NEEDLE DEPTH ADJUSTMENT

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

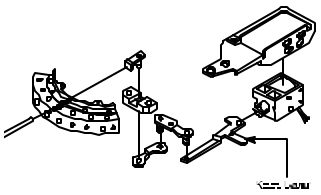
TOOLS NEEDED
3 mm Allen Wrench
Needle Screwdriver
Flathead Screwdriver
Offset Screwdriver
Flashlight
New Needle
Cleaning Brush

PROCEDURE:

1. **Power** down Embroidery Machine

2. **Disengage** Needle Bar Driver.

3. **Pull** thread **Keep Lever** forward to disengage Thread Apron Clamps.
   See Figure 1.



3. Using a 3 mm Allen Wrench, **remove** 2 screws and C Sewing Head Cover. *See Figure 1*.

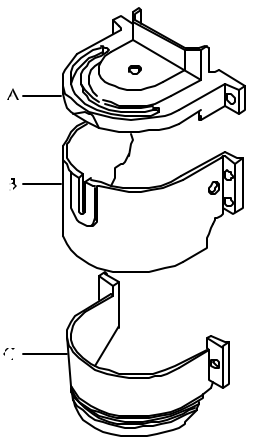


Figure 2

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. **Manually** rotate Turret to **Needle #1**.
9. **Remove** thread from Needle #1.
10. Using Needle Screwdriver, **loosen** needle set screw.
11. **Remove** and **discard** old needle.

12. **Insert new needle** correctly. (Groove facing front and scarf is in back.)
See Figure 2.

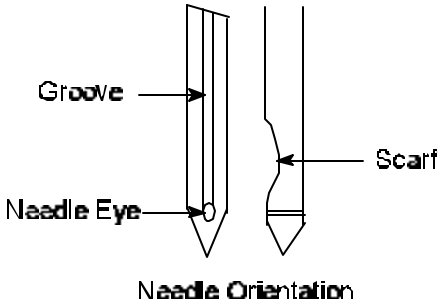


Figure 2

13. Using Needle Screwdriver, **tighten** needle set screw.

14. **Engage** Needle Bar Driver.

15. 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**).

16. Before making any adjustments see if needle eyelet is positioned halfway through hook basket. *See Figure 3*.

If needle eyelet looks out of position proceed to ***Step 17****.*

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

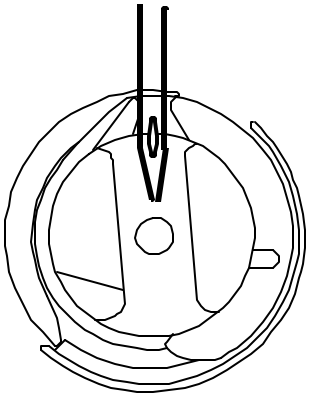


Figure 3

17. Using 3 mm Allen Wrench, **loosen** top and bottom hex socket bolts on Needle Bar Driver Fixing Base. *See Figure 4.*

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

      Replace *damaged parts*.

18. **Adjust** by moving Needle Bar Driver up or down so ½ of needle eyelet is viewed in hook basket.

19. Using 3 mm Allen Wrench, **tighten** hex socket bolts to set Needle Bar Driver.

20. **Recheck** needle depth. (As bolts are tightened Needle Bar Driver may lower needle eyelet.)

21. **Rotate** gangshaft to **Color Change Position**. (Rotate degree wheel to 235 degrees).

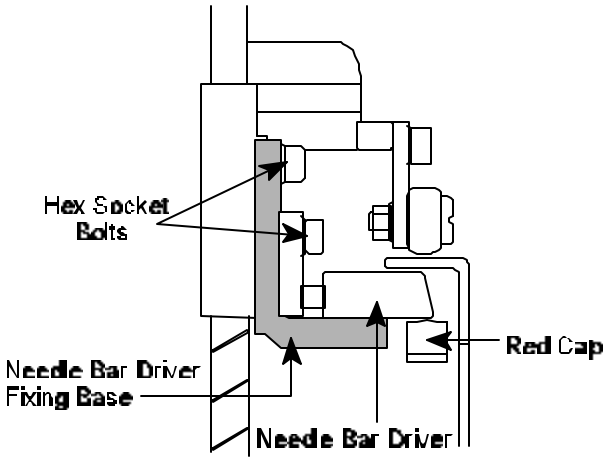


Figure 4

22. **Reinstall** throat plate.

23. Using Flathead Screwdriver, **tighten** throat plate screws.

24. **Reinstall** bobbin case.

25. Using 3 mm Allen Wrench, **replace** Sewing Head Cover.

26. Using enclosed disk, **sew** the **"HOX" test** to check for proper adjustment.

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

HOOK TIMING

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"

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

PROCEDURE:
Needle depth must be checked before timing the hook.

A. PREPARATION

1. **Power down** Embroidery Machine.
2. **Disengage** Needle Bar Driver.
3. Using a Flathead Screwdriver, **remove** throat plate screws.
4. **Remove** throat plate.
5. **Remove** bobbin case from Hook Assembly.

6. Using **cleaning brush**, clean any thread debris or lint from hook area.

7. **Rotate** gangshaft until Take-up Levers are in up position. (On Embroidery Machine rotate degree wheel [numbers ascend] to 235 degrees).

8. 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**

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

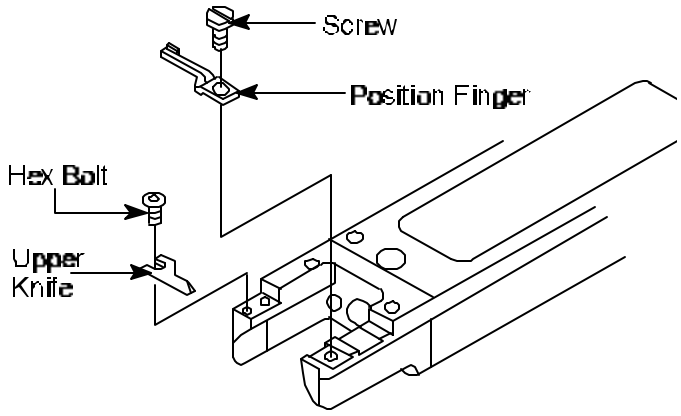


Figure 1

10. **Remove** Upper Knife (**MK 4** trimmer only apply).

11. Using a Flathead Screwdriver, **remove screw**. Position Finger

12. **Remove** Position Finger.

13. **Remove** Hook Driving Rod from Hook (Fork).

14. **Release** Hook (Fork). (This allows Hook Assembly to be removed easily).

15. Using a Flathead Screwdriver, **loosen** three set screws on Hook Assembly.

16. **Remove** Hook Assembly.

17. 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.

18. **Rotate** gangshaft to **Color Change Position**. (Rotate degree wheel to 235 degrees).

19. **Insert** repaired or new Hook Assembly on bottom shaft.

20. **Replace** Position Finger.

21. **Insert** Position Finger **screw**. (Do not tighten completely).

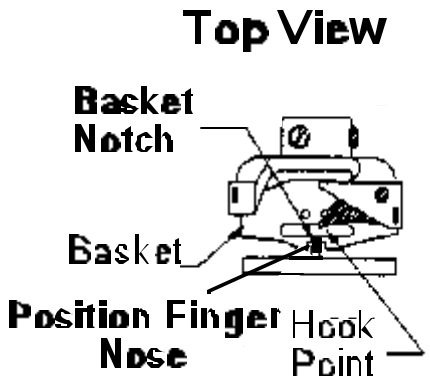


Figure 2

22. **Rotate** Hook Assembly until Basket Notch is aligned with Position Finger Nose. *See Figure 2*.

23. Using Flathead Screwdriver, **tighten** Position Finger screw.

24. **Replace** Upper Knife (**MK 4** trimmer only apply).

25. Using 2 mm Allen Wrench, **insert** hex bolt (**MK 4** trimmer only apply). (Do not tighten completely).

26. **Upper Knife** tip rests on Position Finger and back rests flush against Needle Plate Bracket (**MK 4** trimmer only apply). *See Figure 3*.

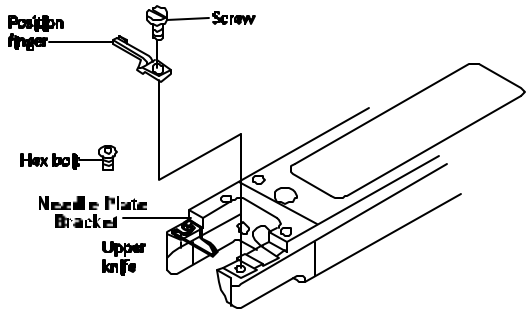


Figure 3

27. **Replace** Hook Driving Rod.

28. **Rotate** Hook Point to 9:00 position.

29. **Only tighten** set screw closest to Hook Point.

C. HOOK POINT TIMING

30. **Manually** rotate Turret to **Needle #1.**

31. **Remove** thread from Needle #1.

32. **Loosen** needle set screw.

33. **Remove** and **discard** old Needle.

34. **Insert new needle** correctly. (Groove facing front and scarf is in back). *See Figure 4*.

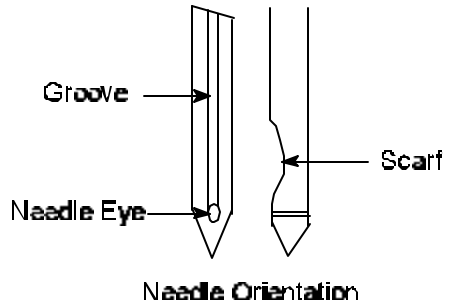


Figure 4

35. Using Needle Screwdriver, **tighten** needle set screw.

36. **Engage** Needle Bar Driver.

37. **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 5.*

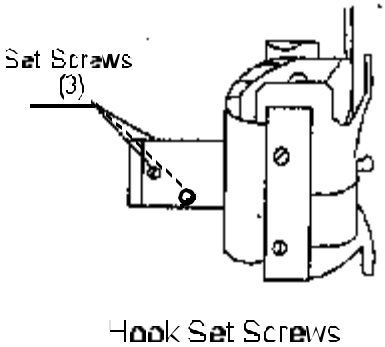


Figure 5

(**Degree Wheel:** First screw=115 degrees; Second screw=175 degrees)

38. While Standing in front of training sewing head, rotate gangshaft towards you so needle is at its lowest point **(Bottom Dead Center).**
(Rotate degree wheel to **zero degrees** this is called **Bottom Dead Center**).

39. 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 6.

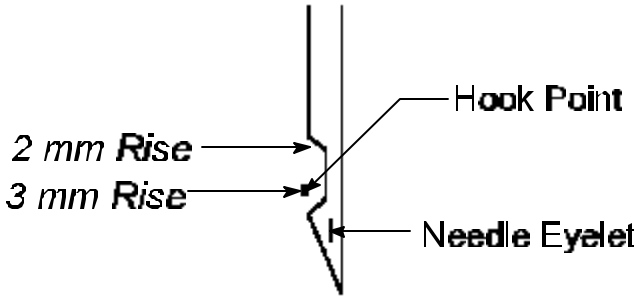


Figure 6

*If hook point **needs** adjustment proceed to **Step 36.***

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

40. Using Flathead Screwdriver, **loosen** remaining set screw (closest to hook point).

41. Adjust so tip of hook point is behind and in **middle of needle**. *See Figure 7.*

42. 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 #7** may be touching the hook point so move the hook .5 mm away.)*

43. **Rotate** gangshaft to **Color Change Position**. (Rotate degree wheel to 235 degrees)

44. **Engage** Needle Bar Driver.

45. Using Flathead Screwdriver, **loosen** needle set screw.

46. **Rotate** needle so groove is facing back and scarf is in front.

47. Using Needle Screwdriver, **tighten** needle set screw.

48. Rotate gangshaft until **Hook Point** is behind needle. (Rotate degree wheel to 24 degrees.)

49. Using Flathead Screwdriver, **loosen** set screw closest to Hook Point.

50. **Adjust** Hook Assembly so Hook Point is directly behind needle and as close to needle as possible. (Should not cause needle to bend).

51. Using Flathead Screwdriver, **tighten** set screw closest to Hook Point.

52. **Rotate** gangshaft to **Color Change Position**. (Rotate degree wheel to 235 degrees).

53. Using Needle Screwdriver, **loosen** needle set screw.

54. **Rotate** needle to correct position. (Groove facing front and scarf is in back).

55. **Disengage** Needle Bar Driver.

56. **Manually** rotate Turret to **Needle #7**.

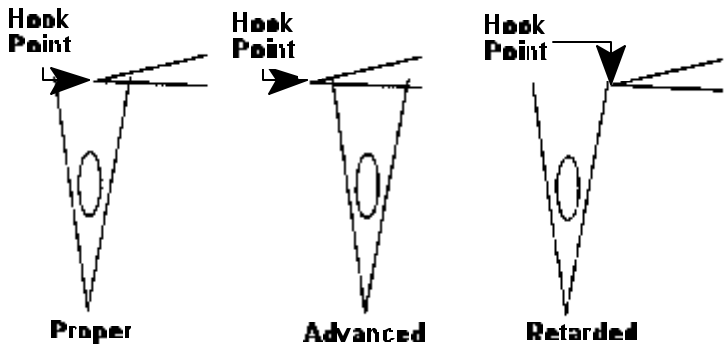


Figure 7

57. **Remove** thread from Needle #7.

58. Using Needle Screwdriver, **loosen** needle set screw.

59. **Insert** new needle, **groove** is facing **back** and **scarf** is in **front**.

60. Using Needle Screwdriver, **tighten** needle set screw.

61. **Engage** Needle Bar Driver.

62. Rotate gangshaft until **Hook Point** is behind needle. (Rotate degree wheel to 24 degrees).

63. 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 #7** then adjust Hook Point 0.5 mm away from needle.*

64. Using Flathead Screwdriver, **tighten** two remaining set screws (furthest from hook point).

65. **Rotate** gangshaft to **Color Change Position**. (Rotate degree wheel to 235 degrees).

66. Using Needle Screwdriver, **loosen** needle set screw.

67. **Rotate** needle to correct position. (Groove facing front and scarf is in back).

68. Using Needle Screwdriver, **tighten** needle set screw.

69. Proceed to **Position Finger Adjustment**.

POSITION FINGER ADJUSTMENT

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.

TOOLS NEEDED
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.

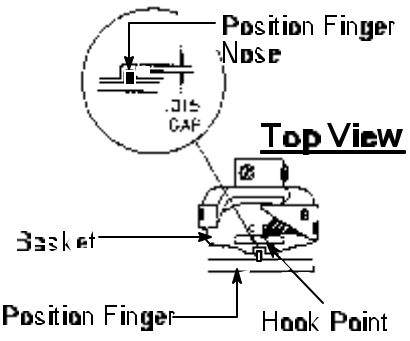
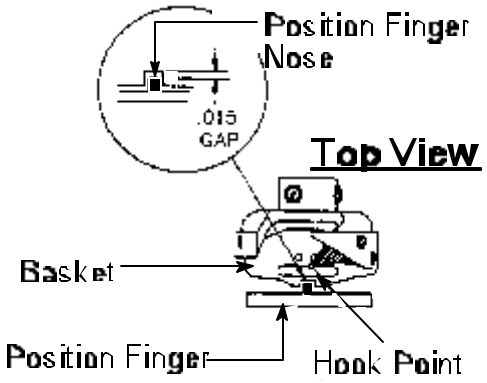


Figure 1

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

5. Move Position Finger Nose **forward or back** from hook basket allowing enough

clearance for thread to pass between easily. *See 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.

NEEDLE BAR REPLACEMENT

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

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

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*.

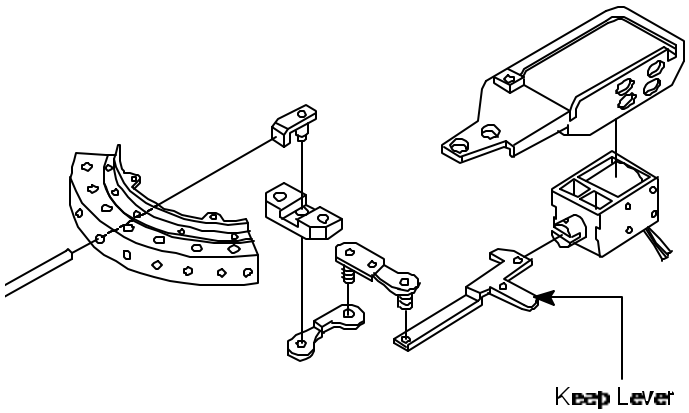


Figure 1

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

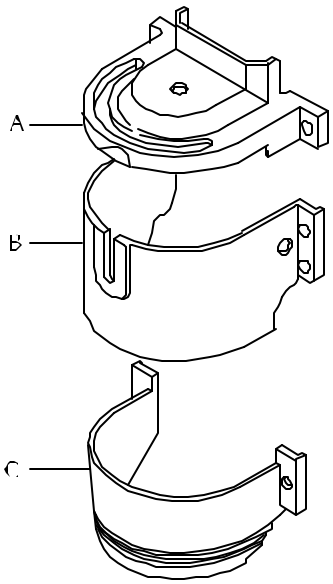


Figure 2

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 Assembly.

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

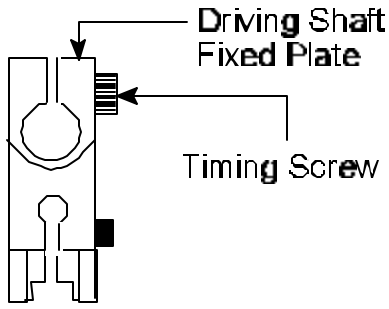


Figure 3

NOTE: If replacing **Needle Bar #7**, Needle Bar stopper must be removed. Using a 2.5 mm Allen wrench to remove left and right hex bolts. *See Figure 4.*

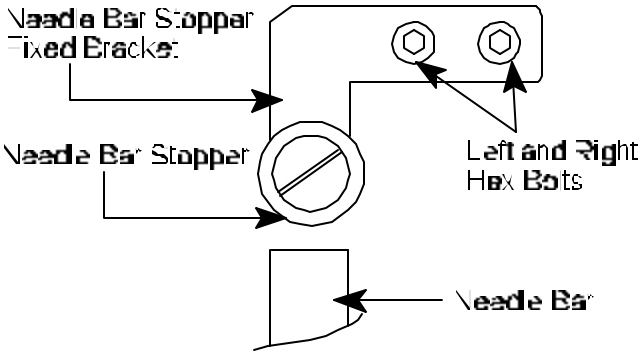


Figure 4

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

> **NOTE**: If removing **Needle Bar #7** rotate Turret to **Needle #6** and manually rotate Turret Assembly to far left.

8. Using a Needle Screwdriver, **loosen** needle set screw and **remove** needle.

9. **Squeeze** and **hold** Needle Bar and Presser Foot together and **remove** needle clamp, white spacer and 6 mm O-ring. *See Figure 5.*

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

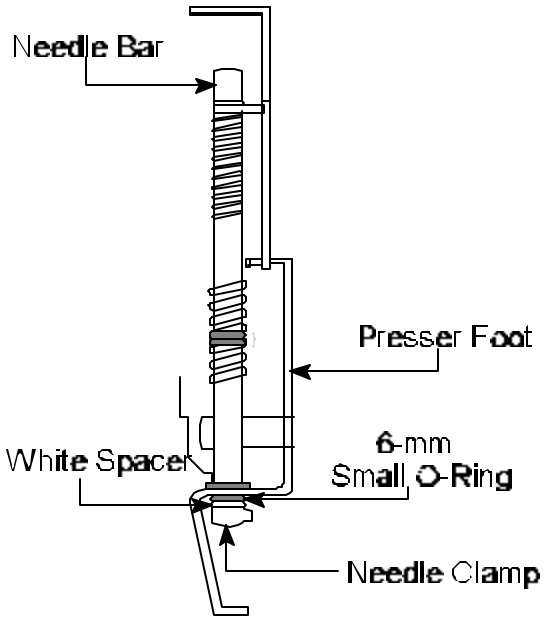


Figure 5

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

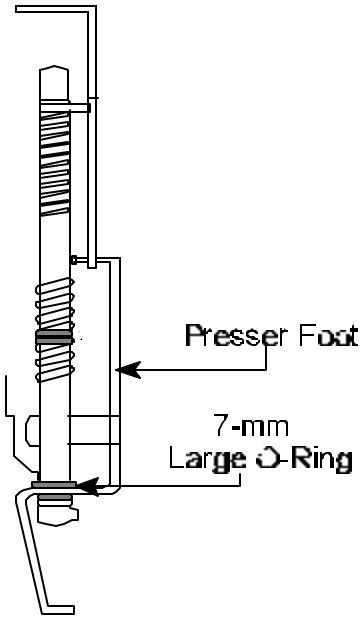


Figure 6

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

    It is not necessary to remove large spring and 2-6 mm O-rings.

NOTE:	If removing **Needle Bar #7**, rotate Needle Bar counterclockwise 90 degrees, this enables Needle Bar to pass stopper bracket.

13. **Discard** old Needle Bar and small spring. *See Figure 7.*

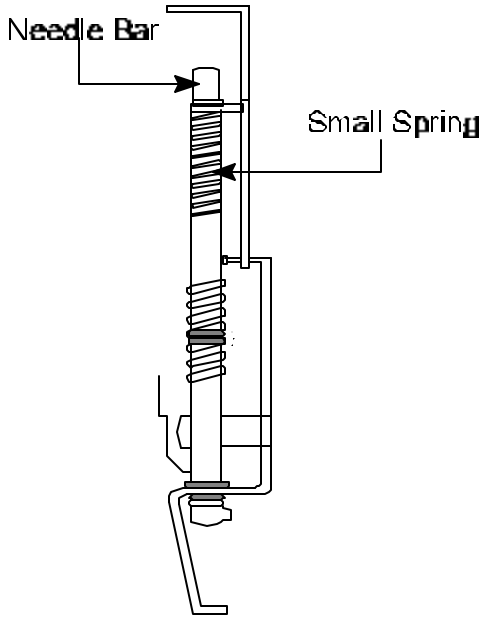


Figure 7

14. **Insert** new small spring onto new Needle Bar.

15. **Insert** new Needle Bar into top Presser Foot hole.

NOTE:	If inserting **Needle Bar #7** reinstall in same manner it was removed in Step 12's *Note*.

16. **Slide** Needle Bar through large spring and two 6 mm O-rings. *See Figure 8.*

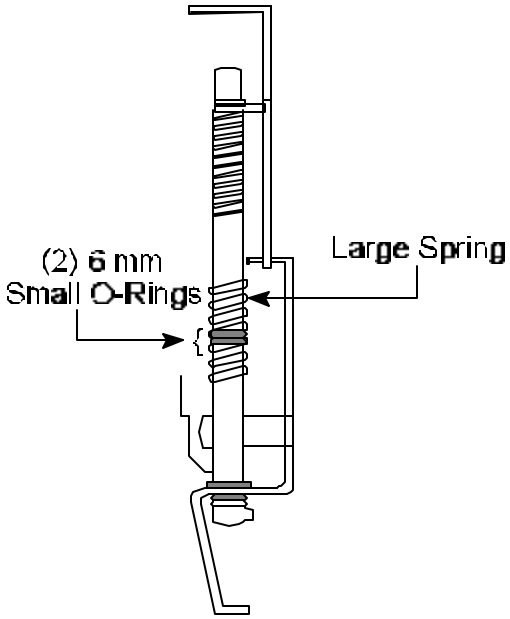


Figure 8

17. Continue **inserting** Needle Bar through Turret Assembly.

18. Press Needle Bar down ½ inch below bottom of Turret Assembly then **slide** 7 mm O-ring onto Needle Bar.

19. **Press** Needle Bar and Presser Foot together making sure Needle Bar guide pin lines up with Presser Foot guide pin hole. *See Figure 9.*

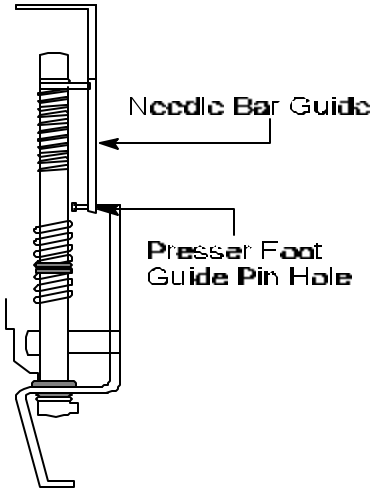


Figure 9

20. While holding Needle Bar and Presser Foot together **slide** 6 mm O-ring and white spacer onto Needle Bar.

21. **Insert** Needle Clamp onto Needle Bar and align set screw with bottom hole then snug set screw. *See Figure 10.*

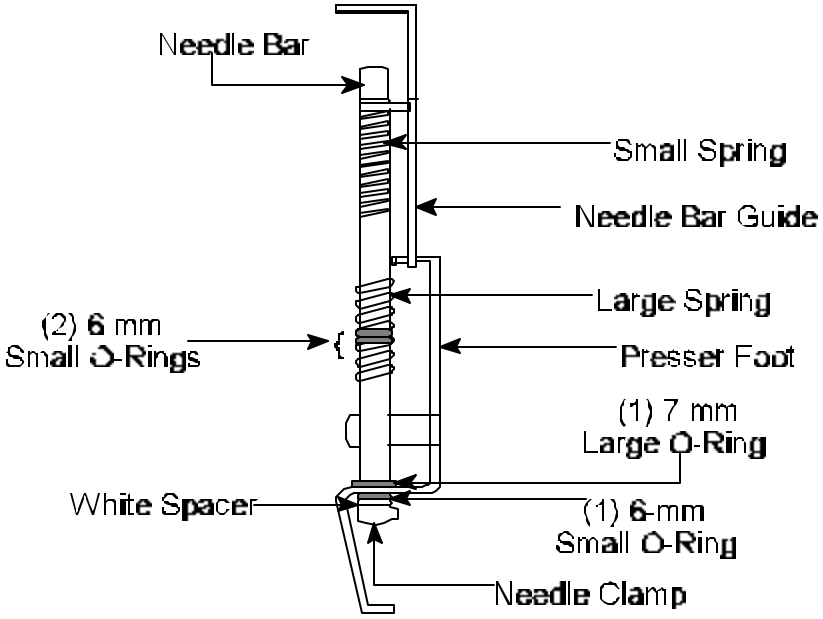


Figure 10

*If replaced needles 1-6 continue to **Section C** to re-time the **Take-up Lever Assembly***

*If **Needle #7** was removed continue to **Section B** to replace the **Needle Bar Stopper Bracket.***

B. NEEDLE BAR STOPPER BRACKET REPLACEMENT

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

If the Stopper is WHITE-Proceed to Step 23.
If the Stopper is CLEAR-Proceed to Step 24.

23. Take a business card width (0.5 mm), place between *white* stopper and top of Needle Bar Assembly then secure hex bolts. *See Figure 11.*

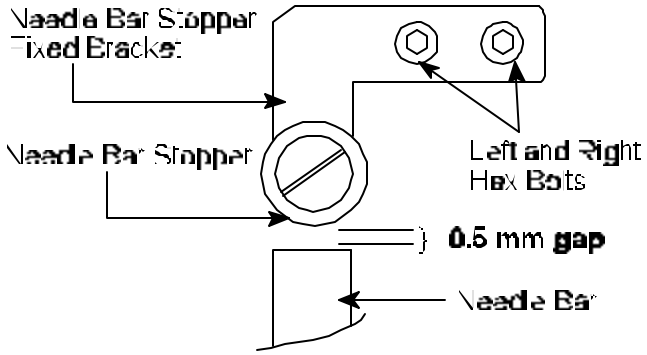


Figure 11

24. Press down on *clear* stopper approximately 0.5 mm to top of Needle Bar Assembly then secure hex bolts. *See Figure 12.*

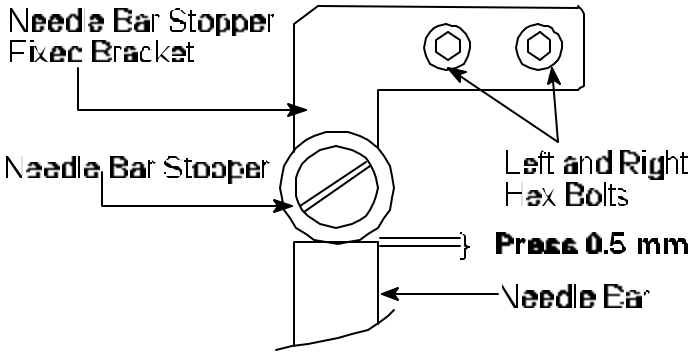


Figure 12

C. RE-TIMING TAKE-UP LEVER ASSEMBLY

25. **Manually rotate** Turret Assembly to **Needle #7.**

26. **Align** Take-up Lever #7 in center of Take-up Lever Driving Roller. *See Figure 13.*

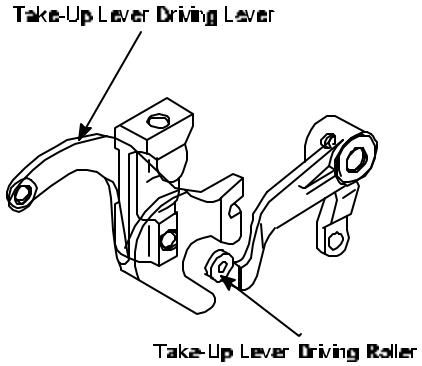


Figure 13

27. **Engage** Needle Bar Driver.

28. **Rotate** gangshaft so Take-up Lever is in its lowest position. (Using degree wheel rotate to 115 degrees).

29. 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 #7** but to check for accurate alignment you must also check **Needle #1**.

30. **Rotate** gangshaft to **Color Change Position**. (Rotate degree wheel to 235 degrees).

31. **Disengage** Needle Bar Driver.

32. **Manually Rotate** Turret Assembly to **Needle #1**.

33. **Engage** Needle Bar Driver.

34. 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 #7** may have to be adjusted slightly right of center to allow clearance for **Take-up Lever #1**.

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

36. Using enclosed disk, **sew** the **"HOX" test** to check for proper adjustment.

PRESSER FOOT REPLACEMENT

DEFINITION:
Presses down on material to prevent flagging.

CAUSES:
- < Bent
- < Damaged beyond repair

MOST PRESSER FEET CAN BE BENT BACK INTO SHAPE.

TOOLS NEEDED
3 mm Allen Wrench
2.5 mm Allen Wrench
2 mm Allen Wrench
Needle Screwdriver
Offset Screwdriver
Small Flathead Screwdriver
Needle Nose Pliers
New Presser Foot
Flashlight

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.*

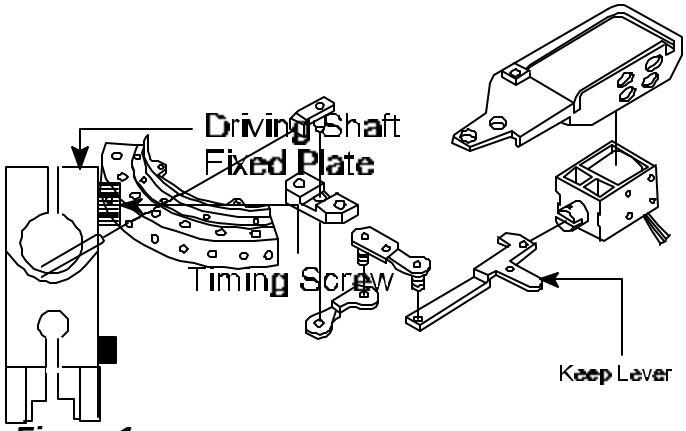


Figure 1

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

5. **Rotat** ***Figure 3*** **e** gangshaft to **Color Change Position**. (On Embroidery Machine rotate degree wheel [numbers ascend] to 235 degrees). This will allow for free movement of Turret Assembly.

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

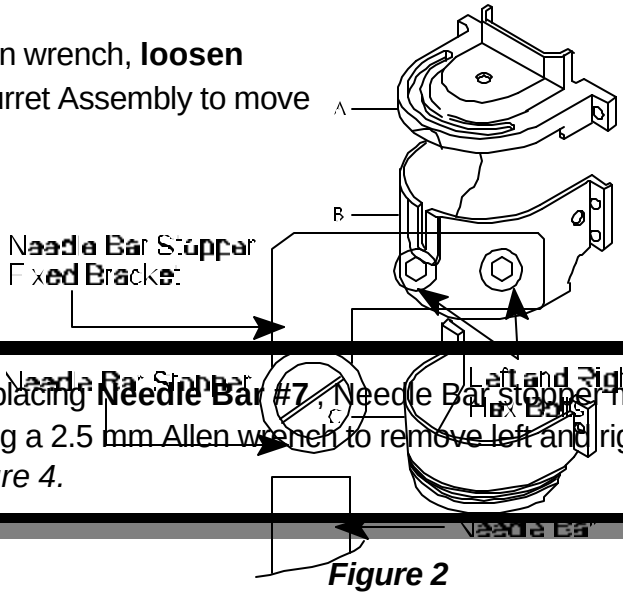


Figure 2

NOTE: If replacing **Needle Bar #7**, 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

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

> **NOTE**: If removing **Needle Bar #7** rotate Turret to **Needle #6** and manually rotate Turret Assembly to far left.

8. Using a Needle Screwdriver, **loosen** needle set screw and **remove** needle.

9. Using a 2.5 mm Allen wrench, **loosen** seven Thread Support Clamp **hex socket screws**. *See Figure 5.*

10. **Pul**l out Thread Support amp enough to grasp ead Support Pin with edle Nose Pliers.

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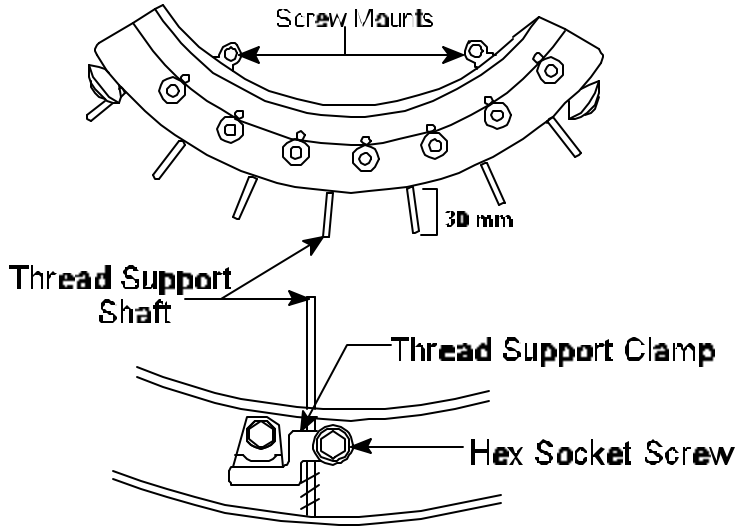


Figure 5

11. Carefully **pull** Thread Support Pin out approximately 30 mm enough to clear Turret Assembly. (If pin is pulled out to far, clamp and spring will fall out.) *See Figure 6.*

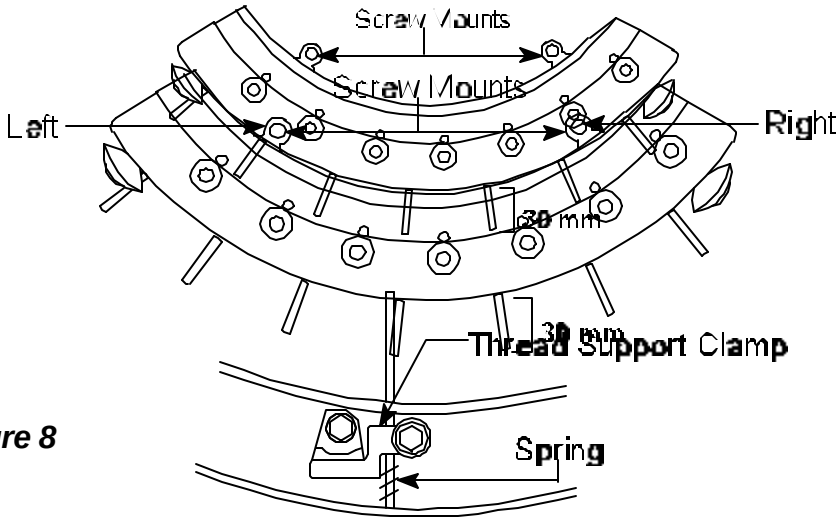


Figure 6

12. Using a Screwdriver, **loosen** and **remove** two set screws that secures the Thread Apron to Turret Assembly. *See Figure 7*.

Figure 8

13. While standing directly in front of sewing head, grasp Thread Apron with both hands and gently hold right side in. With left hand pull Thread Apron up and out. (A small flat area is on outer edge of set screw hole which enables Thread Apron to be removed and replaced easily without breaking). *See Figure 8*.

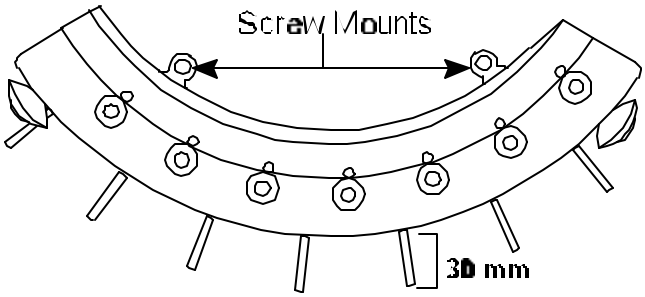
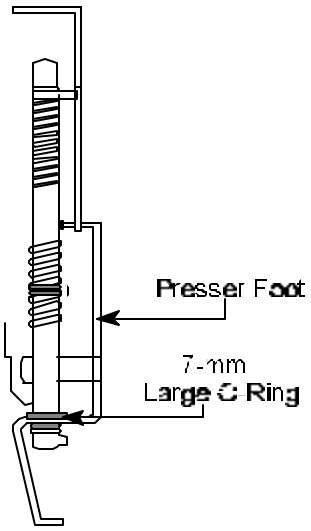


Figure 7

14. Hold Needle Bar and Presser Foot together and **remove** needle clamp, white spacer and 6 mm O-ring. *See Figure 9.*

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

16. **Move** Presser Foot down to its lowest position and **remove** 7 mm O-ring.
See Figure 10.



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

Figure 10

NOTE: If removing **Needle Bar #7,** rotate Needle Bar counterclockwise 90 degrees, this enables Needle Bar to pass stopper bracket.

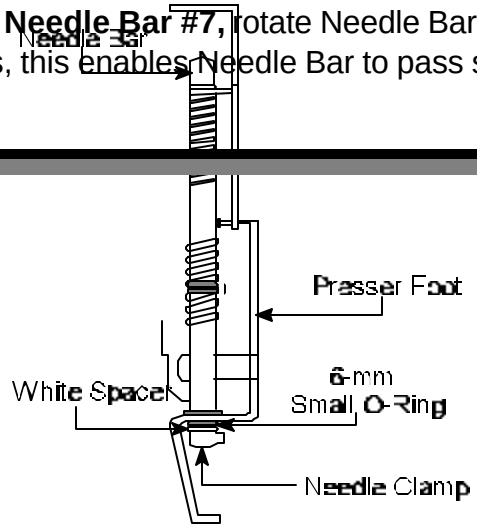


Figure 9

18. **Keep** small spring on shaft of Needle Bar. *See Figure 11.*

19. **Remove** Pressor Foot, large spring and two 6 mm O-rings.

20. **Discard** old Presser Foot.

21. **Slide** two 6 mm O-rings and Large Spring on top of Turret Assembly. *See Figure 12.*

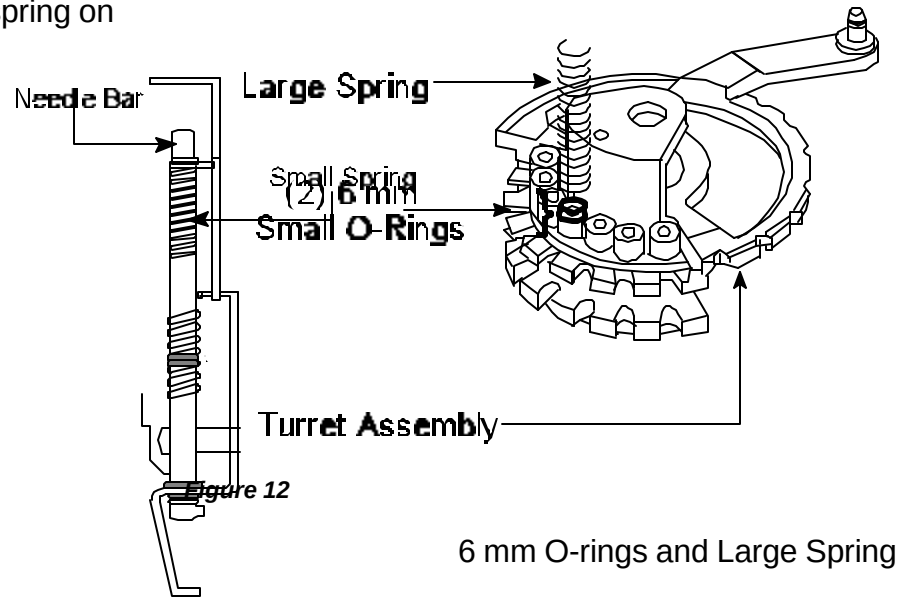


Figure 11

Figure 12

22. While holding new Presser Foot in one hand slide Needle Bar through top opening. *See Figure 13*.

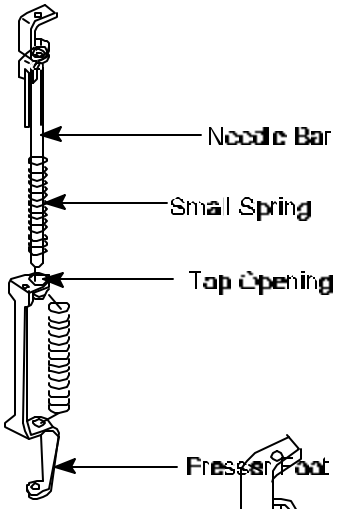


Figure 13

23. **Position** Presser Foot flush with notches on Turret Assembly. *See Figure 14.*

24. Continue **inserting** Needle Bar through Turret Assembly.

NOTE: If inserting **Needle Bar #7** reinstall in same manner it was removed in Step 7. *See Note*

25. Press Needle Bar down ½ inch below bottom of Turret Assembly then **slide** 7 mm O-ring onto Needle Bar. *See Figure 15.*

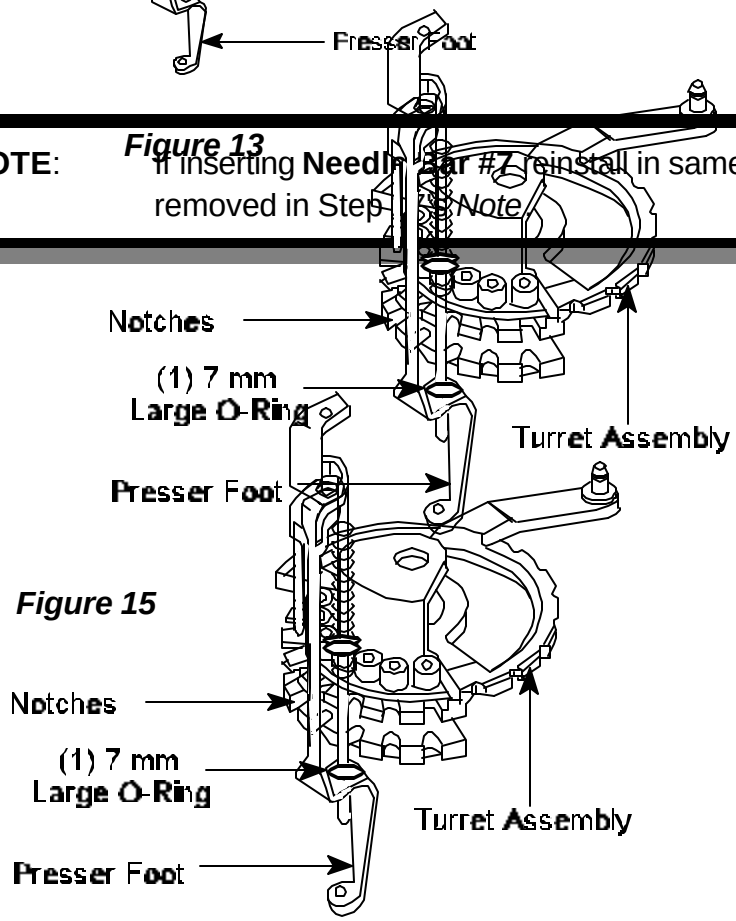


Figure 15

Figure 14

26. **Press** Needle Bar and Presser Foot together making sure Needle Bar guide pin lines up with Presser Foot guide pin hole. *See Figure 16.*

27. While holding Needle Bar and Presser Foot together **slide** 6 mm O-ring, and white spacer onto Needle Bar. *See Figure 17.*

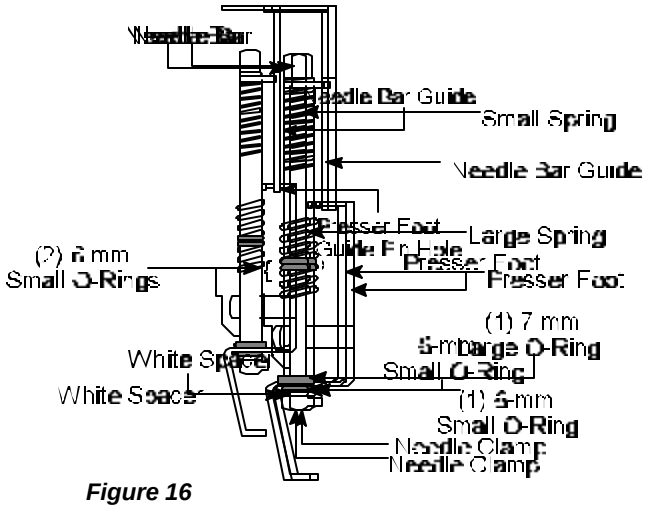


Figure 16

Figure 18 ***Figure 17***

28. **Insert** Needle Clamp onto Needle Bar and align set screw with bottom hole then snug set screw. *See Figure 18.*

If replaced needles 1-6 continue to ***Section C*** *to re-time the* ***Take-up Lever Assembly***

If ***Needle #7*** *was removed continue to* ***Section B*** *to replace the* ***Needle Bar Stopper Bracket.***

B. NEEDLE BAR STOPPER BRACKET REPLACEMENT

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

If the Stopper is WHITE- Proceed to Step 30.

If the Stopper is CLEAR- Proceed to Step 31.

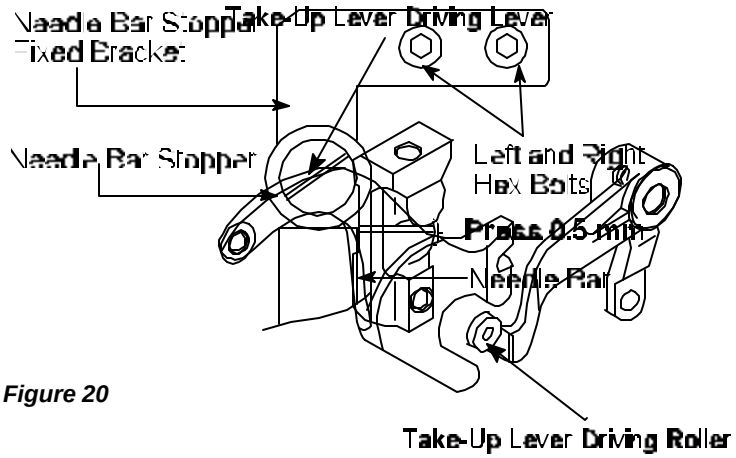


Figure 20

Figure 21

30. Take a business card width (0.5 mm), place between *white* stopper and top of Needle Bar Assembly then secure hex bolts. *See Figure 19.*

31. Press down on *clear* stopper approximately 0.5 mm to top of Needle Bar Assembly then secure hex bolts. *See Figure 20.*

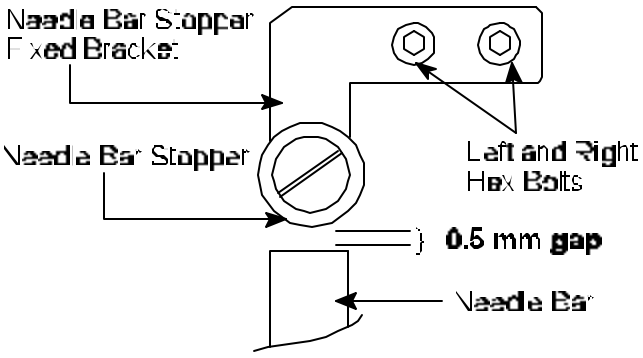


Figure 19

C. RE-TIMING TAKE-UP LEVER ASSEMBLY

32. **Manually rotate** Turret to **Needle #7.**

33. **Disengage** Needle Bar Driver**.**

34. **Align** Take-up Lever #7 in center of Take-up Lever Driving Roller. *See Figure 21.*

35. **Engage** Needle Bar Driver.

36. **Rotate** gangshaft so Take-up Lever is in its lowest position. (Using degree wheel rotate to 115 degrees).

37. Once Take-up Lever is in center of Take-up Lever Driving Roller, using 3 mm Allen Wrench, **tighten** timing screw. *See Figure 22*.

> **NOTE**: The Take-up Lever may be centered with Take-up Driving Roller on **Needle #7** but to check for accurate alignment you must also check **Needle #1.**

38. **Rotate** gangshaft to **Color Change Position**. (Rotate degree wheel to 235 degrees).

39. **Disengage** Needle Bar Driver.

40. **Manually rotate** Turret Assembly to **Needle #1**.

41. **Engage** Needle Bar Driver.

42. 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 degree wheel rotate to 115 degrees).

> **Note**: If gangshaft does not rotate freely there may not be enough clearance between the Take-up Lever and Take-up Driving Roller Arm. **Take-up Lever #7** may have to be adjusted slightly right of center to allow clearance for **Take-up Lever #1**.

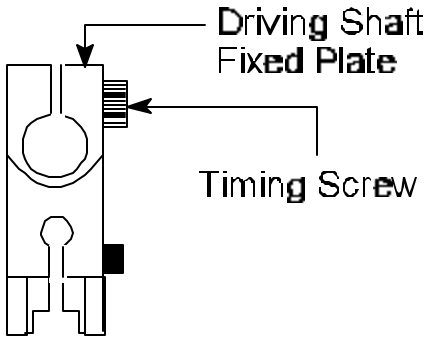


Figure 22

43. **Replace** Thread Apron. With both hands holding Thread Apron, insert right side first then follow through with left side. *See Figure 23.*

44. Using a Flathead Screwdriver, **replace** and **tighten** two set screws that secures the Thread Apron to Turret Assembly.

45. While using end of a Flathead Screwdriver, **push** Thread Support Pins back until flush with Thread Apron.

46. Using a 2.5 mm Allen Wrench, **tighten** seven Thread Support Clamp **hex socket screws**.

47. **Replace** Sewing Head Covers.

48. Using enclosed disk, **sew** the **"HOX" test** to check for proper adjustment.

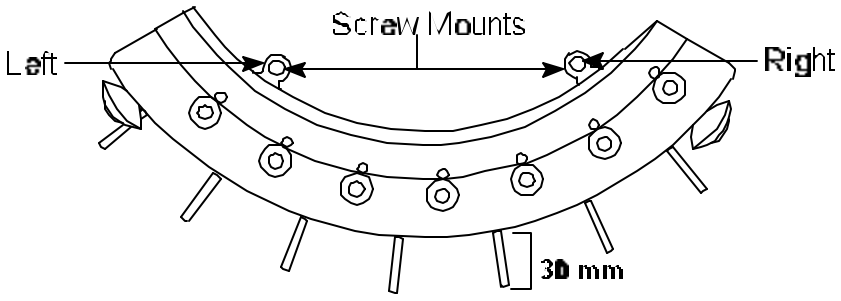


Figure 23

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

SYMPTOMS:

- < Improper Movement
- < Breaking Stitches

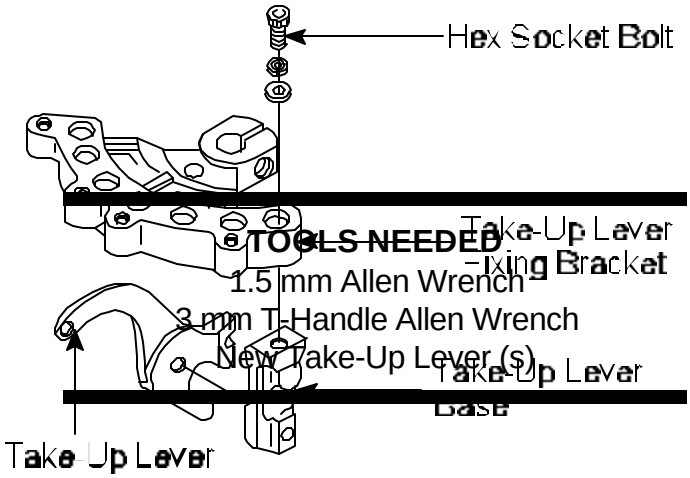


Figure 2

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

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.*

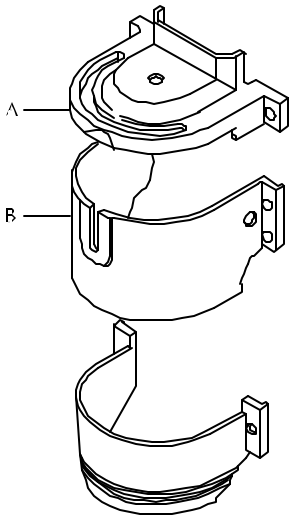


Figure 1

3. 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).

4. **Remove** damaged Take-Up Lever from Sewing Head.

5. Using a 1.5 mm Allen Wrench, **loosen** hex socket set screw. *See Figure 3.*

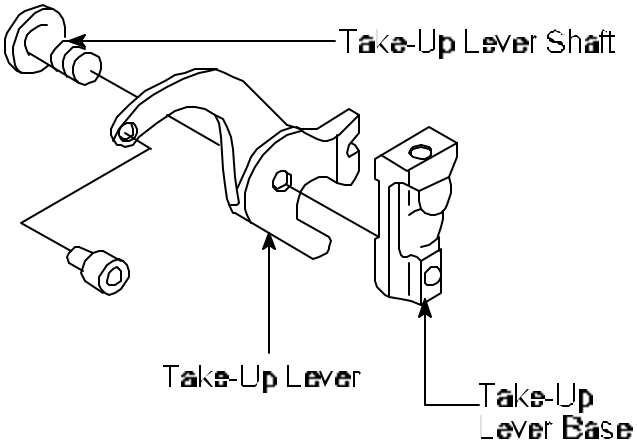


Figure 4

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

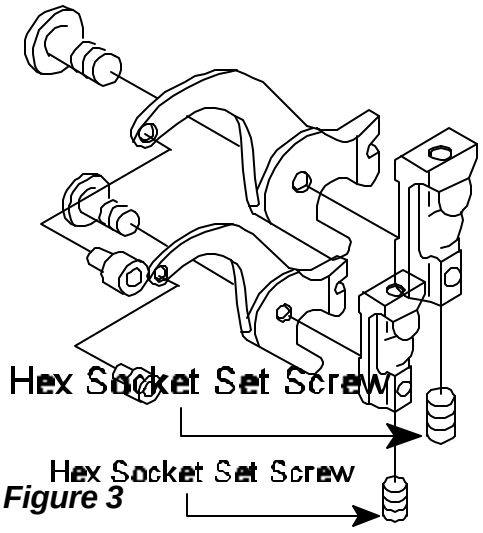


Figure 5

<u>Two ways to replace Take-Up Lever:</u>

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

Figure 3

or

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

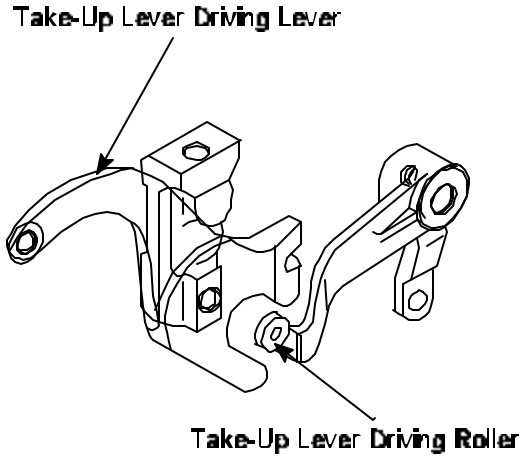


Figure 6

A. ALIGNING WITH TAKE-UP LEVER DRIVING ROLLER

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

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.*

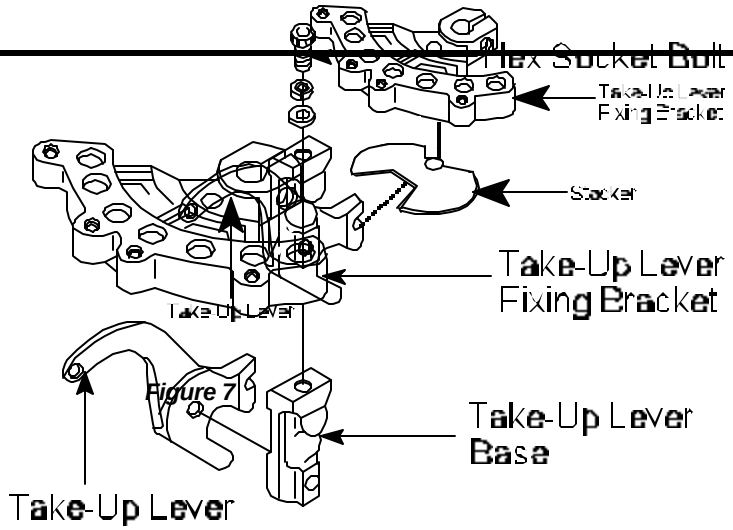


Figure 8

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*.

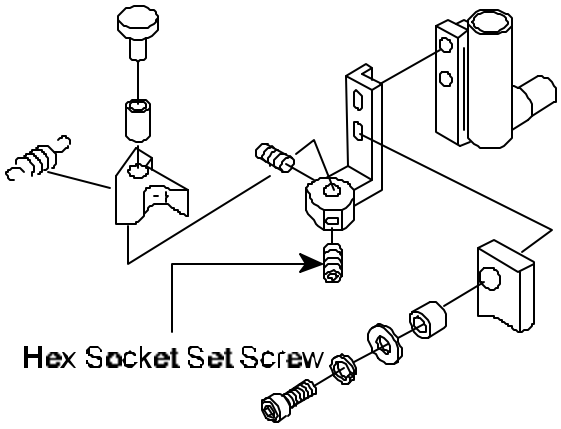


Figure 2

4. Using **Automat/Controller** position Sewing Heads to **Needle #7.**

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

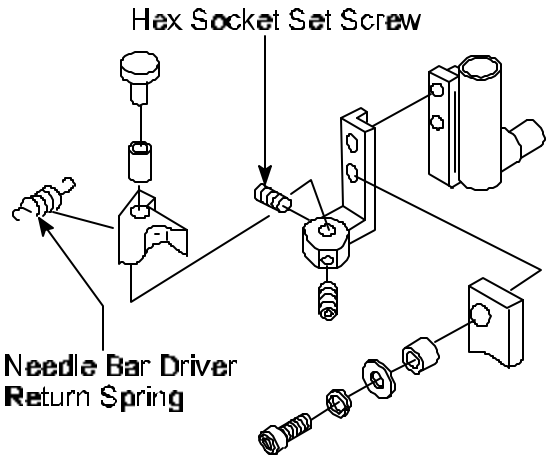


Figure 3

6. Using **Automat/Controller** position Sewing Heads to **Needle #1.**

7. **Remove** Needle Bar Driver Return Spring. *See Figure 3.*

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

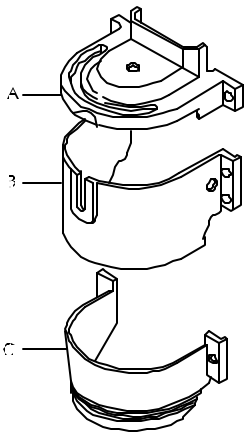
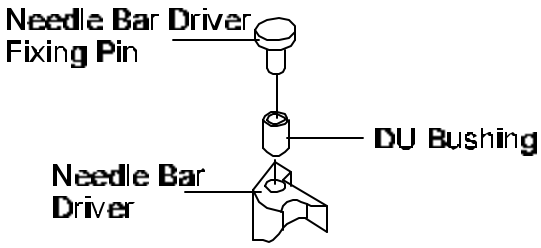


Figure 1

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



10. **Remove** Needle Bar Driver Fixing Bar Driver from Needle 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).

Figure 4

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.

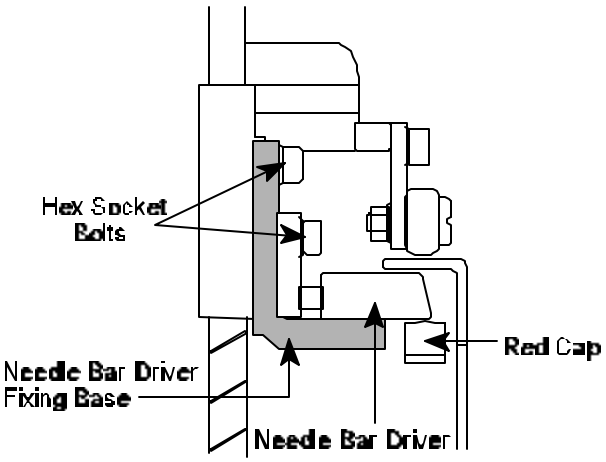


Figure 5

14. **Remove** Needle Bar Driver Fixing Base.

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

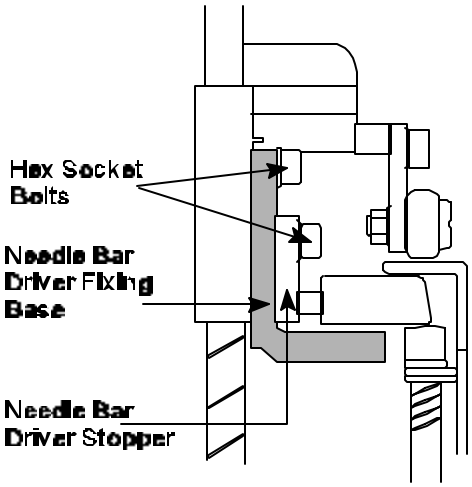


Figure 6

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.*

19. **Position** Needle Bar Driver Stopper on **new** Needle Bar Driver Fixing Base.

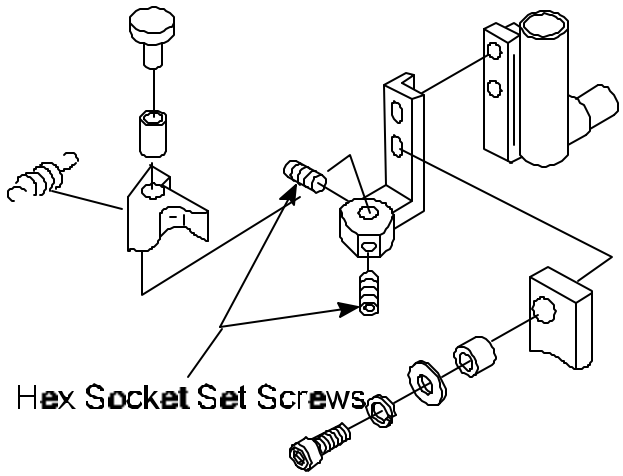


Figure 7

20. **Position** Needle Bar Driver Fixing Base to Needle Bar Driver Guide Block. *See Figure 8.*

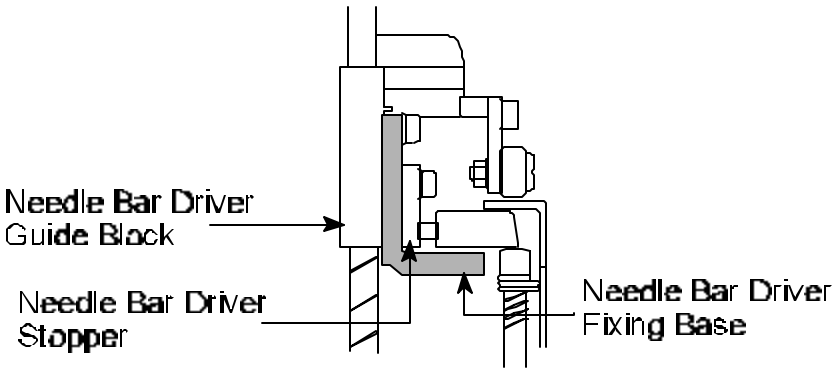


Figure 8

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

22. **Using** a 3 mm Allen Wrench, **install** Allen Screw (15 mm in length) into lower hole. (Do not tighten completely). *See Figure 9.*

23. **Attach** Needle Bar Driver Return Spring.

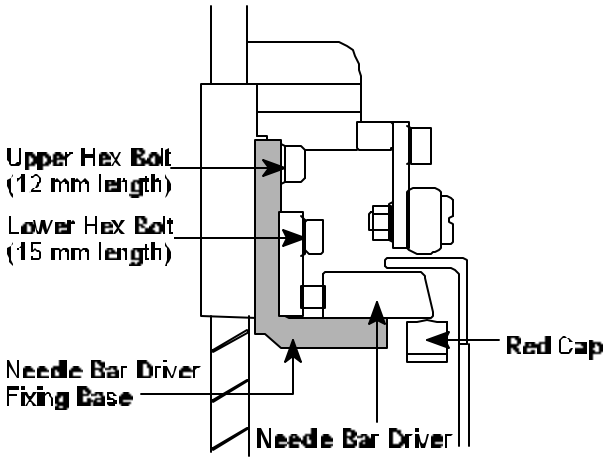


Figure 9

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

C. REPLACING NEEDLE BAR DRIVER

24. **Position** new Needle Bar Driver on new Needle Bar Driver Fixing Base.

25. **Replace** Needle Bar Driver Fixing Pin into **new** Needle Bar Driver.

26. **Using** a 2 mm Allen Wrench, **tighten** hex socket screw to secure Needle Bar Driver on Needle Bar Driver Fixing Base. *See Figure 10.*

27. **Attach** Needle Bar Driver Return Spring. *See Figure 10.*

28. **Using** Automat/Controller position Sewing Heads to **Needle #7.**

29. Tighten remaining hex socket set screw to secure Needle Bar Driver on Needle Bar Driver Fixing Base.

30. **Using** Automat/Controlle r position Sewing Heads to **Needle #1**.

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

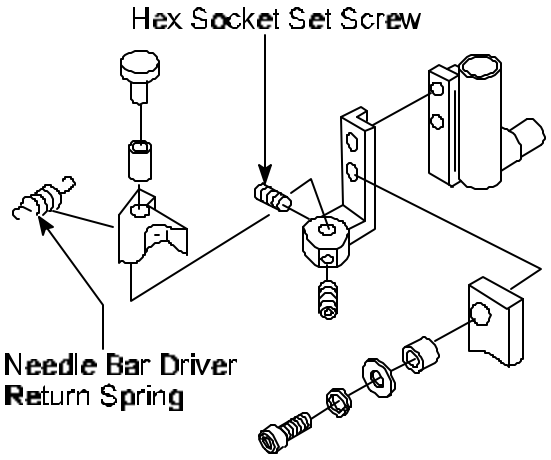


Figure 10

D. NEEDLE DEPTH ADJUSTMENT

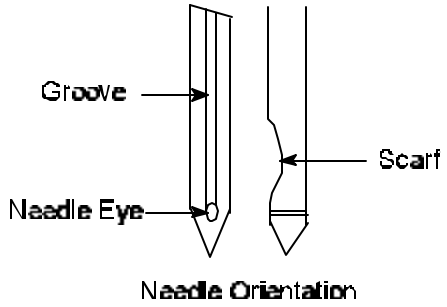


Figure 11

31. **Using** a Flathead Screwdriver, **remove** throat plate screws.

32. **Remove** throat plate.

33. **Remove** bobbin case from Hook Assembly.

34. Using **cleaning brush**, clean any thread debris or lint from hook area.

35. **Remove** thread from Needle #1.

36. Using Needle Screwdriver, **loosen** needle set screw.

37. **Remove** and **discard** old needle.

38. **Insert new needle** correctly. (Groove facing front and scarf is in back.)
See Figure 11.

39. Using Needle Screwdriver, **tighten** needle set screw.

40. **Engage** Needle Bar Driver.

41. 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**).

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

43. **Adjust** by moving down so ½ of needle basket. *See Figure* Needle Bar Driver up or eyelet is viewed in hook *13.*

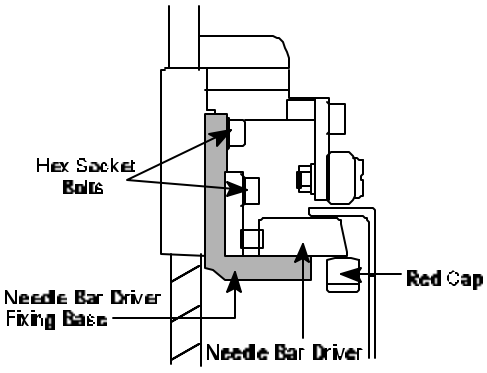


Figure 12

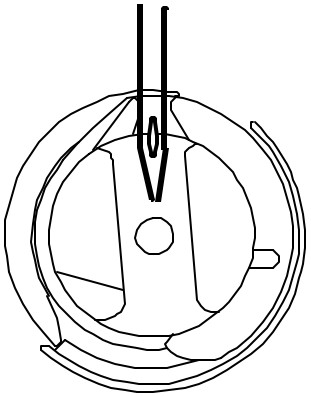


Figure 13

44. Using 3 mm Allen Wrench, **tighten** hex socket bolts to set Needle Bar Driver.

45. **Recheck** needle depth. (As bolts are tightened Needle Bar Driver may lower needle eyelet.)

46. **Rotate** gangshaft to **Color Change Position**. (Rotate degree wheel to 235 degrees)

47. **Reinstall** throat plate.

48. Using Flathead Screwdriver, **tighten** throat plate screws.

49. **Reinstall** bobbin case.

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

51. 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.

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
New Bevel Gear
Flashlight
Cleaning Brush
Permanent Marker

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.

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

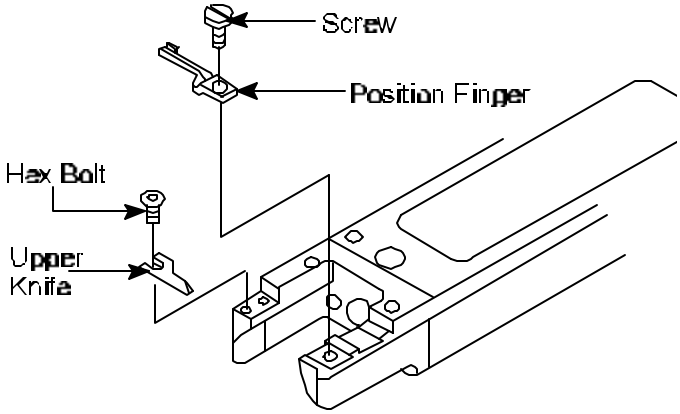
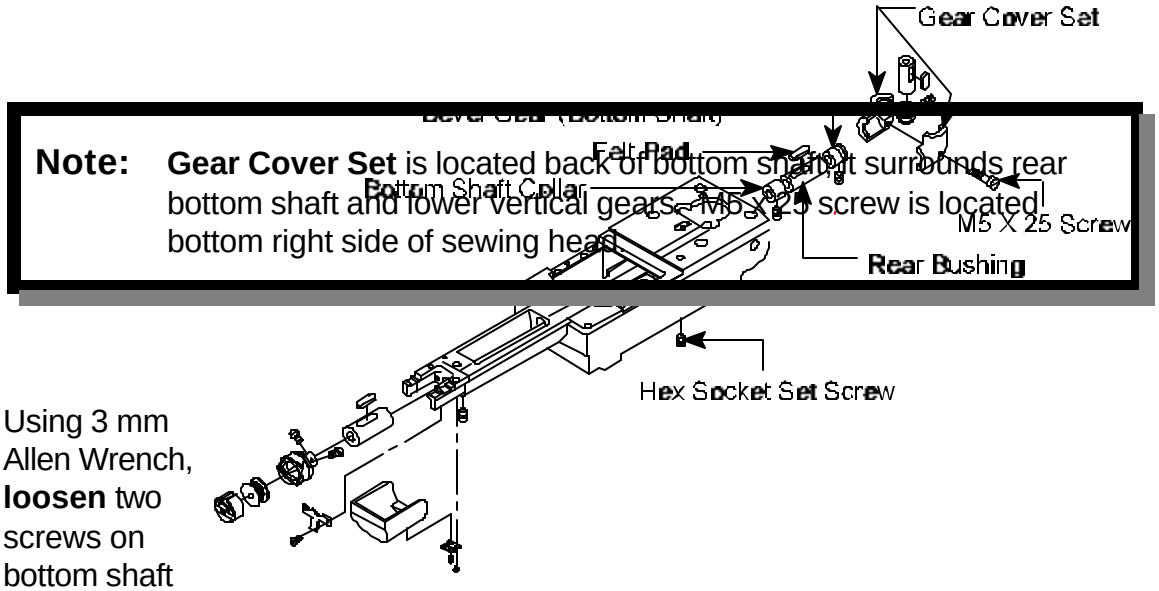


Figure 1

6. **Remove** Upper Knife (**MK 4** trimmer only apply). *See Figure 1.*
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.

13. Using a Flathead Screwdriver, **loosen** and **remove** M5 x 25 screw from Gear Cover Set (Grease Elbow). *See 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 located bottom right side of sewing head.

14. Using 3 mm Allen Wrench, **loosen** two screws on bottom shaft collar. *See Figure 2.*

Figure 2

15. 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 should rotate in the same manner when gears were apart.

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).

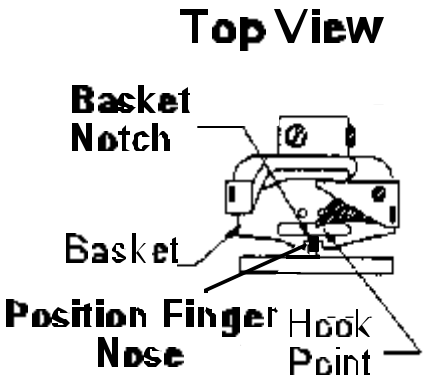
B. HOOK ASSEMBLY REPLACEMENT

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*.



46. Using Flathead Screwdriver, **tighten** Position Finger screw.

47. **Replace** Upper Knife (**MK 4** trimmer only apply). *Figure 3*

48. Using 2 mm Allen Wrench, **insert** hex bolt (**MK 4** trimmer only apply). (Do not tighten completely).

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

50. **Replace** Hook Driving Rod.

51. **Rotate** Hook Point to 9:00 position.

52. **Only tighten** set screw closest to Hook Point.

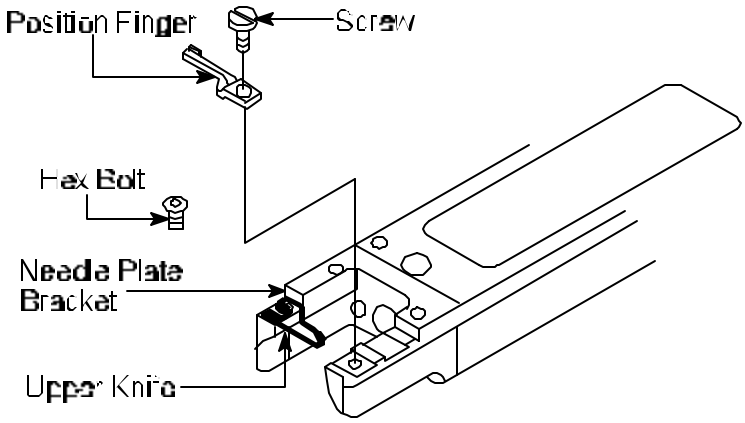


Figure 4

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 #7** 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. *See Figure 5.*

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.)

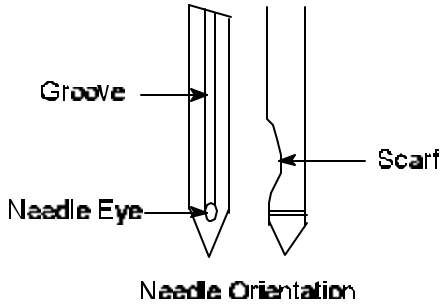


Figure 5

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).

63. Using Needle Screwdriver, **loosen** needle set screw.

64. **Rotate** needle to correct position. (Groove facing front and scarf is in back).
See Figure 6.

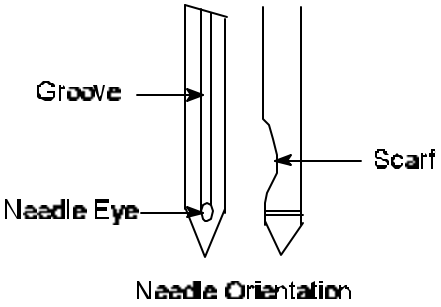


Figure 6

65. Using Needle Screwdriver, **tighten** needle set screw.

66. **Disengage** Needle Bar Driver.

67. **Manually** rotate Turret to **Needle #7**.

68. **Remove** thread from Needle #7.

69. Using Needle Screwdriver, **loosen** needle set screw.

70. **Insert** new needle, **groove** is facing **back** and **scarf** is in **front**.

71. Using Needle Screwdriver, **tighten** needle set screw.

72. **Engage** Needle Bar Driver.

73. **Rotate** gangshaft until **Hook Point** is behind needle. (Rotate degree wheel to 24 degrees).

74. 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 #7** then adjust Hook Point 0.5 mm away from needle.*

75. Using Flathead Screwdriver, **tighten** two remaining set screws (furthest from hook point).

76. **Rotate** gangshaft to **Color Change Position**. (Rotate degree wheel to 235 degrees).

77. Using Needle Screwdriver, **loosen** needle set screw.

78. **Rotate** needle to correct position. (Groove facing front and scarf is in back).

E. POSITION FINGER ADJUSTMENT

79. **Engage** Needle Bar Driver.

80. **Rotate** gangshaft until needle reaches it's lowest point, **Bottom Dead center**. (Rotate degree wheel to 0 degrees).

81. Using Flathead Screwdriver, **loosen** Position Finger screw.

82. **Move** Position Finger **left or right**, centering Position Finger Nose with needle. *See Figure 7.*

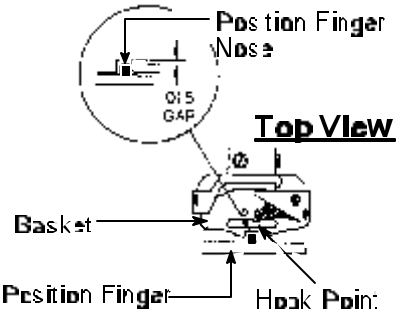
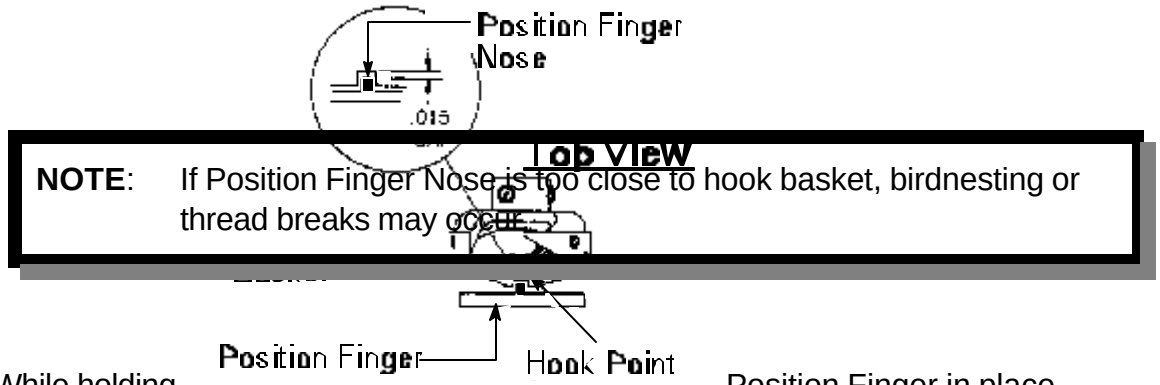


Figure 7

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

83. Move Position Finger Nose **forward or back** from hook basket allowing enough clearance for thread to pass between easily. *See Figure 8.*



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

Figure 8

84. While holding Position Finger in place, **tighten** Position Finger **screw**.

85. **Rotate** gangshaft to **Color Change Position**. (Rotate degree wheel to 235 degrees).

86. **Reinstall** throat plate.

87. Using Flathead Screwdriver, **tighten** throat plate screws.

88. **Reinstall** bobbin case in Hook Assembly.

89. Using enclosed disk, **sew** the **"HOX" test** to check for proper adjustment.

Take Up Lever Assembly

ITEM	LIST NO.	DESCRIPTION	QTY	MACPHERSON PART NO.
1	HB230100	Take up lever driving lever	1	RF30701
2	HB230320	Take up lever driving roller	1	RF40711
3	HB230331	Take up lever driving roller shaft	1	RF40712
4	HB230620	pan screw	3	- -
5	HB230110	Take up lever driving lever metal	1	RF30705
6	KF230500	Take up lever roller Assembly	1	RG80303
7	HB230080	Washer for cam (2)	1	RF30707
8	HB230070	Washer for cam (1)	1	RF30708
9	HB230061	Take up lever can - H6 (for small bobbin)	1	RF30709
	HB230491	Take up lever cam - J1 (for middle bobbin)	1	RF307091
10	HB230050	Take up lever cam base	1	RF30710
11	HB230020	Needle bar crank rod	1	RF30711
12	HB230340	Needle roller (8Q-K38X41X8.8)	1	RF30712
13	HB230011	Take up lever driving can (eccentric 9.2)	1	RF30713
14	HB230030	Bearing case	1	RF30714
15	A9010017	Ball bearing (6004ZZ)	1	RK2070500
16	A9012163	C-Ring i42	1	RF30716
17	HB210010	Arm	1	RF30717

18	HB230090	Take up lever driving lever fixing pin	1	RF30718
19	HB230040	Needle bar driving can set collar	1	RF30719
	HB240290	Thread guide plate (5)	1	RF407021
20	HB240180	Thread guide plate (7)	1	RF40702
ITEM	**LIST NO.**	**DESCRIPTION**	**QTY**	**MACPHERSON PART NO.**
21	HB240151	Thread guide fixing shaft (Upper)	2	RF30721
22	HB230291	Take up fixing bracket	1	RF50704
23	A9011152	Thrust needle bearing (WS1528)	1	RF40706
24	A9011021	Thrust bearing NTB01528	1	RC10205
25	HB230150	Driving shaft - Upper metal	1	RF30725
26	HB230481	Driving shaft	1	RF30726
27	HB230120	Take up lever guide	1	RF30727
28	HB230301	Take up lever base	Nx1	- -
29	HB230130	Take up lever	Nx1	RF30729
30	HB230310	Take up lever shaft	Nx1	RF30730
31	KF230580	Thread guide	Nx1	SM30111
32	HB240161	Thread guide fixing shaft (lower)	2	RF30732
33	HB240171	Thread hanger (7)	1	RF40718
	HB240280	Thread hanger (5)	1	RF407181
34	HB230160	Driving shaft set collar	1	RF40720
35		Hex, socket bolt - M4x8	1	- -
36		Hex, socket bolt - M5x18	1	- -
37		Hex, socket bolt - M4x15	1	- -
38		Cap bolt - M4x6	1	- -

39		Hex, socket bolt - M4x12	1	- -
40		Hex, socket set screw - M4x5	1	- -
41		Spring 8	1	- -
42		Hex, socket set sr\crew - M3x6	1	- -
43		Hex, socket bolt - M8x25		
44		Hex, nut - 7.32		
45		Hex, socket set screw - M4x4		
ITEM	**LIST NO.**	**DESCRIPTION**	**QTY**	**MACPHERSON PART NO.**
46		Hex, socket set screw - M5x10		
47		Hex, socket set screw - M4x8		
48	HB230650	Screw (with adhesion)	1	RF40735
49	HB230640	Take up lever drive lever Assembly	1	RF30748
50	HB230680	Take up lever Needle bar drive Assembly	1	RF30749
	HB230690	Take up lever Needle bar drive Assembly	1	- -
51	HB230710	Needle bar drive cam Assembly	1	RF30751

Needle Bar Jump Assembly

ITEM	LIST NO.	DESCRIPTION	QTY	MACPHERSON PART NO.
1	HB230260	Needle bar driver lever connecting pin	1	RF30901
2	HB230270	Needle bar driver lever fixed pin set collar	1	RF40721
3	HB230240	Needle bar driving lever	1	RF30903
4	HB230220	Needle bar driving pin (B)	1	RF30904
5	HB230350	Out side collar (OR11x14x10x2Px2)	2	RF30905
6	HB230360	Needle roller (8Q-K8x11x10)	2	RF30906
7	HB230280	Needle bar driving lever fixed pin collar	1	RF30907
8	HB230070	Needle bar driving lever fixed pin	1	RF30908
9	A9012164	Thrust washer (R-TW0815)	1	RF40729
10	HB230160	Driving shaft set collar	1	RF40720
11	HB230231	Needle bar driver block	1	RF30911
12	HB230200	Needle bar driving link	1	RF30912
13	HB230210	Needle bar driving pin (A)	1	RF30913
14	HB230371	Needle bar driver fixing base	1	RF30914
15	HB230414	Needle bar driver stopper	1	RF40912
16	HB230414	Needle bar driver stopper set collar	1	RF40911
17	HB230381	Needle bar spring	1	RF30917
18	HB230390	Needle bar driver	1	RF40903
19	HB230401	Needle bar spring	1	RF30919
20	A9012190	DU Bush (MB0606DU)	1	RF30920

21	A9011023	Thrust Bearing (GS1528)	2	RC10203
22	A9011021	Thrust bearing (NTB-1528)	1	RC10205
23	A9011022	Thrust washer (AS-1528)	1	RC10207
ITEM	**LIST NO.**	**DESCRIPTION**	**QTY**	**MACPHERSON PART NO.**
24	HB230140	Driving shaft lever metal	1	RF40933
25	HB230170	Driving shaft fixing plate	1	RF40913
26	KN231350	Needle bar cap	Nx1	RL11167
27	HB230531	Needle bar guide setting screw	Nx1	RF40915
28	HB230521	Needle bar guide	Nx1	RF40916
29	HB230510	Needle bar	Nx1	RF40917
30	HB230540	Needle bar spring (upper)	Nx1	RF40918
31	Kg230020	Pressure foot	Nx1	RG50007
32	KF230920	O-Ring (L)	Nx1	RC10191
33	KF230930	Washer	Nx1	SM30135
34	KF230230	Needle clamp	Nx1	SM30077
35	KF230340	Needle clamp screw (SM9/64)	Nx1	RC10193
36	KF230250	Needle (DBK5-11)	Nx1	SM30079
37	KN231700	Turret plate oil pad	1	RG80426
38	KF230210	Pressure foot spring	Nx1	SM30075
39	KF230910	O-Ring (S)	Nx3	SM30133
40	HB230550	Turret plate joint pin	1	RF40929
41	HB230441	Turret plate (UF)	1	RF40930
	HB230431	Turret plate (US)	1	RF409301
42	KF230670	Lock lever spring pin	1	RK0044000
43	HB230180	Lock lever bracket	1	RF30943

44	KL230280	Lock lever	1	RF30944
45	KF230661	Lock lever spring	1	RG80326
46	HB230190	Lock lever shaft	1	RF30946
47	KF230640	Lock connecting bar clamp	1	SM30129
48	HB240060	Cancel bracket	1	RF30948
49	HB240090	Cancel lod guide	1	RF40957
ITEM	**LIST NO.**	**DESCRIPTION**	**QTY**	**MACPHERSON PART NO.**
50	HB240080	Manual cancel pin	1	RF40958
51	HB240110	Cancel return spring	1	RF40952
52	HB240070	Cancel lod	1	RF40953
53	A9012051	E-Ring i6	1	RF40955
54	KC33040	Lock connecting lod (2M)	3	RY10311
55	KF330381	Lock bar hand grip	2	RA70501
56	A9056020	Rotary solenoid (3ER35-35x3x8x9L=45)	1	RF40945
57	HB240010	Jump solenoid fixing bracket	1	RF30957
58	HB230460	Needle bar stopper fixing pin	1	RF40942
59	HB230470	Needle bar stopper	1	RF40943
60	HB230450	Needle bar stopper fixing bracket	1	RF30960
61	HB240020	Jump solenoid lever	1	RF40950
62	HB240030	Jump solenoid lever pin	1	RF40951
63	KC330310 300	Turret plate connecting rod (L=250)	1	RG81128
64	A9012005	Uniball joint (RD4-020N)	1	RA70629
	A9012003	Uniball joint (RD4-020L)-final head	1	RA706292
65	HB240030	Eccentric collar	1	RF40948

66	HB240040	Stopper eccentric	1	RF40949
67	A9014051	O-Ring (P-5)	1	RF40954
68	HB230590	Screw for return spring	1	RF40902
69		Hex, nut - M4		- -
70		Hex, nut - M5		- -
71		Hex, socket set screw - M5x5		- -
72		Hex, socket set screw - M4x6		- -
73	A9012291	Parallel pin - i 5x14R	1	RF40928
74		Hex, socket bolt - M4x12		- -
ITEM	**LIST NO.**	**DESCRIPTION**	**QTY**	**MACPHERSON PART NO.**
75	A9012053	Hex, socket set screw - M6x0.75x8	2	RF40975
76		Hex, socket set screw - M5x10		- -
77		Hex, nut - M6		- -
78		Hex, socket bolt - M8x18		- -
79		Hex, socket set screw - M6x15		- -
80		Hex, socket bolt - M4x8		- -
81		Hex, socket set screw - M4x4		- -
82		Hex, socket bolt - M4x15		- -
83		Hex, socket bolt - M4x10		- -
84		Hex, socket bolt - M5x18		- -
85	HB230700	Needle bar drive lever Assembly	1	RF30986
86	HB230570	Needle bar drive Assembly	1	RF40980
87	HB230600	Turret plate Assembly (YS)	1	RF40983
	HB230610	Turret plate Assembly (YF)	1	RF409831

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