

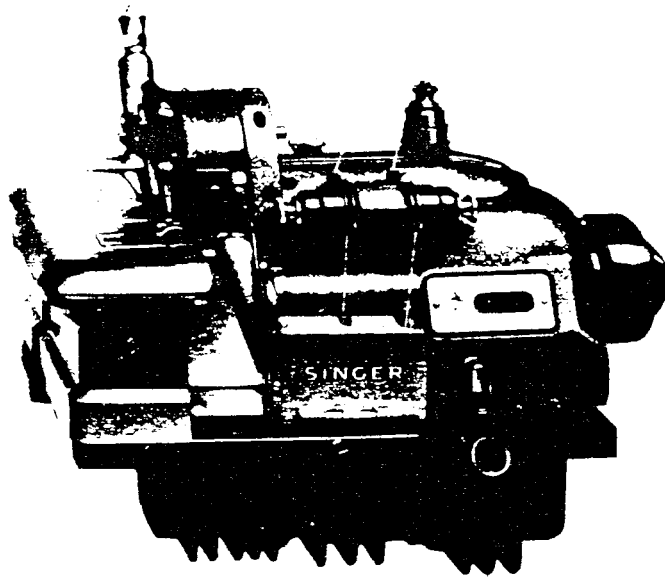
SINGER
CLASS 460

SERVICE MANUAL

FOR

SINGER*

CLASS 460/ MACHINE



CAUTION—See that machine reservoir is filled with oil, as instructed on page 8 before using machine.

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DESCRIPTION

Trimming and overedging knit or woven goods and other fabrics with a one-, two-, three-, or four thread stitch.

Knife trims ahead of needle.

All varieties feature small horn on machine frame to permit stitching small tubular articles.

All varieties can be fitted with swing attachments by replacing Knife (movable) Lever Bearing No.164032 with No.87262 (standard on 460/16).

Automatic lubrication and cooling system.

Reduced needle curvature to increase sewing capacity, and improved right hand looper path (four bar linkage).

Foot lifter regularly furnished. Knee Lifter will be supplied when specified on order.

Note: As the stands recommended for Class 460 Machines with foot lifter include a foot lifter treadle, only foot lifter chain will be furnished with the machine. When the machine is to be fitted to a stand or other equipment which does not include a suitable treadle, orders should state that foot lifter treadle 4885 is required and it will be furnished without extra charge.

Machine pulley: 2-1/2" dia. for 3/8" V-belt, 1-3/4" dia. for 5/16" round leather belt.

Chip chute 168198, for semi-submerged or fully submerged installations, furnished when specified on order at no extra charge for all territories except U.S.A. and Canada. Supplied as standard for U.S.A. and Canada.

MACHINE 460/12 ONE NEEDLE

Trimming and overedging light, medium and heavy weight fabrics. One looper, one spreader. Drop feed. Two-thread overedge chain-stitch (type 503). Can be fitted for three-thread purl-on edge stitch (type 505) by substituting right hand looper for spreader, interchanging springs on looper tensions, and replacing needle holder washer 82282 with 82313. Clearance under presser foot: 1/8". Clearance of 3/16" under presser foot can be obtained with all non-standard fittings. Bight adjustable from 1/16" to 7/32", depending upon/

upon fittings used. Stitch length: 5 to 16, 18, 20, 22, 24, 28, 32 and 36 per inch (length determined by feed eccentric). Unless otherwise specified, machine will be fitted with feed eccentric for approximately 5 stitches per inch. Maximum speed 6,500 s.p.m. (6,000 s.p.m. recommended for continuous runs).

Needles: Cat. 1431 (Light Set)
Cat. 1433 (Medium Ball Point)

Note: Machine is regularly fitted for serging pants of light, medium and heavy weight materials. Fittings for other operations can be substituted for those regularly furnished. Refer separate Parts Chart for Fittings, for additional fittings. For operations not listed, sample of work must accompany order.

MACHINE 460/13 ONE NEEDLE

Trimming and overedging light, medium and heavy weight fabrics. Two loopers. Three-thread tight stitch (type 504). Can be fitted for three-thread purl-on edge stitch (type 505) by interchanging looper tension springs and replacing needle holder washer No.82313 with No.82282, or two-thread overedge stitch (type 502 or 503) by removing right hand looper and substituting spreader, replacing needle holder washer 82313 with 82282 and interchanging looper tension springs. Clearance under presser foot: 3/16". Bight adjustable from 1/16" to 7/32", depending upon fittings used. Stitch length: 5 to 16, 18, 20, 22, 24, 28, 32 and 36 per inch (length determined by feed eccentric). Unless otherwise specified, machine will be fitted with two feed eccentrics for approximately 14 stitches per inch. Maximum speed: 6,500 s.p.m. (6,000 s.p.m. recommended for continuous runs).

Needles: Cat. 1431 (Light Set)
Cat. 1433 (Medium Ball Point)

Note: Machine is regularly fitted for rayon, glove silk and light weight materials, 1/8" bight. Fittings for other operations can be substituted for those regularly furnished. Refer separate Parts Chart for Fittings, for additional fittings. For operations not listed, sample of work must accompany order.

MACHINE 460/14**ONE NEEDLE**

Trimming, overedging and blind stitch hemming or welting light, medium and heavy weight fabrics. One looper, one spreader. Two-thread overedge stitch (type 502 or 503). Can be fitted for three-thread tight stitch (type 504) by substituting right hand looper for spreader, interchanging springs on looper tensions, and replacing needle holder washer No. 82282 with No. 82313 or three-thread purl-on-edge stitch (type 505) by substituting right hand looper for spreader. Clearance under presser foot: 3/16". Stitch length: 6 to 16 and 18 per inch (length determined by feed eccentric). Unless otherwise specified, machine will be fitted with two feed eccentrics for approximately 14 stitches per inch. Bight adjustable from 1/16" to 7/32", depending upon fittings used. Maximum speed: 6,500 s.p.m. (6,000 s.p.m. recommended for continuous runs).

Needles: Cat. 1431 (Light Set)
Cat. 1433 (Medium Ball Point)

Note: Machine is regularly fitted for light and medium weight sweater material. Fittings for rayon, balbriggan and nylon can be substituted for those regularly furnished. Refer separate Parts Chart for Fittings, for additional fittings. For operations not listed, sample of work must accompany order.

MACHINE 460/15**ONE NEEDLE**

Same as 460/13 except having better needle penetration angle, and increased looper (left and right), needle and knife stroke permitting 1/4" clearance under presser foot. Also 3/32" to 1/4" bight adjustment, depending upon fittings used.

For medium heavy and heavy cotton, knit goods, synthetic fabrics, sports jackets, fruit bags, laundry bags, etc.

Maximum speed: 5,500 s.p.m.

Needles: Cat. 1431 (Light Set)
Cat. 1433 (Medium Ball Point)

Note: Machine is regularly fitted for heavy knit goods. Fittings for other operations can be substituted for those regularly furnished. Refer separate Parts Chart for Fittings, for additional fittings. For operations not listed, sample of work must accompany order.

This machine can be fitted with a device for shortening the length of stitch at the will of operator, for bunch tacking at the beginning and ending of a seam.

MACHINE 460/16**ONE NEEDLE**

Intermittent gathering on light, medium and heavy weight fabrics. Controlled gathering feed. Gathering blade attached to presser foot. Knee lever to operate controlled feed mechanism at will. Two loopers. Trimmer. Three-thread tight stitch (type 504). Can be fitted for two-thread overedge stitch (type 503) by substituting spreader for right hand looper, replacing needle holder washer 82313 with 82282 and interchanging springs on looper tensions. Clearance under presser foot: 3/16". Bight adjustable from 1/16" to 7/32", depending upon fittings used. Stitch length: 6 to 16 and 18 per inch (length of stitch and maximum gathering feed dog movement, using controlled gathering mechanism, determined by feed eccentrics). Unless otherwise specified, machine will be fitted with two eccentrics, stitch length 14 and gather 6.

Maximum speed: 5,500 s.p.m.

Needles: Cat. 1431 (Light Set)
Cat. 1433 (Medium Ball Point)

Note: Machine is regularly fitted for "Controlled Gathering". Can also be fitted to lengthen or shorten stitches while machine is in operation, however, if so fitted, "Controlled Gathering" cannot be accomplished. If these fittings are required in addition to those regularly furnished they can be supplied at extra charge.

MACHINE 460/20**TWO NEEDLES**

Trimming, overedging bathing suits, house dresses and similar articles, drip dries, wash and wear, light and medium knitwear etc. Two loopers. Four-thread dual stitch (type 512) consisting of reinforcing stitch running parallel with overedge stitch. Spacing between needles fixed at .109". Can also be furnished with spacings of 1/16" or 2 m.m. between needles when specified. Stitch type 506 modified. Clearance under presser foot: 3/16". Bight adjustable from 3/32" to 7/32", depending upon fittings used. Stitch length: 5 to 16, 18, 20, 22, 24, 28, 32 and 36 per inch (length determined by feed eccentrics). When needle spacing is .109", two feed eccentrics for 10 stitches per inch are furnished. For spacing of 1/16" and 2 m.m., two feed eccentrics for 14 stitches per inch are furnished.

Maximum speed: 6,500 s.p.m.

Needles: Cat. 1435 (Light Set)
 Cat. 1437 (Medium Ball Point)

Note: Machine is regularly fitted for .109" spacing between needles. Fittings for 1/16" and 2 m.m. spacing and other operations can be substituted for those regularly furnished. Refer to separate Parts Chart for Fittings, for additional fittings. For operations not listed, sample of work must accompany order.

MACHINE 460/21**TWO NEEDLES**

Same as 460/20 except having better needle penetration angle, and increased looper, needle and knife stroke, permitting 1/4" clearance under presser foot. Also 3/32" to 1/4" bight adjustment, depending upon fittings used. Can also be furnished with 2 m.m. space between needles when specified on order. For medium heavy and heavy materials, knit goods, track suits, etc.

Maximum speed: 5,500 s.p.m.

MACHINE 460/22**TWO NEEDLES**

Closing operations on ladies' seamless hosiery, anklets, leotards, men's and children's socks and similar items with a flat-butted seam. One looper, one spreader. Trimmer. Three-thread chainstitch (type 504 modified). Spacing between needles fixed at .045". Clearance under presser foot: 1/8". Clearance of 3/16" under presser foot can be obtained with all non-standard fittings. Bight adjustable from 1/8" to 7/32", depending upon fittings used. Stitch length: 14, 20, 32, 40, 50, 60, 70, 80 and 100 per inch (length determined by feed eccentrics). When fitted for ladies' hosiery, eccentrics for 80 and 100 stitches are incorporated in machine, eccentrics for 50, 60 and 70 stitches are furnished extra. When fitted for men's socks, eccentrics for 40 and 50 stitches are incorporated in machine, eccentrics for 20, 32 and 60 stitches are furnished extra.

Maximum speed: 6,000 s.p.m.

Needles: Cat. 1439 (Light Set)
 Cat. 1441 (Medium Ball Point)

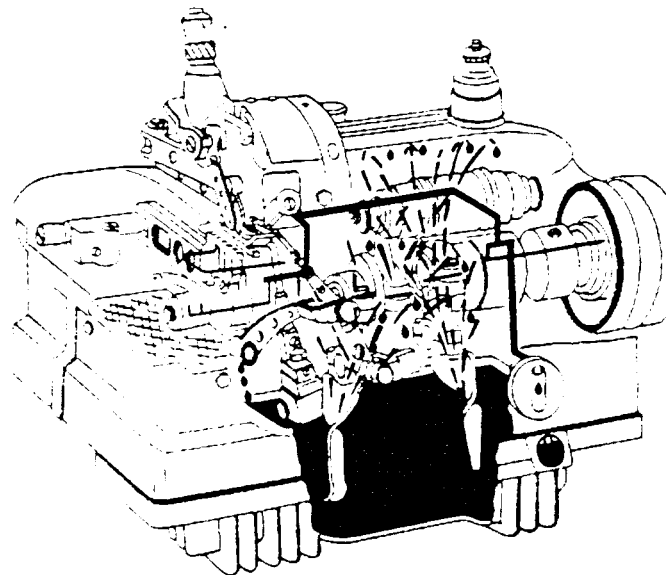


Fig.2 X-Ray View of Class 460/Machine.
 (Lubricating System shown in Solid Black).

GENERAL CHARACTERISTICS

Loopers (or looper and spreader) independently driven, permitting variations in their adjustment in relation to each other and to the needle, to suit the work required.

Either left or right twist of thread may be used in needle and in loopers.

Adjustable trimmer cuts cleanly; operating in advance of needles. Trimmings guided into chip chute to avoid interference with work and with mechanism.

Presser foot can be swung toward left to facilitate threading or replacement of needle.

Tubular operation is accommodated by a small "horn" extension of the throat plate support.

Cloth plate can be swung to the left for convenience, when stitching tubular pieces or when making machine adjustments.

Fittings for Machines 460/12, 460/14 and 460/22 are designed to retain control of thread-chain as long as presser foot is engaged with feed dog, enabling operator to break the thread chain manually, without losing control of chain or distorting the thread loops.

Splash lubricating system automatically and continuously oils principal bearings through rotary shaft during operation

Oil cooling reservoir in rear of machine.

Oil level and oil drip sight gauges, in direct view of operator (see Fig.10, Page 8).

Oil reservoir under base of machine.

Oils recommended, see inside front cover.

Machine pulley 164231 for 3/8 inch V-belt; also used for 5/16 inch round belt.

Machine pulley should always turn over away from operator when machine is in motion.

ACCESSORIES AND TOOLS

See Accessories Chart, Form K6619.

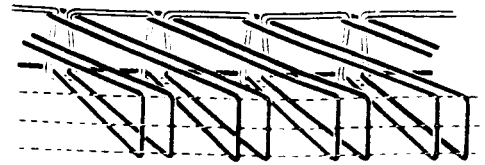


Fig.3. Stitch Formation
(Stitch Type No.502)

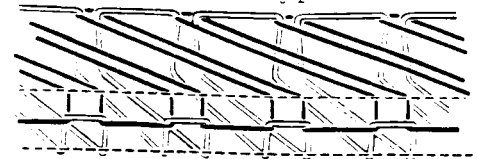


Fig.4. Stitch Formation
(Stitch Type No.503)

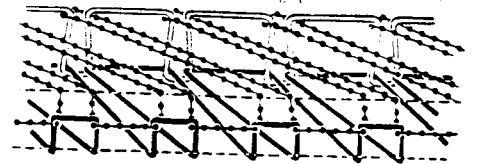


Fig.5. Stitch Formation
(Stitch Type No.504)



Fig.6. Stitch Formation
(Stitch Type No.505)

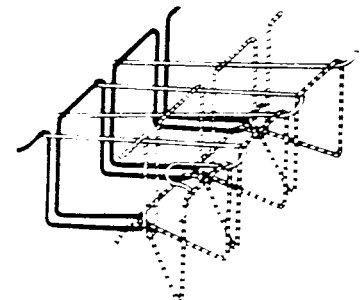


Fig.7. Stitch Formation
(Stitch Type No.506)

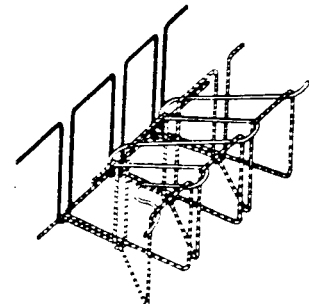


Fig.8. Stitch Formation
(Stitch Type No.512)

INSTALLATION OF MACHINE ON TABLE

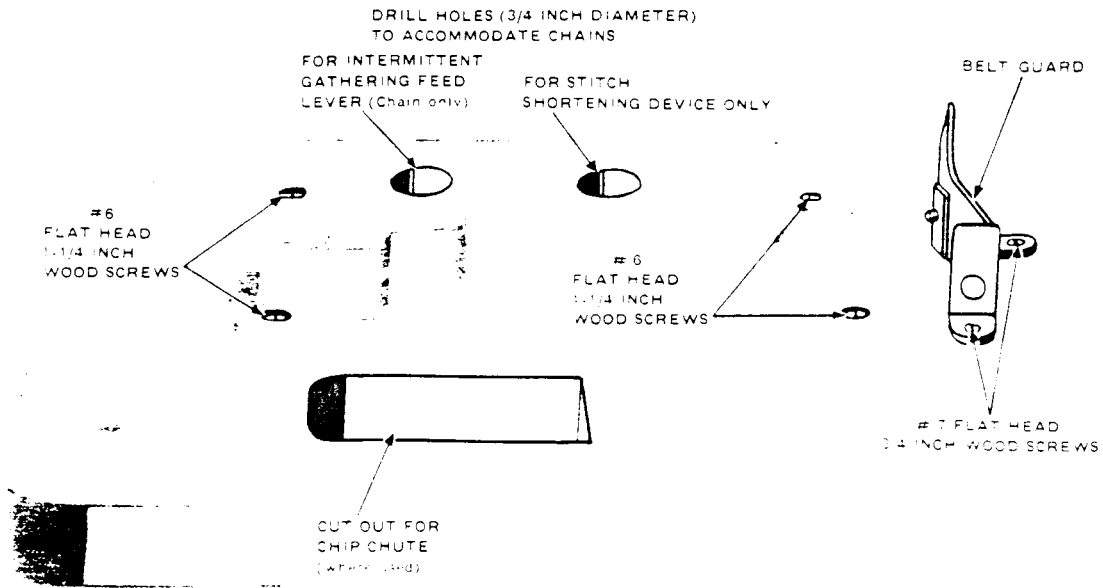


Fig. 9. Machine Cutout, Showing Position and Drill Sizes of Holes Required for Installation.

Place machine mounting template (cardboard) on table top in line with belt groove of driving pulley.

Spot position of 4 screw holes.

When a plain table is used, place mounting template in the required position and pencil mark inside area to be cut out.

Using machine mounting template and belt guard, spot and drill six holes in table for wood screws, as shown in Fig. 9.

Fasten machine mounting post and belt guard to table with the six screws as illustrated in Fig. 9.

Place rubber cushions over mounting posts.

Set machine on rubber cushions.

Spot position of hole either in line with chain for intermittent gathering feed lever or in line with chain for stitch shortening device, to suit device in use, as instructed in Fig. 9 (applies to 460 15 machine and 460 20 and 460/21 machines when fitted with conversion kit).

Note: For semi and fully submerged mounting Part No. 22829, Machine Locating Template should be used. (Supplied only when specified on order and at an extra charge).

CAUTION

All of the oil is drained from the machine before it is shipped from the factory.

DO NOT START THE MACHINE UNTIL IT HAS BEEN THOROUGHLY LUBRICATED AS INSTRUCTED ON PAGE 8

LUBRICATION

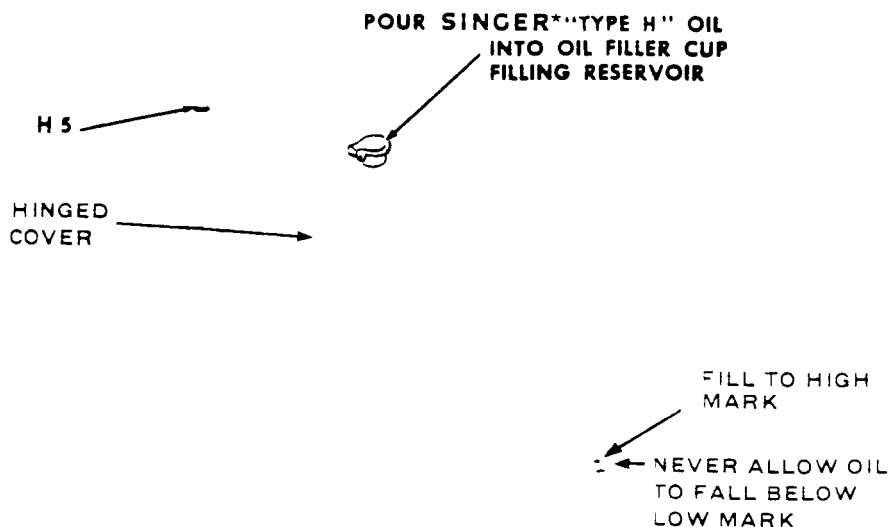


Fig. 10.

Use "TYPE H" Oil, sold by Singer Sewing Machine Company. For description of oil, see inside front cover of this book.

Apply this oil to oil filler cup on top of machine, pouring oil slowly and carefully into reservoir until oil in the sight gauge is at "FULL" mark, as indicated in Fig. 10.

NOTE:- To prevent an airlock when filling up a new machine, it is advisable to loosen the three machine top cover screws and lift one side slightly upward by wedging a small screwdriver under the cover. When filled, remove any traces of oil from around the oil cooler then retighten the machine top cover screws.

Check oil sight gauge daily before starting machine and oil machine, when necessary, as instructed in Fig. 10.

WHEN A MACHINE HAS BEEN IDLE FOR A CONSIDERABLE TIME (OR AFTER A MAJOR INSTALLATION OF PARTS): Clean the machine thoroughly. Then apply a few drops of oil behind upper knife carrier and chip guard. Apply a drop of oil to presser bar at H5, Fig. 10. Check oil level in reservoir, as instructed in Fig. 10.

AFTER MACHINE IS INSTALLED

Run the machine at a moderate speed and check the oil drip gauge for the first sign of oil Fig. 10. Afterwards the machine can be run at the recommended speed.

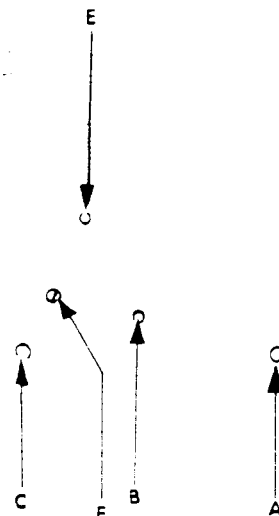


Fig. 11.

To adjust amount of oil flow to the feed, feed lifting and knife (movable) eccentrics, remove chip guard to expose the by-pass oil control screw (E - Fig. 11). Turn control screw (E - Fig. 11) right in and then back out 2 to 3 turns for average flow of oil. Allow 3 to 5 minutes running time for normal sewing operations and then check for sufficient sign of oil in the feed eccentric area. To decrease the oil flow, turn screw anticlockwise (up to 10 turns) until the desired flow is obtained. After machine has been in operation for a considerable period or in the event of over heating in the feed eccentric area, remove the Rotary Shaft Nut No. 113149 and check for accumulation of lint inside the Rotary Shaft Metering Pin No. 81225.

NOTE:- The by-pass oil control screw (nylock) is adjusted for a correct oil flow before the machine leaves the factory and should not be interfered with unnecessarily.

SPEED

MACHINE	MAXIMUM SPEED+ (Stitches per minute)	Speed recommended for Long Runs or while sewing long stitches.
460/12	6,500	6,000
460/13	6,500	6,000
460/14	6,500	6,000
460/15	5,500	not applicable
460/16	6,500	not applicable
460/20	6,000	not applicable
460/21	5,500	not applicable
460/22	6,000	not applicable

- Maximum efficient speed is dependent upon the ability of the operator, the nature of the operation and the type of material being sewn.

It is advisable to operate these machines at more moderate speeds the first few weeks, after which they can be run at top speed.

When the machine is in operation, top of machine pulley must always turn over away from operator.

NEEDLES AND THREAD

Needles.

Catalogue No. 1431 (light set) sizes 7, 9, 10, 12, 14, 16 and 18, regular for single needle machines.

Catalogue No. 1433 (medium ball point) are available in the same sizes.

Catalogue No. 1435, (light set) (flattened on both sides of shank to .060 inch) in sizes 7, 9, 10, 12, 14, 16 and 18, regular for two needle machines. (All needle spacings).

Catalogue No. 1437 (medium ball point) are available in the same sizes.

Catalogue No. 1439, (light set) (flattened on both sides of shank to .045 inch) in sizes 6, 7 and 9, regular for .045 inch space between needles (460/22 machine).

Catalogue No. 1441 (medium ball point) are available in the same sizes.

Selection of needles can make a great difference in the ease and quality of the work. It is important that each needle be just right for machine, thread and work being done.

Choose your needle carefully. The correct size will permit thread to pass freely through needle eye, avoiding strain and breakage of thread.

Either right twist or left twist thread may be used.

If trouble occurs during sewing:

Inspect needle point. A hook or burr may cause poor stitching or some material may be cut when short stitches are used.

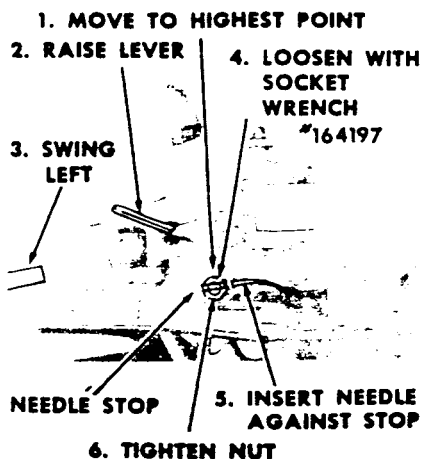
Orders for needles must specify the quantity required, the Size number and the Catalogue number.....

For example....

"100 Size 9, Catalogue No. 1437
Needles."

The best stitching results will be obtained when using needles sold by Singer Sewing Machine Company.

SETTING THE NEEDLE



Move needle clamp up to its highest position.

Insert needle, as instructed in Steps 1 to 5 in Fig. 12.

When needle is correctly inserted in needle clamp, securely tighten needle clamping nut. (See Step 6, Fig. 12)

Fig. 12. Needle Correctly Set in Needle Clamp.

PREPARATION FOR THREADING

For convenience in threading....

- ...On machines installed with bench or fully submerged stand, raise bench stand flap, Step 1.
- ...Open front cover plate, as instructed in Step 2.
- ...Swing cloth plate toward left. (See Step 3).
- ...Release presser bar as instructed in Step 4 and swing presser bar toward left.
- ...Raise housing cover (See Step 5).

Machine 460/12: Swing edge guide out of position, as instructed in Step 6.

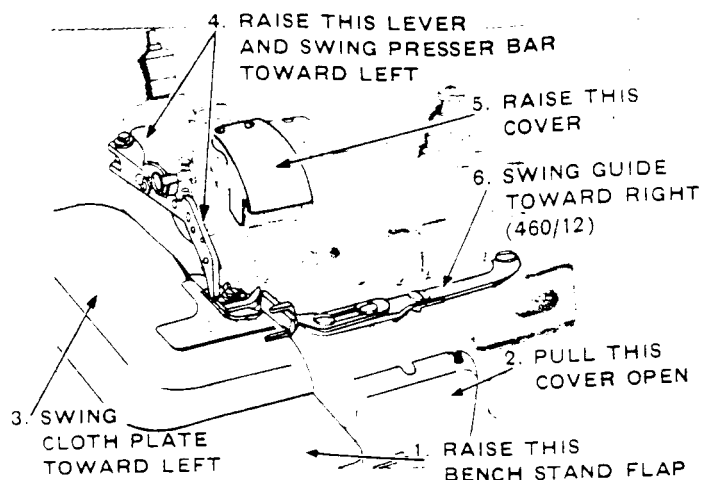


Fig. 13. Preparation for Threading

THREADING THREAD UNWINDER

Select the unwinder suitable for the type of stitch and work to be accomplished.

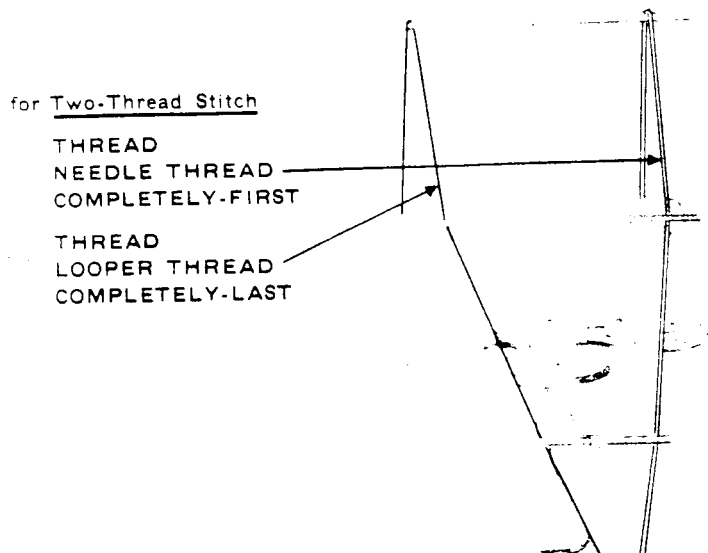


Fig. 14. Unwinder 81443 Threaded for Two-Thread Stitch

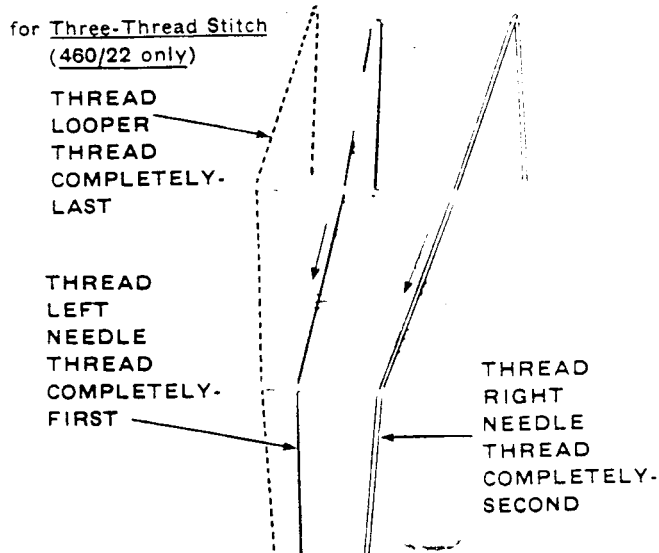


Fig. 16. Unwinder 81443 Threaded for Three-Thread Stitch (460 22 Machine only)

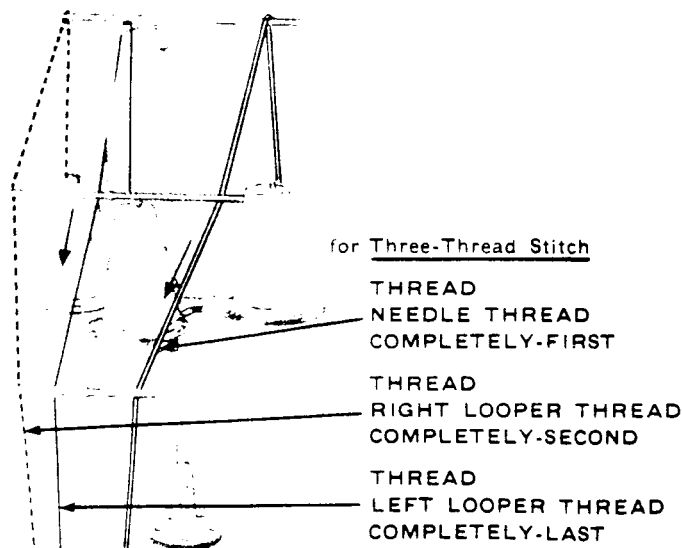


Fig. 15. Unwinder 81443 Threaded for Three-Thread Stitch

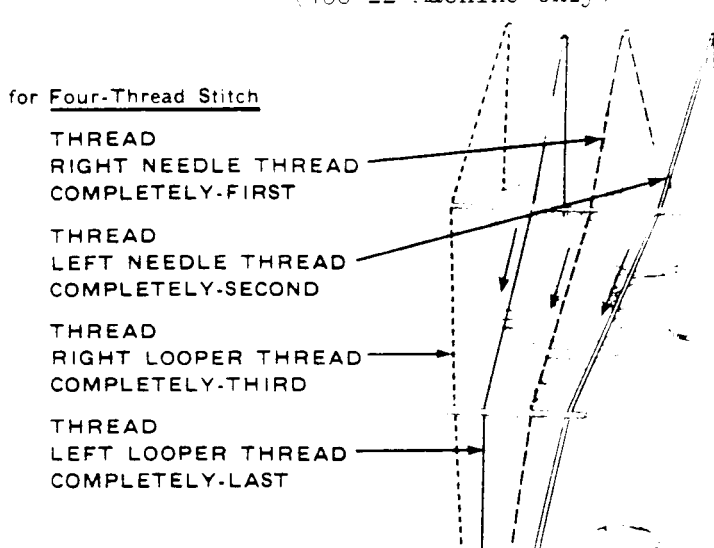


Fig. 17. Unwinder 81444 Threaded for Four-Thread Dual Stitch

TO THREAD THE MACHINE

FOR TWO-THREAD STITCH (TYPES 502 and 503)

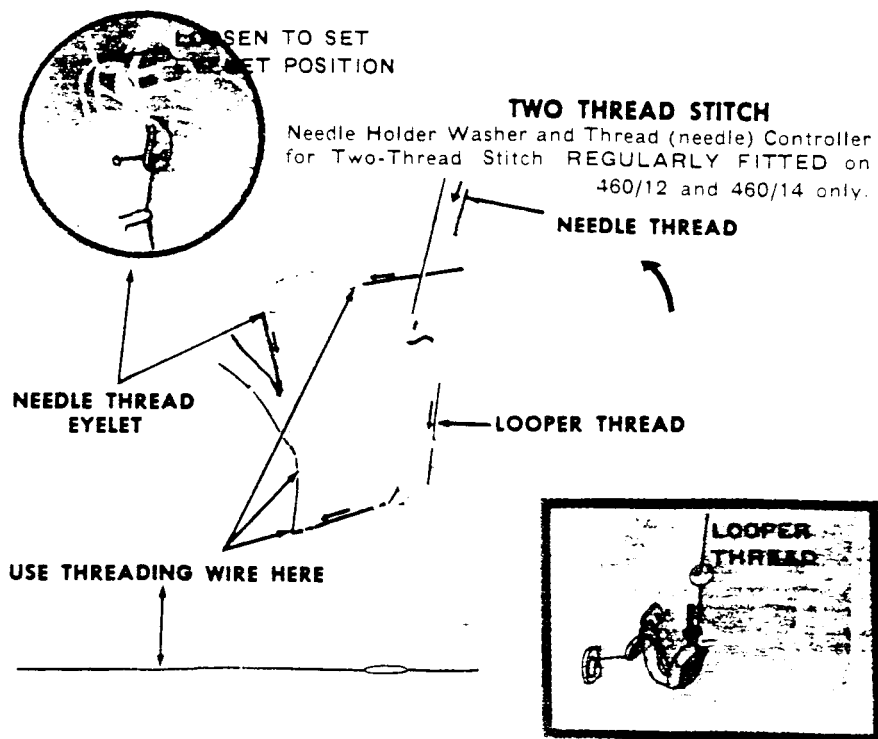


Fig. 18. Threading the Machine.
(Two-Thread Stitch)

FOR THREE-THREAD TIGHT NEEDLE THREAD STITCH (TYPE 504)

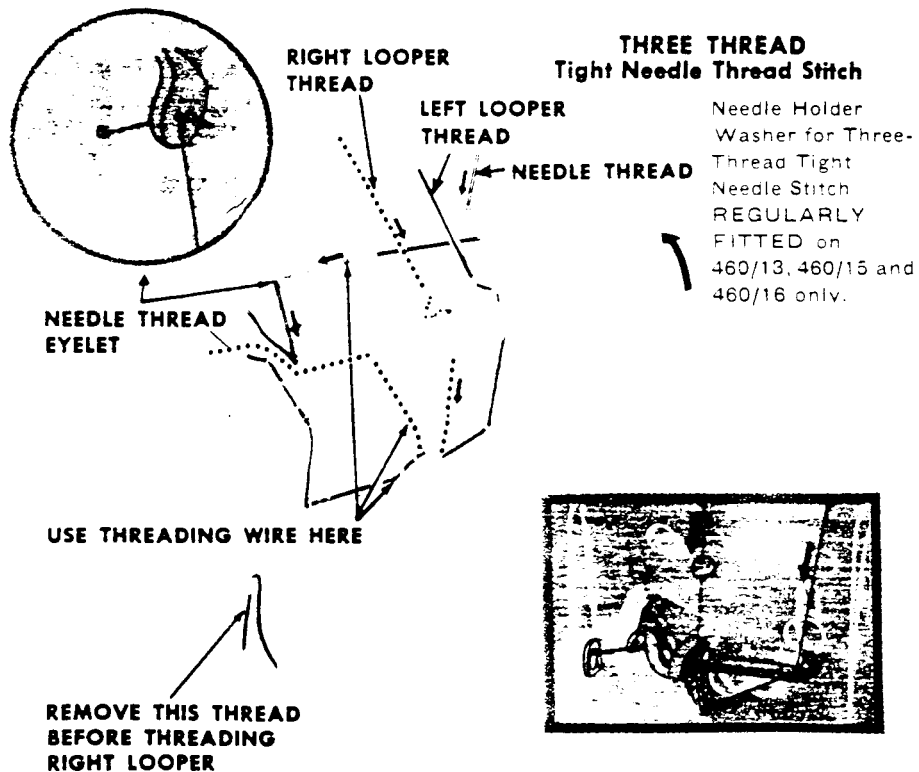


Fig. 19. Threading the Machine.
(Three-Thread Tight Stitch)

TO THREAD THE MACHINE

FOR THREE-THREAD PURL-ON-EDGE STITCH (TYPE 505)

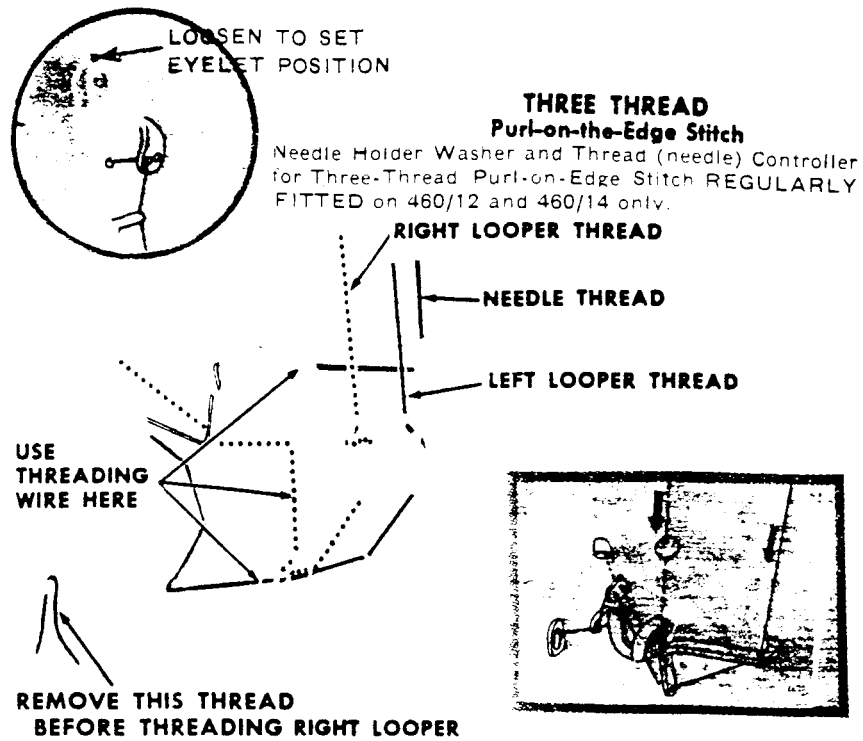


Fig.20. Threading the Machine.
(Three-Thread Purl-on-Edge Stitch)

FOR FOUR-THREAD DUAL STITCH (TYPE 507)

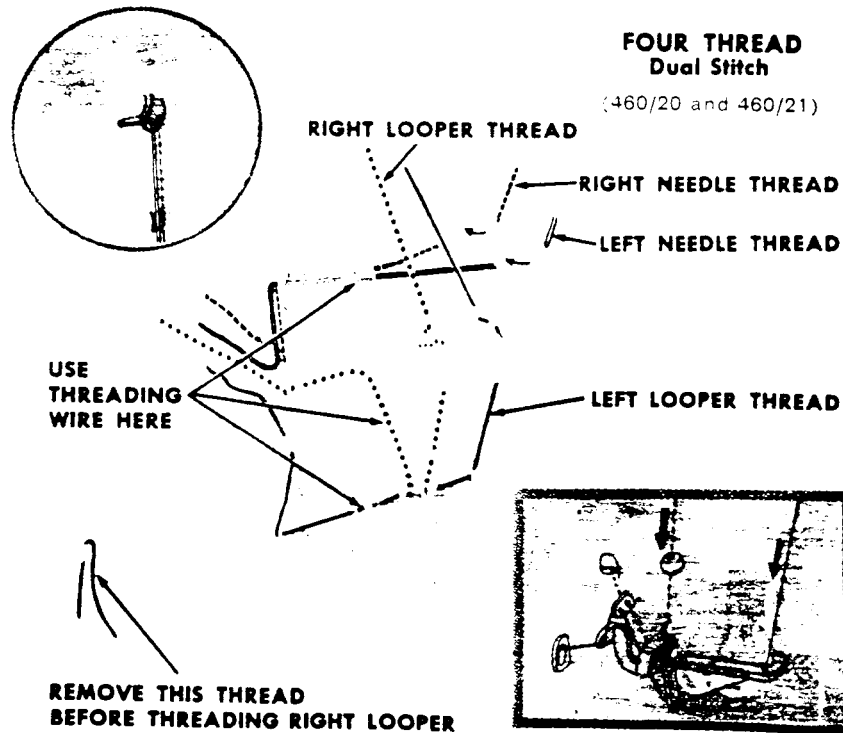


Fig. 21. Threading the Machine.
(Four-Thread Dual Stitch)

TO THREAD THE MACHINE

FOR THREE-THREAD STITCH (TYPE 506)

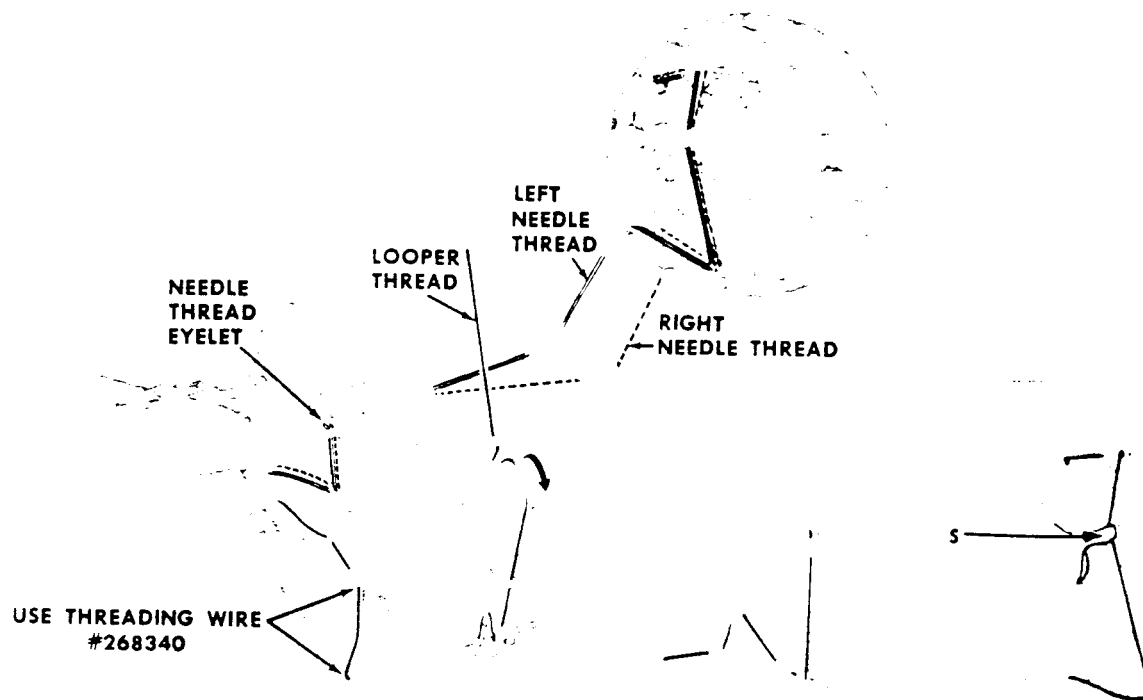


Fig. 22. Threading the Machine
(460/22 Machine - Three-Thread Stitch)

Fig. 23.

ALL MACHINES

Pass each thread through threading points as shown in Figs. 18 to 22.

IMPORTANT

Thread the needle thread (double line) completely first.

Thread right looper thread (dotted line) completely next.

Thread the left looper thread (solid line) last.

When threading, turn machine pulley to raise needle to its highest point. Thread needle thread bridge bracket K Fig. 24, Page 14, making sure that thread is under the thread (needle) controller "H" (Fig. 24, Page 14).

Note: When 460/13 machine is fitted for 1/16" or 3/32" narrow bight, more needle thread will be obtained for purl stitch by placing the needle thread over top of thread (needle) controller. Needle holder washer and thread (needle) controller is not required for this application

TO SET THREAD EYELET (NEEDLE THREAD) AND NEEDLE HOLDER WASHER AND THREAD (NEEDLE) CONTROLLER (PURL STITCH)

- (1) Replace the needle holder washer on needle carrier "N" (Fig. 24, Page 14) with needle holder washer and thread (needle) controller "S" (Fig. 23). Thread as illustrated in Fig. 23.
- (2) Slacken thread eyelet screw "P" (Fig. 24, Page 14) and move thread eyelet "R" (Fig. 24, Page 14) forward for slacker stitch and backwards for tighter needle thread stitch. Tighten screw "P" (Fig. 24).

TO SET THREAD EYELET (NEEDLE THREAD)

- (1) Loosen thread eyelet screw "P" (Fig. 24, Page 14) and position thread eyelet "R" (Fig. 24) so that needle thread is in contact with needle carrier "N" (Fig. 24) at its lowest point.
- (2) Adjust needle thread tension as loosely as possible for satisfactory stitching.

NEEDLE TAKE-UP ADJUSTMENTS

(460/15 AND 460/21 MACHINES)

- (1) Remove machine frame oil guard (top). Loosen thread (needle) controller screw "G" (Fig.24) and move thread (needle) controller "H" (Fig.24) until screw is in centre of slot. Tighten screw "G" securely. Replace machine frame oil Guard (top).
- (2) Loosen needle thread bridge bracket screw "J" (Fig.24) and move bracket "K" (Fig.24) until screw is near top end of slot and in line with thread tube. Tighten screw "J".
- (3) Loosen thread eyelet bridge screw "M" (Fig.24) and position thread eyelet bridge "L" (Fig.24) so that needle thread holes are in line with thread tube.
- (4) For tighter needle stitch, raise needle thread bridge bracket "K" (Fig.24) as required. Additional adjustment is provided by moving the thread eyelet bridge "L" (Fig. 24) forward. The two needle threads and the looper thread should tighten at the bottom of the needle stroke in order to set a balanced stitch.

NEEDLE TAKE-UP ADJUSTMENTS

(460/12, 460/13, 460/14, 460/16, 460/20
and 460/22 MACHINES)

- (1) Remove machine frame oil guard (top). Loosen thread (needle) controller screw "G" (Fig.24) and move thread (needle) controller "H" (Fig.24) forward until screw is near front end of slot. Retighten screw "G" and replace machine frame oil guard (top).

2, 3 and 4 as above.

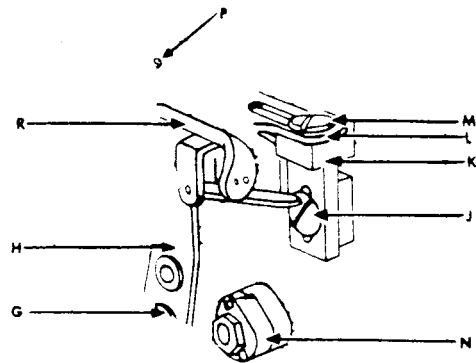


Fig. 24.

LOOPER THREADS

When threading right looper, turn machine pulley over from you until the looper is at its highest point. Be sure that there is no loose loop of thread on end of looper.

Before threading left looper, turn machine pulley over from you until eye of left looper is directly in line with threading tube underneath throat plate.

Pass each looper thread through its threading points, as shown in Figs. 18 to 22.

Draw about two inches of thread through needle eye and through each looper eye, with which to start sewing.

REGULATION

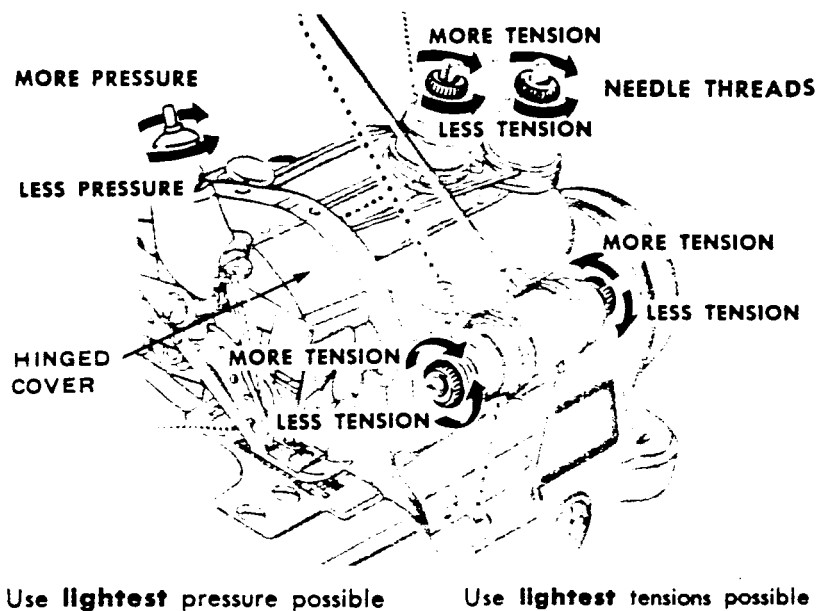


Fig. 25. Regulating Tension on Threads and Pressure of Presser Foot on Material.

THREAD TENSIONS

Tension on needle thread should be just sufficient to set stitch correctly. (See Figs. 3 to 8 on page 6 for correct stitch formation.)

For average sewing, tension on looper thread should be very light.

Regulate thread tensions as instructed in Fig. 25.

PRESSURE OF PRESSER FOOT

Correct pressure of presser foot helps feed the work properly.

Always use lightest pressure possible.

Regulate the pressure of the presser foot on the material as instructed in Fig. 25.

NOTE: The instructions on the following pages are for Service Representatives.

To insure proper timing and avoid unnecessary repetition, these instructions should be followed in the order given.

**EDGE GUIDE (SWING-OUT)
(MACHINE 460/12)**

Edge guide (swing-out) must be adjusted to conform to existing width of bight.

Loosen two screws U, Fig.26 and move the guide V toward left at end of guide arm to suit narrower bight or toward right for wider bight.

Securely tighten both screws U.

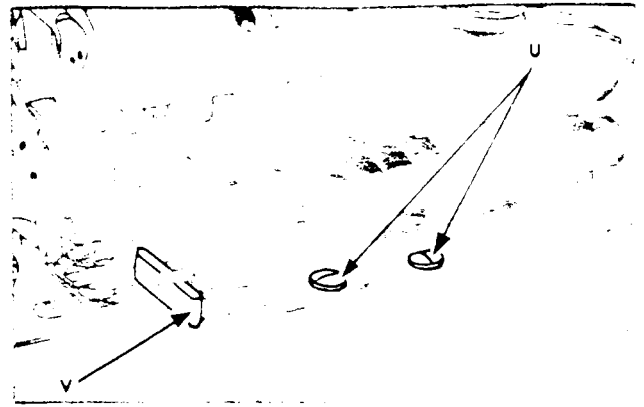


Fig. 26. Edge Guide on Machine 460/12.

FEED CONTROLS

Drop Feed (Regular on Machine 460/12) consists of a lower feed mechanism that moves above and below the throat plate. It is designed to carry the material evenly toward the needle before stitching and away from the needle after it is stitched. Stitch length can be controlled (See "To Control Length of Stitch").

DIFFERENTIAL FEED (Regular on Machines 460/13, 460/14, 460/15, 460/16, 460/20, 460/21 and 460/22) consists of two feed dogs R and T, Fig.28, page 17, independently actuated by two feed eccentrics. The inner feed eccentric (which is placed on the shaft first) controls the movement of the front feed dog T. The outer feed eccentric (which is placed on the shaft last) controls the movement of the rear feed dog R.

TO CONTROL LENGTH OF STITCH

The length of stitch is determined by the feed eccentrics in use.

Each feed eccentric is marked with the number of stitches it makes, as shown at F, Figs.27 and 28, Page 17.

Feed eccentrics 81201 bronze, suffixed -004 to -100 depending on stitch required can be supplied to make 4 to 16, 18, 20, 22, 24, 28, 32, 36, 40, 45, 50, 60, 70, 80 and 100 stitches to the inch.

Unless otherwise ordered feed eccentrics will be supplied according to chart at bottom of this page.

To feed the work evenly (on Machines 460/13, 460/14, 460/15, 460/16, 460/20, 460/21 and 460/22)-use two feed eccentrics marked for the same stitch length.

FEED ECCENTRIC CHART

MACHINE	ECCENTRICS REGULARLY FURNISHED		TYPE OF FEED
	Quantity	Stitches to the inch	
460/12	one	5	Drop
460/13, 460/14	two	Front 14 Back 14	Differential
460/15, 460/20 and 460/21	two	10 10	Differential
460/16	two	6 14	Differential
460/22	two	80 100	Differential

TO CONTROL LENGTH OF STITCH (CONTINUED)

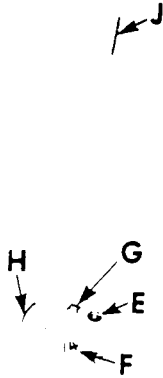


Fig. 27. Feed Eccentric Extractor 164203 and Eccentric.

To gather...for front feed dog use feed eccentric that is marked for longer stitch length than that used for rear feed dog. Place eccentric that is marked for longer stitch length on shaft first.

To stretch the material while sewing... for front feed dog use feed eccentric that is marked for a shorter stitch length than that used for rear feed dog. Place eccentric marked for shorter stitch length on shaft first.

REMOVING FEED ECCENTRICS

Swing cloth plate Q, presser bar, and feed eccentric cover S, Fig. 28 out to the left.

Using Wrench 10875, remove the hexagon head nut from the shaft M, Fig. 28

Screw feed eccentric extractor J, Fig. 27 into threaded hole E of outer eccentric H.

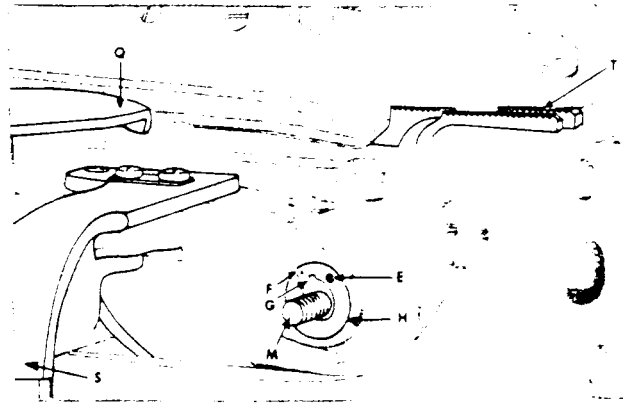


Fig. 28. Changing Length of Stitch.

Machine 460/12: Since only one eccentric is required on this machine, the outer roller is NOT AN ECCENTRIC but merely a spacer-listed as feed bar guide roller 164277. The inner roller 81201 is the only eccentric. It alone determines the stitch length on this machine. On 460/22 machine, feed eccentric 81201-100 is used as a spacer, but can be utilized when required.

All Machines: Pull gently with extractor J to remove outer roller or eccentric H. Inner eccentric can then be removed in the same manner.

INSTALLING FEED ECCENTRICS

When replacing each feed eccentric, be sure that the stamped number is on outside face of eccentric, as shown at F, Fig. 28.

The keyway on the eccentric should fit over key at G on shaft M, Fig. 28. Line up front and back feed bars and install eccentrics. When the feed eccentrics are in position, replace the hexagon head nut securely on the shaft M.

TO SET THE FEED DOGS AT THE CORRECT HEIGHT

Using Gauge 82253 for Machines 460/12, 460/13, 460/14, 460/16, 460/20 and 460/22
and Gauge 82254 for Machines 460/15 and 460/21
(See Fig. 29)

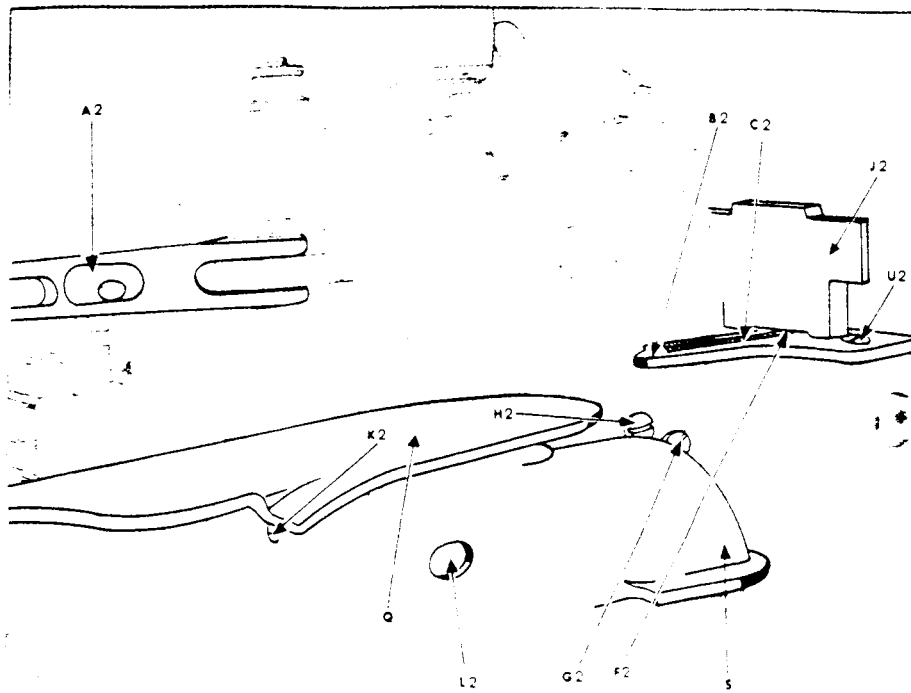


Fig. 29. Setting the Feed Dog.

CHECKING HEIGHT OF FEED DOGS

Swing the presser bar (swing-out) A2 out to the left, and turn the machine pulley over from you until the feed dogs are at their highest position.

Place the gauge J2, over the front feed dog, as shown. Gauge J2, must rest firmly upon the throat plate U2. At this setting, front feed dog should just touch the bottom face F2 of the gauge.

Set rear feed dog at the same height as the front feed dog.

NOTE:- When a machine is fitted for heavier type work with Eccentric No.82263 and Slide Block No.165134, (regular on 460 16 and 460/20; also included in certain Special Fittings), set both feed dogs about .010" higher.

ADJUSTMENT

Swing the cloth plate Q and the feed eccentric cover S out to the left.

Loosen the adjusting screw G2 and raise or lower the front feed dog C2, as required. Then tighten screw G2.

Loosen the adjusting screw H2 and raise or lower the rear feed dog B2, as required. Then tighten screw H2.

TO TILT THE FEED

See Fig. 29.

When it is desired to tilt the feed, first set it at the correct height as described above. Then loosen the hinge pin set screw K2 at the rear of the machine just $\frac{1}{2}$ turn.

To tilt the feed up in the rear and down in the front of the needle, slowly turn the hinge pin L2 over toward the rear of the machine, until the desired amount of tilt is obtained.

To tilt the feed down in the rear and up in the front of the needle, slowly turn the hinge pin L2 over toward the front of the machine until the desired amount of tilt is obtained. Then tighten the screw K2.

TO SET THE NEEDLE CLAMP AT CORRECT HEIGHT

Using Gauge 82253 for Machines 460/12, 460/13, 460/14, 460/16, 460/20 and 460/22
and Gauge 82254 for Machines 460/15 and 460/21
(See Figs. 30 and 31).

CHECKING LEFT TO RIGHT POSITION

Turn the machine pulley over from you until the needle clamp R2, Fig. 30 reaches its highest position.

Swing the presser foot and cloth plate out to the left.

Remove the needle and the throat plate.

On Machine 460/12: Swing edge guide out to right.

On Machine 460/16: Flip gathering plate (swing-up) attachment upwards.

On All Machines: Turn the machine pulley over from you until the needle clamp R2 reaches its lowest position.

Slip the "LOW" end of the gauge J2 between the needle clamp and the throat plate seat V2, as shown.

At this setting, the needle clamp R2 should just touch the top surface Q2 on the "LOW" end of the gauge J2.

ALTERNATE CHECK In the absence of a gauge, the distance "LOW" between bottom of needle clamp and top surface of throat plate seat, on 460/12, 460/13, 460/14, 460/16, 460/20 and 460/22 machines, should be set at .578 inch, and .598 inch on 460/15 and 460/21 Machines.

ADJUSTMENT

Remove the top frame cover and loosen the clamping screw T2, Fig. 31. Set screws P2 and Y, Fig. 31 should be loosened (two or three turns) for up and down adjustment.

Raise or lower the needle clamp R2, Fig. 30, as required.

To secure the needle clamp in the correct position, first securely tighten the screw T2, then carefully tighten set screws P2 and Y, an equal amount so that the needle clamp position is not disturbed.

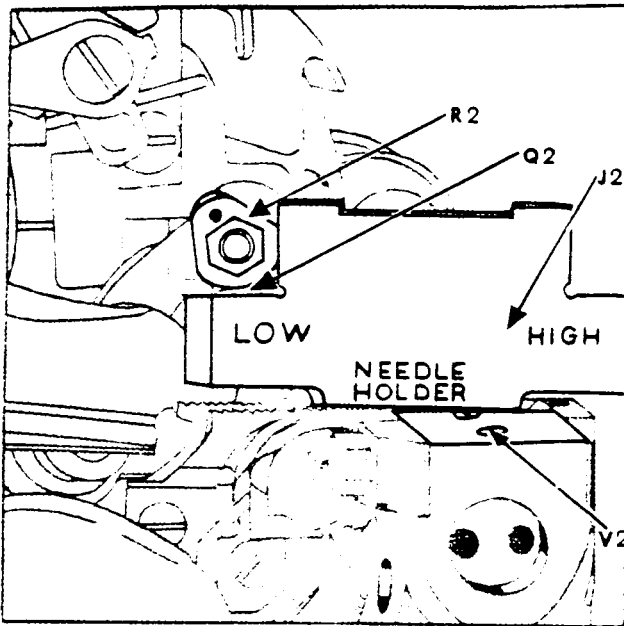


Fig. 30. Checking the Needle Clamp Height.

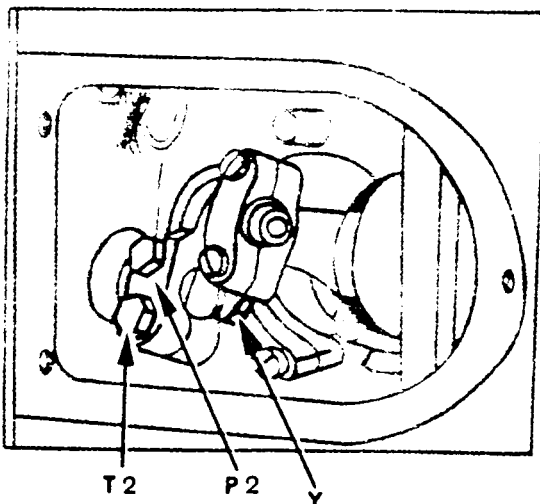


Fig. 31. Adjusting the Needle Clamp.

TO SET THE LEFT LOOPER IN RELATION TO NEEDLE

Using Gauge 82253 on Machines 460/12, 460/13, 460/14, 460/16, 460/20 and 460/22 and Gauge 82254 on Machines 460/15 and 460/21

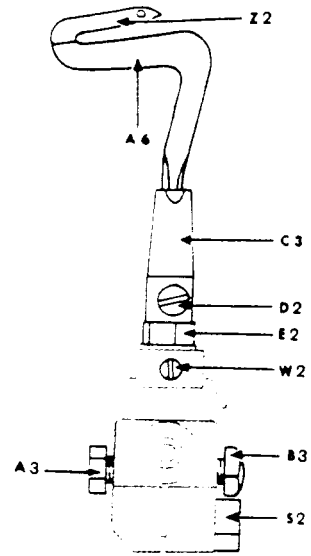


Fig. 32. Left Looper Assembly

PREPARATION

Set the needle in the machine as instructed on page 9.

Remove throat plate and chip guard.

Loosen set screw D2, Fig. 32 in left looper holder C3.

Set left looper Z2 all the way down into its holder.

Securely tighten set screw D2.

CHECKING LEFT TO RIGHT POSITION

Place gauge J2 on throat plate seat V2 as shown in Figs. 33 (single needle) 34 (two needle).

Turn machine pulley over away from you until needle clamp R2 reaches its lowest position and then rises sufficiently to permit "HIGH" end of gauge J2 to pass between needle clamp R2 and throat plate seat, as shown in Figs. 33 and 34.

ALTERNATE CHECK In the absence of a gauge, the distance "HIGH" between bottom of needle clamp and top surface of throat plate seat on 460/12, 460/13, 460/14, 460/16, 460/20 and 460/22 machines, should be set at .593 inch, and .613 inch on 460/15 and 460/21 machines.

When needle clamp R2 just contacts top surface U4 of gauge, the tip of left looper Z2 should be between centre and left side of needle.

SETTING LEFT TO RIGHT POSITION

To move left looper Z2 towards right, first loosen set screw A3 by two to three turns, then loosen clamping screw S2 just enough to allow movement of looper holder assembly. To move left looper forward first loosen set screw B3 by two to three turns.

Recheck setting. When correct setting is obtained securely tighten clamping screw S2, and carefully tighten the two set screws A3 and B3 an equal amount so that the looper position is not disturbed.

CHECKING FRONT TO REAR POSITION

Turn machine pulley so that loopers move through one complete sewing cycle. Observe looper movement.

The left looper must rub lightly on the needle as it passes toward the right. Needle point should also rub lightly on the lower section of looper needle guard A6 Fig. 32.

SETTING FRONT TO REAR POSITION

Turn machine pulley over away from you until point of looper Z2 just reaches needle.

Loosen screw E2 just enough to allow movement of looper holder C3.

Loosen set screw W2.

Move looper holder C3 toward rear of machine. Turn set screw W2 inward until proper relation between left looper and needle is obtained.

Securely tighten screw E2.

Replace throat plate and chip guard.

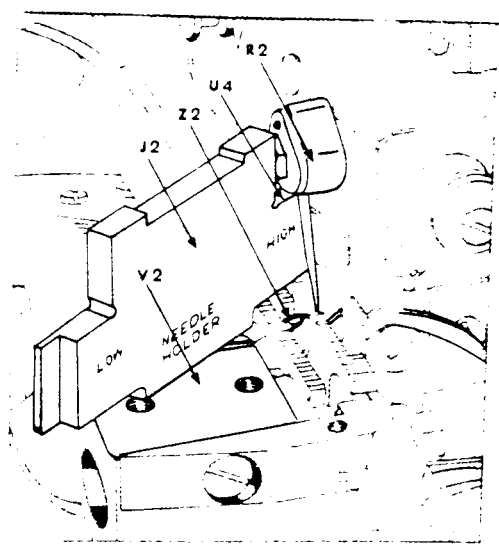


Fig. 33. Settings (Single Needle)

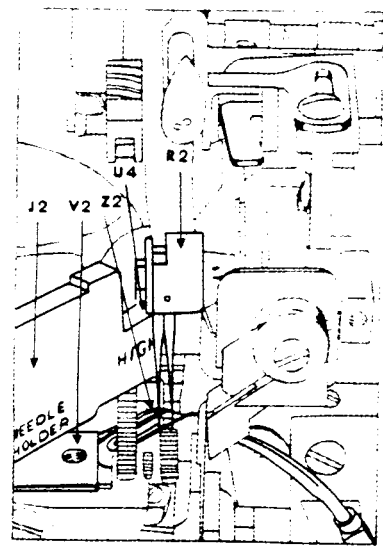


Fig. 34. Settings (Two Needle)

460/K50 gauge
K80 82253

460/K51 82254
K81

460/K72 82253
K72

TO SET THE RIGHT LOOPER OR SPREADER IN RELATION TO NEEDLE

Using Gauge 82253 on Machines 460/12, 460/13, 460/14, 460/16, 460/20 and 460/22,
Gauge 82254 on Machines 460/15 and 460/21 and
Height Gauge 165253 for all machines.

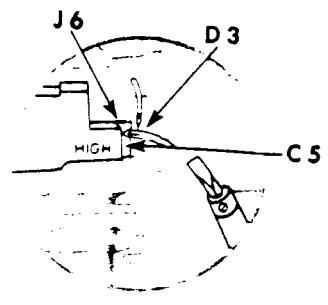


Fig. 35. Right Looper (Left Position) and Gauge 82253 or 82254 (Single Needle).

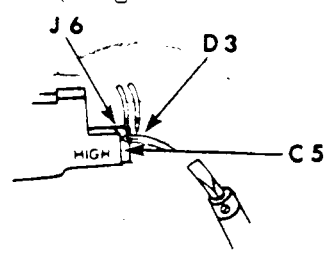


Fig. 36. Right Looper (Left Position) and Gauge 82253 or 82254 (Two Needle)

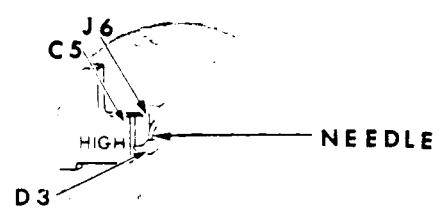


Fig. 37. Spreader (Left Position) and Gauge 82253 or 82254

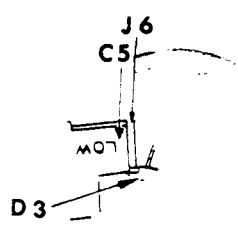


Fig. 38. Spreader or Looper Height.

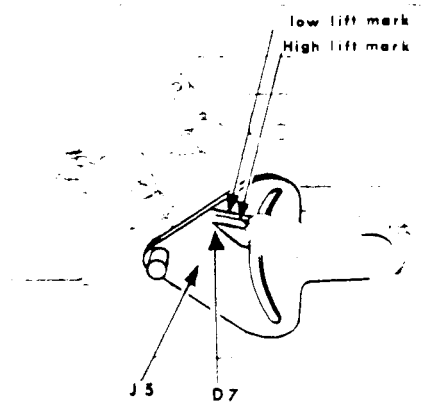


Fig. 39. To Position Gauge 165253.

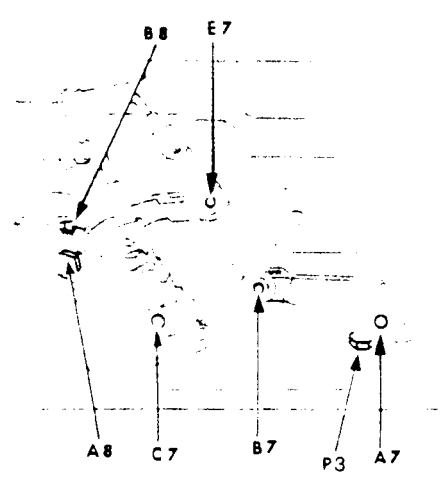


Fig. 40. To Position Gauge 165253 - Cont'd.

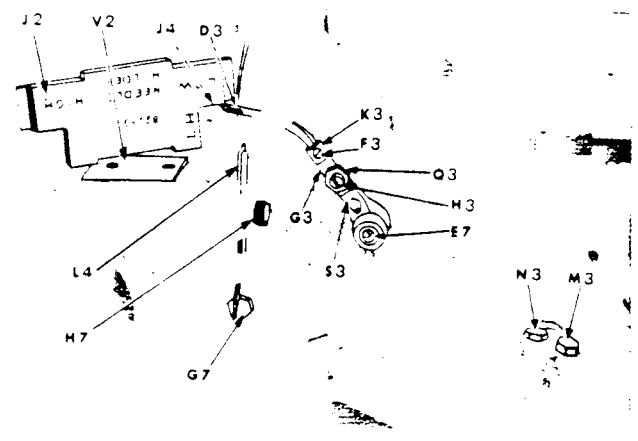


Fig. 41. Adjustments.

TO SET THE RIGHT LOOPER OR SPREADER (Continued)

PREPARATION

Machines 460/12 and 460/16 only:
Swing edge guide out to right and flip attachment bracket upwards.

Set the needle in the machine as instructed on page 9.

Swing presser foot and cloth plate to the left.

Remove chip guard and thread (looper) plate, remove left and right looper or spreader thread take-ups.

Install gauge J5 (Fig.39, Page 21) with threaded pin in looper (right hand) driving shaft hole (A7-Fig.40) and the (2) remaining pins in holes B7 and C7 (Fig. 40).

When looper or spreader carrier is at its highest position, indicator (D7-Fig. 39) should be at the upper line on gauge for low-lift machines, (Nos. 460/12, 460 13, 460/14, 460/16, 460/20, 460/22). For high-lift machines, (Nos. 460/15 and 460 21) looper or spreader carrier is at its highest position when indicator D7 is at lower line on gauge.

Note: This gauge setting represents only an approximate position for use in setting up the machine. Slight alterations of position may be required to suit one or two needle settings, threads being used or materials being sewn. For other and more accurate settings use gauges 82253 or 82254 as follows.

CHECKING RIGHT TO LEFT POSITION

Hold gauge so that end marked "HIGH" on gauge just touches left side of needle, as shown at J6 in Figs. 35 to 38.

When right looper (or spreader) D3 is at its extreme left position it should just touch surface C5 on gauge, as shown in Figs. 35 to 38.

To move right looper towards right, first loosen set screw N3 Fig. 41 two or three turns, then loosen clamping screw M3 Fig. 41 just enough to allow movement of looper assembly.

To move right looper towards left, first loosen set screw P3, Fig. 40 two or three turns.

RECHECK SETTINGS

When correct setting is obtained securely tighten clamping screw M3 Fig. 41, and then carefully tighten the set screws N3 Fig. 41 and P3 Fig. 40 an equal amount so that looper position is not disturbed.

Certain gauge allowances are not so critical in the 460 class machines i.e.

CHECKING RIGHT TO LEFT POSITION

Additional gauge allowance up to 1/16" at extreme left position.

CHECKING HEIGHT

Additional gauge allowance up to 1/32" up or down.

CHECKING FRONT TO REAR POSITION

Additional clearance allowance up to .010" behind looper (left hand) head, and up to .005" deflection between the inside needle and right hand looper head (two needle machines).

Note: These allowances are possible provided the right hand looper carrier connecting link hinge pin E7 Fig. 41 is in contact with machine frame wearing plate. After each adjustment is made to eliminate looper side-wise play, the hinge pin set screw must be securely tightened with Allen Key No. 81440.

TO SET THE RIGHT LOOPER OR SPREADER (Continued)

CHECKING HEIGHT

Place gauge J2 firmly upon throat plate seat V2 with end marked "LOW" toward needle, as shown in Fig.41, Page 21.

When right looper (or spreader) D3 is at its extreme left position its highest point should just touch under surface J4 on gauge, as shown.

ADJUSTMENT FOR HEIGHT

Note: When installing a right looper (or spreader), loosen nut Q3, Fig. 41 and turn screw H3 anti-clockwise to align the screwdriver slot in head of screw H3 with centre-line of looper carrier S3, as shown in Fig. 41. Then loosen screw F3. Place collar K3 on looper shank and insert right looper in looper holder G3, as shown in Fig. 41.

Adjust the height of the right looper (or spreader), in the following manner -

Loosen screw F3 and nut Q3, Fig. 41

Raise or lower right looper (or spreader) D3 in carrier as required.

Press collar K3 firmly against top of carrier S3.

Securely tighten screw F3 and nut Q3.

CHECKING FRONT TO REAR POSITION

Turn machine pulley over away from operator through one full revolution. Observe position of right looper (or spreader) in relation to needle during this full movement.

Right looper (or spreader) D3 should pass just behind left looper head and in front of needle; brushing lightly on needle. Additional adjustment for left to right position behind left looper head is provided by the hexagon head screw G7 Fig. 41.

ADJUSTMENT LEFT TO RIGHT POSITION (behind left looper head)

Loosen screw H7 Fig. 41 and move Knife (stationary) L4 Fig. 41 upwards. Loosen hexagon head screw G7 and move screw up or down in the slot as required. Re-check looper (or spreader) settings and carefully reposition knife L4 and re-tighten screws H7 and G7, Fig. 41.

This setting can be secured by loosening nut A8 Fig. 41 and carefully turning in position screw B8 to make slight contact with the hexagon head screw G7, Fig. 41 Retighten nut A8, Fig. 40.

ADJUSTMENT FRONT TO REAR POSITION

Loosen nut Q3, Fig. 41.

Turn right looper (or spreader) D3 in carrier S3 as required.

Securely tighten nut Q3.

Recheck each setting and securely fasten all parts loosened earlier.

TO ADJUST THE LOOPER THREAD TAKE-UP

TO ADJUST LOOPER THREAD TAKE-UP (LEFT) X3 FOR MORE OR LESS THREAD

Remove the chip guard W, Fig. 42 and open the front cover plate M2, Fig. 43. Loosen the two screws T3, Fig. 43 and raise or lower the right end of the left take-up X3, as required.

Securely tighten the screws T3, Fig. 43 and replace the chip guard W, Fig. 42.

SETTING LOOPER THREAD EYELET (LEFT)

The looper thread eyelet F4 should be normally at the midpoint of the slot K4, Fig. 43 on 460/12, 460/13, 460/14, 460/16, 460/20 and 460/22 machines and at bottom of slot on 460/15 and 460/21 machines.

To adjust the looper thread eyelet, loosen the screw E4 and raise or lower the eyelet F4 to the proper location. Then securely tighten the screw E4.

SETTING LOOPER THREAD TAKE-UP (RIGHT)

To set the right take-up A4, open the front cover plate and loosen the screw N5, Fig. 43. Raise or lower the right take-up A4, as required. Do not permit take-up A4 to interfere with other moving parts nor to hit cover M2. Then securely tighten the screw N5 and close the cover plate M2.

SETTING LOOPER THREAD STRIPPER

The looper thread stripper B4 normally should be at the midpoint of the top and bottom extremes of its adjustment, as shown in Fig. 43.

To set the looper thread stripper, open the front cover plate M2 and loosen the screw H4. Raise or lower the stripper B4, as required. Then securely tighten the screw H4 and close the cover plate M2.

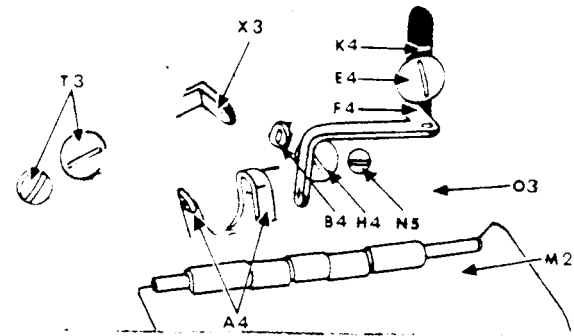


Fig. 42. Take-up Threaded.

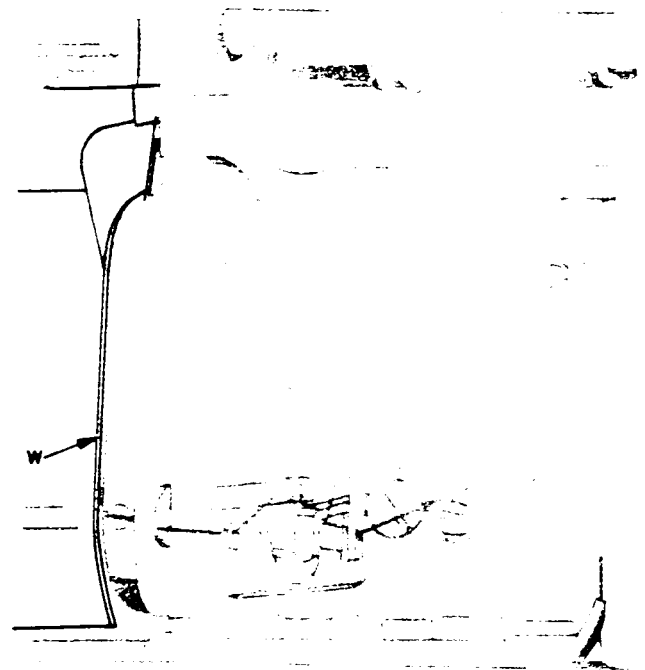


Fig. 43. Adjustments on Take-up for Two-Thread Stitch and Three-Thread Tight Needle Thread Stitch.

TO ADJUST THE LOOPER THREAD TAKE-UP (CONTINUED)

When a machine is fitted for wool or poor quality yarn in left or both loopers the looper thread take-up X3, Fig. 43 should be adjusted as high as possible and thread take-up A4 Fig. 43 as low as possible for maximum thread pull off.

Make certain that none of the above adjustments cause take-up components to strike one another or the cover M2.

TO REMOVE AND REPLACE THE KNIVES

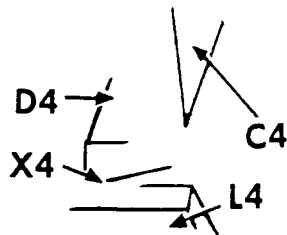


Fig. 44. Contact Point of Knives.

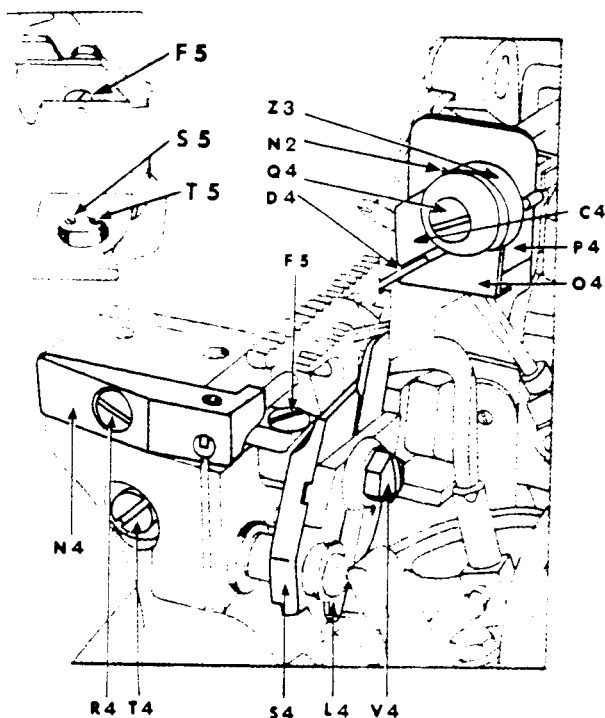


Fig. 45. Removal and Replacement of Knives and Trimmer Adjustment.

REMOVING STATIONARY KNIFE L4

Loosen screw V4, Fig. 45 and draw the knife L4 upward and out.

REPLACING STATIONARY KNIFE L4

Push the knife L4 downward into the knife holder S4, until the cutting edge of the knife L4 is flush with the top surface of throat plate. Then securely tighten the clamping screw V4.

REMOVING MOVABLE KNIFE D4

Remove the clamp screw Q4, Fig. 45 with the chip ejector O4, the knife guard C4 and the knife clamp Z3. Lift the knife D4 from the knife holder P4.

REPLACING MOVABLE KNIFE D4

Slip the knife in knife holder P4, replace the knife clamp Z3, the knife guard C4, the chip ejector O4, and the clamp screw Q4. Press the movable knife D4 downward against the stationary knife L4, Fig. 45 and securely tighten the clamp screw Q4.

Turn the machine pulley over from you, until the lowest point X4, Fig. 44, of the cutting edge of the movable knife D4, just reaches the cutting edge of the stationary knife L4, as shown in Fig. 44. Loosen the set screw T4, Fig. 45 sufficiently to release the spring behind the stationary knife L4, permitting the stationary knife to make a tight spring contact with the movable knife D4. Then securely tighten the set screw T4.

TO ADJUST THE TRIMMER

SETTING HEIGHT OF STATIONARY KNIFE L4

Loosen screw V4, Fig. 45.

Raise or lower knife L4, Fig. 45 in the knife holder S4, until the cutting edge of the knife is at the same level as top surface of throat plate.

Then securely tighten screw V4, Fig. 45.

TO ADJUST THE TRIMMER (Continued)

WIDTH OF BIGHT

The position of the stationary knife L4 in relation to the needle determines the width of bight.

For some types of work, the width of bight must conform to the width of the chaining-off finger.

Before setting stationary knife L4 for width of bight, loosen screw Q4, Fig. 45, page 25 and slide movable knife D4 up in its holder out of possible contact with stationary knife. Tighten screw Q4.

SETTING STATIONARY KNIFE FOR WIDTH OF BIGHT

To change the width of bight, loosen the screw T4 and move the stationary knife holder S4 toward the left or right, as required. Securely tighten the screw T4.

Return movable knife D4 to its correct position; setting it in relation to the stationary knife as described next.

SETTING MOVABLE KNIFE IN RELATION TO STATIONARY KNIFE POSITION

Remove the clamp screw Q4, the chip ejector O4, the knife guard C4 and the knife clamp Z3. Loosen the screw N2 and move the knife holder assembly P4 toward the right or left as required to bring the cutting edge of the movable knife D4, at its lowest position, slightly below the cutting edge of the stationary knife L4, as shown in Fig. 44, Page 25. Securely tighten the screw N2. Then replace the knife clamp Z3, the knife guard C4, the chip ejector O4, and the clamp screw Q4. Then lightly press the movable knife D4 downward against the stationary knife L4 and tighten the screw Q4.

Loosen the screw T4 sufficiently to release the spring behind the stationary knife L4 permitting the stationary knife to make a tight spring contact with the movable knife D4. Then securely tighten the screw T4.

When knives require sharpening they may be removed as instructed on page 25 and sharpened as instructed on page 28.

ANGULAR ADJUSTMENT

To trim efficiently, cutting edge of stationary knife L4 must contact all points along cutting edge of movable knife D4.

To adjust, remove throat plate, screw R4 and guide N4.

NEEDLE GUARD This guard must also be removed. When replacing needle guard, set it so that needle will just brush guard as needle descends.

Remove front feed dog.

Loosen screws S5, T5 and F5 (see inset at top left of Fig. 45).

Align lower knife L4 with upper knife D4 and securely tighten screw F5.

Tighten screws S5 and T5.

TWO TYPES OF FEED CONTROLS

(460/16 MACHINE ONLY)

INTERMITTENT GATHERING FEED

The intermittent gathering feed control mounted behind the cloth plate, as shown in Fig. 46, enables the operator to gather the material at will.

The limits of gathering are determined from the "full gathering" at the mark "F" on the indicator plate CC, Fig. 46, to "feeding the material evenly" (straight stitching at the mark "O", by setting the stop limits DD and EE where desired on plate CC, Fig. 46.

The degree of gathering at any point in the line of stitching is controlled by the knee controller or treadle which is connected to the chain BB, Fig. 46.

When machine is installed fully submerged in a table the range of gathering may be determined by inserting extension stop screw RR, Fig. 46, in one of the three holes GG in the presser foot lifter HH, Fig. 46. The fractions $\frac{1}{4}$, $\frac{1}{2}$ and $\frac{3}{4}$, stamped upon the presser foot lifter HH, correspond to similar markings on the indicator plate CC.

SET THE AMOUNT OF GATHERING DESIRED WITH THIS STOP SCREW

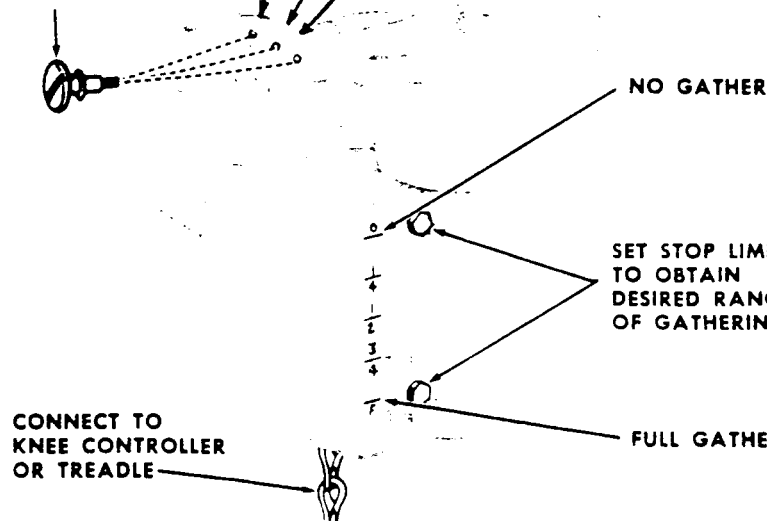


Fig. 46. Intermittent Gathering Feed Mechanism.

STITCH SHORTENING DEVICE

The automatic control for shortening the stitch length, at any point desired, is illustrated in Fig. 47.

This device may be obtained on specific request, at additional cost.

When it is desired to shorten the stitches at any point in line of stitching, press the knee controller or treadle, which is connected to lever MM through chain SS, Fig. 47.

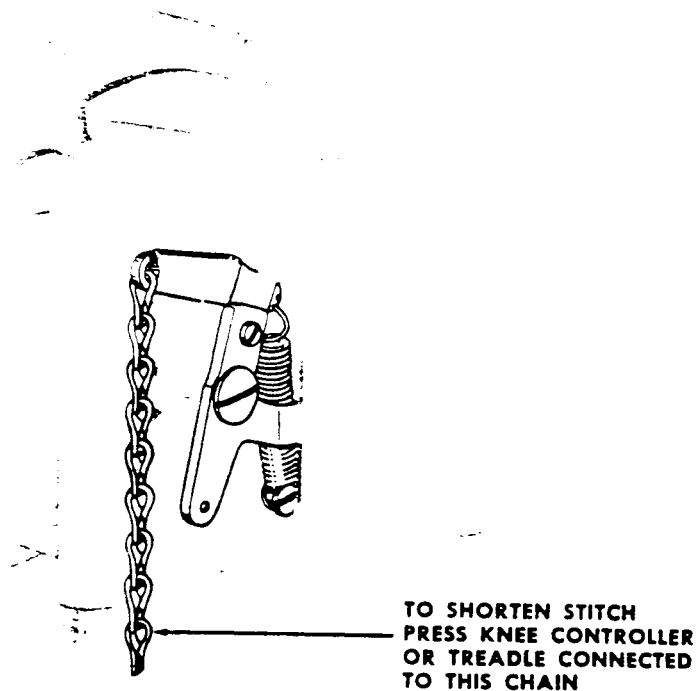


Fig. 47. Automatic Stitch Shortening Device.

TO SHARPEN THE TRIMMER KNIVES

(See Figs. 48 and 49)

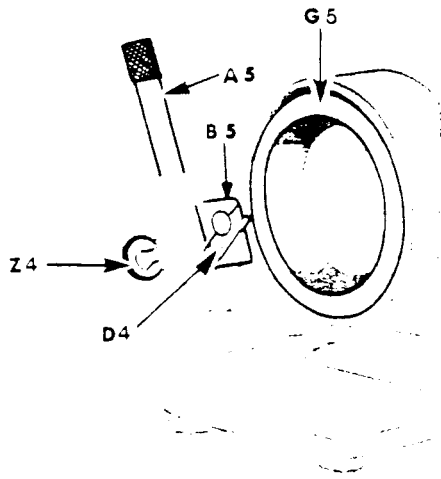


Fig. 48. Sharpening the Movable Knife.

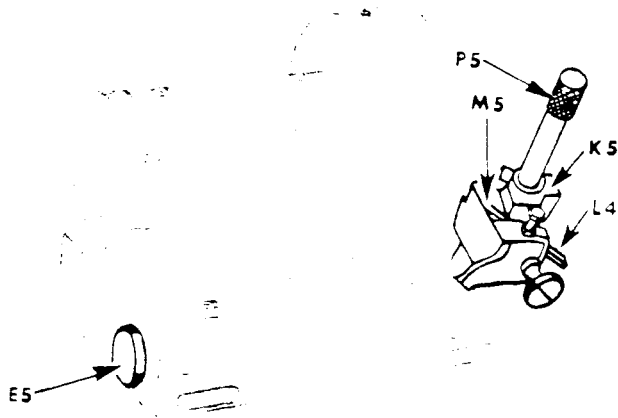


Fig. 49. Sharpening the Stationary Knife.

Knife Grinding Machine 701-9 (belt driven) is necessary for sharpening the knives used on Machines of Class 460. The use of this grinder insures the correct bevel of the cutting edge of each knife.

If this knife grinder is not available, knives that require a new edge should be returned to your SINGER Service Representative or to a SINGER factory for sharpening.

Do not attempt to sharpen these knives by hand.

SHARPENING MOVABLE KNIFE D4

Insert knife D4, Fig. 48 in knife holder B5, Fig. 48 on front of lever arm A5, Fig. 48. Allow approximately 1/16 inch of the knife to extend beyond holder, for grinding. Then tighten thumb screw Z4, Fig. 48.

Turn thumb nut E5, Fig. 49 over from you until the knife D4 clears the grinding face G5, Fig. 48. While moving lever arm A5 alternately back and forth, turn thumb nut E5 as required, to bring the cutting edge of the knife lightly against the grinding face of the wheel.

Continue the back and forth motion of the lever arm, grinding off only enough to sharpen the cutting edge.

The movable knife is thus ground to a shearing edge, requiring no special setting in the machine to shear.

SHARPENING STATIONARY KNIFE L4

Insert knife L4, Fig. 49 in knife holder K5, on rear of lever arm, so that its bevel M5 is parallel with grinding face G5 of grinding wheel. Allow approximately 1/16 inch of the knife to extend beyond holder, for grinding. Then by turning knurled end P5, Fig. 49 of lever arm, screw lever arm into knife holder K5, securing the knife. Sharpen the stationary knife as instructed above.

SUGGESTIONS FOR EFFICIENT OPERATION

Always turn machine pulley over away from you.

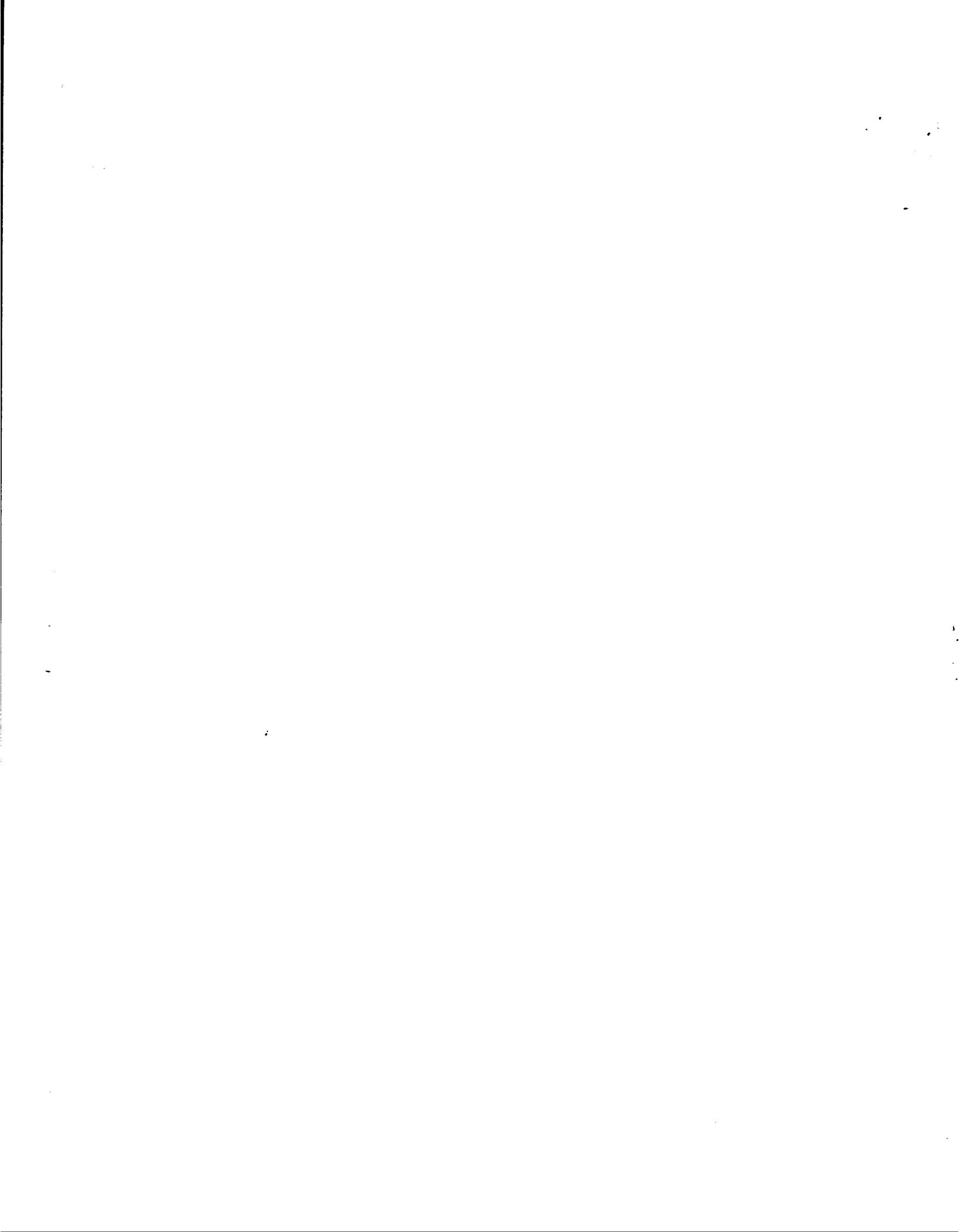
Keep oil level in oil reservoir between upper and lower marks on the oil sight gauge.

Clean out any lint around the loopers and between the feed rows of feed dog.

Frequently inspect area beneath presser bar housing and behind upper knife lever cover and remove accumulation of lint.

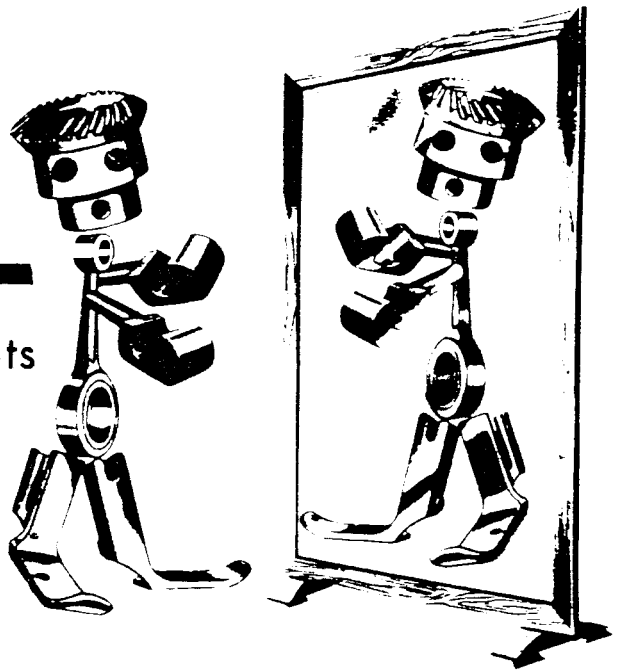
Always use lightest tensions and lightest pressure possible on material.

Don't forget to remove loop of thread from right looper before threading.



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