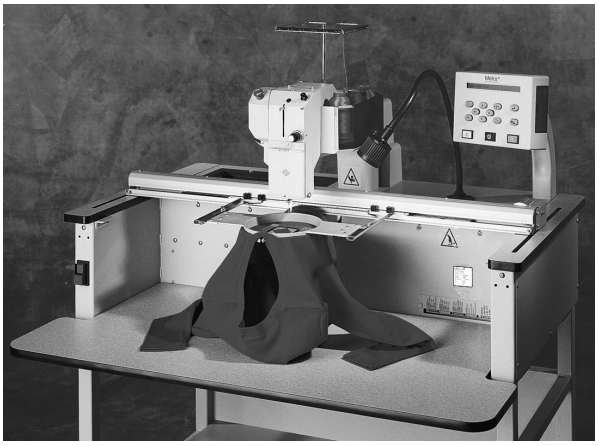
Technical Manual for the EMT 1 embroidery peripheral



- Single Head, One Needle
- Tubular Goods Hooping
- CE

Melco Embroidery Systems

A Saurer Group Company

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1. Introduction

Scope Of Manual

The EMT 1 Embroidery Peripheral Technical Manual is a guide for performing repairs and adjustments which go beyond routine operator maintenance.

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

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

This technical manual is presented in four Sections: 1) an overview of general information useful in understanding the manual and various service requirements, 2) service maintenance of all the machine areas except the embroidery head, 3) embroidery head maintenance, and 4) accessory adjustments. Sections 2, 3, and 4 address mechanical disassembly and replacement of the major components of the embroidery peripheral and any related machine adjustments.

Standard Conventions Used In Manual

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

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

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

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

- To indicate a key on the computer keyboard, the key in question is simply referred to, for example: Press the Enter key to initiate the application.
- A key on the peripheral keyboard is represented by a pictorial of that key.
- Typing with the computer keyboard is referred to in **BOLD** letters, for example: Type: **run** and press Enter to start.

- To indicate that two or more keys must be pressed to obtain a desired result, each key is indicated with commas between them. An example is: Press Shift,8 to type an asterisk (*****).

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

WARNING!

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

CAUTION!

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

NOTE:

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

Glossary Of Terms

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

Maintenance Philosophy

The maintenance philosophy used in this manual, and practiced at Melco, is to isolate potential problems within the system to a "practical" replacement assembly. 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 further damage to machine components; and only replacing one part at a time to enable identification of the defective part after the machine is repaired.

Good Maintenance Practice

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

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

Static Electricity

As with all computerized equipment, the EMT 1 Embroidery Peripheral is sensitive to static electricity. Any time work is performed inside covered areas of the embroidery peripheral, the person performing the work MUST be using a static grounding strap.

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

Grounding Strap Use

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

Warranty Considerations

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

Electrical Grounding

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

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

Functional Arrangement

The EMT 1 is functionally arranged into several sections including the electronics, a power supply section, the keyboard and disk drive, the Embroidery Head, and the Carriage section. Figure 1-1 shows the general locations of these and other functional parts of the embroidery peripheral.

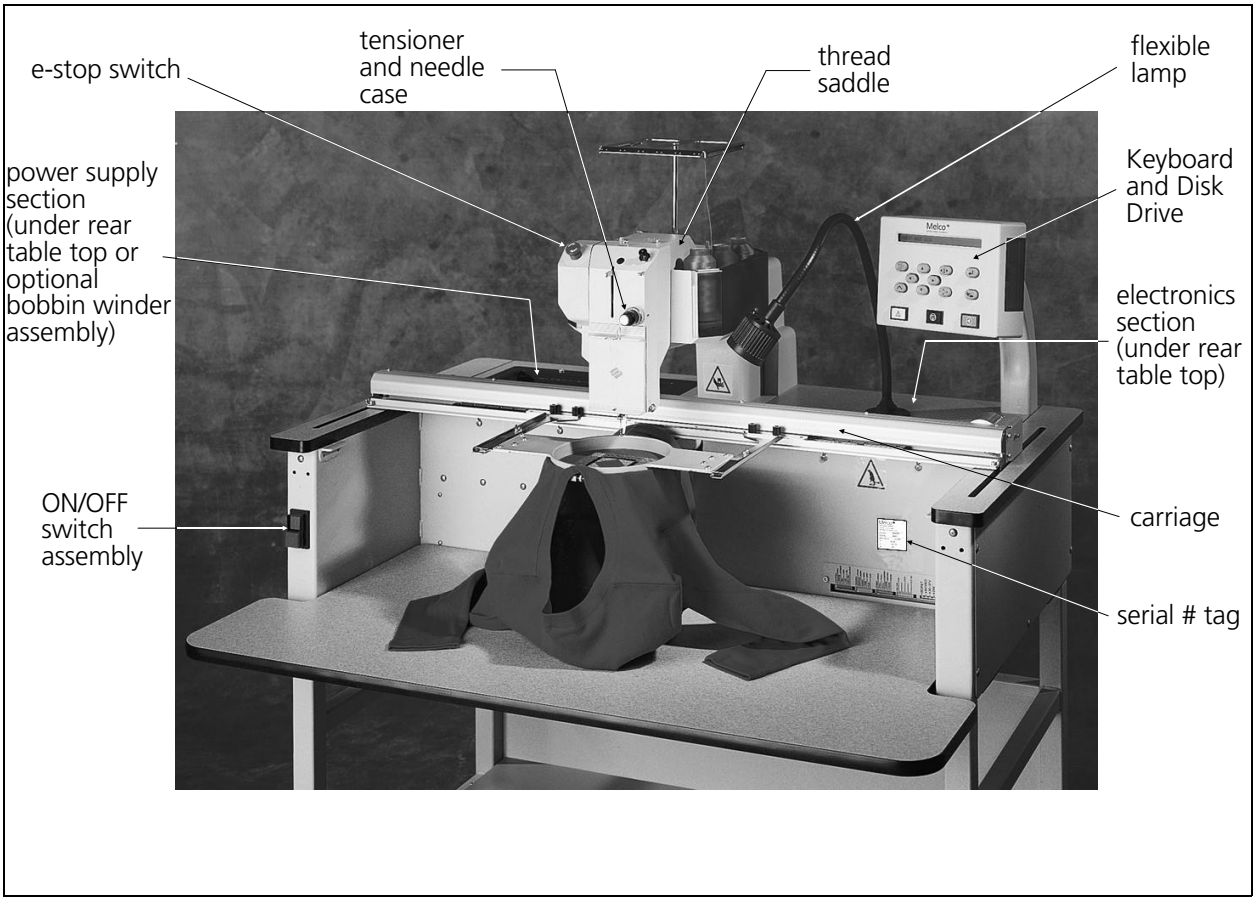

Figure 1 - 1

Configuring the EMT 1

During the operation of the EMT 1, certain situations may arise when the peripheral does not respond to keyboard commands. You may often recover from this type of situation by performing what is called "Configuring" (or Re-configuring) the embroidery peripheral.

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 EMT 1 will clear the power fail rescue function for the current situation.

There are two items that must be set in each EMT 1 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 EMT 1 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 EMT 1 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. The address must 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 unique identification. The EMT 1 uses an Ethernet network card which allows the address to contain the numbers 0 through 9, all 26 English letters, three symbols (-, /, and *), or any combination of these characters. The maximum number of characters that can be used in the network address is sixteen.

Configuration Procedure

Refer to the operation manual for the procedure to configure or re-configure the EMT 1 Embroidery Peripheral.

Troubleshooting LEDs and Test Points

At the front of the EMT 1 is a metal cover plate over a variety of indicator LED lights and a series of test points for checking certain voltages with a multimeter. This area is provided for observing various machine conditions, especially while troubleshooting problems that may occasionally occur. To access this area, remove the screws holding the cover, flip the cover over so the lettering on the cover is visible (as shown in Figure 1-2), and reinstall the cover in the same holes but above the LED opening. The lettering on flip-side of the cover is a brief title for each of the LED and test point locations. You may also refer to Figure 1-3 for this information.

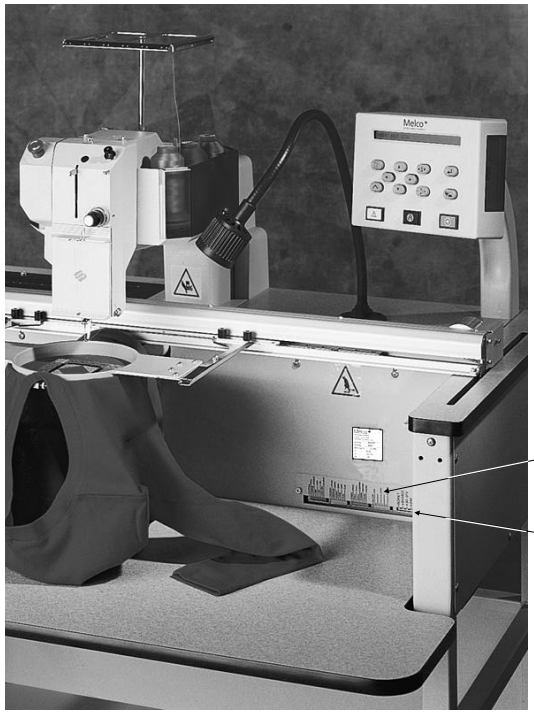

Figure 1 - 2

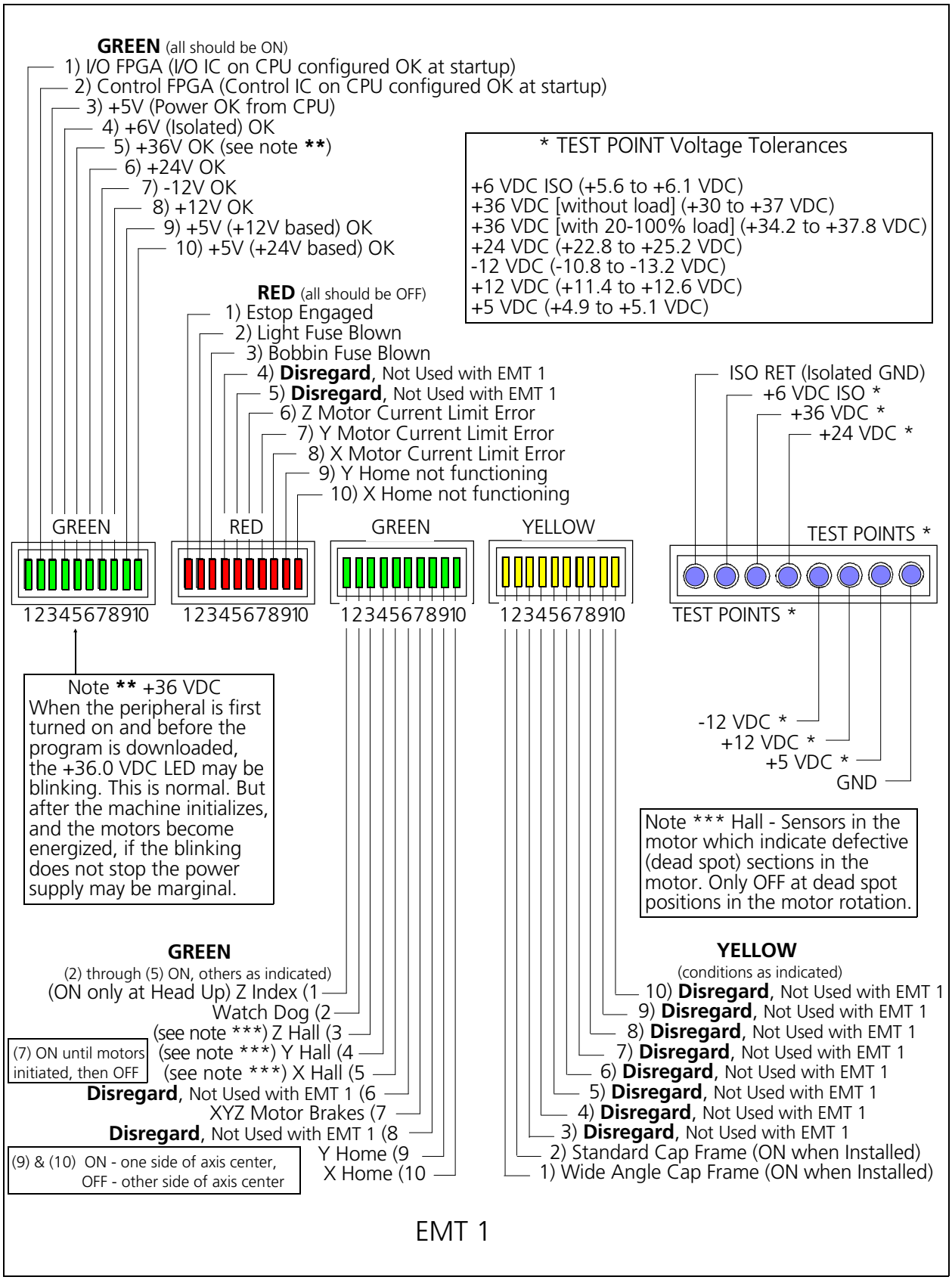
GREEN (all should be ON)
1) I/O FPGA (I/O IC on CPU configured OK at startup)
2) Control FPGA (Control IC on CPU configured OK at startup)
3) +5V (Power OK from CPU)
4) +6V (Isolated) OK
5) +36V OK (see note **)
6) +24V OK
7) -12V OK
8) +12V OK
9) +5V (+12V based) OK
10) +5V (+24V based) OK
* TEST POINT Voltage Tolerances
+6 VDC ISO (+5.6 to +6.1 VDC)
+36 VDC [without load] (+30 to +37 VDC)
+36 VDC [with 20-100% load] (+34.2 to +37.8 VDC)
+24 VDC (+22.8 to +25.2 VDC)
-12 VDC (-10.8 to -13.2 VDC)
+12 VDC (+11.4 to +12.6 VDC)
+5 VDC (+4.9 to +5.1 VDC)
RED (all should be OFF)
1) Estop Engaged
2) Light Fuse Blown
3) Bobbin Fuse Blown
4) **Disregard**, Not Used with EMT 1
5) **Disregard**, Not Used with EMT 1
6) Z Motor Current Limit Error
7) Y Motor Current Limit Error
8) X Motor Current Limit Error
9) Y Home not functioning
10) X Home not functioning
ISO RET (Isolated GND)
+6 VDC ISO *
+36 VDC *
+24 VDC *
GREEN
RED
GREEN
YELLOW
TEST POINTS *
12345678910
12345678910
12345678910
12345678910
TEST POINTS *
Note ** +36 VDC
When the peripheral is first turned on and before the program is downloaded, the +36.0 VDC LED may be blinking. This is normal. But after the machine initializes, and the motors become energized, if the blinking does not stop the power supply may be marginal.
-12 VDC *
+12 VDC *
+5 VDC *
GND
Note *** Hall - Sensors in the motor which indicate defective (dead spot) sections in the motor. Only OFF at dead spot positions in the motor rotation.
GREEN
(2) through (5) ON, others as indicated)
(ON only at Head Up) Z Index (1
Watch Dog (2
(see note ***) Z Hall (3
(see note ***) Y Hall (4
(see note ***) X Hall (5
Disregard, Not Used with EMT 1 (6
XYZ Motor Brakes (7
Disregard, Not Used with EMT 1 (8
Y Home (9
X Home (10
(7) ON until motors initiated, then OFF
(9) & (10) ON - one side of axis center, OFF - other side of axis center
YELLOW
(conditions as indicated)
10) **Disregard**, Not Used with EMT 1
9) **Disregard**, Not Used with EMT 1
8) **Disregard**, Not Used with EMT 1
7) **Disregard**, Not Used with EMT 1
6) **Disregard**, Not Used with EMT 1
5) **Disregard**, Not Used with EMT 1
4) **Disregard**, Not Used with EMT 1
3) **Disregard**, Not Used with EMT 1
2) Standard Cap Frame (ON when Installed)
1) Wide Angle Cap Frame (ON when Installed)
EMT 1

Figure 1 - 3

Various Technical Specifications

The following is a list of various tension and force specifications for the EMT 1 (All specifications to be within plus or minus 10% unless otherwise indicated):

X Drive Belt Tension. . . . . 25 pounds
Y Drive Belt Tensions . . . . . 40 pounds
Y Motor Belt Tension . . . . . 40 pounds
Z Motor Belt Tension . . . . . 7 (+/- 1) pounds
X Carriage Friction . . . . . 5 +/- 2 pounds
Y Beam Friction . . . . . 12 +/- 4 pounds

NOTE: A special force gauge has been designed for adjusting the belt tensions using unique methods that are representative of these tension specifications.

X Home Sensor Position . . . . . centered within +/- 0.015 inches
Y Home Sensor Position . . . . . 7.09 +/- 0.015 inches from arm mounting holes in the carriage relative to the needle plate hole

2. Service Maintenance (except embroidery head)

General

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

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

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

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

Drive Belt Tensions

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

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

Keyboard Section

Keyboard/Display Replacement

To remove the keyboard/display assembly from the cover, refer to Figure 2-1 and the following procedure:

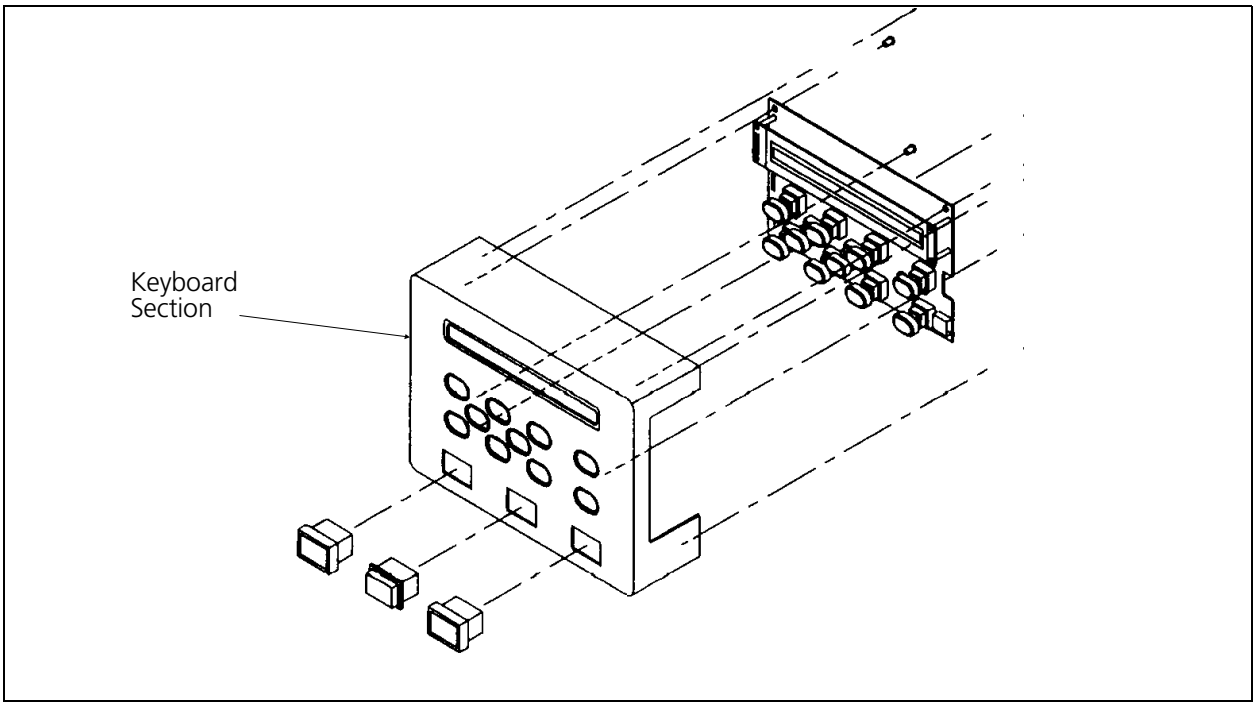

Figure 2 - 1

1. Turn OFF the power switch to the EMT 1 and remove the power cord from the power source electrical outlet and the rear of the machine.

2. Remove the cable cover from the base plate at the rear of the keyboard/display assembly.

3. Remove the cable strain relief plate from behind the keyboard/display assembly.

4. Remove the 4 screws from the base plate of the assembly to loosen the keyboard/display assembly and cover.

5. Carefully slide the assembly forward until you can access the cables.

6. Pinch the locking lever of the small 2-wire connector and remove it from the keyboard PCB.

7. Use a 3/16" nut driver and remove the 2 nuts securing the 15-pin connector to the keyboard PCB.

8. Remove the PCB and cover together.

9. Install a static grounding strap between the working surface and the personnel performing this procedure.

10. Remove the 4 screws that secure the keyboard/display assembly PCB to the cover.

11. Disconnect the 3-button harness from the PCB.

12. Remove the keyboard/display assembly PCB from the keyboard cover.

13. 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.

14. When the key caps are transferred, reinstall the keyboard/display assembly by reversing the preceding steps.

NOTE: When re-attaching the PCB to the cover, be certain the ground wire is attached at the 4th screw and that when the screws are tightened the buttons do not stick in the cover holes when pressed.

Display Screen Intensity

During the adjustment of the display intensity the EMT 1 must be turned on so the result of the adjustment may be observed.

1. Locate the intensity adjustment knob on the top, rear of the keyboard/display printed circuit board as shown in Figure 2-2.

2. Turn ON the power switch to the EMT 1.

3. When facing the machine from the front, rotate the adjustment potentiometer clockwise to decrease intensity on the display, or counterclockwise to increase the intensity on the display.

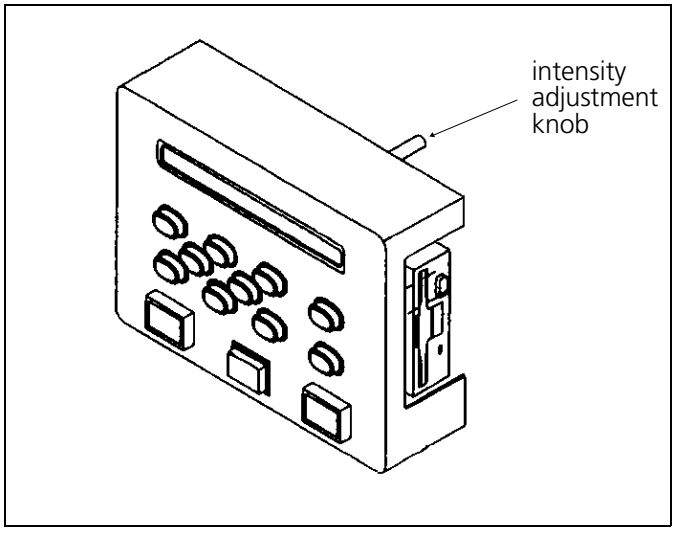

Figure 2 - 2

Disk Drive

1. Remove the keyboard/display assembly and cover as previously described.
2. Disconnect the disk drive harnesses.
3. Remove the 4 screws shown in Figure 2-3 that hold the drive to the side brackets.
4. Replace the disk drive and re-install the hardware, harnesses, and keyboard/display assembly and cover that were removed earlier.

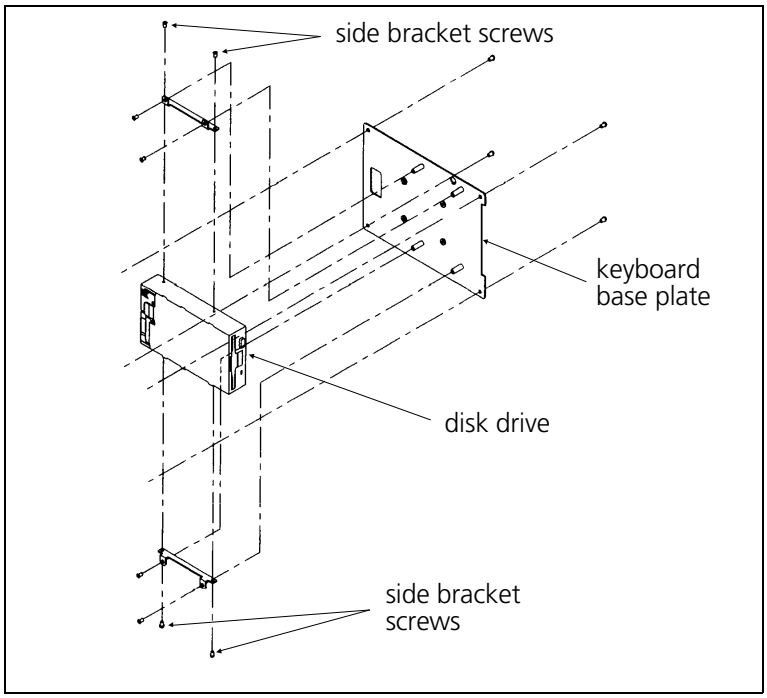

Figure 2 - 3

NOTE: When installing the disk drive data ribbon orient the harness so the edge with the colored stripe (indication pin #1) is lying adjacent to the power harness.

Lamp Assembly

The halogen bulb replacement is described in the operation manual. The bulb has 2 pins that simply plug into the base socket at the end of the lamp post. The bulb case must be removed by rotating it counter-clockwise off the base to access the lamp.

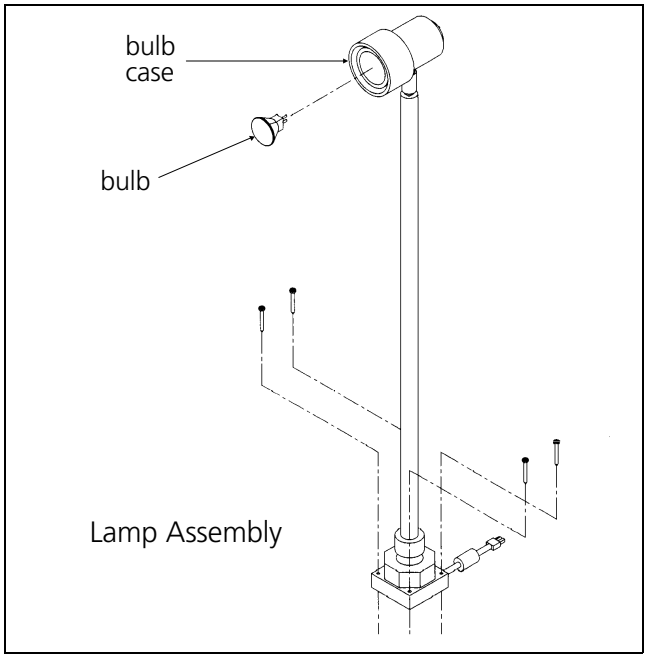

Figure 2 - 4

Bobbin Winder

The optional bobbin winder is mounted in the left rear table top.

There is no need to remove the bobbin winder assembly from the table top to service it. Simply remove the 4 truss screws holding the table top over the power distribution section. As you lift the table top and bobbin winder assembly upward, disconnect the two harnesses going to the bobbin winder motor and switch.

The built in bobbin winder receives its power from the EMT 1 12 V source. Winding starts by moving the actuator lever to the start position. The winding operation stops when the thread in the bobbin triggers the switch inside the actuator lever. The operation may manually be stopped by moving the actuator lever away from the start position by hand.

The bobbin winder motor is equipped with a thermal switch to protect the motor and circuitry in the event of an overload condition. If the bobbin winder stops due to an overload or overheating:

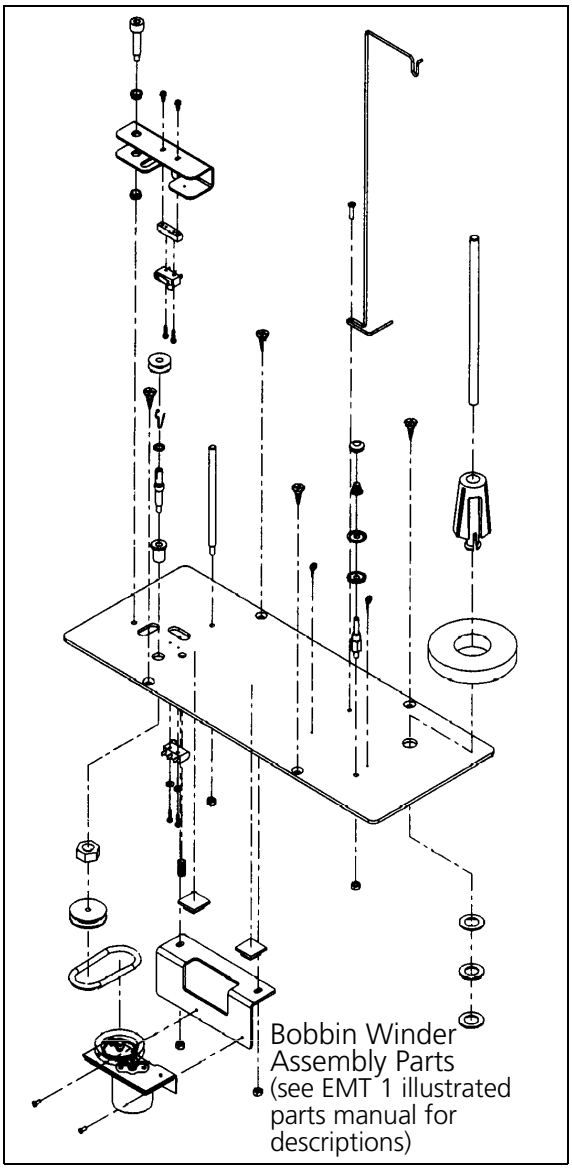

Figure 2 - 5

1. Move the actuator lever to the OFF position.
2. Clear the obstruction and/or lubricate the drive shaft.
3. When the motor cools, the thermal switch will reset.
4. Move the actuator lever to the ON position and resume operation.

Refer to Figure 2-5 for an illustration of the various parts and their orientation in making up the bobbin winder assembly.

For proper operation of the bobbin winder option, refer to the bobbin winder section in the EMT 1 peripheral operation manual.

E-Stop Switch Replacement

The emergency stop switch is located just to the left of the needle case assembly. Refer to the following procedure to replace this switch:

1. Turn OFF the peripheral and unplug the power cord from the source.

2. Remove the three screws on the side of the e-stop cover, then remove the cover from the left side of the needle case assembly as shown in Figure 2-6.

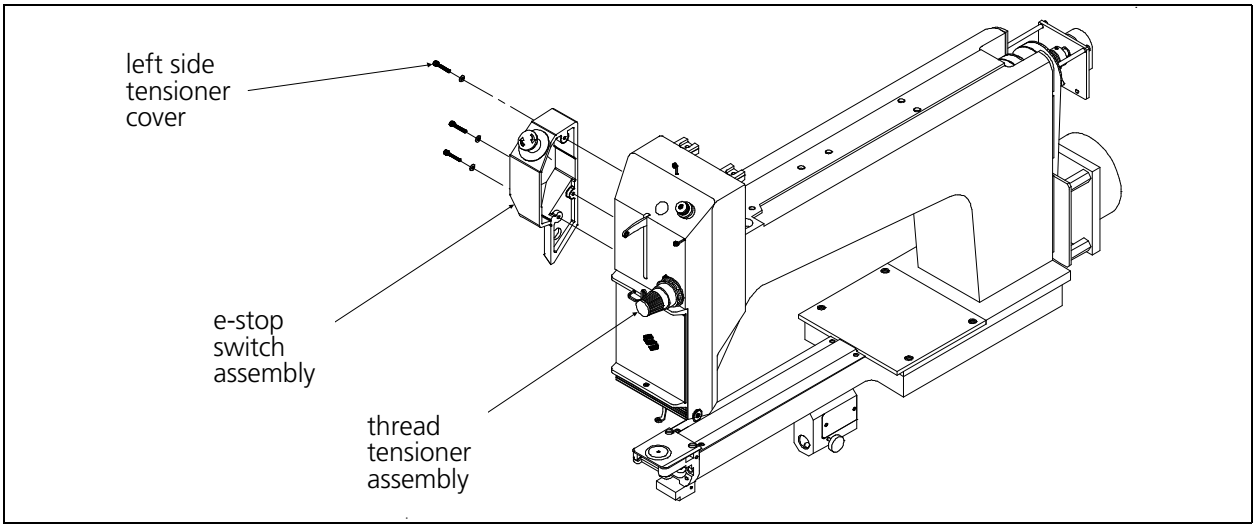

Figure 2 - 6

3. Loosen the locking collar on the e-stop switch assembly at the inside surface of the cover (see Figure 2-7).

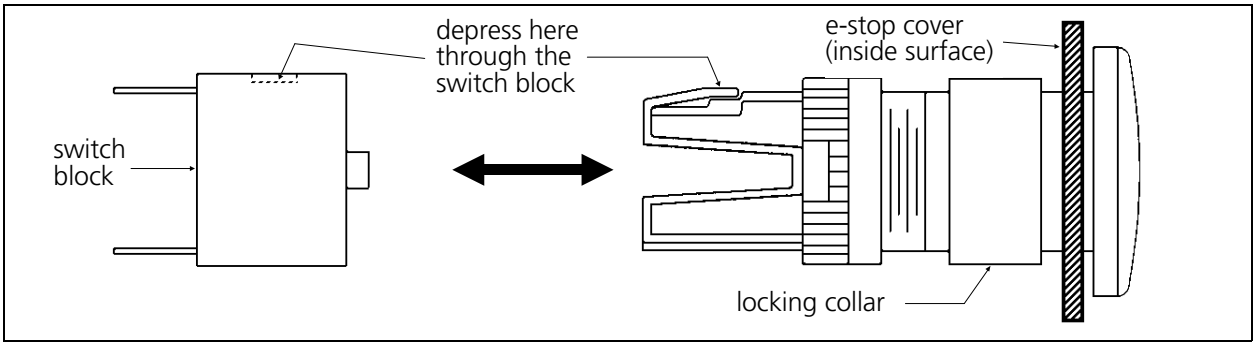

Figure 2 - 7

4. Refer to Figure 2-7 to locate the small square opening in the switch block through which you will see the small locking tab on the switch assembly body.

5. Remove the switch block by depressing the tab on the assembly body through the opening in the switch block and sliding the switch block off the end of the assembly body.

6. Remove the locking collar the rest of the way off the assembly and remove the remainder of the e-stop switch assembly.

7. Install a new e-stop switch assembly by reversing the previous steps for removing the old one. The switch block and assembly body are keyed for assembly in one orientation only.

8. When the new switch block is pressed onto the end of the switch assembly, transfer the wires one at a time to keep them in the proper order (refer to the diagram in Figure 2-8).

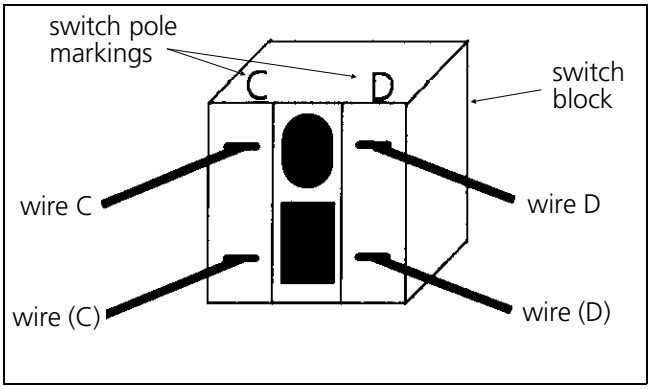

Figure 2 - 8

As shown in the figure, the two wires labeled with C and (C) are connected to the pole marked C. The two wires labeled with D and (D) are connected to the pole marked D.

Power Distribution Section

This section is comprised of various functions including power entry, line filter, and switching circuitry for 110 or 220 volt operation. The various voltage sources for logic circuits, motors, and solenoids are integrated into the power distribution module. Additionally, the e-stop controls are built into the PCB located in this module (see Figure 2-9). The section is located under the left rear table top.

Voltage Adjustments

The voltage values are set at the factory and are regulated within the operating ranges of the peripheral. NO further adjustments are required for voltage values. Should any voltage drift out of its operating range, the module must be replaced.

Remove Table Top

To access the power distribution section for replacing the power module, remove the left rear table top (with optional bobbin winder assembly) described as follows:

1. Loosen the left rear table top (with optional bobbin winder assembly) by loosening the 4 truss screws (2 at the front and 2 at the rear).

Caution: If the optional bobbin winder is installed, you must disconnect the two harnesses going to the bobbin winder assembly as you lift the table top upward.

2. Lift the table top up and disconnect the bobbin winder harnesses if the bobbin winder assembly is installed. Remove the table top to a safe storage area.

Module Replacement

The power distribution module is replaced as an entire assembly regardless of which of the areas included within the module is malfunctioning. To replace the module refer to the following steps:

1. Turn OFF the peripheral and unplug the power cord from the source.

2. Refer to the procedure for removing the left rear table top (with optional bobbin winder assembly) and remove the table top.

3. Remove the five truss head screws and the left side cover of the peripheral to enable access to the power switch harness connector shown in Figure 2-9.

4. Refer to Figure 2-9 and remove all of the harness connections entering the power distribution module. In addition to the three harnesses entering the top and the power switch harness at the side, there is a ground wire attached to a stud near the rear left corner of the power distribution section that must be removed.

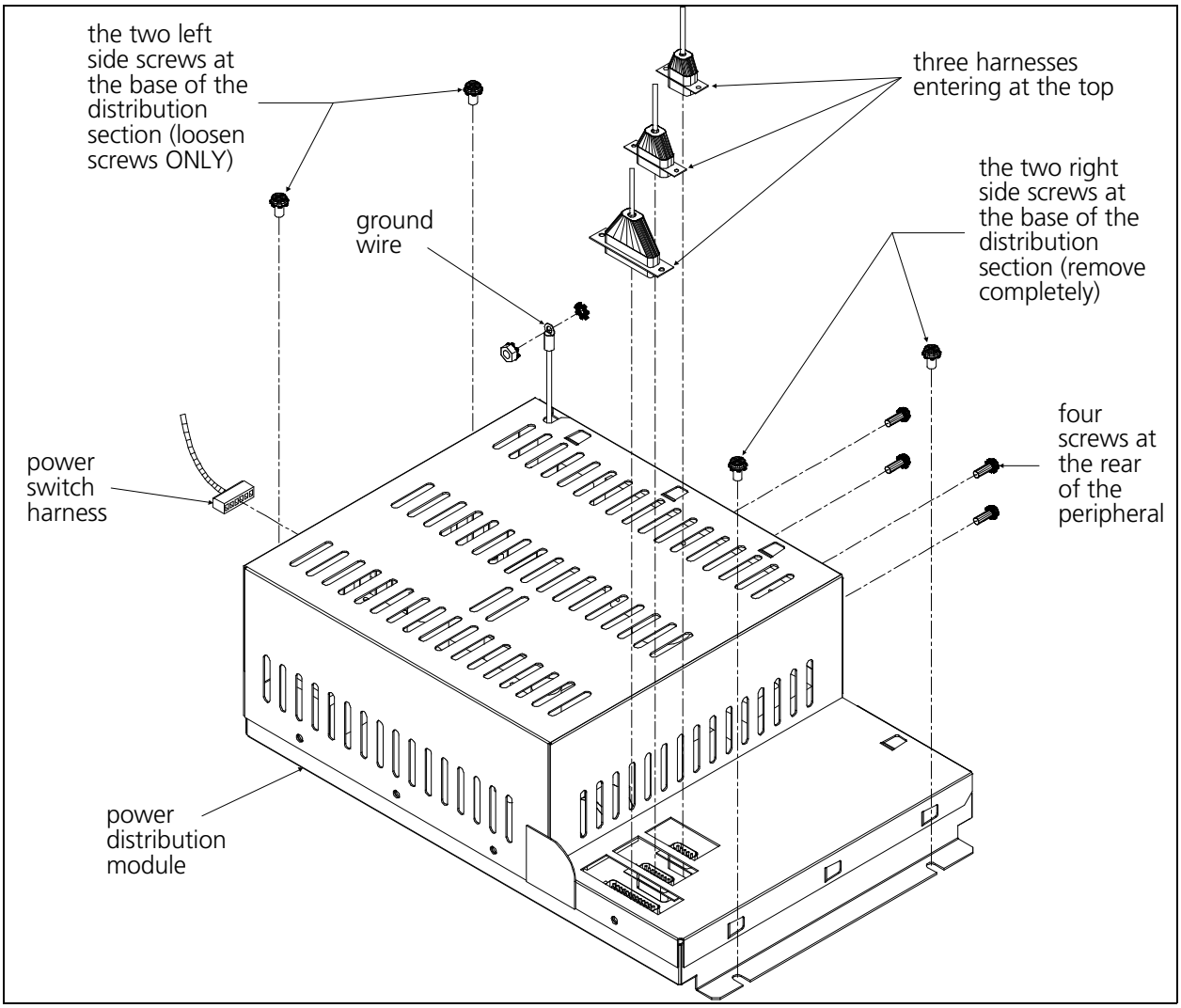

Figure 2 - 9

5. At the rear of the peripheral, remove the four screws holding the power distribution module to the rear wall of the power distribution section.

6. At the side of the module next to the left peripheral wall, loosen the two M5 pan head screws with captured star washer (DO NOT REMOVE THE SCREWS).

7. Remove the remaining two M5 pan head screws holding the power distribution module to the base of the power distribution section.

8. The slots under the two loosened screws near the peripheral wall are shaped in a right angle pattern. To remove the power distribution module from those two screws you must first slide it slightly forward and then to the right. Carefully lift the module out of the peripheral.

9. Put the new power distribution module into place and push the open ends of the slots at the left of the module under the loosened screws near the peripheral wall.

10. Push the module toward the rear allowing the loosened screws to capture the module within the right angled portion of the slots.

11. Install remaining two screws in the base of the power distribution module and four in the rear wall of the power distribution section. Tighten all eight screws.

12. Reinstall the three harnesses in the top, the power switch harness at the side, and the ground wire to the stud near the rear left corner of the power distribution section.

    NOTE: When a new power distribution module is installed, there is no requirement for adjusting any voltages.

13. Reinstall the left rear table top (with optional bobbin winder assembly).

14. Reattach the power cord to the peripheral voltage source.

Electronics Section

The electronic section consists of the major electronic printed circuit boards located within an RFI controlling box called the card cage. The card cage is located under the right rear table top.

Remove Table Top

To access the card cage, remove the right rear table top (with lamp assembly) described as follows:

1. Loosen the right rear table top (with lamp assembly) by loosening the 4 truss screws (2 at the front and 2 at the rear).

Caution: In the next step you must disconnect the harness going to the lamp assembly as you lift the table top upward.

2. Lift the table top up and disconnect the lamp assembly harness. Remove the table top to a safe storage area.

Remove Card Cage Cover

1. Turn OFF the power switch to the EMT 1 and remove the power cord from the power source electrical outlet and the rear of the machine.

2. To remove the card cage cover, remove the 10 screws and associated hardware from around the cover as shown in Figure 2-10 and lift the cover off.

Caution: When the electronics cover is removed the various printed circuit boards are exposed. DO NOT TOUCH THESE BOARDS Without Using Antistatic Precautions as instructed in this manual.

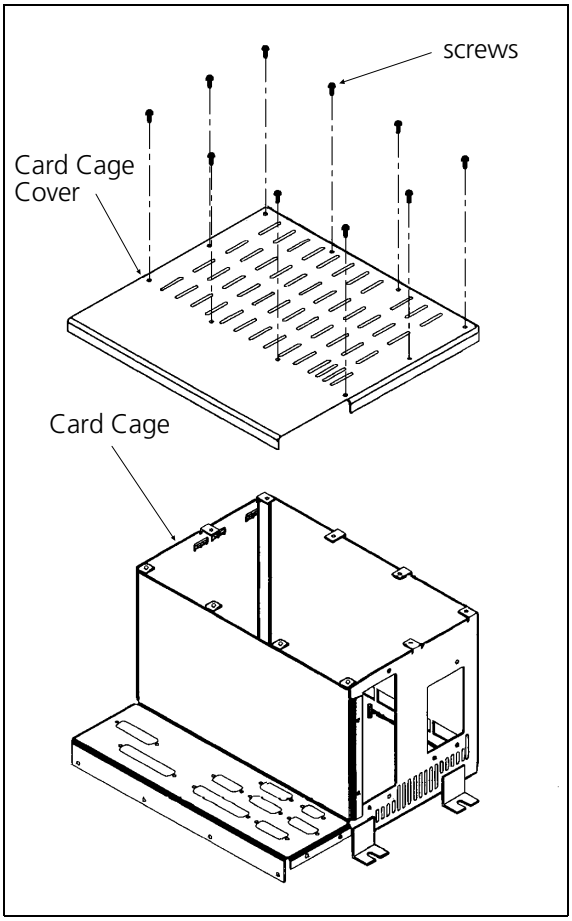

Figure 2 - 10

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.

Card Cage Components

Inside the card cage is found the Backplane PCB laying in the bottom with it's respective PCBs inserted upright into its connectors. The PCBs installed in the EMT 1 Embroidery Peripheral are:

- The CPU PCB
- The Ethernet network PCB (Not required with "disk-boot" system only)
- The Interface PCB
- The Low Voltage Driver PCB
- The XYZ Motor Driver Amplifiers

Refer to Figure 2-11 for identifying where each PCB is specifically located.

CPU PCB

The CPU PCB is the first PCB located to the front of the card cage as shown in Figure 2-11. Refer to the following procedure for replacing the CPU PCB.

1. Turn OFF the power switch to the EMT 1.
2. Remove the card cage cover and install a static grounding strap between the working surface and the personnel performing this procedure.
3. Grasp the CPU at the top corners and gently rock it out of its connectors in the backplane PCB. Remove the CPU.
4. Replace the CPU PCB by reversing the previous steps.
5. Remove the static grounding strap and replace the card cage cover.
6. Reinstall the right rear table top.

NOTE: If during this procedure, the CPU has been replaced with a different one, you must "configure" the embroidery peripheral. Refer to the peripheral operation manual and Section 1 of this manual for information regarding the configuration process.

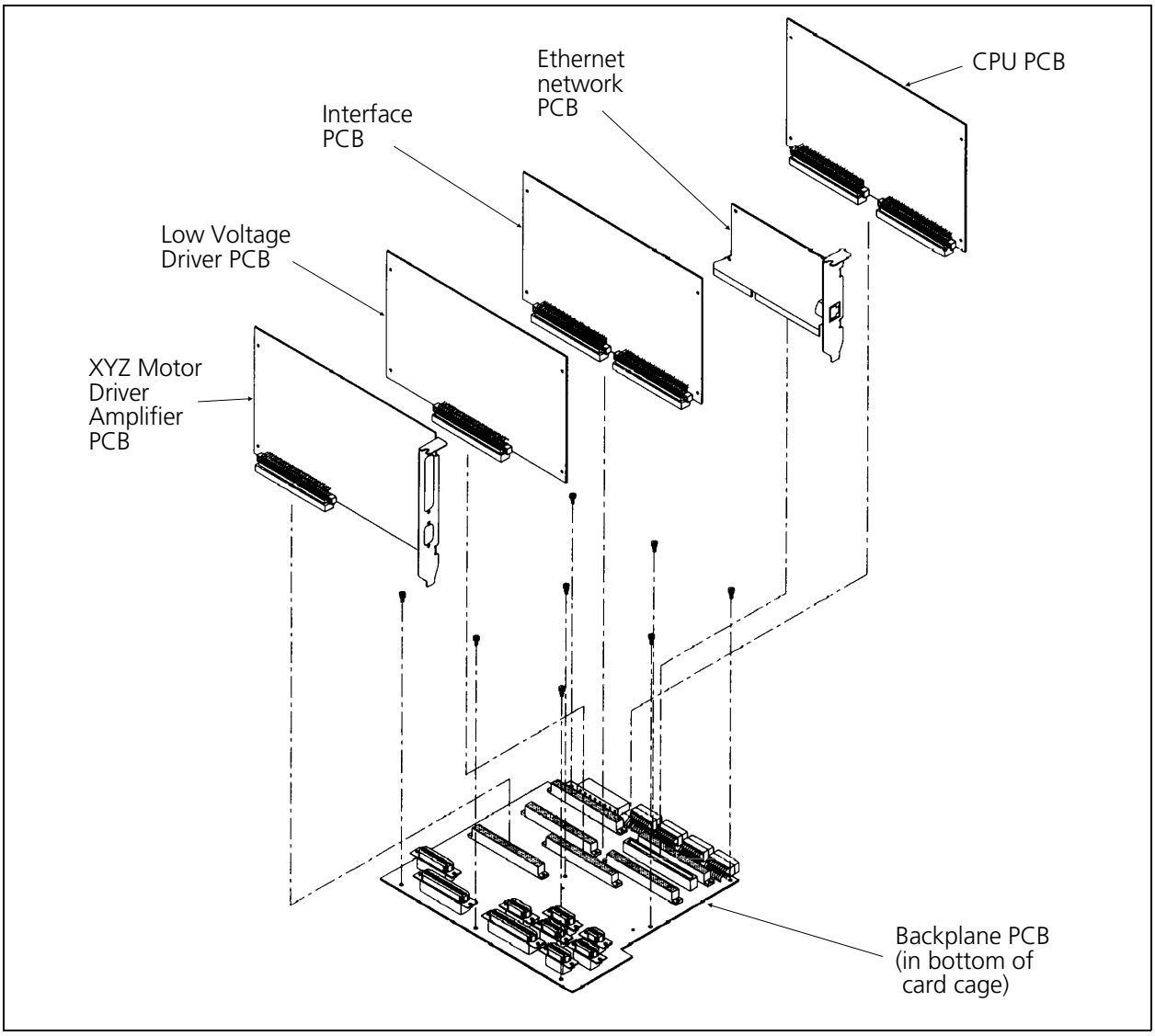

Figure 2 - 11

Ethernet Network PCB

The Ethernet PCB is positioned inside the card cage between the CPU PCB and the Interface PCB as Figure 2-11 shows. (Not required with standalone peripherals that are initiated by a "boot-disk" in the disk drive.) Refer to the following for replacing.

1. Turn OFF the power switch to the EMT 1.

2. Remove the card cage cover and install a static grounding strap between the working surface and the personnel performing this procedure.

3. Disconnect the Ethernet cable from the end of the PCB at the Ethernet card edge mounting bracket.

4. Remove the screw and washer at the card edge mounting bracket for the PCB.

5. Grasp the Ethernet PCB at the top corners and gently rock it out of its connectors in the backplane PCB. Remove the Ethernet PCB.

6. Replace the Ethernet PCB by reversing the previous steps.

7. Install the screw and washer at the card edge mounting bracket to secure the printed circuit board.

8. Reinstall the Ethernet cable to the end of the Ethernet PCB.

9. Remove the static grounding strap and replace the card cage cover.

10. Reinstall the right rear table top.

Interface PCB

The Interface PCB is positioned inside the card cage between the Ethernet PCB and the Low Voltage Driver PCB as shown in Figure 2-11. Refer to the following procedure for replacing the Interface PCB.

1. Turn OFF the power switch to the EMT 1.

2. Remove the card cage cover and install a static grounding strap between the working surface and the personnel performing this procedure.

3. Grasp the Interface PCB at the top corners and gently rock it out of its connectors in the backplane PCB. Remove the Interface PCB.

4. Replace the Interface PCB by reversing the previous steps.

5. Remove the static grounding strap and replace the card cage cover.

6. Reinstall the right rear table top.

Low Voltage Driver PCB

The Low Voltage Driver PCB is positioned inside the peripheral card cage between the Interface PCB and the XYZ Motor Driver Amplifier PCB (see Figure 2-11). Refer to the following procedure for replacement.

1. Turn OFF the power switch to the EMT 1.

2. Remove the card cage cover and install a static grounding strap between the working surface and the personnel performing this procedure.

3. Grasp the Low Voltage Driver PCB at the top corners and gently rock it out of its connectors in the Backplane PCB. Remove the Low Voltage Driver PCB.

4. Replace the Low Voltage Driver PCB by reversing the previous steps.

5. Remove the static grounding strap and replace the card cage cover.

6. Reinstall the right rear table top.

XYZ Motor Driver Amplifiers

The XYZ Motor Driver Amplifier PCB is positioned inside the peripheral card cage next to the Low Voltage Driver PCB and is the last PCB to the rear (see Figure 2-11). Refer to the following procedure for replacement.

1. Turn OFF the power switch to the EMT 1.

2. Remove the card cage cover and install a static grounding strap between the working surface and the personnel performing this procedure.

3. Loosen the screws in the cable connectors and remove the 2 cables from the end of the XYZ Motor Driver Amplifiers PCB that faces the middle of the peripheral.

4. Remove the screw and washer at the card edge mounting bracket for the XYZ Motor Driver Amplifiers PCB.

5. Grasp the PCB at the top corners and gently rock it out of its connectors in the backplane board. Remove the XYZ Motor Driver Amplifiers PCB.

6. Replace the PCB by reversing the previous steps.

7. Install the screw and washer at the card edge mounting bracket to secure the printed circuit board.

8. Reconnect the 2 cables to the end of the XYZ Motor Driver Amplifiers PCB and tighten the screws in the cable connectors.

9. Remove the static grounding strap and replace the card cage cover.

10. Reinstall the right rear table top.

Backplane PCB

The Backplane PCB sits on bottom of the card cage, and contains the connectors where the other PCBs are inserted (see Figure 2-11). Refer to the following procedure for replacing the Backplane PCB.

1. Turn OFF the power switch to the EMT 1.

2. Remove the card cage cover and install a static grounding strap between the working surface and the personnel performing this procedure.

3. Next, remove all the other printed circuit boards as earlier described.

4. Disconnect all the cables from the backplane PCB

5. Remove the entire card cage by removing the four screws holding it to the base of the electronics section (see Figure 2-12).

6. Remove the screws holding the cover over the backplane PCB connectors (see Figures 2-12 and 2-13).

7. Remove the screws holding the backplane PCB to the base of the card cage.

8. Lift the backplane PCB out of the card cage.

9. Install a new backplane PCB using the same hardware that secured the old one in place in the base of the card cage.

10. Replace the cover over the backplane PCB connectors. Use the same hardware that previously secured it.

11. Reinstall the card cage to the base of the electronics section, securing it with the four screws removed earlier.

12. Reconnect the cables to the backplane PCB and reinstall the screws holding the cover over the backplane PCB connectors.

13. Reinstall all the upright printed circuit boards as earlier described.

14. Remove the static grounding strap and replace the card cage cover.

15. Reinstall the right rear table top.

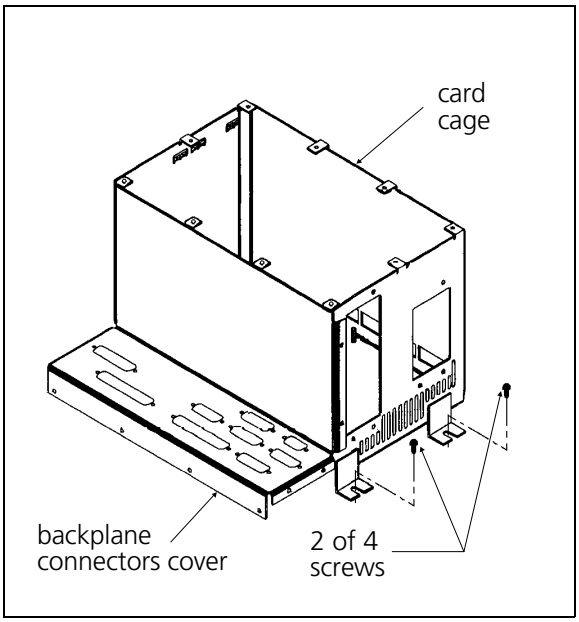

Figure 2 - 12

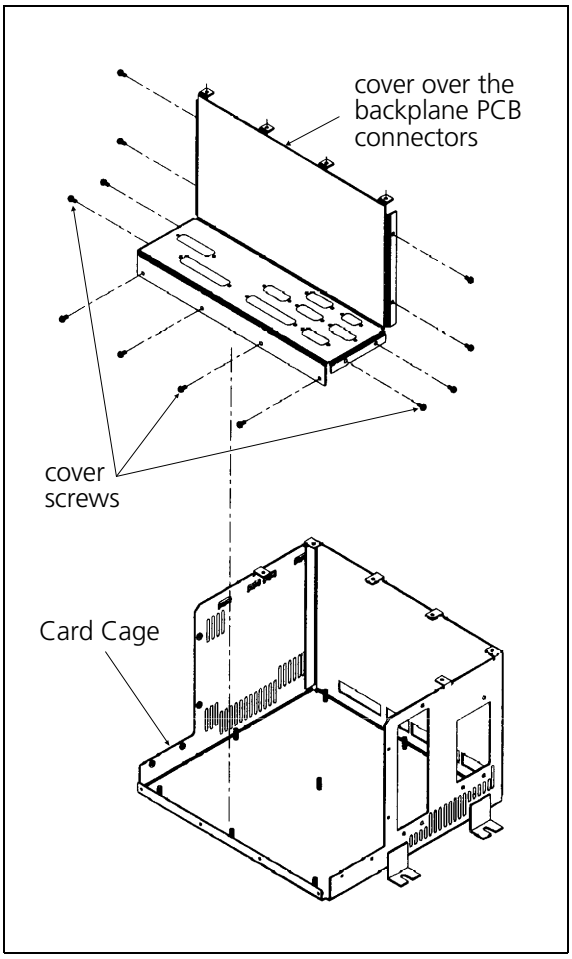

Figure 2 - 13

X Beam Assembly

The X beam assembly consists of the X carriage, X motor, X drive belt, and various other mechanical components that make up the device that holds the hoop during the embroidery process. The X beam is attached to the Y drive system by connecting to the Y drive rails at either end of the beam. Refer to Figure 2-14 to identify various areas of the X beam assembly.

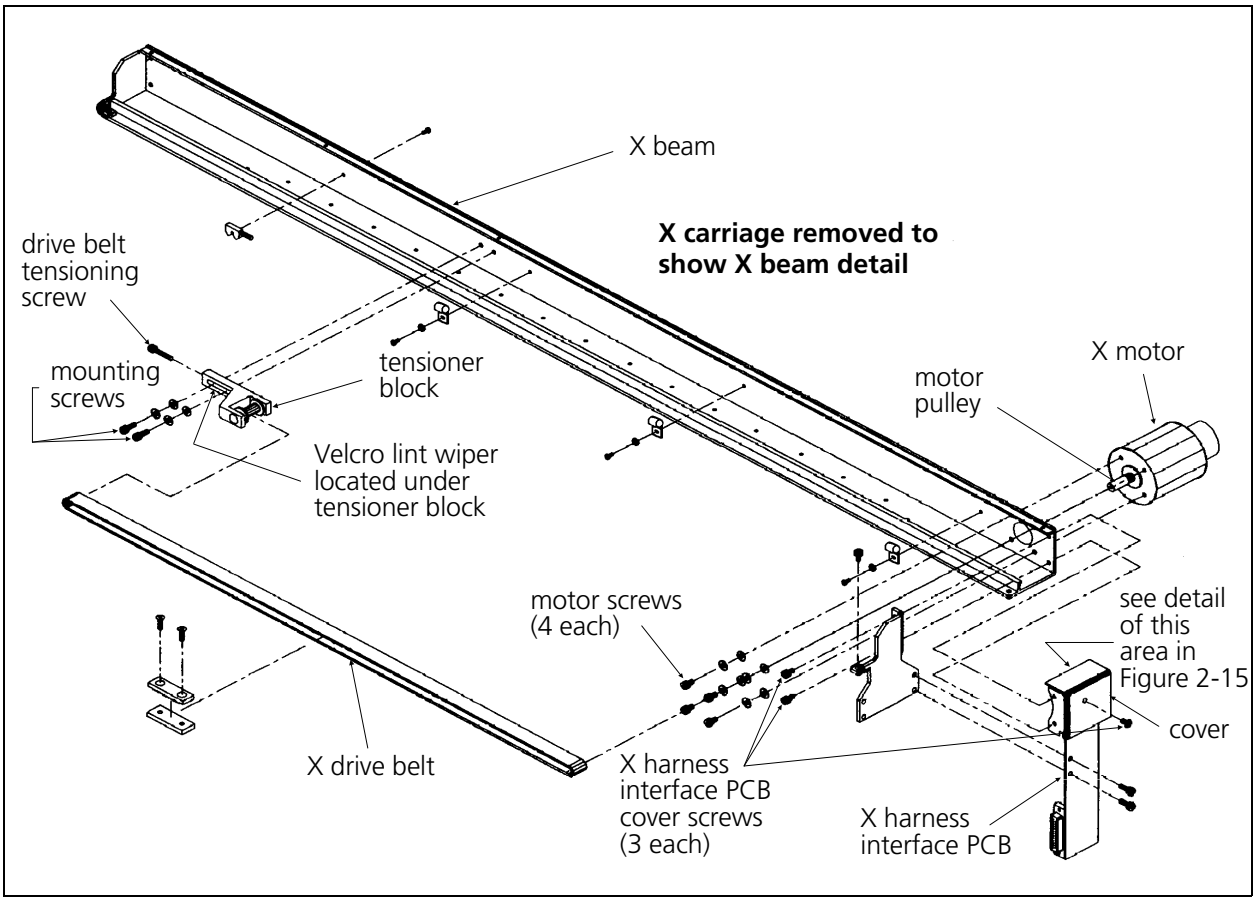

Figure 2 - 14

X Motor

The X motor is attached to the back side of the right end of the X beam. The shaft pulley is a direct connection to the X drive belt. Refer to the following procedure to replace the X motor and adjust the X drive belt tension.

Motor Replacement

NOTE: This procedure requires a specific Melco force gauge (p/n 995585-01) for proper belt adjustment after replacing the motor.

1. Turn OFF the power switch to the EMT 1 and remove the power cord from the power source electrical outlet and the rear of the machine.

2. Remove the X beam cover by first removing the six button head screws on the top, then lifting the cover off the entire length of the X beam.

3. Refer to Figure 2-14 and remove the three screws that hold cover over the top of the X harness interface PCB.

4. Loosen the two tensioner block mounting screws shown in Figure 2-14, then loosen the drive belt tensioning screw to loosen the drive belt.

5. Rotate the X drive belt off the X motor pulley.

6. Refer to Figure 2-15 and press the tab in the middle of the connector to disconnect the X motor encoder harness from the X harness interface PCB.

7. Press the tab in the middle of the connector and disconnect the X motor drive harness from the X harness interface PCB.

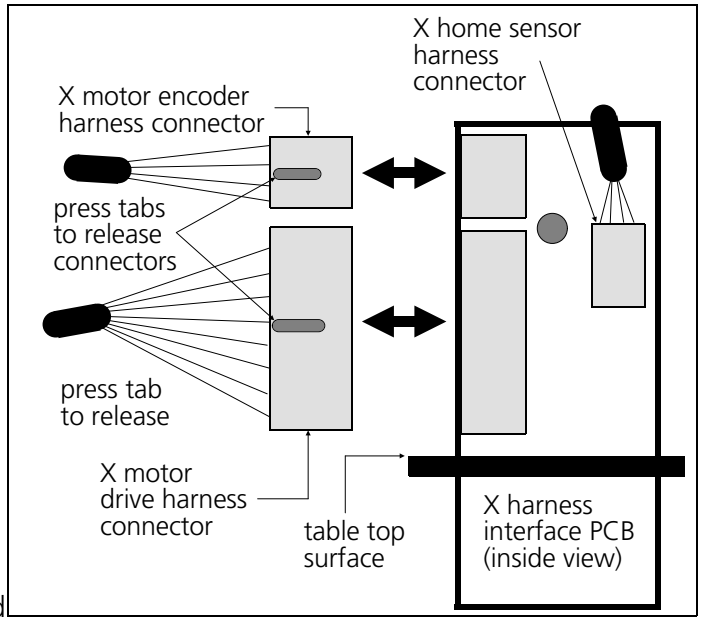

Figure 2 - 15

8. Remove the 4 screws and associated hardware holding the X motor in place and remove the motor (see Figure 2-14).

9. Remove the screw from the end of the old motor shaft and transfer the pulley flange to the new motor shaft. Apply a small amount of Loctite 222 hardware adhesive (or equivalent) and reinstall and tighten the screw.

10. Orient the new motor with the encoder wires facing down and outward, and the motor drive wires facing directly toward the X harness interface PCB.

11. Referring to the orientation described in the previous step, install the new motor into the beam using the existing mounting screws. Slip the X drive belt onto the motor pulley and tighten the mounting screws securely.

12. Refer to Figure 2-15 and reconnect the X motor drive harness and encoder harness into their respective mating connectors on the X harness interface PCB.

13. Carefully tuck the two X motor harnesses between the motor and harness interface PCB and reconnect the cover over the top of the X harness interface PCB.

14. If replacing the X drive belt, refer to the belt replacement and adjustment procedure at this time, otherwise proceed directly to the X drive belt tensioning procedure for instructions tightening the belt to the proper tension.

X Drive Belt

This belt is directly driven by the X motor shaft pulley and moves the X carriage left and right along the rail in the base of the X beam.

Replacement

NOTE: This procedure requires a specific Melco force gauge (p/n 995585-01), for proper adjustment.

Refer to the following procedure to replace the X drive belt:

1. Turn OFF the power switch to the EMT 1 and remove the power cord from the power source electrical outlet and the rear of the machine.

2. Remove the X beam cover by first removing the six button head screws on the top, then lifting the cover off the entire length of the X beam.

3. Refer to Figure 2-14 and loosen the drive belt tensioning screw, then the two tensioner block mounting screws to loosen the drive belt.

4. The existing X drive belt is clamped and held to the X carriage plate by two flat head socket screws, a clamp, and a spacer. The screws go through holes in the belt as well. Remove the two flat head socket screws and associated clamp and spacer to free the belt at this area (see Figure 2-14).

5. Slide the old belt out of the two pulleys at either end and position the new belt into place where the old one was.

6. Bring the ends of the new belt together above the two holes in the X carriage plate.

7. Position the X belt clamp above, and the spacer below the belt ends, sandwiching the belt between them.

8. Insert the two flat head socket screws through the clamp, the holes in the belt ends, the spacer, and into the holes in the X carriage plate.

9. Refer to the following belt tensioning procedure for adjusting the X drive belt tension.

Belt Tension

NOTE: This procedure requires a specific Melco force gauge (p/n 995585-01), for proper adjustment.

1. Refer to Figure 2-14 and ensure the two tensioner block mounting screws are installed and holding the drive belt tensioner block loosely to the X beam frame.

Caution: Over tightening the screw in the next step may cause damage to the motor shaft or other drive components.

2. Refer to Figure 2-14 and rotate the drive belt tensioning screw clockwise to take up the slack in the belt. Do not over tighten the belt in this step.

3. Slightly tighten the two tensioner block mounting screws to snug the belt tensioner block to the X beam frame.

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

5. Orient the Melco force gauge (p/n 995585-01) vertically with the 'push end' down. Place the finger of the 'push end' against the top of the lower loop of the belt and mid-way between the two pulleys at the belt ends (see Figure 2-16). (An X home cable clamps is located approximately at the mid-way location described above.)

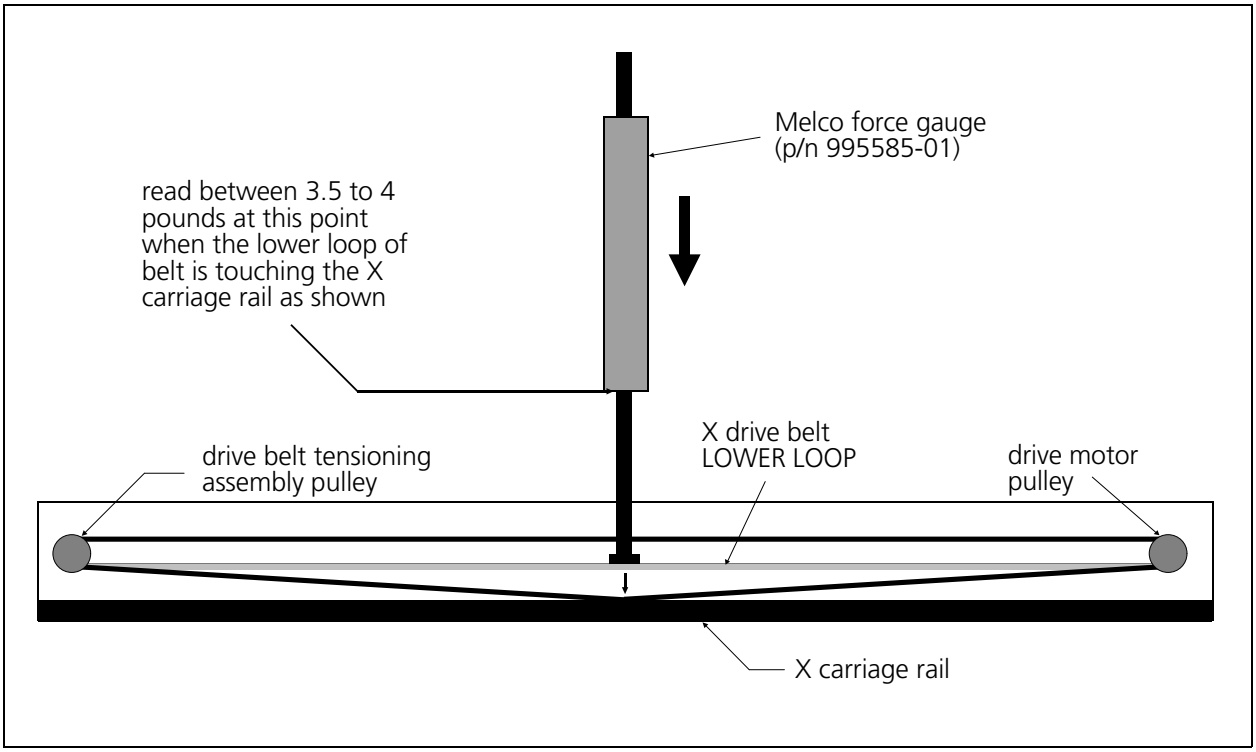

Figure 2 - 16

6. Grasp the force gauge body and push down on the gauge until the lower loop of the belt just touches the X carriage rail.

7. Read the scale on the gauge while maintaining the situation in the previous step.

   The reading should be between 3.5 and 4.0 pounds (3.75 +/- 0.25).

8. If the reading on the gauge is not within the specified range, repeat this belt tension procedure until the reading is within the specified range.

   Tighten the drive belt tensioning screw clockwise to increase the belt tension.

   Loosen the drive belt tensioning screw counter clockwise to decrease the belt tension.

9. Tighten the tensioner block mounting screws and replace the beam cover.

Lint Wiper

Located on the underneath side of the X drive belt tensioner block is a piece of Velcro attached with adhesive. This item is used to keep the top surface of the X carriage "brushed" clean and smooth for accurate reading by the X home sensor in that area of the carriage. In the unlikely event this needs to be replaced, it must be formed with a ripple in it to reach the X carriage surface but with some yielding of position. To form this ripple, simply form the middle section of the piece of Velcro around a 2mm (or equivalent) hex wrench as you attach it to the tensioner block. When the Velcro is securely attached, twist the wrench out from between it and the block. A rippled portion of the Velcro piece remains.

Y Motor

The Y axis drive motor is located under, and slightly left of, the embroidery head. Access to the motor is from inside the electronics and power distribution sections.

Replacement

Refer to the following procedure to replace the Y motor:

NOTE: This procedure requires a specific Melco force gauge (p/n 995585-01), for proper belt adjustment after replacing the motor.

1. Turn OFF the power switch to the EMT 10T and remove the power cord from the power source electrical outlet and the rear of the machine.

2. Refer to the procedure for removing the left rear table top (with optional bobbin winder assembly) and remove the table top.

3. Loosen the four truss head screws and remove the right rear table top from over the electronics section of the peripheral.

4. Move to the rear of the peripheral and locate the Y motor and its mounting bracketry and drive pulleys shown in Figure 2-17.

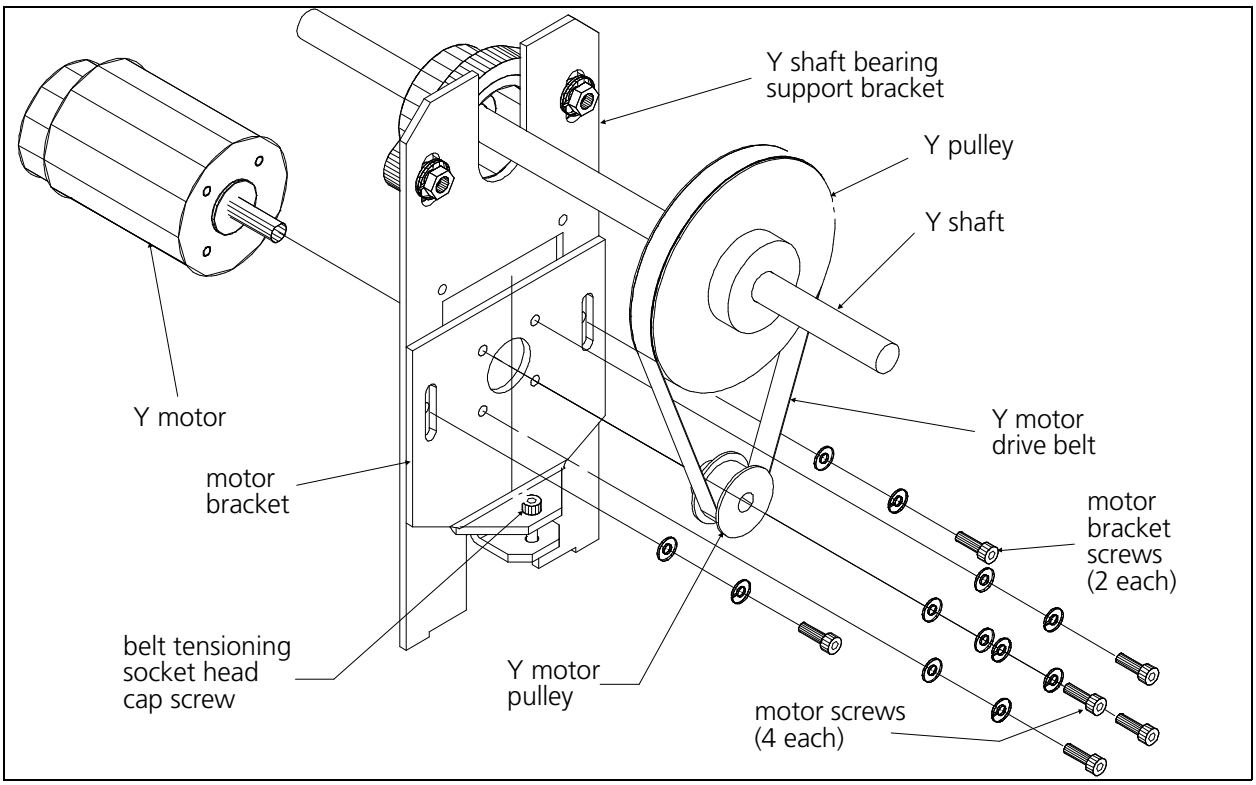

Figure 2 - 17

5. From the electronics section of the peripheral, locate the in-line connector for the motor power and disconnect it.

6. From the power distribution section of the peripheral, loosen the two motor bracket screws, then loosen the belt tensioning socket head cap screw to lessen the tension on the Y motor drive belt (see Figure 2-17).

7. Remove the Y drive belt from the motor and Y shaft pulleys.

8. Note the approximate position where the pulley is located on the motor shaft, then loosen the set screw in the Y motor pulley and remove the pulley.

9. Remove the four socket head cap screws that secure the motor to the motor bracket and gently let the motor lie on the peripheral base.

10. Remove the belt tensioning socket head cap screw and remove the motor bracket.

11. Slide the motor out of the Y shaft bearing support bracket far enough to note the orientation of the encoder connector on the motor, then disconnect the motor encoder harness and remove the motor the rest of the way.

12. Position the new motor slightly through the Y shaft Bearing support bracket and connect the Y motor encoder harness as noted in the previous step and below.

NOTE: When viewing from the rear of the motor and the encoder pins facing upward, the number 1 pin is to the right.

The encoder harness connector pin number 2 does not have a wire, therefore, the harness connector attaches to the encoder pins with the open wire space being the second one from the right.

13. Install a couple of cable ties to hold the encoder harness together with the motor power harness.

14. Orient the motor bracket with the belt tensioning screw hole and tab toward the bottom, then reattach the motor bracket to the motor with the four socket head cap screws and associated hardware. Tighten the screws securely.

15. Place the motor pulley onto the shaft with the hub toward the motor and in approximately the same position it was on the old motor shaft.

16. Attach the motor bracket (with motor) to the Y shaft Bearing support bracket with the two socket head cap screws. Leave the screws slightly loose.

17. Reattach the in-line connector for the motor power harness.

18. Replace the belt onto the motor and Y shaft pulleys and reinstall the belt tensioning socket head cap screw through the hole in the motor bracket tensioning tab into the threaded hole in the tensioning tab of the Y shaft bearing support bracket.

19. Slowly tighten the belt tensioning socket head cap screw to take up the slack in the Y motor drive belt tension (DO NOT OVER TENSION THE BELT).

20. Refer to the Y motor belt tensioning procedure to adjust the belt tension.

Y Motor Belt

The process for replacing this belt requires major disassembly of the Y drive system. It is not recommended without training on the adjustments required in setting the X beam parallelism with the Y carriages.

Belt Tension Adjustment

To adjust the Y motor belt tension after replacing the belt or a Y drive motor, refer to the following procedure:

NOTE: This procedure requires a specific Melco force gauge (p/n 995585-01), for proper belt adjustment after replacing the motor.

1. Refer to the procedure for removing the left rear table top (with optional bobbin winder assembly) and remove the table top.

2. Refer to Figure 2-18 and check the Y motor belt tension using the Melco force gauge (p/n 995585-01) and the steps that follow:

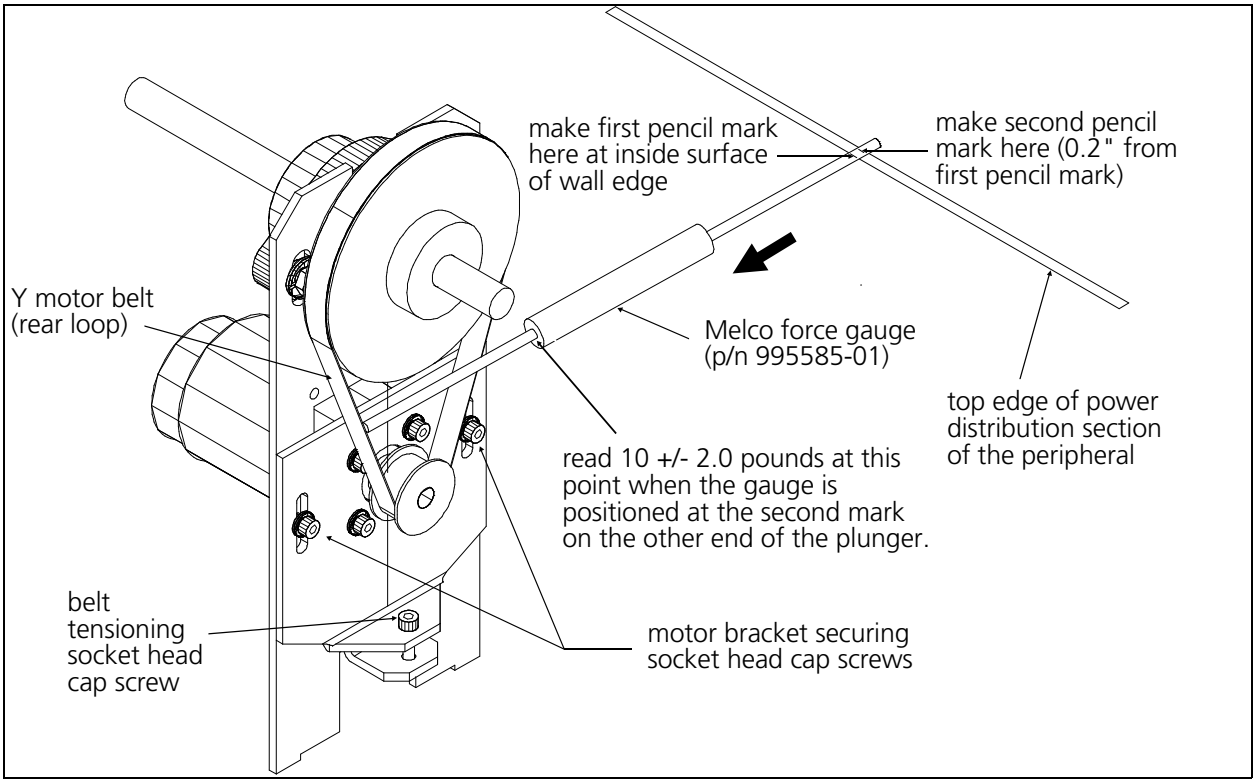

Figure 2 - 18

3. Orient the Melco force gauge (p/n 995585-01) diagonally between the Y motor belt and the top edge of power distribution section of the peripheral as shown in Figure 2-18. The 'push end' of the gauge should be toward the belt.

4. Place the finger of the 'push end' of the gauge against the inside (toothed surface) of the rear loop of the belt and mid-way between the pulleys centers.

The gauge plunger should be located just under the large Y shaft pulley when positioned correctly. The other end of the force gauge plunger will be resting against the top edge of front wall of the power distribution section.

5. Place a pencil mark on the plunger at the location where the inside surface of the power distribution section wall touches the plunger.

6. Measure 0.2 inch toward the end of the plunger from the mark made in the previous step and place another pencil mark on the plunger at that location.

7. Grasp the force gauge body and push the gauge against the belt until the plunger moves from the first mark at the edge of the wall to the second mark.

8. While holding the gauge at the second mark position described in the previous step, read the scale on the gauge.

   The reading should be 10 +/- 2.0 pounds.

9. If the reading on the gauge is not within the specified range, the belt needs to be adjusted. Refer to Figure 2-18 and locate the two motor bracket securing socket head cap screws and the belt tensioning socket head cap screw.

10. Slightly loosen the two motor bracket securing screws socket head cap.

    Note: The screws should remain snug yet not so tight that the motor bracket will not move when the belt tensioning screw is rotated.

11. If the belt tension is too loose, rotate the belt tensioning socket head cap screw slightly clockwise to cause the motor bracket to be pulled downward thus increasing tension on the Y motor belt.

    If the belt tension is too tight, rotate the belt tensioning screw slightly counter-clockwise to allow the motor bracket to move upward to reduce the belt tension.

12. After moving the motor bracket in the previous step, retighten the two motor bracket securing socket head cap screws and check the tension again.

13. Repeat this procedure until the proper tension is attained.

Y Drive Belt

There are two Y drive belts used on the the EMT 1: one associated with each of the Y carriage assemblies at either side of the peripheral.

Replacement

To replace a Y drive belt, refer to the following procedure:

Caution! Never disassemble both Y carriage areas at the same time. By doing so, the parallelism of the X beam with the Y carriages is threatened and may require service by a Melco trained technician.

1. Turn OFF the peripheral and unplug the power cord from the source.

2. Remove the five truss head screws and the side cover (see Figure 2-19 of the peripheral associated with the side where the belt is to be replaced.

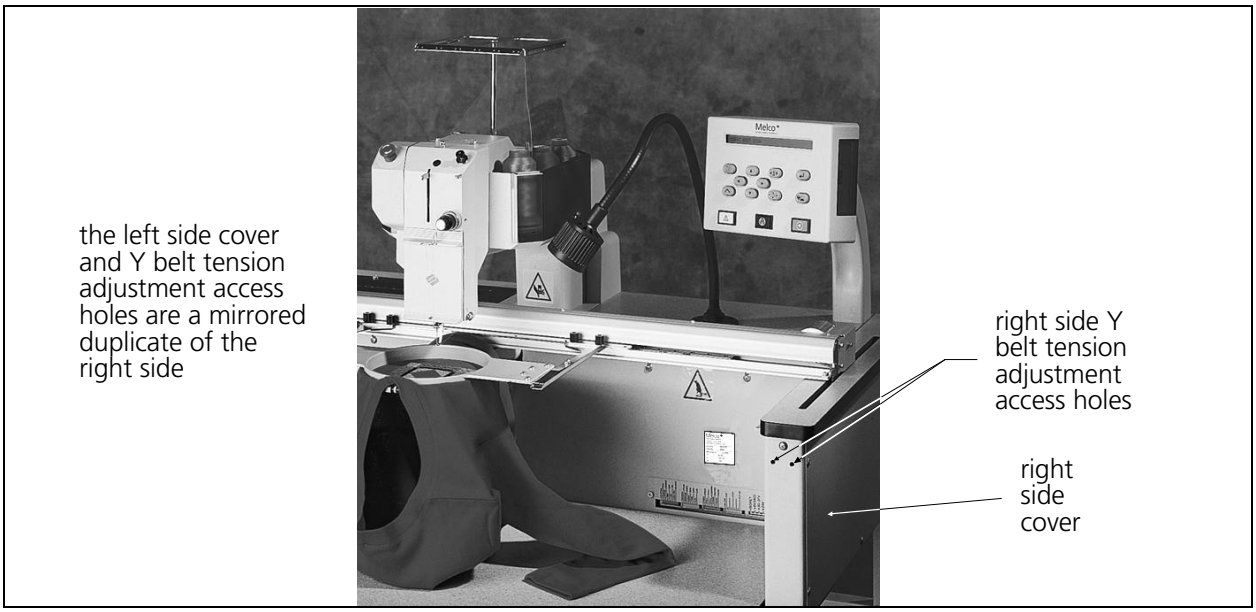

Figure 2 - 19

3. Refer to the Caution statement at the beginning of this procedure and be certain the Y drive belt in the other Y carriage is secure and with some amount of tension.

4. Move the X beam to the rear until it mechanically stops.

5. Position a hex wrench through the access hole (see Figure 2-19) and into one of the two cap head screws in the front of the frame for adjusting the belt tension (see Figure 2-20).

6. Note the location of the wrench handle and rotate the socket head cap screw approximately 3 revolutions counter clockwise.

7. Move to the other access hole associated with tensioning the belt and rotate that socket head cap screw the same amount as the first.

8. If replacing the Y drive belt on the left side of the peripheral, remove the Y home flag to gain access to the belt clamp.

9. Push the now slack belt aside far enough to get a hex wrench through the access holes in the base of the Y carriage mounting bracket and into the socket head cap screws securing the Y drive belt to the under side of the Y carriage block. Remove the screws and belt mounting clamp.

10. Slide the old belt out from around the two pulleys and prepare to install a new belt.

11. Place a new belt into position around the pulleys and attach the belt to the under side of the Y carriage block by reversing the previous steps for removing the belt and mounting clamp.

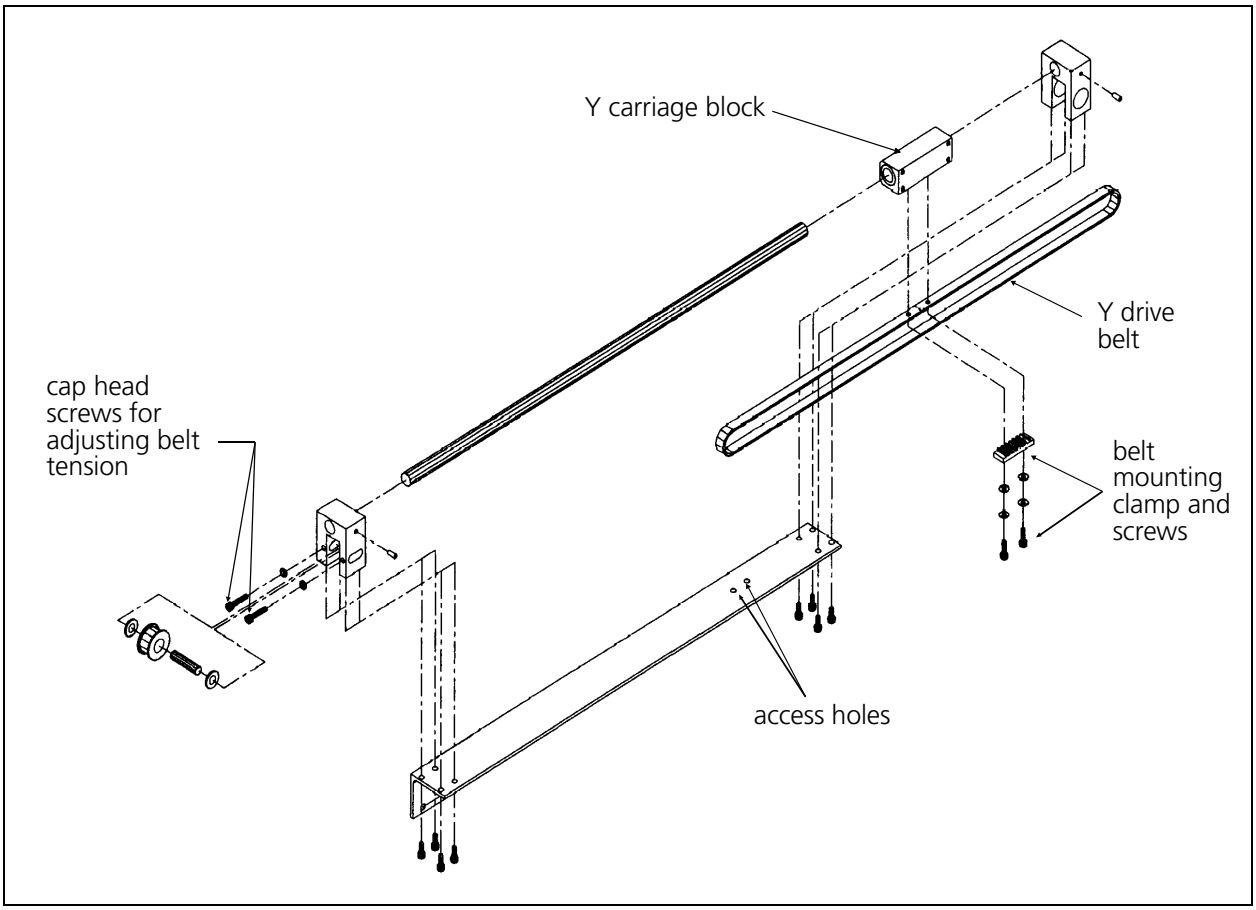

Figure 2 - 20

12. Be certain the teeth on the new belt are positioned in the proper location in the rear pulley to maintain the parallelism between the X beam and Y carriages.

13. Rotate the adjusting socket head cap screws in the front approximately 3 revolutions clockwise to take up the slack in the belt and provide some amount of tension.

14. If the Y drive belt on the left side of the peripheral was replaced, reinstall the Y home flag that was removed earlier to gain access to the belt clamp.

15. Refer to the Y drive belt tension adjustment procedure.

Belt Tension Adjustment

To adjust the Y drive belt tension, refer to the following procedure:

NOTE: This procedure requires a specific Melco force gauge (p/n 995585-01), for proper belt adjustment after replacing the motor.

1. While observing the movement of the Y belt on the front pulley, move the beam forward and backward. The belt will vary somewhat on the surface of the pulley. This is commonly called belt tracking.

2. Adjust the two socket head cap screws independently at this time to obtain the least amount belt tracking when the carriage moves forward and backward.

3. When the adjustment in the previous step is complete, move the X beam to the rear until it mechanically stops.

4. Refer to Figure 2-21 and check the Y drive belt tension with the Melco force gauge (p/n 995585-01) by the following steps.

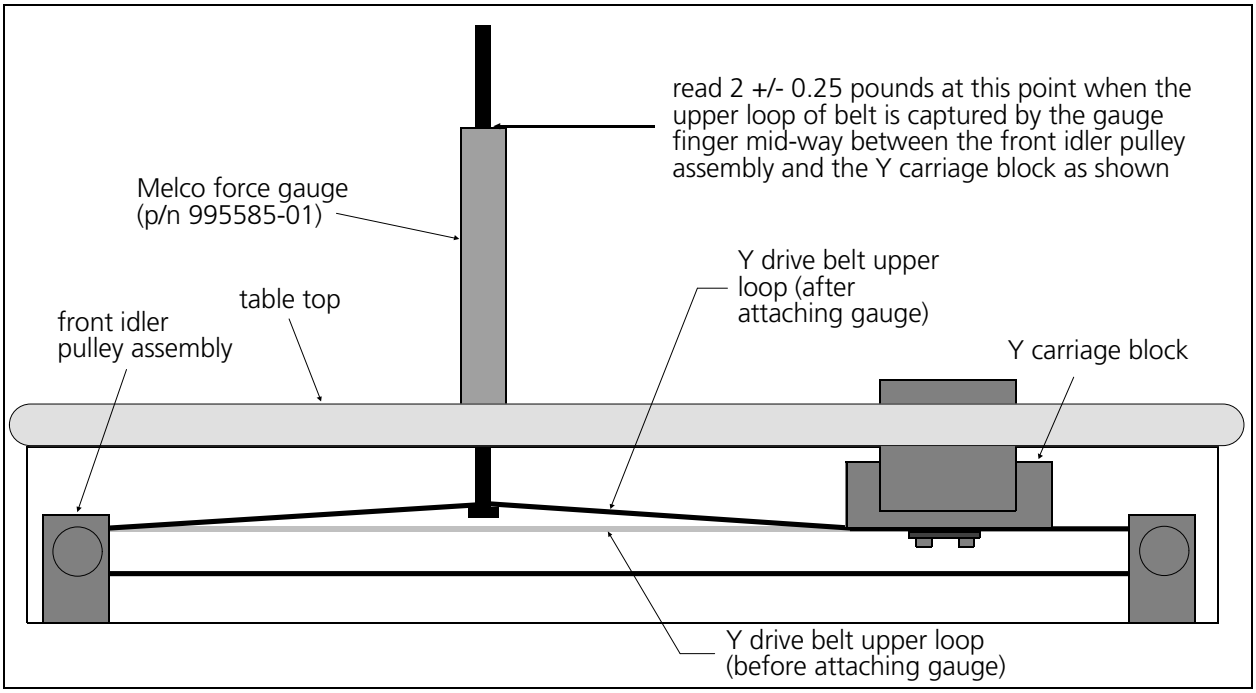

Figure 2 - 21

5. Place the finger of the 'pull end' of the force gauge through the beam support slot in the table top above the Y drive belt. Position the gauge mid-way between the front pulley and the Y carriage block.

6. Press the force gauge plunger down until the finger is between the two loops of the Y drive belt, then twist the plunger so the finger goes under the top loop of the belt.

7. Release the downward force on the gauge plunger and allow the finger to apply an upward force to the bottom of the top loop of the belt.

8. Read the scale on the force gauge.

   The reading should be 2 +/- 0.25 pounds.

9. If the tension is not correct, slightly tighten the two belt tensioning socket head cap screws equally to increase tension on the Y drive belt; or loosening the screws to reduce the tension.

10. Check the Y drive belt tension on the other side of the peripheral using the same method as in the previous steps.

    The tensions of the two belts should be within 0.25 pounds of each other.

11. If needed, adjust the other Y drive belt to the proper tension according to the above specifications.

12. Repeat this procedure until the proper tension adjustments are attained.

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3. Embroidery Head Maintenance

General

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

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

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

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

Arm and Bed Assembly

The arm and bed assembly provides a stable embroidery head platform. All other components of the embroidery 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, needles case, and thread saddle.

Thread Saddle

Removal

The thread saddle is easily removed to gain access to various portions of the top of the embroidery head. The following provides removal and reinstallation information.

1. Refer to Figure 3-1 and remove the two M4 x 12mm screws that secure the front of the thread saddle to the top of the needle case.

2. Refer to Figure 3-1 and remove the two M4 x 20mm screws that secure the rear of the thread saddle to the top of the embroidery head.

3. Lift the thread saddle off the top of the embroidery head.

4. To install the thread saddle, refer to Figure 3-2 and reverse the previous steps. Note that two different lengths of screws are used to attach the thread saddle at the front and rear.

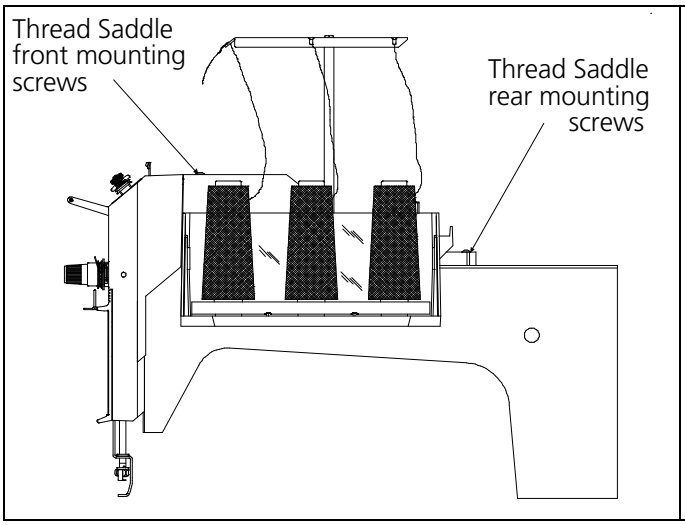


Figure 3 - 1

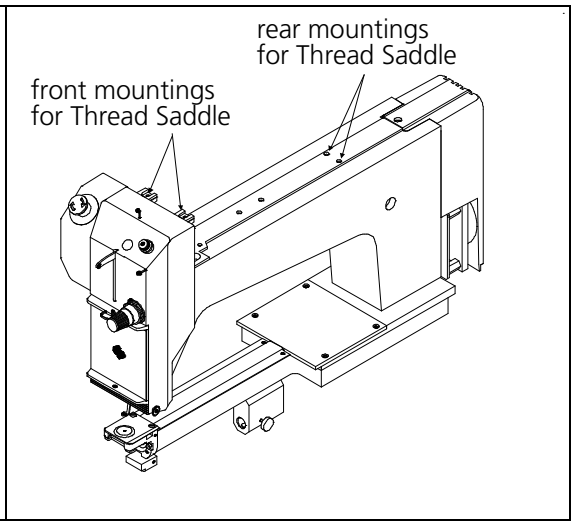


Figure 3 - 2

Z Motor Replacement

Note: This procedure requires a Gates 5M Tensiometer (Melco p/n 992165-01) for proper belt adjustment after replacing the motor.

1. Turn the main power Off, and remove the power cord from power source.

2. Remove the rear head cover and the right rear table top which covers the electronics section.

3. Disconnect the Z motor harness at the in-line connection going into the cable to the electronics card cage connectors.

4. Using a properly sized open end wrench, loosen the two motor bracket mounting/tensioning nuts. (See Figure 3-3) to take the tension off the belt.

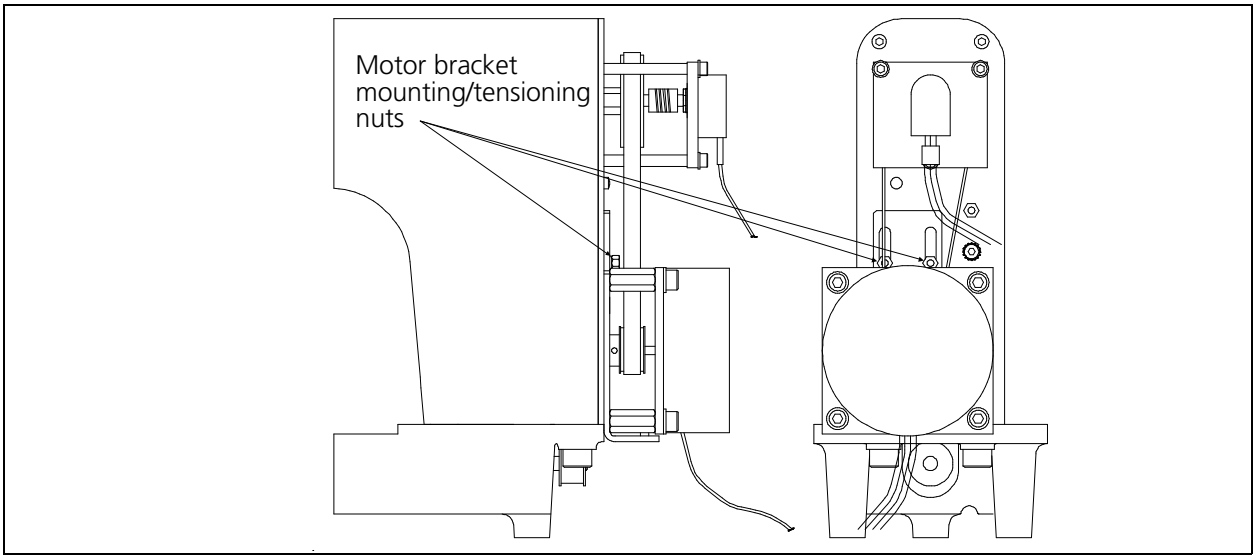


Figure 3 - 3

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 certain 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 certain 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 it is directly below the main Z drive pulley.

13. Tighten both Z drive pulley set screws.

Belt Tension

Note: This procedure requires a Gates 5M Tensiometer (Melco p/n 992165-01) for proper belt adjustment.

14. Apply downward pressure on the motor to establish a belt tension of 7 pounds (+/- 1 pound) measured with the Gates Tensiometer. Tighten the motor bracket mounting/tensioning nuts while maintaining the belt tension.

15. Connect the Z motor harness to the end of the cable from the electronics card cage connector and replace the covers removed earlier.

Z Shaft Encoder

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 other electronics 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 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 marked ZINDEX on the front of the peripheral (see Figure 3-4) can be used to see if the CPU is in fact receiving a head up (or mark) pulse from the encoder. (This indicates that the encoder and associated cables are functional.) It should be noted however, that the ZINDEX (or "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 procedures in the following pages will result in the most proper and accurate alignment and repair of the Z encoder system that is possible and/or feasible 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.

Inspection

This procedure is a guide for determining the condition of the encoder.

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.

1. Switch the peripheral OFF, lower the table top, and remove the rear head cover.

2. When switched back on it is important that the computer not down load a design to the peripheral. To insure this condition remove the network cable (or boot disk if used).

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

4. Locate the green LED marked "ZINDEX" on the front of the peripheral, above the lowered table top (see Figure 3-4).

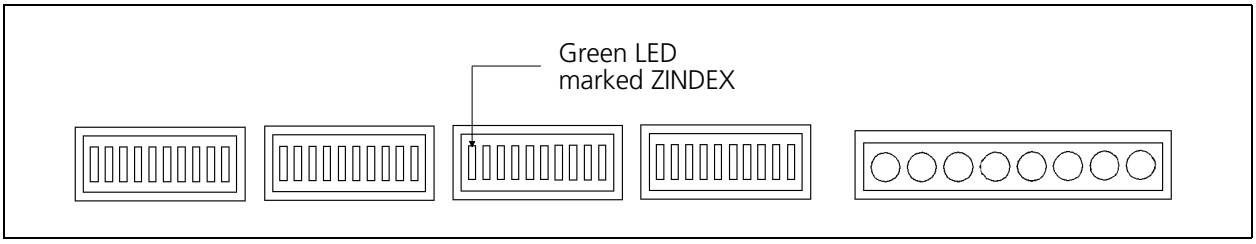


Figure 3 - 4

   Or remove the card cage cover and locate the innermost LED on the top 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. Rotate the embroidery head manually in a clockwise direction (when viewing 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 3-5).

6. While slowly rotating the head, check that the green LED on the front or the innermost LED on the CPU blinks once each revolution (this is the "index" or "headup" mark).

7. If there is no evidence of the LED blinking, 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.

8. Rotate the head again to check for the blinking LED. If the "test" repeatedly fails refer to the following installation procedure for a new Z shaft encoder.

Installation

The Melco EMT 1 Embroidery Peripheral uses a shaft encoder on the rear of the head to provide the information required by the CPU.

Note: This procedure leads to a calibration which requires the use of a special service tool: the Melco head up alignment pin tool (995338-01) or the Melco 10 needle head up fixture (p/n 995673-01).

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

To replace the encoder follow these steps:

1. Turn the machine OFF, then disconnect the power cord from the power source.
2. Remove the cover from the rear of the embroidery head.
3. Disconnect the encoder cable from the current shaft encoder (see Figure 3-5).
4. Loosen the two coupler cap head screws (A) that secure the coupling to the Z encoder shaft (see Figure 3-5).

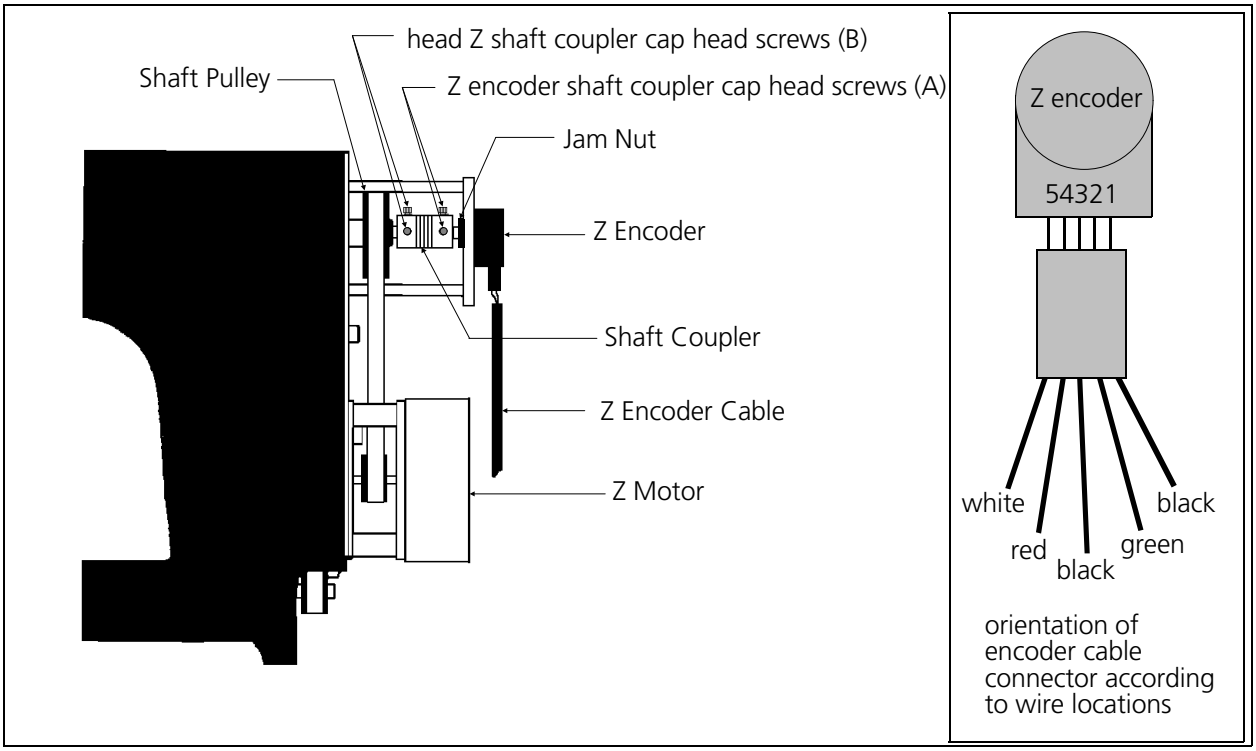


Figure 3 - 5

5. Loosen and unthread the jam nut on the encoder shaft.

6. Pull the encoder out of the shaft coupling and encoder mount. Capture the jam nut and washer as the encoder shaft is removed.

7. 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.

8. Insert the encoder shaft into the shaft coupling.

9. Tighten the jam nut, then snug the coupling cap head screws onto the encoder shaft.

10. Orient the connector on the encoder cable so the outside black wire is to the right and will plug into pin 1 of the new encoder (see inset in Figure 3-5). Push the encoder cable connector onto the new encoder.

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

11. Calibrate the Z encoder per the following procedure.

Calibration

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

Note: This procedure leads to a calibration which requires the use of a special service tool: the Melco head up alignment pin tool (995338-01) or the Melco 10 needle head up fixture (p/n 995673-01).

1. Install the Z shaft encoder as described previously.

   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 being used).

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

3. Locate the green LED marked "ZINDEX" on the front of the peripheral, above the lowered table top (see Figure 3-4). Or with the card cage cover removed, locate the innermost LED on the top of the CPU.

4. Remove the thread saddle to access the head alignment hole in the next step.

5. Position the Melco head up alignment pin tool (995338-01) or the Melco 10 needle head up fixture (p/n 995673-01) into the head up alignment hole in the top of the head as shown in Figure 3-6.

6. Slowly rotate the head at the Z drive pulley until the head up tool pin inserts into the hole in the head up alignment collar on the Z shaft. This is the "mechanical" head up position.

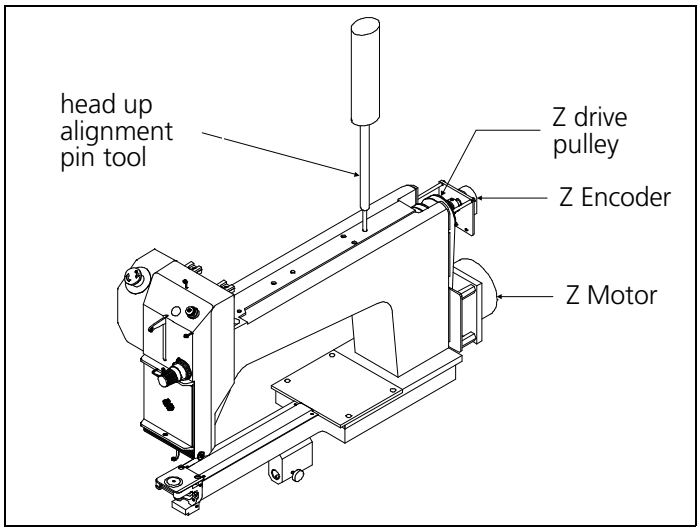


Figure 3 - 6

7. Now loosen the two encoder shaft coupler cap head screws (B) at the embroidery head Z shaft (see Figure 3-5) and slowly rotate the coupling in either direction until the LED glows.

8. When the LED is glowing, tighten one of the encoder coupler cap head screws to the embroidery head Z shaft.

9. Remove the head up tool and rotate the Z shaft until you can access the second cap head screw on the encoder coupling to Z shaft.

10. Remove the screw and apply a small amount of Loctite 222 hardware adhesive (or equivalent) and reinstall and tighten it.

11. Return to the first encoder coupler cap head screw, remove the screw and apply a small amount of Loctite 222 hardware adhesive (or equivalent), then reinstall and tighten it.

12. Turn the embroidery peripheral OFF and attach the network cable (or install the boot disk).

13. Turn the embroidery peripheral ON again and allow its program to download.

14. Go to the head timing menu and check that when the head is brought to head up, that the green ZINDEX LED on the front of the machine or the innermost LED on the CPU glows within plus or minus 1.5 degrees of head rotation.

15. Reinstall thread saddle and any other covers removed during this procedure.

Needle Case

Thread Tensioner Assembly Replacement

1. To access the rear of the thread tensioner assembly to disconnect harnessing, you must first remove the thread saddle.

2. Refer to Figure 3-8 to locate and remove the in-line thread break wire and pin from the rear of the thread tensioner post.

3. The thread tensioner is secured in the needle case by a set screw in the right side of the needle case (see Figure 3-7). Loosen the set screw several turns to allow the thread tensioner to be removed.

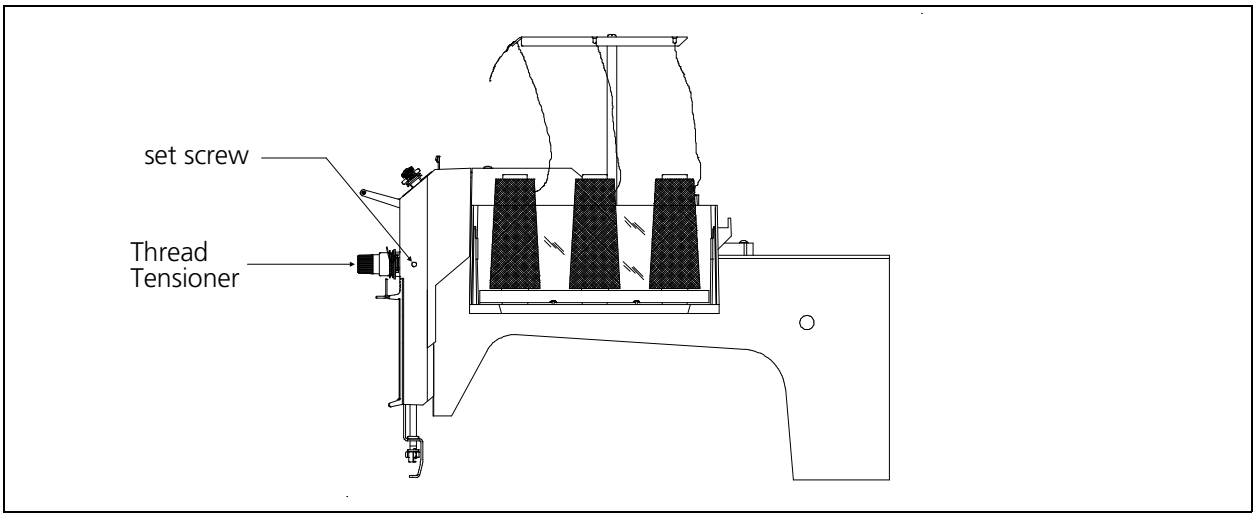


Figure 3 - 7

4. Pull the thread tensioner out of the needle case.

5. To reinstall the thread tensioner, carefully insert the thread tensioner into the hole in the needle case casting.

6. Reattach the in-line thread break wire and pin into the rear of the thread tensioner post.

7. Snug the set screw to secure the thread tensioner in place. (After performing the check spring adjustment on Page 3-11, you must tighten the set screw securely.)

8. After installation, the tensioner disk may wobble while it is rotating. This is caused by the plastic disk not being fully seated on the post. Grasp the plastic disk between your thumb and forefinger; and while twisting back and forth, push to seat the disk fully on the post.

9. Refer to the Thread Check Spring Adjustment to adjust the check spring.

Thread Check Spring Replacement

1. As described previously, remove the thread tensioner.

2. Refer to Figure 3-8 to loosen the screw and remove the tensioner post mount from the rear of the thread tensioner post.

3. Remove the old check spring and discard it.

4. Attach the new check spring as follows:

   a) Place the thread loop end of the check spring through the slot in the tensioner post mount and prepare to slide the mount onto the rear of the tensioner post.

   b) While sliding the tensioner post mount and check spring onto the tensioner post, position the check spring around the end of the tensioner post as shown in Figure 3-8.

   c) Additionally, insert the straight length of spring wire that is inside the check spring coil into the groove cut in the tensioner post as shown.

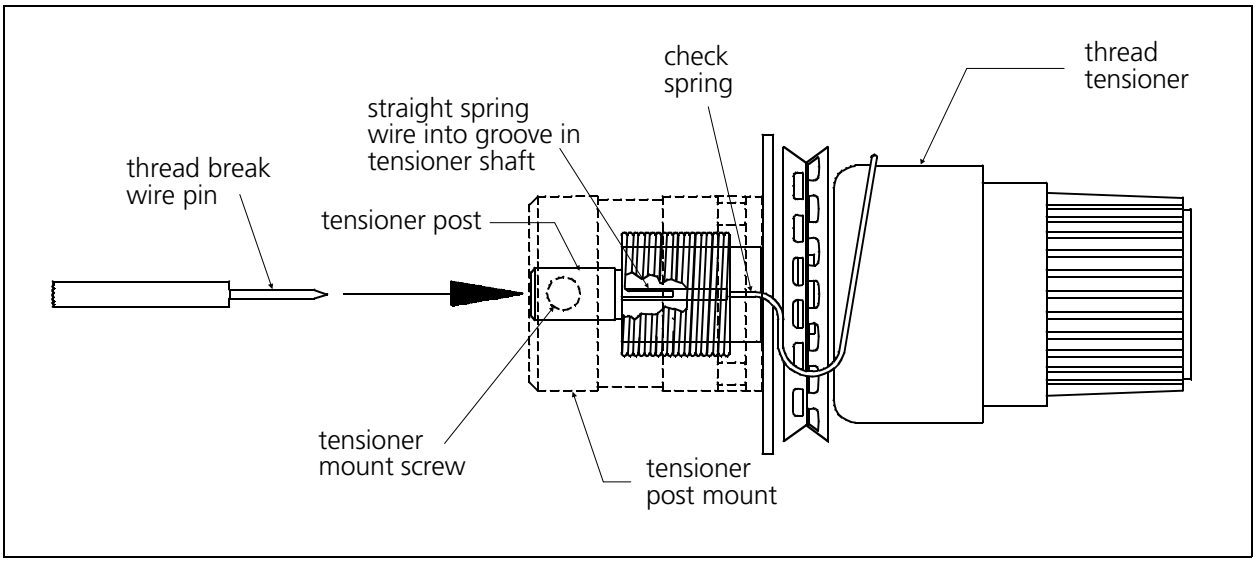


Figure 3 - 8

5. Position the tensioner post mount so the check spring protruding through the slot is near, but not touching, the top end of the slot. (During the adjustment of the check spring, the spring, being restricted by the thread break contact post, must be able to move counterclockwise inside the slot, as the tensioner assembly is rotated clockwise in the needle case.)

6. After inserting the thread tensioner into the tensioner bracket, perform the thread tensioner check spring adjustment.

Thread Check Spring Adjustment

After replacing a thread check spring, reinstall the tensioner assembly into the needle case. You must then adjust the tension of the check spring against the thread break contact post. To set this tension:

1. Slightly loosen the set screw in the side of the needle case that secures the tensioner assembly into the needle case.

2. Rotate the tensioner assembly to the position where the check spring is just touching the bottom of the thread break contact post (see Figure 3-9).

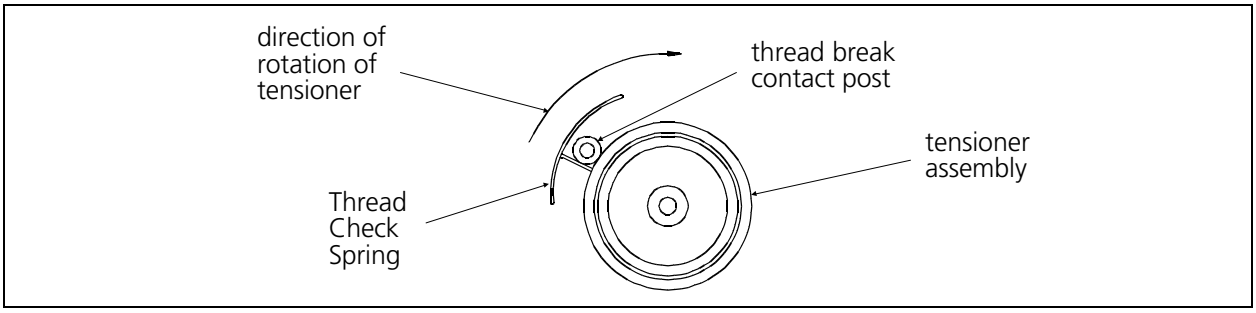


Figure 3 - 9

3. Note the position of the tensioner assembly, then rotate the assembly (not just the tensioner knob) clockwise approximately 60 to 90 degrees.

Adjustment Hints

If you exceed 90 degrees rotation 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 60 degrees 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.

4. Tighten the set screw in the side of the needle case.

Replacing The Needle Bar / Presser Foot / Associated Parts

To replace the needle bar, presser foot or other associated parts, refer to the steps below. Then turn to the Hook Timing procedure later in this chapter of the manual.

1. Turn ON the EMT 1 and bring the embroidery head to the HEAD UP position.
2. Turn OFF the EMT 1 and disconnect the power cord from its power source.
3. Remove the thread saddle from the top of the embroidery head.
4. Refer to Figure 3-10 and slide the needle case cover plate out of the needle case cover and remove the 4 screws and needle case cover.
5. Refer to Figure 3-11 and snap out the plug in the top of the needle case so the needle bar can be removed out the top of the needle case.
6. Loosen the needle clamp set screw and remove the needle and needle clamp from the bottom of the needle bar.
7. Next, loosen the needle bar stop clamp (black clamp).

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 fly out of position.

8. Loosen the needle bar clamp.

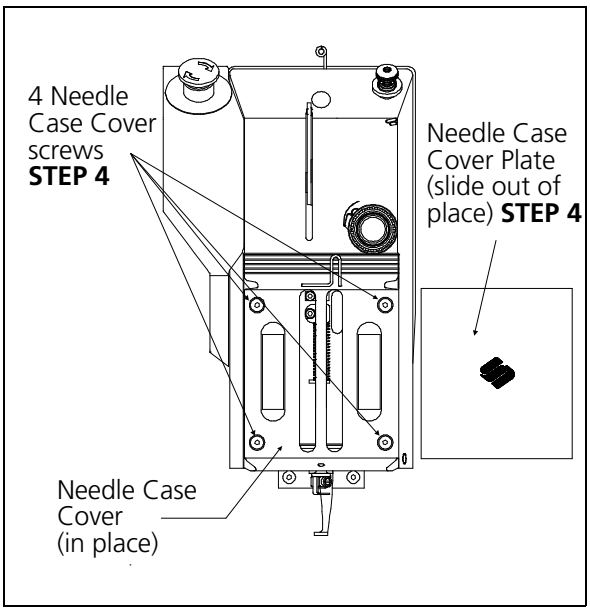


Figure 3 - 10

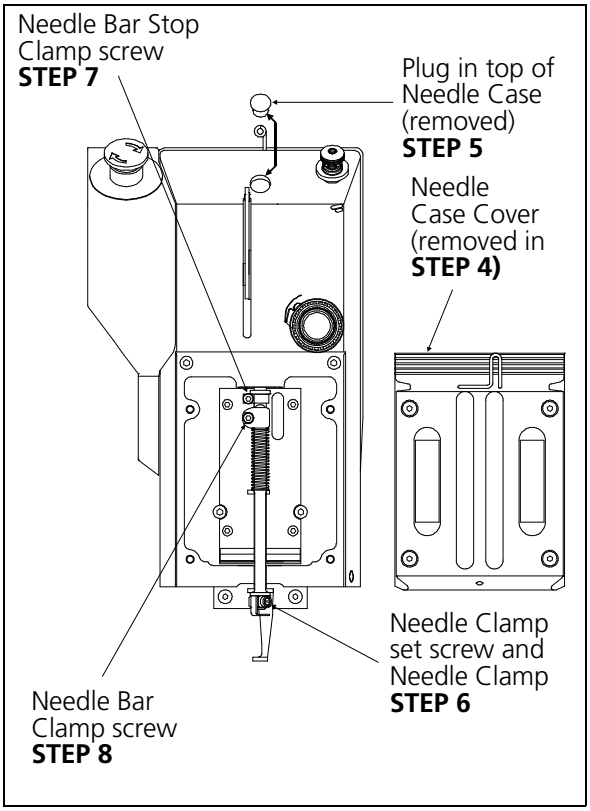


Figure 3 - 11

9. Carefully capture and retain the various parts that become released as you remove the needle bar upward and out the top of the needle case.

10. If replacing the needle bar, transfer the screw from the top of the old needle bar to the top of the new needle bar.

11. Install the needle bar by inserting it from the top of the needle case through the various parts as shown in Figure 3-12. Replace the parts as needed in this step.

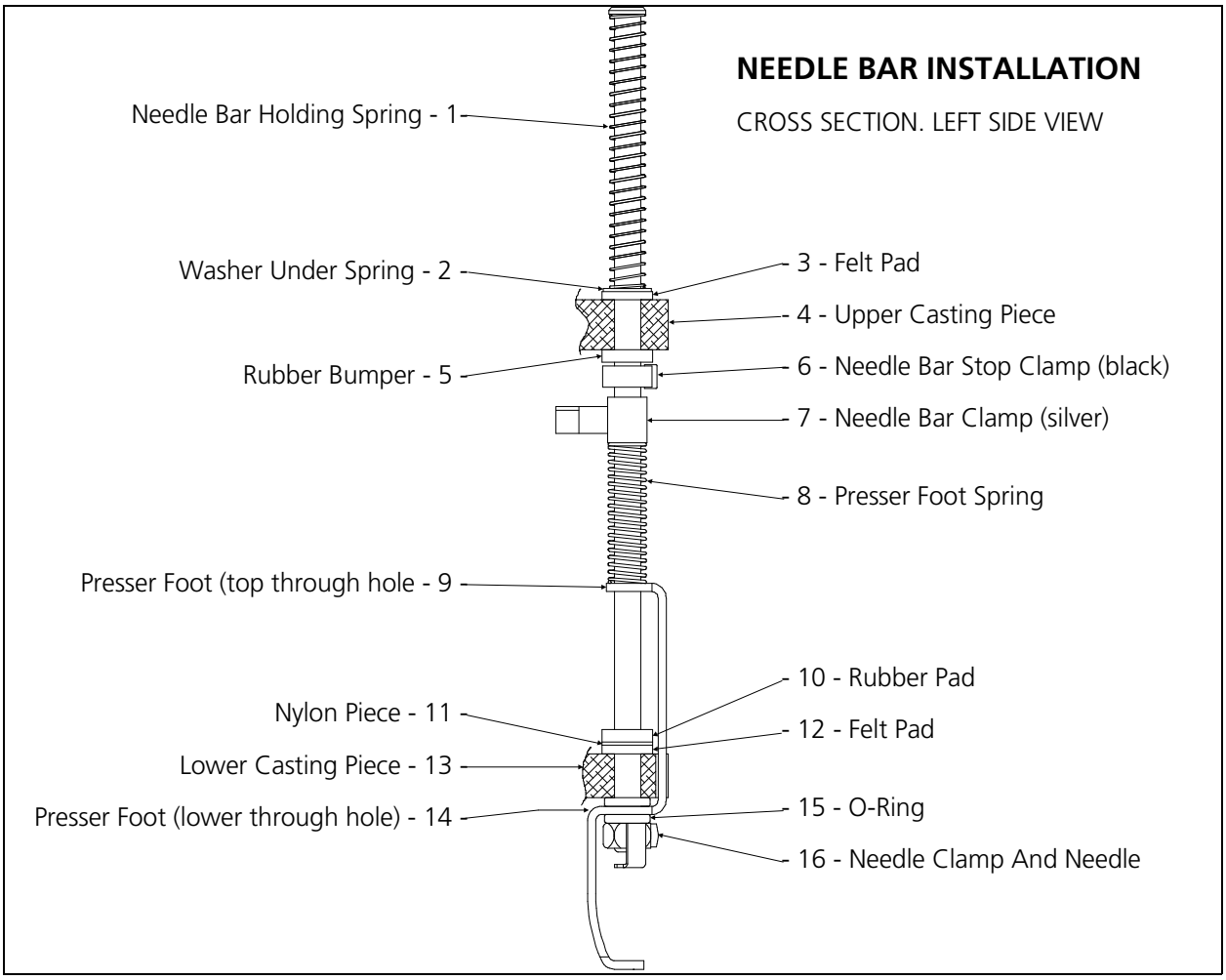


Figure 3 - 12

12. Install the needle clamp and needle, and tighten the needle clamp screw to secure the needle and capture the needle bar.

13. Reinstall the covers and plug that were removed during this procedure.

The needle bar height must now need to be properly adjusted. Refer to the hook timing procedure later in this chapter for information in making this adjustment.

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, or needle bar reciprocator. Refer to the following steps to remove the needle case from embroidery head.

1. Turn ON the EMT 1 and bring the embroidery head to the HEAD UP position.
2. Turn OFF the EMT 1 and disconnect the power cord from its power source.
3. Remove the thread saddle from the top of the embroidery head.
4. Remove the screw and wire tie-down holding the thread break and ground wires to the top of the head.
5. Disconnect the thread break and ground wire in-line connector located just behind where the tie-down was removed (see Figure 3-13).

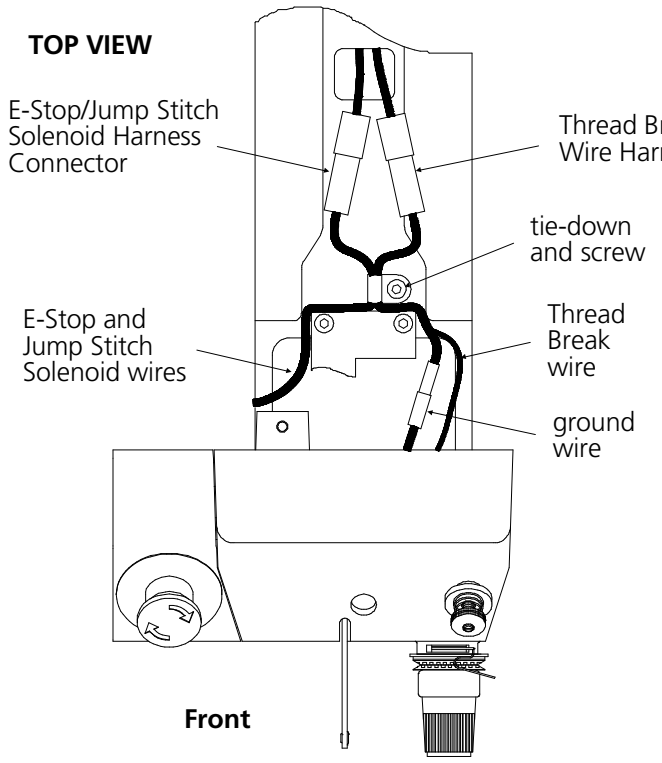


Figure 3 - 13

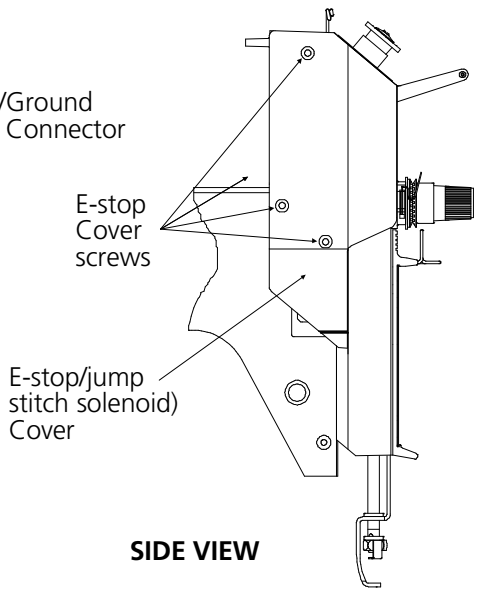


Figure 3 - 14

6. Remove the 3 screws and e-stop/jump stitch solenoid cover from the needle case (see Figure 3-14). Place the e-stop assembly on the top of the head.

7. Slide the needle case cover plate out of the needle case cover and remove the 4 screws and needle case cover (see Figure 3-10).

8. Next, hold onto the needle case as you remove the 4 screws that hold the needle case to the front of the embroidery head (see Figure 3-15). Allow the needle case to come off in your hand when the screws are removed.

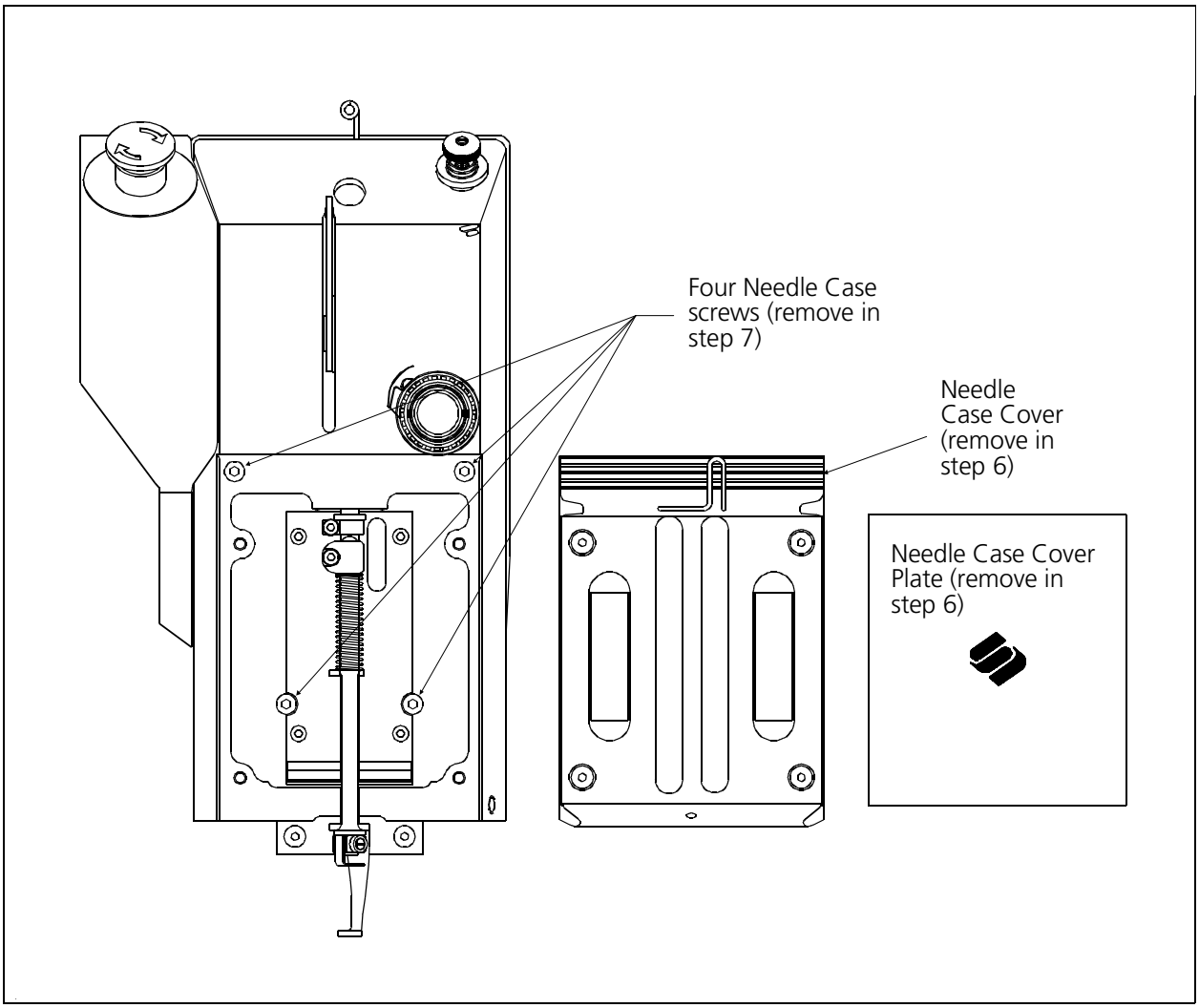


Figure 3 - 15

9. To reinstall the needle case, reverse the order of the previous steps.

Jump Stitch Solenoid Replacement

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

1. Remove the thread saddle from the top of the embroidery head.

2. Remove the Needle Case as described previously.

3. Remove the screw and wire tie-down holding the e-stop and jump stitch solenoid wires to the top of the head.

4. Disconnect the e-stop and jump stitch solenoid wire in-line connector located just behind where the tie-down was removed (see Figure 3-16).

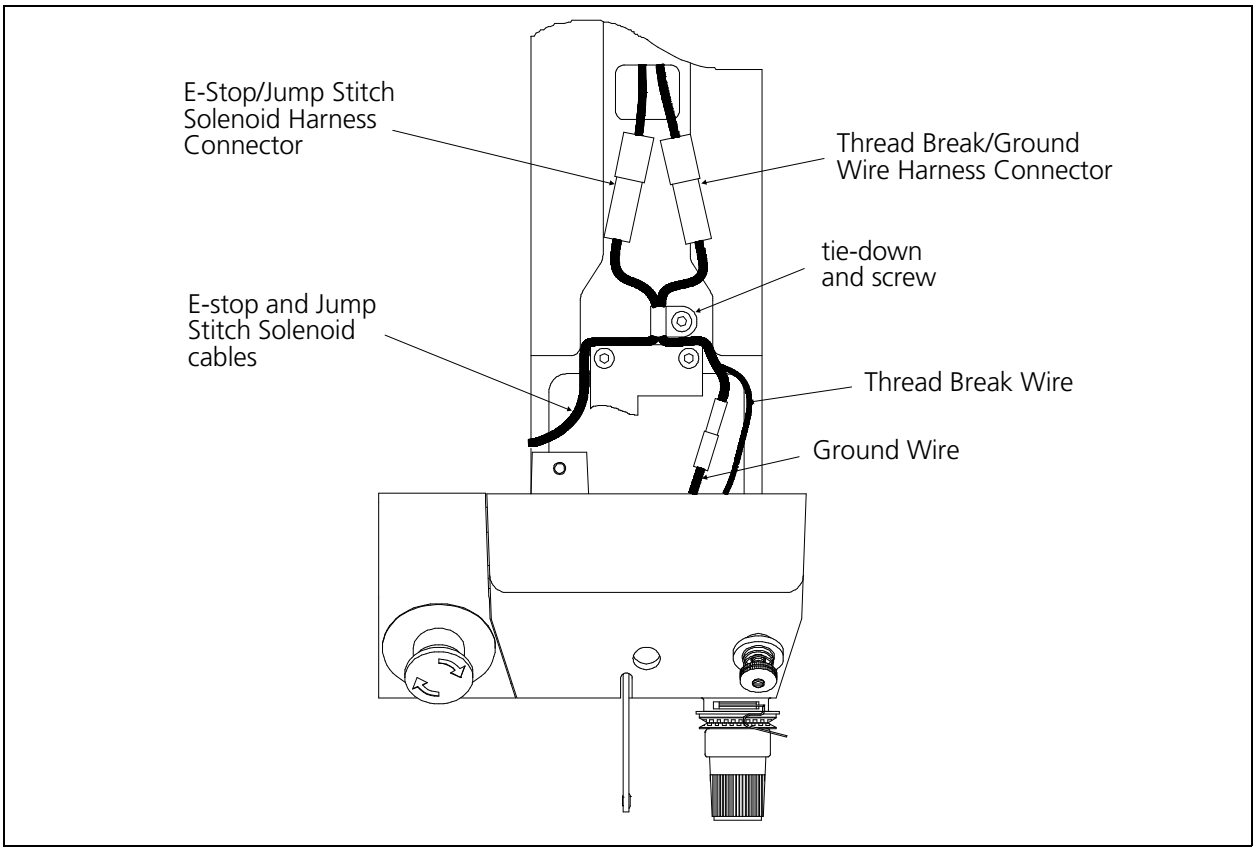


Figure 3 - 16

5. Disconnect the jump stitch harness wires from the in-line connector and connect the wires from the new jump stitch solenoid where the old ones were removed.

6. Refer to Figure 3-17 and remove the top and bottom screws ONLY of the jump stitch solenoid bracket and then remove the solenoid and the solenoid bracket as one piece.

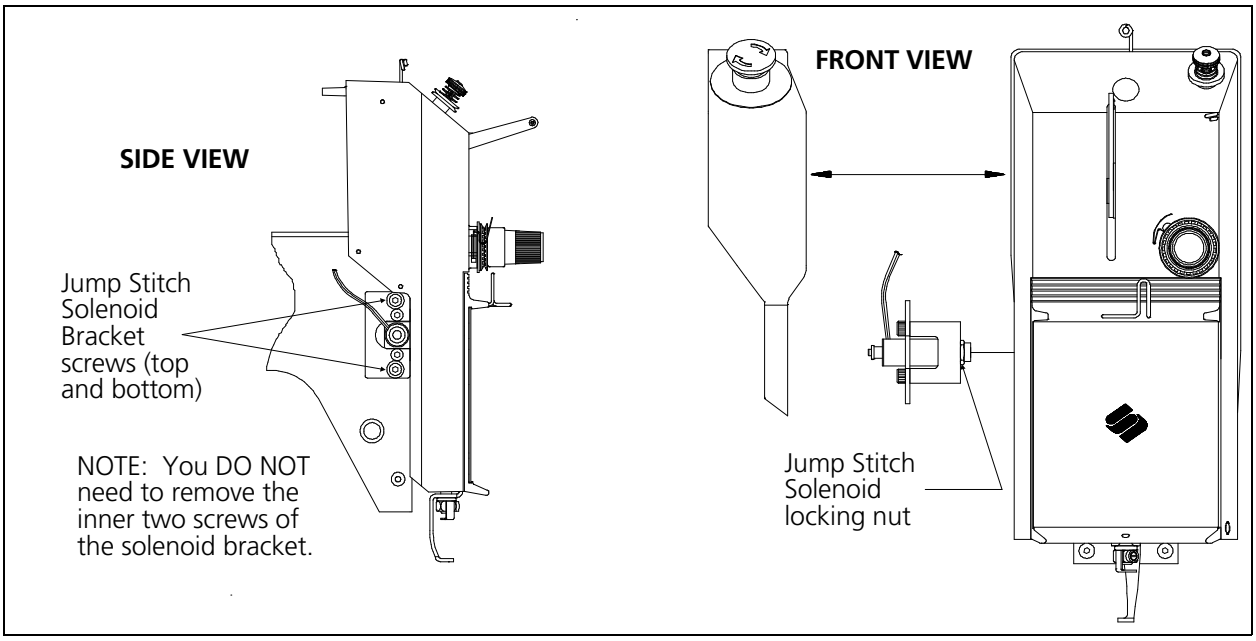


Figure 3 - 17

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 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) you recorded in this step.

7. Loosen the locking nut on the solenoid, then rotate the bracket off the solenoid.

8. Replace with new solenoid by reversing the previous steps. Adjust the position of the solenoid into the solenoid bracket using the "thread counts" or measurement you obtained in the above **NOTICE**.

9. Refer to the following adjustment procedure for the proper adjustments.

Jump Stitch Solenoid Adjustment

If a jump stitch solenoid has been replaced, perform the following adjustments:

NOTE: The needle case must be removed to make this adjustment.

Plunger Positioning

Plunger Position 1 The jump stitch solenoid must be positioned so the plunger is close enough to actuate the needle bar driver reciprocator when the solenoid is engaged (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) as shown in Figure 3-18.

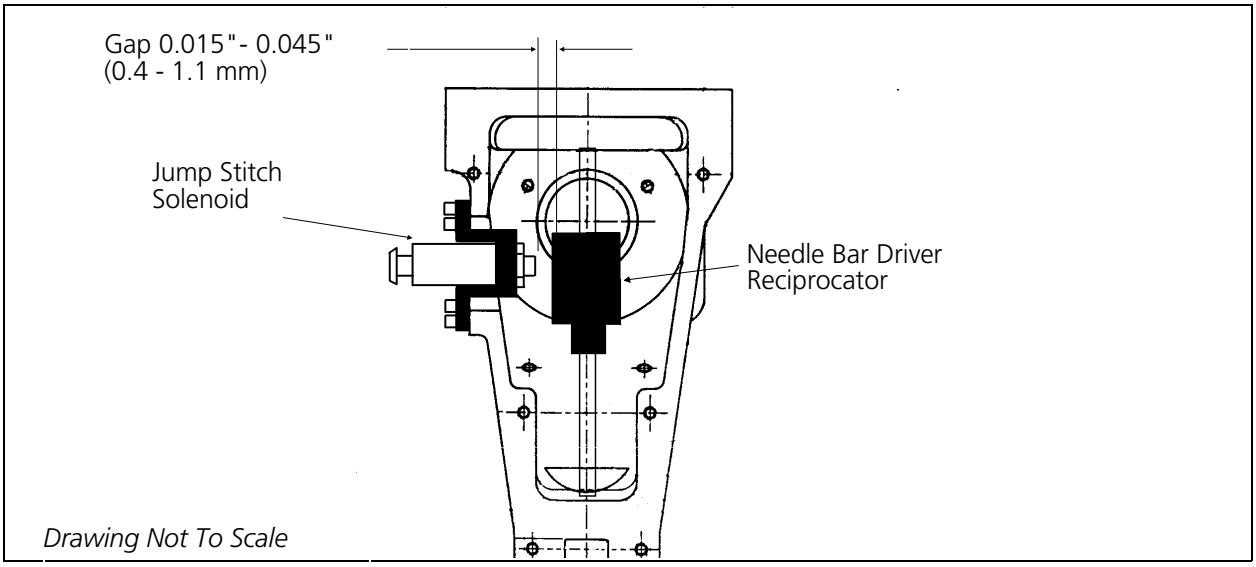


Figure 3 - 18

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. Reattach the e-stop and jump stitch solenoid in-line connector at the top of the head and again secure the wires with the tie-down and screw.

4. Reinstall the needle case and all the 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.

After attaching the new solenoid and bracket assembly to the embroidery head and check the alignment. Be sure the plunger contacts the reciprocator mechanism, and the reciprocator mechanism does not contact other internal head parts when the solenoid is energized. The two wires coming from the solenoid 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. It therefore is 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.

Replacing Reciprocator / Needle Bar Guide Shaft

1. Remove the needle case as described previously.

2. Loosen the set screw from the left side of the head that secures the needle bar guide shaft (see Figure 3-19).

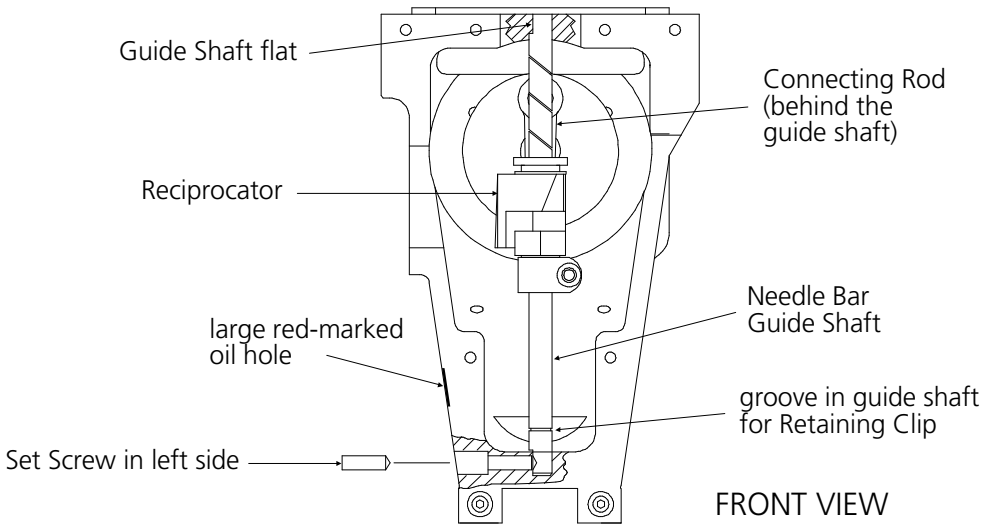


Figure 3 - 19

3. Remove the retaining clip from the groove in the needle bar guide shaft.

4. Remove the felt from the hole in the top of the arm casting, then remove the needle bar guide shaft by sliding it up and through the hole.

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. 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. Be certain 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 Figure 3-19):

    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. Reinstall the retaining clip onto the needle bar guide shaft.

11. Turn the needle bar guide shaft until the flat near the top faces the left side of the head.

12. Pull the needle bar guide shaft down until it seats into the lower hole. be certain the retaining clip is located low enough so the reciprocator will not hit it during its down stroke and the roller bearing is loose enough to rotate freely.

13. Tighten the set screw on the left side of the head to secure the needle bar guide shaft. Reinstall the felt in the hole in the arm casting.

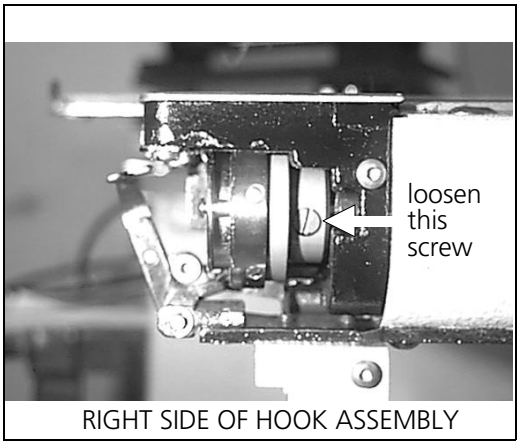
Rotary Hook

Hook Replacement

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

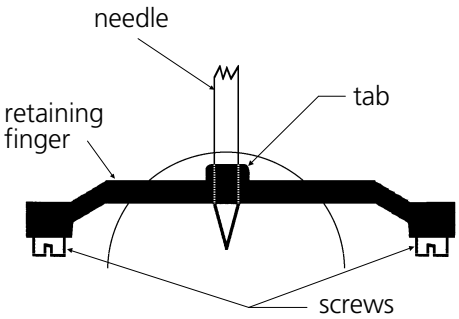
If you are not replacing the hook but wish to check and adjust hook timing only, refer to that section later in this manual.

1. Move the table top to the lower position, or remove it and set it aside.
2. Remove the needle plate, both rotary hook covers, and the bobbin case.
3. With the machine ON and ready for operation, press  to switch to the Service/Maintenance Menu. The peripheral LCD displays HEAD TIMING MENU.
4. Press  and the LCD displays HEAD TIMING ON.
5. Press   keys. The head rotates to the ''Head Up'' position and the LCD displays GO TO HEADUP 110.0*.
6. Locate the screw that is visible on the right side of the hook assembly as shown in Figure 3-20. Loosen this screw one or two turns.
7. Press the  key 6 times until the second hook screw is visible, also as shown in Figure 3-20. Loosen this screw one or two turns.
8. Press  6 more times and another screw will become visible. This screw will be protruding more from a flat surface than the previous two screws. Loosen this screw one or two turns. The hook assembly is now free on the shaft.
9. Remove the two screws holding the inner basket retaining finger and remove the finger (see Figure 3-21).



RIGHT SIDE OF HOOK ASSEMBLY

Figure 3 - 20



FRONT VIEW OF HOOK ASSEMBLY

Figure 3 - 21

* May not be exactly the degrees indicated.

10. Remove the rotary hook assembly for cleaning and reinstallation, or for replacing with a new one.

11. Press the ^ ▲ keys to again rotate the head to Head Up.

12. Press the ^ ▼ keys. The head rotates to the ''Needle Depth'' position without bringing the needle down and the LCD displays NEEDLE DEPTH 180.0*.

13. Press ^ ▶ and the head rotates to the ''Hook Timing'' position. The LCD displays HOOK TIMING 201.0*.

14. Clean and replace the current hook, or place a new rotary hook on the hook shaft.

15. Align the hook point to the approximate hook timing position as shown in Figure 3-22.

16. With a good needle installed in the needle bar above the rotary hook, grasp the needle bar clamp and pull down until the needle goes into the slot in the bobbin basket and the needle bar catches securely.

17. Refer to Figure 3-22 for aligning the hook point to the needle. At the same time, refer to Figure 3-23 and position the hook point so the gap between the needle scarf and the hook point is 0.002" to 0.020" (about the width of a thread).

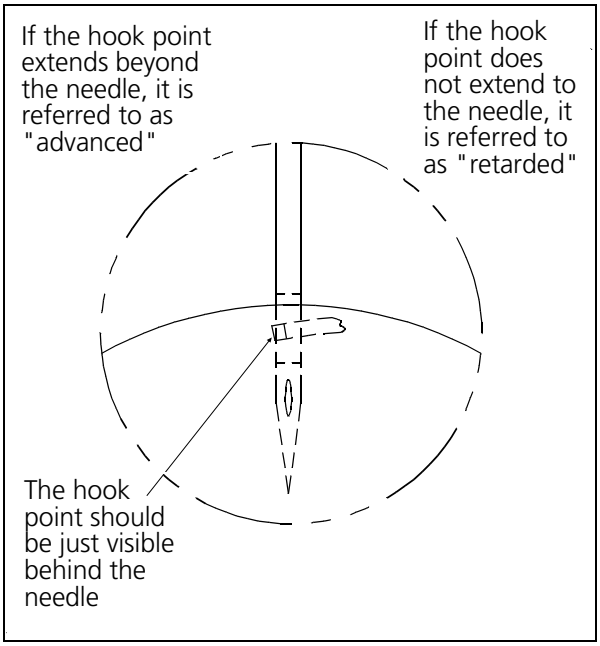


Figure 3 - 22

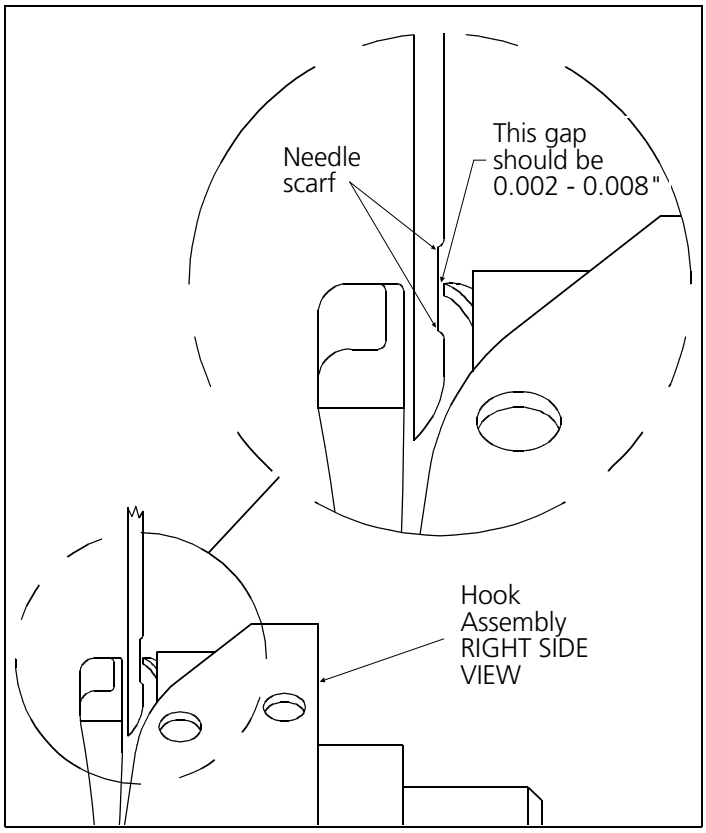


Figure 3 - 23

* May not be exactly the degrees indicated.

18. While maintaining the specifications outlined in the previous step, tighten the rotary hook screw that is accessible at the right of the hook assembly.

19. Refer to Figure 3-24 and position the retaining finger tab inside the rotary hook inner basket notch. Install the screws but do not tighten them.

20. Insure the retaining finger tab is inside the inner basket notch enough to secure the basket from rotating with the outer hook. At the same time, leave a gap between the tab and the notch large enough to allow thread to pass through it easily (.020 to .040 inches).

21. While maintaining the gap described in the previous step, align the center of the tab to the center of the needle, then tighten the screws to secure the retaining fingers position.

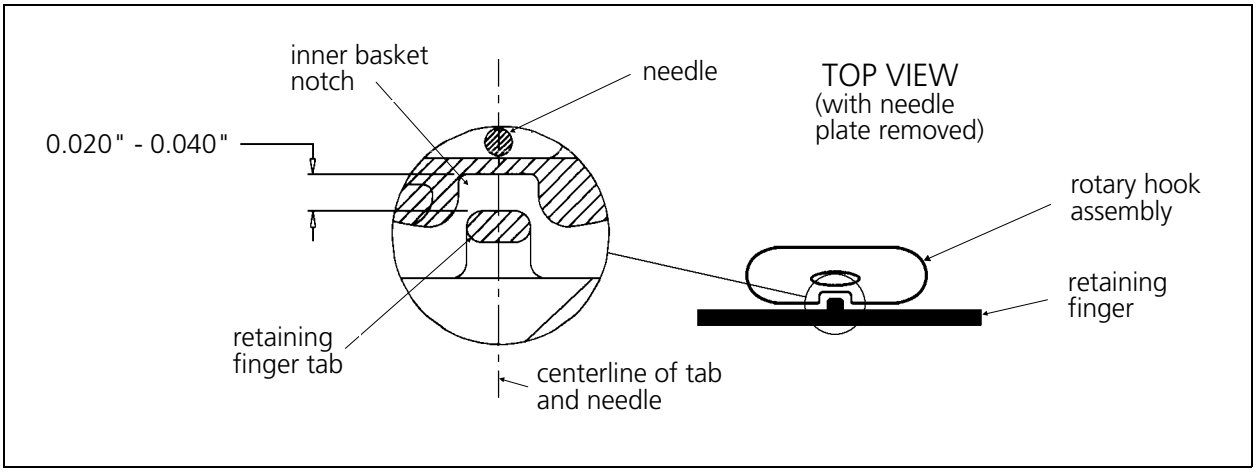


Figure 3 - 24

22. Use the key to rotate the hook to the other two HOOK SCREWS and tighten each of these screws to secure the hook assembly.

Needle Depth

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

1. Remove the lower needle case cover (see Figure 3-26).

2. With the machine ON and ready for operation, press to switch to the Service/Maintenance Menu. The peripheral LCD displays HEAD TIMING MENU.

3. Press and the LCD displays HEAD TIMING ON.

4. Press keys. The head rotates to the ''Head Up'' position and the LCD displays GO TO HEADUP 110.0*.

* May not be exactly the degrees indicated.

5. Next press ⌃ ◀ . The head rotates one revolution. The LCD displays ONE REVOLUTION 110.0. The needle bar should be down with the presser foot about 1/4 inch from the needle plate.

NOTE: If the needle does not come down the upper dead stop clamp may need adjustment as described later in this procedure. For now, however, complete the needle depth adjustment by grasping the presser foot and pulling down until the needle bar catches securely. At this time the presser foot will be about 1/4 inch from the needle plate.

6. Press ⌃ ▼ . The head rotates to the ''needle depth'' position and the LCD displays: NEEDLE DEPTH 180.0*. The needle has reached its lowest point.

7. Look directly into the hook assembly and check the location of the needle's eye compared to Figure 3-25. Not more than 1/8 of the needle's eye should be visible in the hook assembly.

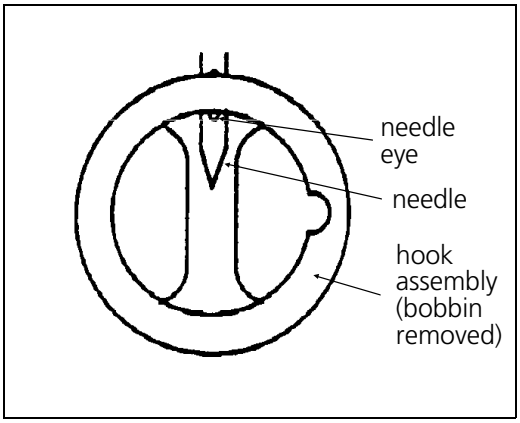


Figure 3 - 25

If the needle's eye is in the acceptable range, skip the next few steps and go to Step 16.

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

8. Loosen the needle bar clamp screw (silver clamp) shown in Figure 3-26.

9. Slide the needle bar up or down until not more than 1/8 of the needle's eye should be visible in the hook assembly. If you twisted the needle bar, return it to its original rotation before continuing.

10. Re-tighten the needle bar clamp screw.

11. Loosen the screw on the upper-dead-stop clamp (black clamp). Push the upper dead stop down to the needle bar clamp. Tighten slightly (but do not turn the upper dead stop).

12. Press ◀ and ▲ simultaneously. The head will rotate to the full needle up position (needle at its highest point) and the LCD displays TOP DEAD CENTER.

* May not be exactly the degrees indicated.

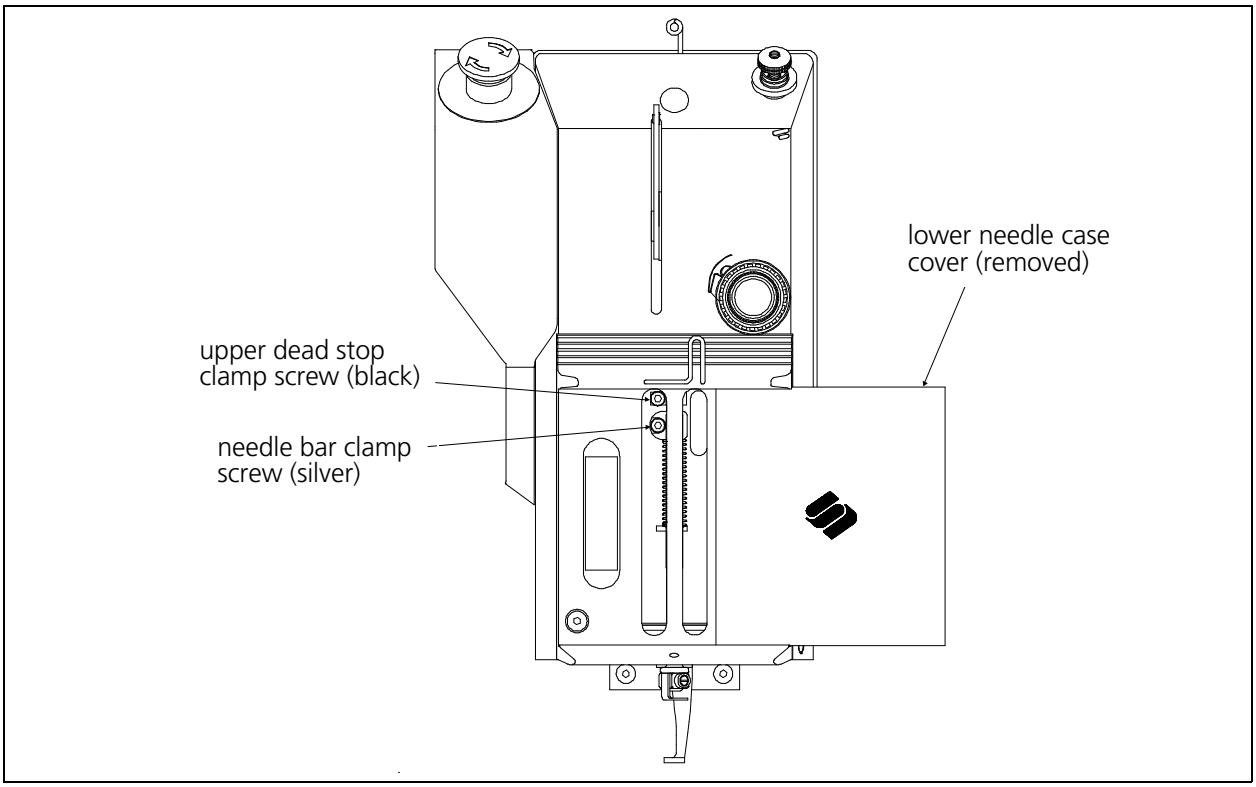


Figure 3 - 26

13. Loosen the screw on the upper-dead-stop clamp again and slide the clamp against the upper stop bumper. The screw must be positioned directly forward. If it is rotated, it may rub the plastic guide plate or catch the needle bar next to it during its down stroke. Tighten the upper-dead-stop clamp screw.

14. Press ⌃ ▲. The head rotates to GO TO HEAD UP 110.0*.

15. Repeat steps 5, 6 and 7 to check the needle depth and that there is no restriction to head rotation.

NOTE: After any needle depth adjustment the upper dead stop **MUST** also be readjusted!

16. Replace the lower needle case cover.

17. Replace the needle plate, both rotary hook covers, and the bobbin case; and return the machine to its operational state.

* May not be exactly the degrees indicated.

Hook Timing Adjustments Only

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

1. Move the the table top to the lower position, or remove it and set it aside.
2. Remove the needle plate, both rotary hook covers, and the bobbin case.
3. With the machine ON and ready for operation, press ^ and then to switch to the Service/Maintenance Menu. The peripheral LCD displays HEAD TIMING MENU.
4. Press ↵ and the LCD displays HEAD TIMING ON.
5. Refer to the Needle Depth procedure that immediate precedes this procedure and perform the steps numbered 4 through 16, then return to Step 6 below.
6. Press ^ and ▲ keys. The head rotates to the ''Head Up'' position and the LCD displays GO TO HEADUP 110.0*.
7. Hold down ^ and press ▼ (the display will read NEEDLE DEPTH 180.0)*.
8. Hold down ^ and press ▶ (the display will read HOOK TIMING 201.0)*.
9. Grasp the needle bar clamp and pull down until the needle goes into the slot in the bobbin basket and the needle bar catches securely.
10. Check to see if hook timing is correct before you proceed. You must check the hook point's alignment with the needle, and you must check the gap. Refer to Figure 3-27 to check the alignment to the needle. Refer to Figure 3-28 to check the gap; there should be a 0.002" to 0.020" gap (about the width of a thread) between the needle and the hook point. Since there is some variation between the needles, check needles 1, 5, and 10; ideally, the smallest gap should be set at 0.003".

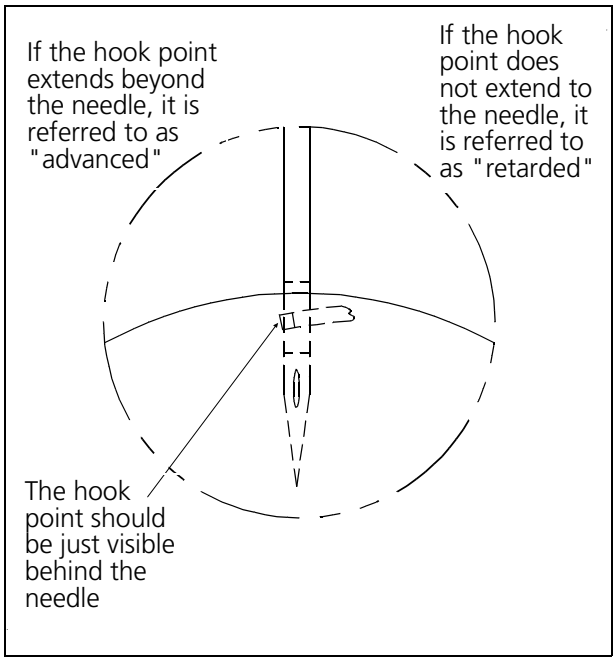


Figure 3 - 27

* May not be exactly the degrees indicated.

If hook timing is correct, no further adjustment is required. Proceed to Step 23. If hook timing is NOT correct, proceed to Step 11.

11. While the hook is still in the HOOK TIMING position, color the screw on the RIGHT side of the hook (see Figure 3-29) with a felt-tipped marker.
DO NOT LOOSEN THIS SCREW AT THIS TIME.

12. Press ▶ until you see the 2nd screw. Loosen this screw.

13. Press ▶ until you see the 3rd screw. Loosen this screw.

14. Hold down ^ and press ▲ (the display will read Go To Headup).

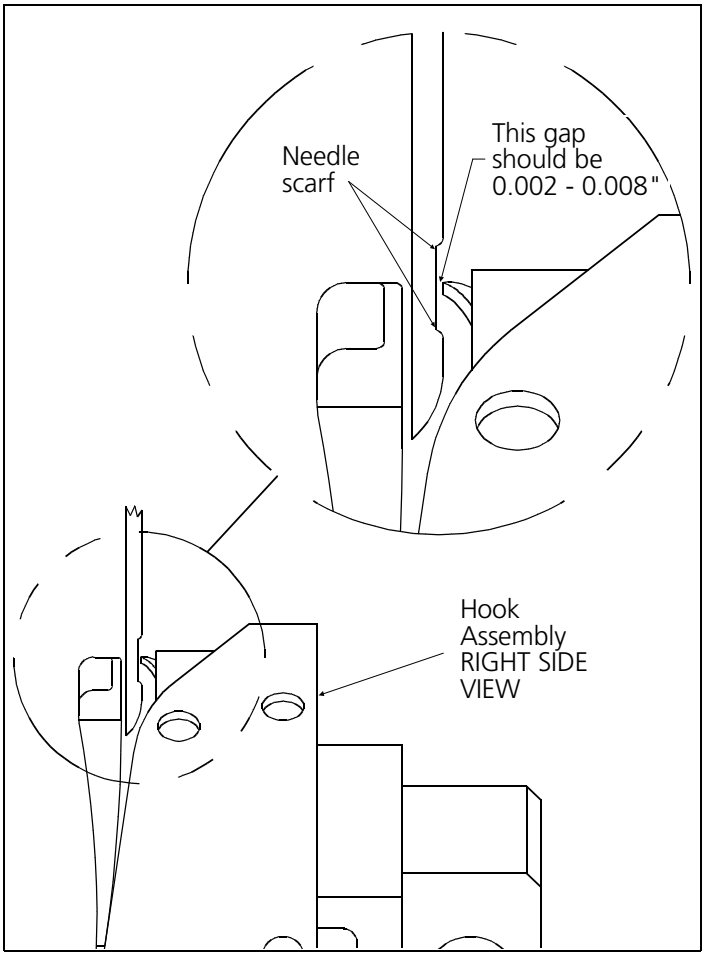


Figure 3 - 28

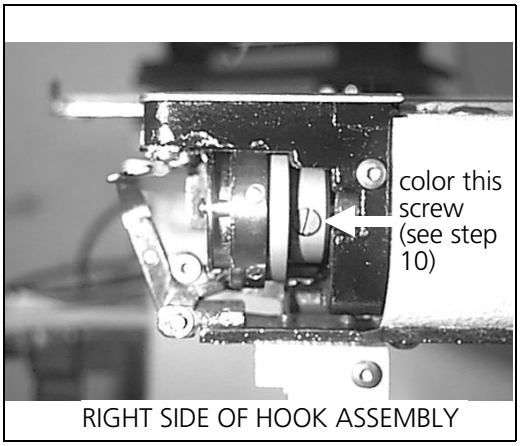
15. Hold down ^ and press ▼ (the display will read NEEDLE DEPTH 180.0)*.

16. Hold down ^ and press ▶ (the display will read HOOK TIMING 201.0)*.

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

18. Line the hook up in the approximate HOOK TIMING position (refer to Figures 3-27 and 3-28).

19. Grasp the needle bar clamp and pull down until the needle goes into the slot in the bobbin basket and the needle bar catches securely.



RIGHT SIDE OF HOOK ASSEMBLY

Figure 3 - 29

* May not be exactly the degrees indicated.

20. Position the POINT of the HOOK directly behind the SCARF of the needle. Leave a THREAD distance between the POINT of the hook and the needle.

21. Tighten the colored hook screw and check that the setting is correct as shown in Figures 3-27 and 3-28.

22. Press the key to rotate the the hook to access the other two hook screws and tighten them securely.

23. After checking and setting hook timing as required, replace the needle plate, rotary hook covers, and the bobbin case; then return the machine to its operational state.

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4. Accessory Adjustments

Wide Angle Cap Frame

The Wide Angle Cap Frame (also referred to as "WACF") has several adjustable components. Refer to this section for instructions on how to properly adjust these components.

Cap Supports

If you are experiencing registration or sew quality problems in parts of your design, you may need to adjust the cap supports (Figure 4-1).

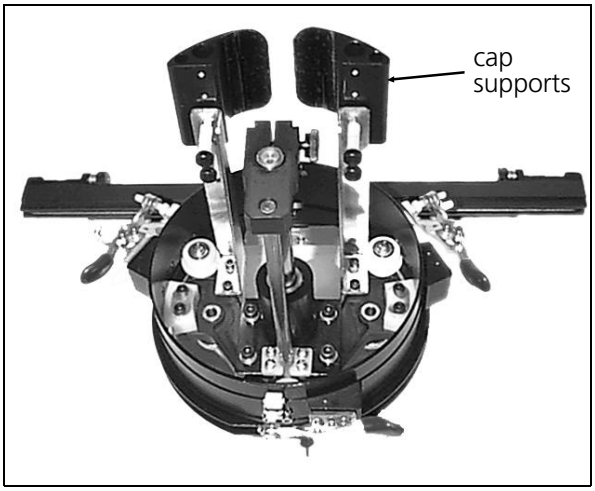

Figure 4 - 1

- For registration or sew quality problems in the lower part of a design (nearest the brim) move the cap supports toward the driver.
- For registration or sew quality problems in the upper part of a design, move the cap supports away from the driver.

To move the cap supports, follow these instructions:

1. Loosen the 4 thumb screws (2 on each side) holding the cap supports (Figure 4-2).
2. Slide the cap supports in or out; make sure you move both sides equally. Use the ruler marks on the cap supports to verify this.
3. Tighten the 4 thumb screws.

   Use the scales on the cap support arms to help you properly align the cap supports.

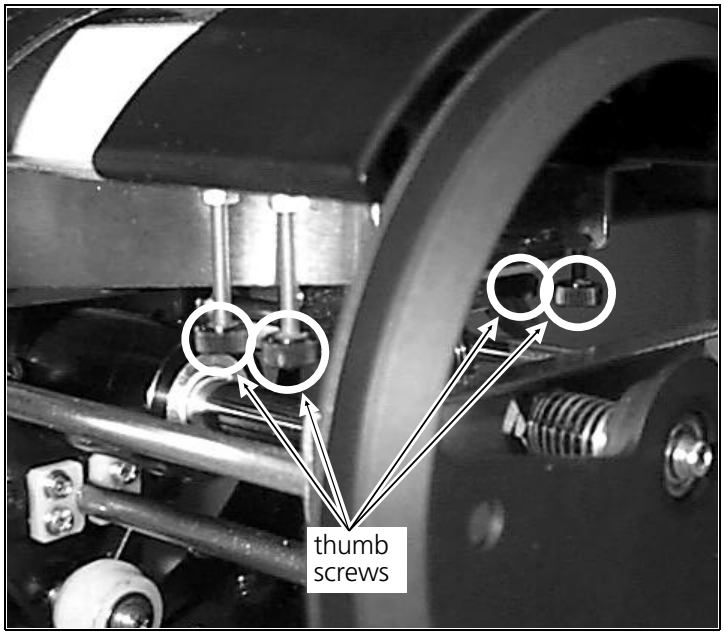

Figure 4 - 2

Cap Support Pads

Check the pads under the cap supports regularly (see Figure 4-3). When pads become worn, they must be replaced. Follow these instructions to replace the pads:

1. Remove the old pads.
2. Clean the surface with a solvent such as isopropyl alcohol.
3. Remove the paper from the new pads (provided in the operator kit), exposing the adhesive surface.
4. Attach the new pads to the cap supports, and trim the new pads even with the supports.

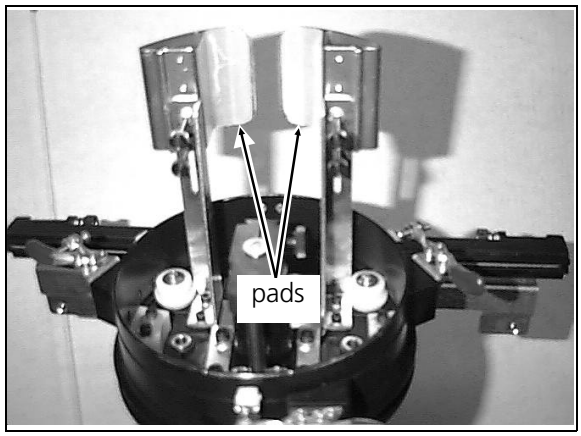

Figure 4 - 3

Driver Bar Cable

The driver bar cable, when tensioned properly, moves the driver precise amounts during embroidery. If the cable tension falls out of adjustment, embroidery quality may suffer.

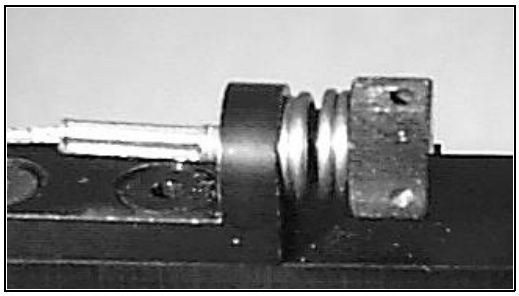

Figure 4 - 4

To check the cable tension, look at the spring coils holding the cable. The coils should be closed (as shown in Figure 4-4).

If the coils are open (Figure 4-5), tighten the cable by pulling on the cable slightly with your fingers as you tighten the thumb screw.

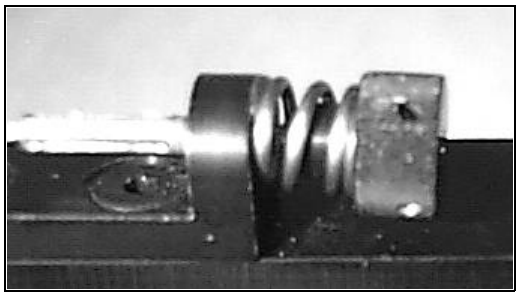

Figure 4 - 5

Caution! Do not over-compress the coils or you may cause excessive wear to the cable terminal. Figure 4-6 shows an over-compressed coil.

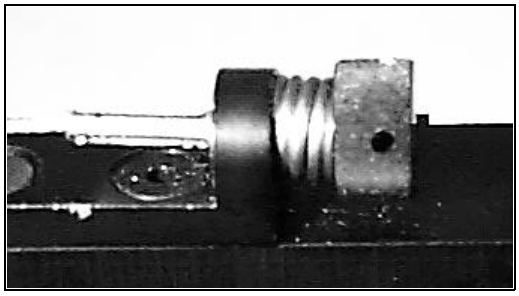

Figure 4 - 6

Spindles On The Clamps

The clamps form a positive lock on the frame when it is installed on the driver. The clamps press the spindles against the rollers on the driver to form this lock. If the frame can move when it is installed on the driver, you should adjust the spindles.

To adjust the spindle, follow these steps:

1. Loosen the upper nut on the spindle slightly (see Figure 4-7).
2. Move the spindle down until the upper nut contacts the spindle arm.
3. Tighten the lower nut on the spindle.

Caution! Do not over-tighten the nut or you may damage the spindle.

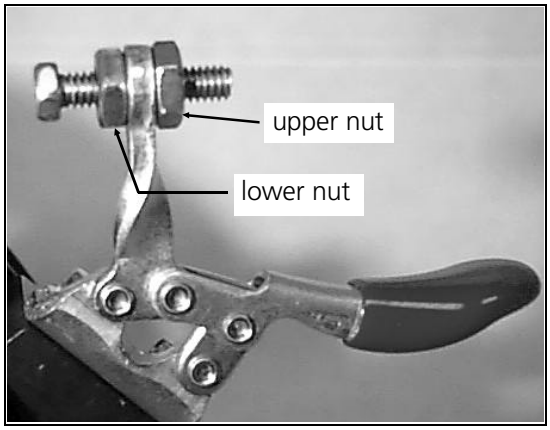

Figure 4 - 7

4. Close the clamp. You should hear an audible ''Click'' when the clamp is closed. You should not need excessive force to close the clamp. If you NEED excessive force to close the clamp, you have moved the spindle too far. Loosen the lower nut and reverse the process.
5. With the clamp closed, try to move the spindle up and down. If the spindle moves, go to step 1 and repeat the procedure.

Clip Posts

The clip posts are where the clips are attached when hooping a cap. The posts are extendible, and should be extended fully into the crown of a cap. Unless you switch between high- and low-crowned caps often, you will not need to make this adjustment regularly.

To adjust the posts, follow these steps:

1. Use the 2mm hex wrench to loosen the 2 set screws on each post (Figure 4-8).
2. Slide the outer cover of the post out for high-crowned caps and in for low-crowned caps.
3. Tighten the 2 set screws on each post.

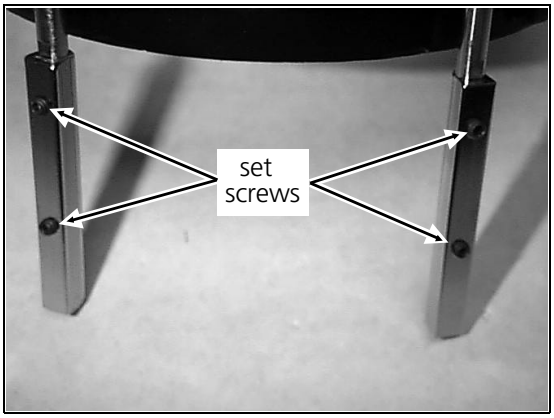

Figure 4 - 8

Cap Frame

The strap on the cap frame may need to be adjusted for different cap materials. The factory adjustment will suffice for most cap types, but if you need to adjust it, follow these steps:

1. Close the cap frame but do not fasten the latch. Make sure the strap is in the groove on the locator (see Figure 4-9).

2. Loosen the 2 wing nuts on the strap (Figure 4-10).

3. Slide the frame (loosening or tightening its grip on the cap) to its new position.

   Caution! Do not overtighten the strap on the cap frame. If the strap is too tight (and the clip is difficult to close) you may damage the frame.

4. Retighten the 2 wing nuts.

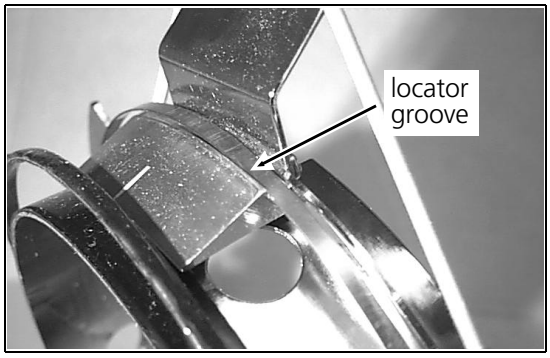

Figure 4 - 9

Figure 4 - 10

Note: For normal to heavy-duty cap materials, the latch on the end of the strap is attached at the outer-most two screw holes (see Figure 4-11).

With very thin cap material you may not be able to get the strap tight enough with the wing nut adjustments described above. To obtain a tighter strap with very thin cap material, remove the 2 screws shown in Figure 4-11. Move the latch to the inner-most screw holes as shown in Figure 4-12 and secure the latch with the same screws and nuts.

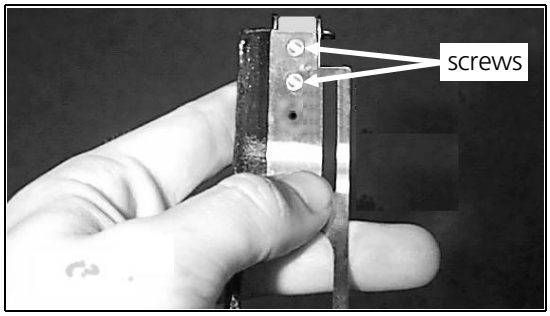

Figure 4 - 11

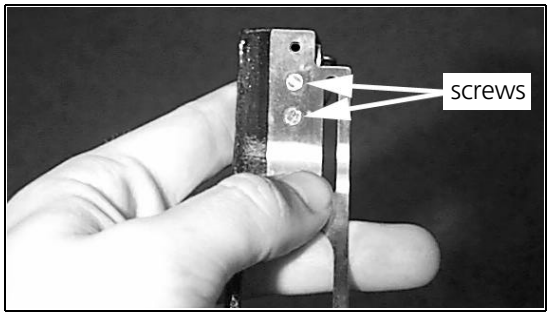

Figure 4 - 12

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