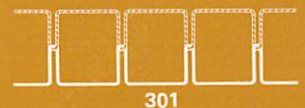


SINGER*

591 UTT Service Manual



301

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DESCRIPTION

An electro-mechanical underbed thread trimming unit, which is an integral part of the machine, is incorporated in the "B" variety machines.

The machine is driven by a needle positioner motor, and its sensor and control box relay the electronic commands to the built-in solenoids of the machine.

The needle and bobbin threads are trimmed below the throat plate after the sewing operation.

A thread wiper "Wipes" the needle thread to proper position for starting the next sewing operation.

In addition to the under bed thread trimming unit, a back tacking system is incorporated in the "G" variety machines. The automatic back tack switch and control box relay the electronic commands to the built-in solenoid for automatic back tacking at start and at end of stitching. The push button switch provided adjacent to the needle bar permits back tacking in the midst of the sewing operation.

This manual should be used in connection with the Service Manual Form U3208 for the regular 591 machine. It informs especially regarding the operation and maintenance of the underbed thread trimmer and back tacking device and their drive systems.

UNDERBED THREAD TRIMMER

PRINCIPAL PARTS

Drive System of Thread Trimmer

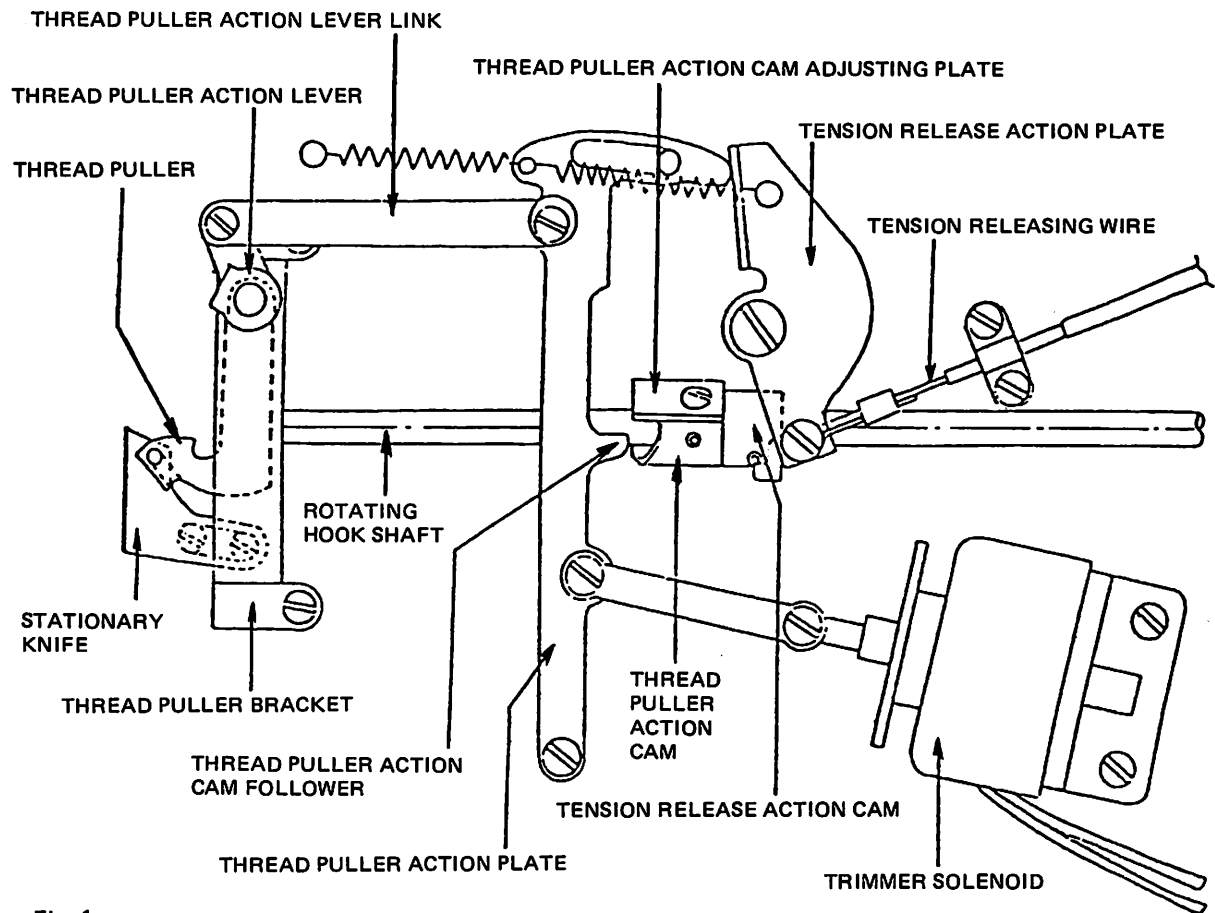


Fig. 1

Pulling and Trimming Unit

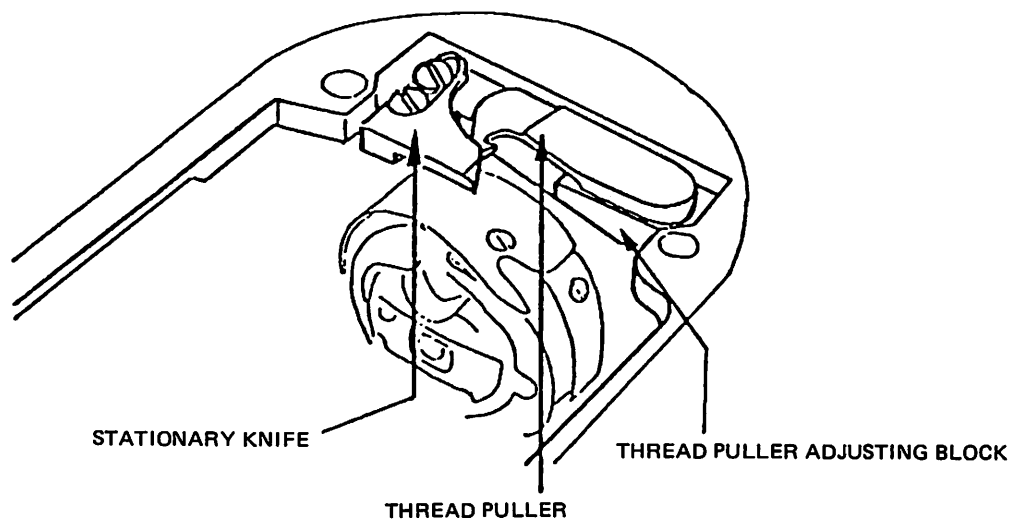


Fig. 2

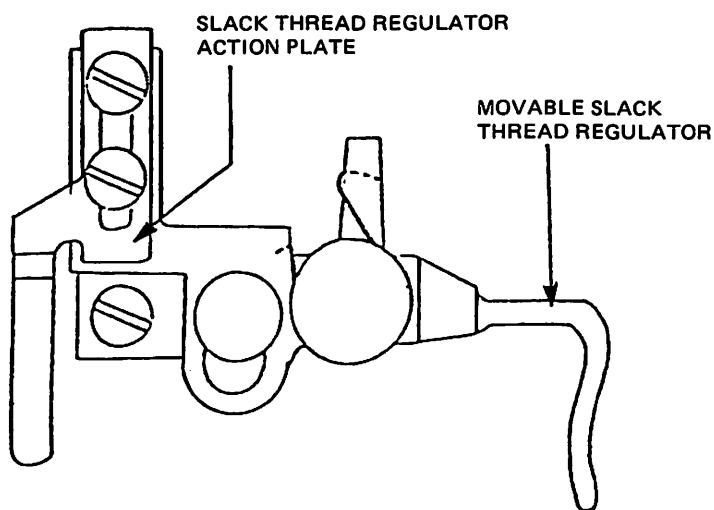


Fig. 3

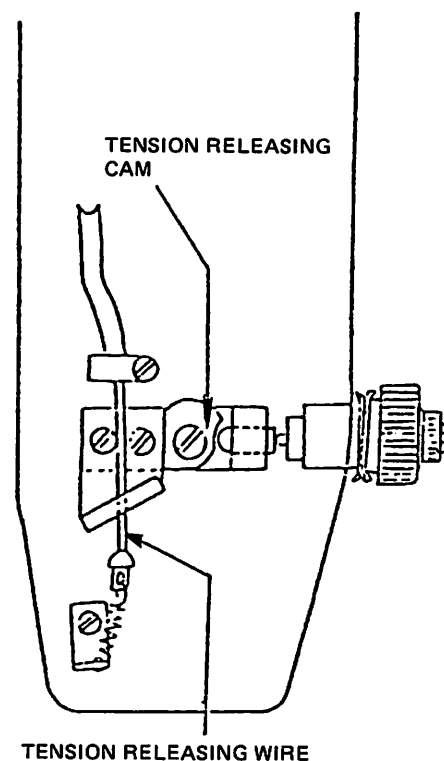


Fig. 4

DESCRIPTION OF THE TRIMMING OPERATION

1. When the foot treadle is returned to its neutral position upon completion of the sewing cycle, the machine stops approximately 3mm (.118") beyond the bottom dead center of the needle (Fig. 5, hook point in the loop of needle thread) when the sensor plate A (red) reaches a point shown in Fig. 6.
2. Heeling the foot treadle will start the machine to run at the trimming speed (200 r.p.m).

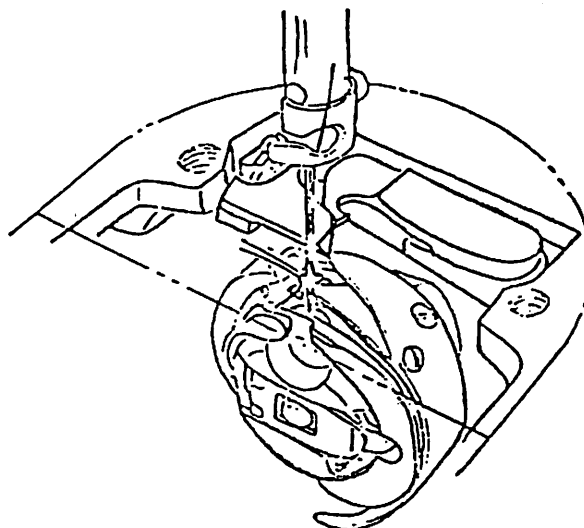


Fig. 5

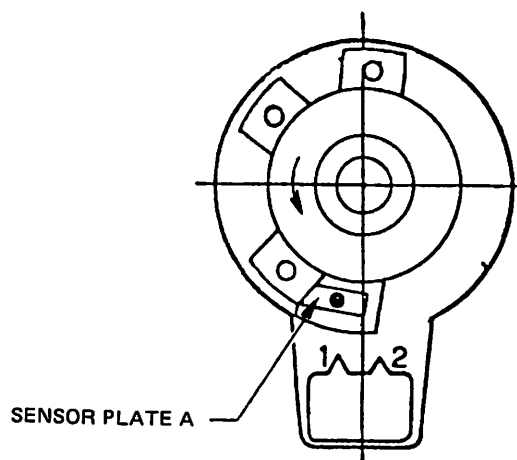


Fig. 6

3. The trimmer solenoid is energized when the sensor plate B (yellow) reaches a point shown in Fig. 7.

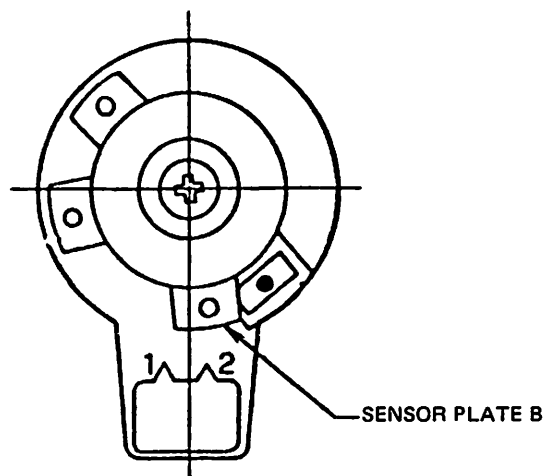


Fig. 7

4. When the cam follower on the thread puller action plate slips into the recessed portion of the thread puller action cam adjusting plate, the thread puller is activated to move through the loop (Fig. 8) to a point shown in solid line in Fig. 9, and the needle and bobbin threads are positioned as shown also in Fig. 9. Simultaneously, the thread puller action plate pushes the tension release action plate making its pin ride on the tension release action cam. Immediately when the pin rides on the tension release action cam, the electronic command relayed from the sensor plate C (yellow, Fig. 10) cuts off the current supply to the trimmer solenoid. The above motion makes the tension releasing cam rotate until just before the tension discs are released.

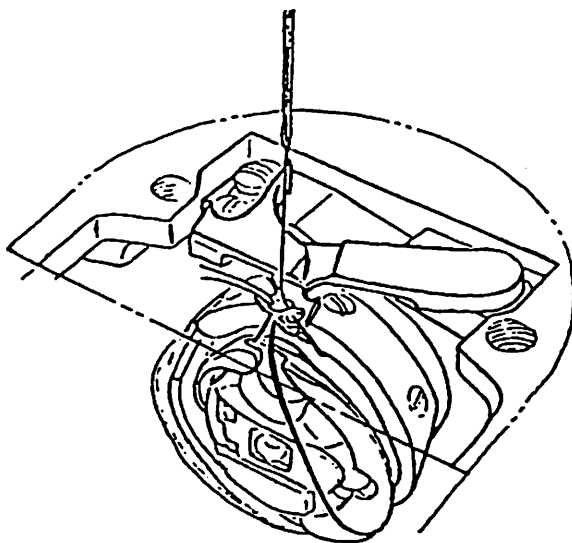


Fig. 8

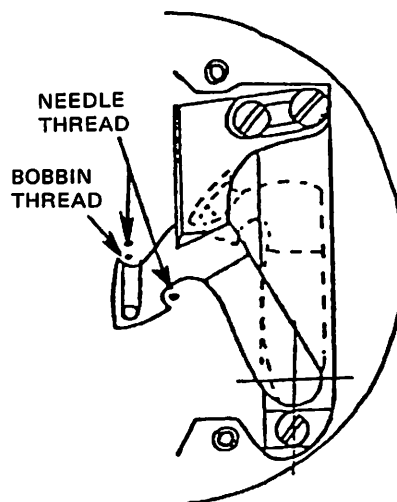


Fig. 9

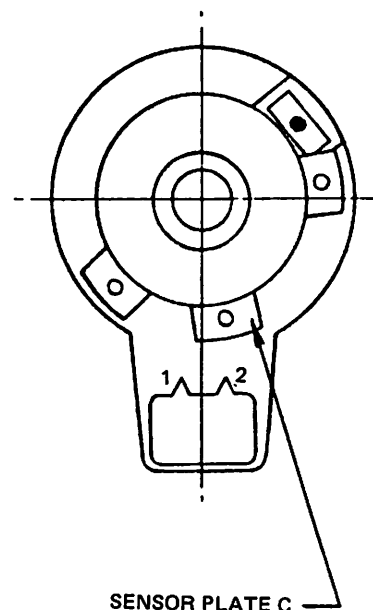


Fig. 10

5. As the needle thread is cast off the rotating hook, it catches on the hook portion of the thread puller. (Fig. 11)
6. The tension release action plate pin reaches the inclination on the tension release action cam and starts releasing the tension discs immediately after the needle thread catches on the thread puller.

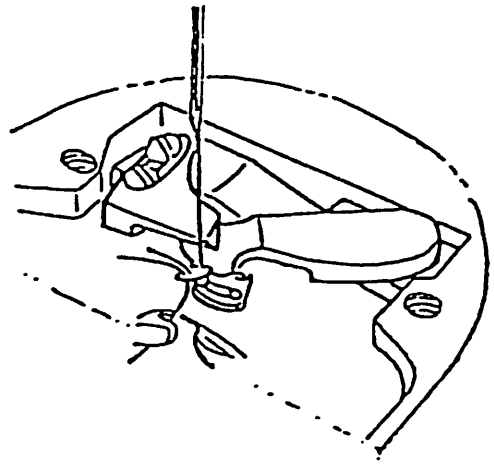


Fig. 11

7. While the above takes place, the cam follower on the thread puller action plate reaches the inclination on the thread puller action cam and the thread puller begins to pull the bobbin and needle threads toward the stationary knife.
8. The bobbin and needle threads are severed when the cutting edge of the thread puller closes in against the cutting edge of the stationary knife. (Fig. 12 and 13)
9. When the threads are trimmed, the spring biased tension release action plate moves back to its rest position disengaging its pin from the tension release action cam and thus completes its function of releasing and holding the needle thread tension open.
10. The trimmer and tension releasing mechanisms return to their rest positions upon completion of the trimming operation and the machine stops in the upper needle position. When the sensor plate D (yellow) reaches a point shown in Fig. 14.

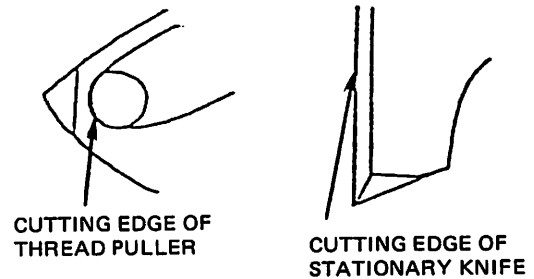


Fig. 12

200 type – Approximately 1mm (.039”) before take-up lever reaches its upper dead center.

300 type – Take-up lever at its upper dead center.

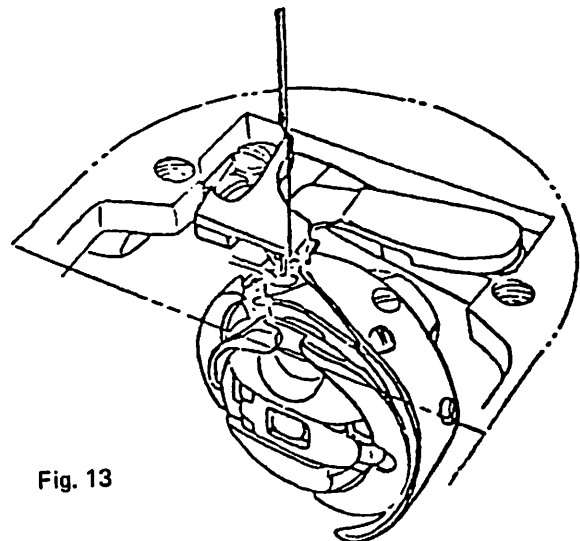


Fig. 13

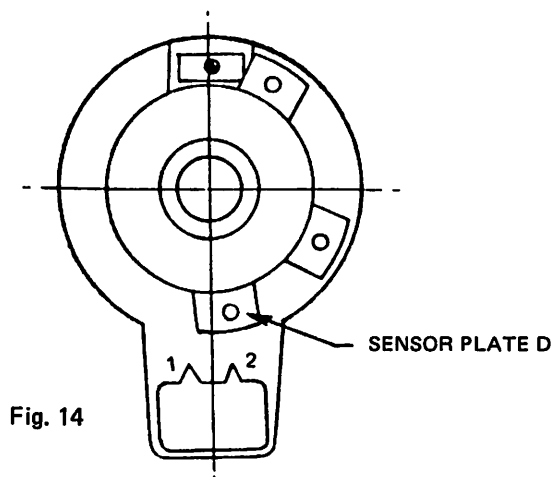


Fig. 14

11. Upon completion of the trimming operation, the thread wiper makes a swivelling movement to place the needle thread in proper position for starting the next sewing operation.

TIMING AND SETTING

When checking the operation of the trimmer mechanism by manual actuation of the mechanisms.

- a. Be sure to turn machine pulley over toward front of machine.
- b. Push thread puller action plate toward cam when take-up lever is almost at its lower dead center.

NOTE: The thread puller may strike the needle and damage itself and the needle unless the thread puller action plate is pushed toward the cam as described above since the rotating hook shaft makes two revolutions against one cycle of the needle bar.

Be sure to check that the machine is correctly adjusted before making adjustments to the trimmer mechanism. (Refer to Service Manual Form U3208 for regular 591 machine).

Check and adjust the trimmer mechanism in the order instructed in this manual since it is interlocked with many other area.

Adjustment of Needle Stop Position

When checking and making adjustments of needle stop positions, be sure to disconnect the trimmer and wiper connectors from the control box.

Needle Stop Positions

a. Lower Needle Position

The lower needle position is approximately 3mm (.118") beyond the bottom dead center of the needle. This 1st position does not call for absolute accuracy and minor adjustments may be made if the threads cannot be properly trimmed due to skip stitching.

b. Upper Needle Position

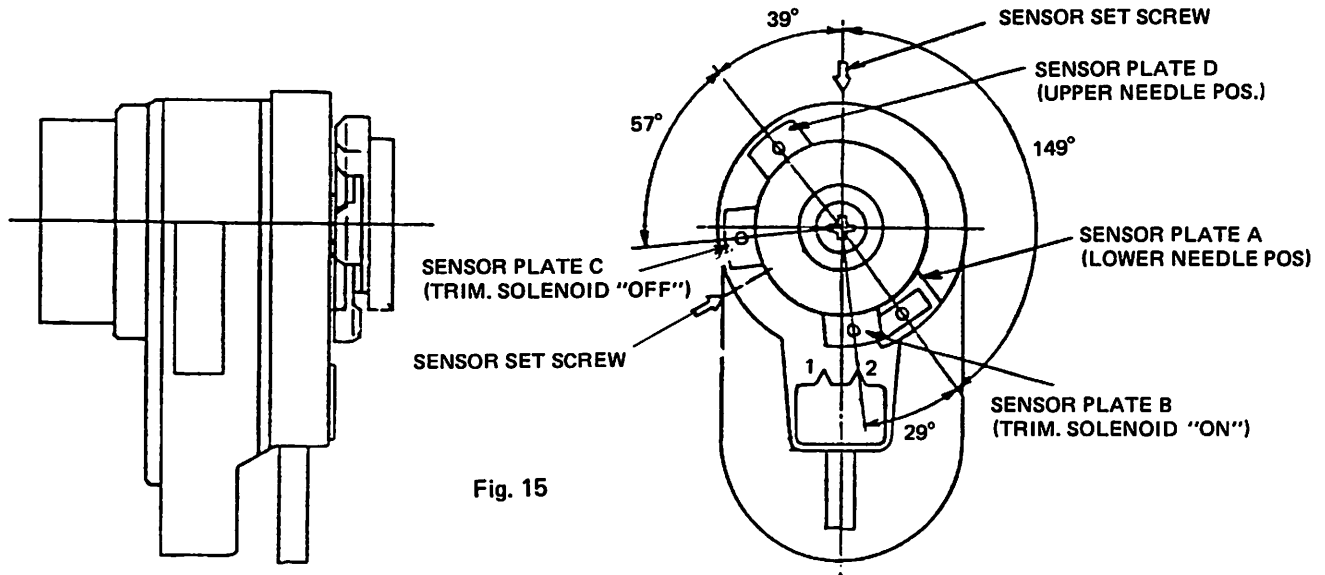
The upper needle position of the 200 type machine is approximately 1mm (.039") before the take-up lever reaches its upper dead center and the upper needle position of the 300 type machine is when the take-up lever is at its upper dead center.

Adjust upper needle position as accurately as possible by running and stopping machine several times to check for correct position.

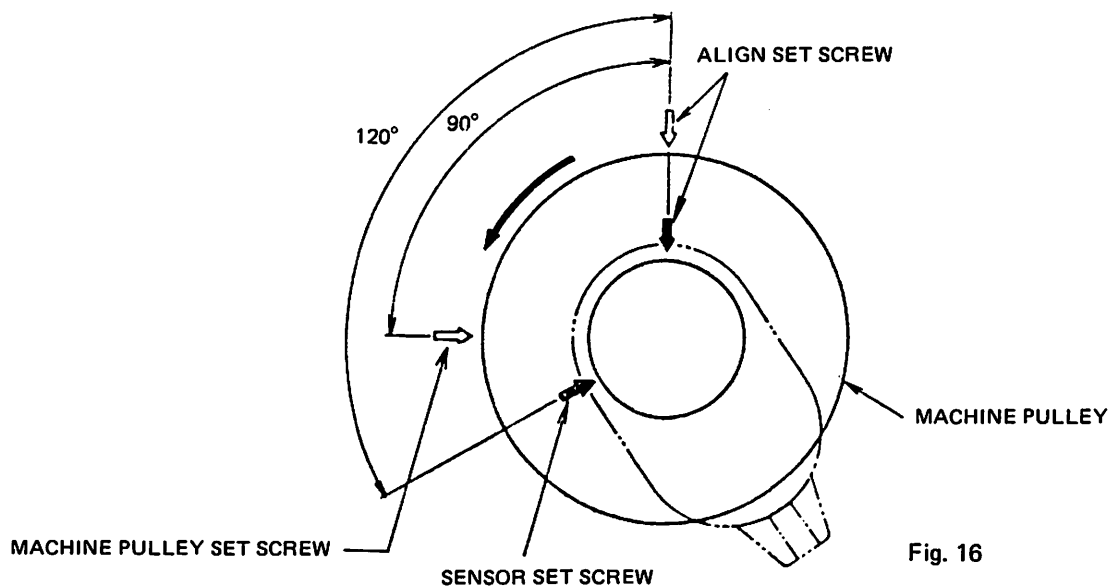
Adjustments

All sensors are correctly timed and set before leaving the factory. If, however, this timing or setting has been disturbed and retiming or resetting becomes necessary, adjust by correctly positioning the sensor plates.

1. The positions of the sensor plates (for upper and lower needle positions and for controlling the trimmer solenoid) in relation to the sensor set screw should be as shown in Fig. 15. To adjust the position of a sensor plate, loosen screw on end of the sensor and turn sensor plate as required, then tighten the screw.



2. Position sensor on hub of machine pulley so that its second set screw (set screw which appears immediately after the first set screw when sensor is rotated over toward the operator) is aligned with the second set screw of the machine pulley and firmly tighten the two set screws. (See Fig. 16)



3. Use sensor retainer supplied with the machine and be sure it is correctly secured in position.

Note: The sensor plate for upper needle position should not be reset in order to solve the problem of tension releasing mechanism not being released when needle stops in the upper needle position.

This adjustment should be made by resetting the sensor unit on the hub of machine pulley as instructed below.

- a. Loosen the two set screws holding the sensor unit and while holding the sensor with one hand, turn machine pulley slightly over toward the front of machine.
- b. Hold sensor in this position and temporarily tighten the first screw.
- c. Run machine and check whether the tension releasing mechanism is released when the needle stops in the upper position. Repeat above, if necessary.
- d. Firmly tighten both first and second set screws.

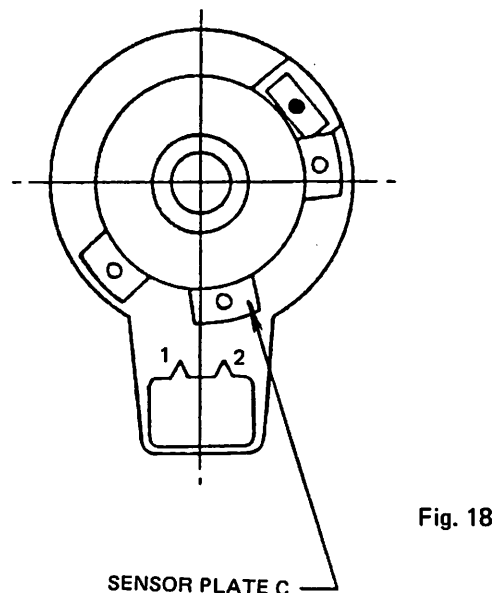
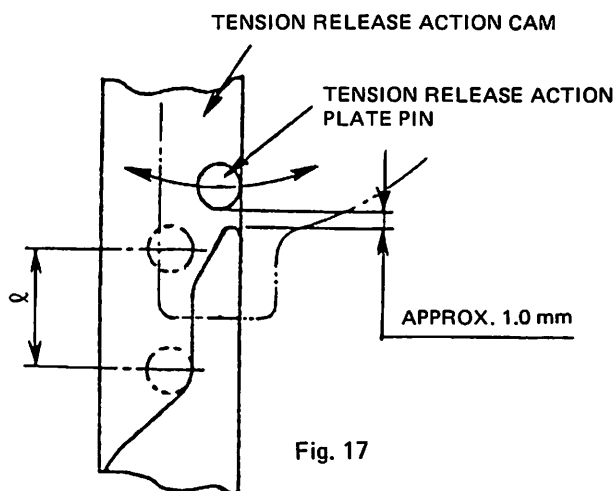
Timing – Actuation of Trimmer Solenoid

The trimmer solenoid is actuated when the take-up lever reaches a point 10mm (.394”) before its lower dead center. The timing of this actuation is controlled by the sensor plate B in the sensor unit. (Refer to item 3 under Description of Trimming Operation).

Timing – Completion of Actuation of Trimmer Solenoid

The current supply to the trimmer solenoid is cut off completing its actuation when the tension release action plate pin is in the range 2 shown in Fig. 17. This timing is controlled by the sensor plate C and when adjustment is necessary, reset this sensor plate.

Turn machine pulley until the clearance between tension release action plate pin and tension release action cam is approximately 1mm (.039”) (Fig. 17) and while holding the machine pulley in this position, set sensor plate C as shown in Fig. 18.



Note: This timing must be adjusted as accurately as possible. If timing is too fast, the thread puller will not operate to trim the threads. If the timing is slow, it will cause the take-up lever to slow down on its upward stroke and stop anywhere before or beyond the correct upper stop position.

Setting of Trimmer Solenoid

The trimmer solenoid is correctly set on the machine before the machine leaves the factory. If, however, this setting has been disturbed and resetting becomes necessary, adjust as instructed below. (Fig. 19)

To adjust setting, loosen the two screws holding the trimmer solenoid bracket and move bracket as required to set:

Angle — Plunger on trimmer solenoid should be aligned with trimmer solenoid link.

Stroke — Clearance between flange of plunger and solenoid should be 4mm (.157")

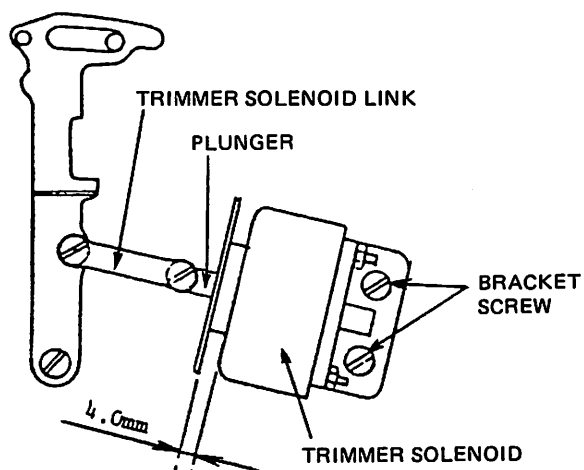


Fig. 19

Setting of Stationary Knife

The stationary knife should be set so that there is a clearance of 0.3mm (.012") between its cutting edge and the right side of the feed dog. (Fig. 20)

To adjust, loosen the two screws holding the stationary knife and move knife to the left or right as required, then firmly tighten the screws.

When replacing the feed dog, be sure this clearance is provided as instructed above.

Note: If the clearance mentioned above is too large, the length of thread end under the fabric will become longer.

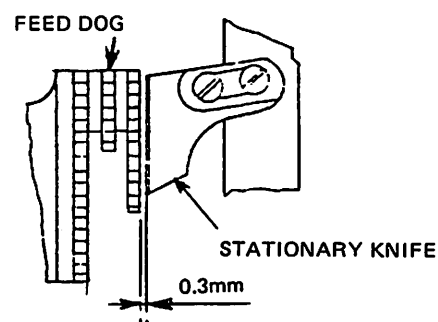


Fig. 20

Setting of Thread Puller

When the thread puller is in its rest position, its right edge should be parallel with the edge of bed as shown in Fig. 21.

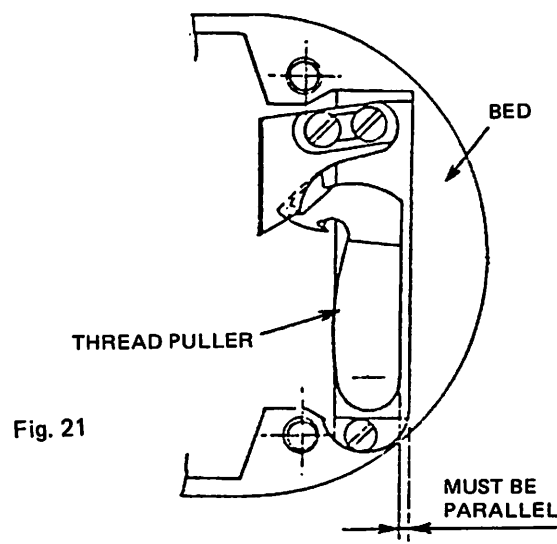


Fig. 21

To make this adjustment, loosen the set screw and turn eccentric bushing, as required, then tighten the set screw. (Fig. 22)

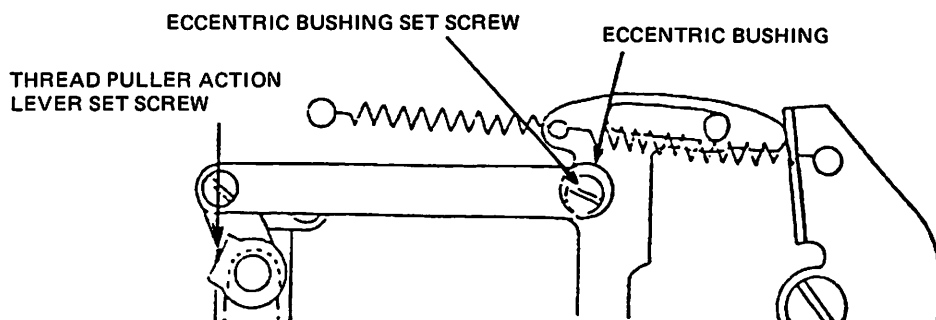


Fig. 22

The thread puller bracket should be set so that the tip of thread puller will pass by the center of the needle. (Fig. 23)

On compound feed M/CS. stitch length should be set at 10 S.P.I. when making this check.

To adjust loosen the two screws holding the thread puller bracket and move bracket as required, then firmly tighten the two screws.

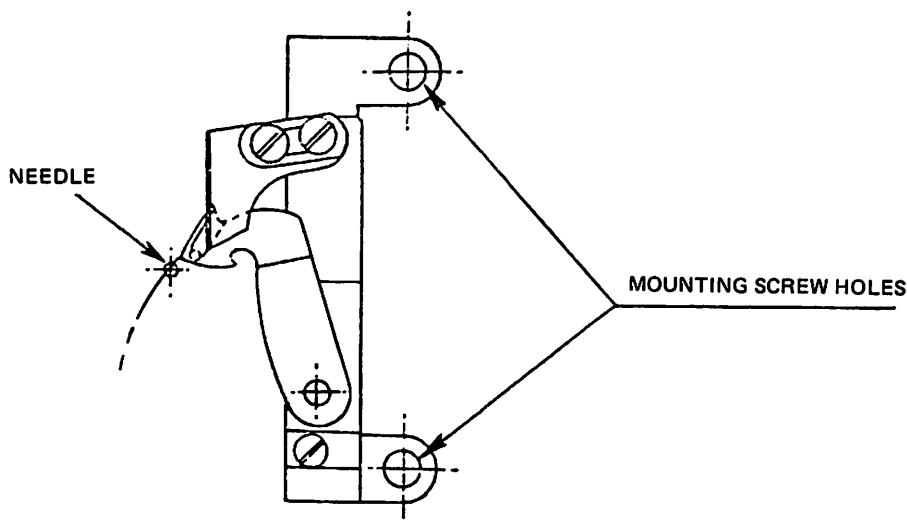


Fig. 23

Note: When replacing the feed dog with a new one, use only Singer part. Further, the feed dog should not be set lower than the standard height because it may cause the thread puller to interfere with the underside of the feed dog.

Adjustment of Pressure of Thread Puller Against Stationary Knife

The pressure of thread puller against stationary knife should be held as light as possible and never be greater than actually required. (The force required to actuate the thread puller when applied to point A, Fig. 24 should be approximately 1kg.)

To adjust the pressure, loosen set screws holding the eccentric stud and thread puller action lever and move pressure adjusting block as required by turning the eccentric stud. Tighten set screws.

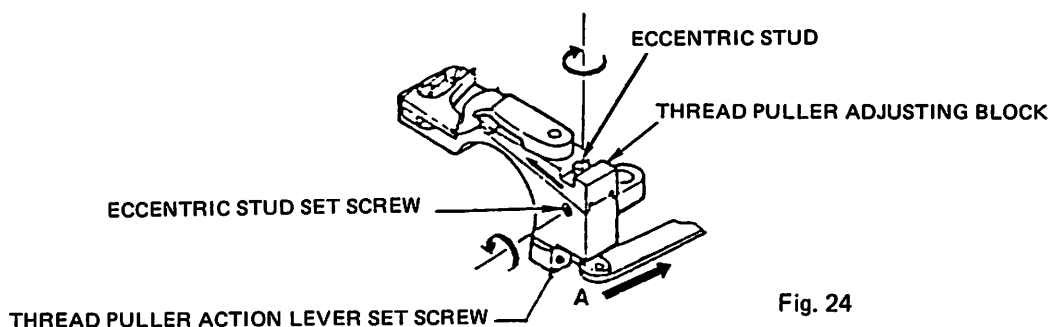


Fig. 24

Timing and Setting of Thread Puller Action Cam

The clearance between the highest point of thread puller action cam and follower portion of thread puller action plate should be 0.5 mm (.020") (Fig. 25)

To make this adjustment, follow the adjustment procedure noted hereunder.

1. Loosen the two set screws holding the thread puller action cam and the two tension release action cam set screws.
2. Turn thread puller action cam until its highest point is located opposite the follower on thread puller action plate and slide thread puller action cam to the left or right as required to provide the 0.5mm (.020") clearance specified above, then temporarily tighten the set screws.
3. Push tension release action cam lightly against the right end of thread puller action cam and temporarily tighten the set screws.
4. Firmly tighten the set screws when thread puller action cam has been correctly timed as instructed in the following paragraph.

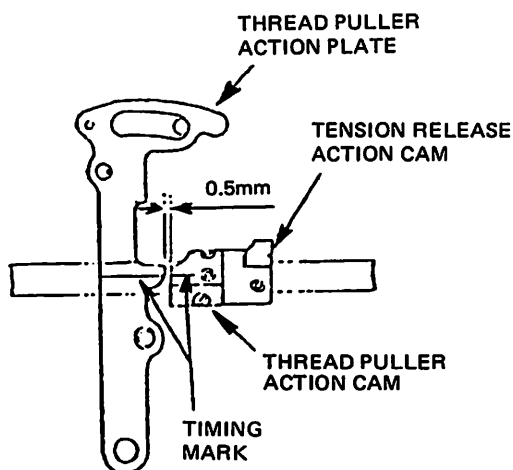


Fig. 25

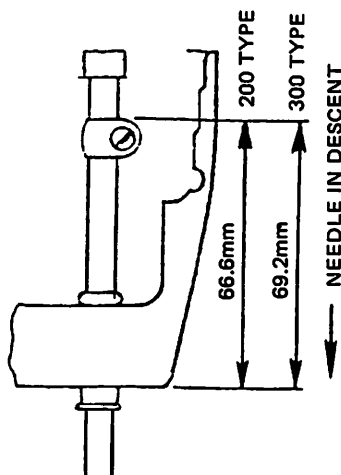


Fig. 26

(FOR DROP FEED MACHINE)

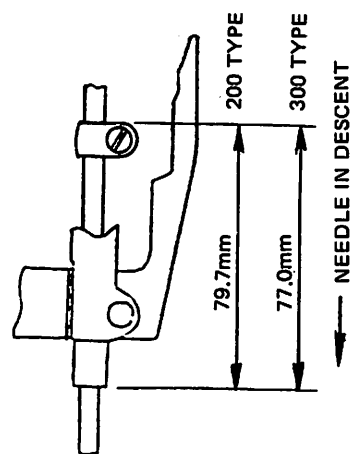


Fig. 27

(FOR COMPOUND FEED MACHINE)

The timing mark on the thread puller action cam must align with the timing mark on the thread puller action plate when distance from top of needle bar connecting stud, needle bar on its downward stroke, to underside of arm at needle end is 66.6mm (2.622") in the case of drop feed 200 type machine and 69.2mm (2.724") in the case of drop feed 300 type machine. (Figs. 25 and 26)

On compound feed machines, the timing mark on the thread puller action cam must align with the timing mark on the thread puller action plate when distance from top of needle bar connecting stud, needle bar on its down stroke, to lower end of needle bar frame is 79.7mm (3.138") in the case of 200 type machine and 77.0mm (3.031") in the case of 300 type machine. (Figs. 25 and 27)

Adjust timing as instructed below.

1. Loosen the two set screws holding the thread puller action cam.
2. Turn machine pulley over toward front of machine until the needle bar is beyond upper dead center and descends to the point shown in Fig. 26 or 27.
3. Turn thread puller action cam until its timing mark is aligned with the timing mark on the thread puller action plate and while holding the thread puller action cam pressed lightly against the tension release action cam, firmly tighten the two set screws.

Timing of Tension Release Action Cam

The tension release action cam must be set so that the tension release action plate pin is disengaged from the tension release action cam immediately after thread trimming is completed. (Fig. 28)

To make this adjustment, follow the instructions noted below.

1. Loosen two set screws and turn the tension release action cam as required.
2. When correct position has been located, firmly tighten the two set screws while holding the tension release action cam pressed lightly against the thread puller action cam.

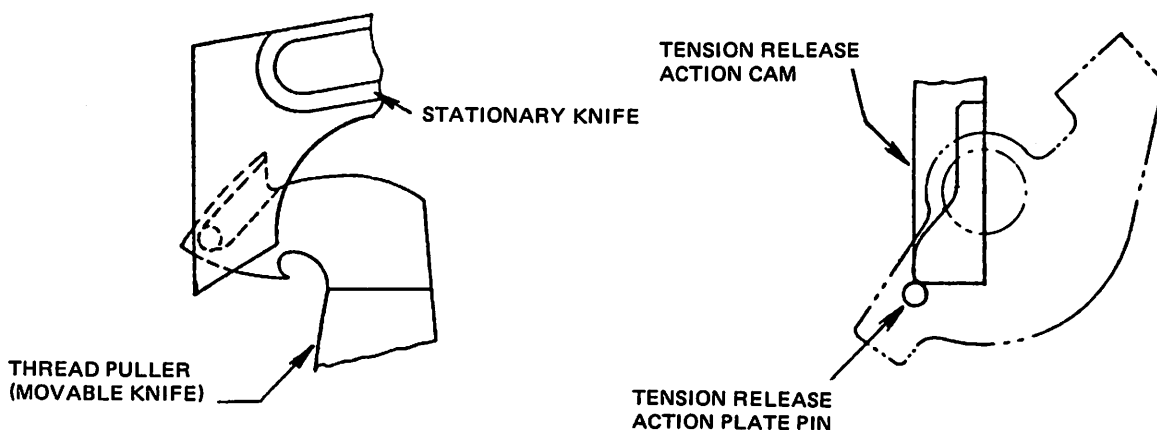


Fig. 28

Note: When replacing the feed dog with a new one, be sure to check the timing of tension release action cam and readjust if necessary.

Setting of Thread Puller Action Cam Adjusting Plate (Timing (start of activation) of thread puller)

The thread puller action cam adjusting plate should be set so that its step portion will align with the follower on the thread puller action plate when distance from top of needle bar connecting stud to underside of arm at needle end, needle bar in ascent, is 69.5mm (2.736") in the case of drop feed 200 type machine and 72.5mm (2.854") in the case of drop feed 300 type machine. (Figs. 29 and 30)

On compound feed machines, the thread puller action cam adjusting plate should be set so that its step portion will align with the follower on the thread puller action plate when distance from top of needle bar connecting stud to lower end of needle bar frame, needle bar in ascent, is 83.2mm (3.276") in the case of 200 type machine and 78.3mm (3.083") in the case of 300 type machine. (Figs. 29 and 31)

This timing will be acceptable for the majority of threads, however in some instances it may be necessary to depart slightly from this standard setting.

THREAD PULLER ACTION
CAM ADJUSTING PLATE

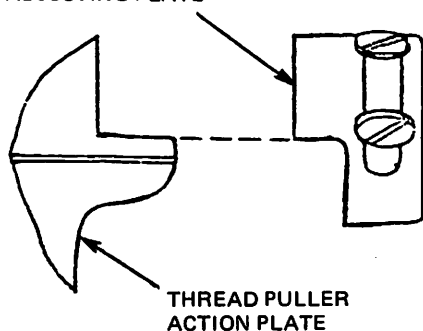


Fig. 29

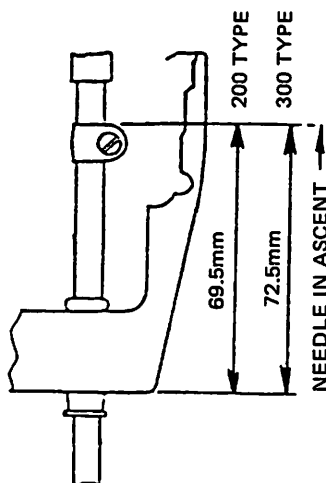


Fig. 30

(FOR DROP FEED MACHINE)

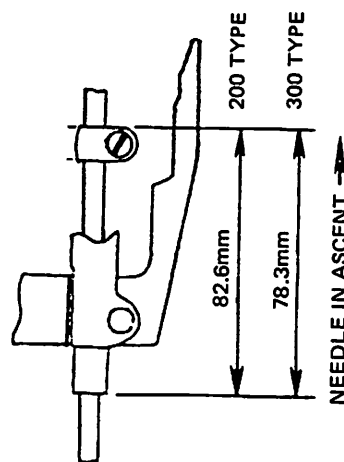


Fig. 31

(FOR COMPOUND FEED MACHINE)

Adjustment of Gap Between Tension Discs (Figs. 32 and 33)

The gap between the two tension discs should be 0.8 – 1.0mm (.032 – .039") while the tension is released. This gap will not increase even if the presser bar is pushed up as far as it will go.

Adjust gap as instructed below.

1. Check that the tension (complete) is correctly set in position.
2. Loosen the set screw holding the tension releasing cam bracket and move bracket to the left or right as required until desired gap has been achieved.
3. Hold bracket in this position and firmly tighten the set screw.

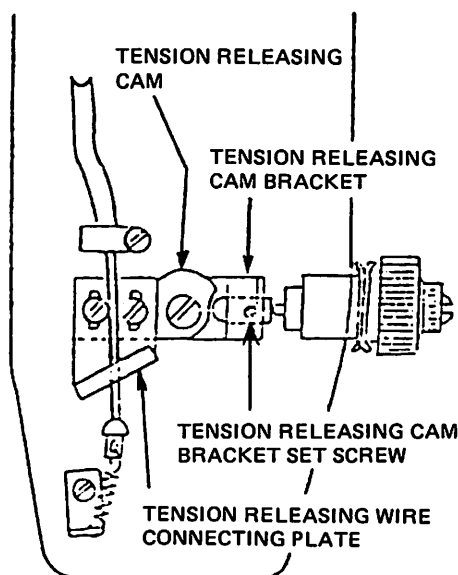


Fig. 32

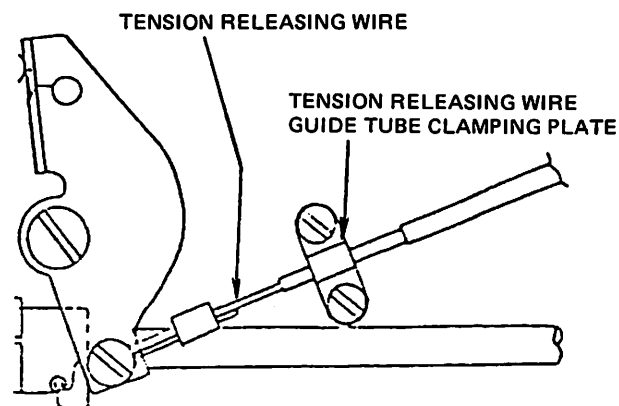


Fig. 33

Timing of Tension Release

To adjust the timing of releasing the tension when presser bar is raised by hand or by knee operation, loosen the two tension releasing wire connecting plate screws and move connecting plate up or down as required.

If timing is late, move connecting plate downward.

If timing is fast, move connecting plate upward.

Firmly tighten the two screws when correct timing has been achieved. (Fig. 32)

The tension discs should begin to separate, or release the needle thread tension, just before the thread puller begins to make its return stroke to trim the threads.

When adjusting this timing:

1. Check timing of tension release action cam. (Refer to Timing of Tension Release Action Cam adjustment procedure)
2. Loosen the two screws holding the tension releasing wire guide tube clamping plate and move guide tube to the left or right as required and firmly tighten the screws. (Fig. 33)

(To advance timing, move guide tube to the right and to retard the timing, move guide tube to the left.)

Adjusting the Length of Needle Thread End

To adjust the starting length of needle thread end with pre-tension, loosen the pre-tension cap screw and turn pre-tension cap clockwise to shorten the thread end, and turn pre-tension cap counterclockwise to lengthen the thread end. (Fig. 34)

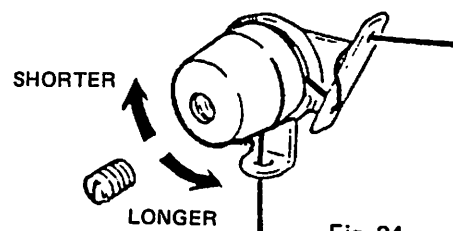


Fig. 34

Note: When using the pre-tension to adjust the length of needle thread end, every care must be taken not to cause ill effect to sewing performance.

To adjust the starting length of needle thread end with movable slack thread regulator, loosen the two set screws holding the slack thread regulator action plate and move action plate up or down as required, then firmly tighten the set screws. (Fig. 35)

(Move the slack thread regulator action plate up to shorten and down to lengthen the needle thread end)

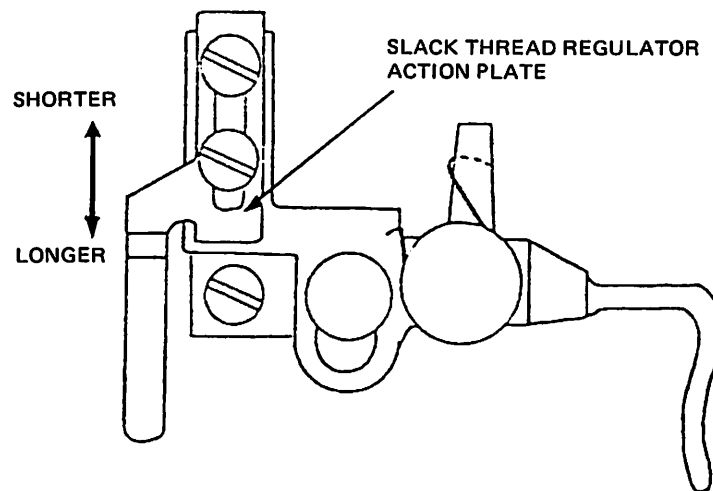


Fig. 35

Adjustment of Thread Wiper

The thread wiper does not require minute adjustment however care should be taken so that —

1. The wiper will not interfere with the right hand side of the presser foot when presser foot is raised.
2. there is at least 1.0mm (.039") clearance between wiper and point of needle when wiper is operated when needle is in upper stop position.

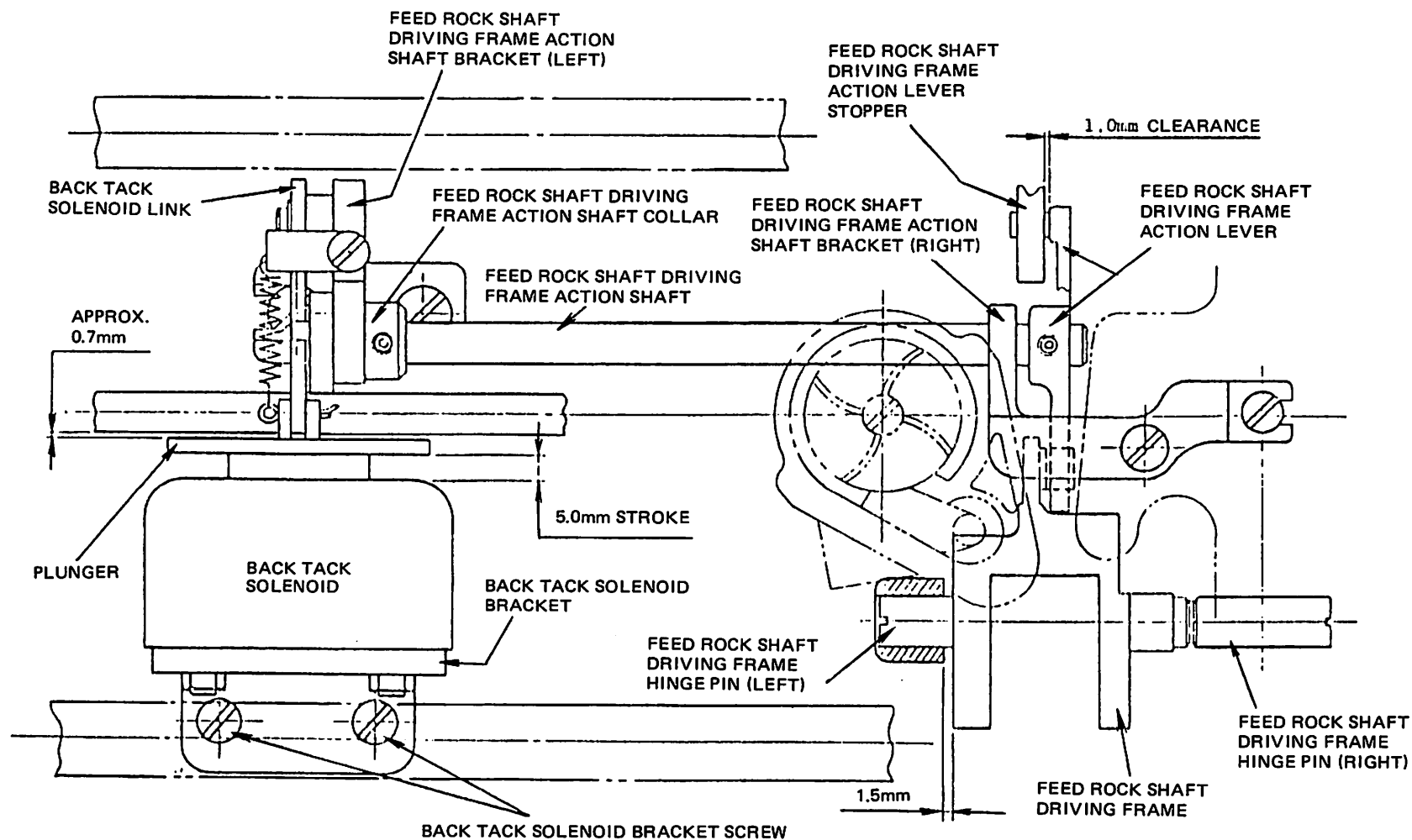


Fig. 36

PRINCIPAL PARTS (Continued)

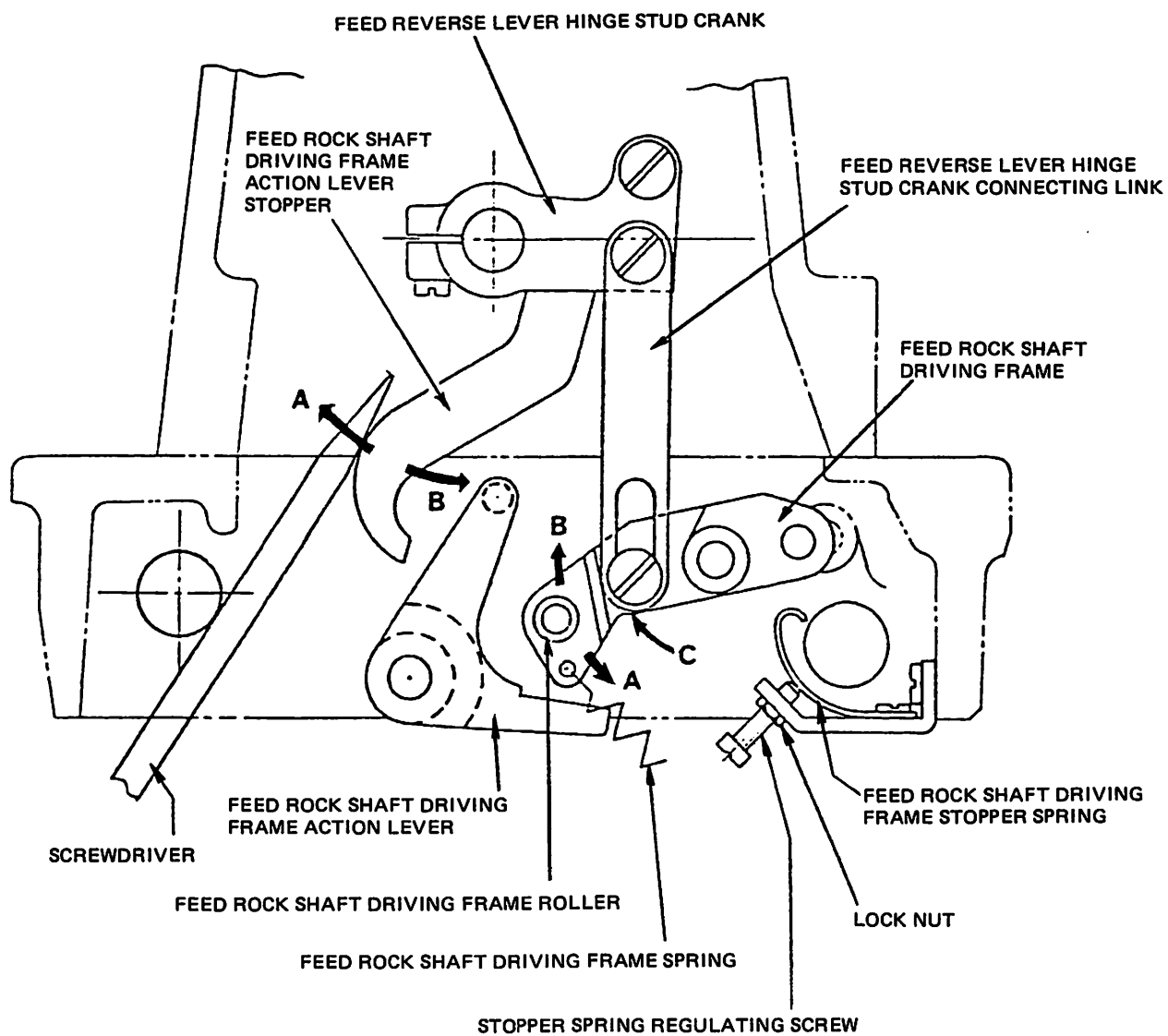


Fig. 37

DESCRIPTION OF BACK TACKING OPERATION

Back tacking with the back tack device is done by means of a built-in back-tack solenoid.

When an electronic command from the control box (for automatic back tacking) and/or the push button switch is relayed to the back-tack solenoid, the solenoid causes the feed rock shaft driving frame action lever fastened to the right end of driving frame action shaft to rotate and push the feed rock shaft driving frame upward and hold it in this position until back tacking is completed. While the above takes place, the feed reverse lever remains immovable due to the slot provided on the joint portion of the feed reverse lever hinge stud crank connecting link which is connected to the feed rock shaft driving frame.

The feed rock shaft driving frame stopper lever provided on the feed reverse lever hinge stud crank has been designed to control the reverse stitch length to same stitch length as set for forward stitch with the feed regulating dial on the feed reverse lever.

The automatic back tack switch connected to the control box permits automatic back tacking at start and at end of stitching independently. The number of stitches in reverse is controlled by the control box.

Back tacking can be done at any desired position during the sewing operation by depressing the push button switch provided adjacent to the needle bar. The machine will continue to sew in reverse while the push button is depressed, however, when the machine is stopped, the protective circuit automatically cuts off the current supply to the solenoid after 12 seconds even when the push button is continuously depressed.

SETTING AND ADJUSTMENT OF BACK TACK DEVICE

Setting of Back Tack Solenoid (Fig. 36)

The back tack solenoid is correctly set in the machine before the machine leaves the factory. If, however, this setting has been disturbed and resetting becomes necessary, reset as instructed below.

Setting

Set the back tack solenoid so that there is a clearance of about 0.7mm (.03") between the flange of its plunger and the rotating hook shaft when plunger is pushed toward the shaft.

When assembling the back tack solenoid link to the solenoid, be sure the solenoid is correctly positioned laterally and correctly angled so that the link can operate smoothly and without any binding in the groove provided on the plunger.

Adjustment

Loosen the two screws holding the back tack solenoid bracket and adjust position of solenoid as required and re-tighten the screws.

Setting of Feed Rock Shaft Driving Frame (Fig. 36)

Setting

Set feed rock shaft driving frame so that there is a clearance of 1.5mm (.06") between its left end and the boss on the bed.

The feed rock shaft driving frame hinge pins, feed and feed lifting eccentric and feed reverse lever hinge stud crank must be correctly set in relation with the feed rock shaft driving frame so that it can rotate freely when operated manually.

Adjustment

Set feed regulating dial to "6" and loosen the set screws holding the feed and feed lifting eccentric. Loosen the set screws holding the left and right feed rock shaft driving frame hinge pins and slide hinge pins away from feed rock shaft driving frame leaving a clearance of approximately 1mm (.039") on each side of the driving frame. Move the driving frame to the left or right as required until it is positioned where it can function freely, then push the left and right hinge pins lightly against the driving frame just enough to prevent lateral play and temporarily tighten the set screws. Set feed and feed lifting eccentric so that it is in alignment with the feed rock shaft driving frame and firmly tighten the set screws. Then firmly tighten the feed rock shaft driving frame hinge pin set screws.

Using a screwdriver, zero out feed rock shaft driving frame as shown in Fig. 37. To make forward stitch length longer, turn feed rock shaft driving frame toward A. To make reverse stitch length longer, turn feed rock shaft driving frame toward B.

Setting of Feed Rock Shaft Driving Frame Action Shaft and Collar

Feed Rock Shaft Driving Frame Action Shaft

The feed rock shaft driving frame action shaft supported by the left and right feed rock shaft driving frame action shaft brackets must rotate freely without any binding. When torque is heavy, loosen the two screws holding the right bracket and adjust bracket so that the driving frame action shaft will rotate lightly, then firmly tighten the bracket screws.

Feed Rock Shaft Driving Frame Action Shaft Collar

Loosen the set screw holding the feed rock shaft driving frame action shaft collar and push the collar lightly against the left bracket just enough to prevent lateral play and also permit the driving frame action shaft to rotate freely. Then tighten the set screw.

Setting of Feed Rock Shaft Driving Frame Action Lever

Setting

Check feed rock shaft driving frame for correct zero position and set feed regulating dial to "6".

While holding the back tack solenoid plunger in its rest position, turn feed rock shaft driving frame action lever until it contacts the feed rock shaft driving frame roller and firmly tighten the two driving frame action lever screws.

Check that the driving frame action lever is set laterally in the relation with the feed rock shaft driving frame stopper lever as shown in Fig 36.

Adjustment

Loosening the two screws holding the feed rock shaft driving frame action lever will permit moving the action lever sidewise and in rotational direction. Set action lever correctly in position and firmly tighten the two screws.

Feed Rock Shaft Driving Frame Spring Tension

The feed rock shaft driving frame spring tension should be set so that the force required to actuate the feed rock shaft driving frame when applied to point C would be approximately 1 kg., feed regulator set at "6". (Fig. 37)

To adjust spring tension, bend the spring retainer portion of the oil pump screen frame as required.

Setting of Feed Rock Shaft Driving Frame Stopper Spring

Set feed regulating dial to "6" and depress feed reverse lever as far as it will go. While holding the feed reverse lever in this position, loosen the stopper spring regulating screw lock nut and adjust regulating screw so that its tip is in contact with the stopper spring and firmly tighten the lock nut.

Setting of Push Button Switch

To set the back-tack push button switch in desired position, loosen the two screws holding the push button switch box and move switch box as required, then firmly tighten the two screws. (Fig. 38)

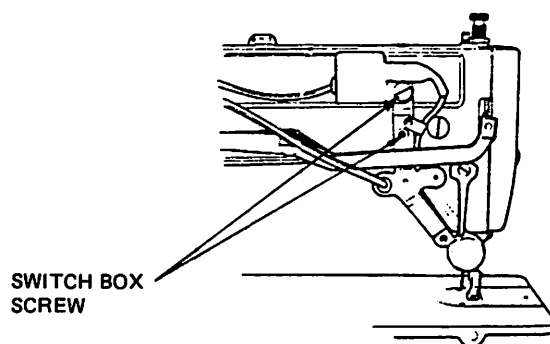


Fig. 38

Adjustment of Push Button Spring Tension

To adjust the spring tension of the push button, loosen the back-tack switch action shaft collar set screw and move collar toward rear of machine to increase the spring tension and move collar toward front of machine to decrease the spring tension, then firmly tighten the set screw. (Fig. 39)

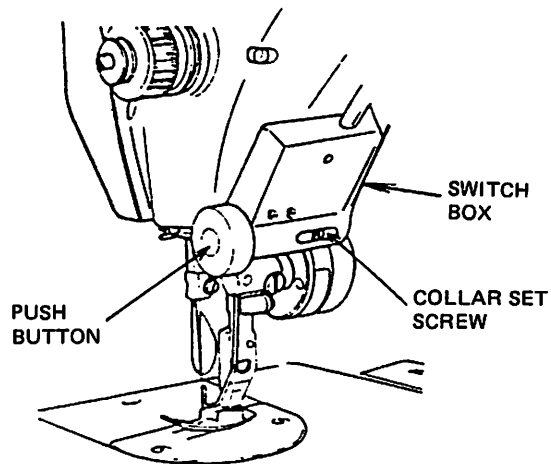


Fig. 39

Cords and Connections

Join the connectors to their mating terminals on the control box making sure they are correctly and fully inserted into the terminals. (Fig. 40)

Check that the sensor cord, back-tack switch cord and other wiring in the machine are not in contact with the belt, machine pulley and/or other moving parts.

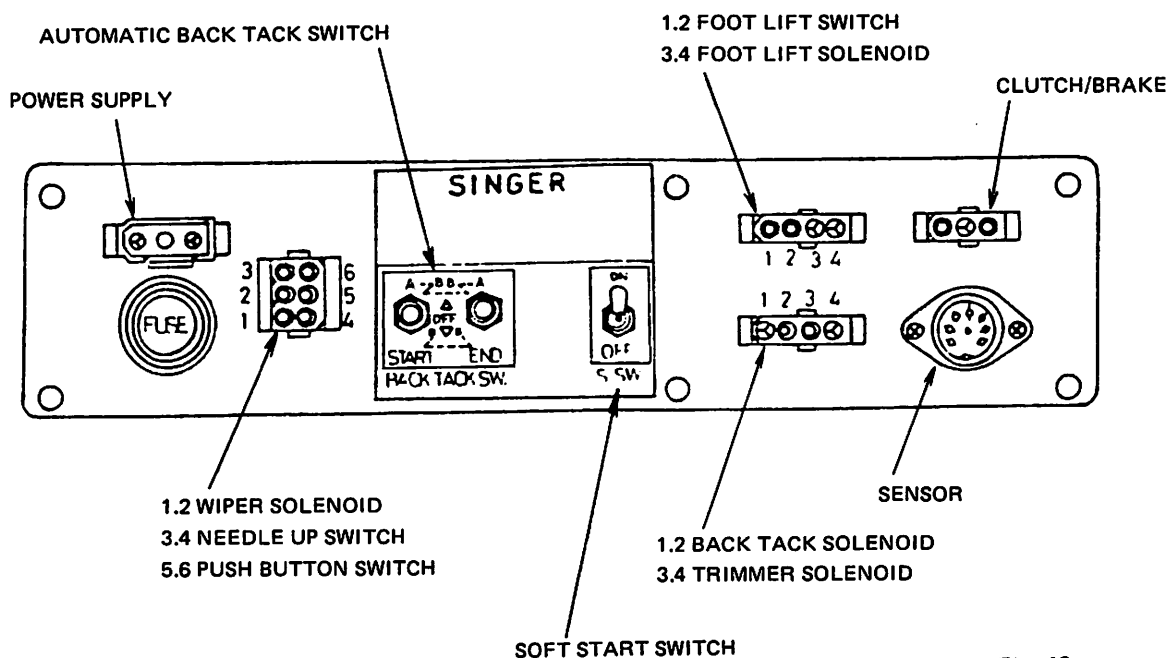


Fig. 40

— MEMO —

— MEMO —

— MEMO —

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