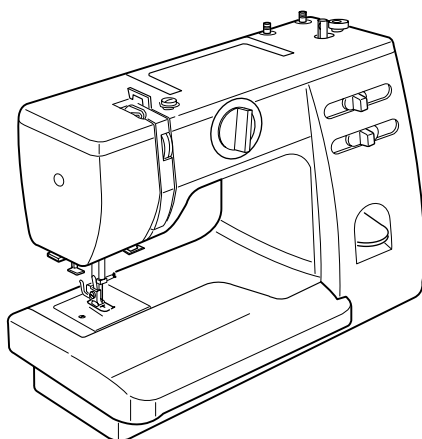
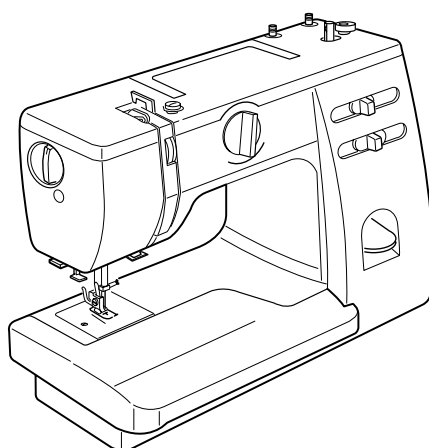


SERVICING MANUAL



415



419S/423S

TROUBLESHOOTING

PROBLEM	CAUSE	REMEDY	REFERENCE
1. SKIPPING STITCHES	1. NEEDLE IS NOT INSERTED PROPERLY.	INSERT THE NEEDLE PROPERLY.	P. 15 P. 16 P. 12, 13
	2. NEEDLE IS BENT OR WORN.	CHANGE THE NEEDLE.	
	3. INCORRECTLY THREADED	RETHREAD.	
	4. NEEDLE OR THREAD ARE INAPPROPRIATE FOR FABRIC BEING SEWN.	USE THE RECOMMENDED SEWING NEEDLE AND THREAD.	
	5. SEWING ON STRETCH FABRIC	USE A #11 BLUE TIP NEEDLE.	
	6. INAPPROPRIATE NEEDLE BAR HEIGHT	SEE MECHANICAL ADJUSTMENT "NEEDLE BAR HEIGHT."	
	7. INAPPROPRIATE NEEDLE TO HOOK TIMING	SEE MECHANICAL ADJUSTMENT "NEEDLE TIMING TO SHUTTLE."	
	8. INAPPROPRIATE NEEDLE TO HOOK CLEARANCE	SEE MECHANICAL ADJUSTMENT "CLEARANCE BETWEEN NEEDLE AND HOOK."	
2. FABRIC NOT MOVING	1. INCORRECT FEED DOG HEIGHT	SEE MECHANICAL ADJUSTMENT "FEED DOG HEIGHT."	P. 14
	2. THREAD ON BOTTOM SIDE OF FABRIC IS JAMMED UP.	MAKE SURE TO BRING BOTH NEEDLE AND BOBBIN THREAD UNDER THE FOOT WHEN STARTING SEWING.	
	3. FEED DOG TEETH ARE WORN.	CHANGE THE FEED DOG.	

PROBLEM	CAUSE	REMEDY	REFERENCE
3. BREAKING UPPER THREAD	1. INITIAL SEWING SPEED IS TOO FAST. 2. THREAD PATH IS INCORRECT. 3. NEEDLE IS BENT OR DULL. 4. UPPER THREAD TENSION IS TOO STRONG. 5. NEEDLE SIZE IS INAPPROPRIATE FOR FABRIC. 6. NEEDLE EYE IS WORN. 7. NEEDLE HOLE IN NEEDLE PLATE IS WORN OR BURRED.	START WITH MEDIUM SPEED. USE THE PROPER THREAD PATH. REPLACE WITH A NEW NEEDLE. ADJUST UPPER THREAD TENSION CORRECTLY. USE APPROPRIATE NEEDLE AND THREAD FOR FABRIC IN USE. CHANGE THE NEEDLE. REPAIR THE HOLE OR REPLACE THE NEEDLE PLATE.	P. 7
4. BREAKING BOBBIN THREAD	1. INCORRECTLY THREADED BOBBIN CASE. 2. TOO MUCH THREAD IS WOUND ON THE BOBBIN. 3. LINT IS STUCK INSIDE THE HOOK RACE. 4. THREAD QUALITY IS TOO LOW. 5. THREAD IS JAMMING AROUND THE BOBBIN. 6. BOBBIN THREAD TENSION IS TOO STRONG.	THREAD BOBBIN CASE CORRECTLY. ADJUST THE POSITION OF STOPPER. CLEAN THE HOOK RACE. CHANGE TO A HIGH QUALITY SEWING THREAD. CLEAR OUT THE JAMMING THREAD. ADJUST BOBBIN THREAD TENSION CORRECTLY.	P. 8
5. NEEDLE BREAKS	1. NEEDLE IS HITTING THE NEEDLE PLATE. 2. NEEDLE IS BENT OR WORN. 3. NEEDLE IS HITTING THE HOOK RACE. 4. THE FABRIC MOVES WHILE THE NEEDLE IS PIERCING IT, OR THE NEEDLE ZIGZAGS WHILE IN FABRIC. 5. FABRIC IS BEING PULLED TOO STRONGLY WHILE SEWING.	SEE MECHANICAL ADJUSTMENT "NEEDLE DROP." CHANGE THE NEEDLE. SEE MECHANICAL ADJUSTMENT "CLEARANCE BETWEEN NEEDLE AND HOOK." SEE MECHANICAL ADJUSTMENT "NEEDLE SWING." GUIDE THE FABRIC GENTLY WHILE SEWING.	P. 11 P. 12, 13 P. 10

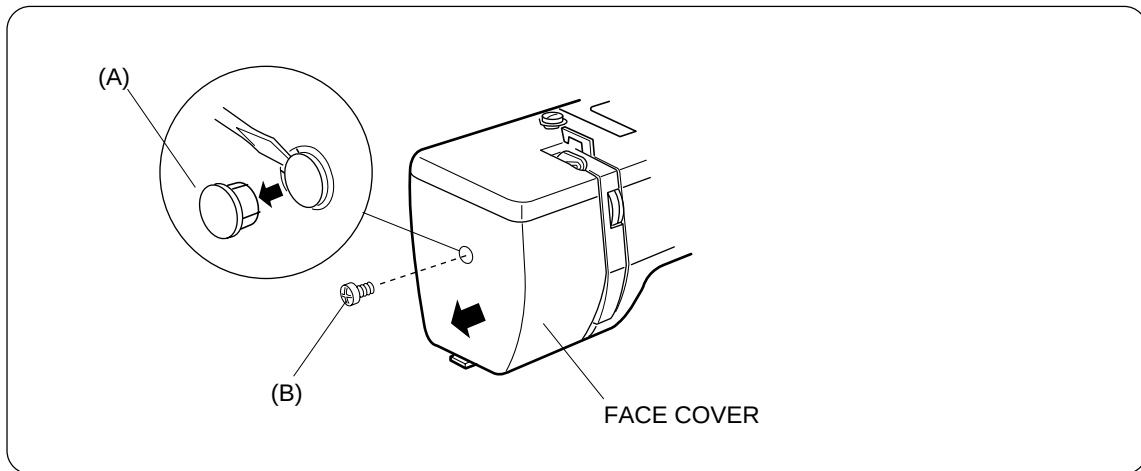
PROBLEM	CAUSE	REMEDY	REFERENCE
6. NOISY OPERATION	1. BACKLASH BETWEEN SHUTTLE HOOK GEAR AND LOWER SHAFT GEAR IS TOO GREAT.	SEE MECHANICAL ADJUSTMENT "CLEARANCE BETWEEN NEEDLE AND HOOK (NO. 2)."	P. 13
	2. LOWER SHAFT GEAR IS LOOSE.	ELIMINATE THE LOOSENESS.	
	3. INAPPROPRIATE BELT TENSION.	SEE MECHANICAL ADJUSTMENT "MOTOR BELT TENSION."	P. 24
	4. UPPER SHAFT WORM IS LOOSE.	ELIMINATE THE LOOSENESS.	
	5. NOT ENOUGH OIL.	OIL ALL MOVING PARTS.	
7. DEFORMATION OF PATTERN	1. INAPPROPRIATE ZIGZAG SYNCHRONIZATION.	SEE MECHANICAL ADJUSTMENT "NEEDLE SWING."	P. 10
	2. INAPPROPRIATE DISENGAGEMENT OF CAM FOLLOWER.	SEE MECHANICAL ADJUSTMENT "DISENGAGEMENT OF CAM FOLLOWER."	P. 20
	3. UPPER THREAD TENSION IS TOO STRONG.	ADJUST UPPER THREAD TENSION CORRECTLY.	P. 7
	4. INAPPROPRIATE FEED BALANCE	SEE MECHANICAL ADJUSTMENT "FEED BALANCE ON STRETCH STITCH."	P. 18

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SERVICE ACCESS

FACE COVER



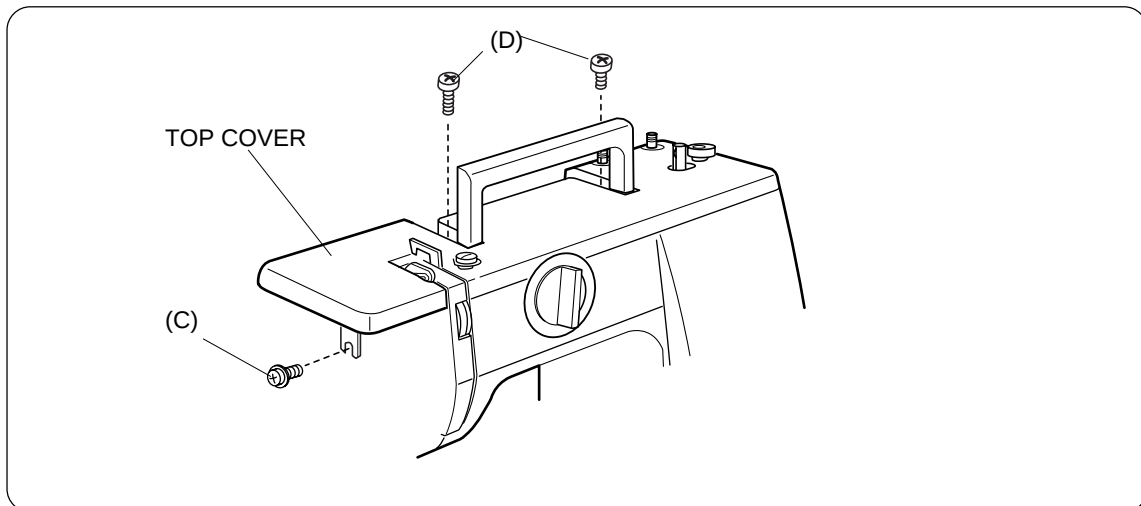
(TO REMOVE)

1. REMOVE THE FACE COVER BY REMOVING THE CAP (A) AND SCREW (B).

(TO ATTACH)

2. ATTACH THE FACE COVER WITH THE SCREW, AND THEN, REPLACE THE CAP.

TOP COVER



(TO REMOVE)

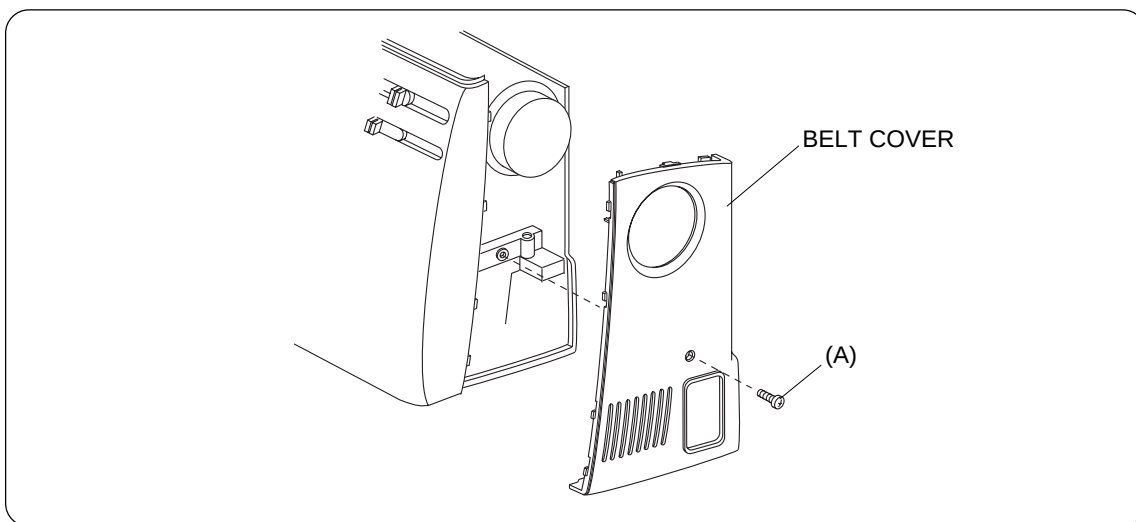
1. REMOVE THE FACE COVER.
2. LOOSEN THE SETSCREW (C) AND REMOVE SETSCREWS (D).
3. REMOVE THE TOP COVER.

(TO ATTACH)

4. FOLLOW THE ABOVE PROCEDURE IN REVERSE.

SERVICE ACCESS

BELT COVER

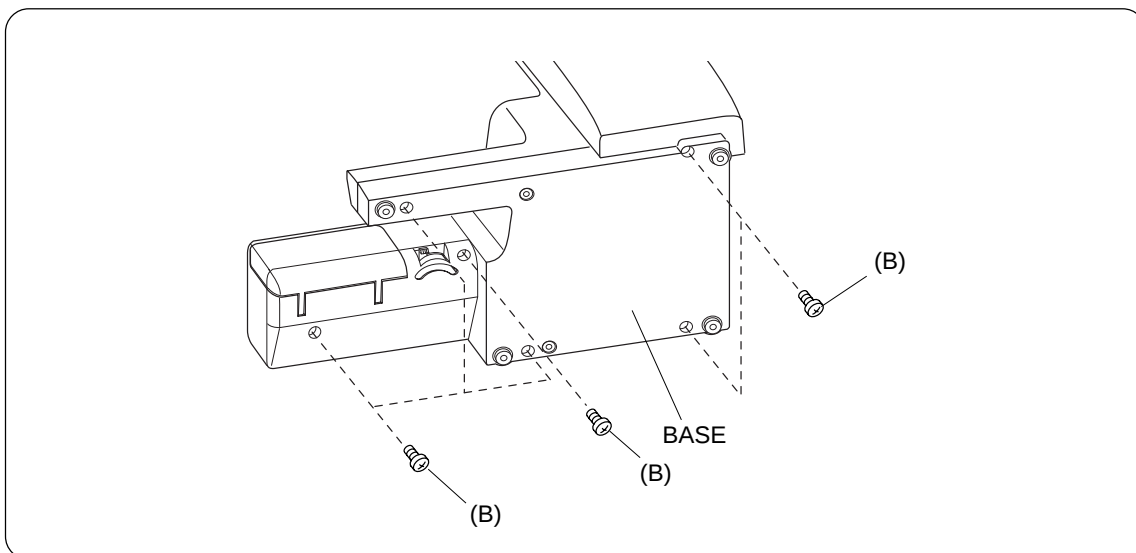


1. REMOVE THE FACE COVER AND TOP COVER (SEE PAGE 4).
2. LOOSEN SCREW (A).
3. TAKE THE BELT COVER OUT.

(TO ATTACH)

4. FOLLOW THE ABOVE PROCEDURE IN REVERSE.

BASE



(TO REMOVE)

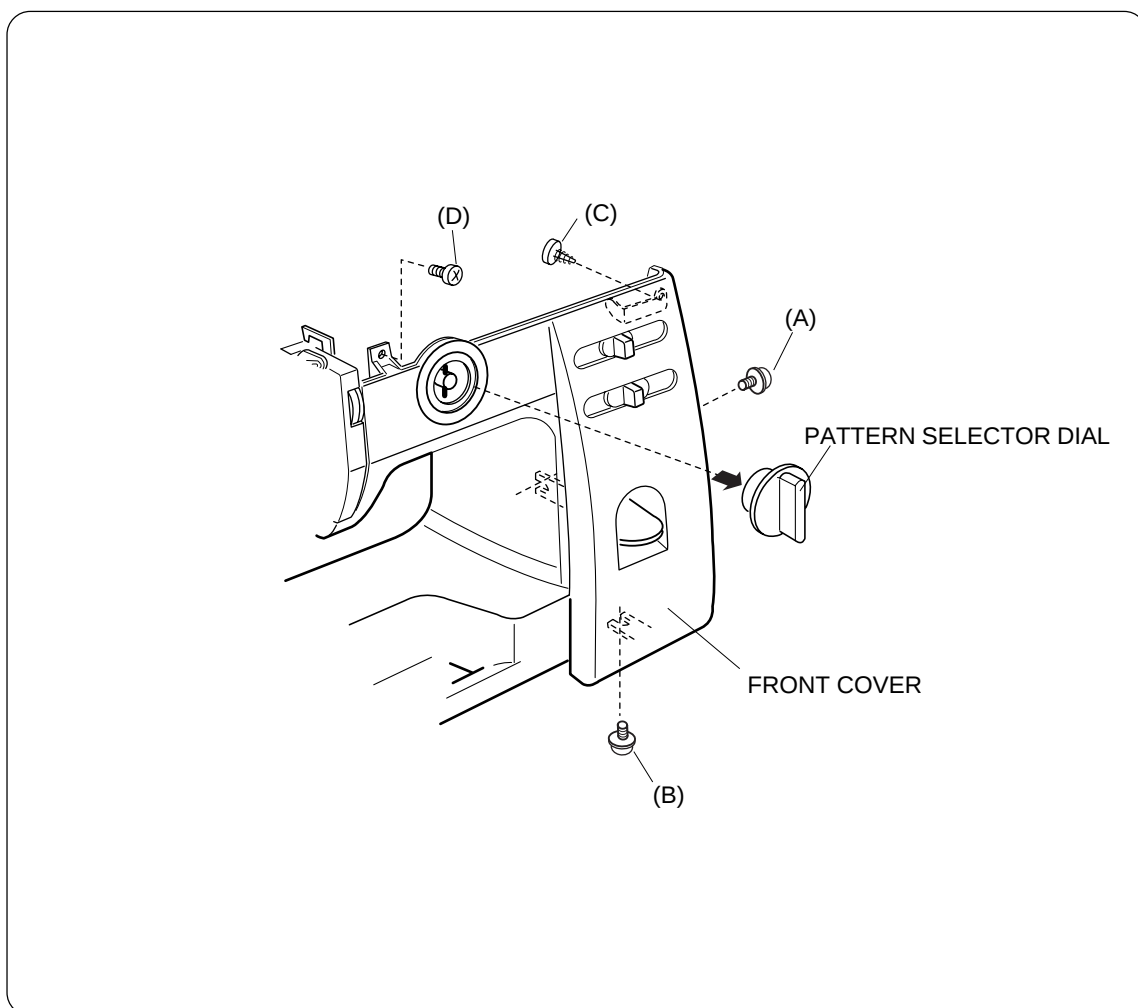
1. REMOVE THE FACE COVER, TOP COVER (SEE PAGE 4) AND BELT COVER.
2. REMOVE 6 SCREWS (B).
3. REMOVE THE BASE.

(TO ATTACH)

4. FOLLOW THE ABOVE PROCEDURE IN REVERSE.

SERVICE ACCESS

FRONT COVER



(TO REMOVE)

1. REMOVE THE FACE COVER, TOP COVER, BELT COVER AND BASE (SEE PAGES 4-5).
2. REMOVE THE PATTERN SELECTOR DIAL.
3. LOOSEN SETSCREWS (A) AND (B), AND THEN, REMOVE THE FRONT COVER BY REMOVING SETSCREWS (C) AND (D).

(TO ATTACH)

4. FOLLOW THE ABOVE PROCEDURE IN REVERSE.

MECHANICAL ADJUSTMENT

TOP TENSION

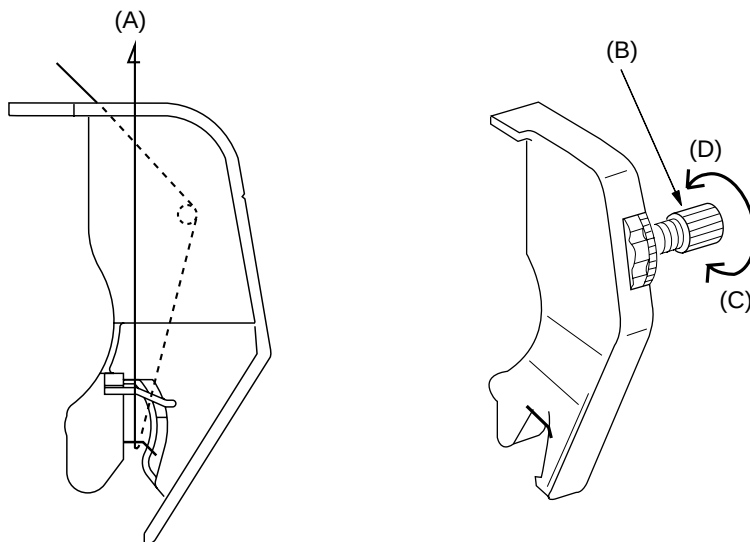
TO CHECK:

THE STANDARD UPPER THREAD TENSION SHOULD BE 65–95 g WHEN PULLING THE THREAD (COTTON THREAD #50) IN THE DIRECTION OF (A) WITH THE TENSION DIAL AT “3.” (MAKE SURE THE FOOT IS LOWERED.)

IF THE TENSION IS OUT OF THE STANDARD RANGE, ADJUST IT AS FOLLOWS:

ADJUSTMENT PROCEDURE:

1. REMOVE THE TOP COVER (SEE PAGE 4).
2. TURN THE ADJUSTING NUT (B) IN THE DIRECTION OF (C) WHEN THE UPPER THREAD TENSION IS TOO TIGHT.
TURN THE ADJUSTING NUT (B) IN THE DIRECTION OF (D) WHEN THE UPPER THREAD TENSION IS TOO LOOSE.
3. ATTACH THE TOP COVER.



MECHANICAL ADJUSTMENT

BOBBIN TENSION

TO CHECK:

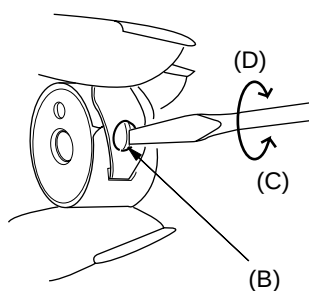
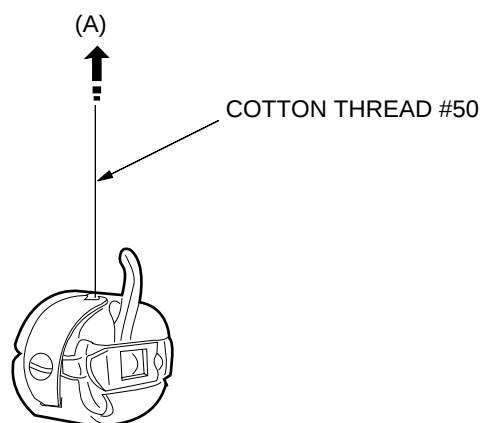
SET THE BOBBIN IN THE BOBBIN CASE AND PASS THE THREAD (COTTON #50) THROUGH THE TENSION SPRING.

THE BOBBIN THREAD TENSION SHOULD BE 45–55g WHEN PULLING THE THREAD IN THE DIRECTION OF (A).

IF THE TENSION IS OUT OF THIS RANGE, ADJUST IT AS FOLLOWS:

ADJUSTMENT PROCEDURE:

1. IF THE BOBBIN THREAD TENSION IS TOO TIGHT, TURN THE ADJUSTING SCREW (B) IN THE DIRECTION OF (C).
2. IF THE BOBBIN THREAD TENSION IS TOO LOOSE, TURN THE ADJUSTING SCREW (B) IN THE DIRECTION OF (D)



MECHANICAL ADJUSTMENT

PRESSER BAR HEIGHT AND ALIGNMENT

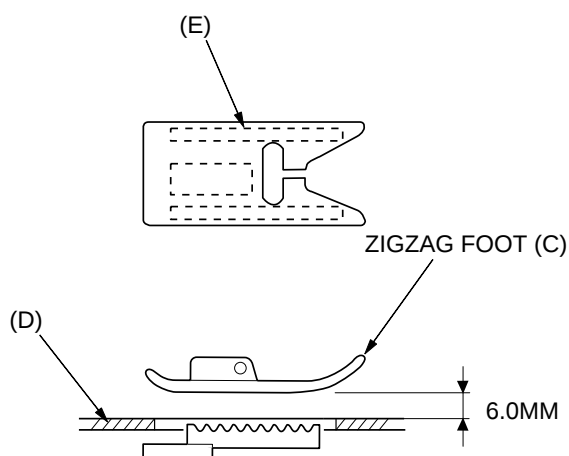
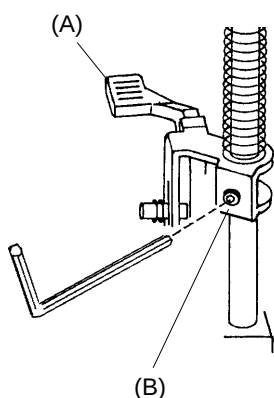
TO CHECK:

1. RAISE THE PRESSER FOOT LEVER (A).
2. THE DISTANCE BETWEEN THE PRESSER FOOT (C) AND THE NEEDLE PLATE (D) SHOULD BE 6.0 MM (0.24").

ADJUSTMENT PROCEDURE:

1. REMOVE THE FACE COVER (SEE PAGE 4).
2. RAISE THE PRESSER FOOT LEVER AND LOOSEN THE SCREW (B) ON THE PRESSER BAR HOLDER.
ADJUST THE DISTANCE BETWEEN THE ZIGZAG FOOT (C) AND THE NEEDLE PLATE (D) TO 6.0 MM (0.24").
3. TIGHTEN THE SCREW (B) SECURELY.
4. ATTACH THE FACE COVER.

NOTE: WHEN YOU TIGHTEN THE SCREW (B), MAKE SURE THAT BOTH SIDES OF THE PRESSER FOOT ARE PARALLEL TO THE FEED DOG SLOTS (E) ON THE NEEDLE PLATE.



MECHANICAL ADJUSTMENT

NEEDLE SWING

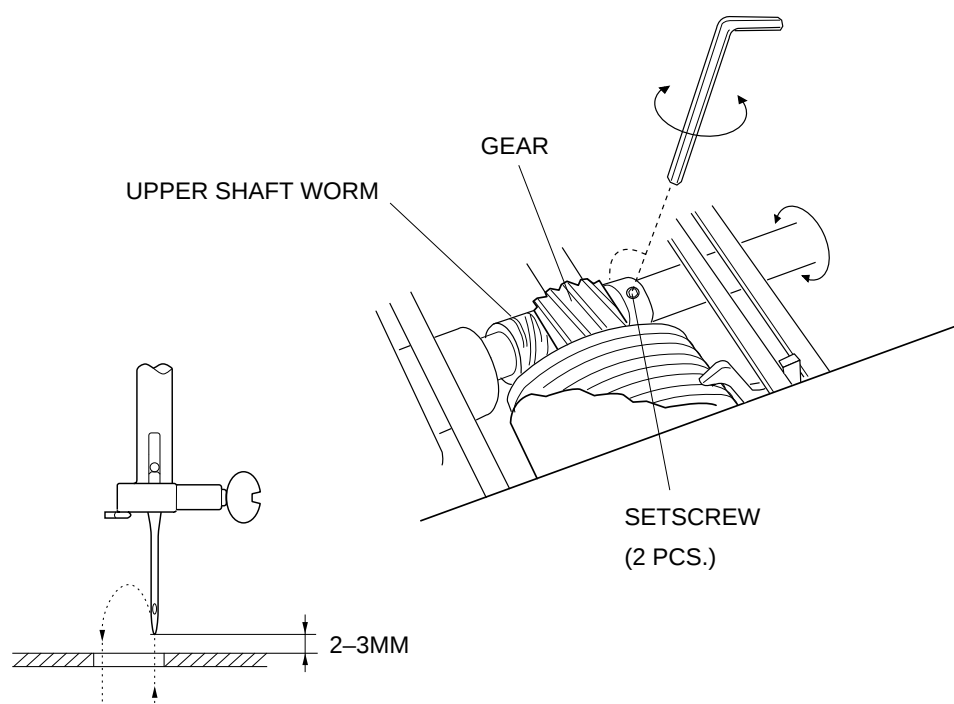
TO CHECK:

WHEN SEWING THE ZIGZAG PATTERN (WITH MAXIMUM ZIGZAG WIDTH), IF THE NEEDLE BAR STARTS MOVING SIDEWAYS WHILE THE NEEDLE IS IN THE FABRIC, ADJUST THE NEEDLE SWING ACCORDING TO THE FOLLOWING PROCEDURE.

ADJUSTMENT PROCEDURE:

1. SET THE PATTERN SELECTOR DIAL WITH MAXIMUM ZIGZAG WIDTH, AND REMOVE THE TOP COVER (SEE PAGE 4).
2. LOOSEN THE TWO SETSCREWS.
3. ADJUST THE NEEDLE SWING BY TURNING THE HANDWHEEL, WHILE HOLDING THE WORM SO AS NOT TO ROTATE IT, UNTIL THE NEEDLE SWING STARTS AT 2–3 MM ABOVE THE NEEDLE PLATE AFTER THE NEEDLE HAS COME OUT OF THE RIGHT SIDE OF THE NEEDLE PLATE HOLE.
4. TIGHTEN TWO SETSCREWS.
5. ATTACH THE TOP COVER.

NOTE: AFTER ADJUSTING THE NEEDLE SWING, CHECK THAT THE UPPER SHAFT WORM AND GEAR ROTATE SMOOTHLY WITHOUT ANY BACKLASH BETWEEN THEM.



MECHANICAL ADJUSTMENT

NEEDLE DROP

TO CHECK:

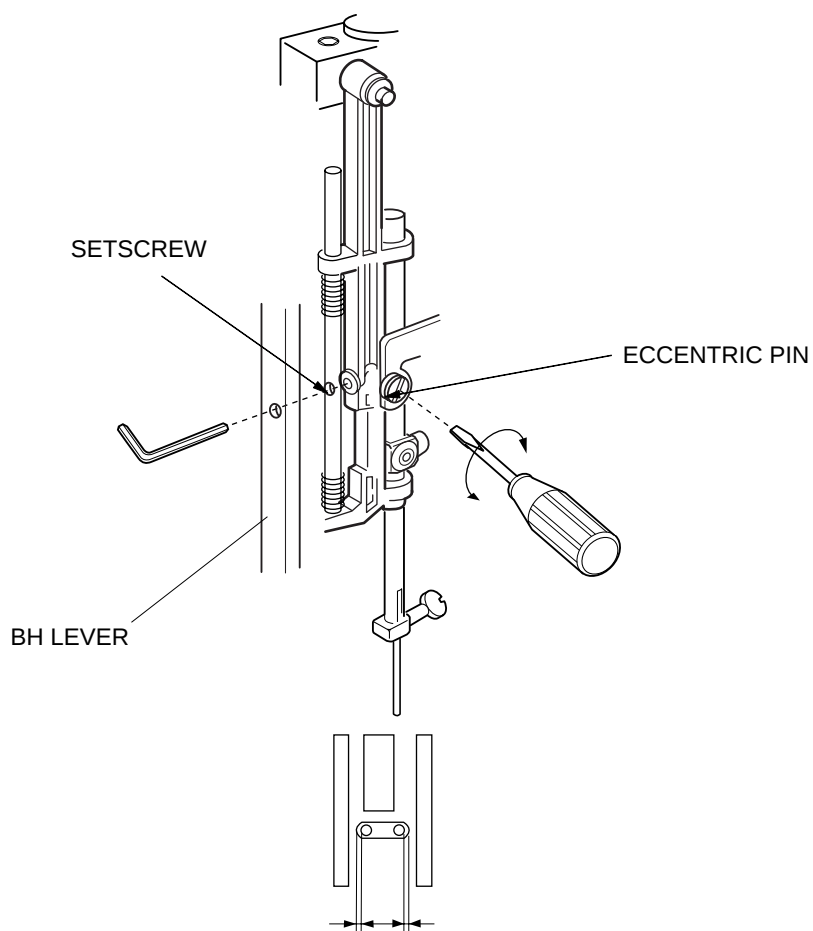
WHEN THE NEEDLE SWINGS IN MAXIMUM ZIGZAG WIDTH, THE DISTANCE BETWEEN BOTH ENDS OF THE NEEDLE HOLE ON THE NEEDLE PLATE AND THE NEEDLE DROP POSITIONS SHOULD BE EQUAL.

IF NOT, ADJUST AS FOLLOWS:

ADJUSTMENT PROCEDURE:

1. REMOVE THE FACE COVER (SEE PAGE 4).
2. SET THE PATTERN SELECTOR DIAL AT MAXIMUM ZIGZAG WIDTH.
3. LOOSEN THE SETSCREW.
4. TURN THE ECCENTRIC PIN TO ADJUST THE NEEDLE DROP.
5. TIGHTEN THE SETSCREW.
6. ATTACH THE FACE COVER.

NOTE: CHECK THE HOOK TIMING AFTER THIS ADJUSTMENT.



BOTH CLEARANCE SHOULD BE EQUAL

MECHANICAL ADJUSTMENT

CLEARANCE BETWEEN NEEDLE AND HOOK (ADJUSTMENT METHOD NO. 1)

TO CHECK:

THE CLEARANCE BETWEEN THE NEEDLE AND SHUTTLE RACE SHOULD BE -0.05 TO $+0.10$ MM.

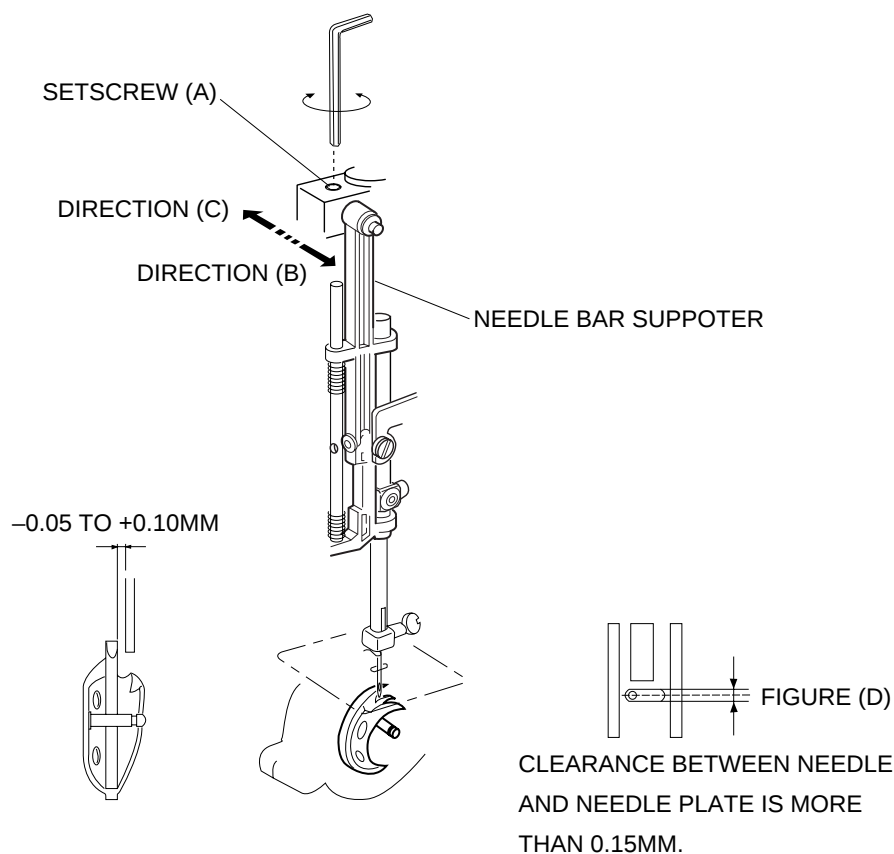
IF NOT, ADJUST AS FOLLOWS:

ADJUSTMENT PROCEDURE:

1. REMOVE THE TOP COVER (SEE PAGE 4).
2. SET THE PATTERN SELECTOR DIAL AT (), STITCH WIDTH CONTROL AT (0).
3. LOOSEN SETSCREW (A), AND MOVE THE NEEDLE BAR SUPPORTER IN THE DIRECTION OF THE ARROWS TO GET A CLEARANCE BETWEEN -0.05 TO $+0.10$ MM.
 - * IF CLEARANCE IS TOO WIDE, MOVE THE NEEDLE BAR SUPPORTER TO DIRECTION (B).
 - * IF CLEARANCE IS TOO NARROW, MOVE THE NEEDLE BAR SUPPORTER TO DIRECTION (C).

NOTE: AFTER THIS ADJUSTMENT, CHECK IF THE CLEARANCE BETWEEN THE NEEDLE AND NEEDLE PLATE IS MORE THAN 0.15 MM AS SHOWN IN FIGURE (D). IF NOT, ADJUST THE CLEARANCE BETWEEN NEEDLE AND SHUTTLE RACE BY ADJUSTMENT METHOD (2), AFTER RE-ADJUSTMENT CHECK THE CLEARANCE BETWEEN NEEDLE AND NEEDLE PLATE AGAIN.

4. ATTACH THE TOP COVER.



MECHANICAL ADJUSTMENT

CLEARANCE BETWEEN NEEDLE AND HOOK (ADJUSTMENT METHOD NO.2)

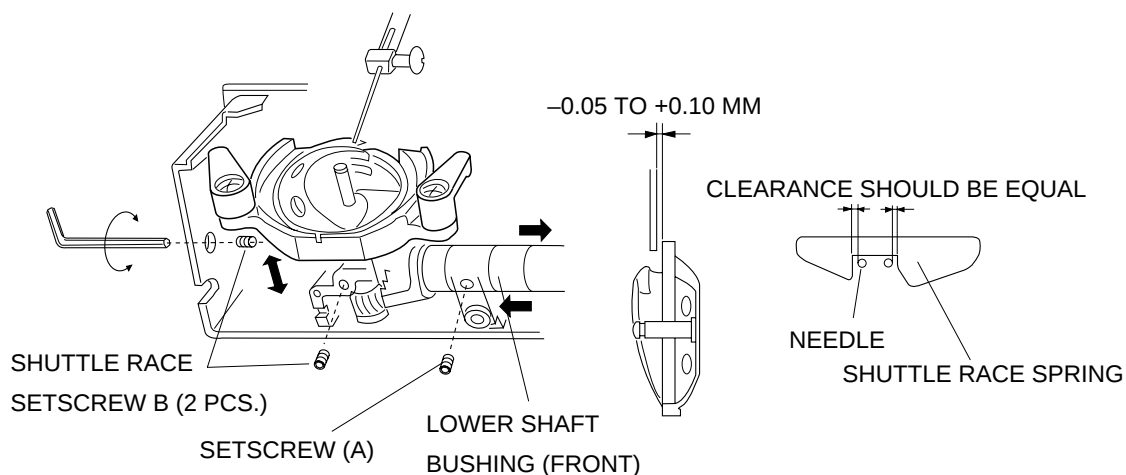
TO CHECK:

USE THIS ADJUSTMENT METHOD NO. 2 WHEN METHOD NO.1 CANNOT BE USED.
THE CLEARANCE BETWEEN THE NEEDLE AND SHUTTLE RACE SHOULD BE -0.05 TO $+0.10$ MM.

ADJUSTMENT PROCEDURE:

1. SET THE PATTERN SELECTOR DIAL AT (, STITCH WIDTH CONTROL AT (0).
2. REMOVE THE BASE (SEE PAGE 5) AND SHUTTLE RACE RING.
3. LOOSEN THE SCREW (A) ON THE LOWER SHAFT BUSHING AND SHIFT THE GEAR ABOUT 0.5 MM TO THE RIGHT TO DISENGAGE GEARS.
THEN, TIGHTEN THE SCREW TEMPORARILY.
4. LOWER THE NEEDLE AND LOOSEN THE TWO SHUTTLE RACE SETSCREWS (B).
PULL UP OR PUSH DOWN THE SHUTTLE RACE TO ADJUST THE CLEARANCE BETWEEN THE NEEDLE AND THE SHUTTLE RACE IN THE RANGE OF -0.05 TO $+0.10$ MM.
5. SET THE PATTERN SELECTOR DIAL AT (, STITCH WIDTH CONTROL AT (5). TURN THE HANDWHEEL TO CHECK IF THE CLEARANCE BETWEEN THE NEEDLE AND INNER EDGES OF THE SHUTTLE RACE SPRING AT THE LEFT AND RIGHT NEEDLE DROPS ARE EQUAL.
IF NOT, ADJUST BY TURNING THE SHUTTLE RACE UNIT.
6. TIGHTEN THE TWO SHUTTLE RACE SETSCREWS (B).
7. LOOSEN THE SET SCREW ON THE LOWER SHAFT BUSHING AND SHIFT THE GEAR BACK TO THE ORIGINAL POSITION WHILE ADJUSTING THE BACKLASH.
8. TIGHTEN SCREW (A) FIRMLY.
9. ATTACH THE SHUTTLE RACE RING AND BASE.

NOTE: THE ROTARY PLAY OF SHUTTLE DRIVER SHOULD BE LESS THAN 0.3 MM
AND THE LOWER SHAFT SHOULD TURN SMOOTHLY.
AFTER THE ADJUSTMENT, CHECK THE HOOK TIMING.



MECHANICAL ADJUSTMENT

FEED DOG HEIGHT

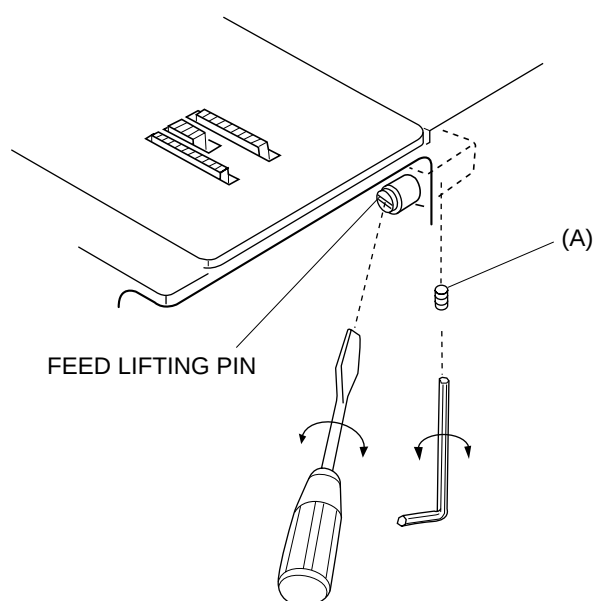
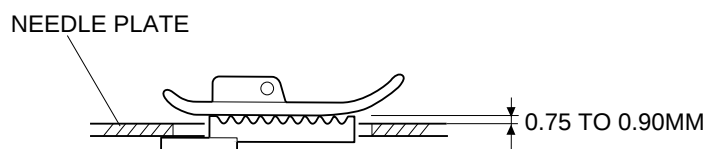
TO CHECK:

1. LOWER THE PRESSER FOOT.
2. TURN THE HANDWHEEL TOWARD YOU TO BRING THE FEED DOG TO ITS HIGHEST POSITION. THE HEIGHT OF THE FEED DOG FROM THE NEEDLE PLATE SHOULD BE 0.75 TO 0.90 MM.

IF IT IS NOT IN THE RANGE, ADJUST AS FOLLOWS.

ADJUSTMENT PROCEDURE:

1. REMOVE THE BASE (SEE PAGE 5).
2. LOWER THE PRESSER FOOT AND TURN THE HANDWHEEL TOWARD YOU UNTIL THE FEED DOG COMES TO ITS HIGHEST POINT.
3. LOOSEN THE SCREW (A) .
4. TURN THE FEED LIFTING PIN TO ADJUST THE HEIGHT OF FEED DOG (0.75–0.90 MM).
5. TIGHTEN THE SCREW (A).
6. TURN THE HANDWHEEL TOWARD YOU TO RECHECK THE HEIGHT OF FEED DOG.
7. ATTACH THE BASE.



MECHANICAL ADJUSTMENT

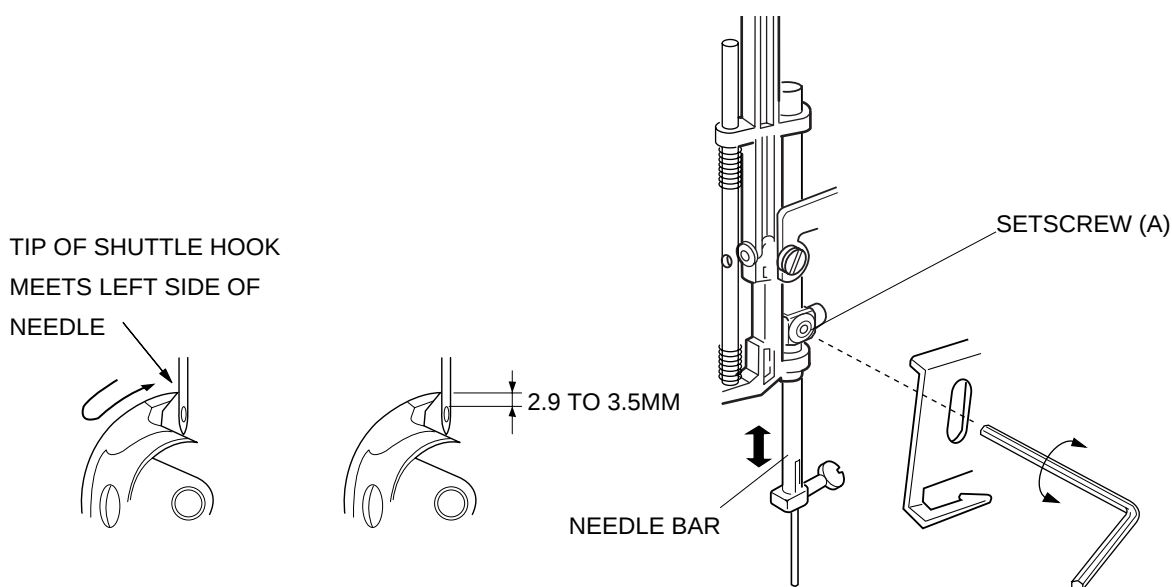
NEEDLE BAR HEIGHT

TO CHECK:

WHEN THE TIP OF SHUTTLE HOOK MEETS THE LEFT SIDE OF THE NEEDLE IN ASCENDING TRAVEL OF THE NEEDLE FROM ITS LEFT AND LOWEST POSITION, THE DISTANCE BETWEEN THE TOP OF THE NEEDLE EYE AND THE TIP OF THE SHUTTLE HOOK SHOULD BE IN THE RANGE OF 2.9–3.5MM.

ADJUSTMENT PROCEDURE:

1. REMOVE THE FACE COVER (SEE PAGE 4).
2. SET THE PATTERN SELECTOR DIAL AT (), STITCH WIDTH CONTROL AT (0).
3. OPEN THE BED COVER PLATE.
4. REMOVE THE SHUTTLE RACE RING.
5. TURN THE HANDWHEEL TOWARD YOU UNTIL THE TIP OF THE SHUTTLE HOOK MEETS THE LEFT SIDE OF THE NEEDLE.
6. LOOSEN THE NEEDLE BAR CONNECTING STUD SCREW (A).
7. ADJUST THE HEIGHT OF THE NEEDLE BAR BY MOVING THE NEEDLE BAR UPWARD OR DOWNWARD WITHOUT TURNING IT.
8. TIGHTEN THE SCREW (A).
9. ATTACH THE SHUTTLE RACE RING.
10. ATTACH THE FACE COVER.



MECHANICAL ADJUSTMENT

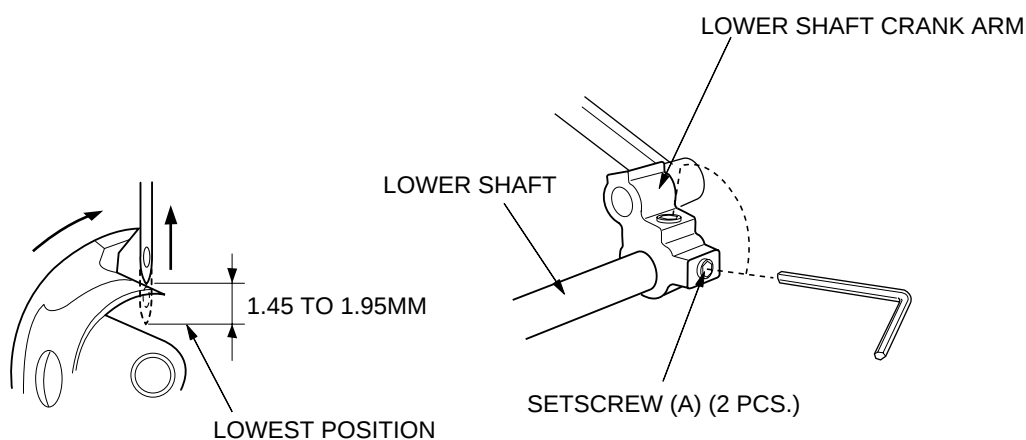
NEEDLE TIMING TO SHUTTLE

TO CHECK:

THE HEIGHT OF THE NEEDLE POINT FROM ITS LOWEST POINT SHOULD BE IN THE RANGE OF 1.45–1.95 MM WHEN THE TIP OF THE SHUTTLE HOOK MEETS THE LEFT SIDE OF THE NEEDLE AT THE LEFT NEEDLE POSITION IN ASCENDING TRAVEL.

ADJUSTMENT PROCEDURE:

1. SET THE PATTERN SELECTOR DIAL AT (ϕ), STITCH WIDTH CONTROL AT "0".
2. REMOVE THE BASE (SEE PAGE 5).
3. OPEN THE BED COVER PLATE.
4. REMOVE THE SHUTTLE RACE RING.
5. TURN THE HANDWHEEL TOWARD YOU UNTIL THE TIP OF THE SHUTTLE HOOK MEETS THE LEFT SIDE OF THE NEEDLE.
6. LOOSEN THE LOWER SHAFT CRANK ARM SCREWS (A).
7. WHILE HOLDING THE SHUTTLE HOOK SO IT DOESN'T TURN, TURN THE HANDWHEEL TOWARD YOU UNTIL THE NEEDLE COMES TO ITS LOWEST POSITION. THEN, FURTHER TURN THE HANDWHEEL TO RAISE THE NEEDLE ABOUT 1.7 MM FROM ITS LOWEST POSITION.
8. TIGHTEN THE SCREWS (A).
9. TURN THE HANDWHEEL TOWARD YOU TO CHECK IF THE HEIGHT IS IN THE RANGE OF 1.45–1.95 MM.
IF IT IS NOT IN THIS RANGE, REPEAT THE ABOVE PROCEDURE.
10. ATTACH THE SHUTTLE RACE RING.
11. ATTACH THE BASE.



MECHANICAL ADJUSTMENT

BUTTONHOLE FEED BALANCE

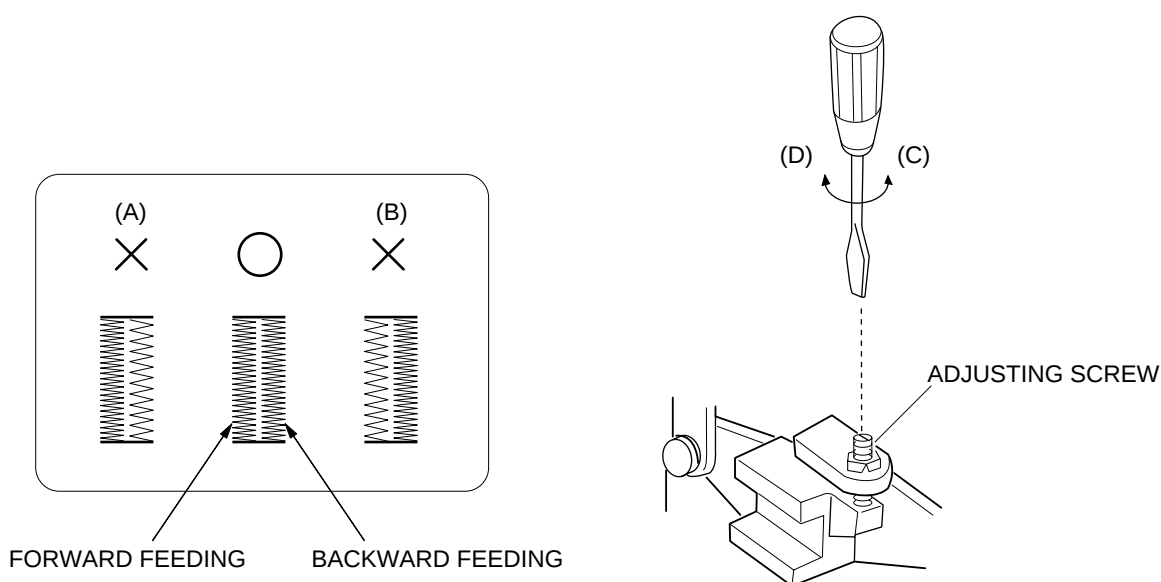
TO CHECK:

WHEN SEWING A BUTTONHOLE, THE STITCHES ON EACH SIDE OF THE BUTTONHOLE SHOULD BE OF THE SAME STITCH DENSITY.

A RANGE OF 9–12 STITCHES IN THE “BACKWARD FEEDING” (RIGHT SIDE ROW) AGAINST 10 STITCHES IN THE “FORWARD FEEDING” (LEFT SIDE ROW) IS CONSIDERED ACCEPTABLE.

ADJUSTMENT PROCEDURE:

1. CHECK FEED BALANCE BY SEWING BUTTONHOLES.
2. REMOVE THE TOP COVER (SEE PAGE 4).
3. TURN THE ADJUSTING SCREW IN THE DIRECTION OF (C) IN THE CASE OF (A) (RIGHT STITCHES ARE SPARSE), OR IN THE DIRECTION OF (D) IN CASE OF (B) (LEFT STITCHES ARE SPARSE).
4. ATTACH THE TOP COVER.



MECHANICAL ADJUSTMENT

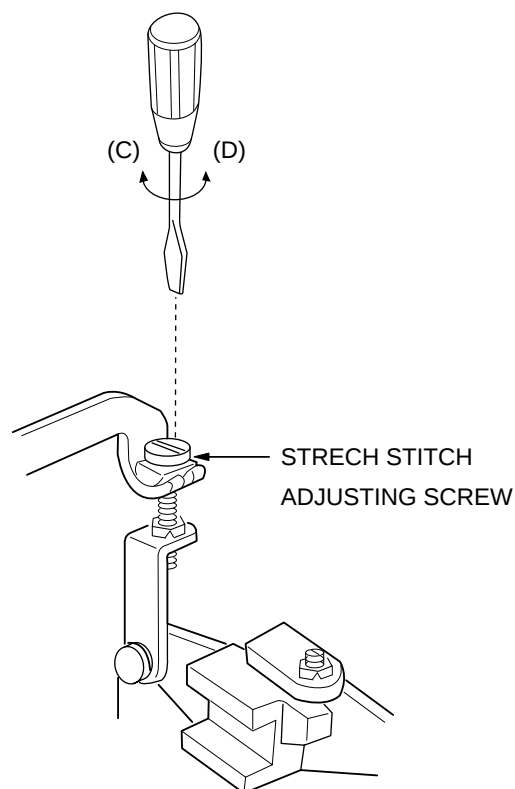
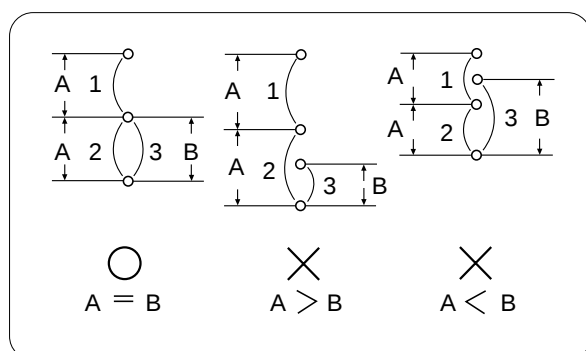
FEED BALANCE ON STRETCH STITCH

TO CHECK:

IF THE STRETCH STITCH PATTERNS ARE DISTORTED WHEN SETTING THE STITCH LENGTH CONTROL AT "S.S." (THERE IS A DIFFERENCE BETWEEN FORWARD FEEDING AND BACKWARD FEEDING, ADJUST AS FOLLOWS:

ADJUSTMENT PROCEDURE:

1. REMOVE THE TOP COVER (SEE PAGE 4).
2. SET THE PATTERN SELECTOR DIAL AT (), AND THE STITCH LENGTH CONTROL AT "S.S."
3. TURN THE STRETCH STITCH ADJUSTING SCREW IN THE DIRECTION OF (C) WHEN $A > B$, OR IN THE DIRECTION OF (D) WHEN $A < B$.
4. ATTACH THE TOP COVER.



MECHANICAL ADJUSTMENT

BARTACK FEED OF BUTTONHOLE

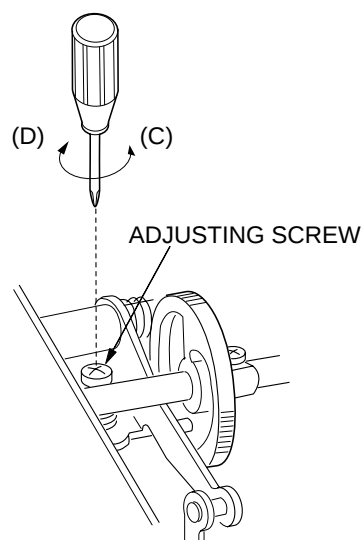
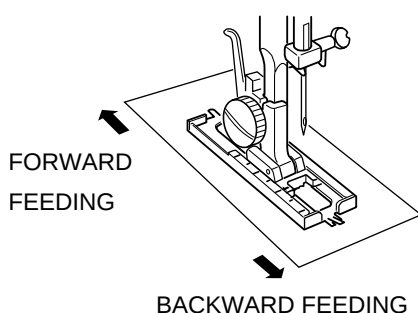
TO CHECK:

IF THE MATERIAL IS FED FORWARD OR BACKWARD WHEN SEWING THE BARTACK ON A BUTTONHOLE, ADJUST AS FOLLOWS:

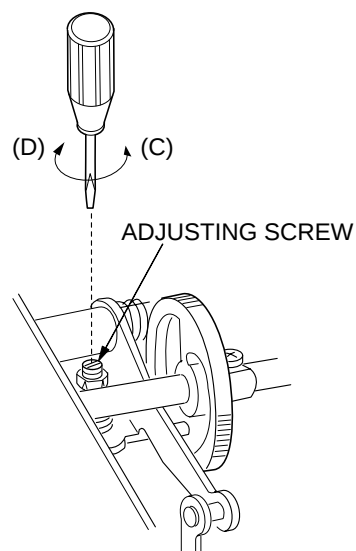
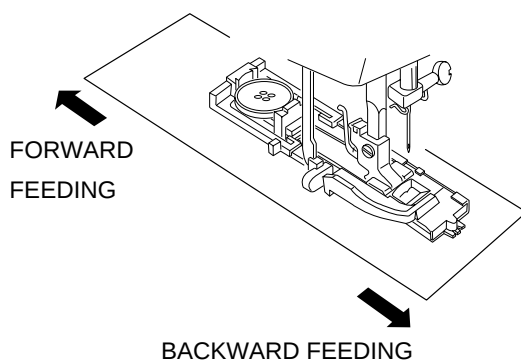
ADJUSTMENT PROCEDURE:

1. SET THE PATTERN SELECTOR DIAL AT (), AND THE STITCH LENGTH CONTROL AT (4).
2. REMOVE THE TOP COVER (SEE PAGE 4).
3. PLACE A PIECE OF PAPER UNDER THE FOOT AND TURN THE HANDWHEEL.
IF THE PAPER IS FED FORWARD, TURN THE ADJUSTING SCREW IN THE DIRECTION OF (C).
IF THE PAPER IS FED BACKWARD, TURN THE ADJUSTING SCREW IN THE DIRECTION OF (D).
4. ATTACH THE TOP COVER.

(FOR MODEL 415)



(FOR MODEL 419S/423S)



MECHANICAL ADJUSTMENT

DISENGAGEMENT OF CAM FOLLOWER

TO CHECK:

IF THE CLEARANCE BETWEEN THE CAM FOLLOWER AND THE TOP CONVEX OF THE ZIGZAG CAM IS NOT ENOUGH, THE PATTERN SELECTOR DIAL IS BLOCKED OR WILL NOT SELECT THE CORRECT PATTERN.

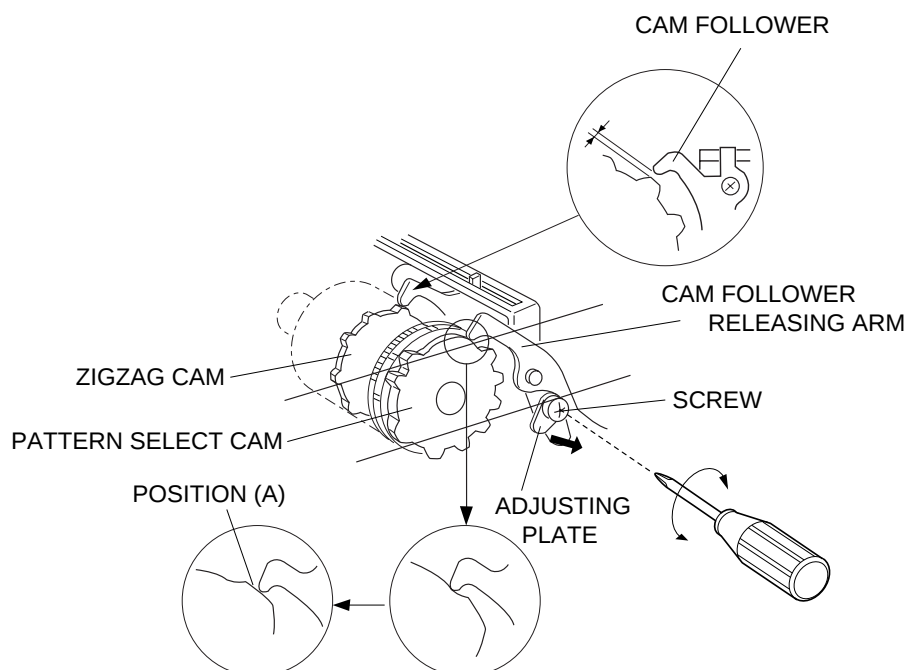
ADJUSTMENT PROCEDURE:

1. SET THE PATTERN SELECTOR DIAL AT ($\oplus$) AND THE STITCH WIDTH CONTROL AT (5).
(THE STITCH LENGTH CONTROL AT ANY POSITION.)
2. REMOVE THE FRONT COVER (SEE PAGE 6).
3. PUT THE CAM FOLLOWER TO THE ZIGZAG CAM (STRAIGHT CAM), AND PUT THE CAM FOLLOWER RELEASING ARM TO THE PATTERN SELECT CAM.
4. LOOSEN THE SCREW.
5. PUSH THE ADJUSTING PLATE IN THE DIRECTION OF ARROW UNTIL IT TOUCHES THE RELEASING ARM AND TIGHTEN SET SCREW.

NOTE: AFTER THIS ADJUSTMENT, CHECK THAT THE CLEARANCE BETWEEN THE ZIGZAG CAM AND THE CAM FOLLOWER IS ABOUT 0.3MM WHEN SETTING THE CAM FOLLOWER RELEASING ARM ONTO POSITION (A) OF PATTERN SELECT CAM.

6. MOUNT THE FRONT COVER.

NOTE: CHECK THE NEEDLE MOVEMENT FOR STRAIGHT STITCH.



MECHANICAL ADJUSTMENT

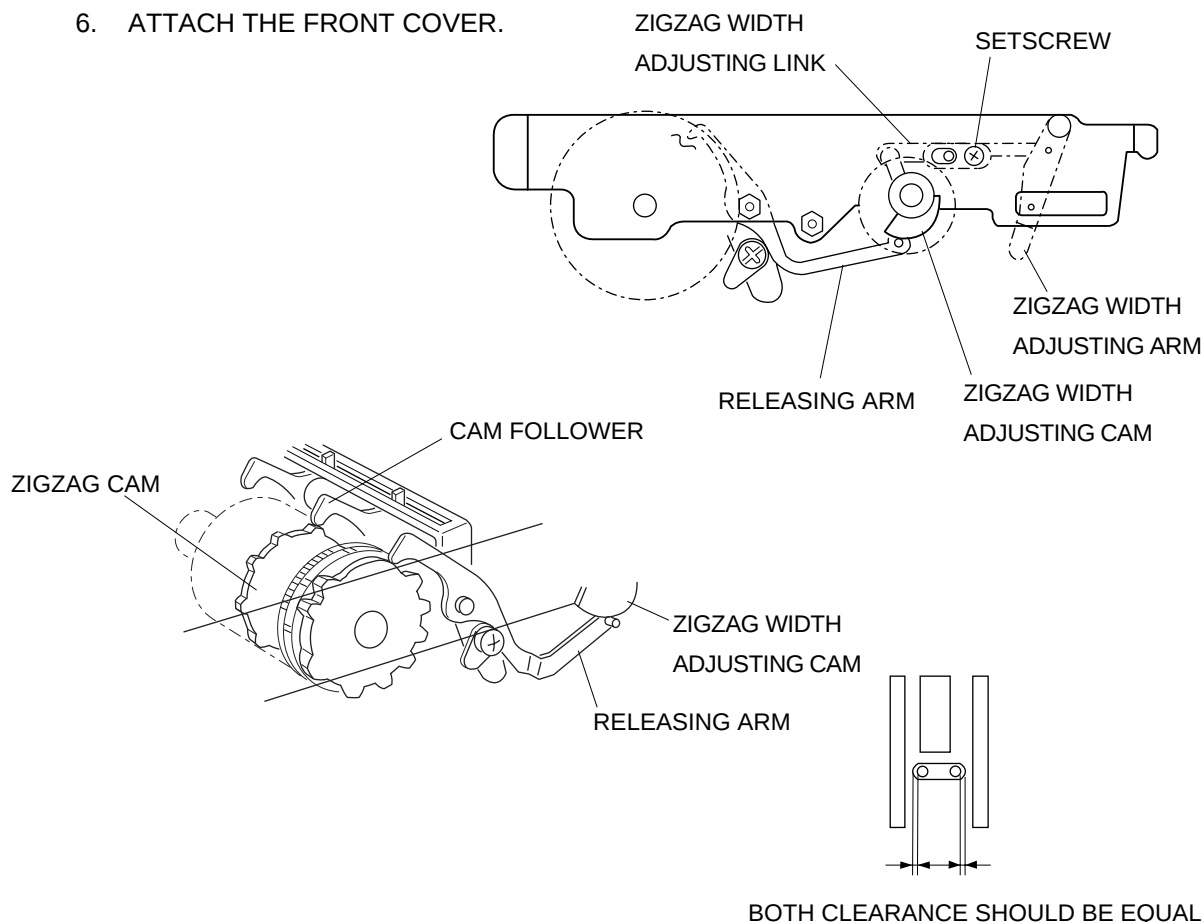
NEEDLE IN STRAIGHT STICH SEWING

TO CHECK:

IF THE NEEDLE SWINGS WHEN RUNNING THE MACHINE WITH ZIGZAG STITCH (≡) AT WIDTH "0", CORRECT IT AS FOLLOWS:

AT THE STRAIGHT STITCH SEWING, ADJUST IT AS FOLLOWS:

1. SET THE PATTERN SELECTOR DIAL AT (≡) AND STITCH WIDTH CONTROL AT (0).
2. REMOVE THE FRONT COVER UNIT (SEE PAGE 6).
3. LOOSEN THE SETSCREW.
4. TURN THE HANDWHEEL TOWARD YOU TO RAISE THE CAM FOLLOWER ON THE CONVEX OF THE ZIGZAG CAM AND BUTT THE RELEASING ARM AGAINST THE ZIGZAG WIDTH ADJUSTING CAM.
5. IN THIS CONDITION, ADJUST THE ZIGZAG WIDTH LINK SO THAT THERE IS NO PLAY IN BOTH CAM FOLLOWER AND RELEASING ARM, AND THEN TIGHTEN THE SETSCREW.
- * AFTER THE ADJUSTMENT, CHECK THE FOLLOWINGS:
MAKE SURE THE NEEDLE DOES NOT SWING AT STRAIGHT STITCH SEWING.
WHEN THE NEEDLE SWINGS IN MAXIMUM ZIGZAG WIDTH, THE DISTANCE BETWEEN BOTH ENDS OF THE NEEDLE HOLE ON THE NEEDLE PLATE AND THE NEEDLE DROP POSITION SHOULD BE EQUAL AND NOT LESS THAN 0.2MM.
6. ATTACH THE FRONT COVER.



MECHANICAL ADJUSTMENT

(FOR MODEL 419S/423S)

BUTTONHOLE LENGTH

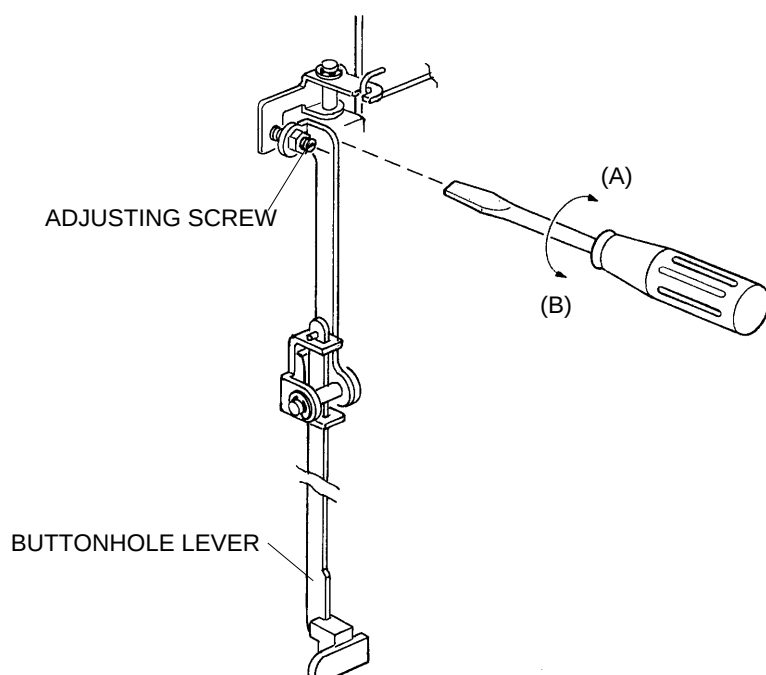
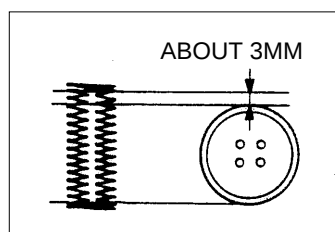
TO CHECK:

BUTTONHOLE SHOULD BE ABOUT 3 MM LONGER THAN THE LENGTH SET BY R FOOT.
IF THE BUTTONHOLE LENGTH IS OUT OF STANDARD RANGE, CHECK AND ADJUST AS FOLLOWS.

ADJUSTMENT PROCEDURE:

1. REMOVE THE FACE COVER (SEE PAGE 4).
2. TURN THE ADJUSTING SCREW IN THE DIRECTION OF (A) IF THE BUTTONHOLE STITCH LENGTH IS LONGER THAN THE STANDARD, OR IN THE DIRECTION OF (B) IF THE BUTTONHOLE STITCH LENGTH IS SHORTER THAN THE STANDARD.
3. ATTACH THE FACE COVER.

STANDARD



MECHANICAL ADJUSTMENT

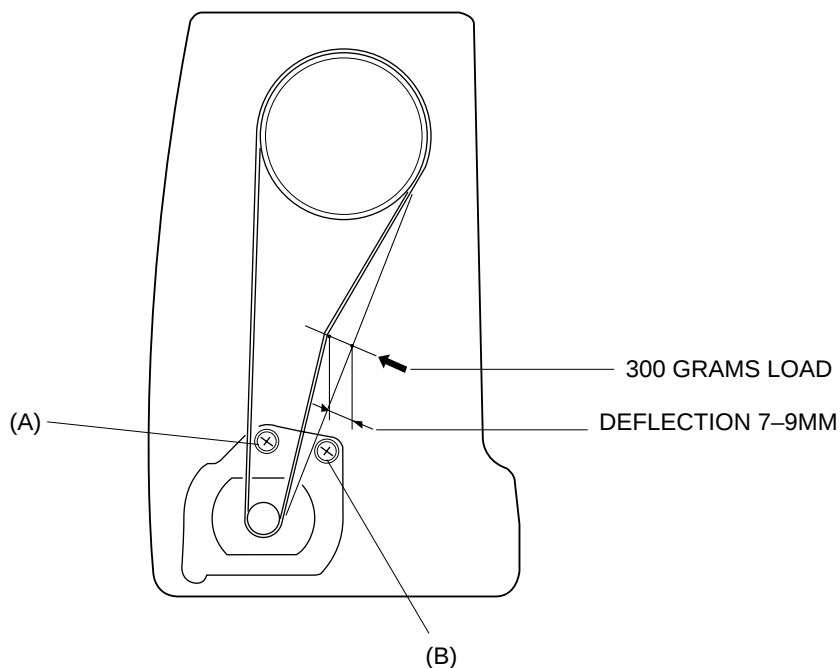
MOTOR BELT TENSION

TO CHECK:

1. IMPROPER BELT TENSION MAY CAUSE NOISE, OVERLOAD OF MOTOR, SLOW RUNNING OR MOTOR BELT JUMPING.
2. THE BELT DEFLECTION SHOULD BE 7MM –9MM WHEN PRESSING THE MIDDLE OF THE MOTOR BELT WITH APPROXIMATELY 300 GRAMS OF PRESSURE.

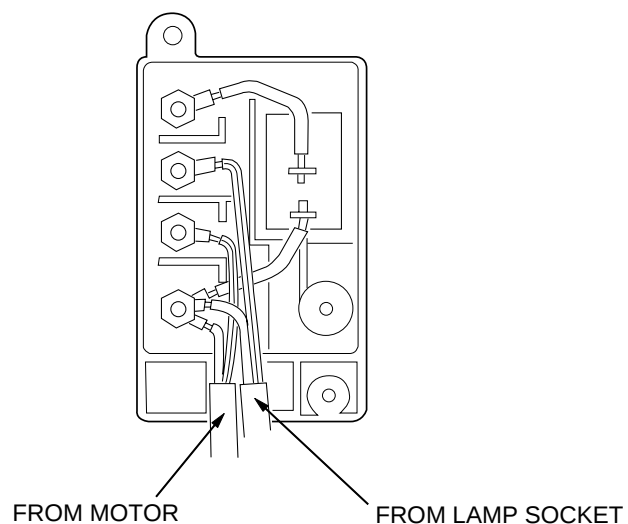
ADJUSTMENT PROCEDURE:

1. REMOVE THE BELT COVER (SEE PAGE 5).
2. LOOSEN THE SCREWS (A) AND (B).
3. MOVE THE MOTOR UP OR DOWN TO ADJUST THE DEFLECTION ABOUT 7MM – 9MM.
4. TIGHTEN THE SCREWS (A) AND (B).
5. ATTACH THE BELT COVER.



WIRING

(FOR 110-120V)



(FOR 220-240V)

