Technical manual for the EMB 10/6T embroidery peripheral

- Six Melco Heads, Bridge Mounted
- Melco Control Panel Software
- Expanded Embroidery Field
- 10 Needles with Automatic Color Change
- Automatic Trimmers
- Caps, Tubular
- CE

Melco Embroidery Systems

A Saurer Group Company

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1. Introduction

Scope Of Manual

The EMB 10/6T Multi-Head Embroidery Machine technical manual is a guide for performing repairs and adjustments that go beyond routine operator maintenance. The various sections of the manual provide procedures that address mechanical disassembly and replacement of major components, and any related adjustments.

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

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

This technical manual is presented in six Sections: 1) an overview of general information useful in understanding the manual and various service requirements including a troubleshooting section, 2) repair maintenance of all the User Station and Rear Electrical Boxes, 3) Head Assembly repair maintenance, 4) repair maintenance on the Bed Assembly area, 5) Z Drive System repair maintenance, and 6) repairing the Carriage Section.

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

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

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

  - A key on the peripheral keyboard is represented by a pictorial of that key.

  - Typing with the computer keyboard is referred to in BOLD letters, for example: Type: **run** and press Enter to start.

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

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

WARNING!

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

CAUTION!

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

NOTE:

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

Glossary Of Terms

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

Repair Maintenance Philosophy

The repair maintenance philosophy described in this manual, and practiced at Melco, is to isolate malfunctions within the system to a "practical" replacement subassembly. Components are typically not repaired, but rather, a circuit board or mechanical "subassembly" may be replaced. In the process of isolating malfunctions in the machine, the person performing the trouble shooting must also practice good troubleshooting 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 subassembly at a time to enable identification of the defective subassembly 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 EMB 10/6T Multi-Head Embroidery Machine is sensitive to static electricity. Any time work is performed inside covered areas of the embroidery machine, the person performing the work MUST be using a static grounding strap.

WARNING! FAILURE TO USE A GROUNDING STRAP, OR FAILURE TO PRACTICE OTHER GOOD MAINTENANCE/REPAIR TECHNIQUES MAY CAUSE DAMAGE TO THE MACHINE AND POSSIBLE HARM TO PERSONNEL.

Grounding Strap Use

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

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

Warranty Considerations

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

Electrical Grounding

WARNING! IT IS VERY IMPORTANT THAT THE POWER CORD BE PLUGGED INTO A PROPERLY WIRED ELECTRICAL OUTLET. FAILURE TO HAVE A PROPERLY WIRED OUTLET MAY RESULT IN DAMAGE TO THE EQUIPMENT AND INJURY TO PERSONNEL. IT IS RECOMMENDED THAT A LICENSED ELECTRICIAN BE CONSULTED TO ASSURE THAT THE ELECTRICAL OUTLET IS PROPERLY WIRED AND GROUNDED.

CAUTION! IF A PROPERLY WIRED ELECTRICAL OUTLET IS NOT USED FOR THE SOURCE SUPPLY VOLTAGE TO THE SYSTEM, ELECTRICAL FAILURES MAY RESULT.

System Overview

The Melco EMB 10/6T Embroidery Machine is assembled with six bridge-mounted ten needle head modules. The machine is designed for embroidering with tubular hoops and flat goods, as well as with cap frames. It is equipped with automatic thread trimmers and under thread controls. Individual stepper motors are used to provide the jump stitch function and control the take up lever action.

A head node PCB hosting a micro-controller, located at each head, provides local interface and control of the stepper motors, thread break sensors, and head control switches. The interface with the computer is by a serial CAN-type interface, which significantly reduces cabling requirements.

The user interface is a pentium PC computer operating with Windows 98 and Melco Control Panel Software (MCPS). The system comes with a CD-ROM drive, floppy drive, hard drive, and a standard keyboard and mouse. Other user interface features include a keypad for manual rack and color change control, emergency stop switches, and other switches for controlling on-off, start/stop, and frame. The machine is capable of being networked with an Ethernet connection, and carries the European Union CE mark.

The software features self diagnostics, statistics, self test menu, auto checking for error messages, and notification of lubrication times.

Physical/Functional Arrangement

The EMB 10/6T may be divided into several distinct physical and/or functional areas of description (see Figure 1-1.)

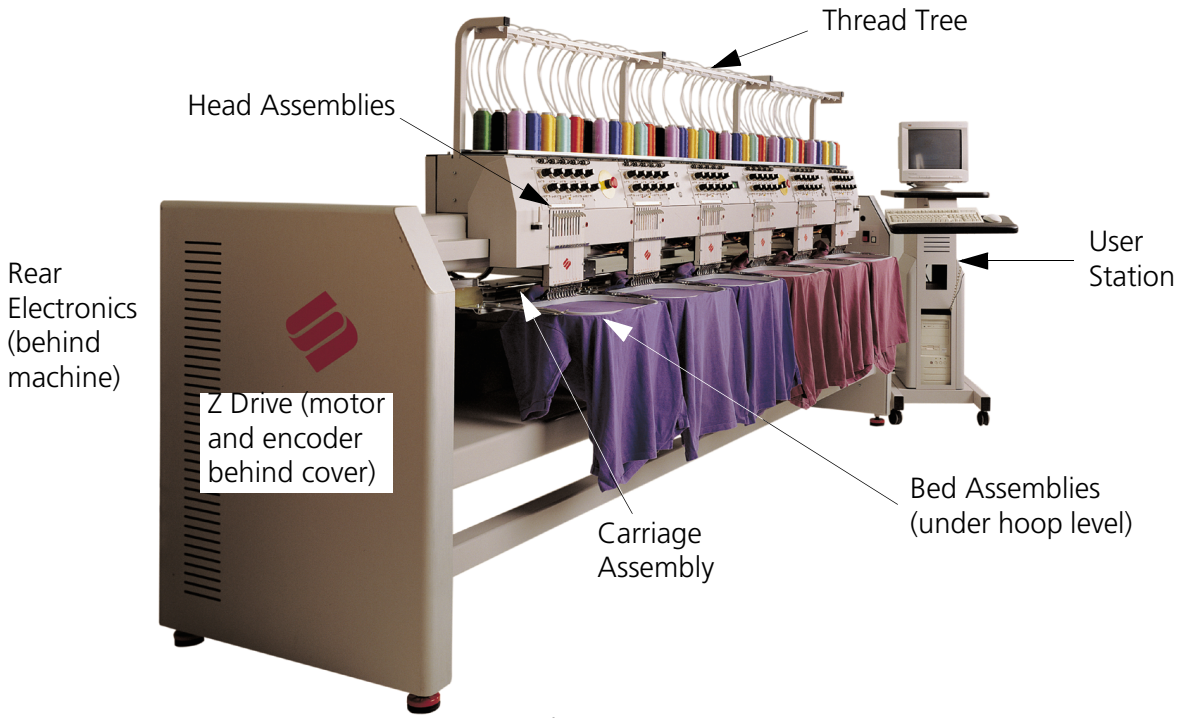


Figure 1-1

One of these areas is where all the computerized controls are housed. This area is called the User Station. The user station is located to the far right of the embroidery heads and consists mainly of the computer items such as the monitor, keyboard, and the controller box containing various printed circuit boards.

A second distinct section of the EMB 10/6T is the Head Assembly. This section consists of each of the 6 embroidery heads which includes the thread tensioners, needle cases, and needle bar drive, take up lever drive, and jump stitch drive systems, as well as the thread tensioners and individual head node interface electronics. The color change and grabber systems, as well as the user interface keypad, Start/Stop, E-Stop, and Frame switches are also part of this section.

The Thread Tree and other thread handling mechanics are included are located above the head assembly section.

The area below the head assembly section becomes its own section called the Bed Assembly. This section contains an embroidery bed assembly associated with each of the heads. This section includes the bobbin shaft drive system and associated rotary hooks, in addition to the trimmer, picker, and UTC devices. The means for attaching various optional devices such as cap frames is also included in this section.

The Z drive system includes the Z motor, Z encoder, Z shafts, and other common parts associated with both the head and bed drive assemblies. These parts comprise their own section of the EMB 10/6T.

Another area, the Carriage section, consists of the mechanical devices that hold the garments and move them forward and backward (y axis movement) and left to right (x axis movement). The carriage section consists of the motors, drive belts, pulleys, and shafts associated with the device.

The Rear Electronics Section is described as that area behind the Y drive shaft where covered boxes are mounted to the top of the chassis frame. This section contains the power distribution assembly and the XYZ motor amplifiers.

Troubleshooting

Section 1 - Introduction

Welcome to the EMB 10/6T troubleshooting guide. The information in this guide is divided into 4 major sections. Section 1 is an introduction to the troubleshooting portion of this manual and gives a description of the powerup sequence of the machine. It also provides fuse information and explains various LEDs found throughout various parts of the machine.

Section 2 contains malfunctions that the EMB 10/6T may or may not do. Section 3 contains a list of status and error messages the EMB 10/6T might display. Both of these sections can be used as a starting point in determining what might be wrong with the EMB 10/6T. In both sections under each item is an example of things that might cause the malfunction. Use these sections to help get an idea of where the malfunction might be.

Sections 1, 2, and 3 can be used by anyone to get an idea of what is going on with the EMB 10/6T. This may be helpful when you need to talk to a Melco representative or technician.

Section 4 is an advanced troubleshooting guide written for someone with a technical background and who is comfortable with troubleshooting the EMB 10/6T.

Power Up Sequence

This section describes the sequence of events that occurs when the machine is turned ON until the time it is in its ready state to receive instructions through the computer keyboard or the keypad.

After the computer boots up, automatic commands are sent out to the embroidery machine to perform several functions in the process of getting ready for operator input commands. These functions and the order that they occur are described as the "Power Up" sequence.

If there are any head node configuration failures during power up, the sequence stops with the last node that was successfully configured showing on the monitor.

After all the head nodes are configured, several other checks and initialization functions occur. If any of these fail during the sequence, a message associated with the error appears on the monitor.

When all power up configurations, checks, and initializations are successful the message on the monitor indicates so. The following are the actual steps in the sequence order:

1. Zero out unused RAM and all Dual Port RAM; and initialize clocks.
2. SRAM (battery backed memory) is cleared if:
   * check sum value stored in SRAM is incorrect
   * revision level has changed in RSA

   Then, all machine parameters are set to default values and the following message appears:

MACHINE EMBROIDERY PARAMETERS RESTORED TO FACTORY DEFAULT VALUES [47]

3. All electronic nodes are configured in order 0 to 6 (0 is the bed node module and 1-6 are the head nodes in order from right to left). One or more of the following messages will appear:

   BED / EMBROIDERY HEAD X ELECTRONICS CONFIGURED SUCCESSFULLY *(X = 1-6)* **[50]/[51]**

   BED / EMBROIDERY HEAD X ELECTRONICS NOT RESPONDING TO COMMANDS, SHUTDOWN AND RESTART THE MACHINE, CONTACT SERVICE IF PROBLEM PERSISTS *(X = 1-6)* **[57]/[58]**

   BED / COMMUNICATIONS ERROR DETECTED BY EMBROIDERY HEAD X ELECTRONICS, SHUTDOWN AND RESTART THE MACHINE, CONTACT SERVICE IF PROBLEM PERSISTS *(X = 1-6)* **[64]/[65]**

   BED / EMBROIDERY HEAD X ELECTRONICS NOT RESPONDING TO CONFIGURATION COMMAND, SHUTDOWN AND RESTART THE MACHINE, CONTACT SERVICE IF PROBLEM PERSISTS *(X = 1-6)* **[71]/[72]**

4. Enable motors, toggle brake signal.
5. Global initialize DSP motor controller. The following message will appear if failure occurs:

   SERIOUS DSP ERROR, CPU HALTED, SHUTDOWN AND RESTART THE MACHINE, CONTACT SERVICE IF PROBLEM PERSISTS **[32]**

6. Initialize Z axis in DSP. The following message will appear if successful:

   Z AXIS CONTROL CONFIGURED SUCCESSFULLY **[101]**

   The following message will appear if failure occurs:

   SERIOUS DSP ERROR, CPU HALTED, SHUTDOWN AND RESTART THE MACHINE, CONTACT SERVICE IF PROBLEM PERSISTS **[32]**

7. Initialize X axis in DSP. The following message will appear if successful:

   X AXIS CONTROL CONFIGURED SUCCESSFULLY **[97]**

   The following message will appear if failure occurs:

   SERIOUS DSP ERROR, CPU HALTED, SHUTDOWN AND RESTART THE MACHINE, CONTACT SERVICE IF PROBLEM PERSISTS **[32]**

8. Initialize Y axis in DSP. The following message will appear if successful:

   Y AXIS CONTROL CONFIGURED SUCCESSFULLY **[98]**

   The following message will appear if failure occurs:

   SERIOUS DSP ERROR, CPU HALTED, SHUTDOWN AND RESTART THE MACHINE, CONTACT SERVICE IF PROBLEM PERSISTS **[32]**

9. Initialize Grabber axis in DSP and put to home position. One or more of the following messages may appear:

   THREAD GRABBER CONTROL CONFIGURED SUCCESSFULLY **[99]**

   EMERGENCY STOP BUTTON ENGAGED, RELEASE EMERGENCY STOP BUTTON WHEN SAFE **[31]**

THREAD GRABBER MOTOR DRIVER FAULT, CHECK FOR OBSTRUCTIONS, SHUTDOWN AND RESTART THE MACHINE, CONTACT SERVICE IF PROBLEM PERSISTS **[35]**

SERIOUS DSP ERROR, CPU HALTED, SHUTDOWN AND RESTART THE MACHINE, CONTACT SERVICE IF PROBLEM PERSISTS **[32]**

THREAD GRABBER HOME NOT SET, CLICK ADVANCED, SERVICE, CONTROLLER, THEN GRABBER HOME BUTTONS TO CONTINUE **[05]**

10. Initialize color axis in DSP. The following message will appear if successful:

COLOR CHANGE CONTROL CONFIGURED SUCCESSFULLY **[100]**

The following message will appear if failure occurs:

SERIOUS DSP ERROR, CPU HALTED, SHUTDOWN AND RESTART THE MACHINE, CONTACT SERVICE IF PROBLEM PERSISTS **[32]**

11. Initialize backstitch buffers.

12. E-Stop status. The following message may appear:

EMERGENCY STOP BUTTON ENGAGED, RELEASE EMERGENCY STOP BUTTON WHEN SAFE **[31]**

13. The machine will try to find center on the color change index flag. One or more of the following messages will appear if failure occurs:

COLOR CHANGE MOTOR DRIVER FAULT, CHECK FOR OBSTRUCTIONS, SHUTDOWN AND RESTART THE MACHINE, CONTACT SERVICE IF PROBLEM PERSISTS **[30]**

SERIOUS DSP ERROR, CPU HALTED, SHUTDOWN AND RESTART THE MACHINE, CONTACT SERVICE IF PROBLEM PERSISTS **[32]**

COLOR CHANGE MOTOR HAS STALLED, CHECK FOR OBSTRUCTIONS, SHUTDOWN AND RESTART THE MACHINE, CONTACT SERVICE IF PROBLEM PERSISTS **[41]**

14. Initialize dual port variables (SRAM to DUAL PORT, hoop data, jump/takeup lever status).

15. Initialize Z axis to headup. One or more of the following messages will appear if failure occurs:

Z MOTOR DRIVER FAULT, CHECK FOR OBSTRUCTIONS, SHUTDOWN AND RESTART THE MACHINE, CONTACT SERVICE IF PROBLEM PERSISTS **[29]**

NOT AT HEADUP, CLICK COMMAND BUTTON THEN HEADUP BUTTON TO CONTINUE **[18]**

16. Command X/Y to self position. The following message will appear if failure occurs:

SERIOUS DSP ERROR, CPU HALTED, SHUTDOWN AND RESTART THE MACHINE, CONTACT SERVICE IF PROBLEM PERSISTS **[32]**

17. If no errors happen during power up, the RSA file successfully loads and the following message will appear:

MACHINE INITIALIZED, READY FOR OPERATION **[01]**

Fuses (See also advanced troubleshooting section)

There are 4 replaceable fuses located on the E-Stop PCB in the EMB 10/6T.

EMT10/6T FUSE CHART

FUSE Description	Quanity	Value		Location
AC Power Input	1	5x20mm	5 Amp	Power entry
E-STOP Relay Contacts	2	5x20mm	10 Amp	E-stop PCB
E-STOP	1	5x20mm	32mAmp	E-stop PCB

The AC Power Input fuse is a 5 Amp, Slow Blow fuse located on the E-Stop PCB. If it blows, it may indicate one of the following:

- There is a defective driver amplifier in either the X, Y, or Z axis.
- The rectifier diode is defective.
- There is a short in the main transformer.
- One of the capacitors on the filter PCB is shorted.
- Or there is an unidentifiable harness short

There are two 10 Amp, Fast Blow fuses located on the E-Stop PCB that protect the E-Stop relay contacts. If either fuse blows, the fault is not obvious, however, there was obviously an excessive current surge somewhere in the system which must be troubleshooted.

Also located on the E-Stop PCB is a 32 mA, Slow Blow fuse which will blow when the E-Stop power supply has a serious fault and must be replaced.

NOTE: There is also a fuse located on the +36 Volt Power Supply which, if blown, requires the replacement of that power supply.

LEDs on Bed Node and Head Node PCB

On the bed node PCB there are 4 LEDs and a 7-segment numerical LED. The 7-segment numerical LED should have a small 'blinking' LED and the number should show '0' when properly configured. The blinking LED only indicates the processor on the PCB is functioning. The 4 other LEDs indicate the following:

first on right	5 volts OK (green ON indicates proper condition)
second	Cutter Fault (Red ON indicates fault - caused by over current)
third	Grabber Fault (Red ON indicates fault - caused by timeout)
first on left	Color Change Fault (Red ON indicates fault - caused by over current)

On the head node PCBs, there are 2 LEDs - the left one is on solid when there is power to the PCB. The right one is 'blinking' only to indicate the processor on the PCB is functioning.

Section 2 - Machine Malfunctions

This is a list of some potential machine malfunctions. Below each malfunction are examples of what may correct the situation. The solutions may not be totally inclusive and are not guaranteed to be the only cause(s) or solutions to the specific malfunction. If the solution is not listed, further troubleshooting must be done to determine the correct solution for the situation.

Color Change Runaway - Color change mechanism runs the needle case left or right and off the head. The encoder is "out of phase" with the motor. (See also advanced troubleshooting section)

Color Change cable has bent pins

Color Change cable disconnected

Color Change motor encoder cable connected backwards

Color Change motor connected wrong

Color Change flag broken on the color change cam

E-Stop Malfunction - E-Stop switch is not engaged and the display says "E-STOP ENGAGED". (See also advanced troubleshooting section)

Defective E-Stop cable

Loose E-Stop cable at E-Stop switch

Loose E-Stop cable at power supply assembly

Defective E-Stop fuses

Defective E-Stop PCB

Grabber, Does Not Operate - It will not perform a grab function. (See also advanced troubleshooting section)

Grabber blade binding

Grabber guides too tight

Grabber guides not aligned properly

Cable loose or disconnected

Bent pin in cable connector

Wire loose on motor

Grabber sensor or blade misadjusted

Bed node PCB defective

Grabber, Noise - Grabber motor is making noise at idle or when moving. (See also advanced troubleshooting section)

Grabber blade binding

Loose grabber blade guides

Grabber sensor or blade misadjusted

Defective grabber motor

Bed node PCB defective

Jump Stitch Engaged At All Times - Jump stitch mechanism stays engaged holding the needle up.

Jump stitch motor defective

Pinched or defective cable

Defective ribbon cable from color change PCB to the tensioner or between tensioners

Head node PCB defective

CPU PCB defective

Losing Configuration - The embroidery machine cannot remember what it is.

Defective battery on CPU

Losing Origin - The embroidery field seems to drift in any direction while the machine is running.

Old PCB revision

Defective motor driver PCB

Defective X or Y motor

Electronic noise situation - check for damaged connectors or cabling

No Power - When the machine is turned ON nothing happens. (See also advanced troubleshooting section)

Machine is not plugged in

Blown fuse in power entry

Circuit breaker is tripped somewhere in the building

Power supply is defective

Keyboard Display Does Not Change - The keyboard display will not accept any keystrokes. It is locked up.

Keyboard switch stuck

Loose power connector at the display PCB

Defective keyboard display PCB

Defective CPU PCB

Trimmer Will Not Work - The trimmer will not fire when a trim function is performed. (See also advanced troubleshooting section)

Trimmer is turned OFF

A birdnest has occurred

Trimmer wiring pinched

A trimmer cable not connected

Defective cutter solenoid

Voltages incorrect - When viewed on computer monitor, the machine voltages are not measuring correctly. (See also advanced troubleshooting section)

Power supplies defective

X or Y Home Not Working - The X or Y home is not functioning properly. Machine may have a malfunction setting home. (See also advanced troubleshooting section)

X or Y home sensor dirty

X or Y home sensor loose

X or Y home sensor not adjusted properly

X or Y home sensor not connected

X flex cable not connected or defective

Bed node PCB defective

CPU PCB defective

X Runaway - The X rack will jog to one side and hit a hard stop. (See also advanced troubleshooting section)

Encoder on X motor not connected

Encoder not connected properly

Pinched wire on encoder

Loose wire on encoder

Encoder cable loose

X flex cable loose

X flex cable not connected properly

Y Runaway - The Y rack will jog forward or to the rear and hit a hard stop. (See also advanced troubleshooting section)

Encoder on Y motor not connected

Encoder not connected properly

Pinched wire on encoder

Loose wire on encoder

Encoder cable loose

Encoder cable not connected at backplane or loose

Z Runaway - The needle will start moving up and down quickly without the command to do so. (See also advanced troubleshooting section)

Encoder on Z motor not connected

Encoder not connected properly

Pinched wire on encoder

Loose wire on encoder

Encoder cable loose

Encoder defective

Section 3 - Status and Error Messages

This section contains commonly displayed messages and what may cause them. Complete troubleshooting of the malfunction may be required to determine the correct solution.

MACHINE INITIALIZED, READY FOR OPERATION **[01]**

RSA file successfully loaded and machine initialized properly.

INCOMPATIBLE RSA FILE HAS RECEIVED AN INVALID X OR Y SEEK HOME COMMAND, CHECK RSA FILE VERSION, REINSTALL COMPATIBLE VERSION IF NECESSARY **[02]**

Invalid X/Y axis command received at the controller from the host computer. Incompatible software between RSA and host.

RACK HOME WAS NOT SET, OPERATOR MUST CLEAR OBSTRUCTIONS AND SET X AND Y HOME, CLICK COMMAND BUTTON AND SET HOME BUTTON, CONTACT SERVICE IF PROBLEM PERSISTS **[03]**

Either an error was detected when setting home or home must be set before trying to perform an X/Y position command. Home will be set the first time a design is selected after power up; or if a hard reset was performed home needs to be set.

INCOMPATIBLE RSA FILE HAS RECEIVED AN INVALID THREAD GRABBER MESSAGE, CHECK RSA FILE VERSION, REINSTALL COMPATIBLE VERSION IF NECESSARY **[04]**

Received an invalid thread grabber command from the host computer. Incompatible software between RSA and host.

THREAD GRABBER HOME NOT SET, CLICK ADVANCED, SERVICE, CONTROLLER, THEN GRABBER HOME BUTTONS TO CONTINUE **[05]**

Command was received from host computer to perform grabber function, but home has not been set. Go to grabber function in service menu and set grabber home.

INCOMPATIBLE RSA FILE HAS RECEIVED AN INVALID TYPE 2 COMMAND, CHECK RSA FILE VERSION, REINSTALL COMPATIBLE VERSION IF NECESSARY **[06]**

Received an invalid type 2 command (design download) from the host computer. Incompatible software between RSA and host.

INCOMPATIBLE RSA FILE HAS RECEIVED AN INVALID TYPE 3 COMMAND, CHECK RSA FILE VERSION, REINSTALL COMPATIBLE VERSION IF NECESSARY **[07]**

Received an invalid type 3 command (Operator commands) from the host computer. Incompatible software between RSA and host.

INCOMPATIBLE RSA FILE HAS RECEIVED INVALID HEAD TIMING COMMAND, CHECK RSA FILE VERSION, REINSTALL COMPATIBLE VERSION IF NECESSARY **[08]**

Invalid Z axis command received at the controller from the host computer. Incompatible software between RSA and host.

OFF COLOR INDEX, STOPPED BETWEEN COLORS, MANUALLY MOVE THE NEEDLE CASE UNTIL NEEDLES ARE ALIGNED CORRECTLY **[09]**

Color change motor not on index when trying to perform Z command or color change command. Manually turn color change motor to index position and re-enter last command.

Z MOTOR IS NOT TURNING, CHECK FOR OBSTRUCTIONS, SHUTDOWN AND RESTART THE MACHINE, CONTACT SERVICE IF PROBLEM PERSISTS **[10]**

Z axis motor not completing commanded move in proper allotted time. Z axis timer is set to 1 second for completing commanded move or completing one rotation (stitch) while embroidering. This will cause Z motor to stop.

Possible Causes:

major thread jam (birdnest) causing binding
other bind in embroidery head(s) or Z drive system
defective Z axis motor
defective Z axis motor drive amplifier

HOOP LIMIT DETECTED, NEEDLE WILL HIT HOOP, MAKE SURE HOOP IS LARGE ENOUGH FOR THE DESIGN **[11]**

Commanded X/Y motion will cause needle to hit hoop. Either restart job with corrected start position or select a larger hoop.

CONTROLLER MISSED Z HEAD UP INDEX PULSE, SHUTDOWN AND RESTART THE MACHINE, CONTACT SERVICE IF PROBLEM PERSISTS **[12]**

Z axis motor should generate an output signal every time the motor passes through the headup encoder. This signal generates an interrupt to the 188 CPU to synchronize the Z motor position with the electronic position generated by the PMD controller. If this signal is missed, Z motor will stop.

THREAD BREAK DETECTED **[13]**

Machine stops after detecting 3 consecutive stitches with no thread tension. Machine will then back up 5 stitches.

Other Possible Causes (Machine falsely detects an upper thread break when there is no break in the thread):

loose upper thread tension
loose lower thread tension
check spring adjusted too tight
check spring wrong side of brass post
defective thread break PCB
defective head node PCB

GRABBER NOT HOME, THREAD GRABBER IS NOT RETRACTED, CHECK FOR OBSTRUCTIONS, THEN SHUTDOWN AND RESTART THE MACHINE, CONTACT SERVICE IF PROBLEM PERSISTS **[14]**

Thread grabber not at home position. When machine is initialized, grabber motor tries to find home position but can't, or grabber was at home when embroidery started but has since lost index signal or grabber motor has moved. Grabber home flag possibly not adjusted properly.

TRIMMER NOT HOME, CHECK FOR OBSTRUCTIONS UNDER NEEDLE PLATE, SHUTDOWN AND RESTART THE MACHINE **[15]**

Trimmer cam home sensor has moved off home while embroidering, or is not at home position when start key is pressed. Operator must try to manually put trimmer to home before continuing.

Z MOTOR IS BINDING, CHECK FOR OBSTRUCTIONS, SHUTDOWN AND RESTART THE MACHINE, CONTACT SERVICE IF PROBLEM PERSISTS **[16]**

Z axis motor is not keeping up with the operator selected embroidery speed. The motor position is lagging behind where the computer has calculated its projected position should be with respect to the selected embroidery speed.

Possible Causes:

rotary hook(s) needs lubrication
minor thread jam is causing friction
other slight friction in embroidery head(s) or Z drive system
defective Z axis motor
defective Z axis motor drive amplifier

EMBROIDERING COMPLETE, END OF DESIGN **[17]**

Machine has finished embroidering selected design.

NOT AT HEADUP, CLICK COMMAND BUTTON THEN HEADUP BUTTON TO CONTINUE **[18]**

Z motor not at headup, which is required to perform selected operation (start, color change, trim, headup, etc.). Enter headup command, then re-enter last command.

THREAD TRIMMER DISABLED BY SETTINGS BUTTON PREFERENCES, THREAD TRIMMER IS NOT AVAILABLE **[19]**

Operator tried to perform a trim now command, but thread trimmer is currently disabled. Go to setting menu and enable trimmers.

OUTSIDE OF HOOP, USE MANUAL JOG KEYS TO MOVE BACK INTO EMBROIDERY AREA **[20]**

X/Y rack position is outside of selected hoop limits. Manually jog to inside of selected hoop or select a larger hoop.

PAUSING AFTER COLOR CHANGE, PRESS START KEY TO CONTINUE [21]

Machine has stopped for manual color change, waiting for operator to manually select next needle. The machine stops because of a Pause (P) in color sequence table.

MACHINE MEMORY CLEARED, FACTORY DEFAULT SETTINGS RESTORED, MACHINE READY FOR OPERATION [22]

All machine parameters have been set to default values. Either a new RSA has been installed (detecting a different version level), or the operator performed a system reset from the service menu.

LEARN COLOR CHANGE, ENTER NEW COLOR AND PRESS START [23]

Machine has stopped for a color change, waiting for the operator to enter a needle number. Color change learn mode selected by entering an 'L' in the color sequence. Machine will stop at every color change for the operator to manually enter a needle number. This process is called 'learn mode,' which causes the machine to create its own new color change sequence as a job is completed for the first time.

COLOR CHANGE MOTOR IS BINDING, CHECK FOR OBSTRUCTIONS, SHUT DOWN AND RESTART THE MACHINE [24]

Color change motion took too long to complete.

Possible Causes:

- binding in color change drive system
- defective color change motor
- defective color change PCB
- defective head node #3 PCB
- defective bed node PCB
- defective CPU PCB

NO DESIGN READY, OPEN A DESIGN BEFORE TRYING TO EMBROIDER [25]

Operator pressed start key (start embroidering) before queuing up a design.

THREAD GRABBER IS BINDING, CHECK FOR OBSTRUCTIONS, SHUT DOWN AND RESTART MACHINE, CONTACT SERVICE IF PROBLEM PERSISTS [26]

Thread grabber motor was command to either extend or retract and took too long to finish the motion.

Possible Causes:

- grabber binding
- defective grabber motor
- defective bed node PCB
- defective CPU PCB

RACK IS BINDING IN EITHER X OR Y DIRECTION, CHECK FOR OBSTRUCTIONS SHUT DOWN AND RESTART THE MACHINE, CONTACT SERVICE IF PROBLEM PERSISTS **[27]**

The X/Y motors did not complete a commanded motion in the allotted time. This means RSA software didn't calculate a correct profile for current Z embroidery speed to complete motion by 120 degree of Z axis.

OFF COLOR INDEX AND NOT AT HEADUP, OPERATOR MUST MANUALLY MOVE COLOR CHANGE CARRIAGE UNTIL NEEDLES ARE ALIGNED CORRECTLY AND CLICK COMMAND BUTTON AND HEADUP BUTTON TO CONTINUE **[28]**

If machine is off both index and headup at power up, the machine can't correctly initialize either problem without possible damage to machine. Operator must try to correct either problem before continuing with headup or color change command.

Z MOTOR DRIVER FAULT, CHECK FOR OBSTRUCTIONS, SHUTDOWN AND RESTART THE MACHINE, CONTACT SERVICE IF PROBLEM PERSISTS **[29]**

If Z motor fault is detected when start key is pressed, software tries to clear fault condition and start embroidering. Clearing of fault condition is done by software toggling the brake line to allow for embroidering to start. If condition won't clear, the message is displayed and embroidering will not start.

Possible Causes:

mechanical bind
pinched wires
defective Z motor
defective motor driver PCB

COLOR CHANGE MOTOR DRIVER FAULT, CHECK FOR OBSTRUCTIONS, SHUTDOWN AND RESTART THE MACHINE, CONTACT SERVICE IF PROBLEM PERSISTS **[30]**

If color change motor fault is detected when start key is pressed, software tries to clear fault condition and start embroidering. Clearing of fault condition is done by software toggling the brake line to allow for embroidering to start. If condition won't clear, the message is displayed and embroidering will not start.

Possible Causes:

mechanical bind in color change assembly
defective color change motor

EMERGENCY STOP BUTTON ENGAGED, RELEASE EMERGENCY STOP BUTTON WHEN SAFE [31]

Emergency stop button is pushed in.

Other Possible Causes (E-Stop switch is not engaged but this error is displayed):
bent pin on connector to E-Stop PCB
fuse blown on E-Stop PCB
cable not connected at E-Stop PCB
E-Stop switch wired incorrectly
defective E-Stop switch
defective E-Stop PCB
defective CPU PCB

SERIOUS DSP ERROR, CPU HALTED, SHUTDOWN AND RESTART THE MACHINE, CONTACT SERVICE IF PROBLEM PERSISTS [32]

Power up initialization detected an error while trying to initialize X, Y, Z, or color change motor controller (PMD DSP). Controller would not release its busy signal. This error halts the 188 CPU.

Y MOTOR DRIVER FAULT, CHECK FOR OBSTRUCTIONS, SHUTDOWN AND RESTART THE MACHINE, CONTACT SERVICE IF PROBLEM PERSISTS [33]

Y motor fault was detected when trying to perform either Y motor command or start embroidering. Software tries to clear fault condition by toggling the brake line but fault will not clear.

Possible Causes:
mechanical bind
pinched wires
defective Y motor
defective motor driver PCB

COLOR CHANGE DSP CONTROL CHANNEL NOT RESPONDING, SHUTDOWN AND RESTART THE MACHINE, CONTACT SERVICE IF PROBLEM PERSISTS [34]

PMD controller not responding to selected color change command. All commands require PMD busy bit to be cleared before commands can be issued.

THREAD GRABBER MOTOR DRIVER FAULT, CHECK FOR OBSTRUCTIONS, SHUTDOWN AND RESTART THE MACHINE, CONTACT SERVICE IF PROBLEM PERSISTS [35]

Each time a thread grabber function is performed, motor fault status is checked. If set, the controller toggles brake line to clear fault condition. If fault doesn't clear error message will appear.

Possible Causes:
grabber binding
defective grabber motor

STITCH LENGTH GREATER THAN "TRIM ON STITCH LENGTH," CLICK ADVANCED BUTTON AND CHECK SETTINGS **[36]**

Indicates the stitch is longer than the operator selected parameter trim on stitch length. Will turn the stitch into a needle up or force a thread trim.

X MOTOR DRIVER FAULT, CHECK FOR OBSTRUCTIONS, SHUTDOWN AND RESTART THE MACHINE, CONTACT SERVICE IF PROBLEM PERSISTS **[37]**

X motor fault was detected when trying to perform either an X motor command or start embroidering command. Software tries to clear fault condition by toggling the brake line but fault will not clear.

Possible Causes:

mechanical bind
pinched wires
defective X motor
defective motor driver PCB

X RACK IS NOT MOVING OR HOME DETECTOR IS BROKEN, CHECK FOR OBSTRUCTIONS, SHUTDOWN AND RESTART THE MACHINE, CONTACT SERVICE IF PROBLEM PERSISTS **[38]**

Home must be set before embroidering can start, so that machine knows where to put stitches. Home is defined as zero position for this axis. If X motor can't find its home sensor within allotted time, 10 seconds, motor stops with this error.

Y RACK IS NOT MOVING OR HOME DETECTOR IS BROKEN, CHECK FOR OBSTRUCTIONS, SHUTDOWN AND RESTART THE MACHINE, CONTACT SERVICE IF PROBLEM PERSISTS **[39]**

X/Y home must be set before embroidering can start, so machine knows where to put stitches. Home is defined as zero position for this axis. If Y motor can't find its home sensor within allotted time, 18 seconds, motor stops with this error.

RACK POSITION IS OUTSIDE OF SOFTWARE EMBROIDERY LIMITS, USE MANUAL JOG KEYS TO MOVE BACK INTO EMBROIDERY AREA **[40]**

Commanded X/Y motion exceeded electronic limits of the machines embroidery field.

COLOR CHANGE MOTOR HAS STALLED, CHECK FOR OBSTRUCTIONS, SHUTDOWN AND RESTART THE MACHINE, CONTACT SERVICE IF PROBLEM PERSISTS **[41]**

Color change command exceeded 5 second allotted time to change needles.

Possible Causes:

mechanical bind in color change assembly.
defective head node #3 PCB
defective color change PCB
defective color change motor

BOBBIN THREAD BREAK DETECTED **[42]**

Machine stops after detecting selected number of consecutive bobbin faults. This count is entered in setting menu under bobbin count. Machine will backup total number of stitches equal to bobbin count.

Other Possible Causes (Machine falsely detected a bobbin thread break when there was no break in the bobbin thread):

UTC not adjusted properly
defective UTC
grabber binding

HOOP NOT COMPATIBLE WITH MACHINE SETTING, MATCH HOOP TO HOOP SELECTION ON CONTROL PANEL **[43]**

Not Applicable with EMB 10/6T.

APPLY APPLIQUÉ AND PRESS START **[44]**

Machine has detected an appliqué stop (A) in color sequence. Machine stops and waits for operator to apply appliqué to the design. Press start to resume embroidering.

RACK LIMIT EXCEEDED, RESET DESIGN, START OVER REPOSITIONING DESIGN SO THAT IT FITS IN FRAME **[45]**

Commanded X/Y motion caused hardware limit switch to be detected.

80188 ES SEGMENT REGISTER WAS AUTOMATICALLY CORRECTED, CONTACT SERVICE IF THIS MESSAGE PERSISTS **[46]**

Software register became corrupted and was automatically restored. Some design information may have been lost. Record the message number to give to service if message reappears.

MACHINE EMBROIDERY PARAMETERS RESTORED TO FACTORY DEFAULT VALUES **[47]**

Predetermined embroidery parameter values are set into the software registers.

PICKER IS NOT RETRACTED, CHECK FOR OBSTRUCTIONS, PRESS START TO CONTINUE **[48]**

The picker is not retracted.

THREAD GRABBER HOME NOT SET, CLICK ADVANCED, SERVICE, THEN GRABBER HOME BUTTONS TO CONTINUE **[49]**

Command was received from the host computer to perform grabber function, but home has not been set. Go to grabber function in service menu and set grabber home.

BED ELECTRONICS CONFIGURED SUCCESSFULLY **[50]**

The bed node has configured after power up.

EMBROIDERY HEAD 1 ELECTRONICS CONFIGURED SUCCESSFULLY **[51]**

The head node has configured.

EMBROIDERY HEAD 2 ELECTRONICS CONFIGURED SUCCESSFULLY **[52]**

The head node has configured.

EMBROIDERY HEAD 3 ELECTRONICS CONFIGURED SUCCESSFULLY **[53]**

The head node has configured.

EMBROIDERY HEAD 4 ELECTRONICS CONFIGURED SUCCESSFULLY **[54]**

The head node has configured.

EMBROIDERY HEAD 5 ELECTRONICS CONFIGURED SUCCESSFULLY **[55]**

The head node has configured.

EMBROIDERY HEAD 6 ELECTRONICS CONFIGURED SUCCESSFULLY **[56]**

The head node has configured.

BED ELECTRONICS NOT RESPONDING TO COMMANDS, SHUTDOWN AND RESTART THE MACHINE, CONTACT SERVICE IF PROBLEM PERSISTS **[57]**

The bed node is not responding to commands.

EMBROIDERY HEAD 1 ELECTRONICS NOT RESPONDING TO COMMANDS, SHUTDOWN AND RESTART THE MACHINE, CONTACT SERVICE IF PROBLEM PERSISTS **[58]**

The head node is not responding to commands.

EMBROIDERY HEAD 2 ELECTRONICS NOT RESPONDING TO COMMANDS, SHUTDOWN AND RESTART THE MACHINE, CONTACT SERVICE IF PROBLEM PERSISTS **[59]**

The head node is not responding to commands.

EMBROIDERY HEAD 3 ELECTRONICS NOT RESPONDING TO COMMANDS, SHUTDOWN AND RESTART THE MACHINE, CONTACT SERVICE IF PROBLEM PERSISTS **[60]**

The head node is not responding to commands.

EMBROIDERY HEAD 4 ELECTRONICS NOT RESPONDING TO COMMANDS, SHUTDOWN AND RESTART THE MACHINE, CONTACT SERVICE IF PROBLEM PERSISTS **[61]**

The head node is not responding to commands.

EMBROIDERY HEAD 5 ELECTRONICS NOT RESPONDING TO COMMANDS, SHUTDOWN AND RESTART THE MACHINE, CONTACT SERVICE IF PROBLEM PERSISTS **[62]**

The head node is not responding to commands.

EMBROIDERY HEAD 6 ELECTRONICS NOT RESPONDING TO COMMANDS, SHUTDOWN AND RESTART THE MACHINE, CONTACT SERVICE IF PROBLEM PERSISTS **[63]**

The head node is not responding to commands.

COMMUNICATIONS ERROR DETECTED BY BED ELECTRONICS, SHUTDOWN AND RESTART THE MACHINE, CONTACT SERVICE IF PROBLEM PERSISTS **[64]**

Communications error detected by bed node.

COMMUNICATIONS ERROR DETECTED BY EMBROIDERY HEAD 1 ELECTRONICS, SHUTDOWN AND RESTART THE MACHINE, CONTACT SERVICE IF PROBLEM PERSISTS **[65]**

Communications error detected by head node.

COMMUNICATIONS ERROR DETECTED BY EMBROIDERY HEAD 2 ELECTRONICS, SHUTDOWN AND RESTART THE MACHINE, CONTACT SERVICE IF PROBLEM PERSISTS **[66]**

Communications error detected by head node.

COMMUNICATIONS ERROR DETECTED BY EMBROIDERY HEAD 3 ELECTRONICS, SHUTDOWN AND RESTART THE MACHINE, CONTACT SERVICE IF PROBLEM PERSISTS **[67]**

Communications error detected by head node.

COMMUNICATIONS ERROR DETECTED BY EMBROIDERY HEAD 4 ELECTRONICS, SHUTDOWN AND RESTART THE MACHINE, CONTACT SERVICE IF PROBLEM PERSISTS **[68]**

Communications error detected by head node.

COMMUNICATIONS ERROR DETECTED BY EMBROIDERY HEAD 5 ELECTRONICS, SHUTDOWN AND RESTART THE MACHINE, CONTACT SERVICE IF PROBLEM PERSISTS **[69]**

Communications error detected by head node.

COMMUNICATIONS ERROR DETECTED BY EMBROIDERY HEAD 6 ELECTRONICS, SHUTDOWN AND RESTART THE MACHINE, CONTACT SERVICE IF PROBLEM PERSISTS **[70]**

Communications error detected by head node.

BED ELECTRONICS NOT RESPONDING TO CONFIGURATION COMMAND, SHUTDOWN AND RESTART THE MACHINE, CONTACT SERVICE IF PROBLEM PERSISTS **[71]**

Bed node did not respond to configuration command.

EMBROIDERY HEAD 1 ELECTRONICS NOT RESPONDING TO CONFIGURATION COMMAND, SHUTDOWN AND RESTART THE MACHINE, CONTACT SERVICE IF PROBLEM PERSISTS **[72]**

Head node did not respond to configuration command.

EMBROIDERY HEAD 2 ELECTRONICS NOT RESPONDING TO CONFIGURATION COMMAND, SHUTDOWN AND RESTART THE MACHINE, CONTACT SERVICE IF PROBLEM PERSISTS **[73]**

Head node did not respond to configuration command.

EMBROIDERY HEAD 3 ELECTRONICS NOT RESPONDING TO CONFIGURATION COMMAND, SHUTDOWN AND RESTART THE MACHINE, CONTACT SERVICE IF PROBLEM PERSISTS **[74]**

Head node did not respond to configuration command.

EMBROIDERY HEAD 4 ELECTRONICS NOT RESPONDING TO CONFIGURATION COMMAND, SHUTDOWN AND RESTART THE MACHINE, CONTACT SERVICE IF PROBLEM PERSISTS **[75]**

Head node did not respond to configuration command.

EMBROIDERY HEAD 5 ELECTRONICS NOT RESPONDING TO CONFIGURATION COMMAND, SHUTDOWN AND RESTART THE MACHINE, CONTACT SERVICE IF PROBLEM PERSISTS **[76]**

Head node did not respond to configuration command.

EMBROIDERY HEAD 6 ELECTRONICS NOT RESPONDING TO CONFIGURATION COMMAND, SHUTDOWN AND RESTART THE MACHINE, CONTACT SERVICE IF PROBLEM PERSISTS **[77]**

Head node did not respond to configuration command.

JUMP STITCH MOTOR CANNOT FIND HOME ON EMBROIDERY HEAD 1, SHUTDOWN AND RESTART THE MACHINE, CONTACT SERVICE IF PROBLEM PERSISTS **[78]**

Jump stitch motor cannot find home.

JUMP STITCH MOTOR CANNOT FIND HOME ON EMBROIDERY HEAD 2, SHUTDOWN AND RESTART THE MACHINE, CONTACT SERVICE IF PROBLEM PERSISTS **[79]**

Jump stitch motor cannot find home.

JUMP STITCH MOTOR CANNOT FIND HOME ON EMBROIDERY HEAD 3, SHUTDOWN AND RESTART THE MACHINE, CONTACT SERVICE IF PROBLEM PERSISTS **[80]**

Jump stitch motor cannot find home.

JUMP STITCH MOTOR CANNOT FIND HOME ON EMBROIDERY HEAD 4, SHUTDOWN AND RESTART THE MACHINE, CONTACT SERVICE IF PROBLEM PERSISTS **[81]**

Jump stitch motor cannot find home.

JUMP STITCH MOTOR CANNOT FIND HOME ON EMBROIDERY HEAD 5, SHUTDOWN AND RESTART THE MACHINE, CONTACT SERVICE IF PROBLEM PERSISTS **[82]**

Jump stitch motor cannot find home.

JUMP STITCH MOTOR CANNOT FIND HOME ON EMBROIDERY HEAD 6, SHUTDOWN AND RESTART THE MACHINE, CONTACT SERVICE IF PROBLEM PERSISTS **[83]**

Jump stitch motor cannot find home.

TAKE UP LEVER MOTOR CANNOT FIND HOME ON EMBROIDERY HEAD 1, SHUTDOWN AND RESTART THE MACHINE, CONTACT SERVICE IF PROBLEM PERSISTS **[84]**

Take up lever motor cannot find home.

TAKE UP LEVER MOTOR CANNOT FIND HOME ON EMBROIDERY HEAD 2, SHUTDOWN AND RESTART THE MACHINE, CONTACT SERVICE IF PROBLEM PERSISTS **[85]**

Take up lever motor cannot find home.

TAKE UP LEVER MOTOR CANNOT FIND HOME ON EMBROIDERY HEAD 3, SHUTDOWN AND RESTART THE MACHINE, CONTACT SERVICE IF PROBLEM PERSISTS **[86]**

Take up lever motor cannot find home.

TAKE UP LEVER MOTOR CANNOT FIND HOME ON EMBROIDERY HEAD 4, SHUTDOWN AND RESTART THE MACHINE, CONTACT SERVICE IF PROBLEM PERSISTS **[87]**

Take up lever motor cannot find home.

TAKE UP LEVER MOTOR CANNOT FIND HOME ON EMBROIDERY HEAD 5, SHUTDOWN AND RESTART THE MACHINE, CONTACT SERVICE IF PROBLEM PERSISTS **[88]**

Take up lever motor cannot find home.

TAKE UP LEVER MOTOR CANNOT FIND HOME ON EMBROIDERY HEAD 6, SHUTDOWN AND RESTART THE MACHINE, CONTACT SERVICE IF PROBLEM PERSISTS **[89]**

Take up lever motor cannot find home.

PICKER MOTOR CANNOT FIND HOME, CHECK FOR OBSTRUCTIONS, SHUTDOWN AND RESTART THE MACHINE, CONTACT SERVICE IF PROBLEM PERSISTS **[90]**

Picker motor cannot find home.

AUTOMATICALLY RESYNCHRONIZING TAKE UP LEVER ON EMBROIDERY HEAD 1 **[91]**

Take up lever malfunction causing automatic correction. Press Start to continue.

AUTOMATICALLY RESYNCHRONIZING TAKE UP LEVER ON EMBROIDERY HEAD 2 **[92]**

Take up lever malfunction causing automatic correction. Press Start to continue.

AUTOMATICALLY RESYNCHRONIZING TAKE UP LEVER ON EMBROIDERY HEAD 3 **[93]**

Take up lever malfunction causing automatic correction. Press Start to continue.

AUTOMATICALLY RESYNCHRONIZING TAKE UP LEVER ON EMBROIDERY HEAD 4 **[94]**

Take up lever malfunction causing automatic correction. Press Start to continue.

AUTOMATICALLY RESYNCHRONIZING TAKE UP LEVER ON EMBROIDERY HEAD 5 **[95]**

Take up lever malfunction causing automatic correction. Press Start to continue.

AUTOMATICALLY RESYNCHRONIZING TAKE UP LEVER ON EMBROIDERY HEAD 6 **[96]**

Take up lever malfunction causing automatic correction. Press Start to continue.

X AXIS CONTROL CONFIGURED SUCCESSFULLY **[97]**

Power up DSP initialization. Message indicates successful operation.

Y AXIS CONTROL CONFIGURED SUCCESSFULLY **[98]**

Power up DSP initialization. Message indicates successful operation.

THREAD GRABBER CONTROL CONFIGURED SUCCESSFULLY **[99]**

Power up DSP initialization. Message indicates successful operation.

COLOR CHANGE CONTROL CONFIGURED SUCCESSFULLY **[100]**

Power up DSP initialization. Message indicates successful operation.

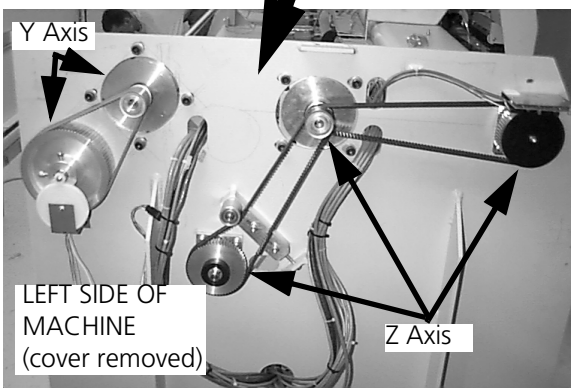
Z AXIS CONTROL CONFIGURED SUCCESSFULLY **[101]**

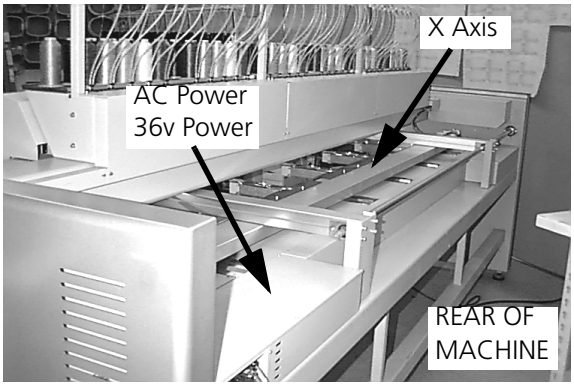
Power up DSP initialization. Message indicates successful operation.

Section 4 - Advanced Troubleshooting

This section contains troubleshooting information for the major sections of the EMB 10/6T. Refer to the following chart to locate page numbers in this section where you will find troubleshooting information on the subject you need to troubleshoot.

AC Power Page 1-11 Page 1-28	UTC (Under Thread Control) Page 1-29	Color Change Page 1-10 Page 1-30	Computer Page 1-11 Page 1-12
36v Power Page 1-12	Jump Stitch Page 1-11	Threadbreak Page 1-33	Trimmer Page 1-12 Page 1-35
Grabber Page 1-10 Page 1-11 Page 1-31	X Axis Page 1-11 Page 1-12 Page 1-13 Page 1-37	Y Axis Page 1-11 Page 1-12 Page 1-13 Page 1-39	Z Axis Page 1-13 Page 1-41





AC Power Troubleshooting

The AC Power Input to the machine is fused at several areas. There is fusing at the input of the AC power to the machine, as well as further fusing as that voltage is converted into other voltages used throughout the machine. The following diagram is a flow chart in troubleshooting a problem with the AC voltage and various blown fuses.

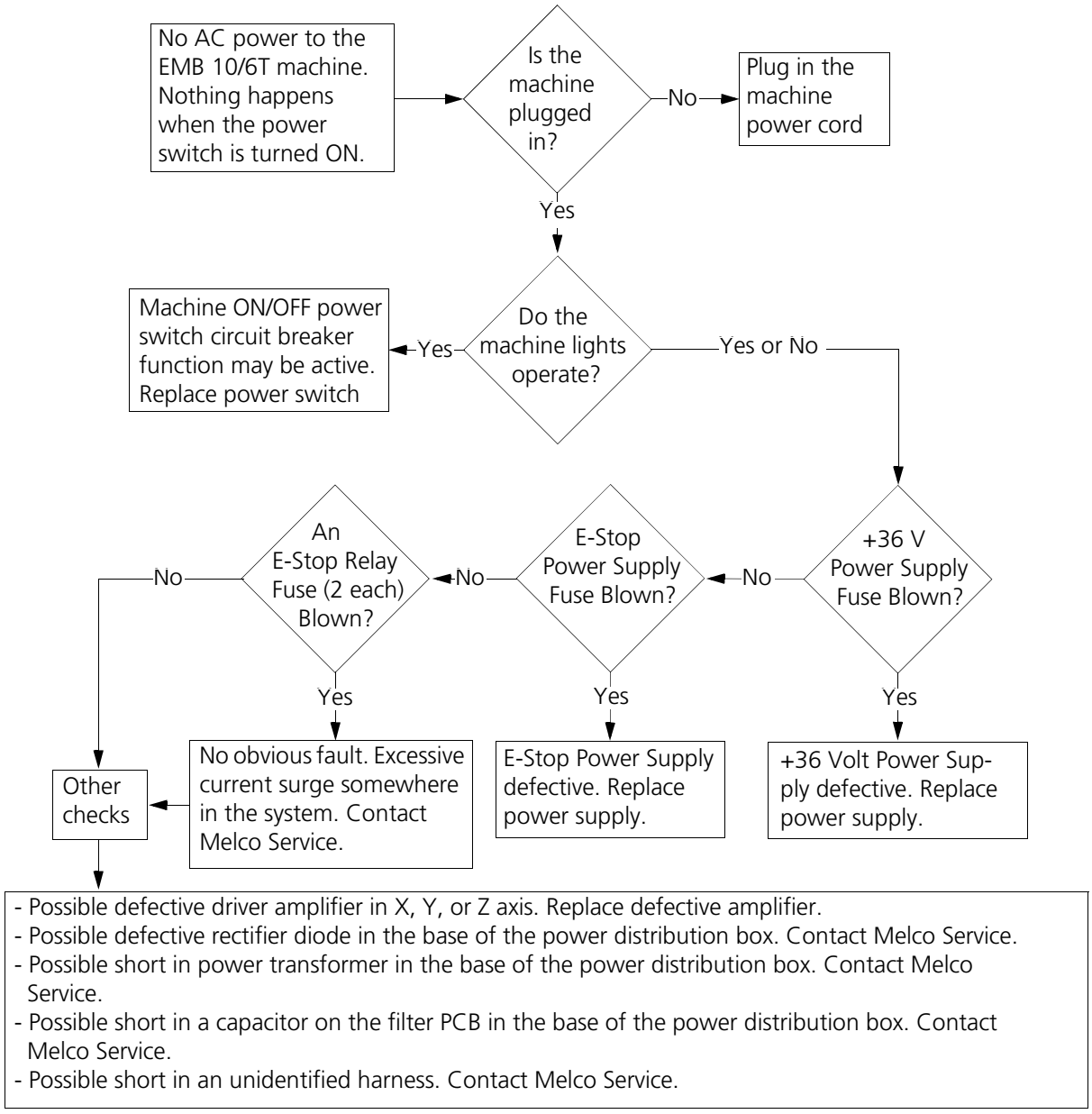


Figure 1-2

UTC (Under Thread Control) Troubleshooting

As the machine embroiders, bobbin thread activates the bobbin sensor by moving its arm. This electrical signal travels throughout various harnesses and electronics until it finally arrives at the CPU. Refer to the following diagram for troubleshooting this area.

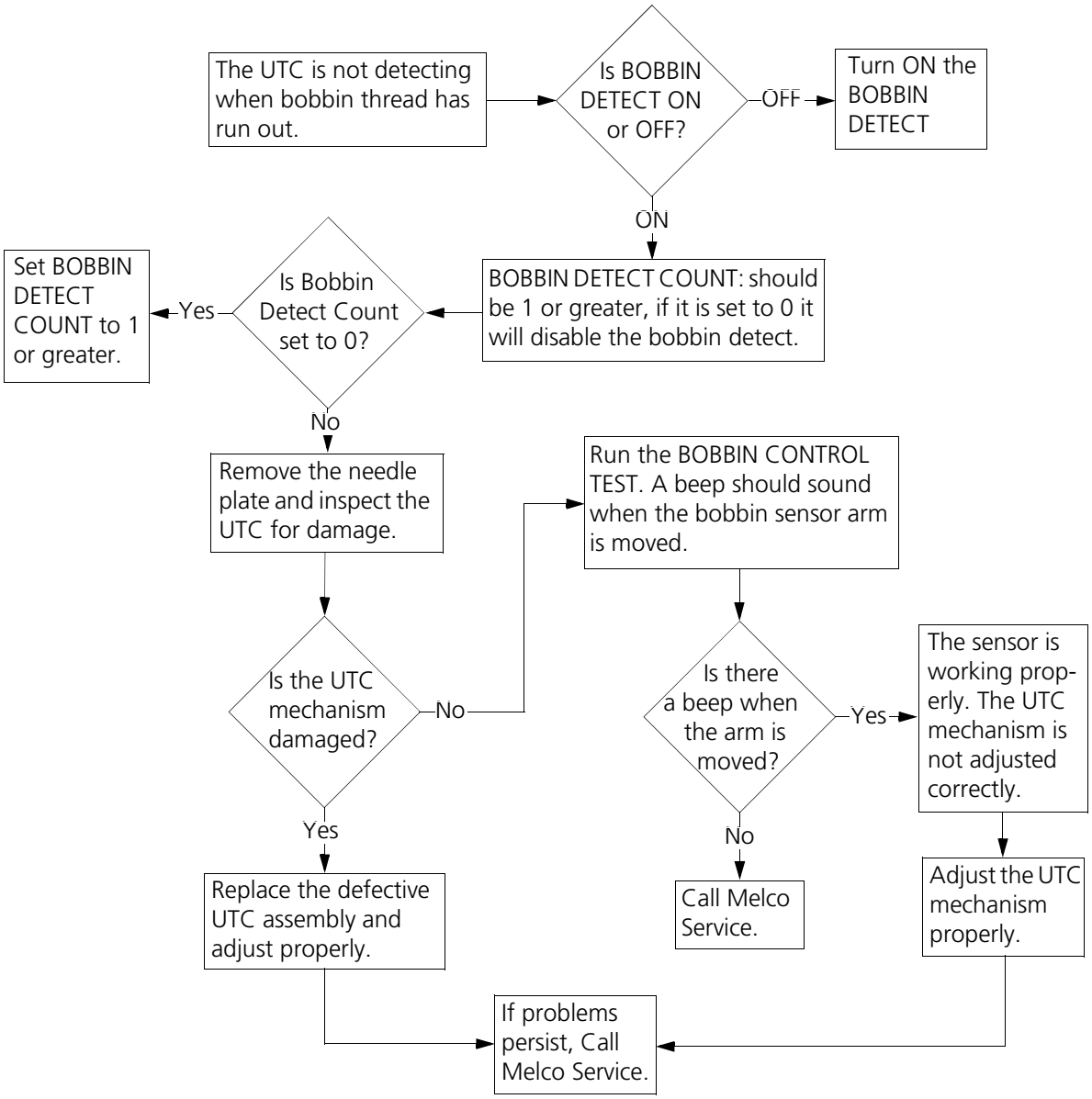


Figure 1-3

Color Change Troubleshooting

The color change PCB has the sensors for color change position and needle index. These signals go through a head cable, thru the backplane, and finally to the CPU. The color change motor is controlled by the motor driver PCB. The motor encoder signals and motor power go thru a motor harness, thru the backplane, to the motor driver PCB, and then to the CPU.

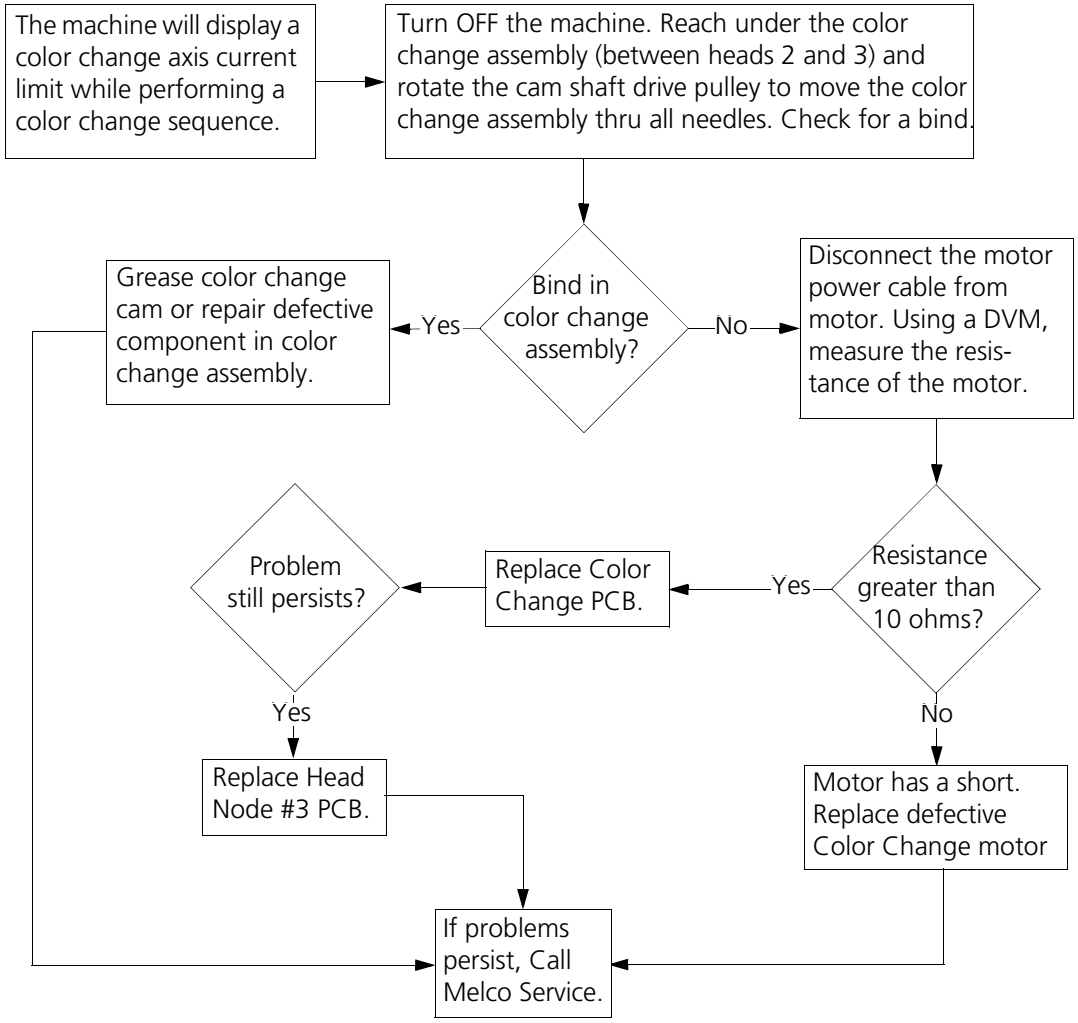


Figure 1-4

Grabber Troubleshooting

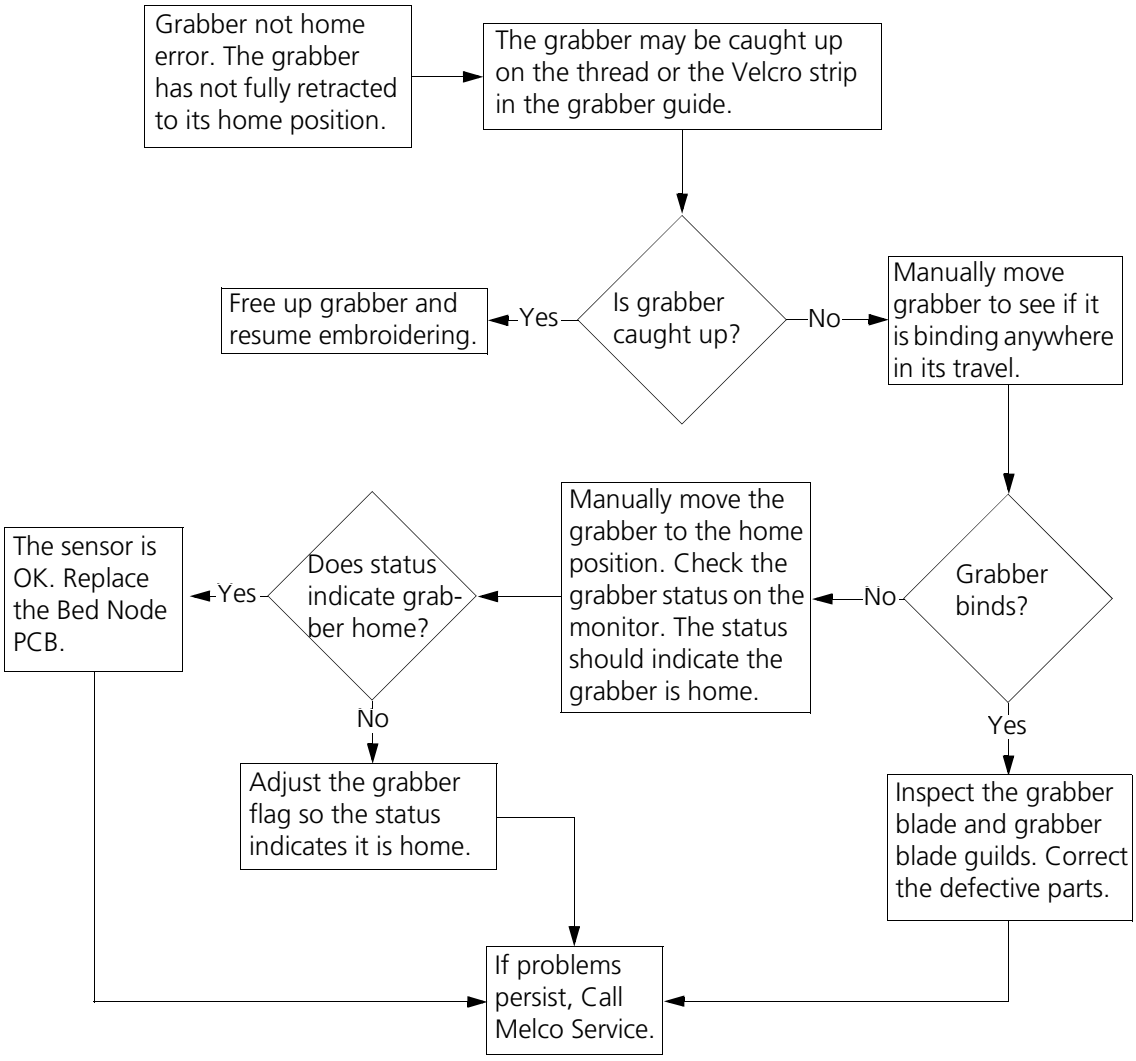


Figure 1-5

Grabber Axis Current Limit

This error is caused by the electronics detecting excessive current draw by the grabber motor.

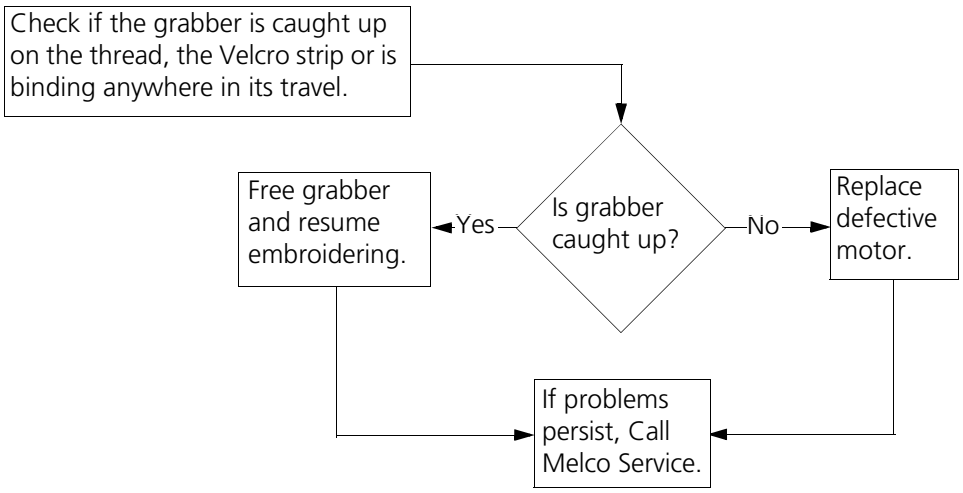


Figure 1-6

Threadbreak Troubleshooting

The thread break electronics work by sensing the stitching motion of the thread. This motion is sensed by the check spring. As the machine stitches, the check spring moves up and down against the check spring post which causes an electrical signal. This signal goes thru the color change PCB to the CPU PCB.

ACTUAL Threadbreakes

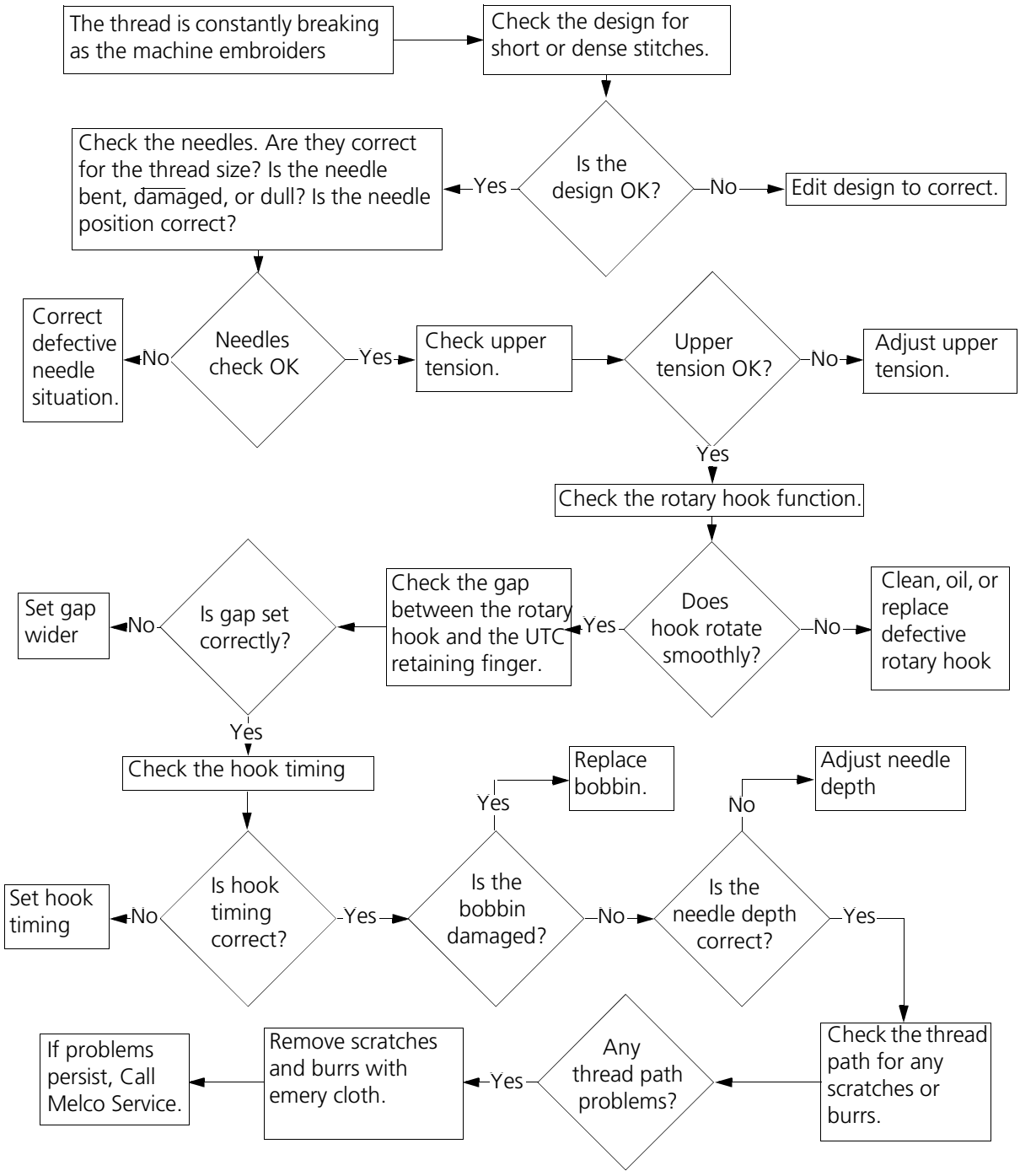


Figure 1-7

FALSE Threadbreaks

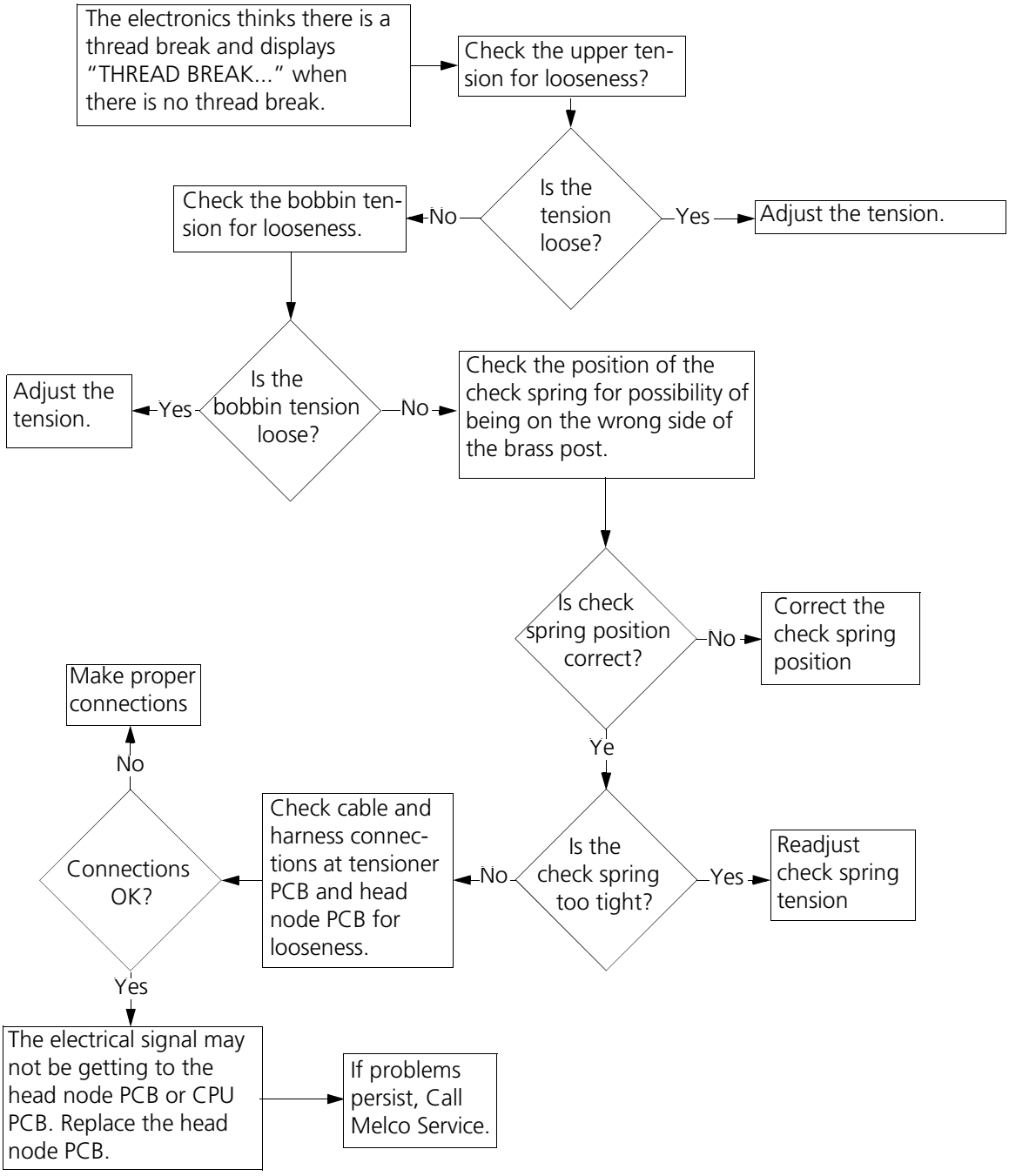


Figure 1-8

Trimmer Troubleshooting

The trimmer assembly is controlled by the electronics. The trimmer and picker solenoids are controlled by the CPU PCB. The CPU generates trim and pick signals which get converted into solenoid drive signals which are then sent to the trim and pick solenoids.

Trimmer Not Home

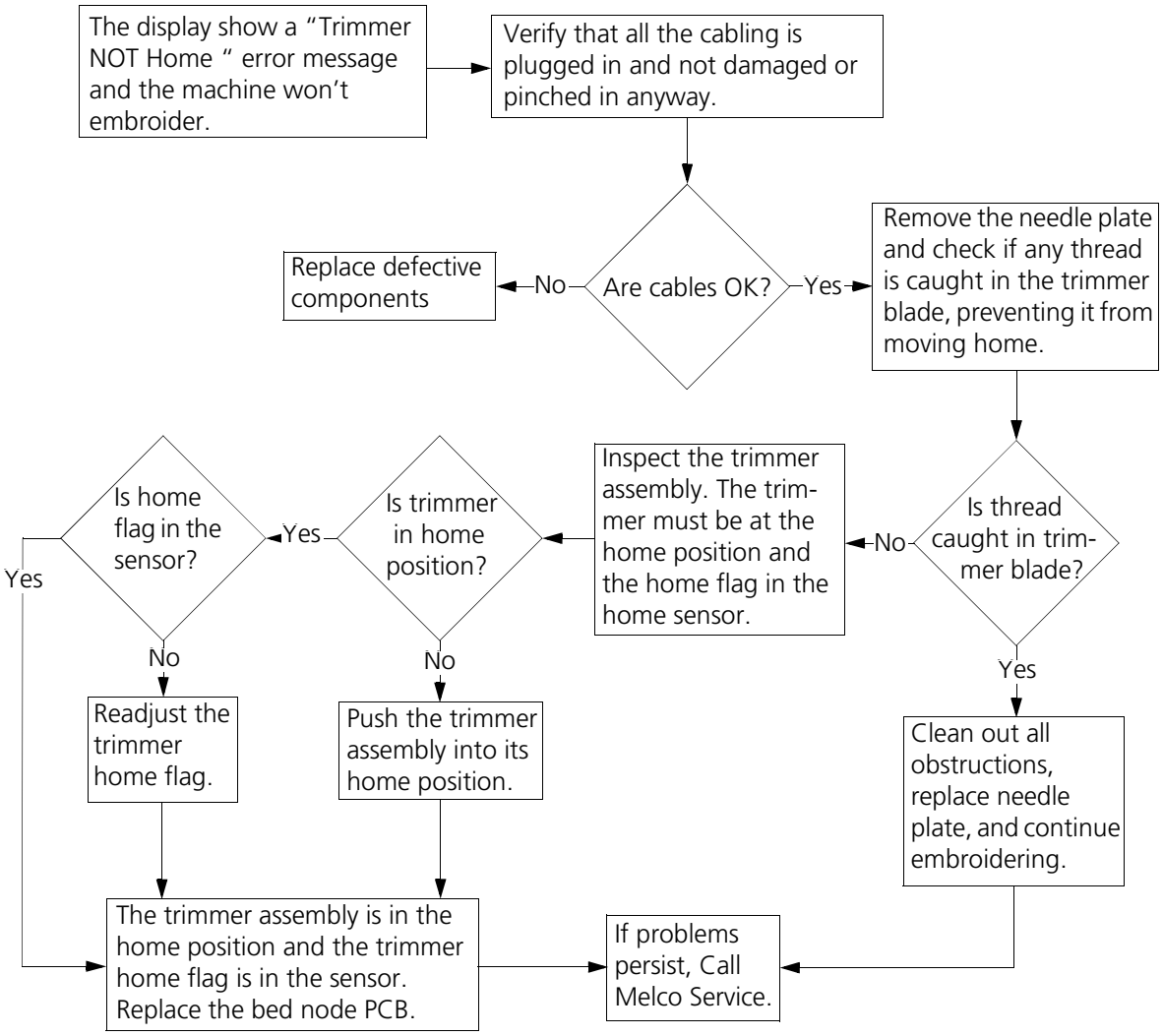


Figure 1-9

Trimmer Not Working At All

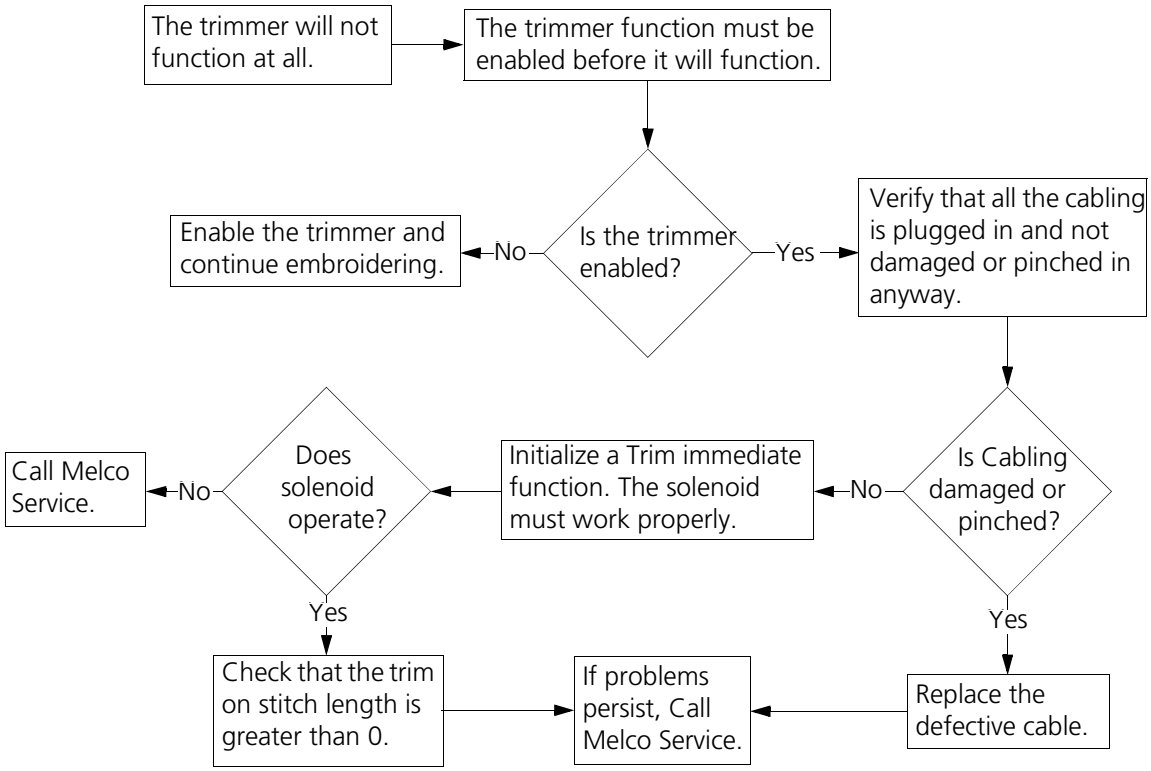


Figure 1-10

X Axis Troubleshooting

The X axis motion is controlled by the electronics. The CPU will send commands to the motor driver PCB. The motor driver PCB will send these commands to the X motor. Feedback to the CPU is provided by the encoder and home sensor. These tell the CPU where the X motor is during embroidering.

X Axis Current Limit

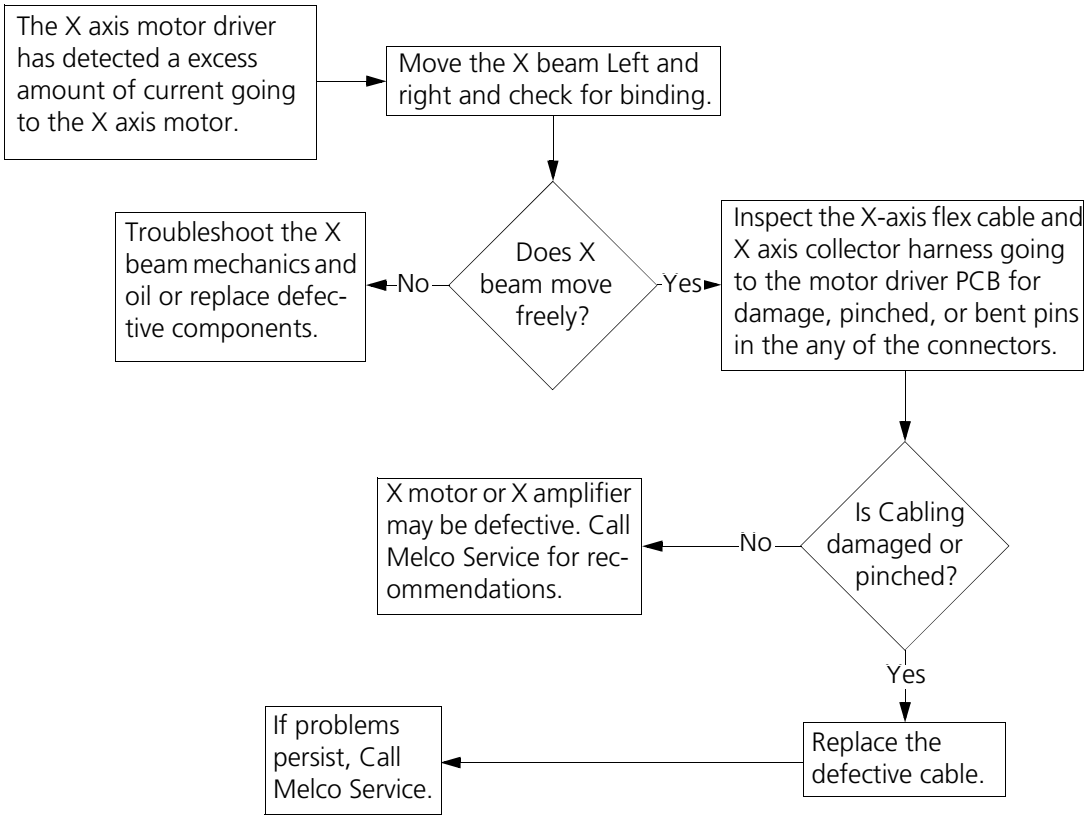


Figure 1-11

X Axis Run Away

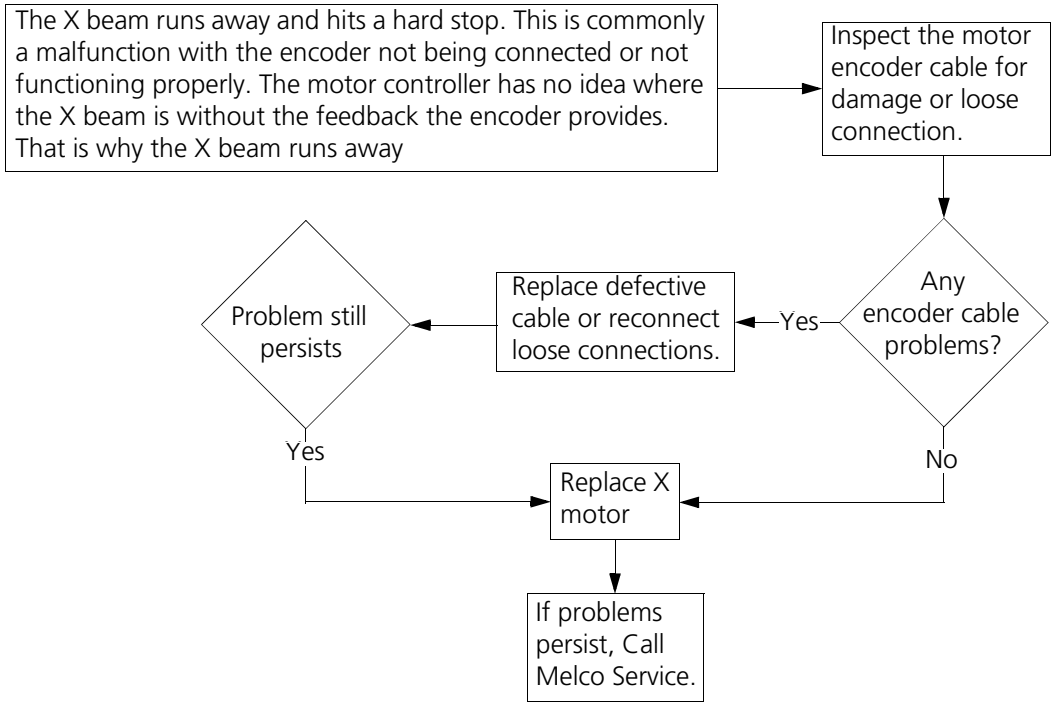


Figure 1-12

Y Axis Troubleshooting

The Y axis motion is controlled by the electronics. The CPU will send commands to the motor driver PCB. The motor driver PCB will send these commands to the Y motor. Feedback to the CPU is provided by the encoder and home sensor. These tell the CPU where the motor is during embroidering.

Y Axis Current Limit

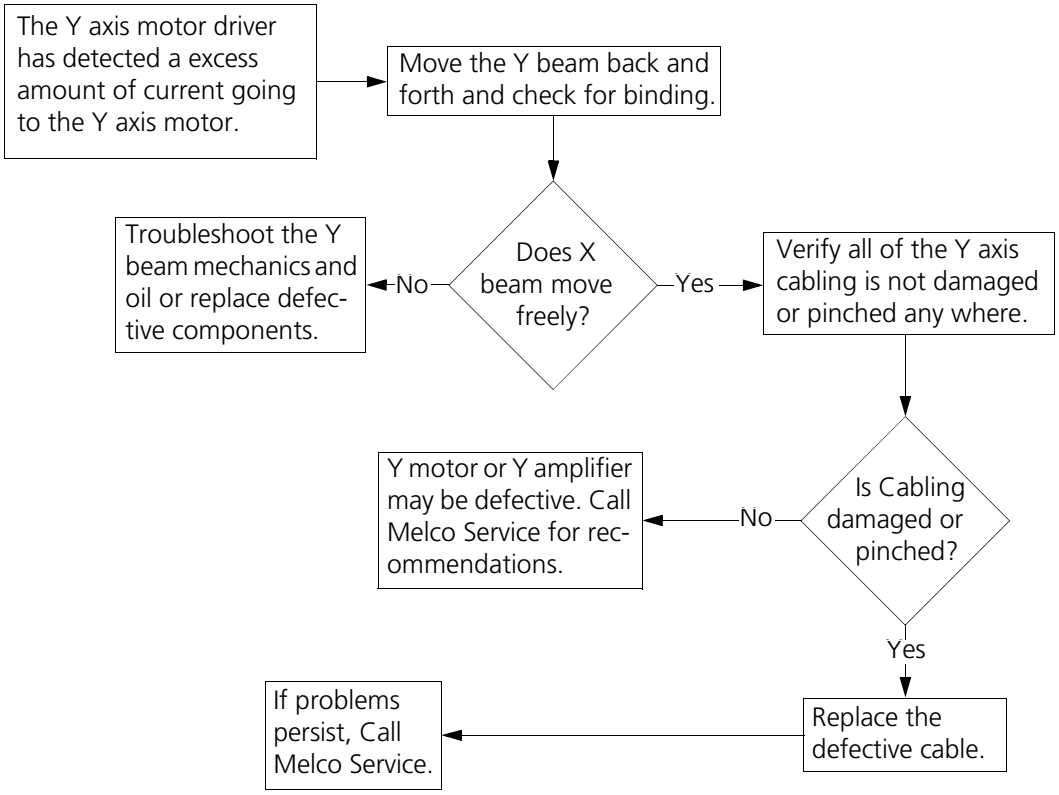


Figure 1-13

Y Axis Run Away

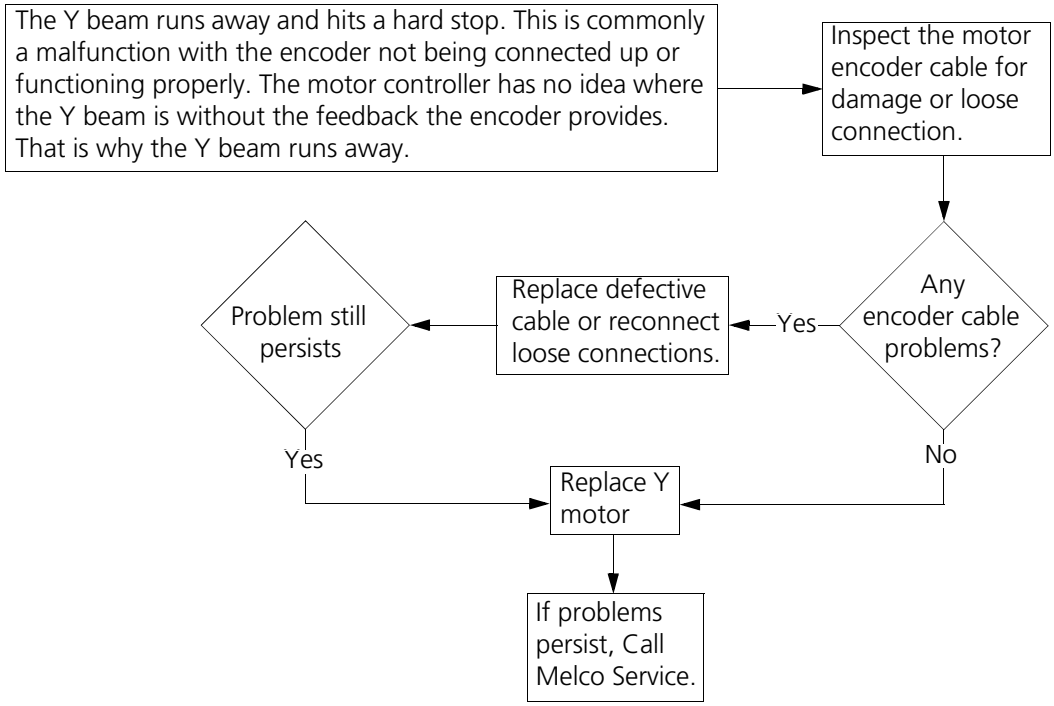


Figure 1-14

Z Axis Troubleshooting

The Z axis motion is controlled by the electronics. The CPU will send commands to the motor driver PCB. The motor driver PCB will send these commands to the Z motor. Feedback to the CPU is provided by the encoder and home sensor. These tell the CPU where the motor is during embroidering.

Z Axis Current Limit

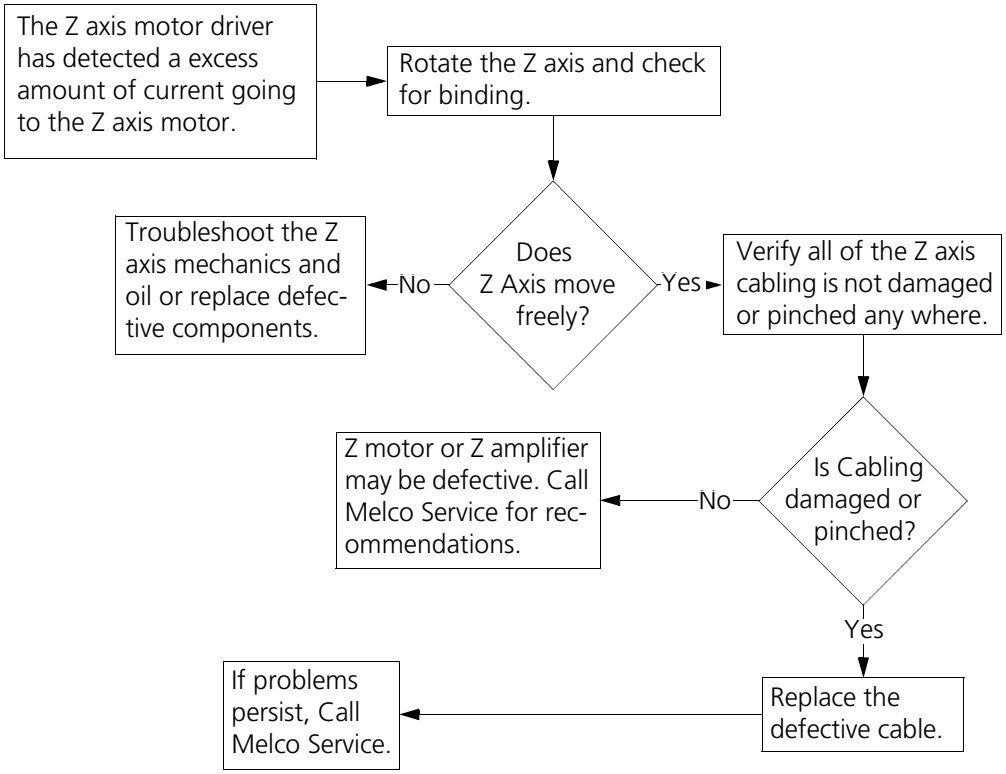


Figure 1-15

Z Axis Run Away

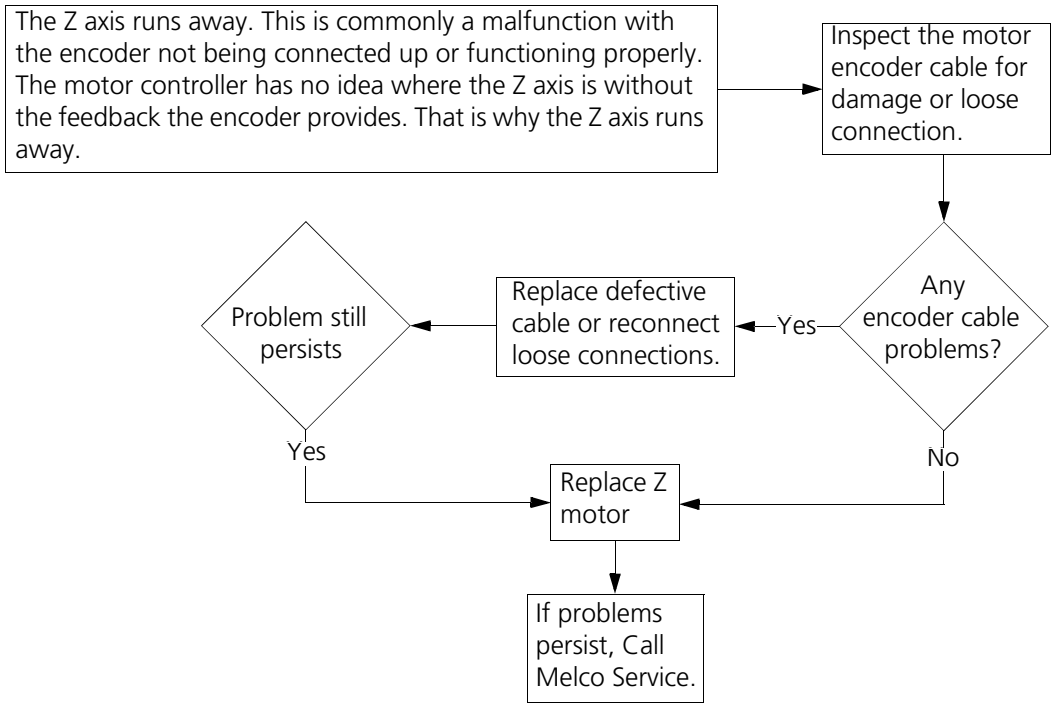


Figure 1-16

2. User Station and Rear Electronics

General

This section provides parts replacement procedures and adjustments required during repair and maintenance of the user station and the electronics located at the rear of the machine.

These procedures are guidelines for performing repairs and must be used by personnel practicing good maintenance and repair techniques. Refer to the Repair 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!

EMB 10/6T User Station

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

Figure 2-1 EMB 10/6T User Station

Keyboard and Monitor

The computer keyboard assembly sits on the keyboard table extending from the front of the user station. It connects to the keyboard connector at the rear of the main computer. The Monitor sits on top of the user station table top with its cables also connecting to the rear of the main computer. Both items are easily removed by disconnecting their respective cables and lifting them out of position.

Keyboard Assembly Replacement

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

1. Close the operating software and turn OFF the power switch to the EMB 10/6T and remove the power cord from the power source electrical outlet.
2. Move to the rear of the main computer box and locate the cable connections from the keyboard assembly.
3. Unscrew the 2 thumb screws and disconnect the mousepad cable from the 9-pin Dsub 'mouse' connector on the outside of the computer box.
4. Unplug the keyboard cable from its location at the rear of the computer box.
5. Route the cable ends through user station to the keyboard assembly.
6. To install a new keyboard assembly, route the cables of the new unit into the logic control box and reverse the steps used for removing the old unit.
7. Reinstall any covers removed during this procedure.

Monitor Replacement

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

WARNING! THE MONITOR WARRANTY MAY BE VOID IF THE CASE IS OPENED. OPENING THE CASE MAY LEAD TO INJURY AND/OR ELECTRICAL SHOCK HAZARD!

1. Close the operating software and turn OFF the power switch to the EMB 10/6T and remove the power cord from the power source electrical outlet.
2. Move to the rear of the main computer box and locate the cable connections from the monitor.
3. Unscrew the 2 thumb screws and disconnect the monitor video signal cable from the 'video' Dsub connector on the outside of the main computer box.
4. Route the video cable end through user station table top to the monitor.
5. Unplug the monitor power cord from the connector at the rear of the monitor.
6. Replace the defective monitor with a new unit by reversing the above steps, or have the existing monitor repaired by a trained electronic technician.
7. Reinstall any covers removed during this procedure.

Main Computer

The Main Computer is the heart of the EMB 10/6T control system. The computer motherboard and embroidery machine control electronic PCBs are located inside the main computer box (see Figure 2-2). The main computer is located inside the lower area of the User Station as shown in Figure 2-1.

Replacing Computer PCBs

CAUTION! FAILURE TO USE A PROPERLY INSTALLED STATIC GROUNDING STRAP MAY CAUSE DAMAGE TO THE ELECTRONICS IN THE EMB 10/6T.

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

Several printed circuit boards may be plugged into the computer motherboard inside the computer box. Among these PCBs will be found the Machine CPU, a Video Controller, and an Ethernet network PCB (if the option is purchased). Refer to Figure 2-2 to identify these PCBs.

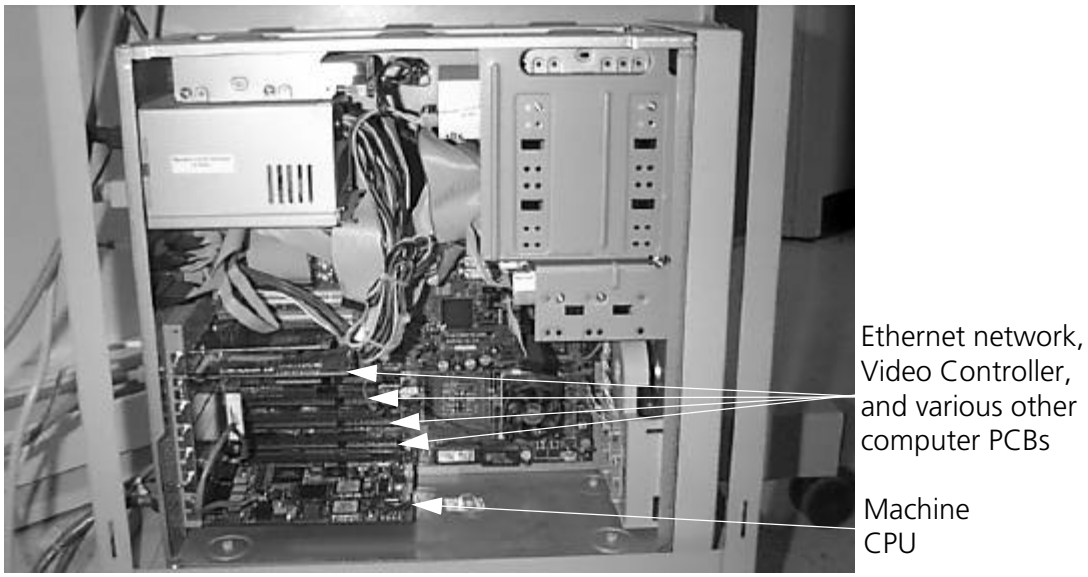


Figure 2-2

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

1. Check that the power switch to the EMB 10/6T is OFF and the power cord is removed from the power source electrical outlet.

2. Remove the computer box outer cover screws and then the outer cover like any standard tower computer cover removal.

3. Install a static grounding strap between the EMB 10/6T and the personnel performing this procedure.

4. Mark the location for reinstallation later, and then remove any and all cables that may be attached to the printed circuit board assembly you are removing.

5. Remove the screw securing the specific PCB end bracket to the PCB bracket support frame.

6. Grasp the PCB at the top outside corners and carefully pull up on the PCB to remove it from the computer motherboard edge connector where it is installed. (Use a gentle rocking motion to make it slightly easier to release the board from the connector.)

CAUTION! ONCE THE PRINTED CIRCUIT BOARD IS REMOVED, USE EXTREME CARE IN HANDLING IT. PORTIONS OF THE BOARD MAY BE VERY SENSITIVE TO STATIC CHARGES. ANY FURTHER HANDLING OF THE PCB MUST BE DONE WITH THE CONTINUED USE OF THE STATIC GROUNDING STRAP UNTIL REINSTALLED.

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

Rear Electrical Boxes

The EMB 10/6 has two electrical boxes, the junction box and the power distribution box, which are physically located at the top, rear of the machine chassis as shown in Figure 2-3. Access to this area is from the rear of the machine.

CAUTION! BE CERTAIN TO TURN THE POWER OFF WHEN ATTEMPTING ANY REPLACEMENTS IN EITHER OF THE REAR ELECTRICAL BOXES.

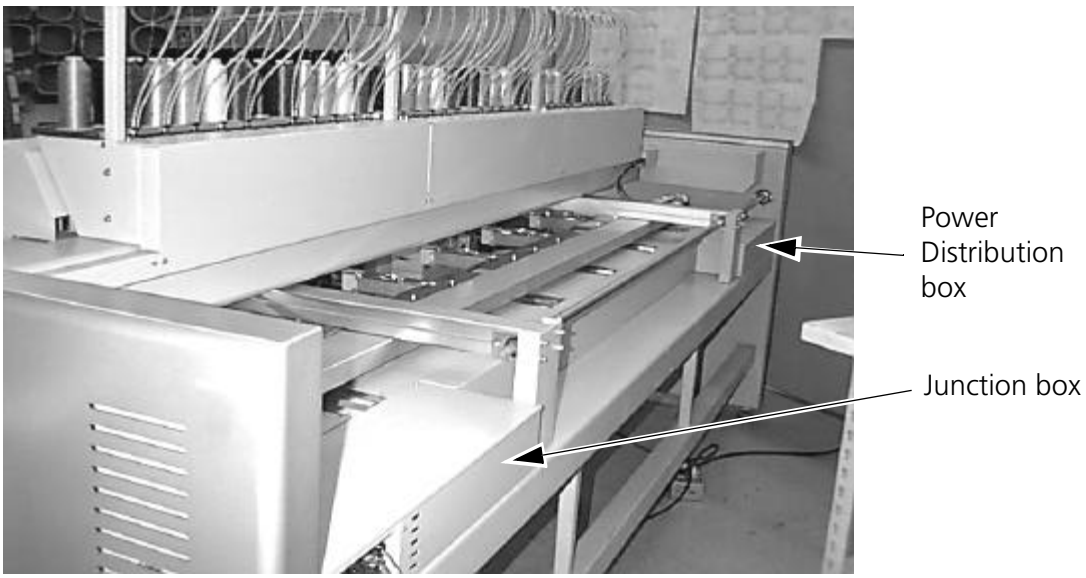


Figure 2-3

Junction Box

The junction box (left) contains the PC power supply, the 36-volt power supply, and the bed node PCB. This box is mounted to the top of the frame at the left of the machine when viewing it from the rear (see Figure 2-3). Figure 2-4 references the area inside the junction box.

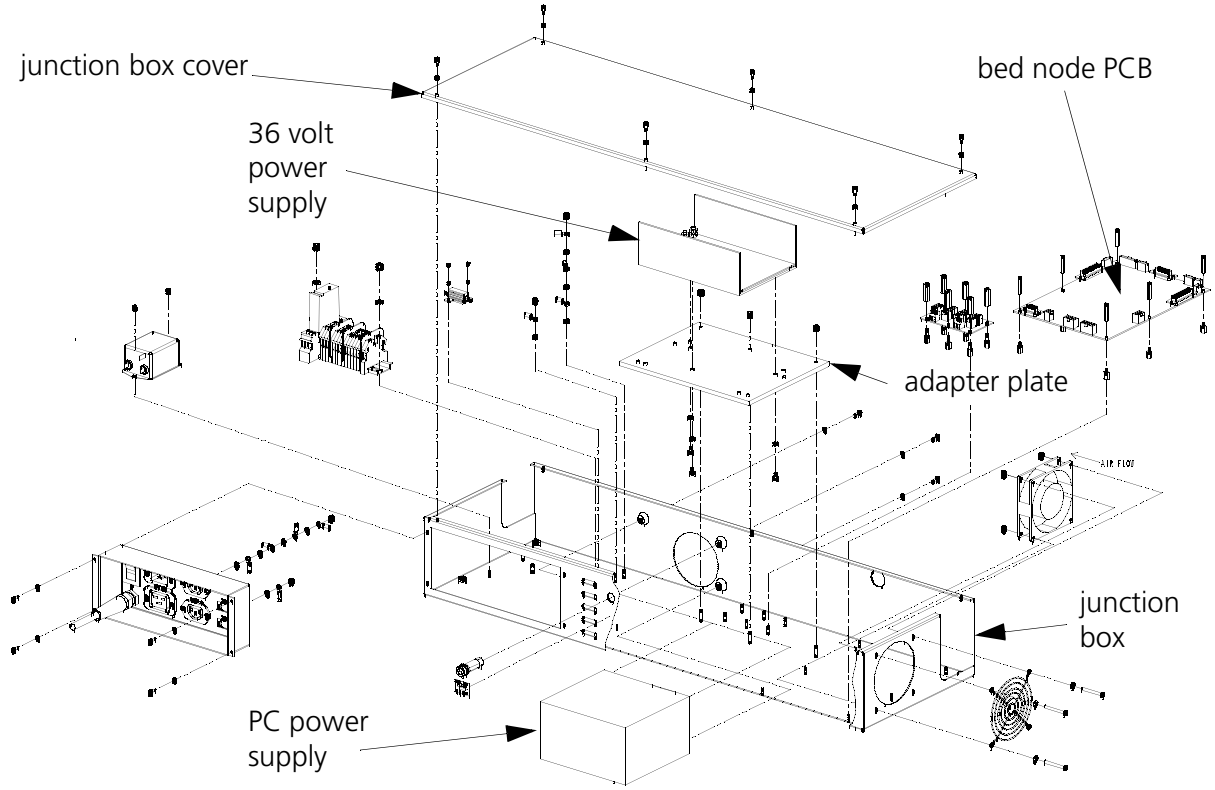


Figure 2-4

Replacing The PC Power Supply (Head Light Power)

1. Remove junction box cover by removing the 6 M3 screws holding it in place.
2. Attach a static control strap from yourself to a non-painted portion of the frame before performing any service inside the box.
3. Remove the 3 screws on the backside of the PC power supply.
4. Unplug all of the cables on the PC power supply. Carefully mark cables to ease replacement.
5. Remove the PC power supply.
6. Replace the PC power supply.
7. Plug in all of the cables on the PC power supply.
8. Replace the 3 screws on the backside of the PC power supply.
9. Replace the junction cover and replace its 6 M3 screws.

Replacing The 36 Volt Power Supply

1. Remove junction cover by removing the 6 M3 screws holding it in place.
2. Attach a static control strap from yourself to a non-painted portion of the frame before performing any service inside the box.
3. Unplug all cables leading to the power supply. Carefully mark cables to ease replacement.
4. Remove the 3 nuts holding the adapter plate.
5. Remove the power supply and the adapter plate as one.
6. Remove the screws holding the power supply and adapter plate together.
7. Replace screws to connect the new power supply to the adapter plate.
8. Replace the power supply and the adapter plate.
9. Replace the 3 nuts holding the adapter plate.
10. Plug in all of the cables to the power supply.
11. Replace the junction cover and replace its 6 M3 screws.

Replacing The Bed Node PCB

1. Remove junction cover by removing the 6 M3 screws holding it in place.
2. Attach a static control strap from yourself to a non-painted portion of the frame before performing any service inside the box.
3. Remove all of the harnesses that are connected to the PCB.
4. Remove the 6 standoffs to disconnect the bed node PCB.
5. Replace the bed node PCB.
6. Replace the 6 standoffs to reconnect the bed node PCB.
7. Replace the harnesses that connect to the PCB.
8. Replace the junction cover and replace its 6 M3 screws.

Power Distribution Box

WARNING! WHEN THE POWER DISTRIBUTION BOX COVER IS REMOVED, AND THE MACHINE IS ON, HARMFUL VOLTAGES ARE PRESENT.

WARNING! THE CAPACITORS IN THIS SECTION MAY STORE VERY HIGH VOLTAGE FOR A FEW MOMENTS AFTER POWER IS REMOVED, THEREFORE EXTREME CARE IS ADVISED WHEN WORKING IN THIS AREA IMMEDIATELY AFTER REMOVING POWER.

WARNING! IT IS ADVISED THAT YOU DELAY ANY WORK IN THIS AREA FOR AT LEAST ONE (1) MINUTE AFTER REMOVING POWER, TO ALLOW THE VOLTAGE IN THE CAPACITORS TO DISCHARGE.

The power distribution box contains the E-stop PCB, Motor Interface PCB, Diode Rectifier, and the X, Y, and Z motor amplifiers. This box is mounted to the top of the frame at the right of the machine when viewing it from the rear (see Figure 2-3). Figure 2-5 references the area inside the power distribution box.

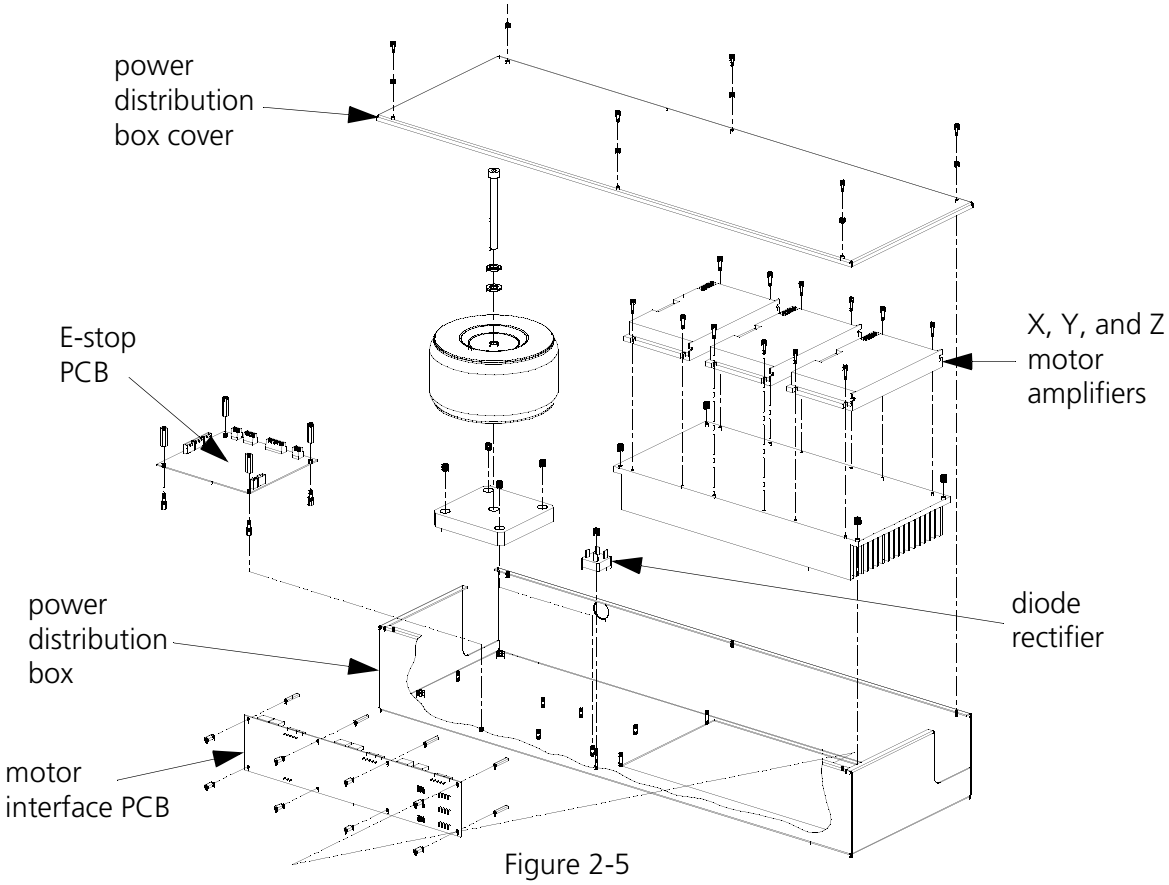


Figure 2-5

Replacing The E-stop PCB

1. Remove power distribution cover by removing the 6 M3 screws holding it in place.

2. Attach a static control strap from yourself to a non-painted portion of the frame before performing any service inside the box.

3. Unplug all of the cables leading to the E-stop PCB. Carefully mark cables to ease replacement.
4. Remove the 4 standoffs to remove the E-stop PCB.
5. Replace the E-stop PCB.
6. Replace the 4 standoffs.
7. Plug in all of the cables to the E-stop PCB.
8. Replace the power distribution cover and replace its 6 M3 screws.

Replacing The Motor Interface PCB

1. Remove power distribution cover by removing the 6 M3 screws holding it in place.
2. Attach a static control strap from yourself to a non-painted portion of the frame before performing any service inside the box.
3. Unplug all of the cables leading to the Motor interface PCB. Carefully mark cables to ease replacement.
4. Remove the 8 standoffs to remove the Motor interface PCB.
5. Replace the Motor interface PCB.
6. Replace the 8 standoffs.
7. Plug in all of the cables to the Motor interface PCB.
8. Replace the power distribution cover and replace its 6 M3 screws.

Replacing The Diode Rectifier

1. Remove power distribution cover by removing the 6 M3 screws holding it in place.
2. Attach a static control strap from yourself to a non-painted portion of the frame before performing any service inside the box.
3. Unplug the cables that lead to the diode rectifier. Carefully mark cables to ease replacement.
4. Remove the single nut holding the diode rectifier in place.
5. Replace the diode rectifier.
6. Replace the single nut.
7. Plug the cables into the diode rectifier.
8. Replace the power distribution cover and replace its 6 M3 screws.

Replacing The X, Y, or Z Motor Amplifier

1. Remove power distribution cover by removing the 6 M3 screws holding it in place.
2. Attach a static control strap from yourself to a non-painted portion of the frame before performing any service inside the box.
3. Remove the 16-pin connector on the top of the motor amplifier. It is marked "P1".
4. Loosen the 5 terminal block screws and mark them to ease later replacement.
5. Remove the 4 M3 socket head screws to release the motor amplifier.

   NOTE: There is thermal grease behind the motor amplifier. Avoid contact with the grease when removing the motor amplifier.

Setting Current Limit Switches

CAUTION! CURRENT-LIMIT SWITCHES MUST BE PROPERLY SET ON ANY NEW MOTOR DRIVE MODULE BEFORE INSTALLING THE MODULE AND ATTEMPTING TO OPERATE THE MACHINE.

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

6. Refer to Figure 2-6 and locate the current limit switches on the drive module as indicated.

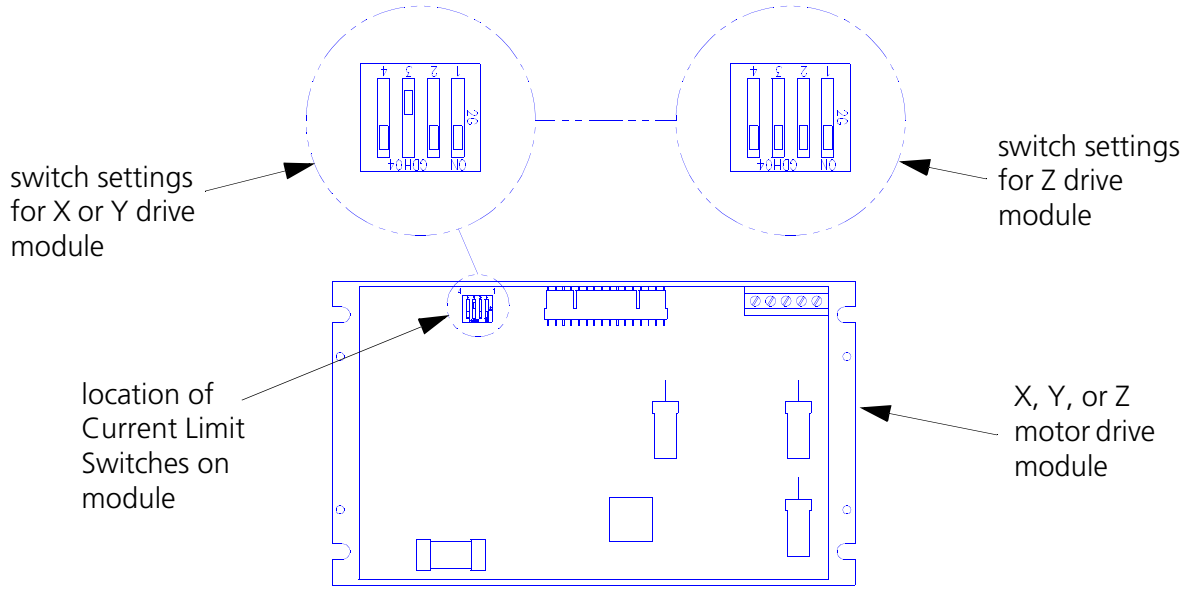


Figure 2-6

7. Using a small screw driver or other similar device, position the switch settings to the proper position.

   For X and Y modules: #1 ON, #2 ON, #3 OFF, #4 ON

For the Z module: #1 ON, #2 ON, #3 ON, #4 ON

8. Add additional thermal grease to the new motor amplifier.
9. Replace amplifier and replace the 4 M3 socket head screws.
10. Tighten the 5 terminal block screws and replace the 16-pin connector to the top of the motor amplifier.
11. Replace the power distribution cover and replace its 4 M4 socket head screws.

3. Embroidery Heads

General

This section provides parts replacement procedures and adjustments required during repair and maintenance of the Embroidery Heads and associated areas. This section consists of each of the 6 heads which includes the thread tensioners, needle cases, and needle bar drive, take up lever drive, and jump stitch drive systems, as well as the thread tensioners and individual head interface electronics. The thread tree and other thread handling mechanics are also included in this section. The color change and grabber systems, and the user interface keypad, start/stop, estop, and frame switches are included in this section as well.

These procedures are guidelines for performing repairs and must be used by personnel practicing good maintenance and repair techniques. Refer to the Repair 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.

Front Panels And Covers

There are several covers attached to the front of the EMB 10/6T as shown in Figure 3-1. These covers may fill spaces between heads and tensioner brackets; and enclose harnesses associated with various devices mounted in this area. They also serve as panels to support and enshroud various user devices in this area which include: the 7-button keypad, start/stop/frame switches, emergency stop switches, 7-segment LED display, tensioners, and needle case assemblies.

To remove any of these covers, refer to Figure 3-1 and the following applicable step or steps:

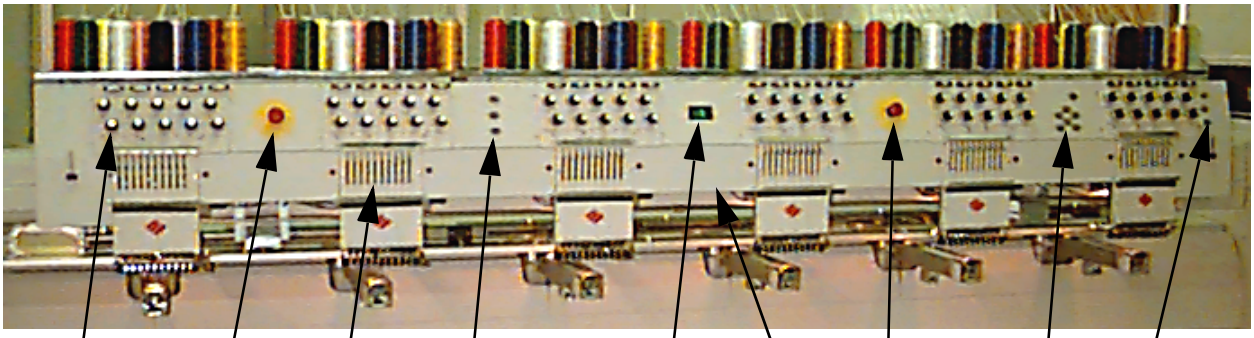


Figure 3-1

Removing Lower Front Covers

1. To remove any of the lower front covers (between needle cases), remove the screws for the cover. Pull down slightly on the cover to remove the pin in the top of the cover from the hole in the bottom of the upper panel. Then remove the cover from the area.

2. To reinstall any or all covers, reverse the previous step.

Replacing 7-Button Keypad and Start/Stop/Frame Panels

1. Turn OFF the power switch to the EMB 10/6T and remove the power cord from the power source electrical outlet.

2. Disconnect the cable from the back of the keypad or start/stop/frame printed circuit board.

3. Remove the lower front cover directly below the panel being replaced (see Figure 3-1).

4. Refer to Figure 3-2 or 3-3 and remove the screws that secure the 7-button keypad or start/stop/frame panel to the adjoining tensioner assemblies. Also remove the screws in the top of the thread tube clamp brackets directly behind the 7-button keypad or start/stop/frame panel.

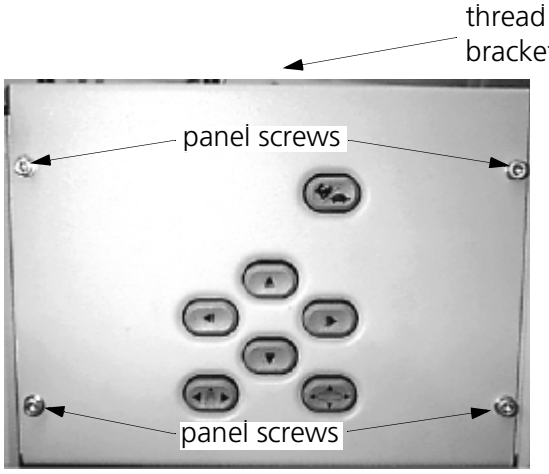


Figure 3-2 7-button Keypad Panel

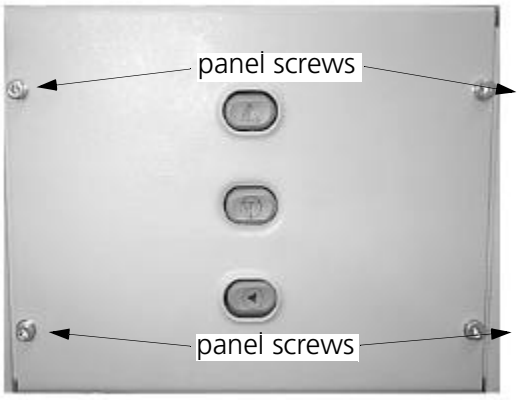


Figure 3-3 Start/Stop/Frame Panel

5. Remove the 7-button keypad or start/stop/frame panel.

6. Disconnect the harness from the PCB.

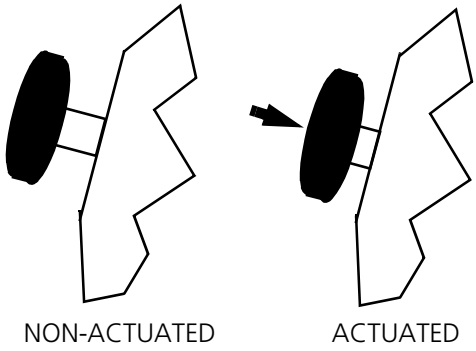
7. Remove the screws that secure the PCB to the back of the panel.

8. Replace the PCB with a new unit and reverse the previous steps to reinstall.

Replacing Emergency Switches

Basic Parts

Each switch set comes with an actuator mechanism and the switch contacts. The actuator mechanism for the emergency stop switch is normally positioned outward (see Figure 3-3, NON-ACTUATED); and locks inward when pressed (see Figure 3-3, ACTUATED). Pull outward to release to the non-actuated condition.



Emergency Stop Switch

Figure 3-4

Basic Configuration

The emergency switch is a normally closed contact that is opened (and held open after actuation).

To replace the emergency stop switch, follow this procedure:

1. Turn OFF the power switch to the EMB 10/6T and remove the power cord from the power source.

2. Remove the lower front cover directly below the emergency stop panel (see Figure 3-1).

3. Remove the screws that secure the panel to the adjoining tensioner assemblies (see Figure 3-5). Also remove the screws in the top of the thread tube clamp brackets directly behind the panel.

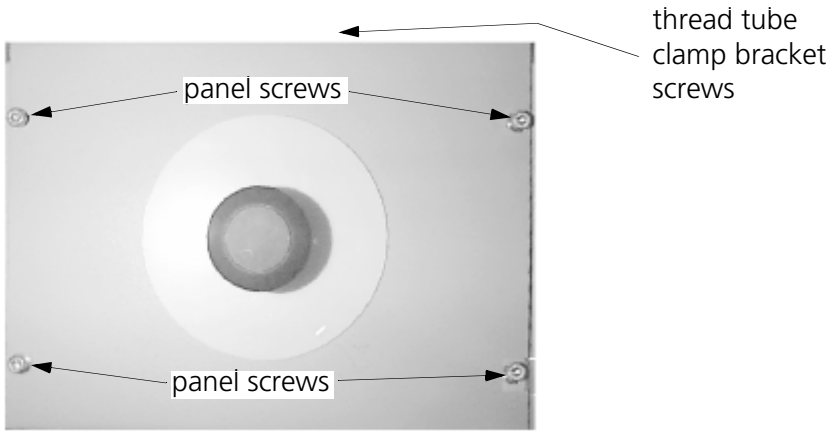


Figure 3-5 Emergency Stop Panel

4. With the emergency stop panel disconnected, remove the emergency switch contacts from the actuator mechanism by rotating the plastic lever at the junction of the contacts and actuator approximately 1/8 turn counterclockwise (see Figure 3-6).

5. Loosen the screws holding the wires in the rear of the defective switch contacts, and transfer the wires to the new switch contacts.

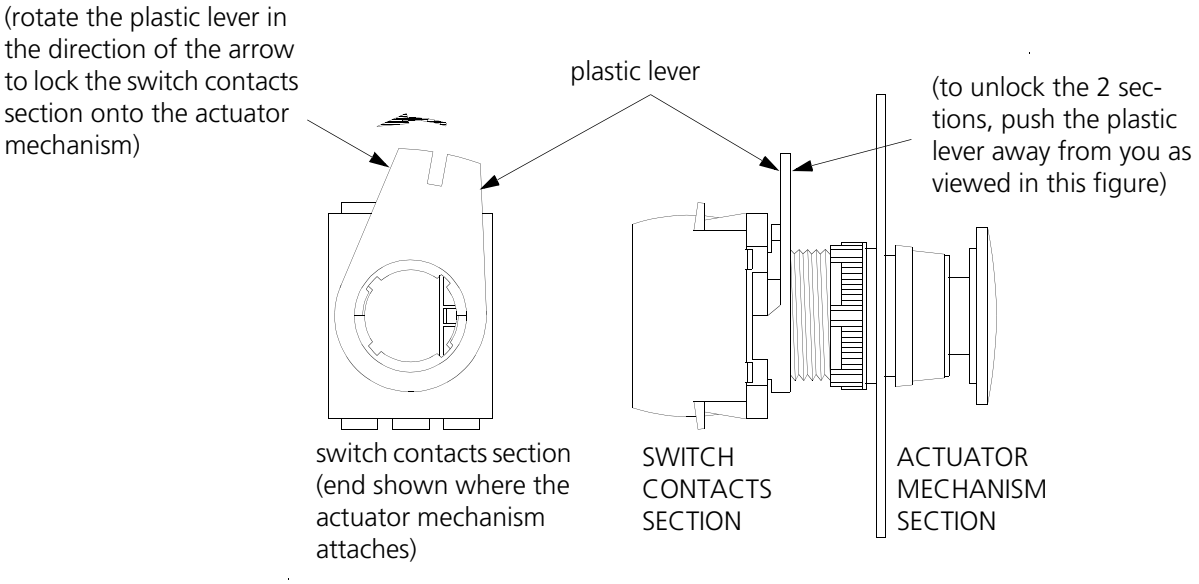


Figure 3-6

6. Unscrew the nut on the rear of the panel and remove the positioning keyway washer. Then remove the rest of the actuator and the rubber washer out the front of the panel.

7. Reverse the previous steps to install the new switch assembly.

8. Reattach all panels and covers.

Heads

The Melco EMB 10/6T features 6 identical heads mounted on a bridge platform. Each head consists of several smaller subassemblies. This section describes the removal and replacement of most of the major components of the head. Unless otherwise specified, each procedure applies to all heads and subassemblies. All other components of this section are attached to or in the general area of the head assemblies.

Head Node PCB Replacement

A Head Node PCB Assembly is located on top of the bridge directly behind each head. This PCB contains the electonics for the jump stitch and takeup motors and thread break detection in each head. Other functions, such as communication for the keypad, color change index, and needle position detection are associated with certain individual head node PCBs, depending on their particular position. Refer to the following procedure to replace a head node PCB assembly.

1. Remove the machine covers to gain access to the head node electronics assembly.

2. Disconnect the various harness connections at the PCB.

3. Refer to Figure 3-7 and carefully grasp the head node PCB at each of the four corners and with a gentle rocking motion, lift the PCB off the 4 snap-top standoffs.

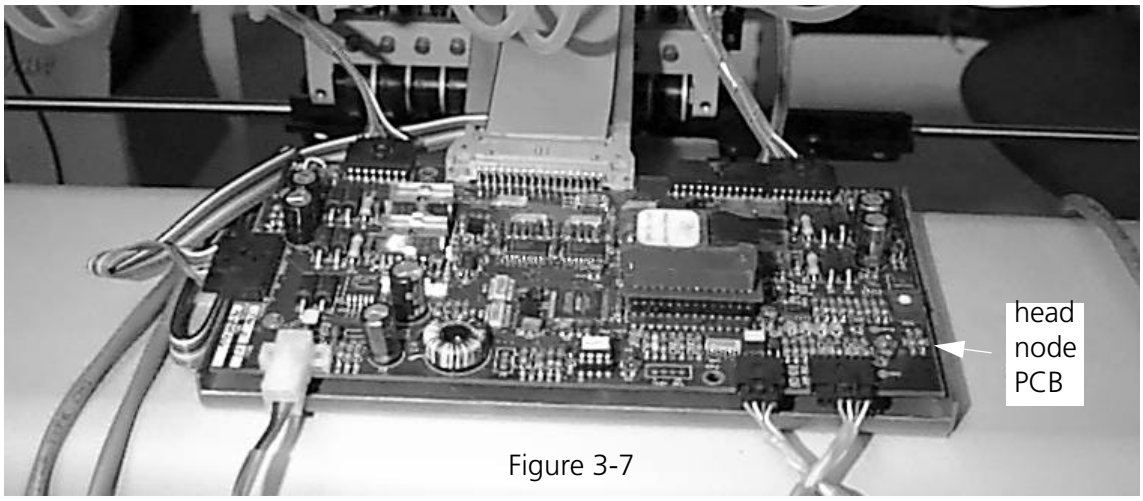


Figure 3-7

4. To install a new head node PCB (or reinstall the original one), merely reverse the preceding steps.

Tensioner Assembly Panel Removal

1. Remove all threads from the needles, guides, tensioners and supply tubes.
2. Remove the thread supply tubes from the back of the tensioner panel by removing the tube clamp bracket and gently pulling the tubes out of their individual holes.
3. Disconnect the connector on the back of the tensioner PCB (refer to Figure 3-8).

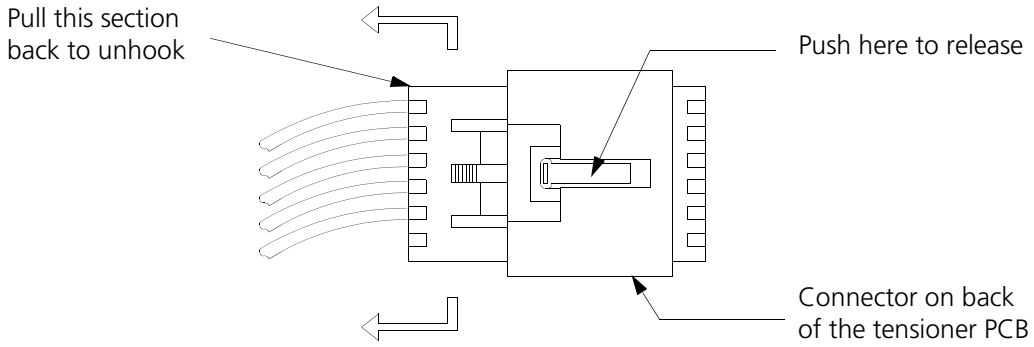


Figure 3-8

4. Remove the upper cover panels on either side of the tensioner assembly.
5. Remove the screws holding the tensioner bracket assembly, then lift the tensioner bracket free from the mounting supports.
6. To install a new tensioner bracket assembly (or reinstall the existing unit), merely reverse the proceeding steps.

Pre-Tensioner

The pre-tensioner consists of a knurled adjustment knob, a tension spring, and two beveled disks. These parts attach to a threaded post that is permanently mounted to the tensioner bracket. To replace any of the pre-tensioner parts merely unscrew the knurled knob. Refer to Figure 3-9 for reassembly. For proper adjustment refer to the EMB 10/6T Operation Manual.

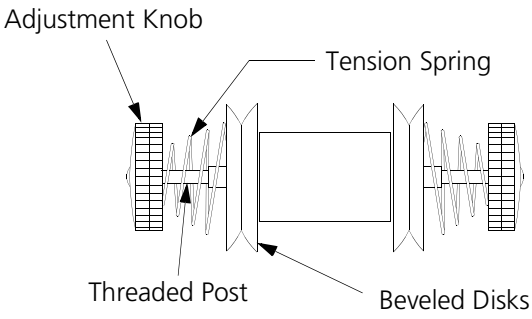


Figure 3-9

Replacing An Individual Thread Tensioner

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

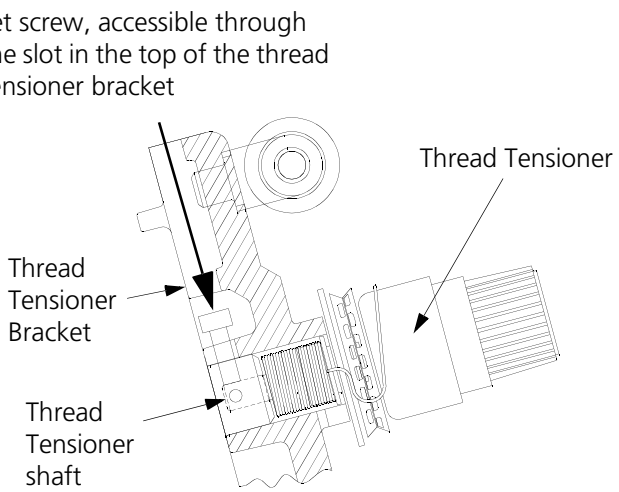


Figure 3-10

1. Using a 2.5 mm Allen wrench, loosen the set screw associated with the thread tensioner to be removed (see Figure 3-10).

2. Pull the thread tensioner out of the tensioner bracket.

3. To reinstall the thread tensioner, hold the check spring in position and place the thread tensioner into the tensioner bracket.

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

4. Tighten the set screw in the top of the thread tensioner mounting bracket that secures the thread tensioner (see Figure 3-10).

5. After inserting the thread tensioner into the tensioner bracket, perform the thread tensioner check spring adjustment in the next procedure.

Changing A Check Spring

1. As described in the previous steps, remove the thread tensioner associated with the check spring that is being changed.

2. Remove the old check spring and discard it.

3. Attach the new check spring as follows:

   a) Position the check spring around the end of the tensioner shaft as shown in Figure 3-11.

   b) Insert the straight length of spring wire that is inside the check spring coil into the groove cut in the tensioner shaft as shown.

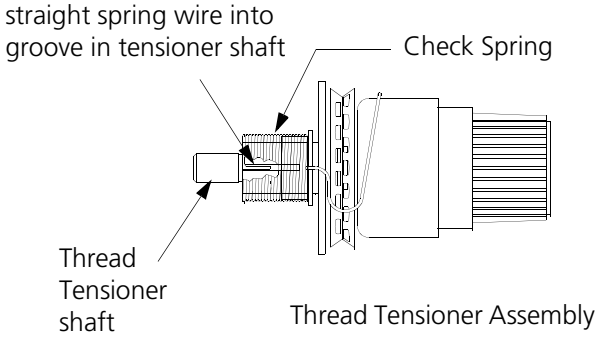


Figure 3-11

4. While holding the check spring in position, place the thread tensioner into the tensioner bracket (see Figure 3-10).

5. Tighten the set screw in the top of the thread tensioner mounting bracket that secures the thread tensioner (see Figure 3-10).

Check Spring Adjustment

6. Slightly loosen the set screw in the top of the thread tensioner mounting bracket that secures the thread tensioner (see Figure 3-10).

7. Rotate the thread tensioner to the position where the check spring is just touching the left side of the thread break contact (brass post). See Figure 3-12.

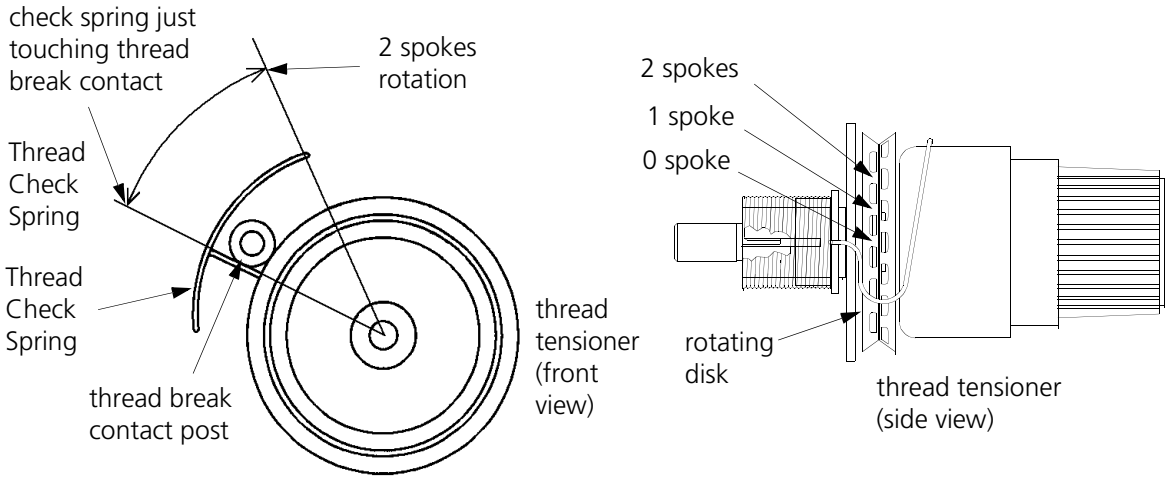


Figure 3-12

8. Observe the position of the thread tensioner check spring, then continue to rotate the thread tensioner clockwise the distance of 2 spokes of the rotating disk (see Figure 3-12). This represents 40 degrees rotation.

9. Tighten the set screw in the top of the thread tensioner bracket.

Adjustment Hints

If you rotate the tensioner assembly more than two spokes, the check spring may become too tight against the thread break post. If this happen the check spring may not retract far enough to make that stroke needed for a good tight stitch. False thread break messages may also occur with excessive rotation.

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

Replacing Other Thread Tensioner Parts

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

Refer to Figure 3-13 for part location and assembly order when replacing any of these parts. For proper tensioning adjustment refer to the EMB 10/6T Operation Manual.

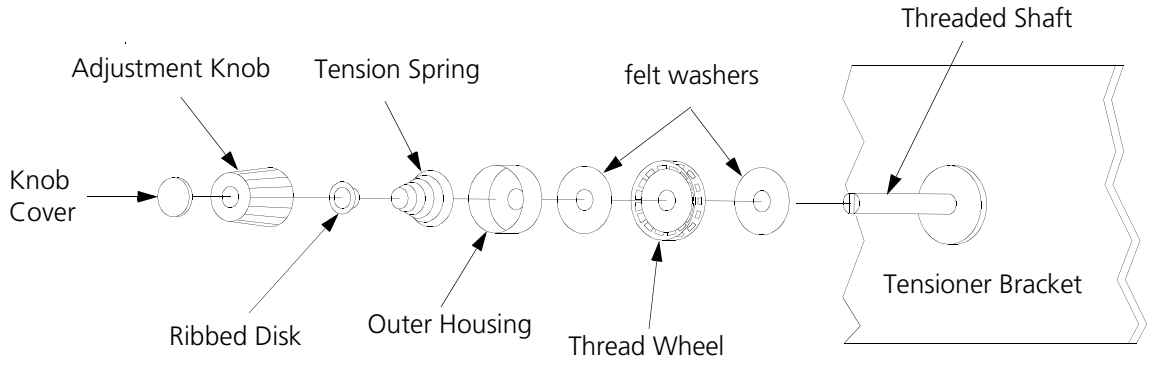


Figure 3-13

Replacing A Thread Break Contact Post

1. As described previously in this manual, remove the thread tensioner associated with the thread break contact post to be replaced.

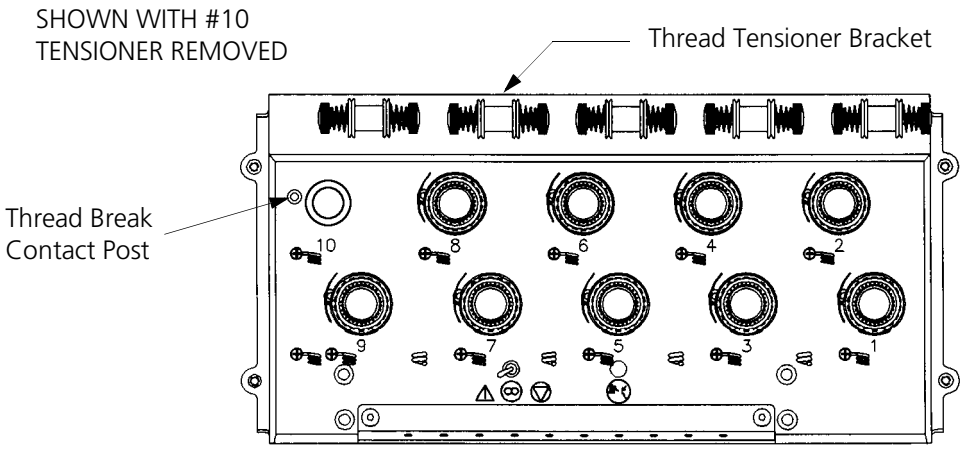


Figure 3-14

2. Remove the thread break contact post by rotating it counterclockwise out of its location in the thread tensioner bracket.

CAUTION! USE CARE NOT TO CROSS-THREAD THE POST WHEN INSTALLING IT DURING THE NEXT STEP.

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

4. You may apply a small amount of Loctite brand #222 screw adhesive or equivalent to keep the post from loosening.

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

5. Reinstall the thread tensioner and check spring as described previously and perform the check spring adjustment.

Replacing A Needle Bar

1. Turn ON the EMB 10/6T and bring the heads to the HEAD UP position.

2. Turn OFF the EMB 10/6T and disconnect the power cord from its power source.

3. Refer to the procedure for removing the thread tensioner assembly and remove it as described.

4. Remove the 2 screws holding the upper needle case cover plate and set the cover plate aside (see Figure 3-15).

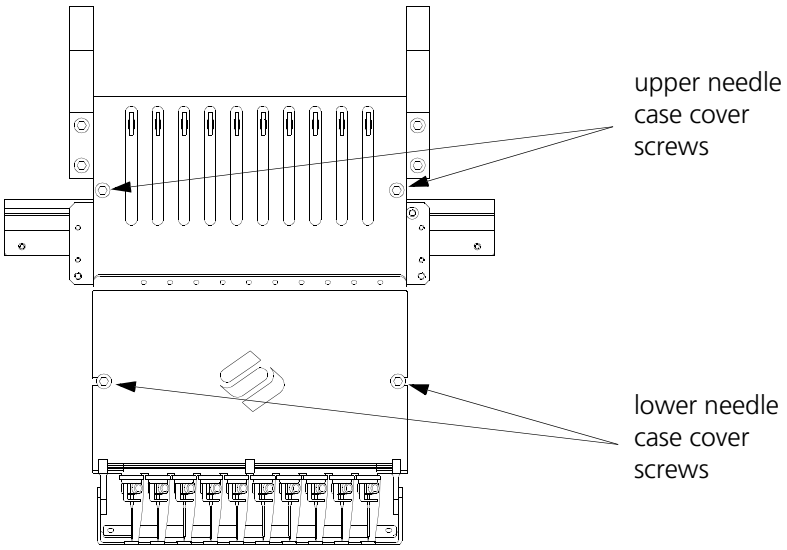


Figure 3-15

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

6. Refer to Figure 3-16 and then loosen the needle clamp set screw and remove the needle, needle clamp, and needle clamp damper from the bottom of the needle bar.

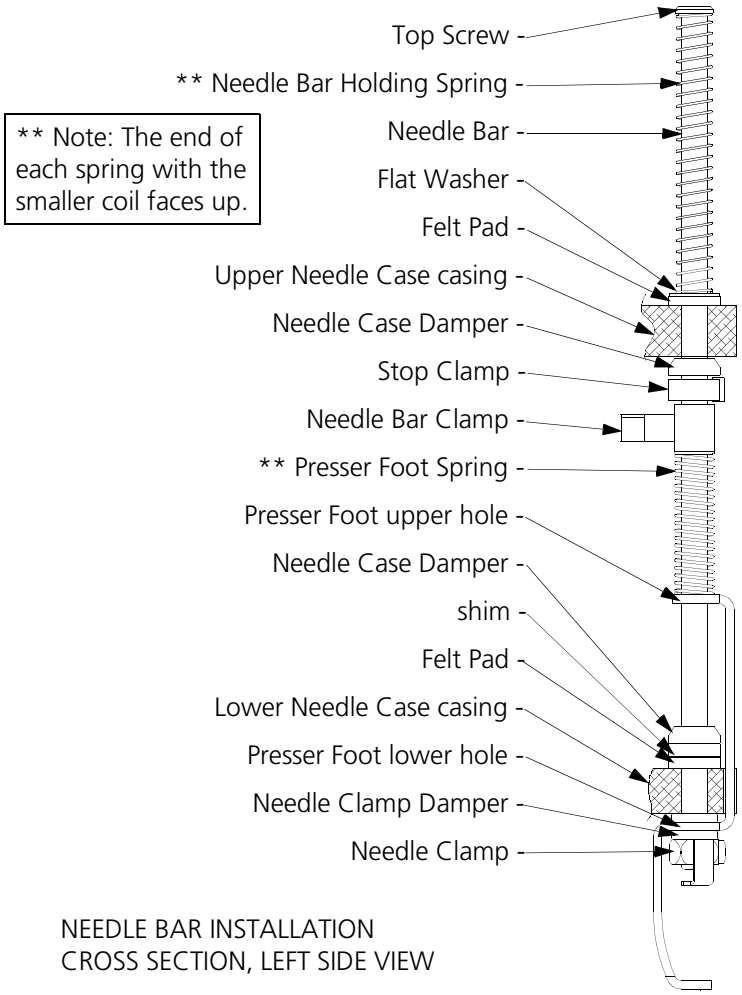


Figure 3-16

7. Next, loosen the needle bar stop clamp (black clamp).

8. Loosen the top screw (see Figure 3-16) on the needle bar. (You will remove and transfer the screw in step 11.)

CAUTION! AFTER THE NEXT STEP, THE NEEDLE BAR IS FREE TO BE MOVED OUT THE TOP OF THE NEEDLE CASE. USE CARE SO THE SPRINGS AND OTHER PARTS DO NOT SUDDENLY FLY OUT OF POSITION.

9. Loosen the needle bar clamp.

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

11. Transfer the screw from the top of the old needle bar to the top of the new needle bar. Apply Loctite screw adhesive number 222 or equivalent to the screw if possible.

12. Install a new needle bar by inserting it from the top of the needle case and through the various pieces in the order shown in Figure 3-16.

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

14. You may reinstall the upper needle case cover at this time. The lower needle case cover must, however, remain off to perform the needle bar height adjustment.

Needle Bar Height

15. Turn the machine ON and with the Main screen showing on the monitor, click the Advanced button and then the Service button to get to the Service menu.

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

17. Click the Bottom Center button. The head rotates to the "Needle Depth" position and the Z Position shows approximately 185.0. The needle has reached its lowest point.

18. Look directly into the hook assembly and check the location of the needle's eye compared to Figure 3-17. The eye should be just out of view from the bobbin opening. Therefore, none of the needle's eye should be visible.

    If the needle depth is acceptable install the lower needle case cover and skip the rest of this procedure.

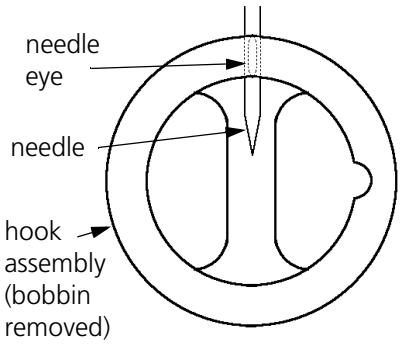


Figure 3-17

    If the needle depth is not acceptable continue with this procedure.

19. Loosen the needle bar clamp screw (silver clamp) shown in Figure 3-18.

20. Slide the needle bar up or down until the eye of the needle is just out of view from the bobbin opening (see Figure 3-17). If you twisted the needle bar, return it to its original rotation before continuing.

21. Retighten the needle bar clamp screw.

22. 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).

23. Click the Top Center button. The head rotates to the "Top Dead Center" or 'full needle up' position.

24. 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.

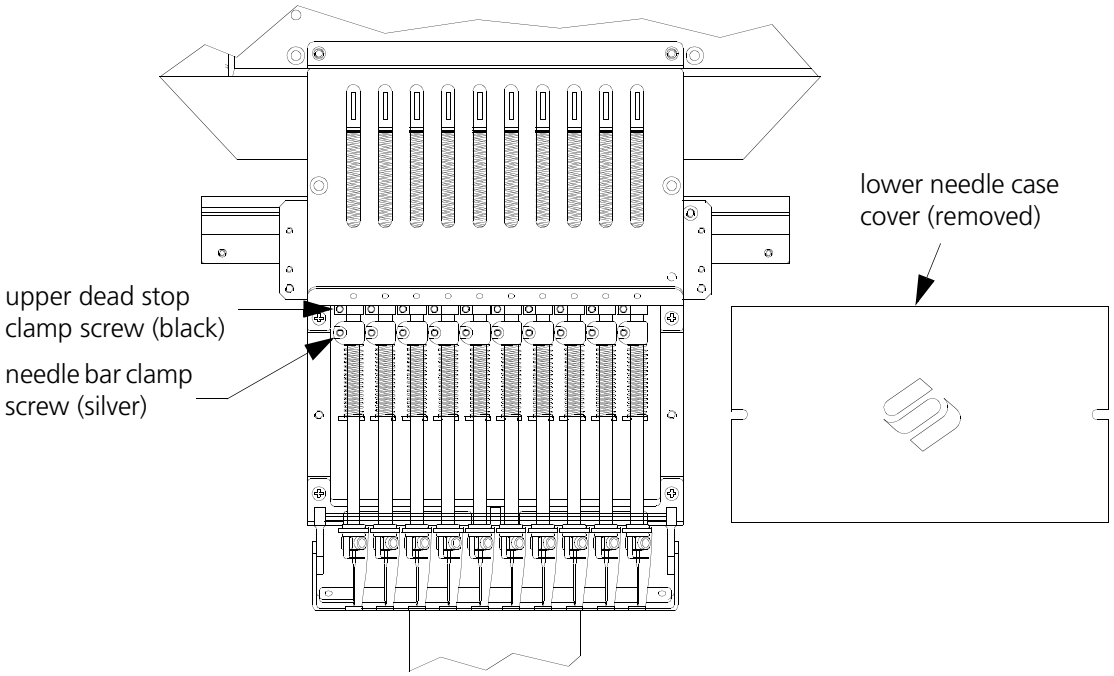


Figure 3-18

25. Click the Headup button. The head rotates to the “Head Up” position.

26. Repeat steps 16 through 18 to check the needle depth and that there is no restriction to head rotation.

27. When the needle bar height has been properly adjusted, install the lower needle case cover.

Needle Case Removal

It may become necessary to remove a needle case from the front of a head to replace the needle bar driver, take up lever gear, needle bar reciprocator, or other associated parts. Refer to the following steps and Figures 3-19 through 3-22 to remove the needle case from a head.

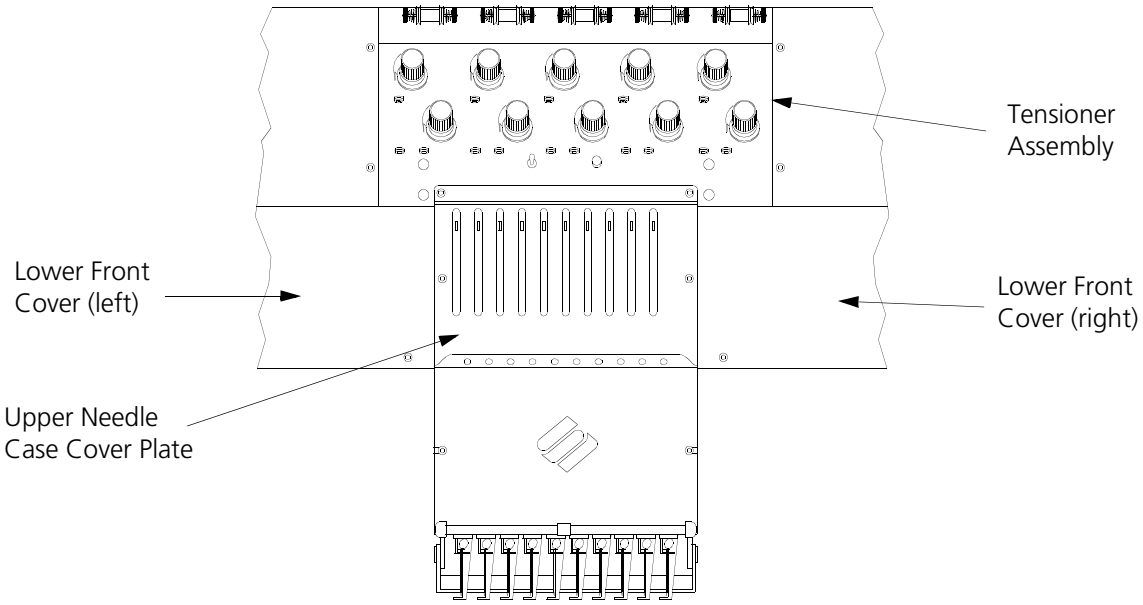


Figure 3-19

1. Turn ON the EMB 10/6T and bring the heads to the HEAD UP position.

2. Turn OFF the EMB 10/6T and disconnect the power cord from its power source.

3. Remove the 2 lower front covers on either side of the needle case.

For the number 2 through number 5 heads, you do not need to remove the tensioner assemblies to remove the needle case.

For the number 1 and number 6 heads, you must remove the end cover and either provide support for the tensioner assembly or remove it before removing the needle case.

4. Refer to Figure 3-18 and remove the four socket head cap screws designated "A" which attach the needle case to the tensioner brackets.

5. Remove the 2 screws holding the upper needle case cover plate and set the cover plate aside.

6. Hold the needle case securely with one hand while you remove the 4 socket head cap screws "B" that secure the needle case to the bearing retainer plate assembly near the top of the needle case (see Figures 3-21 and 3-22).

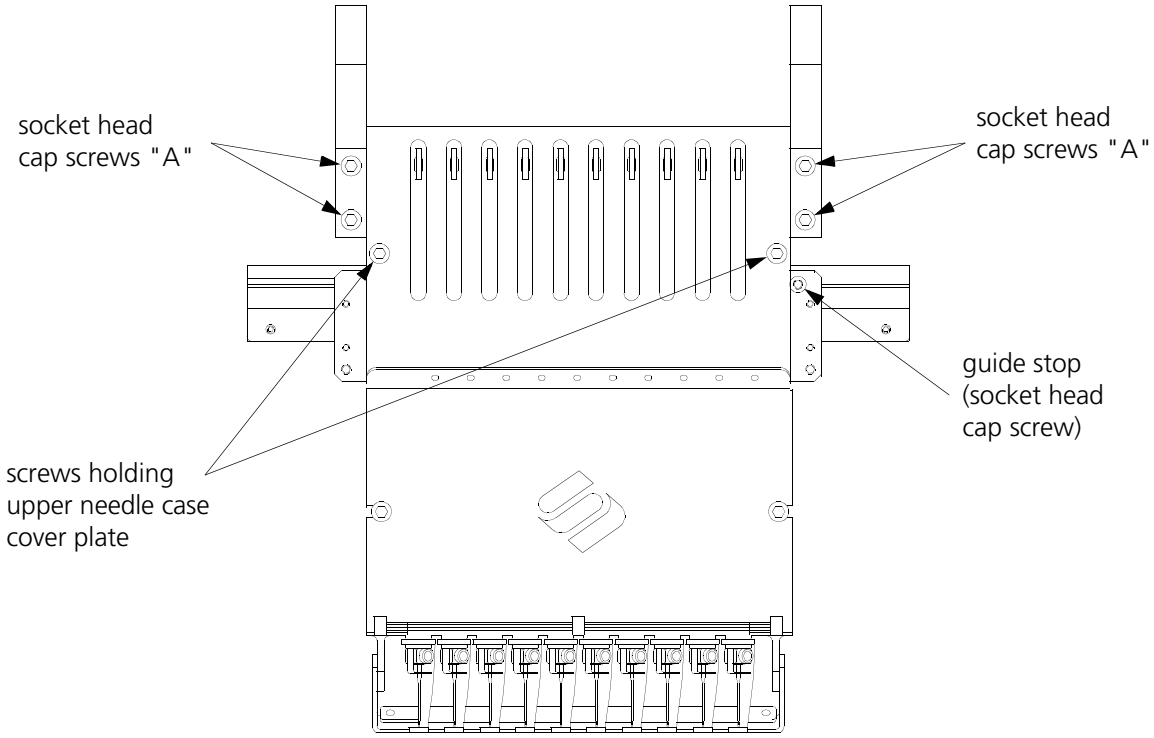


Figure 3-20

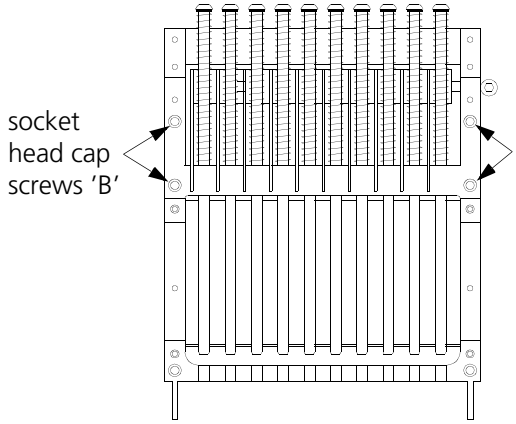


Figure 3-21

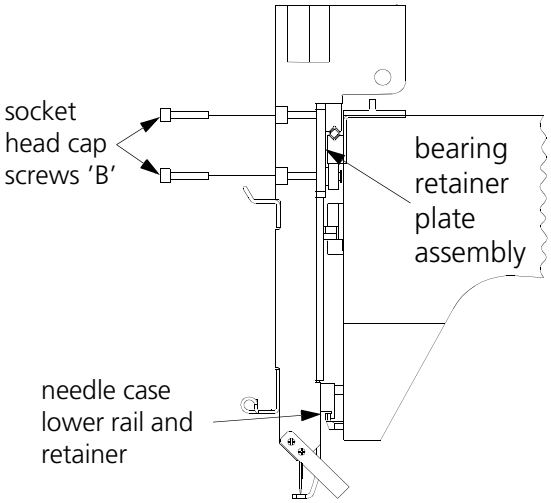


Figure 3-22

7. Lift the needle case slightly to disengage the lower rail from the lower rail retainer coming from the bottom of the head.

8. The needle case will now be free to remove from the head.

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

Reciprocator Replacement

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

1. Remove the needle case as described previously.

2. On the lower right side of the head, loosen the screw holding the needle bar guide shaft (see Figure 3-23).

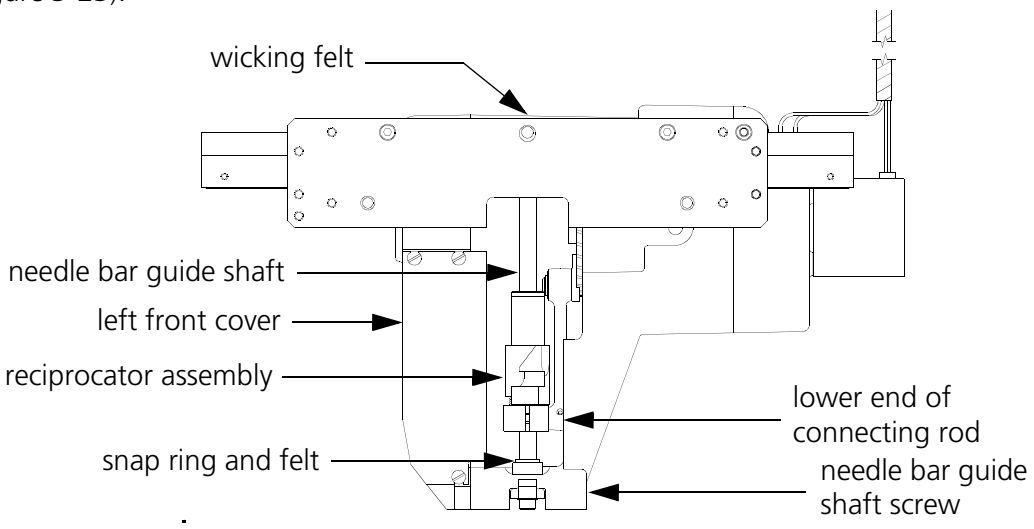


Figure 3-23

3. Refer to Figure 3-23 to locate the wicking felt on top of the head and remove it. Be careful not to damage the felt.

4. Remove the snap ring and felt from the lower end of the needle bar guide shaft.

5. Push the needle bar guide shaft upward until the reciprocator is free from the shaft.

6. Remove the reciprocator out the front of the head by sliding the pin in the reciprocator base out of the lower end of the connecting rod. It may be helpful to remove the front cover from the left side of the head to perform these steps.

7. Reverse the previous steps to install the new reciprocator assembly.

CAUTION! BE CERTAIN THE JUMP STITCH ACTUATOR TAB ON THE BACK OF THE RECIPROCATOR IS ON THE LEFT SIDE OF THE JUMP STITCH LEVER.

Replacing Needle Case Cross Roller Bearing

1. Remove the needle case as described previously.

CAUTION! IN THE NEXT STEP, SOME RETAINER PLATES MAY BECOME FREE TO MOVE OFF THE SIDES OF THE HEADS IF BUMPED. TO ACCOUNT FOR THIS POSSIBILITY, YOU SHOULD ATTACH A CLAMPING DEVICE ON THE OUTSIDE ENDS OF THE LONG V-RAIL MOUNTED ON THE HEAD.

2. Refer to Figure 3-30 to loosen the clamps holding the color change link bars on either side of the needle case. Remove the link bars from both sides of the needle case.

3. Carefully slide the bearing retainer plate assembly with cross roller bearing off either end of the V-rail.

4. Position the new cross roller bearing onto the V-rail and install the bearing retainer plate assembly, then refer to the following Cross Roller Bearing Centering procedure.

Cross Roller Bearing Centering

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

5. With the needle case and retainer plate assembly removed, lay the cross roller bearing onto the head v-rail (see Figure 3-24). Orient the bearing with the welded edge down and position it to the right edge of the v-rail.

6. Place the retainer plate assembly onto the cross roller bearing at the right end of the head v-rail. The needle case should be removed for easier adjustment.

7. Slide the retainer plate assembly left to the point where the left edge of the retainer plate is aligned with the center of the needle bar guide shaft felt pad (see Figure 3-24).

8. Position the left edge of the cross roller bearing in line with the left edge of the retainer plate and the center of the needle bar guide shaft felt pad. (The second roller of the cross roller bearing should just be engaged between the head v-rail and the needle case v-rail.)

9. Slide the retainer plate assembly onto the head v-rail and cross roller bearing.

10. Check that the cross roller bearing is centered in the 2 v-rails by the following method:

    a) Center the retainer plate assembly on the head v-rail.

    b) Carefully insert a solid instrument, such as a straight Allen wrench, into the opening at one end where the two v-rails join. Insert the instrument until it contacts the cross roller bearing. Do not force it any further.

    c) Mark the position of the instrument at the end of the head v-rail, when the instrument is inserted to where it contacts the cross roller bearing.

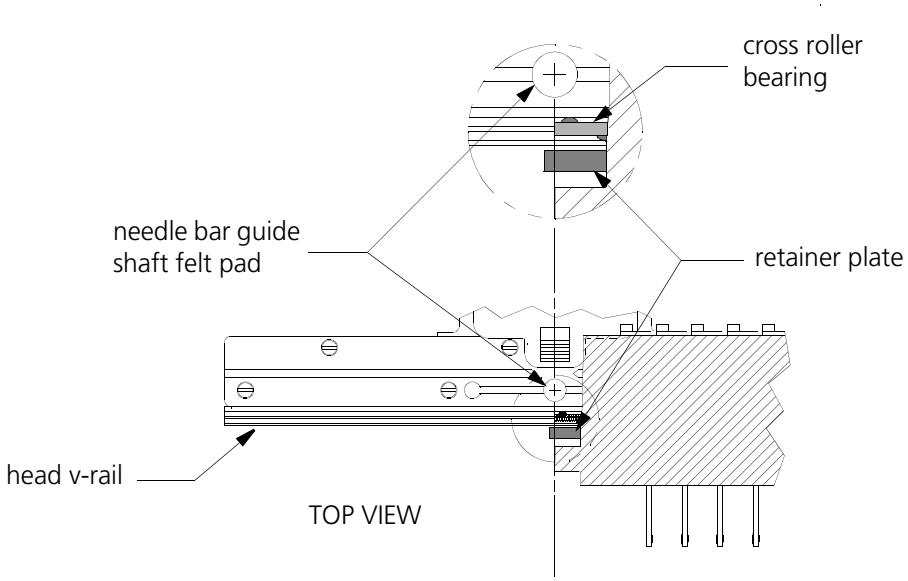


Figure 3-24

d) Repeat this on the other side of the v-rails and compare the two marks. They should be very close to the same - within about 3/32 of an inch.

e) Repeat this process until the cross roller bearing is centered within the proper tolerance.

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

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

12. If the test in step 11 shows an incorrect adjustment continue with the following Retainer Plate Bearing Adjustment. If the test is OK, skip to step 21.

Retainer Plate Bearing Adjustment

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

13. Loosen the two socket head cap screws holding the needle case v-rail to the retainer plate assembly as indicated in Figure 3-25.

14. Insure the cross roller bearing is still centered as descriibed previously.

15. Install the v-rail adjustment fixture (p/n 995675-01) into the middle front hole of the retainer plate assembly as shown in Figure 3-25.

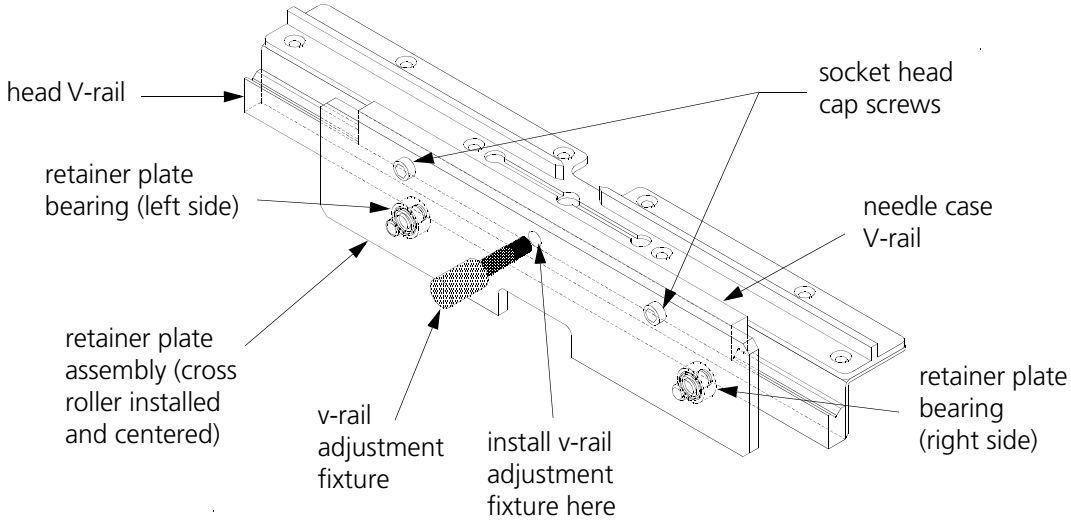


Figure 3-25

16. Snug the needle case v-rail to the retainer plate assembly very lightly with the socket head cap screws. Do not overtighten the screws or the fixture will be unable to perform its adjustment properly.

17. Carefully and slowly rotate the v-rail adjustment fixture (either clockwise or counterclockwise) until you feel a slight resistance. The left and right retainer plate bearings should now be snug against the bottom of the head v-rail.

18. Tighten the socket head cap screws securely and remove the fixture.

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

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

20. If required, loosen the socket head cap screws and repeat this process until the bearings are properly adjusted.

21. Reinstall the needle case as described in the next procedure.

Installing Needle Case

1. Turn ON the EMB 10/6T and bring the head to the HEAD UP position.

2. Turn OFF the EMB 10/6T and disconnect the power cord from its power source.

2. Refer to Figure 3-26 and insert the needle case lower rail into the lower rail retainer. At the same time direct the grabber blade into the grabber bar assembly at the bottom of the needle case..

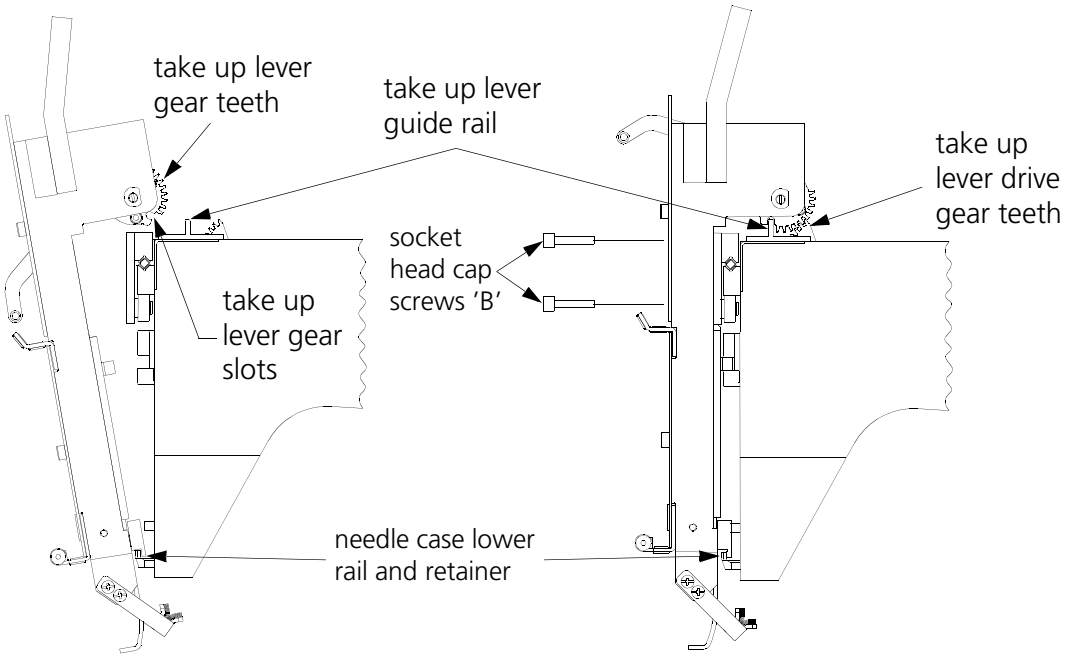


Figure 3-26

Figure 3-27

3. Move the upper part of the needle case into position on the front of the head.

4. Refer to Figures 3-26 and 3-27 and maneuver all the slots in the take up lever gears onto the take up lever guide rail. At the same time you must engage the teeth in the active take up lever gear with the take up lever drive gear teeth.

   NOTE: When the needle case rests solidly and completely against the bearing retainer plate assembly all 10 take up levers must be at the same position in line with each other and slightly down from their uppermost position.

5. Refer to Figure 3-28 and align the 4 through holes on the upper section of the needle case with the 4 threaded holes in the bearing retainer plate assembly. Install the 4 "B" socket head cap screws. Snug the screws but do not tighten them at this time.

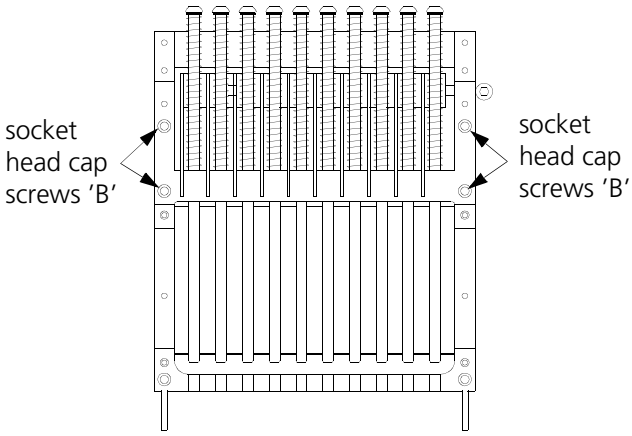


Figure 3-28

6. Refer to Figure 3-29 and align the right edge of the needle case against the guide stop on the bearing retainer plate then tighten the 4 "B" socket head cap screws.

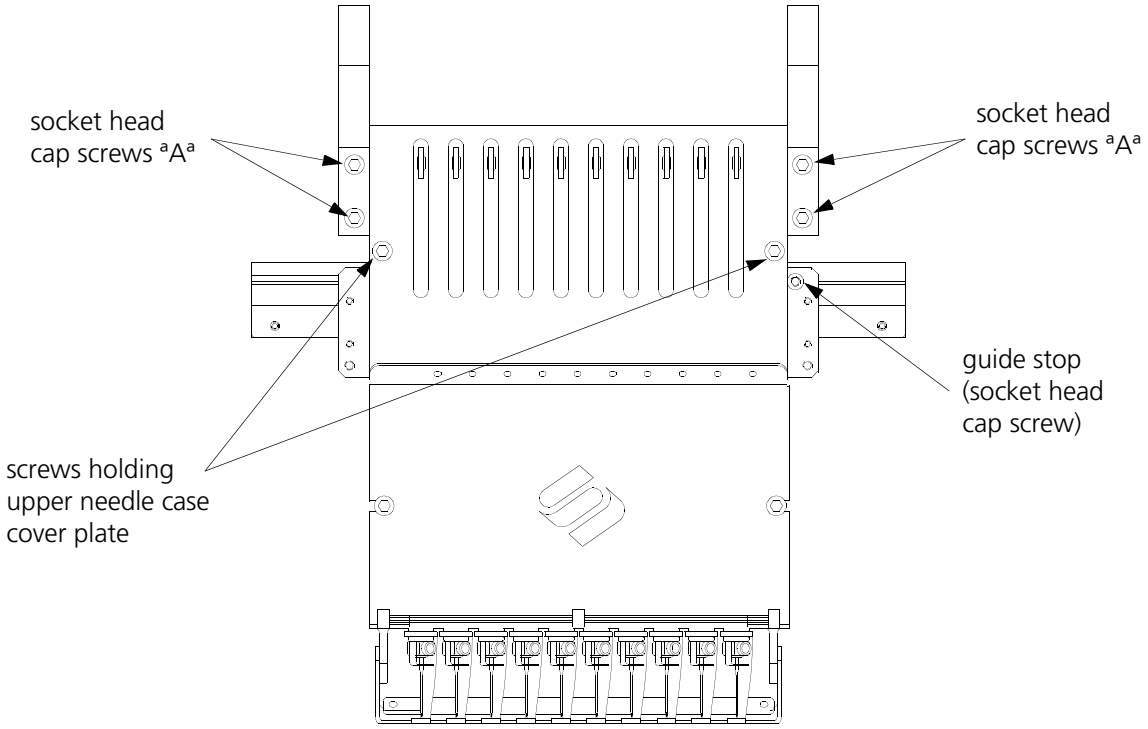


Figure 3-29

7. Refer to Figure 3-29 and install the 4 "A" socket head cap screws into the tensioner brackets and tighten them.

8. Grasp the needle bar which is above the needle plate and pull down until the needle just begins to enter the needle plate hole.

9. Check that the needle enters the needle plate hole in the center and does not come near the edges. If it is centered, replace all the covers.

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

Color Change Link Bar Adjustment (Needle Centering)

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

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

1. Remove lower front cover between the needle cases to access the color change link and attaching clamps.

2. With the needle case in place attach the color change link bars (refer to Figure 3-30). Tighten the top socket head cap screws on the bar clamps but do not fully torque them down. (Note that the lower cap screw holds the clamp to the needle case; the upper cap screw clamps the link bar.)

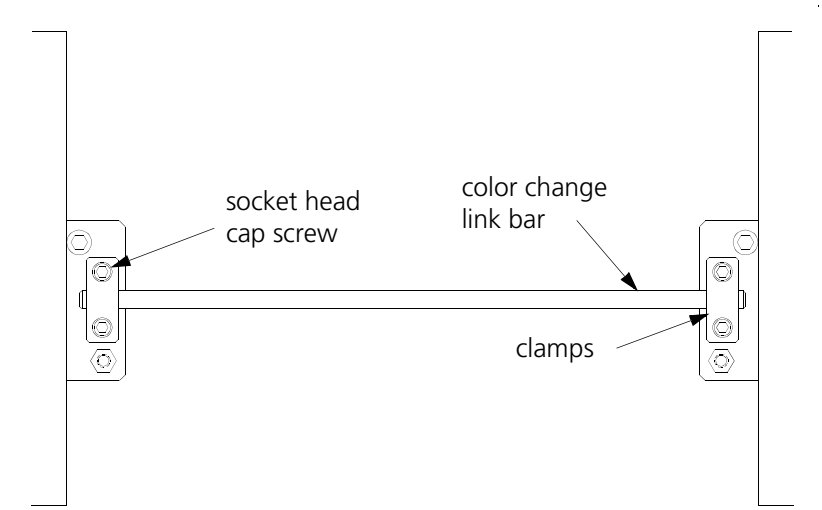


Figure 3-30

3. Deactivate the head to be adjusted by turning the head mode switch on the tensioner assembly panel to the OFF position. (Refer to the EMB 10/6T Operation Manual for more information on the head mode switch).

4. Turn the machine power ON.

5. Using the 7-button keypad, press   or   to move the needle cases to needle 5 or 6.

WARNING! USE CARE DURING THE NEXT STEPS TO AVOID INJURY.

6. Ensure the same needle position in each needle case is in approximate position directly over their respective needle plate holes.

7. Before checking for accurate needle centering replace the needle in the selected needle bar to ensure the straightness of the needle.

8. To check for proper needle center, manually push the selected needle bar down until the needle starts to enter the needle plate hole. The needle should be centered in the needle plate hole.

9. If the needle is not centered loosen the link bar clamp screws and carefully nudge the needle case from side to side until the needle is centered within the hole. Tighten the link bar clamp screws but do not torque them down.

10. Turn the head mode switch to AUTO.

11. Go to the Advanced Features menu and select Head Timing.

12. Select Bottom Dead Center to extend needles on all six heads.

13. Visually check the needle alignment within the needle plate hole. If the alignment is not correct, repeat steps 5 through 9.

14. If the needle alignment is acceptable, tighten the link bar clamp screws.

15. Check the remaining 5 heads, then replace all covers.

Lower Rail Retainer Adjustment

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

1. With the needle case installed, remove the grabber blade guide assembly from the bottom of the head to gain access to the screw under the lower rail retainer (shown in Figure 3-31).

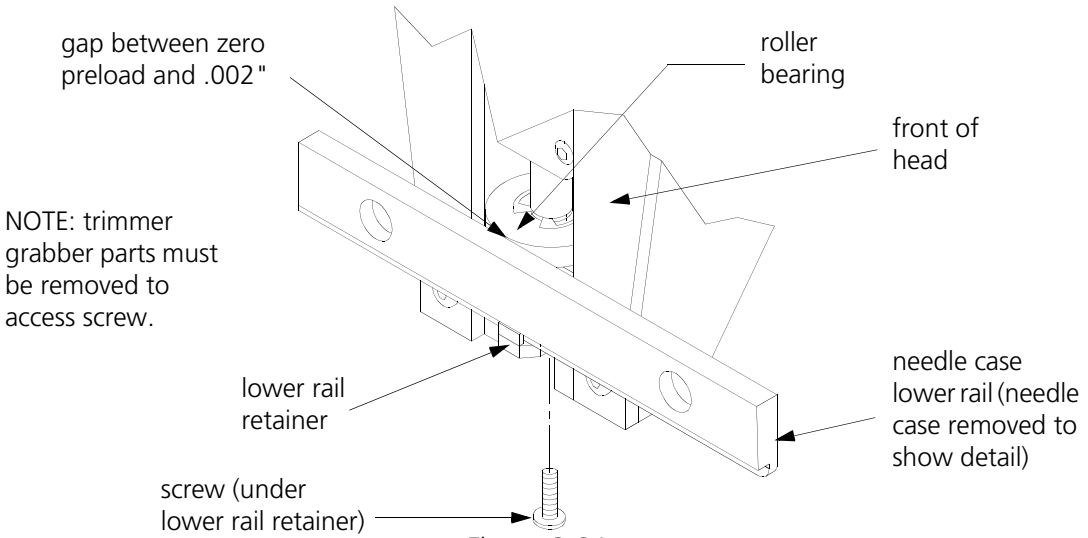


Figure 3-31

2. Loosen the lower rail retainer screw (see Figure 3-31) and push the retainer toward the rear to remove the play between the retainer and the lower rail of the needle case.

3. When the gap between the needle case bottom rail and the head roller bearing (as shown in Figure 3-31) is between zero preload and .002", tighten the screw under the lower rail retainer.

Jump Stitch Assembly Replacement

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

1. Remove the jump stitch motor harness from head node PCB.

2. Remove the four screws holding the jump stitch assembly into the left side of the head (see Figure 3-32).

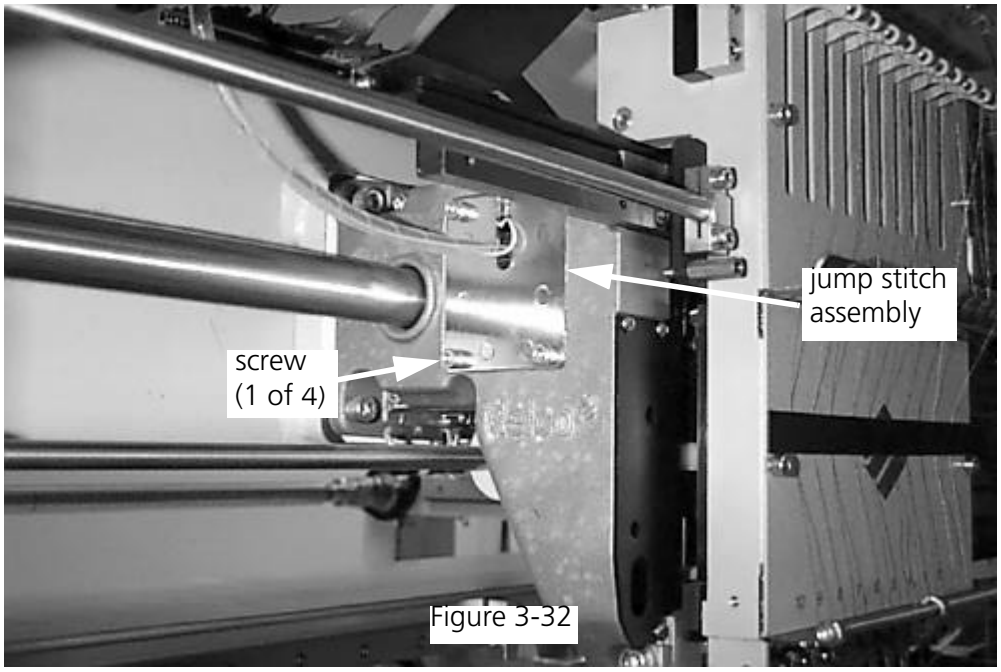


Figure 3-32

3. Remove the jump stitch assembly from the head.

4. Install the new jump stitch assembly into the head by carefully maneuvering it into position with the jump stitch lever to the right side of the jump stitch actuator tab (see Figure 3-33).

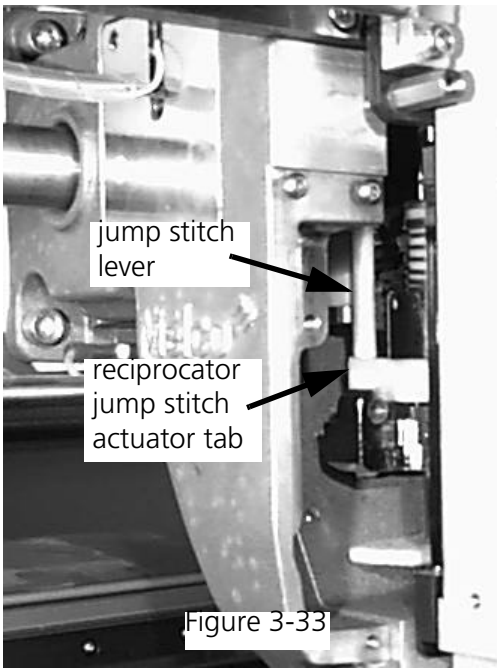


Figure 3-33

CAUTION! BE CERTAIN THE JUMP STITCH LEVER IS ON THE RIGHT SIDE OF THE JUMP STITCH ACTUATOR TAB ON THE RECIPROCATOR. IT IS EASIEST TO PERFORM THE INSTALLATION IF THE NEEDLE DRIVER IS IN THE "BOTTOM CENTER" POSITION.

5. Secure the new jump stitch assembly with the same four screws that were removed from the original assembly.

Grabber Motor and Belt Replacement

The grabber motor is mounted in the grabber drive assembly on the front of the beam just to the right of head number one.

NOTE: If replacing the belt only, perform steps 1 through 4 and disregard the remainder of this procedure. If replacing the motor only, go to step 5 and proceed with the remaining steps of this procedure.

1. Remove the grabber assembly cover by removing 4 screws and sliding the cover off to the right.

2. Refer to Figure 3-34 and loosen, but do not remove the grabber motor mounting screws.

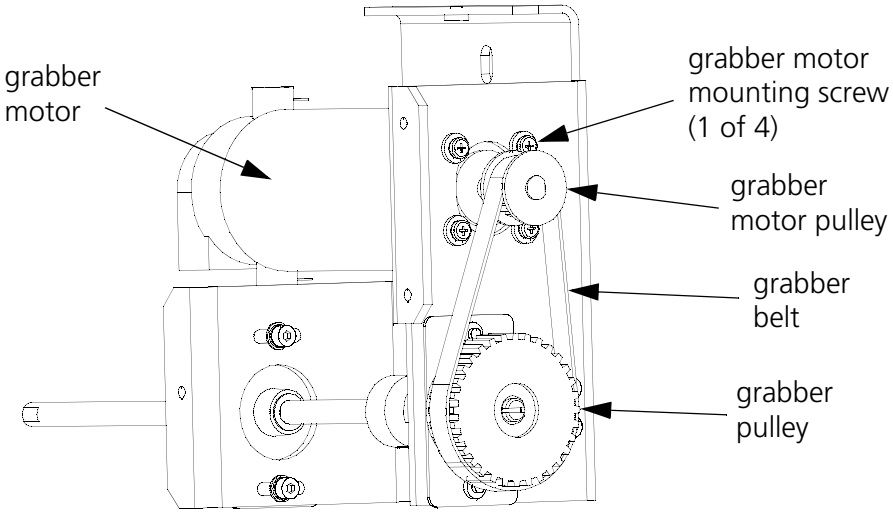


Figure 3-34

3. Slide the belt off the grabber pulley and then the motor pulley.

4. Install the belt in reverse order of the previous steps.

5. Refer to the grabber motor belt tensioning procedure following this procedure.

6. If replacing the motor, make note of the harness wiring orientations, then disconnect the electrical connections to the motor and encoder.

7. Remove the grabber motor mounting screws and remove the belt.

8. The motor is now loose and may be removed.

9. Note the position of the motor drive pulley, then loosen the pulley set screws and remove the motor drive pulley.

10. Position the drive pulley in the same location on the shaft of the new motor as you noted in the previous step and tighten the set screws.

10. Reverse the preceding steps to replace the motor, orienting the harness wiring associated with the motor at the locations as noted in the removal step.

Grabber Motor Belt Tension

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

1. Refer to the procedure for using the Breco Belt Tensioner in Addendum A and measure the grabber motor belt tension. The tension should be **145** +/- 5 units with the Breco Belt Tensioner.

2. Adjust the grabber motor belt tension by loosening the four grabber motor mounting screws (see Figure 3-34) and moving the motor to make the belt more or less taut. When tightening the belt tension, use hand pressure only on the motor. No additional force is needed.

3. Again measure the tension and repeat adjusting the motor position until the reading on the Breco Belt Tensioner is **145** +/- 5 units.

4. Tighten the four (4) grabber motor mounting screws and check all other hardware for tightness.

5. Reattach any covers removed for this procedure.

Grabber Blade Replacement

1. Rotate the grabber assembly until the mounting screw shows in the slot on the back of the grabber housing.

2. Remove the mounting screw and pull out the old, damaged, or broken grabber blade (see Figure 3-35).

3. Inspect the new grabber blade. One side has a smooth and shiny surface over the entire length. The surface of the other side has about half shiny and smooth and the other half is a dull etched surface.

4. With the side with the half etched surface facing down, slide the new grabber blade through the Velcro wiper and lower guide; and into the grabber housing.

5. Continue to slide the blade into the housing and allow it to form around the sprocket until the hole in the blade lines up with the mounting hole.

6. Install the mounting screw but do not tighten.

7. Since the mounting hole is larger than the screw threads, pull out gently on the blade while tightening the mounting screw. This secures the grabber blade at the edge of the hole closest to the end of the blade.

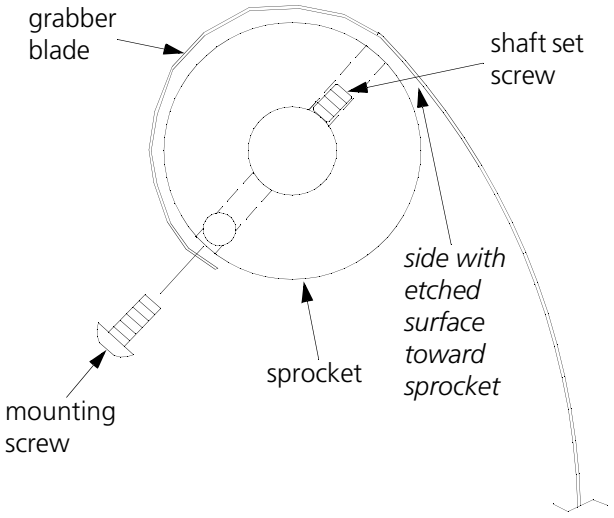


Figure 3-35

Grabber Replacement

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

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

WARNING! FAILURE TO FULLY DISCONNECT THE POWER SOURCE MAY RESULT IN PERSONAL INJURY AND MAY DAMAGE THE EQUIPMENT!

2. Isolate which grabber assembly is defective and loosen the shaft couplings on either side, referring to Figure 3-36. Slide the couplings back onto the "non-removed" shaft ends.

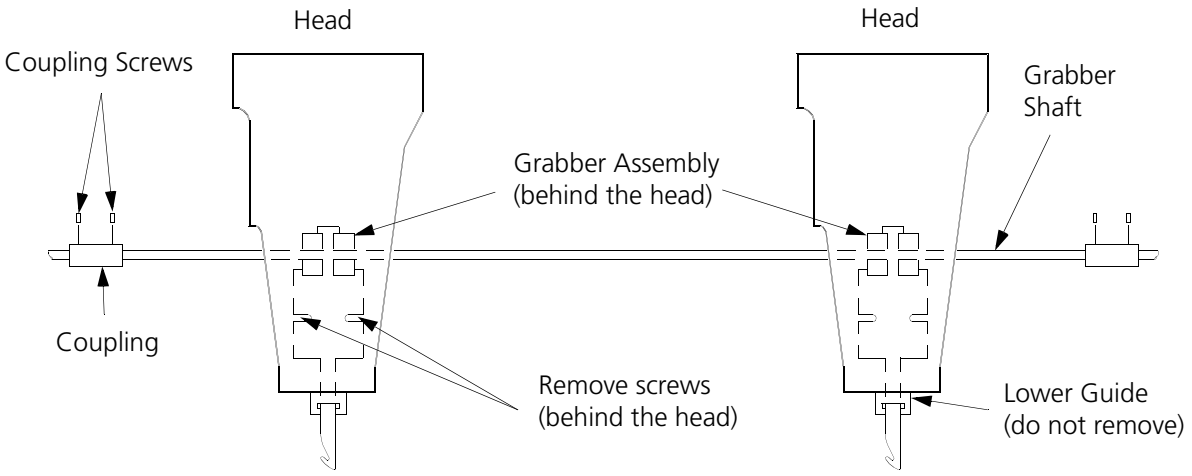


Figure 3-36

3. Turn the shaft clockwise by hand to fully retract the grabber blades. The blades should pull free of the lower guide blocks.

4. Remove the four screws holding the two grabber assemblies to the heads.

5. Remove the shaft with both grabber assemblies still attached.

6. On the defective grabber assembly, pull the grabber blade outward until the set screw holding the assembly to the shaft is visible (refer to Figure 3-35).

7. Loosen the set screw and slide the defective grabber assembly off the shaft.

8. Slide the replacement grabber assembly onto the shaft, making certain it is oriented the same way as the other assembly.

9. Pull the grabber blade outward to reveal the set screw hole (see Figure 3-37). Align the hole over the "flat" portion of the shaft and insert the set screw. Snug the set screw but do not fully tighten it.

10. Set the shaft and grabber assemblies into place behind the heads. Be certain the grabber blades are inserted and aligned in the lower guides.

11. Position the "non-replaced" grabber over its mounting holes and insert the two mounting screws.

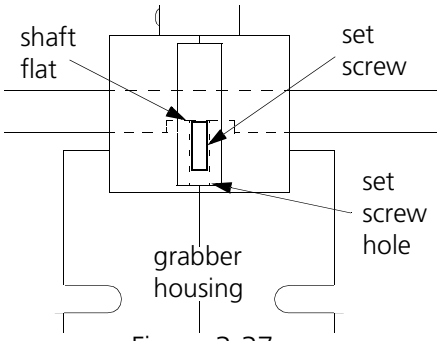


Figure 3-37

12. Gently slide the new grabber back and forth until it is correctly aligned with its mounting holes and insert its screws as well.

13. Turn the grabber shaft clockwise until the grabber blades are full extended and the set screw hole is revealed. Tighten the set screw.

14. Align the "flat" portions at both ends of the shaft with the flat portions of the neighboring shafts. Reattach both couplings, making certain that all 6 grabber blades are extending the same distance through the lower guides. Tighten the coupling set screws.

Grabber Disassembly

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

1. Remove the self-tapping screw that holds the two grabber housing halves together at the top (see Figure 3-38).

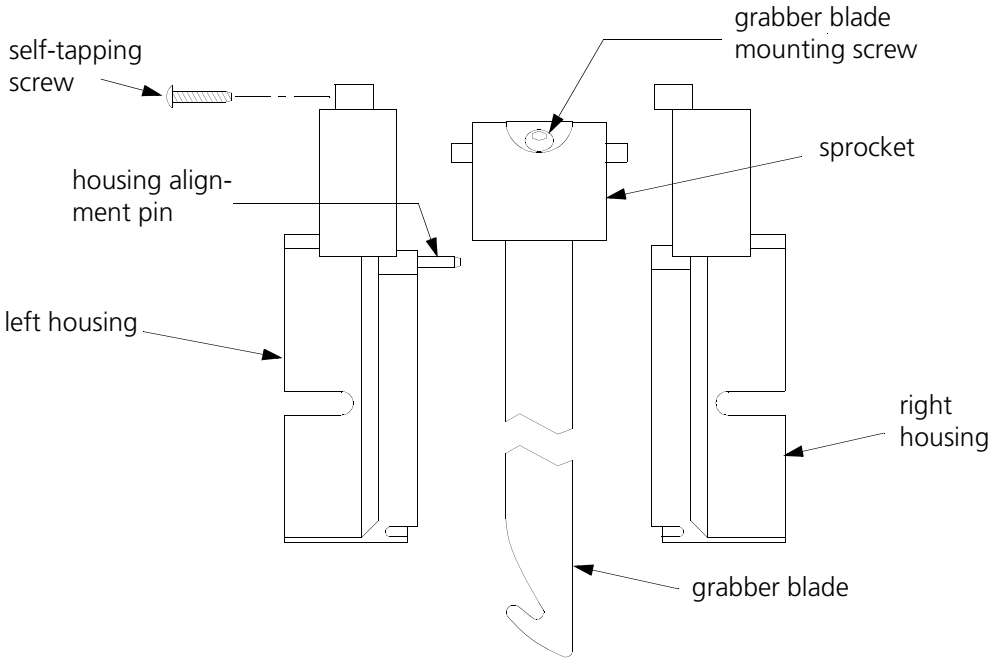


Figure 3-38

2. Grasp the grabber housing in both hands and gently but firmly rock the two halves back and forth until the two pieces begin to separate.

3. Pull the two halves apart, being careful not to drop any of the internal pieces.

4. Replace any broken or damaged parts as required.

5. Gently press the assembly back together, using care to guide the grabber blade inside the housing slots and the alignment pin into its associated hole.

6. Install the self-tapping screw at the top of the two housing pieces.

7. The grabber blade should extend and retract smoothly without any binding or rough movement.

Grabber Home Adjustment

When the system is fully retracted the grabber home flag is positioned inside the grabber home sensor mounted on the grabber assembly bracket. At this time the hook portion of each grabber blade just about to enter the grabber blade guide as shown in Figure 3-39. To set grabber home refer to the following:

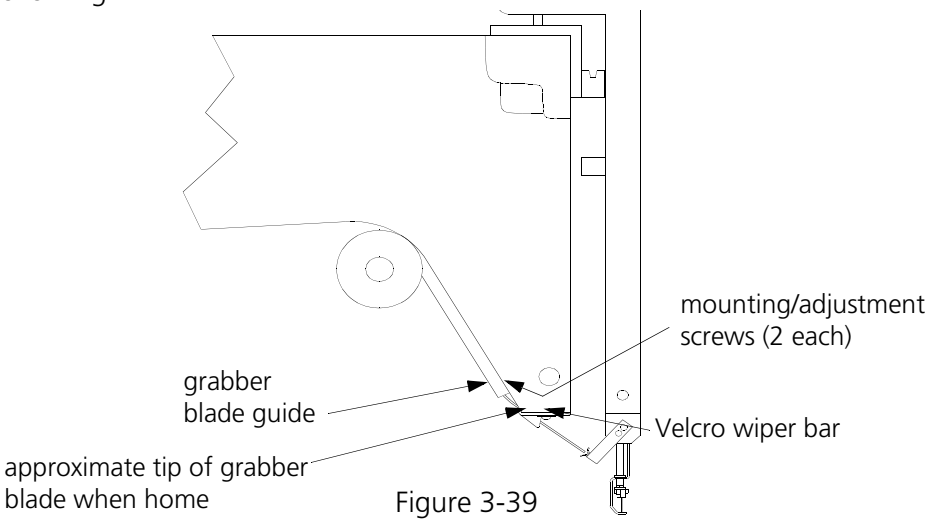


Figure 3-39

1. At the screwdriver slot in the shaft at the right side of the grabber drive assembly, rotate the grabber drive shaft clockwise until it mechanically stops. The grabber blades are fully retracted as described in the previous statement.

2. Slightly rotate the shaft counterclockwise just enough to move it away from the mechanical stop position.

3. Loosen the grabber home flag and position the rear edge of the flag into the sensor until the grabber section of service menu on the monitor indicates it is at the home position.

4. Be certain the flag is not touching the sensor walls, then tighten the grabber home flag.

5. Each grabber blade must pass through the center of the wiper (two pieces of Velcro mounted in a metal bracket). Adjustment is accomplished by loosening the screws on the front of the grabber mount and positioning the blade to pass through the center of the wiper.

Color Change PCB Replacement

The color change PCB is mounted in the color change drive assembly on the front of the beam between head numbers two and three. To access the area you must remove various associated tensioner covers.

1. Move the needle cases to needle position #1.

2. Remove the cover under the E-stop switch assembly panel between heads two and three, then remove the E-stop switch assembly panel.

3. Locate the color change PCB mounted in the base of the color change assembly frame (see Figure 3-40).

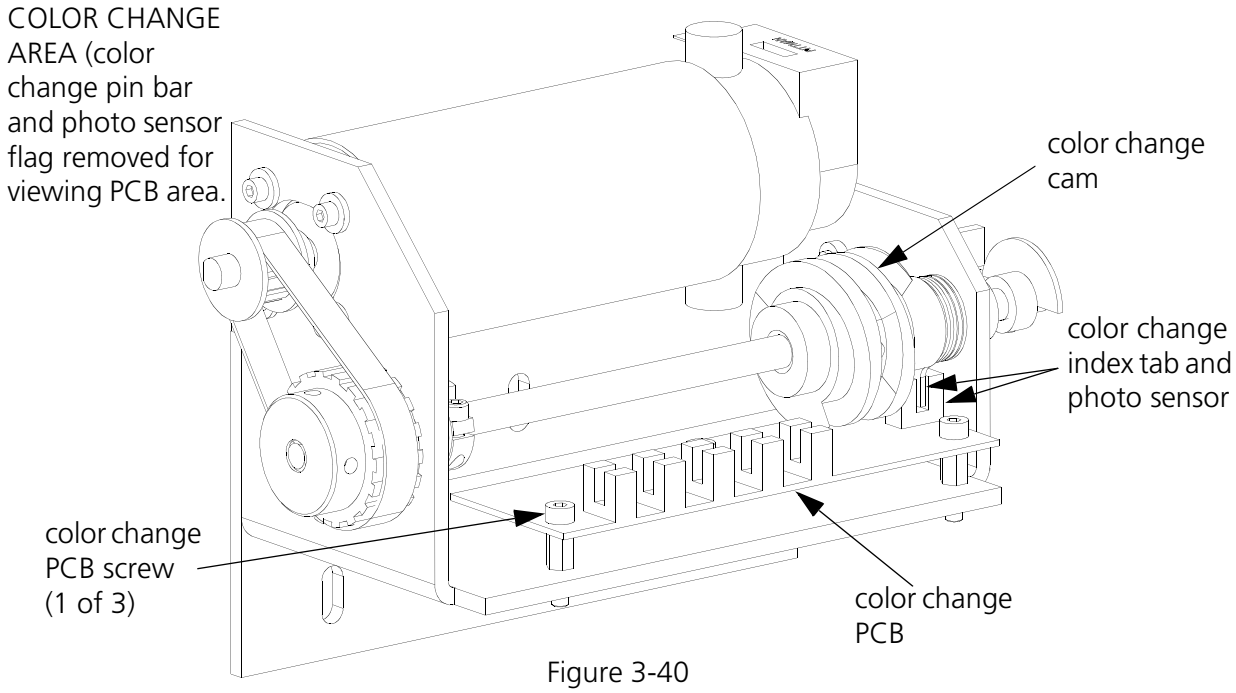


Figure 3-40

4. Disconnect the color change harness from the color change PCB.

5. From above the color change assembly, loosen and remove the three screws holding the color change PCB to the standoffs in the base of the color change assembly frame.

6. Rotate the color change cam slightly to move the color change index tab out of the photo sensor on the color change PCB.

7. Using care not to damage any sensors, slowly slide the color change PCB directly out the front of the assembly.

8. Refer to the previous steps in reverse order and carefully install the new color change PCB.

9. Use care in positioning the new color change PCB to be certain the color change index and needle position indicator flags do not damage any sensors during color change operation. Tighten the PCB screws.

Color Change Motor and Belt Replacement

The color change motor is mounted in the color change drive assembly on the front of the beam between head numbers two and three. To access the area you must remove various associated tensioner covers

NOTE: If replacing the belt only, perform steps 1 through 6 and disregard the remainder of this procedure. If replacing the motor, go to step 7 and proceed with the remaining steps of this procedure.

1. Move the needle cases to needle position #1.

2. Remove the cover under the E-stop switch assembly panel between heads two and three, then remove the E-stop switch assembly panel.

3. Locate the color change motor and loosen, but do not remove the color change motor mounting screws (see Figure 3-41).

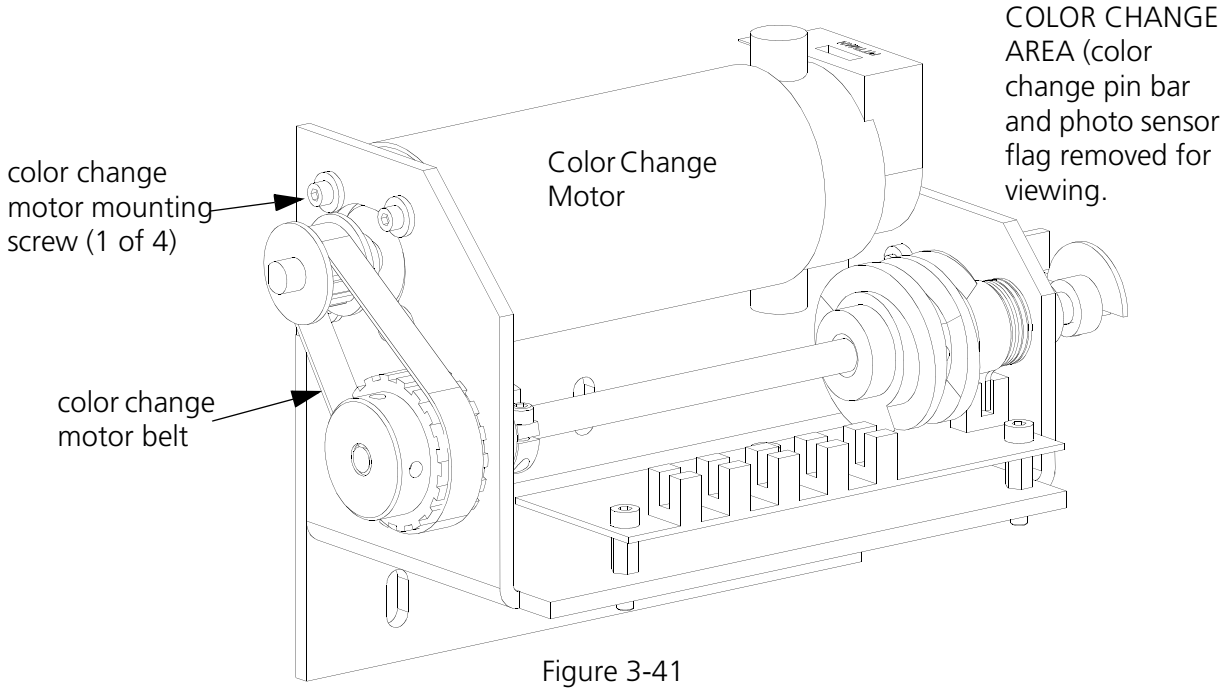


Figure 3-41

4. Slide the belt off the motor pulley and drive shaft pulley.

5. Position the new belt onto the pulleys of the previous step.

6. Refer to the color change motor belt tensioning procedure following this procedure.

7. If replacing the motor, make note of the harness wiring orientations, then disconnect the electrical connections to the motor and encoder.

8. Remove the color change motor mounting screws and remove the belt.

9. The motor is now loose and may be removed.

10. Note the position of the motor drive pulley, then loosen the pulley set screws and remove the motor drive pulley.

11. Position the drive pulley in the same location on the shaft of the new motor as you noted in the previous step and tighten the set screws.

12. Reverse the preceding steps to replace the motor, orienting the harness wiring associated with the motor at the locations as noted in the removal step.

Color Change Motor Belt Tension

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

1. Ensure the grabber drive belt is properly tensioned before tensioning the grabber motor belt. Refer to the Grabber Drive Belt Tension procedure later in this section and adjust the tension as needed.

2. Refer to the procedure for using the Breco Belt Tensioner in Addendum A and measure the grabber motor belt tension. The tension should be **180** +/- 5 units with the Breco Belt Tensioner.

3. Adjust the grabber motor belt tension by loosening the four (4) grabber motor mounting screws and moving the motor to make the belt more or less taut. When tightening the belt tension, use hand pressure only on the motor. No additional force is needed.

4. Again measure the tension and repeat adjusting the motor position until the reading on the Breco Belt Tensioner is **180** +/- 5 units.

4. Embroidery Bed

General

This section provides parts replacement procedures and adjustments required during repair and maintenance of the Embroidery Bed Assembly and associated areas. This section consists of each of the 6 bed assemblies which includes the bobbin shaft drive and rotary hook area, thread trimmers, picker system, and under thread control devices, as well as the bed node interface electronics.

These procedures are guidelines for performing repairs and must be used by personnel practicing good maintenance and repair techniques. Refer to the Repair 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!

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.

2. Remove the needle plate, rotary hook cover, and bobbin case.

3. With the machine ON and with the Main screen showing on the monitor, click the Advanced button and then the Service button to get to the Service menu.

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

5. Locate the screw that is visible on the right side of the hook assembly as shown in Figure 4-1. Loosen this screw one or two turns.

6. In the Z Position section of the Service menu, enter 60 in the text field and click the right arrow (>>) button. The hook should rotate to the position where the second screw is visible, also as shown in Figure 4-1. Loosen this screw one or two turns.

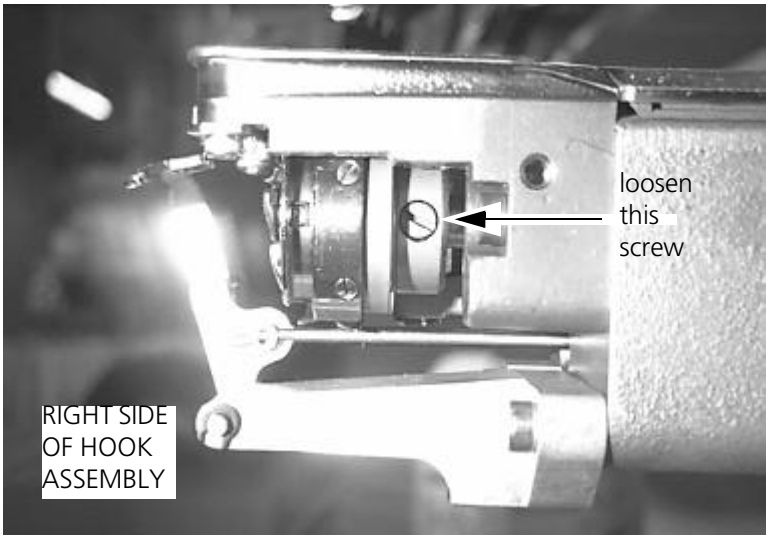


Figure 4-1

7. Click the right arrow (>>) button again and the third screw will become visible. Depending on the type of hook, this screw may be protruding from a flat surface on the hook. Loosen this screw one or two turns. The hook assembly is now free on the shaft.

8. Remove the two screws holding the UTC assembly; and allow it to suspend from its cable off the right rear edge of the needle plate bracket.

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

10. Click the Headup button in the Head Timing section of the Service menu to again rotate the head to Head Up.

11. Click the Bottom Center button. The head rotates to the “Needle Depth” position and the Z Position shows approximately 185.0.

12. Click the Hook Timing button and the head rotates to the “Hook Timing” position. The Z Position shows approximately 203.0.

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

14. Align the hook point to the approximate hook timing position as shown in Figure 4-2.

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

16. Refer to Figure 4-2 for aligning the hook point to the needle.

    At the same time, refer to Figure 4-3 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).

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

18. Install the UTC assembly with the retaining finger tab inside the rotary hook bobbin basket notch. Install the screws.

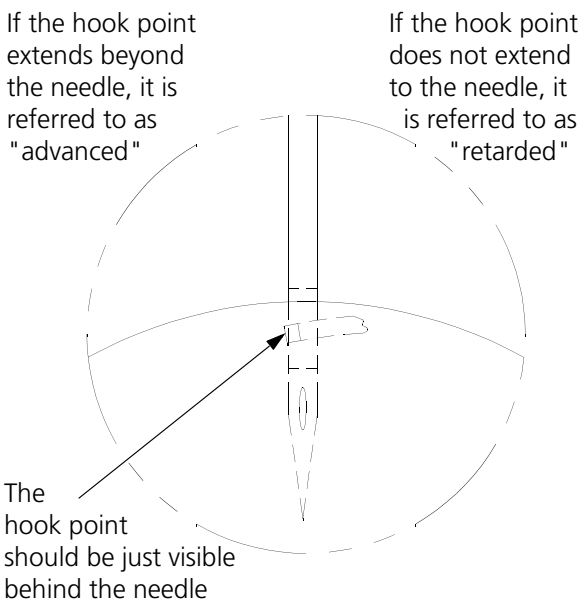


Figure 4-2

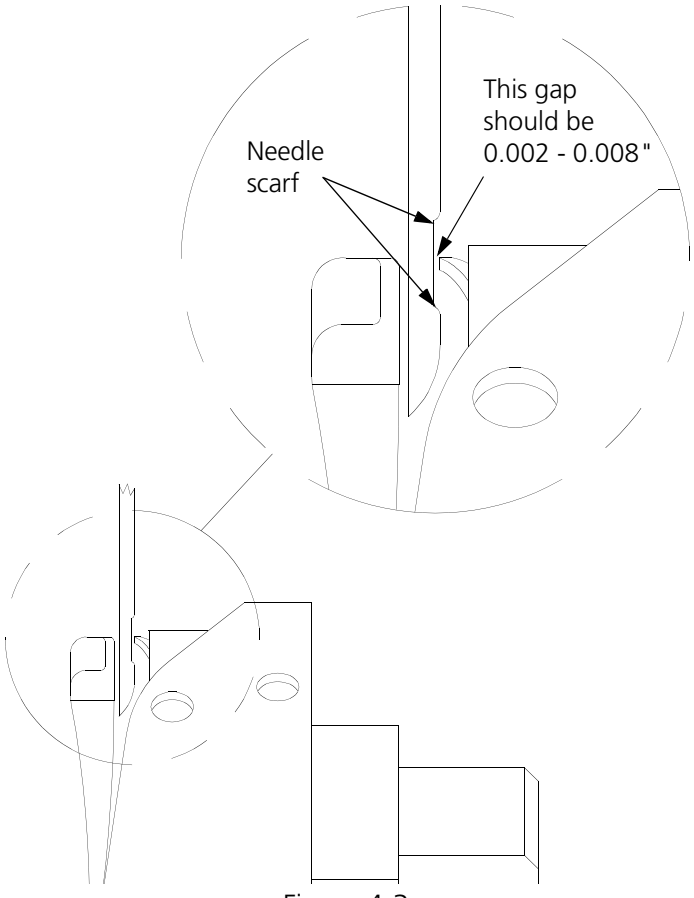


Figure 4-3

Adjust The UTC Assembly

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

19. Place the UTC Combination Gauge (p/n 009027-01) from the operator kit between the retaining tab of the UTC and the notch in the hook basket (see Figure 4-4). The gauge should fit with no restriction, nor with too much play (gap should be .020" - .040").

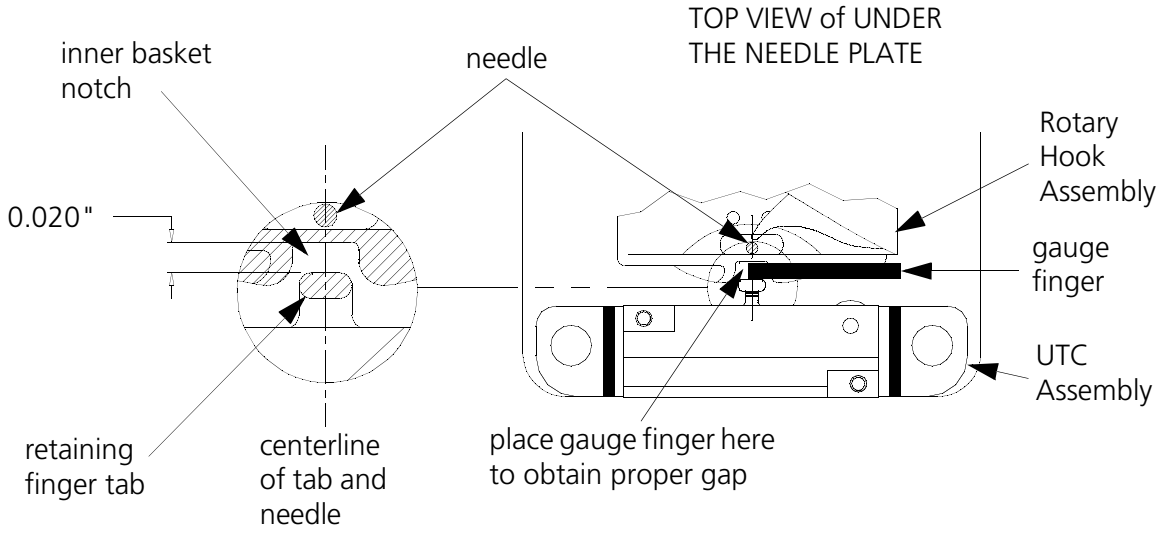


Figure 4-4

20. Move the assembly against the UTC combination gauge and at the same time, align the center of the tab to the center of the needle.

21. Tighten the UTC assembly mounting screws, then remove the UTC combination gauge.

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

23. With the correct gap between the retaining tab of the UTC and the basket of the hook verified with the UTC combination gauge, check for a clearance of between 0.008 to 0.012 inches between the UTC detection arm (shown in Figure 4-5) and the needle.

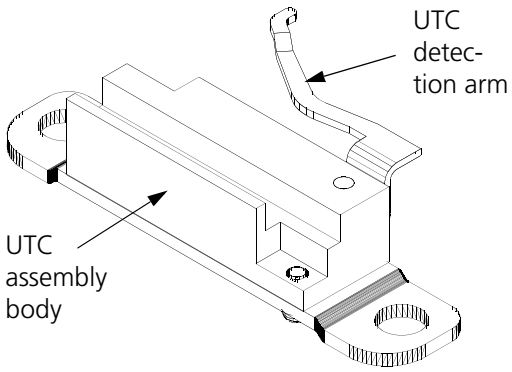


Figure 4-5

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

24. Slightly loosen the two small screws on the underside of the UTC assembly shown in Figure 4-6.

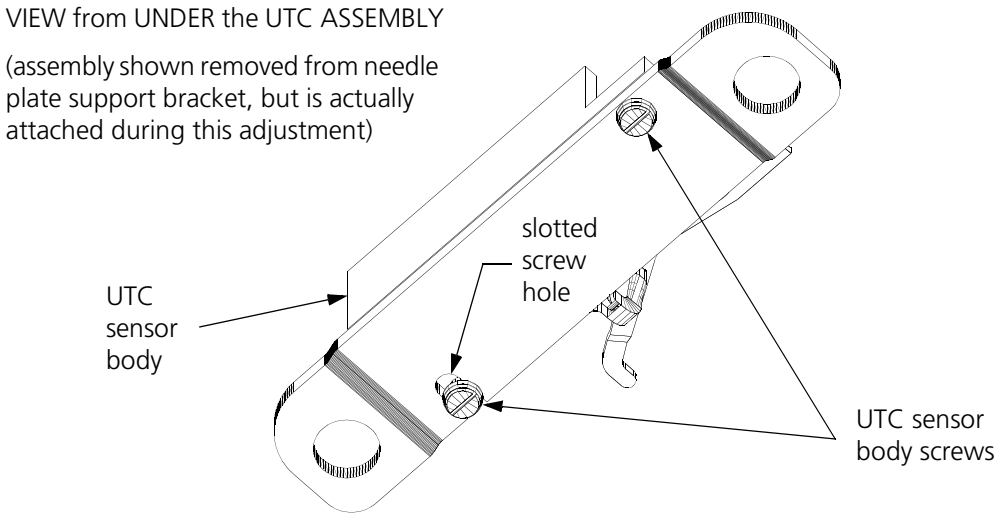


Figure 4-6

25. Move the UTC assembly to set the distance between the needle and the detection arm to between 0.008 and 0.012 inches.

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

Needle Depth

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

27. Remove the lower needle case cover (see Figure 4-8).

28. With the machine ON and with the Main screen showing on the monitor, click the Advanced button and then the Service button to get to the Service menu.

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

30. After the head rotates one revolution, grasp the presser foot and pull down until the needle bar catches securely. At this time the presser foot will be about 1/4 inch from the needle plate.

31. Click the Bottom Center button. The head rotates to the "Needle Depth" position and the Z Position shows approximately 185.0. The needle has reached its lowest point.

32. Look directly into the hook assembly and check the location of the needle's eye compared to Figure 4-7. The eye should be just out of view from the bobbin opening. Therefore, none of the needle's eye should be visible.

    If the needle's eye is in the acceptable range, skip the next few steps and go to Step 41.

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

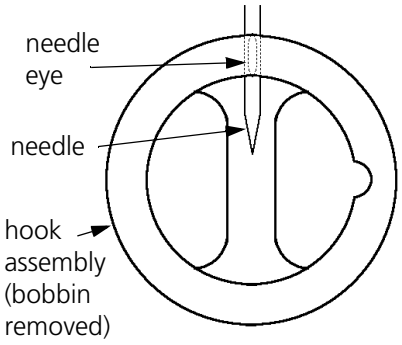


Figure 4-7

33. Loosen the needle bar clamp screw (silver clamp) shown in Figure 4-8.

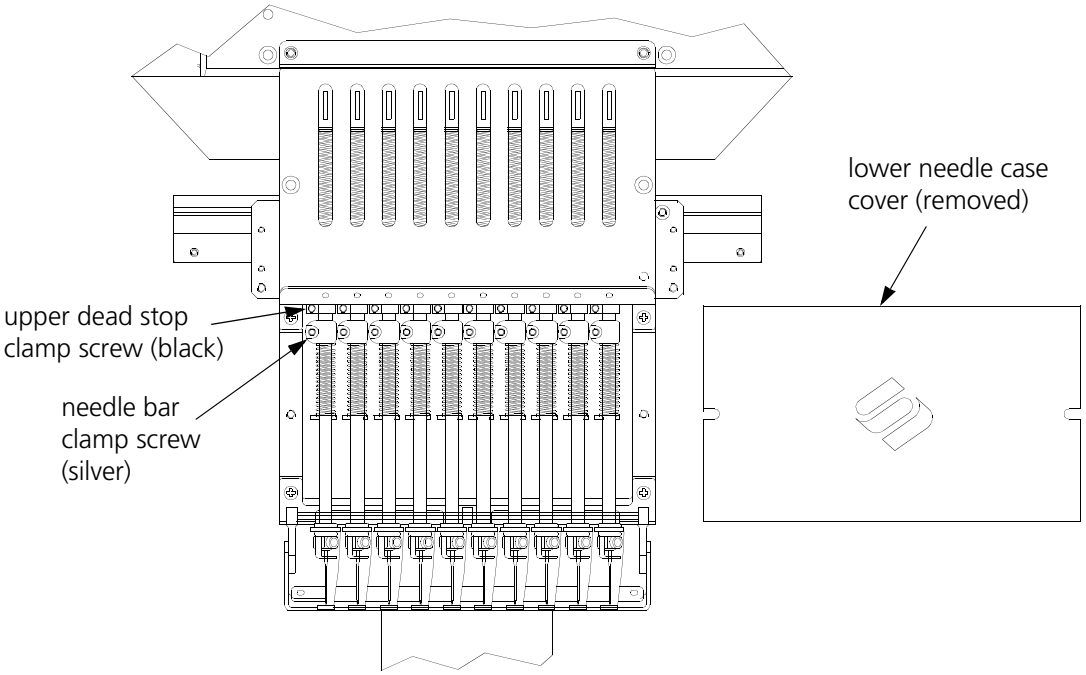


Figure 4-8

34. 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.

35. Retighten the needle bar clamp screw.

36. 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).

37. Click the Top Center button. The head rotates to the "Top Dead Center" or 'full needle up' position.

38. 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.

39. Click the Headup button. The head rotates to the "Head Up" position and the Z Position shows approximately 110.0.

40. Repeat steps 30 through 32 to check the needle depth and that there is no restriction to head rotation.

41. Repeat the needle depth adjustment for the remaining needles.

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

42. Replace the lower needle case cover.

43. Go to the UTC Adjustment procedure located on page 4-29 in this Chapter of the manual to make the fine adjustments for the UTC assembly.

44. After the fine adjustments are set with the UTC, replace the needle plate, rotary hook cover, and bobbin case; and return the machine to its operational state.

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 table top to the lower position.

2. Remove the needle plate, rotary hook cover, and bobbin case.

3. With the machine ON and with the Main screen showing on the monitor, click the Advanced button and then the Service button to get to the Service menu.

4. Refer to the Needle Depth procedure that immediate precedes this procedure and perform the steps numbered 29 through 42, then return to Step 5.

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

6. Click the Bottom Center button. The head rotates to the "Needle Depth" position and the Z Position shows approximately 185.0.

7. Click the Hook Timing button and the head rotates to the "Hook Timing" position. The Z Position shows approximately 203.0.

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

9. Check to see if hook timing is correct before you proceed. You must check the hook point's alignment with the needle, and you must check the gap. Refer to Figure 4-9 to check the alignment to the needle. Refer to Figure 4-10 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".

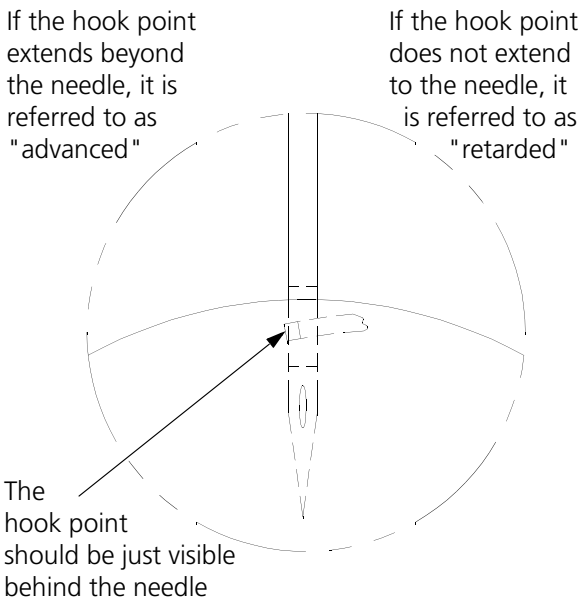


Figure 4-9

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

10. While the hook is still in the HOOK TIMING position, color the screw on the RIGHT side of the hook (see Figure 4-11) with a felt-tipped marker.

    DO NOT LOOSEN THIS SCREW AT THIS TIME.

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

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

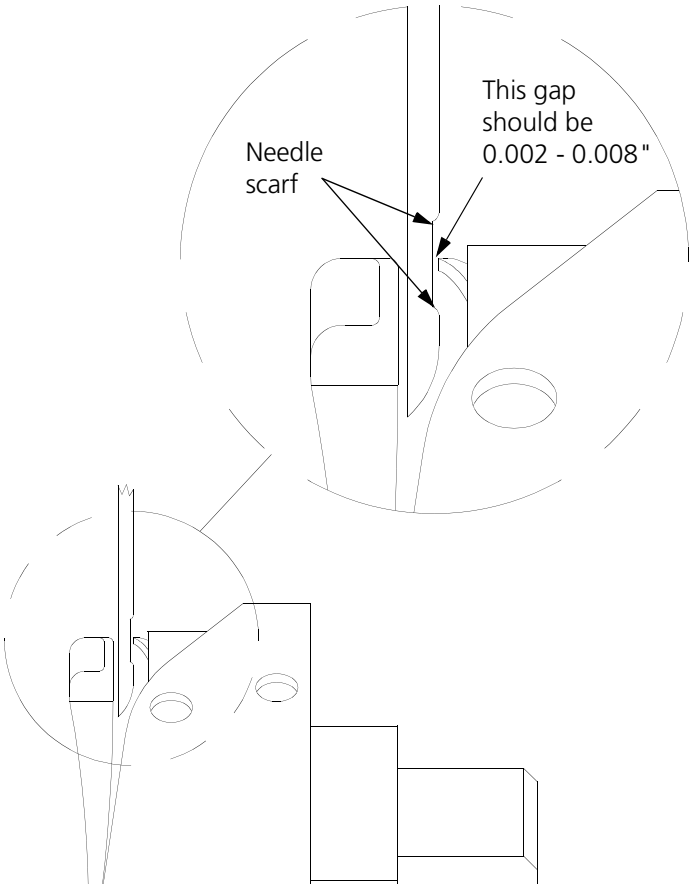


Figure 4-10

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

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

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

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

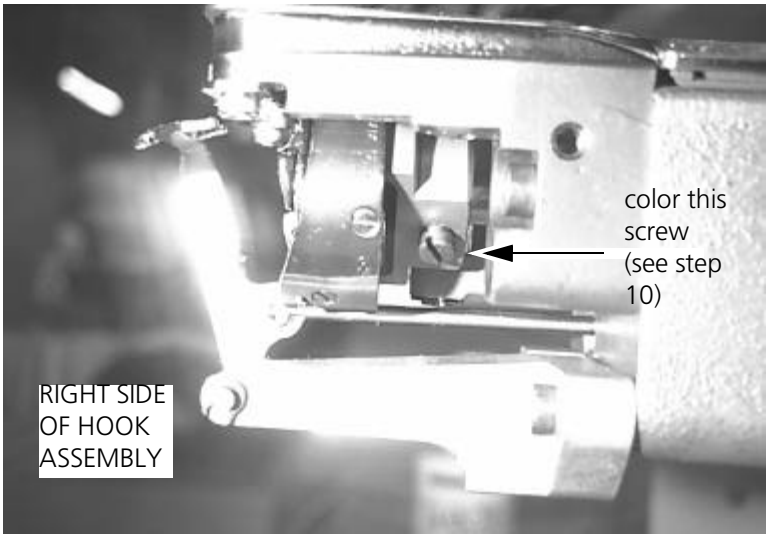


Figure 4-11

17. Line the hook up in the approximate HOOK TIMING position (refer to Figures 4-9 and 4-10).

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

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

20. Tighten the colored hook screw and check that the setting is correct as shown in Figures 4-9 and 4-10).

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

UTC Adjustments

22. Refer to the UTC and Needle Depth adjustments on Pages 4-4 through 4-7.

23. After setting the UTC adjustments replace the needle plate, rotary hook cover, and bobbin case; and return the machine to its operational state.

Trimmer Maintenance

General

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

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

WARNING! FAILURE TO PRACTICE GOOD MAINTENANCE AND REPAIR TECHNIQUE MAY RESULT IN INJURY TO PERSONNEL PERFORMING THE WORK, AND DAMAGE TO THE EQUIPMENT!

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

Trimmer System

Although the trimmer system for the EMB 10/6T is assembled and thoroughly tested before the machine is shipped, there are a few things to be aware of to help prevent problems.

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

Sequence of Trim Events

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

1. While embroidering a design, the trim function is initiated when the embroidery machine detects the design code for: a color change, a trim, a set number of consecutive jump stitches, or the end of design.

2. The embroidery heads will slow to about 80 stitches per minute, which is the speed range for the trimming action.

3. The picker engages with the current thread loop as it is being formed in the hook and bobbin area. This process is required to provide the correct length for restarting embroidering next time this thread color is used.

4. The movable knife comes forward to the ready state for trimming. During its forward movement, it separates the top thread from the thread that is looped around the hook. It is here where it "selects" the top thread and bobbin thread for trimming.

5. When the movable knife returns to the "home" position, the selected threads will be cut between the movable knife and the adjustable fixed knife.

6. At approximately the same time the threads are being cut, the grabber reaches out from behind the needle area and "grabs" the cut top thread (called the tail), pulling it up and into the Velcro wiper strip.

7. After the thread is cut and the tail is grabbed, the beam moves a small distance away from the current location and back again to insure the tail has been completely removed from the embroidery material.

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

Trimmer Replacement Procedures

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

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

Picker Replacement

To replace a defective picker, refer to Figure 4-12 and the following steps:

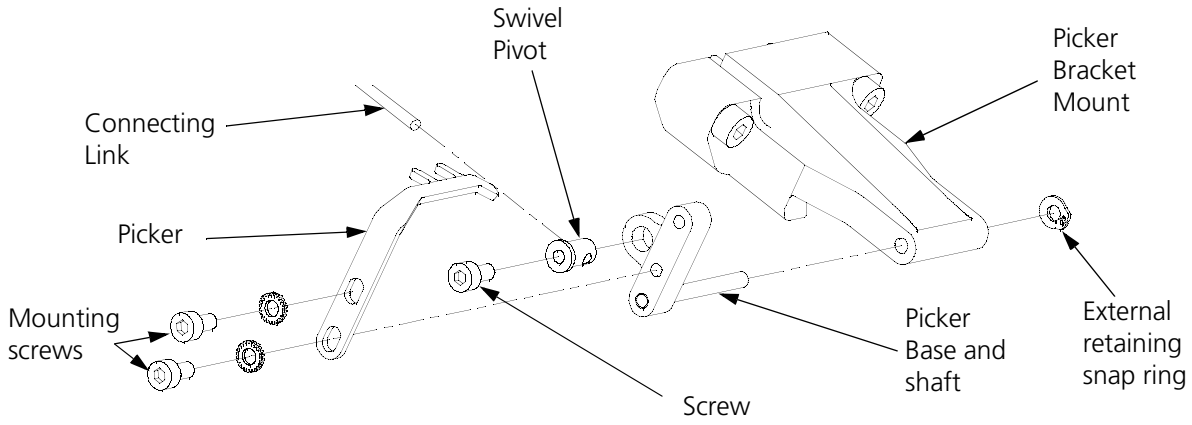


Figure 4-12

1. Remove the two mounting screws, locking washers, and defective picker.

2. Install a new picker and attach it to the picker base with the removed screws and locking washers.

3. Refer to the picker adjustment procedures found in the Trimmer Setup And Adjustments section found later in this chapter of the manual.

If other parts in the picker assembly need to be replaced refer to Figure 4-12 and the following steps:

4. Remove the 2 screws holding the needle plate. Remove the needle plate.

5. Disconnect the picker link from the picker base by loosening the screw inside the swivel pivot of the picker base.

6. Remove the external retaining ring at the right end of the picker base shaft.

7. Slide the picker base assembly out of the picker bracket mount.

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

Movable Knife

1. Remove the screws holding the needle plate. Remove the needle plate.

2. Remove the five screws holding the bed cover. Remove the cover.

3. Lift the forward end of the connecting link from the pin on the movable knife drive arm (see Figure 4-13).

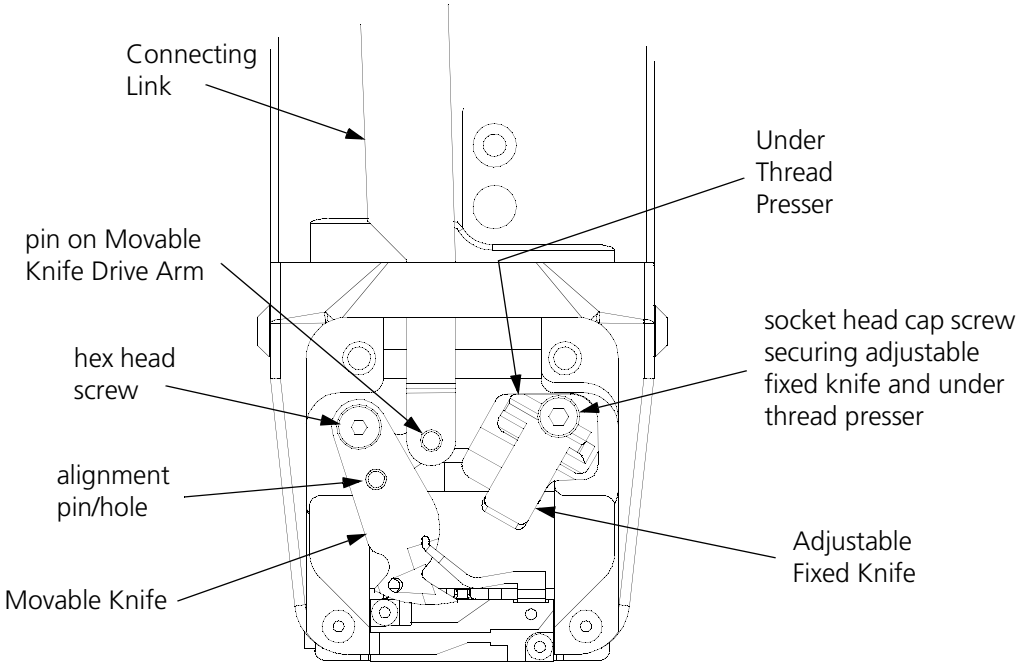


Figure 4-13

4. Push the movable knife all the way back until it stops.

5. By rotating counter clockwise, loosen the hex head screw holding the movable knife to the top of the knife drive arm.

6. Rotate the movable knife out of the adjustable fixed knife, then remove the hex head screw and the movable knife.

7. Place the new movable knife on the top of the knife drive arm, positioning the alignment hole in the knife over the alignment pin in the arm.

8. Apply Loctite 222 screw adhesive (or equivalent) and install the hex head screw and snug it with your fingers.

9. Rotate the knife and arm clockwise until the back side of the knife is resting against the left side of the needle plate mounting bracket, then tighten the hex head screw.

10. After replacing a movable knife refer to the trimmer adjustment procedures later in this chapter for the adjustable fixed knife.

Adjustable Fixed Knife/Under Thread Presser

1. Remove the screws holding the needle plate. Remove the needle plate.
2. Remove the screws holding the bed cover. Remove the cover.
3. Lift the forward end of the connecting link from the pin on the movable knife drive arm (see Figure 4-13).
4. If the movable knife is positioned under the adjustable fixed knife and under thread presser, rotate it forward to move it from under that area.
5. Remove the socket head cap screw securing the adjustable fixed knife and under thread presser to the top of the needle plate bracket.
6. Remove the adjustable fixed knife and the under thread presser.
7. Replace the required new parts.
8. Install the socket head cap screw to secure the adjustable fixed knife and the under thread presser. Snug the cap screw until the parts are held securely. Do not over tighten.
9. After replacing an adjustable fixed knife or under thread presser, refer to the trimmer adjustment procedures later in this chapter for the adjustable fixed knife.

Movable Knife Drive Arm

1. Remove the screws holding the needle plate. Remove the needle plate.
2. Remove the screws holding the bed cover. Remove the cover.
3. Lift the forward end of the connecting link from the pin on the movable knife drive arm (see Figure 4-13).
4. Refer to Figure 4-14 and remove the external retaining ring from the bottom of the movable knife drive arm. (Also see Figure 4-20 for retaining ring reference.)
5. Once this retaining ring is removed, the arm shaft is free to be remove out of the top of the needle plate bracket.

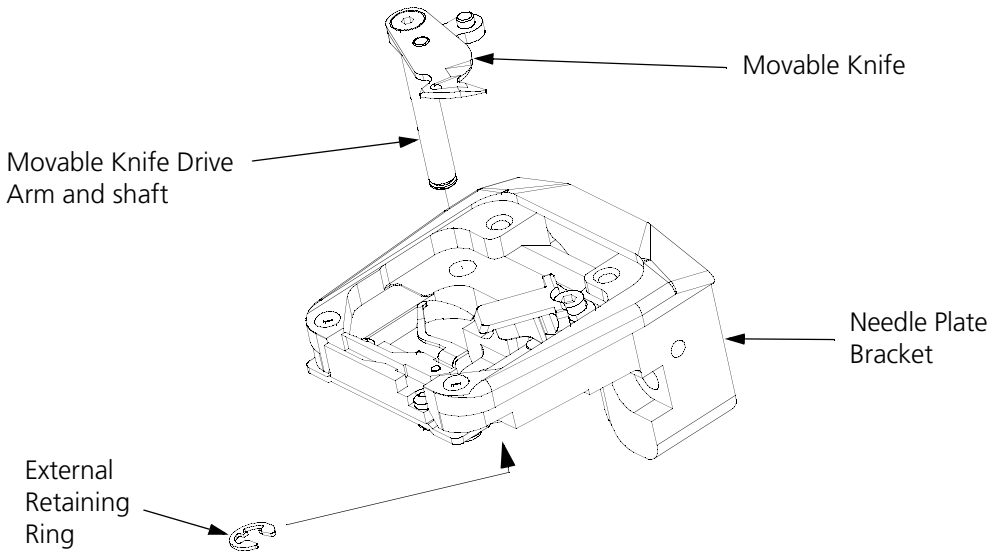


Figure 4-14

UTC Replacement

1. With the machine in the head up position, turn the power switch OFF.

2. Remove the table top insert from the machine to access the Hook and UTC area.

3. Remove the needle plate and bed cover. Remove the connecting link from the moveable drive arm and needle plate bracket.

4. Disconnect the sensor cable from the harness inside the bed and remove the cable through the slot in the needle plate bracket where the connecting link was located (see Figure 4-15).

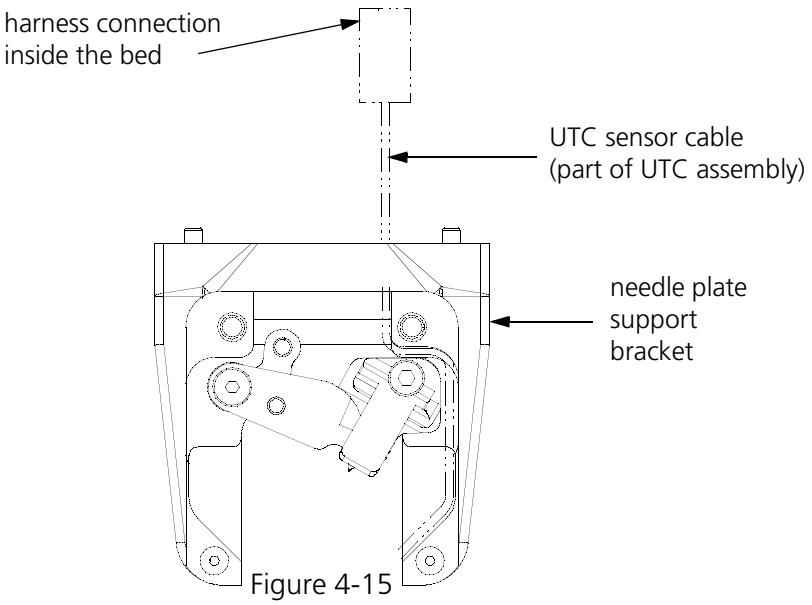


Figure 4-15

5. Remove the 2 UTC assembly mounting screws that hold the UTC assembly and rotary hook retaining finger to the bottom of the needle plate support bracket (see Figure 4-16).

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

6. Connect the sensor cable from the new UTC assembly to the harness inside the bed as indicated in Figure 4-15.

7. Reinstall the bed cover using care not to pinch the UTC cable.

8. Rotate the rotary hook inner basket to position the notch to the top so the retaining finger tab will fit into the notch properly when the UTC assembly is attached.

9. Place the UTC assembly under the needle plate support bracket as shown in Figure 4-16 and install the 2 UTC assembly mounting screws.

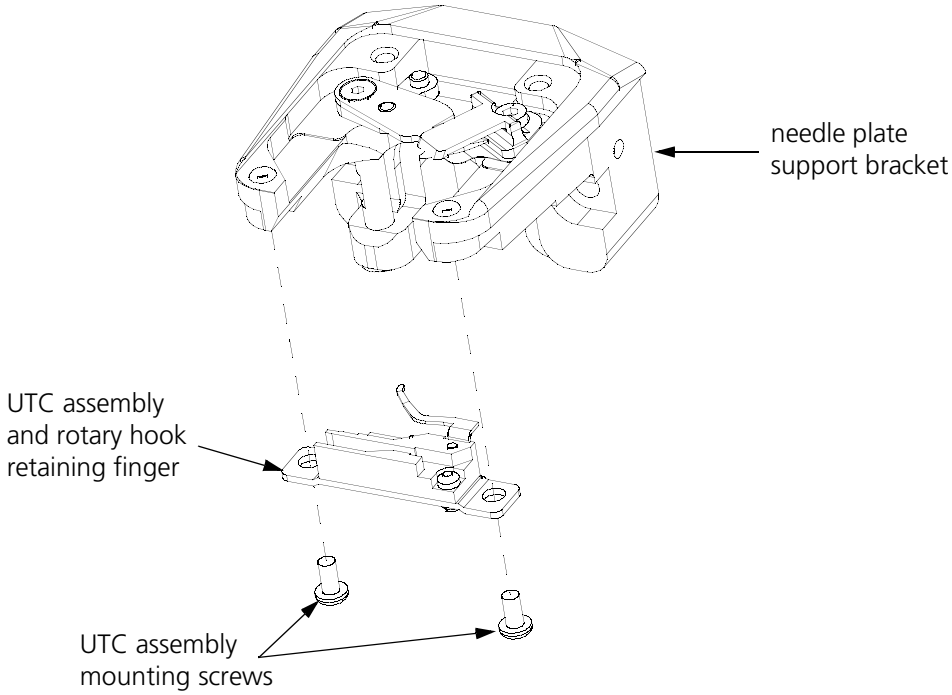


Figure 4-16

10. Perform the UTC adjustments.

Trimmer Setup And Adjustments

"FACTORY SERVICE ADVISED"

CAUTION! IF THESE ADJUSTMENTS ARE ATTEMPTED WITHOUT USING THE PROPER PROCEDURES AND TOOLS (AND WITHOUT PROPER TRAINING IN SOME CASES), MACHINE COMPONENTS MAY BE DAMAGED AND OPERATION OF THE TRIMMERS MAY BECOME INCONSISTENT.

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

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

Adjustable Fixed Knife

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

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

Under Thread Presser

The under thread presser shown in Figure 4-17 holds the bobbin thread after a trim. This permits a loop of bobbin thread for the next stitch. While the under thread presser holds the bobbin thread there should only be enough pressure applied to hold the thread in place under the movable knife. If the under thread presser is damaged it can cause problems that look like tension troubles. For example, if the pressure of the under thread presser against the movable knife is too much, it may hold the bobbin thread and not allow a loop to be formed, or it may nick or fray the thread, again making it look like the bobbin tension is incorrect. Another example, would be if the under thread presser is "crumpled" (see Figure 4-17) it does not allow the movable knife to pass under the adjustable fixed knife completely to cut the thread, causing a "no cut" condition. If the under thread presser is damaged it can cause intermittent long tails of the upper thread.

Checking the under thread presser is done in two parts. First by looking at the part itself to see if there has been any "crumpling" as shown in the bottom left section of Figure 4-17.

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

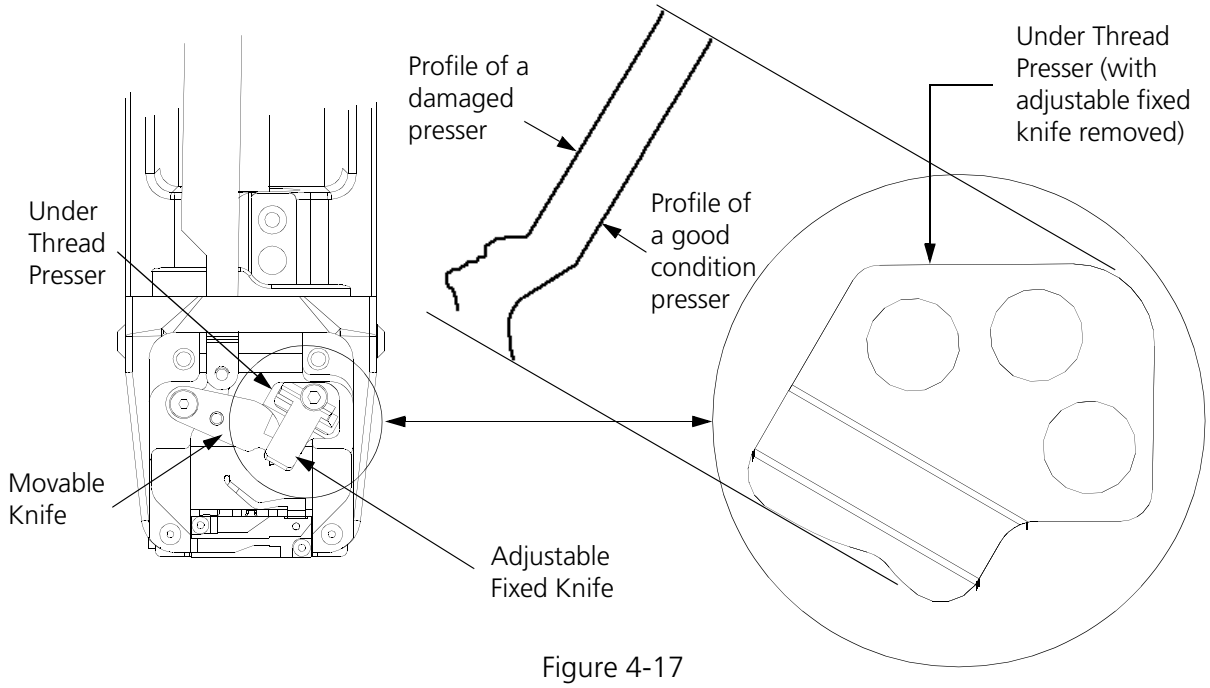


Figure 4-17

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

1. While the machine is still turned off, remove the bed cover and disconnect the connecting link from the movable knife drive arm by lifting it from the front pin (see Figure 4-13).

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

3. Leaving the bobbin case in the rotary hook, pull off some bobbin thread, and drape it over the movable knife as shown in Figure 4-18.

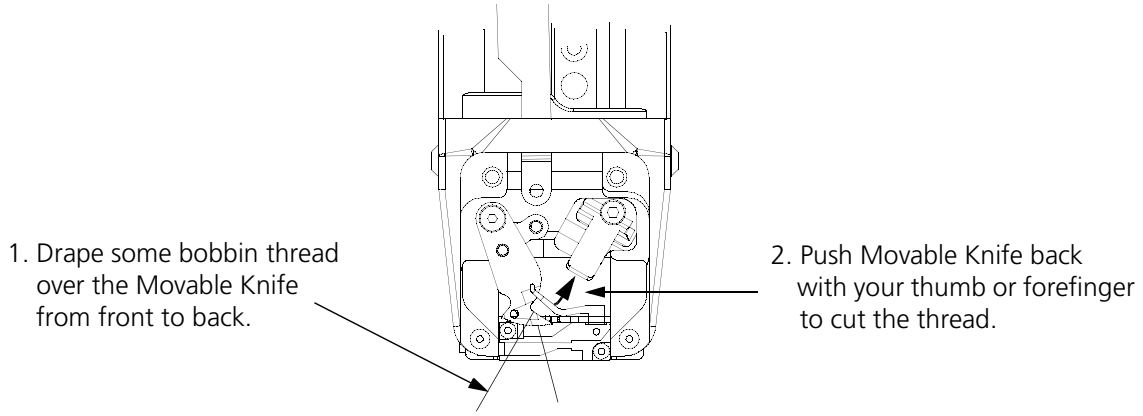


Figure 4-18

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

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

5. The "top" thread should be loose and fall away, because it has no support. The "bottom" thread should be held in place under the movable knife by the under thread presser.

6. If the under thread presser does not provide the required action, replace it and check using steps 2 to 4 again.

7. After you are satisfied with the under thread presser action, reattach the connecting link (see Figure 4-13).

Adjustable Fixed Knife Adjustment

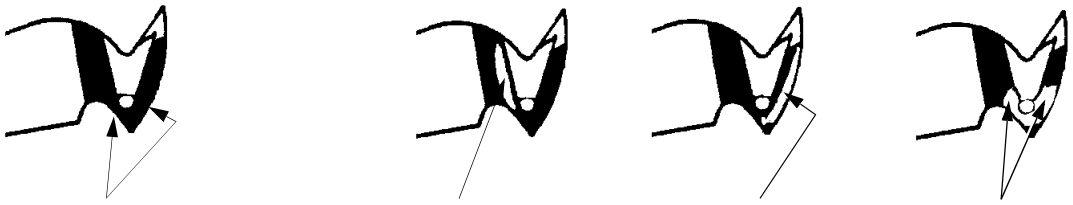
After replacing the adjustable fixed knife per the instructions earlier in this chapter it will need to be properly adjusted. Refer to following steps in performing this adjustment.

Ink Wipeoff Test

1. With the machine turned off, disconnect the connecting link from the movable knife drive arm by lifting it from the front pin (see Figure 4-13).

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

3. With a black marking pen, mark the areas of the movable knife as shown in the left illustration of Figure 4-19.



Apply Ink in these areas of the Movable Knife

ink wipeoff in this area . . . Adjustable Fixed Knife tilted left

ink wipeoff in this area . . . Adjustable Fixed Knife tilted right

ink wipeoff in these areas . . . Adjustable Fixed Knife OK

Figure 4-19

4. Push the movable knife back under the adjustable fixed knife to simulate the thread cutting action.

5. Again pull the knife forward and inspect where the marking pen ink has been wiped off. Refer to the remaining three illustrations in Figure 4-19 to determine if the adjustable fixed knife needs adjustment.

Knife Adjustment

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

6. Refer to Figure 4-20 and locate the two small set screws in the bottom of the needle plate bracket directly under the under thread presser.

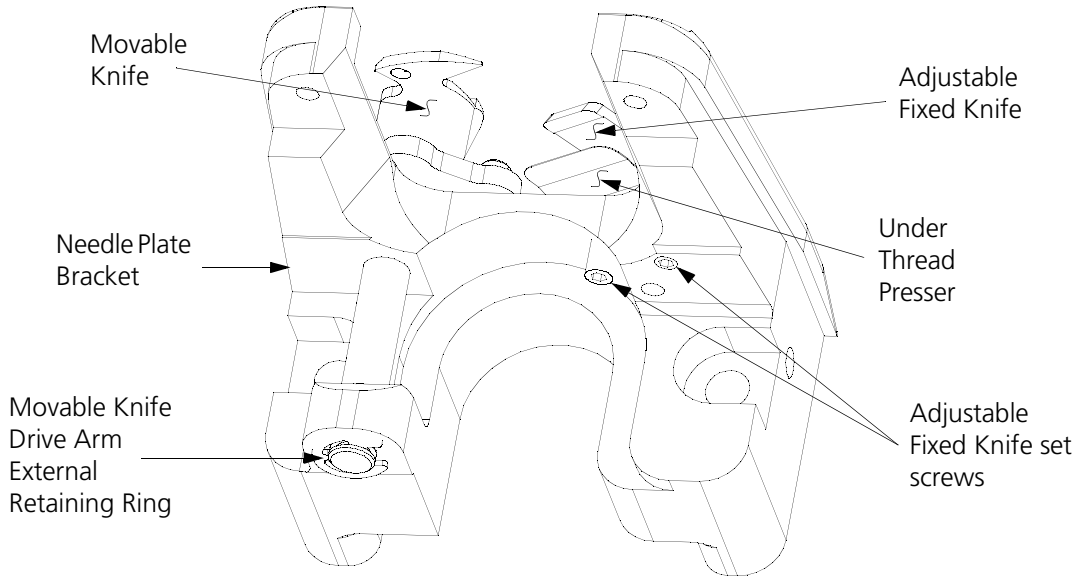


Figure 4-20

These two set screws together with the larger socket head cap screw that secures the adjustable fixed knife and under thread presser at the top of the needle plate bracket (see Figure 4-13) provide for the knife adjustment.

7. Refer to the 'Ink Wipeoff Test' and determine what direction the adjustable fixed knife is tilted.

8a. If the ink wipeoff test indicates the adjustable fixed knife is tilted left, slightly loosen the top socket head cap screw, then tighten the left under side set screw.

8b. If the ink wipeoff test indicates the adjustable fixed knife is tilted right, slightly loosen the top socket head cap screw, then tighten the right under side set screw.

9. After either of the adjustments in step 8, perform the ink wipeoff test again to check the position of the adjustable fixed knife.

10. Repeat the previous steps until the ink wipeoff test shows equal ink removal on both sides of the movable knife and the force to move the movable knife is

    1/2 +/- 1/4 lbs (200g +/- 100g) of pull.

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

Cut Threads

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

12. With the machine turned off, disconnect the connecting link from the movable knife drive arm by lifting it from the front pin (see Figure 4-13).

13. Pull the movable knife forward with a small hex wrench hooked behind it.

14. Obtain a piece of upper thread from the tensioner assembly and drape it over the movable knife (see Figure 4-18).

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

16. Repeat the previous step with the thread positioned at different locations across cutting surface.

17. If the thread is frayed at any location you may need to replace the adjustable fixed knife, movable knife, or both. You must readjust the adjustable fixed knife.

Movable Knife Adjustment

Each movable knife is connected to the camming mechanism via a series of levers, rods and pivots. During a trim operation the cam follower is engaged and this in turn activates the trimmer reciprocator arm which provides back and forth movement to the trimmer rod (refer to Figure 4-22). The trimmer rod is connected to the trimmer drive linkage that transmits movement to the connecting link, causing the movable knife to "cut."

Movable Knife Home Position

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

1. Remove the needle plates from all six embroidery beds (refer to Figure 4-11). Visually inspect the trimmer mechanisms. Replace any crumpled under thread pressers or damaged adjustable fixed knives. Lubricate the trimmer knife drive arm (refer to the EMB 10/6T Operation Manual).

2. Turn the machine power ON.

3. From the Control Panel click the Advanced button and select Trim in the Do Now section of the Advanced Features dialog box.

4. Visually check all movable knives. The knives should be located under the adjustable fixed knife, positioned as shown in Figure 4-21. If the sloped rear tip of the movable knife is not showing in front of the leading edge of the adjustable fixed knife, the "home" position needs to be adjusted. DO NOT Adjust if the knife position looks like Figure 4-21.

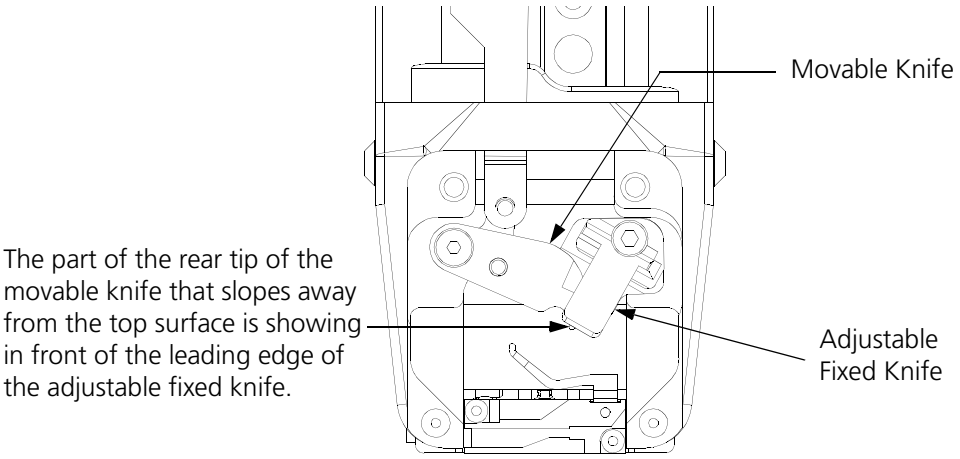


Figure 4-21

5. If all 6 knives are in the same relative position, but not in the home position, adjust all knife positions simultaneously as described in Steps 6 through 8.

6. Remove the left bed spacer cover to access the trimmer cam assembly.

7. Refer to Figure 4-22 and loosen the screw at point A.

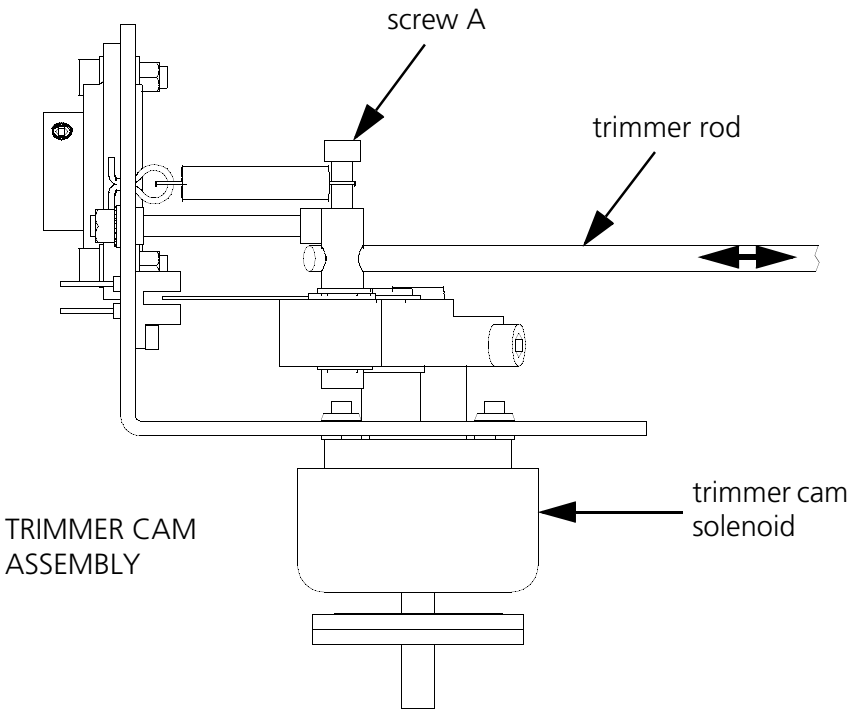


Figure 4-22

8. Move the trimmer rod until all the knives are at the home position as shown in Figure 4-21, then tighten the screw at point A.

9. If after the majority of knives are at the home position but some individual knives are not in the home position, refer to the following steps:

10. Remove the plug from the bed cover (see Figure 4-23) with the knives not in the home position.

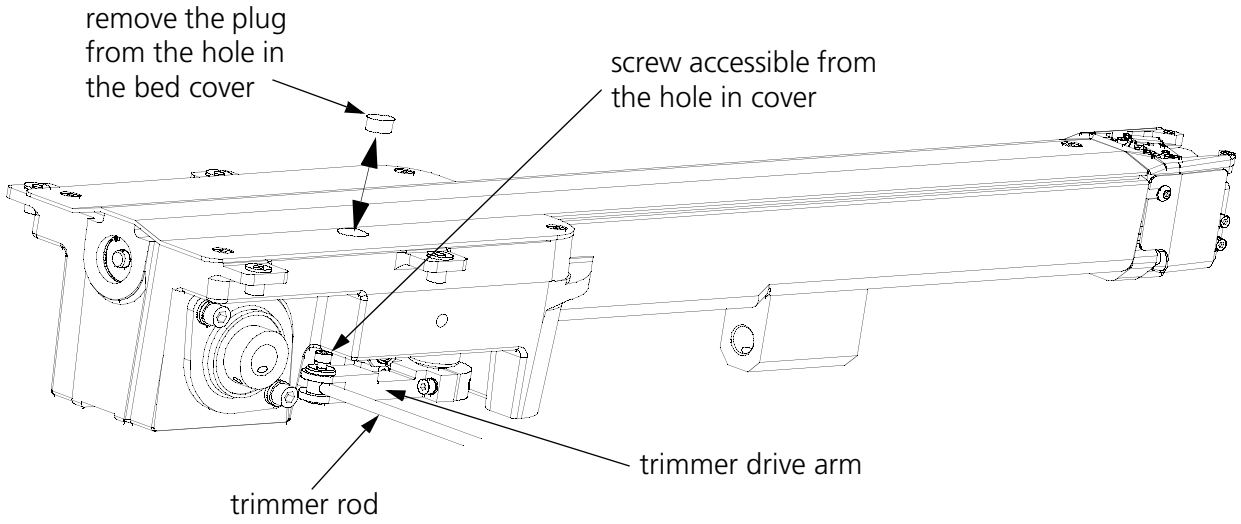


Figure 4-23

11. Loosen the screw that is accessible through the hole in the bed cover (see Figure 4-23).

12. With the end now loose from the trimmer rod, rotate the trimmer drive arm until the moveable knife is at the home position as shown in Figure 4-21. Tighten the screw and replace the plug into the bed cover.

13. Repeat Steps 10 through 12 for any other knives that are not in the home position.

Trimmer Cam Position

14. In the Control Panel window, click the Advanced button, then click the Service button in the resultant Advanced Features dialog box.

15. In the Service dialog box click the Cutter Timing button. This takes the Z rotation to the position for setting the trimmer cam. Record the degrees number indicated in the Z Posn section of the Service dialog at this time. This number is referred to in Step 21.

16. Place the cam locating fixture #12350 onto the trimmer cam assembly (refer to Figure 4-24). With the fixture flush against the Y shaft bearing bracket, the pin in the fixture must fit into the locating hole at the edge of the cam. The fixture surface must also be parallel with the top edge of the Y shaft bearing bracket.

17. If the fixture pin drops into the hole as indicated, and the fixture body aligns with the Y shaft bearing bracket, you have correct trimmer cam positioning and can skip to Step 28.

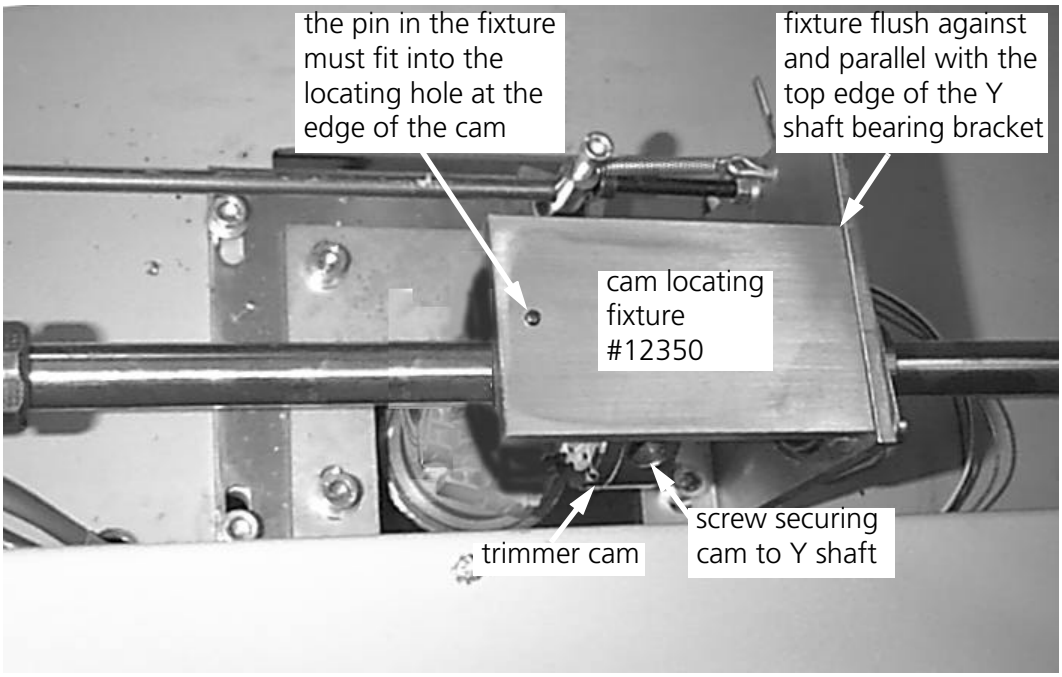


Figure 4-24

18. If the pin in the fixture does not fit into the locator hole in the cam when the body of the fixture is aligned with the Y shaft bearing bracket, you must adjust the trimmer cam rotational position.

19. Loosen the screw securing the cam to the Y shaft shown in Figure 4-24.

20. With the cam locating fixture pin still installed in the hole in the cam, position the cam until the fixture body is flush and parallel with the Y shaft bearing bracket as indicated in Figure 4-24.

21. Refer to the Z Posn degrees number currently indicated in the Service dialog box and check that it is the same as the number recorded in Step 15.

22. If the numbers in Step 21 are not the same, in the Service dialog, click the Release check box to enable manual rotation of the Z-axis shaft. Then rotate the Z-axis shaft until the Z Posn indication is the same as the degrees number you recorded in Step 15.

23. While maintaining the degrees at that number, click the Release check box to lock the Z shaft movement.

24. Using a torque wrench, tighten the screw that holds the cam to the Y shaft. Tighten the screw to a torque of 87.5 in/lbs.

25. Remove the cam locating fixture from the trimmer cam assembly.

26. From the Service dialog box click the Cutter Timing button one or two times.

27. Again place the test fixture #12350 onto the trimmer cam assembly (refer to Figure 4-24) to check for proper trimmer cam positioning.

- If the pin in the fixture does not fit into the locator hole in the cam when the body of the fixture is aligned with the Y shaft bearing bracket, you must readjust the trimmer cam rotational position starting with Step 19.
- If the pin in the fixture fits into the locator hole in the cam when the body of the fixture is aligned with the Y shaft bearing bracket, you have correct trimmer cam positioning and may continue with this procedure.

28. Remove the test fixture from the trimmer cam assembly and store it.

29. Select Trim in the Do Now section of the Advanced Features dialog box.

30. Visually check all movable knives. The knives should be located under the adjustable fixed knife, positioned as shown in Figure 4-21. If not repeat Steps 6 through 8 or 10 through 12 before continuing.

Select Position

31. Engage the cam follower into the cam groove (refer to Figure 4-24) and hold the follower in place with a small block of wood (or other similar jamming device).

32. In the Service dialog, click the Release check box to enable manual rotation of the Z-axis shaft.

33. Rotate the Z-axis shaft by hand to a Z Posn indication of between 312 degrees (for shorter thread tail lengths move between 309 and 311). While maintaining this degree position, click the Release check box to remove the check and lock the Z shaft movement.

34. Install the needle plate back onto head #6.

35. Using Select Position Fixture (Melco part number 995372-01), check the movable knife for the select position (refer to Figure 4-25).

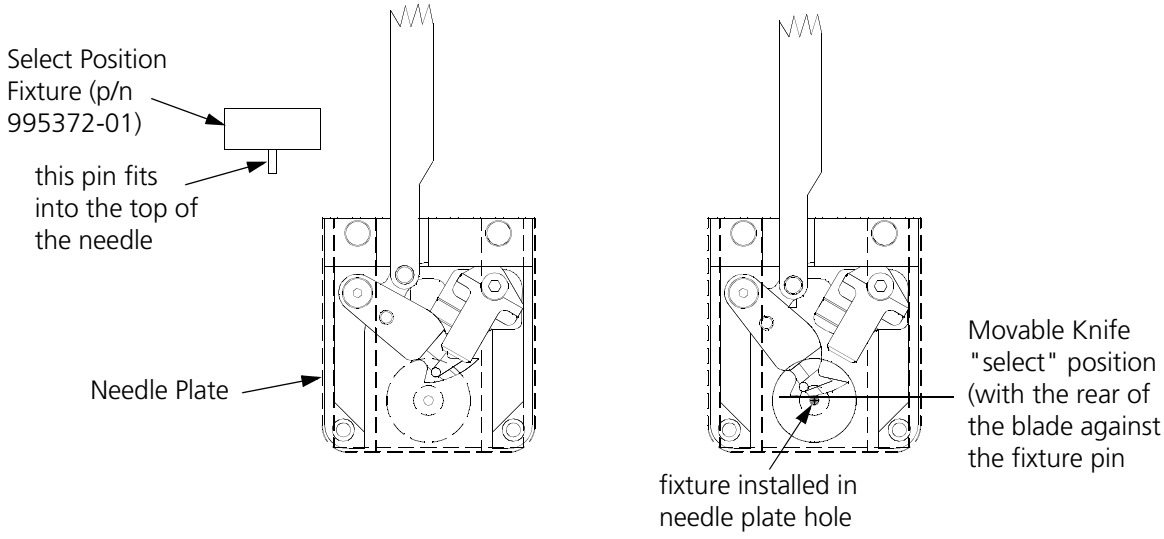


Figure 4-25

36. If the movable knife select position is correct, remove the select position fixture and proceed to the next head.

37. If the select position is not correct, remove the plug in the top of the bed cover and loosen the screw shown in Figure 4-23.

38. Move the trimmer drive arm back and forth until the correct select position is achieved. Tighten the screw to secure the drive arm, replace the bed cover plug, then remove the select position fixture and proceed to the next head.

39. Adjust all six movable knives to the same relative select position.

40. Remove the select position fixture from the last head and then remove the jamming device from the cam follower.

41. Click the Trim button several times in the Do Now section of the Advanced Features dialog box.

42. Inspect all 6 knives to insure they are at the home position. The rear point of the movable knife should just protrude from under the adjustable fixed knife (refer to Figure 4-21).

43. Move the adjustable fixed knife of any home position that may need adjustment.

    NOTE: If moving the adjustable fixed knife does not correct the adjustment, you may need to yield equally on both the select and home position adjustments for those knives that do not position correctly at both locations.

44. Install all the needle plates.

45. Replace the left bed spacer cover.

Picker Home Position

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

1. Go to Advanced Features, Bed node, Picker, and select Home. This will move all the pickers to the home position.

2. Install the picker set fixture (as shown in Figure 4-26) to set the picker home position.

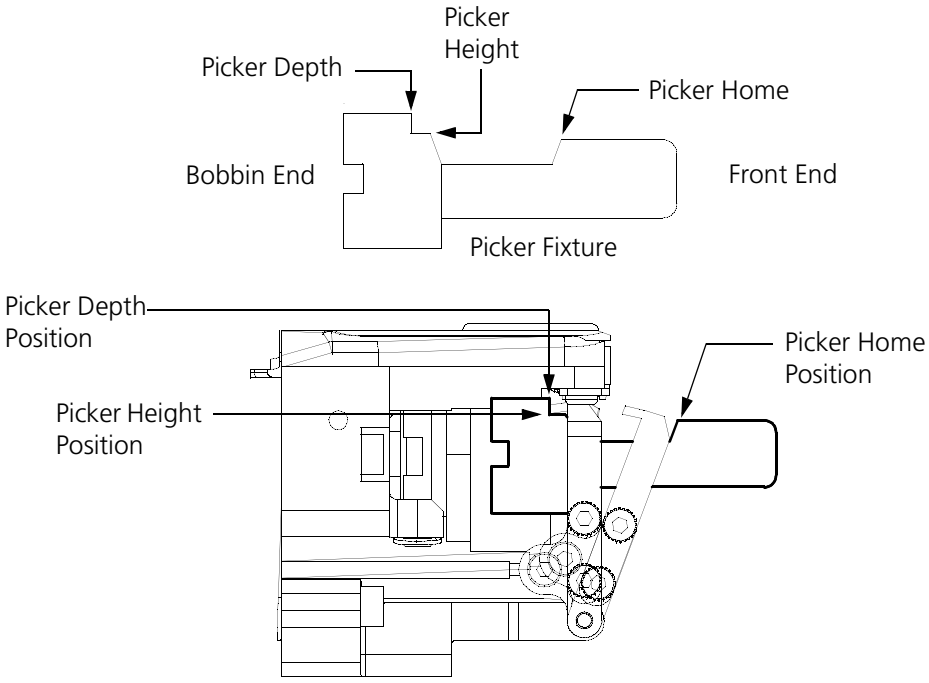


Figure 4-26

3. Loosen the set screw inside the swivel pin body shown in Figure 4-27.

4. Move the picker until it rests in the fixture at the picker home position as shown in Figure 4-26.

5. Retighten the set screw.

Picker Height/Depth Position

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

1. With the picker fixture still installed, select the "In" button on the picker setting menu.

2. To adjust the picker height, loosen the two screws on the left side of the picker as shown in Figure 4-27

3. Position the height of the picker against the fixture location shown in Figure 4-26.

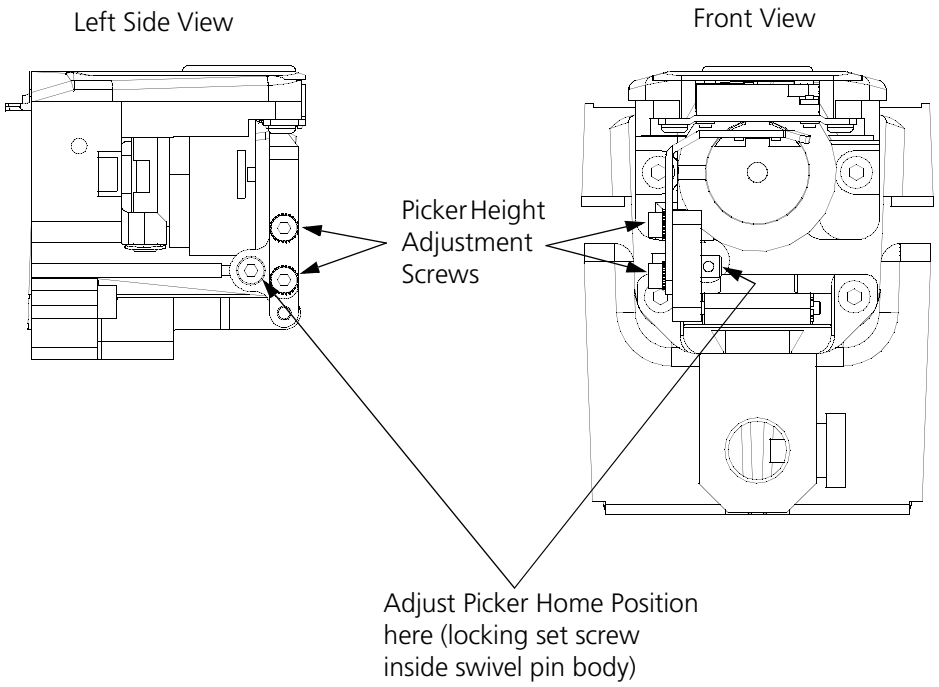


Figure 4-27

4. Retighten the 2 screws.

5. Select the "Out" or Home button in the picker setting menu and remove the picker fixture.

   NOTE: The depth setting of the picker is determined by the picker stepper motor which moves the picker in a predetermined distance. The picker fixture is an initial setting. If the the picker depth is not sufficient it may be adjusted by loosening the swivel pin screw when the picker is in the "In" position (the picker fixture should not be installed).

Under Thread Control (UTC) Adjustments

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

NOTE: The procedures in this section require the following special tools:

1) a small straight blade screw driver with a thin blade, and

2) the Melco UTC combination gauge part number 009027-01.

Rotary Hook Retaining Finger Positioning

1. Attach the UTC assembly as described earlier in this procedure.
2. Turn the machine ON and go to the Head Timing menu.
3. Position the head to the "Needle Depth" location in the Head Timing menu.
4. Slightly loosen the 2 UTC assembly mounting screws from under the needle plate support bracket.
5. Place the finger of the UTC combination gauge (see Figure 4-29 for diagram of the gauge) between the retaining finger tab and the rotary hook inner basket notch (see Figure 4-28).

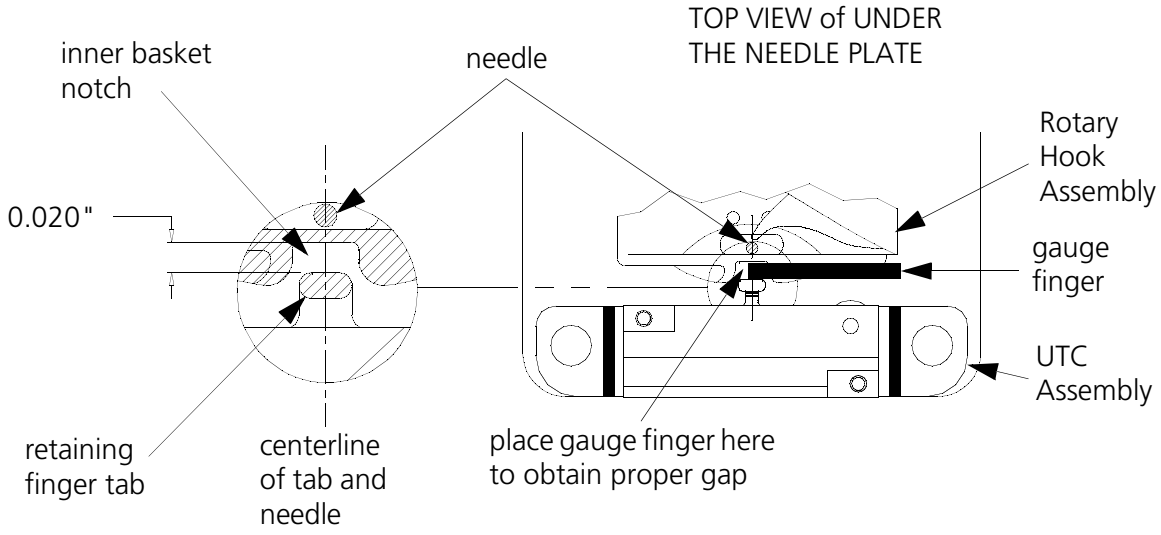


Figure 4-28

6. Position the UTC assembly until the gap between the retaining finger tab and the rotary hook inner basket notch is set to the thickness of the gauge finger. The gap is 0.020 inches as shown in Figure 4-28).
7. Additionally, align the center of the retaining finger tab to the center of the needle as indicated in Figure 4-28.
8. Tighten the UTC assembly mounting screws.

9. Place the UTC Combination Gauge on top of the needle plate support bracket as shown in Figure 4-29 and check that the UTC detection arm does not touch the bottom surface of the gauge which represents the bottom of the needle plate when it is installed.

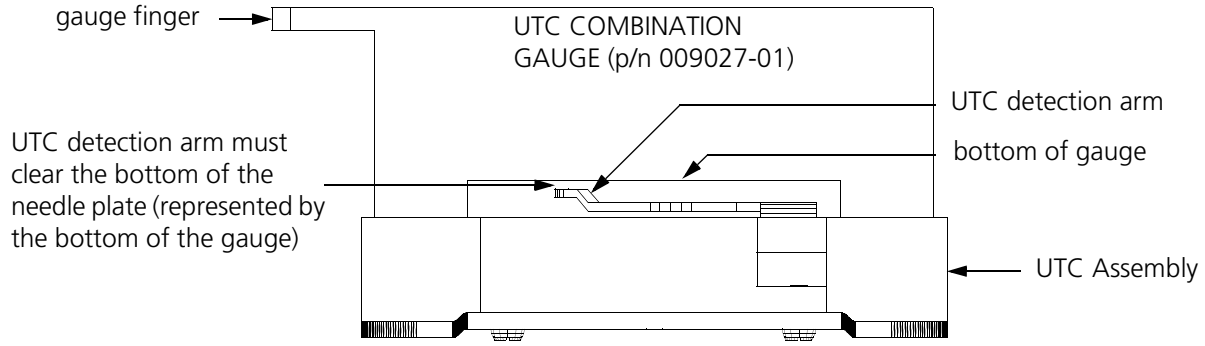


Figure 4-29

10. If the arm touches the gauge, carefully reshape the arm slightly until it clears.

11. Refer to Figure 4-30 and lift the connecting link off of the movable knife assembly.

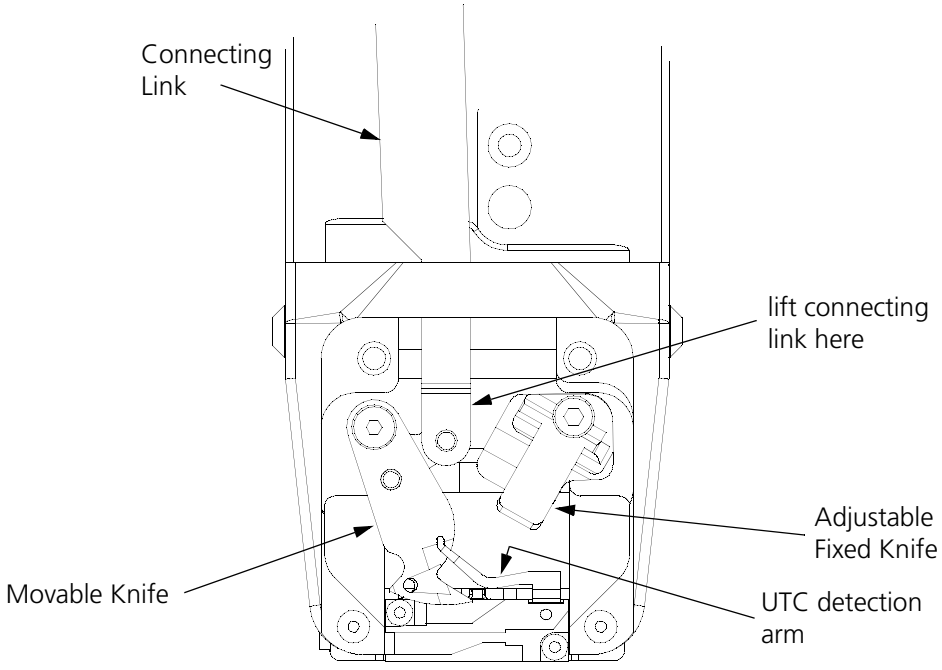


Figure 4-30

12. Check that the movable knife clears the UTC detection arm by physically moving the knife under the UTC detection arm and back.

13. If the knife touches the arm, reshape the arm slightly until it clears then repeat steps 9 through 12.

14. Reattach the connecting link to the pin on the movable knife assembly.

CAUTION! WHEN INSTALLING THE COVERS, BE SURE NOT TO PINCH THE UTC ASSEMBLY WIRES!

15. Reattach the rotary hook cover, the needle plate, and the bed cover.

Embroidery Test

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

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

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

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

Preliminary Checks

The following must be checked before performing the embroidering:

1. Check that the bobbin tension is within the proper adjustment specifications as described in the operation manual.

2. Verify that the BOB. COUNT in the BOBBIN MENU is set to 5.

Perform The Test

During the embroidering:

A) Check that the UTC detects an absence of bobbin thread when you run out of bobbin thread and displays the CHECK BOBBIN message.

   1. Test for this by wrapping a foot or so of thread around an empty bobbin.

   2. Embroider the test design until the thread is completely used.

   3. Repeat steps 1 and 2 until the bobbin runs out at least once in both directions of diagonal stitching in the test design.

   4. If the sensor does not detect when the bobbin runs out of thread, slightly loosen the UTC sensor body at the screws shown in Figure 4-31, and at the slotted screw hole (left side) move the sensor a very small amount away from the needle. Retighten the screws.

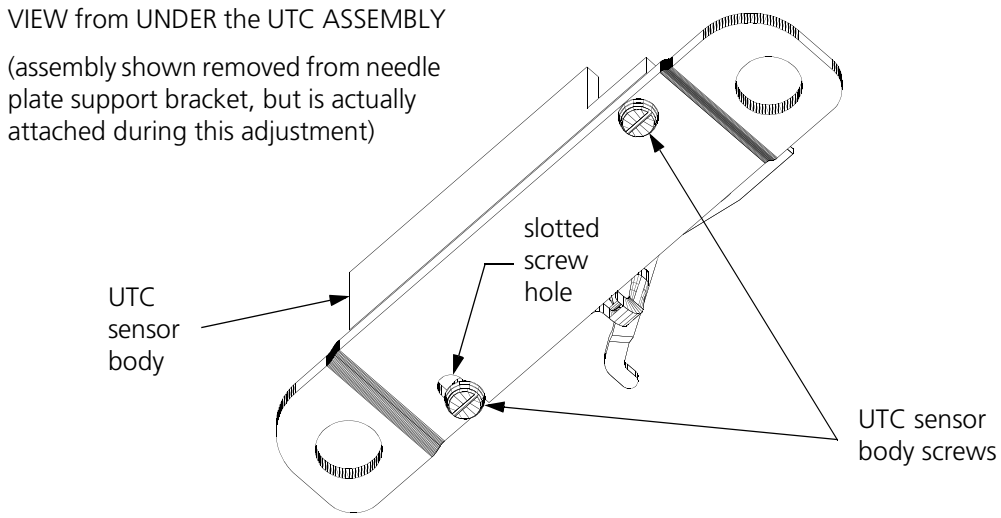


Figure 4-31

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

1. Test for this by simply embroidering with the test design. For reliable results, embroider the design for at least 5 minutes, or about 4000 stitches at 750 stitches per minute.

2. If you get false CHECK BOBBIN messages, slightly loosen the UTC sensor body at the screws shown in Figure 4-31, and at the slotted screw hole (left side) move the sensor a very small amount closer to the needle. Retighten the screws.

5. Z Drive System

General

This section provides parts replacement procedures and adjustments required during repair and maintenance of the Z drive system and associated areas. The Z drive is comprised of the drive mechanics that are common to both the Head and Bed Assemblies, as well as the interface electronics associated with this area.

These procedures are guidelines for performing repairs and must be used by personnel practicing good maintenance and repair techniques. Refer to the Repair 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!

Z Drive Mechanical System

The synchronized movement in the embroidery heads and bed assemblies are driven by the Z drive system. This is a mechanical system of two shafts, with their associated pulleys and gears driven by a single motor. The upper Z shaft runs through each of the 6 heads and provides the movement for the needle bars and take up levers. The lower Z shaft runs through each of the bed assemblies and provides the hook assembly rotation for each of the beds. These shafts are connected by belts to the Z motor at the left end of the machine as shown in Figure 5-1.

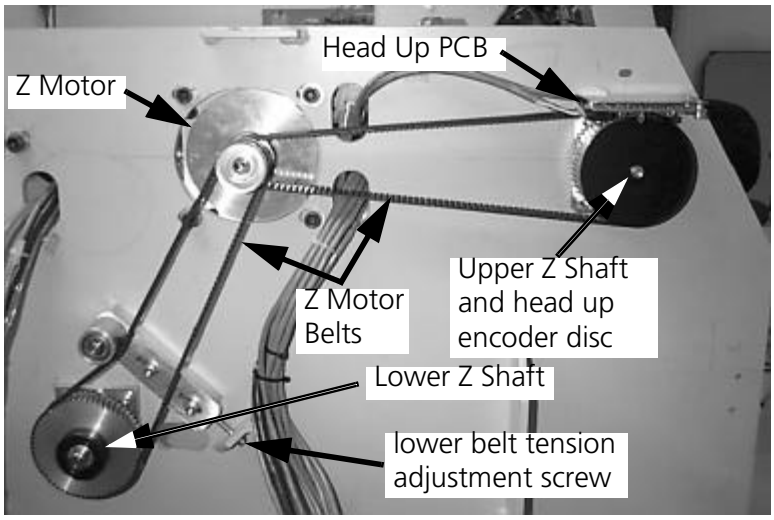


Figure 5-1

Attached to the left end of the upper Z shaft is a disc with a single slot cut in its outer edge. The disc rotates through a photo sensor on the Head Up PCB. This encoder mechanism provides a method for detecting the "head up" rotational position of the shaft. Attached to the lower Z shaft is the trimmer drive cam, used to drive the trimmers at appropriate times.

The alignment and calibration of this mechanical system is critical for proper operation of the EMB 10/6T Embroidery Machine.

Replacing the Belts

After replacing either of the Z motor belts, you are required to reset the timing of the Z drive. To do this, follow the 6 Head Sync Procedure.

CAUTION! WHEN THE TENSION OF THE LOWER Z MOTOR BELT IS ADJUSTED, HOOK TIMING **MUST** BE CHECKED AND PROPERLY ADJUSTED!

BE CERTAIN THE MACHINE IS MECHANICALLY SET TO THE "HEAD UP" POSITION BEFORE BEGINNING ANY BELT REPLACEMENT PROCEDURE!

Replacing Lower Z Motor Belt

1. Color change to needle number 1.
2. Remove the start/stop/frame panel from the right side of head number 1.
3. Locate the head up alignment hole in the front of the head casting and position the head up pin fixture (part number 12453) into the hole as shown in Figure 5-2.

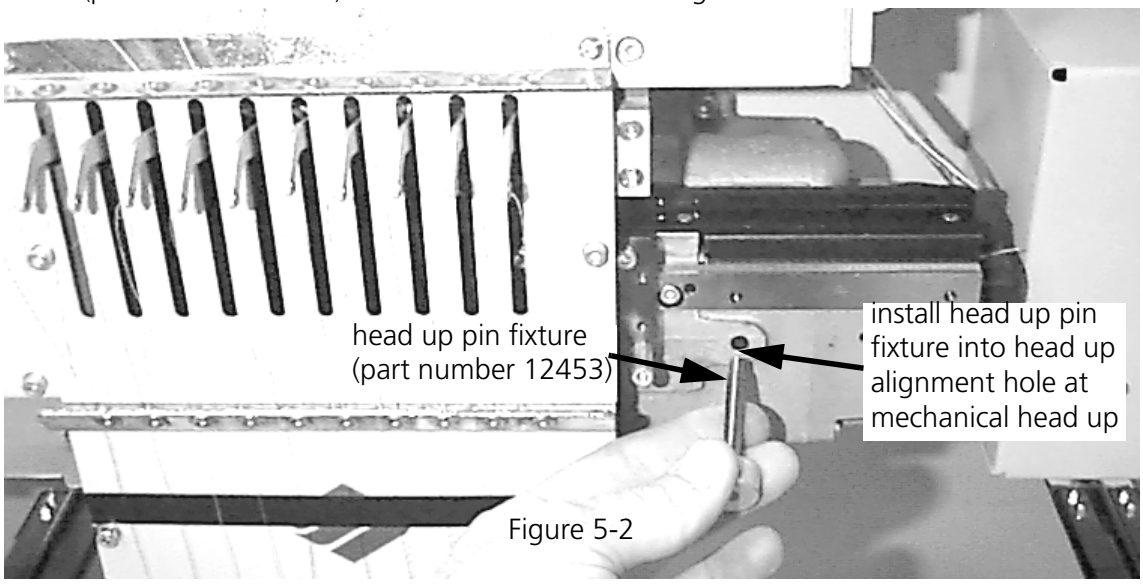


Figure 5-2

4. Turn OFF the machine and while applying a light pressure on the end of the head up pin fixture, rotate the upper Z shaft by hand to verify the machine is at the mechanical head up position. (At mechanical head up, the pin will fall into a slot in the drive mechanism inside the head, thus locking the rotation of the upper Z shaft.)
5. Remove side cover to expose the Z motor belts.
2. Loosen the tension on the lower Z motor belt by rotating the tension adjustment screw shown in Figure 5-1.
3. Remove the lower Z motor belt.
4. Insert the new lower Z motor belt.

5. Re-tension the lower belt using a Breco meter and rotating the tension adjustment screw to obtain the proper tension. Refer to Addendum A for information on the use of the Breco meter. Set the tension to **55** +/- 5 on the meter.

   Note: Breco meters read the vibration of metal. Because the belt is made of rubber, you must attach a paper clip to the belt to get a reading.

6. Remove the head up pin fixture and reinstall the start/stop/frame panel to the right side of head number 1.

CAUTION! WHEN THE TENSION OF THE LOWER Z MOTOR BELT IS ADJUSTED, HOOK TIMING **MUST** BE CHECKED AND PROPERLY ADJUSTED!

7. Check and adjust hook timing as described in Chapter 4 of this manual starting at Page 4-8.

Replacing Upper Z Motor Belt

1. Color change to needle number 1.

2. Remove the start/stop/frame panel from the right side of head number 1.

3. Locate the head up alignment hole in the front of the head casting and position the head up pin fixture (part number 12453) into the hole as shown in Figure 5-2.

4. Turn OFF the machine and while applying a light pressure on the end of the head up pin fixture, rotate the upper Z shaft by hand to verify the machine is at the mechanical head up position. (At mechanical head up, the pin will fall into a slot in the drive mechanism inside the head, thus locking the rotation of the upper Z shaft.)

5. Remove side cover to expose the Z motor belts.

6. Loosen the tension on the lower Z motor belt by rotating the tension adjustment screw shown in Figure 5-1.

7. Remove the lower Z motor belt.

8. Move to the inner side of the right end of the machine to access the Z motor mounting bolts.

9. Loosen the 4 bolts that hold the Z motor and loosen the tension on the upper Z motor belt by sliding the motor toward the front of the machine.

10. Remove the upper Z motor belt.

11. Insert the new upper Z motor belt.

12. Re-tension the upper belt by adjusting the Z motor and using a Breco meter. Refer to Addendum A for information on the use of the Breco meter. Set the tension to **55** +/- 5 on the meter.

    Note: Breco meters read the vibration of metal. Because the belt is made of rubber, you must attach a paper clip to the belt to get a reading.

13. Tighten the 4 bolts holding the Z motor.

14. Insert lower Z motor belt.

15. Re-tension the lower belt using a Breco meter. Refer to Addendum A and the previous procedure for tensioning the lower belt for information. Set the tension of the lower belt to **55** +/- 5.

16. Remove the head up pin fixture and reinstall the start/stop/frame panel to the right side of head number 1.

CAUTION! WHEN THE TENSION OF THE LOWER Z MOTOR BELT IS ADJUSTED, HOOK TIMING **MUST** BE CHECKED AND PROPERLY ADJUSTED!

17. Check and adjust hook timing as described in Chapter 4 of this manual starting at Page 4-8.

Replacing the Z Motor

After replacing the Z motor, you are required to reset the timing of the Z drive. To do this, follow the 6 Head Sync Procedure.

1. Color change to needle number 1.

2. Remove the start/stop/frame panel from the right side of head number 1.

3. Locate the head up alignment hole in the front of the head casting and position the head up pin fixture (part number 12453) into the hole as shown in Figure 5-2.

4. Turn OFF the machine and while applying a light pressure on the end of the head up pin fixture, rotate the upper Z shaft by hand to verify the machine is at the mechanical head up position. (At mechanical head up, the pin will fall into a slot in the drive mechanism inside the head, thus locking the rotation of the upper Z shaft.)

5. Remove side cover to expose the Z motor belts.

6. Loosen the tension on the lower Z motor belt.

7. Remove the lower Z motor belt.

8. Move to the inner side of the right end of the machine to access the Z motor mounting bolts.

9. Loosen the 4 bolts that hold the Z motor and loosen the tension on the upper Z motor belt by sliding the motor toward the front of the machine.

10. Remove the upper Z motor belt.

11. Completely remove the 4 bolts holding the Z motor to remove the motor.

12. Replace the motor and loosely tighten the screws.

13. Insert the upper Z motor belt.

14. Tension the upper belt by adjusting the Z motor and using a Breco meter. Refer to Addendum A and the previous belt tensioning procedure for information.

15. Tighten the 4 bolts holding the Z motor.

16. Insert lower Z motor belt.

17. Tension the lower belt using a Breco meter. Refer to Addendum A and the previous belt tensioning procedure for information.

18. Remove the head up pin fixture and reinstall the start/stop/frame panel to the right side of head number 1.

CAUTION! WHEN THE TENSION OF THE LOWER Z MOTOR BELT IS ADJUSTED, HOOK TIMING MUST BE CHECKED AND PROPERLY ADJUSTED!

19. Check and adjust hook timing as described in Chapter 4 of this manual starting at Page 4-8.

Z Index Calibration

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 index signal. The information provided by the Z index signal is the basis for all the embroidery head activity.

NOTE: This procedure requires using a special tool designed by Melco, the Gear Mesh and Encoder Setting Fixture (part number 995567-01):

1. Turn the machine power ON and allow the software to download.
2. Move the needle cases to the needle #1 position.
3. From the Advanced Features menu select Head Timing, followed by 1 Rev Or To Headup.
4. Click on the Release button.

   This will release the Z-axis shaft and allow manual movement. It will also display the shaft position in degrees.

5. Remove the lower needle case cover from head #6.
6. Rotate the Z drive shaft until the needle bar is approximately at full needle down.
7. Refer to Figure 5-3 and install the Gear Mesh and Encoder Setting Fixture (part number 995567-01) as follows:

   a) Attach the needle bar extender to the needle bar so it is facing to the right of the needle case when looking at the needle case from the front.

   b) Loosely attach the dial indicator and bracket to the right front of the needle case as shown in Figure 5-3. Use an M4 x 16mm socket head cap screw and M4 flat washer into the screw hole used to secure the lower needle case cover (removed earlier).

9. By sliding the dial indicator and bracket vertically within the slot in the bracket, position the dial indicator pin to touch the top of the needle bar extender.

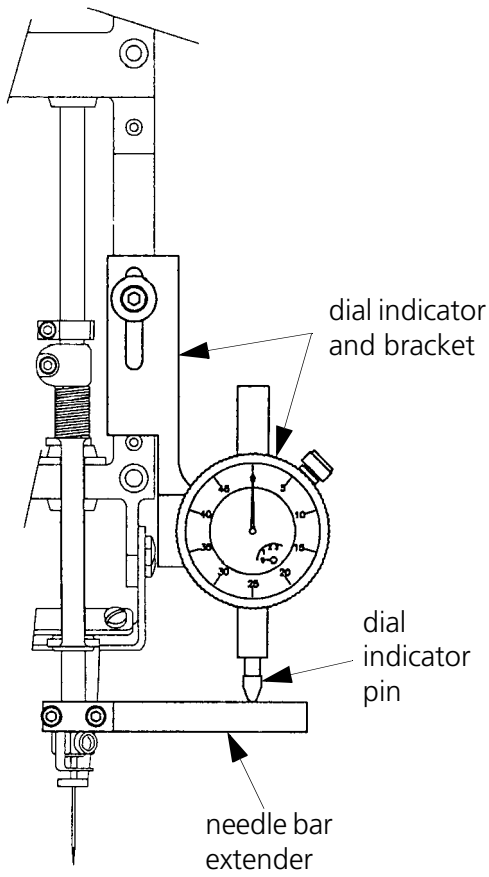


Figure 5-3

10. Rotate the Z drive shaft first one direction through full needle down and then the other direction through full needle down. While rotating through full needle down, refer to the dial indicator. You will notice that at full needle down, the pointer on the dial indicator will reverse its direction. Note the reading of the dial indicator at full needle down.

11. Add 2.4 mm to the full needle down reading on the dial indicator and have that number available for the next two steps.

12. Rotate the Z drive shaft in the direction for embroidering through full needle down as shown by the dial indicator reading noted in Step 10. Continue to rotate the shaft in the same direction until the dial indicator reading is the same as the number you noted in Step 11.

13. Click on the Release button. This will now lock the Z shaft from being able to be rotated mechanically.

14. Loosen the screw securing the Z index disc (see Figure 5-4) and rotate the disc until the slot in the disc is in the photo sensor of the head up PCB. The monitor displays 201.0 +/- 0.4 degrees.

17. Carefully retighten the Z index disc set screw.

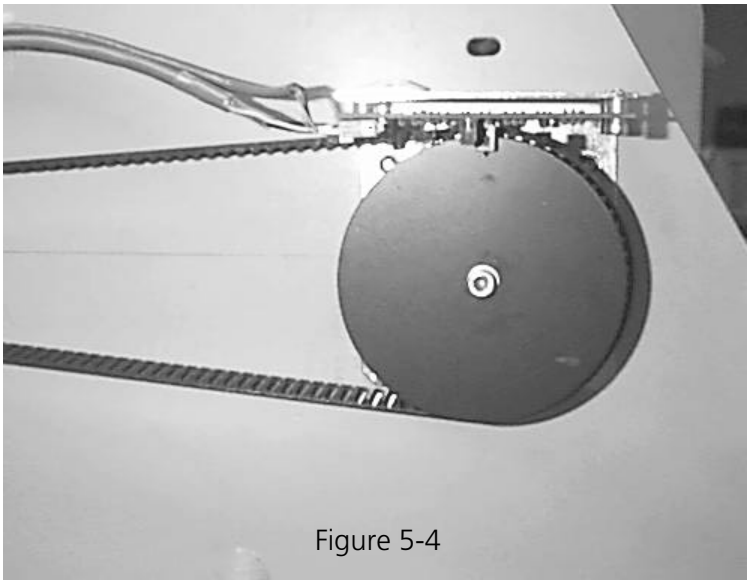


Figure 5-4

6. Carriage Assembly Maintenance

General

This section provides parts replacement procedures and adjustments required during repair and maintenance of the Carriage Assembly and associated areas. This section consists of the X and Y axis mechanics which includes the motors, belts, and control electronics.

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!

X Motor and Motor Belt Replacement

"FACTORY SERVICE ADVISED"

Special tools are required to tension the X axis motor belt properly after replacing the motor or belt. The belt must be properly tensioned to ensure accurate movement and prevent premature wear of the belt, pulleys, bearings and motor.

To replace the X motor and/or belt refer to the following procedures:

1. Turn OFF the power switch to the EMB 10/6T and remove the power cord from the power source electrical outlet.

2. Move the X carriage to its approximate mid-range position and pull the Y beam all the way forward.

3. Locate the X motor assembly at the left end of the beam and remove the belt cover to gain access to the X motor pulley and belt area.

4. Refer to Figure 6-1 and loosen the four socket head cap screws that secure the motor to the motor housing. Loosening the screws will allow the belt to become slack.

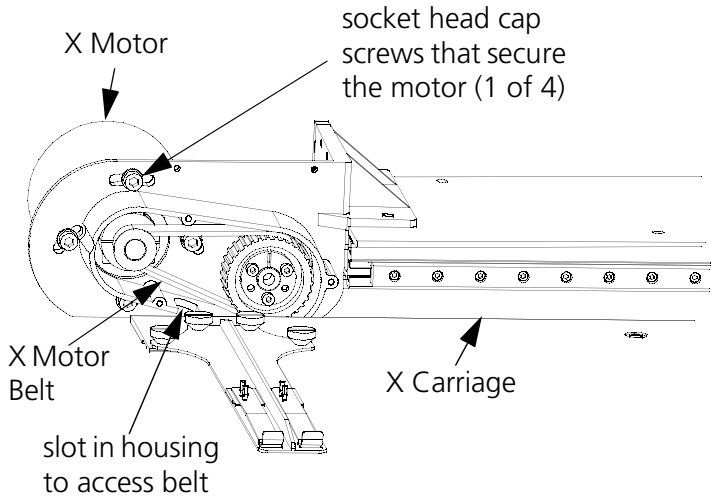


Figure 6-1

5. Slip the motor belt off of the motor shaft pulley and the X drive shaft pulley.

6. If replacing the belt only, simply place the new belt onto the motor shaft pulley and X drive shaft pulley at this time and go to the X Motor Belt Tension section of this procedure.

7. If replacing the motor, remove the four socket head cap screws securing the housing top cover and remove the cover.

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

9. Remove the socket head cap screws and pull the motor (with pulley still attached) out of the motor housing.

10. Transfer the motor shaft pulley clamp and pulley from the old motor to new motor, aligning the pulley the same distance on the shaft from the new motor body as on the old motor body.

11. Reinstall the new motor to the motor housing using the same socket head cap screws. Snug the motor to the housing, allowing for movement within the slotted holes.

12. Place the motor belt onto the motor shaft pulley and X drive shaft pulley.

13. Replace the wiring and harnesses associated with the motor at the locations as noted in the removal step.

14. The bottom motor mounting hole in the housing is NOT slotted. This is to hold the motor in place and is used as a pivot while the motor is rotated in the slotted holes. Rotate the motor in the slotted holes to take up the tension on the motor belt.

    NOTE: Some leverage is needed between the motor and the housing to rotate the motor and increase the belt tension. A long handled screwdriver should suffice. Do NOT use excessive force, however.

15. When the belt is believed to be close to the proper tension, tighten the socket head cap screws securely and prepare to measure the belt tension, described in the following steps.

X Motor Belt Tension

"FACTORY SERVICE ADVISED"

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

16. Refer to the procedure for using the Breco Belt Tensioner in Addendum A and locate the point on the belt midway from the center of the drive shaft pulley to the center of the motor pulley.

    NOTE: As shown in Figure 6-1, a slot is located in the lower part of the housing belt shroud for accessing the midpoint of the belt with the Breco meter.

17. Again, referring to Addendum A, perform a the belt tension measurement with the Breco Belt Tensioner.

18. The reading on the tensioner display should be **155** +/- 5.

19. Repeat Steps 14 and 15 as needed to attain the proper reading.

Y Motor and Motor Belt Replacement

"FACTORY SERVICE ADVISED"

Special tools are required to tension the carriage Y axis motor belt properly after replacing the motor or belt. The belt must be properly tensioned to ensure accurate movement and prevent premature wear of the belt, pulleys, bearings and motor.

To replace the Y motor and/or belt refer to the following procedures:

1. Turn OFF the power switch to the EMB 10/6T and remove the power cord from the power source electrical outlet.

2. To gain access to the Y motor belt area shown in Figure 6-2, remove the machine cover at the left end of the machine.

3. Move the carriage to its full rear position.

4. Refer to Figure 6-3 and loosen the Y motor belt tensioner screw located on the inner side of the left end panel of the machine.

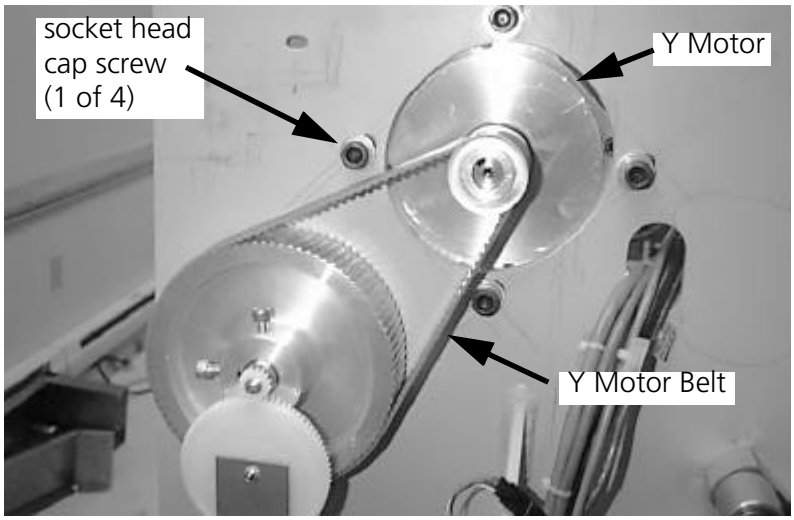


Figure 6-2

5. Loosen the four socket head cap screws that secure the motor.

6. Slip the motor belt off of the motor shaft pulley.

Refer to the appropriate section(s) on the following pages, depending on whether you are replacing a motor or belt or both.

Replacing Y Motor

If replacing belt only, skip this section and go to the Y Motor Belt Tension section.

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

2. Remove the socket head cap screws and remove the motor.

3. Transfer the motor shaft pulley from the old motor to new motor, aligning the pulley the same distance on the shaft from the new motor body as on the old motor body.

4. Attach the new motor using the same socket head cap screws and tighten the screws.

5. Replace the wiring and harnesses associated with the motor at the locations as noted in the removal step.

6. Slip the belt back onto the motor shaft pulley, then refer to the Y Motor Belt Tension section that follows.

Y Motor Belt Tension

"FACTORY SERVICE ADVISED"

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

1. Refer to the procedure for using the Breco Belt Tensioner in Addendum A and locate the point on the belt midway from the center of the drive shaft pulley to the center of the motor pulley.

2. Again, referring to Addendum A, perform a the belt tension measurement with the Breco Belt Tensioner.

3. The reading on the tensioner display should be **150** +/- 5.

4. Refer to Figure 6-2 and loosen the motor mounting bracket bolts. Refer to Figure 6-3 and rotate the tensioner screw clockwise to increase the tension or counter-clockwise to decrease the tension.

5. Tighten the motor mounting bracket bolts securely before making another tension reading.

6. When the tension reading is correct, move the paper clip (or other metallic material) to the other edge of the belt and check the belt tension value at that location. If the reading is correct and the same as the other side of the belt, go to Step 8, if not, go to Step 7.

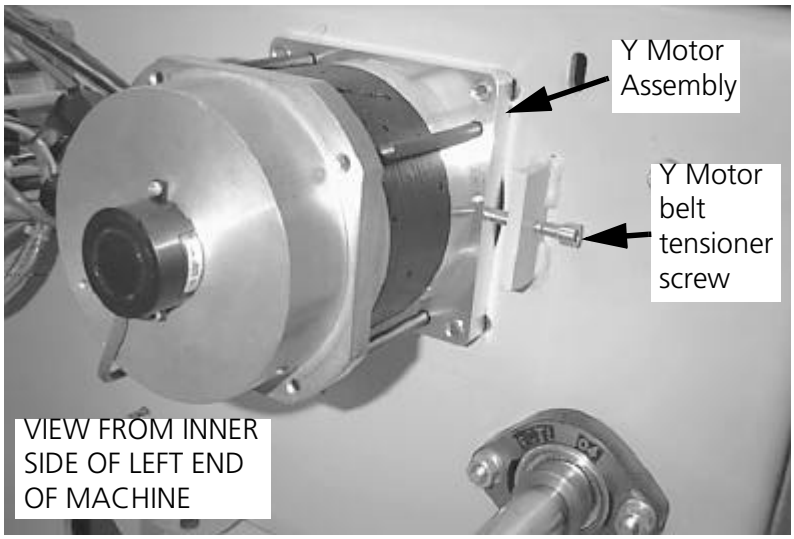


Figure 6-3

7. If the two readings vary by more than 1 unit on the tensioner display, align the motor pulley to the shaft pulley until both sides read within 1 unit.

8. Tighten the motor mounting bracket bolts securely.

Replacing X Drive Belt

"FACTORY SERVICE ADVISED"

The carriage X axis has one drive belt. Special tools are required to properly tension this belt after it is replaced. Improper belt tension adjustment will lead to premature wear of the belt, pulleys and bearings, and may produce diminished embroidery quality.

To replace the belt refer to the following procedure:

1. Turn OFF the power switch to the EMB 10/6T and remove the power cord from the electrical source.

2. Move the carriage all the way to the rear and to the right, lightly resting against the mechanical limits. Do not force the carriage past the mechanical limits or place a force load against them.

3. Refer to Figure 6-4 and loosen the two tensioner jam nuts.

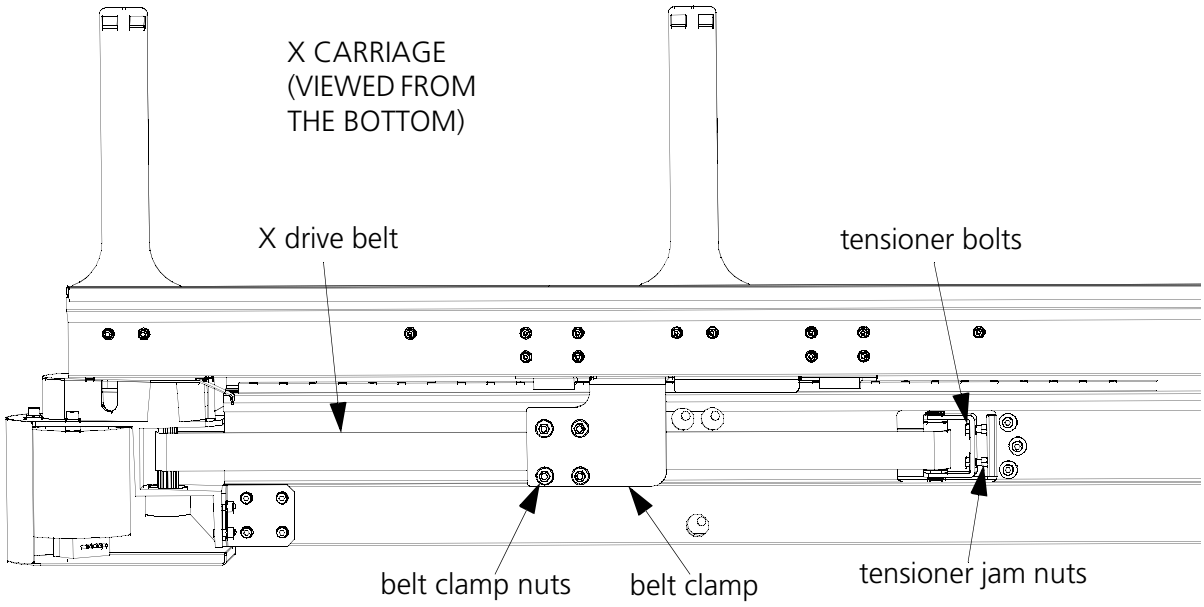


Figure 6-4

4. Loosen the two tensioner bolts approximately 10 mm to create belt slack.

5. Loosen and remove the four belt clamp nuts.

6. Push the M5 studs up as needed to release the belt ends and remove the belt.

7. Feed the new belt (with teeth facing to inside of loop) around the idler pulley, down the cavity in the beam, and around the drive shaft/pulley.

8. Pull the belt ends until they meet and are centered between the belt clamp M5 studs.

9. Push the ends into the clamp stack, making certain the ends meet and engage the top clamp teeth. (If needed, entire base plate may be removed to improve access.)

10. Reinstall the belt clamp nuts onto the studs and tighten the nuts evenly.

X Drive Belt Tension

"FACTORY SERVICE ADVISED"

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

1. Refer to the procedure for using the Breco Belt Tensioner in Addendum A and locate the point on the belt midway from the outer belt clamping block to the center of the drive shaft pulley.

2. Again, referring to Addendum A, perform a the belt tension measurement with the Breco Belt Tensioner.

3. Move the X carriage to the full right travel. Verify it is just touching the mechanical stop and is not heavily loaded against it - this will give a false belt tension reading.

4. Attach a paper clip at the middle of the span of belt at either edge.

5. Take the belt tension reading with the Breco meter.

6. The belt reading should be **76** +/- 1 at both edges and the edges should not vary more than +/- 1 on the meter.

7. With the jam nuts loosened, adjust the tensioner hex head bolts as necessary to obtain the proper belt tension.

   NOTE: It is suggested that no more than 1/4 turn be made between tension readings.

8. After the proper tension is achieved, hold the tensioner bolt heads from rotating and tighten the jam nuts against the bracket to secure the adjustment.

Replacing Y Drive Belts

"FACTORY SERVICE ADVISED"

The carriage Y axis consists of two rails, each having one drive belt. Special tools and factory training are required to properly replace and tension these belts. It is recommended that factory trained service personnel replace the Y belts.

Y Drive Belt Tensions

"FACTORY SERVICE ADVISED"

The carriage Y axis belts require a special tool to proper tension adjustment. Improperly tensioned belts may lead to premature wear of the belt, pulleys and bearings, and may produce diminished embroidery quality. Refer to the following procedure for tensioning the Y drive belts.

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

1. Move the X carriage to the full rear of its travel.
2. Refer to the procedure for using the Breco Belt Tensioner in Addendum A and locate the point on the belt midway from the outer idler pulley block to the X axis carriage.
3. Again, referring to Addendum A, perform a the belt tension measurement with the Breco Belt Tensioner.
4. Attach a paper clip at the middle of the span of belt at either edge.
5. Take the belt tension reading with the Breco meter.
6. The belt reading should be **56** +/- 1 at both edges and the edges should not vary more than +/- 1 on the meter.

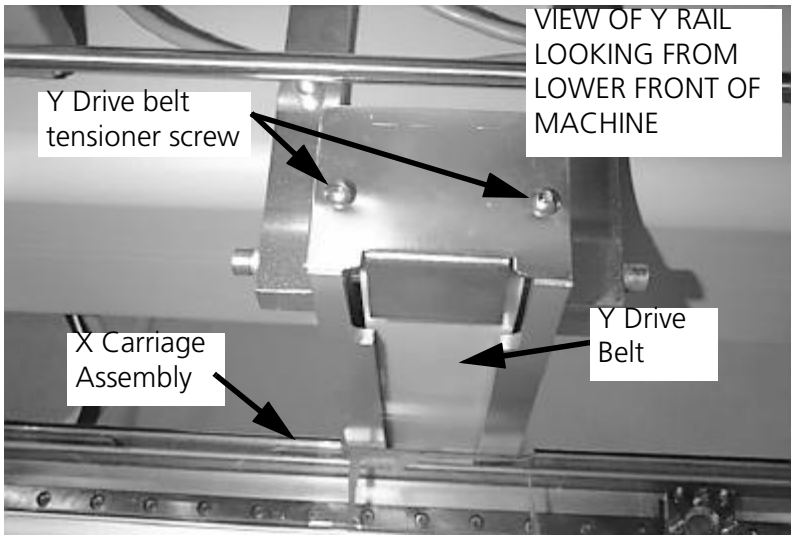


Figure 6-5

7. To adjust the belt tension, tighten or loosen the screws at the front of the Y rail shown in Figure 6-5.

NOTE: It is suggested that no more than 1/4 turn be made between tension readings.

X and Y Home Sensor Adjustments

Both the X and Y axes have a separate 'home' photo sensor/flag assembly attached to their mechanical drives. To adjust the home positions refer to the following procedures:

X Home

1. If replacing the X Home sensor itself, remove the single screw shown in the middle in Figure 6-6 and unplug the connector directly behind it.

2. Loosen the two outer screws (one shown with screwdriver attached in Figure 6-6) to allow home sensor adjustment both vertically and horizontally.

3. Loosen the three screws in the flag (lying flat on the X carriage surface) to allow adjustment within the photo sensor.

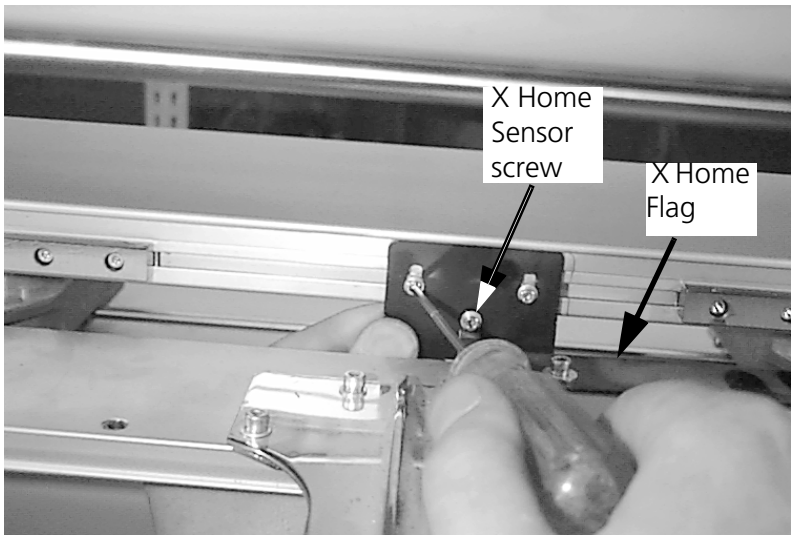


Figure 6-6

Y Home

1. To adjust Y Home position, carefully grasp the larger plastic gear shown in Figure 6-7 and disengage its teeth with the teeth of the smaller plastic gear.

2. Reposition the teeth of the larger plastic gear with the adjacent teeth of the smaller plastic gear to effectively move the sensor flag one way or the other in the Y Home sensor.

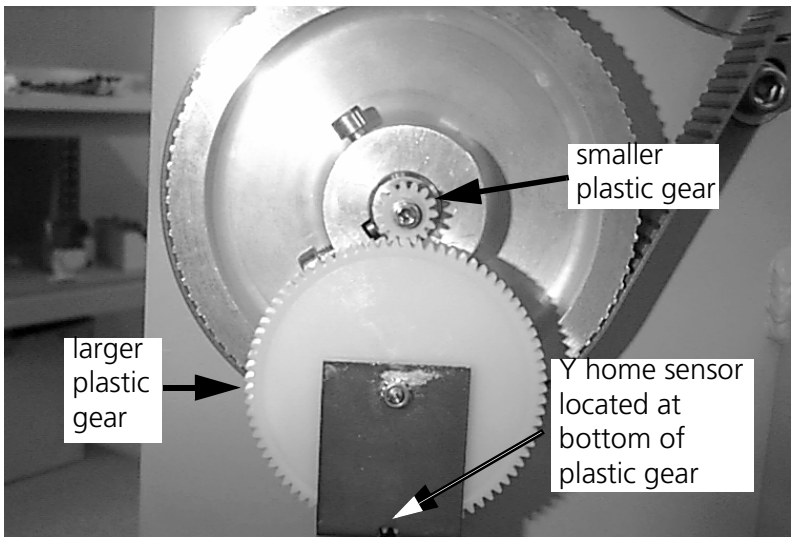


Figure 6-7

Addendum A - Belt Tensioning

General

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

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

Using The Breco Belt Tensioner

CAUTION! DAMAGE TO THE MACHINE MAY RESULT IF BELT TENSIONS ARE IMPROPERLY ADJUSTED.

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

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

1. Refer to the procedure in this manual for the belt you are tensioning to identify the location for positioning the applicable metallic detection material such as a paper clip. The general position for measuring a belt is at the midpoint on the belt between the two pulley center lines.

2. Turn ON the Breco Belt Tensioner and press the red button. The display will show FFFF then change to a number. This number represents battery condition. The battery should be replaced if the number falls below 6800.

3. Press the red button again and the display shows all zeros. The unit is now ready for testing.

4. Position the tensioner sensor about 10mm above and perpendicular to the portion of the belt where the paper clip (if applicable) is attached.

5. While holding the tensioner in position, strike the belt lightly to cause it to vibrate. The tensioner will beep and show a reading on the display.

6. Observe the reading on the tensioner display and refer to the applicable belt procedure in this manual to adjust the belt tension until the reading on the display matches the specified value for that belt.

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

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

7. Remove any paper clip (or other applicable metallic material) that was attached to the belt to make the measurement.

Timing Belt Specifications

The following is a list of timing belt tension specifications for the EMB 10/6T. The numbers opposite each belt description represent the number read on the Breco Belt Tensioner when used as described in this addendum.

X Axis Drive Belt	76 +/- 1
Y Axis Drive Belt (left)	56 +/- 1
Y Axis Drive Belt (right)	56 +/- 1
X Motor Belt	155 +/- 5
Y Motor Belt	150 +/- 5
Z Motor Belt (Upper Shaft)	55 +/- 5
Z Motor Belt (Lower Shaft) *	55 +/- 5
Color Change Motor Belt	180 +/- 5
Grabber Motor Belt	145 +/- 5

* If the tension of the Z Motor Belt (lower shaft) is adjusted - hook timing MUST be checked and properly adjusted!

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