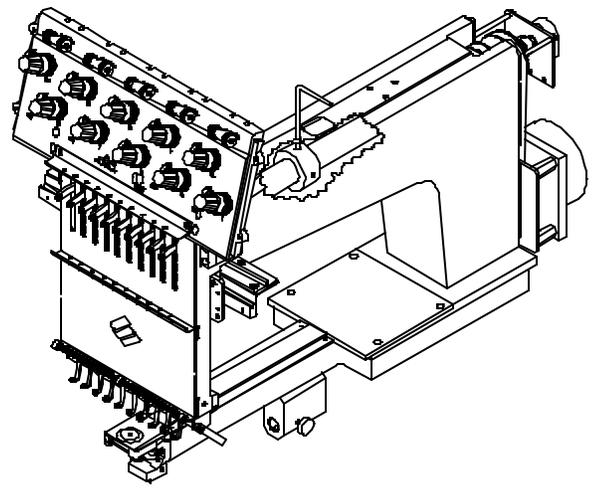


Technical Manual for the EMC 10 embroidery peripheral



- Ten Needle
- Automatic Color Change
- Under Thread Control

European Compliance Version

Part Number 110304-01, Revision A

Melco 
Embroidery Systems

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1. Introduction

Scope Of Manual

The EMC 10 Embroidery Peripheral Technical Manual is designed to provide the user with information necessary to perform repairs beyond routine operator maintenance.

The Melco EMC 10 Embroidery Peripheral is one of several embroidery peripherals in Melco's EDS II and EDS III family of products. The EMC 10 is a single head embroidery machine, which is assembled with the Melco ten-needle, cylinder arm embroidery head. It is designed to allow for flat goods and cap frame embroidery. It is equipped with an Under Thread Control (UTC) device which is used to detect the presence of bobbin thread. An optional Thread Trimmer system is also available.

This technical manual is presented in three basic sections: 1) an overview of general information, such as, the proper configuration of the peripheral, in this introductory section, 2) service adjustments, and 3) mechanical disassembly and replacement of the major components of the embroidery peripheral.

Warranty Registration

Please complete the Warranty Registration Form upon installation of the system; and return it to Melco to validate and register the machine warranty. If no Warranty Registration is on file at Melco when warranty service is requested, it will be assumed that your warranty began on the 7th day after the ship date from Melco.

Standard Conventions Used In Manual

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

When referring to the Embroidery Peripheral or peripherals, the initials "EP" or "EPs" may occasionally be used. 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. Specifically, the *Pantograph* consists of the *Y Beam* (the part that moves forward and backward) and the *X Carriage* (the part within the Y Beam that moves left and right, and to which the hoops or cap frame drivers are attached).

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 indicate a key on the computer keyboard, it is referred to as simply the key in question, for example: Press the Enter key to initiate the application.

- Typing with the computer keyboard is referred to in **BOLD** letters, for example: Type: **run** and press Enter to start.
- To indicate that two keys must be pressed simultaneously the following conventions are used: with the computer keyboard, the first key to be pressed and held down is simply referred to, then the second key which needs to be pressed while the first key is held down is referred to after a comma, for example: Press Shift,8 to type an asterisk (*).

Explanation Of Symbols



Caution!



Indicates a machine component will move. Keep clear!



Shock hazard. No user replaceable parts behind this label. Do not open!



Pinch point, Keep clear!



Pinch point, Keep clear!



Pinch point, Keep clear!

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 appendix section of the EMC 10 Operation manual. Refer to that appendix for information on terms that may be unfamiliar to you.

Functional Arrangement

The EMC 10 is functionally arranged into four sections (five sections with Trimmer Option): the Controller, the Keyboard, the Embroidery Head (with optional trimmer), and the Carriage section. Figure 1-1 shows these and other functional parts of the embroidery peripheral.

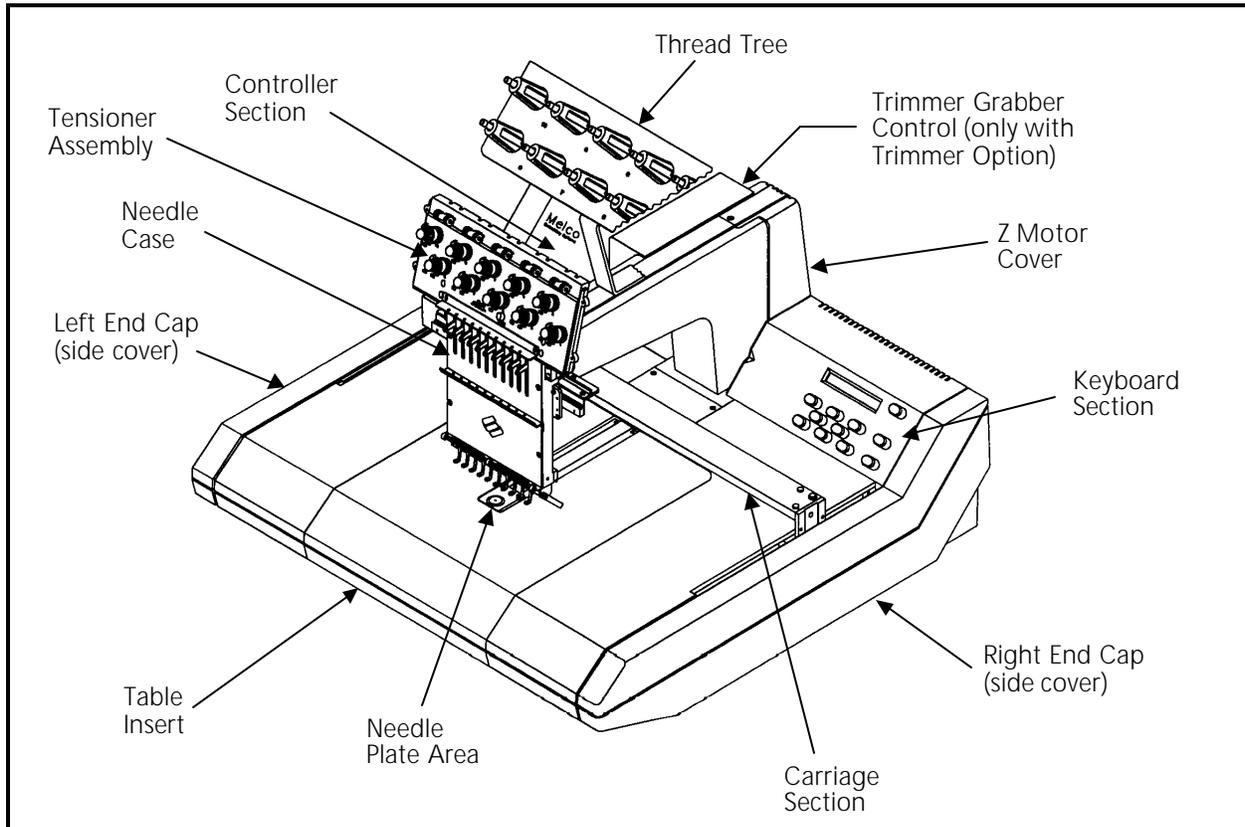


Figure 1 - 1

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. Therefore, 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 damage to machine components.

Static Electricity And Grounding Strap Use

The embroidery peripheral electronic circuits are quite sensitive to static electricity. Melco recommends that personnel use anti-static techniques when performing maintenance on the machine.



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

Warranty Considerations

Some areas of maintenance require factory trained personnel to assure proper service. If unauthorized personnel attempt to service these areas, the FACTORY WARRANTY MAY BE VOIDED.

Therefore, it is recommended that Melco factory trained personnel be consulted whenever the "FACTORY SERVICE ADVISED" statement is noted with a procedure.

Although areas marked specifically for factory service are subject to voiding the warranty if performed improperly, any service that is improperly performed may cause the warranty to be voided.

Configuring the EMC 10

Occasionally during the operation of the EMC 10, certain situations may arise when the peripheral software simply "locks up."

You may often recover from this type of situation by performing what is called "Configuring" (or Re-configuring) the embroidery peripheral. (When this type of situation happens with a computer, you are usually asked to perform a "soft reboot" [Ctrl], [Alt], [Del].)

You must also configure the peripheral any time you install a new CPU (Central Processor Unit) printed circuit board.

Configuration is initially set at the factory. However, if for any reason the configuration is not set properly, or if you have replaced the CPU board, you should know how to set the configuration.

NOTICE: Re-configuring your EMC 10 will clear the power fail rescue function for the current situation.

There are three items that must be set in each EMC 10 Embroidery Peripheral before it is used in the Melco system for the first time.

First you must set the Peripheral Program. The CPU PCB used on the EMC 10 Embroidery Peripheral may also be used in other embroidery peripherals produced at Melco. Therefore, you must tell the CPU board what peripheral it is being used in.

If the CPU PCB is ever replaced, you must reconfigure the peripheral before using it again.



CAUTION! If the EMC 10 is not configured with the correct Peripheral Program, it will not run properly, and may become damaged.

The second configuration item is the network address (or Unit Number). The Unit Number must be set and be different for each peripheral attached to an EDS II or EDS III computer or network. There may be up to 64 (16 if using EDS II software) total embroidery peripherals attached to any one computer, and each must have its own Unit Number. The number is selected from the peripheral Keyboard and is between 1 and 64 (16 if using EDS II software).

The third and last configuration item is to choose if you want the Display Language to appear in English or Spanish.

The "configuration mode" in the EMC 10 is accessible by pressing a certain keystroke combination while switching ON the power. When the EMC 10 is initially turned ON, and any time you wish to change the configuration status of the machine, refer to the following steps:

NOTE: If the Peripheral Program has not been downloaded (the program and unit number alternately show on the display), you can also enter into the configuration mode without turning the machine OFF, then ON again.

Configuration Procedure

1. Before you turn ON the EMC 10 (or if the unit has not yet been "downloaded" by the EDS operating software), locate the 10-key Keyboard (Peripheral Keyboard) and LCD (Liquid Crystal Display) in the upper right area of the peripheral unit.
2. Also locate the power switch at the right rear of the unit. It is the rocker switch mounted in the Power Input Module, as Figure 1-2 shows.

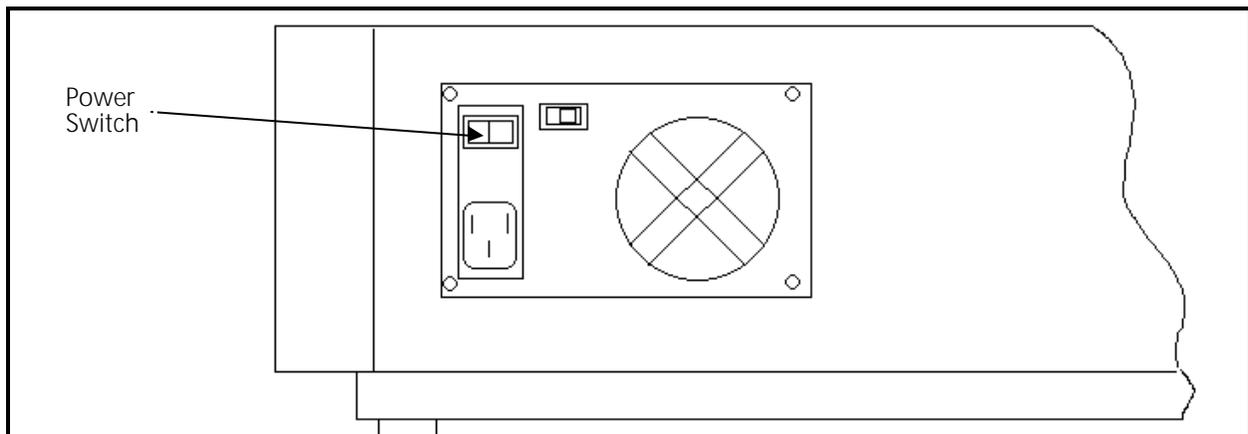


Figure 1 - 2

3. Find the 3 keys on the Peripheral Keyboard marked:  ,  , and  .
Depress and hold all three keys at the same time.

4. While holding these three keys down, turn ON the EMC 10 by pressing the rocker switch to the ON position. Hold these keys depressed until the unit "beeps" and the Display shows a message depicting the Peripheral Program currently selected.

The peripheral will now be in the "configuration mode," and you can release the 3 keys.

NOTE: With the situation when the unit is already ON, but has not yet "downloaded," you need only to depress and hold the 3 Peripheral Keyboard keys until the unit beeps to get into the configuration mode. Then proceed. You do not need to turn the EMC 10 OFF, then ON again.

When the EMC 10 is in the "configuration mode," you can set (or change) the Peripheral Program, Unit Number, and Display language for the machine.

Peripheral Program

5. To set the Peripheral Program, simply depress the  or  keys on the Peripheral Keyboard until the correct program shows on the Display. The programs specific to the EMC 10 are: **EMC 10**, (without trimmers), or **EMC 10T** (with the trimmer option). After getting the proper program name showing on the Display, depress the  key on the Peripheral Keyboard to "set" the program.

Unit Number

6. After the  key is depressed the configuration item will go to the Unit Number selection. To select a Unit Number, again simply depress the  or  keys on the peripheral keyboard until the desired Unit Number shows on the Display. (You cannot have two peripherals with the same Unit Number.) After the desired number is showing on the Display, depress the  key.

Display Language

7. The last item you may select in the configuration mode is the language used for showing the information in the display. Again, depress the  or  keys on the peripheral keyboard until English or Spanish appears on the display.
8. After the desired language is showing on the display, depress the  key on the peripheral keyboard.

The EMC 10 configuration is now complete.

2. Service Adjustments

General

This section of the manual provides detailed information for performing machine adjustments required during maintenance or parts replacement. The procedures are guidelines for performing service maintenance, and must be used by personnel practicing good maintenance 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.

It is recommended that some procedures in this section be performed by factory trained personnel to obtain best results. This reference is indicated by stating "*FACTORY SERVICE ADVISED*" at the start of the procedure.

Drive Belt Tensions

"FACTORY SERVICE ADVISED"



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



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. If a belt tension adjustment is needed, follow the procedure in the manual or, if "factory service is advised," contact your local factory trained service representative.

Controller Section

Although no adjustments are performed inside the controller section of the EMC 10, there are occasions when reference is directed to this section to monitor or measure the results of other adjustments.

Keyboard Section

Display Screen Intensity

Adjusting the intensity of the display in the keyboard/display assembly requires the removal of the keyboard cover to gain access to the adjusting potentiometer on the side of the keyboard printed circuit board. During the adjustment of the display intensity the EMC 10 must be turned on so the result of the adjustment may be observed.

1. Refer to specific instructions for removing covers in Section 3, then remove the keyboard cover. Use care not to allow the keyboard/display to come in contact with any portion of the machine that will short circuit any voltages. Also, do not touch the components on the printed circuit board. Set the keyboard cover on the peripheral table top.
2. Install the static strap as explained in the specific instructions in Section 3.
3. Locate the intensity adjustment pot on the right side of the printed circuit board as shown in Figure 2-1.

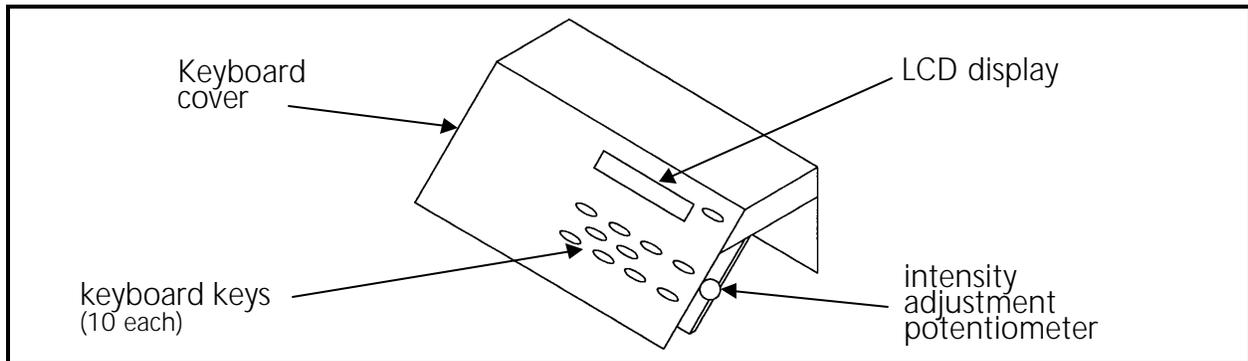


Figure 2 - 1

4. Turn on the power switch to the EMC 10.
5. Rotate the adjustment potentiometer clockwise to increase intensity on the display, or counterclockwise to decrease the intensity on the display.
6. After the desired intensity is obtained, reinstall the keyboard cover using the same precautions as before.

Power Supply (5 Volt Setting)

"FACTORY SERVICE ADVISED"

Note: This procedure requires the use of specific service tools: a Digital Voltmeter (DVM) and an insulated alignment tool.

The power supply for the EMC 10 is located under the keyboard cover. The power supply is a sealed unit, and if it fails, the whole unit must be replaced. (See Section 3 for removal and replacement.) If a new power supply is installed, the +5 volt setting must be adjusted before using the machine.

1. Turn OFF the peripheral power and remove the power plug from the wall.
2. Refer to specific instructions for removing covers in Section 3, then remove the electronics cover.

3. Inside the electronics section, locate the 4 axis driver board directly in front of the CPU PCB. This board has a row of test points near the top left area of the board. Connect the DVM red test lead to test point TP3 (+5v) and the black test lead to test point TP4 (GND). Set the DVM to the 10 Volt DC scale.
4. Refer to specific instructions for removing covers in Section 3, then remove the keyboard cover, using care not to damage the keyboard ribbon cable.
5. Locate the adjustment potentiometer directly next to the connector block of the power supply (see Figure 2-2).

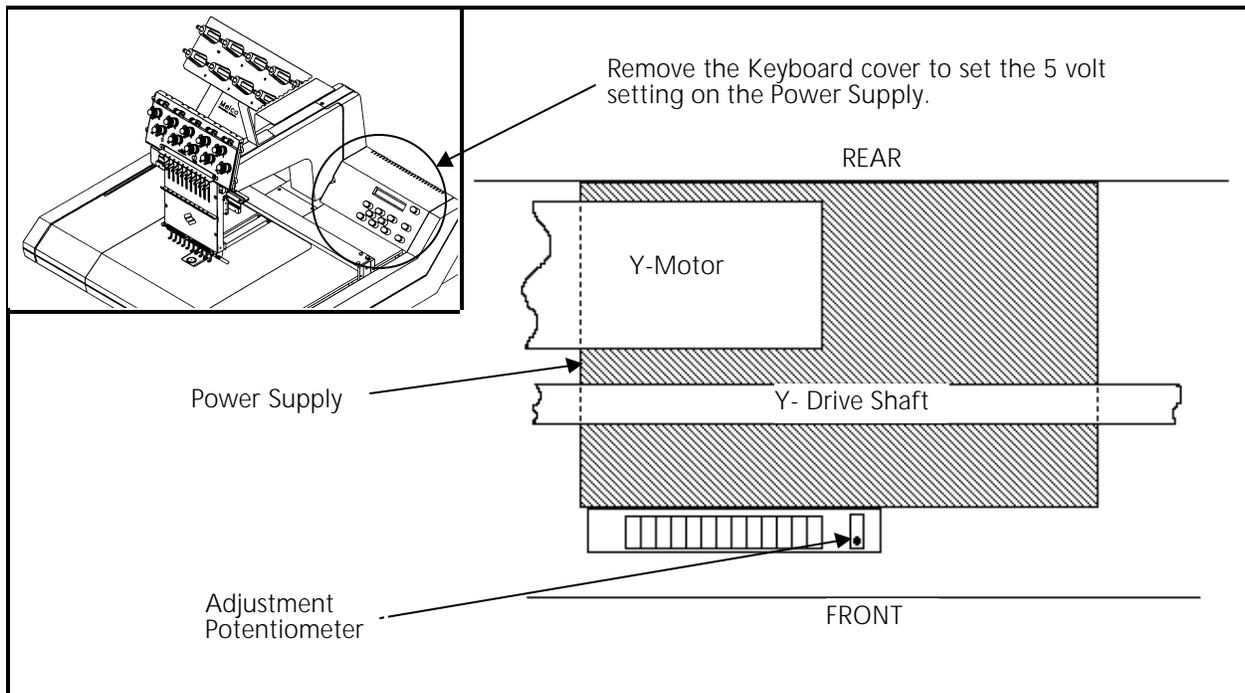


Figure 2 - 2

6. Turn ON the embroidery peripheral.
7. Using an insulated alignment tool, adjust the screw in the potentiometer to obtain a reading on the DVM between +5.00 and +5.05 volts DC.

Carriage Assembly

X Drive Belt Tension

Note: This procedure requires the use of a special service tool: a one pound weight.

1. Move the X carriage assembly all the way to the left of the beam until it mechanically stops.

2. Attach the Melco one pound fixture (p/n 995357-01) to the belt, midway between the X carriage assembly and the idler pulley assembly on the right end of the beam.

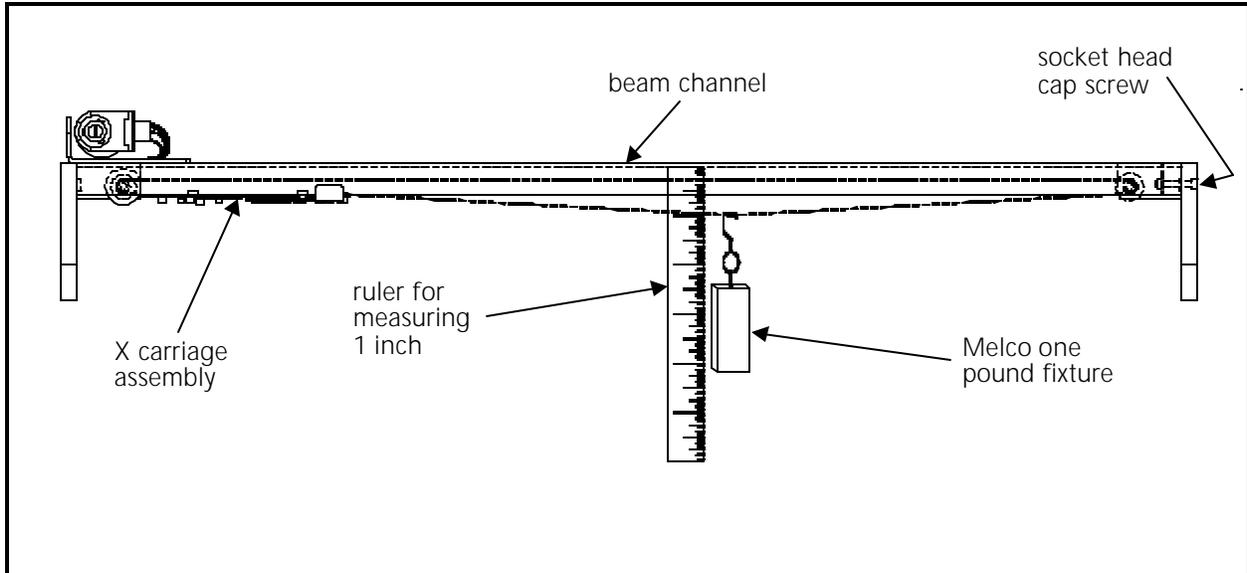


Figure 2 - 3

3. Measure the distance from the under side of the beam channel and the top of the belt where the 1 pound fixture is pulling it down.
4. The measurement should be 1 inch.
5. Tighten the socket head cap screw in the idler assembly clockwise to increase the belt tension (shorten the measurement).

Loosen the socket head cap screw in the idler assembly counterclockwise to decrease the belt tension (lengthen the measurement).

Y Drive Belt Tension

Note: This procedure requires the use of a special service tool: the Gates 5M Tensiometer, available from Melco, part number 992165-01.



CAUTION! Over-tightening the y drive belt tension may cause irreparable damage to the chassis.

1. Refer to specific instructions for removing covers in Section 3, then remove both end cover to access the Y drive belts.
2. Move the Y carriage and beam all the way to the rear.

3. Properly attach a Gates 5M Tensiometer to the belt, midway between the beam and the idler pulley tensioning assembly and check the tension.

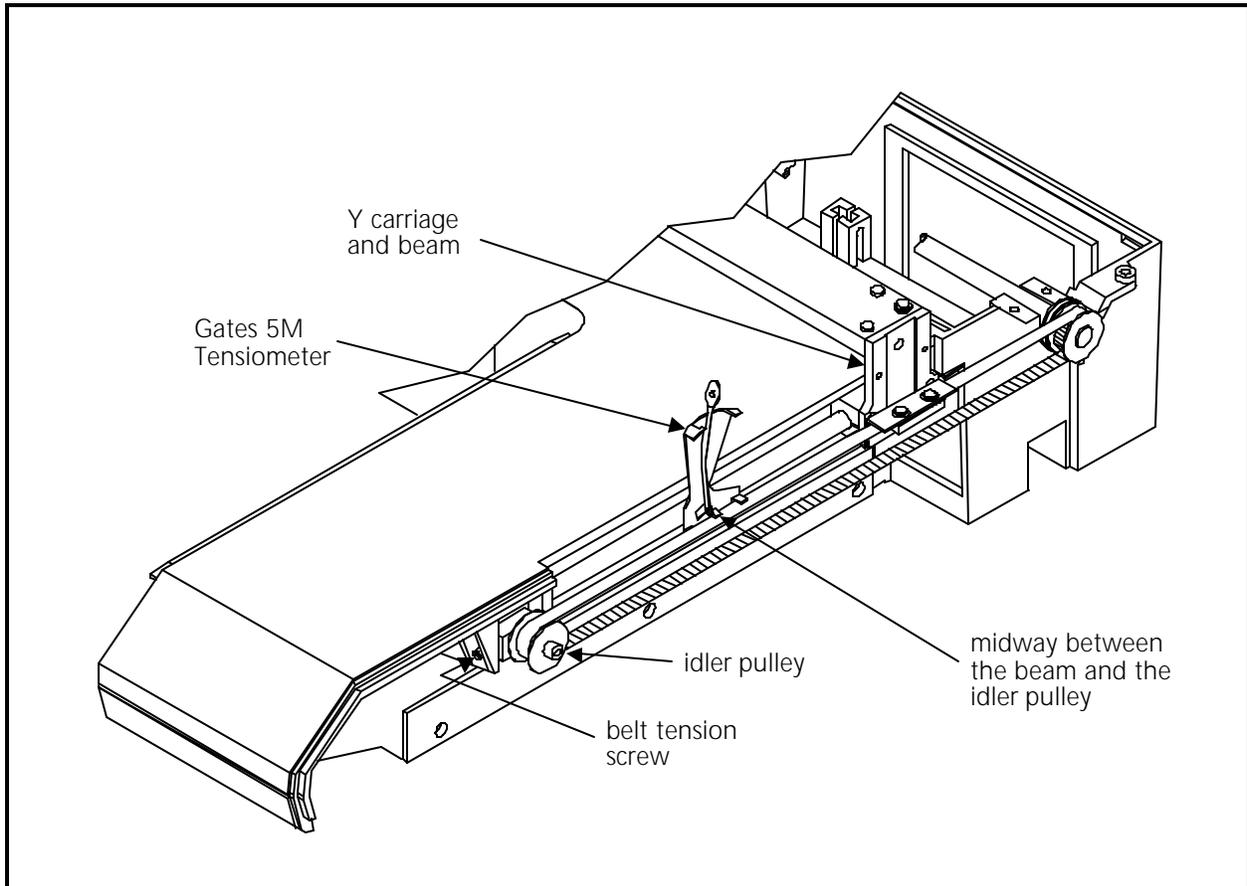


Figure 2 - 4

4. The tension scale should read 10 plus or minus 1/2 with the Gates tensiometer.
5. Adjust as described below, checking the tension with the tensiometer frequently until the proper value ($10 \pm 1/2$) is measured.
 - a) Tighten the belt tension screw at the front of the idler pulley bracket clockwise to increase the belt tension (shorten the measurement).
 - b) Loosen the belt tension screw at the front of the idler pulley bracket counterclockwise to decrease the belt tension (lengthen the measurement).
6. Repeat the above procedure for both belts to ensure that they are "balanced" (tensioned the same).
7. Reinstall the covers that were removed earlier.

X Motor Belt Tension

Note: This procedure requires the use of a special service tool: a 20 pound pull gauge.

1. Loosen the four X motor screws enough to move the motor on the motor bracket.
2. Wrap a piece of small, strong cable or cord around the X motor drive pulley to the side of the belt nearest the motor.

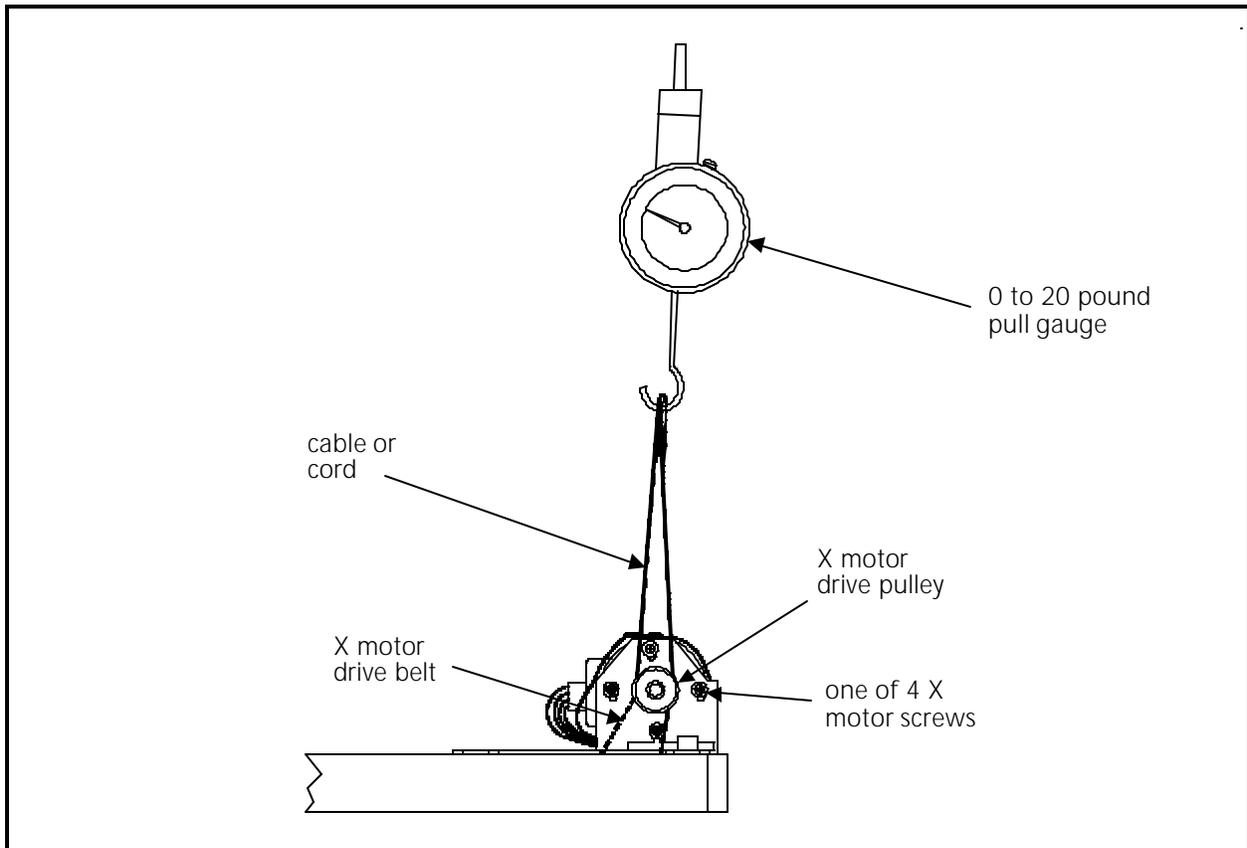


Figure 2 - 5

3. Form loops in the ends of the cable or cord and hook a 0 to 20 pound pull gauge into the loops.
4. Pull straight up on the pull gauge until it reads 9 pounds.
5. While holding the pull gauge at the 9 pound reading, tighten the 4 motor screws to secure the motor with the belt tensioned at 9 pounds of pull.
6. Remove the cable or cord.

X Carriage Assembly Movement

1. Move the X carriage assembly to the middle of the beam.
2. Hold the beam secure, then grasp at one end, then the other, and push backward and forward seeking any movement of the X carriage inside the beam channel.

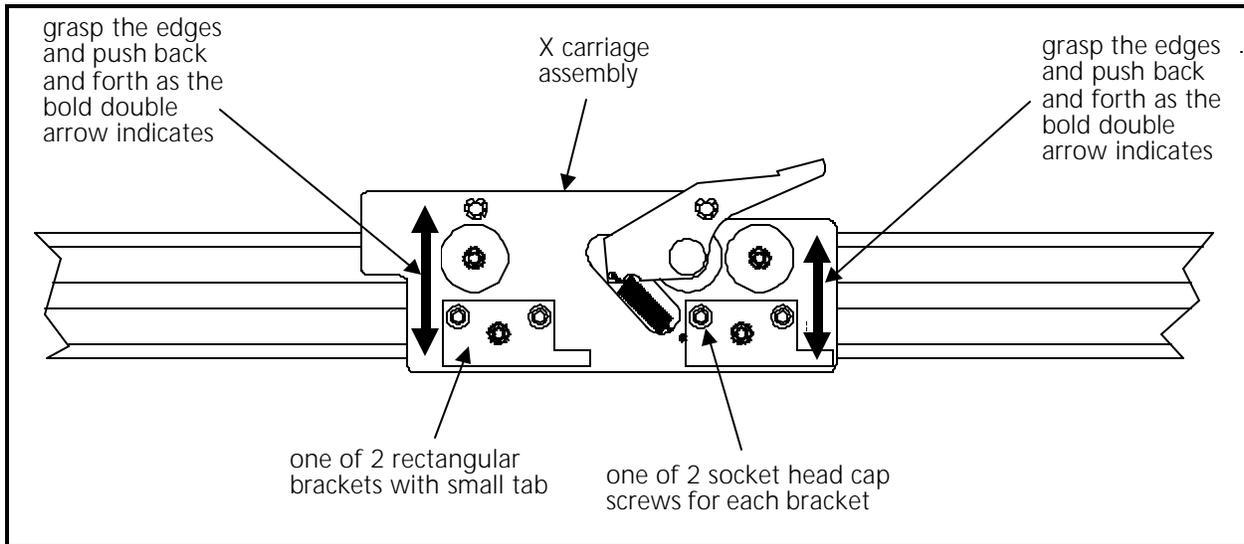


Figure 2 - 6

3. There should be no back and forth movement in the above step.
 - a) If no movement is detected, locate the rectangular brackets with the small tabs at one corner on the under side of the X carriage, and insure the 2 socket head cap screws in each of the brackets are tightened.
 - b) If there is movement, locate the rectangular bracket with the small tab at one corner on the under side of the X carriage at the end that appears loose. Loosen the 2 socket head cap screws in the bracket and push on the tab away from center of the carriage. This should take the back and forth play out of the X carriage assembly.

NOTE: Too much pressure on the tab may "load" the roller bearings too tightly and cause the X carriage to bind during movement. Only push on the tab until you just feel carriage movement goes away, and do not put any additional pressure against it.

4. Tighten the 2 socket head cap screws.
5. Position the X carriage assembly to the left side of the beam.

6. Hook a 0 to 10 pound pull gauge onto the X carriage hoop holder actuator lever (see Figure 2-7).

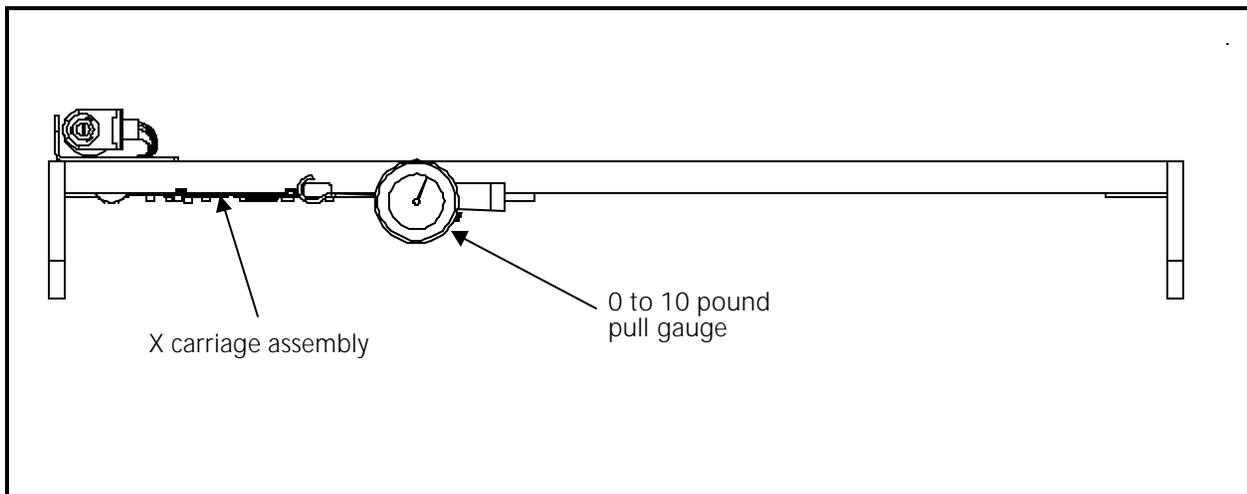


Figure 2 - 7

7. Pull the pull gauge to the right slowly until the X carriage begins to move.
8. The pull gauge value should read no more than 4 pounds when the X carriage begins to move.
9. Continue to pull on the pull gauge through the entire movement of the X carriage to the right end of the beam.
10. If the gauge reads more than 4 pounds at any time, you must adjust the X carriage assembly slightly.
11. To adjust the X carriage, refer to Step 3 and loosen the 2 socket head cap screws in each of the brackets.
12. Next apply less pressure on the tabs than you did in Step 3b originally, and tighten the 2 screws again.
13. Check the X carriage movement with the pull gauge again as described in Steps 5 through 9.
14. When the pull is less than 4 pounds and the X carriage does not move back and forth in the beam channel, the adjustment is correct.

Embroidery Head

Z Encoder System Introduction

The ability to place stitches precisely at high speed is dependent on the accurate operation of the electronics and electromechanical assemblies. The "key" to this is the Z encoder. The information provided to the CPU and 4 axis driver by the Z encoder is the basis for all the embroidery head activity.

The Z Encoder is a two channel quadrature output with index pulse. If you send the output to an oscilloscope you will see two square wave signals, one slightly ahead of the other. You will also see a third signal, the index pulse. The CPU interprets these signals to determine position, speed, and head up.

The CPU uses this information to determine when to move the beam, when to stop the head for a color change, when setting home position is allowed, how fast the head is running, how many stitches have been embroidered, etc.

It is important for the technician to understand that the peripheral operational software handles the motor control circuitry differently when the Z axis is running than it does when the Z axis is stopped. When running, the motor control circuitry allows the X,Y, and Z axis motors only minute errors in rotation. Any error greater than the allowed error will cause the motor to be driven to eliminate the error. When the peripheral is stopped however, the software that controls the Z motor allows a larger "window" of error. The purpose of this window is to keep the motors from oscillating around the null, hunting for absolute position.

The green LED on the CPU, can be used by the technician to see if the CPU is in fact receiving a head up (or mark) pulse from the encoder (indicating that the encoder and associated cables are functional). It should be noted however, that "the headup LED does NOT have to be lit when the peripheral is stopped, and the LED CANNOT be used to make a determination of the Z encoder alignment status." If used in conjunction with the proper headup tool, the LED can be used to see if the head up pulse is triggering early or late as compared to absolute mechanical headup.

The use of the procedures described in the following pages will result in the most proper, accurate alignment and repair of the Z encoder system that is possible and or feasible for use in the field by a technician.

It can be seen that the proper alignment of the Z encoder can result in maintaining embroidery quality and proper machine operation. Slight Z encoder misalignment can cause many kinds of erratic operation and/or intermittent thread breaks. A larger misalignment can be the cause of equipment damage and subsequent electronic or mechanical failures. The careful application of the Z encoder procedures by a factory trained technician will result in a machine that will operate correctly and reliably.

Z Encoder Inspection

"FACTORY SERVICE ADVISED"

This procedure is a guide for determining the condition of the three channel optical encoder. If unauthorized personnel attempt to service this area, the FACTORY WARRANTY MAY BE VOIDED if the work is improperly performed and damage occurs.

Inspect the Z shaft encoder following the steps below. If the requirements of this process are not met, replace the encoder by following the Shaft Encoder Installation procedure in Section 3 of this manual.

1. Remove the electronics cover and the Z motor cover.
2. It is important that the computer not download a design to the peripheral. You may disable the peripheral from the computer by the following method: Locate the , , and  keys on the keyboard of the EMC 10 Embroidery Peripheral. Press and hold these three keys while you then turn ON the peripheral power.
3. Hold the keys until the "configuration mode" is initiated and the peripheral program name appears on the display.

DO NOT PERFORM ANY OTHER KEYSTROKES WHILE IN THE CONFIGURATION MODE AT THIS TIME.

4. Locate the 4 red LEDs and 1 green LED on the left side at the top of the CPU PCB (see Figure 2-8).

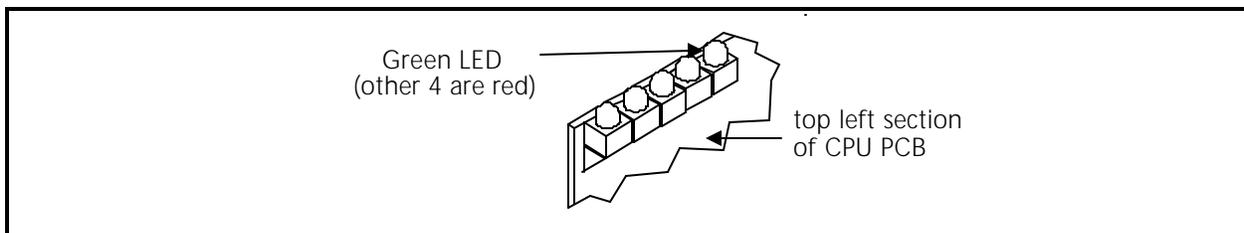


Figure 2 - 8

5. Rotate the embroidery head manually in a clockwise direction from the rear of the machine. This rotation can be performed by rotating the shaft pulley that is driven by the motor belt (see Figure 2-9).
6. While slowly rotating the head, check that the green LED blinks once each revolution (this is the "index" or "headup" mark).
7. Inspect the electrical connectors (encoder cable plug and encoder body) for loose wires, loose fits, and any visual damage. Clean connections and/or replace components as necessary.

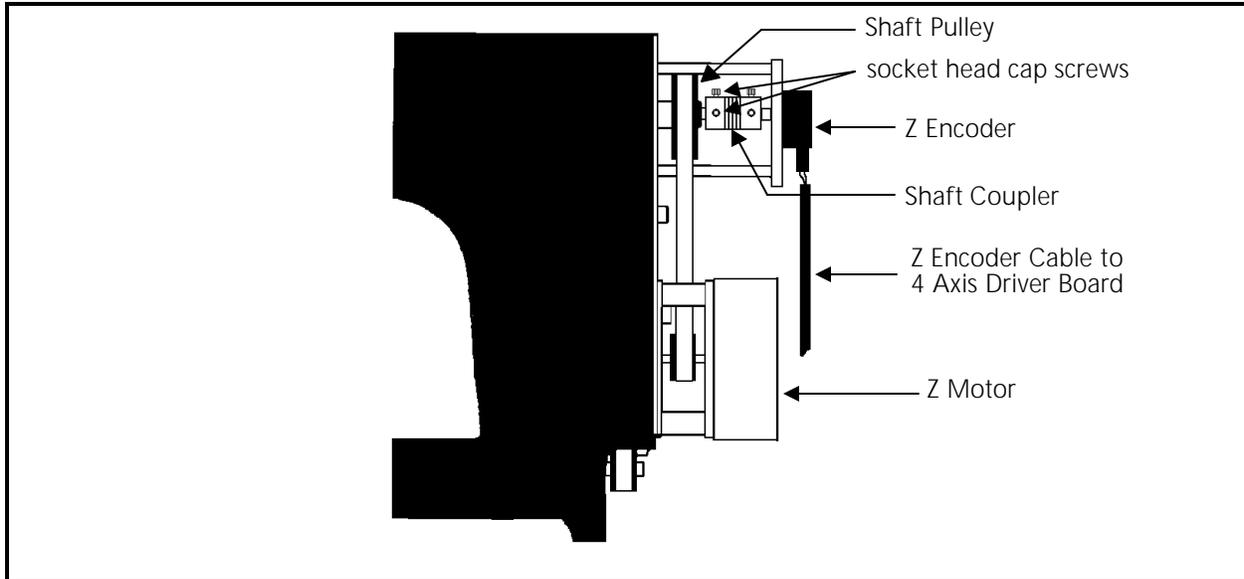


Figure 2 - 9

If the previous "test" fails or is in question, contact your local Melco service representative for advise. Refer to Section 3 of this manual for the installation procedure for a new Z shaft encoder.

Z Shaft Encoder Calibration

"FACTORY SERVICE ADVISED"



CAUTION! Failure to properly calibrate the Z shaft encoder after replacing it, may cause damage when attempting to operate the machine.

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

1. Install the Z shaft encoder as described in Section 3 of this manual.
2. With the embroidery peripheral turned OFF, remove the electronic cover as described earlier in this manual. This will expose the row of LEDs along the top left of the CPU.

Note: To perform this procedure, it is important that the peripheral does not "download." To insure this condition remove the network cable (or boot disk if the disk drive option is installed).

3. With the network cable removed (or boot disk not inserted into a disk drive option), turn ON the embroidery peripheral.

4. Locate the green LED on the top left of the CPU. Most likely this LED will not be glowing. It is only supposed to glow for a 1 degree duration each revolution of the Z shaft encoder.
5. Position the Melco 10 needle head up fixture (p/n 995673-01) into the head up alignment hole in the top of the head, just in front of the thread tree (see Figure 2-10).

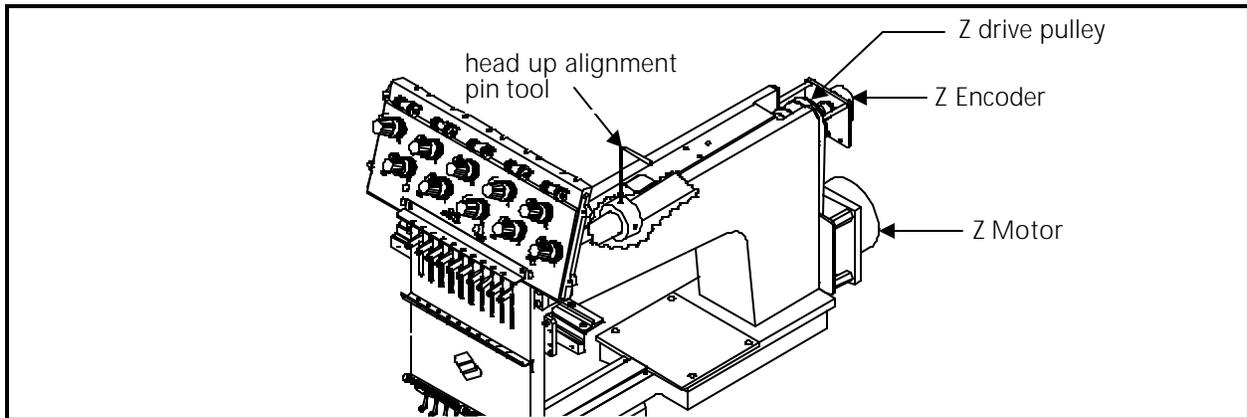


Figure 2 - 10

6. Slowly rotate the head at the Z drive pulley until the head up alignment pin tool inserts into the hole in the head up alignment collar on the Z shaft. This is the "mechanical" head up position.
7. Now loosen the two encoder coupler socket head cap screws at the embroidery head Z shaft (see Figure 2-9) and slowly rotate the coupling in either direction until the green LED glows.
8. When the green LED is glowing, tighten one of the encoder coupler socket head cap screws at the embroidery head Z shaft.
9. Remove the head up alignment pin tool and rotate the Z shaft until you can tighten the second encoder coupler socket head cap screw at the embroidery head Z shaft.
10. Turn the embroidery peripheral OFF and attach the network cable (or install the boot disk if the disk drive option is installed).
11. Turn the embroidery peripheral ON again and allow its program to download.
12. Go to the head timing menu and check that when the head is brought to head up, that the green LED on the CPU glows within plus or minus 1.5 degrees of rotation.
13. Reinstall all covers removed during this procedure.

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 3-25 in Section 3).
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 2-11.

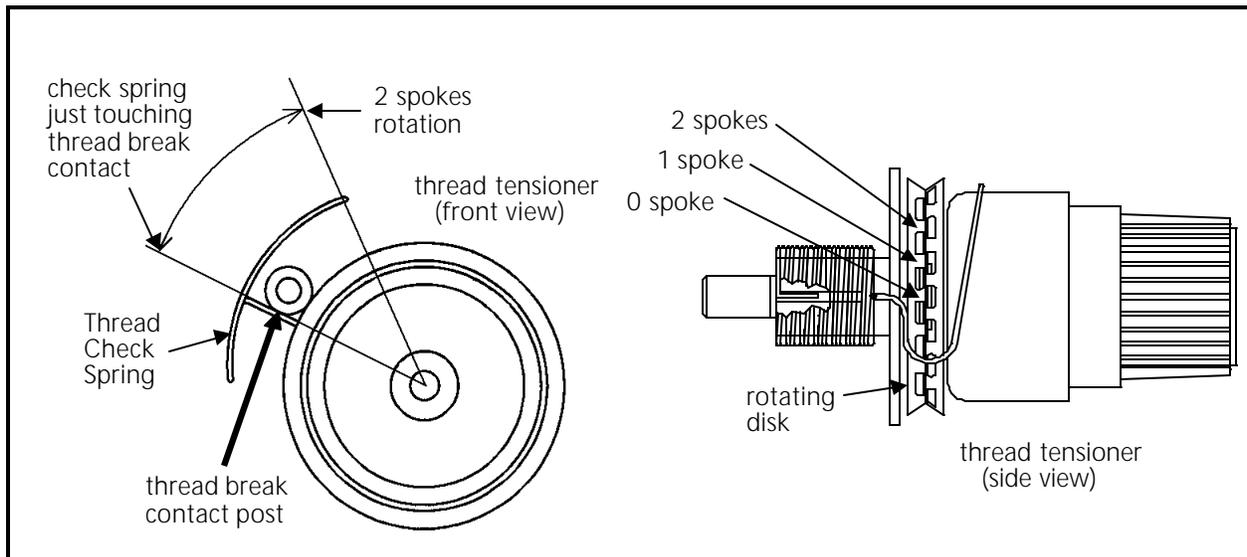


Figure 2 - 11

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 2-11). 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.

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).

1. With the needle case and retainer plate assembly removed, lay the cross roller bearing onto the embroidery head v-rail. Orient the bearing with the welded edge down and position it to the right edge of the v-rail.
2. Place the retainer plate assembly onto the cross roller bearing at the right end of the embroidery head v-rail. (The needle case may or may not be attached to the retainer plate assembly at this time.)
3. 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 2-12).

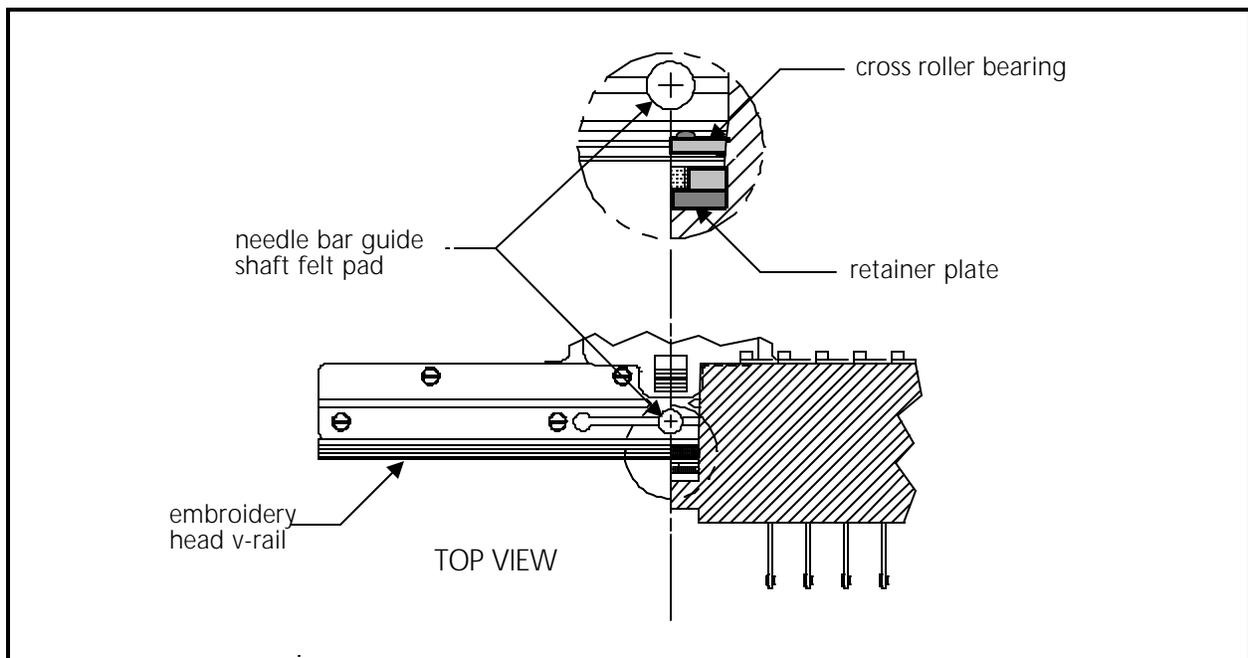


Figure 2 - 12

4. 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 engaging between the embroidery head v-rail and the needle case v-rail.)
5. Slide the retainer plate assembly onto the embroidery head v-rail and cross roller bearing.
6. 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 allen 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.

Retainer Plate Bearing Adjustment

Note: This procedure requires the use of a special service tool: the V-Rail Adjustment fixture (p/n 995675-01).

1. Loosen the two socket head cap screws holding the needle case v-rail to the retainer plate assembly as indicated in Figure 2-13.
2. Install the retainer plate assembly with the cross roller bearing centered between the 2 v-rails.
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 2-13.
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 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.

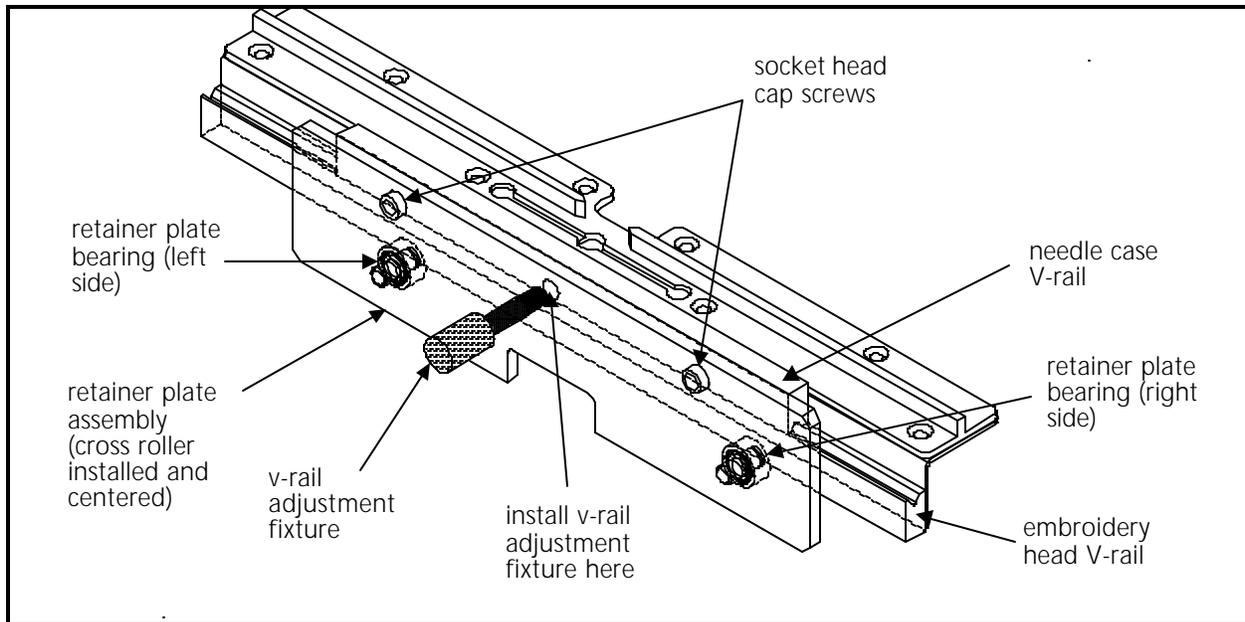


Figure 2 - 13

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

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 Section 3 in this manual on installing the needle case assembly.
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 (see Figure 2-14).

Note: If you have the trimmer option, you will have to remove the grabber blade guide assembly to access the screw.

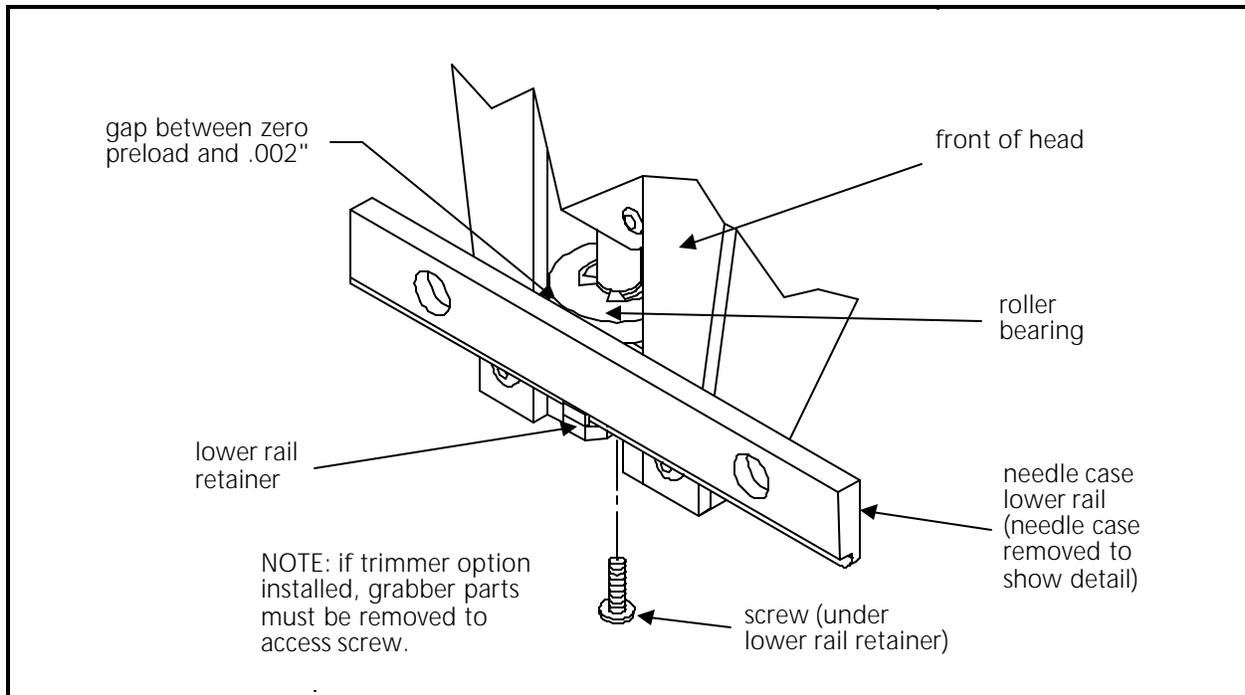


Figure 2 - 14

- 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.

Jump Stitch Solenoid

If a jump stitch solenoid has been replaced, you may have to perform one or more of the following adjustment procedures:

NOTE: The needle case must be removed to perform the adjustment procedures in this section. See Section 3 for needle case removal.

Plunger Positioning

During the jump stitch solenoid replacement procedure in Section 3, you were to count the number of threads that are showing beyond the solenoid bracket. If this was not done, the following procedure will help 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 is energized (energized).

Plunger Position 2

The plunger also must not be contacting the reciprocator during normal embroidery, when the solenoid is relaxed or not 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). Refer to Figure 2-15 for an illustration of the gap location.

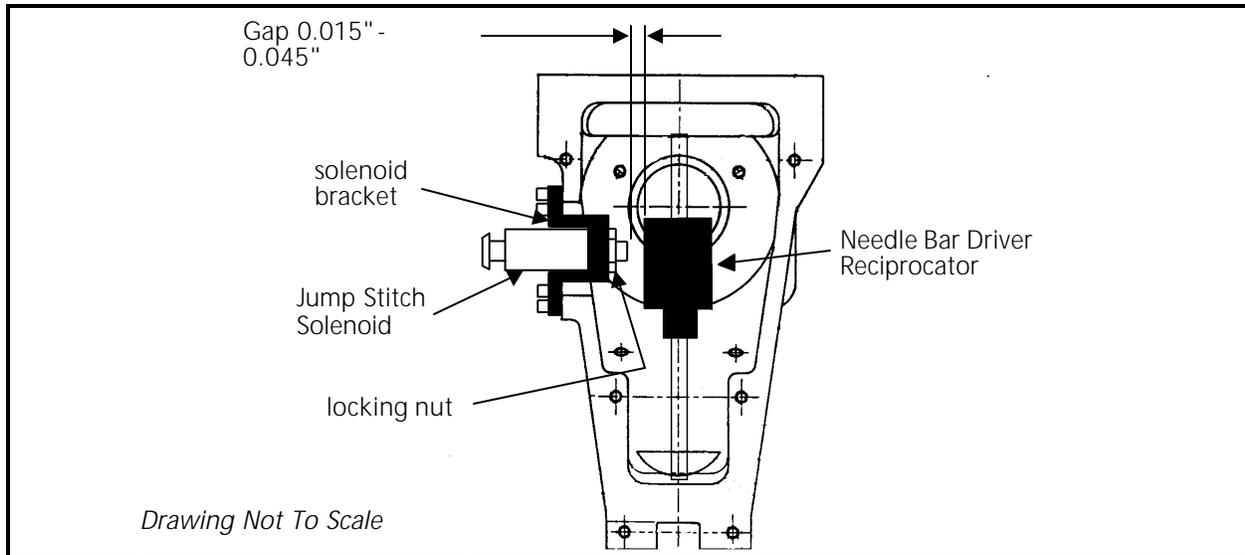


Figure 2 - 15

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.

To position the solenoid and bracket:

1. Put the new solenoid and bracket assembly in place and push it to the back of the cutout in the side of the head.

2. 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.
3. Attach the solenoid wires to the color change PCB.

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.

4. Reinstall all covers removed to change the jump stitch solenoid and test embroider a large letter (6 inch block I, for example) to check the machine for proper jump stitch operation.

Color Change Motor Belt Tension

The color change belt tension should cause the color change cam to rotate with minimum backlash. The belt should be tensioned with some amount of slack so it is not so tight that it wears the color change shaft and bushings needlessly.

Adjust the color change belt tension by loosening the 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.

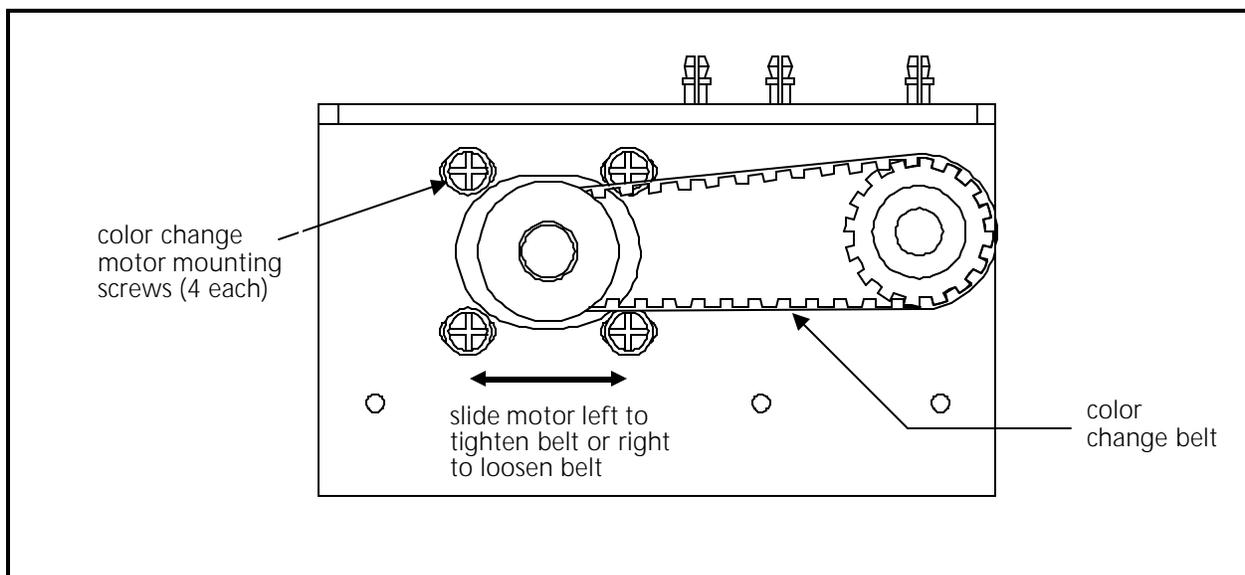


Figure 2 - 16

Thread Break Brush Adjustment

The thread break brush must be adjusted to make proper contact with the thread break contact posts coming off the rear of the thread tensioner assembly PCB.

1. Put the needle case in any selected needle position.
2. Loosen the thread break brush bracket mounting screws at the color change PCB.
3. Position the thread break brush so it is centered directly under the selected needle thread break contact post coming from the thread tensioner assembly PCB.

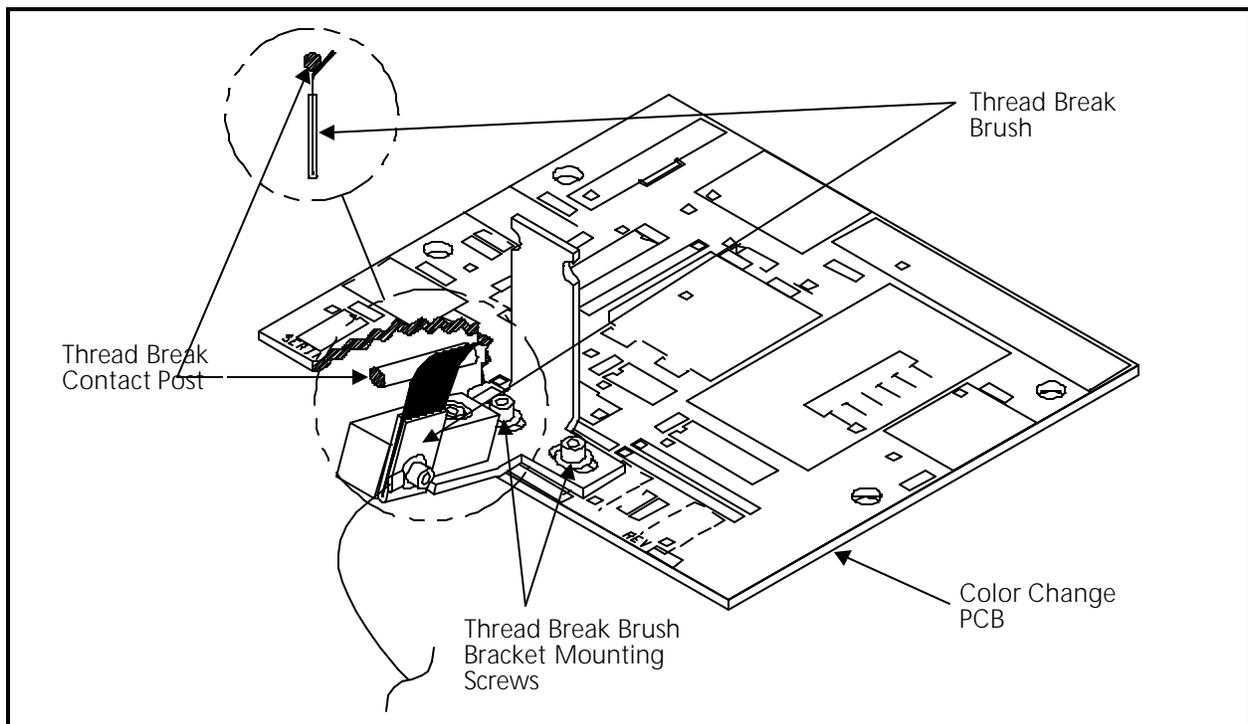


Figure 2 - 17

4. Tighten the thread break brush bracket mounting screws securely, but not overtighten.

Trimmer Option

The trimmer option for the EMC 10 Embroidery Peripheral is assembled and thoroughly tested before the machine is shipped. Although the set up of the trimmers should not change during normal use, there are a few things to be aware of to prevent problems.

- Dirt, dust, and thread lint debris can build up and prevent the movable knife (in the rotary hook assembly) from actuating correctly. Keep the area clean and you shouldn't have a problem here. 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 peripheral 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 100 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 the 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 spring knife.
6. The beam makes two moves that clears the top thread (now called the tail) out of the material.
7. At approximately the same time the the threads are being cut and the beam is moving to clear the tail, the grabber reaches out from behind the needle area and "grabs" the tail, pulling it up and back into the Velcro wiper strip.

8. When the trim is complete the peripheral begins embroidering again automatically.

Trimmer Set Up And Adjustments

The following procedures provide a guide for adjusting various portions of the trimmer system.

"FACTORY SERVICE ADVISED"

Note: This procedure requires the use of several service tools: a medium screw driver, a small screw driver, a 3/32" hex wrench, a 1.5 mm hex wrench, a 2 mm hex wrench, and a 2.5 mm hex wrench.

Note: In addition to the "standard" tools needed above, you will need a torque wrench (0-250 in/lbs) if making adjustments to the "select" position.



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. Failure to comply with this caution may void the warranty!

Although many adjustments are fairly straight forward, some are not and they are recommended to be performed by factory trained technical personnel. These adjustments are marked: "FACTORY SERVICE ADVISED."

Z Timeout Errors

An area of concern with the trimmer system is when birdnesting occurs in the hook area. If a birdnest builds up in the hook area, there is a potential that movable knife movement may be obstructed and a mechanical slippage or bending may occur with one or more components of the trimmer system. This is the most probable cause for the trimmer system to create Z timeout errors. When Z timeout errors are a result of the trimmer system, there are two general areas that may contribute to the situation: 1) bent or broken parts in the trimmer cam system, and 2) movable knife select position adjustment.

Damaged Trimmer Cam or Trimmer Solenoid

To check for a damaged trimmer cam or trimmer solenoid, refer to the following procedure:

1. Remove the Z motor cover from the rear of the head.

- Remove the rear bed cover of the head to expose the trimmer camming area as seen in Figure 2-18.

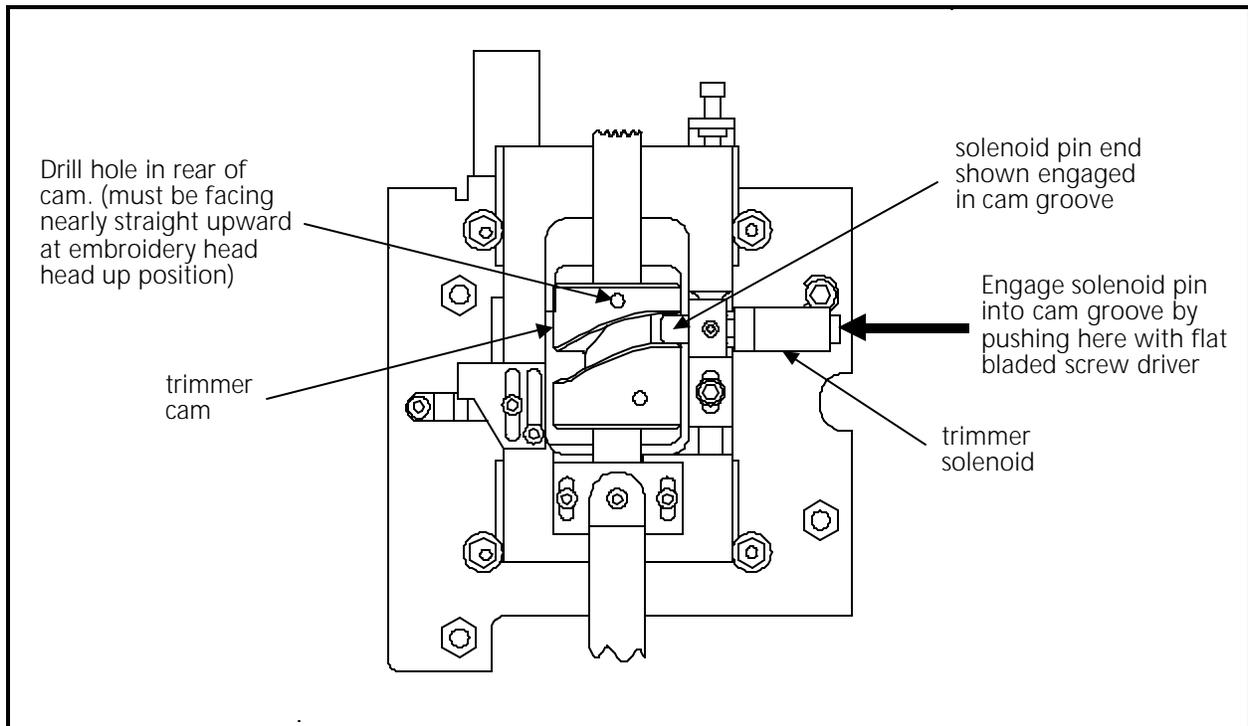


Figure 2 - 18

- Turn the machine power ON.
- Go to the HEAD TIMING MENU and press  to turn HEAD TIMING ON.
- Press the  and  keys simultaneously to go into the "Z pos" mode. On the display you will see: 'Z pos' followed with a numerical indication in degrees.



WARNING! Potential danger exists any time you perform service around a rotating belt. Please use caution during the following steps.

- Slowly rotate the Z drive pulley/belt clockwise until the number of degrees indicated in the display reads between 280 and 300.
- Refer to Figure 2-18 and manually engage the trimmer solenoid pin into the trimmer cam groove by pushing the protruded end of the pin inward with a flat bladed screw driver.
- Hold the trimmer solenoid pin in as you continue to apply clockwise rotation to the Z drive pulley/belt. Rotate the head shaft at least one full revolution.

You should not feel any restrictions during the rotation. If you do, you may have a damaged trimmer cam or trimmer solenoid.

NOTE: You may remove the trimmer solenoid for inspection or replacement. However, when the trimmer solenoid mount is moved, the movable knife home position may become mis-adjusted.

9. Go to the Mechanical Disassembly section of the manual for the procedure to replace the trimmer solenoid.
10. While the trimmer solenoid is removed, inspect the trimmer cam for damage. If the cam is damaged beyond use, factory service is recommended to replace it.
11. Go to the movable knife home position adjustment procedure after the solenoid is reinstalled.
12. Repeat this procedure to check again for unrestricted cam assembly movement.

Checking "Head Up" Position

Before checking/adjusting movable knife "home" or "select" positions, you should check the cam positions at head up.

1. Remove the embroidery head rear bed cover to expose the trimmer camming mechanisms shown in Figure 2-18.



WARNING! Keep clear of the moving parts that are exposed during the operation of the next step(s).



2. Go to the HEAD TIMING MENU and press  to turn HEAD TIMING ON. Put the heads to the "head up" position by pressing the   key combination.
3. Locate the holes in the rear of the cams (see Figure 2-18) and check that they are facing nearly straight upward. If the holes are not facing close to straight upward, the select position may require adjustment. Refer to the Select Position Adjustment section in this chapter for information on recommended factory service.

Trimmers Not Trimming Properly

When the trimmers are not providing adequate trim quality, there are three general areas that may be contributing to the situation: 1) The physical condition of the trimmer parts, 2) The Movable Knife "home" position, and 3) The Movable Knife "select" position.

Physical Condition Of Trimmer Parts

Component Identification

Figure 2-19, identifies those components that comprise the trimmer system: the spring knife, movable knife, and the under thread presser. These components are covered by the front bed plate and the needle plate (see inset in Figure 2-19). Remove the screws holding these covers to gain access to the trimmer area. You may test the trimmer adjustments without the covers in place, but they must be installed to embroider.

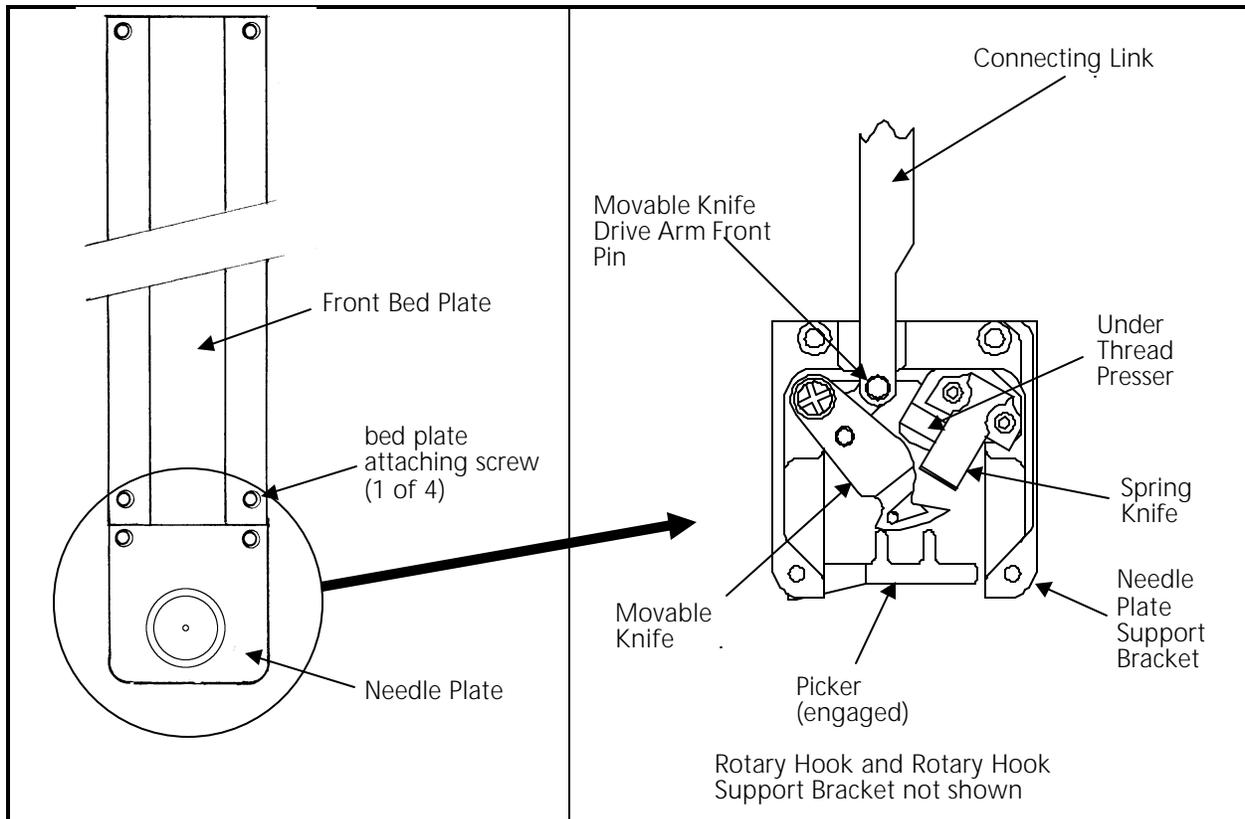


Figure 2 - 19 Trimmer Component ID

Spring Knife

Poor trimming quality and non trimming may be caused by the condition of the spring knife.

This situation may result if the spring knife is worn or is not parallel to the trimming action of the movable knife. Check this condition of the spring knife by inspecting the marks left on the surface of the movable knife that is under the spring knife. If the marks are more severe in the area that aligns with one edge of the spring knife, the spring knife may need to be replaced. Another way to check this condition is to perform the "ink wipeoff test" as described in the following steps.

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 2-19).

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 2-20.

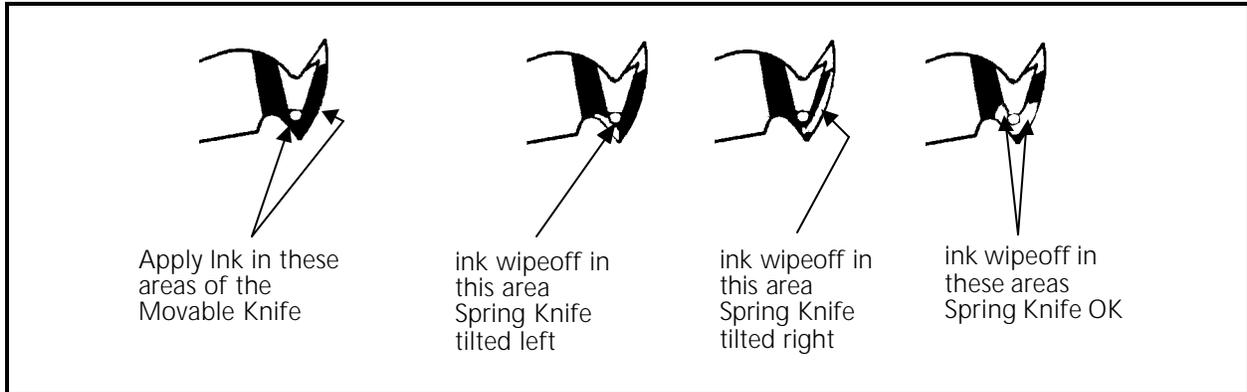


Figure 2 - 20 Ink Wipeoff Test

4. Push the movable knife back under the spring 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 2-20 to determine if the spring knife has a problem.



CAUTION! The spring knife has no adjustment. You should make no attempt to bend or reshape the spring knife in any way.

The general condition of sharpness of the blade will also affect trimming quality. It may be that the spring knife has simply become dull and needs replaced.

Replace the spring knife per the instructions in Section 3 of this manual. Do not attempt to make any adjustment to the spring knife, however, after replacing a spring knife and all the covers and needle plate, it is advised to operate the TRIM IMMEDIATE command several times to allow the spring knife to 'seat' itself with the movable knife.

You may check the thread cutting ability in much the same way as the ink wipeoff test by performing actual thread cuts at several locations across the cutting range of the blade. To do this follow the steps below:

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 2-19).
2. Pull the movable knife forward with a small hex wrench hooked behind it.

3. Obtain a piece of upper thread from the tensioner assembly and drape it over the movable knife (see Figure 2-21).

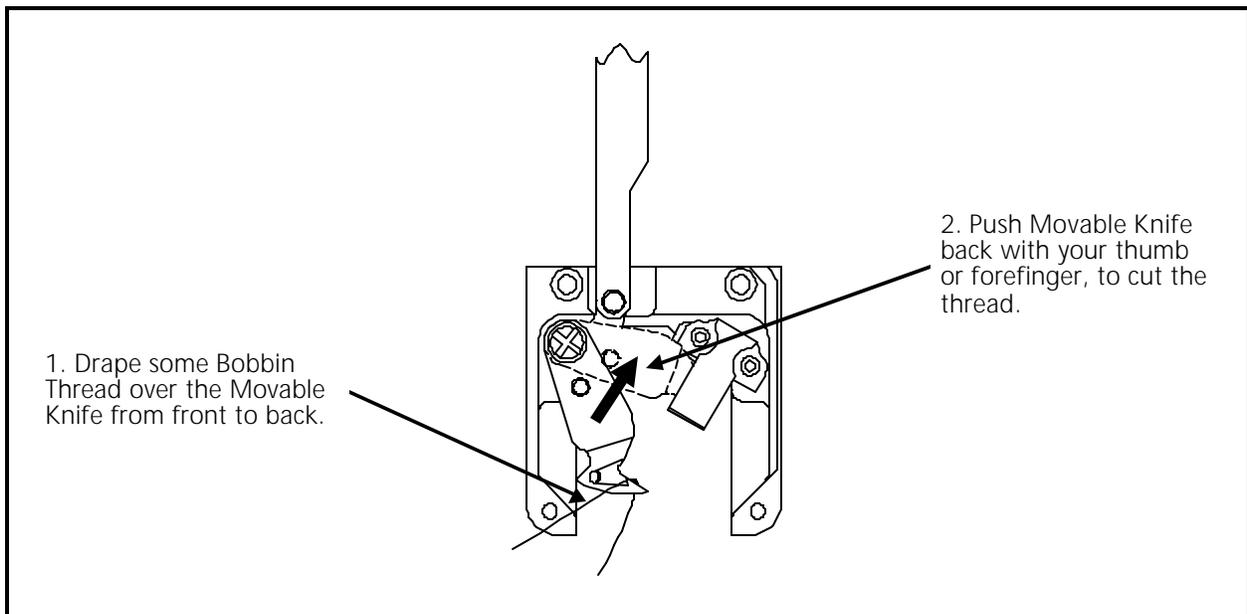


Figure 2 - 21 Checking The Cut

4. 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.
5. Repeat Step 4 with the thread positioned at different locations across cutting surface.
6. If the thread is frayed at any location you may need to replace the spring knife, movable knife, or both.

Replace the fixed blade per the instructions in Section 3 of this manual. Do not attempt to make any adjustment to the fixed blade. After replacing a fixed blade, it is advised to operate the TRIM IMMEDIATE command several times to allow the fixed blade to 'seat' itself with the movable knife.

Under Thread Presser

The under thread presser, shown in Figure 2-22, 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 incorrect. Another example, would be if the under thread presser is "crumpled" (see Figure 2-22), it does not allow the movable knife to pass under the spring 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.

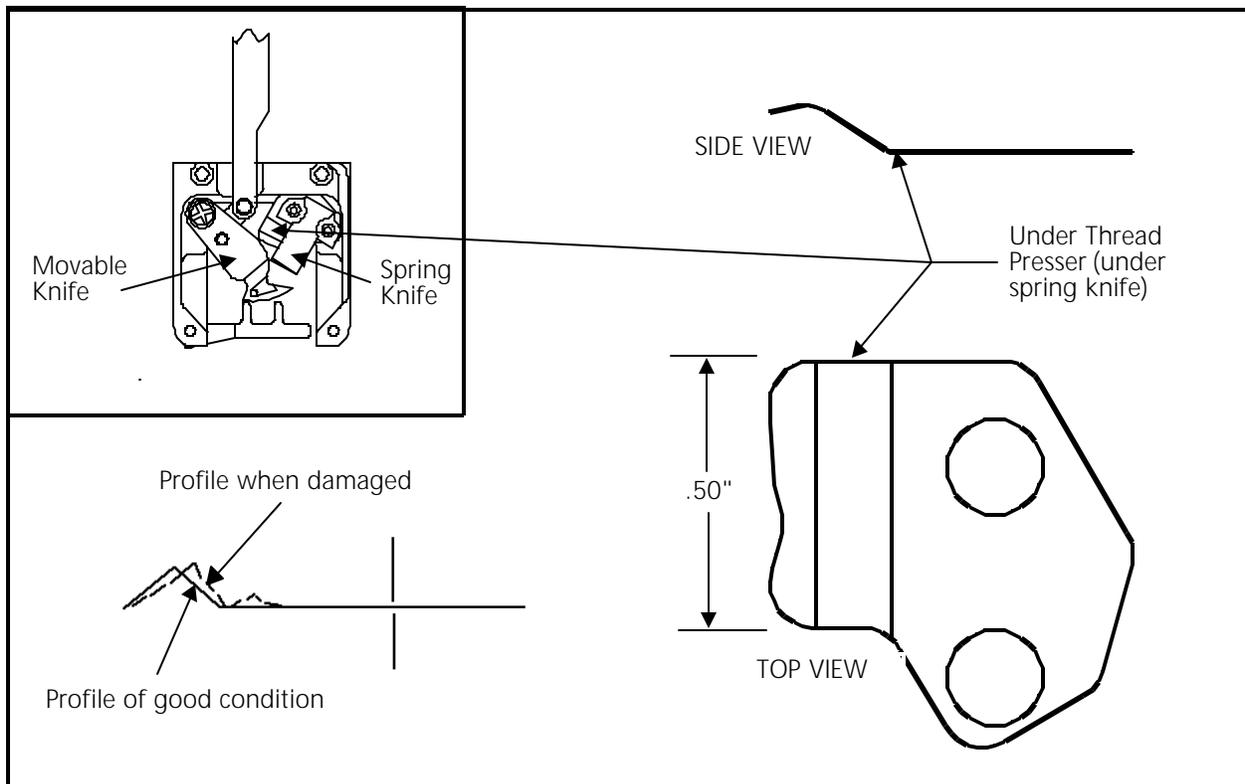


Figure 2 - 22 Under Thread Presser

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 2-22. 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 in Section 3 of this manual.

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 2-19).
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 (see Figure 2-21).
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 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 spring knife, movable knife, or both.

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 and front bed plate (see Figure 2-19).

Movable Knife

Home Position

The movable knife home position is where the knife stops under the spring knife after completing a trim cycle. This position is shown in Figure 2-31. Notice that when properly positioned, the part of the rear tip of the movable knife that slopes away from the top surface is showing in front of the leading edge of the spring knife.

To check that the movable knife is at home position, perform these steps:

1. If the front bed plate is not installed, install it now.
2. Turn the machine power ON.

WARNING! Keep clear of the moving parts that are exposed during the operation of the next steps.

3. Set "home" when prompted to set home on the display.





4. Go to the TRIM MENU and perform a TRIM IMMEDIATE command.
5. The movable knife should be located under the spring knife, positioned as shown in Figure 2-23. If the sloped rear tip of the movable knife is not showing in front of the leading edge of the spring knife, the "home" position needs to be adjusted. DO NOT Adjust if the knife position looks like Figure 2-23.

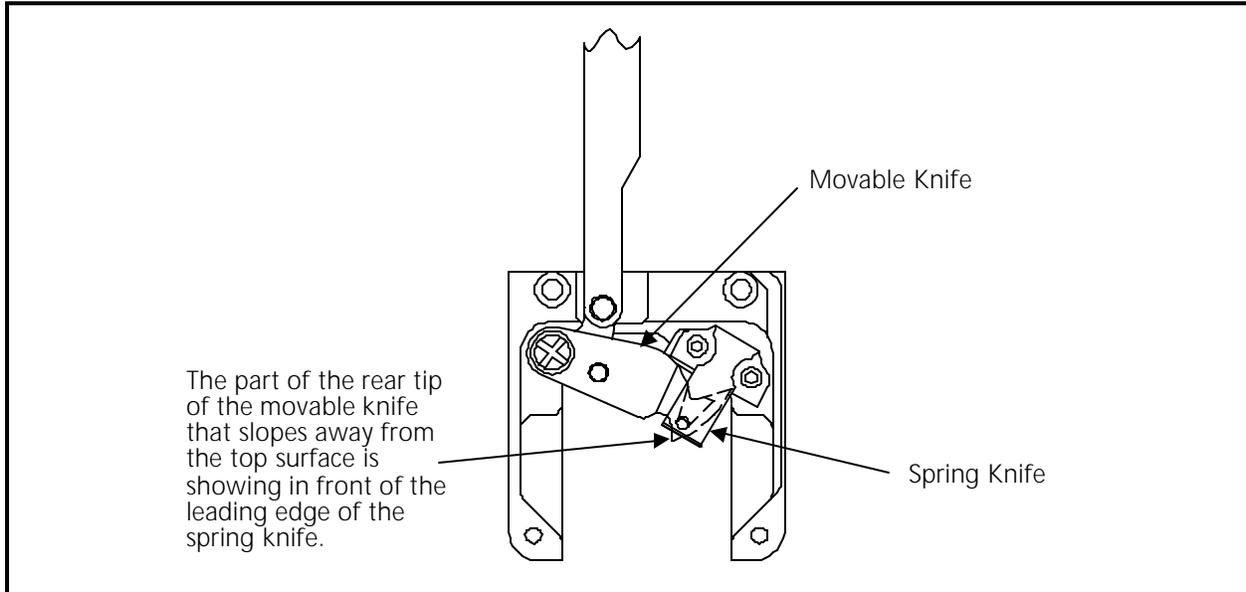


Figure 2 - 23 Movable Knife Home Position



6. To adjust movable knife home position, loosen the two screws at the connecting link drive block in the camming section of the trimmer system (see Figure 2-24).
7. By moving the movable knife, position it to the described home position, allowing the connecting link block to reposition on the camming frame.
8. Snug the two connecting link block screws.



WARNING! Keep clear of the moving parts that are exposed during the operation of the next step(s).



9. Perform a TRIM IMMEDIATE command again and check for the correct home position.
10. Repeat steps 7, 8, and 9 until the movable knife home position is correct.
11. Tighten the two connecting link block screws when the home position is adjusted correctly.

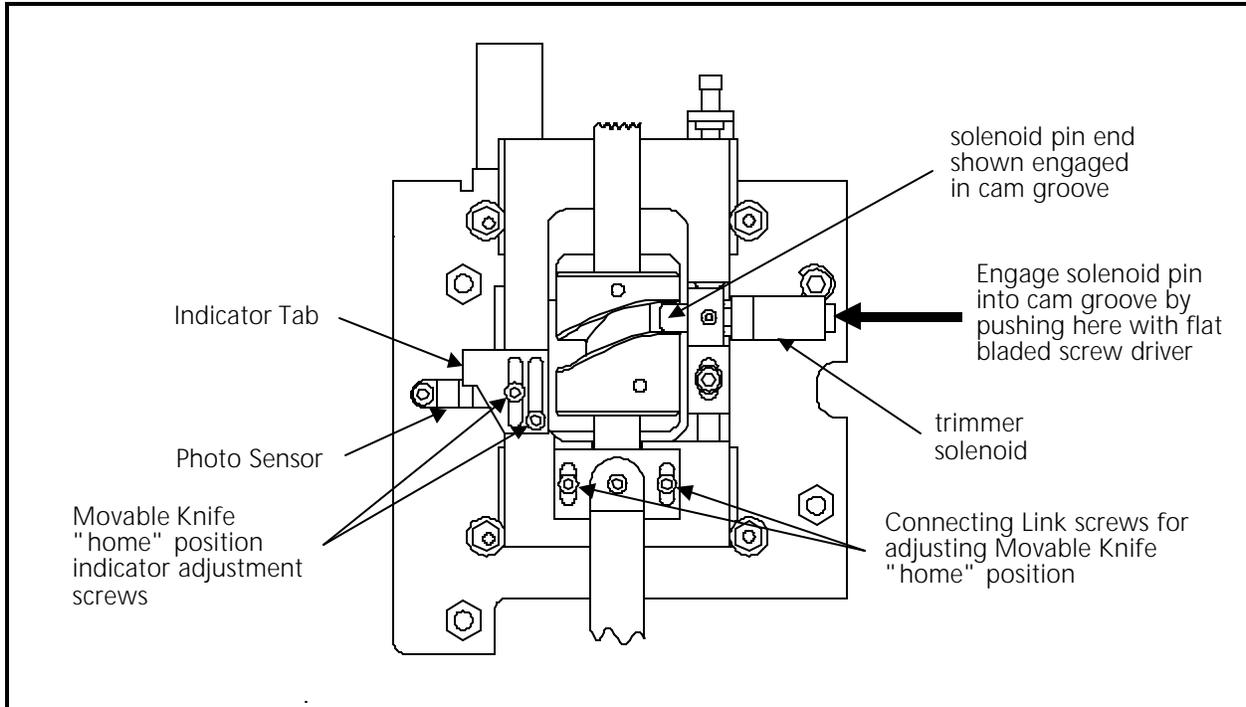


Figure 2 - 24

Home Position Sensor

If the movable knife is mechanically adjusted correctly for home position, but the "Trimmer Not Home" message comes ON, the home position sensor needs adjustment. This adjustment is to move the indicator tab (attached near the cam) to the middle of the photo sensor when the movable knife is at the home position (see Figures 2-23 and 2-24). To make the adjustment:

1. Loosen the two socket head cap screws that hold the indicator.
2. Move the indicator forward or backward the required amount.
3. Retighten the screws.



WARNING! Keep clear of the moving parts that are exposed during the operation of the next step(s).

4. Repeat the TRIM IMMEDIATE cycle and recheck for the message. Repeat the adjustment as needed until the message no longer comes on after the TRIM IMMEDIATE cycle.

Checking Select Position

After adjusting the movable knife home position, you must check for the movable knife "select" position. If adjustment is required it is recommended that Melco factory-trained personnel be consulted.

1. Replace the standard needle plate on the embroidery head arm (See Figure 2-19). Do not install the raised needle plate used with cap frames.
2. Turn the machine power ON.
3. Go to the HEAD TIMING MENU and press  to turn HEAD TIMING ON.
4. Press the  and  keys simultaneously to go into the "Z pos" mode. On the display you will see: 'Z pos' followed with a numerical indication in degrees.



WARNING! Potential danger exists any time you perform service around a rotating belt. Please use caution during the following steps.

5. Remove the Z motor cover from the rear of the head and the triangular trimmer cover at the left side of the head. (See Figure 1-1 for location information for these covers.)
6. Refer to Figure 2-26 and slowly rotate the Z drive pulley/belt clockwise (as shown by the arrow in the figure) until the number of degrees indicated in the display reads between 280 and 300.
7. Refer to Figure 2-24 and manually engage the trimmer solenoid pin into the trimmer cam groove by pushing the protruded end of the pin inward with a flat bladed screw driver.
8. Hold the trimmer solenoid pin in as you apply clockwise rotation to the Z drive pulley/belt. Slowly rotate the pulley/belt until the entire camming apparatus begins to move forward. Typically, this will read somewhere in the range of 301 to 303 on the numerical display.
9. Before rotating the Z drive pulley/belt any further, place the Melco select position fixture (p/n 995372-01) into the needle plate hole (see Figure 2-25). If you do not have the fixture, you may use one of several substitute items (such as a 1.5 mm bent hex wrench or the butt of a needle).
10. Now continue to slowly rotate the Z drive pulley/belt clockwise until the movable knife just contacts the select position fixture or substitute item (see Figure 2-25).
11. Stop rotation and allow the preload of the movable knife against the fixture to relax.
12. Check the reading of the display to be between 311 and 313 degrees.



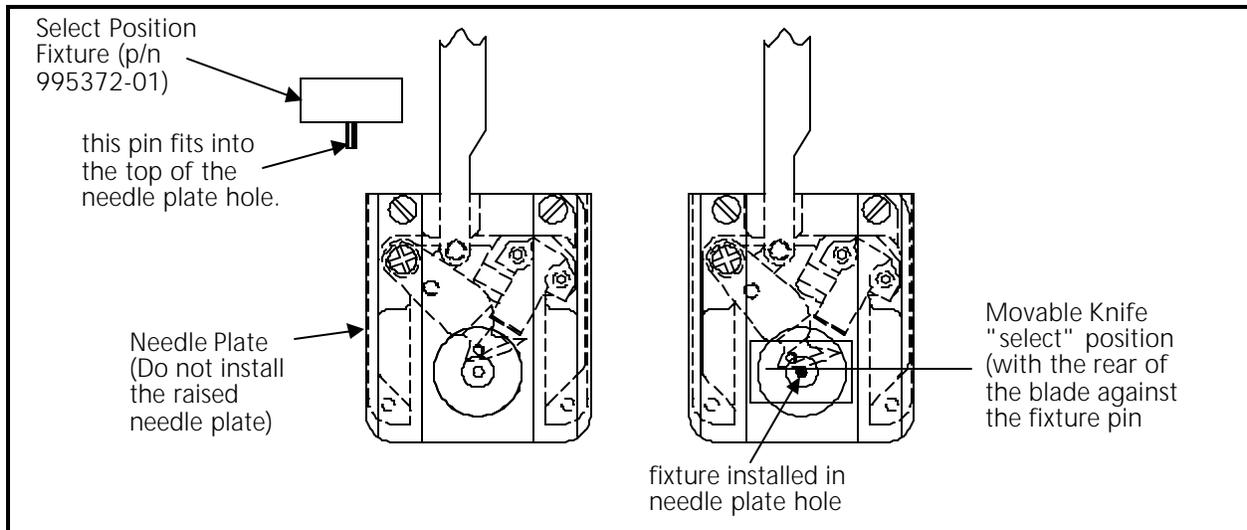


Figure 2 - 25

13. If the movable knife does not contact the fixture between 311 and 313, or contacts too soon, the select position adjustment may be required.

Note: It is recommended that Melco factory trained personnel be contacted for the select position adjustment.

Select Position Adjustment

"FACTORY SERVICE ADVISED"

If the select position adjustment is required, it is recommended that Melco factory-trained personnel be contacted for this adjustment.

Note: This procedure requires 0 to 250 in/lbs torque wrench when making adjustments to the "select" position.

Note: After performing any adjustments to the pulley location in the following steps, you **MUST** check and most likely need to adjust rotary hook timing. Refer to the EMC 10 Operation Manual for hook timing information.

1. Position the trimmer system to 312 degrees using the previous procedure for checking select position.
2. Press the  key. This will keep the Z shaft from rotating from the 312 position.
3. Loosen the large socket head screw in the locking collar for the Top Bobbin Drive Pulley (see Figure 2-26) and rotate the belt and pulley slightly until the movable knife just contacts the select position fixture (see Figure 2-25).
4. Stop rotating and hold the belt and pulley in place while you tighten the large socket head screw in locking collar to 45 inch lbs (6.22 km) of torque.





5. Remove the select position fixture.
6. Press the  key to rotate the head to the head up position.
7. Perform the select position checking procedure again, to check that the movable knife now just contacts the select position fixture in the needle plate hole between 311 and 313 degrees.
8. Insure all areas loosened to adjust for select position are properly retightened before continuing.

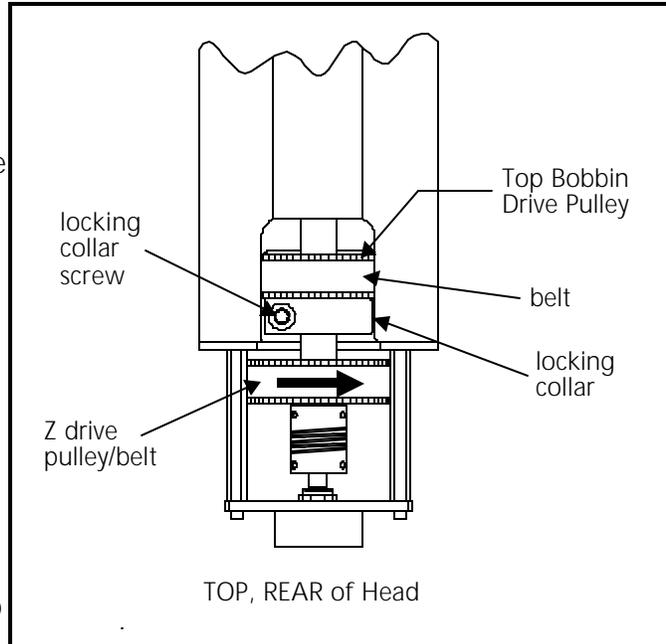


Figure 2 - 26

9. Refer to the EMC 10 operation manual for the procedure to reset hook timing.

Picker Finger Centering

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 EMC 10 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 shown in Figure 2-27).
 - 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.

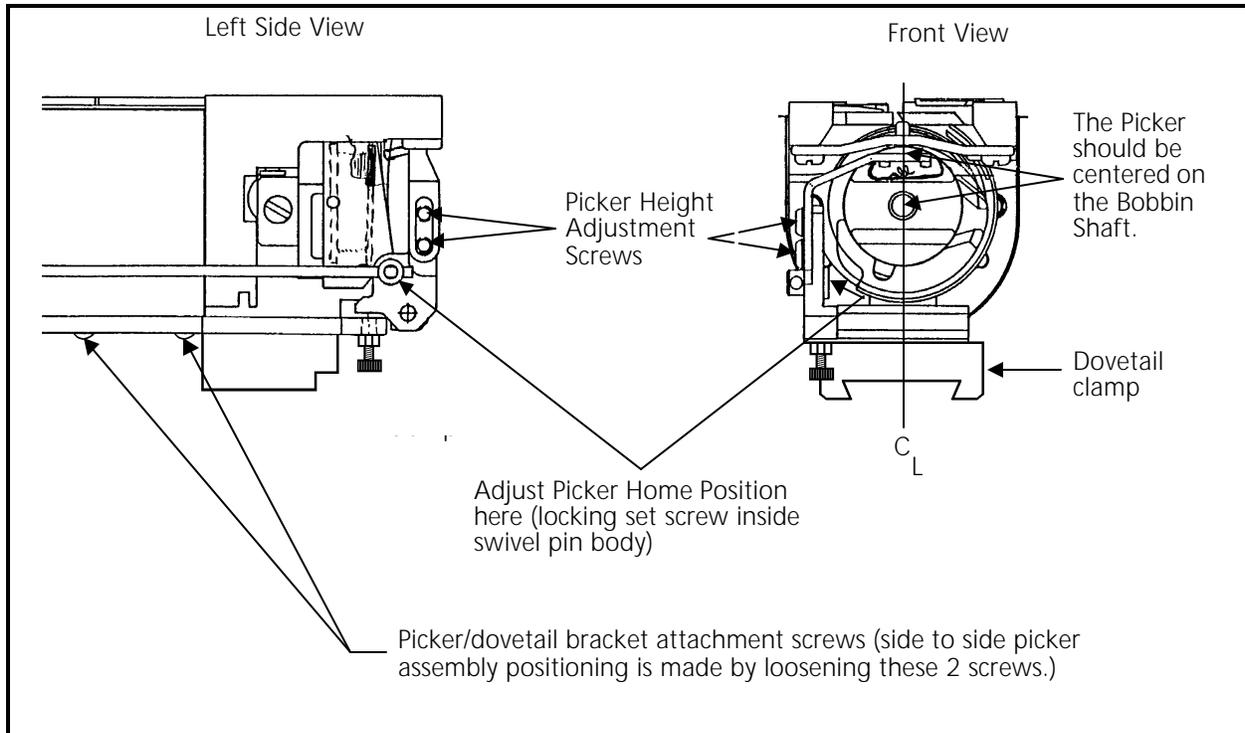


Figure 2 - 27

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 2-28) to set the picker home position.
2. Loosen the set screw inside the swivel pin body shown in Figure 2-27.
3. Move the picker until it rests in the fixture at the picker home position as shown in Figure 2-28.
4. Retighten the set screw.

Picker Height/Depth Positions

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 positions, manually push the picker into place as shown in Figure 2-28.
2. Loosen the 2 screws on the left side of the picker as shown in Figure 2-27.
3. Position the height of the picker against the fixture location shown in Figure 2-28.

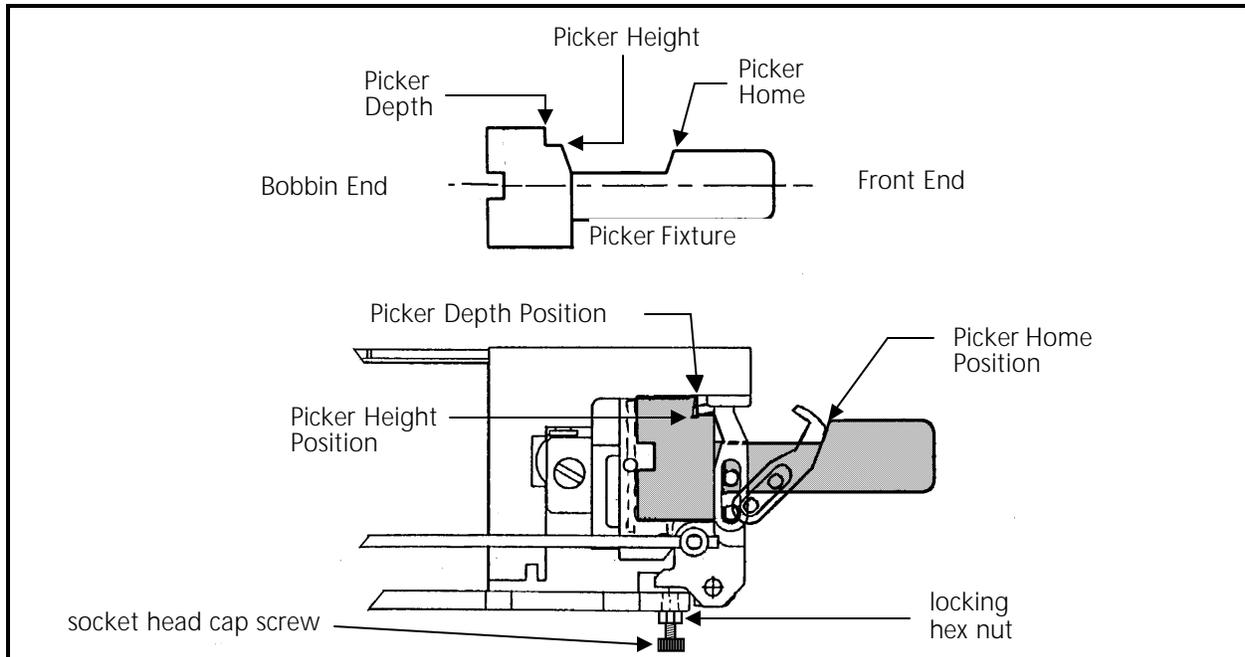


Figure 2 - 28

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 2-28.
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 2-28.
7. Retighten the hex nut, locking the socket head cap screw to hold the depth position setting.

Grabber Adjustments

The grabber blade travel is adjusted at the wire swivel where the transition bracket and guide rod enter into the rear of the head near the grabber motor. From the transition bracket, the rod is inserted into the wire swivel and held in place with a set screw.

To Check Grabber Blade Travel Follow These Steps:

1. Turn the machine off, and unplug the power cord from the power source.
2. Remove the grabber motor cover.

3. Manually rock the motor limit stop assembly to move the grabber blade all the way forward and all the way back one time (see Figures 2-29 and 2-30). This checks if the blade is binding somewhere in its travel. If so, find the mechanical bind and correct it.

DO NOT USE OIL TO TRY TO CORRECT THE BIND!

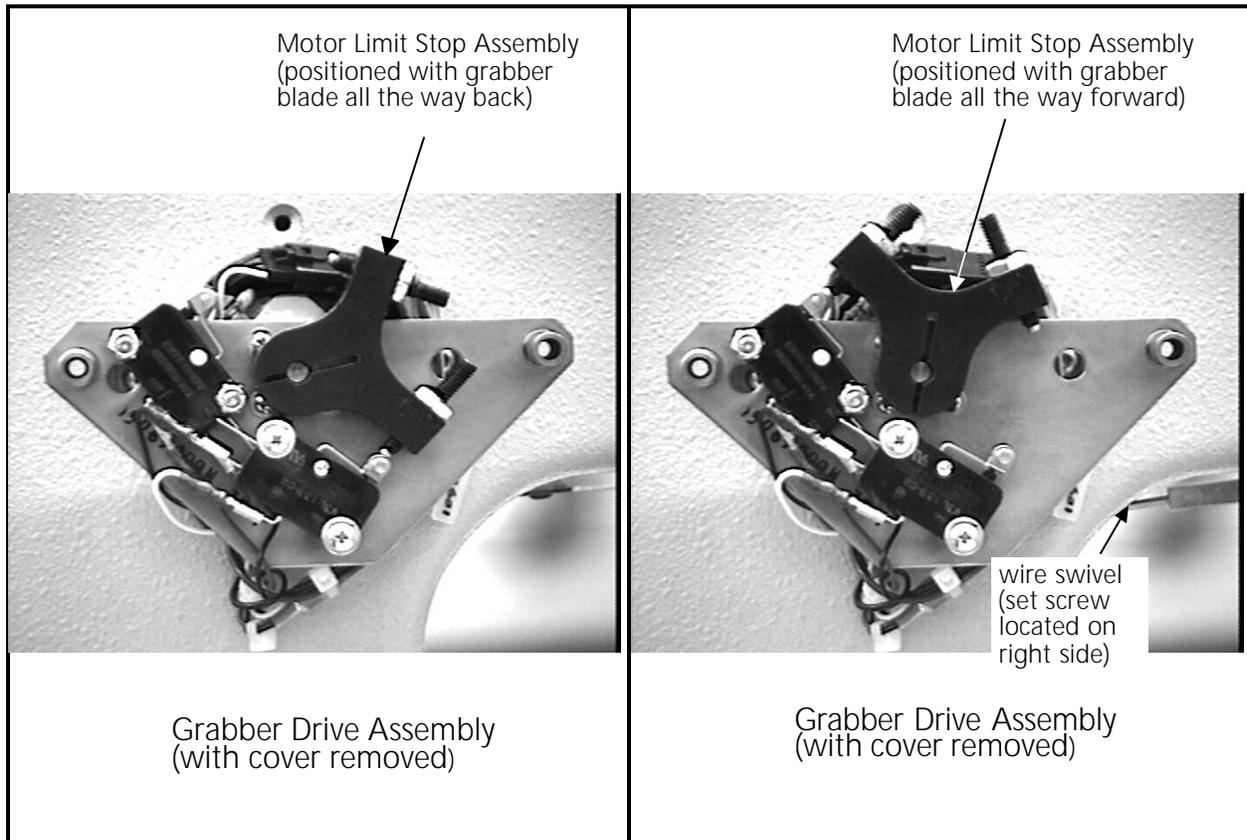


Figure 2 - 29

Figure 2 - 30

Locate the grabber blade guide just behind Velcro wiper bar at the bottom of the needle case area. There are two conditions that must be met at this area for the grabber blade to be correctly adjusted:

- A The grabber blade should be directed toward the middle of the Velcro wiper bar by the the grabber blade guide.
- B With the grabber blade positioned as far back as it will go, it should be inside the grabber blade guide, with just the "hook" portion of the blade extending out the front of the guide.

To Adjust For A:

1. Position the grabber blade as far back as it will go into the grabber blade guide by manually rocking the motor limit stop assembly as shown in Figure 2-29.
2. Locate the socket head cap screw in the end of the grabber blade guide (see Figure 2-31).

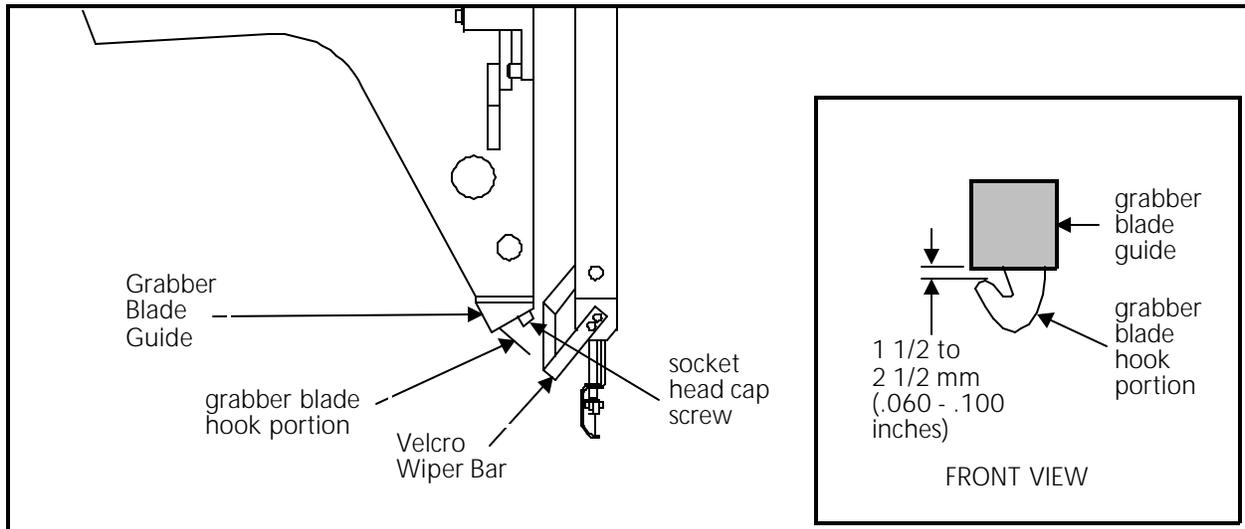


Figure 2 - 31

3. Loosen the cap screw and move the guide until the grabber blade is directed toward the middle of the Velcro wiper bar.
4. Tighten the socket head cap screw in the grabber blade guide.

To Adjust For B:

1. Position the grabber blade as far back as it will go into the grabber blade guide by manually rocking the motor limit stop assembly as shown in Figure 2-29.
2. Look at the right side of the wire swivel to find the small set screw (shown in Figure 2-30).
3. Loosen the set screw in the wire swivel and position the grabber blade so the hook is protruding between 1.5 and 2.5 mm from the guide (see the inset in Figure 2-31).
4. Tighten the set screw in the wire swivel.
5. Replace all covers after making the grabber adjustments.

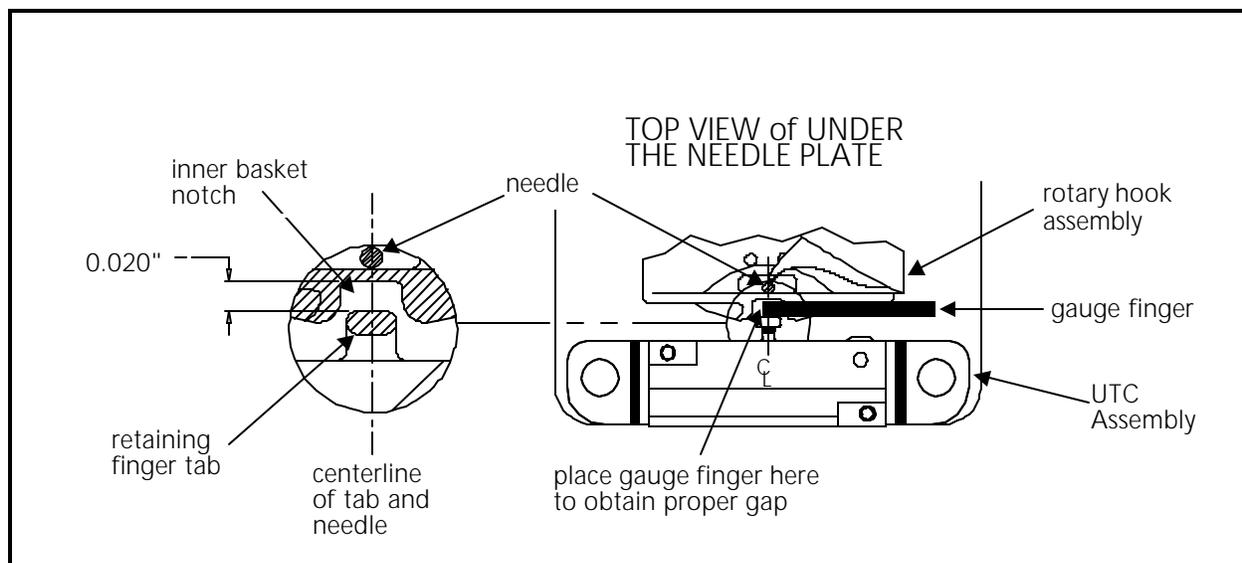
Under Thread Control (UTC) Adjustments

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.
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 2-33 for diagram of the gauge) between the retaining finger tab and the rotary hook inner basket notch (see Figure 2-32).



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 2-32).

7. Additionally, align the center of the retaining finger tab to the center of the needle as indicated in Figure 2-32.
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 2-33 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.
10. If the arm touches the gauge, carefully reshape the arm slightly until it clears.

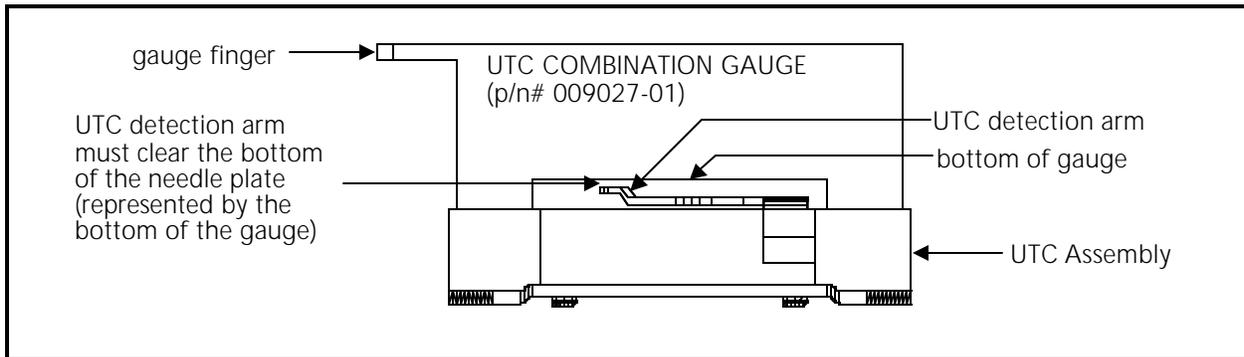


Figure 2 - 33

11. Refer to Figure 2-34 and lift the connecting link off of the movable knife assembly.

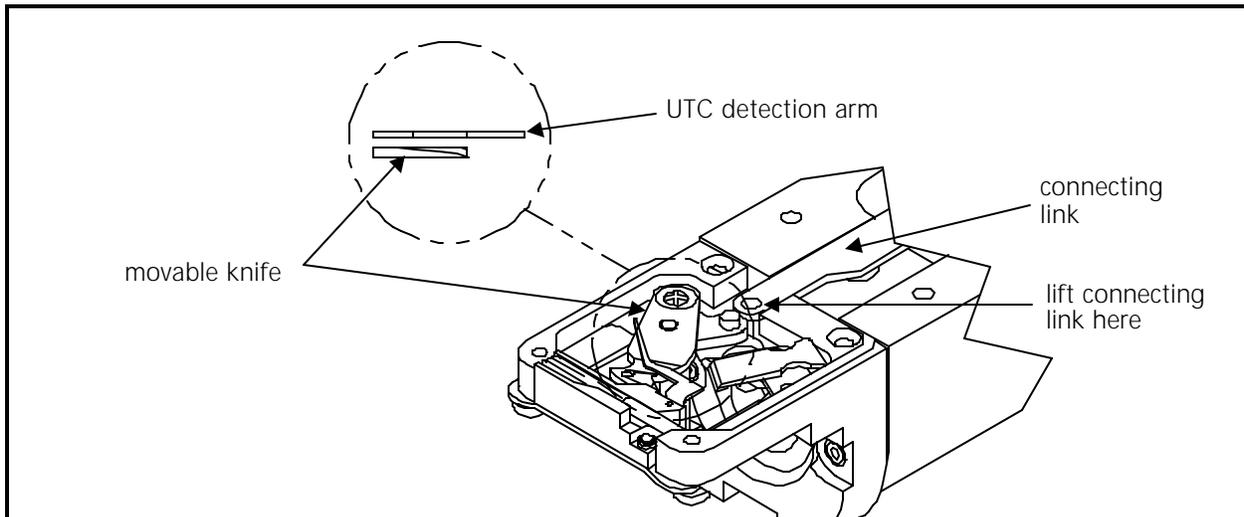


Figure 2 - 34

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.
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 2-35, and at the slotted screw hole (left side) move the sensor a very small amount away from the needle. Re-tighten the screws.

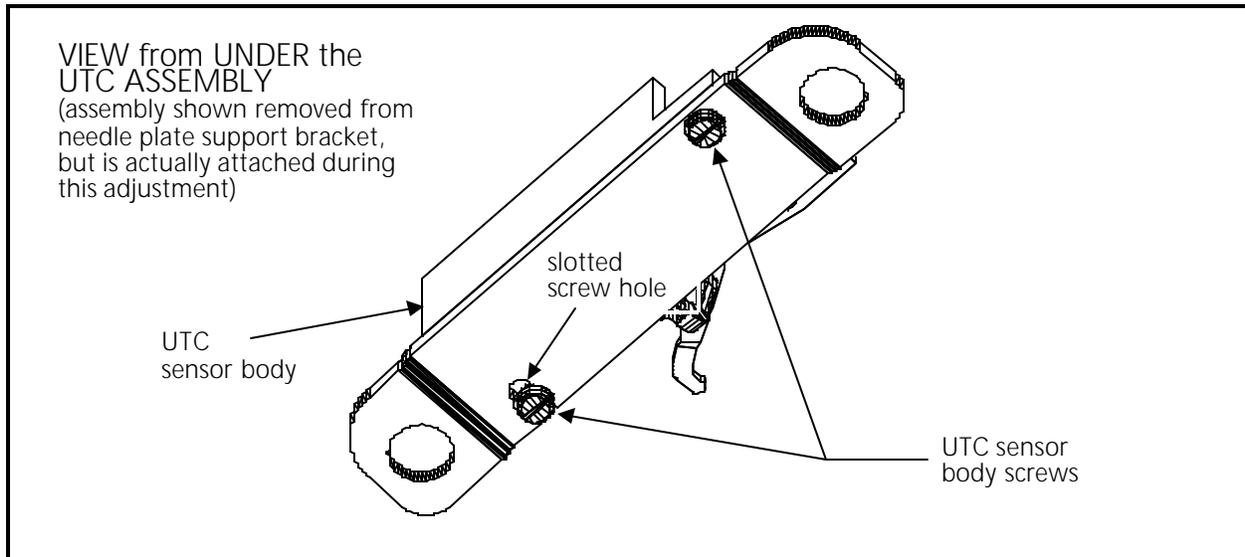


Figure 2 - 35

- 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 2-35, and at the slotted screw hole (left side) move the sensor a very small amount closer to the needle. Re-tighten the screws.

3. Mechanical Disassembly

General

This section of the manual provides detailed information for performing parts replacements that may be required during the life of the product. The procedures 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.

With certain areas in this section it is recommended that the procedure be performed by a factory trained technician. This reference is indicated by stating "*FACTORY SERVICE ADVISED*" at the start of the procedure.



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

Static Electricity / Grounding Strap Use

As with all computerized equipment, the EMC 10 Embroidery Peripheral is extremely sensitive to static electricity. Therefore it is essential that the following warnings and cautions be understood and followed. If there is any contents in these statements that is not understood, please contact the Melco technical representative in your local service area for assistance.



WARNING! It is very important that the EMC 10 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 Epicor System, electrical failures may result.

Any time work is performed inside the covered areas of the embroidery peripheral, the person performing the work **MUST** be using a static grounding strap.

The grounding strap must be connected in the proper manner to insure the static charge on the persons body is neutralized to the chassis ground level of the embroidery peripheral when working in the electronic areas under the covers.



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



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 extreme danger of exposure to dangerous voltages. It is ALSO RECOMMENDED that the static strap be checked during daily use for proper resistance protection.

Figure 3-1 shows the recommended location for attaching the grounding strap when working inside the controller area of the EMC 10.

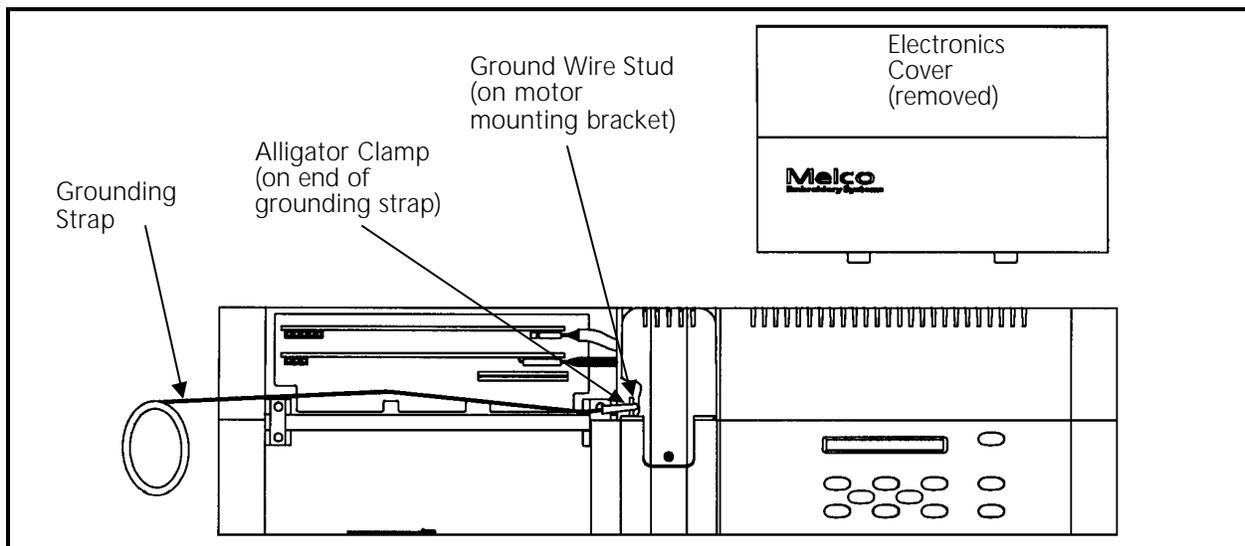


Figure 3 - 1

After removing the electronics cover (as described on the next page), locate the ground wire stud on the Z drive motor mounting bracket. This bracket is located directly behind the rear of the embroidery head. The ground stud protrudes enough to allow the alligator clamp to be attached effectively. After placing the wristband over your wrist, attach the alligator clamp of the grounding strap to this ground wire stud (or any other metal which is proven to have chassis electrical ground level).

When working inside the area under the keyboard and display, attach the grounding strap to any metal which is proven to have chassis electrical ground level, but on that side of the machine.

Embroidery Peripheral

Removing The Covers

There are two covers at the rear of the machine, the electronics cover and the keyboard cover (see Figure 3-2). These covers are attached to the machine with cover catches in the rear and angled tabs in front. The front angle tabs slip into slots at the rear edge of the embroidery area. The rear cover catches lock the covers in place.

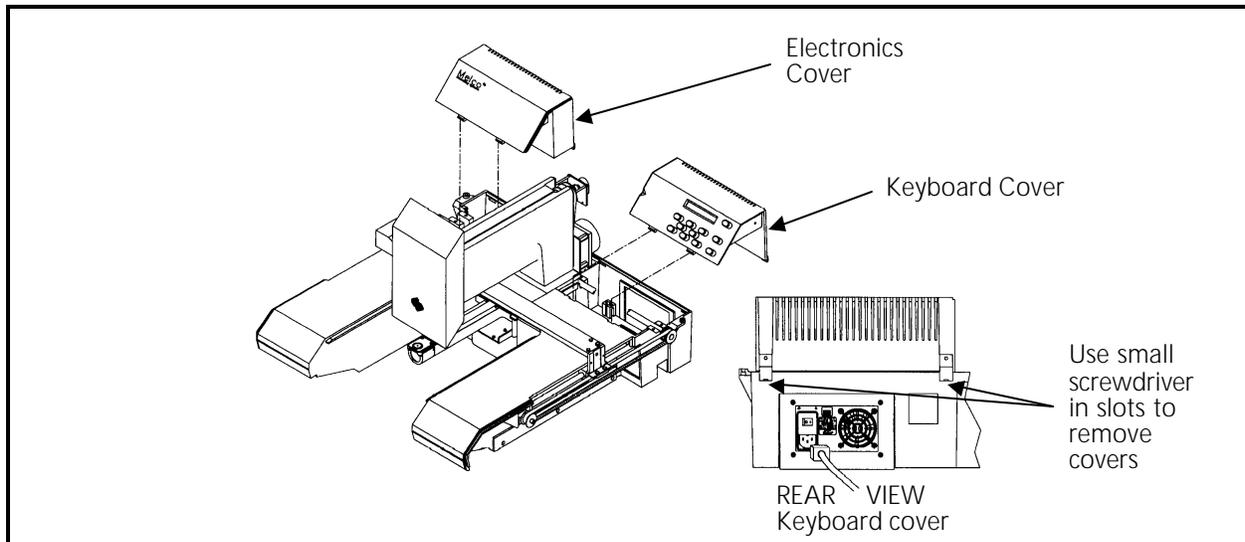


Figure 3 - 2

To remove either cover, place a small bladed screw driver under the center of, first one locking tab at the rear, and then the other, and pry up. The cover comes off in one motion toward the front.



Caution: When the electronics cover is removed, the CPU, the 4 axis driver, and the backplane boards are exposed. **DO NOT TOUCH THESE BOARDS WITHOUT USING ANTISTATIC PRECAUTIONS.**



IMPORTANT: Do Not operate the embroidery peripheral with the electronics cover removed. This cover provides the top of the EMI shielding for reducing RF interference. Operating the equipment without the shield (cover) can be a violation of FCC regulations.

End Cap Removal

The 2 end caps (or side panels) of the EMC 10 are removable to gain access to the areas covered by each. The Y drive belts and adjustments for each are accessible only with the end caps removed.

There are 3 cap head screws that must be removed, and 2 cap head screws that must be loosened to remove each end cap (refer to Figure 3-3).

Remove the 3 horizontal cap head screws first, then loosen the 2 outer cap head screws.

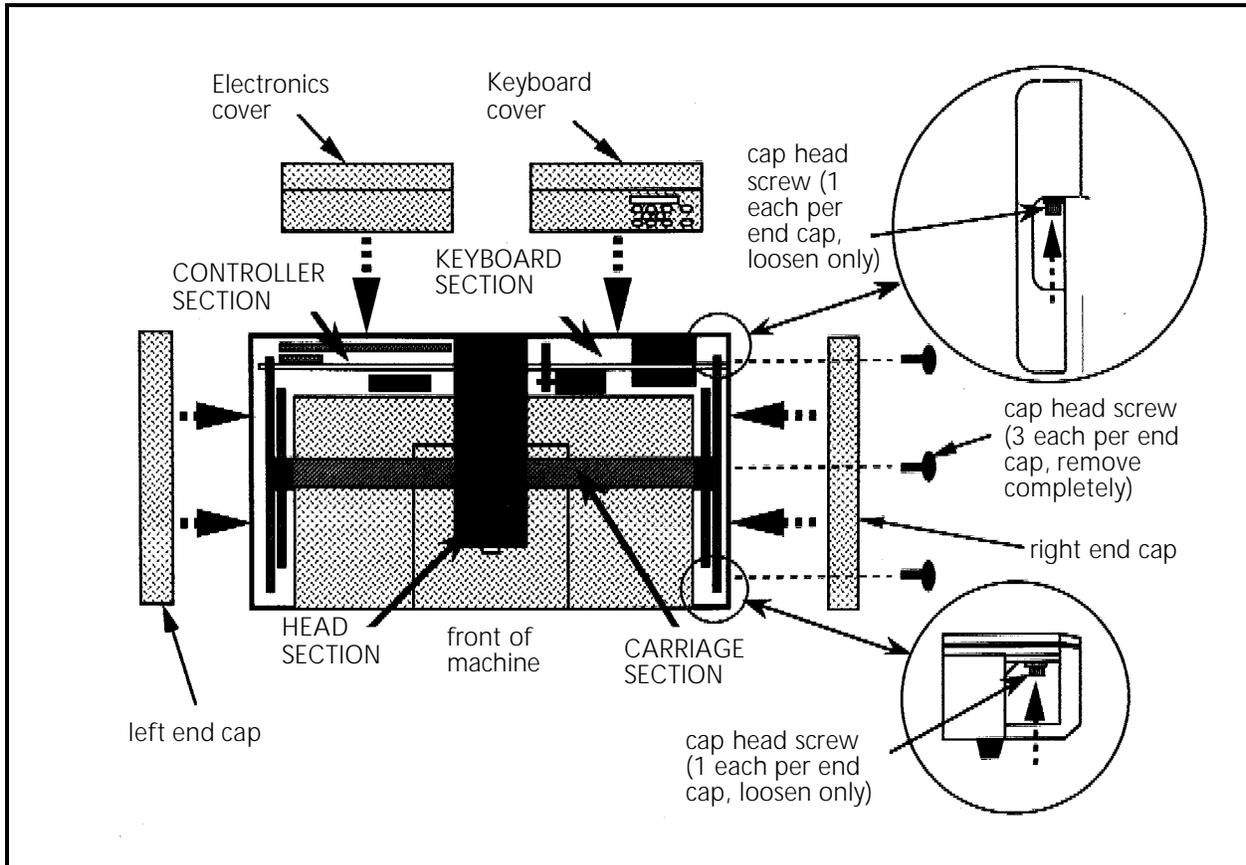


Figure 3 - 3

Controller Section

Replacing the CPU PCB and 4 Axis Driver Board



CAUTION! In removing any PCBs from the EMC 10, use extreme care in handling. Portions of the boards are very sensitive to static charges and handling them must be done using a static grounding strap as instructed in specific procedures in this manual.

The CPU PCB and the 4 axis driver board are positioned inside the electronics area of the peripheral. To replace either of these assemblies requires the removal (or at least partial removal) of the other. Refer to the following procedure for the replacement of either assembly.



TURN THE MACHINE POWER OFF AND DISCONNECT THE POWER CORD FROM THE POWER SOURCE!

1. Remove the electronics cover and set up a proper static grounding strap arrangement as described in an earlier procedure in this section.
2. Refer to Figure 3-4, then remove the ground cable and associated hardware from the middle front of the RFI shielding panel located inside the electronics opening just in front of the 4 axis driver board.

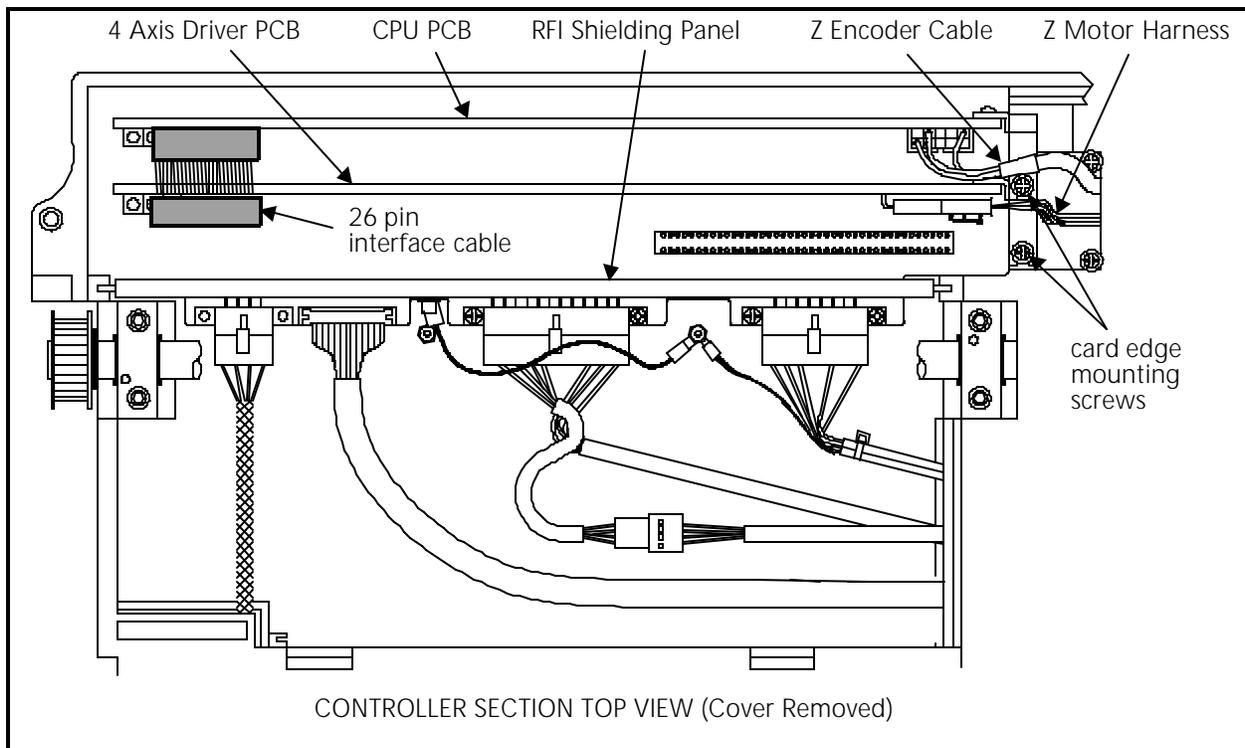


Figure 3 - 4

3. Grasp the RFI shielding panel at the top and pull it out of the electronics opening.

4. Disconnect the Z motor harness at the top right hand corner of board 4 axis driver board.
5. Disconnect the Z encoder cable at the top right hand corner of the CPU.
6. Disconnect the network cable, and terminator (if present) from the rear of the peripheral at the CPU card edge mounting bracket. Disconnect the 18 color interface harness from the rear of the peripheral at the 4 axis driver card edge mounting bracket.
7. Disconnect the 26 pin interface cable connected at the bottom left of the 4 axis driver board.
8. Remove the screws and washers at the card edge mounting brackets (near the embroidery head) for the CPU and 4 axis driver board.
9. Grasp the 4 axis driver board at the top corners and gently rock it up and out of its card edge connectors in the bottom backplane board.

Do not attempt to remove the 4 axis driver board at this time.

10. Grasp the CPU at the top corners and gently rock it out of its connectors in the backplane board.
11. Remove the CPU from the electronics section, using care not to catch the 26 pin interface ribbon cable on any 4 axis driver board components.
12. Move the 4 axis driver board to the rear of the electronics section so the ejection levers on the connector in the card edge mounting bracket will clear the chassis bracket when the board is removed.
13. Carefully remove the 4 axis driver board from the electronics section.
14. Replace the 4 axis driver board, then the CPU PCB, in that order by reversing the previous steps.
 - a) Insert the 4 axis driver board into the electronics section and position it forward without installing it in the backplane board.
 - b) Insure the 26 pin interface cable is securely connected to the bottom left of the CPU PCB.
 - c) Lift the 4 axis driver board slightly, then carefully lower the CPU into the card edge connectors of the backplane board. Make sure the 26 pin interface cable routes itself under the 4 axis driver board.
 - d) Insert the 4 axis driver board into the card edge connectors of the backplane board.

15. Install the screws and washers at the card edge mounting brackets to secure the CPU PCB and 4 axis driver board.
16. Connect the 26 pin interface cable connection to the bottom left of the 4 axis driver board.
17. Reconnect the Z motor harness at the top right corner of the 4 axis driver board.
18. Reconnect the Z encoder cable at the top right corner of the CPU.
19. Reinstall the network cable, terminator (if present), and 18 color interface harness to the rear of the peripheral at the CPU and 4 axis driver board card edge mounting brackets.
20. Reinstall the RFI shielding panel in front of the 4 axis driver board in the electronics section.
21. Reinstall the ground cable and associated hardware at the middle front of the RFI shielding panel.
22. Replace the electronics cover.
23. If during this procedure, the CPU has been replaced with a different one, you must "configure" the embroidery peripheral. Refer to Section 1 of this manual for information regarding the configuration process.

Backplane PCB Replacement

The backplane PCB sits on bottom of the controller section, and contains the connector where both the CPU and 4 axis driver PCBs are inserted.

1. To remove and replace the backplane PCB, first remove the electronics cover, the RFI shielding wall, and CPU PCB & 4 axis driver board as earlier described.

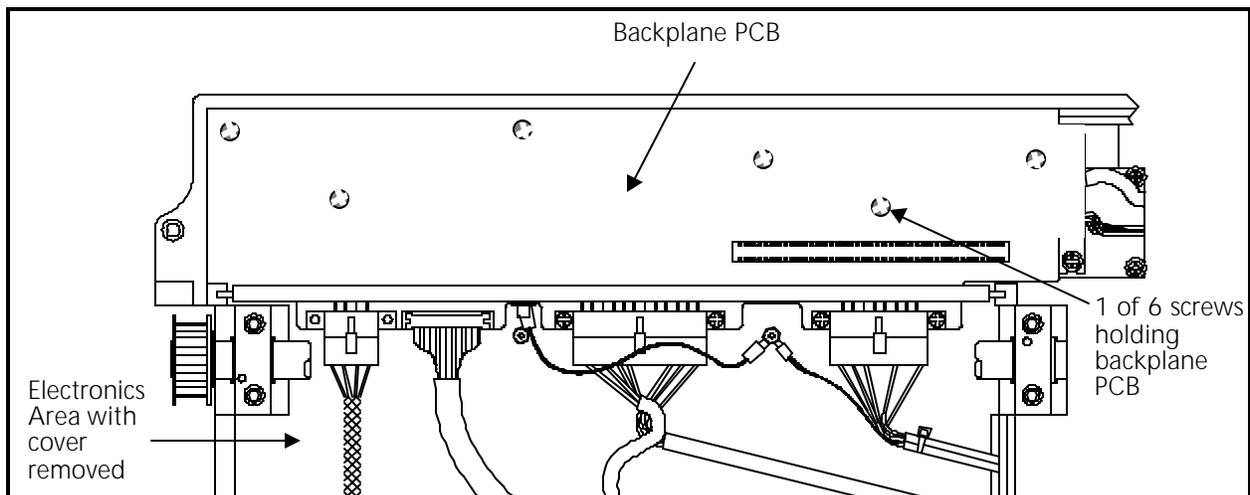


Figure 3 - 5

2. Disconnect the cables from the backplane PCB and remove the 6 screws holding the PCB to the base of the controller section.
3. Lift the PCB out of the controller section.
4. Replace the backplane PCB using the previous steps in reverse.

Keyboard Section

Keyboard/Display Replacement

To remove the keyboard/display assembly from the cover, refer to Figure 3-6 and the following procedure:

1. Turn OFF the power switch to the EMC 10 and remove the power cord from the power source electrical outlet and the rear of the machine.
2. Remove the keyboard cover (refer to specific instructions) and carefully slide the flat ribbon cable off the keyboard PCB edge connector.
3. Place the cover (with keyboard/display assembly) onto a surface which is free of static electricity.
4. Install a static grounding strap between the working surface and the personnel performing this procedure. Refer to Figure 3-6 to perform the next steps.

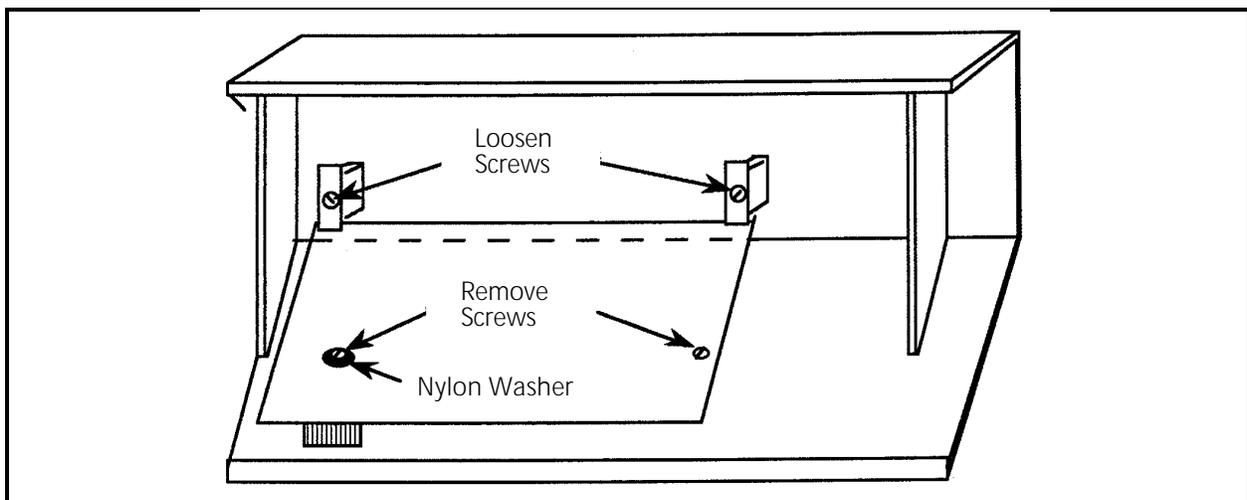


Figure 3 - 6

5. Locate and loosen the two screws (indicated in Figure 3-6) that secure the PCB at the top.

6. Locate and remove the two screws that secure the PCB near the bottom as indicated in Figure 3-6.

NOTE: Locate the nylon insulating washer under the head of the left screw as shown in the figure. This washer must be reinstalled with a new PCB to avoid the possibility of causing electrical circuit damage.

7. Remove the PCB from the keyboard cover. Lift at the bottom and the top will follow.
8. Transfer the key caps from the old PCB to the new PCB by simply lifting them off of the keys by using finger pressure only. It is recommended that this be done one key at a time to avoid errors in key cap arrangement on the new PCB.
9. When the key caps are transferred, reinstall the keyboard/display assembly by reversing the preceding steps. Insure that the nylon insulating washer is installed under the left screw on the PCB.

Refer to the Adjustment Section of this manual for information in adjusting the intensity of the display, if required.

Power Supply Replacement

1. Turn OFF the peripheral, and unplug the power cord from the source.
2. Remove the keyboard cover. Disconnect the keyboard ribbon cable, and set the cover aside.
3. Disconnect the power distribution cable from the connector on the power supply.
4. Remove the two cap head screws (one on each side of the power supply at the rear, shown in Figure 3-7). These 2 screws hold the mounting bracket to the chassis.

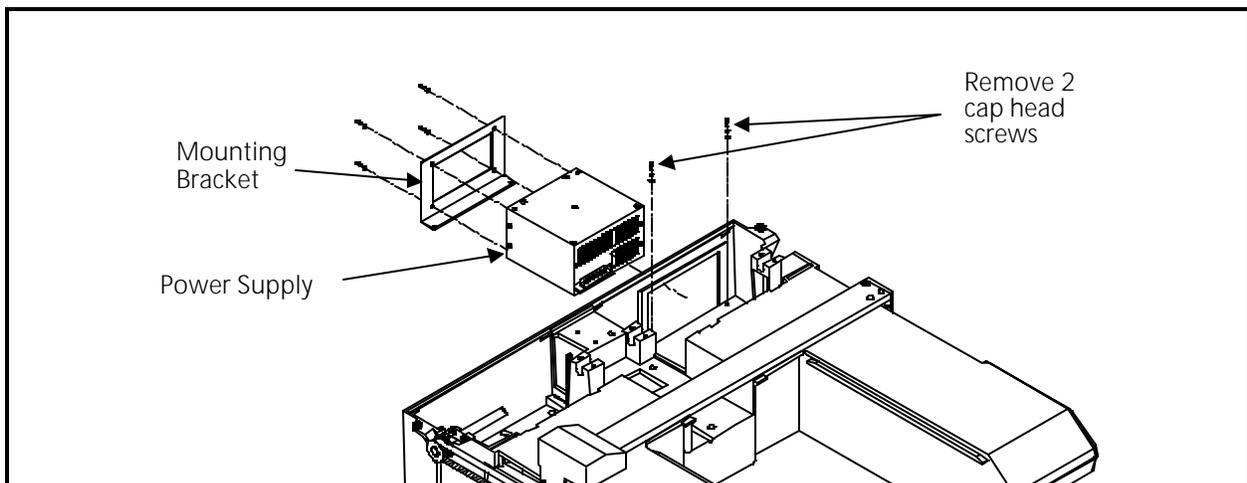


Figure 3 - 7

5. Remove the 4 phillips screws holding the mounting plate to the power supply.
6. Remove the mounting bracket from the chassis by swinging the bottom of the mounting bracket away from the chassis and pulling down.
7. Slide the power supply partially out of the slot and disconnect the power harness from the power supply (see Figure 3-8).

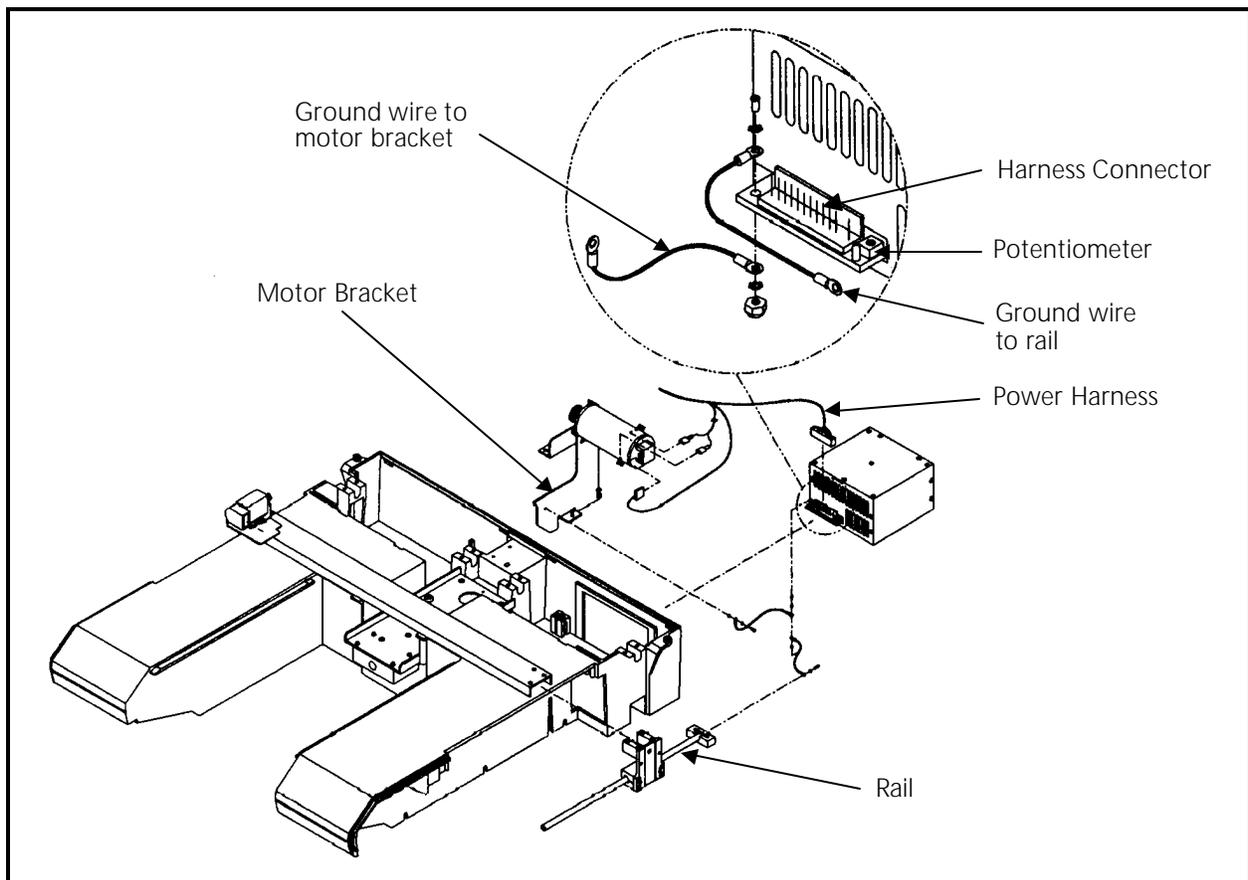


Figure 3 - 8

8. Remove the grounding cables and hardware attaching them to the power supply.
9. Grasp the power supply and slide it out of the rear cutout in the chassis.
10. Put the new power supply partially into place in the rear of the chassis.
11. Attach both of the grounding cables to the new power supply with the existing hardware.
12. Re-attach the power harness to the new power supply connector, then push the power supply all the way into the chassis.

13. Insert the bottom end into the cutout slot on the chassis, then push the top part of the bracket toward the chassis and pull it up into proper position.
14. Install the power supply to the mounting bracket with the four screws removed earlier.
15. Attach the mounting bracket to the bottom of the chassis with the 2 cap head screws that were removed earlier.
16. Attach the power cord to the new power supply.

Refer to the Adjustments section of this manual to check and adjust (if needed) the +5 volt value.

Y Drive Motor Replacement

"FACTORY SERVICE ADVISED"

When replacing the Y drive motor, the drive belt tension adjustment is very critical. Therefore, before attempting to replace and adjust the belt tension of the Y drive motor, it suggested that you contact the Melco service representative in your area for recommendations before proceeding.



CAUTION! DO NOT attempt to adjust the tension of the Y drive motor belt before first contacting a factory trained Melco service representative. Over tightening the attaching/adjustment screw will result in damage to the chassis.

To replace the Y drive motor, refer to the following procedure:

1. Turn OFF the power switch to the EMC 10 and remove the power cord from the power source electrical outlet and the rear of the machine.
2. Remove the keyboard cover (refer to specific instructions for removal).
3. Refer to the previous procedure for removing the power supply, if you must remove the Y motor mounting bracket.
4. Refer to Figure 3-9 and disconnect the encoder harness (the harness with the 4 small green, red, white, and black wires) from the Y drive motor encoder.
5. In Figure 3-9 locate and remove the drive belt adjusting screw and the Y motor support bracket locking screw (under the motor).

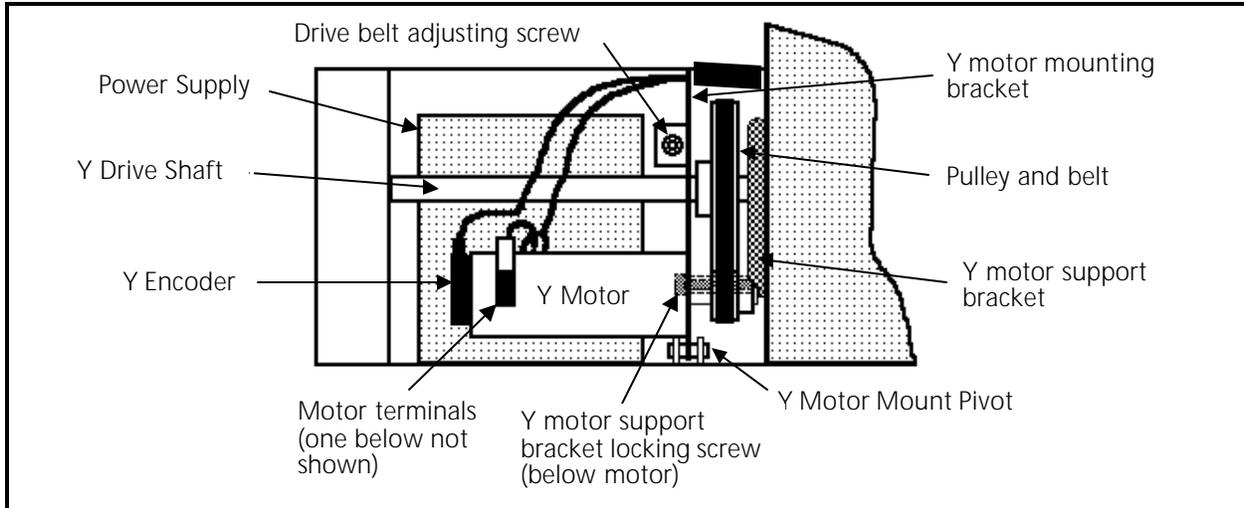


Figure 3 - 9

6. The motor mounting bracket rotates upward, pivoting on the pin. Carefully maneuver the motor (with bracket still attached) upward and out of the chassis slot in the front; and the block at the rear.

NOTE: The bracket is slotted in the rear to allow it to detach from the pin in the block without the need to remove the pin.



CAUTION! It is advised to label the wires with appropriate means so you will understand exactly where the wires are to be replaced during reinstallation. Identify which of wires goes to which motor terminal before removing the wires in the next step.

7. Before the assembly can be completely removed, identify and disconnect the two motor power harness connections (one connector wire is red and the other one is black).



WARNING! If the two motor power harness connectors are reversed from the original connections, the motor will drive the beam to the mechanical stops of the embroidery field with no regard to speed control when machine is first operated.



CAUTION! DO NOT attempt to adjust the tension of the Y drive motor belt before first contacting a factory trained Melco service representative. Over tightening the attaching/adjustment screw will result in damage to the chassis.

8. Reverse the previous steps to reinstall a new motor. Contact the Melco factory trained service representative in your area regarding the installation of the drive belt adjusting screw and before attempting to adjust the tension of the Y drive motor belt.

Carriage Section

X Beam Removal

The purpose of this procedure is to remove the X beam as an assembly for field replacement and factory rebuild (or bench top repair/adjustment). Refer to the specific replacement procedures for replacement of the X motor, X motor belt, or X drive belt.

1. Turn OFF the power switch to the EMC 10 and remove the power cord from the power source electrical outlet and the rear of the machine.
2. Remove the left and right end caps from the embroidery peripheral. (Refer to specific instructions for removal.)
3. Remove the X motor cover by loosening the two button head cap screws (see Figure 3-10) just enough to slip it off.

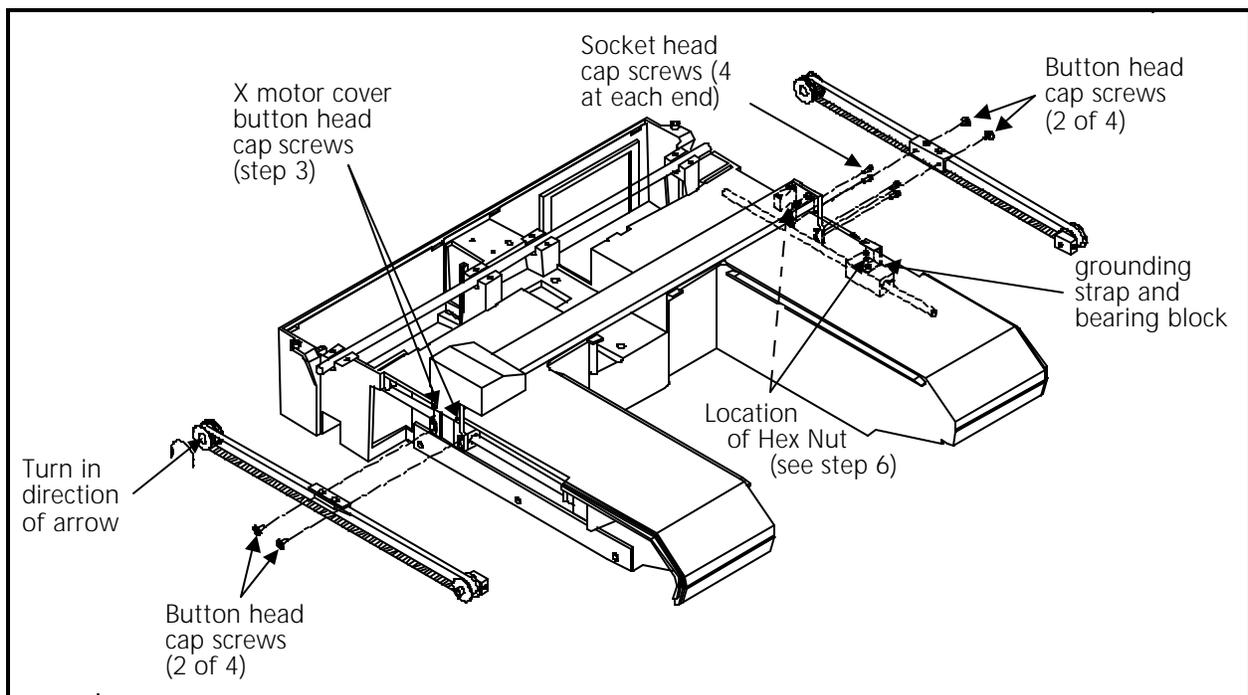


Figure 3 - 10

4. Remove the four button head cap screws (2 at each end) that attach the belt clamps to the carriages (see Figure 3-10).

NOTE: The Y drive belt clamps have four button head screws: two fasten the belt to the clamps, and two fasten the clamps to the carriage. Remove only the screws that hold the clamps to the carriage!

5. Turn the pulley in the back and move the belt clamps out of the way towards the rear of the machine (see Figure 3-10).
6. On the keyboard side of the beam, locate the hex nut (under the beam) connected to the grounding strap (see Figure 3-10). Loosen, but do not remove the hex nut.
7. On the keyboard side of the beam, remove the four socket head cap screws from the right carriage (see Figure 3-10).
8. Slide the grounding strap and bearing block towards the front of machine and away from the beam (see Figure 3-10).

9. Disconnect the X beam harness from the connector of the X drive harness located under the left carriage (see Figure 3-11).
10. Remove the X drive harness from the bracket by first pressing in on the tabs (see Figure 3-11).
11. Remove the 3 phillips head screws on the connector bracket and remove the bracket from the bottom of the bearing block (see Figure 3-11).
12. Remove the 4 socket head cap screws from the left Y carriage (see Figure 3-11).

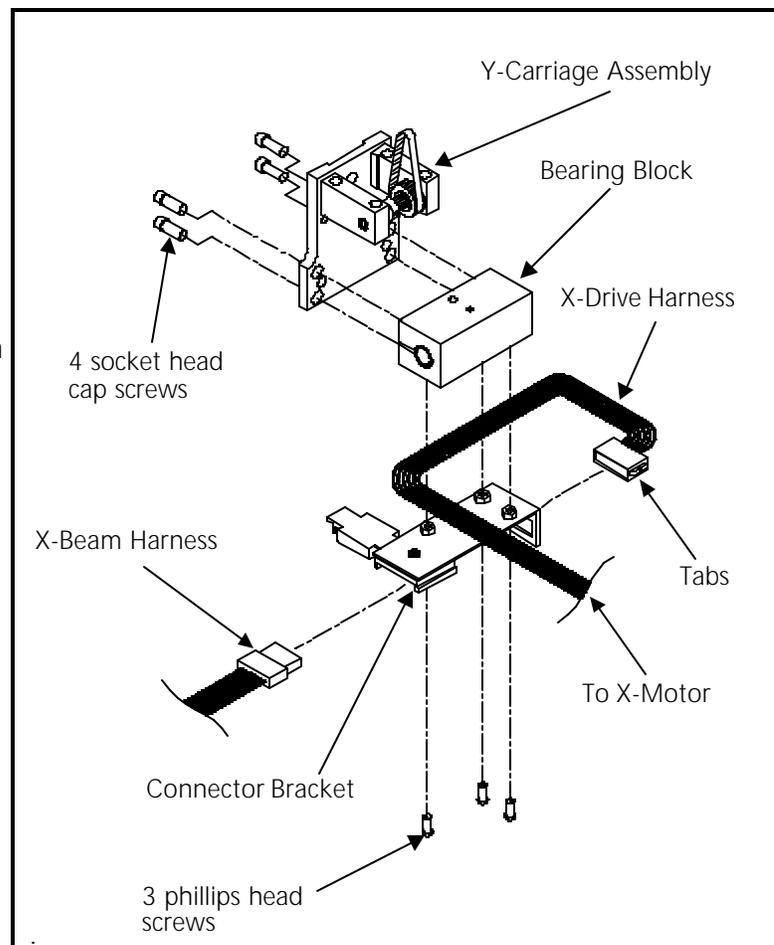


Figure 3 - 11

13. Carefully remove the beam assembly, guiding the harness up between the belt and chassis.

X Beam Installation

1. Place the X beam carefully into position, being sure to guide the X motor harness down between the belt and the chassis.
2. Slide the right side bearing block (with the grounding strap) under the beam, positioning the grounding strap between the hex nut and star washer and the underside of the beam.

NOTE: Do not tighten the nut at this time, but remember to go back and tighten it after the next step.



CAUTION! **DO NOT** over tighten the screws in the following step, to avoid possibly cracking or breaking the Y carriage brackets!

3. Attach the right side Y carriage to the bearing block with the four socket head cap screws (see Figure 3-11). Use Loctite 222 hardware adhesive, or equivalent, and tighten these screws.
4. Now tighten the nut securing the ground strap from step 2 above.
5. Slide the left side bearing block under the beam and attach the left side Y carriage to the bearing block with the four socket head cap screws (see Figure 3-11). Refer to the precaution for step 3 above, then, using Loctite 222 hardware adhesive or equivalent, tighten these screws.
6. Position the X motor harness under the left side bearing block.
7. Position the connector bracket under the bearing block with the X motor harness between the bracket and the bearing block (see Figure 3-11). Attach the connector bracket with the 3 phillips head screws.
8. Squeeze in the tabs on the X drive harness and snap it into the slot in the connector bracket (see Figure 3-11).
9. Connect the X beam harness to the X drive harness. Place the X beam harness into the strain relief and snap it closed (see Figure 3-11).
10. Push the beam to the back of the machine so that it rests against the back stops. Turn the rear pulley and align the belt clamps with the Y carriages.
11. Install, but do not tighten, the two button head cap screws attaching each belt clamp to the bearing blocks on each side (see Figure 3-10).
12. Squared up the belt clamps with the Y carriage when the beam is against the back stops on each side, then tighten the screws.

13. Slip the X motor cover back in position and tighten the two button head cap screws (see Figure 3-10).
14. Install the end caps removed earlier.

X Motor Replacement

"FACTORY SERVICE ADVISED"

This procedure requires a specific adjustment tool (0 to 20 pound pull gage) for proper adjustment.

1. Turn OFF the power switch to the EMC 10 and remove the power cord from the power source electrical outlet and the rear of the machine.
2. Remove the left end cap. (Refer to specific instructions for removal.)
3. Remove the black plastic X motor cover, by loosening the two (2) hex button head screws attaching the cover to the beam (see Figure 3-10).



CAUTION! The Y drive belt clamp has four button head screws 2 fasten the belt clamp, and 2 fasten the clamp to the Y carriage. **LOOSEN ONLY THE SCREWS THAT HOLD THE CLAMP TO THE CARRIAGE!**

4. Remove the 2 screws that secure the Y drive belt clamp to the Y carriage (see Figure 3-10).

NOTE: These screws, lock washers, and flat washers **MUST NOT BE MIXED WITH** or **SUBSTITUTED BY** other hardware. The exact dimensions are very critical in the smooth operation of the carriage.

5. Identify the locations in the X drive harness connector where the red and black X motor wires are inserted. (The red wire is in position #8, the black wire is in position #4.) See Figure 3-12.

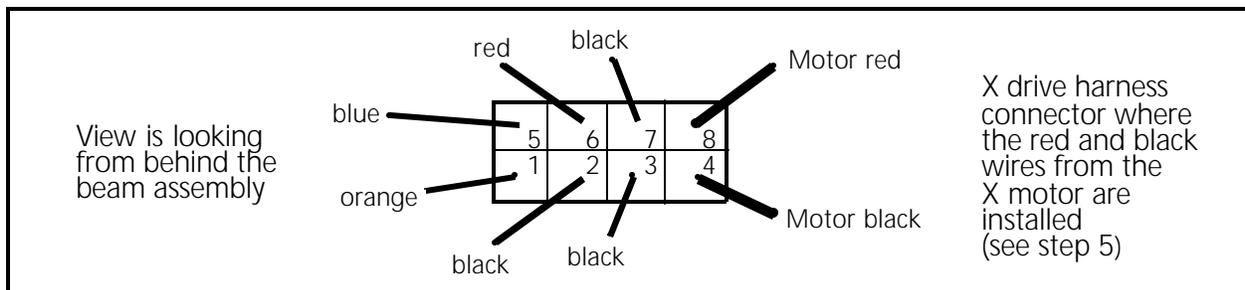


Figure 3 - 12

6. Extract the old motor wires from this connector.

7. Carefully disconnect the X motor encoder harness from the encoder body on the old X motor (see Figure 3-13).

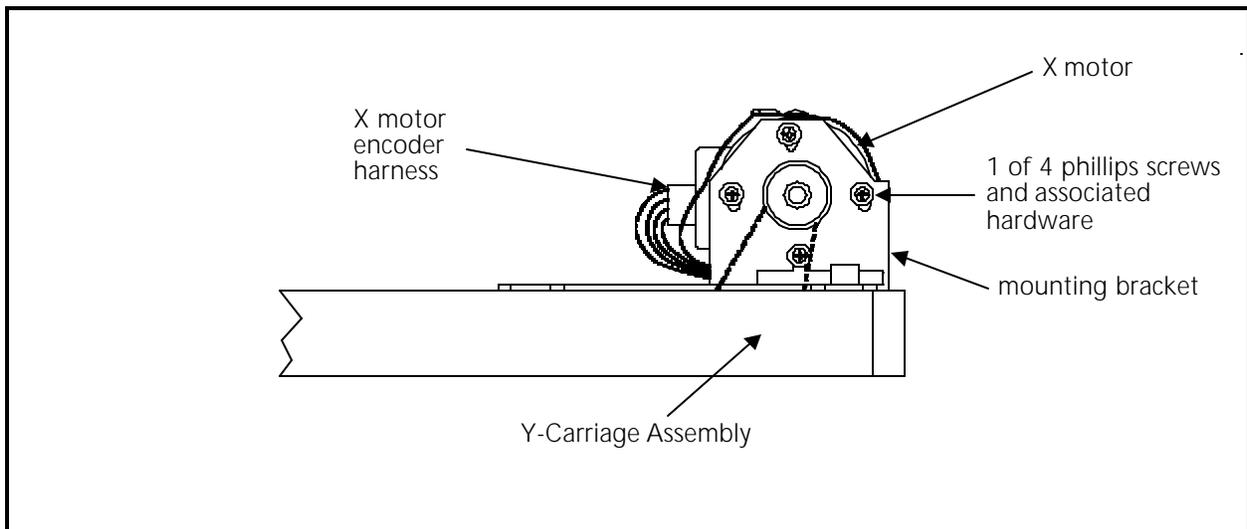


Figure 3 - 13

8. Remove the 4 phillips screws and associated hardware attaching the X motor to the mounting bracket. Tilt the motor to take the belt off the pulley, then remove the motor.
9. With a hex driver loosen the X motor drive pulley set screw and remove the pulley from the old motor.
10. Remove the set screw from the pulley and apply "red" Loctite (or equivalent) screw adhesive to the set screw. Reinstall the set screw.
11. Install the drive pulley onto the new motor shaft.
12. Tighten the pulley set screw leaving a gap of at least .0020" between the back of the pulley and the motor bracket to ensure there is no bind.
13. Place the new motor in the bracket and put the belt onto the pulley that has been transferred from the old motor.
14. Install, but do not tighten, the four phillips mounting screws and associated hardware.
15. Refer to the motor belt tensioning procedure in the Service Adjustments section of this manual for information in tightening the mounting screws.
16. Replace the covers removed at the beginning of this procedure.

X Motor Belt Replacement

"FACTORY SERVICE ADVISED"

To replace the X motor belt, the motor end of the beam assembly must be disassembled. This procedure requires specific adjustment tools (the Melco one pound weight and a 0 to 20 pound pull gauge) for proper adjustment.

1. Remove the X beam by referring to the specific procedures in this manual.
2. Remove the X motor by referring to steps 1, 2, 3, 4, and 7 in the specific procedures for removal in this manual.

NOTE: Do not remove the red and black wires from the X drive harness connector as described in steps 5 and 6 in the X Motor Replacement procedure. Also, there is no need to disconnect the X motor encoder harness from the encoder body on the old X motor. In addition, you will not be transferring the motor drive pulley.

3. At the right end of the beam assembly, loosen the X drive belt idler pulley assembly by rotating the socket head cap screw at the end of the assembly counter-clockwise (see Figure 3-19).
4. At the X motor end of the beam, remove the 2 socket head cap screws and 1 button head screw (with the ground wire attached) and take the motor mount off the beam (see Figure 3-14).

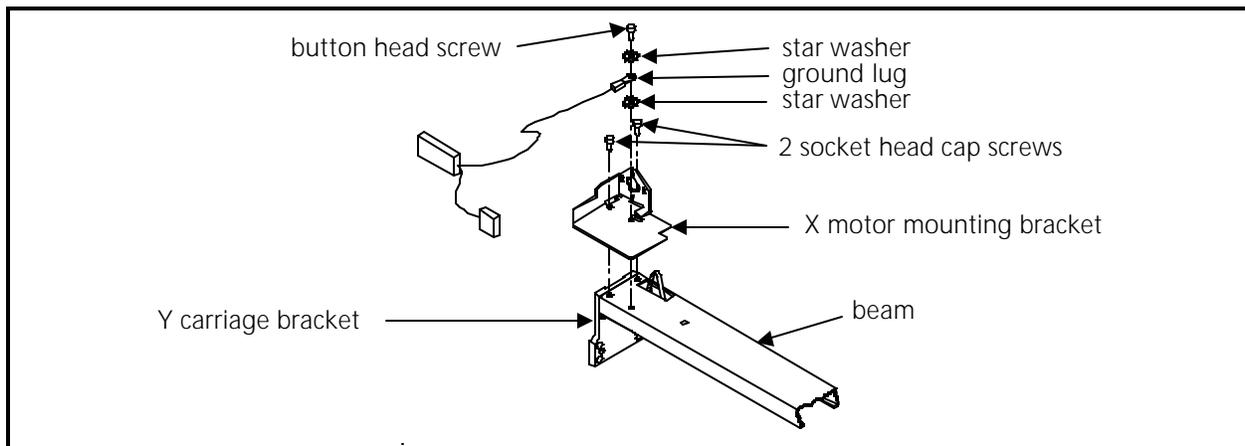


Figure 3 - 14

NOTE: There is star washer on each side of the ground lug at the above button head screw. Be sure to replace this hardware in the same order when replacing these parts.

5. The Y carriage bracket at the X motor end of the beam will now be loosened and able to be removed from the end of the beam.

To replace the X motor belt, you must disassemble the pulley system inside the Y carriage bracket. These parts consist of the X drive pulley and belt, the motor pulley and belt, a spacer at each end, and the shaft that all these parts fit onto.

6. To disassemble the Y carriage pulley system, you must keep the pulleys in their relative arrangement, then loosen the set screws in each pulley and remove the shaft (see Figure 3-15).

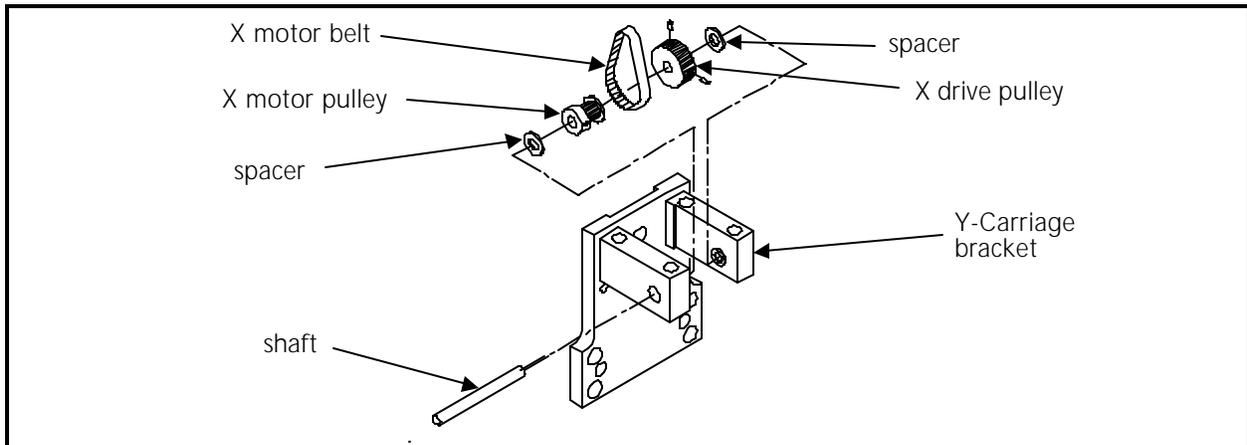


Figure 3 - 15

7. Place the new motor belt around the motor pulley, then reinstall the shaft into the assembly parts in the following order: the front facing side of the Y carriage bracket, a spacer, the X drive pulley and belt, the motor pulley and belt, another spacer, and then the back side of the Y carriage bracket. (Insure that both belts are installed.)
8. With the shaft centered in the bracket, apply force on one pulley to its respective Y carriage bracket wall and against the spacer.
9. Apply Loctite brand 222 screw adhesive (or equivalent) and tighten the set screws in the pulley against the flats on the shaft.
10. Repeat the 2 previous steps with the other pulley.
11. After reassembling the Y carriage bracket pulley assembly, there should be no end to end movement of the pulleys and shaft, both belts should be installed, and the shaft ends should not be extended beyond the bracket at either end.
12. Reattach the Y carriage bracket assembly and X motor mount to the end of the beam with the 2 socket head cap screws and 1 button head screw (with the ground wire and hardware attached). Before tightening the screws, ensure the motor mount is positioned forward as far as it will go and the Y carriage bracket assembly is aligned evenly on the end of the beam. Also, ensure there is star washer on each side of the ground lug at the button head screw before tightening (see Figure 3-14).

13. Reattach the X motor to the beam following the X motor replacement and motor belt adjustment procedures found earlier in this manual.
14. Refer to Section 2 of this manual and adjust the X drive belt tension.
15. Reinstall the X beam by referring to the specific procedure in this manual.

X Drive Belt Replacement

"FACTORY SERVICE ADVISED"

If the need arises for the X drive belt to be replaced, it is recommended that the entire X beam be replaced with one that has been refurbished at the factory. Other components in the beam should be evaluated during X drive belt replacement, and factory trained technicians are equipped to perform this procedure properly.

For X beam replacement, refer to the X beam procedure in this manual.

If you decide, however, to go ahead and replace the X drive belt only, refer to the following procedure. This procedure requires specific adjustment tools (the Melco one pound weight and a 0 to 10 pound pull gauge) for proper adjustment.

1. Remove the X beam by referring to the specific procedures in this manual.

To replace the X drive belt, you must remove the X carriage assembly from the beam and turn it over to get to the X drive belt fastening clamps.

2. At the right end of the beam assembly, remove the X drive belt idler pulley assembly by removing the socket head cap screw at the end of the assembly (see Figure 3-19).
3. On the X carriage assembly, loosen the 2 socket head cap screws in each of the 2 rectangular brackets with small tabs at one corner (see Figure 3-16).

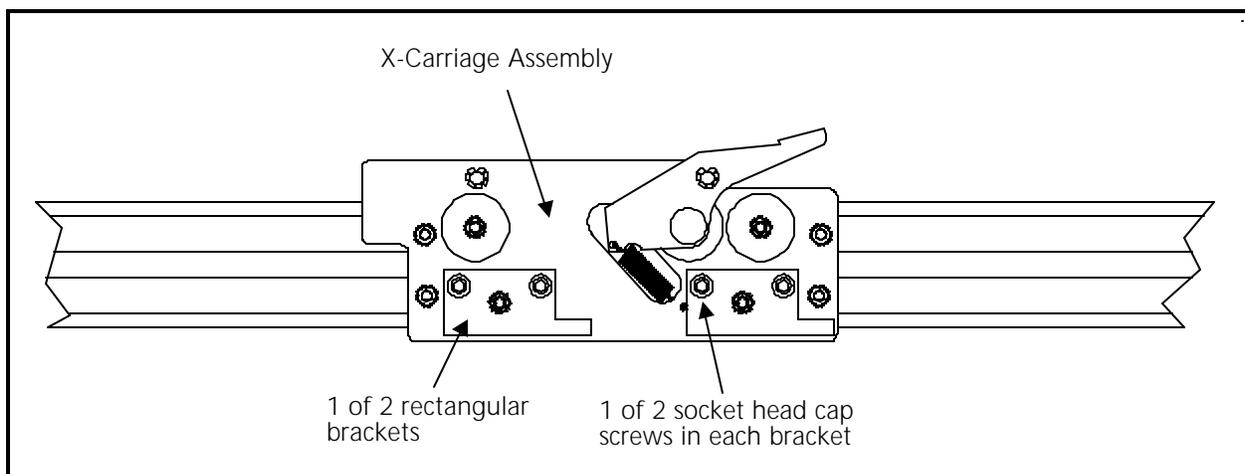


Figure 3 - 16

4. Move the tabbed end of these brackets toward the center of the assembly. This should free the assembly to be removed from the beam.
5. Remove the X carriage assembly from the beam and turn it over to gain access to the X drive belt clamps (see Figure 3-17).

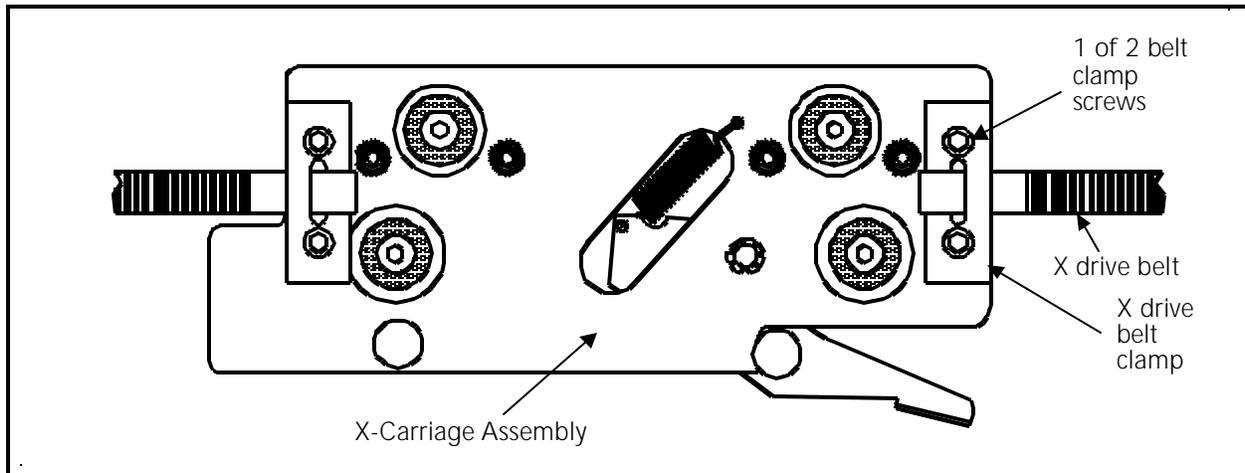


Figure 3 - 17

6. Note how the old belt is attached to the clamps, then remove the 2 screws securing the belt clamp at one end only. Working with one end at a time will allow you to use the other end as a guide when installing the new belt.
7. Install one end of the new belt into the clamp that was removed in step 6. Refer to the following steps and Figure 3-18. Use the end of the X carriage assembly that still has the clamp holding the old belt as a guide.
 - a) Position the belt clamp with the recessed middle area facing up.

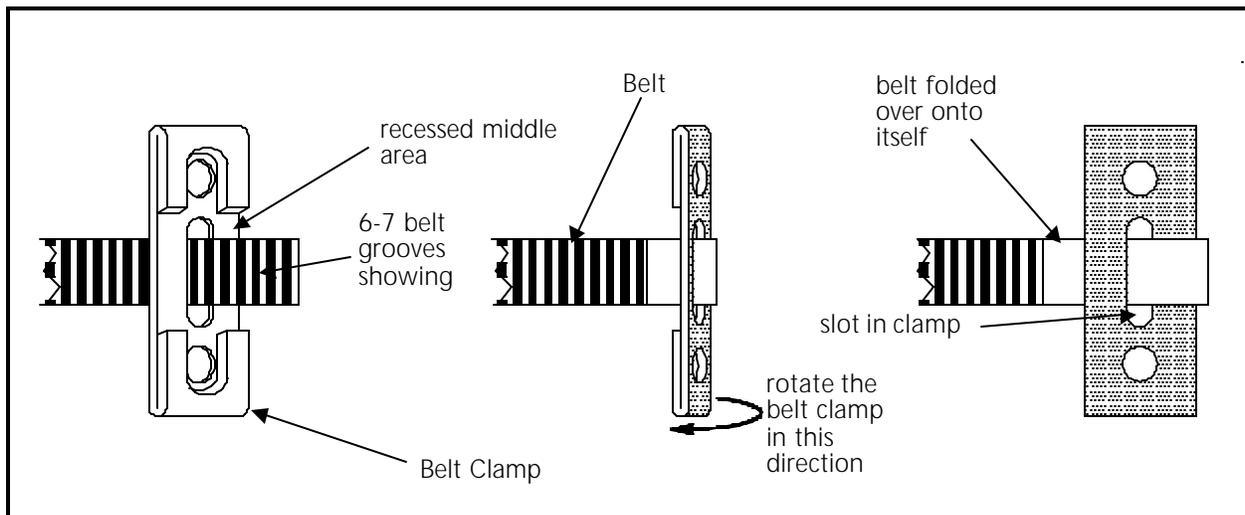


Figure 3 - 18

- b) From the bottom of the clamp, put the end of the belt through the slot in the middle of the clamp. Allow 6 or 7 grooves of the belt to show through the clamp slot.
 - c) Fold the clamp and end of the belt over and onto the portion of the belt that is directly in front of the clamp. The grooves and teeth of the end of the belt will mesh with the grooves and teeth of the portion of the belt that is directly in front of the clamp thus causing the clamp to be captured by the belt. (Check that the length of the belt that overlaps around the clamp is approximately the same as what is shown at the old belt that is still clamped.)
8. Center the belt in the slot in the clamp and attach it securely in place with the 2 screws.
 9. Disassemble the other end of the old belt from the remaining end of the X carriage assembly and remove it from the idler pulley and drive pulley.
 10. Route the new belt into place through the pulleys. Refer to Figure 3-19 and the following precautions:
 - a) Remember that the X carriage will be turned over for installation when the belt is attached at the remaining end of the carriage. Therefore, insure that you compensate for this and do not allow the belt to have any incorrect twists.
 - b) Also refer to the note below to orient the X drive belt idler pulley assembly correctly when you route the belt through it.

NOTE: The idler pulley does not lie directly in the middle of the U-shaped bracket. The pulley flanges come almost even with one side of the bracket, but are located some distance inside the bracket when viewed from the other side. When reinstalling the idler pulley assembly, it must be oriented so the side with the pulley flanges even is facing outward (or downward when the beam is installed).

11. Refer to the previous installation process for attaching the first belt end to the X carriage assembly and attach the second end of the belt to the remaining end of the carriage in the manner.
12. Turn the X carriage assembly over and reposition it into the beam.
13. Orient the X drive belt idler pulley assembly so the side with the pulley flanges even with the edge of the bracket is facing outward (or downward when the beam is installed). See Figure 3-19.

NOTE: If you can not attach the idler assembly as described above without creating improper twists in the belt, you must correct the problem with the new belt installation before proceeding.

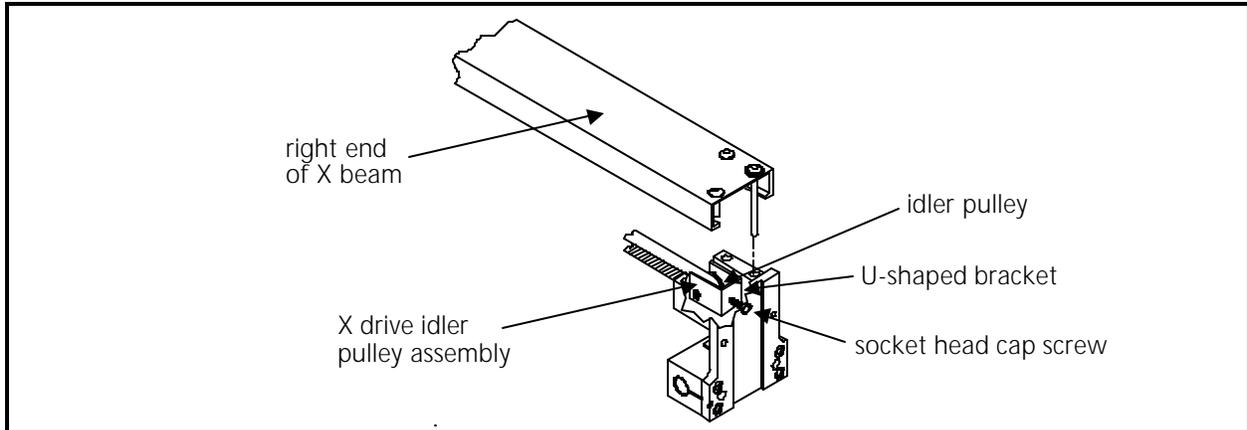


Figure 3 - 19



14. Secure the X drive belt idler pulley assembly to the end of the beam with the socket head cap screw at the end of the assembly.

DO NOT over-tighten the screw causing the belt to become too tight.

15. Move the tabbed end of each of the rectangular brackets on the X carriage assembly outward to remove any end play from the carriage between the channel edges of the beam.

16. Snug the 2 socket head cap screws in each of the rectangular brackets.

17. Refer to Section 2 of this manual for adjusting the X drive belt tension.

18. Refer to Section 2 of this manual for adjusting the X carriage movement.

19. Reinstall the X beam by referring to the specific procedure in this manual.

Y Drive Belt Replacement

"FACTORY SERVICE ADVISED"

This procedure requires a specific adjustment tool (Gates 5M Tensiometer) for proper adjustment.

1. Turn OFF the power switch to the EMC 10 and remove the power cord from the power source electrical outlet and the rear of the machine.
2. Remove the EMC 10 end caps. (Refer to specific instructions for removal.)
3. Loosen the belt tension adjustment screw at the front of the idler pulley bracket. This will allow the old belt to become slack for ease in replacement (see Figure 3-20).

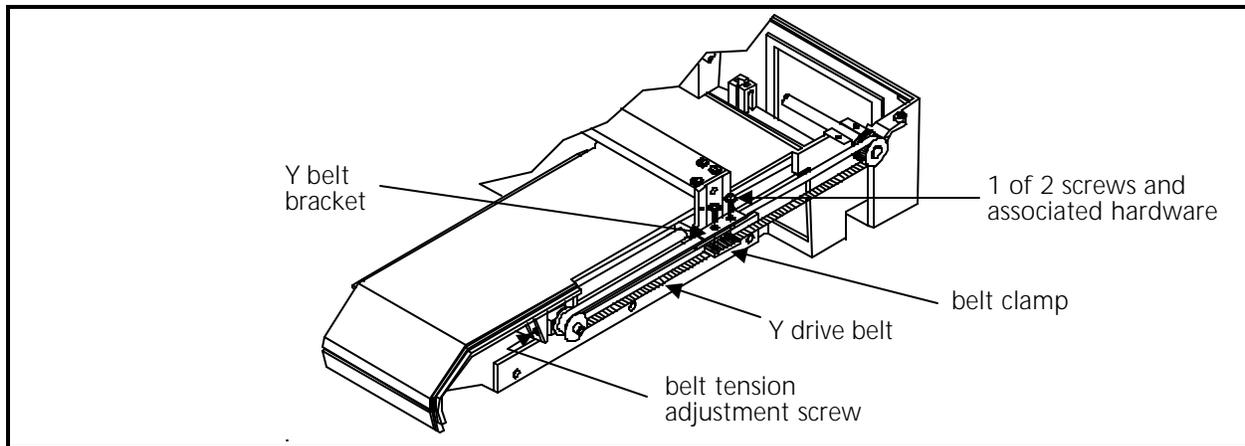


Figure 3 - 20

4. Remove the two screws, flat washers, and lock washers at the top of the Y-belt bracket. These screws go through the belt and into the belt clamp underneath the belt to secure the Y drive belt between the two pieces.



Caution: Overtightening the screws in the next step may cause the belt clamp to be damaged.

5. Place the new belt around the two pulleys and secure both ends of the belt between the Y-belt bracket and the belt clamp piece with the two screws and associated hardware removed in the previous step.
6. Refer to Section 2 of this manual for adjusting the Y drive belt tension.
7. Replace the end caps and test the machine for proper embroidery quality.

Head Section

General

The Melco embroidery head consists of several physical assemblies. This section of the manual describes the removal and replacement of most of the major assemblies of the head.

Arm and Bed Assembly

The arm and bed assembly provides a stable embroidery head platform. All other components of the head are attached to this assembly.

Inside the arm and bed assembly are the shafts, belts, and pulleys that drive the needle and rotary hook. Attached to the outside of the arm and bed assembly are the Z drive motor, needle case and color change mechanism, thread tree, and trimmer grabber blade control.

Z Motor Replacement

1. Turn the main power OFF and remove from power source.
2. Remove the rear head cover and the electronics cover.
3. Disconnect the Z motor harness from the 4 axis driver board.
4. Using a properly sized open end wrench, loosen the two motor bracket mounting/tensioning nuts (see Figure 3-21).

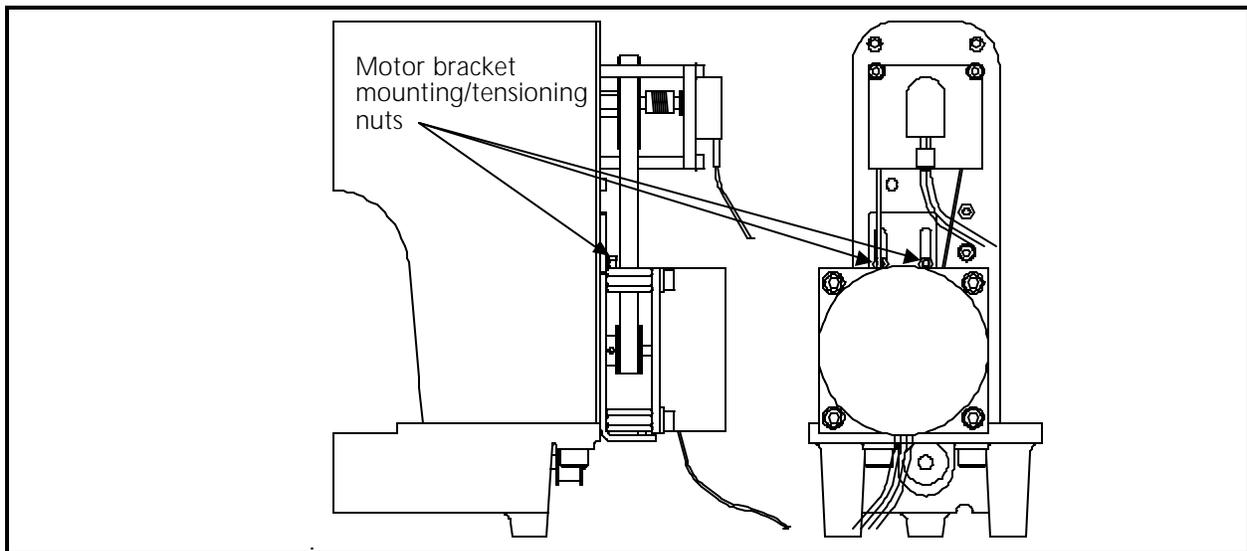


Figure 3 - 21

5. Remove the four cap head screws attaching the motor to the bracket standoffs.
6. Lift the motor away from the standoffs and allow the drive belt to slip off the motor drive pulley.
7. Loosen the pulley set screws and remove the pulley from the motor shaft.
8. Place the pulley on the new motor shaft and slightly tighten one of the pulley set screws.
9. Slide the motor mount bracket up and hold it in place while placing the motor in position at the standoffs.
10. Be sure that the bottom loop of the drive belt is below the motor drive pulley, then reattach the motor to the standoffs with the four cap head screws, removed earlier.
11. Allow the motor and mounting bracket to slide down as the drive belt catches the assembly in the center of the drive pulley.

12. Make sure that the bottom loop of the drive belt is centered in the drive pulley. If not, loosen the drive pulley set screw and adjust the pulley so that the pulley is directly below the main Z drive pulley.
13. Tighten both Z drive pulley set screws.
14. Adjust the belt tension to 6-7 pounds (using the Gates Tensiometer) and tighten the motor bracket mounting/tensioning nuts.
15. Connect the Z motor harness to the 4 axis driver board and replace both the electronics cover and the rear head cover.

Z Shaft Encoder Installation

The Melco EMC 10 Embroidery Peripheral uses a shaft encoder on the rear of the head to provide the information required by the CPU.

"FACTORY SERVICE ADVISED"



CAUTION! If the Z shaft encoder is replaced, DO NOT OPERATE THE EMBROIDERY PERIPHERAL until the new Z shaft encoder is properly calibrated!

If you feel that you may have a problem with the Z encoder, first contact your Melco service representative for advice. It may be that the encoder is not the problem. To replace the encoder follow these steps:

1. Turn the machine OFF, then disconnect the power from the power source.
2. Remove the electronics cover and the keyboard cover.
3. Remove the Z drive cover from the top, rear of the head.
4. Using proper antistatic precautions, disconnect the encoder cable from the CPU board.
5. Loosen the two coupler socket head cap screws that secure the coupling to the Z encoder shaft (see Figure 3-22).
6. Loosen and unthread the jam nut on the encoder shaft.
7. Pull the encoder out of the shaft coupling and encoder mount. Capture the jam nut and washer as the encoder shaft is removed.
8. Insert the new encoder/shaft into the hole of the encoder mount, place the washer and then the jam nut onto the encoder shaft as you insert the shaft through the mounting plate.
9. Insert the encoder shaft into the shaft coupling.

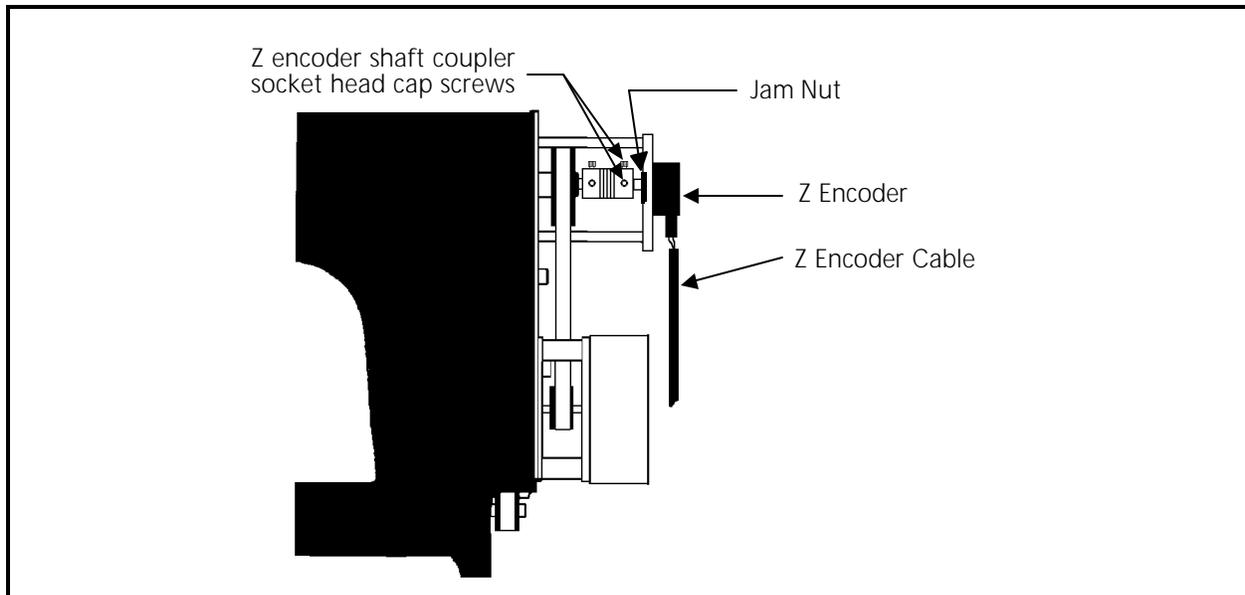


Figure 3 - 22

10. Tighten the jam nut, and then snug the coupling socket head cap screws onto the encoder shaft.
11. Connect the encoder cable to the CPU board.



CAUTION! If the Z shaft encoder is replaced, **DO NOT OPERATE THE EMBROIDERY PERIPHERAL** until the new Z shaft encoder is properly calibrated!

12. Calibrate the Z encoder per section 2 of this manual.

Thread Tree Assembly Removal

If you need to remove the thread tree for any reason, refer to the following procedure:

1. Turn OFF the EMC 10 and disconnect the power cord from its power source.
2. Carefully grasp the thread guide tubes individually and remove them from the thread tensioner assembly by pulling on each thread guide tube near where it enters the hole in the thread tensioner bracket (see Figure 3-23).
3. Hold the thread tree with one hand while you remove the 3 screws from the top of the head that secure the thread tree bracket. Lift off the thread tree.

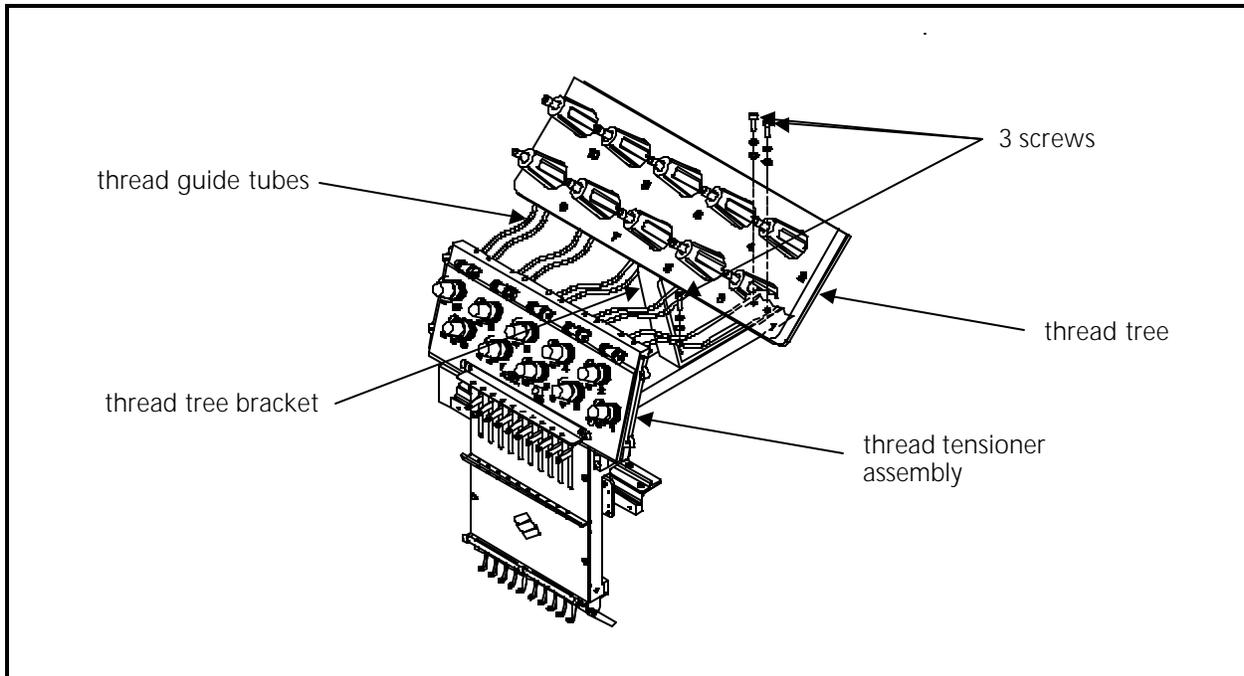


Figure 3 - 23

Removing the Thread Tensioner Bracket Assembly

The thread tensioner bracket assembly is attached to the top of the needle case. To remove the tensioner bracket assembly refer to the procedure that follows.

1. Turn OFF the EMC 10 and disconnect the power cord from its power source.
2. Remove the ground wire and the covers on each side of the tensioner bracket.
3. Disconnect the thread break harness connection at the rear of the tensioner assembly PCB.
4. Remove the 4 screws at the front of the tensioner assembly shown in Figure 3-24.

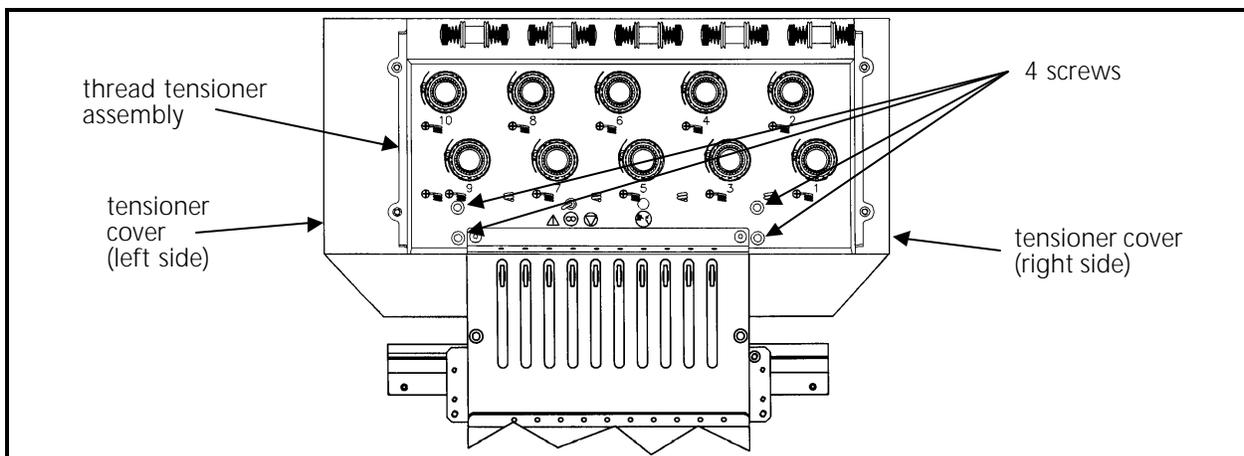


Figure 3 - 24

5. Carefully lay the tensioner bracket assembly (with the thread tubes still attached) over the top of the thread tree.

The thread guide tubes from the thread tree extend into the tensioner bracket. If you wish to remove the tensioner bracket assembly further from the head, you will need to remove the thread guide tubes.

6. Remove the thread from the thread guide tubes.
7. Carefully grasp the thread guide tubes individually and remove them from the thread tensioner bracket assembly by pulling on each thread guide tube near where it enters the hole in the thread tensioner bracket.

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 allen wrench, loosen the set screw associated with the thread tensioner to be removed (see Figure 3-25).

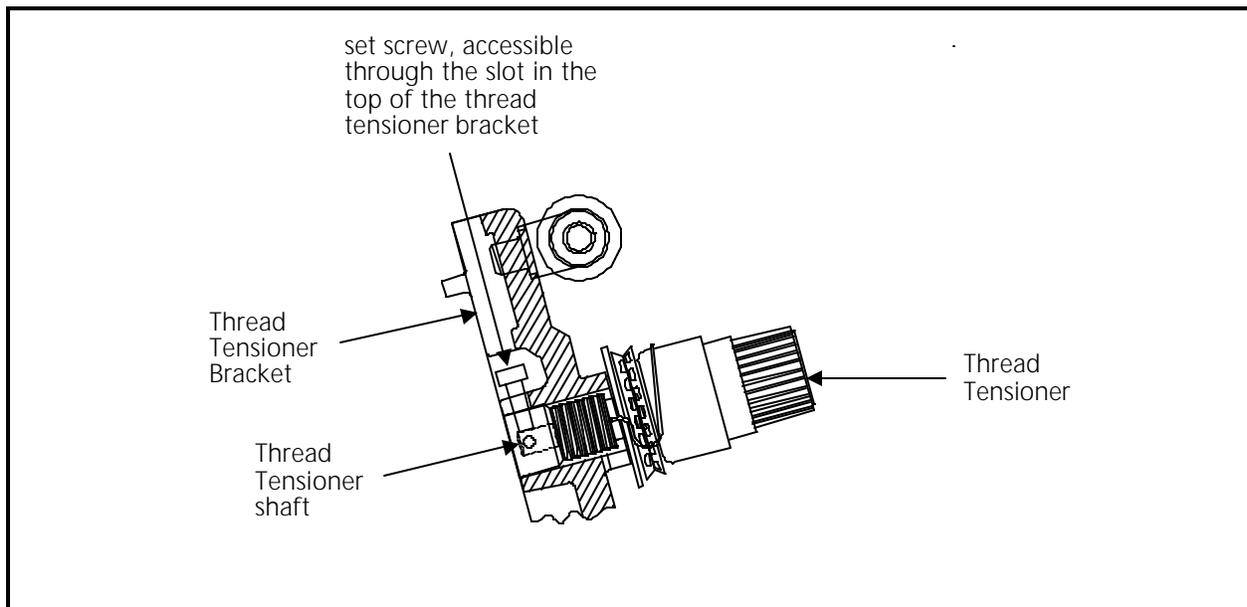


Figure 3 - 25

2. Pull the thread tensioner out of the tensioner bracket.
3. To reinstall the thread tensioner, follow the procedure on the next page for changing a check spring.

4. After inserting the thread tensioner into the tensioner bracket, perform the thread tensioner check spring adjustment from Section 2 of this manual. This adjustment 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.

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 3-26.

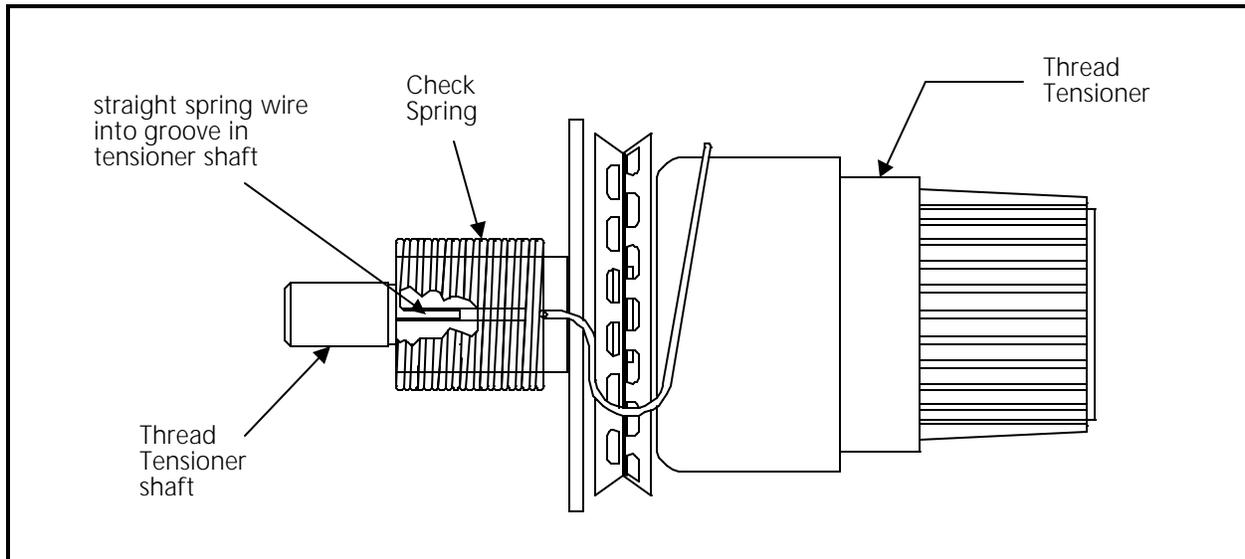


Figure 3 - 26

- 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.
5. After inserting the thread tensioner into the tensioner bracket, perform the thread tensioner check spring adjustment from Section 2 of this manual. 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.

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 (see Figure 3-27) by rotating it counter-clockwise out of its location in the thread tensioner bracket.

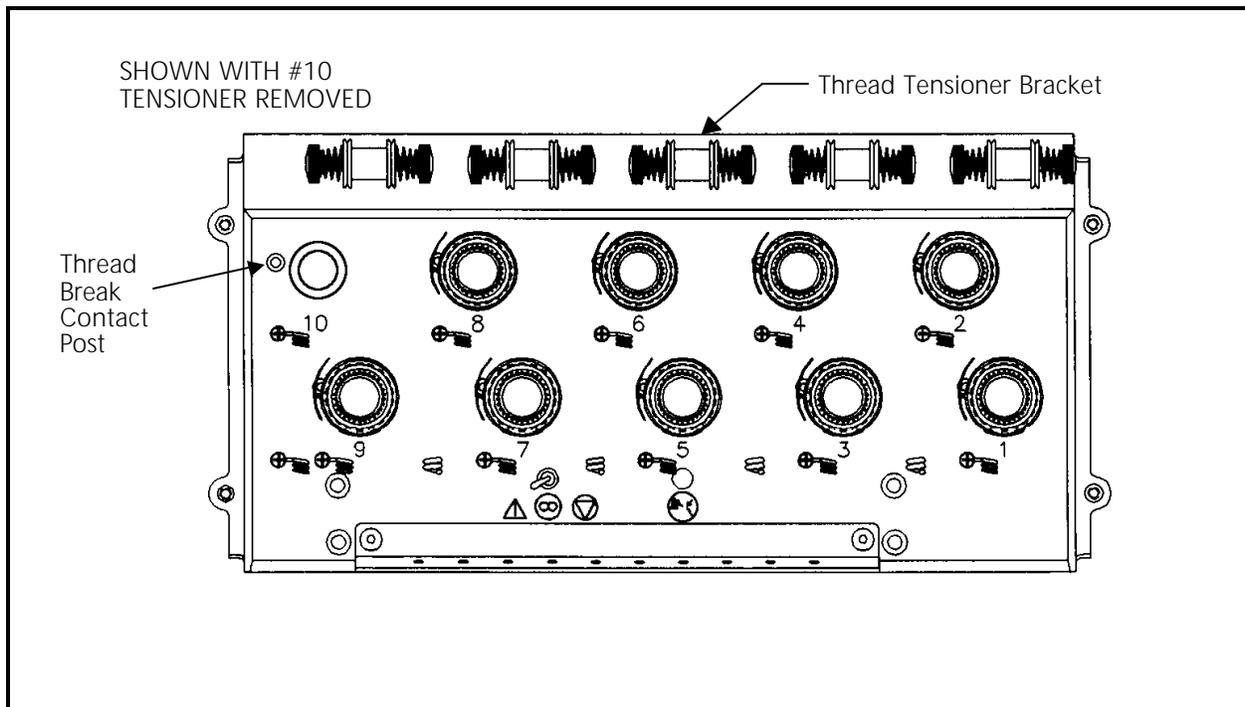


Figure 3 - 27

3. Install the new thread break contact post by rotating it clockwise into the tensioner bracket. Secure the post "finger-tight" only.



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

4. Reinstall the thread tensioner and check spring as described in a previous procedure in this section, then perform check spring adjustment from Section 2 of this manual.

Replacing The Thread Break Wiper Brush

1. Remove the two color change covers.
2. Locate the thread break wiper brush attached to the bracket coming from the color change PCB (see Figure 3-28).

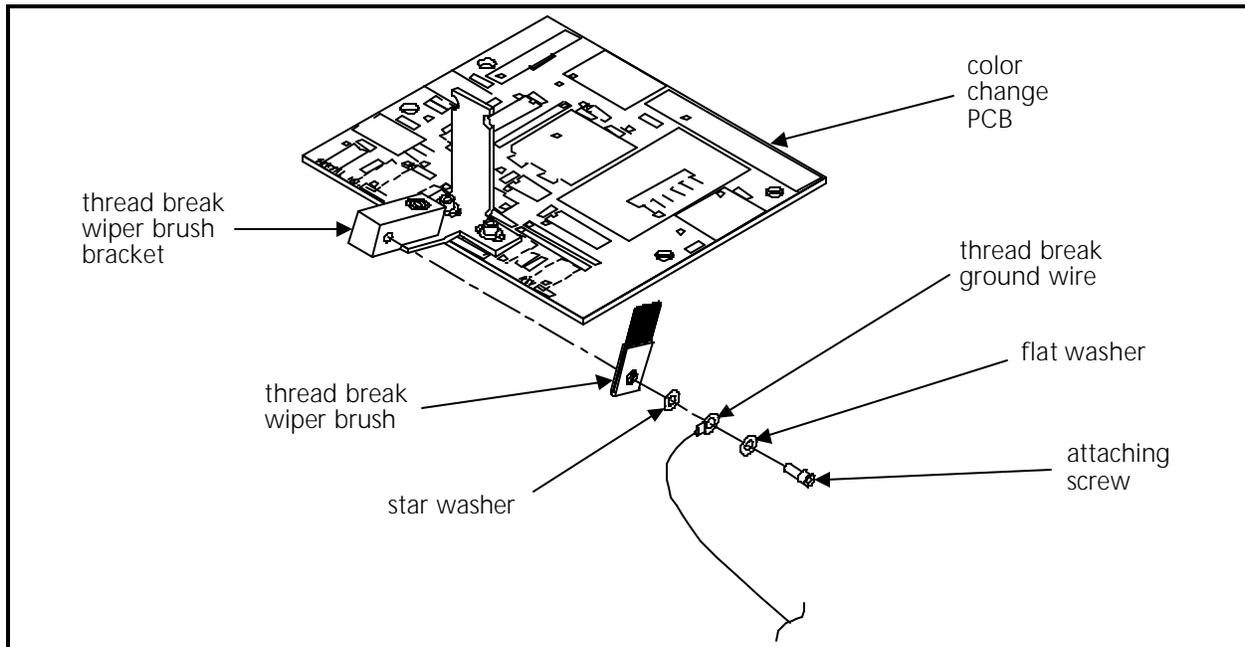


Figure 3 - 28

3. Remove the thread break brush by removing the screw, thread break ground wire, and associated hardware that secures it to the bracket.
4. Replace the brush with the identical part to insure proper operation. Attach the screw, thread break ground wire, and associated hardware as shown in Figure 3-28.
5. Refer to Section 2 of this manual for the adjustment procedure for the thread break wiper brush.

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 EMC 10 Operation Manual.

1. Turn ON the EMC 10 and bring the head to the HEAD UP position.
2. Turn OFF the EMC 10 and disconnect the power cord from its power source.
3. Remove the thread tensioner bracket assembly as described in a previous procedure.

- Remove the 2 screws holding the upper needle case cover plate and set the cover plate aside (see Figure 3-29).

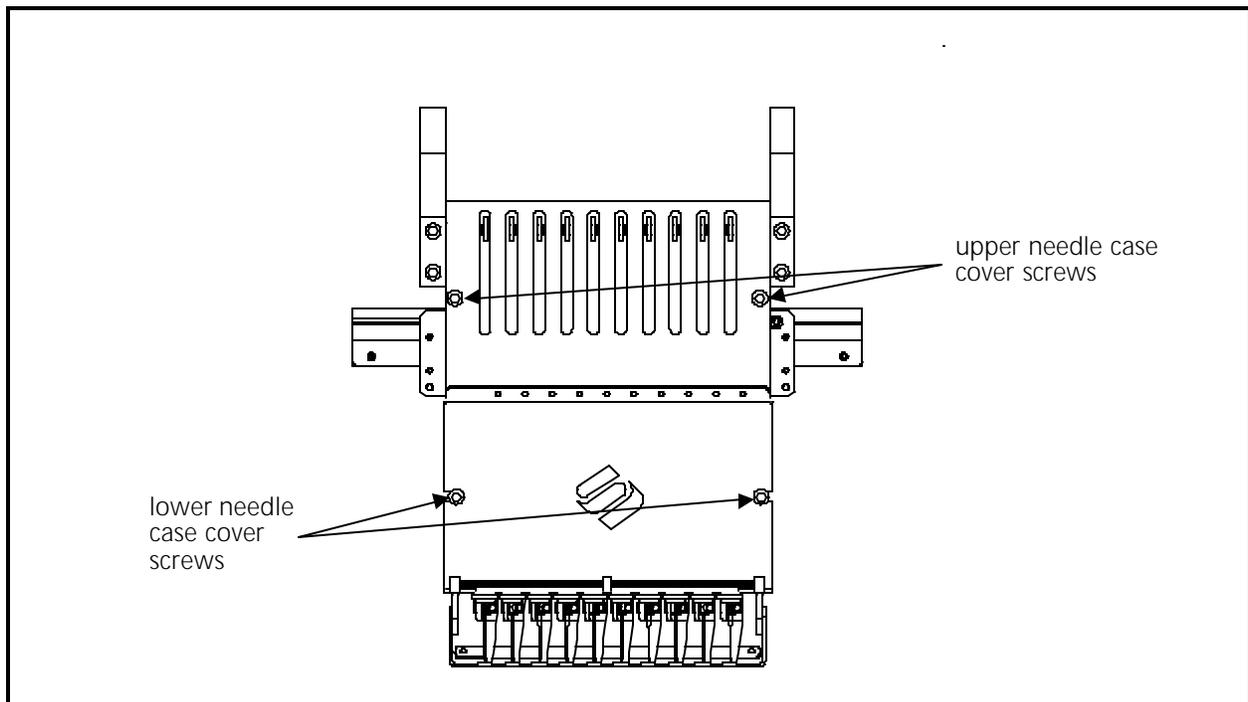


Figure 3 - 29

- Loosen one and then remove the other of the 2 screws holding the lower needle case cover plate and set the cover plate aside. You can now access the needle bar area to remove any of the 10 needle bars out through the top of the needle case.
- Refer to Figure 3-30, then loosen the needle clamp set screw and remove the needle, needle clamp, and needle clamp damper from the bottom of the needle bar.
- Next, loosen the needle bar stop clamp (black clamp).
- Loosen the top screw (see Figure 3-30) 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.

- Loosen the needle bar clamp.
- 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 3-30.

13. Install a new needle into the needle clamp and tighten the needle clamp screw to secure the needle and capture the needle bar.

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 EMC 10 Operation Manual for the adjustment procedure for needle bar height.

16. When the needle bar height has been properly adjusted, reinstall the lower needle case cover.

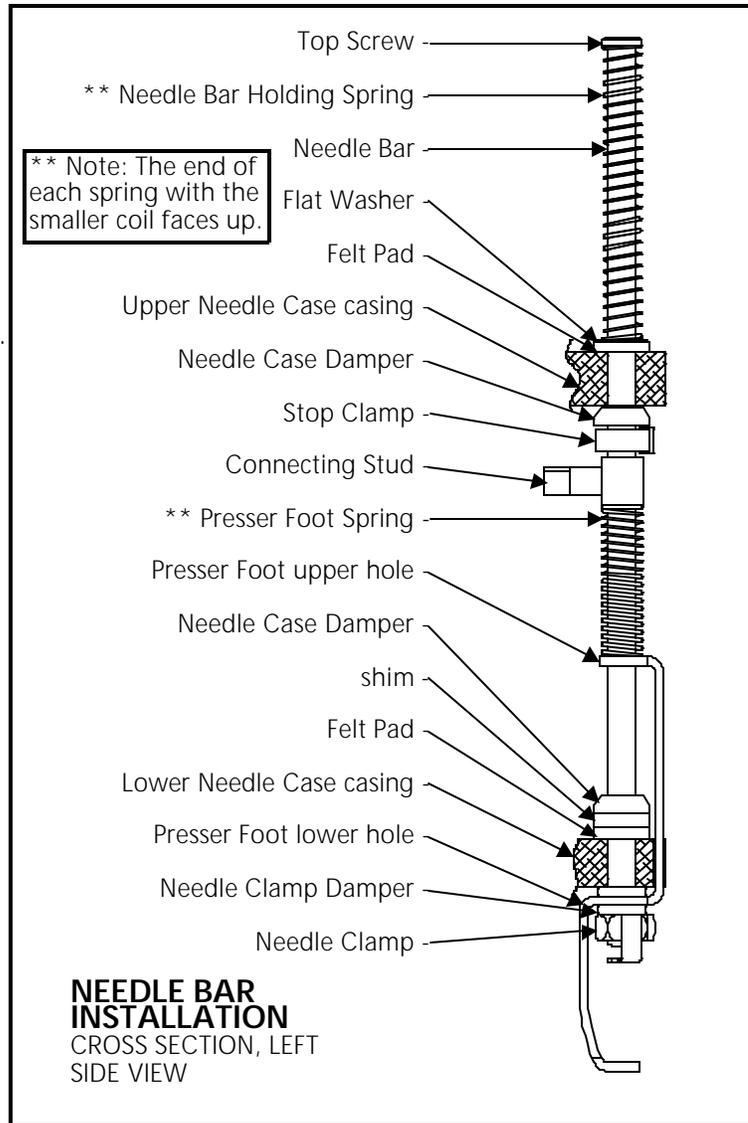


Figure 3 - 30

Needle Case Removal

It may become necessary to remove the needle case from the front of the head to replace the needle bar driver, take up lever gear, needle bar reciprocator, or other associated parts. Refer to the following steps to remove the needle case from embroidery head.

1. Turn ON the EMC 10 and bring the head to the HEAD UP position.
2. Turn OFF the EMC 10 and disconnect the power cord from its power source.
3. Remove the thread tensioner bracket assembly as described in a previous procedure.
4. Position the needle case to mid-point (needle 5 or 6), then secure the bearing retainer plate assembly from sliding left or right by placing any workable clamping device onto each end of the V-rail.
5. Remove the 2 screws holding the upper needle case cover plate (see Figure 3-31) and set the cover plate aside.

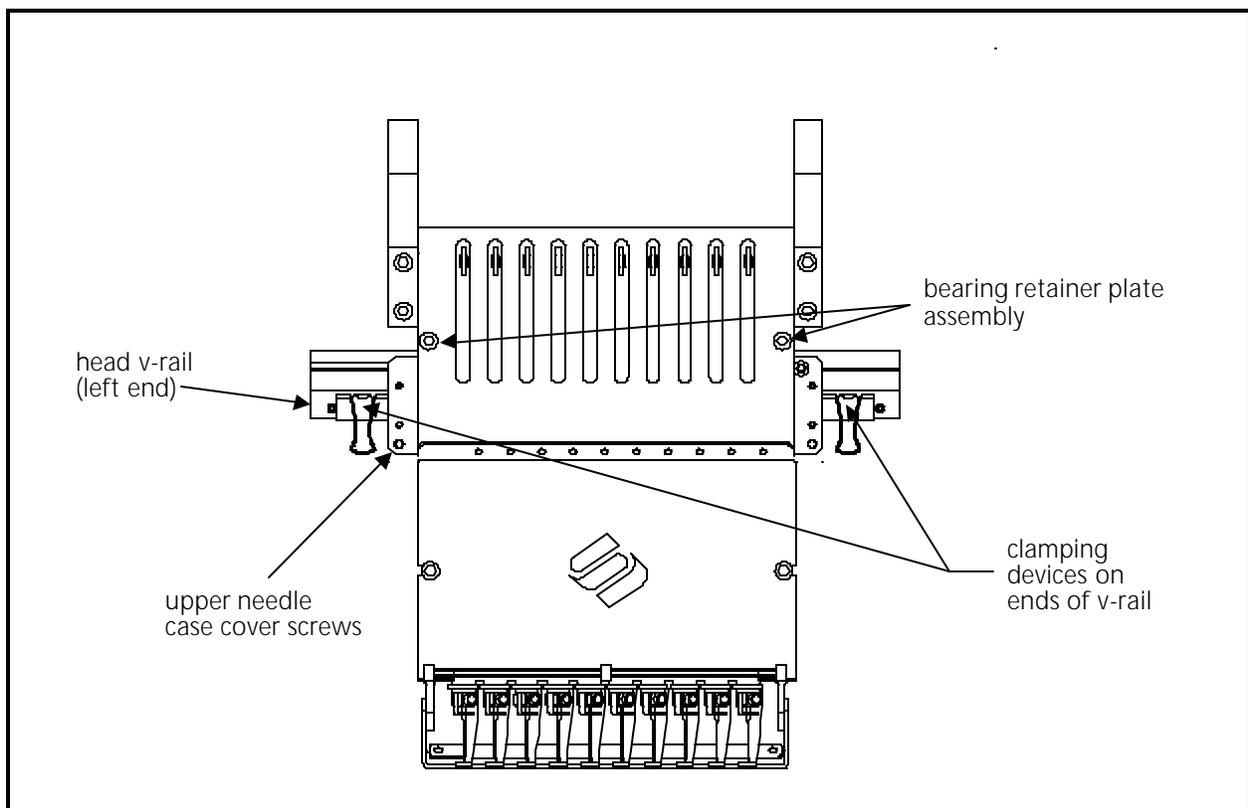


Figure 3 - 31



Caution! You must remove the needle position LED sensor interrupter blade to avoid damage to the LEDs on the color change PCB.

6. Remove one and loosen the other of the 2 screws that hold the sensor interrupter blade to the top of the needle case. Carefully slide the blade out from between the LEDs under the color change PCB.
7. Hold the needle case securely with one hand while you remove the 4 socket head cap screws that secure the needle case to the bearing retainer plate assembly near the top of the needle case (see Figure 3-32).

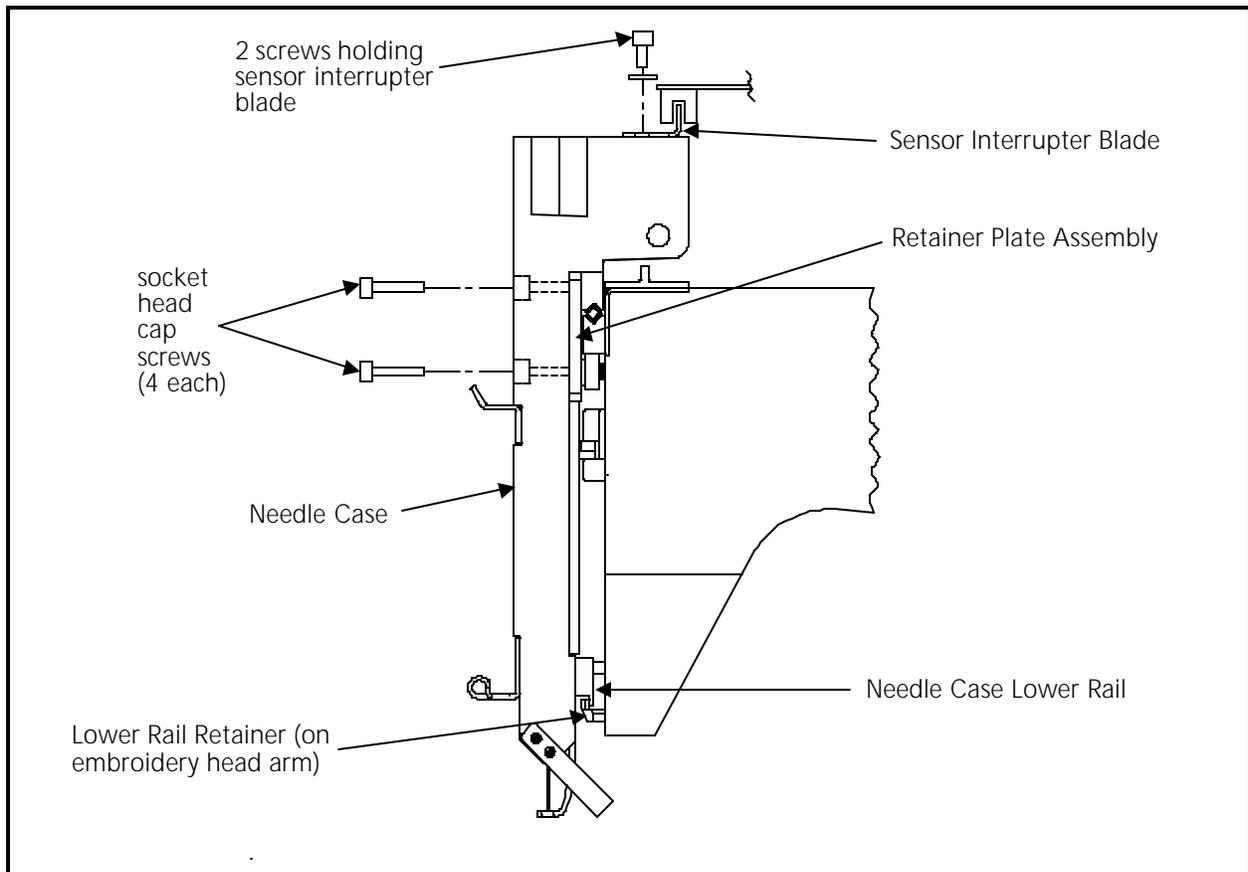


Figure 3 - 32

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 head.

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

Installing Needle Case

To reattach the needle case refer to the following procedure:

1. Insure the following conditions are set:
 - a) The cross roller bearing is properly installed and centered. Refer to Section 2 of this manual for adjustment procedure.
 - b) The retainer plate assembly bearings are properly adjusted. Refer to Section 2 of this manual for adjustment procedure.
 - c) The bearing retainer plate assembly is clamped from moving left or right by a clamping device on each end of the V-rail.
 - d) The embroidery head is at its mechanical "head up" position.
 - e) The color change cam is in position for a selected needle (preferably needle #5 or #6).
2. Refer to Figure 3-32 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. Rotate the upper part of the needle case into position on the front of the 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 "valley" of the take up lever gears.
 - b) The needle case color change pins fit into the color change cam properly.
 - c) 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 socket head cap screw in the bearing retainer plate as shown in Figure 3-33.
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. Install and tighten the 4 socket head cap screws.
6. Reattach the LED sensor interrupter blade to the top of the needle case.
7. Remove the clamping devices from each end of the V-rail and reinstall all covers that were removed during the procedure.

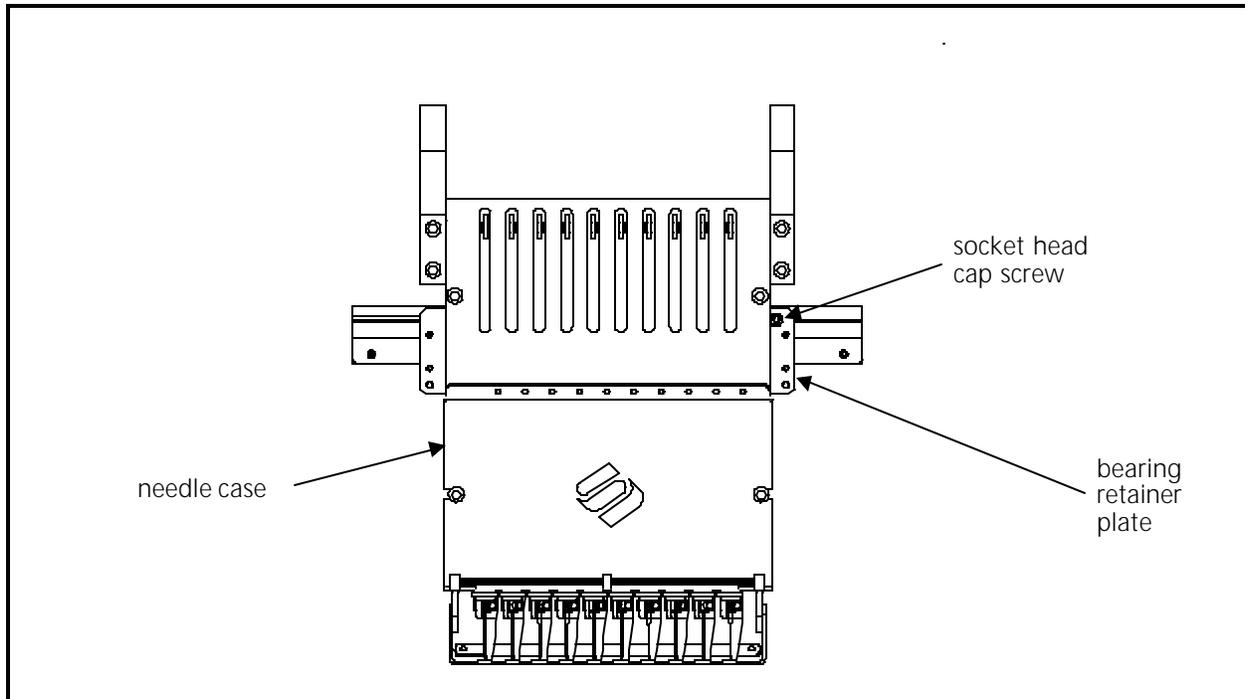


Figure 3 - 33

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 in this manual.
2. Remove the clamping devices that were installed at each end of the V-rail during the removal of the needle case.
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. Refer to the cross roller bearing adjustment procedure in Section 2 of this manual.
5. Check for proper adjustment of the bearing retainer plate assembly bearings by referring to the adjustment procedure for bearing retainer plate assembly bearings found in Section 2 of this manual.
6. Reinstall the clamping devices at each end of the V-rail.

Replacing Reciprocator / Needle Bar Guide Shaft

1. Remove the needle case as described previously in this manual.
2. Loosen the set screw from the left side of the head that secures the needle bar guide shaft (see Figure 3-34).

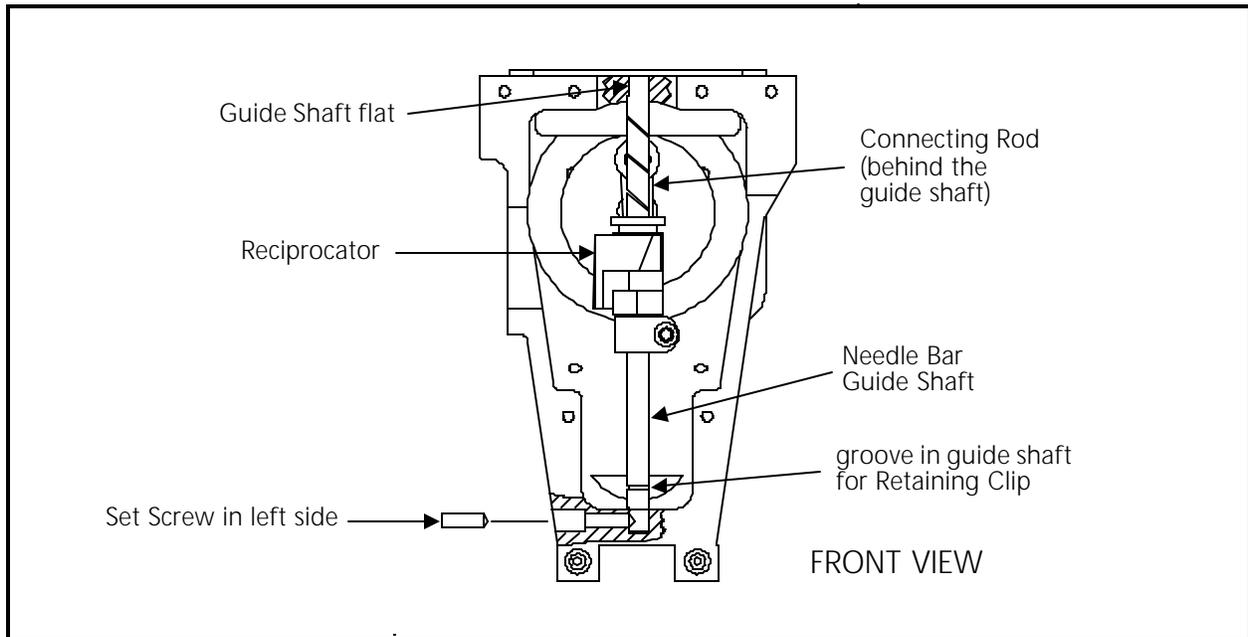


Figure 3 - 34

3. Remove the retaining clip from the needle bar guide shaft (see Figure 3-35).
4. Slide the needle bar guide shaft up through the hole in the top of the head to remove it (see Figure 3-35).

Note: If you are only replacing the needle bar guide shaft, proceed to step 8.

5. Remove the reciprocator from the connecting rod by pulling it straight out of the head (see Figure 3-34). Discard the reciprocator.
6. On the new reciprocator place a drop of machine oil on the reciprocator connecting stud (located on the lower back side of the reciprocator).
7. Install the new reciprocator into the head (see Figures 3-34 & 3-35). Make sure it is oriented properly and insert the connecting stud onto the connecting rod.
8. Add two drops of machine oil onto the needle bar guide shaft (or new guide shaft if replacing).

9. Install the needle bar guide shaft as follows (see Figures 3-34 & 3-35):
 - a) Insert the guide shaft down through the hole in the top of the head.
 - b) Insert the guide shaft through the reciprocator.
 - c) Insert the guide shaft down through the roller bearing.
10. Turn the needle bar guide shaft until the flat near the top faces the left side of the head (see Figure 3-34).
11. Pull the needle bar guide shaft down until it seats into the lower hole.
12. Tighten the set screw on the left side of the head to secure the needle bar guide shaft (see Figure 3-34).
13. Reinstall the retaining clip onto the needle bar guide shaft (see Figure 3-35).

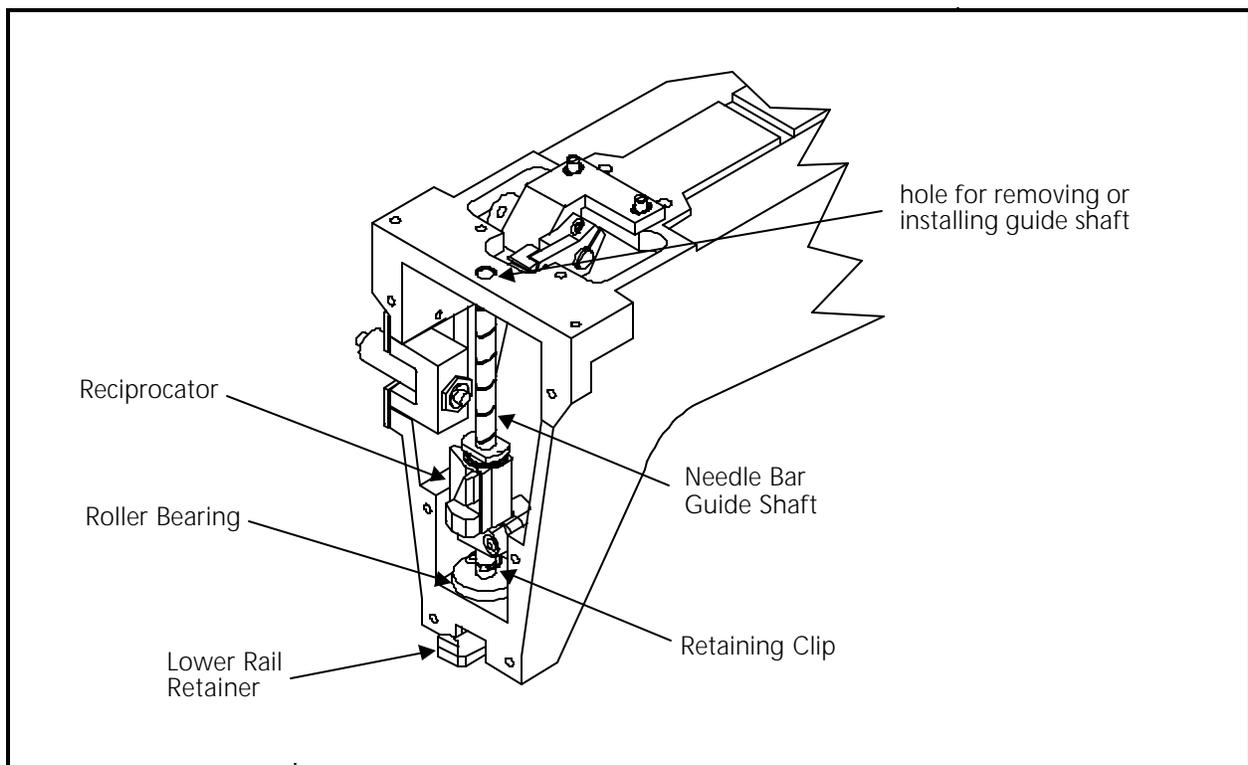


Figure 3 - 35

Jump Stitch Solenoid Replacement

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

1. Remove the left color change cover behind the tensioner bracket assembly by first loosening the top two screws then removing the side two screws.

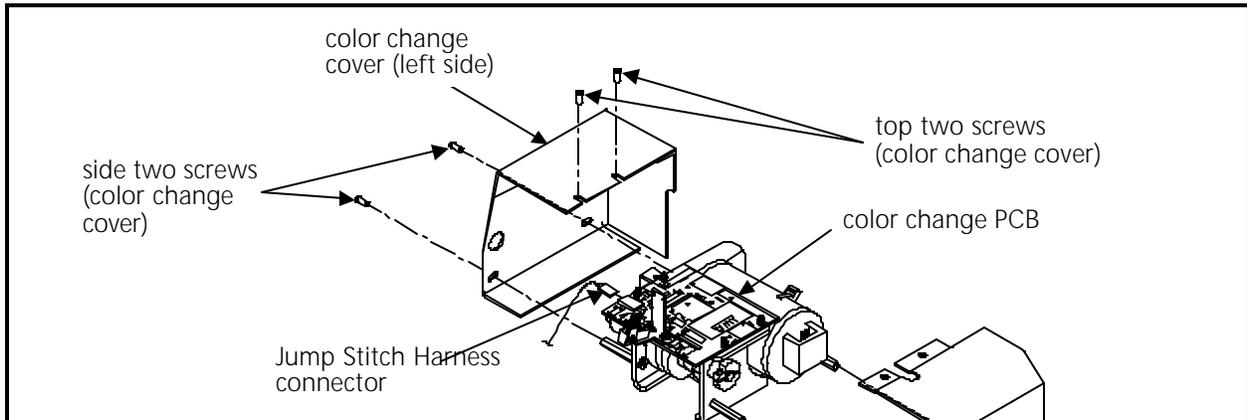


Figure 3 - 36

2. Cut any and all cable tie wraps holding the jump stitch harness, then disconnect the jump stitch harness connector from the color change PCB.
3. Remove the 2 screws holding the mechanical jump stitch mechanism and cover to the jump stitch bracket. Remove the mechanism and cover.

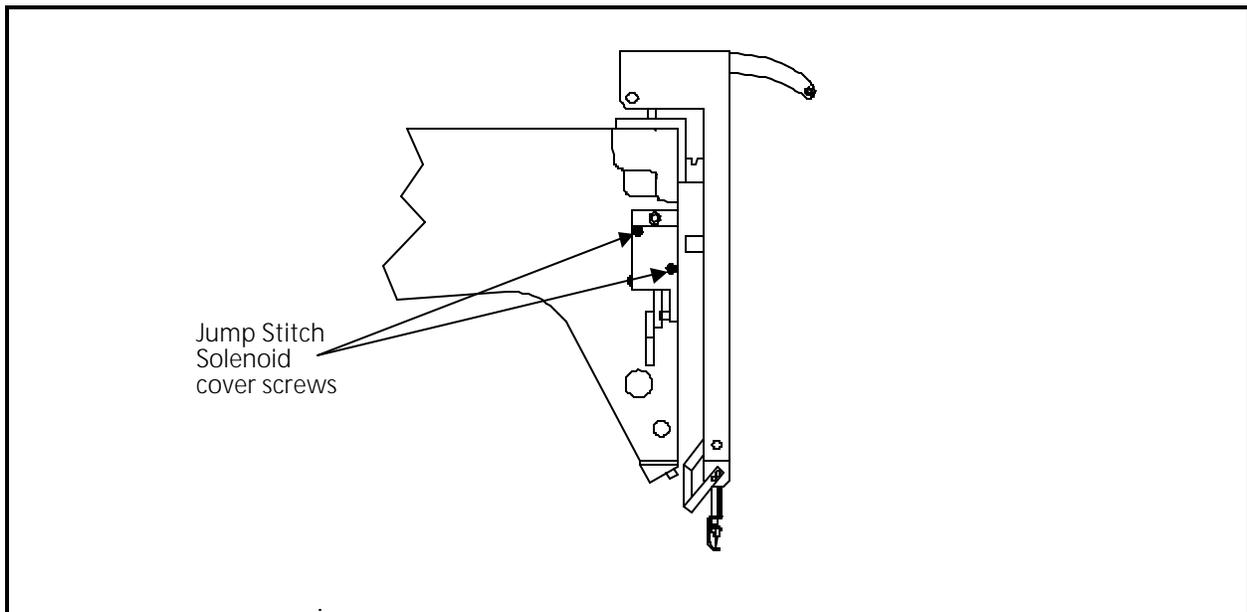


Figure 3 - 37

4. Remove the 2 jump stitch solenoid bracket screws (see Figure 3-38), then remove the solenoid and the solenoid bracket as one piece.

NOTICE: Before you remove the solenoid from the bracket, 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 (or distance) that you recorded in this step.

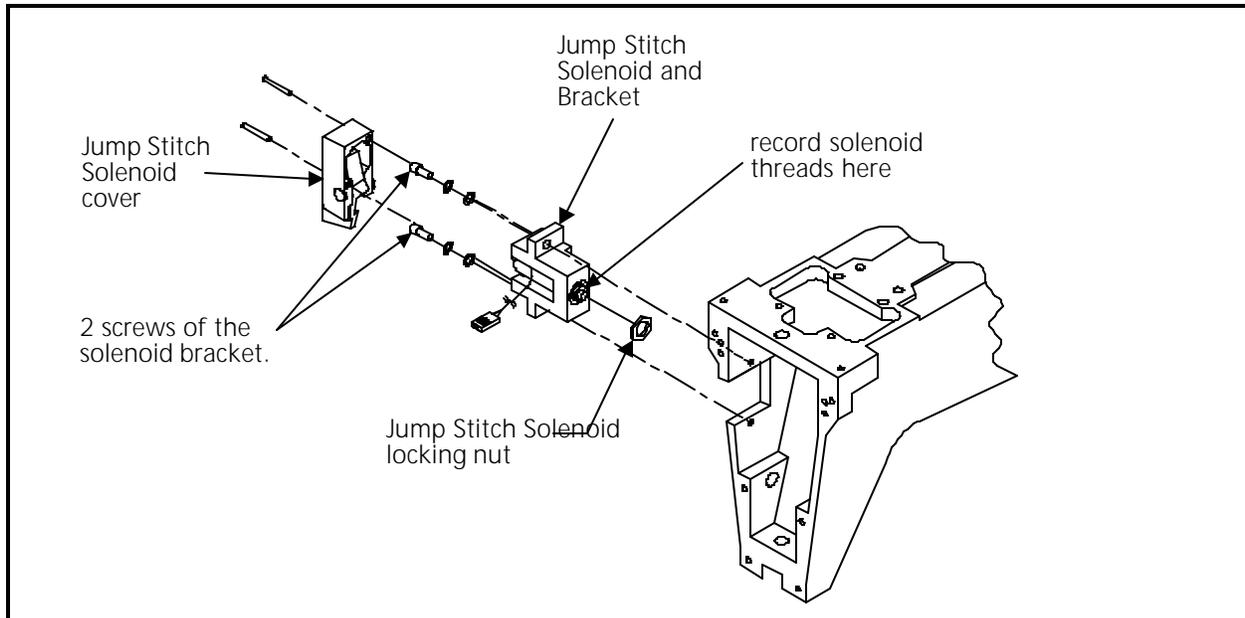


Figure 3 - 38

5. Loosen the solenoid locking nut then rotate the bracket off of the solenoid.
6. Replace with new solenoid by reversing the procedure above. Adjust the position of the solenoid into the solenoid bracket using the "thread counts" or measurement you obtained above (see NOTICE above).
7. Position the jump stitch bracket back in the embroidery head against the mechanical stop.
8. Remove the Z motor cover and manually rotate the belt/pulley to make the head go through at least one revolution to check that no mechanical interference occurs.

NOTE: During installation the solenoid must be adjusted properly. If you did not adhere to the NOTICE above, or if for some other reason, the adjustment for the solenoid is not correct, Refer to the Jump Stitch Adjustment procedure in Section 2 for the proper adjustments.

Color Change PCB Replacement

The Color Change PCB controls color change commands from the design and keyboard, thread break information, the jump stitch solenoid, and the color change motor. The color change PCB, motor, cam, and wire harnesses are located under the covers directly behind the embroidery head tensioner assembly. To remove the color change PCB refer to the following procedure:

1. Remove the left color change cover behind the tensioner assembly by first loosening the top two screws then removing the side two screws.

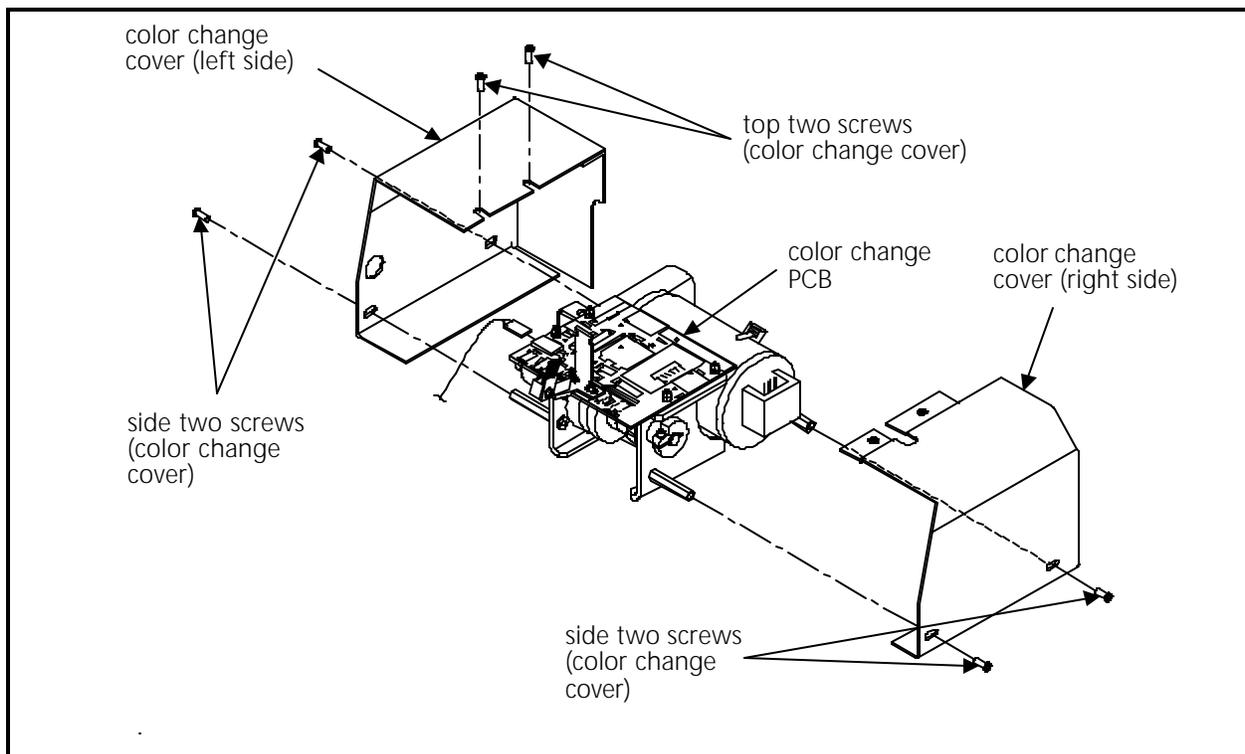


Figure 3 - 39

2. Remove the two screws in the side of the right color change area cover and remove the cover.
3. Remove the right side tensioner bracket.
4. In clockwise rotation from the middle of the left side of the color change PCB, disconnect the following 5 harnesses: jump stitch solenoid, color change motor, 10 needle color change power, 18 color interface, and 10 needle grabber.
5. Locate and disconnect the thread break harness from the rear of the thread tensioner PCB.



CAUTION! The Color Change PCB is snapped into place on top of the color change bracket. Be careful not to damage the LED sensors or any other components when removing the PCB.

- Remove the color change PCB by lightly prying up on the board near the 4 catch pins that hold the PCB in place. The color change PCB should simply lift off of the color change housing.

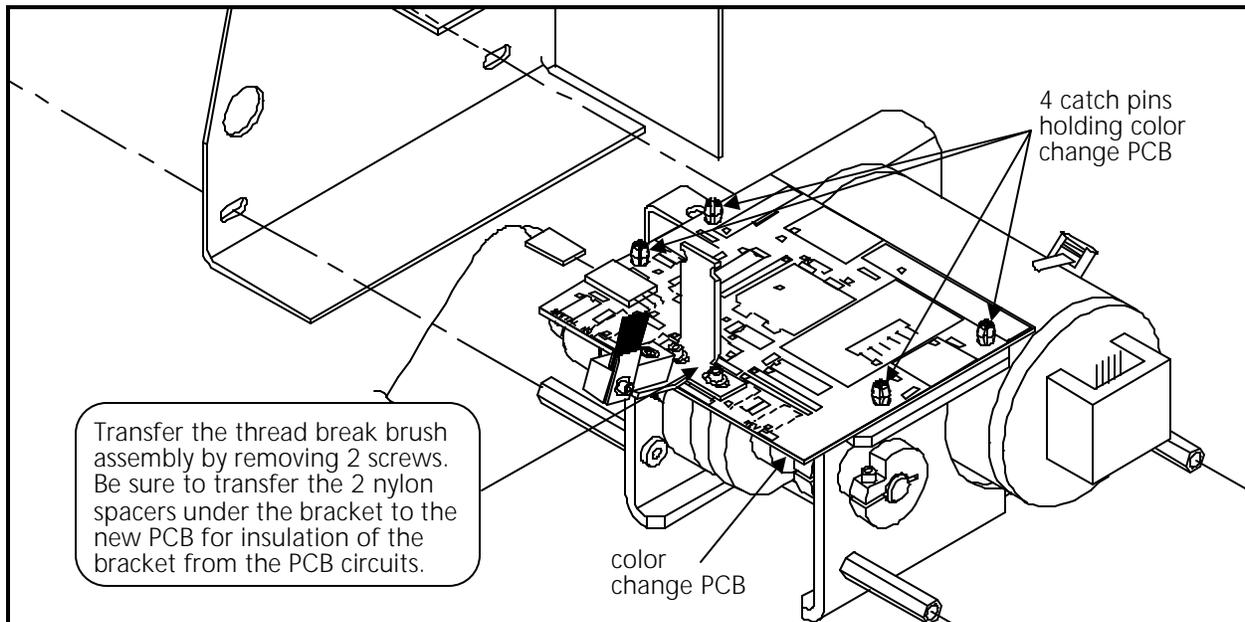


Figure 3 - 40

- Remove the 2 screws securing the thread break contact brush assembly onto the old color change PCB.
- Attach the thread break brush assembly to the new color change PCB. Transfer the two nylon spacers, or if damaged, install two new spacers between the thread break contact brush bracket and the new color change PCB (see Figure above). The screws need only to be snugged slightly, since you will be adjusting the brush position after the next step.



CAUTION! In the next step, press only on the board, **DO NOT** press on board components.

- To reinstall the color change PCB, align the holes in the board over the catch pins in the color change bracket and lightly press on the board to seat it in place. **DO NOT** press on board components.
- Reinstall the thread break harness connection to the thread tensioner PCB, then refer to Section 2 of this manual to adjust the thread break contact brush position.

11. Reinstall the remaining harnesses to the new color change PCB (refer to Figure 3-40).
12. Reattach the color change area covers removed during earlier steps in this procedure.

Color Change Motor Replacement

To remove the color change motor refer to the following steps:

1. First remove the color change area covers and the right side tensioner bracket cover.
2. Remove the color change PCB as described in previous procedures.
3. Loosen and remove the 4 color change motor mounting screws.

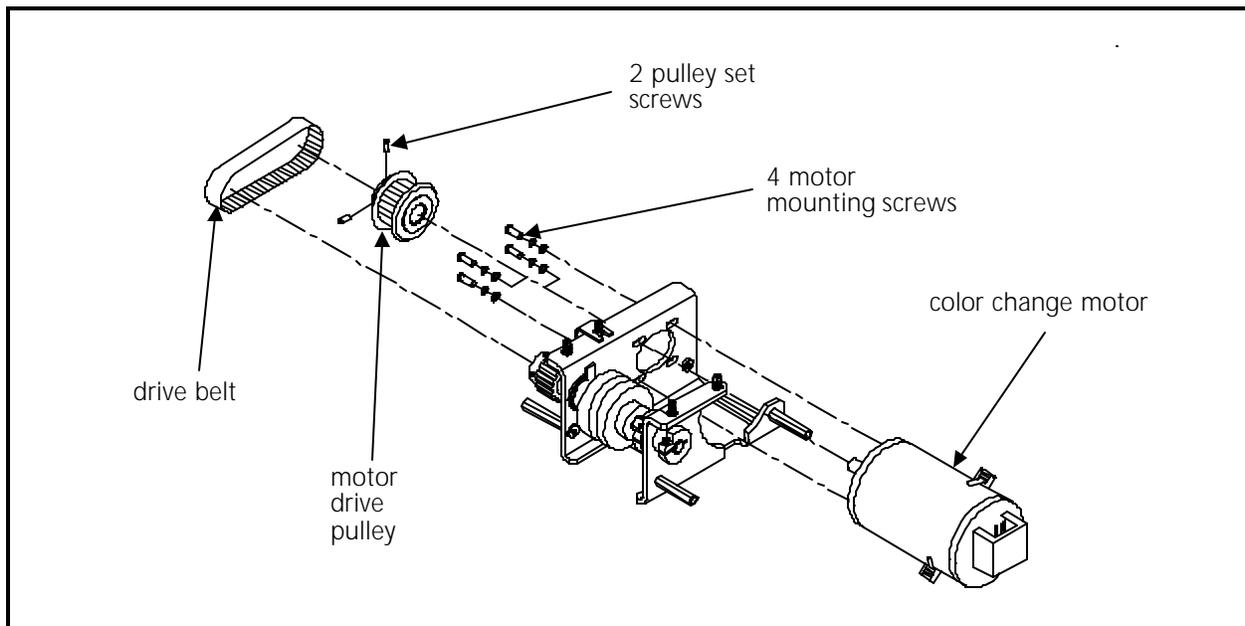


Figure 3 - 41

4. When the motor is loose, pull off the drive belt.
5. Loosen the pulley set screws and remove the motor drive pulley.
6. The motor is now loose and can be removed.
7. Replace the motor and reverse the preceding steps.
8. Refer to the color change motor belt tension adjustment procedure in Section 2 of this manual and adjust the belt.
9. Replace all the covers removed to perform this service.

Color Change Cam Assembly Replacement

The color change cam and associated hardware is replaced as an assembly within the color change bracket.

1. Remove the right tensioner bracket cover and the color change area covers behind the tensioner assembly.
2. Remove the color change PCB as described earlier.
3. Remove the color change motor as described earlier.
4. Remove the 2 screws, then remove the color change bracket (with cam).

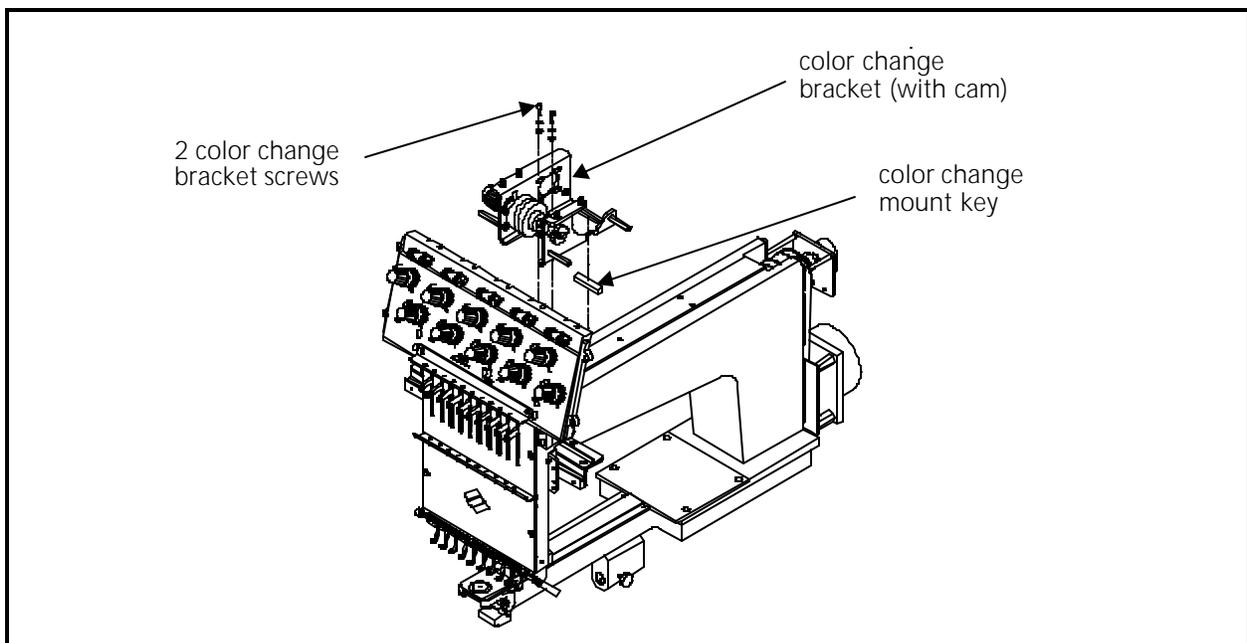


Figure 3 - 42

5. Lay the color change mount key into the embroidery head keyway, then put the new color change bracket (with the cam) into position.
6. Ensure the needle case is positioned with the needle centered in the needle plate hole by moving the color change bracket to obtain the needle centering, then tighten the color change bracket screws.
7. Reinstall the color change motor and color change PCB as previously described.
8. Reattach the color change area cover behind the tensioner assembly.

Trimmer Assemblies

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. Replacement procedures for these various parts are found in this section.

Grabber Drive Assembly

The grabber drive assembly is mounted to the left side of the arm casting. To remove the grabber drive assembly:

1. Remove the grabber blade as described in the next procedure.
2. Remove the 2 screws and grabber drive assembly cover on the side of the head.
3. Disconnect the grabber motor harness connection (see Figure 3-43).

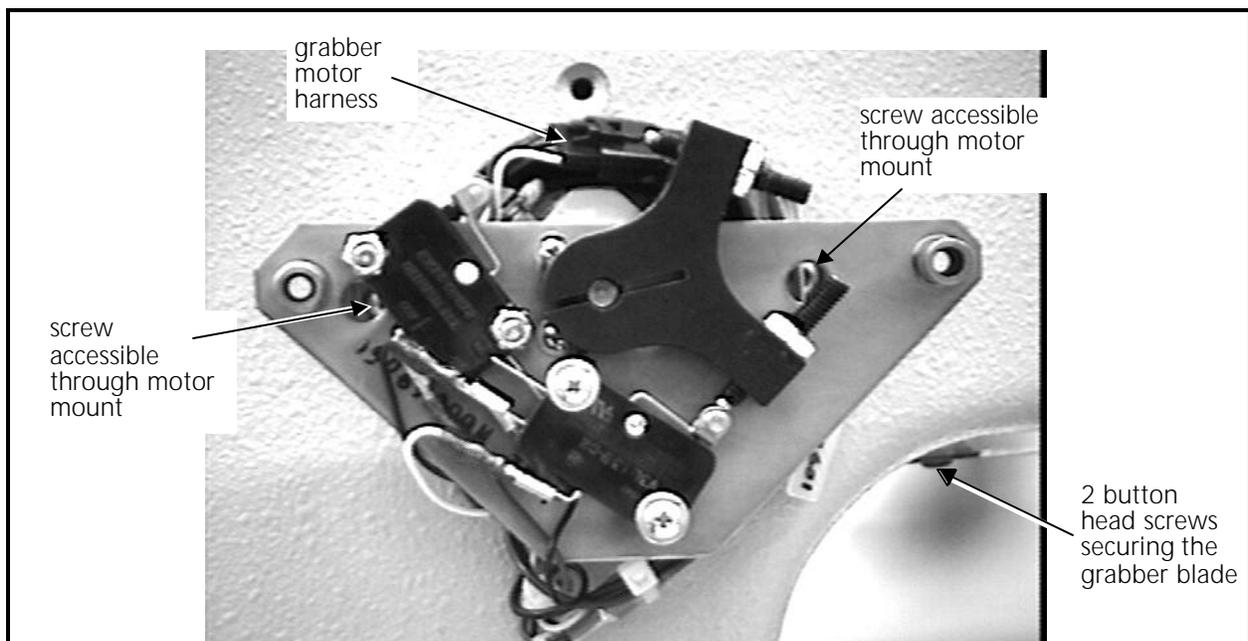


Figure 3 - 43 Grabber Drive Assembly

4. Remove the two screws holding the grabber drive assembly to the embroidery head casting. (The screws are accessible through holes in the motor mount, see Figure 3-43.)
5. Maneuver the grabber drive assembly out of the embroidery head casting.
6. Reverse order of the above steps to replace the grabber drive assembly.

Grabber Blade

1. Remove the 4 screws and take off the top grabber blade cover.
2. Remove the two button head screws that secure the grabber blade to the grabber drive assembly where it enters into the embroidery head arm casting (See Figure 3-43).
3. Remove the 4 screws to free the front grabber blade cover (see Figure 3-44). Slide the grabber blade out of the grabber blade guide (just behind the Velcro wiper bar) as you remove the cover and grabber blade.

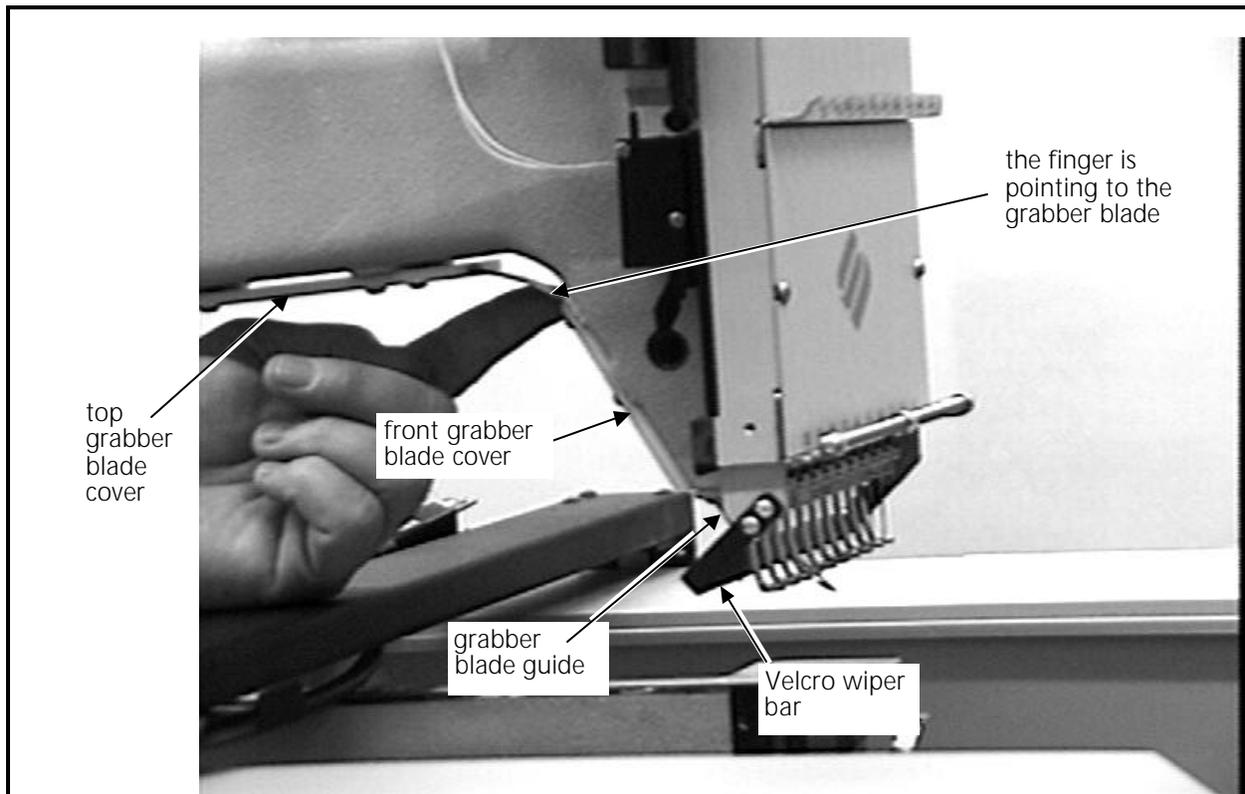


Figure 3 - 44

4. Reverse order of the above steps to replace the grabber blade.

When reinstalling the grabber blade, be sure to slide the grabber blade into the front blade cover and then the grabber blade guide before installing the screws to attach the grabber blade to the grabber drive assembly at the entry into the arm casting.

When tightening the covers, some positioning adjustment may be required to ensure smooth blade movement.

Trimmer Drive Assembly

Trimmer Cam

FACTORY SERVICE ADVISED!

This assembly is mounted under the head in the rear bed. To remove this mechanical assembly requires several steps, including removing the embroidery head from the frame. A factory trained technician is recommended for removal and installation of parts in this area.

Trimmer Solenoid

NOTE: When the trimmer solenoid mount is moved, the movable knife home position may become mis-adjusted. Refer to the movable knife home position adjustment procedure after the solenoid is reinstalled.

1. Remove the head rear bed cover to gain access to the trimmer drive assembly.
2. Refer to Figure 3-45 and mark the position of the solenoid mount in its track on the movable frame. This will aid in returning the assembly to its current position, helping to keep the movable knife home position as close as possible.

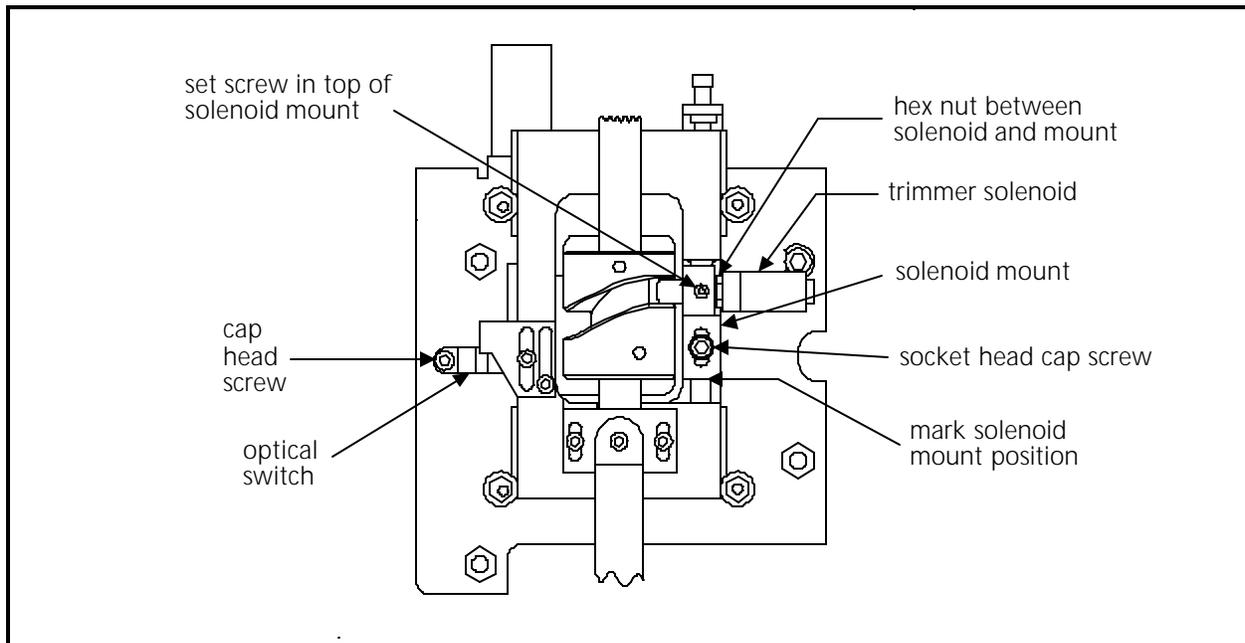


Figure 3 - 45 Trimmer Camming Mechanism

3. Remove the socket head cap screw from the solenoid mount and lift the solenoid and mount out together.
4. Loosen the set screw in the top of the solenoid mount to allow the solenoid to be rotate out of the mount.

5. Loosen the hex nut between the the solenoid body and the mount, then rotate the solenoid assembly out of the mount.
6. Rotate a new solenoid assembly into the mount. Do not tighten the hex nut or set screw in the top of the mount at this time.
7. Reinstall the solenoid and mount to the movable frame and refer to the adjustments section of this manual to adjust for solenoid positioning and movable knife home position. When the trimmer solenoid and mount are reinstalled you may also need to adjust the home stop screw or adjust the solenoid mount to achieve proper travel of the solenoid pin into the cam groove.
8. Reinstall the head rear bed cover.

Picker Solenoid Assembly

FACTORY SERVICE ADVISED!

This assembly is mounted under the embroidery head in the rear bed. To remove this assembly requires several steps, including removing the head from the chassis. A factory trained technician is recommended for removal and installation of parts in this area.

Home Position Optical Switch

1. Remove the cap head screw holding the body of the optical switch in position (see Figure 3-45).
2. Carefully manipulate the switch harness through the cutout in the bracket until you can access and disconnect the in-line connector.
3. Connect the new optical switch to the in-line connector and place the switch in position on the bracket.
4. Reconnect the optical switch with the cap head screw.

Picker Assembly

1. Remove the screws holding the needle plate. Remove the needle plate.
2. Disconnect the picker link from the picker base by loosening the set screw inside the swivel pivot of the picker base (see Figure 3-46).

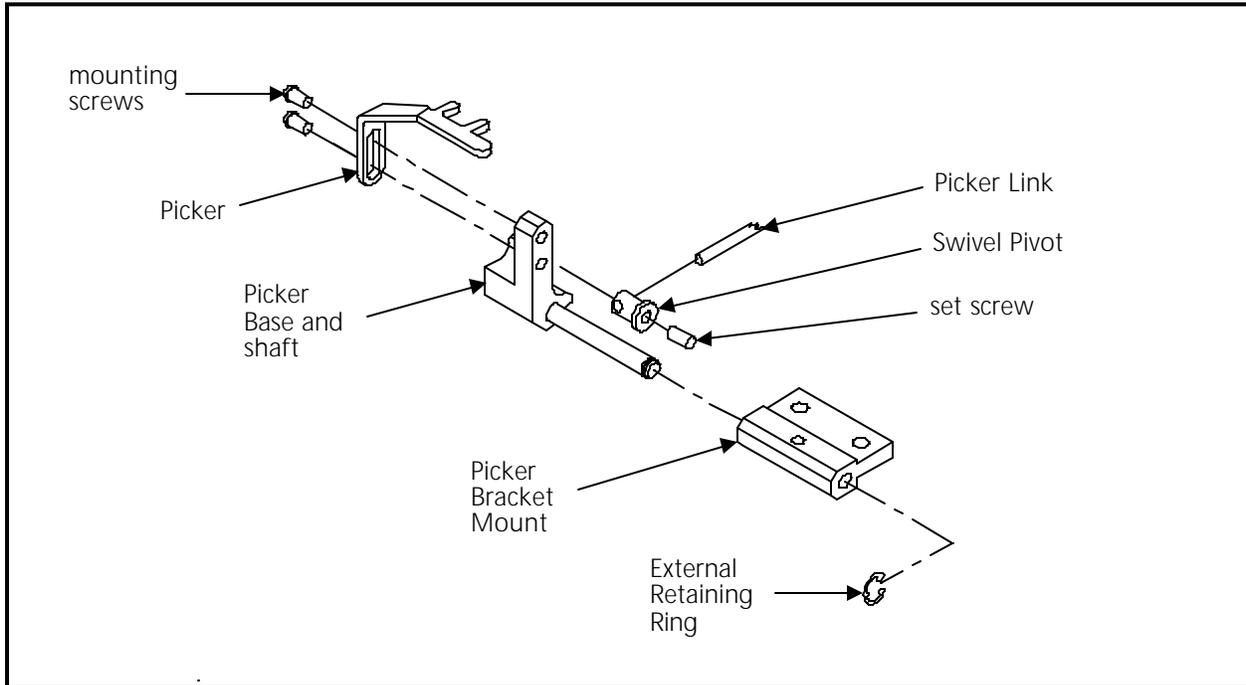


Figure 3 - 46

3. Remove the external retaining ring at right end of the picker base shaft.
4. Slide the picker assembly out of the picker bracket mount.

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.

Movable Knife

1. Remove the screws holding the needle plate. Remove the needle plate.
2. Remove the screws holding the front and rear bed covers and remove the covers.
3. Lift the forward end of the connecting link from the pin on the movable knife drive arm (see Figure 3-47).
4. Push the movable knife all the way back until it stops.
5. Loosen the hex socket screw holding the movable knife to the top of the knife drive arm.



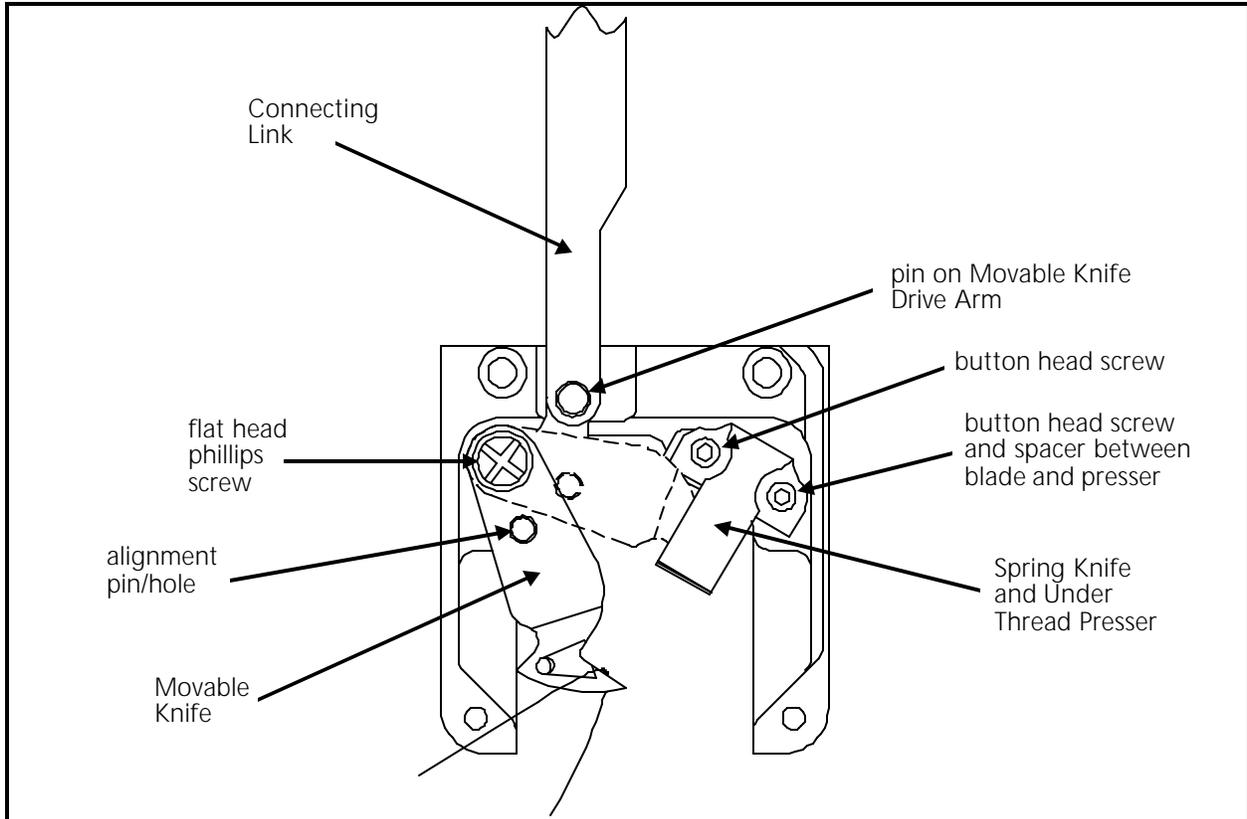


Figure 3 - 47



6. Rotate the movable knife out of the spring knife, then remove the hex socket 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 socket 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 bracket.

10. Tighten the hex socket screw.

Spring 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 3-47).



4. Rotate the movable knife forward to remove it from under the spring knife and under thread presser.

5. Remove the two button head screws from the top of the spring knife.

Note: In the next step it is important to note at which screw hole any spacer might be located.

6. Remove the spring knife, the under thread presser, and/or a spacer.

Note 1: A spacer may be placed under one of the screws for leveling at initial installation. If reinstalling the old spring knife, you must reinstall the spacer at the same location as it is currently.

Note 2: When installing a new spring knife, disregard the spacer and attach the new spring knife without using the spacer. Later in the adjustment process you may need a spacer, but you cannot determine it at this time.

7. Replace the required new parts.

Note 1: If the old spring knife is reinstalled and a spacer was under one screw hole, replace the spacer at the same screw location.

Note 2: If a new spring knife is being installed, DO NOT install any spacer.

8. Install and tighten the 2 button head screws.

The only adjustment for the spring knife is for the inclusion of a spacer, if needed). However, after replacing a spring knife, it is advised to operate the TRIM IMMEDIATE command several times to allow the spring knife to "seat" with the movable knife. Then refer to Section 2 of the manual for adjustment information.

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 3-48).

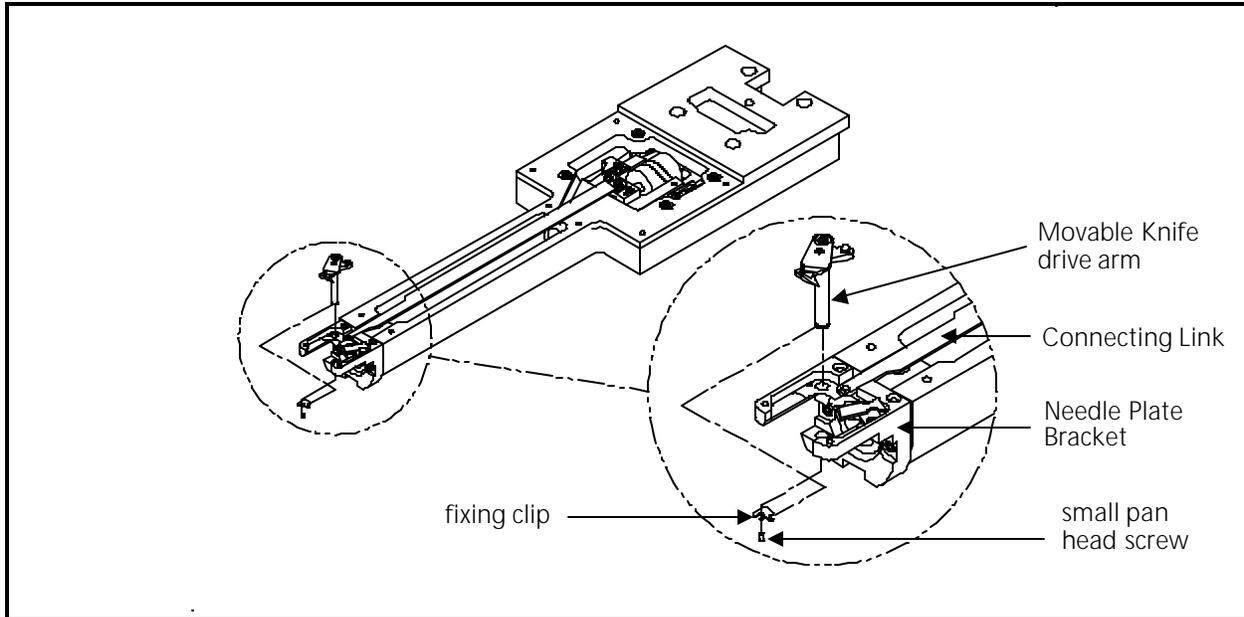


Figure 3 - 48

4. Remove the small pan head screw and fixing clip from the bottom of the needle plate bracket.

The clip is held into a slot in the arm shaft by the screw and the combination holds the arm shaft in place. Once this clip is removed, the arm shaft is free to be removed out of the top of the needle plate bracket.

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 3-49).

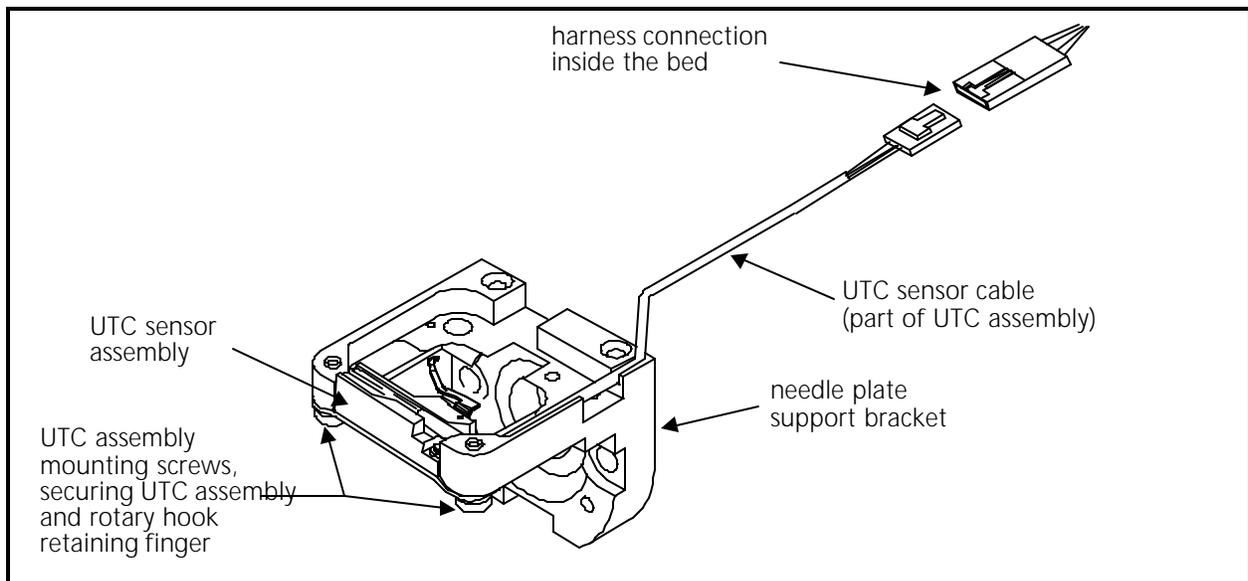


Figure 3 - 49

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 3-49).

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 3-49.

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 3-50 and install the 2 UTC assembly mounting screws.

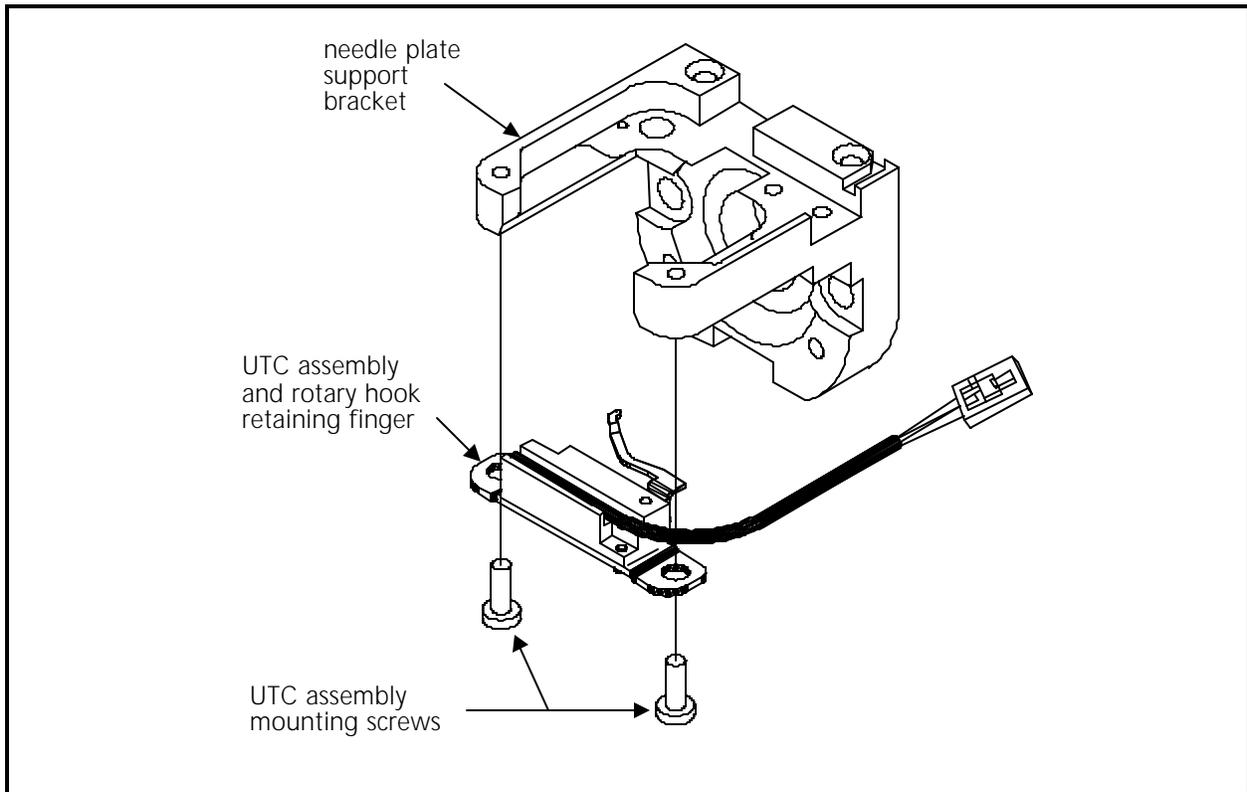


Figure 3 - 50

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

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