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

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](image)

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.*

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.*
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).
22. **Reinstall** throat plate.

23. Using Flathead Screwdriver, **tightly** 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”

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.

TOOLS NEEDED
2 mm Allen Wrench
Flathead Screwdriver
Needle Screwdriver
Offset Screwdriver
Flashlight
New Needles
Cleaning Brush
Emery/Crocus Cloth
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 **remove** Upper Knife (MK 4 trimmer only apply). See Figure 1.

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

11. Using a **remove** screw. Flathead Screwdriver, 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).

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

23. Using Flathead Screwdriver, **tightly** 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](image)

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.*

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.*
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).

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.

If hook point needs adjustment proceed to Step 36.

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

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

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

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).


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.

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.


4. Move Position Finger left or right, centering Position Finger Nose with needle. See Figure 1.

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

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

PROCEDURE:

A. NEEDLE BAR REPLACEMENT


2. Disengage Needle Bar Driver.

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

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

*Figure 5*
11. **Move** Presser Foot down to its lowest position and **remove** 7 mm O-ring. 
   *See Figure 6.*

![Figure 6](image)

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](image)

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](image_url)

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.

24. Press down on clear stopper approximately 0.5 mm to top of Needle Bar Assembly then secure hex bolts. See 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](image)

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.

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.

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
3. **Pull** thread keep lever forward to disengage thread apron clamps.  
*See Figure 1.*

![Figure 1](image1.png)

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

![Figure 2](image2.png)

5. **Rotate** *Figure 3* 
**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](image3.png)

**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](image4.png)
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. **Pull** out Thread Support amp enough to grasp ead Support Pin with edle Nose Pliers.

    ![Figure 5](image-url)
11. Carefully pull Thread Support Pin out approximately 30 mm enough to clear Turret Assembly. (If pin is pulled out too far, clamp and spring will fall out.) See Figure 6.

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

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 hole which enables Thread Apron to be removed and replaced easily without breaking.) See Figure 8.

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 and **remove** 7 mm O-ring. See Figure 10.

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

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

**Figure 9**

**Figure 10**
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.*
22. While holding new Presser Foot in one hand slide Needle Bar through top opening. See Figure 13.

23. **Position** Presser Turret Assembly.

24. Continue inserting Needle Bar through Turret Assembly.

25. \( \frac{1}{2} \) inch Assembly O-Ring. See Figure 15.

**NOTE:** If inserting Needle Bar #7 reinstall in same manner it was removed in Step 17's Note.
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.*

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.

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 approximately 0.5 mm to top Assembly then secure hex bolts. See Figure 20.

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](image_url)
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.
**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

**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.

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.

*Figure 1*

*Figure 2*
5. Using a 1.5 mm Allen Wrench, **loosen** hex socket set screw. *See Figure 3.*

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. *Figure 4*

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.*

*Two ways to replace Take-Up Lever:*

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

*Figure 5*
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 Lever Driving Roller.

    See Figure 6.

    **Figure 6**

    **Take-Up Lever Driving Lever**

    **Take-Up Lever Driving Roller**

    **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.

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 position Sewing

3. Using remove 6 screws and Covers. See Figure

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

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

6. Using position Sewing Heads

7. Remove Return Spring. See

8. Using a 2 mm Allen Wrench, remaining hex screw. See Figure 3.

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

14. Remove Needle Bar Driver Fixing Base.

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


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.
20. **Position** Needle Bar Driver Fixing Base to Needle Bar Driver Guide Block.  
   *See 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 Screw lower hole. (Do not tighten completely).  *See Figure 9.*

23. **Attach** Needle Bar Driver Return Spring.  
   Proceed to **Section D Needle** Depth **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, **tightly** 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/Controller position Sewing Heads to **Needle #1**.

*Proceed to Needle Depth*

*Figure 10*
D. NEEDLE DEPTH ADJUSTMENT

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.


37. Remove and discard old needle.

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


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 12*

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.

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
- New Bevel Gear
- Flashlight
- Cleaning Brush
- Permanent Marker
5. Using 2 mm Allen Wrench, **remove** Upper Knife hex bolt (**MK 4** trimmer only apply). *See Figure 1.*

6. **Remove** Upper trimmer only *Figure 1.*

7. Using Flathead **remove** Position Finger screw. *Figure 1.*

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.*

![Figure 2](image)

**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.*

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, **tightly** 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** gan shaft (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** gan shaft 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 is aligned with Position Finger Nose. **See Figure 3**

46. Using Flathead Screwdriver, **tightly** Position Finger Nose.

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

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.*

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](image-url)

**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.*

![Figure 8](image)

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

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

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

86. **Reinstall** throat plate.

87. Using Flathead Screwdriver, **tightly** 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

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# Needle Bar Jump Assembly

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