



**TEHX-C  
MULTI-HEAD  
MAINTENANCE  
GUIDE**

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# **Introduction**

**Embroidery machines are a big investment. To insure your Tajima machine stays productive and profitable you must follow a dedicated maintenance schedule.**

**This guide clearly describes the areas of your machine that require cleaning, lubrication and adjustment on a regular basis.**

**Following the outlined procedures will reduce downtime and keep you in production.**

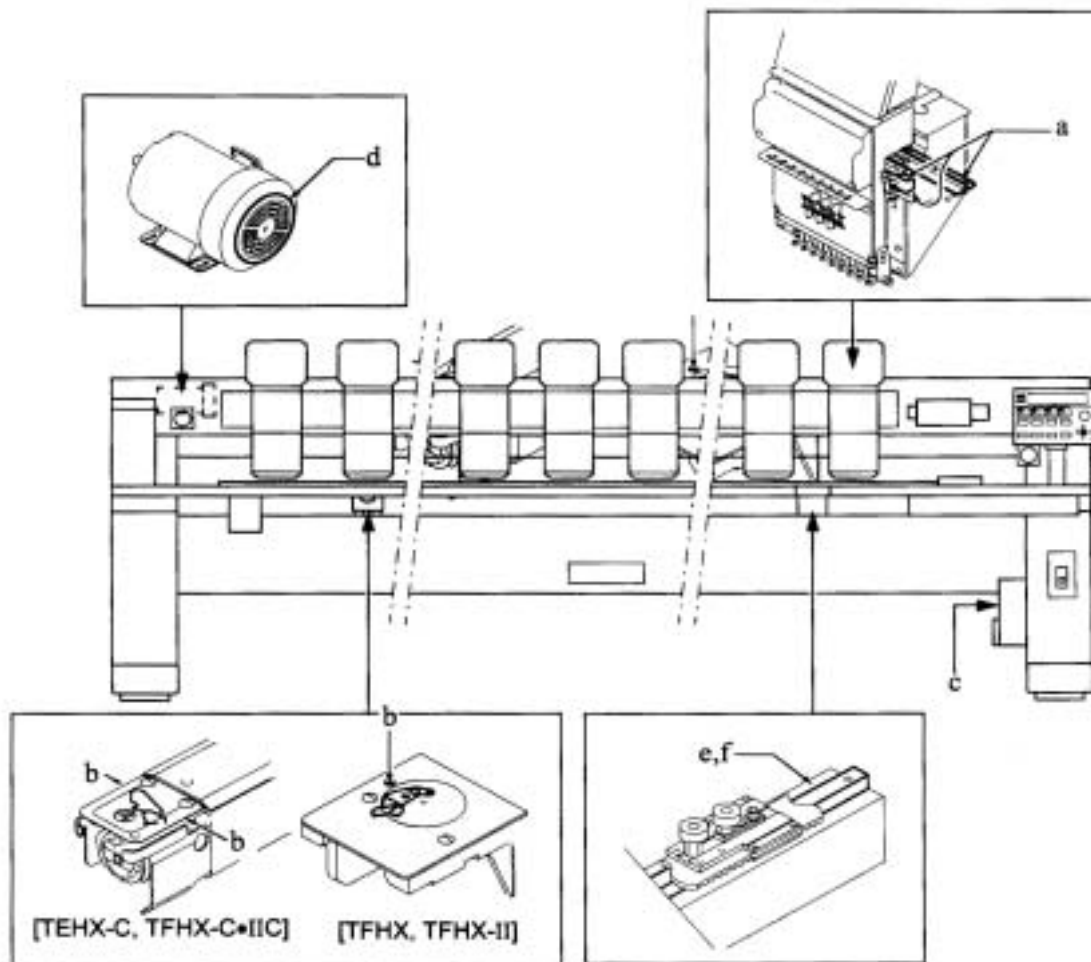
# TEHX-C Multihead

## Cleaning

Main cleaning areas and cleaning cycles are indicated below.

Cleaning Area	Cleaning Cycle
Take-up lever guide, Case linear section (a)	Once/week
ATH section (b)	Everyday
Slit section (c) of Power supply/driver box	Once/week
Filter of the main shaft motor (d)	Once/week
X-axis drive system (e), Y-axis drive system (f)	Once/2 weeks

**NOTE :** The information in this section is prepared using TFHX as an example model for the purpose of explanation. Accordingly, illustrations used in this section could differ from actual view of your machine. However, since maintenance procedure and other information stated in this manual are the same as TFHX, please follow the instructions.



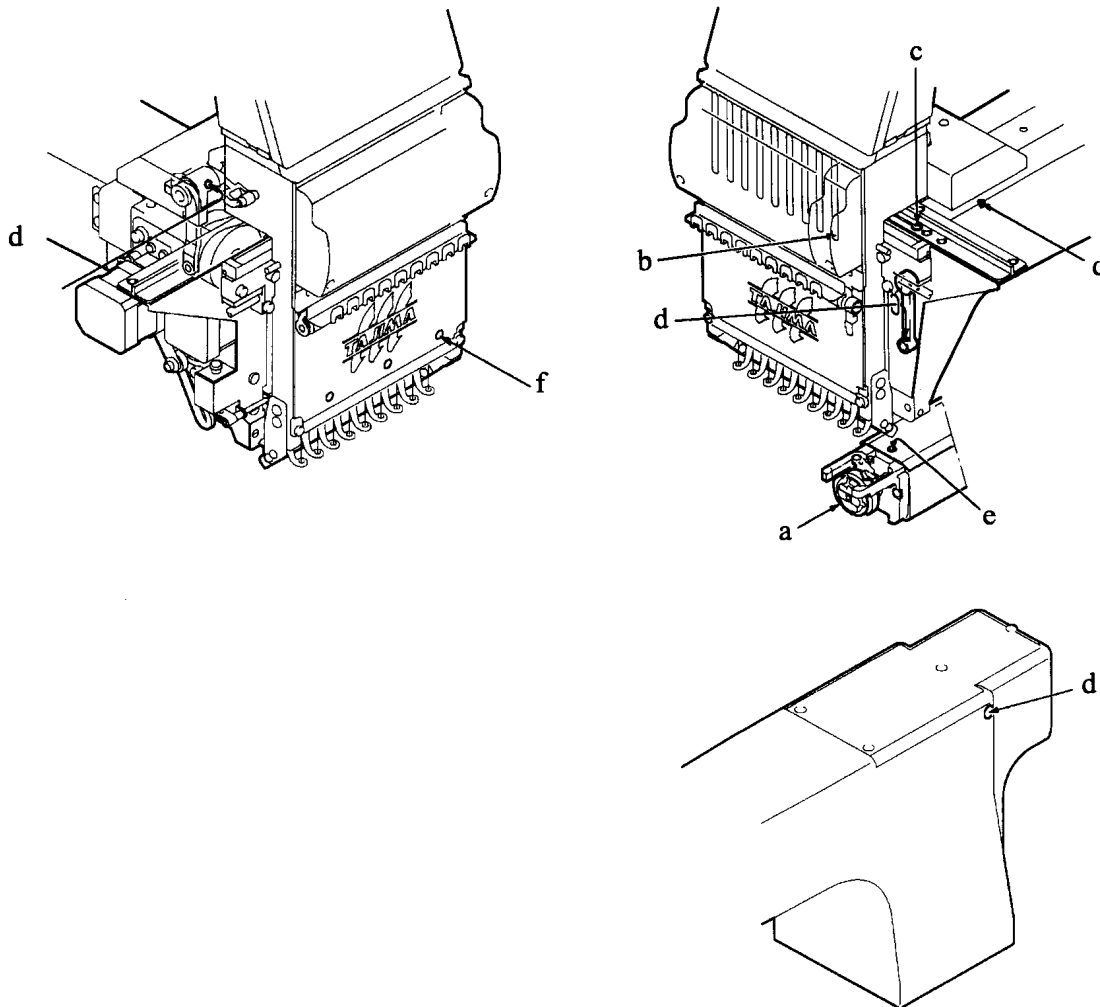
# TEHX-C Multihead

## Oiling

Main lubrication points and cycles are indicated below. [ TEHX-C]

Lubrication Points	Lubrication Cycle
Rail on rotary hook (all rotary hooks) (a)	Every 3 to 4 hours of operation
Needle bar (b) (lubricate from the slits of the upper cover), Needle bar drive shaft (c), Inside of the arm (d)	Once/week
Inside of the cylinder bed (front) (e), Felt packing (Needle bar) (f)	Once/3 months

**NOTE :** If your machine is equipped with the automatic lubricating unit, follow the instructions given in the manual for the automatic lubricating unit.

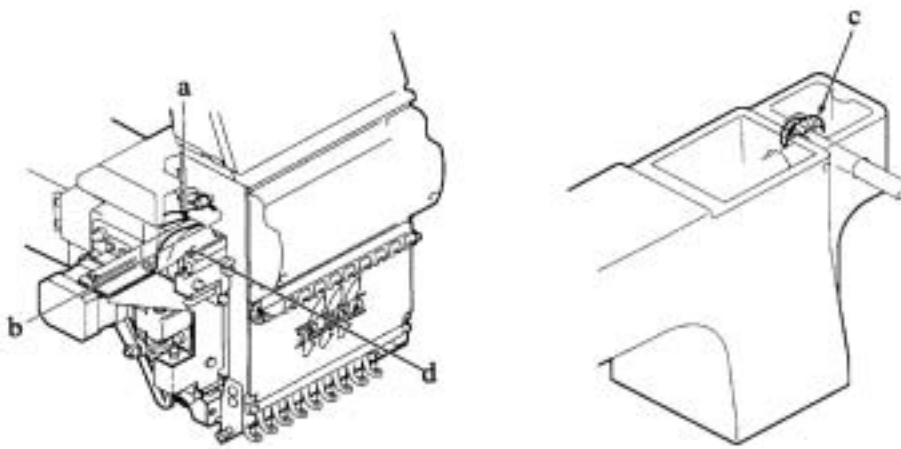


# TEHX-C Multihead

## Greasing

Main greasing points and greasing cycles [TEHX-C]

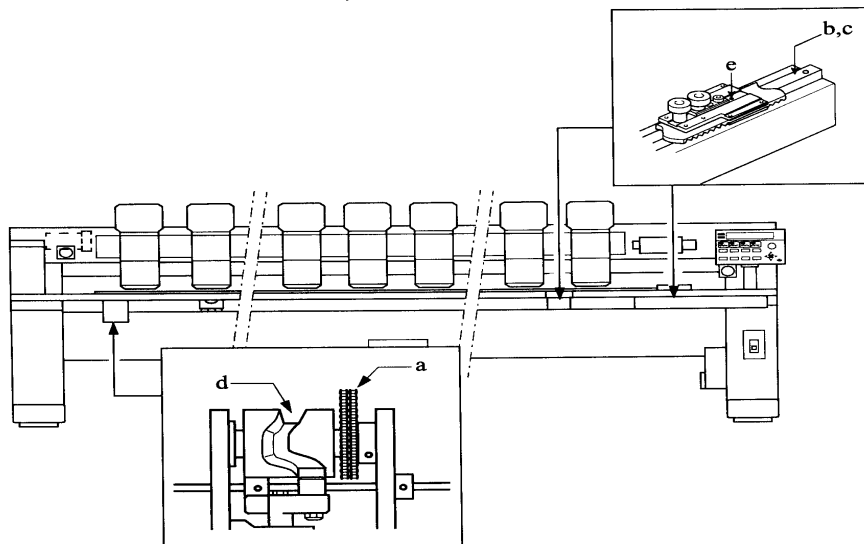
Greasing Points	Greasing Cycle
Take-up lever drive cam (a), Roller of take-up lever drive lever (b), Spiral bevel gear (c)	Once/3 months
Case linear section (d)	Once/6 months



Greasing Points	Greasing Cycle
Roller chain (a)	Once/3 months
X-axis drive system (b), Y-axis drive system (c) (*1), ATH cam (d)	Once/6 months

\* 1 : For the machine with greasing holes (e), inject grease from the greasing holes using greasing gun, etc.

**NOTE :** The information in this section is prepared using TFHX as an example model for the purpose of explanation. Accordingly, illustrations used in this section could differ from actual view of your machine. However, since maintenance procedure and other information stated in this manual are the same as TFHX, please follow the instructions.



# TEHX-C Multihead

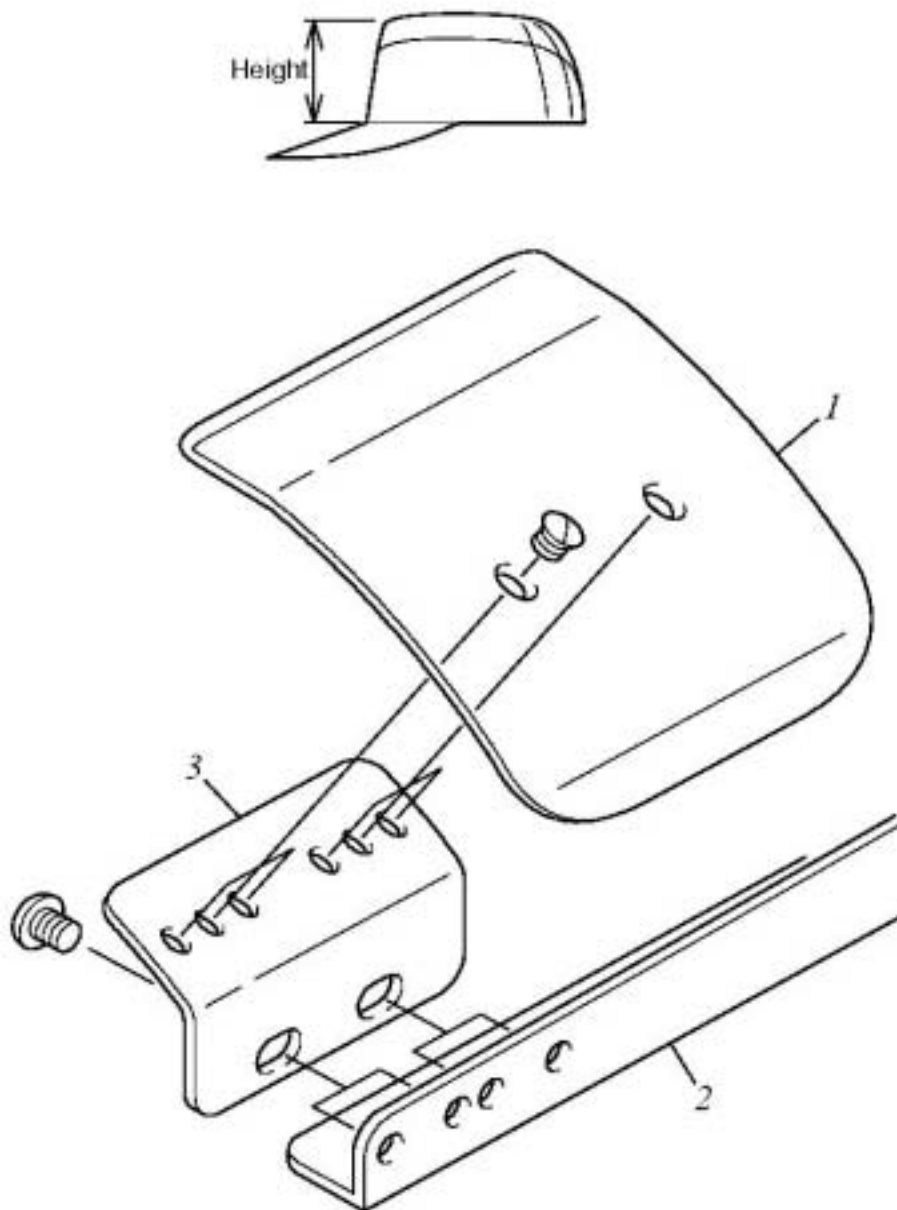
## Cap Frame Adjustments

### ADJUSTING THE FRAME TO THE CAP SIZE (HEIGHT)

#### Adjusting the Needle Plate Guide

Adjust the needle plate guide (1) according to the cap size (height).

Adjustment can be made within a 20 mm range in units of 5 mm by shifting the guide bracket (3) (two mounting positions) with respect to the guide base (2) and by shifting the needle guide (1) (three mounting positions) with respect to the guide bracket (3).



# TEHX-C Multihead

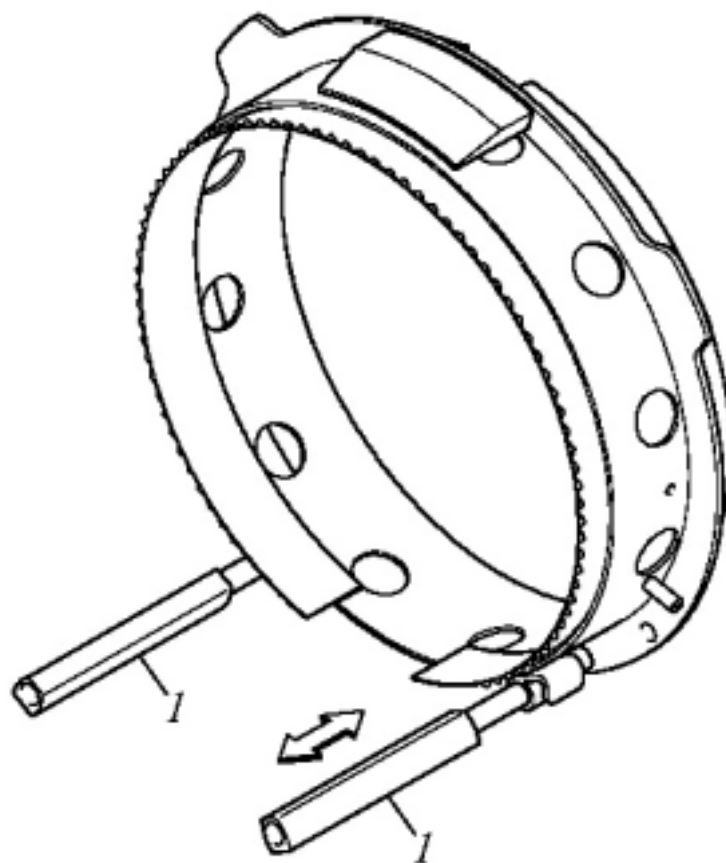
## Cap Frame Adjustments

### Adjusting the Cap Frame

The procedure for adjusting the cap frame differs depending on the type of the frame (wide cap frame, semi-wide cap frame). Carry out the adjustment meeting the type of the cap frame to be used.

#### [Using the Wide Cap Frame]

After loosening the clip stopper (1), adjust the position of the clip stopper (1).



# TEHX-C Multihead

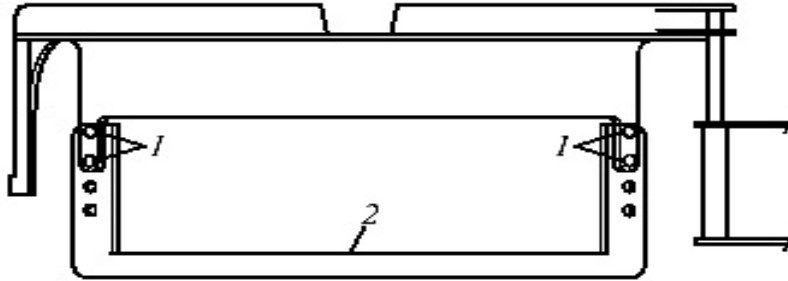
## Cap Frame Adjustments

### ADJUSTING THE FRAME TO THE CAP SIZE (HEIGHT)

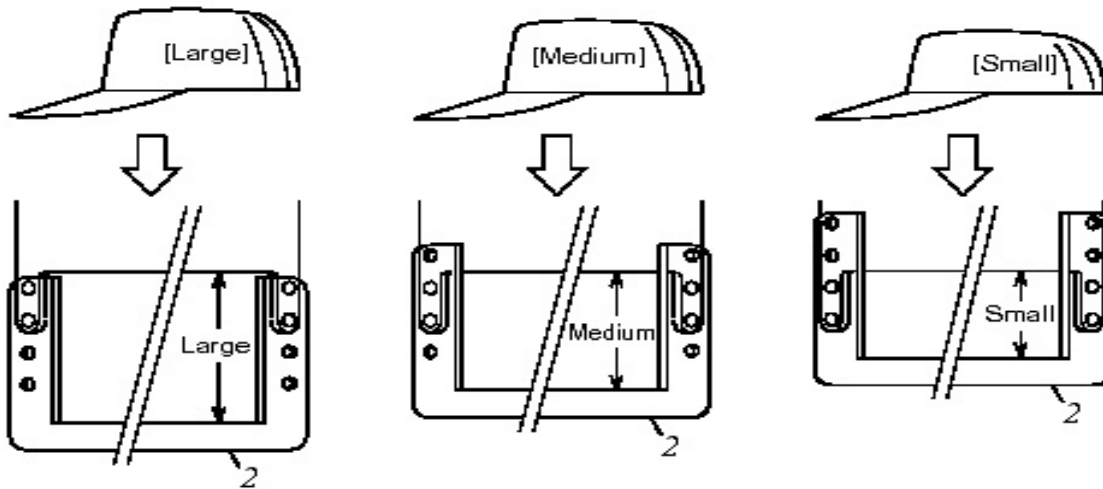
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#### [Using the Semi-Wide Cap Frame]

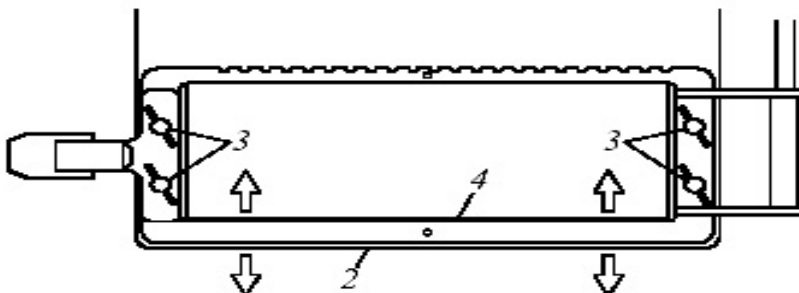
1. Remove the base frame B set (2) by removing the set screws (1).



2. Install the base frame B set (2) at the position which matches the cap size (height).



3. Loosen the four wing nuts (3) and adjust lid frame A set (4) to the size of the base frame B set (2) which was adjusted in 2. above by sliding it in the directions indicated by the arrows. Then, after adjustment, secure it by retightening the wing nuts (3).




# TEHX-C Multihead

## Cap Frame Adjustments

### ADJUSTING THE CAP FRAME TO THE THICKNESS OF THE MATERIAL

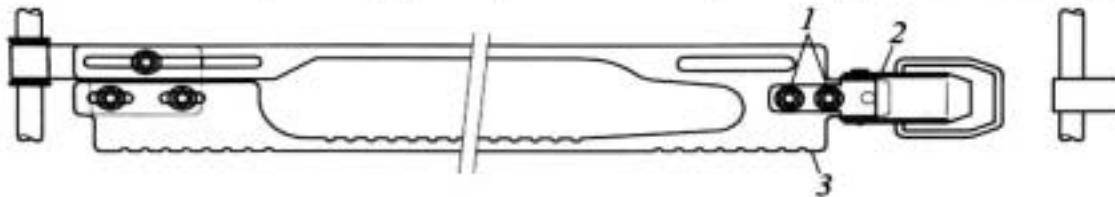
Adjustment procedure differs according to the type of frame (wide cap frame/semi-wide cap frame).  
Make sure to perform the adjustment meeting the type of frame to be used.

#### ⚠ CAUTION

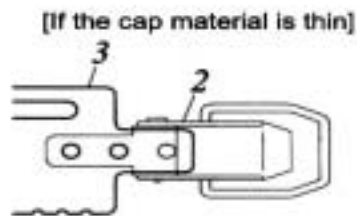
Adjust the size of the lid frame meeting the cap material thickness.  
Unless the size is not adjusted to the cap material thickness, it may cause damage to the frame and/or design displacement. 

#### [Using the Wide Cap Frame]

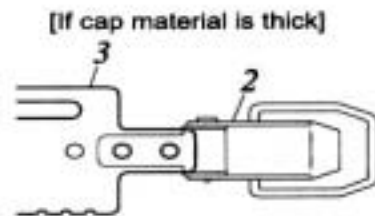
1. Remove the hexagon nuts (1) (2 nuts) and remove the pinch lock (2) from the lid frame (3).



2. Install the pinch lock (2) so that the cap is held securely by the lid frame.



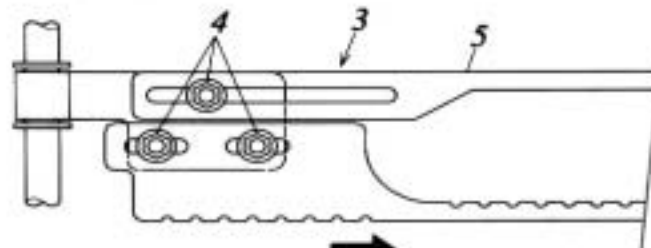
Secure the pinch lock (2) by using two inner holes of the lid frame (3).



Secure the pinch lock (2) by using two outer holes of the lid frame (3).

3. Loosen the hexagon nuts (4) (3 nuts) and adjust the tightness of the pinch lock (2) when a cap is set.

NOTE: In this adjustment, give allowance to side (5) of the lid frame (3) so that it comes above the visor support bracket. (See p.15 )



[If the pinch lock is too tight]

Slide the lid frame (3) in the direction of the black arrow as shown above and secure it.

[If the pinch lock is too loose]

Slide the lid frame (3) in the direction of the white arrow as shown above and secure it.

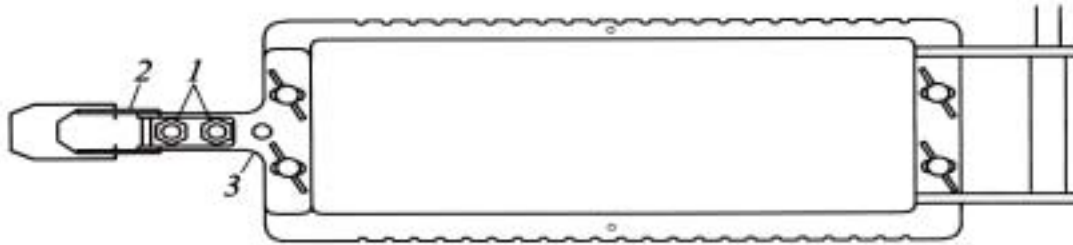
# TEHX-C Multihead Cap Frame Adjustments

## ADJUSTING THE CAP FRAME TO THE THICKNESS OF THE MATERIAL

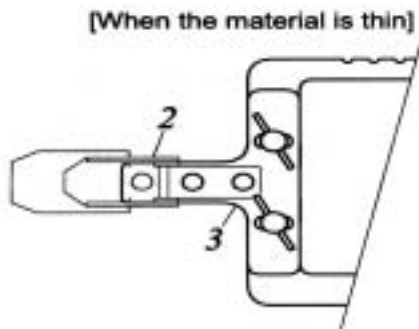
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### [Using the Semi-Wide Cap Frame]

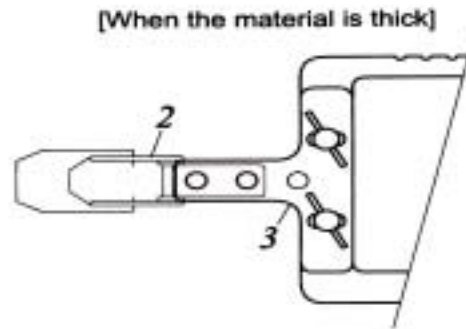
1. Remove the pinch lock (2) from the clamp base (3) by removing the hexagon nuts (1).



2. Install the pinch lock (2) at the position which matches the thickness of the material.

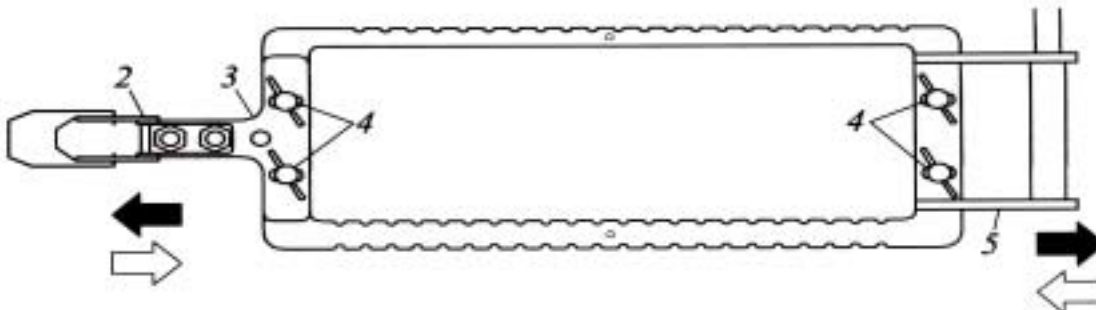


Secure the pinch lock (2) by using the inner two holes in the clamp base (3).



Secure the pinch lock (2) by using the outer two holes on the clamp base (3).

3. Loosen the wing nuts (4) to adjust the tightness of the pinch lock (2) when the cap frame has been set.



[When the pinch lock is too tight]

Slide the clamp base (3) and the lid frame fitting (5) in the directions indicated by the black arrows and secure them.

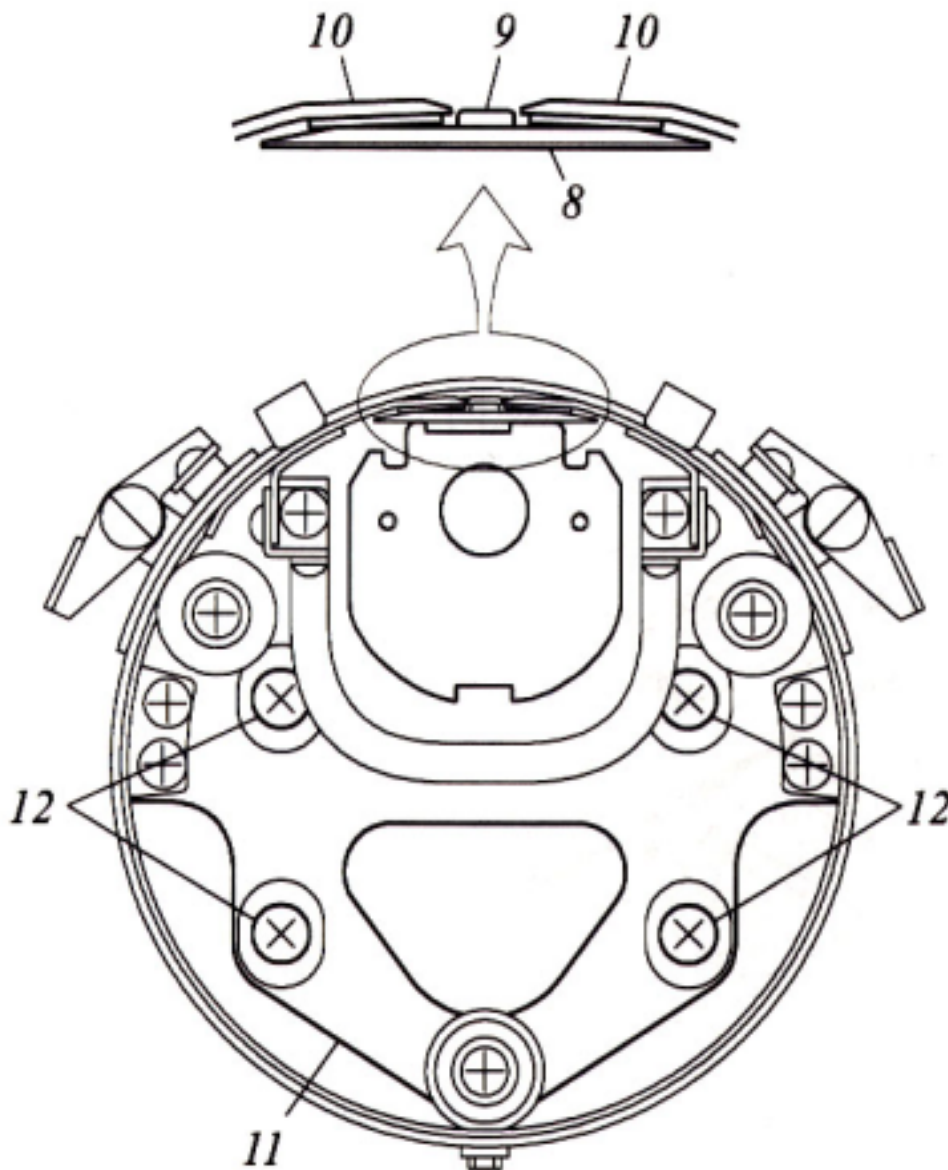
[When the pinch lock is too loose]

Slide the clamp base (3) and the lid frame fitting (5) in the directions indicated by the white arrows and secure them.

# TEHX-C Multihead

## Cap Frame Adjustments

Check if the projection (9) of the needle plate (8) is positioned at the center of the needle plate guide (10), and also check if the silicone tape beneath the needle plate guide (10) contact lightly the top surface of the needle plate (8). If it is not positioned at the center nor contacting lightly, loosen the drive base (11) attaching screws (12) (4 screws) and adjust the position of the drive base (11).

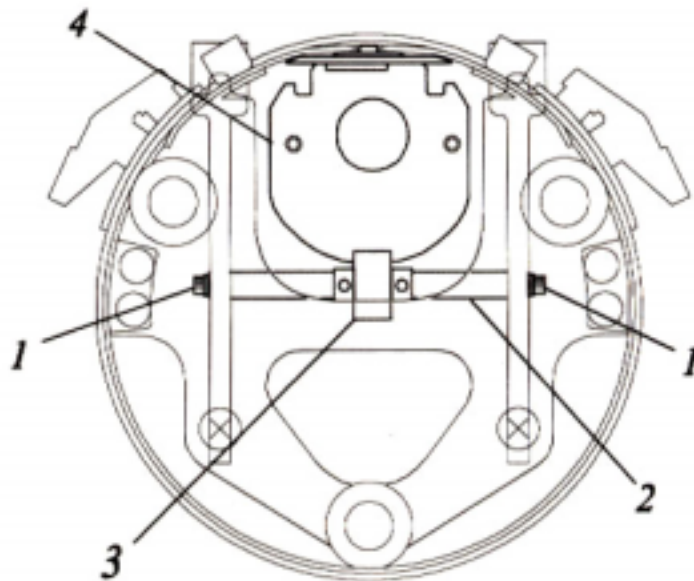


# TEHX-C Multihead

## Cap Frame Adjustments

### Adjusting the Base Holder Roller Position

Loosen the attaching screws (1) (two) and lift up the base holder shaft (2). Adjust the base holder roller (3) position so that it contacts lightly the bottom surface of the groove at the bottom of the bed (4) and so that the base holder shaft (2) is positioned horizontally, and then, tighten the attaching screws (1).



# TEHX-C Multihead

## Basic Repair And Adjustments

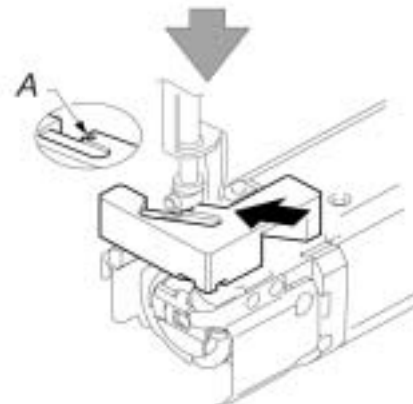
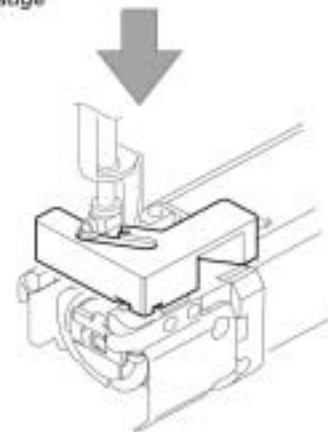
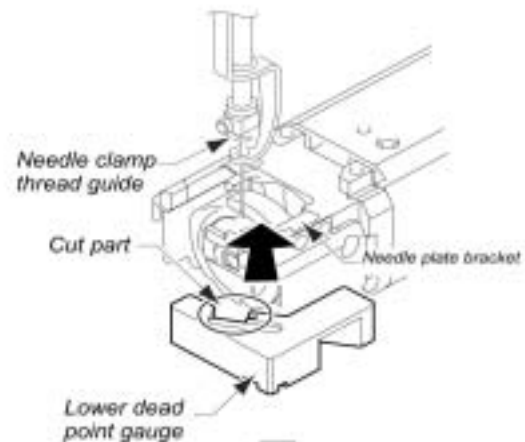
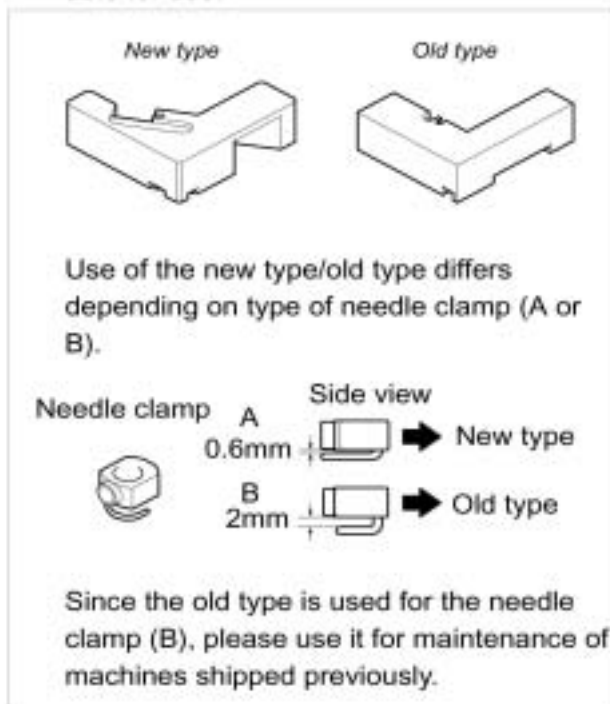
### Lower Dead Point Adjustment

Remove the needle plate, and then turn the main shaft counterclockwise (\*1) so that the needle bar positions at the lower dead point at 180 degrees.

\*1: The tool (main shaft handle, hexagon wrench, etc.) for turning the main shaft differs depending on model.

(1) Insert the cut part of the lower dead point gauge (\*2) between the needle plate bracket and the needle clamp thread guide viewing at an angle to the right.

\*2: Use the new type. The old type is not available for use.



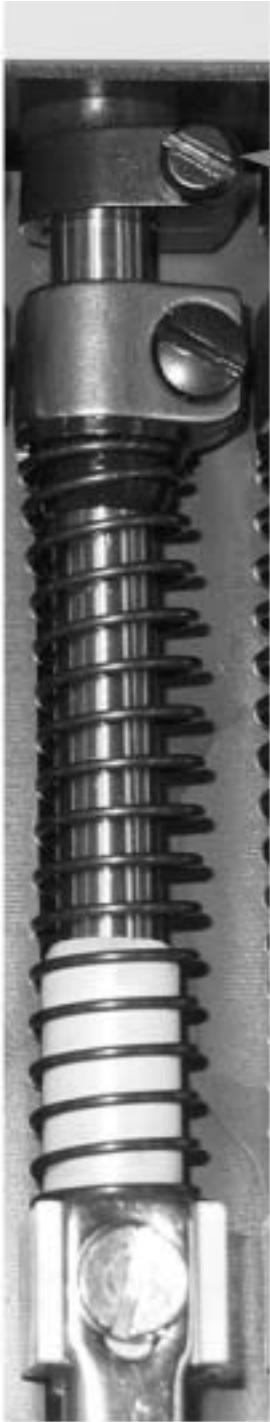
(2) Move the lower dead point gauge to the front left direction so that the needle comes to the cut part (A) of the lower dead point gauge.

# TEHX-C Multihead

## Basic Repair And Adjustments

### Upper Dead Stop Adjustment

When adjusting the lower dead point you **MUST** always reset the upper dead stop.



FIRST LOOSEN THE UPPER DEAD POINT STOPPER. THEN ROTATE THE MAIN SHAFT UNTIL THE NEEDLE BAR IS AT ITS HIGHEST POSITION. PUSH THE UPPER DEAD POINT STOPPER UP WITH LIGHT PRESSURE AND TIGHTEN THE SCREW WITH OUT ALLOWING THE BACK SIDE TOUCHING THE NEEDLE BAR GUIDE PLATE BEHIND IT.

# TEHX-C Multihead

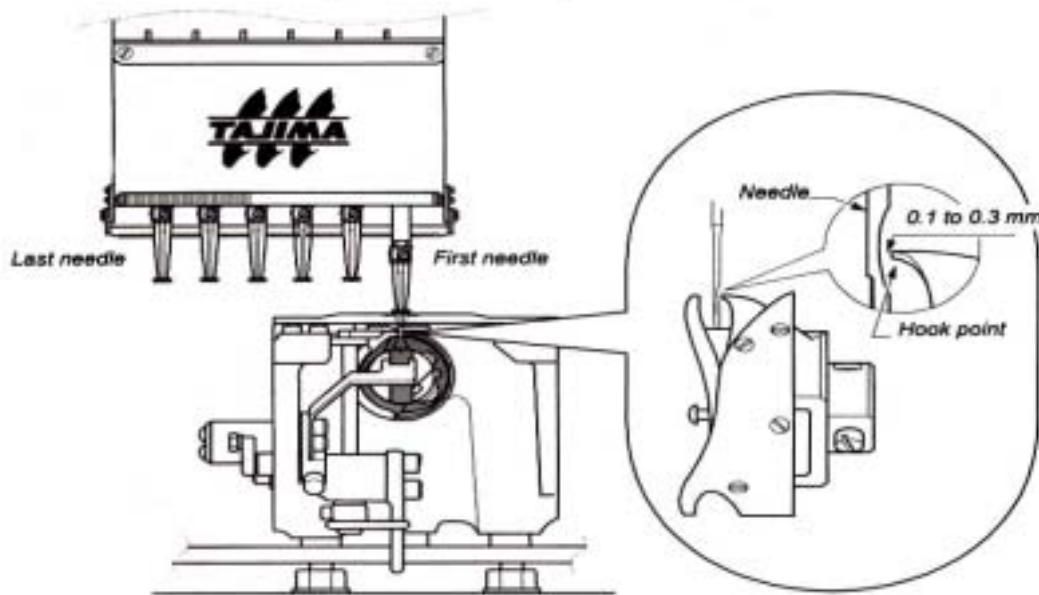
## Basic Repair And Adjustments

### Hook Timing

#### Checking the Clearance at the Needle Bar/Rotary Hook Timing

##### 1. First needle

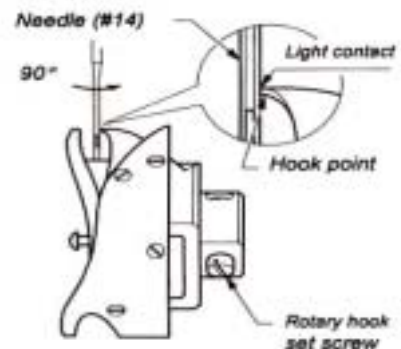
Turn the main shaft of the FX heads in the counterclockwise direction by using the main shaft handle or a 5-mm hexagon wrench to the angular position (see the table given in 13 "TIMING CHART" p.56) where the needle meets the hook point. Check the clearance between the recessed face of the needle and the hook point if it is correct (0.1 to 0.3 mm).



**NOTE:** If ordinary needles (#9 to #18) are used, the clearance can be set easily by following the procedure indicated below.

- 1) Change the needle to a #14 needle (used as the gauge needle) and clamp it after turning by 90°.
- 2) Loosen the rotary hook set screw.
- 3) Slide the rotary hook so that the hook point comes into light contact with the side face of the needle, then tighten the rotary hook set screw.
- 4) Change the needle to the one used for embroidery.

With the steps indicated above, the clearance between the needle (recessed face) and the hook point is adjusted to about 0.2 mm.



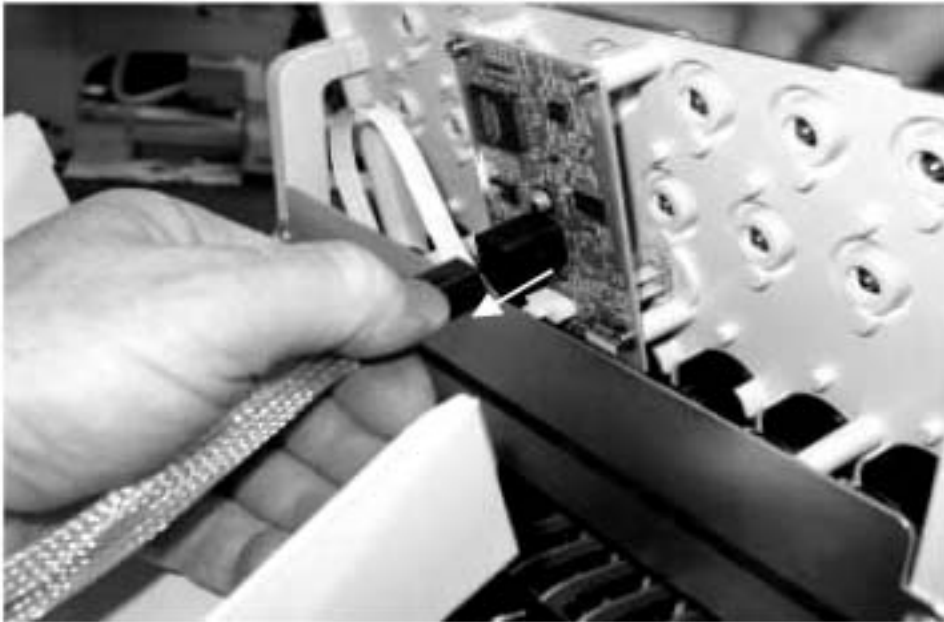
##### 2. Last needle

Follow the procedure mentioned in 1. to check the needle and rotary hook timing for the last needle.

# TEHX-C Multihead

## Basic Repair And Adjustments

### Replacing the Reciprocator



1, EXECUTE A MANUAL COLOR CHANGE TO NEEDLE NUMBER ONE. PUT THE MAIN POWER SWITCH TO THE OFF POSITION. REMOVE THE COVER FROM THE REAR OF THE TENSION BASE BY PUSHING DOWN ON THE TOP OF THE COVER AND APPLYING A LITTLE PRESSURE TOWARD THE REAR OF THE MACHINE. UNPLUG THE CABLE FROM THE TENSION BASE CARD.



2, REMOVE THE TOP COVER FROM THE NEEDLE BAR CASE.

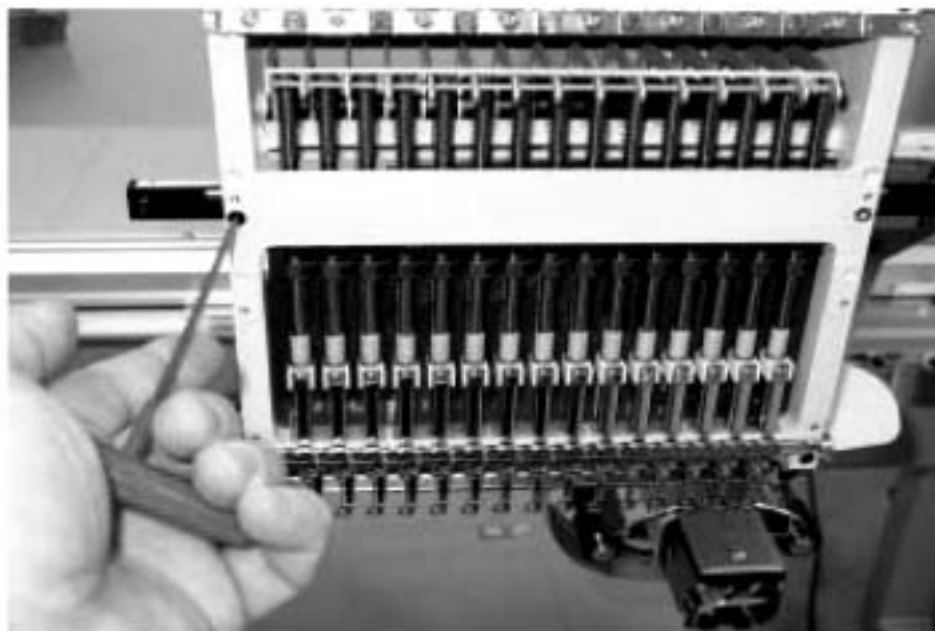
# TEHX-C Multihead

## Basic Repair And Adjustments

### Replacing the Reciprocator



3, PLACE A RUBBER BAND AROUND THE TAKE UP LEVERS.



4, AFTER REMOVING THE TWO 3MM. HEX SCREWS THAT HOLD THE NEEDLE BAR CASE TO THE MACHINE,

# TEHX-C Multihead

## Basic Repair And Adjustments

### Replacing the Reciprocator



THE NEEDLE BAR CASE MAY BE LIFTED FROM THE ARM OF THE MACHINE.

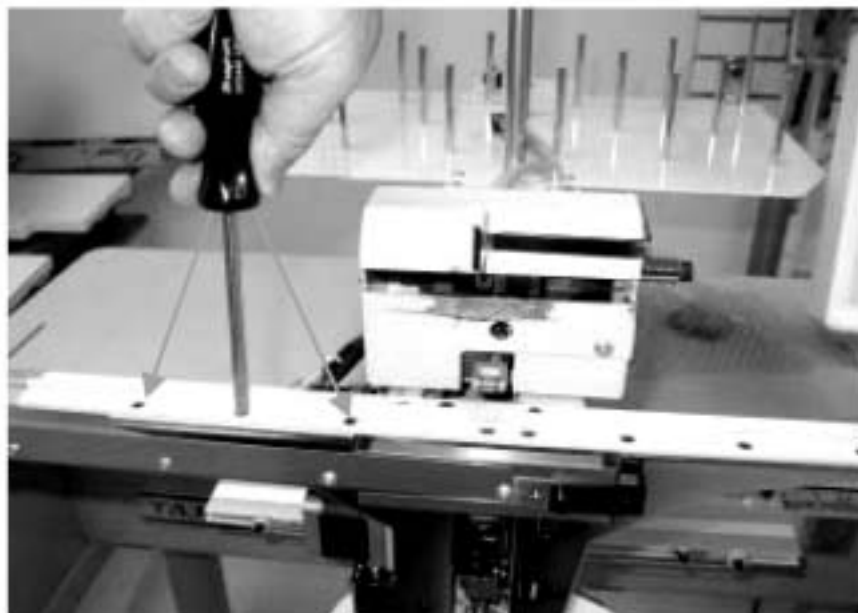


5, REMOVE THE TWO BLACK FLAT HEAD SCREWS FROM THE FRONT SURFACE OF THE LEFT ARM COVER,

# TEHX-C Multihead

## Basic Repair And Adjustments

### Replacing the Reciprocator



AND THE THREE SCREWS FROM THE LEFT SIDE OF THE TAKE UP LEVER GUIDE RAIL.



6, YOU MAY THEN LET THE LEFT ARM COVER HANG BEHIND THE CAP FRAME GUIDE ( BILL DEFLECTER ).

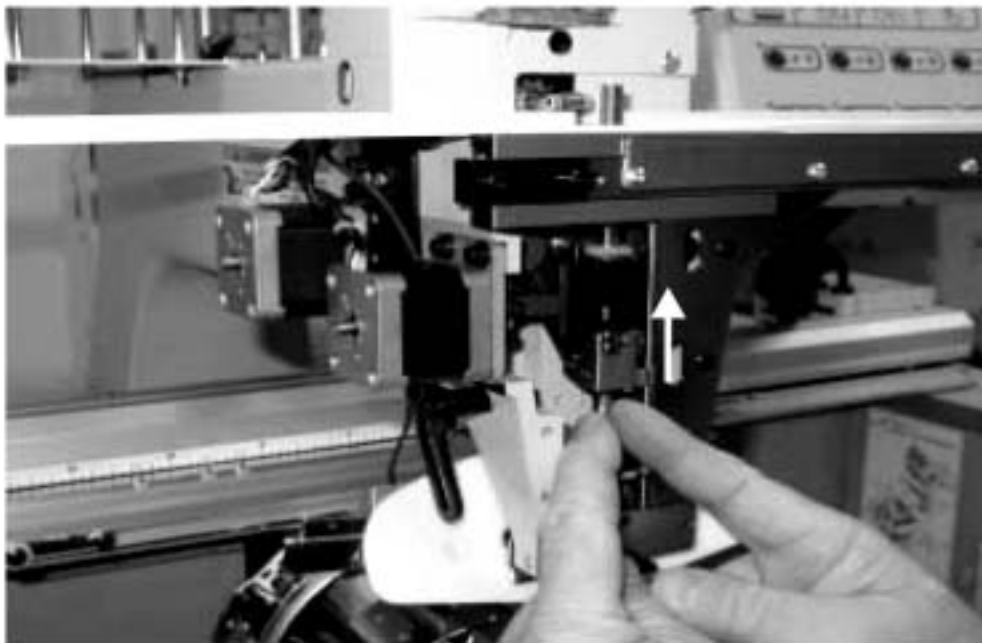
# TEHX-C Multihead

## Basic Repair And Adjustments

### Replacing the Reciprocator



- 7, WITH A 2.5 MM. HEX WRENCH, LOOSEN THE SET SCREW FOUR ROTATIONS.

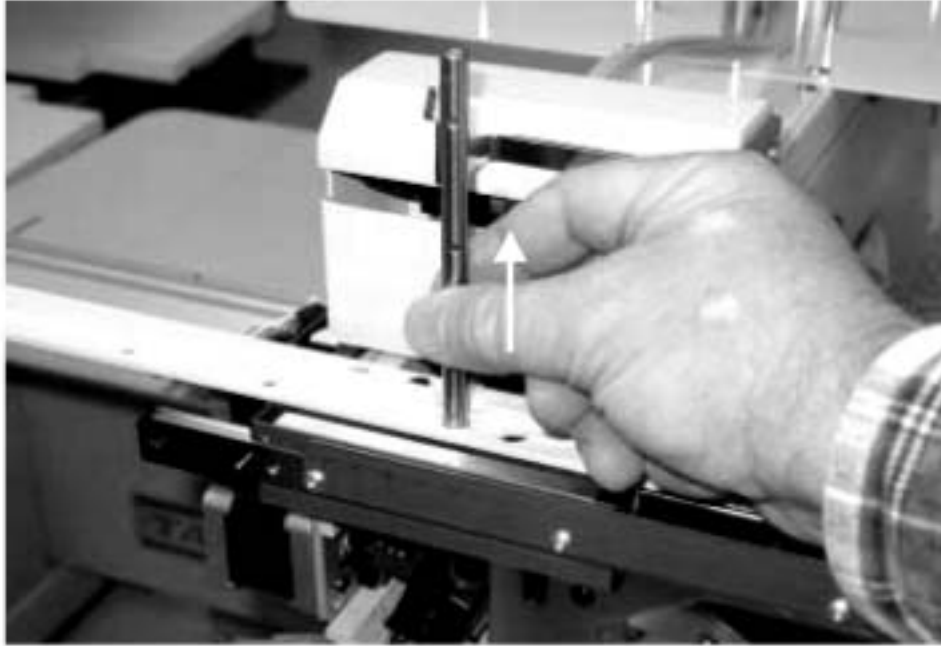


- 8, YOU SHOULD, AT THIS POINT, BE ABLE TO PUSH THE NEEDLE BAR DRIVE SHAFT UP, TO WHERE.....

# TEHX-C Multihead

## Basic Repair And Adjustments

### Replacing the Reciprocator



YOU CAN GRAB IT FROM THE TOP, AND REMOVE IT FROM THE MACHINE.

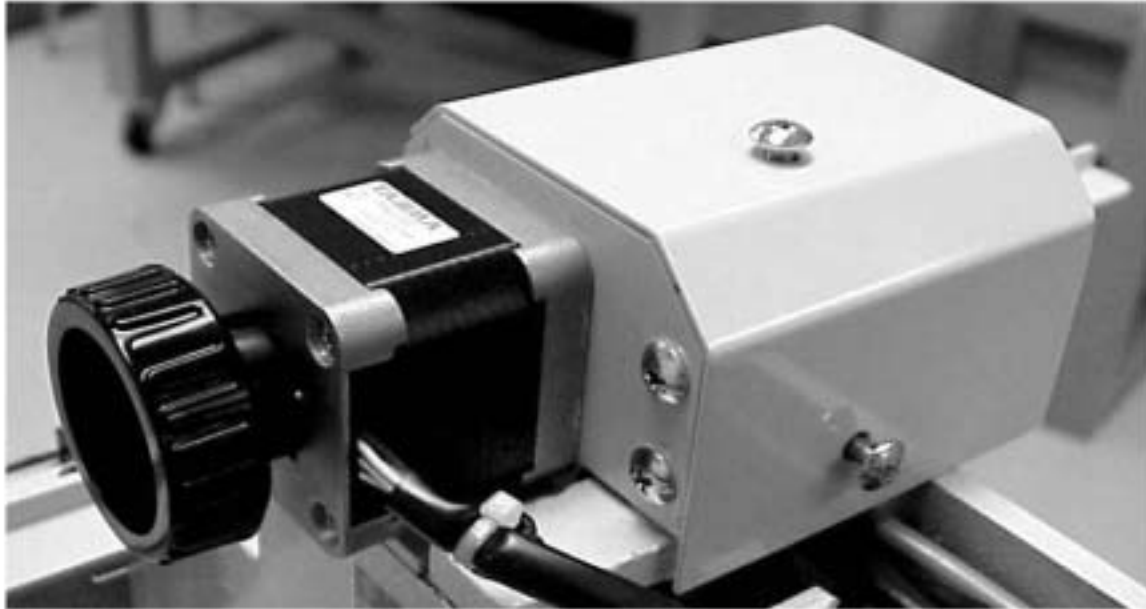


9, THE NEEDLE BAR RECIPROCATOR SET, MAY NOW BE REMOVED.....

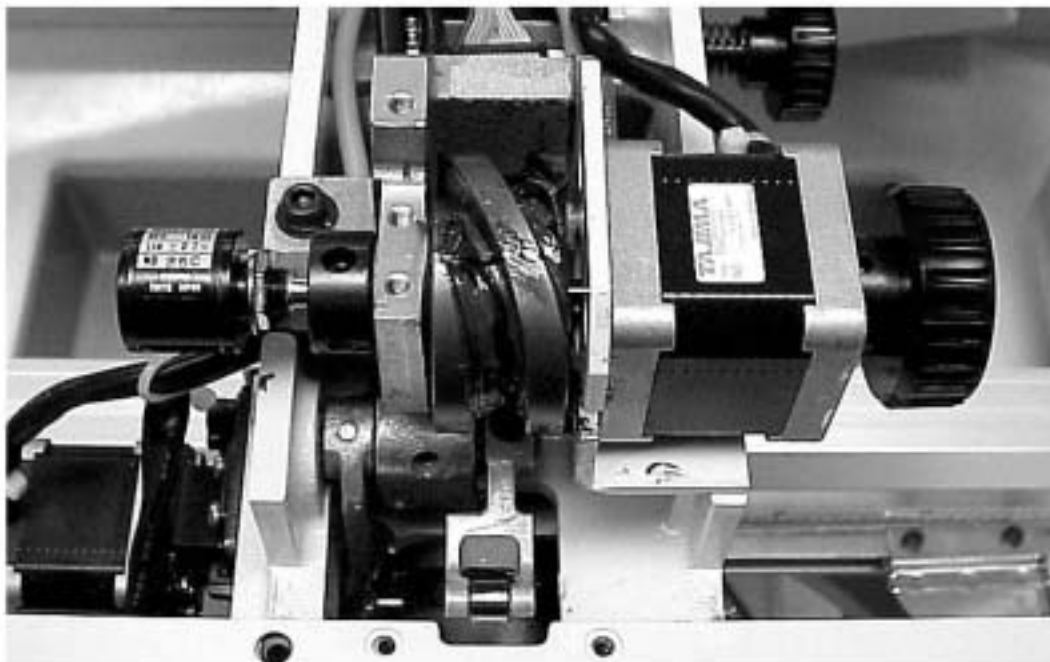
# TEHX-C Multihead

## Basic Repair And Adjustments

### Replacing the Reciprocator



NEXT REMOVE THE COLOR CHANGE CAM COVER  
BY LOOSENING THE TWO SCREWS ABOVE.



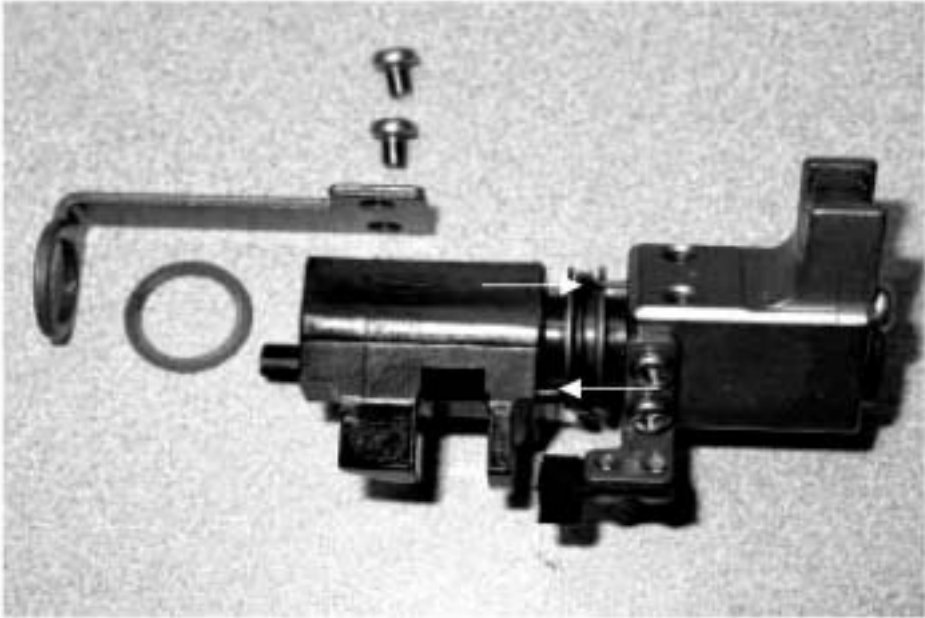
# TEHX-C Multihead

## Basic Repair And Adjustments

### Replacing the Reciprocator



10, WHERE IT CAN BE DISASSEMBLED.....

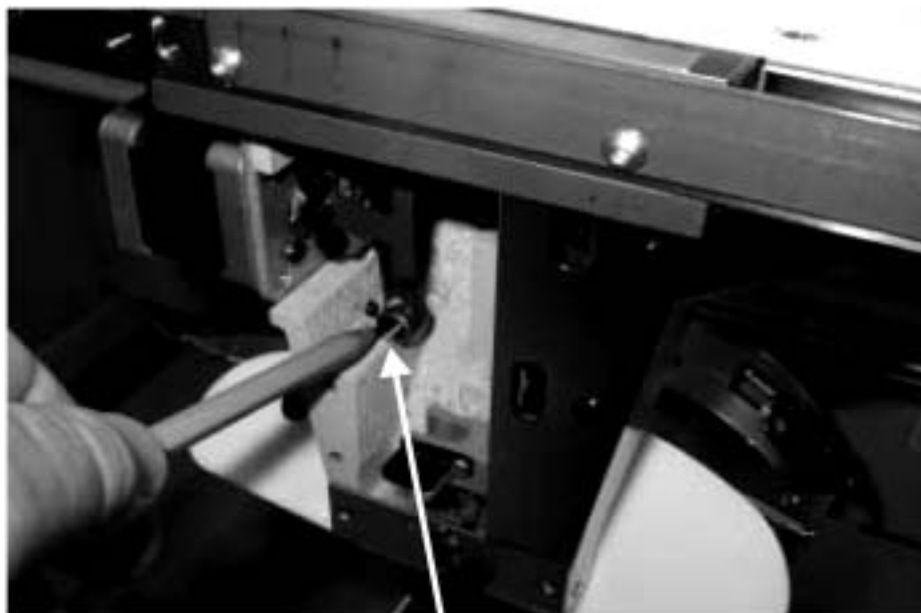


AND THE RECIPROCATOR REPLACED, PAYING ATTENTION TO PLACING THE SPRINGS IN THE HOLES IN THE RECIPROCATOR AND THE SLIDE BLOCK.

# TEHX-C Multihead

## Basic Repair And Adjustments

### Replacing the Reciprocator



OIL

11, NOW WOULD BE A GOOD TIME TO PLACE A FEW DROPS OF OIL ON BOTH ENDS OF THE CONNECTING ROD, AND A SMALL AMOUNT OF GREASE ON THE JUMP LEVER.



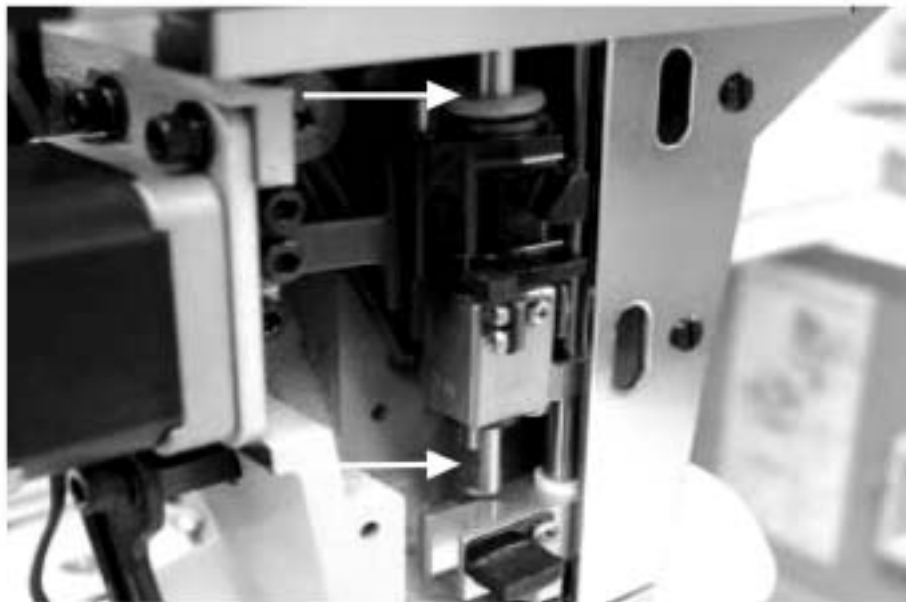
# TEHX-C Multihead

## Basic Repair And Adjustments

### Replacing the Reciprocator



12, REPLACE THE RECIPROCATOR SET INTO THE CONNECTING ROD.

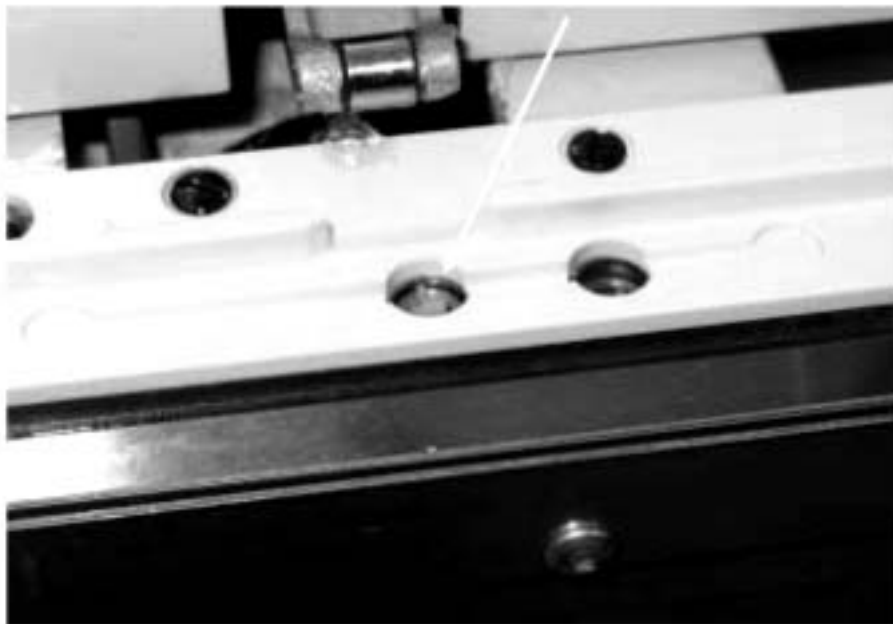


13, LOWER THE NEEDLE BAR DRIVE SHAFT THROUGH THE RECIPROCATOR, MAKING SURE THE FELT SPACER IS ABOVE THE RECIPROCATOR, AND THE FLAT SURFACE ON THE SHAFT IS ON THE BOTTOM, AND FACING TO THE LEFT!

# TEHX-C Multihead

## Basic Repair And Adjustments

### Replacing the Reciprocator



14, THE TOP OF THE NEEDLE BAR DRIVE SHAFT SOULD BE BELOW THE IRON SURFACE OF THE ARM.

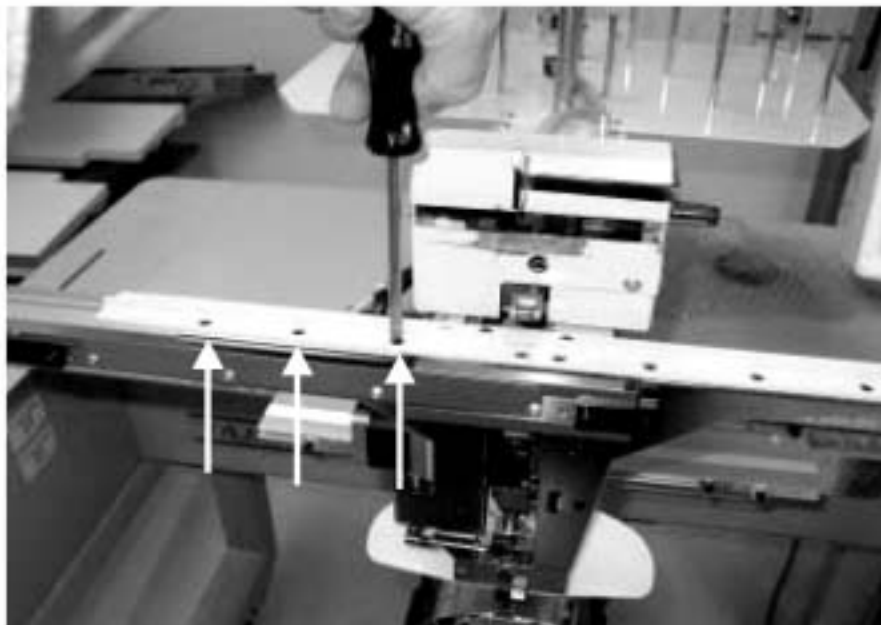


15, TIGHTEN THE 2.5 MM. SET SCREW.

# TEHX-C Multihead

## Basic Repair And Adjustments

### Replacing the Reciprocator



16. REINSTALL THE LEFT ARM COVER, MAKING SURE ALL THE SCREWS ARE TIGHT.



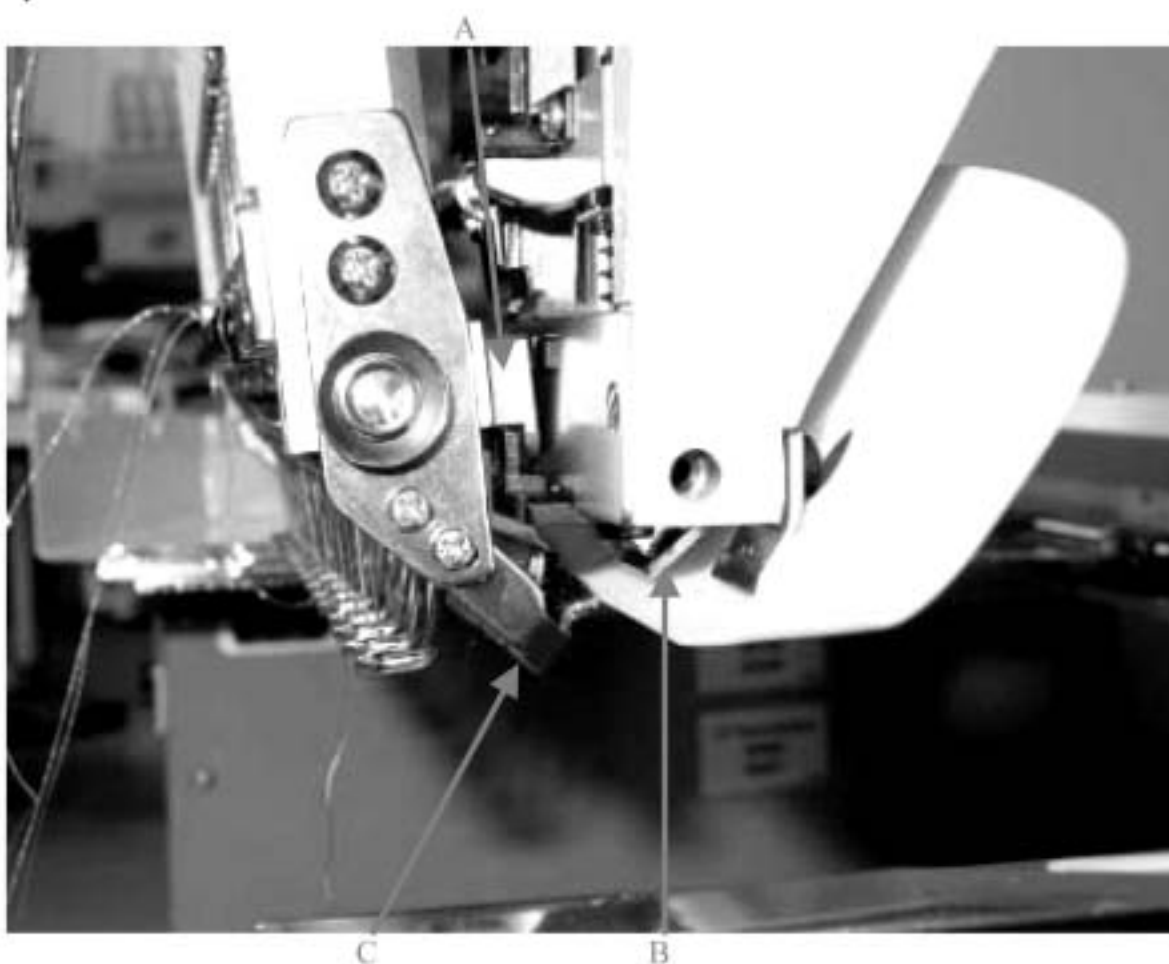
**CAUTION!** EXERCISE CARE WHEN MAKING THE TWO FLAT HEAD SCREWS ON THE FRONT OF THE ARM COVER TIGHT! THE SCREW HEADS ARE FRAGILE, AND MAY BREAK, IF THE PRESSURE APPLIED IS EXCESSIVE.

# TEHX-C Multihead

## Basic Repair And Adjustments

### Replacing the Reciprocator

17. AT THIS TIME YOU MAY WANT TO EXECUTE A FEW MANUAL THREAD TRIMS. THIS WILL CYCLE THE RECIPROCATOR, ALLOWING YOU TO OBSERVE THE MOTION OF THE INTERNAL PARTS. THE MACHINE WILL STOP AT THE 100-DEGREE MARK, AT WHICH POINT YOU CAN INSTALL THE NEEDLE BAR CASE.

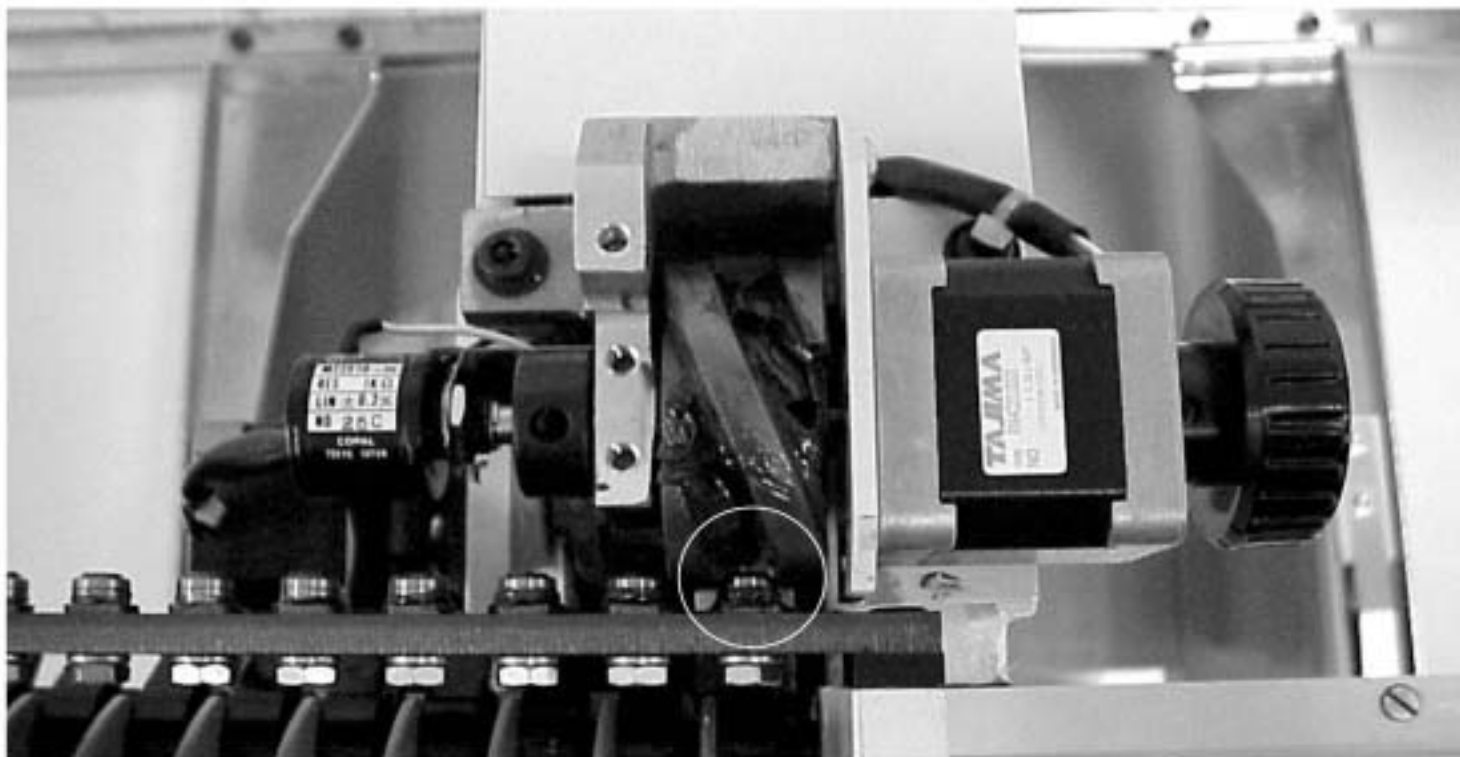


BEGIN BY ALIGNING NEEDLE NUMBER ONE WITH THE HOLE IN THE NEEDLE PLATE. ENGAGE THE LOWER CASE RAIL ( A ) BETWEEN THE POSITIONING PLATE AND THE LOWER ARM. MAKE SURE THE UPPER THREAD HOOK MOVES FREELY THROUGH THE HOOK GUIDE ( B ), AND BETWEEN THE VELCRO STRIPS ( C ). THEN SWING THE NEEDLE BAR CASE UP AND TOWARD THE REAR OF THE MACHINE

# TEHX-C Multihead

## Basic Repair And Adjustments

### Replacing the Reciprocator



YOU'RE READY TO INSTALL THE NEEDLE BAR CASE. THERE ARE MANY CONDITIONS THAT ARE REQUIRED TO TAKE PLACE ALL TOGETHER. VIEW THE NEXT FEW PAGES BEFORE BEGINING. \*BE SHURE THE DISPLAY SHOWS THAT THE HEAD IS IN THE #1 NEEDLE POSITION\* THE COLOR CHANGE ROLLER BASE BEARING #1 SHOULD FALL INTO THE CAM AS SHOWN ABOVE.

# TEHX-C Multihead

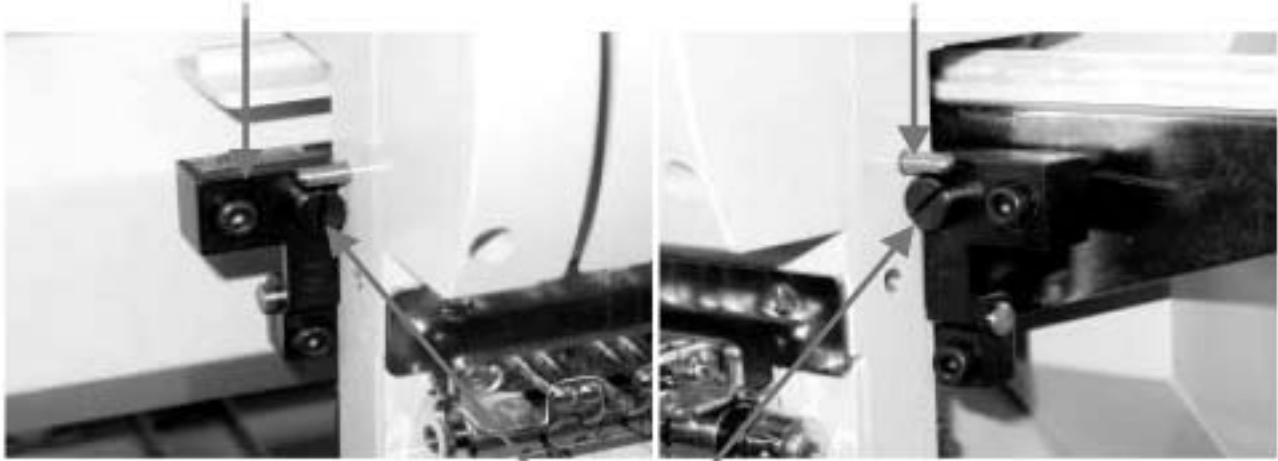
## Basic Repair And Adjustments

### Replacing the Reciprocator

19. AT THIS POINT, THE NEEDLE BAR CASE SHOULD NESTLE IN BETWEEN THE LEFT AND RIGHT LINEAR STOPPERS.

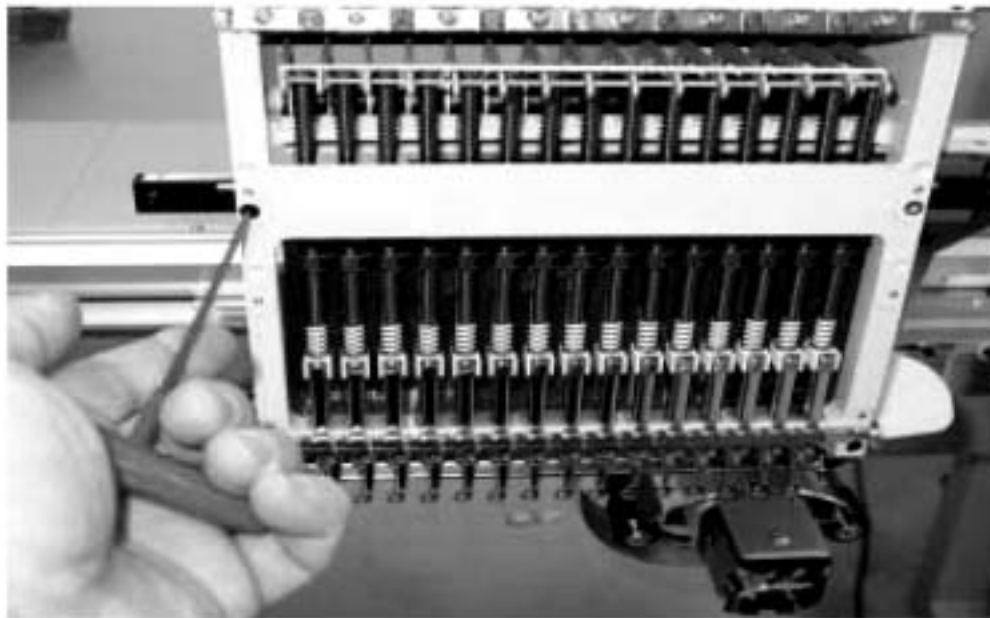
LINEAR STOPPER

PARALLEL PIN



PIN NUMBER 714

THE PARALLEL PIN ON EACH SIDE WILL REST ON PIN NUMBER 714.



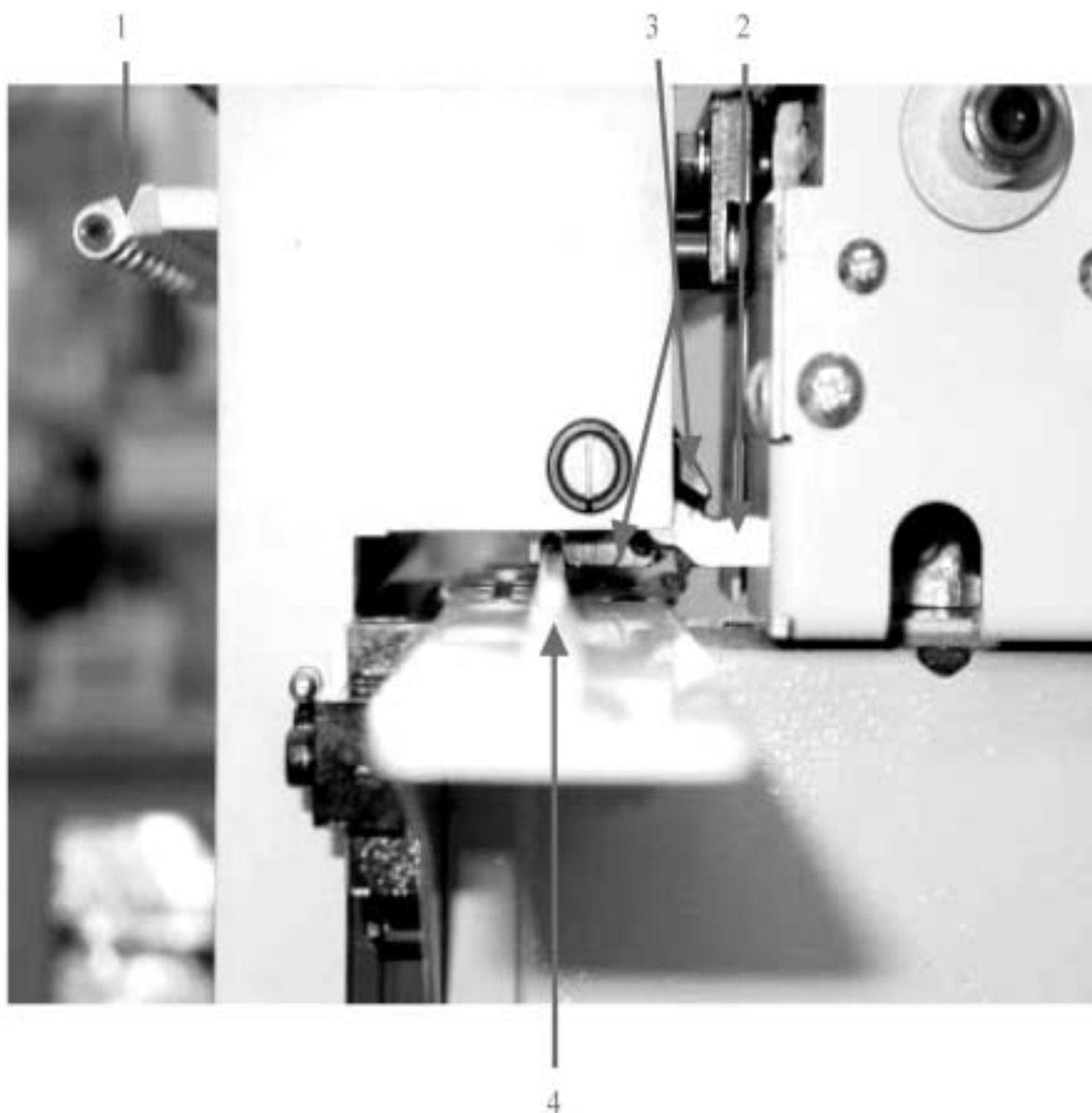
20. SECURE THE NEEDLE BAR CASE TO THE LINEAR RAIL WITH THE TWO 3MM. HEX SCREWS, REMOVE THE RUBBER BAND, AND REPLACE THE FRONT COVER.

# TEHX-C Multihead

## Basic Repair And Adjustments

### Replacing the Reciprocator

NOTE THE POSITION OF THE TAKE UP LEVERS ( 1 ), THE TAKE UP LEVER DRIVE ( 2 ) IN THE LARGE GROOVE OF THE TAKE UP LEVER BOSS ( 3 ), AND THE TAKE UP LEVER GUIDE RAIL ( 4 ) IN THE SMALL GROOVES IN THE TAKE UP LEVER BOSSES ( 3 )



# TEHX-C Multihead

## Basic Repair And Adjustments

### Replacing the Reciprocator

18, AS IF YOU DIDN'T HAVE ENOUGH TO WORRY ABOUT, WHILE ALL OF THE ABOVE IS GOING ON, YOU MUST ALSO BE AWARE OF THE SENSOR ARM ( D ) WHICH IS MOUNTED ON THE SIDE OF THE COLOR CHANGE MOTOR COVER. IT ENGAGES THE THREAD BREAKAGE SENSOR BASE ( E ), WHICH SLIDES LEFT AND RIGHT IN THE THREAD BREAKAGE SENSOR RAIL ( F ).



F

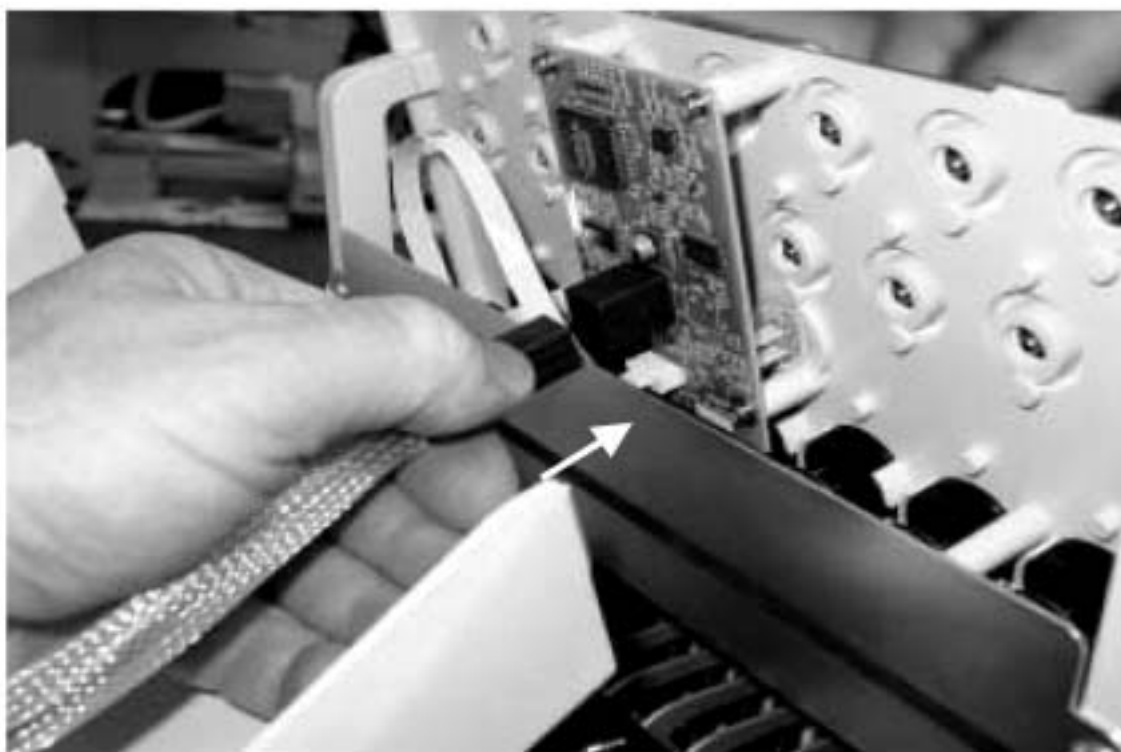
D

# TEHX-C Multihead

## Basic Repair And Adjustments

### Replacing the Reciprocator

21, RECONNECT THE CABLE TO THE CIRCUIT BOARD ON THE REAR OF THE TENSION BASE, AND REINSTALL THE TENSION BASE COVER.



22, TRY A FEW MANUAL TRIMS AND MANUAL COLOR CHANGES. GENERALLY IF THE MACHINE WILL SUCCESSFULLY PERFORM THESE MANEUVERS, YOU MAY RETURN THE MACHINE TO SERVICE.

GOOD LUCK!

## *Embroidery Glossary*

### **A**

**Aetze** – 1) The breaking down or dissolving of a base fabric on which a lace pattern has been stitched, leaving only the stitched threads; 2) Lace processing; may be “wet aetze,” involving a caustic soda bath or “dry aetze”, involving heat.

**Applique** – 1) Decoration or trimming cut from one piece of fabric and stitched to another to add dimension and texture; 2) In schiffli houses, an embroidered motif, hand cut or aetzed away from base fabric.

**Arm** – Portion on each station that the needle bar case is mounted.

**Arm machine** – Unlike the bridge machine an arm machine has two separate shafts for *each* head thus limiting the amount of embroidery space in the “Y” axis. This allows for easier replacement of parts.

**ATH** - Automatic Trimming and Holding

**ATH solenoid** – The solenoid that actuates the thread trimming shaft.

**Auto jump** – When the stitch is larger than the selected setting the machine will split the stitch into two frame movements.

**Automatic trim** – Automatically cutting top and bobbin thread controlled by machine data, usually used after a jump or a color change. This function eliminates the need for manual trimming.

### **B**

**Backing** - Woven and non-woven material used underneath the item or fabric being embroidered to provide support and stability. Can be hooped with the item, or placed between the machine throat plate and the hooped garment. Available in various weights and in two basic types: cut-away and tear-away.

**Beam sensor**- A laser beam that stretches from one end of the machine to the other in line with the presser feet that when broken stops the machine.

**Bean Stitch** – Three stitches placed back and forth between two points. Often used for outlining because it eliminates the need for repeatedly digitizing a single-ply running stitch outline.

**Bevel gear**- An angled gear that inter-links with another. Some are plastic.

**Birdnest** - Collection of thread between goods and needle plate, resembling a bird’s nest. Formation of a bird’s nest prevents free movement of goods, and may be caused by: inadequate tensioning of the top thread in the needle plate hole; top thread not through take-up lever; top thread not following thread path correctly; or flagging of goods.

**Blatt stitch** – Schiffli term meaning to feed more yarn, therefore producing a long zig-zag stitch with threads laying close together. Adapted for multi-head use: See satin stitch

**Bobbin case** - Spool or reel that holds the bobbin thread, which helps form stitches on the underside of the fabric.

**Bonnaz** – Chain stitch machine developed in the 1800’s. Named for its French inventor, Emile Bonnaz, and first manufactured by the Cornely Co. of France.

**Border sash frame** – Frame used for flat or yard goods.

**Boring** - Openwork incorporated into embroidered designs; a sharp-pointed instrument punctures, or bores, the fabric, and stitches are made around the opening to enclose the raw edges. E.g. Button holes.

**Boulogne** – A chain stitch used to apply a round cord to a garment. The stitch angle can be adjusted to create a slight twist in the cord.

**Bourdon** – A stitch similar to a zig-zag stitch except that the alternating stitches are parallel to each other to form a Z. Commonly used to stitch appliques to garments.

**Braiding** – A flat, round or oval braided material stitched on a garment to form a decorative design. Soutache is one braid commonly used.

**Bridge machine** - Type of embroidery machine with heads suspended from a bridge or beam, allowing the pantograph a wider range of movement from front to back (Y-axis) of the machine table. This type of machine features twin shafts, one turning the upper components, with the two shafts turned by a belt at the end of the machine. Used for embroidering yard goods.

**Buckram** – Coarse woven fabric, stiffened with glue, used to stabilize fabric for stitching. Commonly used in caps to hold the front panel erect.

## C

**Cap frame driver** – Frame used for embroidering caps.

**Cartoon** – Enlargement of original artwork which is used in tablet digitizing as a template for finished embroidery. This artwork usually contains notes relating to stitch type, density and color order. Usually six times larger than finished design size, based on art to stitching ration of schiffli machines.

**Ceeding stitch** – See Fill Stitch (used interchangeably).

**Chain Stitch** – 1) Stitch that looks like a chain link. A flat stitch created on a chenille machine usually used as outline to define moss (loop) areas; 2) also used to define chevron stitch used in standard embroidery.

**Check spring** – The spring located around the main tension knob for picking up slight slack in upper thread and also serves as the thread break detector.

**Chenille** - Type of embroidery in which a loop stitch is formed on the top side of the fabric. Uses heavy yarns of wool, cotton or acrylic, which are pulled up from reverse side of the fabric using a hook. Also known as loop piling. Created by a stitch machine that has been adjusted to form this stitch type.

**Claw stitch** – See feather stitch

**Coiling** – A decorative effect used three yarns of threads – a coiling thread wrapped around a core thread that is sewn to the garment with a third thread. Also known as three-thread embroidery.

**Color change cam** – A motor assists the cam to perform color changing of the needle bar case.

**Column stitch** – Formed by closely arranged zig-zag stitches. Often used to form borders. See Satin Stitch.

**Complex fill** – A digitizing capability that allows void areas to be designated as such when mapping perimeter points, allowing digitizing of fill areas without sectioning.

**Condensed format** – Method of digitizing in which a proportionate number of stitches are placed between defined points after a scale has been designated. With a machine that can read condensed format, the scale, density and stitch lengths in a design may be changed. Also referred to as Outline Format. See Expanded Format.

**Cording** - The attachment of any type of round, decorative cord. Raised cording is achieved by sewing the garment around the cord from the wrong side. The result is a self-fabric raised effect.

**Cross stitch** - Two stitches that cross at the center to form an X.

**Cylinder Arm/Bridge machine** – A machine with a structure that makes it possible to embroider curved or unusually shaped articles, such as caps, sleeves and pant legs on finished garments.

## D

**Denier** – Unit of weight used to measure the fineness of thread. Equal to weight in grams of 9000 meters of thread. Deniers are represented by the weight of the strands of thread, a slash, and the number of strands per thread, 120/2 Den.

**Digitize** - Modern term for punching reflecting the computerized method of converting artwork into a series of commands to be read by an embroidery machine's computer. See punching.

**Driver** – The circuit boards the control the three axis of the machine, X, Y, and Z. Frame movement and needle penetration.

## E

**Emblem** – Embroidered design with a finished edge, commonly an insignia of identification, usually worn on outer clothing. Historically an emblem carried a family crest, motto or verse, or suggested a moral lesson.

**Embroidery** – Decorative stitching on fabric. Generally involves non-lettering and/or monograms. Evolved from hand embroidery, to simple one-head manual sewing machines, schiffli machines with hundreds of needles, to high-speed multi-head machines. Evidence of embroidery exists during the reign of Egyptian pharaohs, in the writings of Homer, from the Crusaders to the 20<sup>th</sup> century.

**Embroidery frames** – The cape frame sash, border frame sash and the tubular frame sash are all embroidery frames. They also make specialty frames.

**Expanded format** – Individual stitches in a design have been specifically digitized. Generally, designs punched in this format can not be enlarged or reduced more than 10-20% without distortion because the stitch count remains constant. See Condensed Format.

## F

**Facing** – Material hooped or placed on top of items to be embroidered that have a definable nap or surface texture, such as corduroy and terry cloth. Compacts the whale or nap and holds the stitches above it. Includes a variety of substances such as plastic wrap, water soluble plastic “foil”, and open weave fabric which is chemically treated to disintegrate with the application of heat.

**Feather stitch** – A type of stitch in which short stitches project at right angles from a main line of stitching formed similarly to coiling. Also known as ray stitching.

**Fill Stitch** – Series of running stitches commonly used to cover large areas. Different fill patterns can be created by altering the angle, length, and repeat sequence of stitches.

**Finishing** – Processes performed after embroidery is complete. Includes trimming loose threads, cutting or tearing away excess backing, removing facing, cleaning any stains, pressing if needed, and packing for sale or shipping.

**Flagging** - Up and down motion of goods under action of needle, named after the motion of a waving flag. Often caused by improper framing of goods, flagging may result in poor registration, unsatisfactory stitch formation and “birdnesting”. See birdnest.

**Format** – By which company the designs were created. They’re a many formats.

**Fox test** – Method of testing thread tension and soundness of timing. Sew the word FOX in one inch satin stitch block letters with each needle bar, then examine the reverse side for skipped stitches and correctly balanced ratio of top thread to bobbin thread. The correct balance is generally considered to be a 1/3 ratio of bobbin to two-thirds top thread. These letters are used because they require the movement of the pantograph in all directions, increasing the likelihood that the beginnings of timing irregularities will be discovered.

**Frame** – Holding device for insertion of goods under an embroidery head for the application of embroidery. May employ a number of means for maintaining stability during the embroidery process, including clamps, vacuum devices, magnets or springs. See hoop.

## G

**Geflect** – A fill pattern in which all lines of stitches are parallel.

**Guide Stitch** – A series of stitches used to line up placement of subsequent embroidery in multiple hooping situations, or assist in placement of fabric pieces for applique.

## H

**H Test** – Method of testing thread tension. Stitch one (1), one-inch block letter ‘h’ for each needle bar. The reverse side of the completed embroidery should show a ratio of two-thirds top thread to one-third bobbin thread.

**Holding fixtures** – Devices used to hold or frame small or unusually shaped items, such as socks and gloves. Commonly used for delicate goods, rigid goods, gang loading applications, or to speed up the framing process to achieve production efficiency.

**Hook** – Holds the bobbin case in the machine, and plays a vital role in stitch formation. Making two complete rotations for each stitch, its point meets a loop of top thread at a precisely timed moment and distance (gap) to form a stitch.

**Hook timing** – Relationship between the rotary hook and the needle

**Hoop** - Device made from wood, plastic or steel with which fabric is gripped tightly between an inner ring and an outer ring. Attaches to the machine's pantograph. Machine hoops are designed to push the fabric to the bottom of the inner ring and hold it against the machine bed for embroidering.

**Hooping board** – Device that aids in hooping garments or items for embroidery, for hooping multilayered items and for uniformly hooping multiple items.

## I

**I Test** – A thread tension test in which one 1-inch capital letter 'I' is stitched out in each of the color threads available on the machine, after which all I's are compared for consistent and correct tension.

**Individual tension base** – The tension base moves together with the needle bar case during color changes to maintain thread stability.

**Interlock stitch** – Two or more rows of overlapping satin stitches. The point of overlapping can be straight or curved. Also known as thread blending or random stitch.

**Inverter** – Device that converts alternating current to direct current (AC to DC) for powering the main shaft motor.

## J

**Jacquard** – Joseph M., inventor of the Jacquard loom, which used a punch card to instruct the loom to weave a pattern in color. Later applied to punching 64mm jacquard for automated embroidery machines.

**Jump conversion** – When the amount of jump data is greater than the selected setting. The machine will convert that data into a frame stepping code thus forcing a trim.

**Jump solenoid** – The solenoid that actuates the reciprocator to release the needle bar.

**Jump stitch** - Movement of the pantograph without needle penetration, commonly called “keyboard lettering” may be created from circuit boards that allow variance of letter styles, size, height, density and other characteristics.

## L

**Led, LCD** – Light emitting diode, liquid crystal display.

**Lettering** – Embroidery using letters or words. Lettering commonly called “keyboard lettering” may be created from circuit boards which allow variance of letter styles, size, height, density and other characteristics.

**Lip hooping** – This technique is also known as recessed hooping. It is useful when hooping bulky or slick fabrics, such as insulated jackets. The inner ring is pushed past the edge of the outer ring, so that the outer ring sticks up higher, forming a lip. This helps prevent the inner ring from being pushed up during the embroidery process, and places the goods flatter to the machine table.

**Lock stitch** - 1) This stitch is formed by three or four consecutive stitches of at least a 10-point movement. It should be used at the end of all columns, fills in any element where a trim will follow, such as color changes or the end of the design. May be stitched in a triangle or a straight line; 2) Lock Stitch is also the name of the type of stitch formed by the hook and needle of home sewing machines, as well as computerized embroidery machines.

**Logo** – Short for logotype. The name, symbol or trademark of a company or organization.

**Loop piling** – See chenille

**Lower dead point** – The position of the needle bar when it is the lowest.

## M

**Manual stitch** – Stitch used in the automatic punching process to manually plot stitches one by one.

**Marking** – Marking of goods to serve as an aid in positioning the frame and referencing the needle start point.

**Mode** – The fifth row of the “DC” model for changing various settings to the machine.

**Modular** – Machine system where many separate stitching heads or configurations of heads are controlled by a central computer.

**Monogram** – Embroidered design composed of one or more letters, usually the initials in a name.

**Moss stitch** – See Chain Stitch.

**Movable knife** – The blade that moves in below the fixed blade to perform trimming of both upper and lower thread.

## N

**Needle** – Small, slender piece of steel with a hole for thread and a point for stitching fabric. Machine embroidery needles come in sharp points for piercing heavy, tightly woven fabric; ballpoints, which glide between the fibers of knits; and a variety of specialty points such as wedge points, used for leather. (See diagram on page 13 for parts of the needle)

**Needle bar** - Bar which holds the needle, and regulates the distance to which the needle is driven into the bobbin assembly.

**Needle bar case** – The unit that houses all the needle bars.

**Needle plate** – The plate that the needles penetrate below the garment above the rotary hook and bobbin.

**Needle up** – Punching term, similar to jump, whereby pantograph movement does not entail needle penetration.

**Nippers** - See thread clippers.

## O

**Offset** – The frame moves aside so applique placement, frame changing, etc. can be done easily. The frame can easily be returned to the original position after such operations are completed. Even after the frame has been moved manually during embroidery, it can be easily returned to the previous stitch point.

**Omni-stitch** – A trademarked name for a decorative application of ribbon, yarn and other materials via a lock stitch with a monofilament thread.

**Outline format** – Disk format for storing and retrieving designs which allows for global (automatically changes density, size, stitch width, stitch count in a single operation) changes within that design.

**Overlook stitch** – A stitch used to decorate or prevent raveling along a garment’s edge. Decorative effects include shell and crochet edging.

## P

**Pantograph** - Holding device for frames and frame sash which controls movement of embroidery fabric in the X-and-Y directions, to create your embroidery design while needle remains stationary.

**Paper tape** – Continuous roll of paper or mylar tape defining x and y coordinate information through the use of punched holes. Available in Binary, Fortran or other numeric code to control pantograph movement. Becoming less favored and replaced by computer disk.

**Parameters** – Settings within the machines controllers that change how the machine operates.

**Pearl setting** – The attachment of pearl-like stones by computerized and manual machine methods involving glue or heat. Pearls with metal prongs can also be applied manually.

**Picker** – A fork that is pulled in so the upper thread wraps around it to create tail length.

**Picker solenoid** – The solenoid that operates the picker.

**Pin Tucking** – Self-fabric raised effect achieved using a special raised throat plate and a double needle on a zig-zag machine. Also known as Air Tucking.

**Pitch** – Degree of slope or angle of stitches in relation to a base line.

**Points** – Unit of measurement, with 10 points equal to 1mm.

**Pos** – This is the “fixed or stop position” of the main shaft when machine is idle or stopped.

**Presser foot** – The presser ft. holds the garment down so the needle can penetrate with stability.

**Pretensioner** – The top two tensioners that provide assistance and control in achieving proper tension.

**Pull comp** – Compensation for the pulling of material when many stitches are located closely.

**Puckering** – Result of the fabric being gathered by the stitches. Many possible causes include loose hooping, lack of backing, incorrect tension, or dull needle.

**Punching** - Conversion of artwork into a series of commands to be read by embroidery machine’s computer. Derived from an early method of machine embroidery where paper tapes or jacquards punched with holes representing stitches, pantograph movements, and other commands were read by a part of the machine called an automat. While still capable of producing paper tape, many computerized digitizing systems now store this information on disk formats.

**Push and pull compensation** – Digitizing technique which takes into account the distortion of the design that will occur because of the interaction of the thread with the goods. “Push and pull” will cause a circle digitized perfectly round to sew out with the sides pushed out, resulting in an egg shape. Employ this technique when elements require an outline to achieve registration. Generally, it is necessary to extend horizontal elements and reduce vertical elements.

## R

**Ray stitching** – See feather Stitch

**Reciprocator** – The device that engages the post of the needle bar which enables it to go up and down. It releases the needle bar when pushed to the right by the jump solenoid leaving the needle bar up, then retracts to the left by spring action.

**Registration** - Correct registration is achieved when all stitches and design elements line up correctly.

**Rhinestone setting** – The attachment of rhinestones and other “gem” stones. Computerized and manual machine applications involve glue or heat processes. Stones can also be applied manually using metal prongs.

**Rotary encoder** – The electronic sensor that signals the controller when the machine is in stop position.

**Rotary hook** – The shuttle that assists in creating a lockstitch where the bobbin case is inserted.

**Rotary switch** – The sensor that signals the controller when the needle bar case has reached the selected needle during color changing.

**Running stitch** – Consists of one stitch between two points. Used for outlining and fine detail. Also known as walk stitch.

## S

**Satin stitch** - Formed by closely arranged zigzag stitches. Can be laid down at an angle with varying stitch length. Adapted from the blatt stitch used in schiffi embroidery.

**Scaling** – Ability to enlarge or reduce a design. In expanded format, most scale is limited to 10 to 20 percent because of the fact that the stitch count will remain constant. In condensed format, scale changes may be more dramatic as stitch count and density may be varied.

**Scallop stitch** – Decorative edge stitching that forms a series of curves. The fabric is usually cut away from the stitching to form a finished edge.

**Schiffli** – Type of machine used to embroider yard goods, such as intricate laces, emblems and appliques. Developed in Switzerland in the 1800's, schiffli means "small boat", which refers to the boat-shaped shuttle used with the machine. Some schiffli machines weigh 10 tons and have hundreds of needles. The goods are spanned vertically, as a wall, rather than on a flat table as in multi-heads.

**Scissors** – Cutting utensils having identically sized finger holes, or bows, and an overall length usually of not more than six inches. Useful for detailed cutting and for trimming thread and backing.

**Sequin attachment** – The computerized or manual machine application of sequins by stitching, gluing or heat.

**Shears** - Cutting utensil having a curved handle with one and an overall length of usually more than six inches. Useful for cutting fabrics on a table or other flat surfaces.

**Short stitch** – A digitizing technique wherein you place short stitches within the outside perimeter of a curve or 45 degree angle to balance outside and inside density in a satin stitch, to avoid unnecessary bulky build-up of stitches.

**Solenoid** – A coil which magnetizes a shaft or arm to push or pull.

**SPM** - Stitches per minute. System used to measure the running speed of an embroidery machine.

**Specialty fill** – Borne or recent technology, a fill stitch capability that produces a fill with a "relief" or motif design within.

**Stationary knife** – The fixed blade located above the movable knife, which is the second blade, needed for trimming both upper and lower thread.

**Steil Stitch** – See Column stitch.

**Stitch Editing** – Digitizing feature that allows one or more stitches in a pattern to be deleted, lengthened or altered.

**Stitch to Outline conversion** – Editing feature which allows you to convert a stitch file to an outline format allowing you to perform global changes.

**Stitch processing** – Calculation of stitch formation by means of specialized software, allowing scaling of expanded format designs with density compensation.

**Stock designs** - Digitized generic embroidery designs that are readily available at a cost below that of customer digitized designs.

**Stop factor** – Error codes that reference a chart designed to make the description easier to understand and what actions to take.

**Swiss Embroidery** – 1) Satin stitch embroidery; 2) Also recalls the origin of automated embroidery in Switzerland where the schiffli embroidery machine was developed in the 1800s by Isaak Groebli. Embroidery remains a government-supported industry in Switzerland today.

## T

**Tacking Iron** – Device used to fuse heat-sealable items, such as appliques, emblems and lettering, to fabric.

**Tackle twill** – Letters or numbers, cut from polyester or rayon twill fabric, commonly used for athletic teams and organizations. They have an adhesive backing to tack them in place while the edges are sewn with zig-zag stitches to attach them to a garment.

**Take up lever** – The levers above every needle that pull thread to feed from the cones and to tighten the stitch.

**Taping** – The attachment of woven ribbons or other flat materials. Stitching is usually along one edge of the ribbon so that it appears to stand on end.

**Tension** – Pressure of thread when forming stitches. Top thread as well as bobbin tension needs to be set. Proper thread tension is achieved when about one-third of the thread showing on the underside of the fabric on a column stitch is bobbin thread.

**Thread** – Fine cord of natural or synthetic material made from two or more filaments twisted together and used in stitching. Machine embroidery threads come in rayon, which has a light sheen; cotton, which has a duller sheen than

rayon, but is available in a very fine deniers; polyester, which is strong and colorfast; and metallic, which has a high luster and are composed of a synthetic core wrapped in metal foil.

**Thread clippers** – Small cutting utensils useful for quick thread cutting, but can be suitable for detailed trimming.

**Thread trimming cam** – The cam that forces the thread-trimming shaft to open and close the movable knives.

**Timing** - Relationship between the embroidery machine's hook and needle. To form a stitch, the hook and the loop formed by the top thread must meet at a precise moment or else improper stitch formations, thread breakage, skipped stitches, or broken needles could result.

**Topping** – See Facing.

**Trimming** – Operation in the finishing process that involves trimming the reverse and face sides of the embroidery, including stitches and backing.

**Tubular frame** – The frame that is most widely used in today's market for sewing finished shirts, jackets and some flat goods.

**Tubular machine** – See Cylinder Arm/Bridge Machine.

## U

**Underlay stitch** – A stitch laid down before other design elements to help stabilize stretchy fabrics and tack down wales or naps on fabrics such as corduroy, so the design's details do not get lost. May also be used to create such effects as crowned, flat, raised areas in the embroidery, depending on how they are laid down.

**Under thread presser** – A small piece of tin that is located below the movable knife after the trim to hold the under thread (bobbin thread) in place for the next stitch to catch it.

**Uni-sash** – A combination embroidery frame where the cap frame and tubular frame can be mounted to the machine at the same time. They also use a universal needle plate.

**Upper dead point** – The highest point at which the needle bar rises.

**Upper thread hook** – The hook that grabs the upper thread and pulls it out of the way from being tacked down to the garment by the next color. It stores the thread between the velcro or velour.

**Upper thread hook motor/solenoid** – The solenoid or motor that actuates the upper thread hook

## V

**Variable sizing** – See **Scaling**.

**Verify** – Sample sew-out of a new embroidery design to make sure the pattern is correct.

## W

**Walk stitch** – See running stitch.

## Z

**Zig Zag Stitch** – A stitch created by moving the needle left to right or in the X direction while the pantograph moves the fabric and creates the design.