer to Figure 2-9 and loosen the 4 locking dowel set screws in the outer belt clamping block (nearest the outside edge of the table surface).

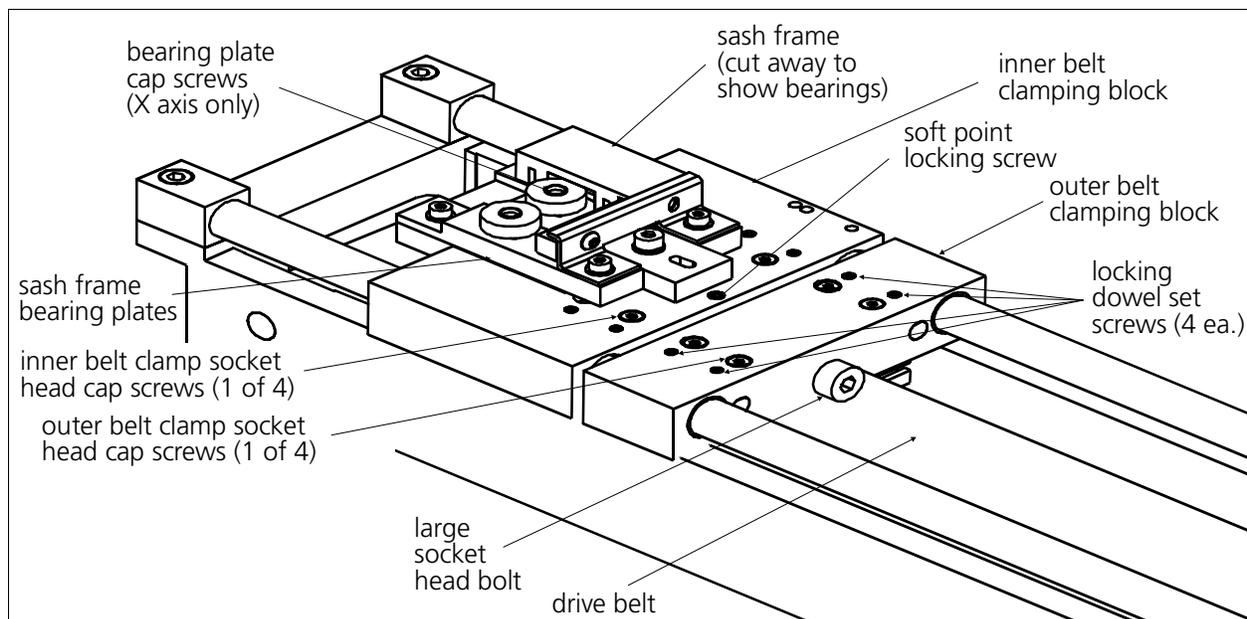


Figure 2 - 9 X or Y Drive Belt Coupling

5. Loosen the soft point screw locking the large socket head bolt and rotate the bolt counter-clockwise to move the two clamping blocks apart. This loosens the belt.
6. Remove the bolt and slide the outer belt clamping block out as far as it will travel.
7. Loosen the belt clamp socket head cap screws to release the belt at the outer block.
8. Tape one end of the new belt to the loose end of the old belt.
9. At the X belt locations . . .
 - a) Loosen the middle bearing plate cap screw at both X belt drives (see Figure 2-9). This allows the sash frame to be loosened around the bearings.
 - b) Lift the sash frame off the bearings and move the frame out of the way so the X drive area may be easily accessible.
 - c) Remove the screws in the two outside sash frame bearing plates (see Figure 2-9).
 - d) Remove the two outside sash frame bearing plates to access the inner belt clamp socket head cap screws (two screws are positioned under the outside bearing plates).
10. Loosen the four inner belt clamp socket head cap screws to release the belt at the inner block.
11. Grasp the loose end of the old belt at the inner block and carefully pull on it as you assist at the other end by pushing on the new belt/old belt tape splice. As you perform this step, the new belt is moved into position to be attached to the inner and outer blocks.
12. When the new belt is in position, remove the old belt and tape and attach the new belt at the inner and outer blocks.
13. At the X belt locations . . .
 - a) Reattach the outside sash frame bearing plates and reposition the sash frame onto the bearing assemblies.
 - b) Apply a slight amount of pressure on the middle plates to take up the bearing slack of the sash frame bearings and tighten the middle bearing plate cap screws.
14. Ensure the sash frame is square to its mechanical alignments; and the belt teeth are engaged in the pulleys without any significant slack in the belt between the pulleys.

15. Move the outer block toward the inner block to take up the slack in the rest of the belt.
16. Attach the tensioning bolt.

X and Y Drive Belt Tensions

"FACTORY SERVICE ADVISED "

NOTE: This procedure requires using the Breco Belt Tensioner tool.

The following procedure is for either the X or Y carriage drive belts.

1. Refer to the procedure for tensioning belts using the Breco Belt Tensioner in Addendum A and perform the belt tension measurement with the Breco Belt Tensioner.
- 2a. For X belts, push the sash frame to the far left position (toward the idler pulley) and measure in the middle of the upper part of the belt.
- 2b. For Y belts, pull the sash frame to the complete forward position (toward the front of the machine) and measure in the middle of the upper part of the belt.
3. The correct tension reading for the X belts is **80** ± 1 Hz on the Breco Belt Tensioner display.

The correct tension reading on the Breco Belt Tensioner display for the Y belts is as follows:

- 65** ± 1 Hz for the first belt (closest to User Station)
- 62** ± 1 Hz for the second belt
- 59** ± 1 Hz for the third and fourth belts

4. If the tension is not correct, refer to Figure 2-9 and, if not already loosened, loosen the soft point screw locking the large socket head bolt and loosen the four set screws locking the dowels.
5. Increase or decrease the belt tension by rotating the large socket head bolt.

To increase the tension (raise the frequency number on the tensioner display) you must make the distance between the inner and outer belt clamping blocks smaller by rotating the bold clockwise.

To decrease the tension (lower the frequency number on the tensioner display) you must make the distance between the inner and outer belt clamping blocks larger by rotating the bold counter-clockwise.

6. Repeat the tension measurement procedure and continue to change the belt tension until the correct tension reading on the tensioner display is obtained.

7. Move the paper clip (or other metallic material) to the other edge of the belt and check the belt tension value at that location.
8. If the two readings are within 2 Hz (units) on the tensioner display, go to step 11.

If the two readings vary by more than 2 Hz on the tensioner display, slightly loosen the two belt clamp socket head cap screws at the outer block on the side of the belt with the highest reading.

9. Retighten the screws and repeat the tension measurement at both sides of the belt.
10. Repeat steps 8 and 9 until the overall tension is in the proper range and the sides of the belt are within their acceptable variance of 2 Hz.
11. Tighten the soft point locking screw onto the large hex head tensioning bolt to hold it in adjustment.
12. Tighten the 4 locking dowel set screws in the outer belt clamping block that you loosened at beginning of the belt removal procedure.
13. Move the sash frame backward and forward several times and stop again with the frame in the complete forward position. Check the belt tension again to verify proper adjustment. Repeat the adjustment procedure if belt tension is not in the proper range.
14. Reattach any table top section or drive belt covers removed for this procedure.

X Motor And Motor Belt Replacement

"FACTORY SERVICE ADVISED "

NOTE: A special tool is required for X motor belt tension adjustment after the motor is replaced.

1. Turn the main power OFF, and remove the power source cable from the power distribution box.
2. Remove the machine right end cover to gain access to the X motor and belt area.
3. Move the X carriage to its full right position.
4. Loosen the bolts that secure the motor to the mounting bracket as shown in Figure 2-10. (DO NOT remove the bracket.)

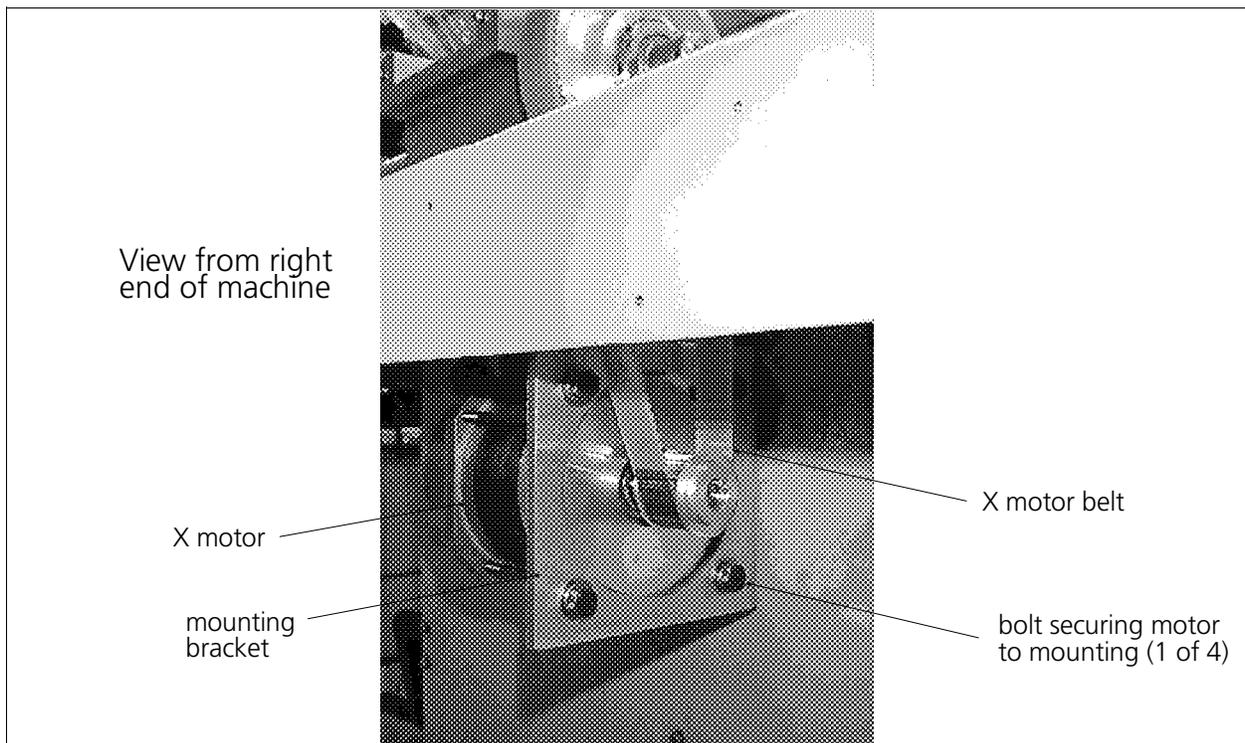


Figure 2 - 10 X Axis Motor and Belt

5. Slip the motor belt off of the motor shaft pulley and the X drive shaft pulley.
6. If replacing the belt ONLY, skip to Step 11.
7. Disconnect the X motor harnesses.
8. Remove the bolts and take the motor off the mounting bracket (DO NOT remove the bracket).

9. Transfer the motor pulley from the old motor to the new motor.
10. Attach the new motor to the mounting bracket using the same bolts. Secure the bolts loosely.
11. Put the belt onto the motor shaft pulley and the X drive shaft pulley.
12. Snug the motor bolts to the mounting bracket, allowing for movement within the slotted holes.
13. If the motor was replaced, reconnect the motor harnesses.
14. Pull down on the motor housing, thus pulling the belt taut.
15. When the belt is believed to be close to the proper tension, tighten the motor mounting bracket bolts securely and prepare to measure the belt tension.

X Motor Belt Tension

"FACTORY SERVICE ADVISED "

NOTE: This procedure requires using the Breco Belt Tensioner tool. Refer to Addendum A for user instructions for this device.

16. Refer to the procedure for using the Breco Belt Tensioner in Addendum A and locate the point on the belt midway from the center of the drive shaft pulley to the center of the motor pulley.
17. Again, referring to Addendum A, perform the belt tension measurement with the Breco Belt Tensioner.
18. The reading on the tensioner display should be **140 ± 5 Hz**.
19. If the tension number is too low, you must loosen the motor mounting bracket bolts and pull down on the motor with additional pulling force to apply more tension on the belt.
20. If the tension number is too high, you must loosen the motor mounting bracket bolts and allow less pulling force on the motor to apply less tension on the belt.
21. Tighten the motor mounting bracket bolts securely, then move the sash frame left and right several times.
22. Check the tension reading again and readjust the belt as needed until the tension is set within the proper tolerance.
23. Reattach the machine right end cover and any other covers removed during this procedure.

Y Motor And Motor Belt Replacement

"FACTORY SERVICE ADVISED "

NOTE: A special tool is required for Y motor belt tension adjustment after the motor is replaced.

1. Turn the main power OFF, and remove the power source cable from the power distribution box.
2. To gain access to the Y motor and belt area shown in Figure 2-11, remove the Y/Z drive cover at the rear of the machine between head numbers 5 and 6.

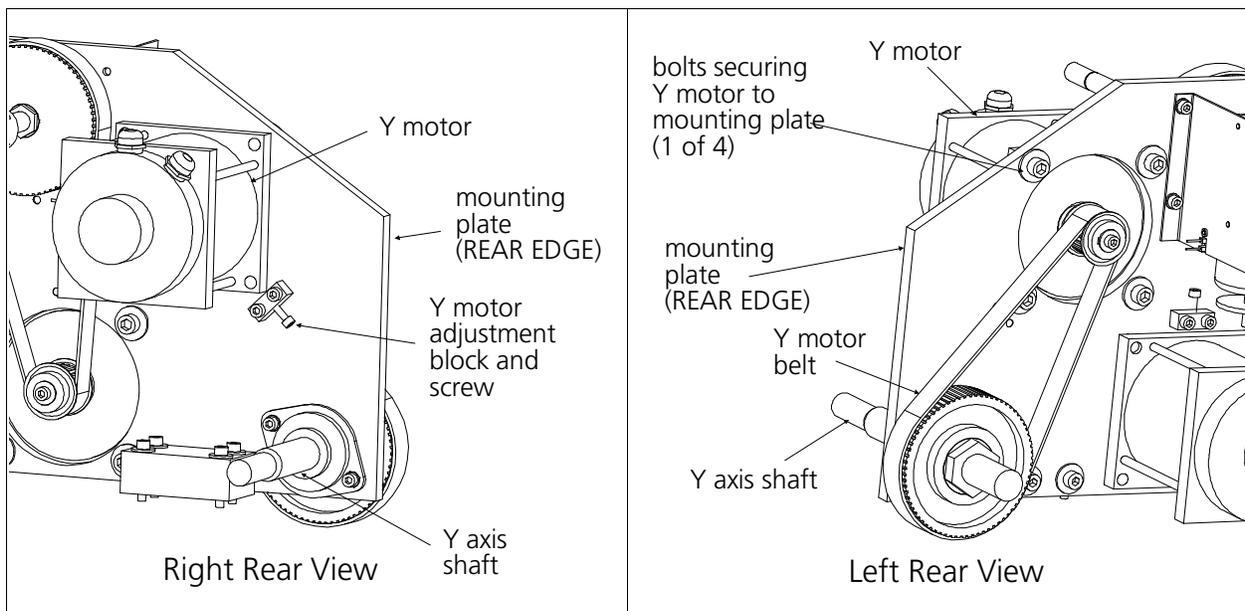


Figure 2 - 11 Y Axis Motor and Belt

3. Move the Y beam to its full rear position.
4. Loosen the bolts that secure the motor to the mounting plate and back off the screw in the adjustment block.
5. Remove the belt from the motor shaft pulley.

Replacing Motor

If replacing the belt only, skip this section and go to Step 14 in the Replacing Belt section.

6. Disconnect the associated wiring and harnesses, making note where to reattach them when installing the new motor.

7. Remove the four bolts holding the motor to the mounting plate and remove the motor.
8. Transfer the pulley from the original motor shaft to the new motor shaft and tighten securely.
9. Place the new Y motor into position on the mounting plate.
10. Install the four motor mounting bolts and secure them loosely.
11. Reconnect the associated wiring and harnesses to the motor as noted in step 6.
12. Replace the Y motor belt. Be certain the belt is aligned with the lower pulley.
13. If installing a new belt go to Step 14 (in the Replacing Belt portion of this procedure.

If not installing a new belt skip to Step 24 in the Belt Tensioning portion of this procedure) to properly tension the belt.

Replacing Belt

NOTE: Disregard this section if replacing the motor only.

14. Be certain the Y beam is still located at its full rear position and motor and the Y motor mounting bolts are loosened to allow the belt to be loose.
15. Remove the rear cover between head numbers 7 and 8 to access the hex shaft coupler section of the Y shaft in that area. (More covers may be removed as needed.)
16. Locate the hex shaft coupler (looks like 3 hex nuts as illustrated in Figure 2-12) on the Y drive shaft. The hex shaft coupler joins 2 Y drive shaft pieces together.
17. Move the motor belt to the left of the 3 hex nut coupling of the two Y drive shaft pieces.

NOTE: To maintain positioning accuracy, do not allow the sash frame to move forward during the following several steps of this procedure.

18. While holding the center hex nut stationary with an open end wrench, rotate the right and left nuts counter-clockwise to loosen them from the center nut.
19. Slide the coupling to the left onto the left drive shaft piece. You will now find a gap between the shaft ends.
20. Remove the old belt and slip the new belt through the gap between the shaft ends.

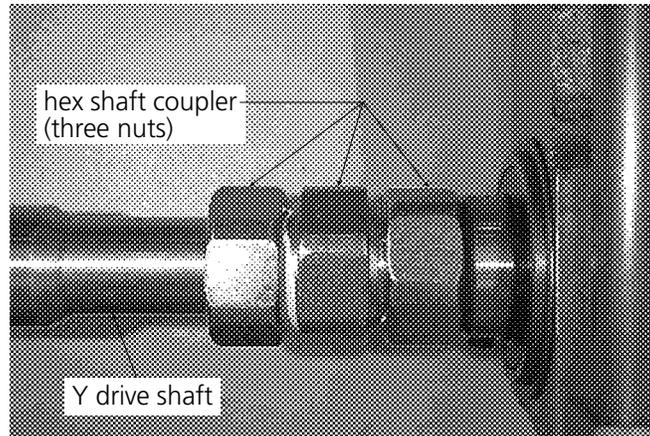


Figure 2 - 12

21. Move the 3 hex nuts back into position over the the 2 Y drive shaft pieces.
22. While holding the middle nut stationary, tighten the 2 outside nuts onto the middle nut to secure the 2 Y drive shaft pieces together. Torque these nuts to prevent the shaft pieces from slipping during rotation.
23. Slip the motor belt back onto Y drive shaft pulley and the motor shaft pulley, then refer to Step 24 in the following Belt Tensioning portion of this procedure.

Belt Tensioning

NOTE: This procedure requires using the Breco Belt Tensioner tool. Refer to Addendum A for user instructions for this device.

24. Refer to the procedure for using the Breco Belt Tensioner in Addendum A and locate the point on the belt midway from the center of the motor pulley to the center of the drive shaft pulley.
25. Tighten the motor mounting bolts securely. Then, referring to Addendum A, perform the belt tension measurement with the Breco Belt Tensioner.
26. The reading on the tensioner display should be **140 ± 5 Hz**.
27. Loosen the motor mounting bolts slightly and rotate the tensioning screw clockwise to increase the tension or counter-clockwise to decrease the tension.
28. Tighten the motor mounting bolts securely, then move the sash frame forward and backward several times.
29. Check the tension reading again and readjust the belt as needed until the tension is set within the proper tolerance.
30. Reattach any table top section or drive belt covers removed for this procedure.

X and Y Stop/Limits

A stop/limit system is associated with each of the X and Y axes. The purpose is to stop the movement of the main frame (or cap frames) at specified locations to protect from possible damage to the mechanics by encountering mechanical extremes.

A separate stop/limit locator "flag" is attached to both the X and Y axis mechanical drives. The flags travel through several photo sensors mounted on PCB assemblies attached to the frame under each of the flags (see Figure 2-13).

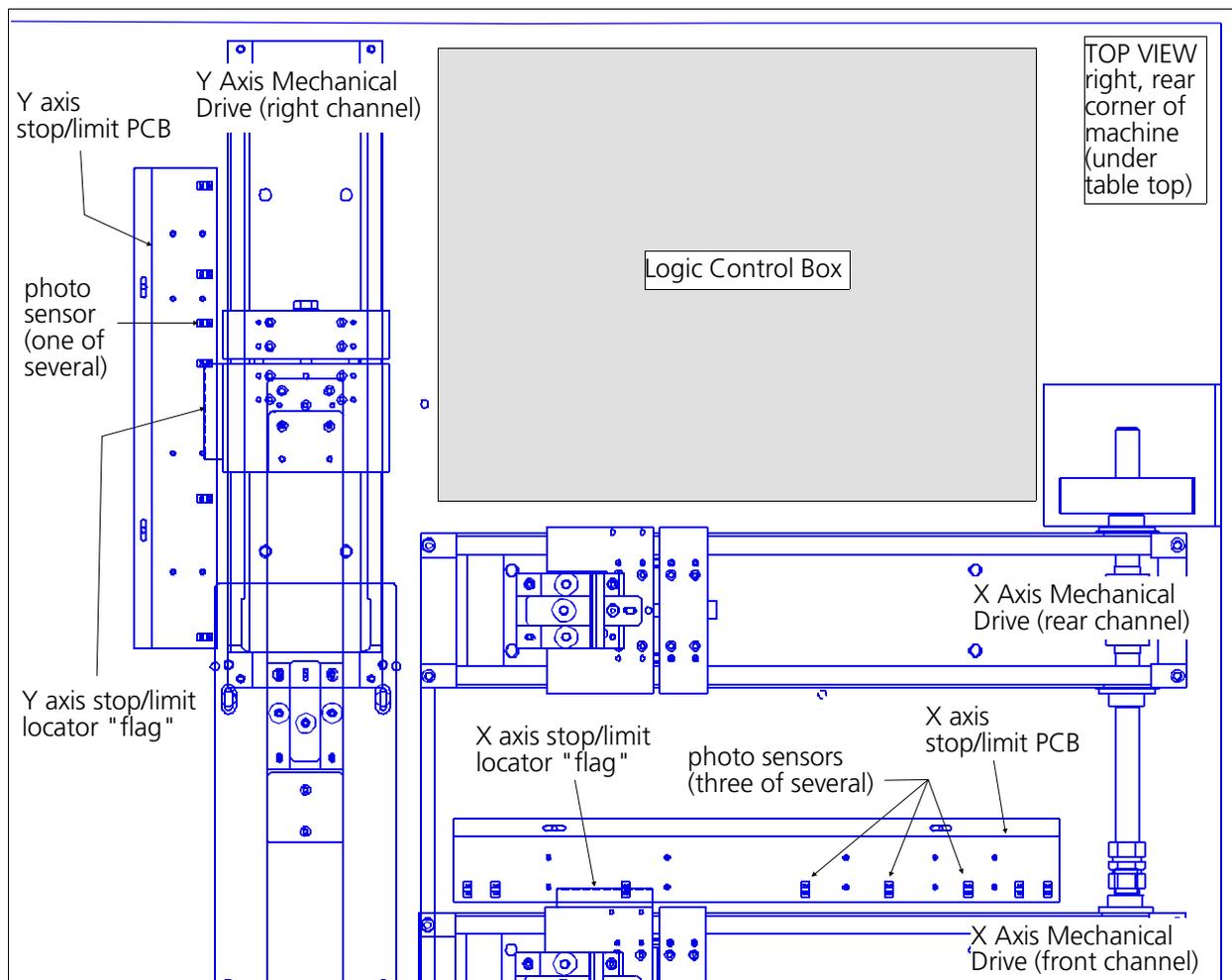


Figure 2 - 13

As the flags move with the frame, the photo sensors are interrupted at various positions along the travel path. When specific interruption combinations are made by the flag, a signal is generated representing a limit or center point in the axis travel.

To adjust the stop/limit systems, refer to the following procedure.

Stop/Limit Adjustment

1. Remove any cap frames or other specialty frames that may be attached at any of the 12 head locations.
2. Turn the machine power OFF.
3. Remove the two covers between head number 1 and the user station area that cover the Y stop/limit PCB. Remove the user station table top to access the X stop/limit PCB.
4. Physically move the X/Y carriage all the way forward (for Y) and all the way to the right (for X) until it comes to its mechanical limits and can be moved no further.
5. Locate the stop/limit PCBs mounted on the frame next to the first Y drive belt housing and to the right of head number 1 (for Y) and between the two X drive belt housings nearest the forward housing (for X). A photo sensor interrupter flag mounted to each drive mechanism should be positioned inside the outermost photo sensors on the PCBs as shown in Figure 2-14.

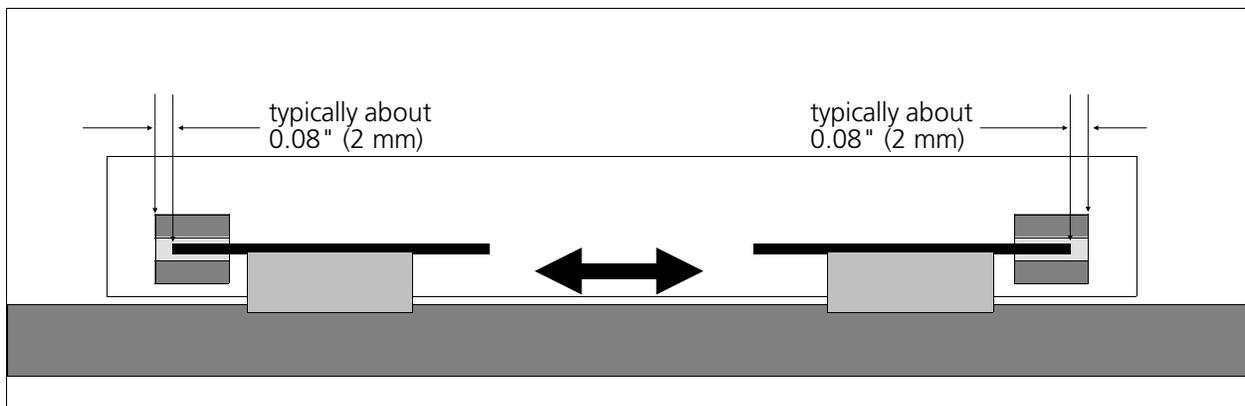


Figure 2 - 14

6. At each axis, measure and record the distance from the edge of the flag to the edge of the photo sensor. It should be approximately 0.08 inches (2 mm).
7. Physically move the X/Y carriage all the way to the rear and to the left until it comes to its mechanical limits and can be move no further.
8. Now the other ends of the photo sensor interrupter flags should be positioned inside the outermost photo sensors on the PCBs at these mechanical limits, as shown in Figure 2-14.
9. Measure the distance from the edge of the flag to the edge of the photo sensor at each axis. The distance should be within plus or minus 1 mm of the distance measured and recorded previously at the other mechanical limits of each axis. If so, no adjustments are required.

10. If, at either axis, the distance measured at the two limits is more than 1 mm, the stop/limit PCB in that axis must be moved so the measured difference is within 1 mm.
11. Loosen the two screws in the stop/limit PCB mounting plate slotted holes and move the plate and PCB toward the end which had the largest measurement. Move it only one half of the distance between the two measurements.
12. Repeat steps 6 through 9 to verify the correct positioning of each stop/limit PCB.
13. Install the two covers between head number 1 and the user station area and replace the user station table top.

Power Supply Assembly

This assembly (also called the Power Distribution Box) is mounted to the frame under the user station section at the right end of the unit. To remove the power distribution box refer to the following procedure and Figure 2-15.

1. Turn the machine OFF and disconnect the power source.
2. Loosen the 4 captive screws fastening the heatsink and swing it open.
3. Remove 9 screws holding the power distribution box cover and remove the cover.
4. Remove the motor cables; and remove the input power conduit and wires from the terminal strip.
5. Disconnect the remainder of the cables at the connectors on the power supplies.
6. Remove the 4 socket head cap screws that secure the power distribution box to the frame.



WARNING! The power distribution box is very heavy. Do Not attempt to remove the assembly unless properly prepared to handle the weight of the assembly as it comes off the frame!

7. Carefully lift the power distribution box out of its position in the frame.

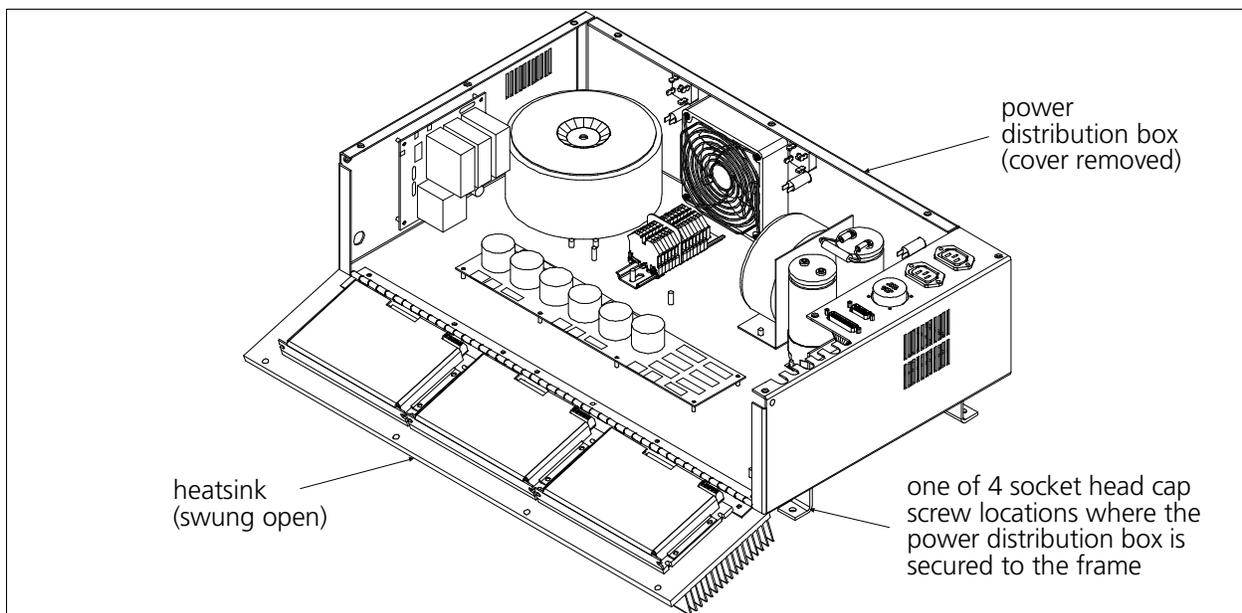


Figure 2 - 15

8. Perform the previous steps in reverse order to replace the assembly.

The power distribution box consists of three independent supplies, the system operating voltage, the motor voltage, and the system logic voltage (see Figure 2-16).

System Operating Voltage

The non-logic system power is supplied from the unregulated +30 VDC power supply. This power supply provides a positive voltage that falls typically between +30 to +45 VDC. This voltage is not adjustable.

Motor Voltage

The motor voltage is supplied from the unregulated +160 VDC power supply. This power supply provides a voltage that falls typically between +150 to +180 VDC. This voltage is not adjustable.

System Logic Voltage

The power supply for all logic circuits other than the computer motherboard are also located in the power distribution box. This is a +5 VDC voltage that is adjusted to a specific voltage range for the machines logic circuits to operate reliably.

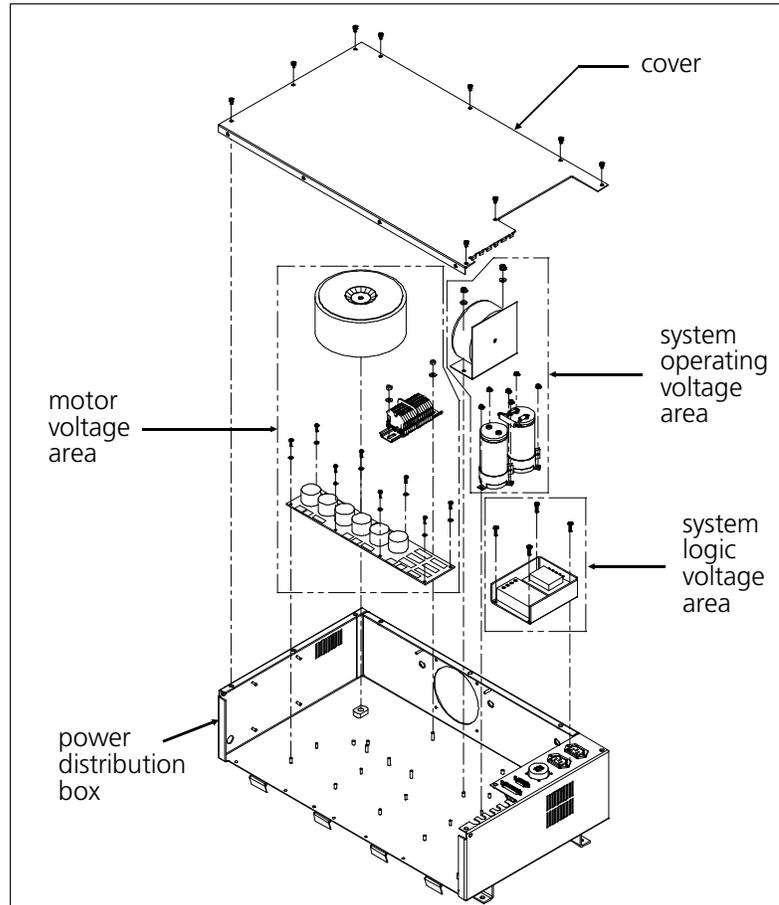


Figure 2 - 16

+5 VDC Adjustment

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WARNING! Harmful voltages are present inside the logic control box and power supply assembly!

When performing the following voltage adjustment, use extreme care!

NOTE: The location for measuring the system logic voltage is in logic control box. The actual +5 Volt system logic power supply is located in the power distribution box. (Do not confuse the computer power supply in the logic control box with the system logic power supply.)

1. Turn OFF the EMT 10/12T Embroidery machine.

Measurement 2. Remove the logic control box cover (see Figure 2-3).

3. Locate the two test points on the Low Voltage Driver PCB labeled 'VCC' and 'GND' (See Figure 2-17).

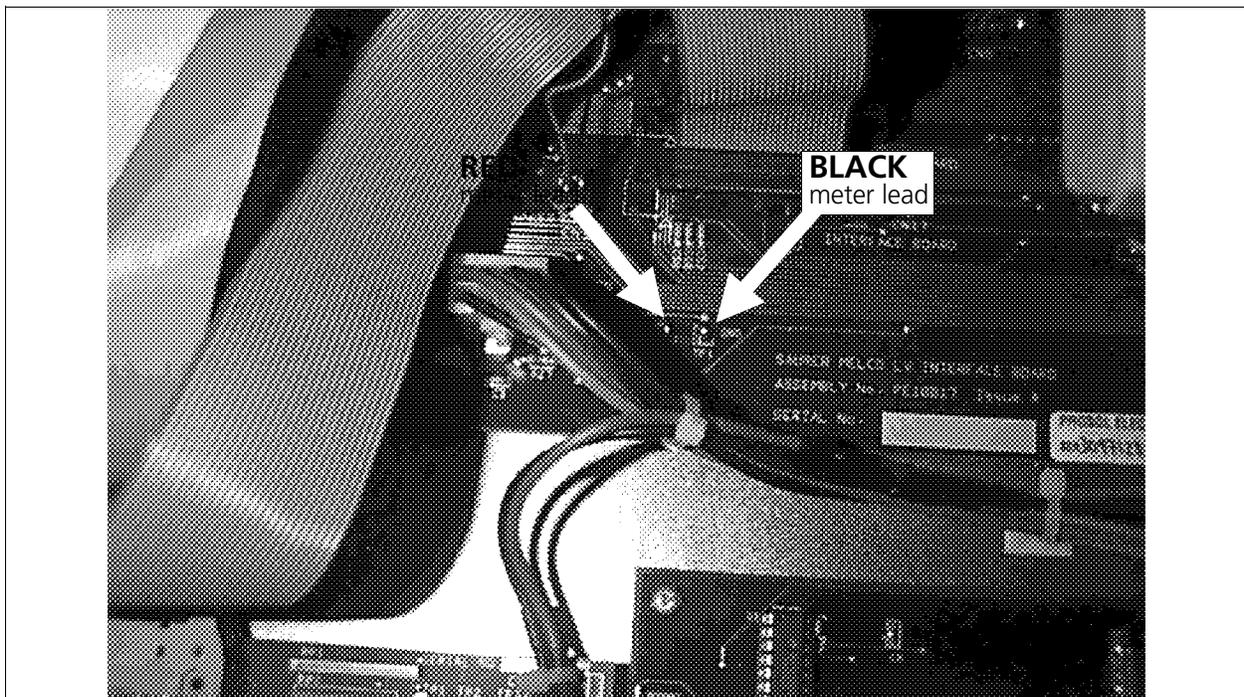


Figure 2 - 17

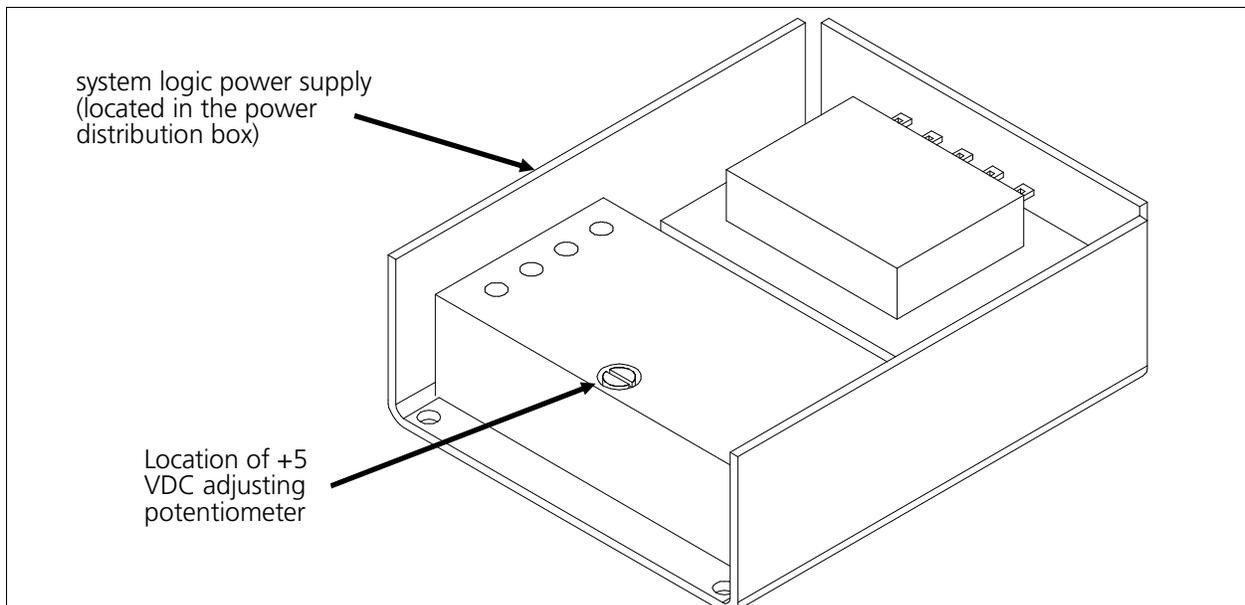
4. Attach your digital voltmeter leads to the test points, red to VCC and black to GND.

5. Turn ON the power to the embroidery machine and observe the voltage reading on the digital voltmeter.

6. If the voltage is between +5.00 and +5.10 Volts DC, stop here, turn OFF the machine again, and reinstall the logic control box covers.
7. If the voltage is not within the range of +5.00 to +5.10 Volts DC, turn OFF the machine again and continue with the rest of this procedure.

Adjustment

8. Remove the captive screws in the heatsink of the power distribution box, then the nine screws fastening the top cover (see Figure 2-16). Lift off the cover.
9. Refer to Figure 2-16 to locate the system logic power supply at the right end of the assembly.
10. Refer to Figure 2-18 and locate the +5 V adjustment potentiometer on the left edge of the system logic power supply as shown.

**Figure 2 - 18**

11. Turn the EMT 10/12T back ON.
12. With an insulated screw driver, carefully rotate the potentiometer clockwise to increase or counter-clockwise to decrease the voltage.
13. Monitor the voltage at the test points as you adjust the potentiometer until the voltage reads between +5.00 and +5.10 Volts DC.
14. Turn OFF the EMT 10/12T and remove the insulated screw driver and the volt meter.
15. Reinstall the power distribution box cover and the logic control box covers.

Motor Drive Modules

There are three identical XYZ motor drive modules located inside the power distribution box enclosure attached to the support frame. Access to the modules is gained by loosening the captive hardware on the power distribution box heatsink and lowering the heatsink.



WARNING! When the heatsink is lowered, and the machine is ON, harmful voltages are present.

The capacitors in this section may store very high voltage for a few moments after power is removed, therefore extreme care is advised when working in this area immediately after removing power.

It is advised that you delay any work in this area for at least one (1) minute after removing power, to allow the voltage in the capacitors to discharge.

If unauthorized personnel attempt to service this area, the Factory Warranty May Be Voided if the work is improperly performed. To replace one or more of the XYZ motor drive modules refer to the following steps:

1. Turn the EMT 10/12T OFF and disconnect the power source.
2. WAIT ONE MINUTE, then loosen the captive screws and lower the heatsink to gain access to the XYZ motor driver modules (see Figure 2-19).

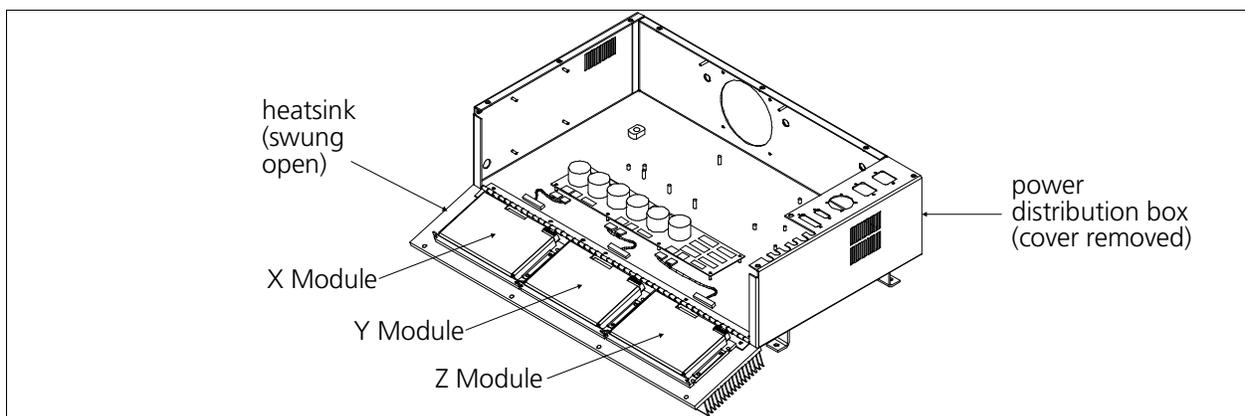


Figure 2 - 19 XYZ Controller Box

3. Disconnect the harnesses and remove the hardware associated with the defective XYZ motor drive module.
4. Remove the defective XYZ motor drive module.



CAUTION! Current-limit switches must be properly set on any new motor drive module before installing the module and attempting to operate the machine.

Setting Current Limit Switches

Before installing any new motor drive module, you must set the current limit switches on the module. The current limit switch setting is the same for the X and Y modules, but is different for the Z module.

- Refer to Figure 2-20 and locate the current limit switches on the drive module as indicated.

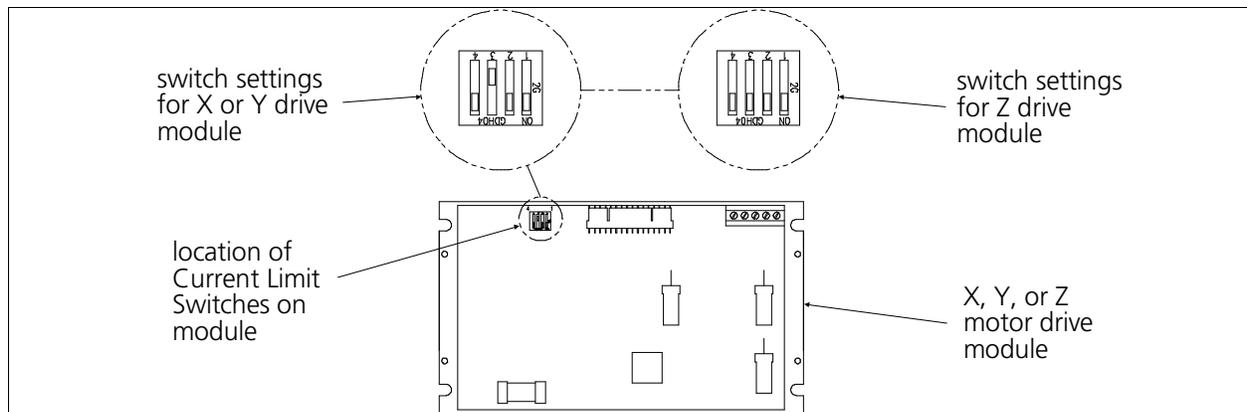


Figure 2 - 20

- Using a small screw driver or other similar device, position the switch settings to the proper position as indicated in following table:

Axis Identity	Switch Number 1	Switch Number 2	Switch Number 3	Switch Number 4
X	ON	ON	OFF	ON
Y	ON	ON	OFF	ON
Z	ON	ON	ON	ON

- Install the new XYZ motor drive module using the same hardware.
- Reconnect the harnesses that were disconnected during the removal of the defective module.
- Resecure the heatsink, and make certain the screws are tight to prevent accidental loosening.

3. Embroidery Head Maintenance

General

This section of the manual provides parts replacement procedures and various adjustments required during repair maintenance of the embroidery head only. Information for service maintenance on trimmers is located in Section 4 and the rest of the machine is located in Section 2 of this manual.

These procedures are guidelines for performing repairs and must be used by personnel practicing good maintenance and repair techniques. Refer to the Maintenance Philosophy topics in Section 1 of this manual for discussion of good maintenance and repair techniques, including concerns with static electricity.



WARNING! Failure to practice good maintenance and repair technique may result in injury to personnel performing the work, and damage to the equipment!

NOTE: The Warranty is exclusive of, and may be VOID if, poor maintenance practices have caused damage to the equipment.

Embroidery Heads

The Melco EMT 10/12T features 12 identical embroidery heads that operate in unison. Each head consists of several smaller sub-assemblies. This section of the manual describes the removal and replacement of most of the major components of the embroidery head. Unless otherwise specified, each procedure applies to all embroidery heads and sub-assemblies.

Arm and Bed Assemblies

The individual arm and bed assemblies provide stable embroidery head platforms. All other components of the embroidery heads are attached to these assemblies. Inside the arm and bed assemblies are the shafts, belts, and pulleys that drive the needle and rotary hook.

Attached to the outside of the arm and bed assemblies are the needle cases and tensioners, color change mechanism, grabber and trimmer systems, and the mechanical Z drive system.

Z Drive Mechanical System

The embroidery heads are driven by the Z drive system. This is a mechanical system of shafts, pulleys and gears driven by a single motor. Each head has two main shafts running through it. The upper shaft moves the needle, take up lever, and other associated parts and the lower shaft rotates the hook assembly. These shafts are connected by a belt at the rear of the head.

A bevel gear is attached to the upper head shaft at the rear of each embroidery head. These gears are mated with bevel gears attached to the Z shaft which runs horizontally along the back of the machine.

The Z shaft consists of two pieces attached together with a coupling. The Z Drive Motor (along with the Y Drive Motor) is located at the rear of the machine between head numbers 5 and 6. The motor is coupled to the Z shaft through a timing belt. Attached to the Z shaft is an encoder disc which provides a physical rotational indicator for the "head up" position. The trimmer cam is also attached to the Z shaft.

The alignment and calibration of this mechanical system is critical for proper operation of the EMT 10/12T Embroidery Machine.

Setting The Shaft Coupling and Thrust Bearings

"FACTORY SERVICE ADVISED "

The two sections of the Z shaft are coupled together by in-line coupling mechanisms between head numbers 5 and 6. To hold the axial position of the shaft sections there is a thrust bearing set and collar on the outside and inside of the gear box wall of head numbers 5 and 6.

Before any other adjustments to the Z drive system are performed, you must first check that each of the Z shaft sections are securely coupled together and that the thrust bearings are set properly. Refer to the following steps:

1. Remove the cover over the Y/Z motor drive area between head numbers 5 and 6. This allows access to the gear boxes of each of these heads and as well as the Z shaft coupling.
2. Remove the Z shaft cover to the left (as viewed from the rear) of head number 5 gearbox. This allows access to the thrust bearing set attached against the outside wall of the head (see Figure 3-1).
3. Locate the clamshell coupling on the Z shaft, just to the right (as viewed from the rear) of head number 5 gearbox (see Figure 3-6).
4. The clamshell coupling joins the two Z shaft pieces together. Loosen the eight screws to loosen the coupling between the two shaft pieces. This enables axial positioning for each shaft independent from the other.
5. Remove the gear box covers from head numbers 5 and 6.
6. Loosen the locking collars on the inside and outside of the gear box. Push the Z shaft piece to the left (as viewed from the rear) until the thrust bearings on the inside of the gear box are tight against the wall surface and the locking collar is against the retaining ring to the right of the collar. Tighten the inside locking collar.

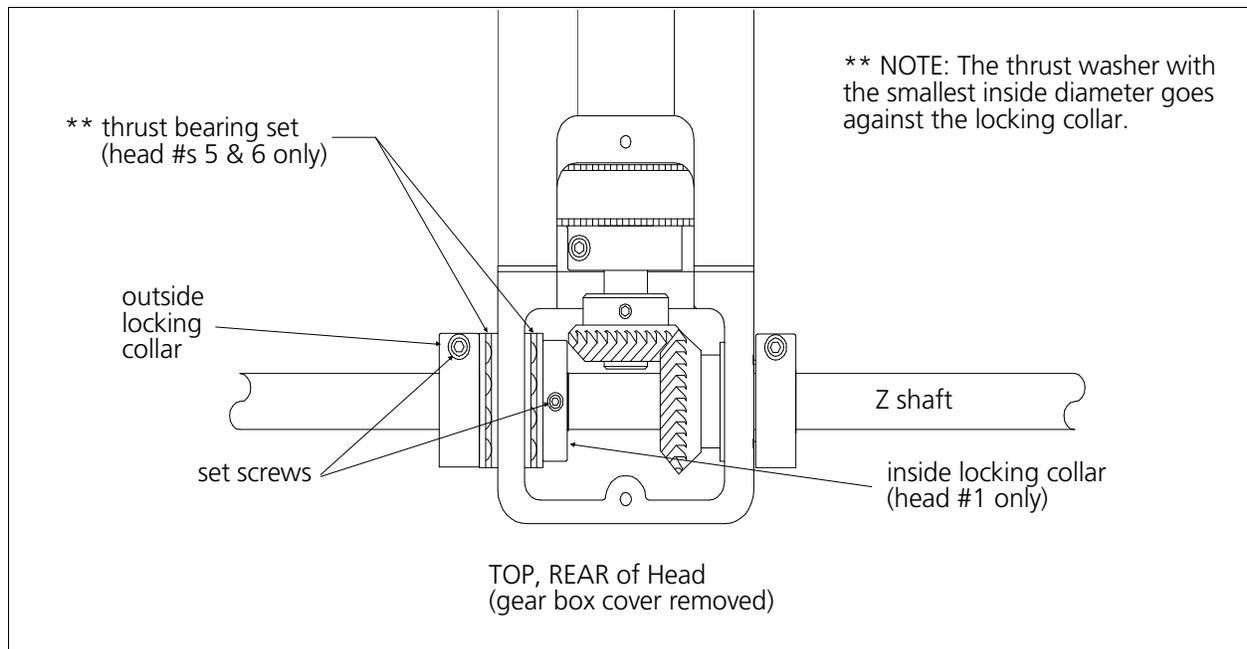


Figure 3 - 1

7. While holding pressure on the thrust bearing and locking collar on the inside of the gear box wall against the wall, loosen the outside locking collar and move it and the outside thrust bearing against the outside wall of the gear box. Tighten the locking collar.
8. Check for axial movement of the shaft piece and repeat adjustment if any.
9. Repeat Steps 6 through 8 for the second shaft piece.
10. Tighten the four set screws in the clamshell coupling joining the two Z shaft pieces together.
11. After making any adjustment to the Z shaft coupling or the thrust bearings, you must check the head synchronization and gear mesh as outlined in the next two procedures and adjust as needed. Start from the head numbers 5 and 6 and work outward to head numbers 1 and 12.

Synchronizing The Heads

"FACTORY SERVICE ADVISED"

NOTE: This procedure requires the use of a special Melco service tool: the Melco 10 needle head up fixture (p/n 995673-01).

Head synchronization is very critical in maintaining proper stitch timing for all the embroidery heads. The embroidery quality for any head that is not in sync with the rest will become very marginal, if it makes stitches at all. To synchronize the heads, refer to the following procedure:

1. Turn ON the EMT 10/12T and go to the service dialog box.
2. Click the "1 Rev or To Headup" button to ensure the machine is set to 110 degrees (the head up position).
3. It is IMPORTANT to insure that the Z shaft remains locked at the head up position during this procedure. Lock the Z shaft by clicking the Release button in the service dialog box so it is NOT checked.

At head up, all 12 heads must be at the same rotational position (110 degrees). If one or more heads are not "in sync" with the others, you must synchronize the head or heads that do not conform.

4. Remove all the covers required to allow access to the hole in the top of the embroidery heads directly behind the cableway. This is required for inserting the head up alignment pin (see Figure 3-2) to check for proper head up position.

5. At head up, the Melco 10 needle head up fixture (p/n 995673-01) must fit through the hole in the embroidery head casting and into the head up alignment hole on the collar attached to the upper shaft as shown in Figure 3-2. This check must be performed with each embroidery head.

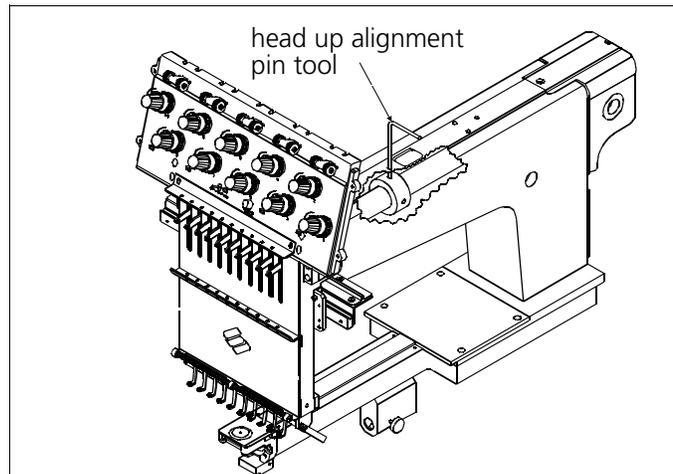


Figure 3 - 2

- 6a. If the fixture fits properly into the head up alignment hole for each embroidery head, synchronization is proper and no further steps are required in this procedure. Reinstall the covers.
- 6b. If the fixture fits properly into the head up alignment hole for most embroidery heads, but NOT for all embroidery heads, synchronization of those other heads is required. Skip to Step 23 (in the Final Head Synchronizing portion of this procedure) and adjust those heads that may be out of synchronization with the rest of the heads.
- 6c. If the fixture does NOT fit properly into the head up alignment hole for ANY embroidery head, synchronization may or may not be proper, however, the Head Up Index may need to be checked and adjusted before continuing with synchronizing the heads. Remove the head up alignment fixture and go to Step 7 (in the Head Up Index portion of this procedure).

Head Up Index

The ability to place stitches precisely at high speed is dependent on the accurate operation of the electronics and electromechanical assemblies. A key to this operation is the Z axis Head Up Index signal.

7. Remove the cover over the Y/Z motor drive area between head numbers 5 and 6.
8. Refer to Figure 3-3 and locate the head up index disc and the head up PCB.

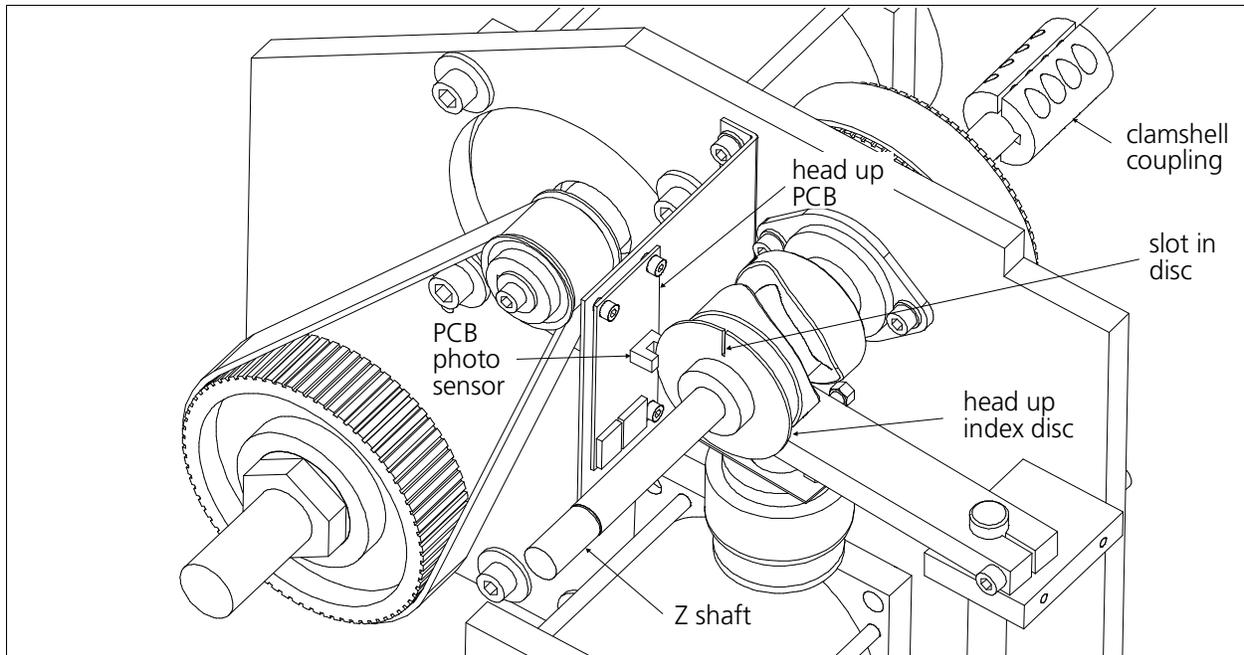


Figure 3 - 3

9. Locate the slot in the disc. At head up this slot must be in the photo sensor located on the head up PCB.
10. Turn ON the power to the EMT 10/12T. When the power is ON and the slot in the head up index disc is properly located in the photo sensor on the head up PCB, the one green LED on the PCB will be ON.
11. Go to the service dialog box and click the "1 Rev or To Headup" button to ensure the machine is set to 110 degrees (the head up position).
12. In the service dialog box click the "Release" button to unlock the hold on the Z shaft and allow manual rotation of the shaft. A check mark will appear in the check box next to the Release button.
13. Position the Melco 10 needle head up fixture (p/n 995673-01) into the head up alignment hole in the casting of one of the embroidery heads (refer to Figure 3-2).

14. Slightly rotate the heads manually at the Z motor belt and pulley. Rotate a small amount one direction and then the other until the head up fixture pin fits into the hole in the collar on the upper shaft of the embroidery head.
15. In the service dialog box click the "Release" button again to remove the check mark from the check box and again lock the Z shaft from being able to be rotated mechanically.
16. Check the fit of the head up fixture at the other embroidery heads.

If most of the embroidery heads are at head up as determined by the fixture, go to Step 17 and continue with this procedure.

If no other heads are at head up, repeat Steps 13 through 16 on different heads until you find the Z shaft rotational position where the majority of the embroidery heads are at head at the same time.

17. Loosen the set screw in the head up index disc and rotate the disc until the green LED on the head up PCB comes ON. Be certain the disc is not touching either of the photo sensor's inside walls, then tighten the set screw.
18. Go to the service dialog box and click the "1 Rev or To Headup" button to again take the machine to the head up position.
19. Repeat Steps 5 and 6 and continue the procedure as directed in Step 6.

Final Head Synchronizing

20. To ensure the "synchronized" heads are at the proper mechanical position at the 110 degree head up rotation, choose one head to be checked before setting the non-synchronized heads.
21. Turn the machine power ON and allow the software to download.
22. From the Advanced Features menu select Head Timing, followed by 1 Rev Or To Headup.
23. Position the Melco 10 needle head up fixture (p/n 995673-01) into the head up alignment hole in the casting of one of the embroidery heads as shown in Figure 3-2. If you were referred to this portion of the head synchronizing procedure from Step 6b, select one of the heads that is at the proper head up position.
24. Be certain the Z shaft is locked by clicking the Release button in the service dialog box so the box is NOT checked.
25. For each head that is "out of synchronization" with heads that are properly adjusted, refer to the following steps.

26. Loosen the socket head cap screw in the locking collar of the bevel gear on the Z shaft associated with the head to be synchronized (see Figure 3-4). This will loosen the grasp of the Z shaft on the head.

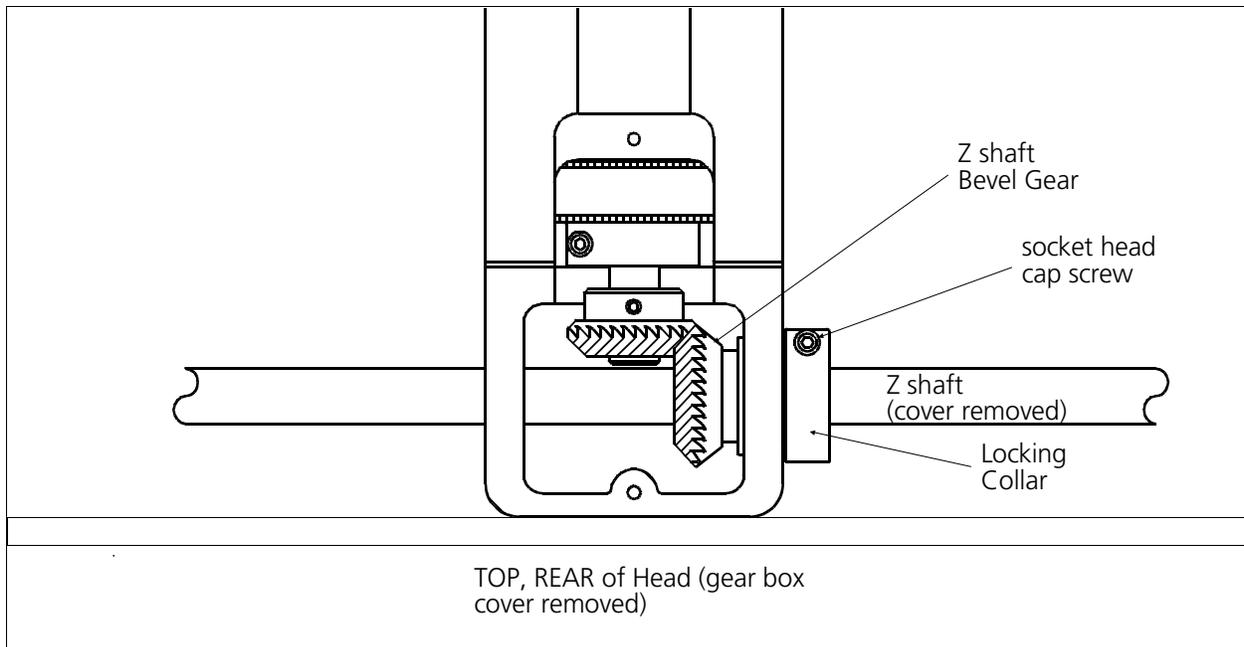


Figure 3 - 4

27. While the machine is at head up, adjust all the non-synchronized heads to the mechanical head up position by rotating the head upper shaft (holding the Z shaft at head up) until the head up alignment tool will insert into position at the head's mechanical head up.
28. Refer to the following Gear Mesh section and retighten the locking collar of the bevel gear on the Z shaft. This will secure the head position.

Gear Mesh

Engaging the bevel gears on the Z shaft and the mating bevel gear on each of the 12 embroidery heads must be a sound mechanical union (refer to Figure 3-4). The coupling relationship between these gears is called the gear mesh.

The gear mesh must be tight enough to avoid excess "backlash" between the gears, while not binding (approximately .003 to .005 inch gear spacing).

When adjusted properly, you should be able to "feel" the free movement between the mating gears, while you may not be able to "see" the movement.



IMPORTANT! When a head is re-synchronized, you must check and adjust the hook timing (if needed) on that head. Refer to the hook timing procedure later in this chapter.

Z Motor And Motor Belt Replacement

"FACTORY SERVICE ADVISED "

NOTE: A special tool is required for Z motor belt tension adjustment after the motor is replaced.

1. Turn the main power OFF, and remove the power source cable from the power distribution box.
2. To gain access to the Z motor and belt area shown in Figure 3-5, remove the Y/Z drive cover at the rear of the machine between head numbers 5 and 6.

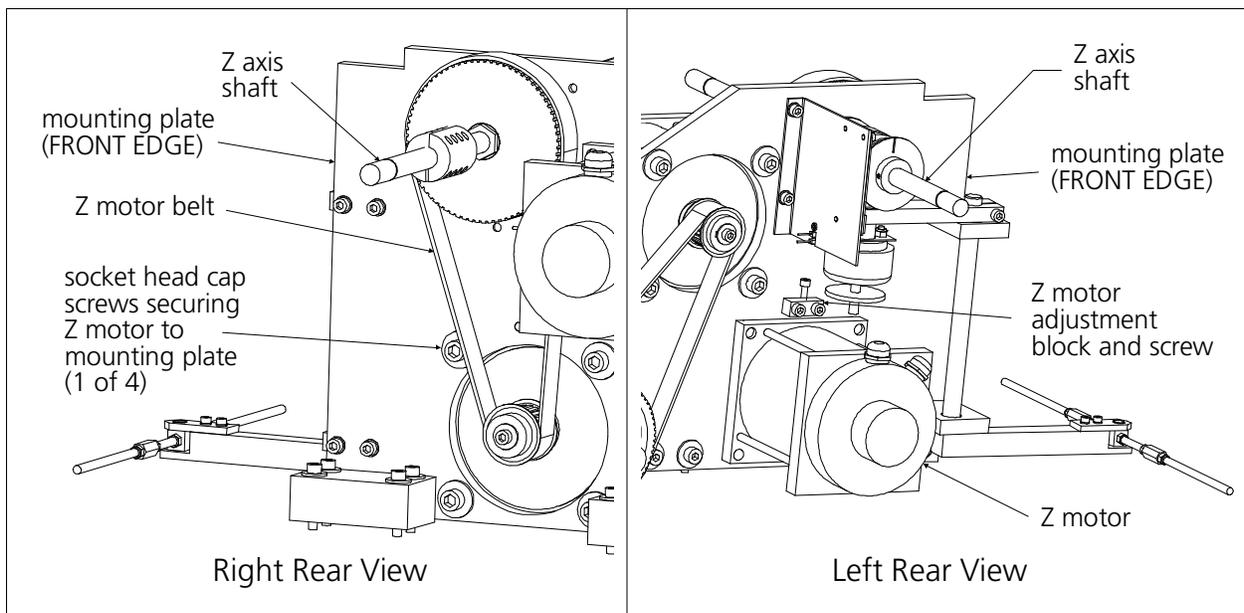


Figure 3 - 5 Z Axis Motor and Belt

3. Loosen the socket head cap screws that secure the motor to the mounting plate and back off the screw in the adjustment block.
4. Remove the belt from the motor shaft pulley.

Replacing Motor

If replacing the belt only, skip this section and go to Step 13 in the Replacing Belt section.

5. Disconnect the associated wiring and harnesses.
6. Remove the four bolts holding the motor to the mounting plate and remove the motor.

7. Remove the pulley from the original motor shaft.
8. Attach the motor pulley onto the new motor shaft.
9. Place the new Z motor into position on the mounting plate.
10. Install the four bolts and secure them loosely.
11. Reconnect the associated wiring and harnesses to the motor as noted in step 5.
12. Replace the Z motor belt. Be certain the belt is aligned with the upper pulley.

If installing a new belt go to Step 13 (in the Replacing Belt portion of this procedure).

If not installing a new belt skip to Step 19 in the Belt Tensioning portion of this procedure) to properly tension the belt.

Replacing Belt

Disregard this section if replacing the motor only. When replacing the belt, you must remove the Z shaft coupling to slip the old belt off and the new belt on.

13. Locate the clamshell coupling on the Z shaft, just to the right of the Z shaft pulley (see Figure 3-6). The clamshell coupling joins two Z shaft pieces together (see also Figure 3-3).

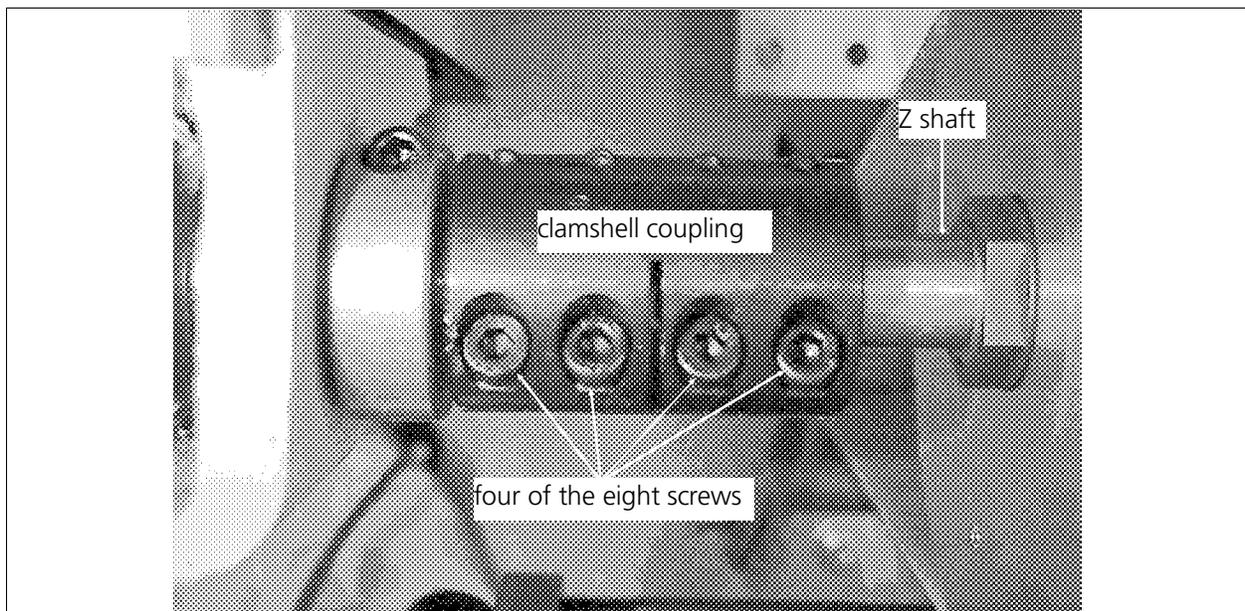


Figure 3 - 6

14. Remove the screws holding the two clamshell halves together and remove the clamshell.

15. Move the motor belt to the junction between the two Z shaft ends where the clamshell coupling was removed and slip it off between the two shaft pieces.
16. Slip the new belt between the two shaft pieces and onto the shaft.
17. Reclamp the clamshell halves and tighten the 8 screws securely.
18. Slip the motor belt back onto Z shaft pulley and the motor shaft pulley, then refer to Step 19 in the following Belt Tensioning portion of this procedure.

Belt Tensioning

NOTE: This procedure requires using the Breco Belt Tensioner tool. Refer to Addendum A for user instructions for this device.

19. Refer to the procedure for using the Breco Belt Tensioner in Addendum A and locate the point on the belt midway from the center of the motor pulley to the center of the drive shaft pulley.
20. Tighten the motor mounting bracket bolts securely. Then, referring to Addendum A, perform a the belt tension measurement with the Breco Belt Tensioner.
21. The reading on the tensioner display should be **100 ± 5**.
22. Loosen the motor mounting bracket bolts and rotate the tensioning screw clockwise to increase the tension or counter-clockwise to decrease the tension.
23. Tighten the motor mounting bracket bolts securely before making another tension reading.
24. Check the tension reading and readjust the belt as needed until the tension is set within the proper tolerance.
25. Reattach any table top section or drive belt covers removed for this procedure.

Tensioner Assembly Panel Removal

1. Remove all threads from the needles, guides, tensioners and supply tubes.
2. Remove the screws holding the tensioner cover. As you remove the cover remove the thread supply tubes from the back of the tensioner panel by gently pulling the tubes out of their individual holes. You may loosen the tube clamps if needed.
3. It is not necessary to remove the cover from the area, just rotate it backwards out of the work area.
4. Disconnect the five-strand wire connector on the back of the tensioner PCB (refer to Figure 3-7). Do not disconnect the connector leading into the plastic wire channel.
5. Remove the upper cover panels on either side of the tensioner assembly. It is not necessary to remove the panel from the area, just rotate it backwards out of the work area.
6. Remove the four screws holding the tensioner bracket assembly in place, then lift the tensioner bracket free from the mounting supports. Be careful not to damage the thread break brush assembly mounted on top of the embroidery head arm.
7. To install a new tensioner bracket assembly (or re-install the existing unit), merely reverse the proceeding steps.

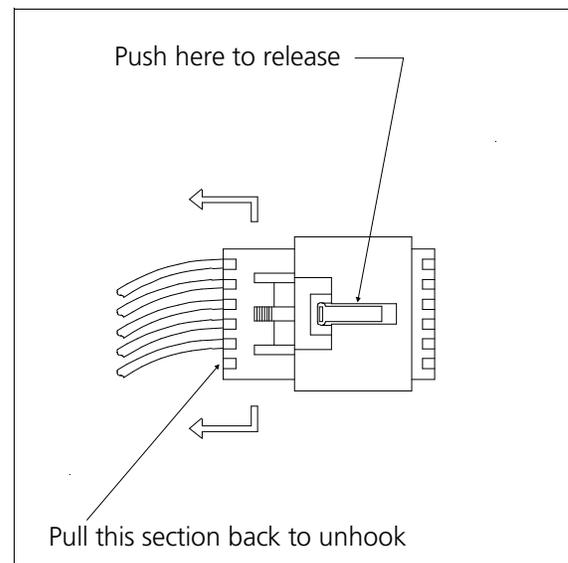


Figure 3 - 7

Pre-Tensioner

The pre-tensioner consists of a knurled adjustment knob, a tension spring, and two beveled disks. These parts attach to a threaded post that is permanently mounted to the tensioner bracket. To replace any of the pre-tensioner parts merely unscrew the knurled knob. Refer to Figure 3-8 for re-assembly. For proper adjustment refer to the EMT 10/12T Operation Manual.

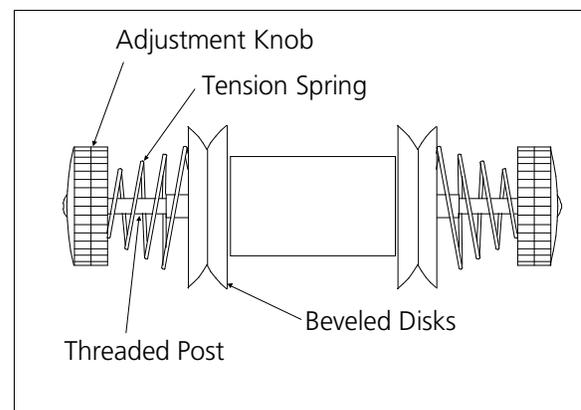


Figure 3 - 8

Replacing An Individual Thread Tensioner

Each thread tensioner is secured by a set screw against the thread tensioner shaft inside the thread tensioner bracket. The set screw is accessible through a slot at the top of the tensioner bracket.

1. Using a 2.5 mm hex wrench, loosen the set screw associated with the thread tensioner to be removed (see Figure 3-9).
2. Pull the thread tensioner out of the tensioner bracket.
3. To reinstall the thread tensioner, follow the procedure for changing a check spring.

NOTE: Be sure to fully seat the tensioner into the hole in the bracket.

4. After inserting the thread tensioner into the tensioner bracket, perform the thread tensioner check spring adjustment in the next procedure of this manual. That procedure, not only adjusts the check spring tension, but secures the thread tensioner in the tensioner bracket by tightening the set screw previously loosened in this procedure.

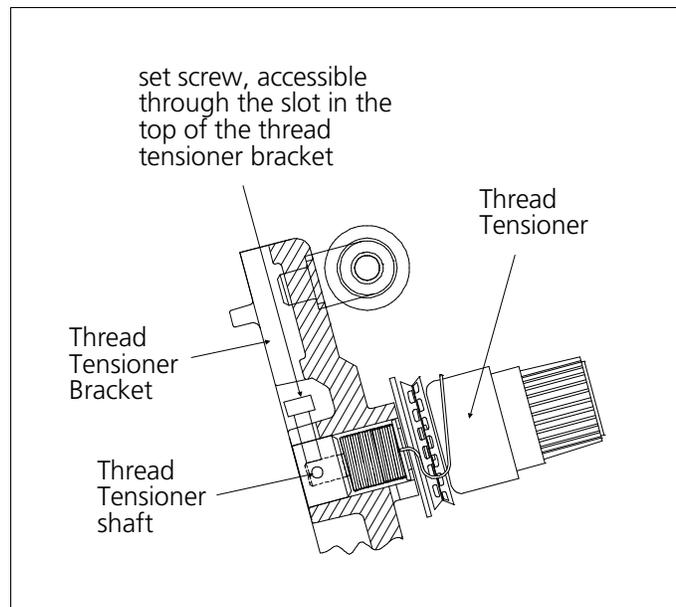


Figure 3 - 9

Changing A Check Spring

1. As described previously in this manual, remove the thread tensioner associated with the check spring that is being changed.
2. Remove the old check spring and discard it.
3. Attach the new check spring as follows:
 - a) Position the check spring around the end of the tensioner shaft as shown in Figure 3-10.
 - b) Insert the straight length of spring wire that is inside the check spring coil into the groove cut in the tensioner shaft as shown.

4. While holding the check spring in position, place the thread tensioner into the tensioner bracket. Insure the tensioner shaft seats into the smaller diameter hole in the bracket with the check spring still positioned on the tensioner shaft properly.

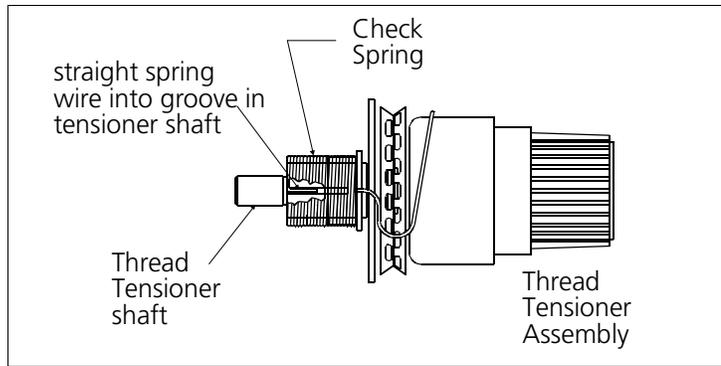


Figure 3 - 10

5. After inserting the thread tensioner into the tensioner bracket, perform the thread tensioner check spring adjustment. This adjustment procedure, not only adjusts the check spring tension, but secures the thread tensioner in the tensioner bracket by tightening the set screw loosened to remove the thread tensioner.

Check Spring Adjustment

After replacing a thread check spring, install the thread tensioner into the thread tensioner mounting bracket. You must then adjust the tension of the check spring against the thread break contact. To set this tension:

1. Slightly loosen the set screw in the top of the thread tensioner mounting bracket that secures the thread tensioner (see Figure 3-9).
2. Rotate the thread tensioner to the position where the check spring is just touching the left side of the thread break contact (brass post). See Figure 3-11.

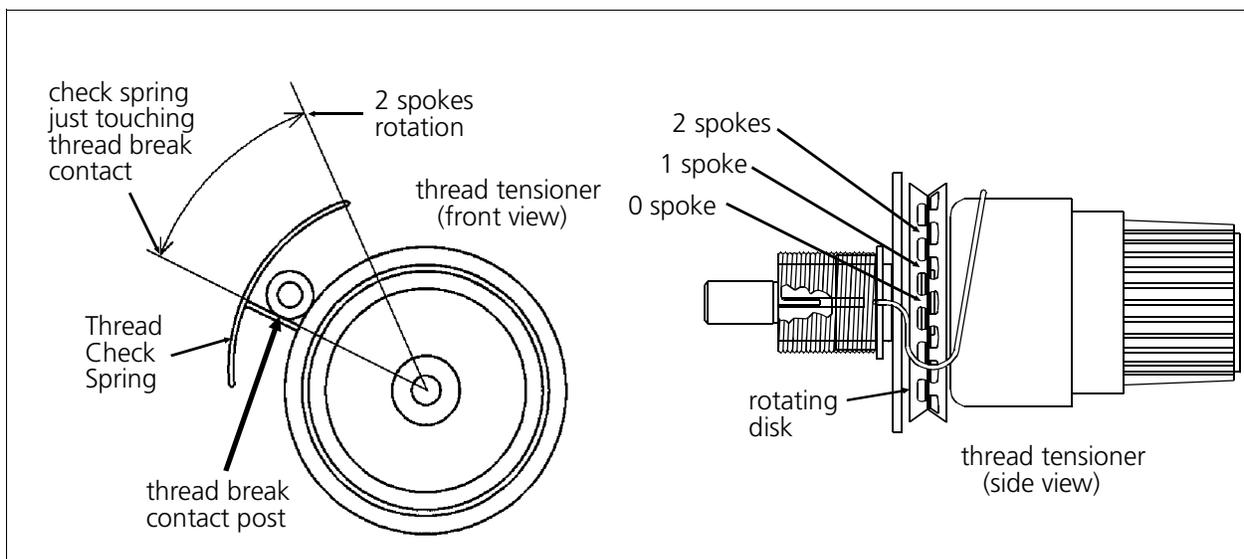


Figure 3 - 11

3. Observe the position of the thread tensioner check spring, then continue to rotate the thread tensioner clockwise the distance of 2 spokes of the rotating disk (see Figure 3-11). This represents 40 degrees rotation.
4. Tighten the set screw in the top of the thread tensioner bracket.

Adjustment Hints

The following is a discussion of embroidery quality issues with respect to the check spring adjustment:

As you exceed 2 spokes you may start to see deterioration of the tightening of the stitch due to a reduced rotational stroke of the check spring. A certain amount of stroke distance is required to take up the thread slack and cinch the stitch properly. If the check spring is too tight against the thread break post it will not retract far enough to make that stroke needed for a good tight stitch. False thread break messages may also occur with excessive rotation.

If you rotate less than 2 spokes you will begin to lose the force needed to make a tight stitch. You may have enough stroke but not enough force to cinch up the stitch tightly. You may also begin to have failure of thread break detection. You must have enough rotation to cause the check spring to make a good contact with the thread break contact post. A poor contact will often not provide the signal to stop embroidering when there is a thread break.

Replacing Other Thread Tensioner Parts

The individual thread tensioners may be disassembled by turning the knurled adjustment knob counter-clockwise until it comes free. Underneath the adjustment knob is a ribbed plastic disk and a tension spring. The knob, disk, and spring all nest within a large outer housing that, in turn, rests against a felt washer and the two-piece, notched thread wheel. The threaded shaft that retains the entire assembly is mounted to the tensioner bracket as described in the procedure for Replacing An Individual Thread Tensioner located earlier in this chapter.

Refer to Figure 3-12 for part location and assembly order when replacing any of these parts. For proper tensioning adjustment refer to the EMT 10/12T Operation Manual.

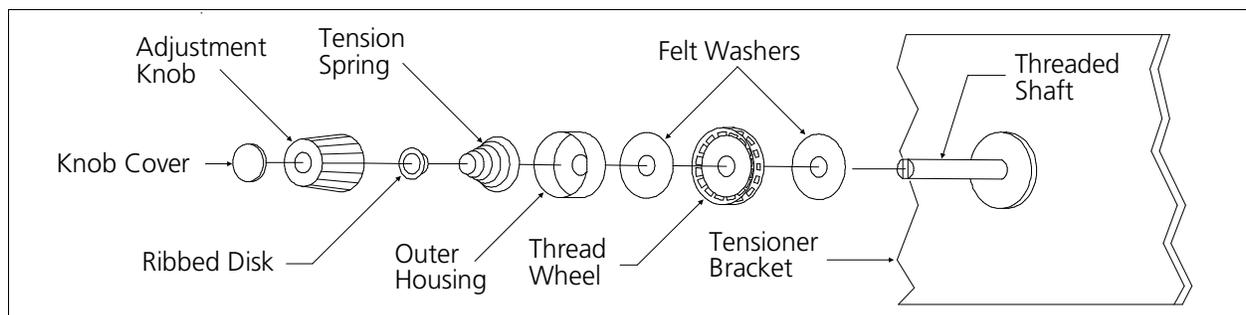


Figure 3 - 12

Replacing A Thread Break Contact Post

1. As described previously in this manual, remove the thread tensioner associated with the thread break contact post to be replaced.
2. Remove the thread break contact post by rotating it counter-clockwise out of its location in the thread tensioner bracket.



CAUTION! Use care not to cross thread the post when installing it during the next step.

3. Install the new thread break contact post by rotating it clockwise into the tensioner bracket. Secure the post "finger-tight" only.
4. You may apply a small amount of Loctite brand #222 screw adhesive or equivalent to keep the post from loosening.

NOTE: Do not use any stronger screw adhesive strength than above.

5. Reinstall the thread tensioner and check spring as described in a previous procedure in this section; and perform check spring adjustment.

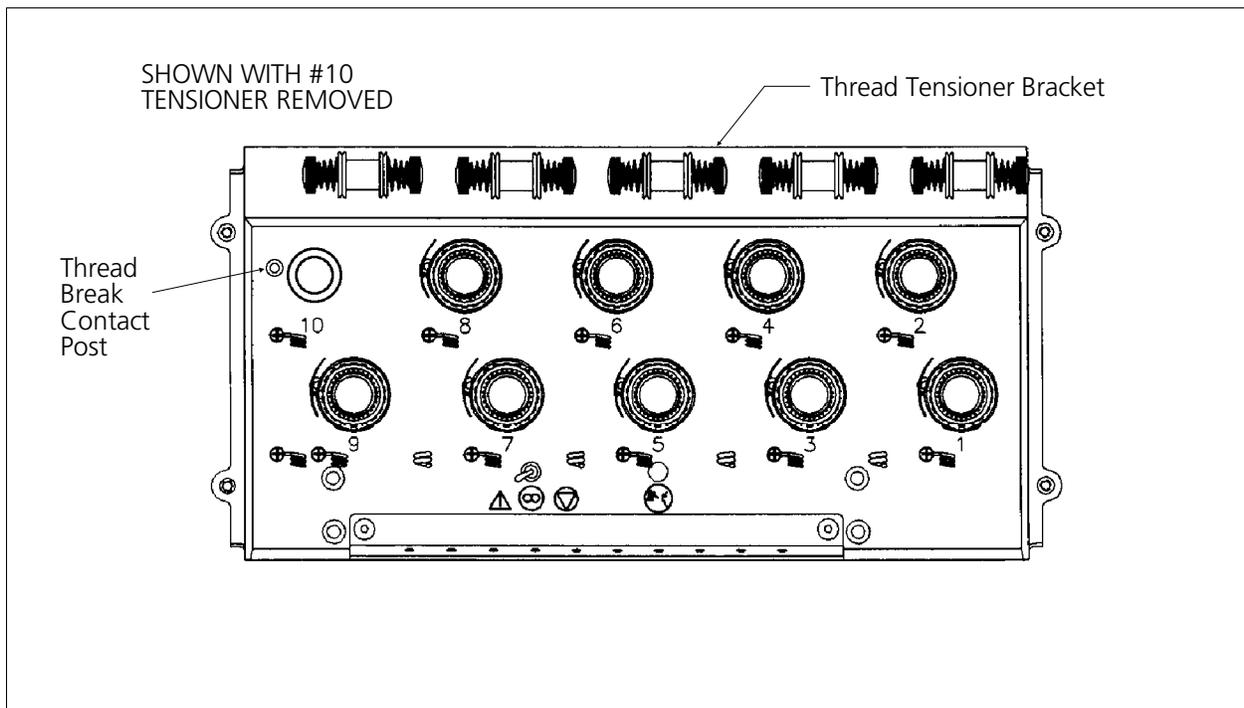


Figure 3 - 13

Replacing A Needle Bar

To replace a needle bar, refer to the steps below, then turn to the Needle Bar Height Adjustment Procedure in the EMT 10/12T Operation Manual.

1. Turn ON the EMT 10/12T and bring the head to the HEAD UP position.
2. Turn OFF the EMT 10/12T and disconnect the power cord from its power source.
3. Refer to the procedure for removing the thread tensioner assembly on Page 3-11 and remove it as described in the procedure.

4. Remove the 2 screws holding the upper needle case cover plate and set the cover plate aside (see Figure 3-14).

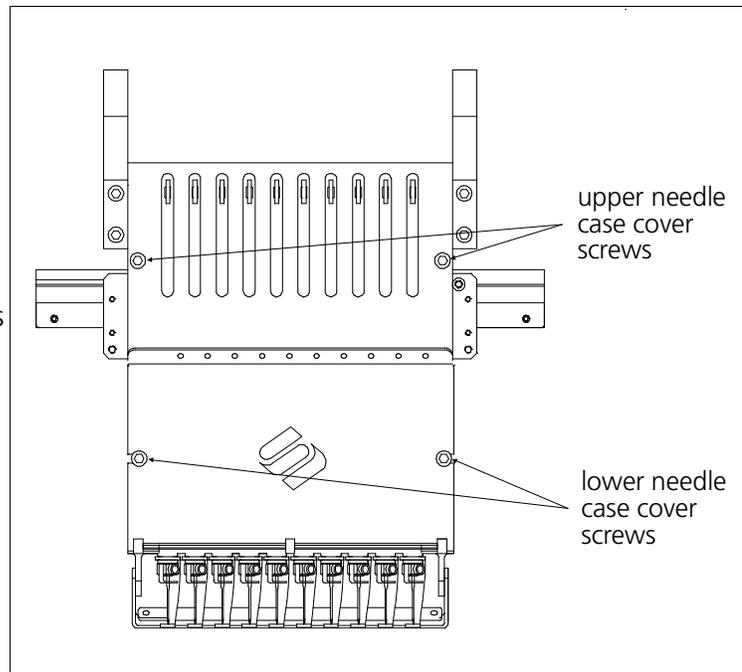


Figure 3 - 14

5. Loosen one screw and then remove the other screw holding the lower needle case cover plate and set the cover plate aside. You may now access the needle bar area to remove any of the 10 needle bars out through the top of the needle case.



CAUTION! After the next step, the presser foot will "jump" down.

6. Refer to Figure 3-15 and loosen the needle clamp set screw. Remove the needle, needle clamp, and needle clamp damper from the bottom of the needle bar.
7. Next, loosen the needle bar stop clamp (black clamp).
8. Loosen the top screw (see Figure 3-15) on the needle bar. (You will remove and transfer the screw in step 11.)



CAUTION! After the next step, the needle bar is free to be moved out the top of the needle case. Use care so the springs and other parts do not suddenly fly out of position.

9. Loosen the needle bar clamp.
10. Carefully capture and retain the various parts that become released by the needle bar as you remove the needle bar upward and out the top of the needle case.
11. Transfer the screw from the top of the old needle bar to the top of the new needle bar. Apply Loctite screw adhesive number 222 or equivalent to the screw if possible.
12. Install a new needle bar by inserting it from the top of the needle case and through the various pieces in the order shown in Figure 3-15.
13. Install a new needle into the needle clamp and tighten the needle clamp screw to secure the needle and capture the needle bar and presser foot.

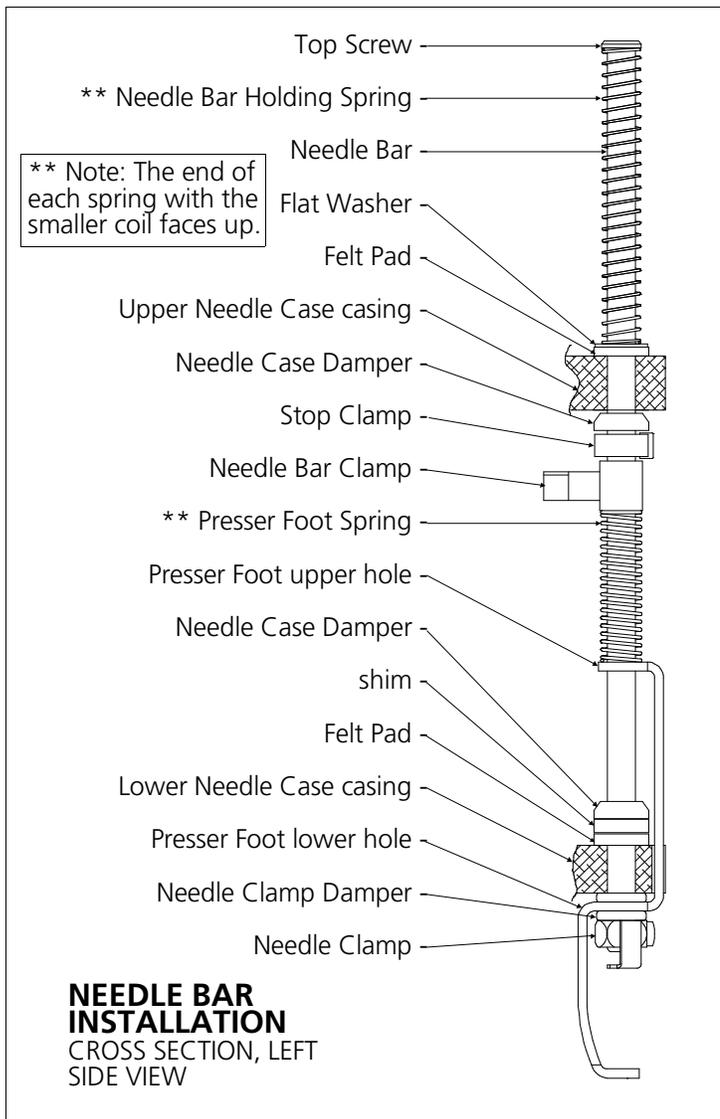


Figure 3 - 15

14. You may reinstall the upper needle case cover at this time. The lower needle case cover must, however, remain off to perform the needle bar height adjustment.
15. After installing a new needle bar, you must adjust the needle bar height. Refer to the Needle Depth procedure on page 3-41 for the adjustment procedure for needle bar height.
16. When the needle bar height has been properly adjusted, reinstall the lower needle case cover.

Needle Case Removal

It may become necessary to remove a needle case from the front of an embroidery head to replace the needle bar driver, take up lever gear, needle bar reciprocator, or other associated parts. Refer to the following steps and Figures 3-16 through 3-19 to remove the needle case from an embroidery head.

1. Turn ON the EMT 10/12T and bring the head to the HEAD UP position.
2. Turn OFF the EMT 10/12T and disconnect the power cord from its power source.
3. Remove the 2 lower front covers on either side of the needle case.

For the number 2 through number 11 embroidery heads, you do not need to remove the tensioner assemblies to remove the needle case.

For the number 1 and number 12 embroidery heads, you must remove the end cover and either provide support for the tensioner assembly or remove it before removing the needle case.

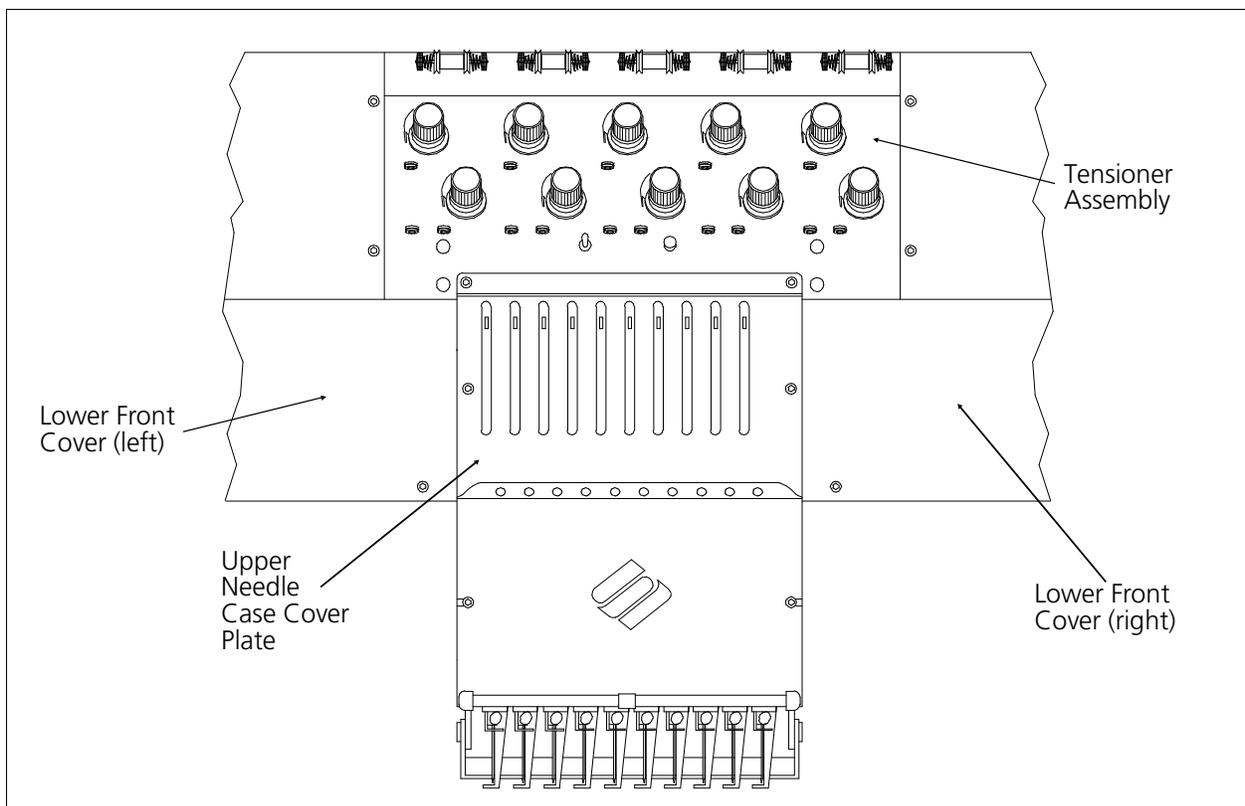


Figure 3 - 16

4. Refer to Figure 3-17 and remove the four socket head cap screws designated "A" which attach the needle case to the tensioner brackets.

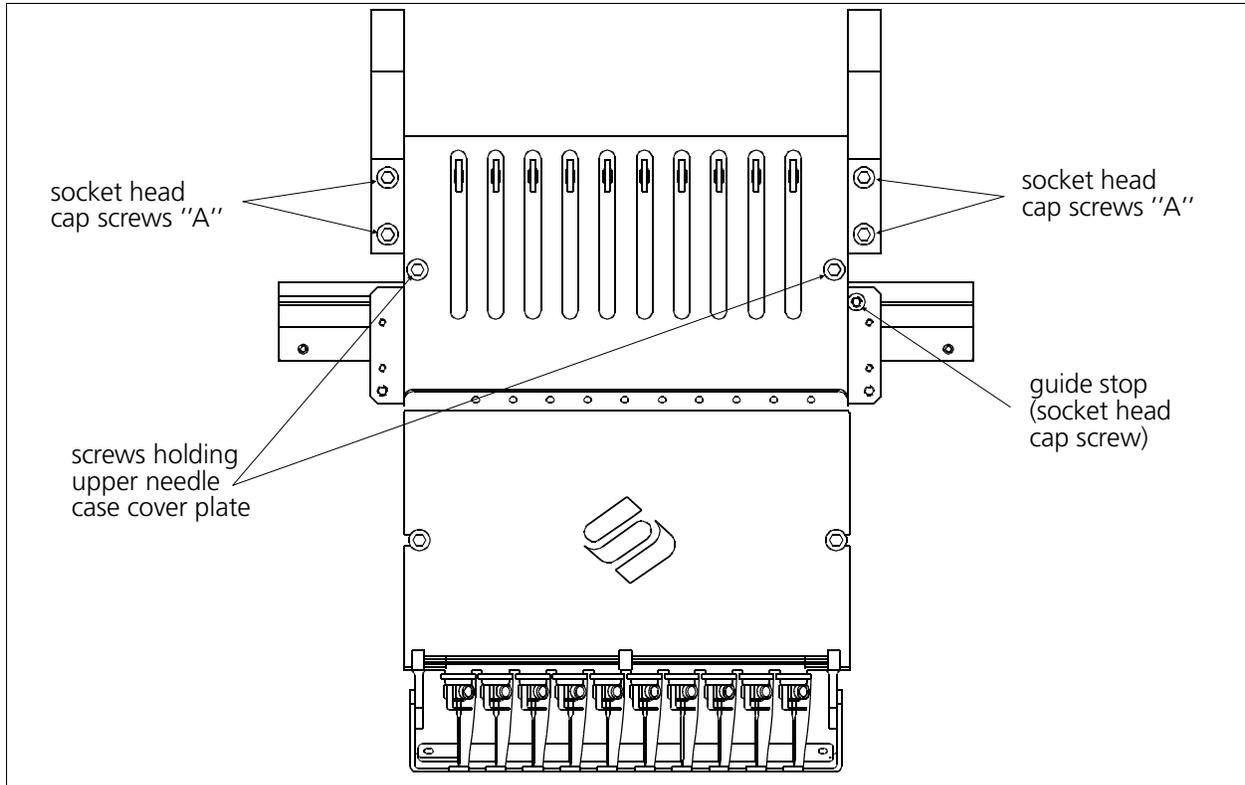


Figure 3 - 17

5. Remove the 2 screws holding the upper needle case cover plate and set the cover plate aside.
6. If removing the needle case from heads number 6 or 7, remove the screw X (for head number 6) or Y (for head number 7) which holds one end of the color change pin bar.

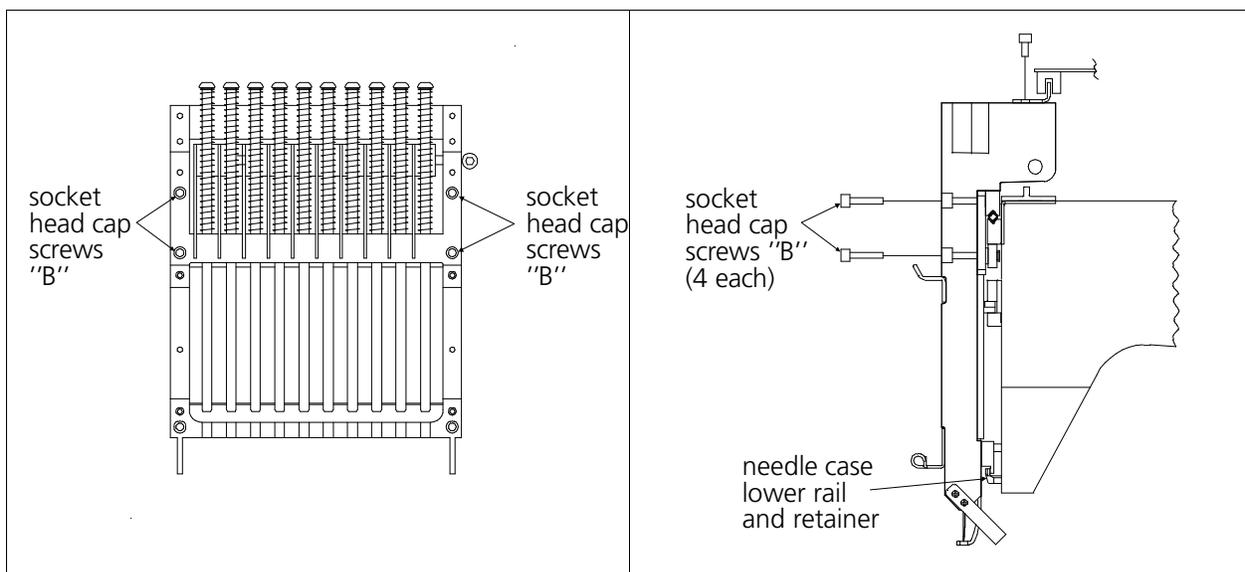


Figure 3 - 18

Figure 3 - 19

7. Hold the needle case securely with one hand while you remove the 4 socket head cap screws "B" that secure the needle case to the bearing retainer plate assembly near the top of the needle case.
8. Lift the needle case slightly to disengage the lower rail from the lower rail retainer coming from the bottom of the embroidery head arm.
9. The needle case will now be free to remove from the the embroidery head.

Using care not to damage any components, set the needle case aside.

Installing Needle Case

To reattach the needle cases refer to Figures 3-16 through 3-19 and the following procedure:

1. Insure the following conditions are set:
 - a) The cross roller bearing is properly installed and centered. Refer to that procedure found later in this section of the manual.
 - b) The retainer plate assembly bearings are properly adjusted. Refer to that procedure found later in this section of the manual.
 - c) The embroidery head is at its mechanical "head up" position.
2. Refer to Figure 3-19 on the previous page and insert the needle case lower rail into the lower rail retainer. Insure the grabber blade fits into the grabber bar assembly at the bottom of the needle case.
3. Move the upper part of the needle case into position on the front of the embroidery head as you insure the following alignments:
 - a) All the take up lever slots are positioned onto the take up lever guide rail and the active take up lever gear teeth are engaged with the take up lever drive gear teeth. With the embroidery head still in the head up position, insure the top tooth of the take up lever drive gear engages with the 5th "groove" of the take up lever gears.
 - b) The needle case rests solidly and completely on the bearing retainer plate assembly and is positioned to the right so the right side of the needle case is against the guide stop (socket head cap screw) in the right side of the bearing retainer plate as shown in Figure 3-17.
4. Align the 4 through holes on the upper section of the needle case with the 4 threaded holes in the bearing retainer plate assembly.
5. Align the right edge of the needle case against the guide stop on the bearing retainer plate (see Figure 3-17).

6. Install the 4 "B" socket head cap screws; then the 4 "A" socket head cap screws (see Figures 3-17, 3-18, and 3-19). Snug the screws but do not tighten them at this time.
7. If installing the needle case onto heads number 6 or 7, reinstall the screw X (for head number 6) or Y (for head number 7) which holds one end of the color change pin bar. Tighten the screw.
8. Pull the needle bar that is above the needle plate hole down until it locks in place just above the needle plate.
9. Insert the hex wrench in the left end of the Z shaft and slowly rotate the shaft clockwise until the needle just begins to enter the needle plate hole.
10. Check that the needle enters the needle plate hole in the center and does not come near the edges.
11. If the needle is centered properly in the needle plate hole, tighten the 4 "B" socket head cap screws and the color change pin bar screw (on head numbers 6 or 7 only).

If the needle is not centered properly in the needle plate hole, refer to the following Color Change Link Bar Adjustment (Needle Centering) procedure.

Color Change Link Bar Adjustment (Needle Centering)

If the color change link bar has been removed (to service the cross roller bearing or reciprocator mechanism for example) the needle case must be properly aligned or machine damage will occur. Refer to the following procedure for color change link bar adjustment.

NOTE: The needle case can be removed without removing or changing the color change link bar.

1. Remove lower front cover between the needle cases to access the color change link and attaching clamps.
2. With the needle case in place attach the color change link bars (refer to Figure 3-20). Tighten the top socket head cap screws on the bar clamps but do not fully torque them down. (Note that the lower cap screw holds the clamp to the needle case; the upper cap screw clamps the link bar.)
3. Deactivate the embroidery head to be adjusted by turning the head mode switch on the tensioner assembly panel to the OFF position. (Refer to the EMT 10/12T Operation Manual for more information on the head mode switch).
4. Turn the machine power ON.

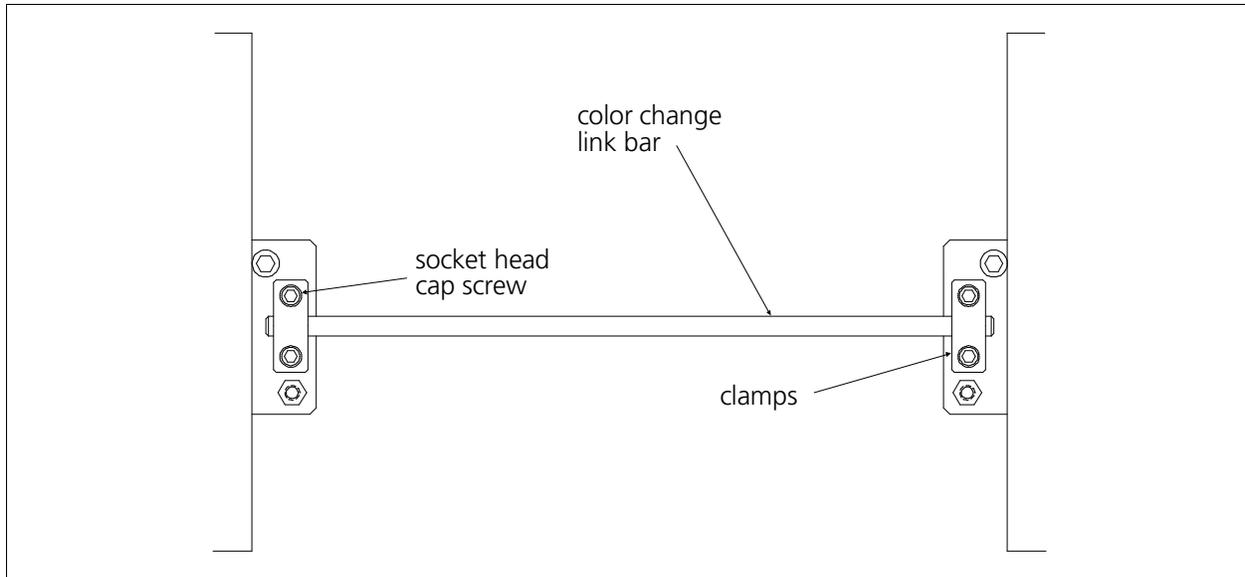


Figure 3 - 20



5. Using the 8-button keypad, press   or   to move the needle cases to needle 5 or 6.

WARNING! Use care during the next steps to avoid injury.

6. Ensure the same needle position in each needle case is in approximate position directly over their respective needle plate holes.
7. Before checking for accurate needle centering replace the needle in the selected needle bar to ensure the straightness of the needle.
8. To check for proper needle center, manually push the selected needle bar down until the needle starts to enter the needle plate hole. The needle should be centered in the needle plate hole.
9. If the needle is not centered loosen the link bar clamp screws and carefully nudge the needle case from side to side until the needle is centered within the hole. Tighten the link bar clamp screws but do not torque them down.
10. Turn the head mode switch to AUTO.
11. Go to the Advanced Features menu and select Head Timing.
12. Select Bottom Dead Center to extend all needles.
13. Visually check the needle alignment within the needle plate hole. If the alignment is not correct, repeat steps 5 through 9.
14. If the needle alignment is acceptable, tighten the link bar clamp screws.
15. Check the remaining 11 heads, then replace all covers.

Replacing Needle Case Cross Roller Bearing

Refer to the figures within the needle case removal and installation procedures for this procedure.

1. Remove the needle case as described previously.



CAUTION! In the next step, some retainer plates may become free to move off the sides of the heads if bumped. To account for this possibility, you should attach a clamping device on the outside ends of the long v-rail mounted on the head.

2. Loosen the clamps holding the needle case linkage shafts and remove the linkage shafts from both sides of the head being worked on.
3. Carefully slide the bearing retainer plate assembly with cross roller bearing off either end of the V-rail.
4. Position the new cross roller bearing onto the V-rail and install the bearing retainer plate assembly, then refer to the following Cross Roller Bearing Centering procedure.

Cross Roller Bearing Centering

The cross roller bearing must be installed between the embroidery head v-rail and the needle case v-rail attached to the retainer plate. When these two are slid together and the retainer plate is centered on the head, the cross roller bearing must be centered (equal distance from each end of the rails).

5. With the needle case and retainer plate assembly removed, lay the cross roller bearing onto the embroidery head v-rail (see Figure 3-21). Orient the bearing with the welded edge down and position it to the right edge of the v-rail.
6. Place the retainer plate assembly onto the cross roller bearing at the right end of the embroidery head v-rail. (The needle case should be removed for easier adjustment.)
7. Slide the retainer plate assembly left to the point where the left edge of the retainer plate is aligned with the center of the needle bar guide shaft felt pad (see Figure 3-21).
8. Position the left edge of the cross roller bearing in line with the left edge of the retainer plate and the center of the needle bar guide shaft felt pad. (The second roller of the cross roller bearing should just be engaged between the embroidery head v-rail and the needle case v-rail.)
9. Slide the retainer plate assembly onto the embroidery head v-rail and cross roller bearing.

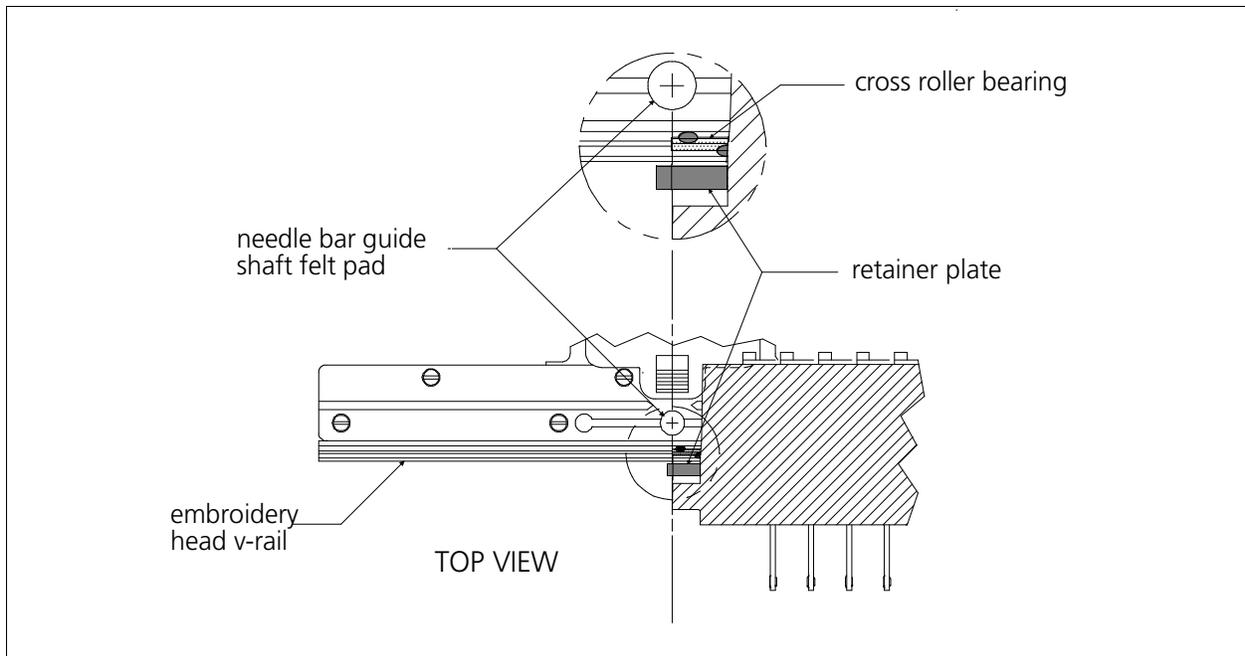


Figure 3 - 21

10. Check that the cross roller bearing is centered in the 2 v-rails by the following method:
 - a) Center the retainer plate assembly on the embroidery head v-rail.
 - b) Carefully insert a solid instrument, such as a straight hex wrench, into the opening at one end where the two v-rails join. Insert the instrument until it contacts the cross roller bearing. Do not force it any further.
 - c) Mark the position of the instrument at the end of the embroidery head v-rail, when the instrument is inserted to where it contacts the cross roller bearing.
 - d) Repeat this on the other side of the v-rails and compare the two marks. They should be very close to the same - within about 3/32 of an inch.
 - e) Repeat the above procedure for centering the cross roller bearing until the checking verifies it is within the proper tolerance.

11. Push the retainer plate assembly left and right as far as possible without the bearings coming off the end of the embroidery head v-rail. While moving the retainer plate assembly try to hold the bearings from rotating (one at a time) with your fingers. With a medium amount of pressure, you should be able to stop the bearing rotation.

Both bearings should require the same amount of pressure to prevent rotation or the cross roller bearing may migrate out of position.

12. If the test in step 11 shows an incorrect adjustment, refer to the next section, Retainer Plate Bearing Adjustment, to make the proper adjustment before continuing to step 13.
13. Reinstall the needle case as described previously in this manual.
14. Position the needle case linkage shafts to both sides of the needle case.
15. Align the needle cases with the needles roughly centered in the needle plate holes.
16. Snug the linkage shaft clamping screws, do not tighten them at this time.
17. Remove the first segment of the Z-axis drive shaft cover.
18. Slowly rotate the Z axis until the needles begin to enter the needle plates. Carefully check the alignment of the needles within the needle plates.
19. Loosen the linkage shaft clamping screws and move the needle cases as needed to adjust all the needle cases for needle centering, then fully tighten the screws.
20. Replace the top needle case cover and tighten the two button head screws.
21. Replace the lower front covers and tighten their button head screws.
22. Re-verify that the needle is correctly aligned within the needle plate and that the grabber blade is seated between the contact brush assembly.
23. Replace the cover over the first segment of the Z axis drive shaft.

Retainer Plate Bearing Adjustment

NOTE: This procedure requires the use of a special service tool: the V-Rail Adjustment fixture (p/n 995675-01). To adjust without the fixture, refer to the Alternate Method at the end of this procedure.

1. Loosen the two socket head cap screws holding the needle case v-rail to the retainer plate assembly as indicated in Figure 3-22.
2. Install the retainer plate assembly with the cross roller bearing centered between the 2 v-rails (see Cross Roller Bearing Centering on the previous page).
3. Install the v-rail adjustment fixture (p/n 995675-01) into the middle front hole of the retainer plate assembly as shown in Figure 3-22.

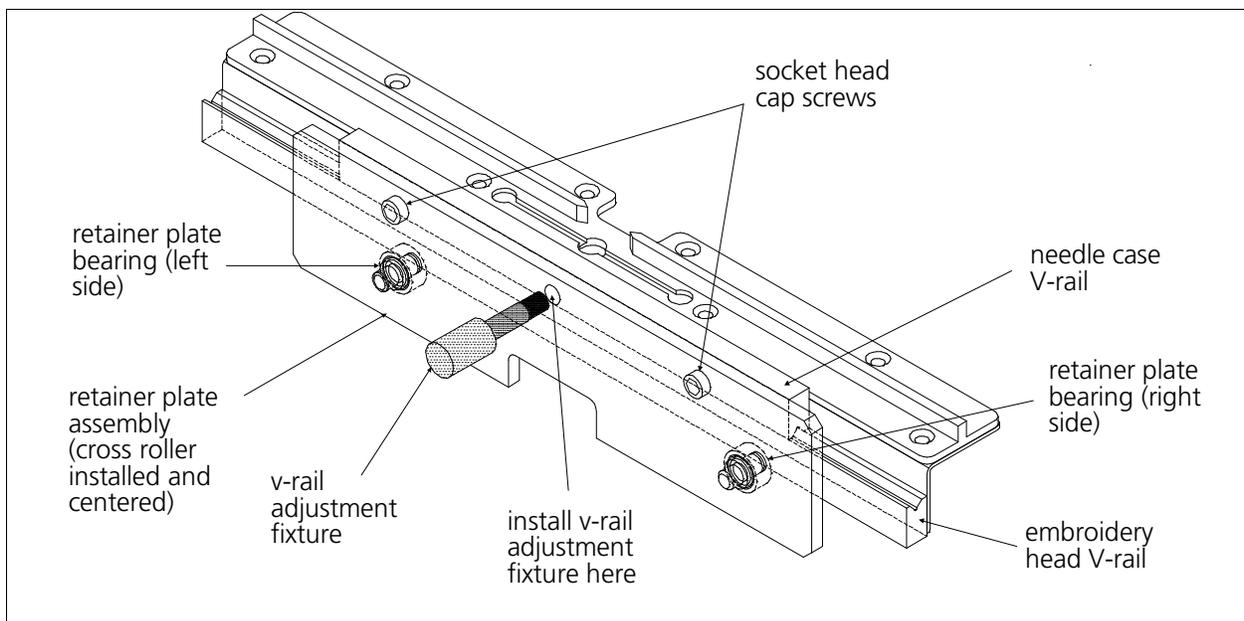


Figure 3 - 22

4. Snug the needle case v-rail to the retainer plate assembly very lightly with the socket head cap screws. Do not overtighten the screws or the fixture will be unable to perform its adjustment properly.
5. Carefully and slowly rotate the v-rail adjustment fixture (either clockwise or counter-clockwise) until you feel a slight resistance. The left and right retainer plate bearings should now be snug against the bottom of the embroidery head v-rail.
6. Tighten the socket head cap screws securely and remove the fixture.

7. Push the retainer plate assembly left and right as far as possible without the bearings coming off the end of the embroidery head v-rail. While moving the retainer plate assembly try to hold the bearings from rotating (one at a time) with your fingers. With a medium amount of pressure, you should be able to stop the bearing rotation.

Both bearings should require the same amount of pressure to prevent rotation or the cross roller bearing may migrate out of position.

8. If required, loosen the socket head cap screws and repeat this process until the bearings are adjusted as described in step 7.

Alternate Method

- A1. After steps 1 and 2, set the retainer plate in its approximate location and snug the two socket head cap screws as described in step 4.

- A2. Attach the needle case as described previously in this section of the manual.

- A3. Check the bearing pressure as described in step 7.

- A4. If adjustment is needed, place a flat blade screw driver or similar instrument to wedge between the needle case side plate and the needle case V-rail.

- A5. Loosen the V-rail socket head cap screw on the side you are attending. (With the upper needle case cover off, you can reach the screw through the front of the needle case.)

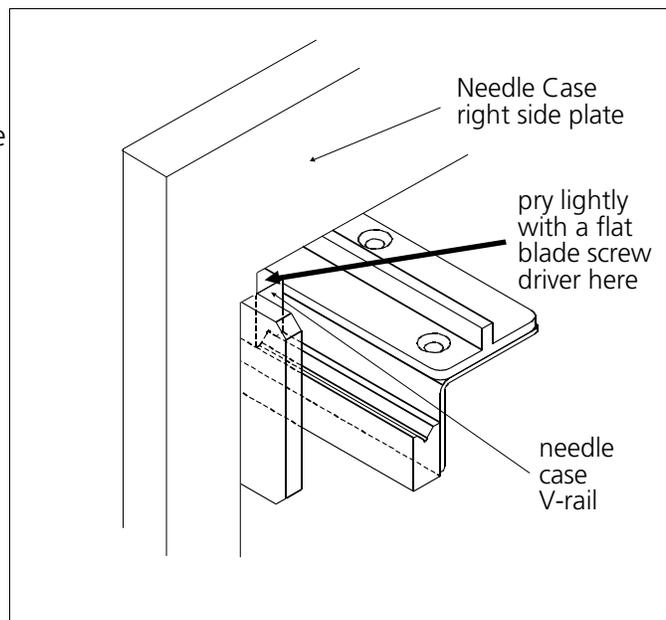


Figure 3 - 23

- A6. Lightly pry in this area and retighten the socket head cap screw.

- A7. Check the adjustment as described in step 7 and repeat until it is properly achieved.

- A8. Repeat the procedure for the bearing on the other side.

Lower Rail Retainer Adjustment

This adjustment affects the forward and backward movement of the bottom of the needle case. Do not make the adjustment so tight that you preload the roller bearing in the head so it wears prematurely. Do not have so much free play that the needle has excessive movement.

1. Install the needle case into the lower rail retainer and attach the needle case to the retainer plate assembly. Refer to the earlier procedure in this manual titled Installing Needle Case.
2. Loosen the screw under the lower rail retainer and push it towards the rear to remove the play between the retainer and the lower rail of the needle case.

NOTE: You will have to remove the grabber blade guide assembly of the trimmer system to access the screw.

3. When the gap between the needle case bottom rail and the embroidery head roller bearing is between zero preload and .002", tighten the screw under the lower rail retainer.

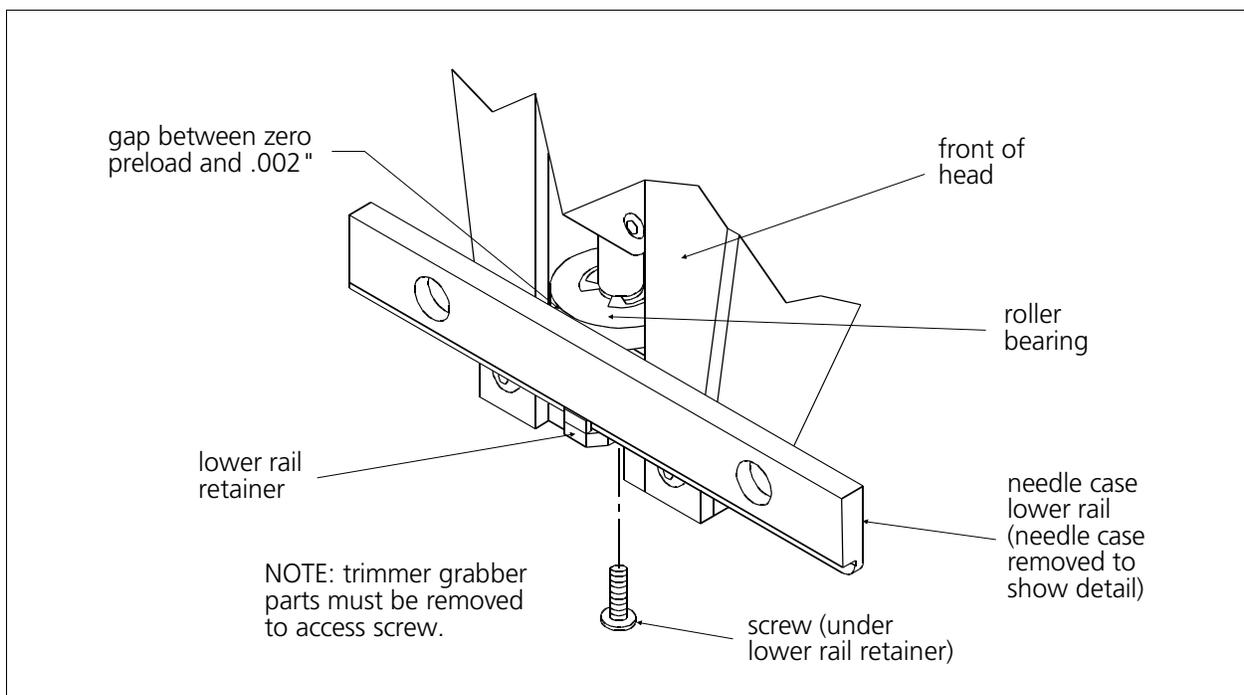


Figure 3 - 24

Reciprocator Replacement

It is recommended that the entire reciprocator assembly be replaced if problems are isolated to this area. There are some critical adjustments required when replacing individual parts. Also, if one component has failed, the other parts may be worn to the point of near failure and it would be prudent to replace them all at the same time. To remove and replace the reciprocator assembly, refer to the following procedure.

1. Refer to the Needle Case Removal procedure and remove the needle case.
2. Remove four button head screws holding the left and right arm cover plates. (see Figure 3-25)

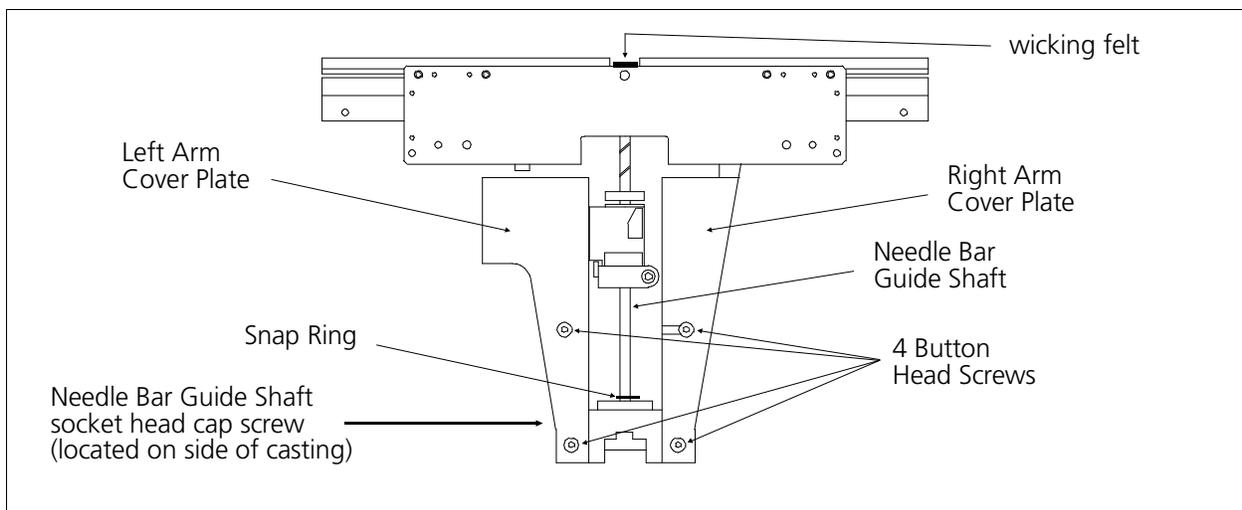


Figure 3 - 25

3. On the lower left side of the embroidery head arm, loosen the needle bar guide shaft socket head cap screw.
4. Remove the snap ring from the groove at the base of the needle bar guide shaft, just above the roller bearing.
5. Locate the wicking felt on top of the embroidery head and remove it. Be careful not to damage the felt.
6. Push the needle bar guide shaft upward until it hits the thread break bracket.
7. Rotate the Z shaft with the hex wrench in the left end of the shaft until the reciprocator is free from the needle bar guide shaft.
8. Reverse the above procedure to install the new reciprocator assembly.

NOTE: When reattaching the snap ring removed in step 4, install it into the uppermost groove if there are two grooves in the needle bar guide shaft.

Jump Stitch Solenoid Replacement

If a jump stitch solenoid must be replaced, follow these steps:

1. Gently pull the two wires and associated jump stitch harness from within the plastic cable way. Disconnect the connector.
2. Remove the two screws and take off the mechanical jump stitch lever and cover to the jump stitch bracket (see Figure 3-26).
3. Remove the 2 jump stitch solenoid bracket screws (see Figure 3-27).

NOTE: Before you remove the solenoid from the bracket in the next step, record the number of threads of the solenoid that are showing beyond the solenoid bracket, or measure the distance that the end of the solenoid protrudes from the solenoid bracket. When the new solenoid is installed into the bracket, position the solenoid with the same number of threads showing (or the same distance) that you recorded in this step.

4. Loosen the locking nut on the solenoid (see Figures 3-27 and 3-28), then rotate the bracket off the solenoid.

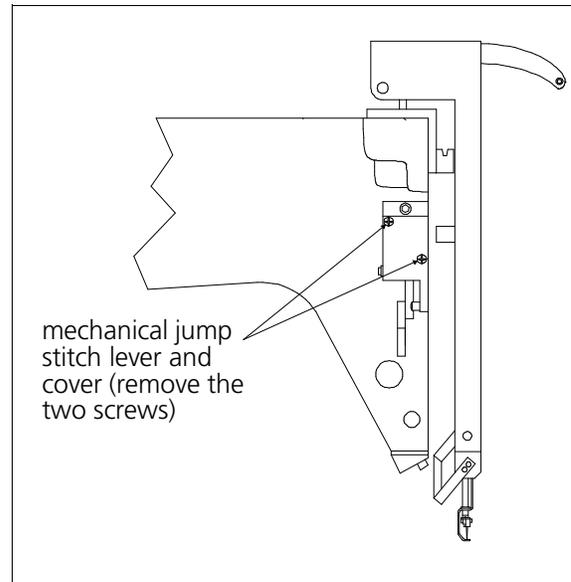


Figure 3 - 26

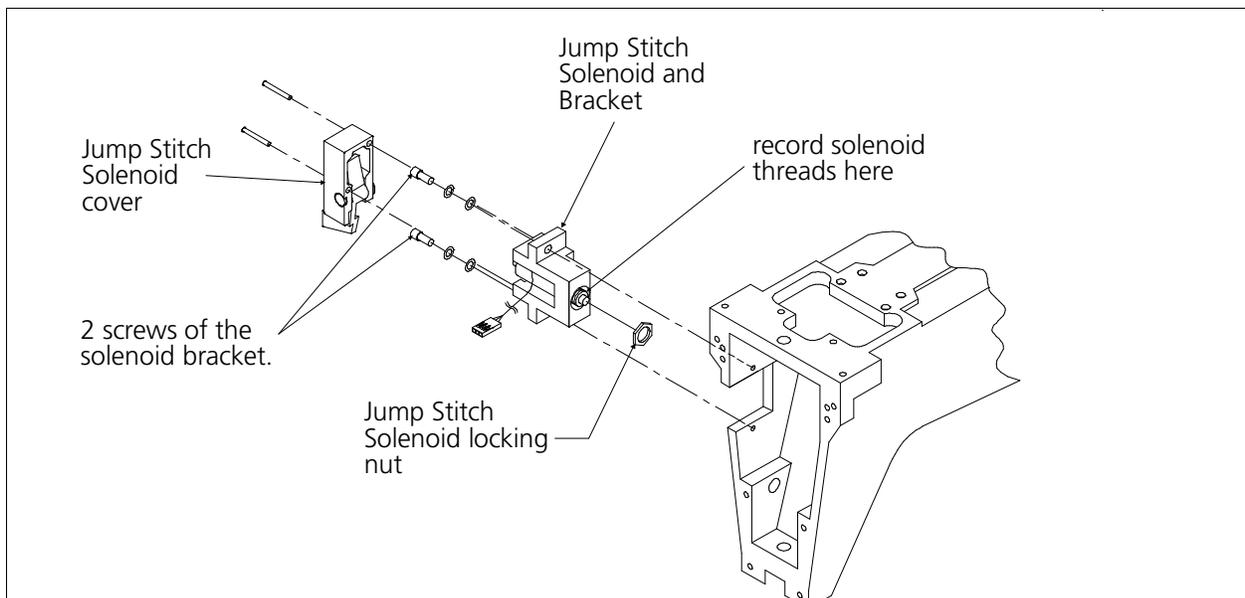


Figure 3 - 27

- Reinstall the new solenoid by rotating the locking nut off the end of the threads then rotating the bracket onto the new solenoids threads.
- Adjust the position of the new solenoid into the solenoid bracket by using the "thread counts" or measurement you previously obtained (see previous Note).

Plunger Positioning

During the jump stitch solenoid replacement procedure you were to count the number of threads that are showing beyond the solenoid bracket. This gets you very close to the proper position. The following procedure will more closely position the solenoid plunger properly. There are two plunger positions of concern:

Plunger Position 1

The jump stitch solenoid must be positioned so that the plunger is close enough to actuate the needle bar driver reciprocator when the solenoid plunger is extended (solenoid de-energized).

Plunger Position 2

The plunger also must not be contacting the reciprocator during normal embroidery when the solenoid is energized.

A typical dimension for the gap between the relaxed solenoid plunger and needle bar driver reciprocator is approximately 0.015 to 0.045 inches (0.4 to 1.1 mm).

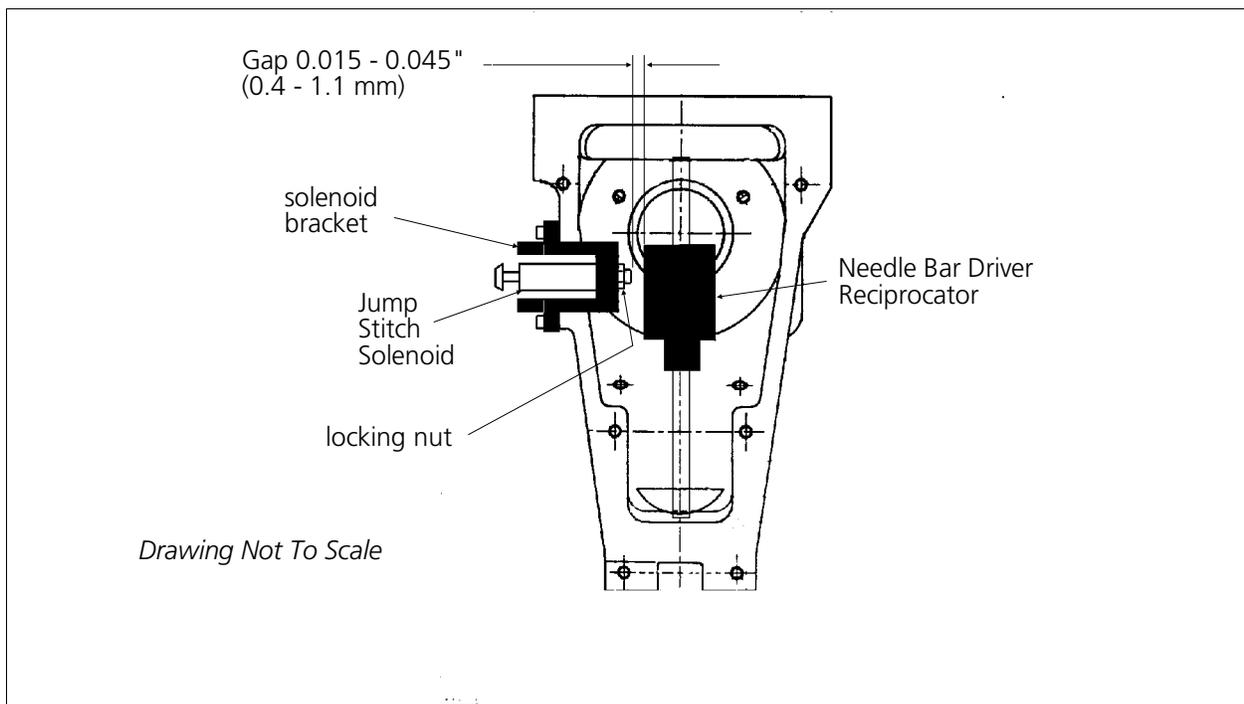


Figure 3 - 28

- To obtain this gap, loosen the locking nut on the solenoid and rotate the solenoid inside the bracket until the gap is proper. Tighten the locking nut.

Bracket Positioning

When attaching the jump stitch solenoid and bracket, it is not only necessary to place the plunger correctly, but you must also position the assembly in the proper forward to backward relationship. There are three concerns in positioning the solenoid and bracket assembly:

Bracket Position 1

The solenoid and bracket assembly should be far enough forward so the plunger will cause the reciprocator to rotate enough to release the needle bar during the jump stitch cycle.

Bracket Position 2

The solenoid and bracket assembly must not be so far forward that it causes the reciprocator to rotate to its mechanical rotational limit. This may cause premature failure of the reciprocator mechanism.

Bracket Position 3

The solenoid and bracket assembly must not be so far backward that it contacts the embroidery head connecting rod during its mechanical motion.

8. Put the new solenoid and bracket assembly in place and push it to the back of the cutout in the side of the embroidery head.
9. Attach it to the head with the 2 screws removed earlier, then check the alignment to be within the above 3 positions. Be sure that the plunger contacts the reciprocator mechanism, that the mechanism works properly, and that the jump stitch assembly does not contact the embroidery head connecting rod during its mechanical motion.
10. Attach the solenoid connector to the thread break harness connection coming from the harness channel above the embroidery head arm and behind the tensioners.

NOTE: The two wires coming from the solenoid body and connecting at the small black plastic connector, can be damaged if they are twisted together. Twisting the wires together will reduce their length and can put undue stress at the connections at both ends. We therefore do not recommend twisting these wires together. If you must group these wires together, use "cable ties" (plastic straps) these are available at most electronic supply stores.

11. Rotate the Z shaft clockwise with the hex wrench in the left end of the shaft to move the heads through at least one revolution to check that no mechanical interference occurs with the jump stitch solenoid mechanism.
12. Reattach the mechanical jump stitch lever and cover to the jump stitch bracket using the screws removed earlier.
13. Test embroider a large letter (6 inch block I, for example) to check the machine for proper jump stitch operation.

Color Change PCB Replacement

The color change PCB is mounted in the color change / grabber drive area located between head numbers 6 and 7 behind the tensioner area. To access the area you must remove various covers and panels, and portions of the thread tree.

1. Turn ON the EMT 10/12T and color change to the needle number 5 or 6 position.
2. Turn OFF the EMT 10/12T and disconnect the power cord from its power source.
3. Remove the lower front cover between head numbers 6 and 7.
4. Locate the color change PCB mounted to the color change / grabber area frame as shown in Figure 3-29. Also locate the photo sensor flag attached to the color change pin bar at the front of the area.
5. Using a pencil, mark the position of the flag by outlining it, then carefully remove the flag from the photo sensors in the color change PCB.
6. Carefully using a sturdy stool or other suitable device to elevate yourself above the area, remove the four screws in the two thread tree portions that lie above head numbers 3 through 6 and 7 through 9.
7. Move the loosened thread tree portions forward enough to access the top cover of the color change / grabber frame.

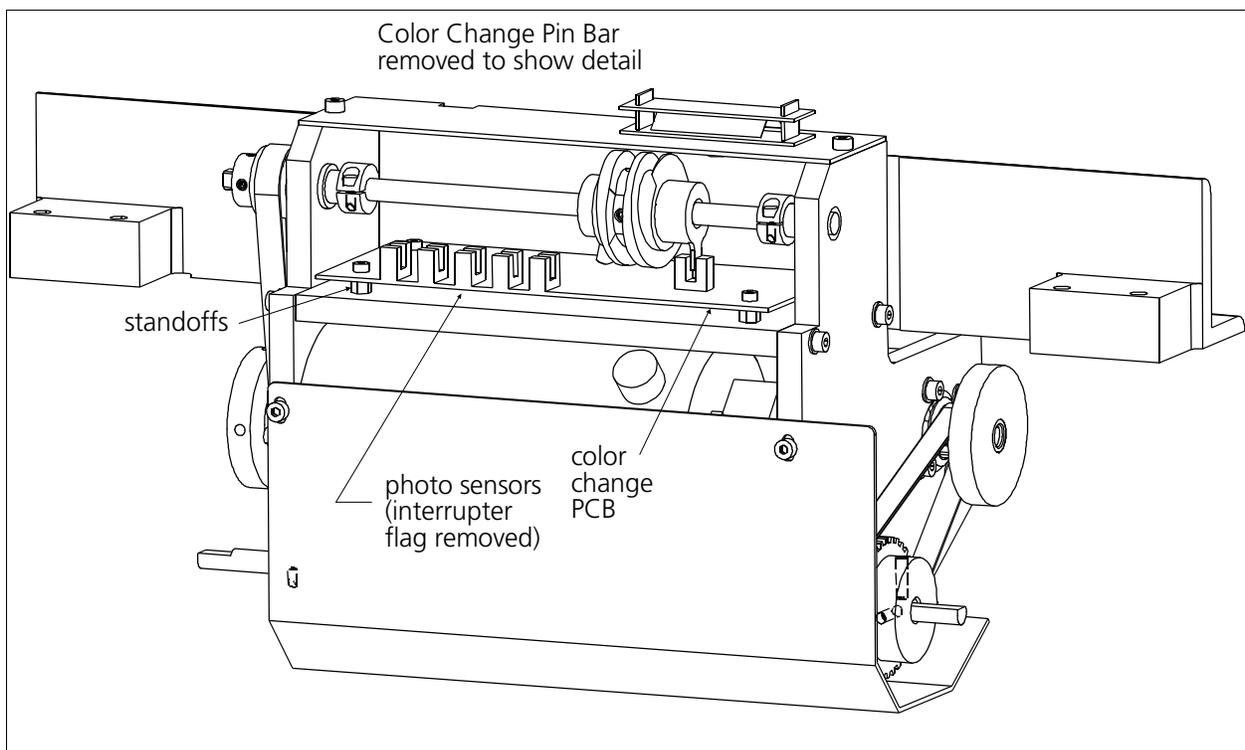


Figure 3 - 29

8. Remove the top cover of the color change / grabber frame to access the color change area from the top.
9. Install a static ground strap between yourself and the machine.
10. Disconnect the color change harnesses from the color change PCB.
11. Remove the screws holding the color change PCB to the standoffs on the color change / grabber frame.
12. Rotate the color change cam slightly to move the color change index tab out of the photo sensor on the color change PCB.
13. Carefully remove the color change PCB by sliding it out the front.
14. Refer to the previous steps in reverse order to install a new color change PCB.

NOTE: When the color change PCB is replaced, be certain the photo sensors on the PCB are not touching the color change indicator flag nor the color change index tab.

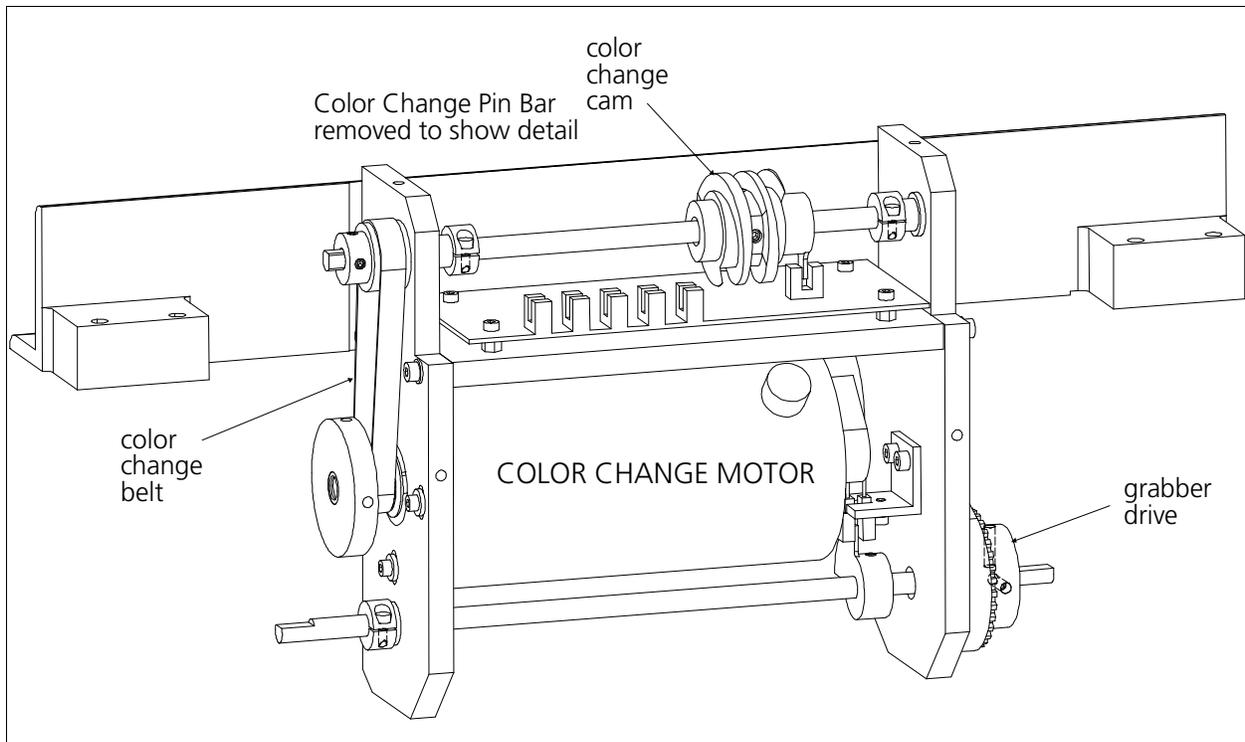
Color Change Motor and Belt Replacement

"FACTORY SERVICE ADVISED "

A special tool is required for motor belt tension adjustment after motor or belt is replaced.

The color change motor is mounted in the color change / grabber drive area located between head numbers 6 and 7 behind the tensioner area. To access the area you must remove various associated covers.

1. Locate the color change motor mounted to the left side plate and toward the front of the the color change / grabber area frame (see Figure 3-30).
2. If replacing the belt only, perform steps 3 through 6 and disregard the remainder of this procedure. If replacing the motor, go to step 7 and proceed with the remaining steps of this procedure.
3. Loosen, but do not remove the color change motor mounting screws.
4. Slide the belt off the motor pulley and around the end of the color change shaft.
5. Install the belt in reverse order of the previous steps.
6. Refer to the color change motor belt tensioning procedure following this procedure.

**Figure 3 - 30**

7. If replacing the motor, make note of the harness wiring orientations, then disconnect the electrical connections to the motor and encoder.
8. Remove the color change motor mounting screws and remove the belt.
9. The motor is now loose and may be removed.
10. Note the position of the motor drive pulley, then loosen the pulley set screws and remove the motor drive pulley.
11. Position the drive pulley in the same location on the shaft of the new motor as you noted in the previous step and tighten the set screws.
12. Reverse the preceding steps to replace the motor, orienting the harness wiring associated with the motor at the locations as noted in the removal step.

Color Change Motor Belt Tension

"FACTORY SERVICE ADVISED "

NOTE: This procedure requires using the Breco Belt Tensioner tool. Refer to Addendum A for user instructions for this device.

1. Refer to the procedure for using the Breco Belt Tensioner in Addendum A and attach a paper clip (or other small piece of iron/steel) to one length of the belt midway from the center of the motor pulley to the center of the drive shaft pulley.
2. Again, referring to Addendum A, perform a the belt tension measurement with the Breco Belt Tensioner.
3. Adjust the color change belt tension by loosening the four (4) color change motor mounting screws and moving the motor to make the belt more or less taut. When tightening the belt tension, use hand pressure only on the motor. No additional force is needed.
4. Measure the tension to be **170** ± 5 Hz with the Breco Belt Tensioner.
5. Tighten the four (4) color change motor mounting screws and check all other hardware for tightness.
6. Re-attach the electrical harnesses to the power distribution box and encoder.
7. Reattach any covers removed for this procedure.

Rotary Hook

Hook Replacement (including hook timing)

If you are not replacing the hook but wish to check and adjust hook timing only, refer to the Hook Timing Only procedure later in this section.

This procedure includes steps for setting hook timing during the hook installation process. After completing this procedure, hook timing adjustments are complete and there is no need to refer to any further hook timing procedure.

1. Move the the table top to the lower position.
2. Move the needle cases to needle position 5 or 6 (one of the middle positions) and remove the needle plate, both rotary hook covers, and the bobbin case.
3. With the machine ON and with the Main screen showing on the monitor, click the Advanced button and then the Service button to get to the Service menu.

4. In the Head Timing section of the Service menu, click the Headup button. The head rotates to the "Head Up" position and the Z Position shows approximately 110.0.

5. Locate the screw that is visible on the right side of the hook assembly as shown in Figure 3-31. Loosen this screw one or two turns.

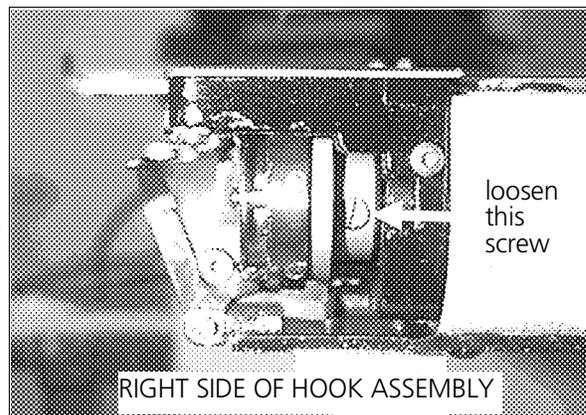


Figure 3 - 31

6. In the Z Position section of the Service menu, enter 60 in the text field and click the right arrow (>) button. The hook should rotate to the position where the second screw is visible, also as shown in Figure 3-31. Loosen this screw one or two turns.
7. Click the right arrow (>) button again and the third screw will become visible. Depending on the type of hook, this screw may be protruding more from a flat surface than the previous two screws. Loosen this screw one or two turns. The hook assembly is now free on the shaft.
8. Remove the two screws holding the UTC assembly; and allow it to suspend from its cable off the right rear edge of the needle plate bracket.
9. Remove the rotary hook assembly for cleaning and reinstallation, or for replacing with a new one.

10. Click the Headup button in the Head Timing section of the Service menu to again rotate the head to Head Up.
11. Click the Bottom Center button. The head rotates to the "Needle Depth" position and the Z Position shows approximately 180.0.
12. Click the Hook Timing button and the head rotates to the "Hook Timing" position. The Z Position shows approximately 201.0.
13. Clean and replace the current hook, or place a new rotary hook on the hook shaft.

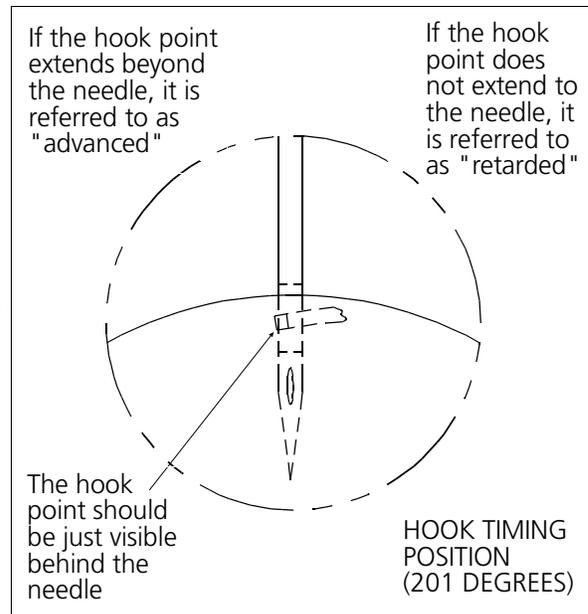


Figure 3 - 32

14. Align the hook point to the approximate hook timing position as shown in Figure 3-32.
15. With a good needle installed in the needle bar above the rotary hook, grasp the needle bar clamp and pull down until the needle goes into the slot in the bobbin basket and the needle bar catches securely.
16. Refer to Figure 3-32 for aligning the hook point to the needle.

At the same time, refer to Figure 3-33 and position the hook point so the gap between the needle scarf and the hook point is 0.002 to 0.008" (about the width of a thread).

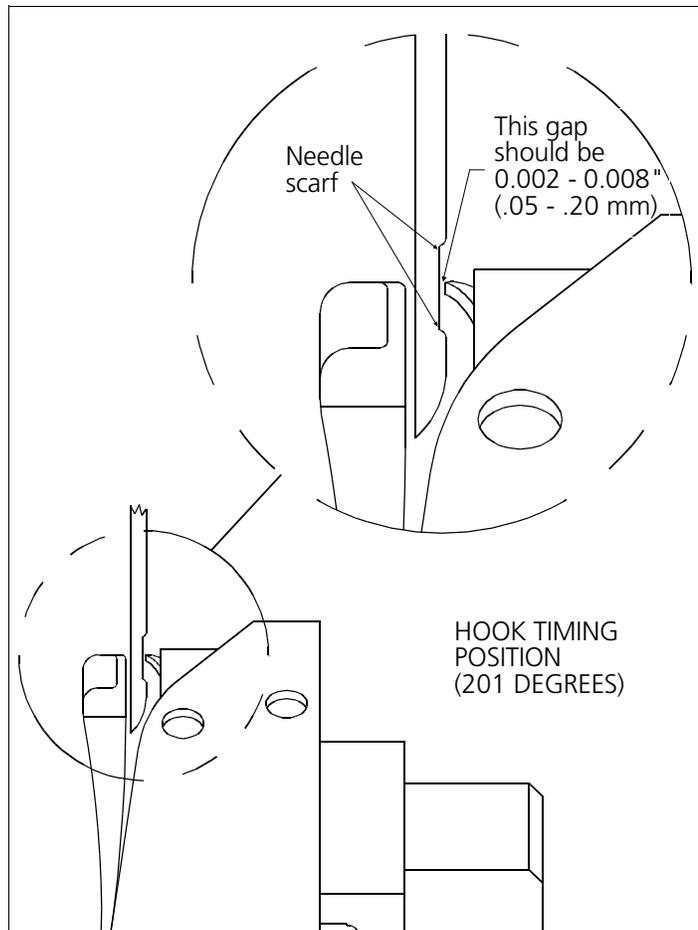


Figure 3 - 33

17. While maintaining the specifications outlined in the previous step, tighten the rotary hook screw that is accessible at the right of the hook assembly.
18. Move to needle position 1 and then position 10 and check the hook gap at each location to be within the 0.002 to 0.008" (0.05 - 0.20 mm) specification. If not within specifications, replace the needles in these needle positions and recheck the hook gap. Repeat the hook gap adjustment as needed to bring all three needle positions into the specified range.
19. In the Z Position section of the Service menu, enter 60 in the text field and click the right arrow (>) button to rotate the hook to the other two HOOK SCREWS and tighten each of these screws to secure the hook assembly.
20. Install the UTC assembly with the retaining finger tab inside the rotary hook bobbin basket notch. Install the screws.

Adjust The UTC Assembly

You must adjust the UTC assembly to a level where the needle will not contact the detection arm during the needle depth procedure.

21. Place the UTC Combination Gauge (p/n 009027-01) from the operator kit between the retaining tab of the UTC and the notch in the hook basket (see Figure 3-34). The gauge should fit with no restriction, nor with too much play (gap should be 0.020" (0.51 mm) minimum).

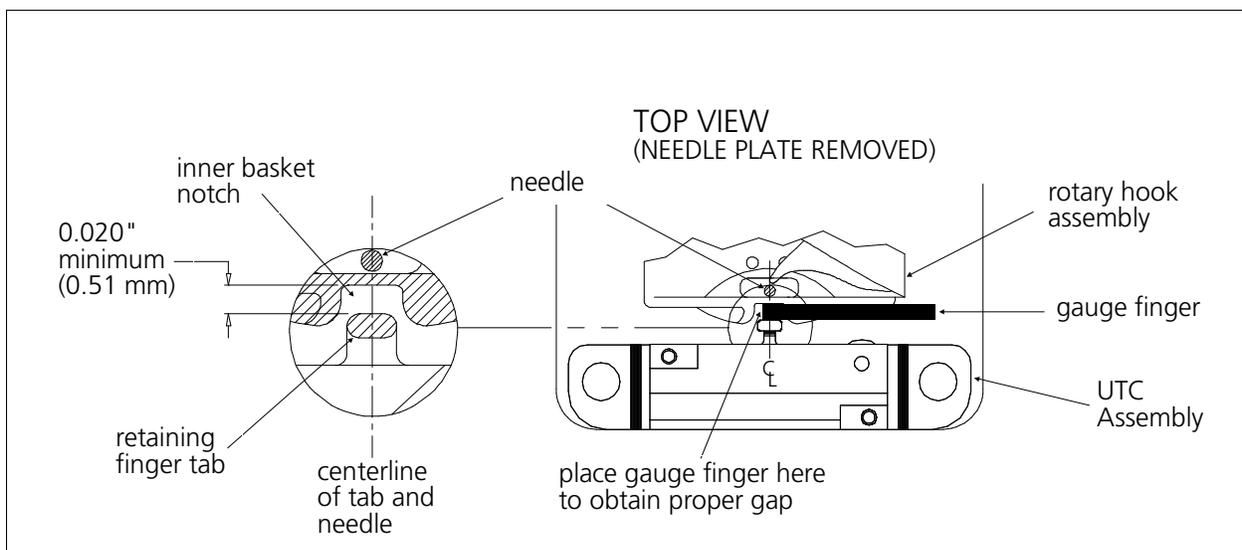


Figure 3 - 34

22. Move the assembly against the UTC combination gauge and at the same time, align the center of the tab to the center of the needle.
23. Tighten the UTC assembly mounting screws, then remove the UTC combination gauge.

24. In the Z Position section of the Service menu, enter 60 in the text field and click the right arrow (>) button to rotate the hook to the other two HOOK SCREWS and tighten each of these screws to secure the hook assembly.

25. With the correct gap between the retaining tab of the UTC and the basket of the hook verified with the UTC combination gauge, check for a clearance of between 0.020 to 0.030" (0.51 - 0.76 mm) between the UTC detection arm (shown in Figure 3-35) and the needle.

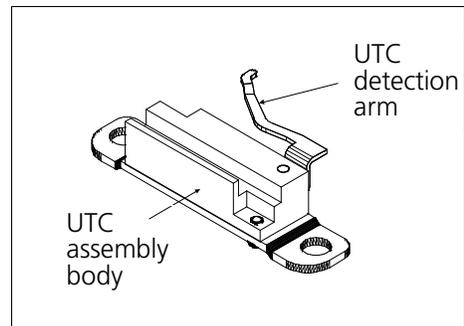


Figure 3 - 35

If the clearance needs to be adjusted proceed with the next step. If OK, go to the Needle Depth adjustment procedure.

26. Slightly loosen the two small screws on the underside of the UTC assembly shown in Figure 3-36.

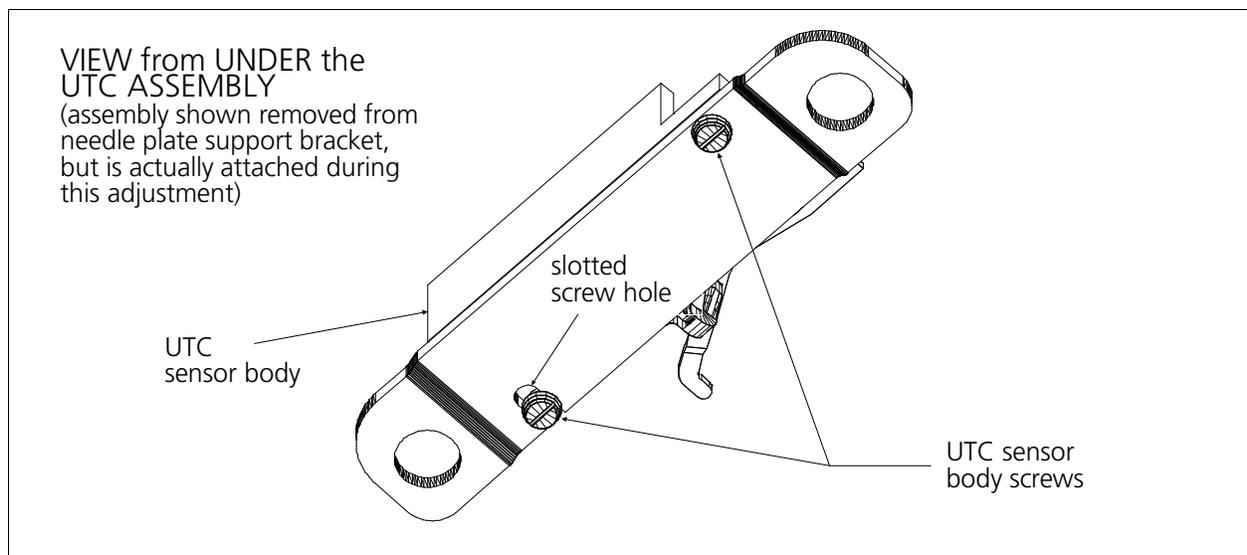


Figure 3 - 36

27. Move the UTC assembly to set the distance between the needle and the detection arm to between 0.020 and 0.030 inches (0.51 - 0.76 mm). This distance is slightly less than the diameter of the needle shipped with the machine.

28. Carefully tighten the two UTC sensor body screws when the clearance is set.

Needle Depth

If the needle depth is out of adjustment, it must be adjusted carefully for proper embroidery quality. Follow these steps to check and adjust needle depth.

29. Remove the lower needle case cover (see Figure 3-37).

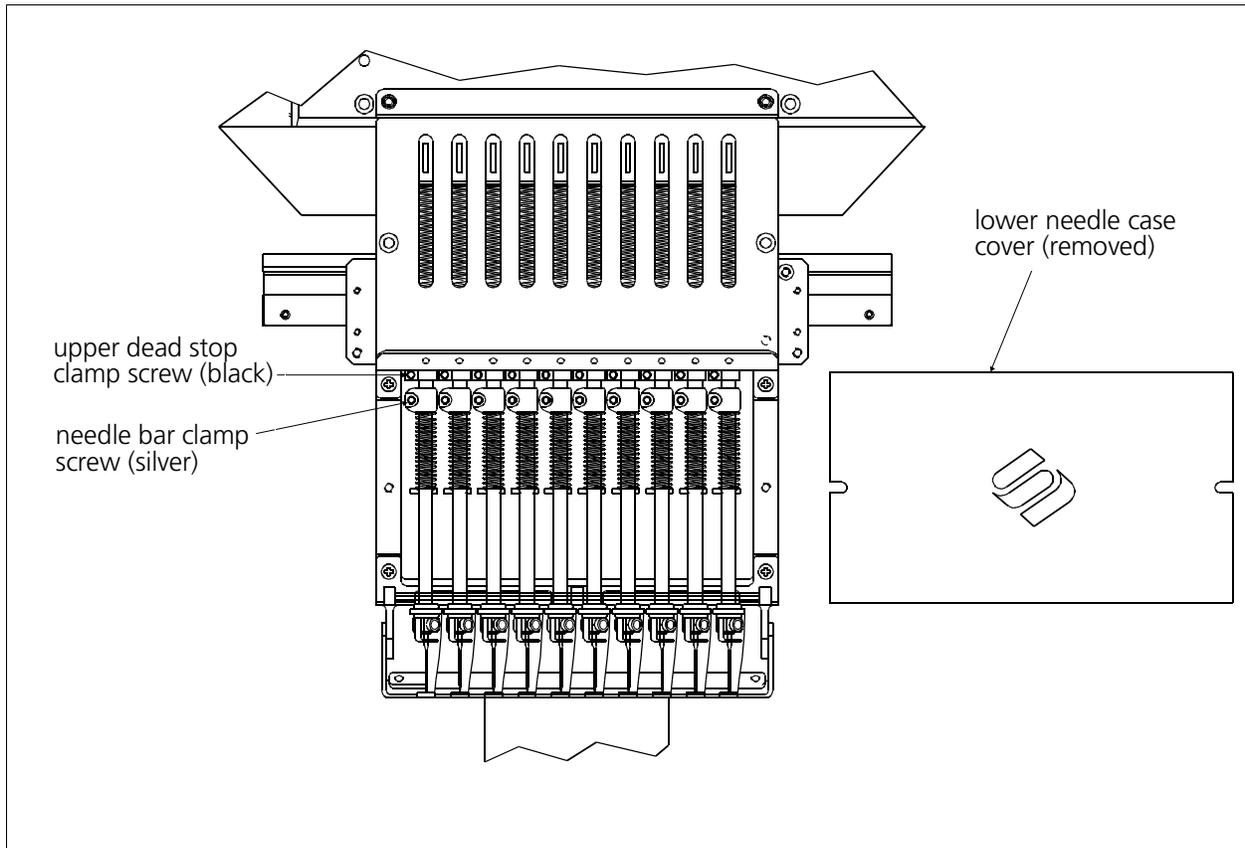


Figure 3 - 37

30. With the machine ON and with the Main screen showing on the monitor, click the Advanced button and then the Service button to get to the Service menu.
31. In the Head Timing section of the Service menu, click the Headup button. The head rotates to the "Head Up" position and the Z Position shows approximately 110.0.
32. After the head rotates one revolution, grasp the presser foot and pull down until the needle bar catches securely. At this time the presser foot will be about 1/4 inch from the needle plate.
33. Click the Bottom Center button. The head rotates to the "Needle Depth" position and the Z Position shows approximately 180.0. The needle has reached its lowest point.

34. Look directly into the hook assembly and check the location of the needle's eye compared to Figure 3-38. Not more than 1/8 of the needle's eye should be visible in the hook assembly.

If the needle's eye is in the acceptable range go to Step 43.

If the needle's eye is not in the acceptable range, continue this procedure with the next step.

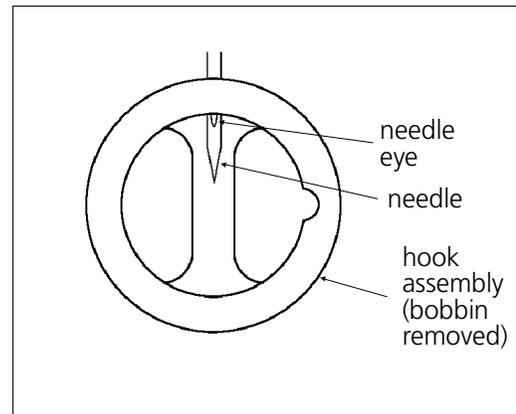


Figure 3 - 38

35. Loosen the needle bar clamp screw (silver clamp) shown in Figure 3-37.
36. Slide the needle bar up or down until not more than 1/8 of the needle's eye should be visible in the hook assembly. If you twisted the needle bar, return it to its original rotation before continuing.
37. Re-tighten the needle bar clamp screw.
38. Loosen the screw on the upper-dead-stop clamp (black clamp). Push the upper dead stop down to the needle bar clamp. Tighten slightly (but do not turn the upper dead stop).
39. Click the Top Center button. The head rotates to the "Top Dead Center" or "full needle up" position.
40. Loosen the screw on the upper-dead-stop clamp again and slide the clamp against the upper stop bumper. The screw must be positioned directly forward. If it is rotated, it may rub the plastic guide plate or catch the needle bar next to it during its down stroke. Tighten the upper-dead-stop clamp screw.
41. Click the Headup button. The head rotates to the "Head Up" position and the Z Position shows approximately 110.0.
42. Repeat steps 32 through 34 to check the needle depth and that there is no restriction to head rotation.
43. Repeat the needle depth adjustment for the remaining needles.
- NOTE: After any needle depth adjustment the upper dead stop **MUST** also be readjusted! (Refer to Steps 38 through 40.)
44. Replace the lower needle case cover.
45. Go to the UTC Adjustment procedure located in Chapter 4 of this manual to make the fine adjustments for the UTC assembly.

Hook Timing Only (without replacing hook)

This procedure is for checking and setting hook timing adjustments when the hook assembly is not being replaced. If you are replacing the hook assembly, refer to the Hook Replacement procedure earlier in this section. If you suspect your peripheral has gone out of timing due to hitting a hoop, bird nesting, or some other reason, follow these steps:

1. Move the the table top to the lower position.
2. Move the needle cases to needle position 5 or 6 (one of the middle positions) and remove the needle plate, both rotary hook covers, and the bobbin case.
3. With the machine ON and with the Main screen showing on the monitor, click the Advanced button and then the Service button to get to the Service menu.
4. Refer to the "Needle Depth" procedure that immediate precedes this procedure and perform the steps numbered 29 through 43, then return to Step 5 below.
5. In the Head Timing section of the Service menu, click the Headup button. The head rotates to "Head Up" and the Z Position shows approximately 110.0.
6. Click the Bottom Center button. The head rotates to the "Needle Depth" position and the Z Position shows approximately 180.0.
7. Click the Hook Timing button and the head rotates to the "Hook Timing" position. The Z Position shows approximately 201.0.
8. Grasp the needle bar clamp and pull down until the needle goes into the slot in the bobbin basket and the needle bar catches securely.
9. Check to see if hook timing is correct before you proceed. You must check the hook point's alignment with the needle, and you must check the gap. Refer to Figure 3-39 to check the alignment to the needle. Refer to Figure 3-40 to check the gap; there should be a 0.002 to 0.008" (0.05 - 0.20 mm) gap (about the width of a thread) between the needle and the hook point. Since there is some variation between the needles, check needles 1 and 10 for proper gap as well.

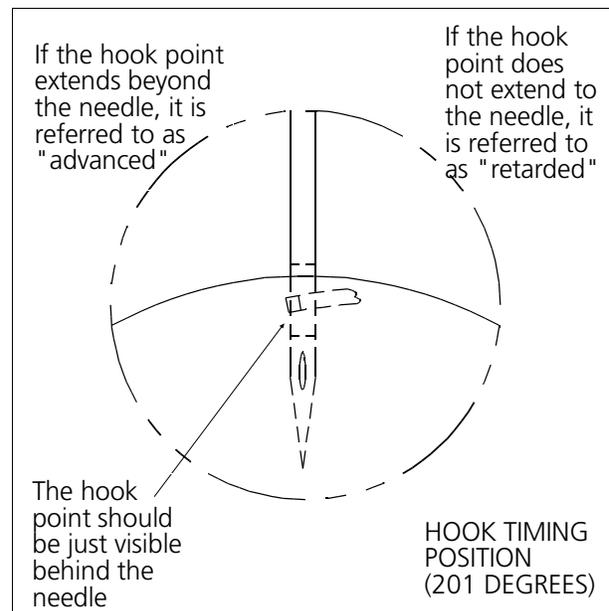


Figure 3 - 39

If hook timing is correct, proceed to the UTC Adjustments in the next procedure. If hook timing is NOT correct, proceed to Step 10.

10. While the hook is still in the HOOK TIMING position, color the screw on the RIGHT side of the hook (see Figure 3-41) with a felt-tipped marker. DO NOT loosen this screw at this time.

11. In the Z Position section of the Service menu, enter 60 in the text field and click the right arrow (>) button. The hook should rotate to the position where the second screw is visible. Loosen this screw.

12. Click the right arrow (>) button again and the third screw will become visible. Loosen this screw.

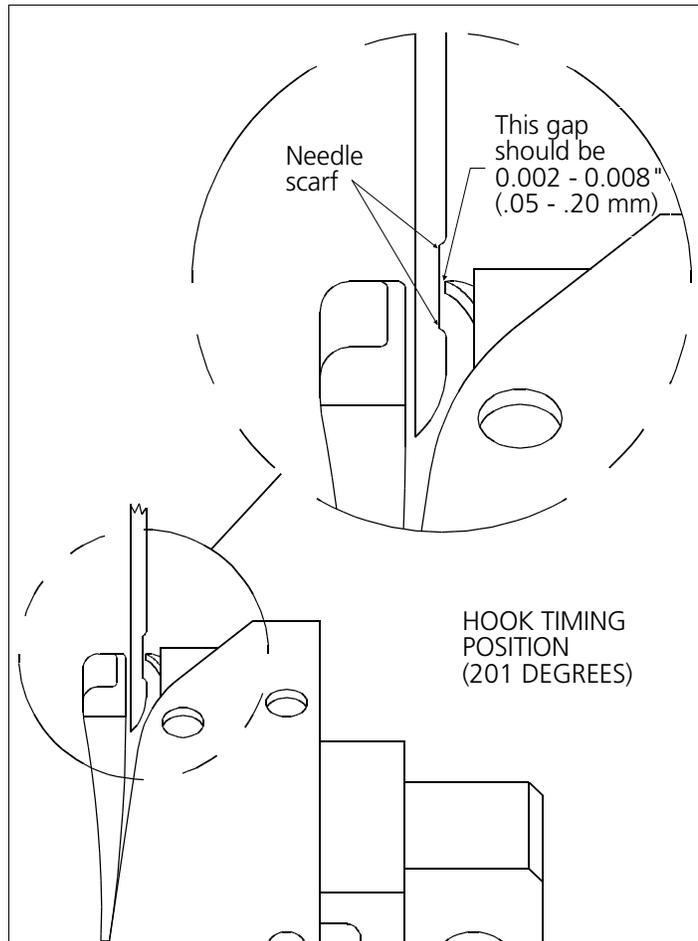


Figure 3 - 40

13. Click the Headup button (the head rotates to the "Head Up" position).

14. Click the Bottom Center button (the head rotates to the "Needle Depth" position).

15. Click the Hook Timing button and the head rotates to the "Hook Timing" position.

16. Loosen the screw on the RIGHT SIDE of the hook (the one that was colored with the felt-tipped marker) while you hold the Hook in position.

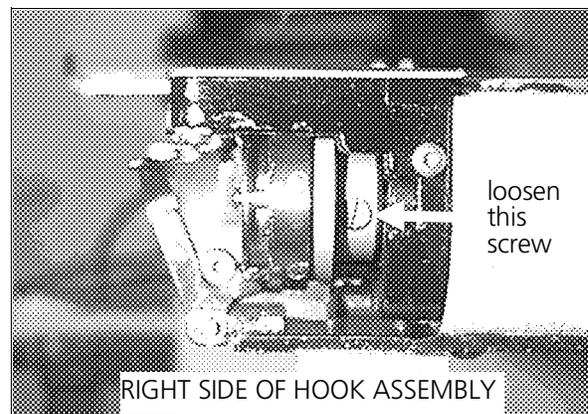


Figure 3 - 41

17. Line the hook up in the approximate HOOK TIMING position (refer to Figures 3-39 and 3-40).
18. Grasp the needle bar clamp and pull down until the needle goes into the slot in the bobbin basket and the needle bar catches securely.
19. Position the POINT of the HOOK directly behind the SCARF of the needle. Leave a THREAD distance between the POINT of the hook and the needle.
20. Tighten the colored hook screw and check that the setting is correct as shown in Figures 3-39 and 3-40.
21. In the Z Position section of the Service menu, enter 60 in the text field and click the right arrow (>) button to rotate the hook to the other two HOOK SCREWS and tighten each of these screws to secure the hook assembly.

UTC Adjustments

22. Go to the UTC Adjustment procedure located in Chapter 4 of this manual to make the fine adjustments for the UTC assembly.
23. After setting the UTC adjustments replace the needle plate, both rotary hook covers, and the bobbin case; and return the machine to its operational state.

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4. Trimmer Maintenance

General

This section of the manual provides parts replacement procedures and various adjustments required during repair maintenance of the embroidery head trimmer system. Information for service maintenance on the rest of the embroidery head is located in Section 3 and the rest of the machine is located in Section 2 of this manual.

These procedures are guidelines for performing repairs and must be used by personnel practicing good maintenance and repair techniques. Refer to the Maintenance Philosophy topics in Section 1 of this manual for discussion of good maintenance and repair techniques, including concerns with static electricity.



WARNING! Failure to practice good maintenance and repair technique may result in injury to personnel performing the work, and damage to the equipment!

NOTE: The Warranty is exclusive of, and may be VOID if, poor maintenance practices have caused damage to the equipment.

Trimmer System

Although the trimmer system for the EMT 10/12T is assembled and thoroughly tested before the machine is shipped, there are a few things to be aware of to help prevent problems.

- Dirt, dust, and thread lint may build up and prevent the movable knife from actuating correctly. Keep the area clean and you shouldn't have a problem. If for some reason you find that the movable knife is out of adjustment a procedure for adjusting it is presented in this section.
- Thread birdnesting around the rotary hook, picker, and UTC sensor arm could cause the knife and/or picker, to become misadjusted.

Sequence of Trim Events

During the trim function, many events occur with a set timing sequence to enable the trimming action to be successful. The following steps provide you with a very general outline (and sometimes brief descriptions) of the major actions that take place during the trim function.

1. While embroidering a design, the trim function is initiated when the embroidery machine detects the design code for: a color change, a trim, a set number of consecutive jump stitches, or the end of design.
2. The embroidery heads will slow to about 80 stitches per minute, which is the speed range for the trimming action.

3. The picker engages with the current thread loop as it is being formed in the hook and bobbin area. This process is required to provide the correct length for restarting embroidering next time this thread color is used.
4. The movable knife comes forward to the ready state for trimming. During its forward movement, it separates the top thread from the thread that is looped around the hook. It is here where it "selects" the top thread and bobbin thread for trimming.
5. When the movable knife returns to the "home" position, the selected threads will be cut between the movable knife and the adjustable fixed knife.
6. At approximately the same time the threads are being cut, the grabber reaches out from behind the needle area and "grabs" the cut top thread (called the tail), pulling it up and into the Velcro wiper strip.
7. After the thread is cut and the tail is grabbed, the beam moves a small distance away from the current location and back again to insure the tail has been completely removed from the embroidery material.
8. When the trim is complete the machine begins embroidering again automatically.

Trimmer Replacement Procedures

The thread trimmer assemblies lie in three general areas of the head: in and about the hook and bobbin area, on the arm casting behind the front of the head, and in and throughout the cylinder bed. All the replacement procedures for these various parts are grouped together in this section. All the trimmer adjustments are grouped together in the section following these replacement procedures.

When re-attaching the picker link to the picker assembly, refer to the alignment section of this manual for the alignment procedure for the picker position.

Grabber Motor and Belt Replacement

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A special tool is required for motor belt tension adjustment after motor or belt is replaced.

The grabber motor is mounted in the color change / grabber drive area located between head numbers 6 and 7 behind the tensioner area. To access the area you must remove various associated tensioner covers.

1. Locate the grabber motor mounted to the right side plate and toward the rear of the the color change / grabber area frame (see Figure 4-1).

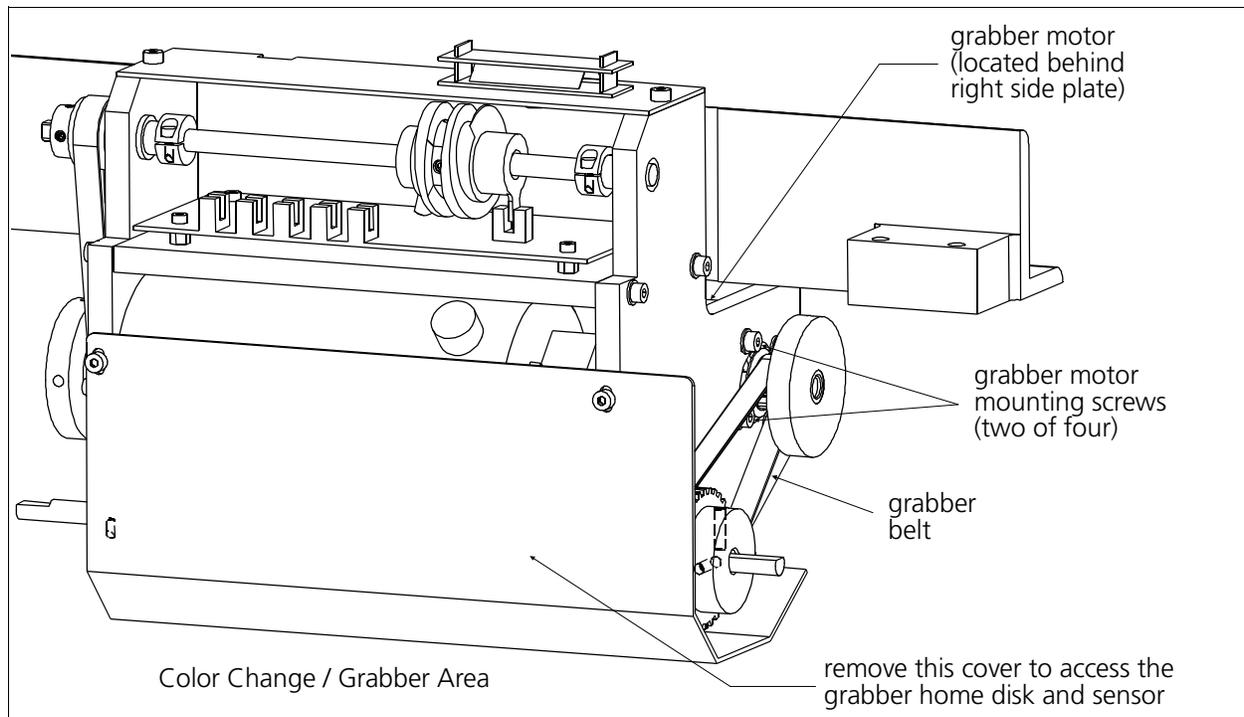


Figure 4 - 1

2. If replacing the belt only, perform steps 3 through 6 and disregard the remainder of this procedure. If replacing the motor, go to step 7 and proceed with the remaining steps of this procedure.
3. Loosen, but do not remove the grabber motor mounting screws.
4. Slide the belt off the motor pulley and around the end of the grabber shaft.
5. Install the belt in reverse order of the previous steps.
6. Refer to the grabber motor belt tensioning procedure following this procedure.
7. If replacing the motor, make note of the harness wiring orientations, then disconnect the electrical connections to the motor and encoder.
8. Remove the grabber motor mounting screws and remove the belt.
9. The motor is now loose and may be removed.
10. Note the position of the motor drive pulley, then loosen the pulley set screws and remove the motor drive pulley.
11. Position the drive pulley in the same location on the shaft of the new motor as you noted in the previous step and tighten the set screws.
12. Reverse the preceding steps to replace the motor, orienting the harness wiring associated with the motor at the locations as noted in the removal step.

Grabber Motor Belt Tension

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NOTE: This procedure requires using the Breco Belt Tensioner tool. Refer to Addendum A for user instructions for this device.

1. Refer to the procedure for using the Breco Belt Tensioner in Addendum A and attach a paper clip (or other metallic material) to one length of the belt midway from the center of the motor pulley to the center of the drive shaft pulley.
2. Again, referring to Addendum A, perform a the belt tension measurement with the Breco Belt Tensioner.
3. Adjust the grabber belt tension by loosening the four (4) grabber motor mounting screws and moving the motor to make the belt more or less taut. When tightening the belt tension, use hand pressure only on the motor. No additional force is needed.
4. Measure the tension to be **140** ± 5 Hz with the Breco Belt Tensioner.
5. Tighten the four (4) grabber motor mounting screws and check all other hardware for tightness.
6. Re-attach the electrical harnesses to the power distribution box and encoder.
7. Reattach any covers removed for this procedure.

Grabber Home Adjustment

8. When the grabber blade is fully retracted the grabber home disk is inside the sensor as shown in Figure 4-2.

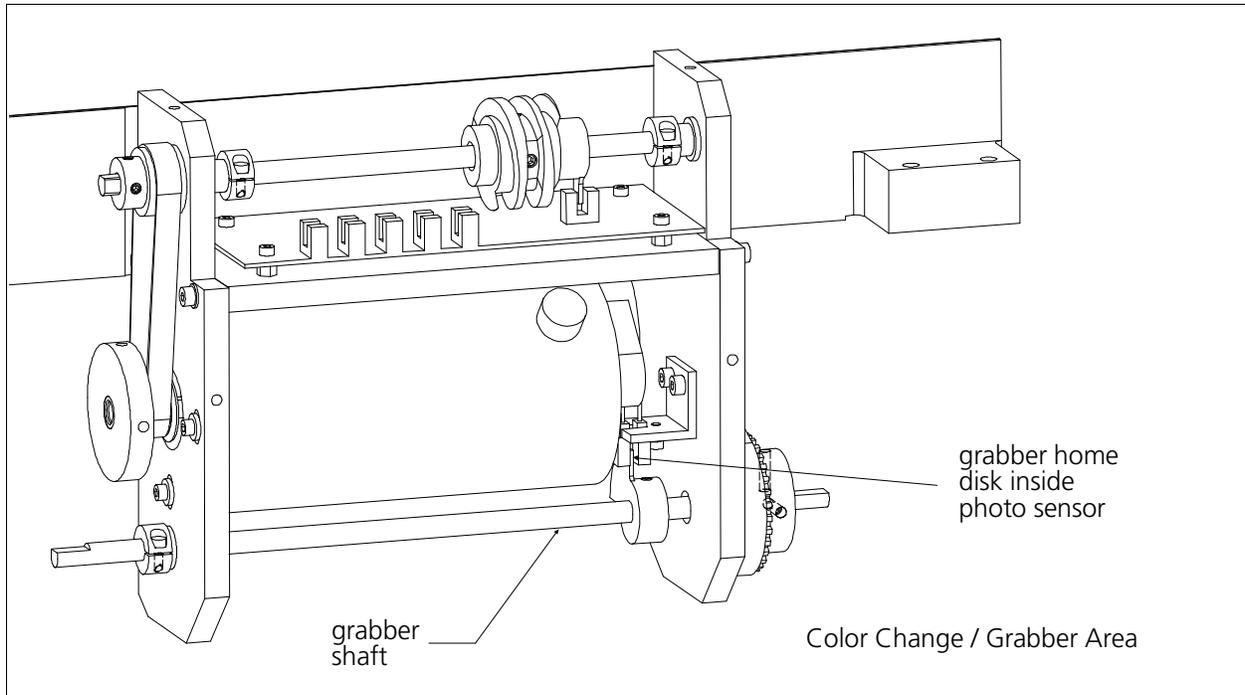


Figure 4 - 2

9. The hook portion of the tip of the grabber blade should be about .060 to .090 inches (1.5 to 2.5 mm) from the grabber blade guide. (Refer to Figure 4-22 in the Grabber Setup And Adjustments procedure later in this chapter for an illustration of this position.)
10. To adjust the grabber home position, loosen the grabber home disk and reposition it inside the sensor so the majority of grabber blades are positioned correctly when in the home position. Be certain the disk is not touching the sensor walls, then tighten the grabber home disk.
11. Refer to the Grabber Setup And Adjustments procedure later in this chapter for individual grabber blade adjustments.

Grabber Blade Replacement

1. Rotate the grabber assembly until the mounting screw shows in the slot on the back of the grabber housing.
2. Remove the mounting screw and pull out the old, damaged, or broken grabber blade (see Figure 4-3).

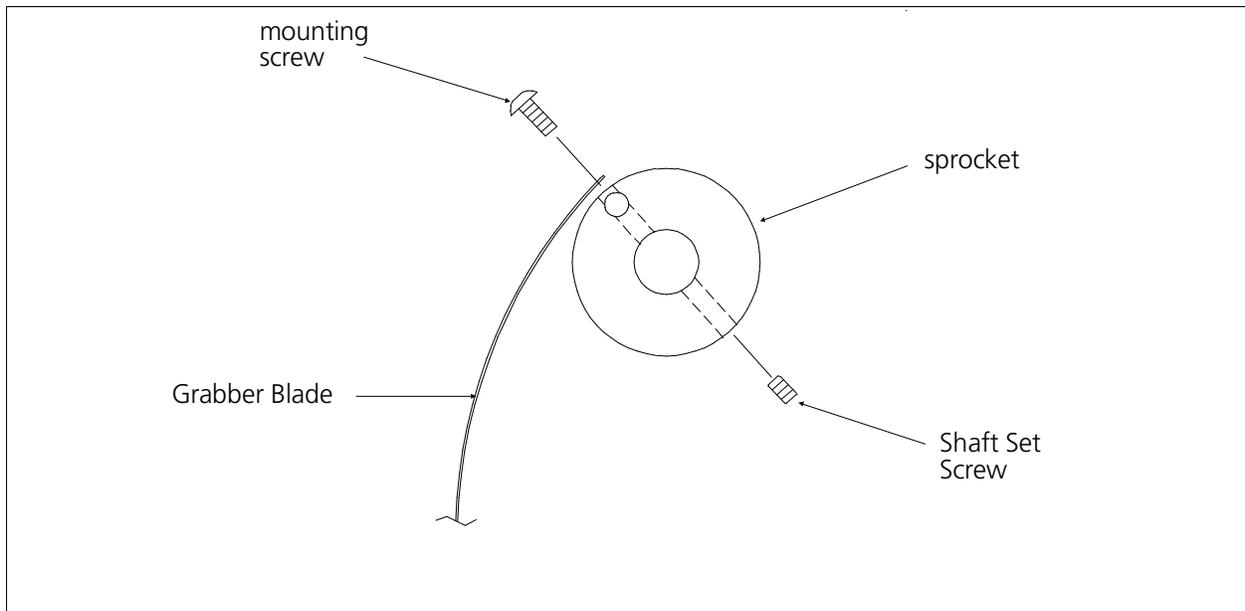


Figure 4 - 3

3. With the etched side of the grabber blade facing up, slide the new grabber blade through the Velcro wiper and lower guide; and into the grabber housing.
4. Continue to slide the blade into the housing and allow it to form around the sprocket until the hole in the blade lines up with the mounting hole.
5. Install the mounting screw while pulling out gently on the blade.
6. Tighten the mounting screw.
7. Refer to the Grabber Setup And Adjustments procedure later in this chapter.

Grabber Replacement

Each grabber assembly is attached to the embroidery head arm by two screws, as well as being "locked" to the grabber drive shaft. The grabber drive shaft is comprised of four individual sections that are associated with three grabber assemblies each. The following procedure is typical for removing any of the four pairs of grabber assemblies.

1. Turn the power OFF and disconnect the power cord from the power source.



WARNING! Failure to fully disconnect the power source may result in injury to the technician or other personnel and may damage the equipment!

2. Isolate which grabber assembly is defective and loosen the shaft couplings on either side, referring to Figure 4-4. Slide the couplings back onto the "non-removed" shaft ends.

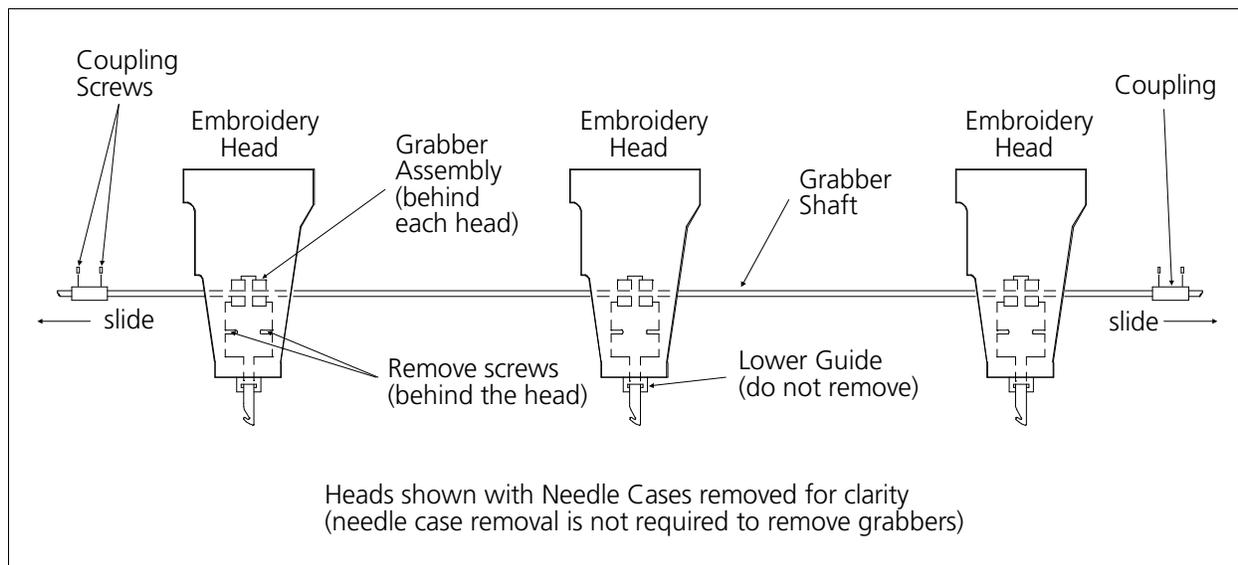


Figure 4 - 4

3. Turn the shaft clockwise by hand to fully retract the grabber blades. The blades should pull free of the lower guide blocks.
4. Remove the six screws holding the three grabber assemblies to the embroidery head arms.
5. Remove the shaft with the grabber assemblies still attached.
6. On the defective grabber assembly, pull the grabber blade outward until the set screw holding the assembly to the shaft is visible (see Figure 4-3).
7. Loosen the set screw and slide the defective grabber assembly off the shaft.

8. Slide the replacement grabber assembly onto the shaft, making certain it is oriented the same way as the other assembly.
9. Pull the grabber blade outward to reveal the set screw hole and align the hole over the "flat" portion of the shaft. Insert the set screw and "snug" it down, but do not fully tighten.
10. Set the shaft and grabber assemblies into place behind the embroidery head arms. Make sure the grabber blades are inserted and aligned in the lower guides.
11. Position the "non-replaced" grabber over its mounting holes and insert the two mounting screws.
12. Gently slide the new grabber back and forth until it is correctly aligned with its mounting holes and insert its screws as well.
13. Turn the grabber shaft clockwise until the grabber blades are full extended and the set screw hole is revealed. Tighten the set screw.
14. Align the "flat" portions at both ends of the shaft with the flat portions of the neighboring shafts. Re-attach both couplings, making certain that all 12 grabber blades are extending the same distance through the lower guides. Tighten the coupling set screws.
15. Turn the machine power ON.
16. Go to the Thread Grabber dialog box and select Start Test to check that all grabbers are working properly.
17. If the grabber blades do not seem to be properly aligned, refer to the Grabber Setup And Adjustments procedure later in this manual.

Grabber Disassembly

Although it is easier to replace the grabber as a complete assembly, the following procedure shows how to disassemble the grabber to replace individual components.

1. Remove the self-tapping screw that holds the two grabber housing halves together at the top (see Figure 4-5).

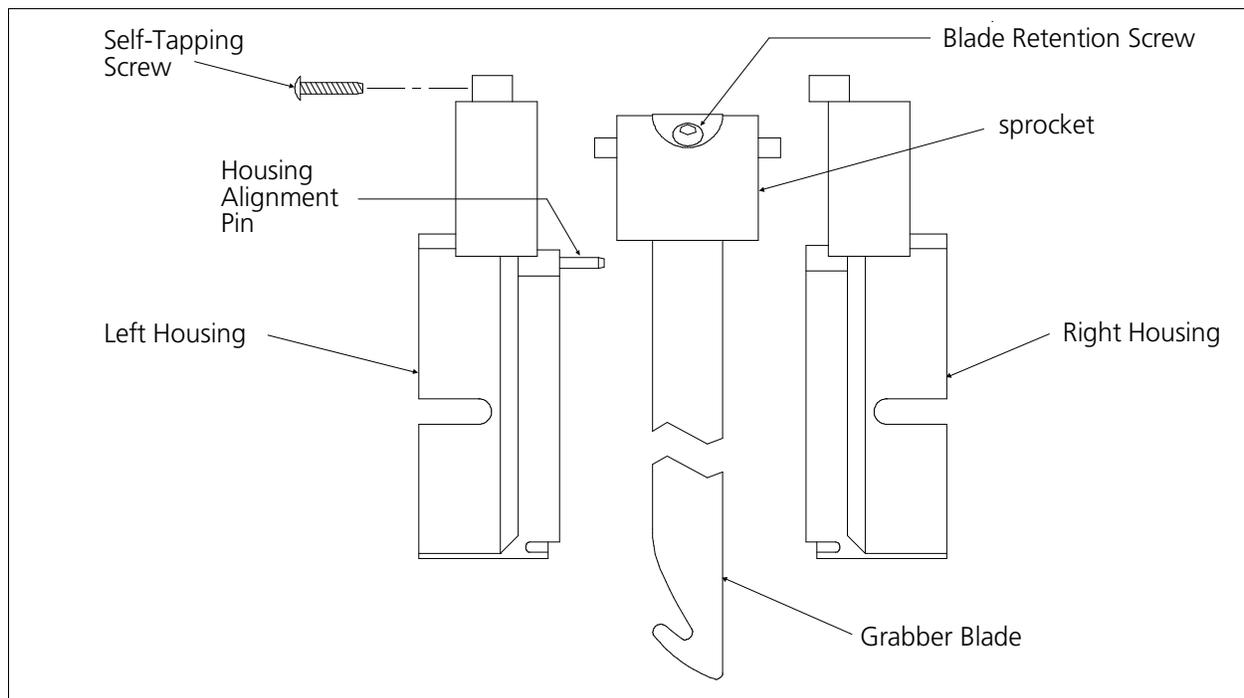


Figure 4 - 5

2. Grasp the grabber housing in both hands and gently but firmly rock the two halves back and forth until the two pieces begin to separate.
3. Pull the two halves apart, being careful not to drop any of the internal pieces.
4. Replace any broken or damaged parts as required.
5. Gently press the assembly back together, using care to guide the grabber blade inside the housing slots and the alignment pin into its associated hole.
6. Install the self-tapping screw at the top of the two housing pieces.

NOTE: To be certain the screw engages the same thread path in the housing as originally, turn the screw counter clockwise until it "snaps" before turning it clockwise to secure it.

7. The grabber blade should extend and retract smoothly without any binding or rough movement. Refer to the Grabber Setup And Adjustments procedure later in this manual.

Picker Replacement

To replace a defective picker, refer to Figure 4-6 and the following steps:

1. Remove the two mounting screws and defective picker.
2. Install a new picker and attach it to the picker base with the removed screws.
3. Refer to the picker adjustment procedures found in the Trimmer Setup And Adjustments section found later in this chapter of the manual.

If other parts in the picker assembly need to be replaced refer to Figure 4-6 and the following steps:

4. Remove the 2 screws holding the needle plate. Remove the needle plate.
5. Disconnect the picker link from the picker base by loosening the set screw inside the swivel pivot of the picker base.
6. Remove the external retaining ring at the right end of the picker base shaft.
7. Slide the picker assembly out of the picker bracket mount.

When re-attaching the picker link to the picker assembly, refer to the picker adjustment procedures found in the Trimmer Setup And Adjustments section found later in this chapter of the manual.

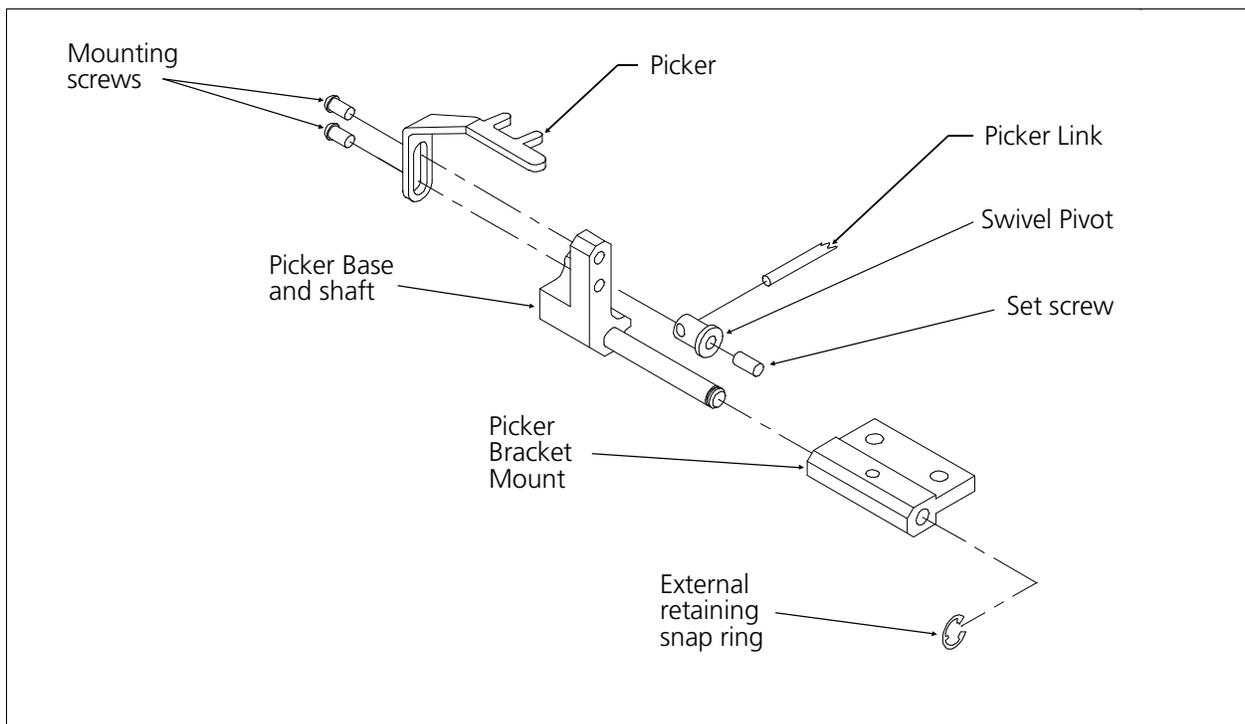


Figure 4 - 6

Movable Knife

1. Remove the screws holding the needle plate. Remove the needle plate.
2. Remove the four screws holding the bed cover. Remove the cover.
3. Lift the forward end of the connecting link from the pin on the movable knife drive arm (see Figure 4-7).

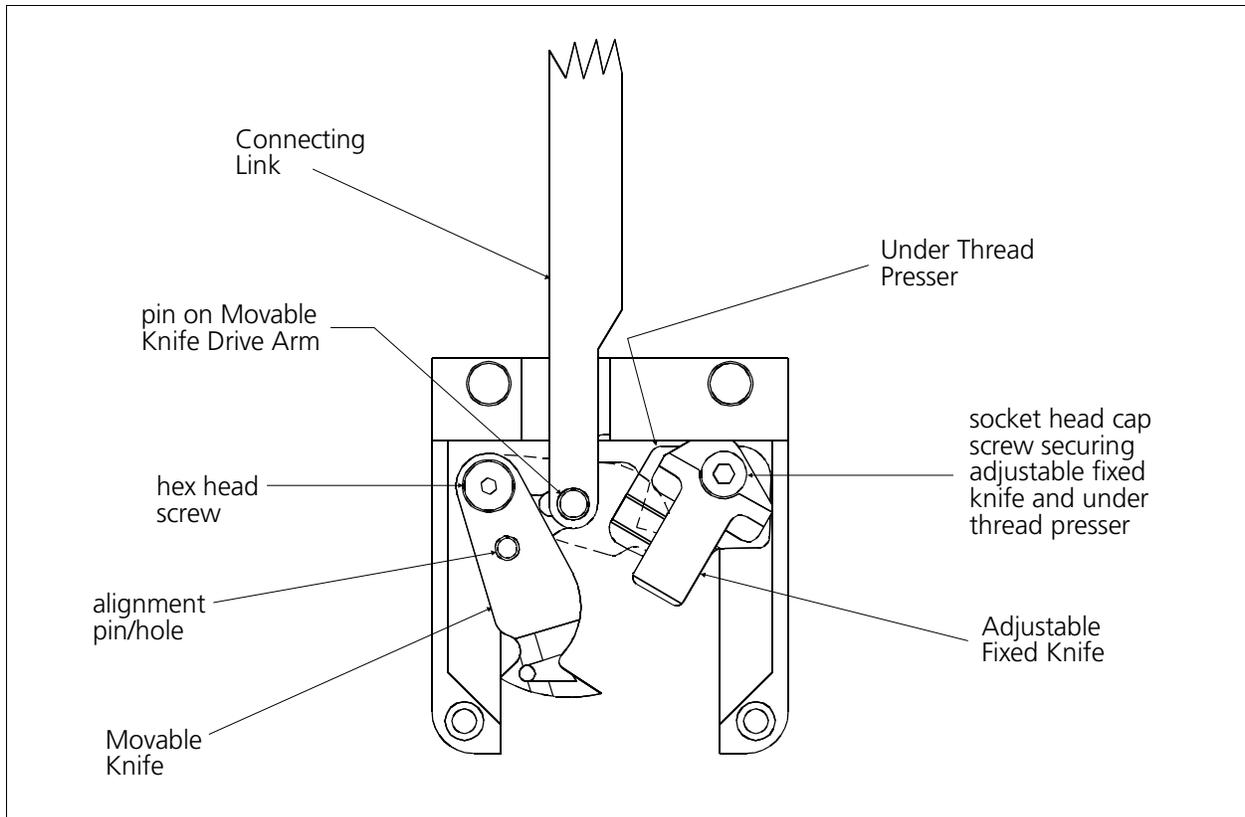


Figure 4 - 7

4. Push the movable knife all the way back until it stops.
5. By rotating counter clockwise, loosen the hex head screw holding the movable knife to the top of the knife drive arm.
6. Rotate the movable knife out of the adjustable fixed knife, then remove the hex head screw and the movable knife.
7. Place the new movable knife on the top of the knife drive arm, positioning the alignment hole in the knife over the alignment pin in the arm.
8. Apply Loctite 222 screw adhesive (or equivalent) and install the hex head screw and snug it with your fingers.

9. Rotate the knife and arm clockwise until the back side of the knife is resting against the left side of the needle plate mounting bracket, then tighten the hex head screw.
10. After replacing a movable knife refer to the trimmer adjustment procedures later in this chapter for the adjustable fixed knife.

Adjustable Fixed Knife/Under Thread Presser

1. Remove the screws holding the needle plate. Remove the needle plate.
2. Remove the screws holding the front and rear bed covers. Remove the covers.
3. Lift the forward end of the connecting link from the pin on the movable knife drive arm (see Figure 4-7).
4. If the movable knife is positioned under the adjustable fixed knife and under thread presser, rotate it forward to move it from under that area.
5. Remove the socket head cap screw securing the adjustable fixed knife and under thread presser to the top of the needle plate bracket.
6. Remove the adjustable fixed knife and the under thread presser.
7. Replace the required new parts.
8. Install the socket head cap screw to secure the adjustable fixed knife and the under thread presser. Snug the cap screw until the parts are held securely. Do not over tighten.
9. After replacing an adjustable fixed knife or under thread presser, refer to the trimmer adjustment procedures later in this chapter for the adjustable fixed knife.

Movable Knife Drive Arm

1. Remove the screws holding the needle plate. Remove the needle plate.
2. Remove the screws holding the front and rear bed covers. Remove the covers.
3. Lift the forward end of the connecting link from the pin on the movable knife drive arm (see Figure 4-7).
4. Refer to Figure 4-8 and remove the external retaining ring from the bottom of the movable knife drive arm. (Also see Figure 4-15 for retaining ring reference.)
5. Once this retaining ring is removed, the arm shaft is free to be remove out of the top of the needle plate bracket.

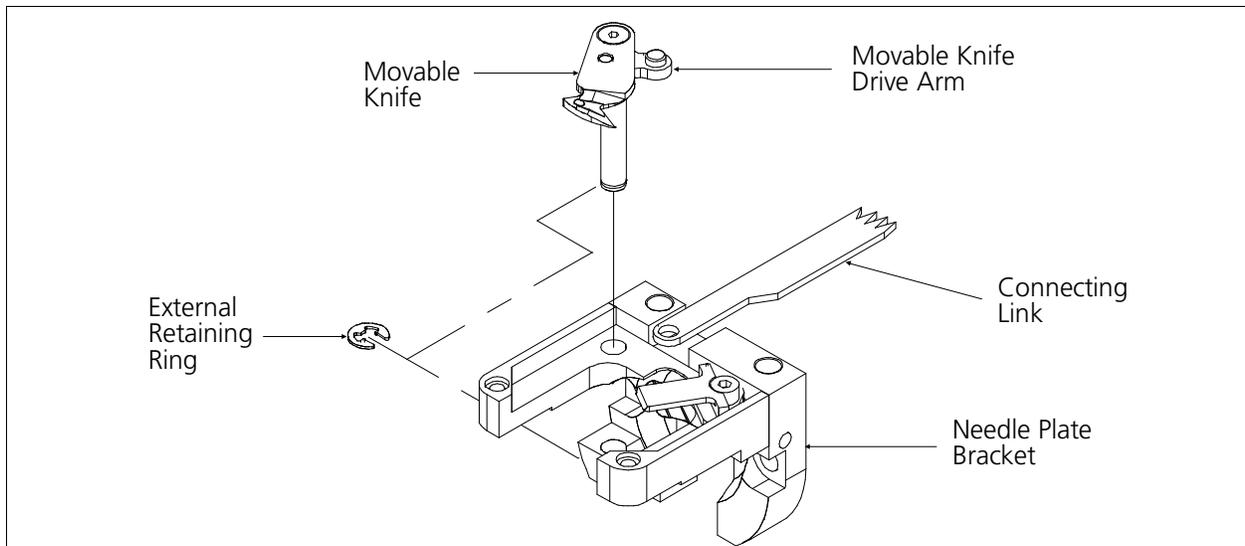


Figure 4 - 8

UTC Replacement

To remove the UTC assembly refer to the steps that follow:

1. With the machine in the head up position, turn the power switch OFF.
2. Remove the table top insert from the machine to access the Hook and UTC area.
3. Remove the needle plate, front bed cover, and right side rotary hook cover to access the UTC assembly including the sensor cable and connection to the harnessing in the bed.
4. Disconnect the sensor cable from the harness inside the bed and remove the cable from around the needle plate support bracket (see Figure 4-9).

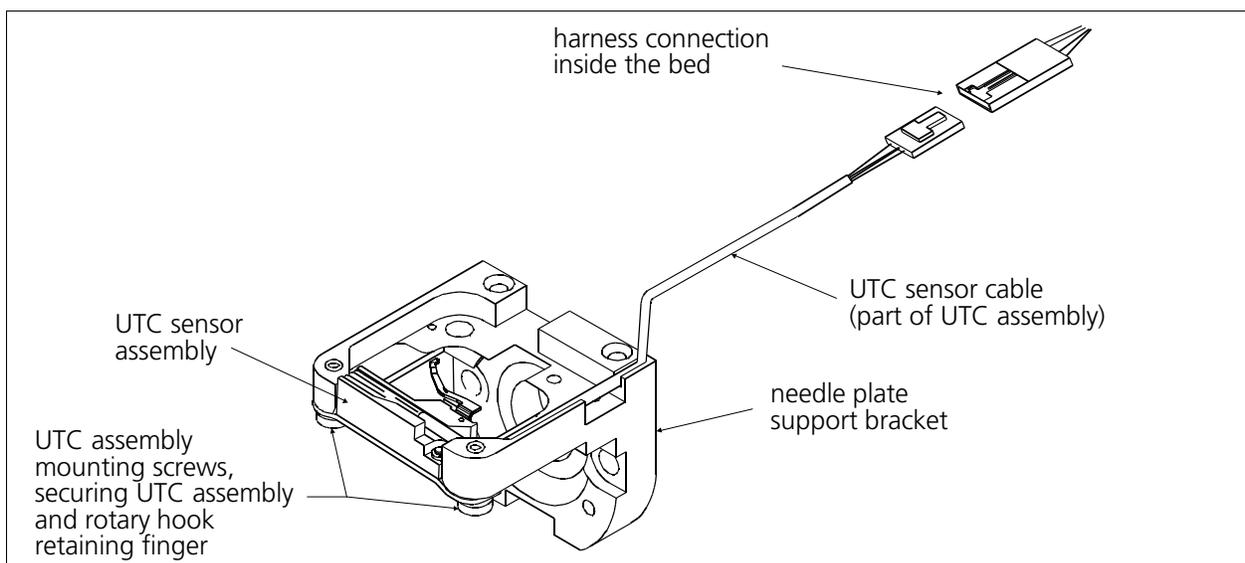


Figure 4 - 9

5. Remove the 2 UTC assembly mounting screws that hold the UTC assembly and rotary hook retaining finger to the bottom of the needle plate support bracket (see Figure 4-9).

To attach the UTC assembly, refer to the steps that follow.

6. Connect the sensor cable from the new UTC assembly to the harness inside the bed as indicated in Figure 4-9.
7. Rotate the rotary hook inner basket to position the notch to the top so the retaining finger tab will fit into the notch properly when the UTC assembly is attached.
8. Place the UTC assembly under the needle plate support bracket as shown in Figure 4-10 and install the 2 UTC assembly mounting screws.

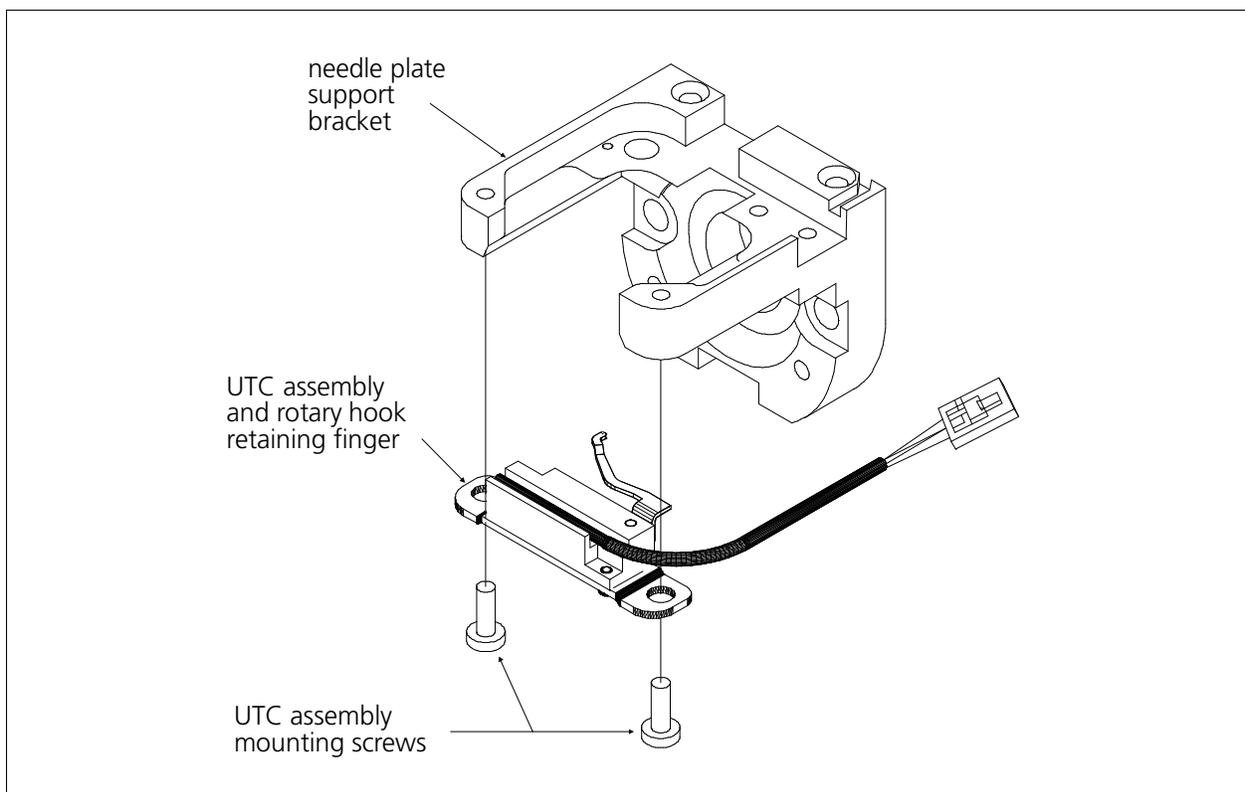


Figure 4 - 10

9. Perform the UTC adjustments in Chapter 2 of this manual.

Trimmer Setup And Adjustments

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CAUTION! If these adjustments are attempted without using the proper procedures and tools (and without proper training in some cases), machine components may be damaged and operation of the trimmers may become inconsistent.

Minimum tools needed: a small screwdriver, a medium screwdriver, 1.5 mm, 2 mm, and 2.5 mm hex wrenches, 10 mm and 3/4 inch open-end wrenches, a 0-200 inch/pound torque wrench, the Cam Timing Fixture (Melco part number 995312-01) and the Select Position Fixture (Melco part number 995372-01).

Figure 4-11 identifies those components that comprise the trimmer system: the adjustable fixed knife, the movable knife, and the under thread presser. These components are covered by the front bed plate and the needle plate (see inset in Figure 4-11). Remove the screws holding these covers to gain access. You may test the trimmer adjustments without the covers in place, but all covers must be installed while embroidering.

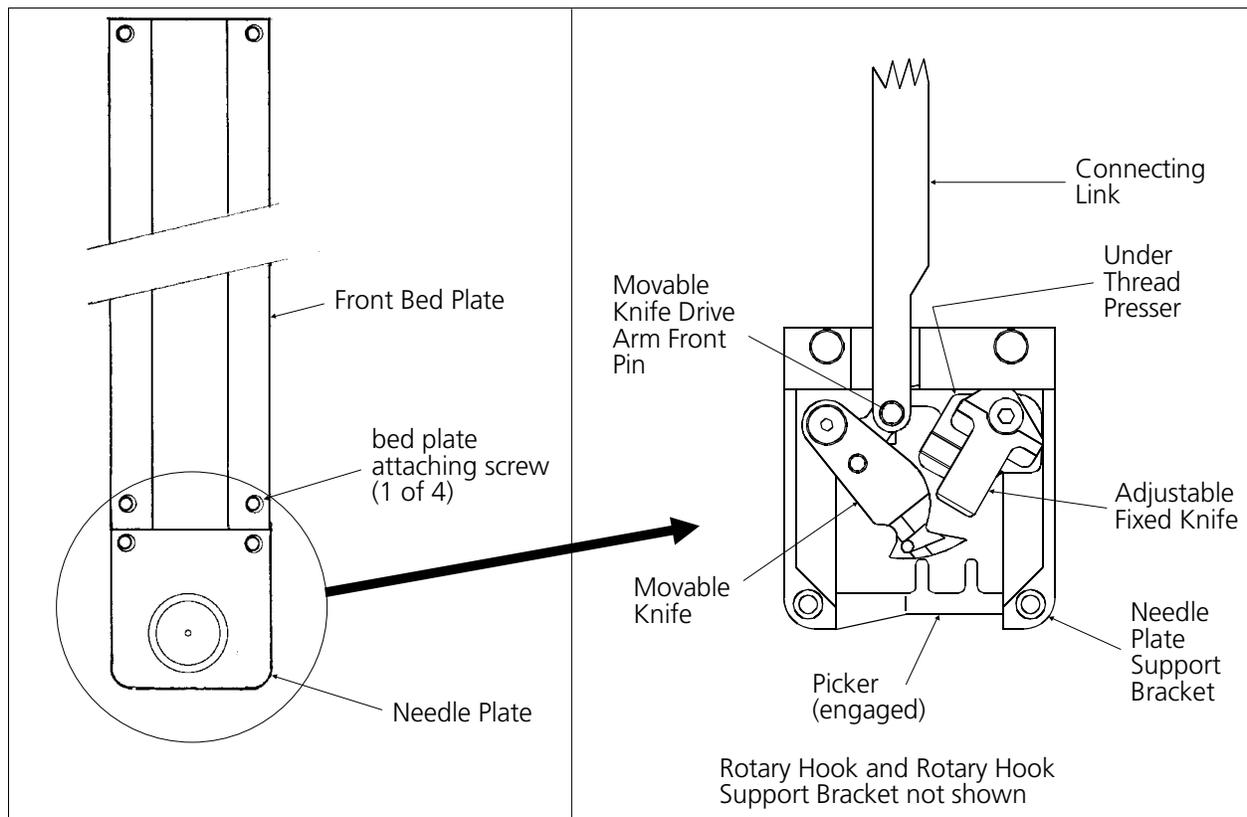


Figure 4 - 11 Trimmer Component ID

Adjustable Fixed Knife

Poor trimming quality and non trimming may be caused by the condition and adjustment of the adjustable fixed knife.

This situation may result if the adjustable fixed knife is worn or is not parallel to the trimming action of the movable knife. Check this condition of the adjustable fixed knife by inspecting the marks left on the surface of the movable knife that is under the adjustable fixed knife. If the marks are more severe in the area that aligns with one edge of the adjustable fixed knife, the adjustable fixed knife may need to be adjusted or replaced, or both. Another method for checking this condition is to perform the "ink wipeoff test" as described in the steps for adjusting the adjustable fixed knife later in this chapter.

Under Thread Presser

The under thread presser shown in Figure 4-12 holds the bobbin thread after a trim. This permits a loop of bobbin thread for the next stitch. While the under thread presser holds the bobbin thread there should only be enough pressure applied to hold the thread in place under the movable knife. If the under thread presser is damaged it can cause problems that look like tension troubles. For example, if the pressure of the under thread presser against the movable knife is too much, it may hold the bobbin thread and not allow a loop to be formed, or it may nick or fray the thread, again making it look like the bobbin tension is

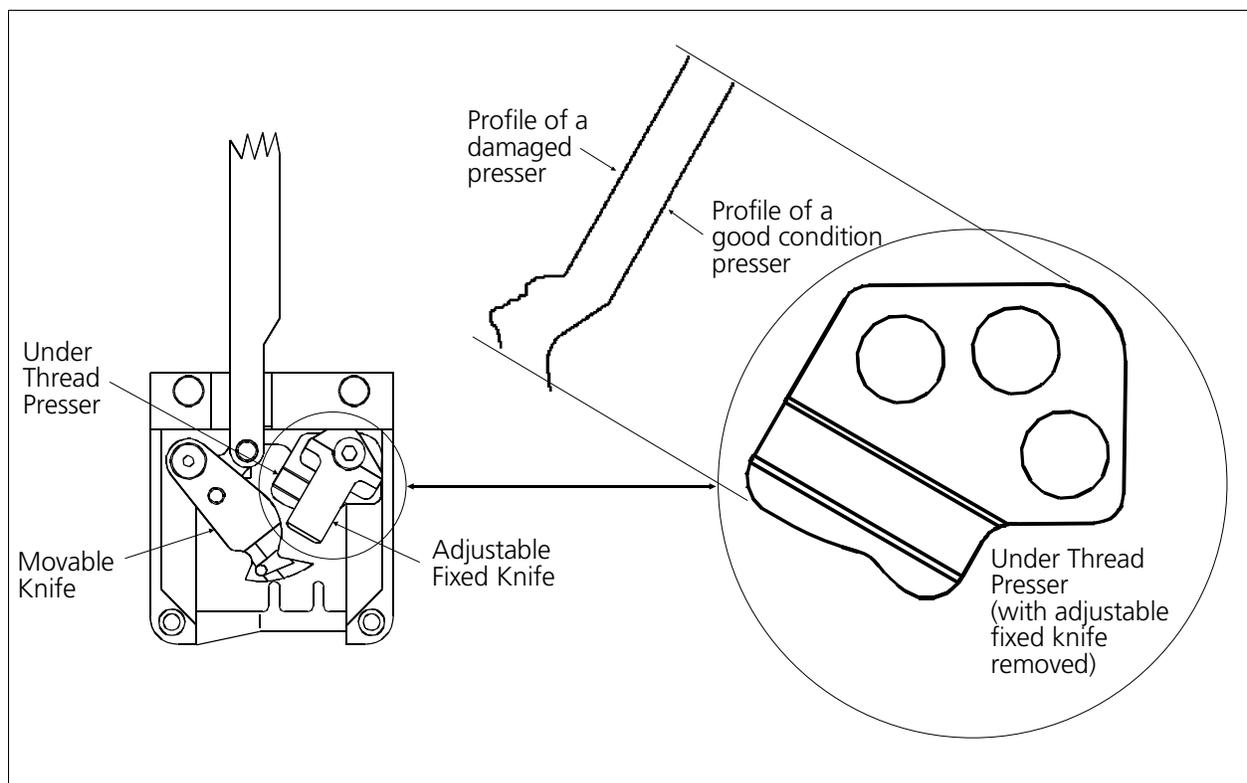


Figure 4 - 12 Under Thread Presser

incorrect. Another example, would be if the under thread presser is "crumpled" (see Figure 4-12), it does not allow the movable knife to pass under the adjustable fixed knife completely to cut the thread, causing a "no cut" condition. If the under thread presser is damaged it can cause intermittent long tails of the upper thread.

Checking the under thread presser is done in two parts. First by looking at the part itself to see if there has been any "crumpling" as shown in the bottom left section of Figure 4-12.

Crumpling is damage caused by the movable knife hitting the under thread presser. If you see visual evidence of any damage, replace the under thread presser as described earlier in this chapter.

The second part of checking under thread presser is to check if the bobbin thread is in fact being held in place.

1. While the machine is still turned off, remove the front bed cover and disconnect the connecting link from the movable knife drive arm by lifting it from the front pin (see Figure 4-7).
2. Pull the movable knife forward with a small hex wrench hooked behind it.
3. Leaving the bobbin case in the rotary hook, pull off some bobbin thread, and drape it over the movable knife as shown in Figure 4-13.

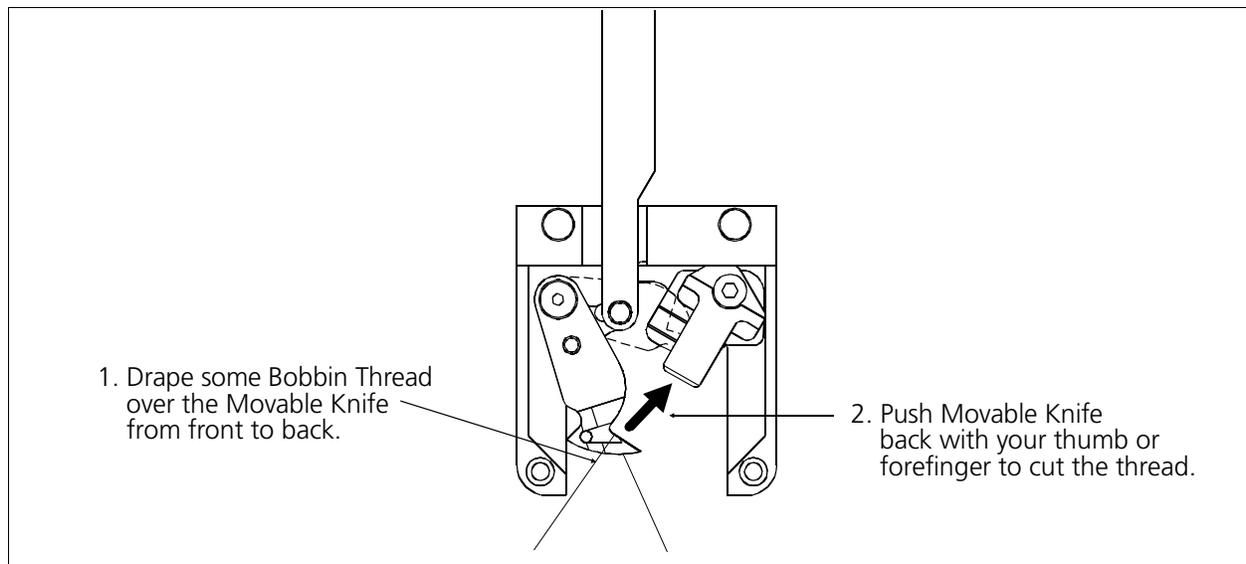


Figure 4 - 13 Checking The Cut

4. With the bobbin thread draped over the movable knife from back to front, gently hold the thread so there is some slack and then push the movable knife back until the thread is cut. This cut should be clean, and should not be frayed.

If the thread is frayed you may need to replace the adjustable fixed knife, adjust the adjustable fixed knife, replace the movable knife, or any combination of these items.

5. The "top" thread should be loose and fall away, because it has no support. The "bottom" thread should be held in place under the movable knife by the under thread presser.
6. If the under thread presser does not provide the required action, replace it and check using Steps 2 to 4 again.
7. After you are satisfied with the under thread presser action, re-attach the connecting link (see Figure 4-7).

Adjustable Fixed Knife Adjustment

After replacing the adjustable fixed knife per the instructions earlier in this chapter it will need to be properly adjusted. Refer to following steps in performing this adjustment.

Ink Wipeoff Test

1. With the machine turned off, disconnect the connecting link from the movable knife drive arm by lifting it from the front pin (see Figure 4-7).
2. Pull the movable knife forward with a small hex wrench hooked behind it.
3. With a black marking pen, mark the areas of the movable knife as shown in the left illustration of Figure 4-14.

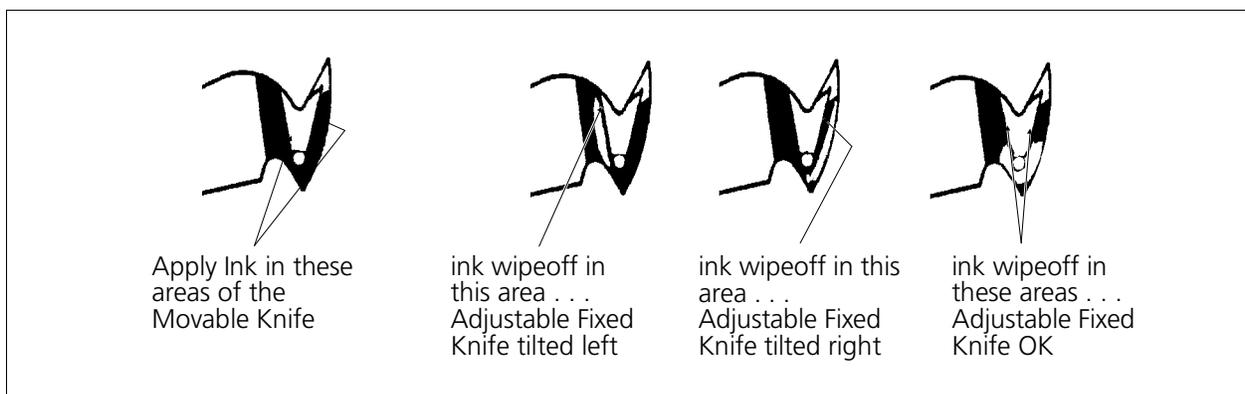


Figure 4 - 14 Ink Wipeoff Test

4. Push the movable knife back under the adjustable fixed knife to simulate the thread cutting action.
5. Again pull the knife forward and inspect where the marking pen ink has been wiped off. Refer to the remaining three illustrations in Figure 4-14 to determine if the adjustable fixed knife needs adjustment.

Knife Adjustment

After performing the ink wipeoff test and determining that adjustment to the adjustable fixed knife is required, follow these steps to perform the knife adjustment.

6. Refer to Figure 4-15 and locate the two small set screws in the bottom of the needle plate bracket directly under the under thread presser.

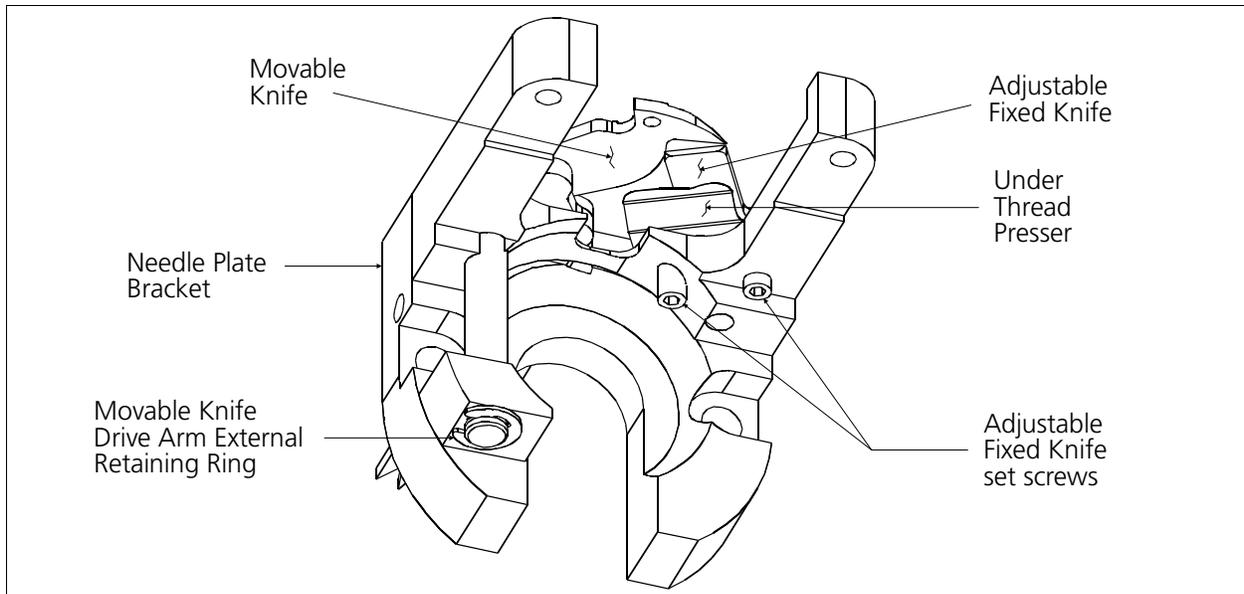


Figure 4 - 15 Underside View of Trimmer Parts

These two set screws together with the larger socket head cap screw that secures the adjustable fixed knife and under thread presser at the top of the needle plate bracket (see Figure 4-7) provide for the knife adjustment.

7. Refer to the 'Ink Wipeoff Test' and determine what direction the adjustable fixed knife is tilted.
- 8a. If the ink wipeoff test indicates the adjustable fixed knife is tilted left, slightly loosen the top socket head cap screw, then tighten the left under side set screw.
- 8b. If the ink wipeoff test indicates the adjustable fixed knife is tilted right, slightly loosen the top socket head cap screw, then tighten the right under side set screw.
9. After either of the adjustments in Step 8, perform the ink wipeoff test again to check the position of the adjustable fixed knife.
10. Repeat the previous steps until the ink wipeoff test shows equal ink removal on both sides of the movable knife and the force to move the movable knife is $1/2 \pm 1/4$ lb. ($200\text{g} \pm 100\text{g}$) of pull.

11. Check the tightness of the top socket head cap screw and recheck the adjustment by performing the ink wipeoff test once again.

Cut Threads

When you are satisfied with the ink wipeoff test, you may check the thread cutting ability by performing actual thread cuts at several locations across the cutting range of the knives. To do this refer to the following steps:

12. With the machine turned off, disconnect the connecting link from the movable knife drive arm by lifting it from the front pin (see Figure 4-7).
13. Pull the movable knife forward with a small hex wrench hooked behind it.
14. Obtain a piece of upper thread from the tensioner assembly and drape it over the movable knife (see Figure 4-13).
15. With the thread draped over the movable knife from back to front, gently hold the thread so there is some slack and then push the knife back until the thread is cut. This cut should be clean, and should not be frayed.
16. Repeat the previous step with the thread positioned at different locations across cutting surface.
17. If the thread is frayed at any location you may need to replace the adjustable fixed knife, movable knife, or both. You must readjust the adjustable fixed knife.

Movable Knife Adjustment

Each movable knife is connected to the camming mechanism via a series of levers, rods and pivots. During a trim operation the cam follower is engaged and this in turn activates the trimmer reciprocator arm which provides back and forth movement to the trimmer rod (refer to Figure 4-17). The trimmer rod is connected to the short and long trimmer linkages that transmit movement to the connecting link, causing the movable knife to "cut."

Movable Knife Home Position

To check the movable knives for possible need for home position adjustment, perform the following steps:

1. Remove the needle plates from all twelve embroidery heads (refer to Figure 4-11). Visually inspect the trimmer mechanisms. Replace any crumpled under thread pressers or damaged adjustable fixed knives. Lubricate the trimmer knife drive arm (refer to the EMT 10/12T Operation Manual).
2. Turn the machine power ON.
3. From the Control Panel click the Advanced button and select Trim in the Do Now section of the Advanced Features dialog box.
4. Visually check all movable knives. The knives should be located under the adjustable fixed knife, positioned as shown in Figure 4-16. If the sloped rear tip of the movable knife is not showing in front of the leading edge of the adjustable fixed knife, the "home" position needs to be adjusted. DO NOT Adjust if the knife position looks like Figure 4-16.

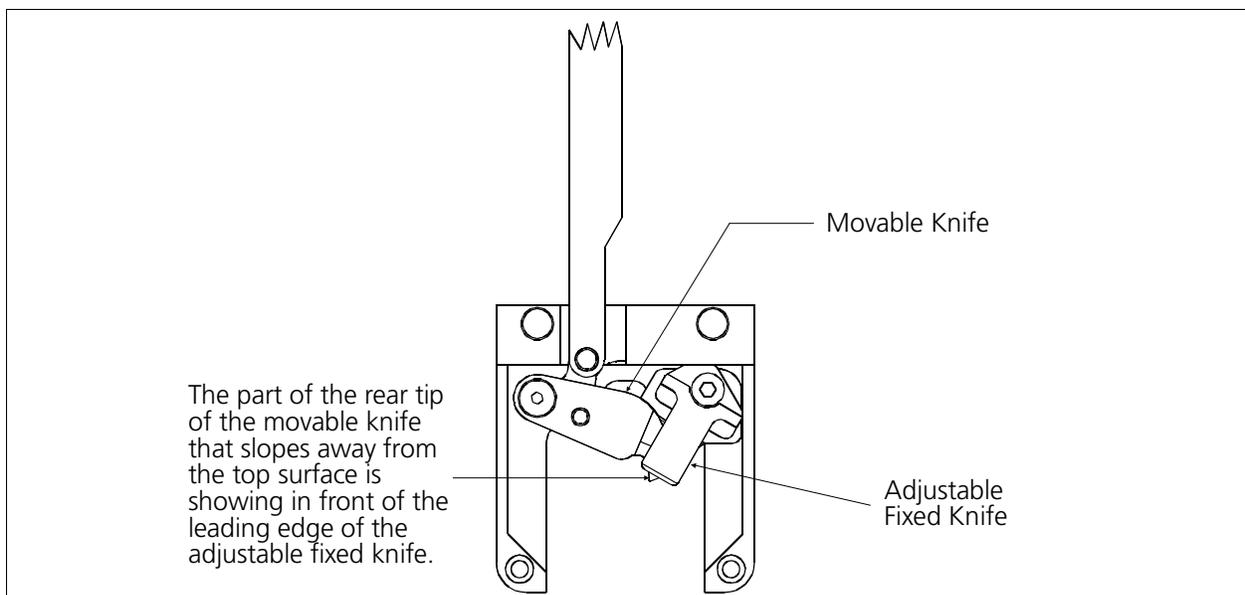


Figure 4 - 16 Movable Knife Home Position

5. If all 12 knives are in the same relative position, but not in the home position, adjust all knife positions simultaneously as described in Steps 6 and 7.
6. Refer to Figure 4-17 and perform one of the following, depending on the rear tip of the movable knife compared against the position shown in Figure 4-16:
 - a) Rotate adjusting nut A1 counter-clockwise and adjusting nut A2 clockwise to move the rear tip of the movable knife away from the fixed knife.
 - b) Rotate adjusting nut A1 clockwise and adjusting nut A2 counter-clockwise to move the rear tip of the movable knife toward the fixed knife.

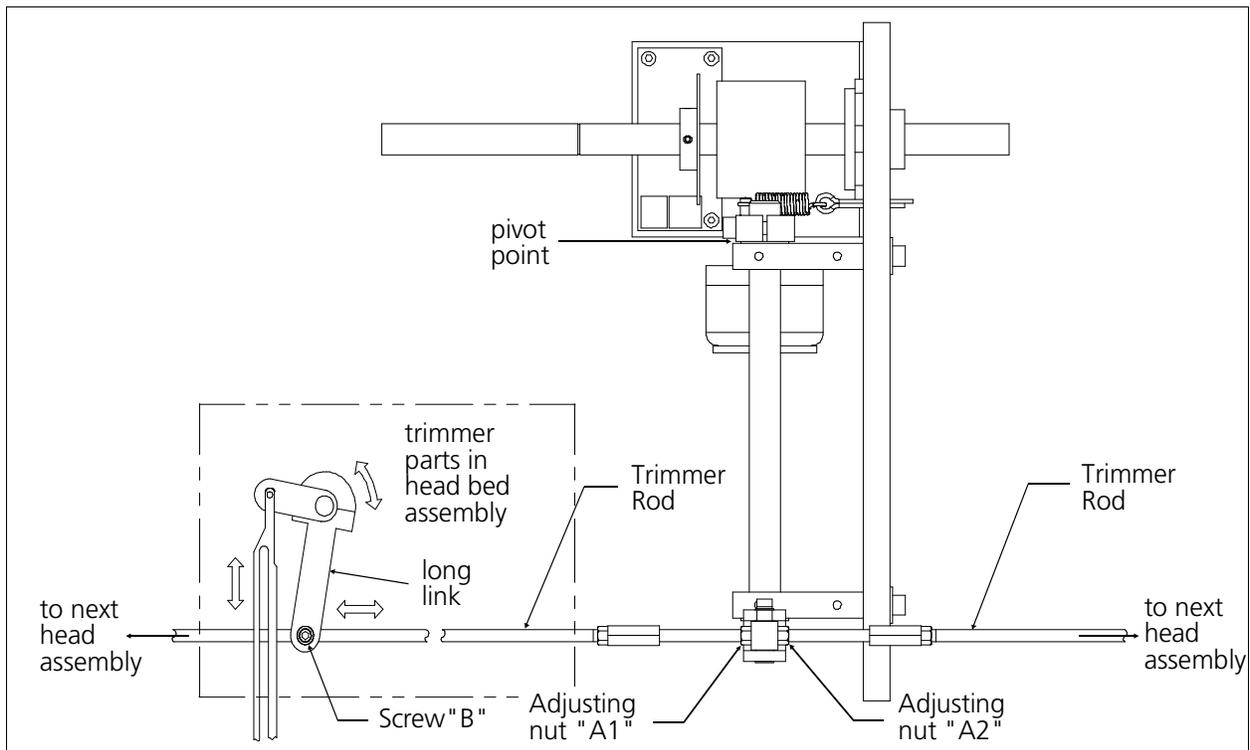


Figure 4 - 17

7. Move the trimmer rod until all the knives are at the home position as shown in Figure 4-16, then tighten the adjusting nuts.
8. If after the majority of knives are at the home position refer to the following steps:



WARNING! Turn the machine power OFF.

9. Disconnect the front portion of the sash frame and lower the table (refer to the EMT 10/12T Operation Manual).
10. Remove the Y/Z motor cover between head numbers 5 and 6. to gain access to the trimmer cam.

11. Turn the power ON. In the Control Panel window, click the Advanced button, then click the Service button in the resultant Advanced Features dialog box.

Trimmer Cam Position

12. In the Service dialog box click the Cutter Timing button. This takes the Z rotation to the position for setting the trimmer cam. Record the degrees number indicated in the Z Position section of the Service dialog at this time. This number is referred to in Step 20.

13. Inspect the position of the pin hole in the trimmer cam as shown in Figure 4-18.

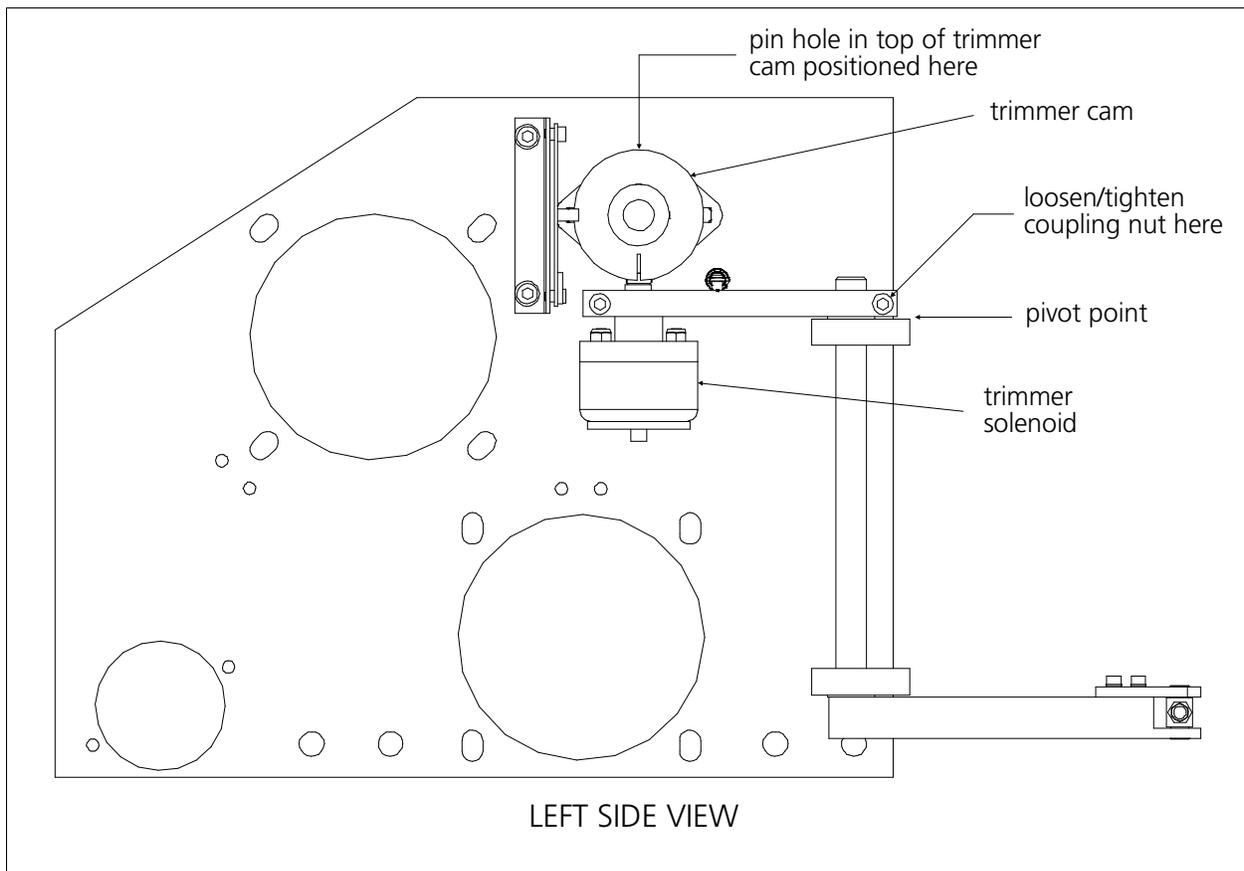


Figure 4 - 18

14. If the pin hole in the cam is vertical as indicated in Figure 4-18, you have correct trimmer cam positioning and can skip to Step 25.
15. If the pin hole in the cam is NOT vertical, you must adjust the trimmer cam rotational position.
16. In the Service dialog, click the Release check box to enable manual rotation of the Z-axis shaft.

17. Rotate the Z-axis shaft by hand at the trimmer cam pulley until the pin hole in the trimmer cam is vertical as indicated in Figure 4-18.
18. Loosen the trimmer cam socket head cap screws.
19. Refer to the Z Position degrees number currently indicated in the Service dialog box.
20. While holding the trimmer cam in position with the pin hole vertical, rotate the Z-axis shaft by hand at the Z motor pulley until the Z Position indication is the same as the degrees number you recorded in Step 12.
21. While maintaining the degrees at that number, click the Release check box to lock the Z shaft movement.
22. Be certain the trimmer cam pin hole is still vertical, then tighten the socket head cap screws in the trimmer cam.
23. In the Service dialog box click the Cutter Timing button one or two times.
24. Check the vertical position of the trimmer cam pin hole for accuracy.
25. If the trimmer cam pin hole is not vertical, repeat Steps 16 through 23 as needed until the trimmer cam pin hole is vertical in Step 24.
26. Select Trim in the Do Now section of the Advanced Features dialog box.
27. Visually check all movable knives. The knives should be located under the adjustable fixed knife, positioned as shown in Figure 4-16. If not repeat Steps 6 and 7 before continuing.

Select Position

28. In the Service dialog, click the Release check box to enable manual rotation of the Z-axis shaft.
29. Manually engage the cam follower into the cam groove and hold it in place.
30. Rotate the Z-axis shaft by hand to a Z Position indication of 312 degrees. While maintaining the 312 degree position, click the Release check box to remove the check and lock the Z shaft movement.
31. Install the needle plate back onto head #12.
32. Using Select Position Fixture (Melco part number 995372-01), check the movable knife for the select position (refer to Figure 4-19).
33. If the movable knife select position is correct, remove the select position fixture and proceed to the next head.

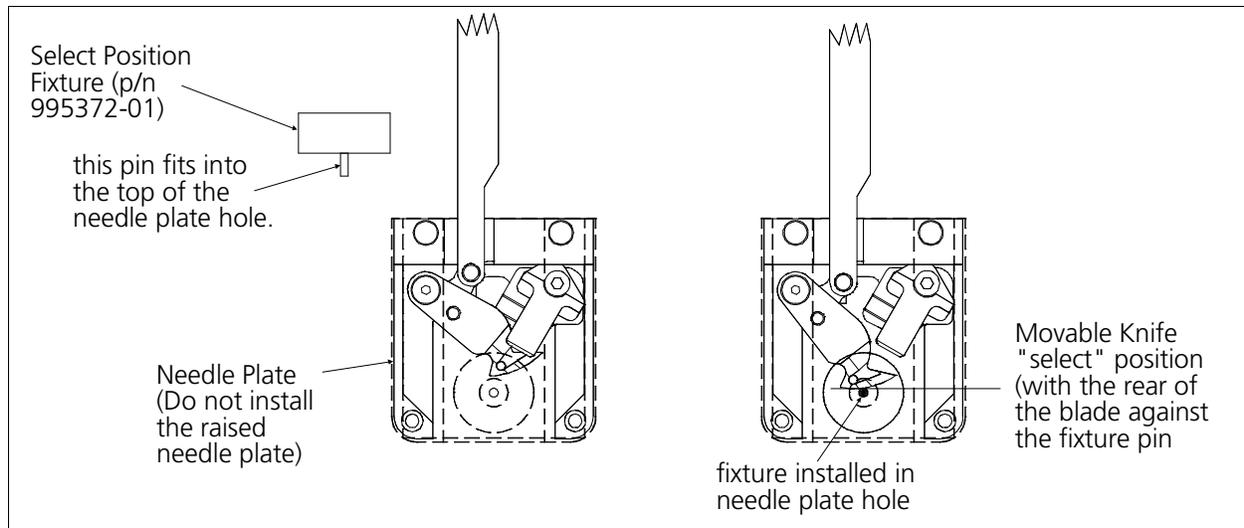


Figure 4 - 19

34. If the select position is not correct, refer to Figure 4-17 and loosen the screw at location 'B' at the end of the long link of the trimmer parts in head bed assembly.
35. Move the long link back and forth on the trimmer rod until the correct select position is achieved. Tighten screw "B" then remove the select position fixture and proceed to the next head.
36. Adjust all twelve movable knives to the same relative select position.
37. Remove the select position fixture from the last head.
38. Click the Trim button several times in the Do Now section of the Advanced Features dialog box.
39. Inspect all 12 knives to insure they are at the home position. The rear point of the movable knife should just protrude from under the adjustable fixed knife (refer to Figure 4-16).
40. Move the adjustable fixed knife of any home position that may need adjustment.

NOTE: If moving the adjustable fixed knife does not correct the adjustment, you may need to yield equally on both the select and home position adjustments for those knives that do not position correctly at both locations.
41. Install all the needle plates.
42. Replace the cam belt cover and cam box cover.
43. If embroidering on flats, raise the table and reconnect the front sash frame.

Picker Finger Center Position

If the cap frame option is not part of your system, you may refer to the following procedure to center the picker fingers, should it become necessary.

If your EMT 10/12T has the cap frame option, you must give centering priority to the cap frame driver. When the cap frame driver is centered properly, the picker fingers will automatically come into proper center alignment. This is because the dovetail clamp for the cap frame driver is fixed to the same bracket as the picker fingers.

1. Loosen the two picker/dovetail bracket screws on the cylinder arm (see Figure 4-20).
- 2a. Move the bracket left or right until the picker fingers are centered on the needle shaft.
- OR
- 2b. With both trimmers and cap frame options on the machine, move the bracket to center the installed cap frame driver on the embroidery head arm.
3. Retighten the screws.

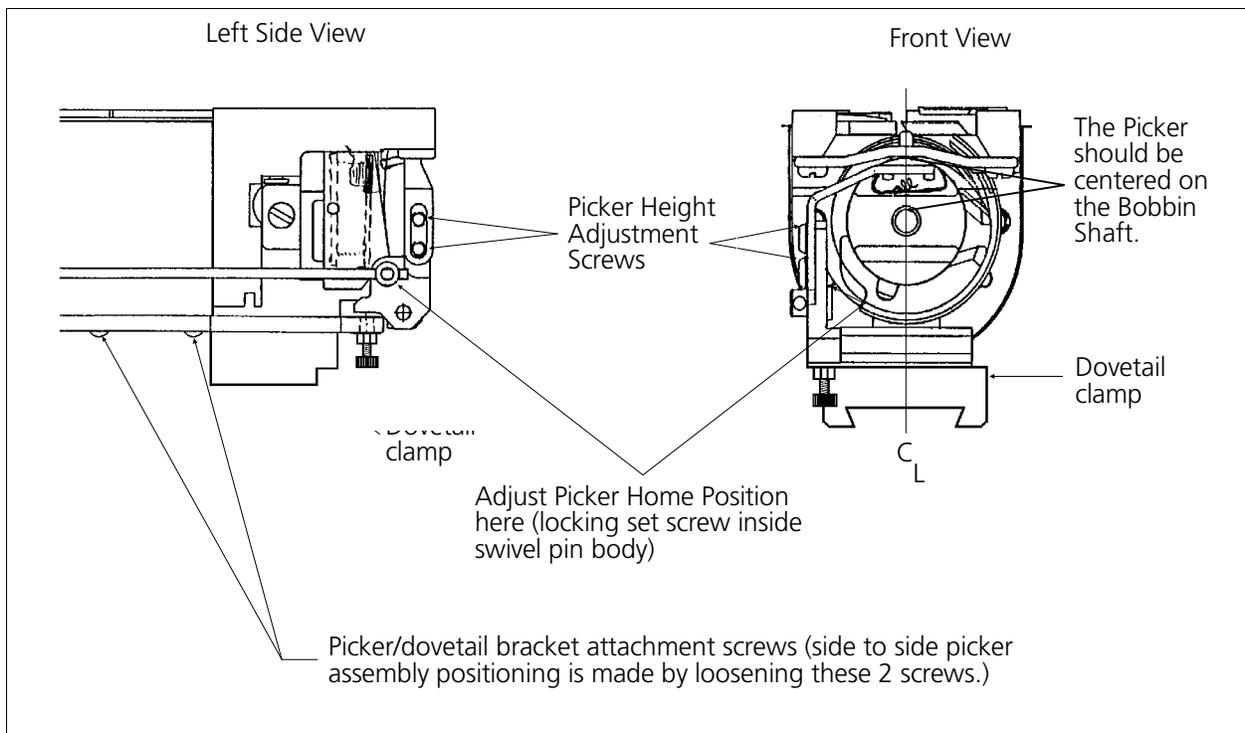


Figure 4 - 20

Picker Home Position

NOTE: This procedure requires the use of a special service tool: the Melco picker set fixture (p/n 995339-01).

1. Install the picker set fixture (as shown in Figure 4-21) to set the picker home position.
2. Loosen the set screw inside the swivel pin body shown in Figure 4-20.
3. Move the picker until it rests in the fixture at the picker home position as shown in Figure 4-21.
4. Retighten the set screw.

Picker Height/Depth Position

NOTE: This procedure requires the use of a special service tool: the Melco picker set fixture (p/n 995339-01).

1. To adjust the picker height/depth position, manually push the picker into place as shown in Figure 4-21.
2. Loosen the 2 screws on the left side of the picker as shown in Figure 4-20.
3. Position the height of the picker against the fixture location shown in Figure 4-21.

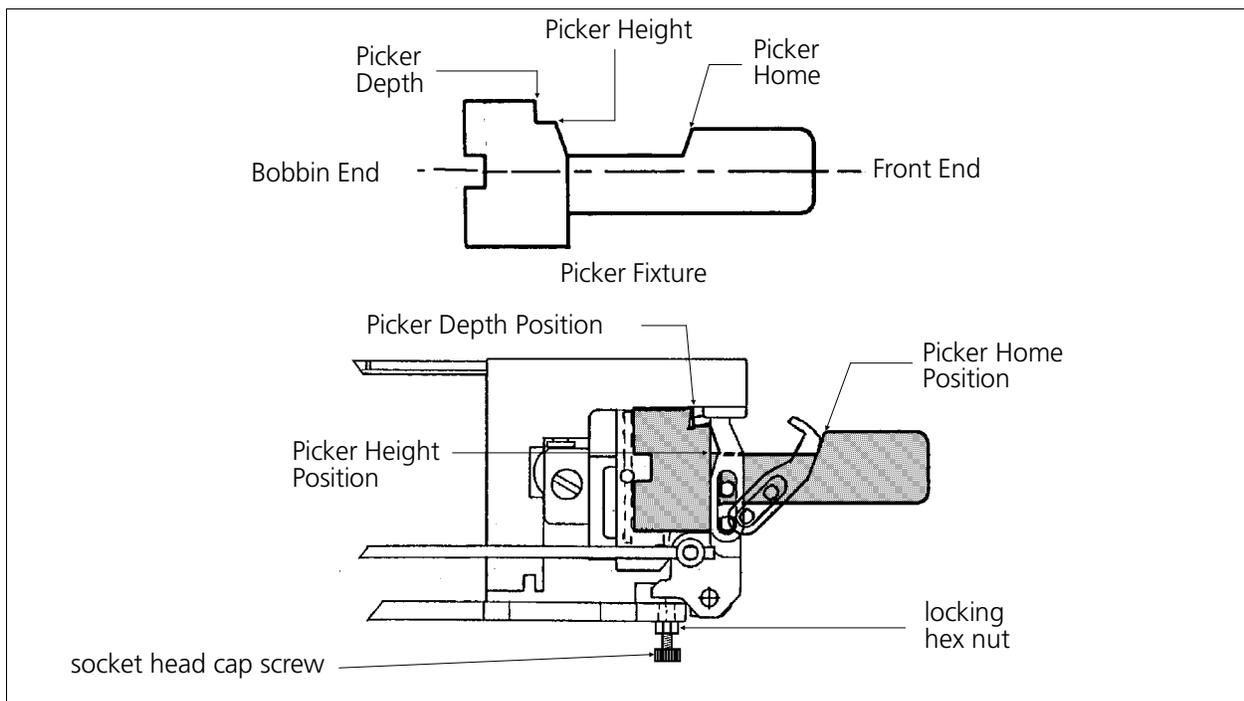


Figure 2 - 21

4. Retighten the 2 screws.
5. Loosen the hex nut which is locking the socket head cap screw under the picker base as shown in Figure 4-21.
6. While still holding the picker in the height/depth position, rotate the socket head cap screw until the depth position is attained as shown in Figure 4-21.
7. Retighten the hex nut, locking the socket head cap screw to hold the depth position setting.

Grabber Setup And Adjustments

1. The grabber blade must pass through the center of the wiper (two pieces of Velcro mounted in a metal bracket). Adjustment is accomplished by loosening the screw on the front of the grabber mount and positioning the blade to pass through the center of the wiper.
2. When the grabber blade is fully retracted, the hook portion of the tip should remain about .060 to .090 inches (1.5 to 2.5 mm) from the grabber blade guide as shown in Figure 4-22.
3. Confirm that all 12 grabber blades are at the recommended distance from the guide.

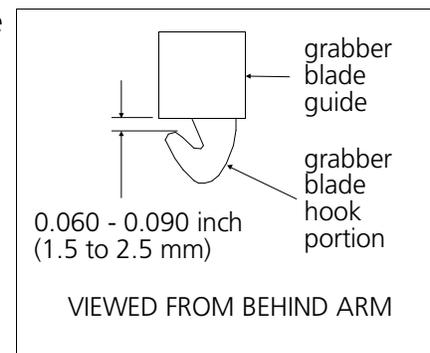


Figure 4 - 22

4. If any blades are not at the recommended distance, loosen the set screw and push the grabber blade back and forth until the correct distance has been achieved (refer to Figure 4-23 for location of the set screw).

5. Tighten the set screw.

6. Go to the Thread Grabber menu and select Full Extended. If any blades are not centered in the wiper, loosen the set screw and push the grabber blade side to side until the correct centering alignment has been achieved (refer to Figure 4-23 for location of the set screw). Use care not to reposition the grabber blade hook gap that was set in Step 4.

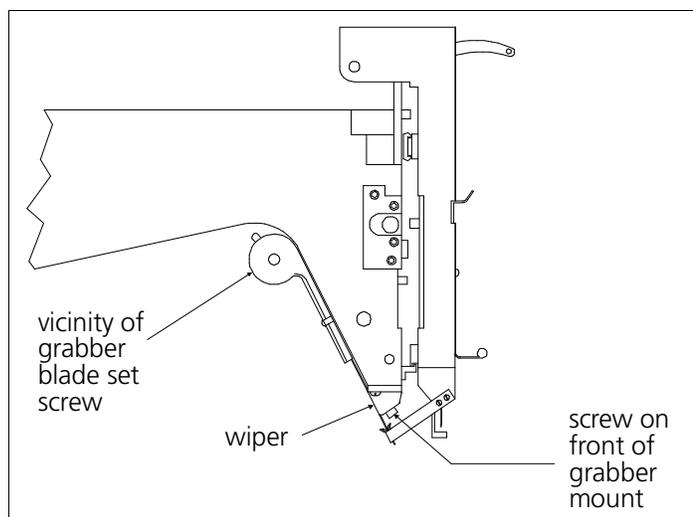


Figure 4 - 23 Grabber Setup

7. Go to the Thread Grabber menu and select Start Test.
8. If the adjustment seems correct, select Stop Test.

Under Thread Control (UTC) Adjustments

It is very important that you follow these instructions any time the rotary hook retaining finger or UTC is loosened or moved. Please follow the instructions in the order they occur.

NOTE: The procedures in this section require the following special tools:
 1) a small straight blade screw driver with a thin blade, and
 2) the Melco UTC combination gauge part number 009027-01.

Rotary Hook Retaining Finger Positioning

1. Attach the UTC assembly as described earlier in this procedure.
2. Turn the machine ON and go to the Head Timing menu.
3. Position the head to the "Needle Depth" location in the Head Timing menu.
4. Slightly loosen the 2 UTC assembly mounting screws from under the needle plate support bracket.
5. Place the finger of the UTC combination gauge (see Figure 4-25 for diagram of the gauge) between the retaining finger tab and the rotary hook inner basket notch (see Figure 4-24).

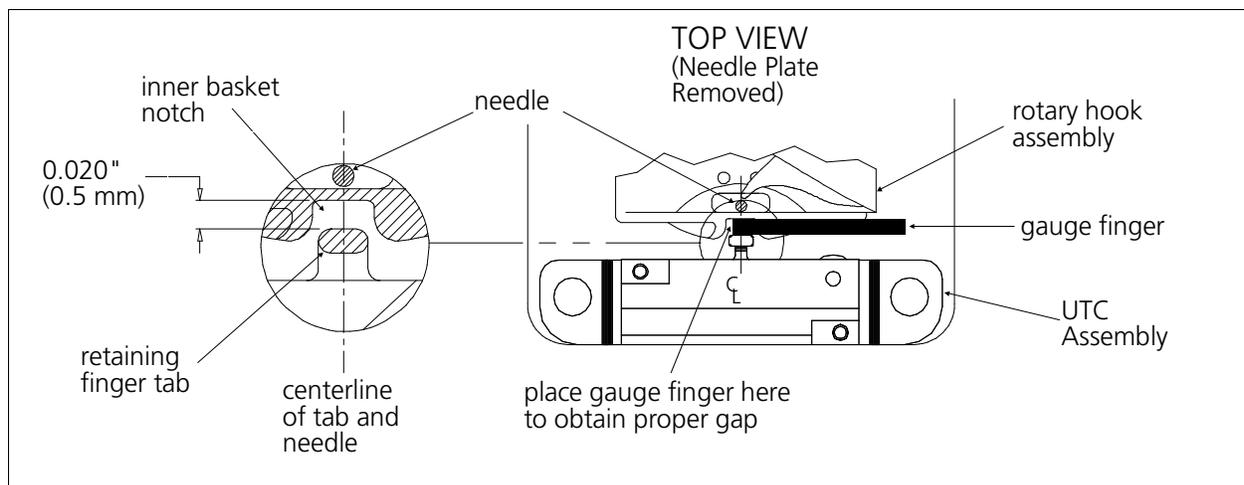


Figure 4 - 24

6. Position the UTC assembly until the gap between the retaining finger tab and the rotary hook inner basket notch is set to the thickness of the gauge finger. The gap is 0.020 inches as shown in Figure 4-24).

7. Additionally, align the center of the retaining finger tab to the center of the needle as indicated in Figure 4-24.
8. Tighten the UTC assembly mounting screws.
9. Place the UTC Combination Gauge on top of the needle plate support bracket as shown in Figure 4-25 and check that the UTC detection arm does not touch the bottom surface of the gauge which represents the bottom of the needle plate when it is installed.

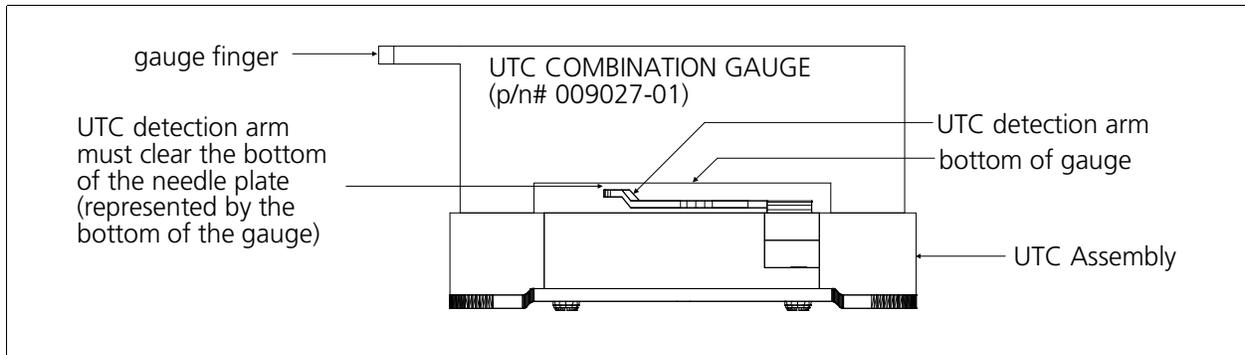


Figure 4 - 25

10. If the arm touches the gauge, carefully reshape the arm slightly until it clears.
11. Refer to Figure 4-26 and lift the connecting link off of the movable knife assembly.

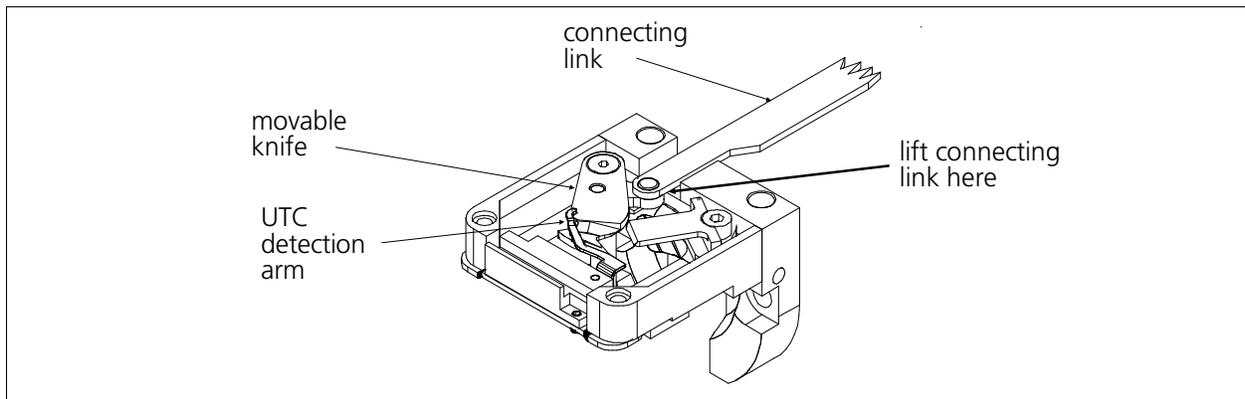


Figure 4 - 26

12. Check that the movable knife clears the UTC detection arm by physically moving the knife under the UTC detection arm and back.
13. If the knife touches the arm, reshape the arm slightly until it clears then repeat Steps 9 through 12.
14. Re-attach the connecting link to the pin on the movable knife assembly.



Caution! When installing the covers, be sure not to pinch the UTC Assembly wires!

15. Re-attach the right side rotary hook cover, the needle plate, and the front bed cover.

Sew Test

We now must actually embroider onto properly hooped material to prove the adjustment is proper. A special design named UTCTEST comes on a disk with your machine. Load the design into your EDS software or optional disk drive and send it to the sewing peripheral.

The primary purpose of the UTC is to signal when the bobbin thread runs out or breaks. The UTC has a mechanical arm that is bumped by the bobbin thread during every stitch. When the sensor is not bumped for the number of consecutive stitches that are set as "Bobbin Count," the machine stops, backs up, and beeps.

If the UTC is too close to the needle, it may not react reliably in detecting the absence of bobbin thread. If the UTC is too far away from the needle, it may falsely indicate that the machine is out of bobbin thread when it indeed has bobbin thread.

Additionally, if the bobbin tension is set too loose, it may also falsely indicate that the machine is out of bobbin thread when it has bobbin thread.

Preliminary Checks

The following must be checked before performing the embroidering:

1. Check that the bobbin tension is within the proper adjustment specifications as described in the operation manual.
2. Verify that the BOB. COUNT in the BOBBIN MENU is set to 5.

Perform The Test

During the embroidering:

- A) Check that the UTC detects an absence of bobbin thread when you run out of bobbin thread and displays the CHECK BOBBIN message.
 1. Test for this by wrapping a foot or so of thread around an empty bobbin.
 2. Embroider the test design until the thread is completely used.
 3. Repeat Steps 1 and 2 until the bobbin runs out at least once in both directions of diagonal stitching in the test design.

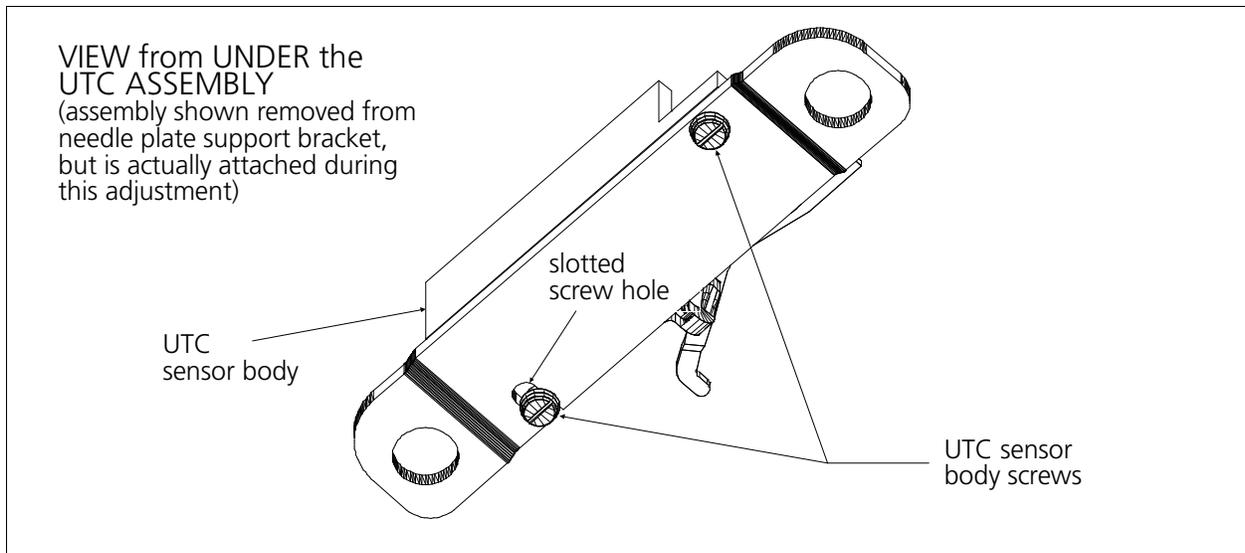


Figure 4 - 27

4. If the sensor does not detect when the bobbin runs out of thread, slightly loosen the UTC sensor body at the screws shown in Figure 4-27, and at the slotted screw hole (left side) move the sensor a very small amount away from the needle. Re-tighten the screws.

B) Check that the UTC does not falsely signal the CHECK BOBBIN message when thread is still on the bobbin.

1. Test for this by simply sewing with the test design. For reliable results, embroider the design for at least 5 minutes, or about 4000 stitches at 750 stitches per minute.
2. If you get false CHECK BOBBIN messages, slightly loosen the UTC sensor body at the screws shown in Figure 4-27, and at the slotted screw hole (left side) move the sensor a very small amount closer to the needle. Re-tighten the screws.

Addendum A - Belt Tensioning

General

This Addendum describes general methods used for tensioning various belts on Melco embroidery equipment using the Breco belt tensioner.

These procedures are guidelines for performing proper tensions and must be used by personnel practicing good maintenance and repair techniques. Refer to the Maintenance Philosophy topics in Section 1 of this manual for discussion of good maintenance and repair techniques.

All drive belts require special procedures and tools for setting the proper tensions. If the tension settings are attempted without using the proper procedures and tools (and without proper training in some cases), machine components may be damaged and potential warranty issues voided.

Using The Breco Belt Tensioner



CAUTION! Damage to the machine may result if belt tensions are improperly adjusted.

The Breco Belt Tensioner is used to check the tensions of motor belts, axis drive belts, the color change motor belt, and the grabber motor and drive belts. In each belt tensioning procedure of this manual where the Breco Belt Tensioner is used, refer to following information. This is a general method for using the tool. Refer to the applicable belt tensioning procedure for any specific information for properly setting the tension for that belt.

NOTE: The Breco Belt Tensioner detects belt frequency when the belt is caused to vibrate by plucking it with your finger. The tensioner sensor mechanism detects frequency of steel/iron only, therefore if the belt does not contain any steel or iron fibers, a steel/iron device such as a paper clip must be attached to the belt in the area where the tensioner is to be positioned.

1. Refer to the procedure in this manual for the belt you are tensioning to identify the location for positioning the applicable metallic detection material such as a paper clip. The general position for measuring a belt is at the mid-point on the belt between the two pulley center lines.
2. Turn ON the Breco Belt Tensioner and press the red button. The display will show FFFF then change to a number. This number represents battery condition. The battery should be replaced if the number falls below 6800.
3. Press the red button again and the display shows all zeros. The unit is now ready for testing.

4. Position the tensioner sensor above and perpendicular to the portion of the belt where the paper clip (if applicable) is attached. Hold the sensor as close as possible to the belt without touching (about 2 to 5 mm).
5. While holding the tensioner in position, strike the belt lightly to cause it to vibrate. The tensioner will beep and show a reading on the display.
6. Observe the reading on the tensioner display and refer to the applicable belt procedure in this manual to adjust the belt tension until the reading on the display matches the specified value for that belt.

Note 1 Always measure at least three (3) times to minimize errors.

Note 2 Move the drive a few times prior to measurement to allow the belt to move to its normal working position.

7. Remove any paper clip (or other steel/iron material) that was attached to the belt to make the measurement.

Various Technical Specifications

The following is a list of various tension specifications for the EMT 10/12T. The numbers opposite each belt description represent the number read on the Breco Belt Tensioner when used as described on pages 2-1 and 2-2 of this manual.

Both X Drive Belts80 ± 1
First Y Drive Belt (closest to User Station)	65 ± 1
Second Y Drive Belt	62 ± 1
Third and Fourth Y Drive Belts	59 ± 1
X Motor Belt	140 ± 5
Y Motor Belt	140 ± 5
Z Motor Belt	100 ± 5
Color Change Motor Belt	170 ± 5
Grabber Motor Belt	140 ± 5

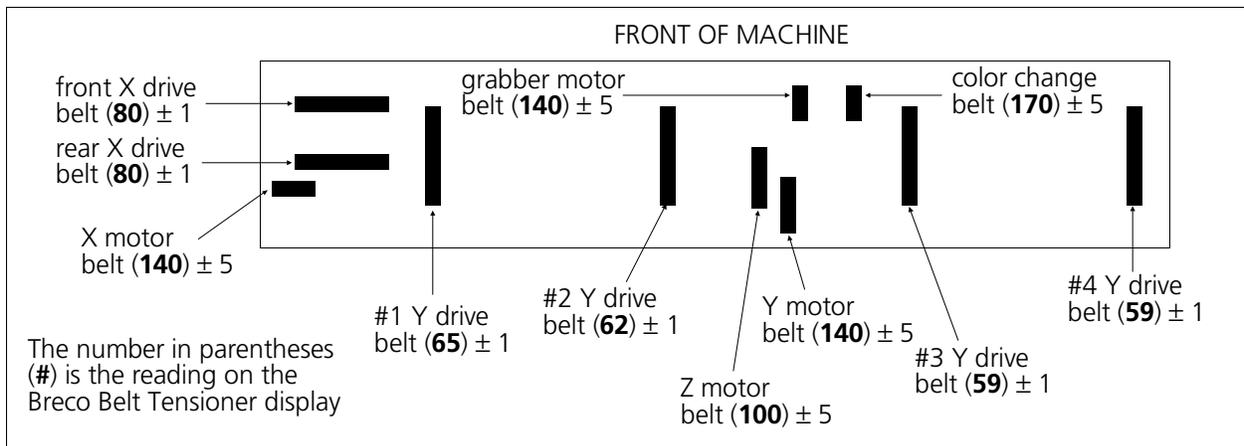
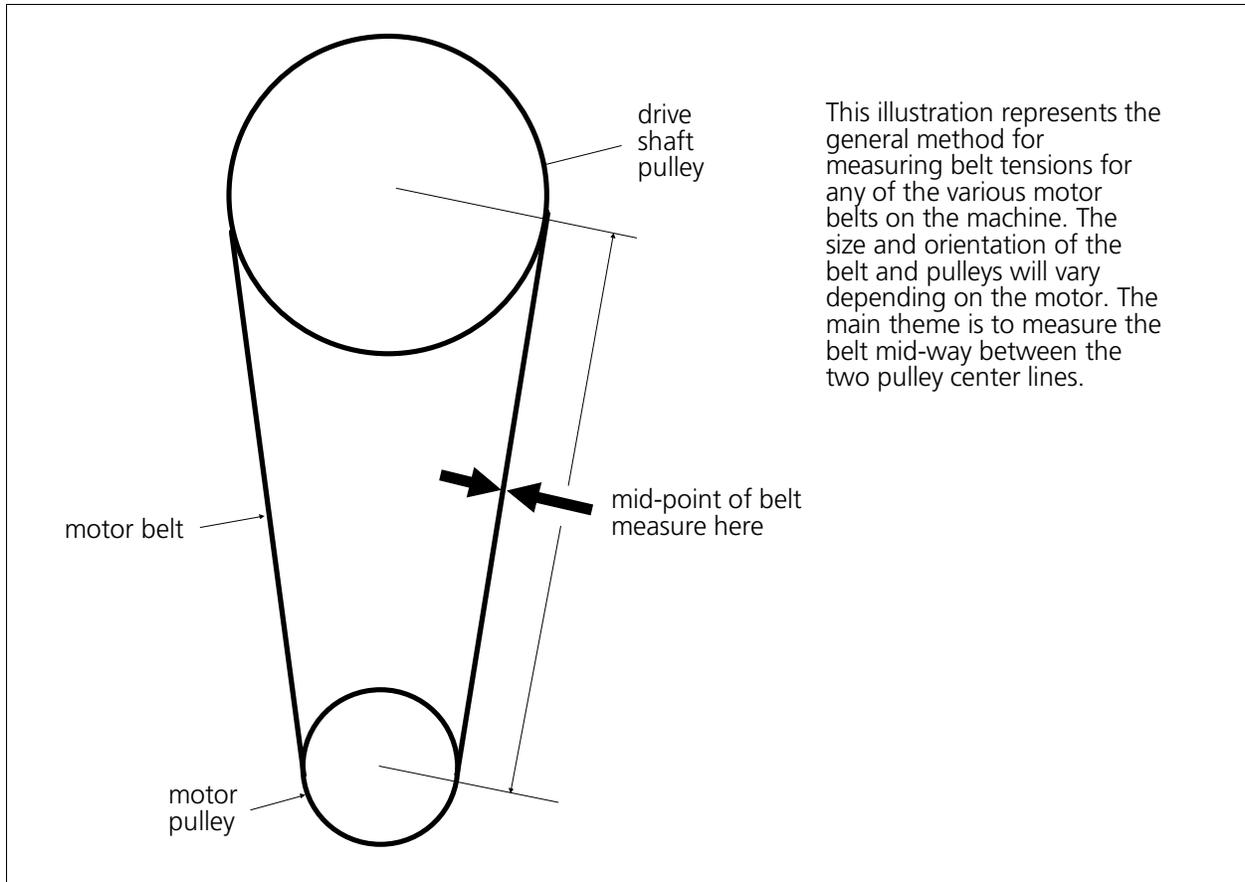


Figure 1 - 1

**Figure 1 - 2**

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