



# **EMC6/4 EMBROIDERY PERIPHERAL**

**(With Melco Head)**

## **TECHNICAL MANUAL**

Part Number: 110049-01

**A technical guide for performing service maintenance and repairs on the four head sewing peripheral with the Melco, six needle sewing head.**

First Edition, Revision A

MELCO INDUSTRIES, INCORPORATED



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# 1. Introduction and Installation

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## INTRODUCTION

### Scope of Manual

The EMC6/4 Embroidery Peripheral Technical Manual is designed to provide the user with information necessary to perform repairs beyond routine operator maintenance. For convenience, however, there is an area in the maintenance section that covers routine operator maintenance. This area is basically a duplicate of the operator maintenance section in the EMC6/4 Operation Manual.

### Warranty Registration

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

### General

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

The terms "Embroidery Peripheral" and "Sewing Peripheral" may both be used to identify the same item. The meaning of the two terms is identical.

When referring to an Embroidery Peripheral or peripherals, the initials "EP" or "EPs" may occasionally be used.

When referring to a Sewing Peripheral or peripherals, the initials "SP" or "SPs" may occasionally be used.

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

## Standard Conventions Used In Manual

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

- To indicate a key on the computer keyboard, it is referred to as simply the key in question - for example: Press the Enter key to initiate the application.
- Square brackets around an all-caps word indicates a key on a peripheral device. The same word without the brackets means a function or description is intended. An example is: **[ENTER]** indicates the ENTER key on the peripheral; and **ENTER** means to perform the function meaning "to go into."
- To indicate typing on the computer keyboard, it is referred to in **BOLD** letters - for example: Type: **run** and press Enter to start the program.
- To indicate that two keys must be pressed simultaneously the following conventions are used: with the computer keyboard, the first key to be pressed and held down is simply referred to, then the second key which needs to be pressed while the first key is held down is referred to after a comma - for example: Press Shift,8 to type an asterisk (\*).
- To indicate two keys with the peripheral keyboard, the above holds true except there is no comma between the keys - for example: Press [ALT][⇒] to drop the needle one height position.

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 to the users attention that the procedure following must be performed with care and accuracy to avoid possible danger or harm 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 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. The following list of terms and definitions is by no means all inclusive, but provides a base knowledge of these terms. Understanding them will greatly enhance your understanding of the contents of the manual.

### **Hoop**

A mechanical device that holds material to be sewn. "HOOP" is generic term and can used to describe any material holding device.

### **Job Queue**

Machine memory location (found in the RUN MENU) where the design name, and Color Sequence information is stored while the machine is powered up. This memory location is cleared when power is lost or the machine is turned off.

### **Needle**

The needle is a long thin shaft with a small "eye" at the end for placing the thread into the garment during the embroidery stitch.

### **Needle Bar**

The device that holds the needle in position to travel vertically in proper coordination with the rest of the sewing head movements.

### **Thread Tension**

A generic term for tensions of thread or yarn used in any style of embroidery.

### **X Axis**

The right to left movement of the Beam and Carriage.

### **Y Axis**

The "front" to "back" movement of the Beam and Carriage.

### **Z Axis**

The rotational movement of the horizontal drive shaft in the sewing head.

## Maintenance Philosophy

The maintenance philosophy used in this manual, and practiced at Melco, is to isolate potential problems with the system to a "practical" replacement assembly. Therefore, components are not replaced, but rather, the circuit board "assembly" is replaced.

In the process of isolating problems in the machine, the person performing the troubleshooting must also practice good troubleshooting techniques. Good troubleshooting techniques include, but are not limited to , guarding against static electricity damaging machine components.

**CAUTION! The EMC6/4 Embroidery Peripheral electronics are quite sensitive to static electricity. To avoid probable damage to the equipment, Melco insists that steps be taken to prevent static charges coming from personnel working on these machines. Therefore, Melco requires that personnel utilize a static grounding strap when performing maintenance on the EMC6/4.**

## Warranty Considerations

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

Therefore, it is recommended that Melco factory trained personnel be consulted whenever the "Factory Service Advised" statement is noted with a procedure.

For general information, most maintenance in the Z Encoder/Motor area includes steps that may void the factory warranty if not performed properly.

Although the above area is specifically subject to voiding the warranty, any service that is improperly performed may cause the warranty to be voided.

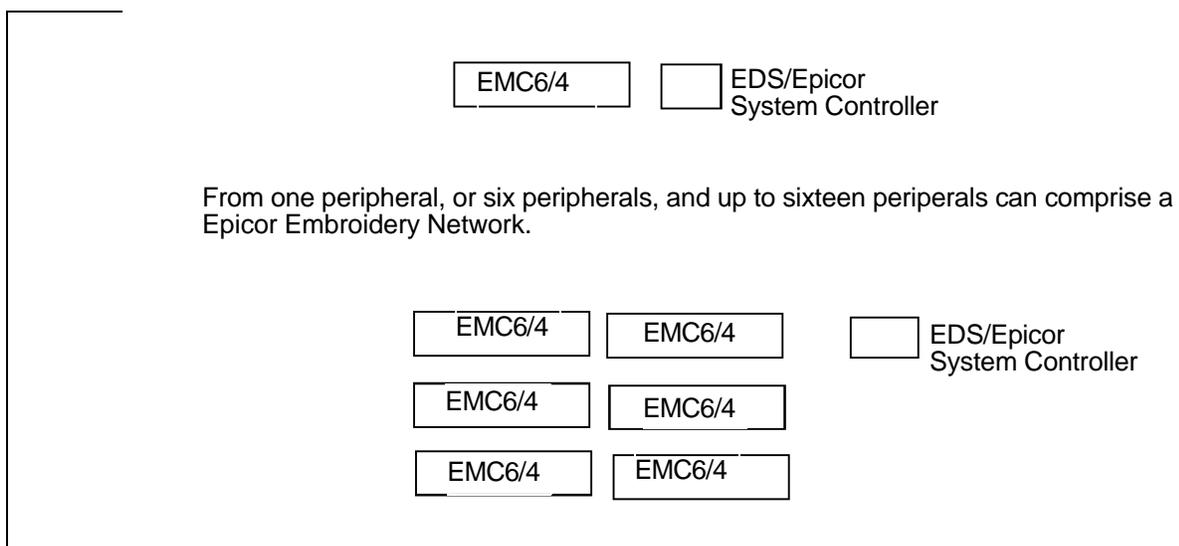
## INSTALLATION

When the system is installed, you must connect the various parts to each other to create the “system.”

To install the system, follow these steps:

### Unpacking And Placing The Equipment

1. Unpack and identify the parts.
  - The ED/Epicor System Controller (computer).
  - The ED/Epicor Monitor.
  - The ED/Epicor Keyboard.
  - The Computer Operation Cabinet (optional).
  - The EMC6/4 Embroidery Peripheral.
  - The EMC6/4 Operation Cabinet (optional).
  - Power Cord for the computer, monitor, and EMC6/4 Network Cable to attach between the computer and EMC6/4.
  - Optional parts you may have ordered, such as the Track Ball, Digitizer Tablet, etc.
  
2. Place the operation cabinets in the desired locations within the work area. Refer to Figure 1-1 for a suggested orientation for placing the equipment.



**Figure 1 - 1**

3. Place the ED/Epicor System Controller onto the Computer Operation Cabinet as shown in Figure 1-2.

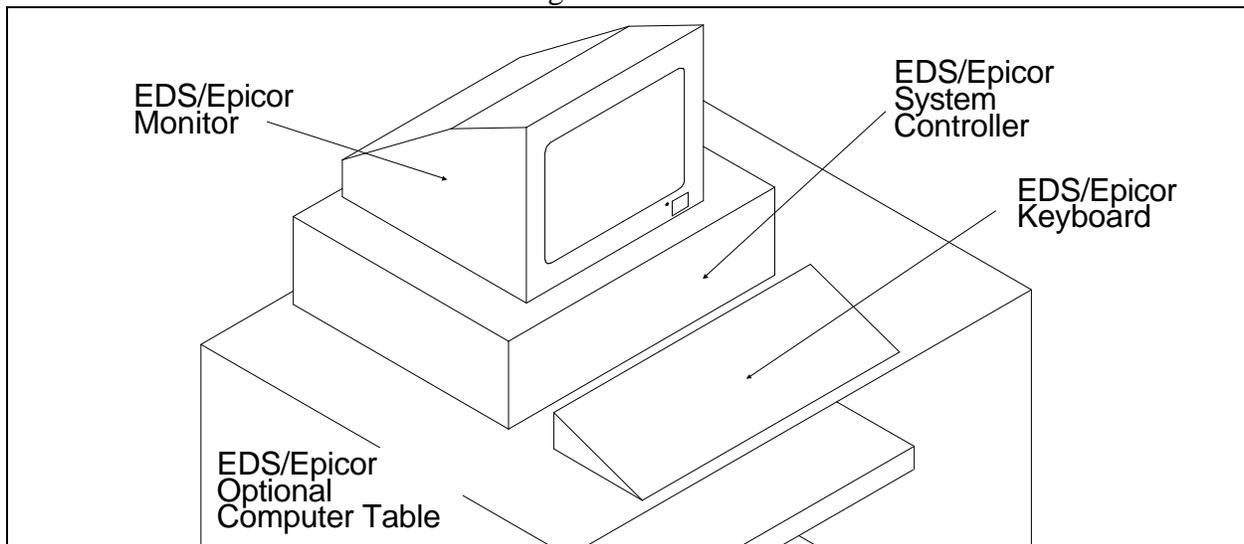


Figure 1 - 2

4. Set the ED/Epicor Monitor on top of the controller and place the ED/Epicor Keyboard in front of the controller on the computer cabinet top.
5. Refer to Figure 1-3 and locate the positions for installing the monitor and keyboard cable connectors to the rear of the controller. Install the two cables. Secure the monitor cable connector by tightening the two small screws at the sides of the connector into the holes in the plug of the computer. Use a small standard blade screw driver that fits the screws properly.

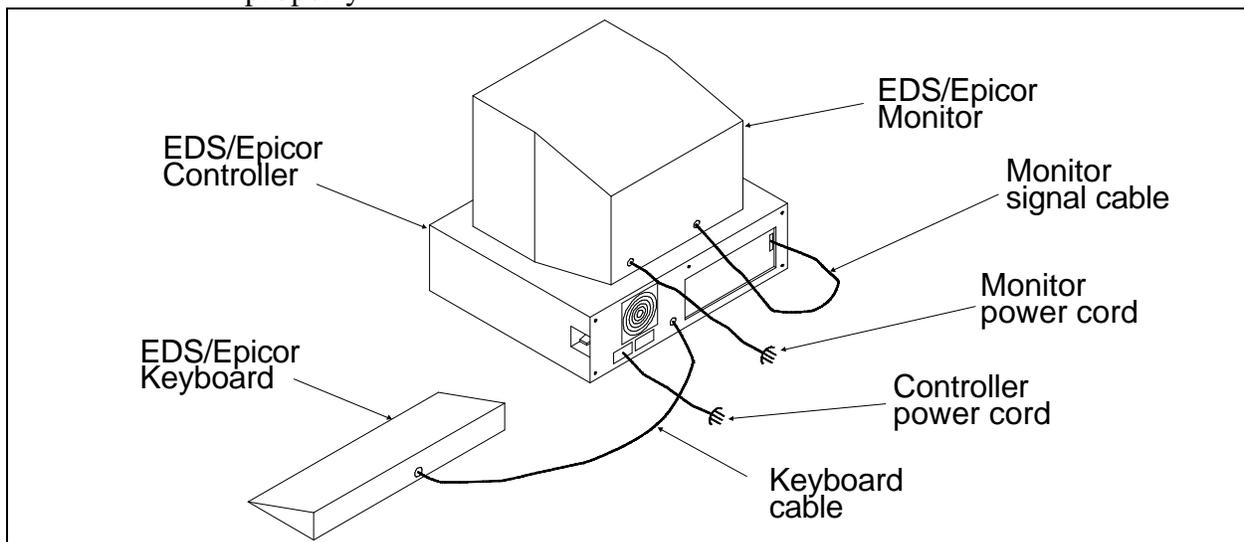


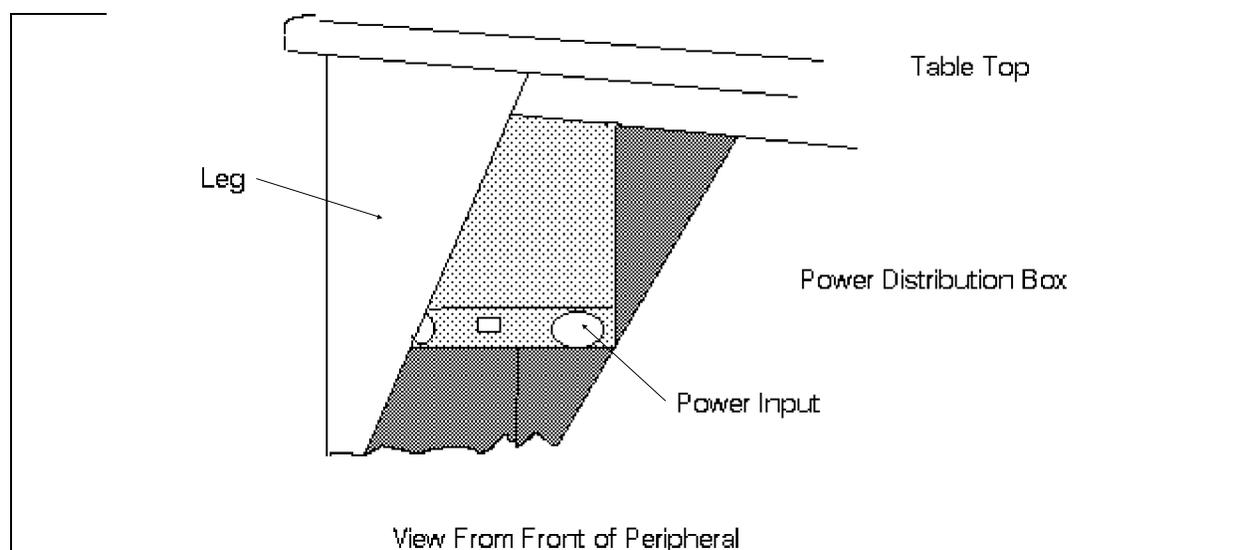
Figure 1 - 3

6. Attach the computer power cord to the rear of the computer as Figure 1-3 shows. Also, attach the monitor power cord to the rear of the monitor.

NOTE: You can use any of the power cords provided with the system for the computer or the monitor.

**CAUTION! Do Not install the power cords to the source voltage until told to do so in a future step.**

7. Attach the power cable to the Power Input receptacle as Figure 1-4 shows.



**Figure 1 - 4**

NOTE: You can use any of the power cords provided with the system for the sewing peripheral.

**Be Sure To  
Install the  
Terminator  
Cable**

8. Refer to Figure 1-5 and install the network cable between the ED/Epicor Controller and the Embroidery Peripheral. If you only have one peripheral device attached to the ED/Epicor Controller, install the “terminator” cable to the peripheral as the figure shows. If more than one peripheral device is attached to the computer, the “terminator” cable must be installed on the last peripheral of the series after attaching the network cables from peripheral to peripheral until all units are linked to the computer through the “daisy-chain” network.
9. Install the power cords of the controller, the monitor, and the sewing peripheral to the power source at this time.

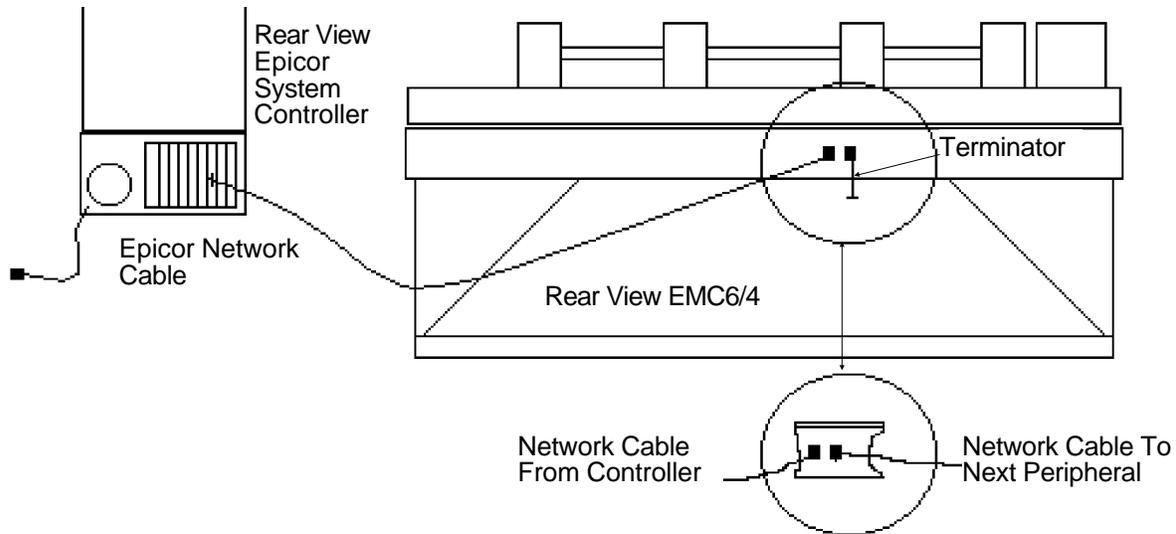


Figure 1 - 5

## Configuring the EMC6/4 (With Melco Head)

There are two things that must be set in each sewing peripheral of any Melco system before it is used for the first time.

First you must set the Peripheral Program. The CPU Printed Circuit Board used on the EMC6/4 Embroidery Peripheral (With Melco Head) is also used for other Embroidery Peripherals produced at Melco. Therefore, you must tell the CPU board what peripheral it is being used on. This is usually set correctly at the factory.

**CAUTION! If the EMC6/4 (With Melco Head) is not configured with the correct Peripheral Program, it will not run properly, and may become damaged.**

If for any reason the Peripheral Program is not set properly, or if you have replaced the CPU board, you should know how to set the Peripheral Program to avoid problems and possible damage to the unit.

The second configuration item is the network address (or Unit Number). The Unit Number must be set and be different for each peripheral attached to a single ED/Epicor controller. There may be up to 16 total peripheral devices attached to any one controller, and each must have its own Unit Number. The number is selected from the peripheral Keyboard and is between 1 and 16.

The “configuration mode” in the EMC6/4 is accessible by pressing a certain keystroke combination while switching on the power.

**Alternate Configuration Mode**

Additionally, the "configuration mode" can be initiated any time the power has been turned on, but the unit has not yet been "down-loaded" by the ED/Epicor operating software. Until the unit is "down-loaded," the Display will alternately show the 2 present configuration items (Program Number and Unit Number) continuously until the unit becomes "down-loaded." When the EMC6/4 is initially turned on, and any time you wish to change the configuration status of the machine, refer to the following steps:

1. Before you turn on the EMC6/4 (or if the unit has not yet been "down-loaded" by the ED/Epicor operating software), locate the 10-key Keyboard (Peripheral Keyboard) and LCD (Liquid Crystal Display) in the upper right area of the peripheral unit.

Also locate the power switch at the left side of the unit. It is the rocker switch mounted in the Frame Leg. Flip the switch UP to turn the power ON.

2. Go to the Keyboard, the display will be flashing on and off, find the 3 keys on the Peripheral Keyboard marked: [ALT], [↑], and [↓]. Depress and hold all three keys down at the same time.

**NOTE:** With the situation where the unit is already ON, but has not been "down-loaded," you need only to depress and hold the 3 Peripheral Keyboard keys until the unit beeps to get into the configuration mode. Then proceed. You do not need to turn off the EMC6/4

Hold these keys depressed until the unit "beeps" and the Display shows a message depicting the Peripheral Program currently selected. The EMC6/4 will now be in the "configuration mode," and you can release the 3 keys.

When the EMC6/4 is in the "configuration mode," you can set (or change) the Peripheral Program and then the Unit Number for the machine.

**Peripheral Program**

3. To set the Peripheral Program, simply depress the [↑] or [↓] keys on the Peripheral Keyboard until the correct program (EMC6/4M w/Melco Head, and EMC6/4T w/trimmers) shows on the Display. After the desired program is showing on the Display, depress the [ENTER] key on the Peripheral Keyboard to "set" the program.

**Unit Number**

4. After the [ENTER] key is depressed the configuration item will go to the Unit Number selection. To select a Unit Number, again simply depress the [↑] or [↓] keys on the Peripheral Keyboard until the desired Unit Number shows on the Display. (Remember, you cannot have two peripherals with the same Unit Number. If you do choose 2 peripherals with the same number, the computer will be confused and data transfer errors will occur.) After the desired number is showing on the Display,

depress the [ENTER] key on the Peripheral Keyboard.

The EMC6/4 (With Melco Head) configuration is now complete and the Display will alternately show the Peripheral Program and then the Unit Number selected.

NOTE: If the ED/Epicor Controller is turned on and the Unit Number that you have just selected is entered into the peripheral menu of the ED/Epicor program, the EMC6/4 will “Down Load” with the EMC6/4M (w/Melco Head) or (EMC6/4-T w/ Trimmers) Peripheral Program at this time and the Display will show something other than the Peripheral Program and Unit Number. Do not be concerned if this happens, more will be discussed on this situation in the system operations area of this section of the manual.

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## 2. Operation

### BASIC OPERATIONS

This section of the technical manual provides a basic procedure for performing some of the routine operations with the EMC6/4 embroidery system. It includes some operational functions required for both the EDS/Epicor controlling and the EMC6/4 Sewing Peripheral as they work together as a system. For a complete description of the operations, refer to the EMC6/4 Operation Manual.

Since a system is an organized structure, to operate the system certain steps must be performed in the proper sequence to insure the desired results. The system start-up portion of this section explains the initial step-by-step system “start-up” procedure. After system start-up is completed, the EDS/Epicor and the EMC6/4 may be operated independently.

Other options and peripheral equipment may be attached to your system, but in this manual, only the basic two-piece EMC6/4 system is discussed.

### System Start-Up

First, you must understand that the embroidery system, although comprised of several individual items, must work and be operated as a “system.” To apply power to the system, follow the steps below in the order given:

1. Turn on the EDS/Epicor Monitor first by depressing the power switch on the monitor. It is possible for more than one monitor style to be used with the system, and the location for the power switch may vary from one to the next. Usually, however, the power switch is located around the front or to the right side of the monitor as Figure 2-1 shows.

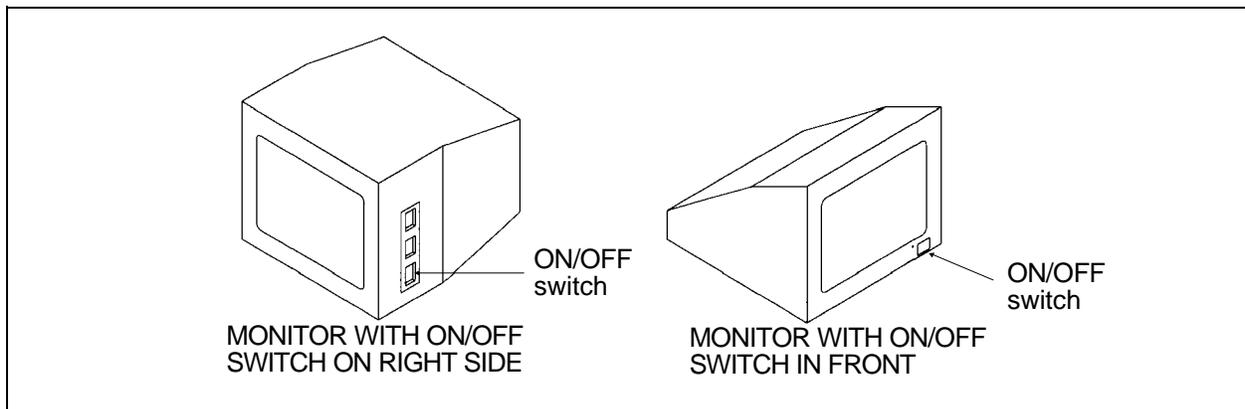


Figure 2 - 1

If you have any questions where the monitor power switch is located, you may call your local Melco distributor.

2. Next, turn on the EDS/Epicor Controller by pushing upward on the switch at the rear of the right side of the controller as Figure 2-2 shows.

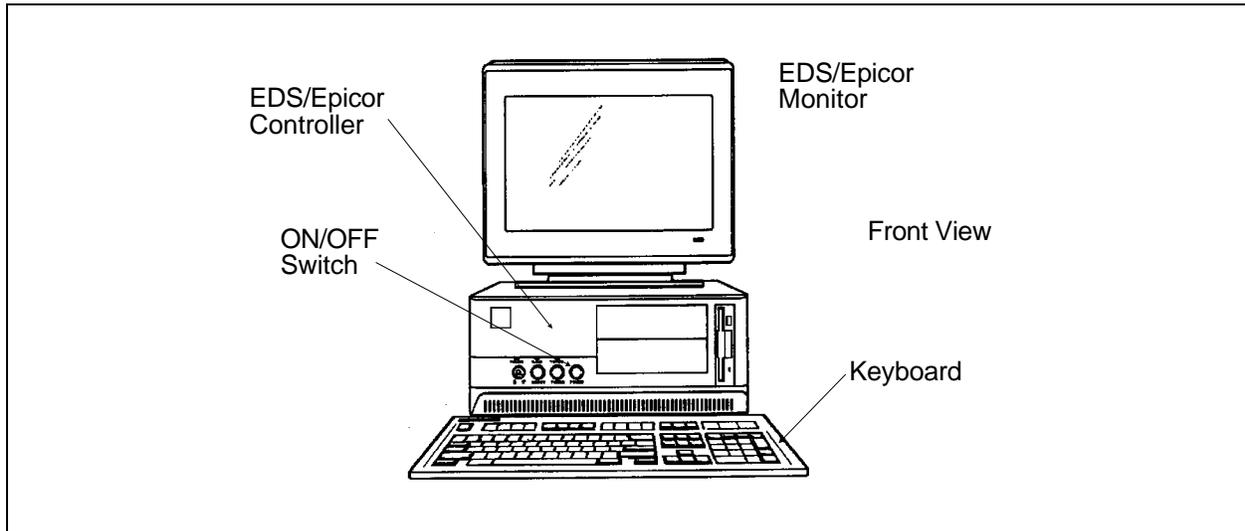


Figure 2 - 2

3. After the EDS/Epicor has come on and the Melco Logo is showing on the monitor screen, you may then turn on the EMC6/4 Sewing Peripheral. The EMC6/4 power switch is a “rocker” type switch mounted in the left side frame leg of the unit (See Figure 2-3). Flip the Switch UP to the “ON” position.

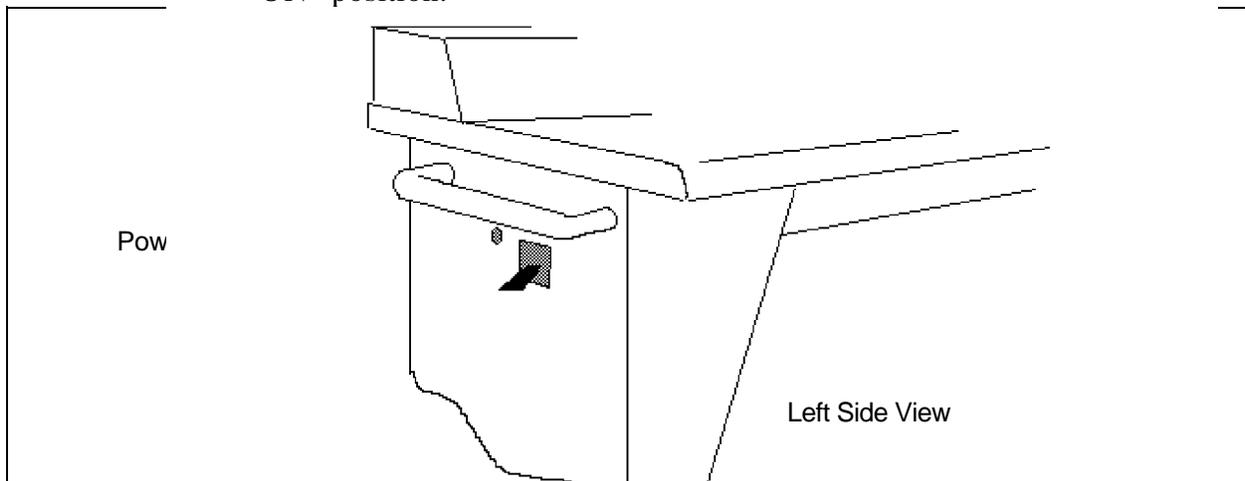


Figure 2 - 3

After the EMC6/4 is turned on, the display will show various messages. The messages provide status information on the sewing peripheral unit.

## System Shut Down

As with starting up the system, a certain sequence is recommended. Also, it is advised to "park" the head on the controller's hard drive whenever leaving the system turned off and unattended (at the end of the day, for example).

### Turning Off The System

When shutting down the system, it is recommended that the computer box be turned off first. After turning off the controller, you may turn off all the other devices in any order you wish. If you have the components all installed into a power surge protector strip or other device that has a common on/off switch, you may turn off the entire system with the one switch.

### Parking The Head

**CAUTION! Moving the controller while it is running can damage the Hard Disk Drive's Read/Write Heads. Be sure that the controller is turned off before moving. If your system uses one or more 20 mb Hard Drives, they must be "Parked" before you turn them off. If your system uses 40 mb or larger Hard Drives they automatically "park" when powered down.**

To park the head on the 20mb Hard Disk Drive, perform the following procedure:

1. Go to the main menu by pressing the Alt and F10 keystroke combination on the controller keyboard until the main menu is on the monitor screen.
2. Press the Ctrl and F9 keys; and then press the F2 key to put the system into the MS DOS format.
3. Type:  
**hdpark**  
Then press:  
**Enter.**

A question will appear on the monitor screen asking if you wish to actually park the head or not.

4. To answer "yes" type:

y

The hard drive head is now "parked" and you may safely move the controller after the power has been turned off.

After the controller hard drive head has been "parked" and the power turned off, the system will automatically come back to the operational state next time the power switch is turned on.

## **Keyboard Key Functions**

The Keyboard located on the EMC6/4 Embroidery Peripheral has 10 keys. Each of these keys has at least one function, and several of the keys are used in conjunction with more than one function. The following is a very brief description of some of the more common functions for each key.

### **General Keystroke Descriptions**

[MENU]

This key is used to select and scroll through the various menu items in the peripheral program. Refer to the EMC6/4 Operation Manual for a full explanation of the various menus that are used.

[ALT]

The [ALT] key has no independent function. Its use is always with another key. With the use of the [ALT] key the other keys can be used for more than one function.

[ENTER]

This key is used primarily to choose or initiate selected functions. By pressing this key with the desired function showing on the display, you will enter into that function or cause that function to be performed.

**[FAST/SLOW]**

Pressing this key will select the Hoop Carriage speed alternately by toggling between fast and slow with each press of the key.

**[RIGHT ARROW]**

Used to move the Hoop Carriage to the left (effectively moving the sewing field to the right) to adjust the position for placing the design. Also used as a "selector" key when in various menu functions.

**[LEFT ARROW]**

Used to move the Hoop Carriage to the right (effectively moving the sewing field to the left) to adjust the position for placing the design. Also used as a "selector" key when in various menu functions.

**[UP ARROW]**

Used to move the Hoop Carriage down (effectively moving the sewing field up) to adjust the position for placing the design. Also used to scroll upward in through a selected menu function.

**[DOWN ARROW]**

Used to move the Hoop Carriage up (effectively moving the sewing field down) to adjust the position for placing the design. Also used to scroll downward through a selected menu function.

**[START]**

Used to initiate the operation of selected job. Also used to restart a job after color changes or other stopped occurrences. Is used in some menu functions to initiate the operation of that function.

**[STOP]**

Used to cause a current sewing or function operation to stop or pause temporarily. Also used with other functions, such as Frame Forward and Frame Backward. Also it is used to clear error messages from the display.

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# 3. Maintenance

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## OPERATOR MAINTENANCE

### Introduction

The EMC6/4 Technical Manual puts most of its emphasis into "service" or "repair" maintenance. There is some reference to certain areas of operator maintenance, but most of the normal day-to-day maintenance procedures that the operator must follow are found in the EMC6 /4 Operation manual. Please refer to that manual for full details in performing "operator" maintenance.

### Cleaning The Equipment

See the EMC6/4 Operation Manual for information on cleaning the machine. The cleaning may be required more often than the operation manual suggests, depending on the environment and amount of time the machine is operated.

### Lubricating The Equipment

#### Lubricating The Sewing Head

Refer to the EMC6/4 Operation Manual for sewing head lubrication instructions. A regular procedure should be followed in lubricating. Always start at one lubrication point and proceed in order to every point rather than jumping from one point to another in a haphazard fashion.

Sewing machine oil (included in the operators kit) is required for lubricating the sewing head. Using any other lubricant may be harmful to the equipment. Lubricate according to the schedule in the operation manual.

#### Lubricating The Beam And Y Rails

The X-Beam and Y-Rails of the EMC6/4 are self lubricating and DO NOT require any operator lubrication.

## **Operator Adjustments**

### **Needle Installation**

See the EMC6/4 Operation manual.

### **Needle Bar Height Adjustment**

Refer to the EMC6/4 Operation manual for this information.

### **Hook Timing**

See the EMC6/4-T Operation manual.

### **Presser Foot Height**

The height of the presser foot is adjusted at the factory for an average combined height of the material and stitching. With any major deviation from routine material and stitching, you may need to adjust the presser foot height.

Presser foot height, however, is not a standard adjustment. It requires that the needle bar be removed, and then spacers are removed or installed as required to position the presser foot.

It is recommended that you do not consider adjusting the presser foot height unless you are experiencing sewing problems that are directly attributed to presser foot height. Experience has proven that the presser foot self-adjusts to the sewing situation quite well.

### **Thread Tension Adjustments**

Refer to the EMC6/4 Operation manual for this information.

## **SERVICE MAINTENANCE**

Occasionally repairs will become necessary on the EMC6/4 Embroidery Peripheral, as with any mechanical device. When your machine needs repair maintenance, Melco recommends that you consult your Melco distributor for service advice.

In this EMC6/4 Technical Manual, service maintenance comes in 2 separate sections: Service Adjustments and Mechanical Disassembly. Refer to these procedures for information on service maintenance.

Many times the only service requirement may be a mechanical part sent to you for you to install and adjust. At other times, however, your distributor may recommend that you obtain professional service from factory trained technicians.

There are some procedures in these sections that require formal technical training and special tools to insure best results. When these procedures are required, we may recommend that the procedure be performed by a factory trained technician. This reference is indicated by stating "FACTORY SERVICE ADVISED" at the beginning of the procedure. If unauthorized personnel attempt to service these areas, the FACTORY WARRANTY MAY BE VOIDED if the work is improperly performed.

We strongly recommend that customers use factory trained technicians when it involves performing highly technical repair maintenance on any equipment. An authorized field service group will have personnel that are factory trained on most of the equipment; and will be kept informed of the latest servicing techniques and product enhancements. The professional service technician will also have access to, and have user knowledge of, any special tools that may be required for servicing certain areas of the equipment.

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## 4. Service Adjustments

### GENERAL

This section of the manual provides detailed information for performing machine adjustments that may be required during the life of the product. The procedures are guidelines for performing service maintenance; and must be used by personnel practicing good maintenance technique.

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

### ADJUSTMENT PROCEDURES

The EMC6/4 is functionally arranged into four sections (five sections with Trimmer Option): the Keyboard section, the Controller section, the Sewing Head section, the Carriage section (and the Trimmer Control Section).

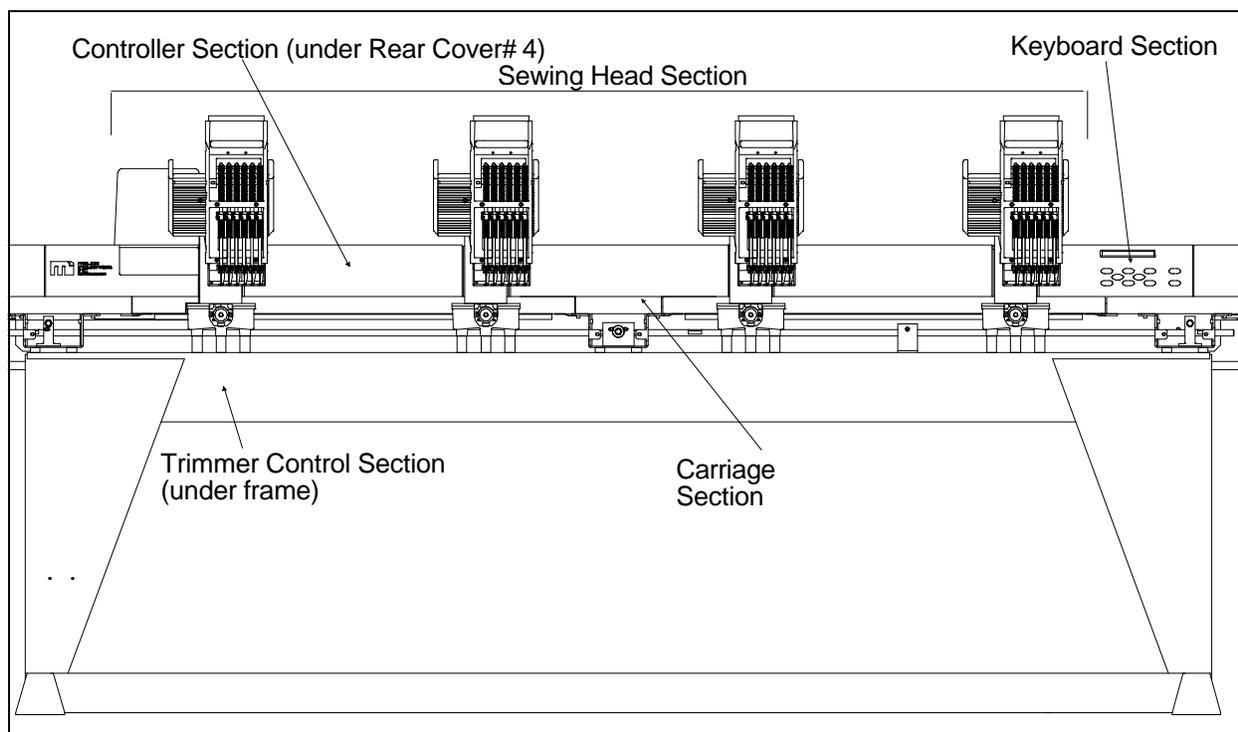


Figure 4 - 1

## **CONTROLLER SECTION**

No adjustments are performed inside the controller section of the EMC6/4.

## **MOTOR AND DRIVE BELT TENSIONS**

*"FACTORY SERVICE ADVISED"*

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

All motor and drive belts require special tooling for setting the proper tensions. If the tension settings are attempted without the proper tooling and without proper training assistance, the machine chassis and some components may be damaged.

If adjustment of a belt tension is thought to be needed, it will be necessary to contact the factory trained Melco service representative in your area for advise and assistance.

## **OPERATOR INTERFACE (KEYBOARD SECTION)**

### **Display Screen Intensity**

To adjust the intensity of the display in the keyboard/display assembly it will require the removal of the operator interface (Keyboard) cover to gain access to the adjusting potentiometer on the side of the keyboard printed circuit board. During the adjustment of the display intensity the EMC6/4 must be on so the result of the adjustment may be observed.

**WARNING! Potentially harmful voltages are present on the keyboard/display printed circuit board.**

1. Remove the Keyboard Cover (cover # 1), using care not to allow the keyboard/display to come in contact with any portion of the machine that will short circuit any voltages. Also, do not touch the components on the printed circuit board. (Refer to specific instructions in Section 5 for removing the cover.) Set the cover on the peripheral table top.

2. Install the static strap as explained in the specific instructions in Section 5.
3. Turn on the power switch to the EMC6/4.
4. Locate the intensity adjustment pot on the right side of the printed circuit board as shown in the figure below.
5. Rotate the adjustment potentiometer clockwise to increase intensity on the display screen, or counterclockwise to decrease the intensity on the display screen.

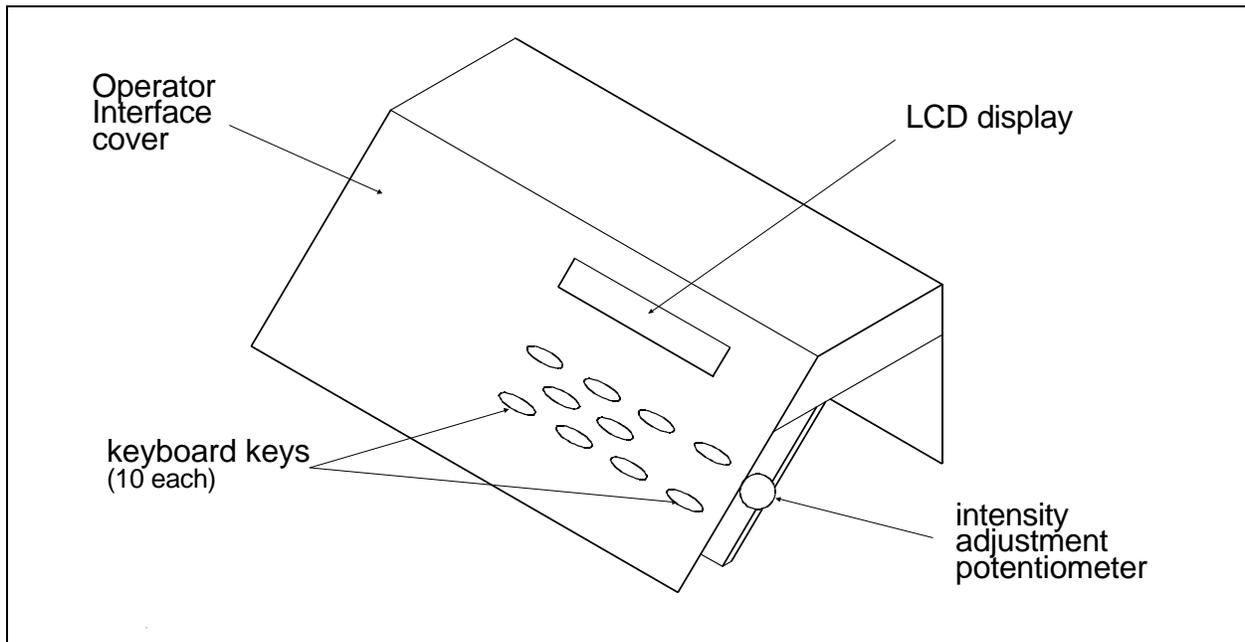


Figure 4 - 2

6. After the proper intensity is obtained, reinstall the operator interface cover using the same precautions as before.

## **Power Supply 5 Volt and 24 Volt Settings**

These adjustments are done at the factory during assembly of the machine.

While there are no adjustments to the power supply in the Controller Section of the peripheral the voltages are read from the test points of the Motor Controller I/F PCB, which lays on the bottom of the EMI Box in the Controller Section.

"FACTORY SERVICE ADVISED"

**Tools Required:** Digital Voltmeter, one short and one long insulated alignment tool, 3/16 (4.74mm) hex wrench, one Phillips screw driver.

1. Remove Rear Cover # 4 (Controller Section). Then remove the EMI Box cover to access the Motor Controller PCB, using Fig.4-3 locate the four Test Points shown, TP5 (GND), TP6 (VCC), TP7 (5 Volt), and TP3 (24 volt).
2. If the Peripheral is OFF, turn it ON, and put into Configuration Mode. Do not allow the peripheral to "Download" from the system controller.
3. Check VDC and VAC for both 5 and 24 volt output. Spec's for VDC: 5volts = 5VDC + /- 0.05VDC (4.95-5.05VDC), AC Ripple = /- 0.150VAC, 24VDC= 24VDC + /- 0.36VDC (23.64VDC-24.36VDC), AC Ripple + /- 0.100VAC.
4. Cycle power on the peripheral, this time allowing the machine to "Download" from the controller. Check the DC voltages again. Do not

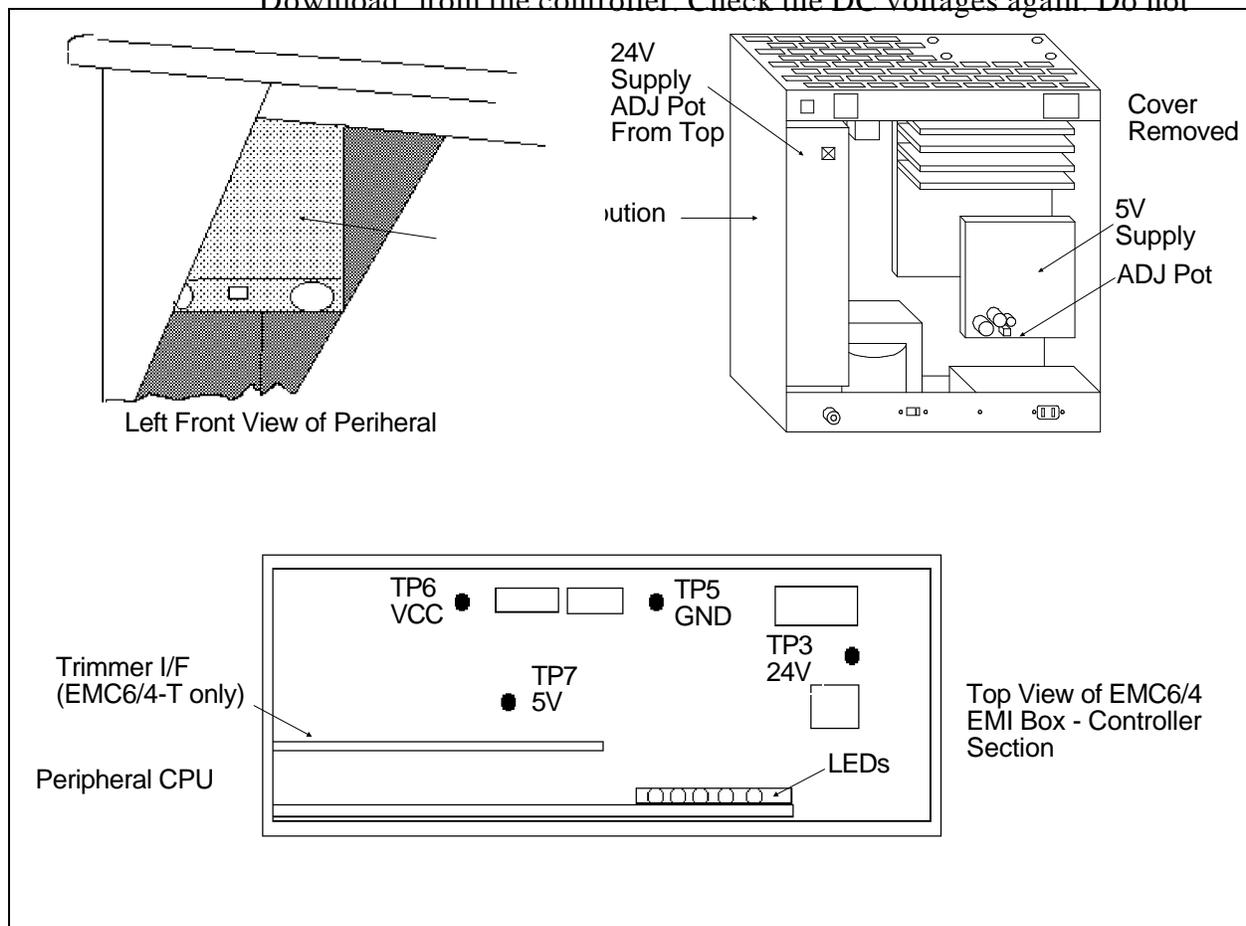


Fig. 4-3

check AC voltages at this time. (Motor noise causes the AC voltages to be out of spec.)

5. If 5 volts needs adjusting, remove the Power Distribution Box cover and using Fig. 4-3 locate the 5 volt power supply and the adjusting potentiometer. Note that the 24 volt output should never need adjusting. However, should it be necessary the 24 volt adjustment potentiometer is found in the 24 volt power supply at R59. Adjusting the 24 volts requires removing the power distribution box, then inserting a long insulated adjustment tool in the top of the supply.

## **SEWING HEADS**

### **Z Encoder System Introduction**

The ability to place stitches precisely at high speed is dependent on the accurate operation of the electronics and electro-mechanical assemblies. The "key" to this is the Z Encoder. The information provided to the CPU by the Z Encoder is the basis for all other actions of the Head, regardless of the style sewing peripheral you are using. The Z Encoder sends the following information to the CPU:

1. Position Count.- This count is a linear count value equal to rotational value (degrees) of the sewing head.
2. Rate Count.- This count is used by the CPU to keep track of how fast the sewing head is rotating. The rate counts are not as frequent in occurrence as the position counts.
3. Mark Count.- This count (or mark) is used by the CPU to know when "Head Up" has occurred. The mark pulse is sent to the CPU once per 360 degree revolution of the sewing head.

The CPU uses this information to determine when to move the X-Carriage, when to move the Y-Axis, when a color change is allowed, when setting home is allowed, how fast the sewing head is running, how many stitches have been sewn, and if the sewing head has moved in the direction and as far as it has been ordered by the CPU.

It is important for the Technician to understand that the peripherals' operational software treats the motor control circuitry differently when the Z-Axis is running than it does when the Z-axis is stopped. When running, the motor control circuitry allows the X,Y, and Z-axis motors no error in rotation (the encoder feedback signal MUST equal the CPU ordered position, or the motor is driven to eliminate all errors). When the peripheral is stopped,

however, the software that controls the motors allows what is called a "window"; in other words, the peripheral will have between 1.5 and 5 degrees (rotational) error that the software allows. The purpose of this window is to keep the motors from oscillating about the null (hunting for absolute position), and making a grinding noise while stopped. The green LED on the CPU, can be used by the Technician to see if the CPU is in fact receiving a mark pulse from the encoder (indicating that the encoder and associated cables are functional). It should also be stated that "The head-up LED does NOT have to be lit when the peripheral is stopped, and the LED CANNOT be used to make a determination of the Z-encoder alignment status". If used in conjunction with the proper head-up tool, the LED can be used to see if the mark pulse is triggering early or late as compared to absolute mechanical head-up.

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

It can be seen, then, that the proper alignment of the Z encoder will result in excellent sewing quality and proper machine operation. Slight misalignment can cause many kinds of erratic operation and/or intermittent thread breaks. A larger misalignment can be the cause of equipment damage and subsequent electronic/mechanical failure. The careful application of the Z Encoder Procedures by a Technician will result in a machine that will operate correctly and reliably.

## **Z Encoder Inspection**

### *"FACTORY SERVICE ADVISED"*

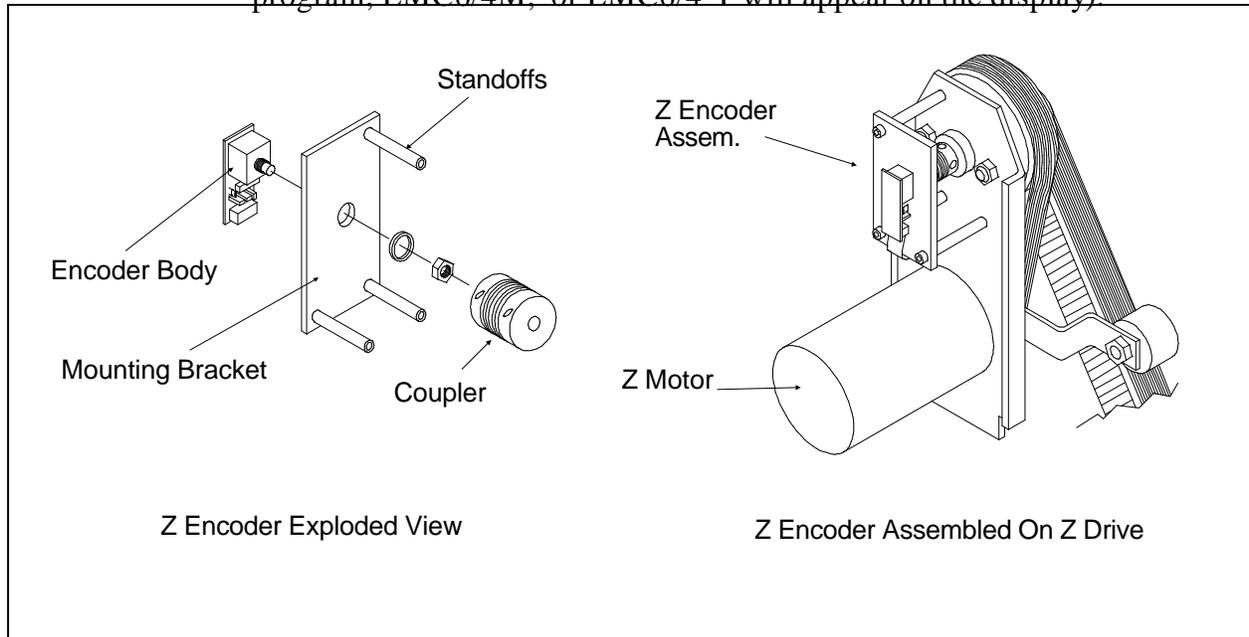
This procedure is a guide for the technician in determining the condition of the three channel optical encoder. If unauthorized personnel attempt to service this area, the FACTORY WARRANTY MAY BE VOIDED if the work is improperly performed.

Inspect the Z shaft encoder following the steps below. If the requirements of this process are not met, replace the encoder by following the Shaft Encoder Installation procedure in Section 5 of this manual.

1. Remove the Rear Cover# 4. Then remove the EMI Box Cover to gain access to the CPU Board. (Refer to specific instructions for removal.)
2. Remove Rear Cover # 5, to gain access to the Z Drive System.
3. It is important that the computer not down load a design to the peripheral. You may disable the peripheral from the computer or, locating the [ALT], the [UP ARROW], and the [DOWN ARROW] keys on the

Keyboard of the EMC6/4 Embroidery Peripheral, press and hold these three keys while you then turn ON the EMC6/4 Embroidery Peripheral.

4. Hold the keys until the "configuration mode" is initiated (the peripheral program, EMC6/4M, or EMC6/4-T will appear on the display).



**Fig. 4-4**

Do not perform any other keystrokes while in the configuration mode at this time.

5. Locate the 4 Red LEDs and 1 Green LED on the outside end at the top of the CPU PCB in the EMI Box. See fig. 4-3.
6. Rotate the sewing heads manually in a clockwise direction from the rear of the machine. This rotation can be performed by rotating the shaft pulley that is driven by the motor belt.
7. While rotating the sewing head, check that the Green LED blinks once each revolution (this is the "index" or "head-up" mark).
8. Inspect the electrical connectors (ribbon cable plug and encoder body) for damage. Clean connections/replace components as necessary.
9. Inspect the blue ribbon cable for cracked, smashed, pinched, folded, or other damage. Replace if any damage to ribbon cable is found.

If the "test" above fails or is in question, replace the component(s) in question

with new ones. Refer to Section 5 of this manual for the installation procedure.

## **Jump Stitch Solenoid**

### **Jump Stitch Solenoid Adjustment**

If a Jump Stitch Solenoid has been replaced, perform the adjustment procedure below.

**NOTE:** The Needle Case must be removed to make this adjustment. The Jump Stitch Solenoid must be positioned so that the plunger is close enough to actuate the Needle Bar Driver Jump Lever when the solenoid is engaged (energized). The plunger also must be located away from contacting the jump lever during normal sewing, when the solenoid is relaxed or not energized.

A typical dimension for the gap between the relaxed solenoid plunger and Needle Bar Driver Reciprocator is approximately 0.015 to 0.045 inches (0.4 to 1.1mm).

Attach the solenoid and bracket assembly to the sewing head, and check the alignment. Be sure that the plunger contacts the reciprocator mechanism; and that the reciprocator mechanism does not contact other internal head parts when the solenoid is energized. The two wires coming from the solenoid body and connecting at the small black plastic connector, can be damaged if they are twisted together. Twisting the wires together will reduce their length and can put undue stress at the connections at both ends. We therefore do not recommend twisting these wires together. If you must group these wires together, use "cable ties" (plastic straps) these are available at most electronic supply stores.

## **TRIMMER SET UP AND ADJUSTMENTS**

### **Trim Info Only**

The Melco Trimmer for the EMC6/4-T was assembled and thoroughly tested before the machine was shipped. Although the set up of the Trimmers should not change during normal use, there are a few things to be aware of to prevent problems.

1. Dirt and dust from thread can build up and prevent the Moveable Knife (in the Rotary Hook Assembly) from actuating correctly. Keep the area clean of dust and thread debris and you shouldn't have a problem here. If for some reason you find that the Knives are out of adjustment a procedure for adjusting them is presented in this section.

2. Birdnesting of thread around the Rotary Hook and Picker could cause the knives to become misadjusted, as well as the Picker.

See Trimmer Troubleshooting, page 6-6 in this manual for other possible problems.

The following procedures provide a guide for adjusting various portions of the Trimmer System.

### **"FACTORY SERVICE RECOMMENDED"**

**NOTE:** Some of the following procedures require fixtures. See your Melco Service Representative before attempting any of these procedures.

The Movable Knife has no specific adjustment, it is necessary to adjust attitude of the Fixed Blade so that the thread is cut square in the center of the Movable Knife. Proper adjustment of the Fixed Blade is a crucial step in Trimmer operation.

Follow the steps listed below carefully and in ORDER. Performing these steps out of order can require a service call to correct.

**Tools needed:** Black Marking Pen,(use a non water base ink ie; Sanford Sharpie Permanent Marker or Eberhard Faber Markette All Purpose Marker),a Medium Screw Driver, a Small Screw Driver, a 2 mm Allen Wrench, a 2.5 mm Allen Wrench, and a 1.5 mm Allen Wrench, one each 3/8" and 3/4" open end wrenches ,one Cam Timing Fixture. Also you will need a Torque Wrench (0-250 in/lbs.) for Cam Timing adjustments.

## **Adjusting the Fixed Blade**

### **TURN THE MACHINE POWER OFF**

1. Fig. 4-5, identifies those components that comprise the Trimmer; the Fixed Blade, Movable Knife and the Under Thread Presser. These components are covered by the Front Bed Plate and the Needle Plate, see inset in Fig. 4-5, remove the screws holding these covers. You may test the Trimmer adjustments without the covers in place, but they must be installed to embroider.
2. Using a small screw driver, carefully lift the B Connecting Plate from the movable knife's Drive Arm Pin. See Fig. 4-5. The B Connecting Plate should come off easily. Be careful not to bend the connecting plate using too much pressure when you raise it up.

- 3 . With the Movable Knife free of the connecting plate, pull the knife towards the front of the Needle Plate Bracket with a small allen wrench hooked behind the Movable Knife. See Fig. 4-6.
- 4 . With the Black Marking Pen mark in the area of the movable knife, shown in Fig. 4-6. Then push the movable knife back to the rear of the Needle Plate Bracket with your thumb or forefinger until it passes UNDER the Fixed Blade. It should take a little force to push the Movable Knife under the Fixed Blade, be careful not to press down on the knife, but use a steady horizontal movement to push the knife.

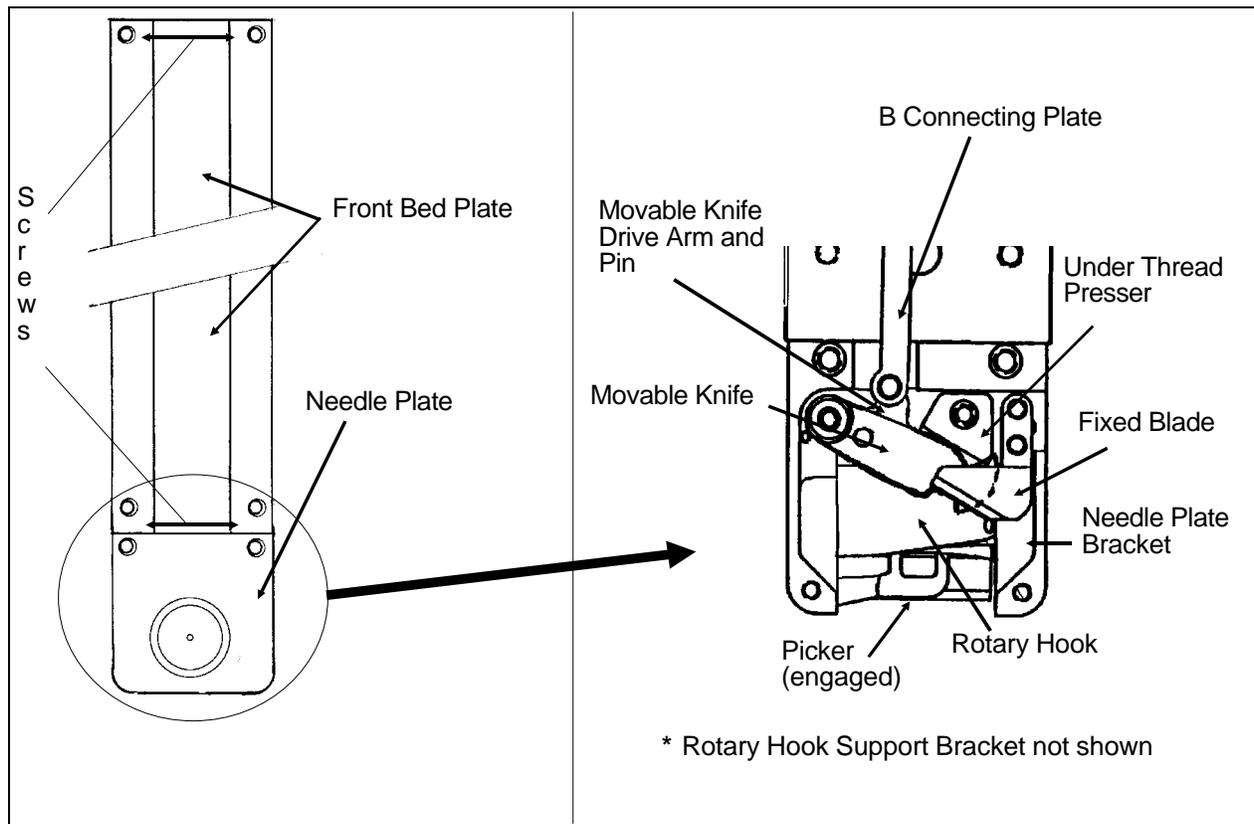
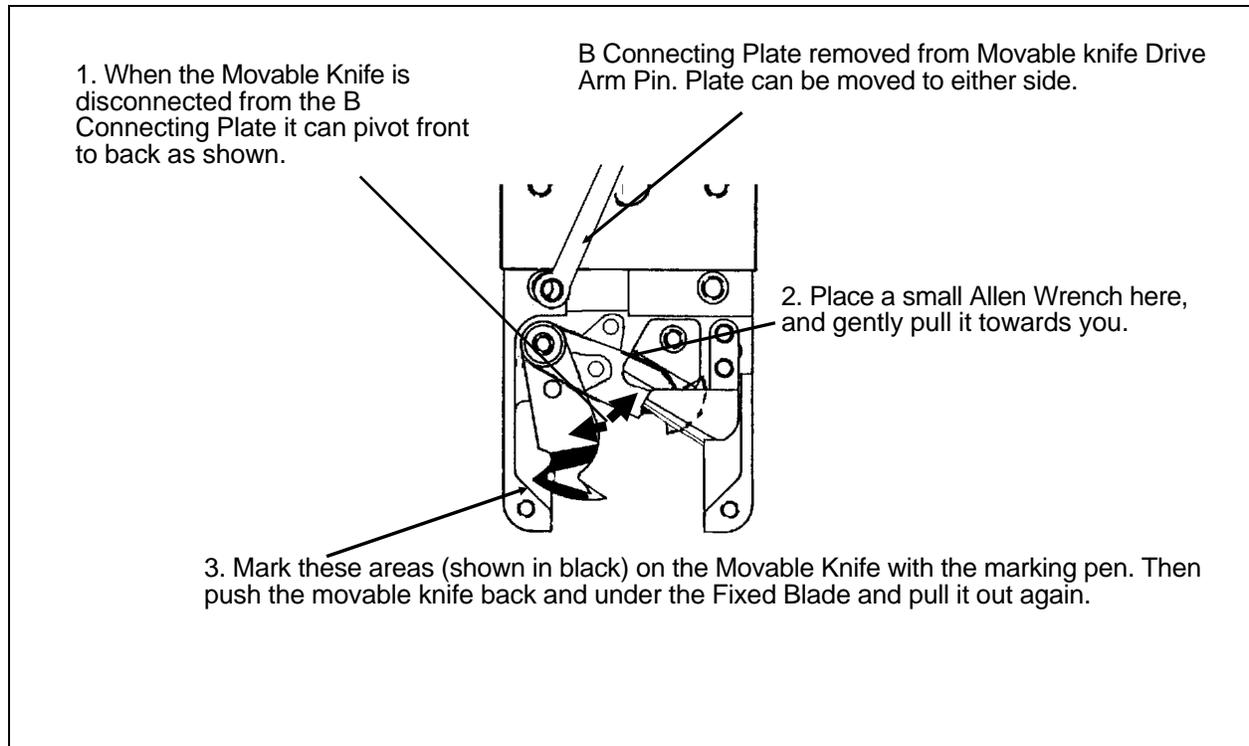


Fig. 4-5 Trimmer Component ID

- 5 . Using an allen wrench pull the Movable Knife out from under the Fixed Blade and look at the "wipe off" of the marking pen ink. See step 6, to determine how the Fixed Blade needs to be adjusted.
- 6 . Use Fig. 4-7 as a guide to making the Fixed Blade adjustments. Adjust the Fixed Blade with the two (2) screws, labeled A and B shown in Fig.4-7.

**NOTE:** You should never have to change the height of the Fixed Blade Set



**Fig. 4-6 Marking The Movable Knife**

Screw, shown in Fig. 4-7 , the only time you will need to adjust the height of the Set Screw is if it is replaced. At which time this screw should be set 1 1/2 turns above flush on the needle plate bracket. This is indicated in Fig.4-7.

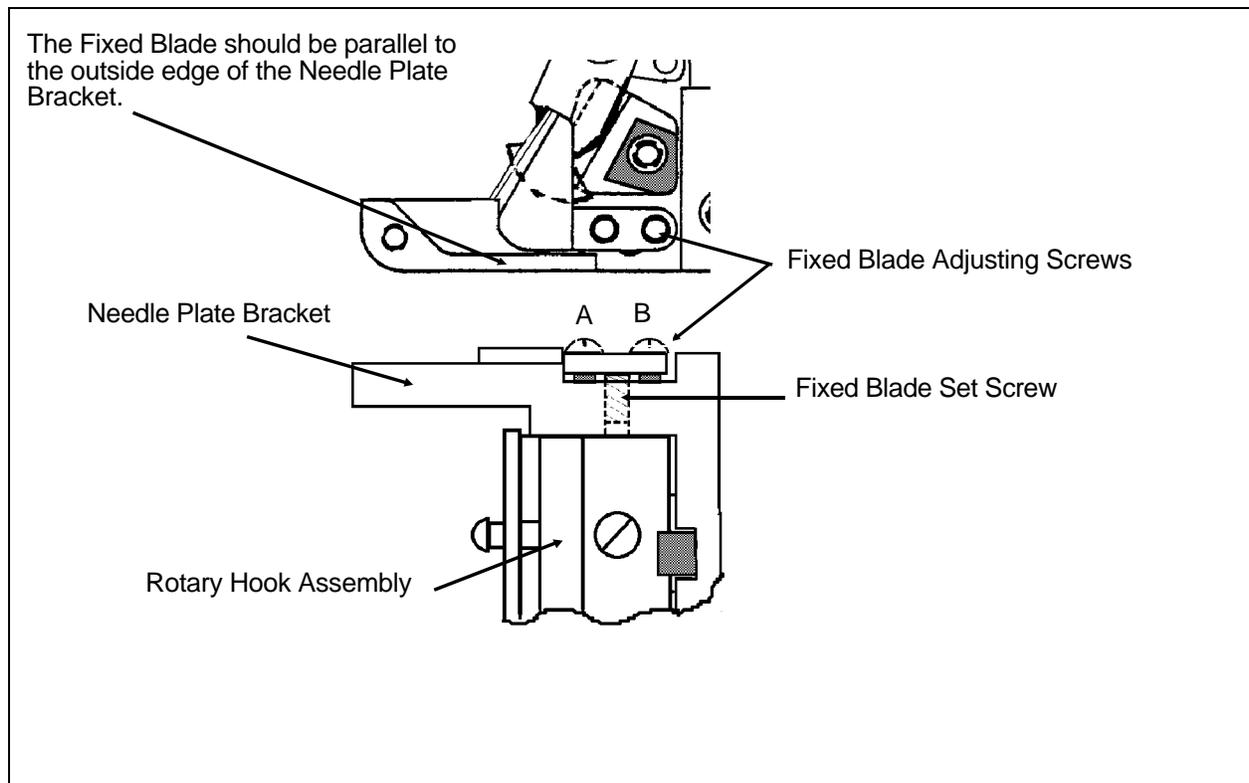
- Tighten screw A until the ink wiped off looks like # 2 in Fig. 4-8.
- Then tighten screw B until it looks like # 3 in Fig. 4-8.
- If the wipe off looks like # 1, screw A is too tight. Back screw A off just a little bit and try screw B again.

If you look directly at the Fixed Blade from the front you will see that it "tilts" a little as you adjust the blade. It is this "tilt" that you are really adjusting. If the Fixed Blade is adjusted too far to the left, as you look directly head on at the blade, the ink wiped off the top of the blade will look like Fig. 4-8, # 1. This condition is the result of screw B being too tight. Back off the screw a little bit. Tighten screw A little bit and then pass the Movable Knife under the Fixed Blade again and look at the knife if it does not look like Fig.4-8, # 3, tighten screw B a little bit more. The object here is to get the ink wiped off the Movable Knife, by the Fixed Blade, so that the wipe off looks like Fig. 4-8, # 3. There should be some resistance as the Movable Knife passes under the Fixed Blade, but be careful, you can get a good wipe off and still have the Fixed Blade too tight, this can cause Z Timeout Errors. Make no mistake

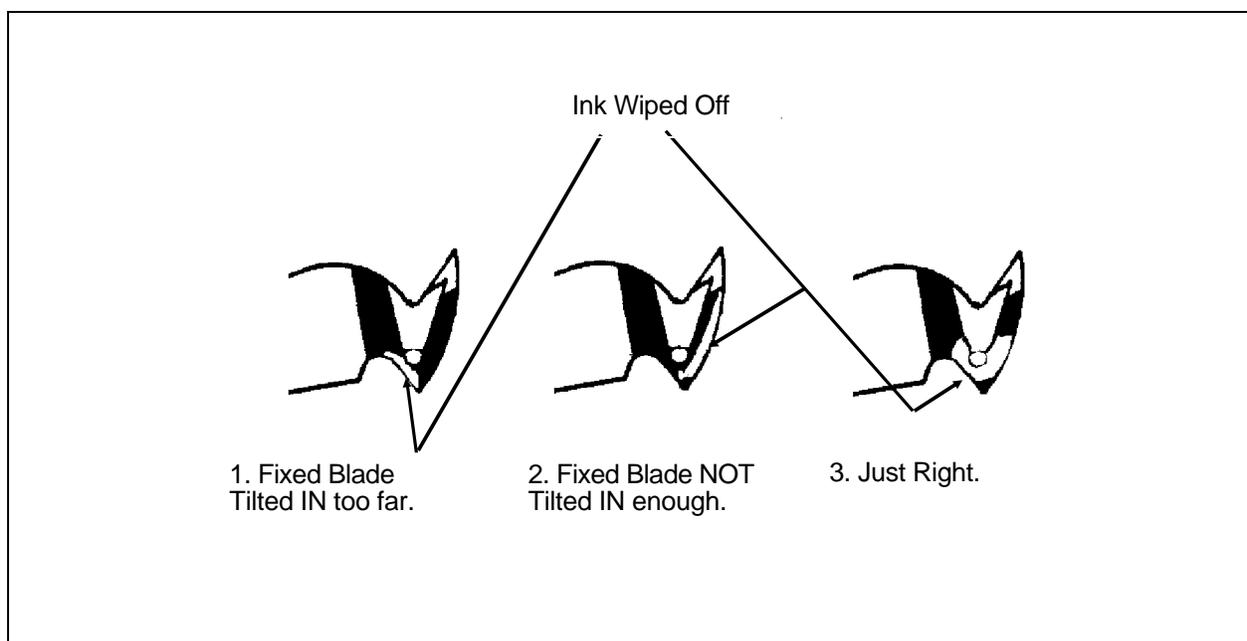
here, this is a difficult adjustment. The first few times you attempt it you will get frustrated. But keep going, once you get the "feel" for adjusting the Fixed Blade you will be able to accomplish it for each head that needs the adjustment in a few minutes. All it takes is a little practice and some patience.

### Checking The Under Thread Presser

The Under Thread Presser, shown in Fig. X, holds the bobbin thread after a trim. This permits a loop of bobbin thread ready 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 Fig.X ), it does not allow the Movable Knife to pass under the Fixed Blade 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.



**Fig. 4-7 Adjusting The Fixed Blade**

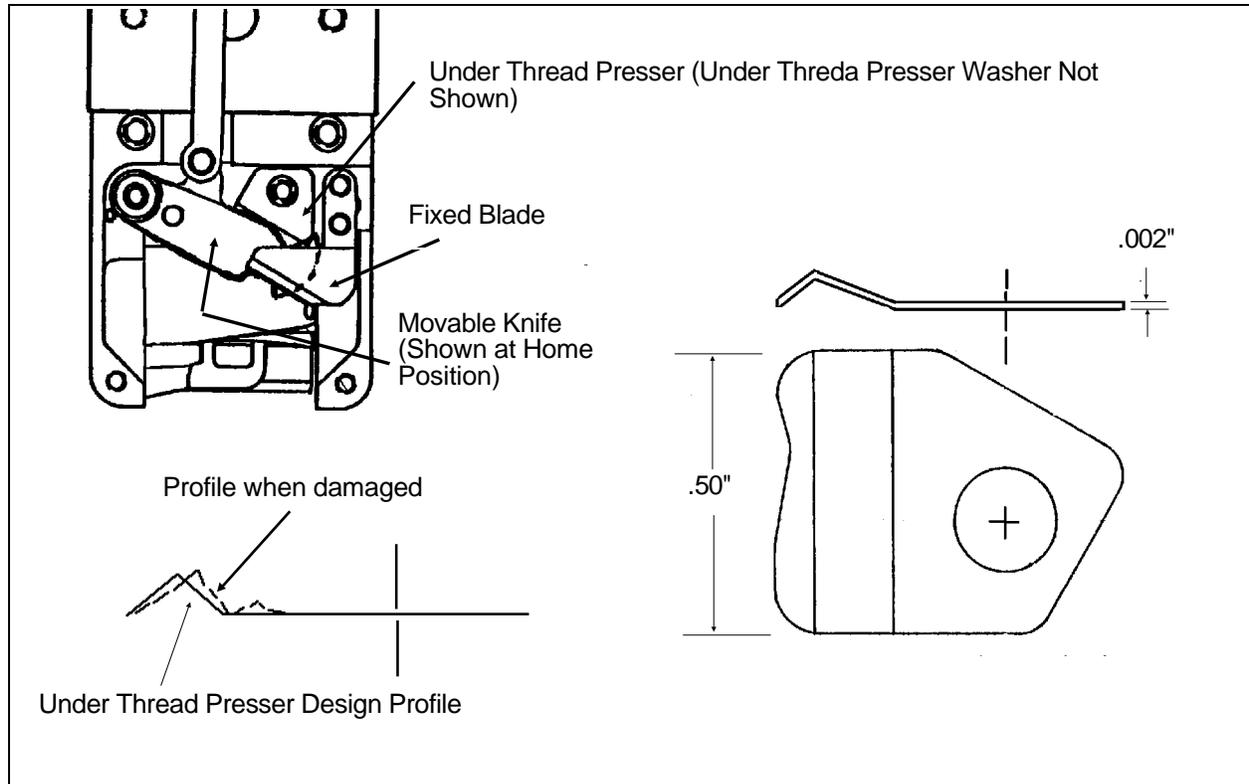


**Fig. 4-8 Knife Ink Wipeoff**

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", this is damage caused by the Movable Knife hitting the Under Thread Presser. ( See Fig. X ) If you see visual evidence of any damage, replace the Under Thread Presser. Second by checking if the Bobbin Thread is in fact being held in place.

While the machine is still turned off, and the B Connecting Plate is disconnected:

1. Pull the Movable Knife "out", as you did before when adjusting the Fixed Blade.
2. Leaving the Bobbin Case in the Rotary Hook, pull off some Bobbin Thread, and drape it over the Movable Knife. See Fig. 4-10.
3. 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 cutter "back" until the thread is cut. This cut should be clean, it should not be frayed. If the thread is frayed readjust the cutter once again. The "top" thread should be loose and fall away, because it has no support.



**Fig. 4-9 Under Thread Presser**

The "bottom" thread should be held in place under the Movable Knife by the Under Thread Presser. Again look closely at the cut, it should not be frayed, it should be CLEAN CUT.

**Remember:** *These adjustments may take a few times to accomplish before you become satisfied with the cut.*

4. After you are satisfied with the movable knife's cut, reattach the B Connecting Plate. See Fig. 4-5 .

### **Movable Knife Home Position**

The Home Position of the Movable Knife is directly below the Fixed Blade. To check that the Movable Knife is indeed in its Home Position preform the following steps.

1. If the Needle Plate and the Front Bed Plate are installed remove them (see Fig. 4-5).
2. Turn the machine power ON.

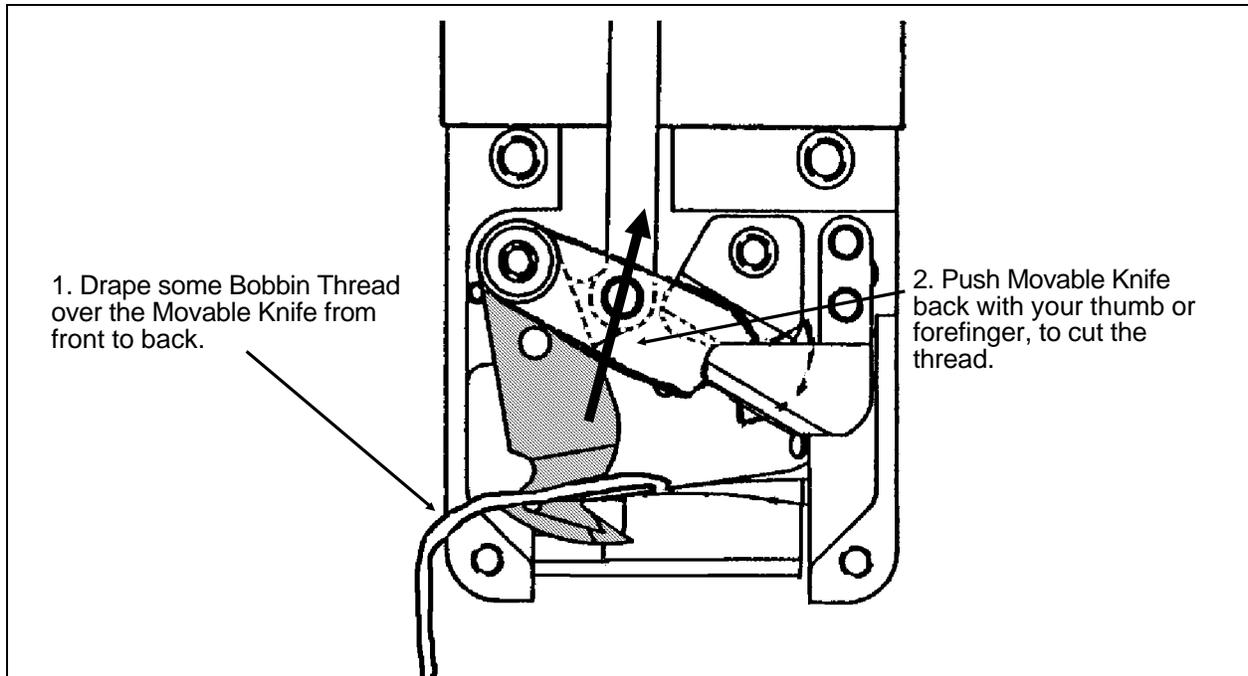
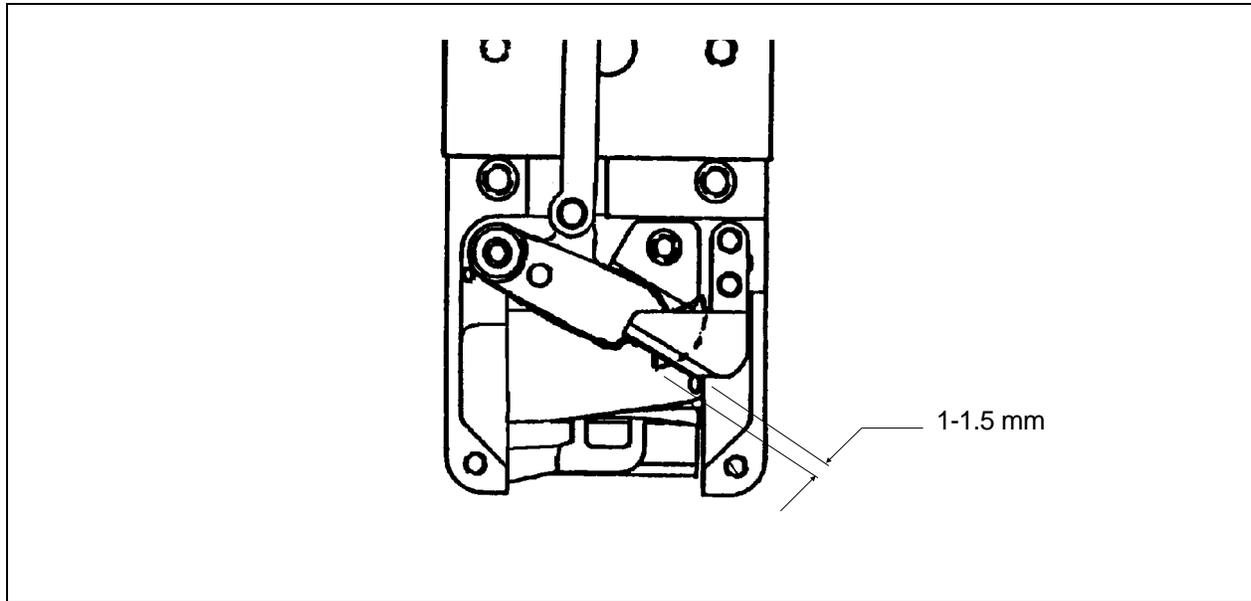


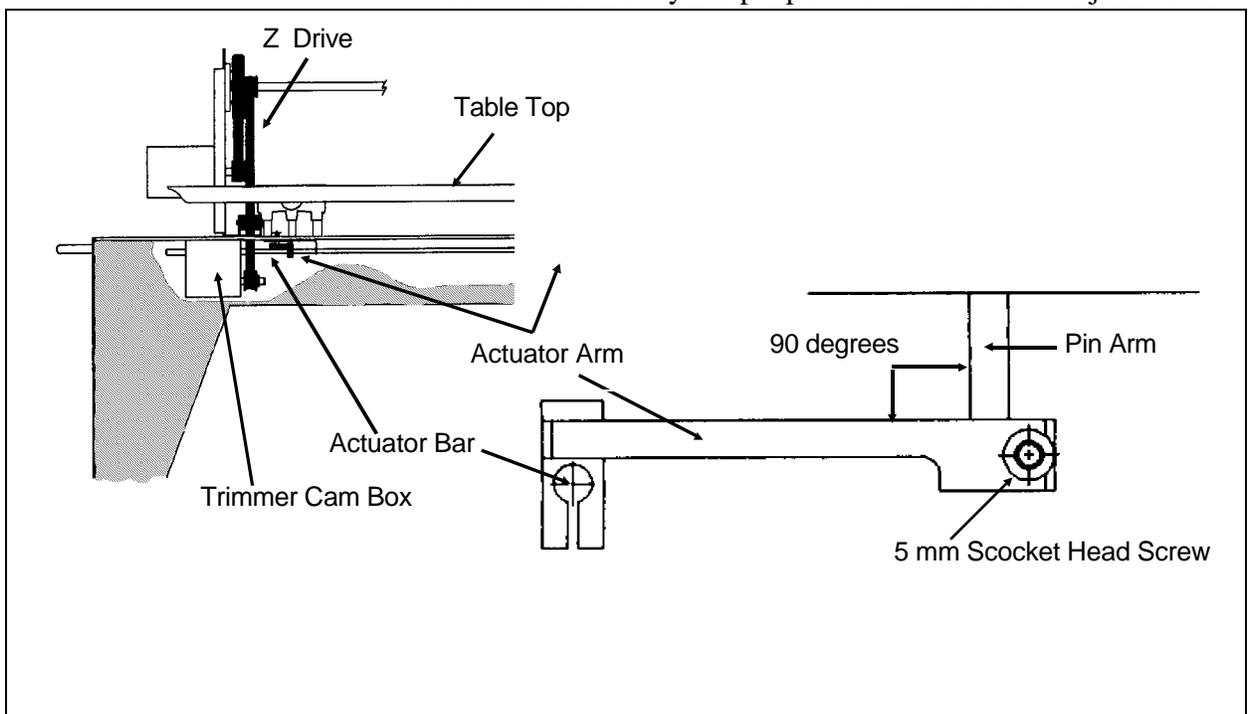
Fig. 4-10 Checking The Cut

3. Go to the TRIM MENU, do a TRIM IMMEDIATE.
4. Check all four Movable Knives. They should look like the Knife in Fig. 4-11. There should a small portion (1-1.5mm )of the Movable Knife's Selector side showing past the edge of the Fixed Blade. Each sewing head should show the same condition. If one or more of the heads have more or less than 1-1.5 mm of the Movable knife showing, they need adjustment. Adjust only those knives that do not look like Fig.4-11.
5. If all four knives are in the same position but not in the Home Position they can be adjusted at the Trimmer Cam Coupling, (see Adjusting Home At The Cam Coupling on the next page ).
6. Otherwise individual knives are adjusted for Home Position from the Actuator Arm under the Frame and Sewing Heads, see Fig. 4-12.
7. Loosen the 5 mm Socket Head Screw, shown in Fig. 4-12. *Do not completely remove the screw.*
8. Pull the Movable Knife out and then push it back into its' proper Home Position as shown in Fig. 4-11.



**Fig. 4-11 Movable Knife Home Position**

9. Using a Torque Wrench, tighten the 5 mm screw with 55 in/lbs of torque making sure that it is 90 degrees to the Pin Arm, see Fig. 4-12.
10. Power Up the Machine, go to the Trim Menu and do a TRIM IMMEDIATE command. Verify the proper Home Position Adjustment.



**Fig. 4-12 Actuator Arm**

Perform this procedure for each head needing adjustment, then replace the Needle Plate and the Front Bed Plate.

### **Adjusting Home Position At The Cam Coupling**

On only rare occasions would this be a "fix." *This is not a regular adjustment procedure.* This procedure should only be considered if .029" - .031" adjustment to Home Position is required. If more adjustment is needed after this procedure, there is something more serious causing trimmer problems.

1. Locate the Cam Box under the Frame and above the Power Distribution Box. See Fig. 4-12. Then locate the Trimmer Home Switch under hd# 1 adjacent to the Cam Box.
2. Remove the two 10-32 screws that connects the coupler together.
3. With a small crescent wrench loosen the jam nut at the cam coupling.
4. Turn the shaft counterclockwise to bring the Movable Knives out a little farther.

**NOTE:** Turning the shaft 1/2 turn moves the Knives .015", a full turn moves the Knives .031".

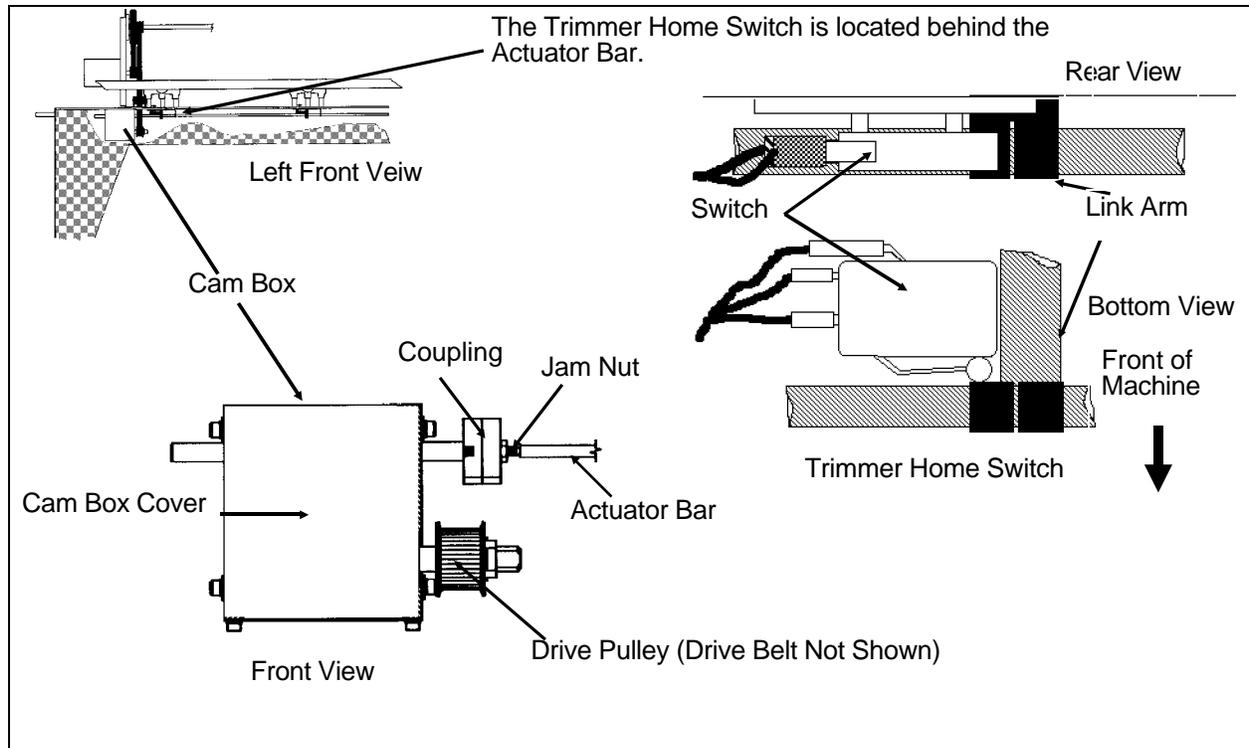
5. Reinstall the two 10-32 screws to connect the coupler, then, tighten the coupling with the jam nut.
6. Check the new position with a TRIM IMMEDIATE command in the Trim Menu.
7. Readjust the Trimmer Home Switch, the switch itself has not moved, but the Actuator Bar has moved if you perform this procedure.
8. Cycle the actuator shaft out and back in manually one time to see that the switch actually trips and that nothing hits it during the cycle.

### **Picker Adjustments**

#### **Picker Position**

The two picker fingers should be centered on the bobbin shaft. If not:

1. Loosen the two picker attachment screws on the cylinder arm and rotate



**Fig. 4-13 Cam Coupling and Trimmer Home Switch**

the Picker until it is centered on the Bobbin Shaft and retighten the screws.

In the engaged position the end of the Picker fingers should be .060 inches to .080 inches (or 1.5 to 2.0mm) above the bottom of the cutout in the bobbin case.

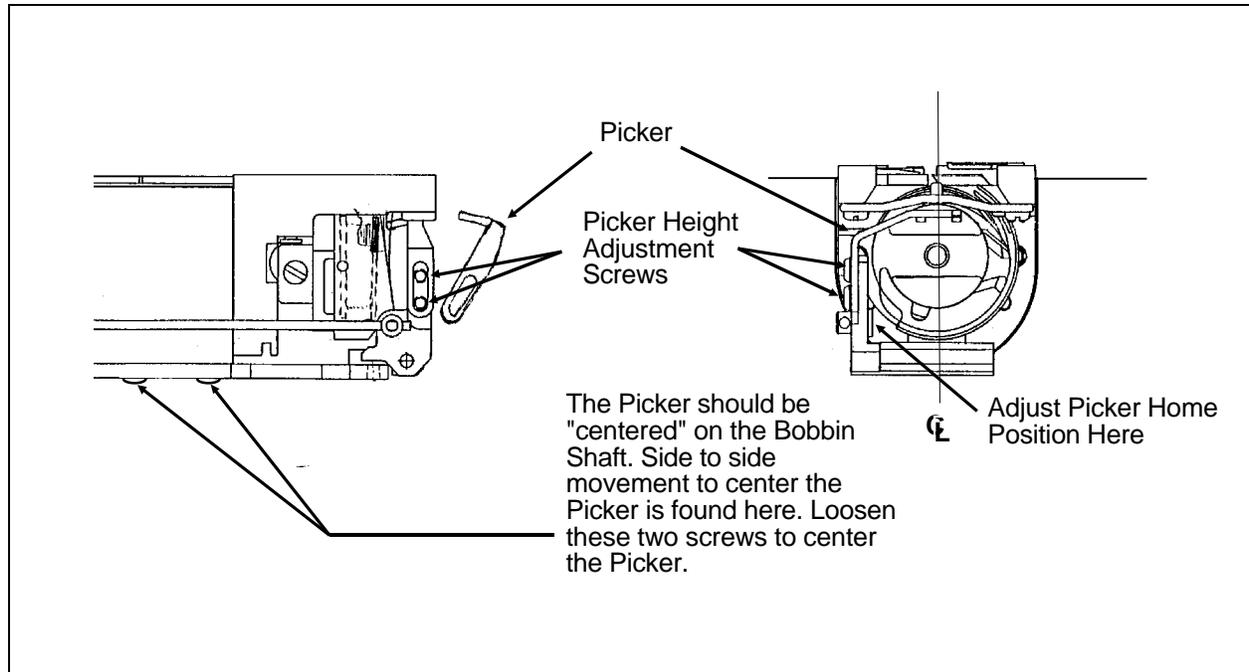
### **Picker Home Position**

The picker Home Position should be set so that when looking down on the assembly the end of the picker fingers are .25 to .30 inches from the outside edge of the rotary hook support. See fig. 4-14.

1. This adjustment is made at the wire to pivot interface at the picker solenoid. use a 1.5mm allen blade at the 3mm set screw.
2. The adjustment can also be made at the front wire to pivot interface if the wire doesn't protrude past the pivot to the front of the wire more than .060 inches maximum.

### **Picker Engaged Position**

The picker engagement performs best if adjusted so the end of the picker



**Fig. 4-14 Picker Adjustments**

fingers are .060-.080 inches (1.5-2.0mm) from the outside edge of the paper bobbin spool. See fig. 4-8 on the previous page.

1. The adjustment is made with a 1.5mm allen blade at the 3mm set on the underside of the picker mount bracket. Manually push the picker in and adjust it so it is at the distance discussed above from the edge of the paper bobbin. The set screw is a polylock set screw this means that it will stay in place until you move it.

## **Grabber Set-Up and Adjustments**

1. The grabber must pass through the center of the velcro pieces (called the wiper) this is accomplished by loosening the 4mm socket head screw with a 3mm ball end driver and moving the blade guide up or down so the blade passes through the center of the wiper.
2. The motor stop arm is clamped to the grabber actuator shaft. Make sure that the actuator arms are in the vertical position when clamped to the grabber actuator shaft.
3. Now is the time to set the blade travel. Put the motor stop arm in the up most (blades fully extended) position.

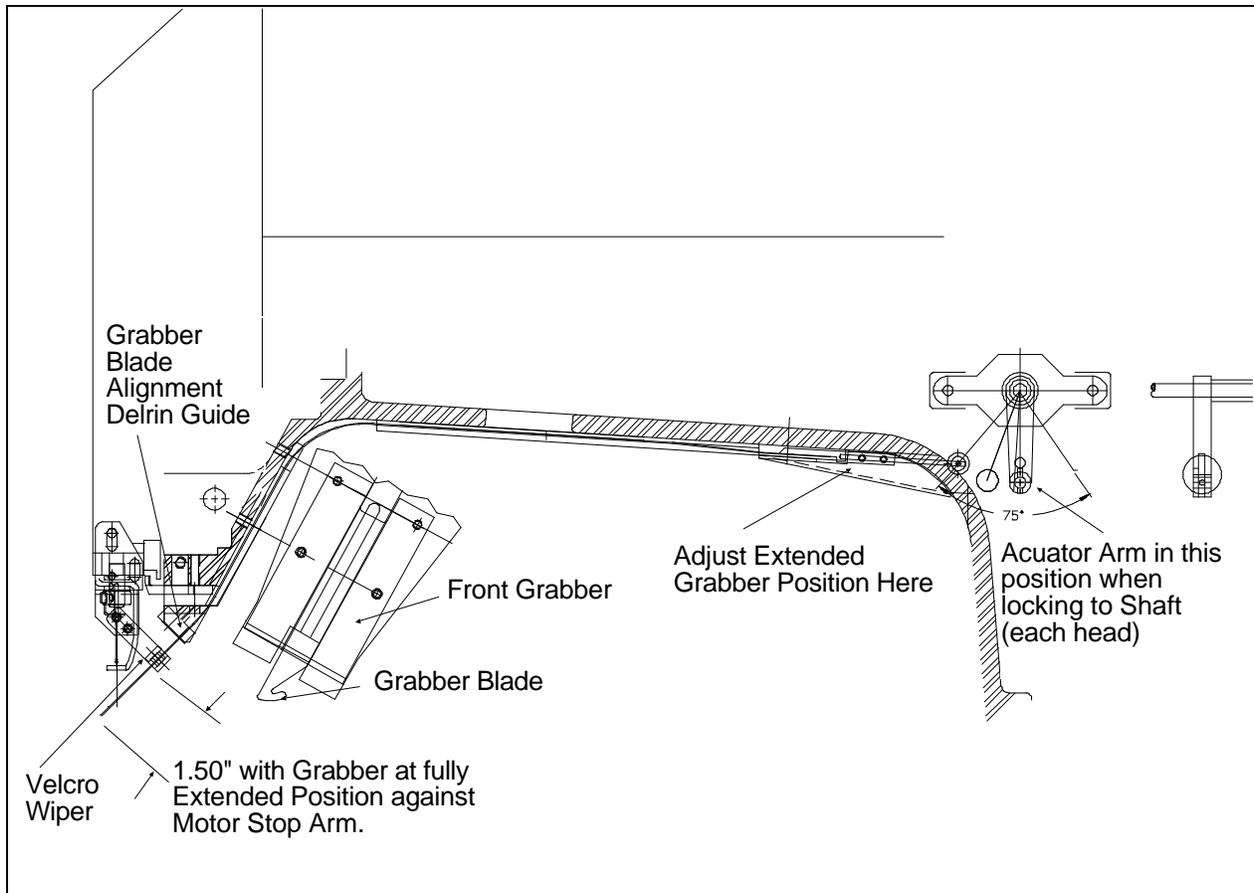


Fig. 4-15

4. With a 1.5 mm allen blade loosen the two 3mm set screws on the transition bracket under the back of the arm. Move the grabber blades in or out until the end of the blades hook is 1.5 inches from the bottom bar of the needle case. tighten the set screws making sure that the blade is flat with the guide.
5. Rotate the motor stop arm to insure that the system works smoothly without interferences.

## 5. Mechanical Disassembly

### GENERAL

This section of the manual provides detailed information for performing parts replacements that may be required during the life of the product. The procedures are guidelines for performing repair maintenance; and must be used by personnel practicing good maintenance and repair technique.

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

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

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

### Static Electricity / Grounding Strap Use

As with all computerized equipment, the EMC6/4 Embroidery Peripheral is extremely sensitive to static electricity. Therefore it is essential that the following warnings and cautions be understood and followed. If any of these statements are not understood, please contact the Melco technical representative in your local service area for assistance.

**WARNING! It is very important that the EMC6/4 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 EDS/Epicor System, electrical failures may be the result.**

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

The grounding strap must be connected in the proper manner to insure the static charge on the person's body is neutralized to the chassis ground level of the Sewing Peripheral when working in the electronic areas under the covers.

**WARNING! The static grounding strap that Melco may occasionally supply, has the proper resistance incorporated into the wire for operator protection from electrical shock. DO NOT attempt to use any grounding strap that is not specifically designed for static use. A "straight-wire" grounding device (one without built-in resistance) will place the operator in extreme danger of exposure to lethal voltages. It is ALSO RECOMMENDED that the static strap be checked during daily use for proper resistance protection.**

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

After removing the EMI Box Cover, you may attach the ground strap to any non-painted surface, ie; chromate plated surfaces, EMI Box sides, motor mounts. Do not use shafts or pulleys to attach the ground strap.

After placing the wristband over your wrist, attach the alligator clamp of the grounding strap to this ground wire stud (or any other metal that is proven to have chassis electrical ground level).

If working inside the Keyboard Cover (under the Keyboard and Display), attach the grounding strap to any metal that is proven to have chassis electrical ground level, but on that side of the machine.

## **SEWING PERIPHERAL**

### **Removing the Rear Covers**

The Rear Covers are attached to the peripheral frame with plastic tabs in the front of the covers and with machine screws on the back side of the covers. All covers removed and reinstalled in the same manner. Covers # 1, 2, 3, and 5 first, and then Cover # 4 over the ends of # 3 and # 5.

### **Keyboard Cover # 1**

When removing the Keyboard Cover, to replace or to adjust the intensity of the display, be careful not to damage the Keyboard Ribbon Cable that attaches to the Keyboard/Display Assembly. See fig. 5-1. Also remember that you must remove covers # 4, 3, and 2, in that order to remove cover # 1.

### **Controller Section Rear Cover # 4**

Rear Cover # 4 covers the Controller Section which houses the EMI Box and its PCBs. As with other covers it is attached with screws at the rear and tabs on the front and since it would be removed more often it overlaps covers # 3 and # 5. After the Rear Cover is removed you may remove the EMI Box Cover. Remember to use the Antistatic starp on chromate plated surfaces and not on painted surfaces.

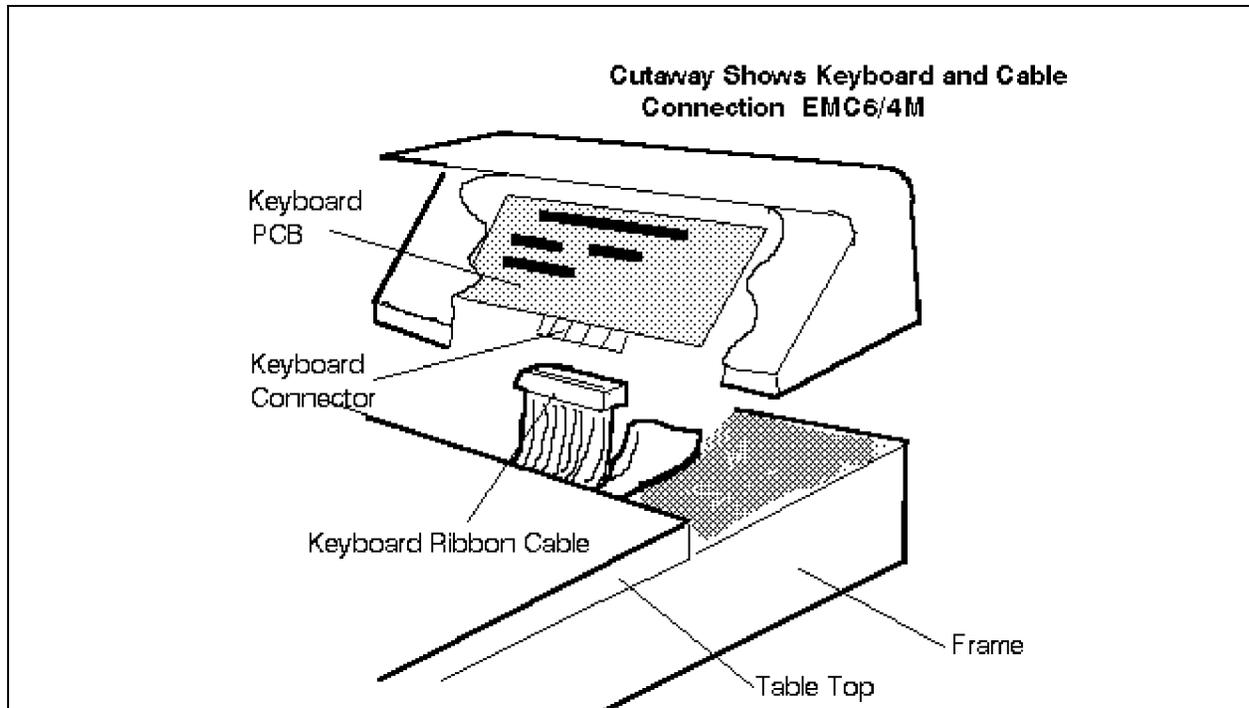


Fig. 5-1

### CPU PCB Replacement

1. Disable the peripheral from the Epicor computer. Turn off the power switch to the EMC6/4 and remove the power cord from the power source electrical outlet and the rear of the machine.
2. Remove the interface cable connected to the CPU PCB at the rear of the EMC6/4.
3. Remove the EMI Box Cover.

**CAUTION! Failure to use a properly installed static grounding strap may cause damage to the electronics in the EMC6/4.**

4. Install a static grounding strap between the EMC6/4 and the personnel performing this procedure.
5. Remove the screw and washer attaching the CPU PCB bracket to the EMI Box side.

**CAUTION! Use care not to drop any hardware into the base of the Controller area.**

6. Remove the Z axis encoder ribbon cable from the connector J3709 of the CPU PCB Assembly and Motor I/F cable from connector J3705 before the CPU PCB is removed.
7. Grasp the CPU PCB at the top corners of the board and carefully pull the board up and out of the cardedge connectors mounted on the Motor I/F PCB at the bottom of the EMI Box. (Use a gentle rocking motion to make it slightly easier to release the board from the connectors.)

**CAUTION! Once the CPU PCB is removed from the EMC6/4, use extreme care in handling the assembly. Portions of this board are very sensitive to static charges. Any further handling of the CPU PCB must be done with the continued use of the static grounding strap still installed as instructed in specific procedures in this manual.**

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

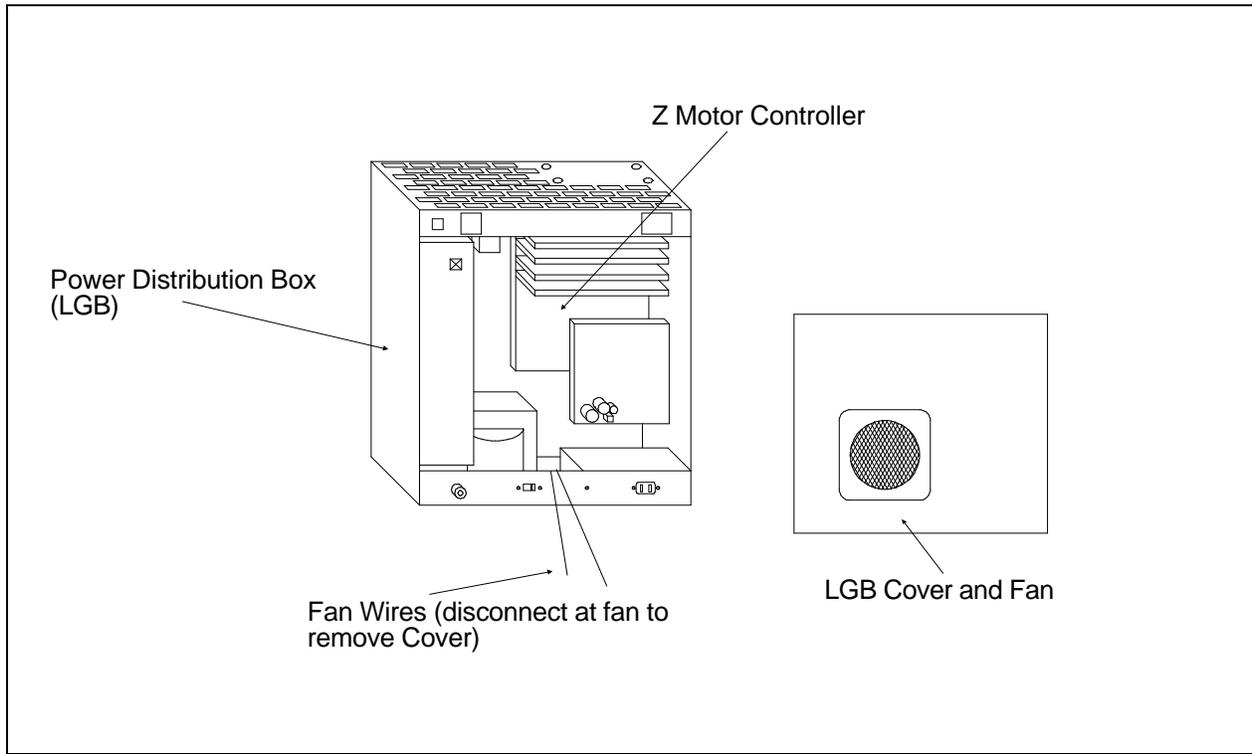
## **Z Motor Controller**

The Z Motor Controller is located in the Power Distribution Box (also called LGB for Large Gray Box or Power Supply). It is attached with four (4) phillips head screws to the top of the Box. The Controller consists of three parts, an Anodized Heat Sink, a chromate plated "L" bracket attached to the heat sink with two (2) hex head screws, and the PCB attached to the L bracket with four (4) phillips head screws. The PCB and the L bracket should be treated as one part. The Controller PCB is very sensitive to static electricity, the precautions already discussed should be followed. Replacing the Z motor controller requires removal of the Power Distribution Box from the machine frame.

### ***'FACTORY SERVICE ADVISED'***

If unauthorized personnel attempt to service this area, the Factory Warranty May Be Voided if the work is improperly performed. It is recommended that prior to removing the Z Motor Controller that individual wire harnesses be labeled, to ease reassembly, before they are disconnected. Be sure that the

machine is turned OFF and unplugged from the source voltage. After labeling the wire harnesses follow the steps on the next page.



**Fig. 5-2**

1. Remove the Power Distribution Box Cover, remember to disconnect the two (2) fan wires.
2. It is not necessary to disconnect the wire harnesses at the top of the LGB, they are long enough to stay connected when on the lower shelf.
3. Disconnect the wire harnesses from the Z controller PCB.
4. Remove the Z controller assembly from the LGB, by removing the four phillips head screws attaching the assembly to the top of the Box.
5. The Z controller PCB is very sensitive to static electricity using the proper precautions disassemble the PCB (and L bracket) from the heat sink (two hex head screws).
6. Replace with the "new" Controller PCB, by reversing these steps.

Two adjustments of the Z Motor Controller are required before reinstalling the LGB on the frame. These adjustments must be made upon replacement of the Z Motor Controller PCB or the Z Motor itself, or the Power Distribution Box as a whole. Follow these steps to make the adjustments:

### **Static Adjustment**

1. Reconnect the wire harnesses to the Controller PCB.
2. With a digital voltmeter, place the leads across C-25 and adjust R-2 CCW to read 2,500 ohms resistance.
3. Place the leads across C-25 and pin 5 of U-4. Adjust R-1 CCW to read 3,300 ohms resistance.

### **Dynamic Adjustment**

1. Be sure that all the wire harnesses are reconnected.
2. Turn the machine ON, and allow the operational software to download.
3. Have one person cycling the machine to "GO TO HEAD UP" while the second person adjusts R-1 to stop Z-axis chatter after each cycle. This may take several cycles and adjustments. Allow 5 minutes for the adjustments to stabilize, and check that the chatter has been removed. If not repeat the adjustment, wait 5 minutes and recheck.
4. Setup the peripheral to sew a design with a short enough stitch length to allow maximum sewing speed of 800 spm, and then place in "test mode" while making the speed adjustments.
5. Use an 800 rpm strobe light on the Z drive shaft disk (or an oscilloscope set to detect 800 pulses a minute attached to the CPU HU LED), and start the machine at 800 spm.
6. Adjust R-2 clockwise until the main shaft mark is aligned with the timing mark or until HU pulses denote 800 pulses per minute.  
At this point a distinct difference in machine speed can be detected by ear (hearing) when changing from 800 to 750 spm.
7. Stop the sewing test and observe that there is no Z - axis chatter when the heads are not sewing. When the adjustments are complete do a Hard Reset to turn the test mode OFF.

NOTE: To set "TEST MODE":

1. Go to Reset Menu, press [ENTER], press [ALT] and [UP ARROW] simultaneously, press [ENTER]. This performs a Hard Reset
2. Return to Reset Menu, press [ENTER], then press [ALT] and [LEFT ARROW] simultaneously, press [ENTER] this sets Test Mode ON.

## KEYBOARD SECTION

### Keyboard/Display Replacement

To remove the Keyboard/Display Assembly from the Operator Interface Cover, refer to the following procedure:

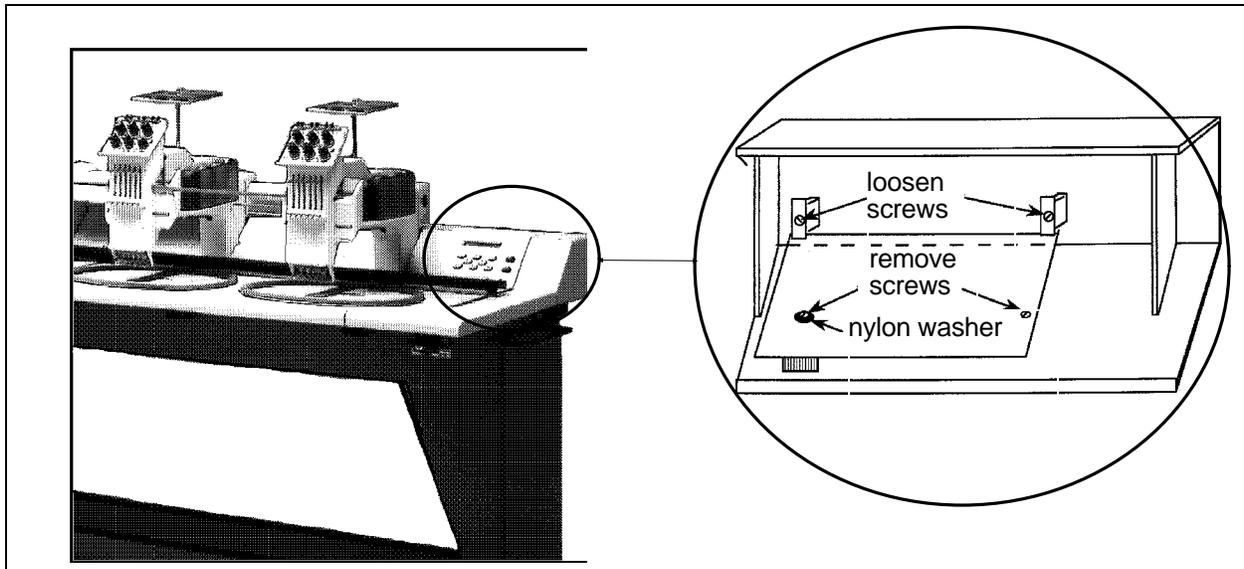


Figure 5 - 3

1. Turn off the power switch to the EMC6/4 and remove the power cord from the power source electrical outlet and the rear of the machine.
2. Remove the Keyboard Cover (cover # 1). Remember to disconnect the Keyboard Ribbon Cable.
3. Place the Keyboard Cover (with Keyboard/Display Assembly) onto a surface which is free of static electricity.
4. Install a static grounding strap between the working surface and the personnel performing this procedure. Refer to the following figure to perform the next steps.
5. Locate and loosen the two screws (indicated in the figure) that secure the PCB at the top.
6. Locate and remove the two screws that secure the PCB near the bottom as indicated in the figure.

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

7. Remove the PCB from the Keyboard Cover. Lift at the bottom and the top will follow.
8. Transfer the key caps Stop, Start, Alt, Menu, Enter, Fast/Slow, Arrow Horiz, Arrow Vert) from the old PCB to the new PCB by simply lifting them off of the keys by using finger pressure only. It is recommended that this be done one key at a time to avoid errors in key cap arrangement on the new PCB.
9. When the key caps are transferred, reinstall the Keyboard/Display Assembly by reversing the preceding steps. Insure that the nylon insulating washer is installed under the left screw on the PCB.

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

## **X AND Y DRIVE MOTOR REPLACEMENT**

The X Drive motor and the Y Drive motor are located under Rear Cover # 3. The X motor provides "front to back" movements of the pantograph (Beam). The Y motor provides "side to side" motion of the hoop carriage. Because the motor drive belt tension is critical to proper motor function and because these tensions cannot be archived without assembly fixtures or service training, *"FACTORY SERVICE IS REQUIRED"* for proper adjustment.

**Tools Required:** A zero to 40 lbs. spring scale, 12 inch length of air craft cable, a set of Hex wrenches (or drive blades).

1. Turn the peripheral OFF and unplug the power cord from the source voltage.
2. Remove Rear Cover # 3.
3. See fig. xx to locate the X or Y motor.
4. Disconnect wires T1, T2, and the four pin connector of the motor encoder housing. Do not pull on the wires of the four pin connector, use the connector body when disconnecting or connecting this portion of the wire harness.

5. Remove the four hex head cap screws attaching the motor bracket to the frame. See fig. xx.
6. Reducing the tension of the drive belt by removing the attaching screws allows the drive pulley to slip out of the belt loop.
7. Slip the new motor drive pulley into the drive belt loop.
8. With the existing hardware attach the motor bracket to the frame, DO NOT tighten the four screws yet.
9. Thread a length of aircraft cable sufficient to pass under the pulley and allow four to six inches of cable loop, tie both ends of the cable in a knot.
10. Position the cable between the rear of the pulley and the motor bracket. Place the "L" shaped end of the spring scale in the cable loop and pull up (vertically, X motor only) on the cable loop with the spring scale, until the scale reads 20 lbs. With tension still applied with the spring scale tighten the attaching screws so that the motor will retain its position and not loosen the drive belt. ( Use the same procedure for both motors. When adjusting the Y

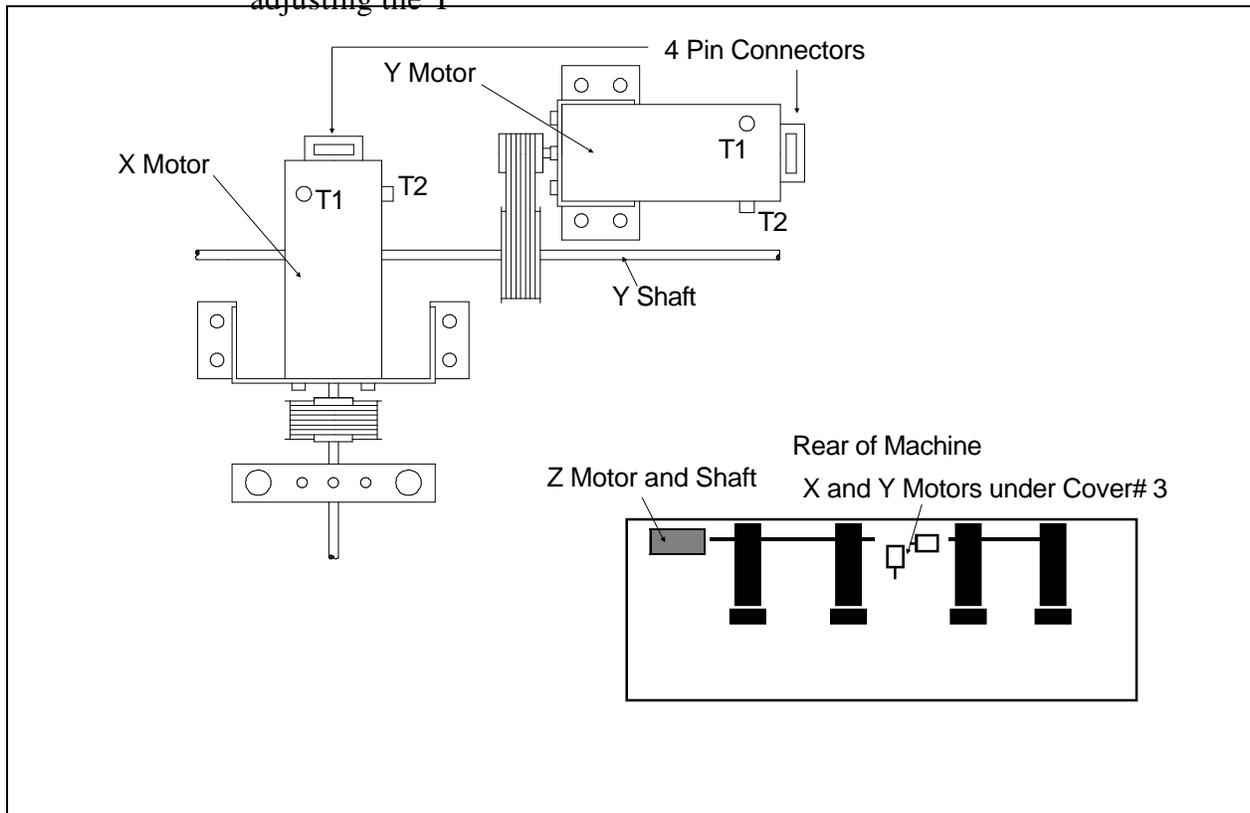


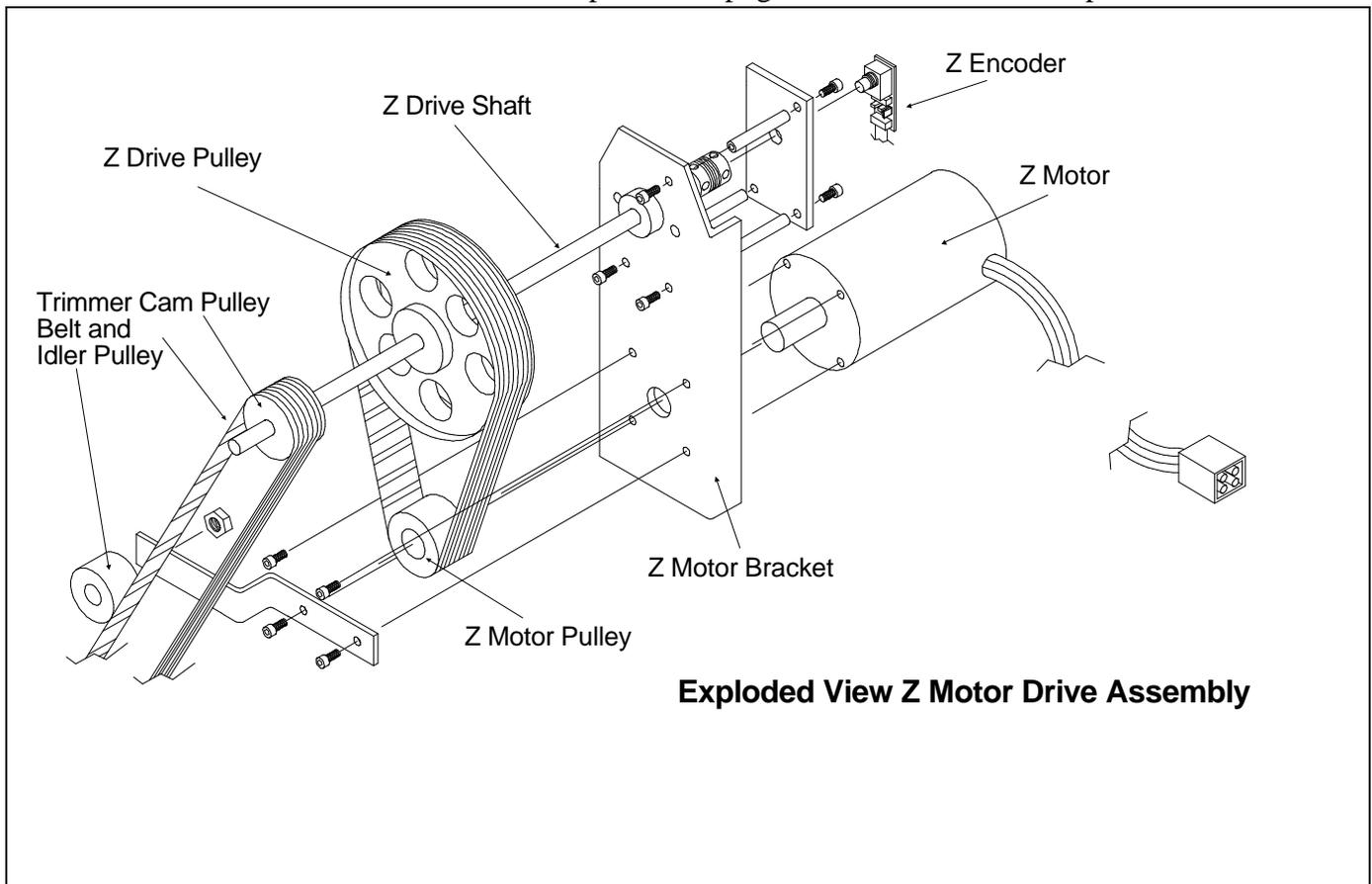
Fig. 5-4

drive belt tension, pull the spring scale horizontally until the scale reads 20 lbs.)

## Z MOTOR REPLACEMENT

*"FACTORY SERVICE ADVISED"*

The Z Motor gives driving force for the sewing heads via the Z Drive Shaft. Replacing this motor requires rezeroing the Z encoder and resetting the Z motor controller and speed. See page 4-6 for Z encoder inspection.



**Fig. 5-5**

And see page 5-5 for Z motor controller adjustments.

**Tools Required:** One set of hex head wrenches or drive blades, one Gates 5M tensionmeter.

1. Turn OFF the peripheral at the power switch, and unplug machine from the source voltage.
2. Remove Rear Cover # 5.
3. The Z motor is located on the frame directly next to the large black bracket.
4. Unplug the Z motor wire harness from the Power Distribution Box.
5. Remove the four hex head cap screws attaching the motor to the motor bracket. The two screws on the Bottom of the motor also attach the Trimmer CAM belt tension idler bracket. See fig.xx for location of parts.
6. Unscrew the Drive Pulley set screws and pull the drive pulley off the motor shaft.
7. Pull the Z motor (weight 7 lbs.) from the bracket and frame.
8. Replace new Z motor and remember to reinstall the Trimmer cam Idler pulley bracket, leave the screws snug enough to hold the motor in place but loose enough to allow motor movement up and down.
9. Place the drive pulley on the motor shaft, line up the flats on the shaft with pulley set screws. Tighten the screws and secure the Drive pulley to the shaft.
10. Slip the Drive belt under the drive pulley.
11. Drive belt tension is partly a function of motor weight, push down on the motor. Using a Gates 5M tensionmeter check that the drive belt has 9 lbs. + /- 1 lbs. tension. (A tension of 9 lbs. should be about 3/8 to 1/4 inch deflection of the belt when depressed with your finger tip.) Tighten the screws so that the motor will not move up or down.
12. (The Trimmer cam idler pulley drive belt should also be at 9 lbs. + /- 1 lbs. This can checked with the Gates 5M tensiometer.)
13. When the motor is in place and the belts are tensioned you must recalibrate the Z Encoder and the Z Motor controller.

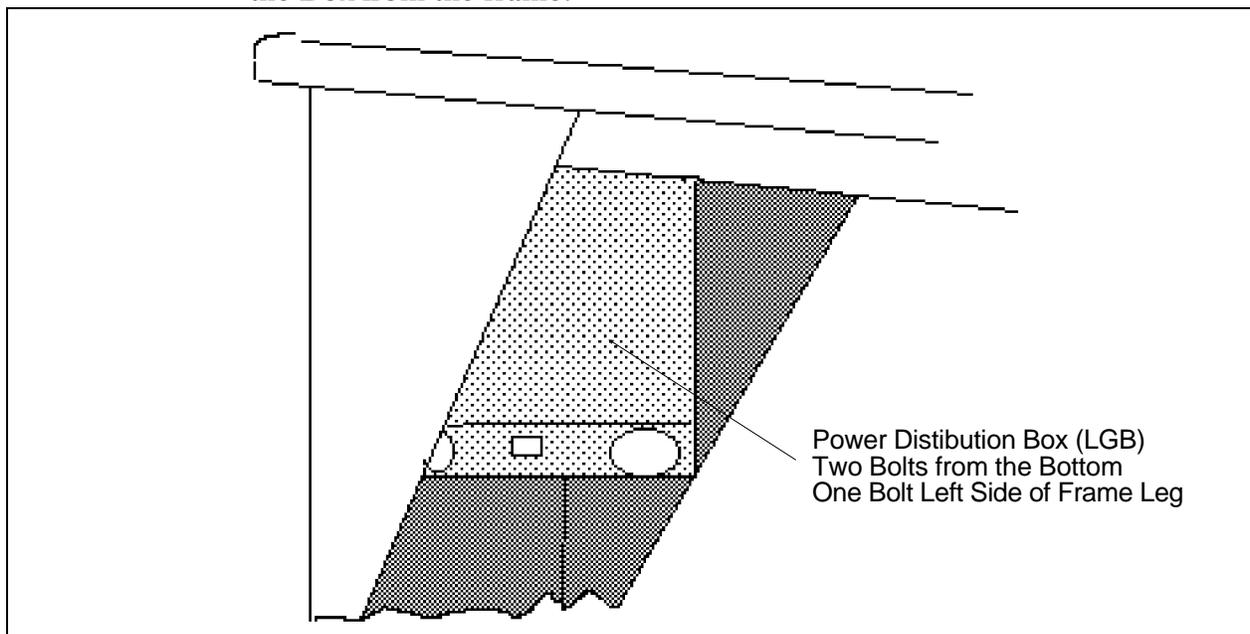
## **POWER SUPPLY REPLACEMENT**

### *"FACTORY SERVICE ADVISED"*

There are two power supplies in the Power Distribution Box. One 5 volt and one 24 volt power supply. It is Melco's maintenance philosophy to replace "assemblies" instead of components. Therefore if either power supply requires replacement the Power Distribution Box should be replaced. Also, replacing the Power Distribution Box requires adjusting the Z Motor Controller PCB inside the Power Distribution Box.

To replace the Power Distribution Box;

1. Turn OFF the sewing peripheral and unplug the power cord from the source voltage.
2. Disconnect the wire harnesses from their recepticals.
3. Unscrew the two hex head screws from under the support ledge.
4. Unscrew the hex screw next to the Peripheral Power Switch on the outside of the frame.
5. The Power Distribution Box weighs xx lbs., if necessary obtain help to pull the Box from the frame.



**Fig. 5-6**

6. Before installing the replacement Box, the Z Motor Controller must be adjusted. See page xx, Z Motor Controller Replacement and Adjustment, Controller Section, of this manual.
7. After adjusting the Z Motor Controller, place the Power Distribution Box on the support ledge and match the Peripheral power switch to the cutout in the frame leg. With the hardware removed from the previous Box screw the replacement Box to the frame, at three places, one screw at the Power switch, and two screws from under the support ledge.
8. Connect the wire harnesses to their respective receptacles.
9. If the Box cover is off, attach it by connecting the two fan wires to the fan terminals, and screwing the cover on with the four Phillips screws

## **ARM AND BED ASSEMBLY**

The Arm and Bed Assembly provides the stable platform for the multi-needle color change embroidery system. All the other components of the sewing head are attached to this assembly.

In the Arm and Bed Assembly are the shafts, belts, and pulleys that drive the Needle, Color Change, and Rotary Hook.

### **Needle Case Removal**

It may never be necessary to remove the needle case from the head. However, to replace the Needle Bar Driver, Take Up Lever Gear, or Needle Bar Reciprocator, you must remove the needle case. Refer to the following steps to remove the Needle Case from sewing head.

1. Turn ON the EMC6/4 and bring the sewing head to the HEAD UP position.
2. Turn OFF the EMC6/4 and disconnect the power cord from its power source.
3. Remove the Thread Saddle from the top of the sewing head.
4. Disconnect the Thread Break Harness from the Color Change PCB, at connector J360201.

5. Remove the Right Slide Support (cap at the right end of the Needle Case Cross Slide Shaft) by loosening the 2 screws that secure it to the Front Facia at the top. Loosen the screws almost all the way.

**CAUTION! When you remove the Needle Case, you must be very careful not to damage the photo sensors on the Color Change PCB with the metal Color Position Indicator. This indicator is attached to the Needle Case and lies within photo sensors.**

**The Needle Case must be moved far enough to the right for the indicator to clear the photo sensors before the Needle Case is pulled away at the top.**

6. You must rotate the Color Change Cam to move the needle case to the right. The Color Change Cam has a slot in the end of the cam shaft for this purpose. Rotate the cam shaft with a single blade screw driver. Grasp the needle case to hold it in position as you rotate the cam.
7. When the Color Position Indicator is out of the last photo sensor on the Color Change PCB, pull the left end of the Needle Case Cross Slide Shaft out of the Left Slide Support and simply pull the top of the Needle Case carefully toward you. As the top rotates outward, pick the Needle Case upward slightly to disengage the Lower Needle Case Guide Rail from the front of the sewing head arm. As the Needle Case is pull out and away from the sewing head arm, the needle bar driver studs and take up lever gears easily disengage. The Needle Case should now be free.

## **To Install the Needle Case**

1. Ensure that the Front Facia is installed if it had been removed.

**CAUTION! The Head must be at Head Up. If you removed the needle case and have not altered the Head Up position manually, the head should still be at Head Up. If not, then you must bring the Head to that position.**

2. If the sewing head is not at Head Up, you must position it to Head Up.

**CAUTION! Keep hands, fingers, and other items**

**away from the printed circuit boards and mechanical areas of the sewing head as you turn ON the EMC6/4.**

3. Turn ON the EMC6/4. If the Color Change Index LED at the Color Change PCB is ON, rotate the Color Change Cam so the light goes OFF.

**CAUTION! In the next steps, keep the Needle Case positioned far enough to the right so the Color Change Indicator will clear the photo sensors as the Needle Case is pushed in at the top.**

4. Grasp the Needle Case and set the Lower Guide Rail into position at the bottom of the sewing head arm.
5. Insure the Take Up Levers are aligned so that the slots at the bottom of the Take Up Lever Gears engage into the "rails" at the top of the Front Facia. This is required to place the Take Up Lever Gears in the correct position to engage the Take Up Lever Drive Gear.
6. Insure all six needle bars are at the full needle up position.
7. Pivot the Needle Case from the bottom, into position, with the Take Up Lever Gears onto the rails and the needle bar driver studs into the channel in the front of the Front Facia.
8. Position the left end of the Needle Case Cross Slide Shaft into the Left Slide Support as you hold the Needle Case solidly in place.
9. Now, as you continue to hold the Needle Case solidly in place, rotate the Color Change Cam to move the Needle Case to the left. Stop rotating the cam when the Needle Case is approximately centered on the Needle Case Cross Slide Shaft.
10. Reattach the Right Slide Support by inserting the shaft into place as you slide the screw slots under the 2 loosened screws.

**CAUTION! Do not over tighten the screws in the top of the Facia.**

11. Snug the 2 screws to secure the Right Side Support to the Facia.

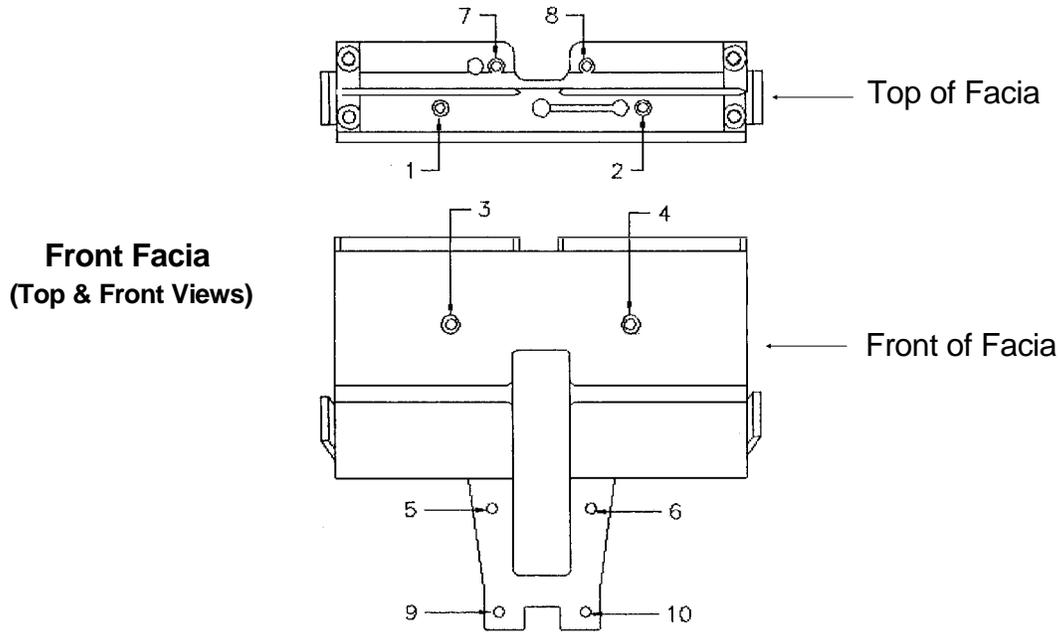


Fig. 5-7

12. Reconnect the Thread Break Harness from the Color Change PCB, at connector J360201.
13. Reinstall the Thread Saddle to the top of the sewing head.

### **To Remove The Front Facia**

If it becomes necessary to remove the Front Facia (to replace the reciprocator assembly, for example), refer to the following procedure.

1. First remove the Needle Case as described in a previous procedure.
2. Remove the four 3mm screws from the top of the Facia. (Refer to fig 5-7.)
3. Remove the six 4mm screws from the front of the Facia. (Refer to fig.5-7 .)
4. Lift off the Facia. If replacing the Facia, transfer any Slide Support that is

attached to the old Facia to the new Facia before installing the new Facia as described on the next page.

## Installing The Front Facia

**CAUTION! The following procedure MUST BE FOLLOWED PRECISELY to avoid possible damage to the Front Facia during installation.  
DO NOT OVERTIGHTEN THE SCREWS!**

1. Put the Front Facia in position on the front of the sewing head arm and "start" all 10 screws (four 3mm screws on top and six 4mm screws on the bottom). Refer to the figure above for screw locations.
2. After all the screws are started, continue to rotate each of them until just before they begin to snug.
3. When all the screws are positioned to "just before snug," refer to the figure above and "snug" the forward 2 screws (screw # s 1 & 2) on the top surface.
4. Next, "snug" the top 2 screws (screw # s 3 & 4 in the above figure) of the front surface.
5. Now finish snugging the screws in the numbered order as shown in the figure. Snug # s 5 & 6 on the front, then go to the top to snug # s 7 & 8, and then to the bottom two screws numbered 9 and 10.
6. Reinstall the Needle Case and associated covers as described in a previous procedure.

## Jump Stitch Solenoid Replacement

If a Jump Stitch Solenoid must be replaced, follow these steps:

1. Remove the Thread Saddle from the top of the sewing head.
2. Disconnect the Jump Stitch Solenoid Harness at the connector location J360204 on the top of the Color Change PCB.
3. Remove the Left Slide Support (cap at the left end of the Needle Case Cross Slide Shaft) by loosening the 2 screws that secure it to the Front Facia at the top. Loosen the screws almost all the way.

By removing the Left Slide Support, you gain access to the top screw of the Jump Stitch Solenoid Bracket through the hole in the side of the Front Facia.

4. Remove the top and bottom screws of the Jump Stitch Solenoid Bracket and then remove the solenoid and the solenoid bracket as one piece.

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

5. Loosen the locking nut on the solenoid, then rotate the bracket off the solenoid.
6. Replace with new solenoid by reversing the procedure above. Adjust the position of the solenoid into the solenoid bracket using the "thread counts" or measurement you obtained above (see NOTICE above).

**NOTE:** During installation the solenoid must be adjusted properly. If you did not adhere to the NOTICE above, or if for another reason, the adjustment for the solenoid is not correct, Refer to the Jump Stitch Adjustment procedure in Section 4 for the proper adjustments.

## **Color Change**

The color change function of the EMC6/4 is much like the color change of other Melco embroidery peripherals offering this feature. The Color Change PCB controls color change commands from the design and from the keyboard, thread break information, the jump stitch solenoid, and the color change motor. The color change PCB, motor, cam, and wire harnesses are located under the Thread Saddle at the front of the sewing head.

## **Color Change Cam Replacement**

The replacement of the Color Change Cam will seldom be required. Contact your Melco representative for advice and instructions before removing this part.

## **Color Change PCB Replacement**

1. Remove the Thread Saddle.

**CAUTION! The Color Change PCB is snapped into place on top of the Plastic Motor Mount Box. Be careful not to damage the LED sensors with the Color Position Indicator when removing the PCB.**

2. You must rotate the Color Change Cam to move the needle case to the right so the LED sensors on the Color Change PCB are clear of the Color Position Indicator.

The Color Change Cam has a slot in the end of the cam shaft for the purpose of rotating cam. Rotate the cam shaft with a single blade screw driver.

3. Disconnect the Jump Stitch Solenoid Harness, the Thread Break Harness, and the Color Change harness from the Color Change PCB.
4. When the Color Position Indicator is out of the last photo sensor on the Color Change PCB, and all the harnesses are disconnected, it is safe to remove the Color Change PCB.
5. To remove the Color Change PCB, pry the rear catch that holds the Color Change PCB, and lift the Color Change PCB off of the Color Change Housing.

## **Color Change Motor Replacement**

To remove the color change motor on head # 4, refer to the following steps:

1. First remove the Thread Saddle and the Color Change PCB as described in previous procedures.
2. Loosen and remove the motor mounting screws.
3. When the motor is loose, pull off the Drive Belt.
4. Loosen the pulley set screw and remove the Motor Drive Pulley.
5. The motor is now loose and can be removed.

6. Replace the Motor and reverse the preceding steps.

### **Replacing A Needle Bar**

To replace a Needle Bar, refer to the steps below, then turn to the Needle Bar height adjustment procedure in the EMC6/4 Operation Manual.

1. Hold the Tensioner Assembly in place while you remove the 2 screws that secure it to the top of the Needle Case.
2. Lift the Tensioner Assembly up a few inches, then disconnect the Thread Break harness from the bottom of the Tensioner Assembly and set the Tensioner Assembly aside.  
NOTE that there is a 180 degree twist counter-clockwise on the cable before it is installed into the Tensioner Assembly.
3. Snap off the Needle Case Front Cover from the Needle Case and identify which Needle Bar is to be replaced.
4. Loosen the Needle Clamp set screw and remove the needle and Needle Clamp from the bottom of the Needle Bar.
5. Next, loosen the Needle Bar Stop Clamp (black clamp).

**CAUTION! After the next step, the Needle Bar is free to be moved out the top of the Needle Case. Use care so the springs and other parts do not fly out of position.**

6. Loosen the Needle Bar Clamp.
7. Use care as you remove the Needle Bar upward and out the top of the Needle Case.
8. Transfer the screw from the top of the old Needle Bar to the top of the new Needle Bar.

9. Install a new Needle Bar by inserting it from the top, through the various pieces as listed below:

The parts that the Needle Bar engage, from top to bottom are:

- Needle Bar Holding Spring
- washer under spring
- felt pad
- upper casting piece
- rubber bumper just under the upper casting piece
- Needle Bar Stop Clamp (black)
- Needle Bar Clamp (silver)
- Presser Foot Spring
- Presser Foot (top through hole)
- rubber pad
- nylon piece
- felt pad
- lower casting piece
- o-ring
- Presser Foot (lower through hole)
- o-ring
- Needle Clamp and needle

10. Insert the needle and tighten the Needle Clamp screw to secure the needle and capture the Needle Bar.
11. Reinstall the covers and assemblies that were removed during this procedure. Please refer to the "NOTE" in step 2 when reinstalling the Tensioner Assembly.

After installing a new needle bar, you must adjust the needle bar height properly. Refer to the EMC6/4 Operation manual for the adjustment procedure for needle bar height.

# 6. Troubleshooting

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## **FUNDAMENTALS OF TROUBLESHOOTING**

### **Symptom Recognition**

The first step in troubleshooting any problem in a system or individual equipment is called SYMPTOM RECOGNITION. By observing the operations of the system or equipment, a symptom of a problem must occur in order to troubleshoot the system or equipment. This step requires reasonable familiarity with the operations of a system or equipment, and the ability to recognize when something is in error.

### **Symptom Elaboration**

The second step in the troubleshooting process is called SYMPTOM ELABORATION, or in other terms, the process of specifically defining what the symptom(s) are. This can be done by changing some of the operational parameters and trying to perform whatever was being done when the initial symptom was recognized. Oftentimes, it is as much help in determining when the symptom DOES NOT OCCUR as when it does.

### **List The Probable Faulty Unit(s) Or Functions**

The third step in the troubleshooting process is to list what units or functions that have a higher probability of being faulty. In order to accomplish this, one must have an understanding of the functional parts of the system.

### **Localization Of The Fault To A Unit Or Function**

The fourth step in the troubleshooting process is to determine a point to begin localization from, and to work from there. Some technicians "split the system" (pick a point between units or functions) and continue troubleshooting by further "splitting"; while other technicians start troubleshooting at the beginning of the system (or unit or function) and follow the symptom (or lack of one) until the fault can be recognized.

### **Localization To A Practical Replacement Assembly**

The fifth step in the troubleshooting process is to define what replaceable assembly contains the fault, and to replace it.

## **Failure Analysis**

Good maintenance and repair practices dictate that an analysis be made to determine the cause of the failure, and to repair or replace the assembly that caused the fault. This is not always applicable (sometimes components "just fail"), but an analysis is good practice nonetheless.

## **Sections of the Peripheral**

To help you in your troubleshooting of problems we present a discription of the peripheral, indicating where major assemblies and componets are located.

The EMC6/4 is divided into four sections (five sections, with Trimmer Option): the Keyboard Section, Carriage Section, Controller Section, Sewing Head Section (and the Trimmer Control Section).

### **Keyboard Section**

This is easily the simplest section as it contains only the Keyboard/Display and Keyboard Cable.

- See page 4-2 for the Display Screen Adjustment or page 5-8 for replacement of the Keyboard/Display. Check the Keyboard Ribbon Cable for kinks, cuts, breaks etc. Replace the Cable if any are found.

### **Carriage Section**

Here we have the X and Y Motors, center spline, Y drive belts, X (or hoop carriage) drive belts found in the Beam, the Home Position PBCs and the Center Stop Safety Switch. See page 5-9 for X or Y Motor replacement.

- The Center Spline can be replaced by Factory Trained personnel only. Although it should never have a problem that would cause replacement.
- Drive Belts are designed to keep constant tension, and if they ever require replacing, special tooling is required.
- The Home Position PBCs are active electrical components and should be handled with antistatic precautions.

## Controller Section

Houses the CPU, Motor Interface PCBs, although not directly in the controller section the Z motor controller (in the Power Distribution Box) is part of the Controller Section. The wire Harnesses from and to the CPU and Power Distribution Box are considered part of this section.

## Sewing Head Section

This section contains the sewing heads, and Z Drive Assembly. The sewing heads are for the most part self contained requiring little or no maintenance. The Needle Case, Rotary Hook and Trimmer Knives may require adjustment after many hours of operation. Of course the needle bars and rotary hook require lubrication, the lubrication schedule for the heads is found in the Operator's Manual.

## Trimmer Control Section

### Trim Info Only

The Trimmer Cam Box Assembly, actuator shaft and cutter linkages as well as the Grabbers (found on the Heads) are part of this section.

### X/Y Axis Accuracy

A test for X/Y Axis accuracy is shown below, you may use this test or develop your own. Remember that consistency is the key, a test or check that provides random results that can not be repeated doesn't tell you anything.

To check the accuracy of the X / Y Axis, perform the steps below:

1. Ready a hoop with test cloth and attach to the machine.
2. Select the hoop size and turn hoop limits on.
3. Using the Head Timing Menu, go to needle depth.
4. Mark the test cloth around the needle penetration as closely as possible.
5. Using the Head Timing Menu, go to head-up.

6. Select the Move menu, and perform the following moves, marking the test cloth after each move (as in steps 4 through 6) for measurement:

MOVE #	X-DISTANCE	Y-DISTANCE
1	+ 0.00	+ 1.00
2	+ 0.25	- 0.25
3	+ 0.25	- 0.25
4	+ 0.25	- 0.25
5	+ 0.25	- 0.25
6	- 0.25	- 0.25
7	- 0.25	- 0.25
8	- 0.25	- 0.25
9	- 0.25	- 0.25
10	- 0.25	+ 0.25
11	- 0.25	+ 0.25
12	- 0.25	+ 0.25
13	- 0.25	+ 0.25
14	+ 0.25	+ 0.25
15	+ 0.25	+ 0.25
16	+ 0.25	+ 0.25
17	+ 0.25	+ 0.25
18	+ 0.00	- 1.00

The result of the above moves should be a 1" square, rotated 45 degrees (like a diamond), with a mark every 1/4 ". The beginning center mark and the ending center mark should be no further than a needle thickness from each other (.004"). Variations of the 1/4" marks between the four "points of the diamond" should be no further than a needle thickness from an imaginary line between the four "diamond points".

Failure of the above accuracy tests can be attributed to the following (in order of precedence):

<u>Cause</u>	<u>Action</u>
Accumulation of dirt/debris	Clean
Faulty hoop	Replace
Incorrectly hooped cloth	Hoop correctly
Faulty hoop latch	Fix / Replace
Lack of lubrication	Lubricate

<u>Cause</u>	<u>Action</u>
Incorrect software	Re-configure
Belt tensions	Adjust
Worn or damaged belts	Replace
Delrin roller adjustments	Adjust
Delrin roller wear or damage	Replace
Loose hardware (screws)	Tighten
Loose pulleys	Tighten
Bent axles / shafts	Replace
Power supply adjustment	Adjust
Faulty motor(s)	Replace

## **PCB FUNCTIONAL EXPLANATIONS**

**CPU** The CPU or Central Processing Unit is the brain of the Sewing Peripheral. It provides a number of functions: Network Communications with the Epicor computer, Motor Control and User Interface control.

**Z Motor Controller** This module is a prepackaged controller for the Z Motor, requiring minimal interface with the CPU.

**Keyboard/Display** This PCB is the Peripheral Operator Interface controller. It provides the CPU with the codes representing functions selected by the operator.

**Motor Drive Interface Board** This PCB provides signal amplification between the CPU and the X and Y motors. It powers the Beam and Hoop Carriage, and the CPU. It also provides passive interconnection to the Trimmer/Interface Board.

**Trimmer Interface Board** This PCB fires an appropriate solenoid when: 1) a Trim command (dataset) is detected in the Design, 2) when a Trim immediate command is recognized from the Trim Menu. It controls the solenoid firing for the Trimmer Cam, Grabber, and Picker.

**Power Distribution Box** Also called the Large Gray Box (LGB), this box contains two power supplies, a + 5 Volt and + 24 Volt power supply. It also contains the Z Motor Controller. The primary function of the Power Distribution Box is to deliver power as required to the EMC6/4 Sewing Peripheral.

**Home Position Boards** These small PCBs are found at the end of travel of

X Center Rail and at the end of travel of left hand Y rail. As their name implies they allow the EMC6/4 to "know" where it is in relation to Home Position. Home Position is the Center of the Cap Frame, but not the center for an aft of Beam travel.

### **Jump Stitch Solenoid**

Any time during the stitching process when the length between two needle penetrations is approximately 1/2 inch (1.27cm) or longer, the Jump Stitch Solenoid is triggered. When the Solenoid triggers (or energizes) the solenoid plunger protrudes into the path of the Needle Bar Driver Reciprocator. As the Needle Bar Driver rises into the upper area of the stitching cycle, the solenoid plunger contacts the reciprocator mechanism and forces it to rotate out of its normal position. When this happens, the Needle Bar is released from the Needle Bar Driver Reciprocator and remains in the Needle Up or Jump Stitch position by the action of the upper springs of the Needle Bar mechanism. The Needle Bar Driver Reciprocator continues to perform the downward stroke of the next stitch, but the Needle Bar remains held in the "Jump Stitch Position". This action will continue until the Jump Stitch Solenoid is de-energized, the plunger is removed from the path of the reciprocator mechanism. On the upward stroke of the next stitch, the Needle Bar will be captured by the Needle Bar Driver Reciprocator and the needle will again penetrate the material to perform a stitch.

A "good" jump stitch solenoid will have an electrical resistance measurement of about 32 ohms (measured with an Ohmmeter) in the solenoid windings. This is measured between the two wires that come out of the solenoid's body. Any reading that is not within a 2 or 3 ohms of 32 should be considered a "bad" solenoid and be replaced.

The Color Change PCB has a "polyswitch" in the jump stitch circuit that acts as a circuit breaker when the Jump Stitch Solenoid fails. This in turn protects the Color Change PCB. If the polyswitch fails and does not recognize that the solenoid is bad, damage to the PCB will result.

When the solenoid does not engage during sewing, the first item to check would be the design information. Be sure that the design contains jump stitches. If it does, then check the resistance across the solenoid windings as discussed above. If you do not have a meter, assume that the solenoid is bad and replace it. See page 5-18 to replace the solenoid.

**Trim  
Info  
Only**

### **Trimmer Troubleshooting**

During the course of trimmer operation problems may occur. Problems like the cutters not picking up the threads, or the thread coming out of needle

when the machine begins to sew after a trim. While things like this will not happen often, they will happen. When they do its an indication that some adjustment is necessary. Most of the major adjustments should be made by factory trained service representatives. Some adjustments however can be accomplished by the operator.

Here we present a troubleshooting guide to help you track down problems you are likely to encounter, with a probable cause and suggested corrective action.

**Problem:** The upper thread is not cut.

### **Probable Cause and Corrective Action**

1. The moving cutter does not pickup the thread.
  - a. Cam timing is not correct.
    - Adjust cam timing referring to Timing Chart.
  - b. Cutter linkage may have slipped.
    - Reset cutter linkage referring to technical manual.
2. Moving cutter doesn't travel far enough by fixed cutter to cut the thread.
  - a. Cutter linkage may have slipped.
    - Reset the linkage referring to technical manual.
3. Fixed to moving cutter relationship out of adjustment.
  - Adjust relationship referring to technical manual.

**Problem:** The thread comes out of the needle at trimming.

### **Probable Cause and Corrective Action**

1. Trimming timing of the moving cutter is too early.
  - a. Cam timing is not correct.
    - Reference technical manual.
2. Check spring on the tensioner is too tight.
  - a. Adjust check spring per technical manual.

**Problem:** Thread comes off the needle when starting.

**Probable Cause and Corrective Action**

1. The upper thread is too short.

- a. Anything in the upper thread handling area makes the tension of the upper thread too tight for trimming.
  - Check the thread path for obstructions.
- b. Pre- Tension disc too tight.
- c. Picker does not move in enough.
  - Adjust Picker clearance to bobbin. (1.5mm) See technical manual.
- d. The moving cutter is damaged.
  - Replace. See technical manual.

2. The under thread (bobbin) is too short.

- a. Bobbin tension is too tight and thread breaks.
- b. Bobbin thread is not being held.
  - Check bobbin thread holding spring.
- c. Bobbin is wrong type for job.
  - Change bobbin thread.

**Problem:** Upper thread is not pulled under at start.

**Probable Cause and Corrective Action**

1. Upper thread is too long after trim.

- a. Pre-Tension is too tight.
- b. Picker is not fully retracting.
  - Check picker function.
- c. Picker not going in at startup.
  - Check picker function.

**Problem:** Thread on inactive needles are not being stored and are getting sewed down.

**Probable Cause and Corrective Action**

1. Grabber not grabbing thread.
  - a. Grabber not going out far enough to catch thread.
    - Check Grabber function.
  - b. Grabber wire broken.
    - Replace assembly. See technical manual.

**Problem:** Error Message "TRIMMER NOT HOME"

**Probable Cause and Corrective Action**

1. Something is preventing the cutters from returning to their home position.
  - Check picker function, look for "birdsnest" of thread wrapped around picker, cutters, or rotary hook.
  - a. Movable knives out of adjustment.
    - Check and adjust. See Technical Manual.
  - b. Bobbin Thread Holding Spring, damaged by cutters.
    - Replace damaged holding spring.
  
- Move cutters home by grasping the Cutter Actuating Shaft under the frame and push it as far left as it will go.

**Problem:** Error Message "GRABBER NOT HOME"

**Probable Cause and Corrective Action**

1. One of the Grabbers under the sewing head is not fully retracted.
  - Rotate the Motor Stop Lever on the left side of head # 2, down, or press the Start Key.

- If the message comes back, check the grabber function on each head to find a cause for the message.

# 7. Spare Parts

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## **SPECIAL PARTS HANDLING**

If care is not taken in handling certain parts of the sewing head, there is a good probability the sewing head will not function properly or the parts will fail prematurely.

These parts are to have special handling considerations from the vendor, through quality control inspection, into spare parts inventories, then on to packaging for shipping, and finally to installation.

Handling of these parts (and for that matter all parts), is not limited to the considerations below. Please use common sense, good judgement, and accepted handling practices in handling all parts. If you have any questions or concerns, please call your area service department.

### **Parts Handling Considerations**

#### **General Considerations**

- \* Painted surfaces need to be protected from dirt, other foreign matter, nicks, and scratches.
- \* Non-painted surfaces must not be touched by the human hand, to prevent corrosive body oils, dirt, and other foreign matter from contaminating the surfaces.
- \* Protect all bearings, bushings, cams, rails, gears, rollers, needle bars, pins, studs, connecting rods, guide shafts, and other surface finishes from dirt, other foreign matter, marring, scratches, and nicks, etc.
- \* Bearing surfaces and shaft bore surfaces need to be thoroughly cleaned and mating parts oiled before assembly.

### **Special Packaging**

Several parts are packaged in specially sealed packages. These packages keep lubricant on the parts and protect them from contamination during shipment. To install these parts, clean your hands and place a small amount of sewing machine oil on your fingers to kept the integrity of the part intact.

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