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## NEEDLE DEPTH ADJUSTMENT

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### PURPOSE:

The needle must rise 2-3 mm from bottom dead center thus forming a loop behind the needle. As the hook point passes behind the needle it captures the formed loop. If the Needle Bar is too high or too low the sewing quality is effected. The needle can not capture the loop therefore a stitch will not be formed or not form properly.

### CAUSES:

- < Red caps worn or broken.
- < Broken needle.
- < "Slam" into hoop.
- < Changed needle brand.

### SYMPTOMS:

- < Skip Stitches
- < Looping
- < Fraying
- < Breaking Thread
- < Breaking Needles

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### TOOLS NEEDED

- 3 mm Allen Wrench
  - Needle Screwdriver
  - Flathead Screwdriver
  - Offset Screwdriver
  - New Needle
  - Cleaning Brush
  - Flashlight
- 

### PROCEDURE:

1. **Power** down Embroidery Machine
2. **Disengage** Thread Keep Lever. See *Figure 1*.

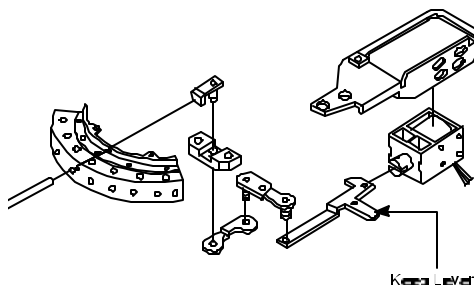


Figure 1

3. **Disengage** Needle Bar Driver.
4. Using a 3 mm Allen Wrench, **remove** 2 screws and C Sewing Head Cover.  
See Figure 2.

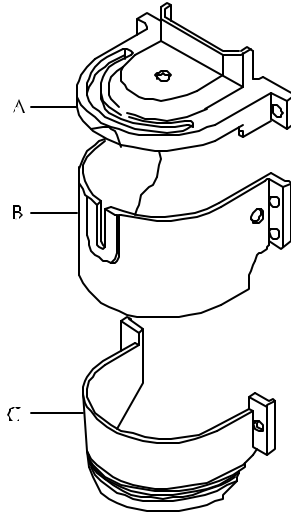


Figure 2

5. Using a Flathead Screwdriver, **remove** throat plate screws.
6. **Remove** throat plate.
7. **Remove** bobbin case from Hook Assembly.
8. Using **cleaning brush**, clean any thread debris or lint from hook area.
9. While Standing in front of training sewing head, **rotate** gangshaft until Take-up Levers are in up position, this is called **Color Change Position**. (On Embroidery Machine rotate degree wheel [numbers ascend] to 235 degrees).
10. **Manually** rotate Turret to **Needle #1**.
11. **Remove** thread from Needle #1.
12. Using Needle Screwdriver, **loosen** needle set screw.
13. **Remove** and **discard** old needle.

14. **Insert new needle** correctly. (Groove facing front and scarf is in back.)  
See Figure 3.

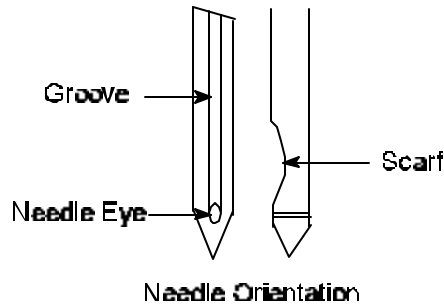


Figure 3

15. Using Needle Screwdriver, **tighten** needle set screw.
16. **Engage** Needle Bar Driver.
17. **Rotate** gangshaft so needle is at its lowest point (**Bottom Dead Center**). (Rotate degree wheel to **zero degrees** this is called **Bottom Dead Center**).
18. Before making any adjustments see if needle eyelet is positioned halfway through hook basket. See Figure 4.

*If needle eyelet looks out of position proceed to **Step 19**.*

*If **no** adjustments are necessary proceed to **Hook Timing**.*

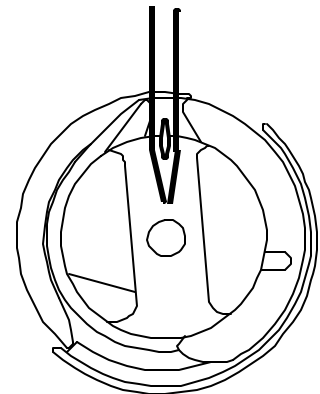


Figure 4



19. Using 3 mm Allen Wrench, **loosen** top and bottom hex socket bolts on Needle Bar Driver Fixing Base. See Figure 5.

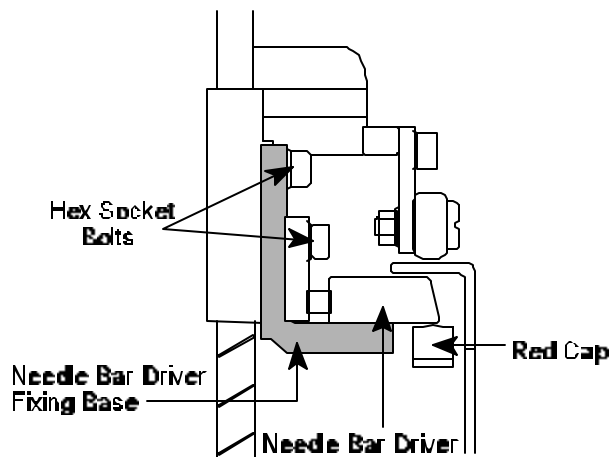


Figure 5

- < **Check** for damage to Needle Bar Driver, Needle Bar Driver Fixing Base and Red Cap.

**Replace** damaged parts.

20. **Adjust** by moving Needle Bar driver up or down so  $\frac{1}{2}$  of needle eyelet is viewed in hook basket.
21. Using 3 mm Allen Wrench, **tighten** hex socket bolts to set Needle Bar driver.
22. **Recheck** needle depth. (As bolts are tightened needle bar driver may lower needle eyelet.)
23. **Rotate** gangshaft to **Color Change Position**. (Rotate degree wheel to 235 degrees).
24. **Reinstall** throat plate.
25. Using Flathead Screwdriver, **tighten** throat plate screws.
26. **Reinstall** bobbin case.

26. Using 3 mm Allen Wrench, **replace** Sewing Head Cover.
27. Using enclosed disk, **sew** the “**HOX**” **test** to check for proper adjustment.

**Note:** If symptoms are still occurring proceed to **Hook Timing**.

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## HOOK TIMING

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Hook timing is probably the most misunderstood aspect of embroidery machine mechanics. It has nothing to do with the type of fabric, tension or synchronization of the heads on a multi-head machine.

### PURPOSE:

Hook timing is the proper position of the Hook Assembly in relation to the needle in order to form a stitch. The hook is directly attached to the drive shaft, eliminating the need to routinely re-time it.

### CAUSES:

- < Something gets caught in Hook Assembly.
- < Size of needle has drastically changed.
- < A build-up of thread behind hook pushes hook out of line.

### SYMPTOMS:

- < Machine fails to form or complete a stitch.
- < Excessive Needle Breaks.
- < Thread Frays
- < "Birdnesting"

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### TOOLS NEEDED

2 mm Allen Wrench  
Flathead Screwdriver  
Needle Screwdriver  
Offset Screwdriver  
New Needles  
Cleaning Brush  
Emery/Crocus Cloth  
Flashlight

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### PROCEDURE:

*Needle depth must be checked before timing the hook.*

#### A. PREPARATION

1. **Power down** Embroidery Machine.
2. **Disengage** Needle Bar Driver.

3. **Disengage** Thread Keep Lever. See Figure 1.

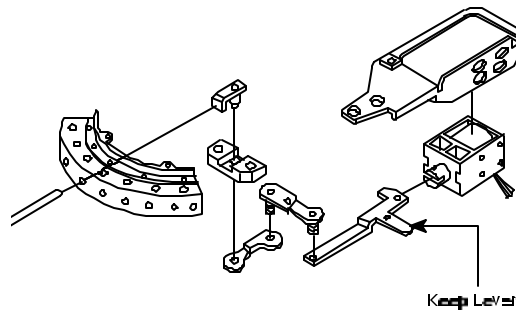


Figure 1

4. Using a Flathead Screwdriver, **remove** throat plate screws.
5. **Remove** throat plate.
6. **Remove** bobbin case from Hook Assembly.
7. Using **cleaning brush**, clean any thread debris or lint from hook area
8. **Rotate** gangshaft until Take-up Levers are in up position. (On Embroidery Machine rotate degree wheel [numbers ascend] to 235 degrees).
9. With finger, **check** entire Hook Assembly for burrs or nicks.

*If burrs or nicks are present on Hook Assembly continue to **Section B.***

*If Hook Assembly is **not** damaged continue to **Section C.***



## B. HOOK ASSEMBLY REPLACEMENT

- Using 2 mm Allen Wrench, **remove** Upper Knife hex bolt. (**MK 4** trimmers only apply).  
See Figure 2.

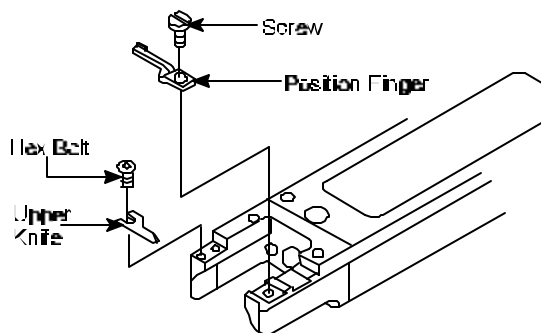
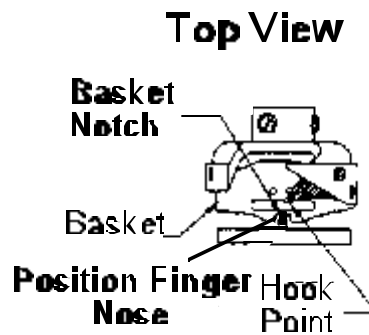


Figure 2

- Remove** Upper Knife. (**MK 4** trimmers only apply).
- Using a Flathead Screwdriver, **remove** Position Finger **screw**.
- Remove** Position Finger.
- Remove** Hook Driving Rod from Hook (Fork).
- Release** Hook (Fork). (This allows Hook Assembly to be removed easily).
- Using a Flathead Screwdriver, **loosen** three set screws on Hook Assembly.
- Remove** Hook Assembly.
- Gently rub burred or nicked area of Hook Assembly with emery or crocus cloth until smooth.

**Note:** If burrs or nicks can not be smoothed, **replace** with new Hook Assembly.

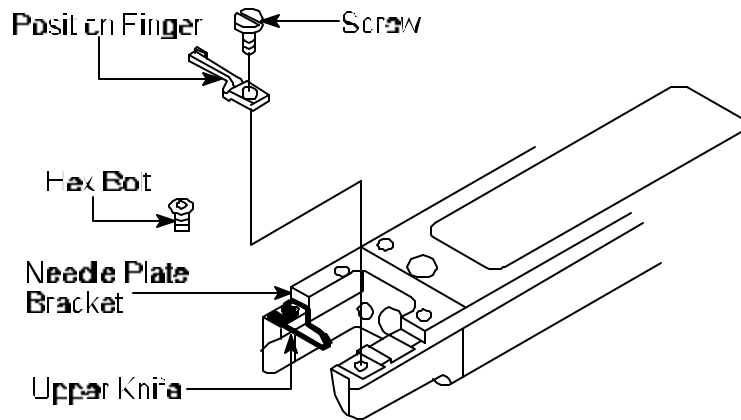
19. **Rotate** gangshaft to **Color Change Position**. (Rotate degree wheel to 235 degrees).
20. **Insert** repaired or new Hook Assembly on bottom shaft.
21. **Replace** Position Finger.
22. **Insert** Position Finger **screw**. (Do not tighten completely).
23. **Rotate** Hook Assembly until Basket Notch is aligned with Position Finger Nose.  
*See Figure 3.*



*Figure 3*

24. Using Flathead Screwdriver, **tighten** Position Finger screw.
25. **Replace** Upper Knife. (**MK 4** trimmers only apply).
26. Using 2 mm Allen Wrench, **insert** hex bolt (**MK 4** trimmers only apply). (Do not tighten completely).

27. **Upper Knife** tip rests on Position Finger and back rests flush against Needle Plate Bracket. (**MK 4** trimmers only apply) See *Figure 4*.



*Figure 4*

28. **Replace** Hook Driving Rod.
29. **Rotate** gangshaft to **Color Change Position**. (Rotate degree wheel to 235 degrees).
30. **Rotate** Hook Point to 9:00 position.
31. **Only tighten** set screw closest to Hook Point.

### C. HOOK POINT TIMING

32. **Disengage** Needle Bar Driver.
33. **Manually** rotate Turret to **Needle #1**.
34. **Remove** thread from Needle #1.
35. **Loosen** needle set screw.

36. **Remove** and **discard** old Needle.
37. **Insert new needle** correctly. (Groove facing front and scarf is in back).  
See Figure 5.

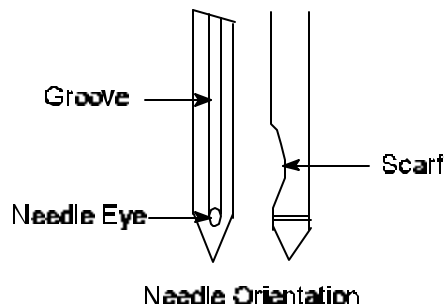


Figure 5

38. Using Needle Screwdriver, **tighten** needle set screw.
39. **Engage** Needle Bar Driver.
40. **Using** a needle screwdriver, **loosen** two set screws **furthest** from hook point leaving the set screw closest to hook point tight. (If Hook Assembly was removed as instructed in Section B, two set screws are loose already) See Figure 6.  
(**Degree Wheel:** First screw=115 degrees; Second screw=175 degrees)

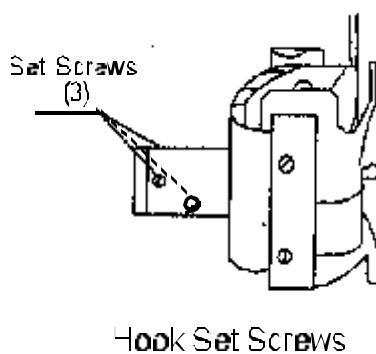


Figure 6

41. **Rotate** gangshaft so needle is at its lowest point (**Bottom Dead Center**).  
(Rotate degree wheel to **zero degrees**).
42. Continue turning gangshaft until **needle rises 2 to 3 mm**. (Rotate degree wheel to 24 degrees.)

Point of hook should be directly behind scarf of needle and above needle eyelet.  
See Figure 7.

If hook point **needs** adjustment proceed to **Step 39**.

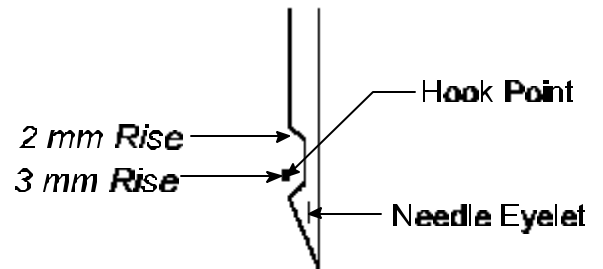


Figure 7

If hook point **does not** need adjustment proceed to **Section D Hook to Needle Gap**.

43. Using Flathead Screwdriver, **loosen** remaining set screw (closest to hook point).
44. Adjust so tip of hook point is behind and in **middle of needle**. See Figure 8.

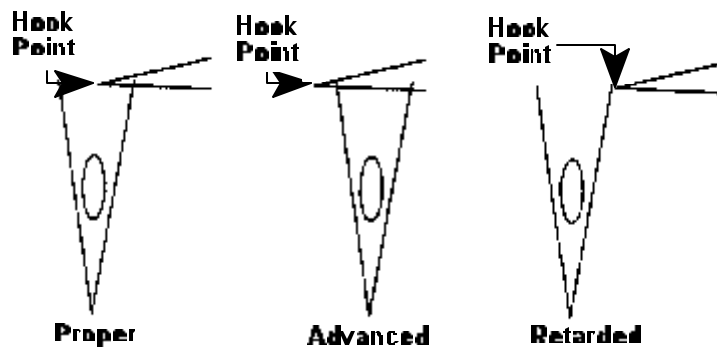


Figure 8

45. Using Flathead Screwdriver, **tighten** set screw closest to hook point.

#### D. HOOK TO NEEDLE GAP

*The circumference on each machine may vary, by checking the **first** and **last** needle will determine whether the embroidery machine should be re-timed (IE: **Needle #1** may be have the correct gap from hook point, **Needle #9** may be touching the hook point so move the hook .5 mm away.)*

46. **Engage** Needle Bar Driver.
47. **Rotate** gangshaft to **Color Change Position**. (Rotate degree wheel to 235 degrees)
48. Using Flathead Screwdriver, **loosen** needle set screw.
49. **Rotate** needle so groove is facing back and scarf is in front.
50. Using Needle Screwdriver, **tighten** needle set screw.
51. Rotate gangshaft until **Hook Point** is behind needle. (Rotate degree wheel to 24 degrees.)
52. Using Flathead Screwdriver, **loosen** set screw closest to Hook Point.
53. **Adjust** Hook Assembly so Hook Point is directly behind needle and as close to needle as possible. (Should not cause needle to bend).
54. Using Flathead Screwdriver, **tighten** set screw closest to Hook Point.
55. **Rotate** gangshaft to **Color Change Position**. (Rotate degree wheel to 235 degrees).
56. Using Needle Screwdriver, **loosen** needle set screw.
57. **Rotate** needle to correct position. (Groove facing front and scarf is in back).
58. **Disengage** Needle Bar Driver.
59. **Manually** rotate Turret to **Needle #9**.
60. **Remove** thread from Needle #9.



61. Using Needle Screwdriver, **loosen** needle set screw.
62. **Insert** new needle, **groove** is facing **back** and **scarf** is in **front**.
63. Using Needle Screwdriver, **tighten** needle set screw.
64. **Engage** Needle Bar Driver.
65. Rotate gangshaft until **Hook Point** is behind needle. (Rotate degree wheel to 24 degrees).
66. Hook Point should be directly behind needle and as close to needle as possible. (Should not cause needle to bend).  
  
*If Hook Point causes needle to bend on **Needle #9** then adjust Hook Point 0.5 mm away from needle.*
67. Using Flathead Screwdriver, **tighten** two remaining set screws (furthest from hook point).
68. **Rotate** gangshaft to **Color Change Position**. (Rotate degree wheel to 235 degrees).
69. Using Needle Screwdriver, **loosen** needle set screw.
70. **Rotate** needle to correct position. (Groove facing front and scarf is in back).
71. Using Needle Screwdriver, **tighten** needle set screw.
72. Proceed to **Position Finger Adjustment**.



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## POSITION FINGER ADJUSTMENT

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### DEFINITION:

The Position Finger secures the hook basket in place and guides the bobbin thread to fabric.

### CAUSES:

- < Replaced Hook Assembly.
- < Position Finger set screw not secure.

<b>TOOLS NEEDED</b> Small Flathead Screwdriver
---

### SYMPTOMS:

- < Bobbin thread underside of garment not centered.
- < No bobbin thread-"looping".

### PROCEDURE:

1. **Engage** Needle Bar Driver.
2. **Rotate** gangshaft until needle reaches it's lowest point, **Bottom Dead center**. (On Embroidery Machine rotate degree wheel [numbers ascend] to **zero degrees** this is called **Bottom Dead Center**.)
3. Using Flathead Screwdriver, **loosen** Position Finger screw.
4. **Move** Position Finger **left or right**, centering Position Finger Nose with needle.  
*See Figure 1.*



Figure 1

<b>NOTE:</b> Bobbin thread may not be centered if adjustment is incorrect.
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5. Move Position Finger Nose **forward or back** from hook basket allowing enough clearance for thread to pass between easily. See Figure 2.

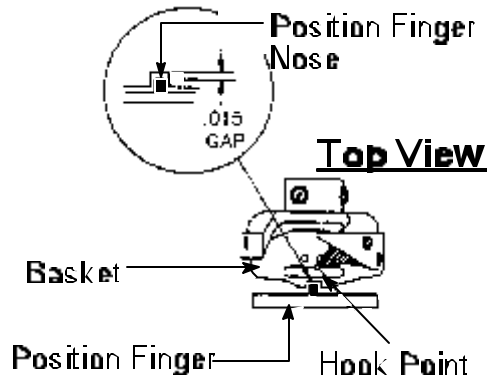


Figure 2

**NOTE:** If Position Finger Nose is too close to hook basket, birdnesting or thread breaks may occur

6. While holding Position Finger in place, **tighten** Position Finger **screw**.
7. **Rotate** gangshaft to **Color Change Position**. (Rotate degree wheel to 235 degrees).
8. **Reinstall** throat plate.
9. Using Flathead Screwdriver, **tighten** throat plate screws.
10. **Reinstall** bobbin case in Hook Assembly.
11. Using enclosed disk, **sew** the "**HOX**" test to check for proper adjustment.

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## NEEDLE BAR REPLACEMENT

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### DEFINITION:

The Needle Bar holds the needle and moves up and down.

### CAUSES:

- < Bent
- < Burrs
- < Lack of Lubrication

### SYMPTOMS:

- < Little or no movement up or down.
- < Skip Stitches.
- < Breaking needles

### PROCEDURE:

#### A. NEEDLE BAR REPLACEMENT

1. **Power down** Embroidery Machine.
2. **Disengage** Needle Bar Driver.
3. **Pull** thread **Keep Lever** forward to disengage thread apron clamps.  
*See Figure 1.*

### TOOLS NEEDED

- 3 mm Allen Wrench
- 2.5 mm Allen Wrench
- 2 mm Allen Wrench
- Small Flathead Screwdriver
- Needle Screwdriver
- Offset Screwdriver
- New Needles
- New Needle Bar
- New Small Spring
- Flashlight

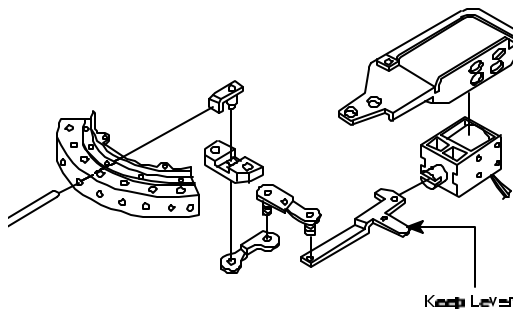
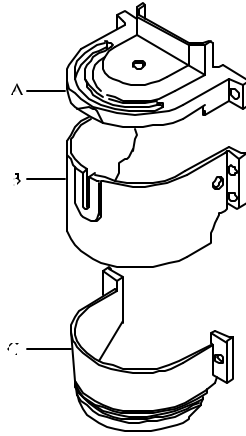


Figure 1

4. Using a 3 mm Allen Wrench **remove** 6 screws and B and C Sewing Head Covers. See Figure 2.



**Figure 2**

5. **Rotate** gangshaft to **Color Change Position**. (On Embroidery Machine rotate degree wheel [numbers ascend] to 235 degrees). This will allow for free movement of Turret Plate (Assembly).
6. **Rotate** Turret to Needle #9.

- Using a 3 mm Allen wrench, **loosen** timing screw allowing Take-up Lever and Turret Plate (Assembly) to move independently. See Figure 3.

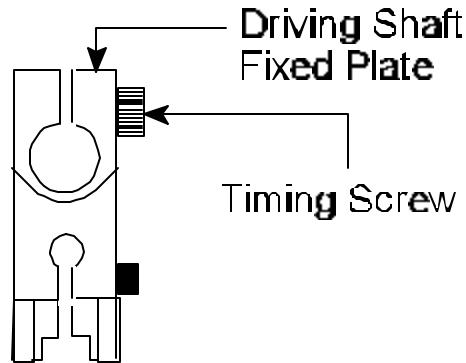


Figure 3

**NOTE:** If replacing #8 or #9 Needle Bar, Needle Bar stopper must be removed. Using a 2.5 mm Allen wrench to remove left and right hex bolts. See Figure 4.

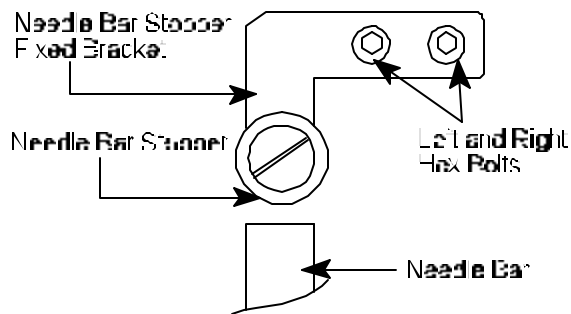
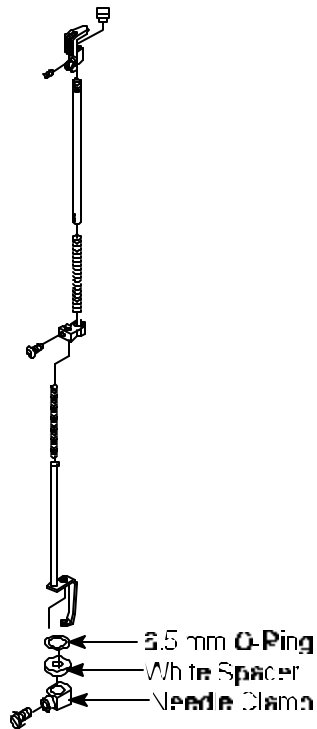


Figure 4

- Move** Take-Up Assembly opposite of Turret Plate (Assembly). (Allowing needle to be removed easily).

**NOTE:** If removing #9 Needle Bar rotate Turret to Needle #8 and manually rotate Turret Plate (Assembly) to far left.

9. Using a Needle Screwdriver, **loosen** needle set screw and **remove** needle.
10. **Squeeze** and **hold** Needle Bar and Presser Foot together and **remove** needle clamp, white spacer and 6.5 mm O-ring. See *Figure 5*.



*Figure 5*

11. Slowly **release** Needle Bar and Presser Foot.

12. **Move** Presser Foot down to its lowest position and **remove** 7 mm O-ring.  
See Figure 6.

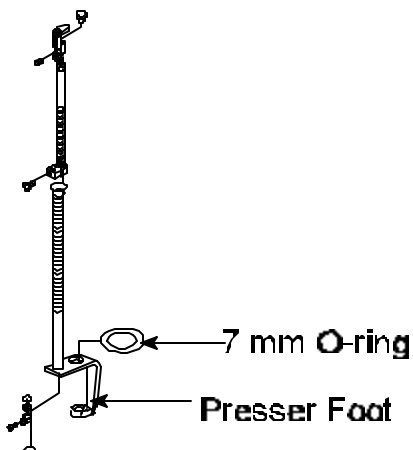


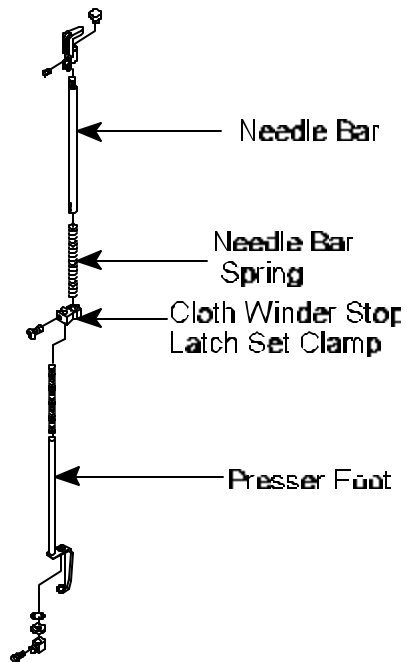
Figure 6

13. Carefully (springs may ricochet) **pull** Needle Bar and spring up and out of Turret Plate (Assembly).

**NOTE:** If removing **#9 Needle Bar**, rotate Needle Bar counterclockwise 90 degrees, this enables Needle Bar to pass stopper bracket.

14. **Discard** old Needle Bar and Needle Bar Spring.
15. **Reposition** 6.5 mm O-ring over hole on top of Turret Plate (Assembly).
16. **Insert** new Needle Bar Spring onto new Needle Bar.

17. **Insert** new needle bar through Cloth Winder Stop Latch Set Clamp. See *Figure 7*.



*Figure 7*

**NOTE:** If inserting Needle Bar #9 reinstall in same manner it was removed in Step 13's *Note*.



18. **Slide** Needle Bar through 7 mm O-ring positioned over hole onto of Turret Plate (Assembly). See Figure 8.

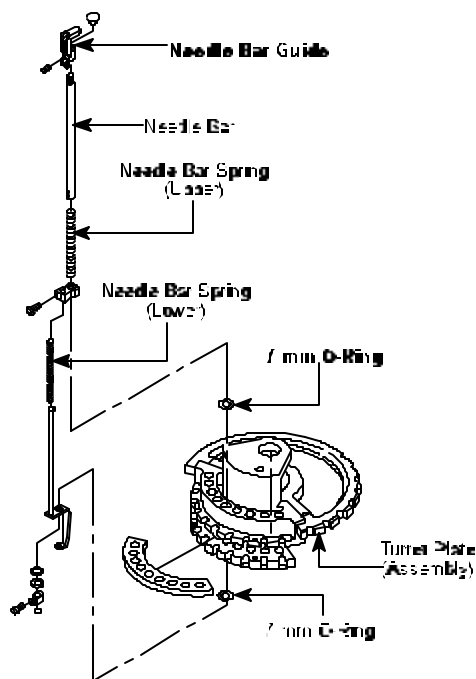


Figure 8

19. Continue **inserting** Needle Bar through Turret Plate (Assembly) See Figure 8.
20. **Press** Needle Bar and Presser Foot together making sure Presser Foot Shaft lines up with Needle Bar Guide Notch. See Figure 8
21. While holding Needle Bar and Presser Foot together **slide** 6.5 mm O-ring and white spacer onto Needle Bar.
22. **Insert** Needle Clamp onto Needle Bar and align set screw with bottom hole then snug set screw.
23. **Insert** Needle correctly. (Groove facing front and scarf is in back).

24. Using a Needle Screwdriver, **tighten** Needle set screw.

*If replaced Needles 1-7 continue to **Section C** to re-time the **Take-Up Lever Assembly**.*

*If **Needle #8 or #9** were removed continue to **Section B** to replace the **Needle Bar Stopper Bracket**.*

## B. NEEDLE BAR STOPPER BRACKET REPLACEMENT

25. **Replace** Needle Bar Stopper Bracket, insert left and right hex bolts. (Do not tighten completely).

***If the Roller is WHITE-Proceed to Step 26.***

***If the Roller is CLEAR-Proceed to Step 27.***

26. Take a business card width (0.5 mm), place between *white* roller and top of Needle Bar Assembly then secure hex bolts. See Figure 9.

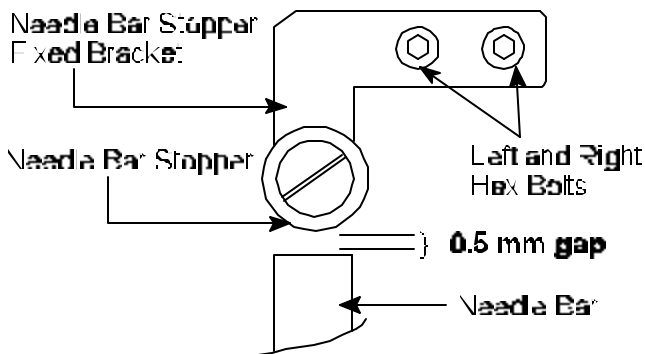


Figure 9

27. Press down on *clear* roller approximately 0.5 mm to top of Needle Bar Assembly then secure hex bolts. See Figure 10.

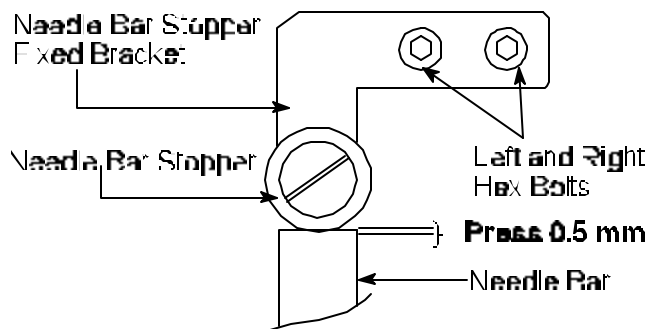
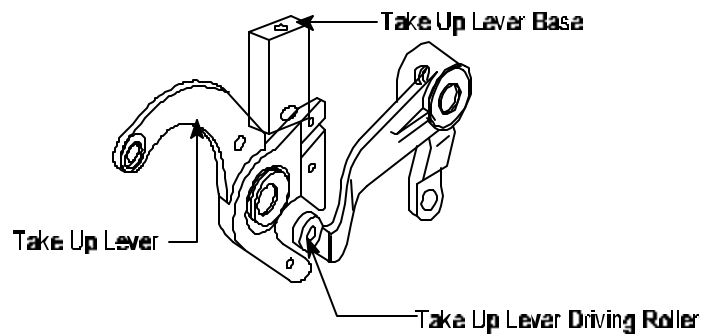


Figure 10

**C. RE-TIMING TAKE-UP LEVER ASSEMBLY**

28. **Manually rotate** Turret Plate (Assembly) to **Needle #9**.
29. **Align** Take-up Lever #9 in center of Take-up Lever Driving Roller. See *Figure 11*.



*Figure 11*

30. **Engage** Needle Bar Driver.

31. **Rotate** gangshaft so Take-up Lever is in its lowest position. (Using degree wheel rotate to 115 degrees).
32. Once Take-up Lever is in center of Take-up Lever Driving Roller, using 3 mm Allen Wrench, **tighten** timing screw.

**NOTE:** The Take-up Lever may be centered with Take-up Driving Roller on **Needle #9** but to check for accurate alignment you must also check **Needle #1**.

33. **Rotate** gangshaft to **Color Change Position**. (Rotate degree wheel to 235 degrees).
34. **Disengage** Needle Bar Driver.
35. **Manually Rotate** Turret Plate (Assembly) to **Needle #1**.
36. **Engage** Needle Bar Driver.
37. While slowly rotating gangshaft (do not force), check to insure proper clearance between Take-up Lever and Take-up Driving Roller Arm until Take-up Lever is in its lowest position. (Using the degree wheel rotate to 115 degrees).

**NOTE:** If gangshaft does not rotate **freely** there may not be enough clearance between Take-up Lever and Take-up Driving Roller Arm. Take-up **Lever #9** may have to be adjusted slightly right of center to allow clearance for **Take-up Lever #1**.

38. Using 3 mm Allen Wrench, **replace** Sewing Head Covers.
39. Using enclosed disk, **sew** the “**HOX**” **test** to check for proper adjustment.

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## PRESSER FOOT REPLACEMENT

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### DEFINITION:

Presses down on material to prevent flagging.

### CAUSES:

- < Bent
- < Damaged beyond repair

### TOOLS NEEDED

3 mm Allen Wrench  
2.5 mm Allen Wrench  
Needle Screwdriver  
Small Flathead Screwdriver  
Offset Screwdriver  
New Presser Foot  
New Needle Bar Spring (lower)

MOST PRESSER FEET CAN BE BENT BACK INTO SHAPE.

### SYMPTOMS:

- < Breaking needles
- < Needle Bar doesn't move freely
- < Presser foot damages material
- < Skipping Stitches

### PROCEDURE:

#### A. REPLACING PRESSER FOOT

1. **Power down** Embroidery Machine.
2. **Disengage** Needle Bar Driver.
3. **Pull** thread keep lever forward to disengage thread apron clamps. *See Figure 1.*

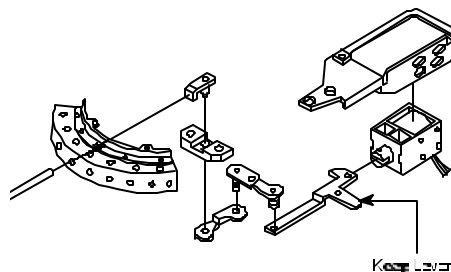
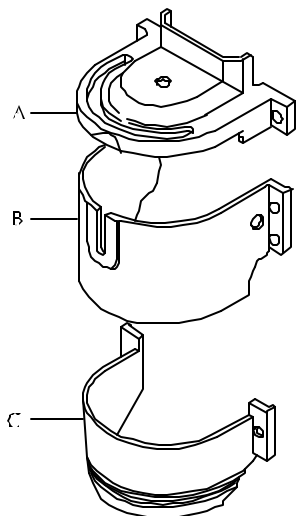


Figure 1

- Using a 3 mm Allen wrench, **remove** 6 screws and B and C Sewing Head Covers. See *Figure 2*.



**Figure 2**

- Rotate** gangshaft to **Color Change Position**. (On Embroidery Machine rotate degree wheel [numbers ascend] to 235 degrees). This will allow for free movement of Turret Plate (Assembly).
- Using flathead screwdriver **remove** throat plate.
- Rotate** Turret to damaged Presser Foot. (If more than one, do one at a time).
- Engage** Needle Bar Driver.
- Rotate** gangshaft to lower Needle Bar until damaged Presser Foot is at its lowest position.
- Using a Needle Screwdriver, **loosen** needle set screw and **remove** needle.

11. While Needle Bar remains lowered **remove** needle clamp, white spacer and 6.5 mm O-ring. See Figure 3.

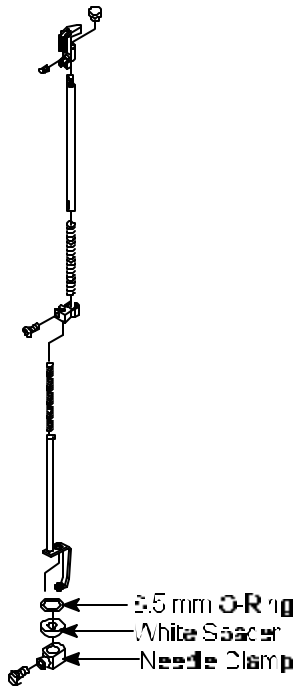


Figure 3

12. With 2.5 mm Allen Wrench **loosen** Cloth Winder Stop Latch Set Clamp. See Figure 4.

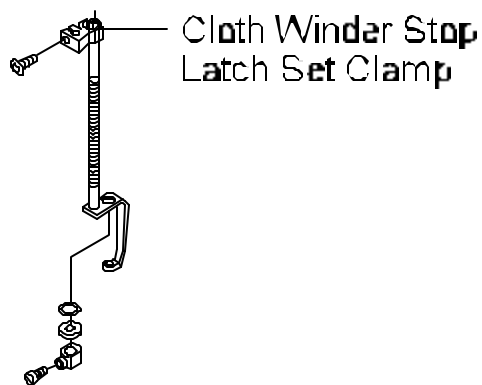


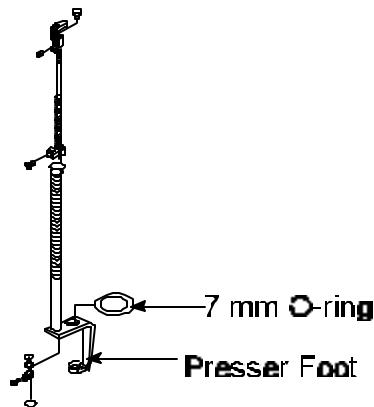
Figure 4



13. **Disengage** Needle Bar Driver to **release** Needle Bar and Presser Foot.
14. **Rotate** gangshaft to **Color Change Position**.

<b>Note:</b> If replacing Presser Feet <b>1-4</b> rotate Turret to <b>Needle #9</b> . If replacing Presser Feet <b>5-9</b> rotate Turret to <b>Needle #1</b> .
---

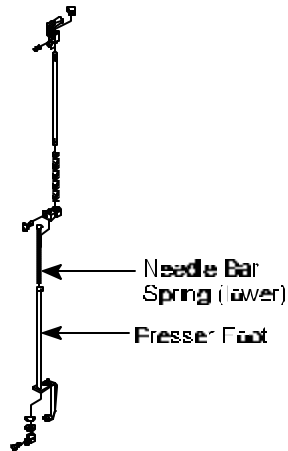
15. **Press** Presser Foot down to its lowest position and **remove** 7 mm O-ring.  
See *Figure 5*.



*Figure 5*

16. Carefully (spring may ricochet) **pull** Presser Foot down and out of Turret Plate (Assembly).

17. **Remove** Presser Foot and Needle Bar Spring (lower). See *Figure 6*.



*Figure 6*

18. **Discard** old Needle Bar Spring (lower) and Presser Foot.
19. **Replace** and **position** new Needle Bar Spring above Turret opening.
20. Slide new Presser Foot up through Turret Plate then through Needle Bar Spring (lower).
21. **Insert** Presser Foot through Cloth Winder Stop Latch Set Clamp.
21. **Press** Needle Bar down 2 mm below the stopper.
22. **Rotate** Turret Plate until Needle Bar is directly under stopper.
23. **Press** Needle Bar down and place 6.5 mm O-ring on Needle Bar.
24. **Engage** Needle Bar Driver.
25. **Rotate** gangshaft to lower the needle bar until Presser Foot is at its lowest point.
26. Slide 6.5 mm O-ring and white spacer onto Needle Bar.

27. **Insert** Needle Clamp onto Needle Bar and align set screw with bottom hole then snug set screw.
28. **Measure** from top of Presser Foot 72 mm and adjust bottom of Cloth Winder Stop latch Set Clamp to measurement. See *Figure 7*.

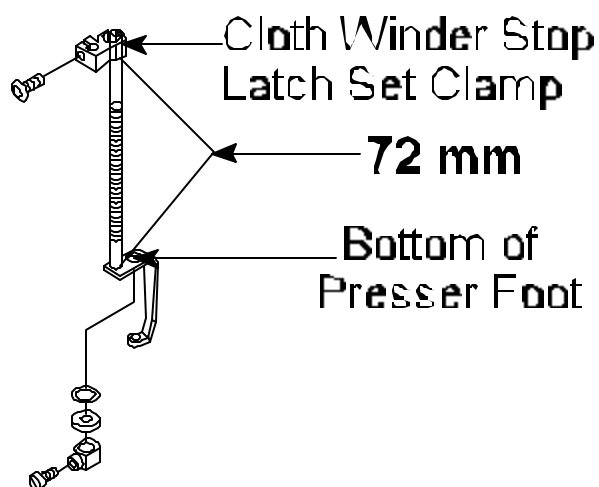


Figure 7

29. Using 2.5 mm Allen Wrench, **secure** Cloth Winder Stop Latch Set Clamp with hex socket bolt. See *Figure 7*.
30. **Insert** Needle correctly. (Groove facing front and scarf is in back).
31. **Replace** Throat Plate.
32. **Replace** Sewing Head Covers.
33. Using enclosed disk, **sew** the “**HOX**” test to check for proper adjustment.

---

## TAKE-UP LEVER REPLACEMENT

---

### DEFINITION:

Pulls the thread through the fabric after the stitch has been made, controlling the flow of thread during stitch formation.

### CAUSES:

- < Improper Color Change
- < Improper replacement
- < Wear and tear
- < "Slam" into hoop

### TOOLS NEEDED

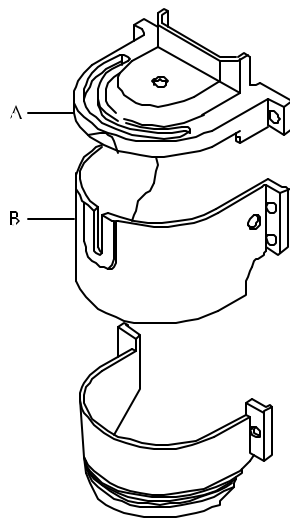
- 1.5 mm Allen Wrench
- 3 mm T-Handle Allen Wrench
- New Take-Up Lever (s)

### SYMPTOMS:

- < Improper Movement
- < Breaking Stitches

### PROCEDURE:

1. **Power** down Embroidery Machine.
2. Using a 3 mm Allen Wrench, **remove** 6 screws from A and B Sewing Head Covers. See *Figure 1*.



**Figure 1**

- Using a 3 mm Allen Wrench, **remove** hex socket bolt corresponding to damaged Take-Up Lever. See *Figure 2*.

(IE: Figure 2 illustrates Take-Up Lever #7 is being replaced).

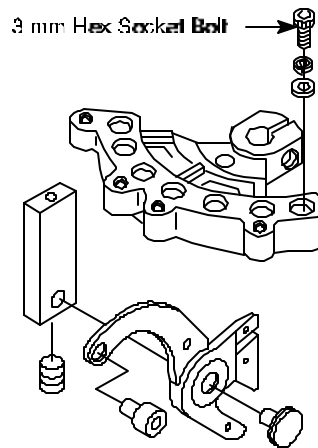


Figure 2

- Remove** damaged Take-Up Lever from Sewing Head.
- Using a 1.5 mm Allen Wrench, **loosen** hex socket set screw. See *Figure 3*.

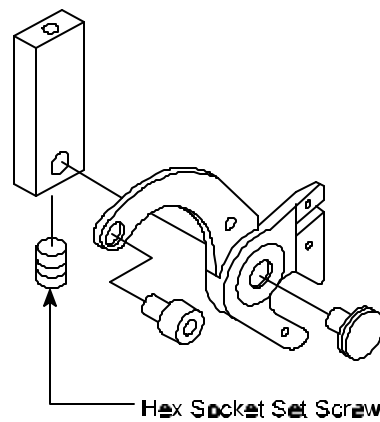


Figure 3

6. **Separate** Take-Up Lever Shaft and Take-Up Lever from Take-Up Lever Base.  
See Figure 4.

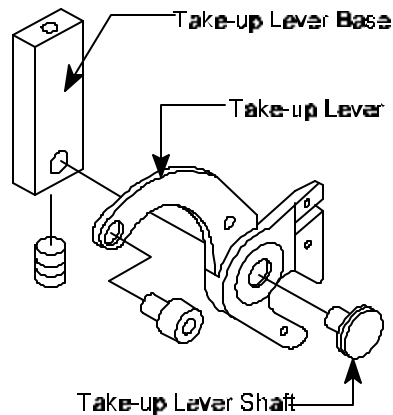


Figure 4

7. **Pull** Take-Up Lever Shaft from damaged Take-Up Lever.
8. **Discard** damaged Take-Up Lever.
9. **Replace** Take-Up Lever Shaft into new Take-Up Lever. See Figure 4.
10. **Join** Take-Up Lever Shaft and Take-Up Lever to flush side of Take-Up Lever Base.  
See Figure 4.
11. Using 1.5 mm Allen Wrench, **tighten** hex socket set screw. See Figure 5.

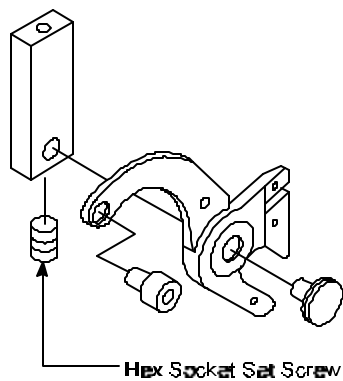


Figure 5

**Two ways to replace Take-Up Lever:**

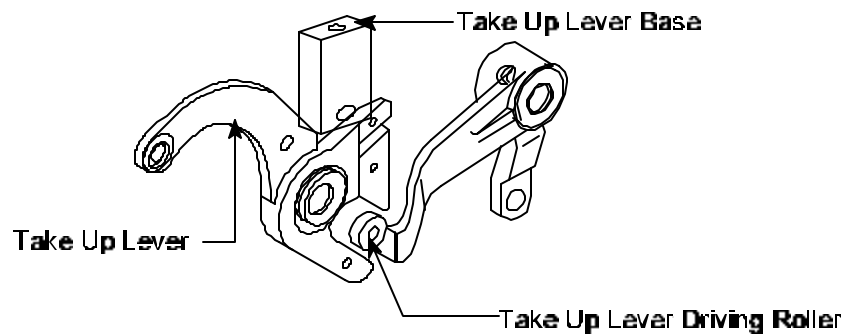
Continue to **Section A** if replacing **Take-Up Lever with Driving Roller**.

or

Continue to **Section B** if replacing **Take-Up Lever with Stocker Plate**.

**A. ALIGNING WITH TAKE-UP LEVER DRIVING ROLLER**

12. **Replace and Align** Take-Up Lever to Take-Up Driving Roller. See *Figure 6*.

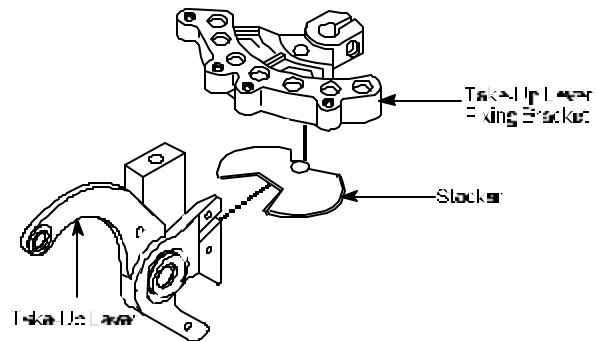


*Figure 6*

Proceed to **Step 14**.

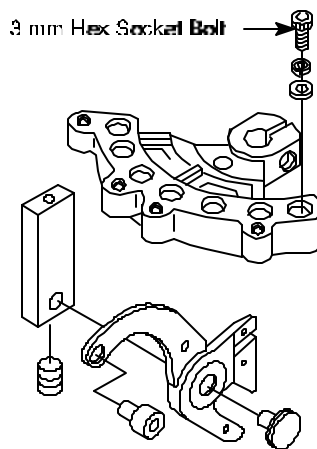
## B. ALIGNING WITH TAKE-UP LEVER STOCKER

13. **Replace** and **Position** Take-Up Lever to Take-Up Lever Stocker. See *Figure 7*.



*Figure 7*

14. Using 3 mm Allen Wrench, **tighten** hex socket bolt securing Take-Up Lever and Base to Take-Up Lever Fixing Bracket. See *Figure 8*.



*Figure 8*

15. Using 3 mm Allen Wrench, **replace** Sewing Head Covers.



---

## NEEDLE BAR DRIVER REPLACEMENT

---

### DEFINITION:

Drives the Needle Bar down.

### CAUSES:

- < Lack of oil on Needle Bar
- < Improper replacement
- < Wear and tear
- < "Slam" into hoop

### SYMPTOMS:

- < Skipping Stitches
- < Breaking Stitches
- < Excessive noise

### TOOLS NEEDED

- 2 mm Allen Wrench
- 3 mm T-Handle Allen Wrench
- Flathead Screwdriver
- Needle Screwdriver
- New Needle Bar Driver
- Flashlight

### PROCEDURE:

#### A. REPLACING NEEDLE BAR DRIVER

1. Deactivate **Drive**. (Machine must be out of drive).
2. Using **Automat/Controller** position Sewing Heads to **Needle #4**.
3. Using a 3 mm Allen wrench, **remove** 6 screws and B and C Sewing Head Covers. See *Figure 1*.

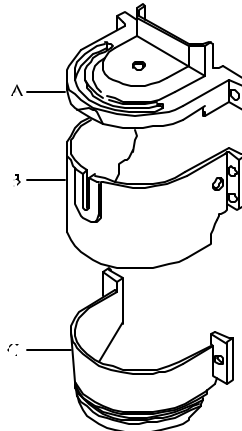


Figure 1

- Using **Automat/Controller** position Sewing Heads to **Needle #7**.
- Using a 2 mm Allen Wrench, **loosen** hex socket set screw. See *Figure 2*.

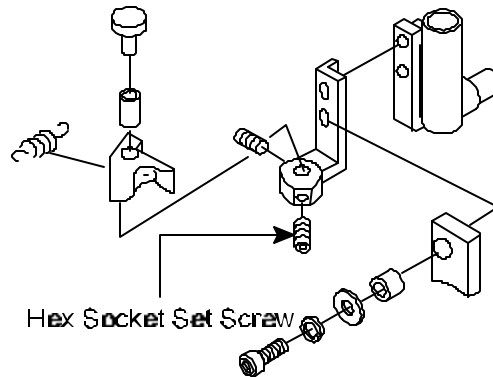


Figure 2

- Using **Automat/Controller** position Sewing Heads to **Needle #1**.
- Remove** Needle Bar Driver Return Spring. See *Figure 3*.

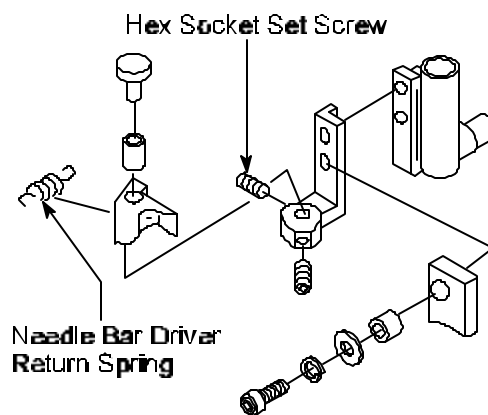
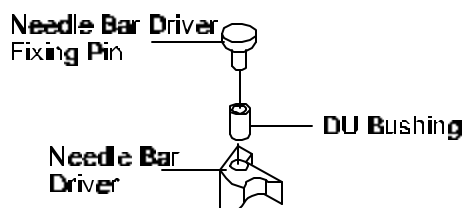


Figure 3

- Using a 2 mm Allen Wrench, **loosen** remaining hex socket set screw. See *Figure 3*.

9. **Remove** Needle Bar Driver Fixing Pin from Needle Bar Driver Fixing Base.  
*See Figure 4.*



**Figure 4**

10. **Remove** Needle Bar Driver from Needle Bar Driver Fixing Base by lifting up and out.
11. **Discard** damaged Needle Bar Driver.
12. **Check** for damage to Needle Bar Driver Fixing Base. (bent or fracture).

*If Needle Bar Driver Fixing Base is damaged proceed to **Section B** Replacing **Needle Bar Driver Fixing Base**.*

*If Needle Bar Driver Fixing Base is **not** damaged proceed to **Section C** Replacing **Needle Bar Driver**.*

## B. REPLACING NEEDLE BAR DRIVER FIXING BASE

13. **Using** a 3 mm Allen Wrench, **loosen** and **remove** 2 hex socket bolts.  
See Figure 5.

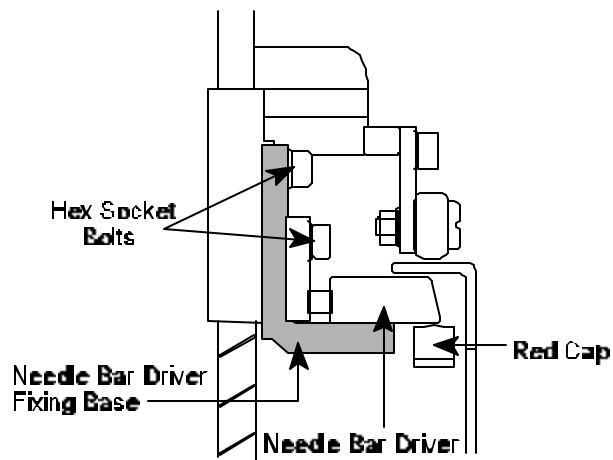


Figure 5

14. **Remove** Needle Bar Driver Fixing Base.
15. **Remove** Needle Bar Driver Stopper from Needle Bar Driver Fixing Base.  
See Figure 6.

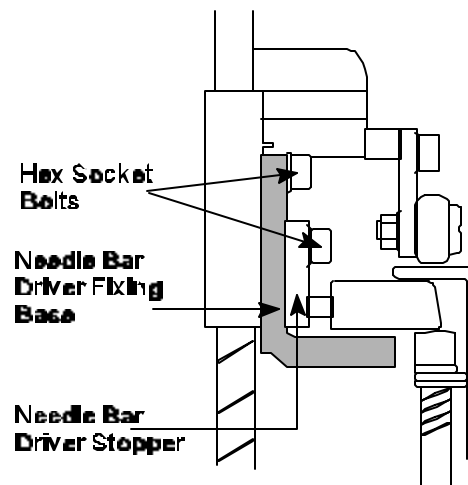
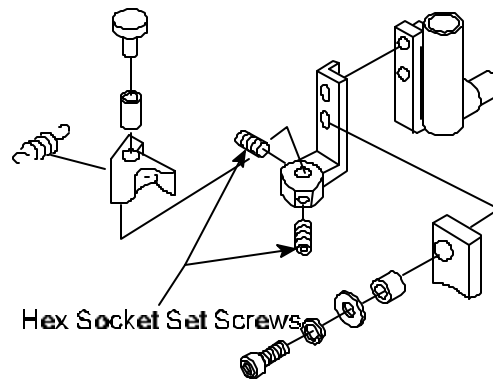


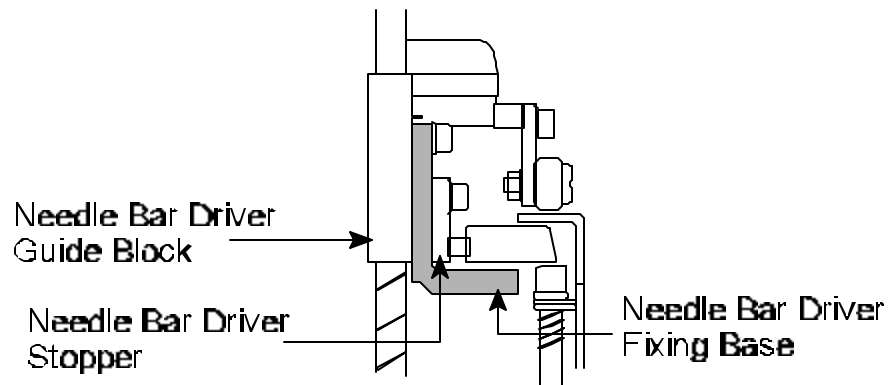
Figure 6

16. **Position** new Needle Bar Driver on new Needle Bar Driver Fixing Base.
17. **Replace** Needle Bar Driver Fixing Pin into **new** Needle Bar Driver.
18. **Using** a 2 mm Allen Wrench, **tighten** 2 hex socket screws to secure Needle Bar Driver on Needle Bar Driver Fixing Base. See *Figure 7*.



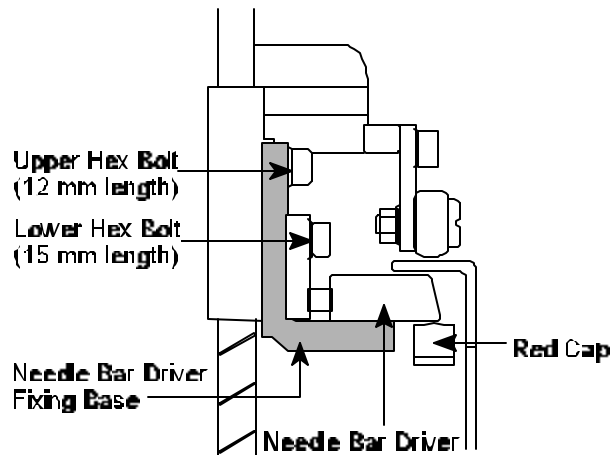
*Figure 7*

20. **Position** Needle Bar Driver Stopper on **new** Needle Bar Driver Fixing Base.
21. **Position** Needle Bar Driver Fixing Base to Needle Bar Driver Guide Block. See *Figure 8*.



*Figure 8*

22. **Using** a 3 mm Allen Wrench, **install** Allen Screw (12 mm in length) into upper hole. (Do not tighten completely). See *Figure 9*.



*Figure 9*

23. **Using** a 3 mm Allen Wrench, **install** Allen Screw (15 mm in length) into lower hole. (Do not tighten completely). See *Figure 9*.
24. **Attach** Needle Bar Driver Return Spring.

Proceed to **Section D Needle Depth Adjustment**.

### C. REPLACING NEEDLE BAR DRIVER

25. **Position** new Needle Bar Driver on new Needle Bar Driver Fixing Base.
26. **Replace** Needle Bar Driver Fixing Pin into **new** Needle Bar Driver.
27. **Using** a 2 mm Allen Wrench, **tighten** hex socket set screw to secure Needle Bar Driver on Needle Bar Driver Fixing Base. *See Figure 10.*

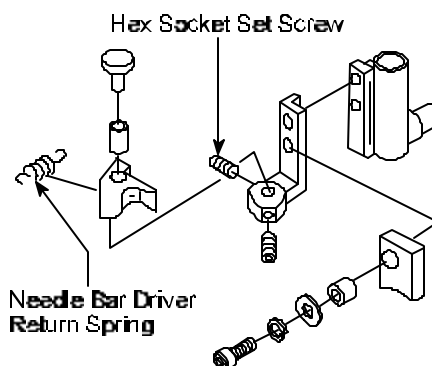


Figure 10

28. **Attach** Needle Bar Driver Return Spring. *See Figure 10.*
29. **Using** Automat/Controller position Sewing Heads to **Needle #7**.
30. Tighten remaining hex socket set screw to secure Needle Bar Driver on Needle Bar Driver Fixing Base.
31. **Using** Automat/Controller position Sewing Heads to **Needle #1**.

Proceed to **Section D Needle Depth Adjustment**.

#### D. NEEDLE DEPTH ADJUSTMENT

32. **Using** a Flathead Screwdriver, **remove** throat plate screws.
33. **Remove** throat plate.
34. **Remove** bobbin case from Hook Assembly.
35. Using **cleaning brush**, clean any thread debris or lint from hook area.
36. **Remove** thread from Needle #1.
37. Using Needle Screwdriver, **loosen** needle set screw.
38. **Remove** and **discard** old needle.
39. **Insert new needle** correctly. (Groove facing front and scarf is in back.)  
*See Figure 11 .*

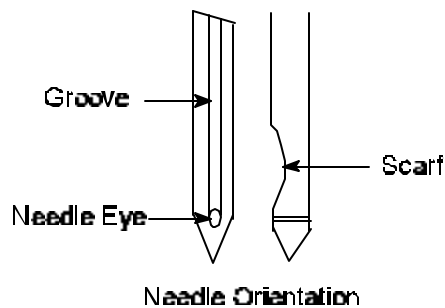


Figure 11

40. Using Needle Screwdriver, **tighten** needle set screw.
41. **Engage** Needle Bar Driver.
42. While Standing in front of training sewing head, **rotate** gangshaft towards you so needle is at its lowest point (**Bottom Dead Center**).  
(On Embroidery Machine rotate degree wheel [numbers ascend] to **zero degrees** this is called **Bottom Dead Center**).



43. Using 3 mm Allen Wrench, **loosen** top and bottom hex socket bolts on Needle Bar Driver Fixing Base. See Figure 12.

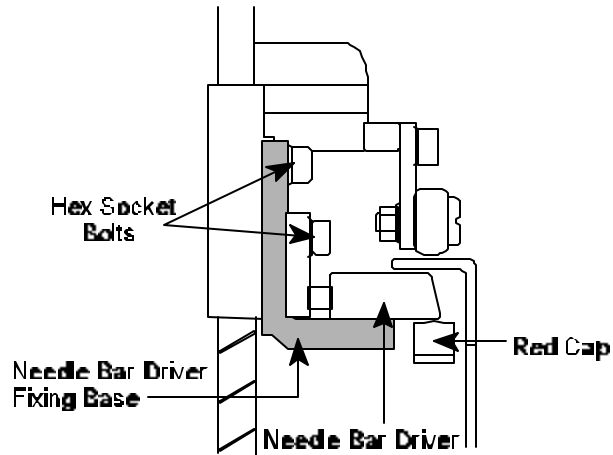


Figure 12

44. **Adjust** by moving Needle Bar Driver up or down so  $\frac{1}{2}$  of needle eyelet is viewed in hook basket. See Figure 13.

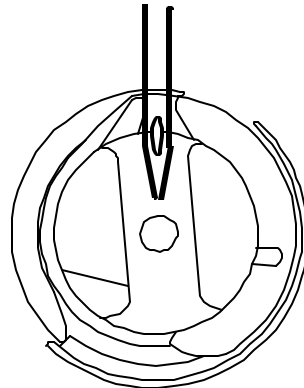


Figure 13

45. Using 3 mm Allen Wrench, **tighten** hex socket bolts to set Needle Bar Driver.
46. **Recheck** needle depth. (As bolts are tightened Needle Bar Driver may lower needle eyelet.)

47. **Rotate** gangshaft to **Color Change Position**. (Rotate degree wheel to 235 degrees)
48. **Reinstall** throat plate.
49. Using Flathead Screwdriver, **tighten** throat plate screws.
50. **Reinstall** bobbin case.
51. Using 3 mm Allen Wrench, **replace** Sewing Head Covers.
52. Using enclosed disk, **sew** the “**HOX**” **test** to check for proper adjustment.

---

## REAR BOTTOM SHAFT BUSHING REPLACEMENT

---

### DEFINITION:

The rear bushing allows the bottom shaft to rotate freely without front to back movement, securing the Hook Assembly. The bushing has an oil pad which allows oil to saturate and lubricate the bottom shaft.

### CAUSES:

- < Lack of oil
- < Improper replacement
- < Wear and tear

### SYMPTOMS:

- < Little or no Hook movement
- < Excessive noise

### PROCEDURE:

#### A. REMOVING REAR BUSHING

1. **Power down** Embroidery Machine.
2. **Disengage** Needle Bar Driver.
3. Using Flathead Screwdriver, **remove** throat plate screws.
4. **Remove** throat plate.

### TOOLS NEEDED

3 mm Allen Wrench  
Flathead Screwdriver  
Needle Screwdriver  
Offset Screwdriver  
Hammer  
Brass Rod  
New Needles  
New Rear Bushing  
New Bottom Shaft  
New Felt Pad  
Flashlight  
New Bevel Gear  
Cleaning Brush  
Permanent Marker

5. Using 2 mm Allen Wrench, **remove** Upper Knife hex bolt (**MK 4 Trimmers** only apply). See Figure 1.

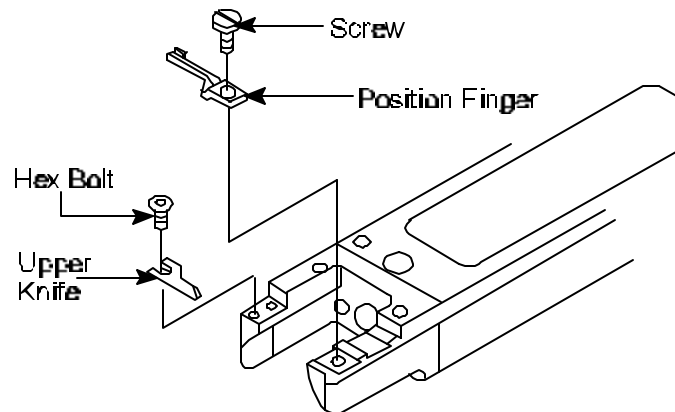


Figure 1

6. **Remove** Upper Knife (**MK 4 Trimmers** only apply).
7. Using Flathead Screwdriver, **remove** Position Finger **screw**.
8. **Remove** Position Finger.
9. **Remove** Hook Driving Rod from Hook (Fork).
10. **Release** Hook (Fork). (This allows Hook Assembly to be removed easily).
11. **Remove** Hook Assembly by **loosening** three set screws.
12. **Remove** Hook Assembly.

- Using Flathead Screwdriver, **loosen** and **remove** M5 x 25 screw from Gear Cover Set (Grease Elbow). See Figure 2.

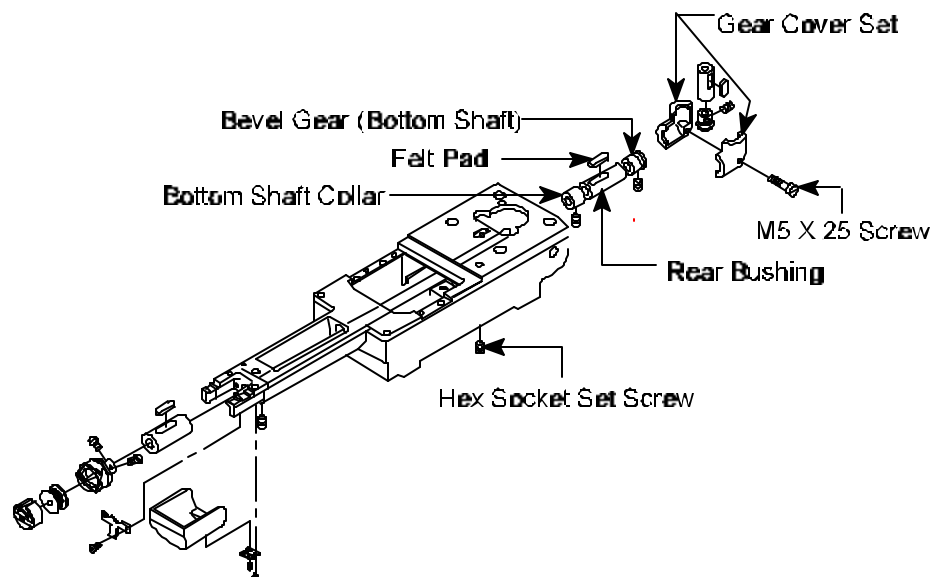


Figure 2

**Note:** Gear Cover Set is located back of bottom shaft, it surrounds rear bottom shaft and lower vertical gears. M5 x 25 screw is accessible through a hole, bottom right side of sewing head.

- Using 3 mm Allen Wrench, **loosen** two screws on bottom shaft collar. See Figure 2.
- Using Flathead Screwdriver, **loosen** two screws on bottom shaft bevel gear. See Figure 2.

**Note:** If screws are not easily accessible, gears may have to be forced to rotate. Hammer against brass rod (preferably) or Flathead Screwdriver.  
**CAUTION:** If using a Flathead Screwdriver, damage may occur--  
**Replace** gear.

16. **Remove** bottom shaft bevel gear.
17. **Remove** bottom shaft and bottom shaft collar.

**Note:** If bottom shaft is seized, hammer against brass rod (preferably) or Flathead Screwdriver to break bottom shaft free from rear bushing.

18. Using 3 mm Allen Wrench, **loosen** 3 mm Allen screw from bottom rear bushing. (This screw holds bushing in place.)
19. **Remove** rear bushing by hammering a brass rod against rear side of bushing. (Bushing can only be removed in one direction--forward towards front of sewing head).
20. **Remove** felt pad from bushing.
21. **Clean** felt pad and set aside.
22. **Discard** bushing.
23. **Insert** felt pad into new bushing.
24. Using **permanent marker**, mark both ends of new rear shaft bushing to indicate oil port location.
25. **Oil** outer bushing for smoother installation.
26. **Insert** new bushing from front (oil port facing up with oil recess facing front) until bushing is 5 mm through opposite side of casting.

**Note:** **CAUTION:** Oil Port on bushing **must** be positioned up with oil recess facing front. This allows oil to pass through bushing onto bottom shaft.

27. Using **permanent marker**, mark new bottom shaft end to indicate flat spot.
28. **Insert** new bottom shaft (marked flat end) through front bushing **only**.
29. **Insert** bottom shaft collar (shiny side against rear bushing) onto bottom shaft.
30. **Position** bevel gear to rear bushing and **align** holes.
31. Continue inserting bottom shaft through rear bushing and bevel gear until bottom shaft protrudes 2 mm.
32. With gears apart rotate gangshaft (degree wheel). Gangshaft should rotate smoothly.

**Note:** Once both gears are meshed and set into place the gangshaft

33. **Align** one set screw on bevel gear to mark (indicating flat spot) on bottom shaft then using Flathead Screwdriver, **tighten** set screw.
34. Using Flathead Screwdriver, **tighten** remaining set screw on bevel gear.
35. **Position** two gears together until teeth mesh .
36. Place brass rod against rear bushing and gently hammer brass rod until a .033 mm gap is between bushing and bevel gear.

**Note: This adjustment is very critical:**

- < **Proper Gear Alignment**-Gangshaft must rotate smoothly. Unnoticeable Bottom Shaft front to back movement. .033 mm gap between bushing and bevel gear.
- < **Tight Gears**-Gangshaft binds. Hammer gear in opposite direction until gangshaft achieves the **Proper Gear Alignment**.
- < **Loose Gears**-Bottom shaft has front to back movement and play between gears. Hammer bushing until achieving **Proper Gear Alignment** .

37. Using 3 mm Allen Wrench, **tighten** 3 mm Allen screw to secure rear bushing.
38. **Position** bottom shaft collar against rear bushing.
39. **Tighten** and **secure** two screws on bottom shaft collar.
40. **Rotate** gangshaft (degree wheel): checking bottom shaft collar adjustment did not effect movement.
  - \* If binding occurs loosen two screws on bottom shaft collar, reposition until binding is eliminated.
41. **Rotate** gangshaft to **Color Change Position**. (Rotate degree wheel to 235 degrees).

## B. HOOK ASSEMBLY REPLACEMENT

42. Insert **Hook Assembly** on bottom shaft.
43. **Replace** Position Finger.
44. **Insert** Position Finger **screw**. (Do not tighten completely).
45. **Rotate** Hook Assembly until Basket Notch is aligned with Position Finger Nose.  
*See Figure 3.*

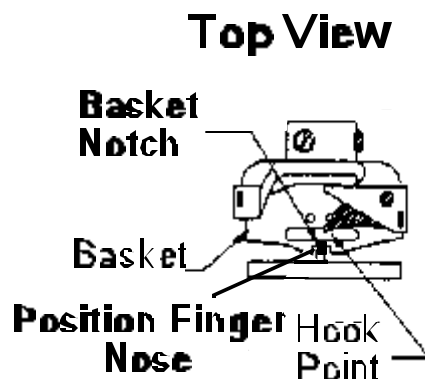


Figure 3



46. Using Flathead Screwdriver, **tighten** Position Finger screw.
47. **Replace** Upper Knife (**MK 4** Trimmers only apply).
48. Using 2 mm Allen Wrench, **insert** hex bolt. (Do not tighten completely).
49. **Upper Knife** rests on Position Finger and back rests flush against Needle Plate Bracket. (**MK 4** Trimmers only apply) See Figure 4.

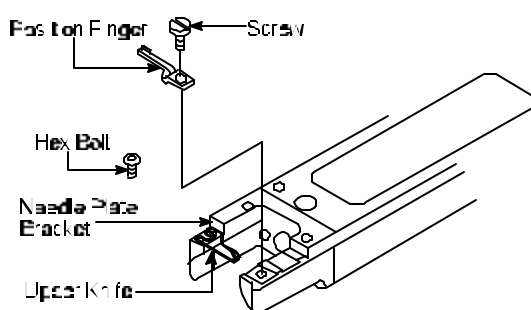


Figure 4

50. **Replace** Hook Driving Fork.
51. **Rotate** Hook Point to 9:00 position.
52. **Only tighten** set screw closest to Hook Point.

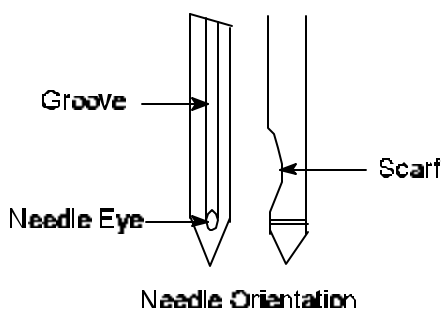
#### D. HOOK TO NEEDLE GAP

*The circumference on each machine may vary, by checking the **first** and **last** needle will determine whether the embroidery machine should be re-timed (IE: **Needle #1** may be have the correct gap from hook point, **Needle #9** may be touching the hook point so move the hook .5 mm away.)*

53. **Rotate** gangshaft to **Color Change Position**. (Rotate degree wheel to 235 degrees)
54. **Disengage** Needle Bar Driver.
55. **Manually rotate** Turret to **Needle #1**.



56. Using Needle Screwdriver, **loosen** needle set screw.
57. **Rotate** needle so groove is facing back and scarf is in front.
58. Using Needle Screwdriver, **tighten** needle set screw.
59. **Engage** Needle Bar Driver.
60. Rotate gangshaft until **Hook Point** is behind needle. (Rotate degree wheel to 24 degrees.)
61. Using Flathead Screwdriver, **loosen** set screw closest to Hook Point.
62. **Adjust** Hook Assembly so Hook Point is directly behind needle and as close to needle as possible. (Should not cause needle to bend).
63. Using Flathead Screwdriver, **tighten** set screw closest to Hook Point.
64. **Rotate** gangshaft to **Color Change Position**. (Rotate degree wheel to 235 degrees).
65. Using Needle Screwdriver, **loosen** needle set screw.
66. **Rotate** needle to correct position. (Groove facing front and scarf is in back).  
*See Figure 5.*



*Figure 5*

67. Using Needle Screwdriver, **tighten** needle set screw.
68. **Disengage** Needle Bar Driver.

69. **Manually** rotate Turret to **Needle #9**.
70. **Remove** thread from Needle #9.
71. Using Needle Screwdriver, **loosen** needle set screw.
72. **Insert** new needle, **groove** is facing **back** and **scarf** is in **front**.
73. Using Needle Screwdriver, **tighten** needle set screw.
74. **Engage** Needle Bar Driver.
75. **Rotate** gangshaft until **Hook Point** is behind needle. (Rotate degree wheel to 24 degrees).
76. Hook Point should be directly **behind** needle and as close to needle as possible. (Should not cause needle to bend).
- If Hook Point causes needle to bend on **Needle #9** then adjust Hook Point 0.5 mm away from needle.*
77. Using Flathead Screwdriver, **tighten** two remaining set screws (furthest from hook point)
78. **Rotate** gangshaft to **Color Change Position**. (Rotate degree wheel to 235 degrees).
79. Using Needle Screwdriver, **loosen** needle set screw.
80. **Rotate** needle to correct position. (Groove facing front and scarf is in back).

#### **E. POSITION FINGER ADJUSTMENT**

81. **Engage** Needle Bar Driver.
82. **Rotate** gangshaft until needle reaches it's lowest point, **Bottom Dead center**. (rotate degree wheel to 0 degrees).
83. Using Flathead Screwdriver, **loosen** Position Finger screw.



84. **Move** Position Finger **left or right**, centering Position Finger Nose with needle. See *Figure 6*.

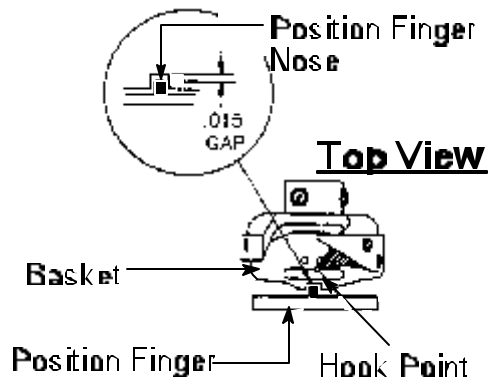


Figure 6

**NOTE:** Bobbin thread may not be centered if adjustment is incorrect.

85. Move Position Finger Nose **forward or back** from hook basket allowing enough clearance for thread to pass between easily. See *Figure 7*.

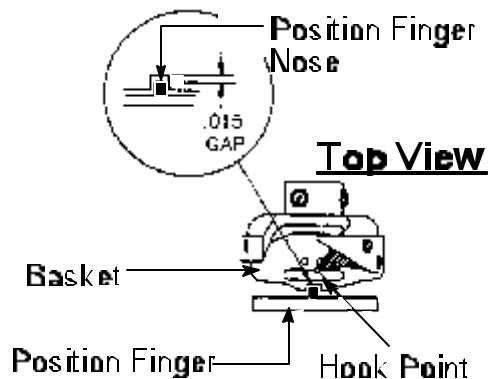


Figure 7

**NOTE:** If Position Finger Nose is too close to hook basket, birdnesting or thread breaks may occur.

86. While holding Position Finger in place, **tighten** Position Finger **screw**.
87. **Rotate** gangshaft to **Color Change Position**. (Rotate degree wheel to 235 degrees).
88. **Reinstall** throat plate.
89. Using Flathead Screwdriver, **tighten** throat plate screws.
90. **Reinstall** bobbin case in Hook Assembly.
91. Using enclosed disk, **sew** the “**HOX**” **test** to check for proper adjustment.

## **Set-Up and Adjustments for the YN-II Sewing Head**

The following instructions explain the necessary adjustments for setting up the YN-II head to sew properly and to minimize noise. Please refer to the following YN-II Drawing.

1. **Refer to Dimension E, .5 mm.**

- A. Rotate the Turret to the **Needle #9**.
- B. Slide a .5 mm feeler gauge between the bottom side of the Turret and the top O-ring of **Needle Bar #9**.
- C. Adjust the needle bar stopper so that it just makes contact with **Needle Bar #9**.

**Note:** There should be no pressure applied to the needle bar.

2. **Refer to Dimension F, 72.4 mm.**

- A. Measure from the top of the Pressure Foot to the bottom of the Cloth Winder Stop Latch. This dimension should be 72.4 mm, if not loosen the screw on the Cloth Winder Stop Latch and make the appropriate adjustment. Then tighten the screw.

3. **Refer to Dimension G, .2 to .3 mm.**

- A. **Rotate** the gangshaft so that the Needle Bar Driver is at top dead center.
- B. Check the gap between the top of the Presser Foot Stop and the bottom of the Cloth Winder Stop Latch. It should be approximately .2 to .3 mm. If it is not, loosen the 2 mounting screws for the pressure foot stop. Move the Pressure Foot Stop up or down to get the proper gap. Tighten the 2 mounting screws.

**Note:** If you make an adjustment to the Needle Bar Stop, make sure it is straight up and down when the mounting screws are tightened. It should not be cocked to the left or right.

4. **Refer to Dimension H, .2 to .3 mm.**

- A. **Rotate** the gangshaft to 235 degrees, then rotate the Turret to **Needle #1**.
- B. **Rotate** the gangshaft so the Needle Bar Driver is at **Bottom Dead Center**.
- C. Check the gap again between the top of the Pressure Foot Stop and the bottom of the Cloth Winder Stop Latch. It should be approximately .2 to .3 mm. If it is not, Loosen the 2 mounting screws for the Pressure Foot Cam. Move the Pressure Foot Cam up or down to get the proper gap. Tighten the 2 mounting screws.

**Note:** After this adjustment, check to see that the Set Slide Block (HT230500) does not bottom out on Turret at Bottom Dead Center. If it does recheck steps 3 and 4.



