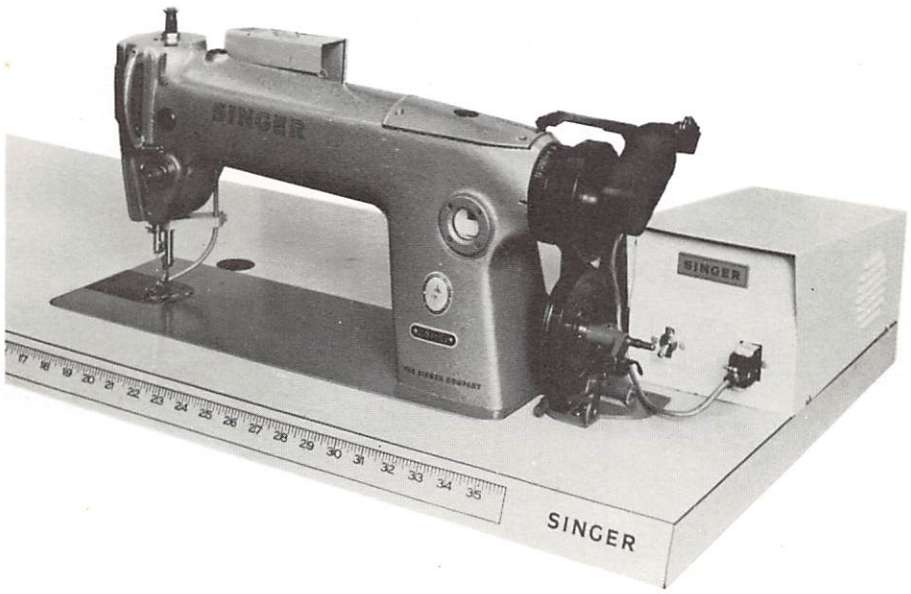
SINGER
INDUSTRIAL PRODUCTS

SERVICE MANUAL
for the
SINGER*

Needle Positioner and Underbed Thread Trimmer
Catalog Numbers NP050101 and NP050103



For details, call your Industrial Sales Office, or write The Singer Company, Industrial Products Division, 30 Rockefeller Plaza, New York, N.Y. 10020

THE SINGER COMPANY
INDUSTRIAL PRODUCTS DIVISION

*A Trade Mark of The Singer Company

Printed in U.S.A.

TABLE OF CONTENTS

LIST OF ILLUSTRATIONS

Catalog No. NP050101 refers to Machine Nos. 281-41 and 281-43.
Catalog No. NP050103 refers to Machine No. 281-61.

SECTION 1 - GENERAL INFORMATION

1-1. PURPOSE

The Underbed Trimmer and Needle Positioner, figure 1, has been developed by The Singer Co. to increase the efficiency, speed and accuracy of a sewing machine operator working on apparel manufacturing. The operator need not position the needle and cut top and bottom threads by hand. Instead the operator merely touches a knee switch or a foot treadle and the positioner/trimmer does this automatically, thus accomplishing automatic positioning, and trimming of both top and bottom threads of material being sewn.

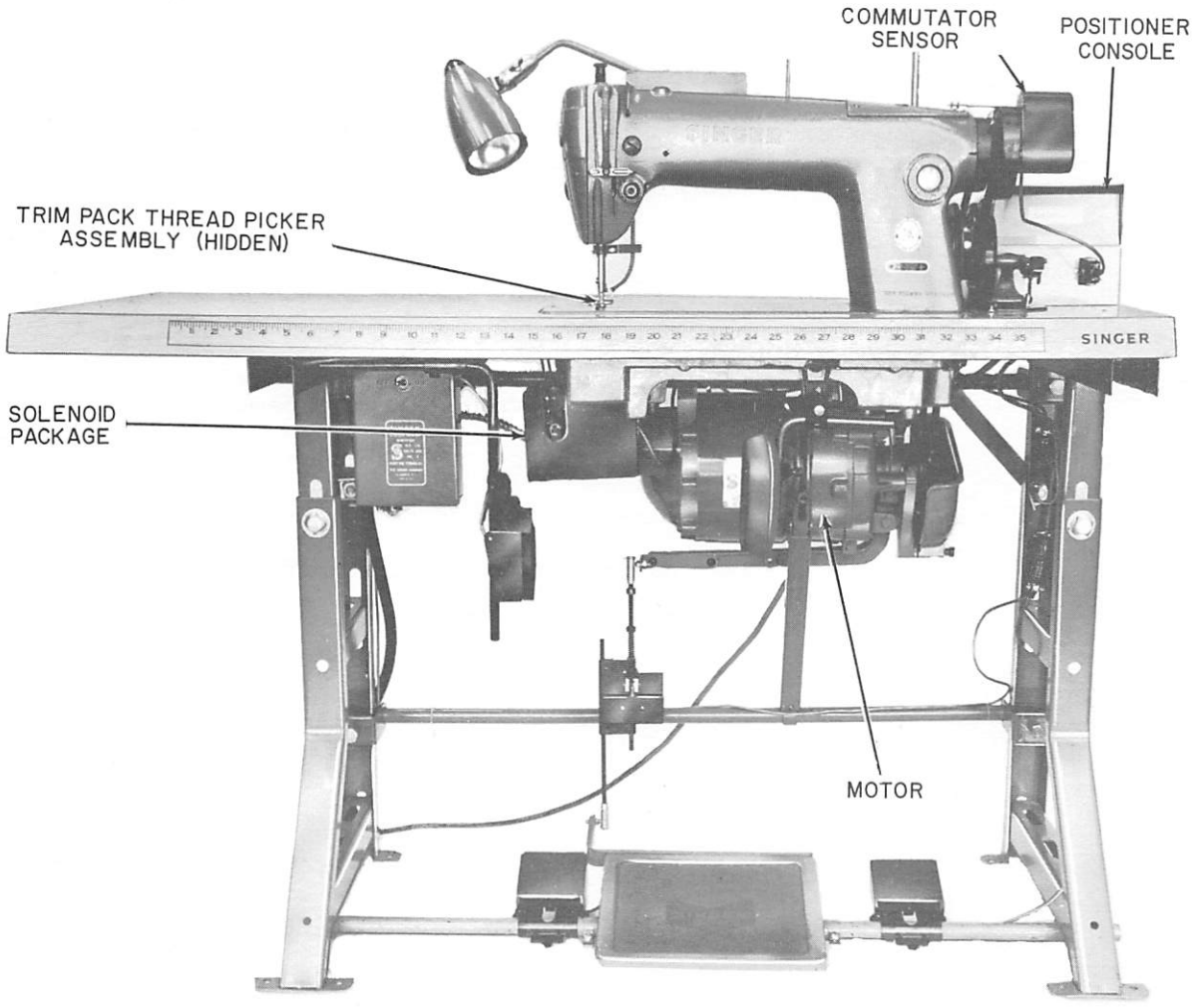


Figure 1....SINGER Needle Positioner and Underbed Trimmer Equipped Sewing Machine

1-2. FEATURES

The Underbed Trimmer and Needle Positioner has the following advantages:

a. INCREASED PRODUCTION....Increased output because needle positioning and underbed trimming of top and bottom thread is fast and automatic.

b. FLEXIBILITY....When Positioner/Trimmer is not required, the unit can be switched off and the sewing machine can be operated conventionally, since the unit does not require special fittings.

c. RELIABILITY....Exclusive solid-state electronic controls, and quality components coupled with outstanding mechanical design and construction throughout, provide the utmost in reliability.

d. SIMPLICITY OF OPERATION....Operators can be trained quickly and easily. Response time is fast, and controls are designed for fast easy operation. The unit can position one stitch at a time - to "slow sew" (available as an option). Operator may select either Needle Position Down - or Needle Position Up and Trim.

e. EASE OF MAINTENANCE....Maintenance and periodic inspection of the Positioner/Trimmer can be accomplished very easily. The electronic portion of the Positioner/Trimmer is incorporated into two compact, rugged printed circuit boards.

1-3. BASIC COMPONENTS

The Underbed Trimmer and Positioner consists of the following subassemblies:

a. Trimmer Assembly

b. Trimmer Solenoid Assembly

c. Harness Assembly consisting of

(1) Heel Switch

(2) Trimmer Switch (foot or knee switch)

(3) Slow Sew Switch (optional)

d. Needle Positioner Assembly

e. Commutator Sensor Assembly

f. Thread Wiper Assembly

SECTION 11 - INSTALLATION

2-1. GENERAL INFORMATION

This Section will describe the physical installation of the subassemblies that make up the complete Underbed Trimmer and Positioner.

CAUTION

This machine should operate from 110-115 volt source only. Electricity should be shut off during installation until instructed otherwise.

NOTE

Do not attempt to operate from one leg of a 220 volt line.

2-2. PREPARATION OF SEWING TABLE (See Figure 2)

Package table will have the cutout for double v-belt pulley, the large hole for the needle positioner leads and the elongated hole for the thread wiper cable and lamp cord.

NOTE

For field installation, dimensions for cutout and holes are shown in Figure 2.

2-3. CLUTCH MOTOR

If the Underbed Trimmer and Positioner assemblies are to be added to a standard sewing machine and table, it will be necessary to remove the motor and mount it exactly 1 inch (1") to the left of the standard position.

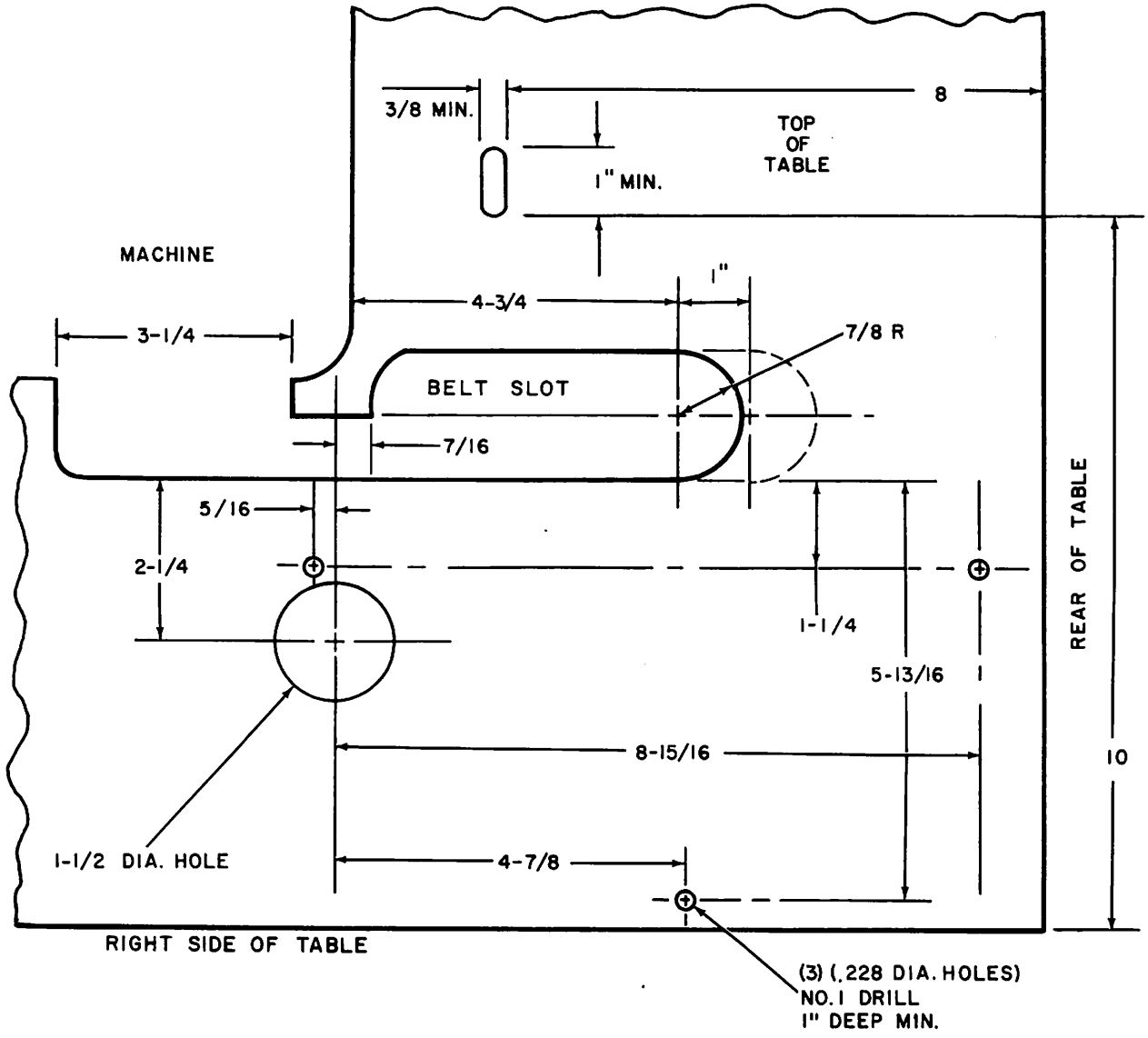


Figure 2....Sewing Table Top

2-4. OPERATING SWITCHES

All operating switches are shown in the illustration, Figure 3. It should be noted that the sewing machine table has the Pitman rods, basic foot treadle and linkages to the power transmitter, in place.

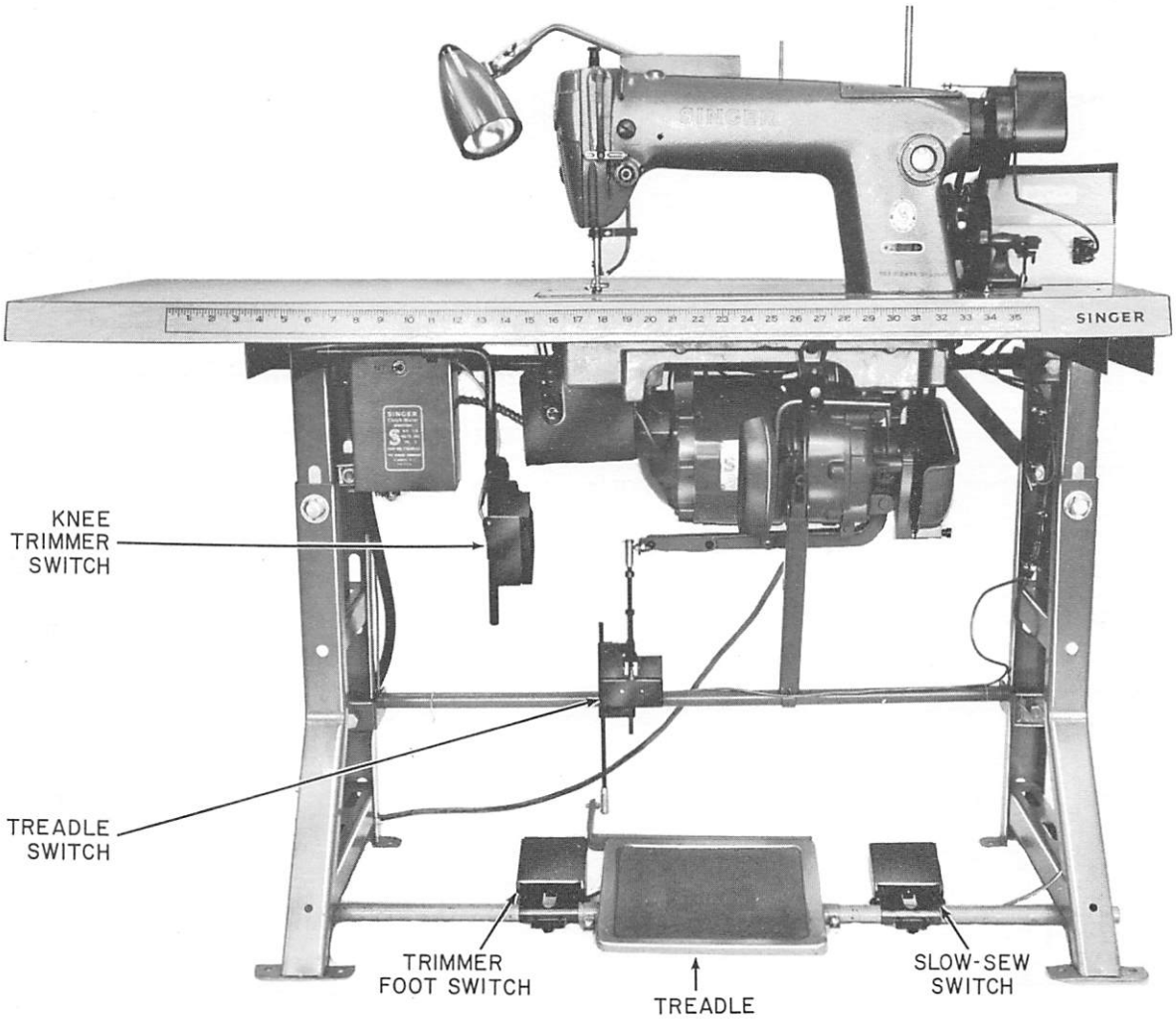


Figure 3....Operating Switches

2-4-1. HEEL SWITCH...The purpose of the heel switch is to activate the needle positioner. Since the heel switch is mounted on the Pitman rod, when the treadle is firmly heeled, the heel switch is activated. If the heel switch has not been mounted on the Pitman rod, refer to Figure 4 for its proper position and proceed as follows:

a. Remove clamp from standard Pitman rods. Pitman rod should be mounted at extreme outside position of power transmitter lever rod.

b. Install heel switch as shown in Figure 4.

2-4-2. TRIM SWITCH (See Figure 3)

The Trim Switch is a universal type that can be used either for knee operation, mounted under table or as a foot switch when slipped on treadle rod to left of treadle.

a. Foot Trim Switch - mounted to the left of the treadle. When treadle is firmly heeled and the foot trim switch is depressed, the machine will position up and trim.

b. Knee Trim Switch - mounted under the table. When activated by the knee, the machine will position up and trim.

If the trim switch has not been installed on the sewing table proceed as follows:

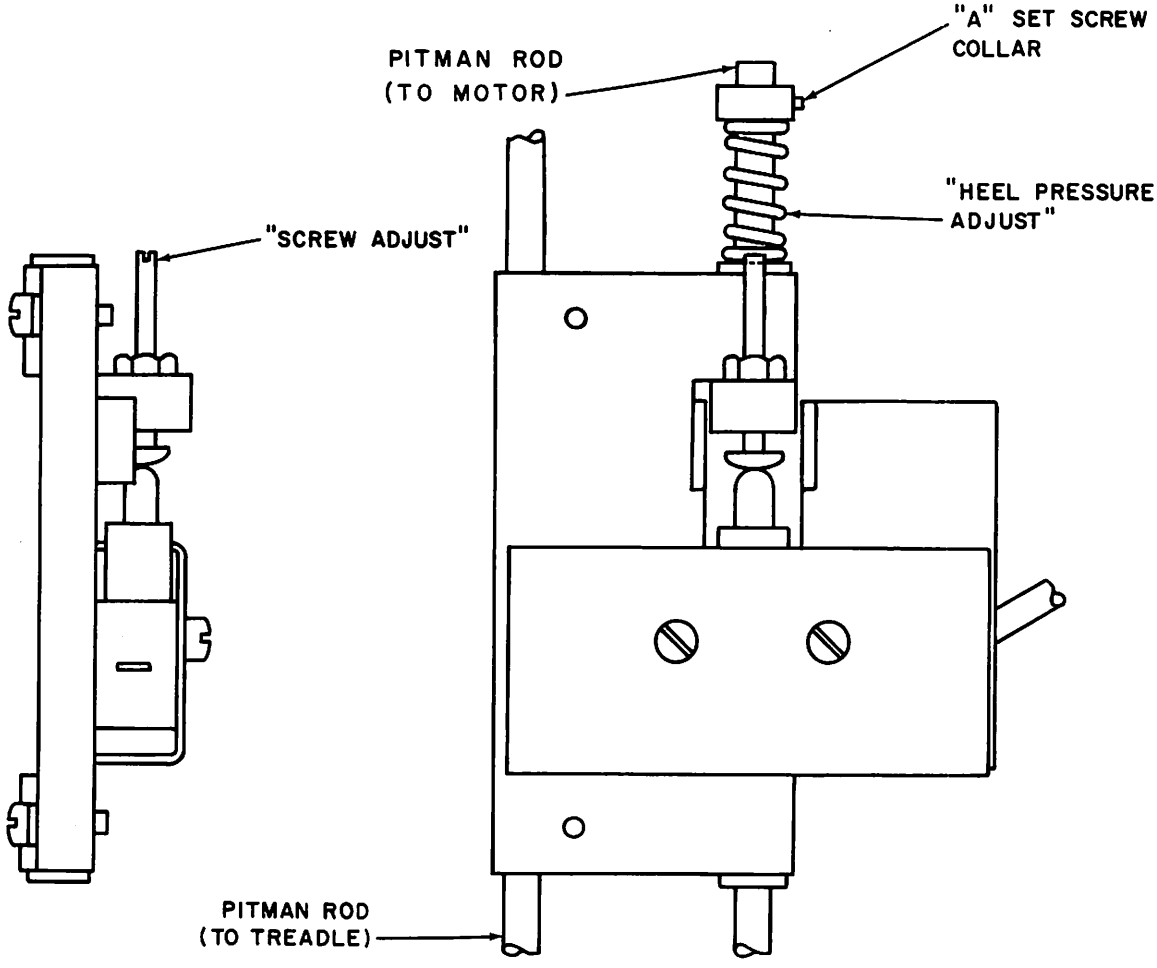


Figure 4....Heel Switch Installation

2-4-2-1. Foot Type (See Figure 5)

(a) Loosen clamp screws for treadle support rod and slide to right.

(b) Slip foot switch over rod and locate several inches to left of treadle to suit operator.

2-4-2-2. Knee Type (See Figure 6)

(a) Locate and pilot drill holes for wood screws according to location shown in Figure 6.

(b) Mount switch bracket with wood screws, "B".

(c) By loosening clamp screws "A", the switch may be moved to the left or right or rotated forward or back to suit operator. Tighten clamp screws.

(d) By loosening screws "C", the knee switch may be moved up or down to suit operator. Tighten clamp screws.

2-4-3. The Slo-Sew Switch is physically the same as the trim switch and mounts on treadle rod to the right of the treadle. (See Figure 7)

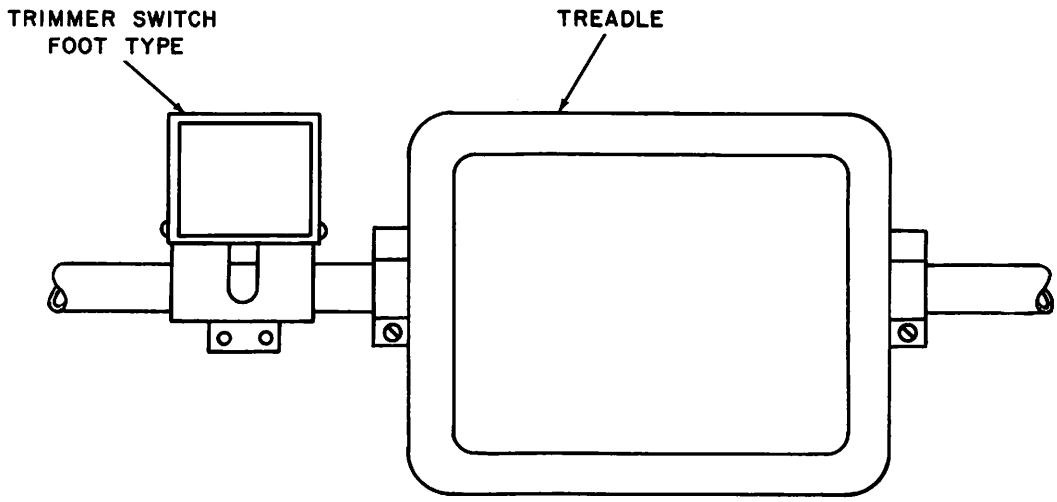


Figure 5....Foot Trim Switch Installation

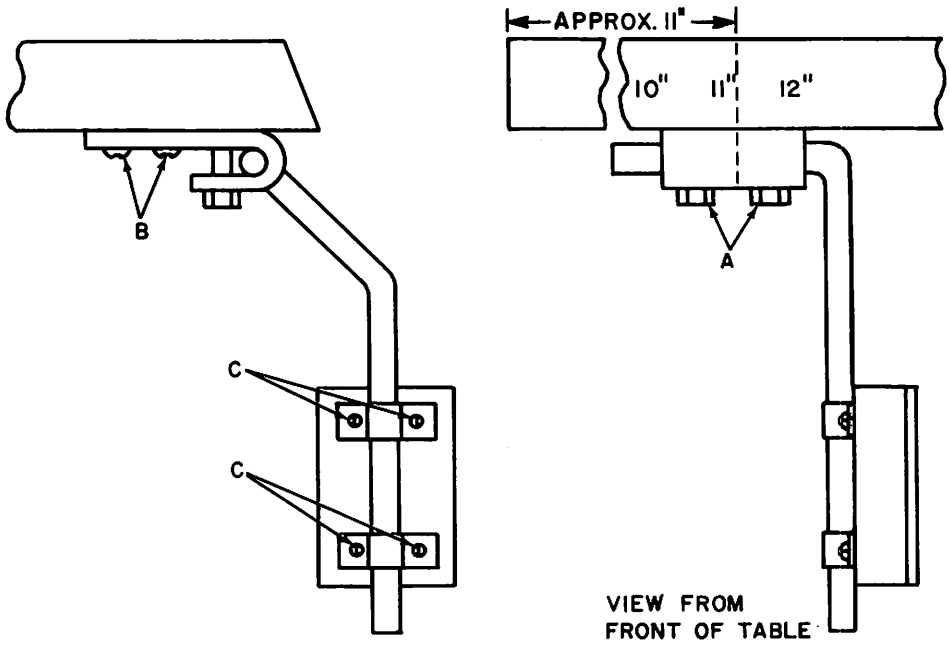


Figure 6....Knee Trim Switch Installation

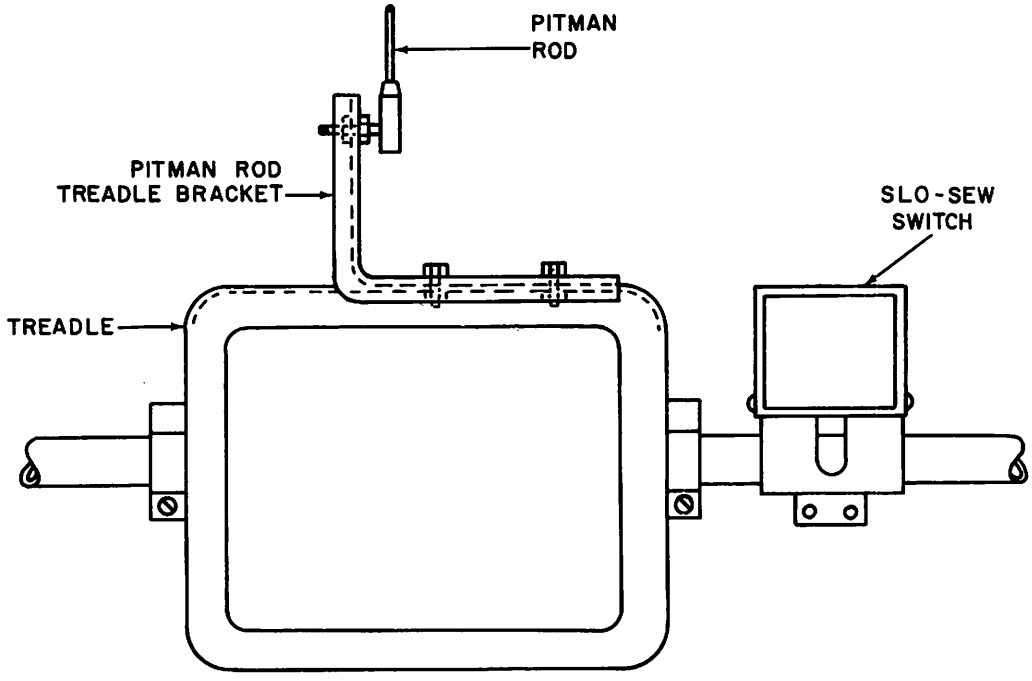


Figure 7....Slo-Sew Switch

2-4-4. OPERATING SWITCHES ASSEMBLY and wiring data. Check to see that all operating switches have been installed and wired properly by checking the information contained in Figure 8.

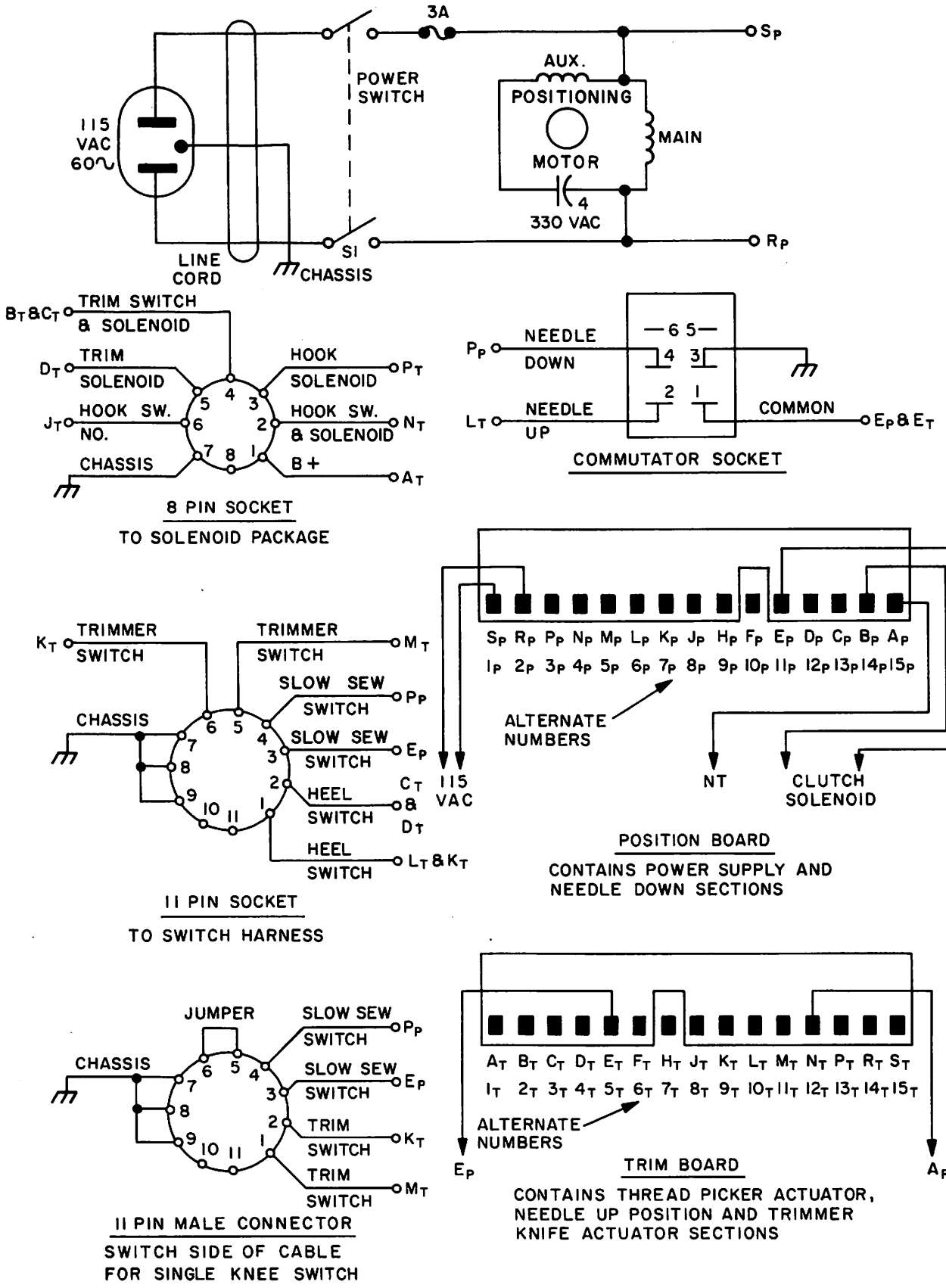


Figure 8....Operating Switches Assembly and Wiring Data

2-4-4-1. DOUBLE ACTING "SINGLE" KNEE OPERATION (No heel switch). This "single" knee switch plugs into the wiring harness that connects the two-switch setup (previously described). There is no harness change required - the difference being that this "single knee switch" setup, allows the operator to position and trim with one motion without the need of a heel or treadle switch. This "single knee switch setup" utilizes the built-in position time delay of the present circuitry before trim cycle starts. Thus the operator can call for position down by a touch or trim by holding this switch closed.

2-4-4-2. SLO-SEW SWITCH (Optional). For use with the "Single" knee system. Slo-Sew can be incorporated with the "single" knee system by use of a foot switch (previously described) which when closed before the "single" knee switch, allows normal slo-sew of the positioner.

2-5. SEWING HEAD

Complete installation information for the sewing head is contained in the sewing machine Service Manual. After the head, oil pan and accessories have been set in the sewing table, remove packing attachments from sewing head and trim package underneath.

2-6. COMMUTATOR SENSOR (See Figure 9)

The Commutator Sensor Assembly is mounted in the same manner as a standard hand wheel except only the rear set screw fastens the unit to the main shaft, and the sensor bracket is used to secure the sensor.

To set the commutator - rotate handwheel until take-up is approximately 3/8" from the top of its stroke. At this point set commutator so leading edge of up segment (A) is even with the front edge of brush block (B) by loosening screw (C). This adjustment can be used to shorten length of tail of needle thread on starting end of stitching by lowering take-up position when thread is trimmed.

NOTE

To clean or change brushes refer to Section IV.

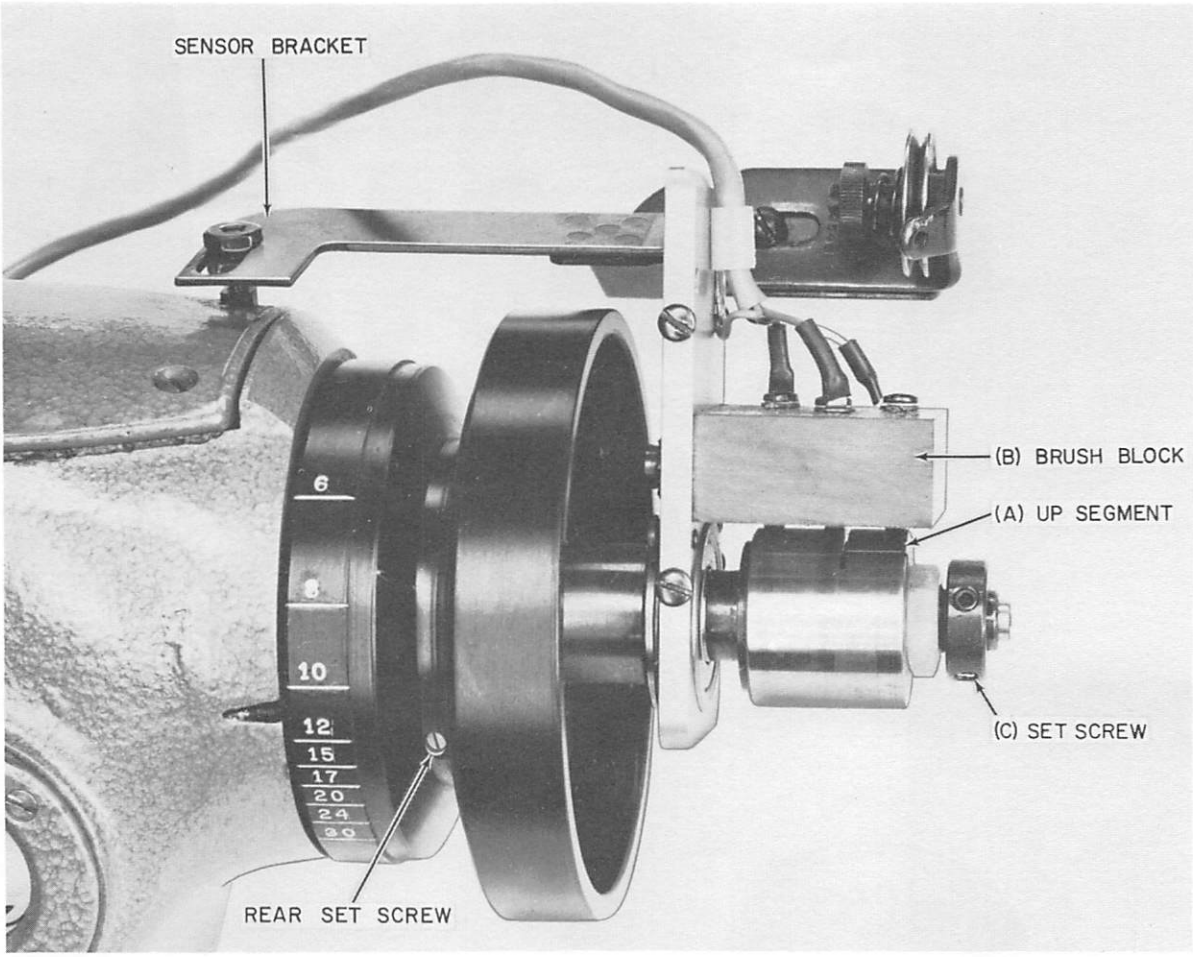


Figure 9....Commutator Sensor

2-7. POSITIONER CONTROL CONSOLE (See Figures 10A and 10B)

Set the positioner control box on the sewing table and proceed as follows: (See Figure 2).

(a) Put leads through large hole.

(b) Align 23 inch belt from handwheel, on sensor unit and inside V-belt groove of the positioner assembly. Check to make sure that there is good alignment.

(c) Remove cover from the positioner console, locate and mark screw holes for the 3 mounting screws.

(d) Remove the unit and drill 3 holes using the proper size drill. (Figure 2)

(e) Mount the positioner control box and adjust belt tension to taut alignment before tightening the screws.

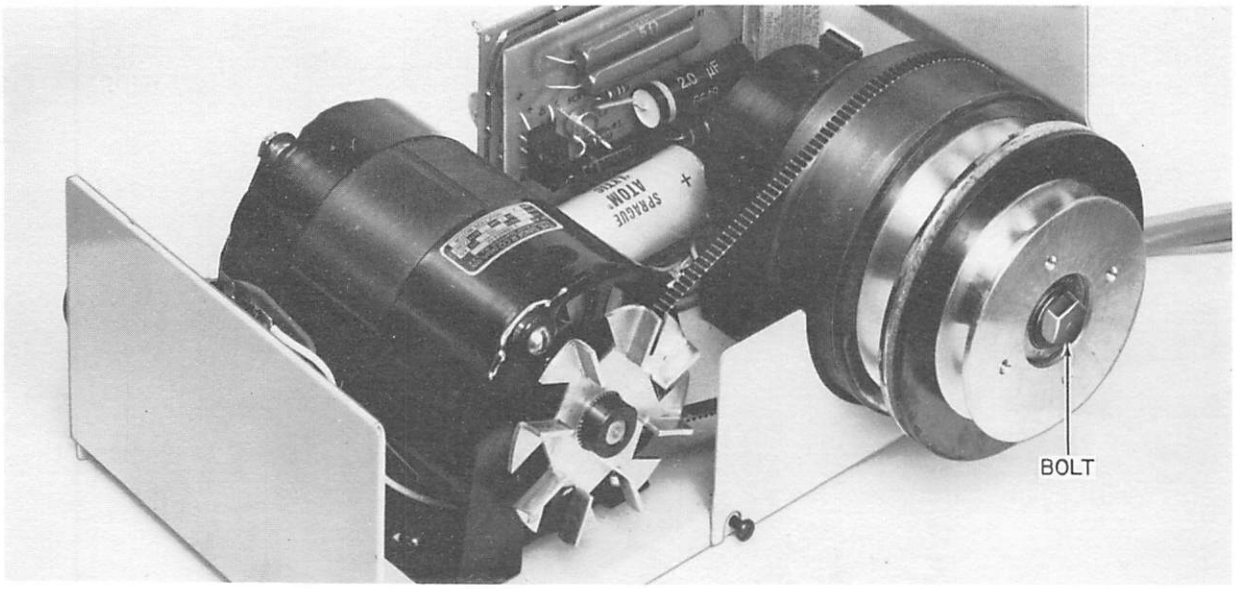


Figure 10A..Positioner Control Console

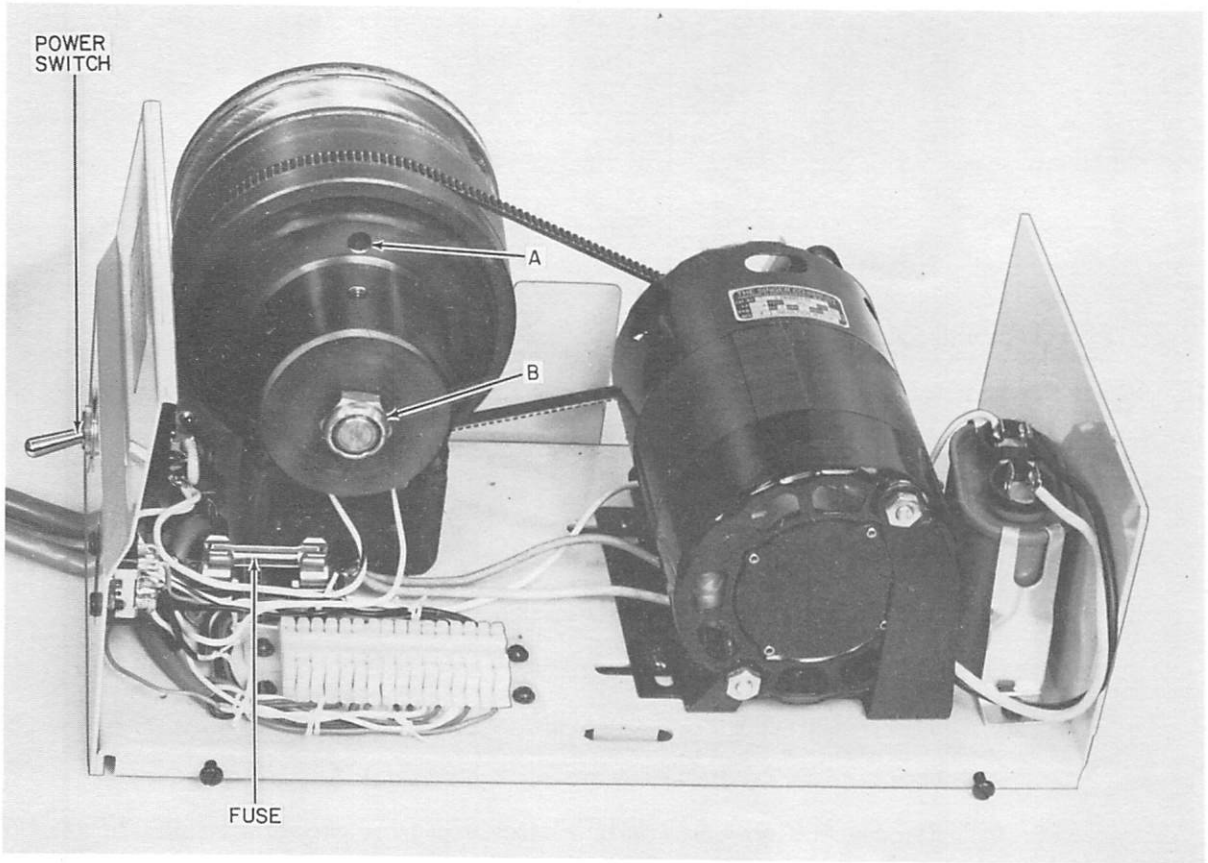


Figure 10B..Positioner Control Console

2-8. TRIMMER PACK ASSEMBLY (See Figures 11A, 11B, 11C and 11D)

The Trimmer Pack Assembly comes installed on the machine. The following instructions are for the installation of the thread picker.

(a) Set picker parallel to bed then turn the barb so that hook side is away from bobbin case, then hand tighten clamp screw.

(b) Set the picker bracket so that picker just rubs the bobbin case as it enters the notch in the basket.

CAUTION

Knife actuating pin is to be placed in slot each time trim pack is placed on machine. (See Figure 11C)

NOTE

Check for depth of picker in sewing hook basket with bobbin case removed. When thread picker is pushed in all the way into hook basket, it should just clear bottom of recess (See Figure 11D).

2-8-1. TIMING OF THREAD PICKER

(a) To time thread picker, turn machine over by hand with machine threaded and sewing on a piece of material, (counter-clockwise rotation toward operator) until needle bar has reached the bottom of the stroke. At this point push thread picker into sewing hook basket. After picker is in basket, picker should stay in locked position with needle in down position. Turn machine over by hand and with adjusting screw shown in Figure 11B. Set picker to release at thread castoff position on sewing hook. Figure 11B. This adjustment can be varied to relieve thread breakage.

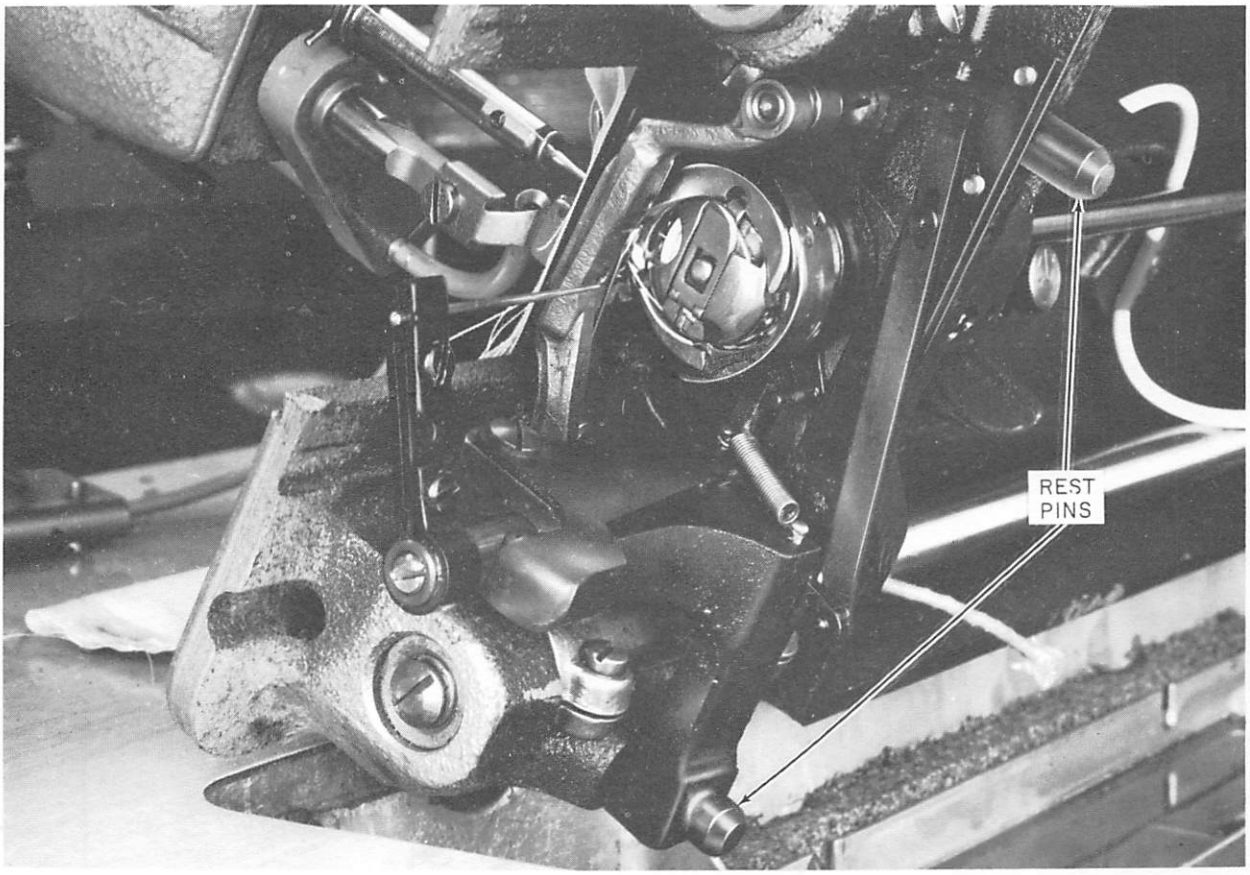


Figure 11A..Trim Pack Thread Picker Installation (Trim Pack at Rest)

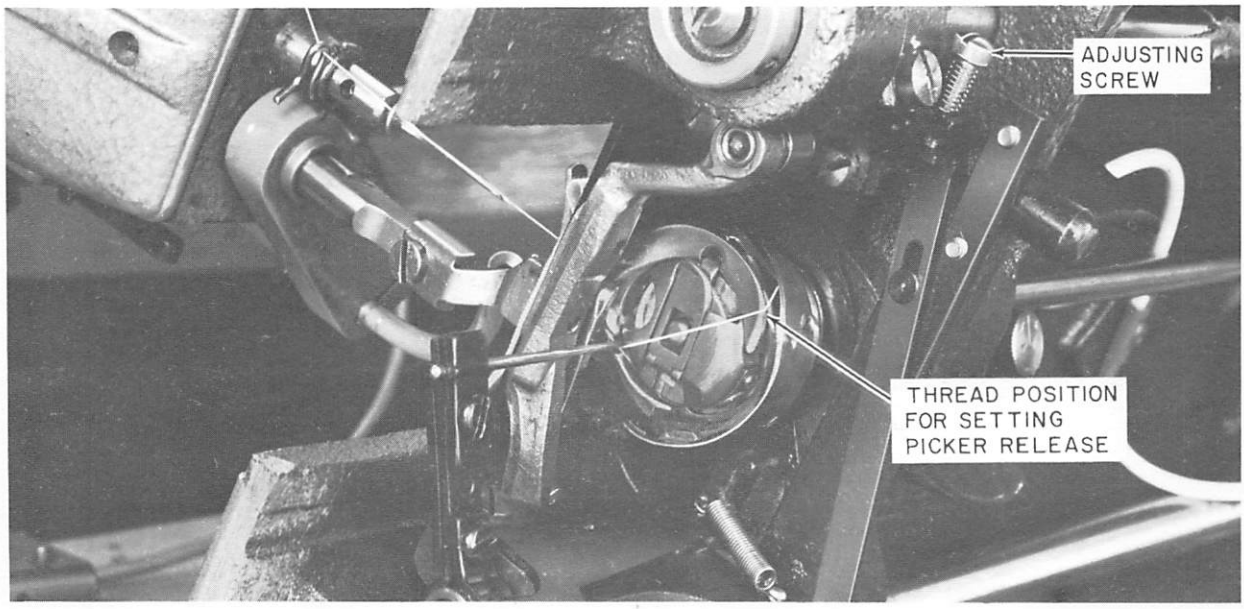


Figure 11B..Trim Pack Thread Picker Installation (Trim Operation at Time of Picker Release)

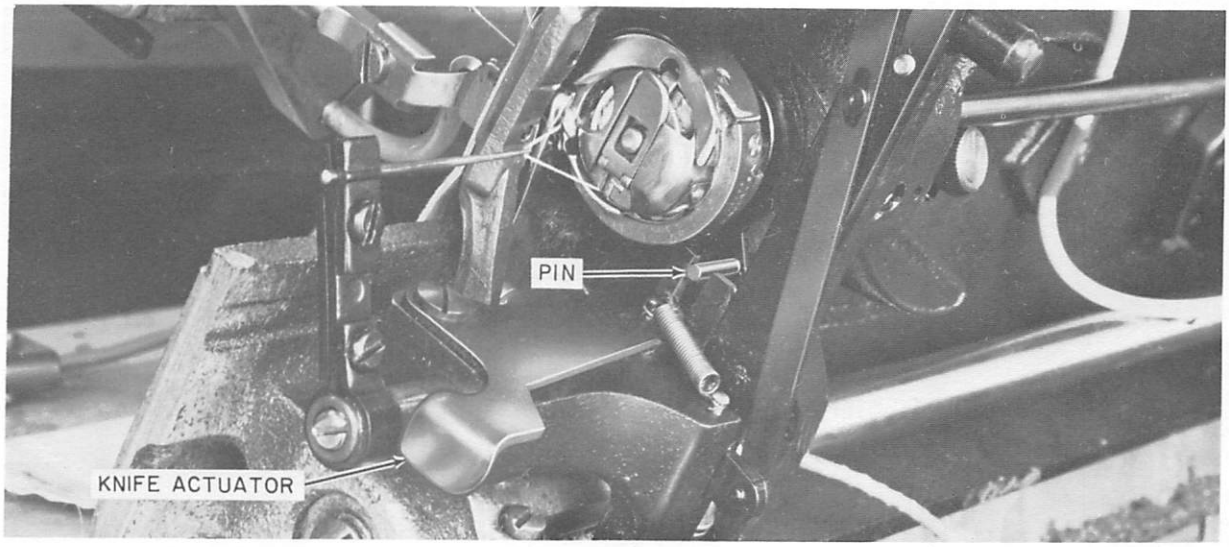


Figure 11C..Trim Pack Thread Picker Installation (Trim Pack in Cutting Time of Cycle)

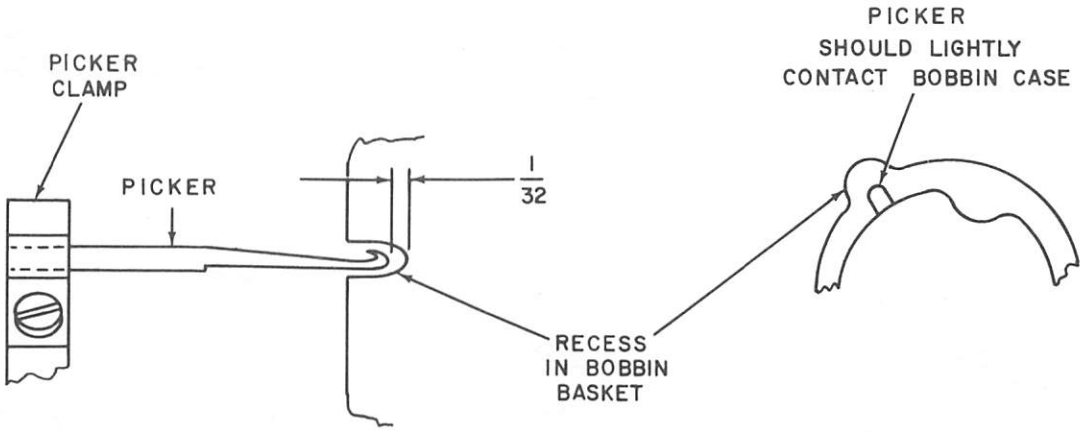


Figure 11D.. Trimmer Assembly

NOTE

When thread picker is released and machine take-up has reached the top of its upward stroke, be sure to trim the threads, by actuating the knife driving link by hand. Figure 11C. Repeat several times to make sure thread picker is catching bobbin and needle thread.

2-8-2. SETTING OF TRIMMING KNIFE (See Figure 12)

To set the trimming knife, refer to Figure 12 and proceed as following:

(a) Remove presser foot, throat plate, and feed dog. Check each and the feed bar for rough or sharp edges.

(b) Move knife manually to cutting position, loosen knife holding screw and position end of knife just beyond end of the position finger as shown in Figure 12.

(c) Tighten knife holding screw.

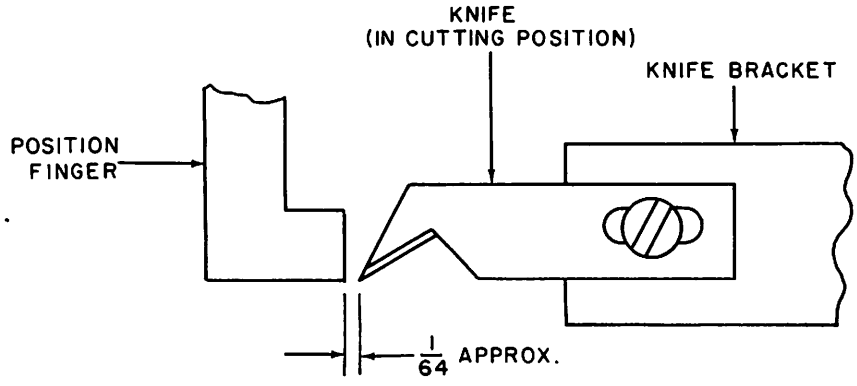


Figure 12...Setting of Trimmer Knife

2-9. TRIMMER SOLENOID ASSEMBLY (See Figure 13)

If the Trimmer Solenoid Assembly has not been installed on the machine, proceed as follows: Mount the Trimmer Solenoid Assembly to the underside of the machine, left end of the oil pan. Fasten using both nuts on the solenoid assembly threaded mounting stud, to the inside of oil pan.

Adjust the solenoids as follows:

NOTE

Figure 14-A shows the picker solenoid in its actuated position and the trim solenoid in its normal position. Figure 14-B shows the picker solenoid in normal and trim solenoid actuated.

(a) Adjust thread picker (upper) solenoid so that when the plunger seats in the solenoid, the picker shaft is latched and contact is made on the upper microswitch (refer to Figure 14). Both latching and switch contact takes place at the end of the picker-actuating arm travel (when picker travel is complete, there should be a small opening enough to see a minimum of light between travel arm and end of picker shaft.) (See Figure 14-A).

(b) Repeat above adjustment procedure for the trim (lower) solenoid.

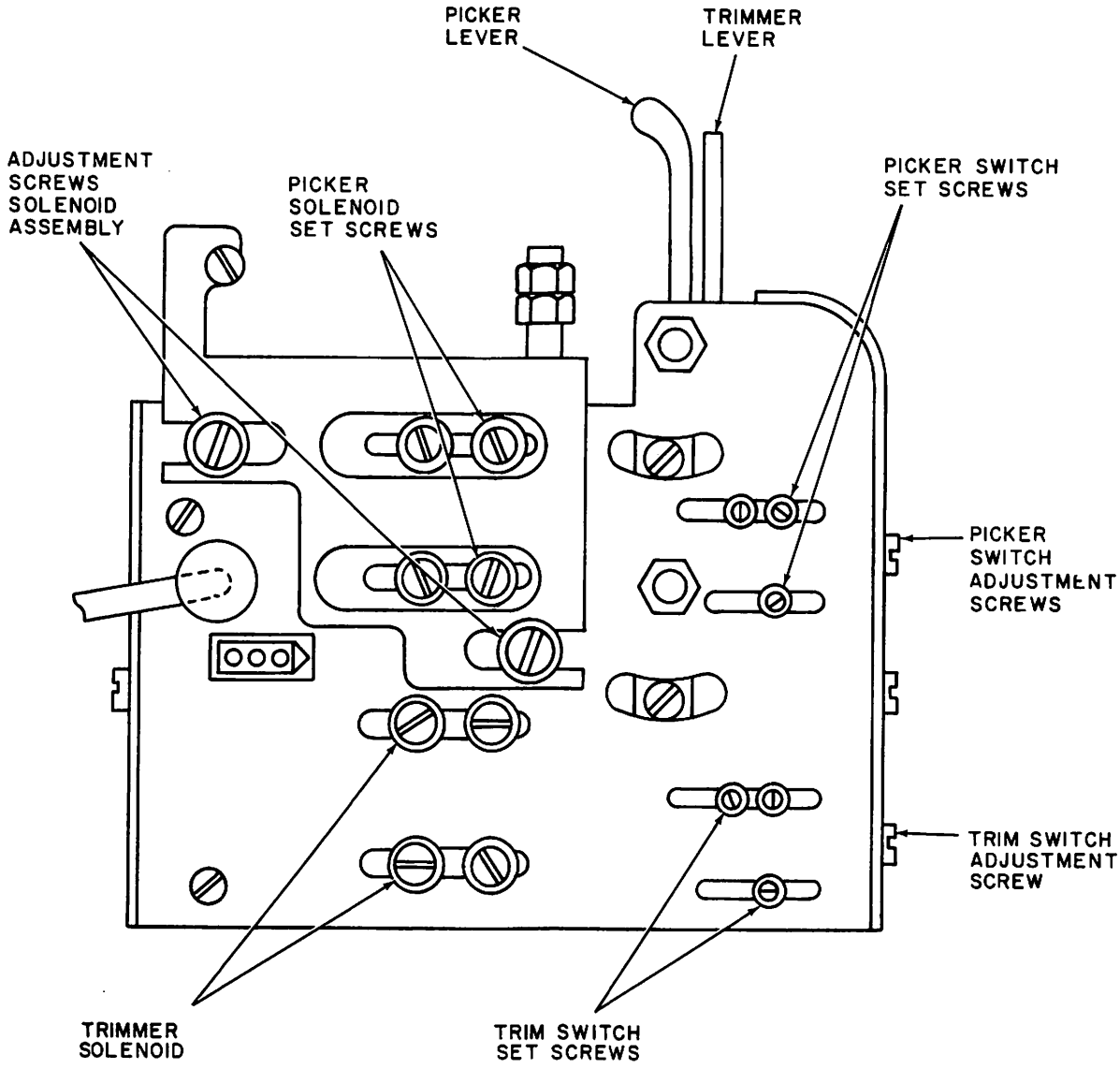


Figure 13...Trimmer Solenoid Assembly

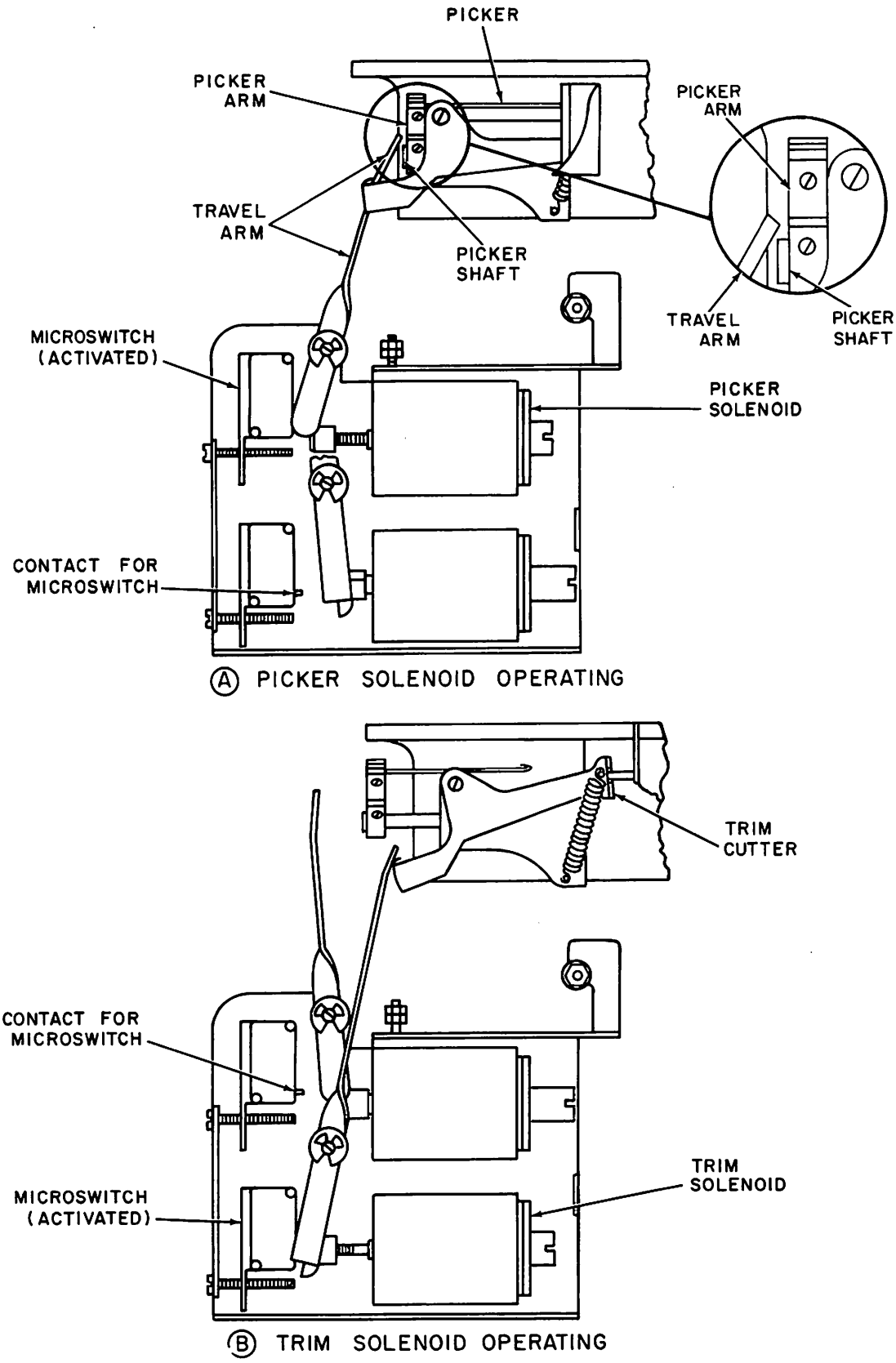


Figure 14...Trimmer Solenoid Adjustments Procedure

2-10. THREAD WIPER (See Figure 15)

The blade travel is adjusted for the barb to go just past the thread on the outward stroke, clear the thread, then pull the thread on the return stroke. Adjustments for this travel are as follows:

Adjust vertical height of thread wiper (when extended) to come as low as possible below needle and yet clear presser foot. This is done by means of adjusting height of thread wiper tube held by tube clamp. Set thread wiper with respect to needle as shown in Figure 15, as follows:

(a) Push solenoid in by hand and by means of thread wiper tube clamp, direct thread wiper so that thread comes directly at center of front slanted edge of thread wiper as thread wiper touches thread.

(b) By means of threaded yoke at solenoid adjust thread wiper so that tail of hook on thread wiper comes 1/8" beyond needle when solenoid is home.

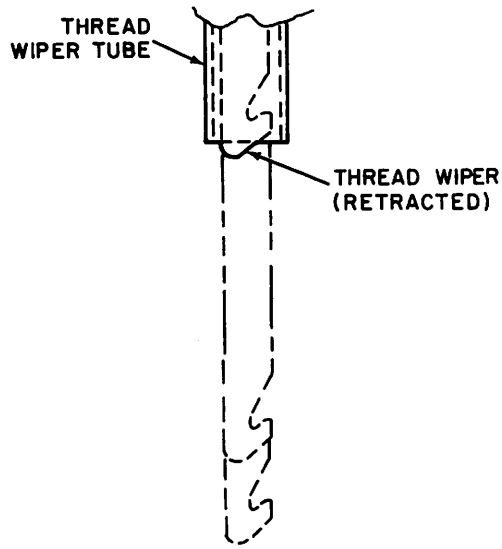


Figure 15...Thread Wiper

SECTION III - OPERATION

3-1. GENERAL INFORMATION

The initial starting procedure and operating instructions for the Needle Positioner and Underbed Trimmer is given below. Reference should be made to the callouts and references on Figure 16 before putting the unit into operation. Additionally, before starting, follow the instructions in the SINGER 281 Machine Manual to be sure the machine is in proper sewing condition.

NOTE

Sewing machine may be operated in conventional manner when positioner is switched to OFF position.

3-2. PRE-OPERATING CHECKS

Prior to actual operation, check visually to see that all new units, switches and trim components have been installed properly.

3-3. OPERATION

For standard operating procedure, refer to Figure 16 and proceed as follows:

(a) Plug machine into 110 volt source only, or use a transformer that has an output of 110-115 volts only.

NOTE

Do not attempt to operate from one leg of a 220 volt line.

(b) Turn positioner ON switch located on the front of positioner control console to ON position (Ref. 1).

(c) Proceed to sew in normal manner.

(d) To position needle down, heel treadle firmly.

(e) To trim, hold heel pressure on treadle with right foot; and with left foot activate trimmer switch (Ref. 2). If knee

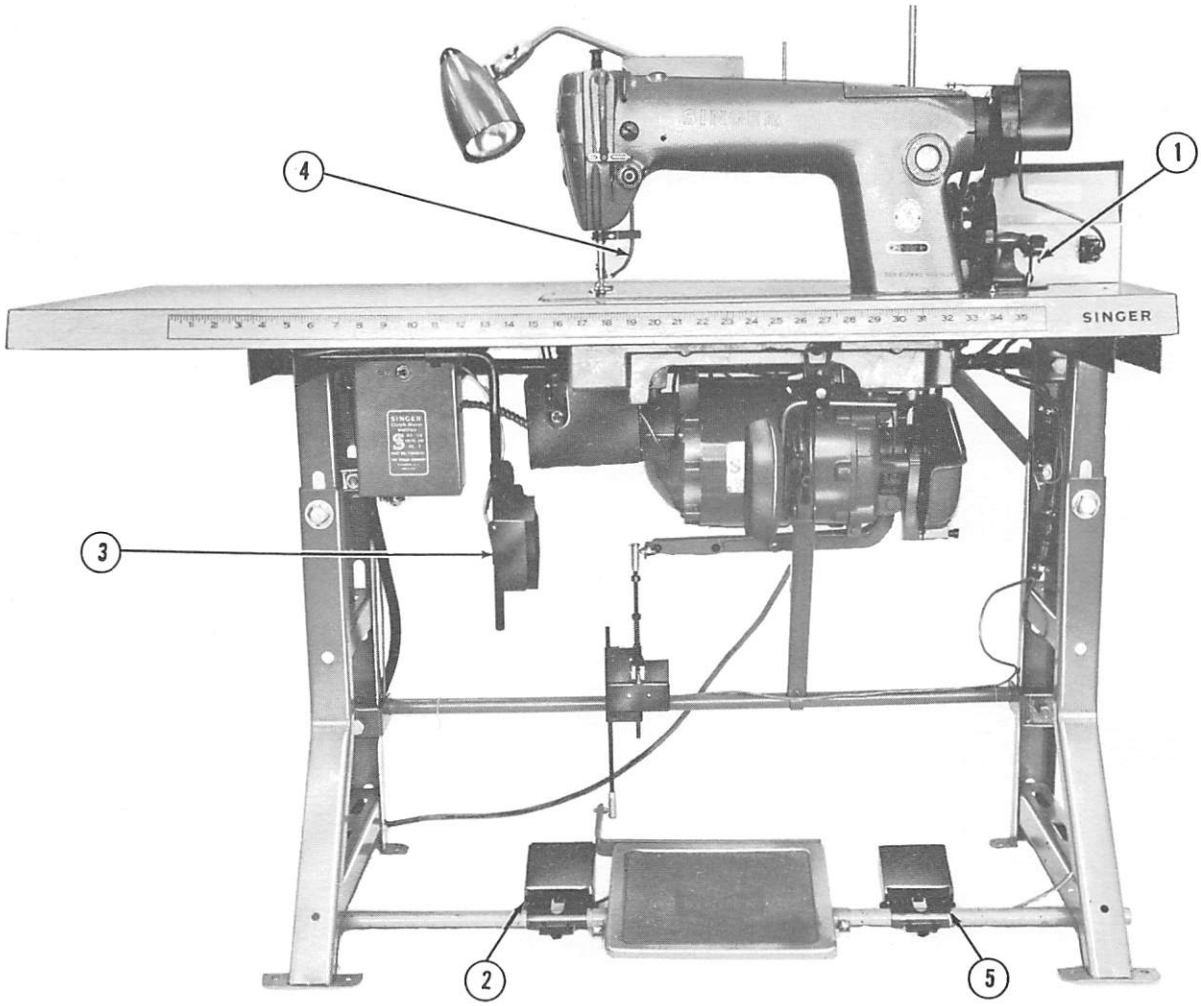


Figure 16...Operating Controls

activated trimmer switch (Ref. 3) is used on machine, press knee switch. DO NOT TRY TO RAISE PRESSER FOOT UNTIL TRIMMING IS COMPLETE.

(f) After trimming, raise presser foot and remove work. Insert next piece and sew. Needle thread is ready for sewing after each trim due to action of the thread wiper (Ref. 4) which keeps the cut end of the needle thread from being trapped under presser foot.

(g) Optional Slo-Sew. If machine is equipped with optional Slo-Sew switch, either single stitches or slow sewing may be obtained by heeling treadle with left foot and depressing Slo-Sew switch (Ref. 5).

SECTION IV - SERVICING AND ADJUSTMENTS

4-1. GENERAL INFORMATION

The sewing machine and all the assemblies installed will provide trouble-free operation, if care was taken in the installation and adjustment procedures given in Sections 1, 2, and 3. The equipment requires a minimum of preventive maintenance to keep it in proper functioning order.

4-2. CLEANING INSTRUCTIONS

4-2-1. SENSOR ASSEMBLY...The Sensor Assembly should be cleaned at intervals of 3 months, with a lint free rag and solvent cleaner such as carbon tetrachloride. Carbon rings cannot be removed from the commutator. Do not attempt to do anything but clean with solvent and rag.

4-2-2. SEWING MACHINE....The basic sewing head should be serviced in accordance with the service instructions contained in the 281 Class Machine Manual.

4-2-3. POSITIONER CONSOLE (See Figure 10a, and 10b)

4-2-3-1. To clean the clutch assembly, refer to Figure 10a, and proceed as follows:

(a) Remove bolt.

(b) Remove end pulley and use TRU-ARC pliers to remove the snap ring on main shaft, holding the rest of the assembly.

CAUTION

This assembly is under spring tension and should be held firmly when snap ring is removed.

4-2-3-2. Use a suitable solvent to clean all clutch and brake surfaces as well as the main shaft. These surfaces should be kept clean and free of foreign matter to prevent slipping of clutch and brake.

WARNING

DO NOT USE OIL ON THIS ASSEMBLY

4-2-3-3. To adjust clutch gap approx. .005" refer to Figure 10b and proceed as follows:

(a) Loosen set screw (a) and tighten or loosen nut (b) to decrease or increase clutch gap.

NOTE

Do not remove or loosen set screw too far as this screw is on a flat on the shaft to keep shaft from rotating when turning the nut.

(b) If no feeler gauge is available, tighten nut until there is friction between flywheel and pulley and then back off nut until flywheel turns free of pulley.

(c) Tighten set screw when finished.

SECTION V - TROUBLESHOOTING

5-1. GENERAL INFORMATION

This section contains troubleshooting data that will enable the operator, or maintenance men to spot the trouble, localize the trouble and procedures to complete adjustment or repair.

5-2. Needle Not Positioning Properly

A. Check On-Off Switch to be sure it is on.

B. Check slow speed motor to see that it is running.

C. Check fuse in Positioner Control Console.

D. Check Commutator Sensor Connector to be sure it is properly engaged in receptacle on front of Positioner Console.

E. Check:

1. Heel switch to be sure it is functioning properly.
2. If no heel switch is used, check knee switch.

F. Check Commutator Sensor Assembly for proper operation and clean if necessary. Refer to Figure 9.

G. Check Clutch Assembly for proper operation and clean if necessary. Refer to Figure 10.

H. Replace Positioner Circuit Board.

5-3. Faulty Trimming or Double Triggering of Solenoid Assembly

A. See Solenoid Assembly installation procedure, Figure 13 and 14.

B. See Trimmer Assembly installation procedure, Figure 11 A, B, C and D.

C. See Clutch Assembly installation procedure, Figure 10.

D. See Commutator Sensor Assembly, Figure 9.

E. Replace Trim Circuit Board.

5-4. Bobbin Thread Cut Too Short

A. Check Trimmer adjustment procedure for proper Picker operation, Figure 11.

B. Check Picker for sharp edges.

C. Check timing of picker release, Figure 11B.

D. Check all points to left of needle for sharp edges; that is: throat plate, feed dog, feed bar, position finger.

5-5. Needle Thread Cut Too Short

A. Picker does not latch in. Refer to Figure 11.

B. Picker releases too early or too late. Refer to Figure 11.

C. Knife too far to the left, cutting both legs of the needle thread. Refer to Figure 12.

5-6. Needle Thread Pulls Out of Needle

A. Check position of needle take-up after trimming. It should be approximately 3/8" from top of upward stroke.

NOTE

If needle thread take-up is too high in upward stroke, starting end of thread under fabric may be too long. If too low needle thread will pull out of needle at start of next stitch.