SEWING MACHINE
MODEL 340 SERIES

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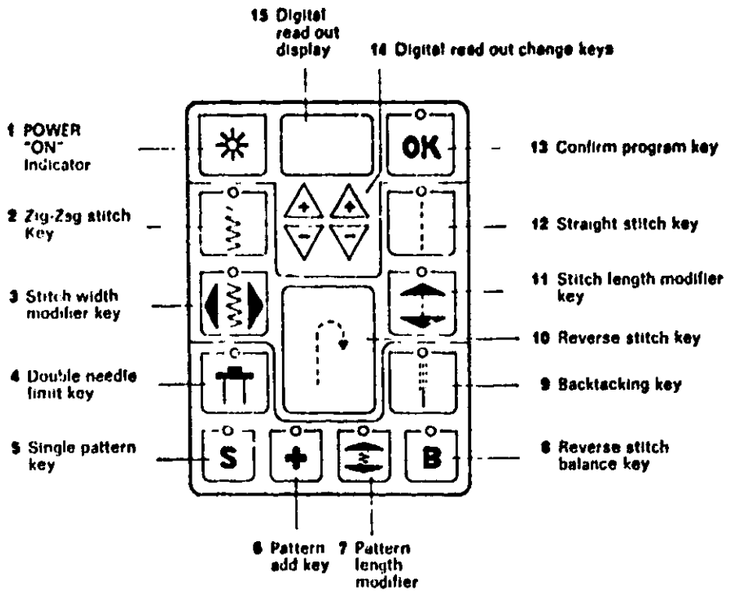
SECTION 1 340.1991180

KEYBOARD FUNCTIONS

FOLLOWING IS A BRIEF DESCRIPTION OF EACH KEY ON THE KEYBOARD SHOWING ITS LOCATION, IDENTIFICATION AND FUNCTION.



1. Power ON Indicator: Glows when Power is "ON"

2. Zig-Zag Stitch Key: Pre-programmed to 2 mm length, 5 mm width

3. Stitch width modifier Key: touching permits stitch width change

4. Double needle limit Key limits stitch width to maximum allowable for double needle (5 mm)

5. Single pattern Key programs machine to stop after a single pattern is completed

6. Pattern add Key permits addition of a second stitch pattern to one selected previously. Permits two patterns to be sewn alternately

7. Pattern length modifier Key: touching permits change in pattern length (up to 99 mm) without affecting stitch length

8. Reverse stitch, Balance Key, touching permits change of reverse stitch balance

9. Backtacking Key, when touched machine will make three forward, three backward stitches and then begin straight stitching

10. Reverse Stitch Key: machine will sew in reverse as long as key is touched.

11. Stitch length modifier key: touching permits stitch length change.

12. Straigh Stitch key: programmed to 2 5 mm stitch length

13. Confirm Program key: touched to show acceptance of program any time the digital read-out is changed.

14. Digital Read-out change key:
Stitch length or width change the two keys on the left (+), (—) change read-out rapidly
The two keys on the right (+), (—) change read out slowly

NOTE. Stitch length and width read-outs always show a decimal point

PATTERN SELECTION The two left keys (+) & (—) control the left number in the read out
The two right keys (+) & (—) control the right number in the read out

NOTE. Pattern numbers do not show a decimal point

15. DIGITAL READ OUT displays numbers corresponding to the stitch pattern selected or to the length or width programmed for the selected stitch pattern

NOTE Out the Digital read out display, stitch sewings show a decimal point, pattern selection show no decimal point

SECTION 1 340.1991180

PROGRAMMING SEQUENCE

THE FOLLOWING CHARTS PROVIDE A BRIEF EXPLAINATION OF THE STEPS REQUIRED TO PROPERLY ENTER A PARTICULAR STITCH OR PATTERN. TO OBTAIN THE STITCH SHOWN IN THE LEFT HAND COLUMN TOUCH KEYS IN THE ORDER SHOWN UNDER STEPS 1 THROUGH 5 BEFORE PRESSING ON FOOT CONTROL..

MACHINE PROGRAMMING

UTILITY STRETCH SATIN STITCHES, MONOGRAMS	STITCH VARIATION	STEP 1	STEP 2	STEP 3	STEP 4	STEP 5
Straight	Stitch memorized length (2.5 mm)					
Straight	Longer stitches (up to 6 mm)					
Straight	Shorter stitches (down to 1 mm)					
Zig-Zag	As memorized					
Zig Zag	Wider than memorized					
Zig-Zag	Wider & longer					
Zig-Zag	Narrower					
Zig-Zag	Narrower & shorter					

UTILITY STRETCH, SATIN STITCHES, MONOGRAMS		STEP 1	STEP 2	STEP 3	STEP 4	STEP 5	STEP 6	STEP 7
Any numbered pattern shown in machine cover	Continuous pattern as memorized			OK				
Same pattern	But wider			OK				
Same pattern	But narrower			OK				
Same pattern	But wider & longer			OK				
Same pattern	But narrower & shorter			OK				
Satin stitches	Elongated, same stitch density			OK				
Any numbered pattern	Single pattern or monogram			OK	S			
Two letters or patterns continuously alternating	To be selected in same pattern group as shown in machine cover			+		OK		

UTILITY STRETCH, SATIN STITCHES, MONOGRAMS		Clear	STEP 1	STEP 2	STEP 3	STEP 4	STEP 5	
Two monograms (or monogram and period)	Single pattern			+		OK	S	
Buttonholes*	Memorized width			OK				
Buttonholes*	Wider			OK				

* NOTE: Machine will sew one complete buttonhole, then it stops automatically no need to touch [S] If you want to sew same buttonhole again, simply touch [S] key.

SECTION 2
CHECK POINTS

Past service records indicate that customers sometimes do not follow or misinterpret instructions in the Owner's Manual Threading the machine and balancing thread tension are commonly misunderstood

Before proceeding with troubleshooting chart, refer to important information in Section 5--General Maintenance Users and technicians should understand the basic points covered in this section

The following chart will help you determine whether the machine needs further adjustment

COMPLAINTS RELATING TO STITCHING PERFORMANCE

Ask the customer to sew in order to duplicate the problem and check the following points as she/he sews

IS THE CORRECT NEEDLE PROPERLY USED AND INSERTED?

NO - Replace with correct needle or reinsert needle properly

Make sure
- Only Kenmore needle is used
- Needle is correct size for thread and fabric *(see Section 5B)*
- Bent or blunt needle is not used
- Needle is securely clamped with screw
- Basting using stitch program 37 requires special basting needle

YES

IS THE TOP THREADING CORRECT?

NO - Correct top threading

Refer to Section 5A
Make sure
- Thread passes between the thread tension discs
- Thread is not tangled
- Thread tension control is functioning properly *(see Section 2C 1)*

YES

IS THE BOBBIN CASE THREADED CORRECTLY?

NO - Correct bobbin case threading

Refer to Section 5A
Make sure
- Bobbin thread is under tension spring
- Bobbin is installed to rotate counterclockwise as thread is pulled

YES

IS THE PRESSER FOOT PRESSURE REGULATOR SET CORRECTLY?

NO Correct the setting

Refer to Section 5E
Make sure pressure knob is
- Set for more pressure with lightweight fabric
- Set for less pressure with heavy fabric

YES

DOES THE PRESSER FOOT SUIT THE TYPE OF STITCHING?

NO Replace the presser foot with suitable one (see instructions in Owner's Manual)

Refer to Section 5E

YES

ARE ALL CONTROLS SET CORRECTLY?

NO - Correct all the settings

Make sure
- Bobbin winder lever is properly positioned
- Feed dog control lever is properly positioned

YES

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2. CHECK POINTS

IS THREAD TENSION BALANCED BETWEEN TOP AND BOBBIN?

NO Usually balance of thread tension is achieved by adjusting the top thread tension control If bobbin thread tension adjustment is also needed see *Section 5C*

YES

WAS STITCH PROGRAM ENTERED CORRECTLY?

NO Try to enter selected program following Owner's Manual instructions step by step

YES

Check the following list for section which corresponds with customer's complaint

TROUBLESHOOTING IN MECHANICAL AREA

Pulling or pushing the fabric by hand against machine feeding action will make the needle bend A bent needle will contact and can damage the needle plate or hook resulting in needle breakage

IS NEEDLE STRIKING NEEDLE PLATE OR SCRAPING EDGE OF THE NEEDLE HOLE?

YES – Needle position is not correct See *Sections 2C 2 4 & 2C 2 5* for adjustment

Set machine for straight stitching Use straight stitch needle plate

NO

IS NEEDLE HITTING HOOK OR BOBBIN CASE?

YES – If needle clearance to hook is zero or too little see *Section 2C 2 1* for adjustment

Remove both needle plate and cover plate

Check that bobbin case is properly fastened by holder, with enough play left between case and holder See *Section 2C 2 3*

NO

IS HOOK/BOBBIN CASE AREA CLEAR OF THREAD OR LINT?

NO – Refer to *Section 2B 3* "Top Thread Breaking or Jamming in Hook" Also refer to *Section 5D*

YES

IS THE TIMING BETWEEN NEEDLE VERTICAL MOTION AND ZIGZAG BIGHT CORRECT?

NO – Set correct timing

Refer to *Section 2C 2 5*

YES

IS THE TIMING BETWEEN VERTICAL MOTION AND FEED CORRECT?

NO – Set correct timing

Refer to *Section 2C 3 1*

USER HINTS

Advise user to follow instructions Getting Ready to Sew in Owner's Manual frequent needle breakings are often caused by the fact that user is still unfamiliar with sewing

ADVISE CUSTOMER ABOUT FOLLOWING DON'TS

1 Don't pull or push fabric while sewing simply guide it
2 Don't leave needle plate and presser foot for straight stitching while programming any zigzag stitch pattern
3 Don't try to use worn-out needles replace them regularly
4 Don't use high speed when sewing thick fabrics

AND THE FOLLOWING "DO'S

1 Use needles according to instructions in Owner's Manual When using double needle always press double needle key on keyboard to limit zigzag width
2 Always use presser feet as indicated in Owner's Manual
3 Select needle according to Owner's Manual
4 Always draw approximately 4 inches of both top and bobbin thread to the rear of the machine before placing the fabric
5 Check that surface of the parts along the thread path are smooth Damaged scratched or rough surfaces on parts along the thread path, will weaken thread resulting in thread breaking and/or shuttle hook jamming

IMPORTANT: If machine is off with fabric under presser foot, check first needle position, before switching the machine on If needle is down, piercing the fabric, rotate handwheel toward you to raise needle When needle is out of fabric, it is all right to switch machine on You could damage the needle or fabric by not following this instruction

IS THE NEEDLE SIZE SUITABLE FOR THREAD AND FABRIC?

NO - Sewing sheer fabric with needle size larger than 12 may cause puckering Select suitable size needle for the fabric Refer to *Section 5B*

If customer is having problems with stretch fabric suggest use of 0 Needle™ With this special needle we recommend use of the completely flat sole presser foot located in the machine s accessories tray

YES

IS THE NEEDLE CLEARANCE TO SHUTTLE HOOK CORRECT?

NO - Check clearance with proper tools and gauges For clearance adjustment refer to *Section 2C 2 1*

YES

IS NEEDLE HEIGHT CORRECT?

NO - Check with proper gauge Refer to *Section 2C 2 2* Refer to *Section 2C 2 2* for adjustment

YES

IS NEEDLE TIMING TO SHUTTLE HOOK CORRECT?

NO - Check with timing gauges Refer to *Section 2C 2 1* for adjustment

YES

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2B 2 SKIPPED STITCHES

IS THE HOOK TIP SHARP AND SMOOTH?

NO - Replace hook Refer to *Section 2C 2 7*

YES

IS HOOK 3 PIVOT PROPERLY POSITIONED AT 45 ? (Check with gauge and tool)

NO - Refer to *Section 2C 2* for adjustment

YES

IS NEEDLE BAR CORRECTLY ORIENTED? (Check with gauge)

NO - Refer to *Section 2C 2 2* for adjustment

YES

ARE YOU GETTING SKIPPED STITCHES WHEN SEWING WITH MAXIMUM WIDTH STITCHES (8 MILLIMETER)?

NO - Check that machine is not stitching at width larger than 8 mm Refer to *Section 2C 2 5* for the adjustment

YES

IS UPPER THREAD TAUT ENOUGH WHEN THE NEEDLE EYE IS DOWN TO NEEDLE PLATE S LEVEL?

NO - Before lowering needle, place remnant of sheer fabric under presser foot, rotate handwheel to bring needle eye down to needle plate level Verify that the check spring is functioning correctly Refer to *Section 2C 1* for adjustments

340.1991188
2B 3 TOP THREAD BREAKING, OR JAMMING IN SHUTTLE HOOK

IS UPPER TENSION CORRECTLY SET?

NO - Set correct tension. Refer to *Section 5C*

YES

IS GOOD QUALITY THREAD USED?

NO - Some poor quality threads on the market are not suitable for machine sewing. Use good quality thread such as cotton wrapped polyester

YES

IS TOP THREAD TANGLING ON PARTS ALONG THE THREAD PATH?

YES - Check needle, spool pins, thread guides, tension assembly, etc. Rethread machine

NO

DO ANY PARTS ALONG THREAD PATH HAVE ROUGH SURFACES OR ARE ANY DAMAGED?

YES - Check thread guides, tension control, thread take up lever, needle eye, presser foot needle hole, needle plate, rotary shuttle hook, etc. Replace parts, if necessary

NO

IS THE TIP OF THE SHUTTLE HOOK SHARP AND SMOOTH?

NO - Replace shuttle hook. Refer to *Section 2C27*

YES

IS LINT OR BROKEN THREAD ACCUMULATED IN SHUTTLE HOOK OR FEED DOG AREA?

YES - Clean shuttle hook and feed dog areas. Refer to *Section 5D*

Lint or broken thread in these areas will delay timing of thread escape from shuttle hook, resulting in thread breaking

NO

340.1991188
2B 3 TOP THREAD BREAKING, OR JAMMING IN SHUTTLE HOOK

IS THE BOBBIN CASE RING, LATCH PROPERLY POSITIONED AND IS IT PROPERLY TIGHTENED BY BOTH SMALL LATCHES OF THE SPRING HOLDER?

NO - Properly reset latch

YES

ARE NEEDLE HEIGHT, NEEDLE TIMING TO SHUTTLE HOOK CLEARANCE BETWEEN BOBBIN CASE AND LATCH CORRECT?

NO - Refer to *Sections 2C21, 2C22, and 2C23* for adjustments

USER HINTS

Advise user to follow instructions *Getting Ready to Sew* in Owner's Manual. Always draw 4 inches of both top and bobbin threads to the rear of the machine before placing the fabric.

Use proper needle according to kind of fabric and thread.

340 1991100
2B 4 BOBBIN THREAD BREAKING

DO ANY PARTS ALONG THREAD PATH HAVE ROUGH SURFACES OR ARE ANY DAMAGED?

YES - Replace damaged parts

Check smoothness of bobbin case tension spring and thread path along bobbin case and needle plate

NO

↓

IS BOBBIN CASE PROPERLY THREADED?

NO - Reinsert bobbin case

Check that bobbin rotates counterclockwise while thread is pulled Check that thread passes under bobbin case tension spring

YES

↓

IS BOBBIN ENTIRELY FREE TO ROTATE INSIDE CASE?

YES - Replace damaged part

Damaged bobbin or bobbin case will interfere with smooth feeding of thread

NO

↓

IS TENSION OF BOBBIN CASE SPRING CORRECT?

NO - Reset tension refer to *Section 5C*

YES

↓

IS BOBBIN THREAD EVENLY WOUND ON BOBBIN?

NO - Rewind the bobbin thread

If thread is not evenly wound on bobbin it will not unwind smoothly

340 1991100
2B 5 LOOSE STITCHES OR PUCKERING

IS TENSION OF TOP THREAD AND BOBBIN THREAD BALANCED?

NO - Adjust tension of top thread and of bobbin thread to obtain good balance Refer to *Section 5C*

Loose stitches occur when top thread tension is too loose or bobbin thread is too tight

YES

↓

IS NEEDLE TIP DAMAGED?

YES - Replace needle

NO

↓

IS NEEDLE SIZE SUITABLE FOR THREAD AND FABRIC?

NO - Select suitable size needle for the fabric Refer to *Section 5B*

Sewing sheer fabric with needle size larger than 10 may cause puckering

YES

↓

IS UPPER THREAD PROPERLY THREADED BETWEEN TENSION DISCS?

NO - Do upper threading with presser foot lifted so that tension discs are open

YES

↓

IS PRESSURE ON PRESSER FOOT CORRECT?

NO - Set pressure knob on position 3 for normal sewing, increase pressure for light fabric, decrease it for thick fabric

YES

↓

IS CHECK SPRING FUNCTIONING PROPERLY?

NO - Replace tension group Refer to *Section 2C 1*

Check smooth movement of check spring several times with finger

YES

↓

ARE TENSION DISCS WORKING PROPERLY?

NO - Replace tension group Refer to *Section 2C 1*

Thread machine from spool to take up lever and check that thread flows freely between tension discs when presser foot is raised, while correct tension is made on thread when presser foot is lowered Check to see that friction on thread increases when tension knob is rotated toward higher values

YES

↓

2B 6 LOOSE STITCHES OR PUCKERING

IS UPPER TENSION KNOB PROPERLY POSITIONED?

NO - Decrease tension when sewing light fabric increase it when sewing on heavy fabric

Correct tension for general sewing is "3" setting

YES

IS FEED DOG HEIGHT CORRECT?

NO - Refer to *Section 2C 3 2* for adjustment

Incorrect feed dog height will cause poor feeding or loose stitches Check height of feed dog with gauge

YES

IS TIMING BETWEEN NEEDLE AND FEED CORRECT?

NO - To check it refer to *Section 2C 3 1*

To adjust timing refer to *Section 2C 3 1*

SERVICE HINTS

1 Sheer or elastic fabrics tend to cause puckering To avoid this, recommend tissue paper under layer for sewing such fabrics

2 Every sewing machine is adjusted at the factory to produce best sewing in the most frequently used stitch widths and lengths Apparent loose tension when sewing widest stitch width and longest stitch length should not be considered a mechanical problem

2B 8 IRREGULAR STRAIGHT STITCHING

ARE STITCHES IN STRAIGHT SEAM ALIGNED?

NO

YES

IS NEEDLE BAR PRODUCING NOISY VIBRATIONS?

NO

YES - Refer to *Section 3B 7*

IS PRESSER FOOT PRESSURE PROPERLY SET?

YES

NO N 3 is the proper setting for general sewing Insufficient pressure may allow irregular feeding of fabric

Adjust pressure

IS PROPER SIZE OF NEEDLE BEING USED?

YES

NO If using thin needles on fabrics woven with thick threads seam may show irregular stitches

Select and install needle of proper size

Refer to *Section 5B*

DO YOU FIND EXCESSIVE PLAY IN THE KINEMATIC CHAIN OF MECHANISMS CONNECTING THE ACTUATOR WITH NEEDLE BAR?

YES - Refer to *Section 2C 2 6*

IS NEEDLE POSITIONED TOWARD LEFT OR RIGHT OF THE NEEDLE HOLE BORED IN NEEDLE PLATE?

YES - Check and if necessary replace fuses of close loop boards See *Section 2C 4 7* Check that connector is well plugged into the potentiometer of needle bar actuator, refer to *Section 2C 4 7* If problem persists, refer to *Section 3B 10*

NO

WITH MACHINE SWITCHED ON, BUT NOT OPERATING, CAN NEEDLE BAR BE MANUALLY PUSHED TO LEFT OR RIGHT, WITHOUT ANY RESISTANCE?

YES - Check that connector between needle bar actuator and close loop board is properly connected at both ends Refer to *Section 2C 4 7* If negative, refer to *Section 3B 10*

NO

340 1991190
28 6 IRREGULAR STRAIGHT STITCHING

WITH NEEDLE PLATE POSITIONED FOR STRAIGHT STITCHING (SMALL ROUND WINDOW) IS NEEDLE POINT CORRECTLY CENTERED OVER PLATE HOLE?

YES - Install thick needle (Size 16) and switch machine on

Program machine for straight stitching Rotate handwheel verify that needle tip is well centered in needle plate hole Refer to *Section 2C 2 1* for adjustments

HINTS FOR USER

Among the accessories of your machine you find the special straight stitch presser foot (the one with a small hole drilled right above the presser foot fork) to be used when sewing sheer stretch fabrics

Needle plate should be positioned with the small round hole for straight stitching

340 1991190
28 7 POOR KNOTTING OF STITCHING

ARE UPPER THREAD AND BOBBIN THREAD PATHS CORRECTLY FOLLOWED?

NO - Rethread

Refer to *Section 5A*

YES

↓

IS THREAD COMING OFF OF THREAD SPOOL SMOOTHLY?

NO - Check that proper size of spool disc is being used and that disc edge is smooth all around

YES

↓

ARE BOTH UPPER AND BOBBIN TENSIONS BALANCED?

NO - Recheck and balance tensions Refer to *Sections EE and 5C*

YES

↓

IS CLEARANCE BETWEEN LATCH AND BOBBIN CASE CORRECT?

NO - Refer to *Section 2C 2 3* for adjustment

If clearance is too close upper thread cannot be fed smoothly irregular knots may appear in lower side of fabric

YES

↓

ARE SURFACES OF UPPER PART OF BOBBIN CASE AND OF BOBBIN SMOOTH?

NO - Smooth surface of parts, or replace rough parts

YES

↓

IS THE CHECK SPRING OF THE TAKE-UP LEVER GROUP PROPERLY PULLING BACK UP THREAD?

NO - Refer to *Section 2C 1* for adjustment

YES

↓

ARE THE SHUTTLE HOOK GROOVE, BOBBIN CASE SLOT, AND BOBBIN CASE HOLDER CLEAN OF DUST OR LINT?

NO - Carefully clean all shuttle hook components

Lint and dust cause excessive attrition between bobbin case and hook so that thread is not smoothly fed

SERVICE HINTS

Variation in stitch knotting may be caused by machine being run at uneven speed

Upper tension, when sewing with stretch stitches should be set at higher value than when sewing the utility stitches, especially when machine is being run at top speed

This section deals with problems of machine zigzag stitches producing incorrect or deformed patterns or insufficient zigzag width

WHEN MACHINE IS TURNED OFF, IS SIDE MOVEMENT OF NEEDLE BAR SMOOTH AND EASY?

NO — Check kinematic chain of mechanisms from needle bar actuator to needle bar, be sure no part is damaged Check that magnetic field created by actuator has not attracted metallic particles — Refer to *Section 2C 2 6*

YES

↓

TURN MACHINE ON AND PROGRAM ZIGZAG STITCHING IF YOU ROTATE HANDWHEEL, IS MACHINE PERFORMING ZIGZAG STITCHING?

NO - Check to see that connector is securely fastened to close loop control board Refer to *Section 2C 4 7* If problem still remains, refer to *Section 3B 7 and 3B 10*

YES

↓

IS ZIGZAG WIDTH DIFFERENT FROM THE ONE THAT HAS BEEN PROGRAMMED?

YES - Set zigzag at maximum width Right should be from 7 5 to 7 8 millimeters, at least Refer to *Section 2C 2 5*

NO

↓

IS THE RIGHT PRESSURE ON PRESSER FOOT PROPERLY SET?

NO - Poor pressure causes irregular feeding — Set proper pressure

YES

↓

WITH ZIGZAG SET AT MAXIMUM WIDTH, TURN HANDWHEEL AND CHECK WHETHER NEEDLE EVER TOUCHES EDGES OF NEEDLE PLATE OPENING

YES - Refer to *Section 2C 2 5* for adjustments

NO

↓

340.1991188
28.8 IRREGULAR ZIGZAG STITCHING

IS NEEDLE PATH CENTERED ALL ALONG NEEDLE PLATE OPENING, WHEN NEEDLE MOVES OVER OPENING DRIVEN BY ZIGZAG BIGHT?

NO - Refer to *Section 2C 2 5* for adjustments

YES

↓

DO YOU HEAR MECHANICAL BANGING WHEN NEEDLE SEWS AT MAXIMUM ZIGZAG WIDTH?

YES - Check correct positioning of actuator Refer to *Section 2C 2 5* Check correct positioning of actuator coil limiting devices Check that maximum zigzag width does not exceed 7 8 mm Refer to *Sections 2C 2 5* for adjustments

NO

↓

DOES ZIGZAG WIDTH CHANGE WHEN SEWING SPEED IS BEING INCREASED?

YES - Check that machine is not running over 1,000 r p m

NO

↓

DO YOU FIND SUDDEN VARIATION IN STITCH WIDTH AND/OR LENGTH WHEN ZIGZAG SEWING?

YES - Refer to *Section 3B 8*

Refer to *Section 2C 4 5* for adjustment With special gauge check zigzag timing phase, *Section 2C 2 5*

340.1991188
28.9 BOBBIN THREAD DOES NOT WIND, OR WINDS IMPROPERLY

DOES CLUTCH RELEASE UPPER SHAFT FROM MOTOR?

NO - Check clutch mechanism, replace damaged parts Refer to *Section 2C 4 1*

YES

↓

DOES BOBBIN WINDER SHAFT RUN PROPERLY?

NO - Check to see if thread is tangled around bobbin winder shaft Check shape of rubber ring in bobbin winder assembly rubber material may change shape with age Replace rubber ring Refer to *Section 2C 4 1*

YES

↓

IS INITIAL THREADING OF BOBBIN CORRECT?

NO - Correct initial threading of bobbin Refer to Owner's Manual

YES

↓

IS THREAD PROPERLY WOUND ON BOBBIN?

NO - A correctly wound bobbin should have a cylindrical shape If shape is rather irregular, bobbin winder tension disc may need adjustment Refer to *Section 2C 4 1*

YES

↓

IS PROPER AMOUNT OF THREAD WOUND ON BOBBIN?

NO - Bobbin winder mechanism automatically stops before bobbin is full Too much thread on bobbin can be a cause of thread breaking or loose stitches

Adjust winder limiting device Refer to *Section 2C 4 1* for adjustments

SERVICE HINTS

Machine should not be run at speed higher than 1,000 stitches/minute Higher speed would not allow enough time for electromechanical actuators to properly position needle bar or feed eccentric rod, resulting in irregular sewing of pattern

340.1991180
2B.10 ENGAGEMENT & DISENGAGEMENT OF FEED DOGS

WHEN FEED DOGS ARE DISENGAGED, ARE THEY LOWERED BELOW THE NEEDLE PLATE?

NO - Check conditions of the lifting spring pulling the feed dog mount. lifting spring could be unhooked or broken Check to see that feed dog's teeth are not leaning against edges of feed dog's windows Check to see that feed lifting lever has not jumped out of position Refer to *Section 2C 3 4* for repairs

YES

IS THE FEED DOG GROUP SOMETIMES JUMPING OUT OF ENGAGEMENT?

YES - Spring controlling the position of the feed lifting lever may be out of position, or damaged Replace spring, refer to *Section 2C 3 4*

NO

DO YOU FIND THE FEED DOG GROUP HARD TO ENGAGE?

YES - Check to see that surface between cylindrical portion of feed lifting lever and the eccentric shaft is not dented or damaged Check to see that feed dogs are correctly aligned with needle plate windows Refer to *Sections 2C 3 2 and 2C 3 4* for repairs, or part replacement

340.1991180
2B.11 POOR FEEDING OF FABRIC

IS FEED DOG LOWERING LEVER (LOCATED IN BOBBIN AREA, TO THE RIGHT SIDE OF SHUTTLE HOOK) PROPERLY POSITIONED?

NO - Move lever in the proper position

YES

IS PROPER PRESSURE APPLIED ON PRESSER FOOT?

NO - More pressure for light-weighted fabric, less pressure for heavy fabric Refer to *Section 5E*

YES

LINT OR PIECES OF BROKEN THREAD ACCUMULATED IN FEED DOGS AREA?

YES - Remove needle plate, clean feed dog area

Lint or pieces of thread accumulated in feed dog area will decrease feeding le stitch length

NO

ARE FEED DOG TEETH ALIGNED WITH NEEDLE PLATE WINDOWS?

NO - Check that clearance between feed dogs and needle plate openings are as indicated in *Section 2C 3 2*

Correct alignment accordingly

YES

IS HEIGHT OF FEED DOG TEETH CORRECT?

NO - Incorrect feed dog height may result in poor feeding or loose stitches Use feed dog height gauge to check height Refer to *Section 2C 3 2* for adjustments In straight stitching, check to see that maximum stitch length is between 5 5 and 6 0 millimeters For necessary adjustments, refer to *Section 2C 3 3*

YES

ARE FEED DOGS BELOW NEEDLE PLATE WHENEVER NEEDLE IS IN ITS LOWER POSITION?

NO - Check feed timing to needle movement, as per *Section 2C 3 1* Reset timing accordingly

YES

2B.11 POOR FEEDING OF FABRIC

IS FABRIC BEING FED WITHOUT EXCESSIVE SIDE DRIFTING?

NO - Side drifting is caused by insufficent attrition between presser foot sole and feed dogs

Replace presser foot if sole appears damaged or uneven

YES

IS LENGTH OF SEWED STITCHES DIFFERENT FROM KEYBOARD PROGRAMMED LENGTH?

YES - Check to see that no part is stuck in feed kinematic mechanism Refer to *Section 1B 6* Reset stitch length control referring to *Section 2C 3 3*

NO

STITCHING WITH REVERSE, ARE YOU MAKING BACKWARD STITCHES OF SAME LENGTH AS WHEN STITCHING FORWARD?

NO - Refer to *Section 2C 3 3* for necessary adjustments As a final check, enter program 26 through keyboard and sew

YES

IS MACHINE FED ONLY IN ONE DIRECTION AND WITH MAXIMUM STITCH LENGTH, EVEN WHEN DIFFERENT STITCH PATTERNS ARE PROGRAMMED?

YES - Verify that connector from feeding actuator is properly plugged to close loop board Check fuses of close loop board and replace them if necessary If problem persists, refer then to *Section 3B 3*

NO

DO SOME STITCH PATTERNS SEEM TO BE SEWING IN A STRETCHED ELONGATED SHAPE?

YES - Check to see that no loose tolerances are in the kinematic chain of mechanisms linking feed actuator with feed dog, refer to *Section 1B 6* for adjustments, or for replacing defective parts Also, see *Section 1B 10* Check that metallic burrs are not trapped inside actuator magnetic field If you still have problems, refer to *Section 3B 4 and 3B 8*

USER HINTS

With proper presser foot and feed dogs at the correct height, the sewing machine automatically feeds the fabric User must not pull or push fabric against machine's feeding action

2B.12 MACHINE DOES NOT RUN

Jamming or freezing of mechanical parts or electric components will be the main cause of this problem

CAUTION: When a machine will not run due to mechanical jamming, do not force it to run with extra power otherwise machine may lose its timing completely and fail to sew

IS BOBBIN WINDER LEVER DISENGAGED?

NO - Disengage lever

YES

IS CLUTCH WORKING PROPERLY?

NO - Check clutch components, replace damaged parts, referring to *Section 2C 4 1*

Clutch allows machine to be driven by electric motor when bobbin winder is not engaged When bobbin winder is engaged, clutch cuts off upper & lower machine shafts so that motor drive is directed to bobbin winder group only (see *Section 1B 1*)

YES

DO YOU FEEL STRONG RESISTANCE IF YOU TRY TO MANUALLY ROTATE HANDWHEEL?

NO

YES

IS ANYTHING TANGLED IN THE GEARS OF ROTARY HOOK, OR DO GEARS SHOW DAMAGED TEETH?

NO

YES - Clean parts Oil adequately only where you find dried up lubricant Be careful that no oil drops on P C boards Refer to *Section 2C 4 7*

WAS THE MACHINE DROPPED?

YES - Repair or replace damaged parts If the main frame is bent or broken machine is not economically repairable

DO BULBS LIGHT UP?

NO - Replace main fuse Replace electric cord Refer to *Section 3B 1 and 3B 2*

Check to see that machine is properly plugged into wall socket and that foot control plug is well plugged into machine

YES

IS THE "ON-OFF LED SIGNAL ON KEYBOARD OPERATIVE?

NO - Replace fuses of close loop board If you still have problems, refer to *Section 3B 1 and 3B 2*

Connectors of controlling potentiometers of both needle bar and feeding actuators must be securely connected a faulty erratic connection would cause fuses to cut feeders circuit

YES

340.1991180
2B 12 MACHINE DOES NOT RUN

ARE THE CORRECT LED's LIT WHEN STRAIGHT OR ZIGZAG STITCHING IS PROGRAMMED?

NO - Problems are in the electronic circuitry, refer to *Section 3B 1 and 3B 2*

YES

↓

ONCE THE STITCHING PROGRAM HAS BEEN ENTERED, CAN THE MACHINE SEW AS SOON AS CONTROL IS BEING PRESSED?

NO - Replace foot control, if machine still does not work, check to see that connectors joining motor and foot control to the motor control board are properly plugged in Refer to *Section 2C 4 7* Check to see whether electric motor brushes need replacement, check brush springs Check condition of motor commutator

For all these checking procedures, refer to *Section 2C 4 6*

SERVICE HINT

If motor commutator shows damage due to excessive sparking, replace motor to avoid second service call To replace motor, refer to *Section 2C 4 6*

If above checks show no result, refer to *Section 3B 5*

340.1991180
2B.13 MACHINE DOES NOT BASTE

IS BASTING NEEDLE INSTALLED ON MACHINE?

NO - Basting on this electronic sewing machine requires the special needle (the one with the golden stem) — Install correct needle

YES

↓

WAS BASTING PROGRAM CORRECTLY ENTERED?

NO - Basting program code number is 37 Try to enter it again into keyboard If inoperative, refer to *Section 3B 10*

YES

↓

ARE NEEDLE HEIGHT AND NEEDLE BAR ORIENTATION CORRECT?

NO - Check with proper gauge Refer to *Section 2C 2 2* for adjustment

YES

↓

ARE TIMING BETWEEN NEEDLE AND SHUTTLE HOOK RIGHT?

NO - Check with proper gauge Refer to *Section 2C 2 1* for adjustment

YES

↓

IS CLEARANCE BETWEEN NEEDLE AND SHUTTLE HOOK CORRECT?

NO - Check clearance, referring to *Section 2C 2 1* — Adjust clearance accordingly

YES

↓

IS ZIGZAG TIMING CORRECT?

NO - Check timing with timing gauge, refer to *Section 2C 2 5* — Reset timing as per *Section 2C 2 5*

YES

↓

IS THE SHUTTLE HOOK TIP SHARP AND SMOOTH?

NO - Replace hook, refer to *Section 2C 2 7*

USER HINTS

Suggest that user select low speed for basting, it's the best way to achieve better control in guiding fabric since basting program number 37 provides extremely fast feeding of machine

340.1991180
2B14 UNSATISFACTORY BUTTONHOLING

DOES BUTTONHOLE LOOK PROPERLY CLOSED AND COMPLETE?

NO - Check to see that machine contact points properly respond to buttonhole foot motion Refer to *Section 2C42*

YES

↓

ARE BAR TACKS OF THE SAME LENGTH?

NO - Check to see that sole glides freely along buttonholer s guide, and that sole is properly positioned before starting to sew Check to see that the sole correctly positioned to start buttonholing, the distance between sensor levers and contact points is properly set For possible adjustments, refer to *Section 2C42*

340.1991180
2B15 MACHINE SEWS WITHOUT FOOT CONTROL BEING PRESSED

TURNING THE MAIN SWITCH ON, DOES MACHINE START SEWING, EVEN IF NO PROGRAM WAS ENTERED THROUGH THE KEYBOARD?

YES - Refer to *Section 3B11*

NO

↓

WHEN A STITCH PATTERN HAS BEEN ENTERED AND THE O K KEY PRESSED, DOES MACHINE SEW WITHOUT THE FOOT CONTROLLER BEING PUSHED DOWN, OR DOES MACHINE CONTINUE SEWING EVEN IF FOOT CONTROL IS RELEASED?

YES - Replace foot control If problem remains, refer to *Section 3B11*

USER HINTS

1 Set speed selector on low speed, we recommend low sewing speed for better buttonholing Be sure buttonholer foot is properly mounted, refer to Owner's Manual

2 Selection of buttonhole length and shape should be checked on remnant of the same material over which buttonholes will be later sewn In this way you ascertain that feeding stitch length and width are the most suited to your demand

3 Feed on some fabrics such as terry cloth, sheer fabrics and velvet are uneven We suggest to increase pressure on presser foot and to lay tissue paper under fabric before lowering presser foot Stitch length should also be increased

4 Before starting to sew a buttonhole, be sure that gliding sole is correctly positioned (all the way forward, toward operator)

340.1991180

2B.16 LIGHTS REMAIN OFF

IS JUST ONE BULB OFF?

YES - Replace bulbs — If problem remains refer to *Section 3B6*

NO

ARE BOTH BULBS OFF BUT MACHINE OPERATES REGULARLY?

YES - Check connectors to see that they are firmly connected — Replace bulbs

Refer to *Section 3B6*

340.1991180

2B.17 MOTOR SPEED SELECTION DOES NOT WORK

You may have a mechanical or an electrical problem

The low speed control will allow machine to sew up to 500 r p m 's, maximum speed should be between 950 and 1 000 r p m 's Machine should not be allowed to run faster or poor stitch quality will result

A WORD OF CAUTION: If you notice machine to be very stiff, do not force it to operate. Find the reasons first

DO YOU FIND HANDWHEEL STIFF WHEN YOU ROTATE IT?

NO

YES

IS THERE ANY TANGLED THREAD OR DRIED LUBRICANT BETWEEN OPERATIVE PARTS?

NO — YES - Remove thread clean out dry lubricant oil CAREFULLY (oil can interfere with P C board contacts)

IS TOOTHED BELT BETWEEN UPPER AND LOWER SHAFT TOO TIGHT?

NO — YES - Refer to *Sections 2C44* for adjustments

IS TOOTHED BELT BETWEEN MOTOR AND UPPER SHAFT TOO TIGHT?

NO — YES - Refer to *Section 2C44* for adjustments

WAS MACHINE DROPPED?

YES - If main frame is bent or broken the machine is not economically repairable

Otherwise, repair or replace damaged parts

WITH MACHINE ALL SET TO SEW, IS JUST A LIGHT PRESSURE ON FOOT CONTROL ENOUGH TO CAUSE MACHINE TO RUN AT FULL SPEED?

YES - Replace foot control Check to see that interruptor is securely fastened to motor control board Refer to *Section 2C47* If problem remains, refer to *Section 3B5*

NO

340.1991100
2B.17 MOTOR SPEED SELECTION DOES NOT WORK

KEEPING SAME PRESSURE ON FOOT CONTROL, DO YOU NOTICE A DIFFERENCE IN SPEED, WHEN FLIPPING SPEED CONTROL LEVER FROM LOWER TO HIGH SPEED, AND VICE VERSA?

NO - Refer to *Section 3B5*

YES

↓

IS THE MAXIMUM SPEED WITHIN SUGGESTED RANGE?

NO - Refer to *Section 2C4 5* for adjustment of potentiometer

YES

↓

IS FOOT CONTROL MAINTAINING SAME SPEED, WHEN BEING PRESSED WITH EQUAL PRESSURE?

NO - Replace foot control

YES

↓

AS SOON AS A STITCHING PROGRAM IS ENTERED, DOES MACHINE RUN WITHOUT FOOT CONTROL BEING PRESSED?

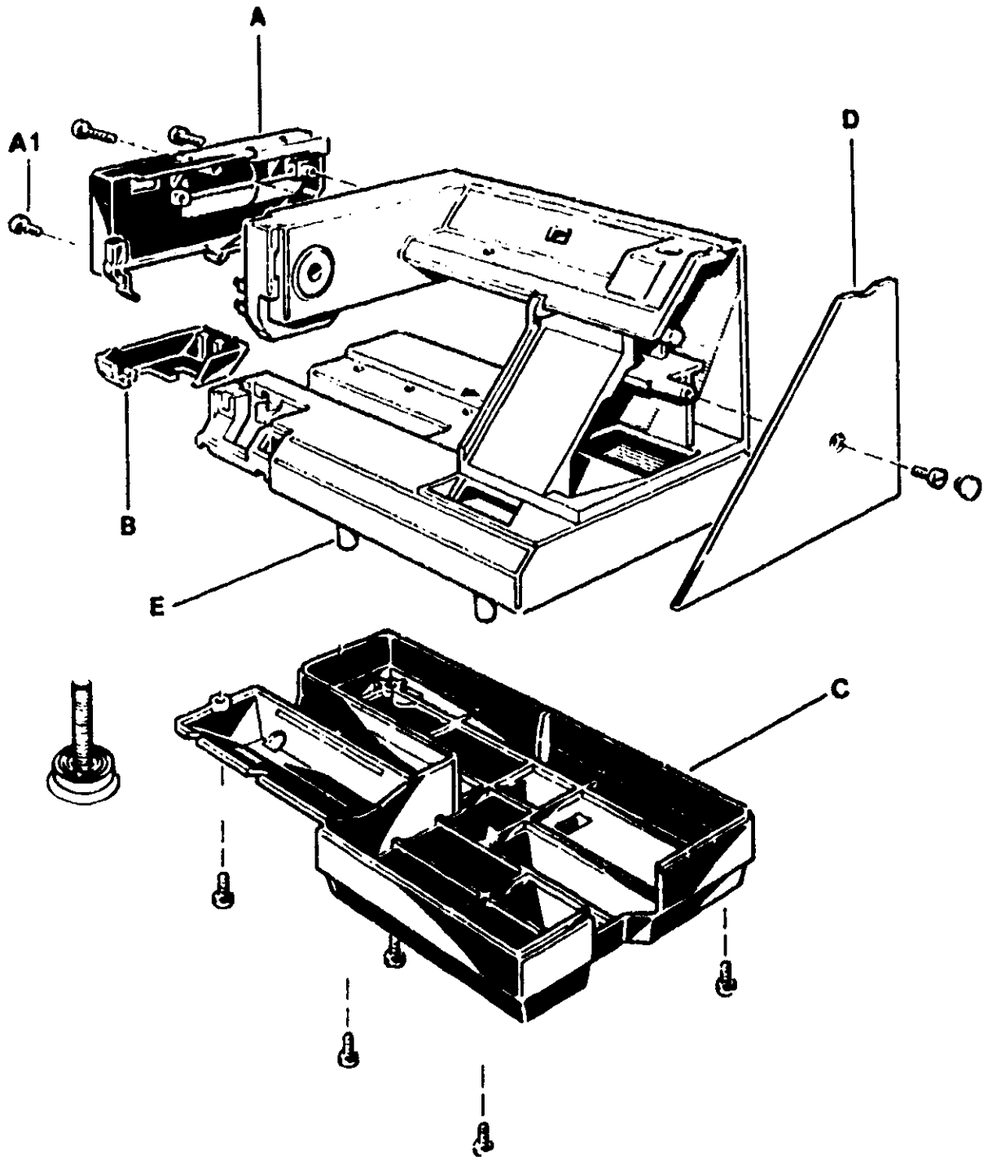
YES - Replace foot control If problem remains refer to *Section 3B11*

340.1991100
2B.18 FAULTY KEYBOARD

Faulty keyboard performance is usually related to a problem in the electronic circuitry
Refer to *Section 3B2*

SERVICE HINTS

It is always advisable to check tensions of toothed belts Too much tension is stressing pulley supports, excessive tension on motor belt reduces speed and it fatigues motor



SERVICE ACCESS

For service access side A B D and base C covers can be removed by removing screws as shown

Before loosening screw (A1) remove first cover B, which is pressure mounted under machine head

Attach to the five studs protruding from underneath of main frame, the five support feet No 68949

1 CHECKING TENSION CONTROL DISC OPENING

SPECIFICATIONS When presser foot is raised clearance between tension discs should be .012 inches (.3 mm). To verify the above specifications

- Lower presser foot
- Set thread tension regulator at 6
- Insert upper tension disc gauge 68939 between discs *(Figure 1)*. The gauge should not fall

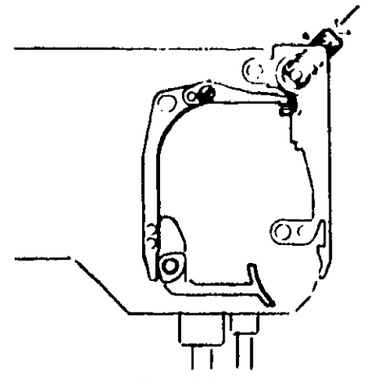


FIGURE 1

- Raise presser foot. The gauge should fall *(Figure 2)*

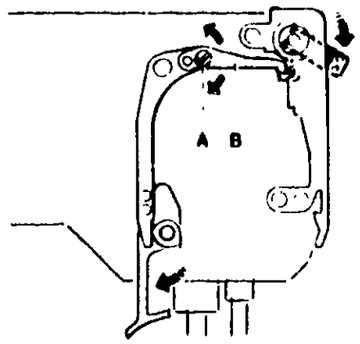


FIGURE 2

2 ADJUSTING DISC OPENING WHILE PRESSER FOOT IS UP

If adjustment is necessary, loosen screw (A) slightly *(Figure 2)* and adjust position of lever (B) upward or downward as illustrated. Tighten screw (A) securely after adjustment

3 TOP THREAD TENSION CONTROL

- Use a cotton wrapped polyester thread
- Raise presser foot and insert thread between discs in tension assembly
- Lower presser foot
- Set tension control at 3
- Tie the 55 gram weight (No 68940) to the end of the thread Sitting in front of machine tilt machine toward you *(Figure 3)* The thread should be held between the tension discs and the 55 gram weight should not lower Add the 15 gram weight to the 55 gram weight The thread should move slowly through the tension discs allowing the weights to move downward

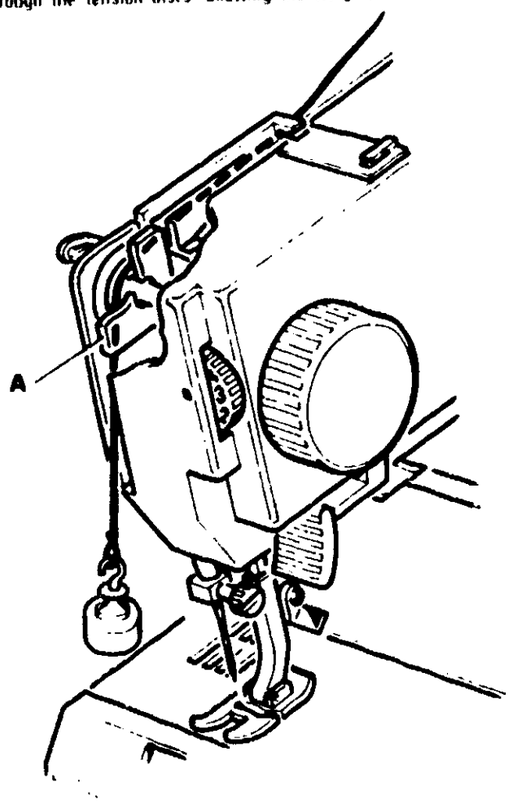


FIGURE 3

- Remove weights and set tension control to 0 Pull on thread and verify that no tension is present
- Set tension control to 1 A very light tension should be felt as the thread is pulled through the discs
- If tension assembly does not operate as described above adjust thread tension assembly

340.1991180
2C.1 TOP THREAD TENSION CONTROL

4 TOP THREAD TENSION ADJUSTMENT

- The thread tension assembly is adjusted by turning knurled nut (A) *(Figure 4)* It will be necessary to remove the tension assembly *(Figure 4)* from the machine to make this adjustment Refer to "Upper Tension Assembly Replacement" paragraph 7
- To adjust tension assembly rotate the knurled ring nut (A) *(Figure 4)* repeating the thread tension tests described previously If satisfactory adjustment cannot be obtained replace tension assembly

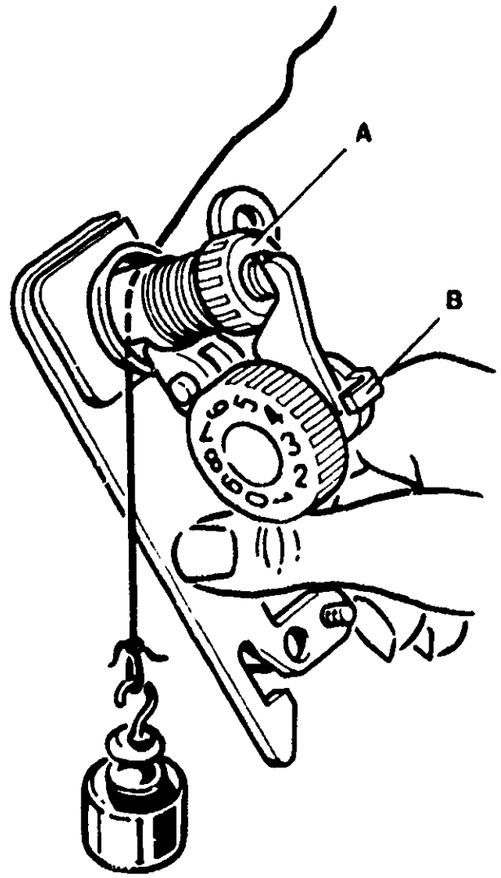


FIGURE 4

5 CHECKING THE THREAD CHECKSPRING

- Thread machine, set tension regulator at 3. Place a lightweight piece of fabric under presser foot. Lower presser foot.
- Rotate handwheel and watch the checkspring (G) motion *(Figure 5)*. When the checkspring is properly positioned it will contact the small limiting bracket (F) at the same time the needle tip starts piercing the fabric.

6 ADJUSTING CHECKSPRING

- To adjust checkspring position, loosen screw (E) and adjust limiting bracket (F), then tighten screw (E) while holding limiting bracket (F) in its newly adjusted position with a second screwdriver *(Figure 5)*.
- Tension created by the checkspring has been factory adjusted. Adjustment was made by positioning checkspring tail into one of the notches carved in the back end of the checkspring bracket (F) to achieve a tension load on the thread of 13-17 grams.
- If this adjustment is incorrect, the checkspring can be readjusted. Changing the checkspring tail location will alter the checkspring tension.

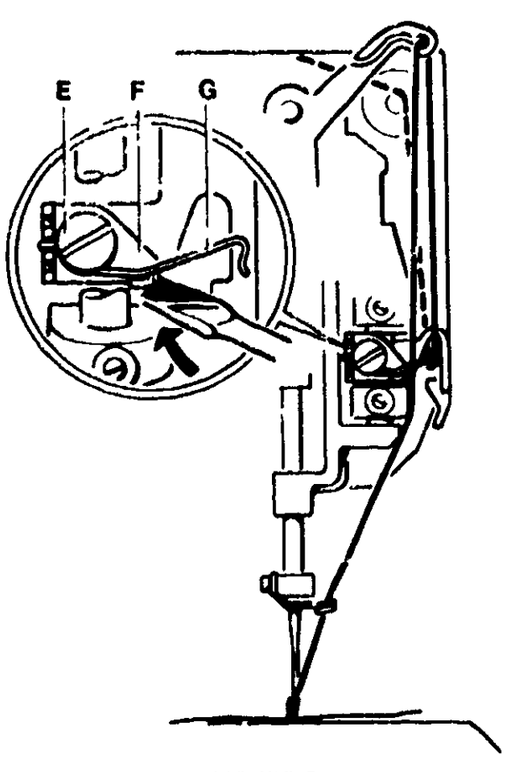


FIGURE 5

340.1991180
2C.1 TOP THREAD TENSION CONTROL

7. TENSION ASSEMBLY REPLACEMENT

To remove the tension assembly from the machine, first remove adjuster ring (H) *(Figure 6)* from the pivot rod of the needle bar holder. To do this, remove "E" clip (I) and then lift connecting rod (L) in order to gain access and loosen screws (M) and (N). Remove adjuster ring (H).

7.1 Removing Tension Assembly

- Lower presser foot.
- Rotate handwheel until take up lever is in its lowest position. Remove screw (A) *(Figure 6)* and remove lever (B).
- Remove screws (C) and (D). NOTE: It may be necessary to loosen screw E and rotate bracket (F) to remove screw (D) if checkspring (G) interferes with removal of screw (D).
- Push lower part of tension assembly in the direction indicated by arrow (1) in *Figure 6* and then rotate it as shown by arrow (2). This dual motion will facilitate removal.

7.2 Installing Tension Assembly

- To install, reverse procedure explained in preceding paragraph 7.1. It is suggested that you tighten screw (D) before screw (C).
- After installing tension assembly, place adjuster ring (H) back into position with the larger opening up. Tighten screw (N) and then tighten screw (M) from under connecting rod (L). Reinstall connecting rod (L) and check to see that needle bar holder moves freely but has no vertical play on shaft. Reinstall "E" clip (I).
- Reposition checkspring bracket (F) (see paragraph 5).
- Install lever (B) and tighten screw (A). Check tension disc specifications as described in paragraphs 1 and 3.

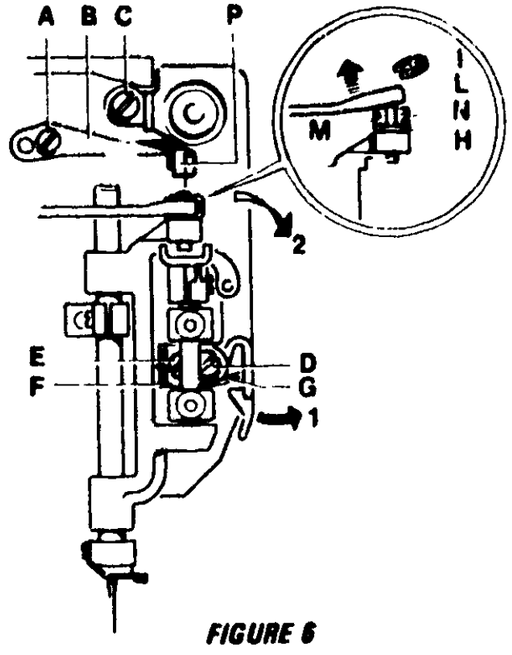


FIGURE 6

1 CHECKING ROTARY SHUTTLE HOOK ANGLE AND AXIAL POSITIONING

NOTE The following instructions should be followed whenever adjustments or repairs of machine were made that could have caused misadjustments in shuttle hook angle and axial positioning

- Rotate handwheel to bring needle to its highest position Remove needle presser foot needle plate, bobbin bobbin case and bobbin case holder To remove bobbin case holder, slide tab "R" *(Figure 9)* downward This will release the bobbin case holder retaining ring
- Remove bobbin case stop (A) *(Figure 8)* by removing screws (B)

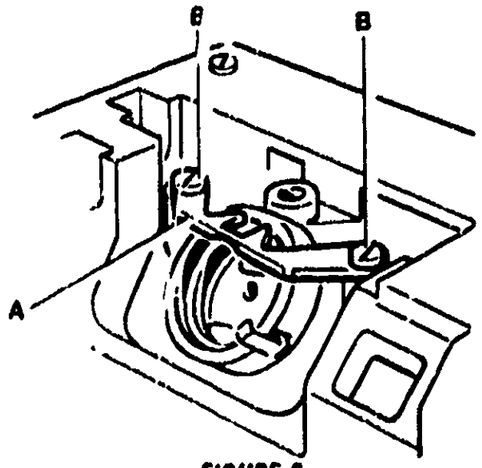


FIGURE 8

- Loosen screws (C) *(Figure 9)* and move crown gear (D) away from shuttle pinion gear (E)
- Loosen screws (F) and (G) *(Figure 9)* and pull shuttle hook assembly upward
- Reinstall needle plate and drop feed dogs

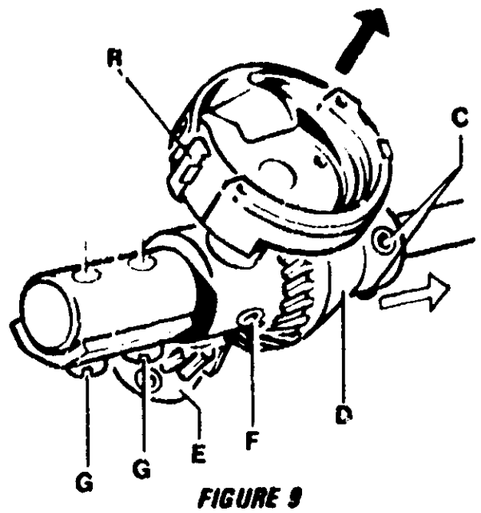


FIGURE 9

340.1991100
2C.2 NEEDLE AND SHUTTLE HOOK AREA

- Rotate shuttle hook by hand until the shuttle hook tip reaches its 12 o'clock position Insert gauge No 68935 firmly into the shuttle assembly *(Figure 10)* and position it so that upper sides (A) of gauge are parallel with the feed dog openings in needle plate (B)
- Lower the shuttle hook assembly and gauge together until the feet of the gauge's upper portion are all touching the needle plate and the lower portion of the gauge is maintaining the proper angle of the shuttle assembly (gauge must be evenly seated in shuttle race assembly)
- Tighten screws (F) and (G) securely Reinstall gauge and recheck shuttle position Remove the gauge and verify that the shuttle assembly rotates freely and smoothly
- Reposition crown gear (D) and tighten screws (C) securely *(Figure 9)* **CAUTION Gears should be snug but not so tight as to create a binding There should not be any up and down movement of the shuttle assembly**
- Reinstall gauge and recheck alignment to needle plate

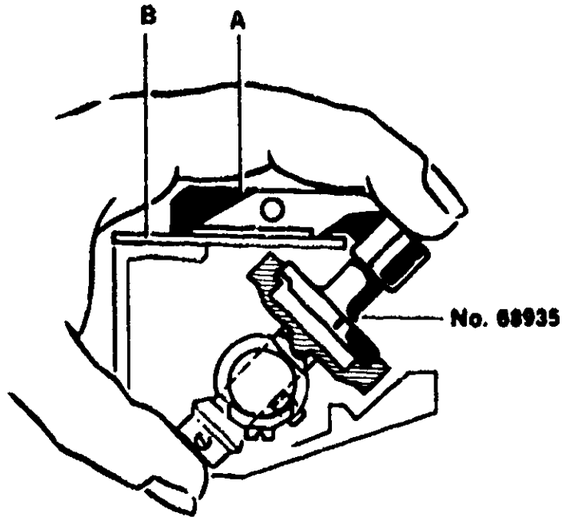


FIGURE 10

2C.2.1 NEEDLE TO SHUTTLE HOOK TIMING AND CLEARANCE

NOTE Before starting adjustments described in this Section check and if necessary adjust needle to needle plate centering refer to Section 2C.2.4

1 CHECKING NEEDLE-TO-SHUTTLE-HOOK TIMING

- Needle to shuttle hook timing is correct when the shuttle hook tip is directly behind the needle when the needle is centered for straight stitching and the needle is 0.1 inch (2.5 mm) above its lowest position
- To check position and alignment rotate handwheel to bring needle bar to its highest position Remove needle presser foot needle plate bobbin and bobbin case Remove bobbin case stop (A) *(Figure 8)* by removing screws (B)
- Insert gauge No 68936 into needle bar actuator to center needle bar as illustrated in *Figure 11* Attach gauge No 68933 to needle bar Turn handwheel to bring needle bar to its lowest position

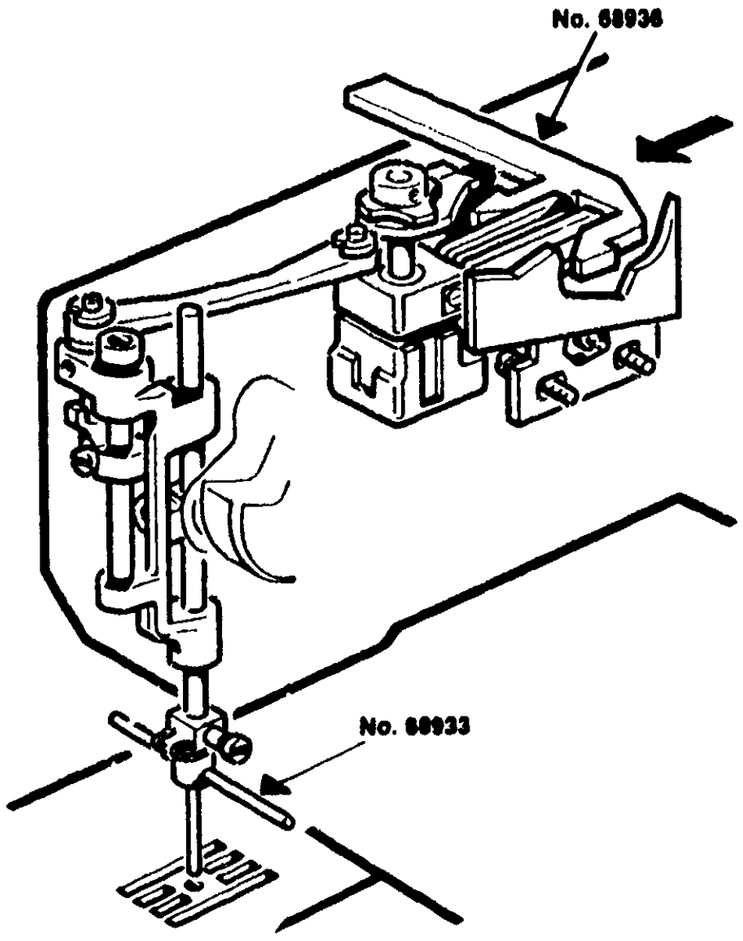


FIGURE 11

340.1991100

2C.2.1 NEEDLE TO SHUTTLE HOOK TIMING AND CLEARANCE

- Position gauge No 68932 on needle bar Place gauge No 68931 around needle bar and on top of gauge No 68932 and raise both gauges until they are tight against needle bar holder *(Figure 12)* Tighten knob on gauge No 68932 and remove forked gauge No 68931 Be sure the pulse motor centering tool No 68936 is securely in place

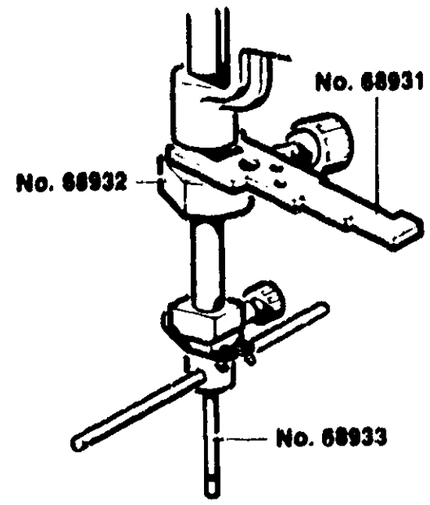


FIGURE 12

- By hand turn handwheel toward you until gauge No 68932 is raised and stops against the needle bar holder *(Figure 13)*

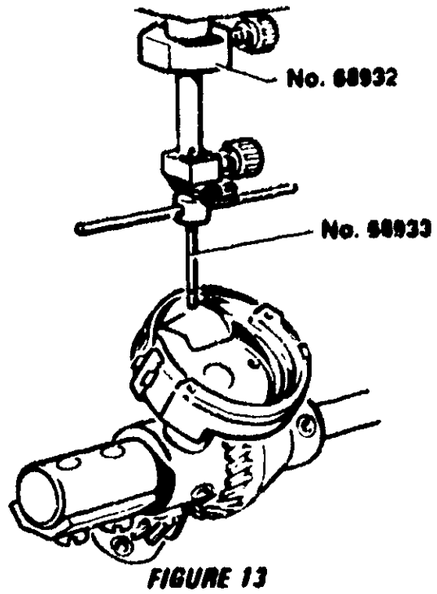


FIGURE 13

- The timing between needle and shuttle hook is correct if, with gauge No 68936 in place and having performed the steps described in paragraphs C, D and E, the shuttle hook tip is hidden by the thin lower caliber rod of No 68933 and cannot be seen while sitting in front of the machine *(Figures 13 and 14)*

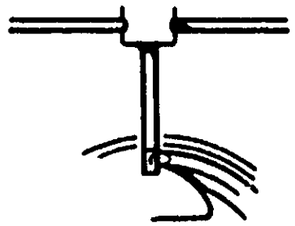


FIGURE 14

2 ADJUSTING NEEDLE TO SHUTTLE HOOK TIMING

If alignment described in paragraph above is not correct, make adjustment as follows

- Loosen screws (A) in crown gear (B) *(Figure 15)* Turn handwheel to raise gauge No 68932 until it stops against needle bar holder *(Figure 13)* Rotate shuttle hook manually, until shuttle hook tip is hidden behind thin caliber rod of gauge No 68933 Pulse motor centering tool No 68936 must be in place during this adjustment
- Reposition crown gear (B) and tighten screws (A) Recheck alignment as described in the last paragraph under number 1
- **CAUTION: Crown gear (B) and pinion gear (D) should be snug but not so tight as to create binding There should be no up and down movement of the shuttle assembly This adjustment is critical for smoothness of operation and noise level**
- Check clearance between needle and shuttle hook as explained in the following paragraph 3

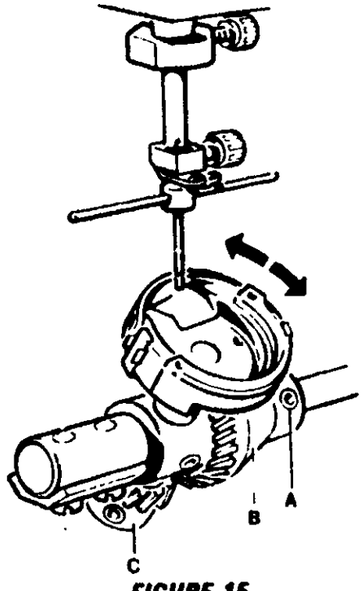


FIGURE 15

348.1991100
2C.2.1 NEEDLE TO SHUTTLE HOOK TIMING AND CLEARANCE

3 CHECKING NEEDLE-TO-SHUTTLE-HOOK CLEARANCE

With needle positioned for straight stitching, clearance of 004 008 inch (0 1 0 2 mm) between shuttle hook tip and back side of needle is acceptable, when measured with needle tip raised 112 inch (2 8 mm) from its lowest position

- To check needle-to-shuttle hook clearance position gauge No 68936 into needle bar actuator *(Figure 11)* Install a #14 needle
- Lower needle bar to its lowest position Position gauge No 68932 on needle bar Place gauge No 68931 around needle bar and on top of gauge No 68932 and raise both gauges until they are tight against needle bar holder *(Figure 12)* Tighten knob on gauge No 68932 and remove gauge No 68931 Turn handwheel manually until gauge No 68932 is tight against needle bar support
- Clearance between needle and hook is correct when with very light pressure on the needle (toward back of machine) the needle tip touches shuttle hook tip *(Figure 16)* Clearance should be 004 008 inch (0 1 0 2 mm)

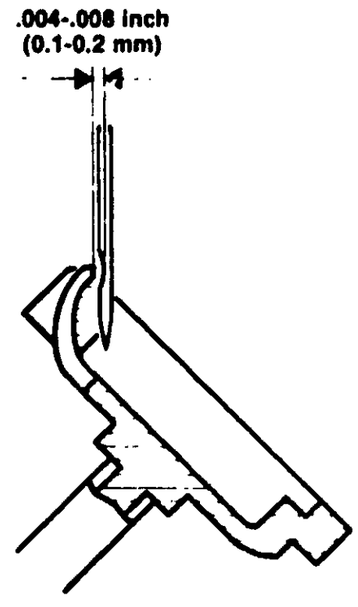


FIGURE 16

4 ADJUSTING NEEDLE-TO-HOOK CLEARANCE

- If clearance is not correct loosen screws (A) and rotate rest bushing (B) which supports the hook until the correct setting is obtained *(Figure 17)* Tighten screws (A) securely after adjustment

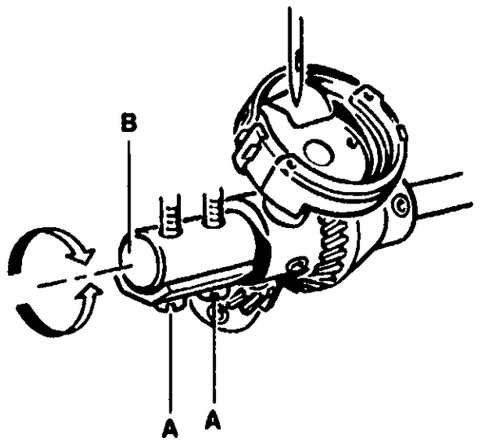


FIGURE 17

- Remove gauge No 68932 from needle bar Rotate handwheel toward you checking to see that shuttle hook tip does not hit needle If it does repeat adjustment as described in preceding paragraph
- Recheck shuttle hook needle timing as covered in paragraph 1 *Figures 13 and 14* Check and if necessary adjust needle bar height and needle bar orientation as described in following Section 2C 2 2

1. CHECKING NEEDLE BAR HEIGHT

NOTE Before proceeding with the steps described in this paragraph we suggest you verify and if necessary adjust centering width and zigzag timing (see Section 2C 2 5)

Set zigzag at maximum width with needle positioned all the way to the left Needle bar height is properly adjusted when needle, in its upward stroke from its lowest position has top of needle eye located 020 inch (.5 mm) below shuttle hook tip when the shuttle hook tip is directly behind the needle

- Remove needle presser foot needle plate bobbin case and bobbin case stop from the machine
- Install gauge No 68933 to needle bar *(Figure 18)*

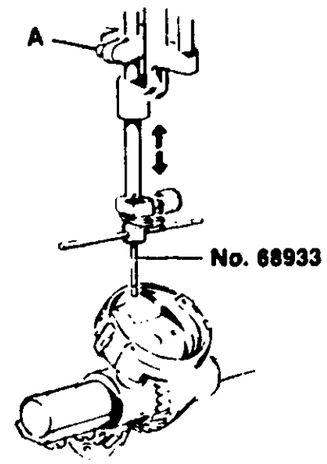


FIGURE 18

- Turn machine on Program stitch pattern 1 (left zigzag) and set zigzag width at zero mm
- Manually rotate handwheel toward you to assure that needle bar has moved to the left position Continue to rotate the handwheel until the needle has gone all the way down and is beginning to rise
- Needle bar height is correct when having performed the procedure indicated above tip of shuttle hook is hidden by the thin rod of gauge No 68933 and the very tip of the hook is at the same level as the groove on the gauge *(Figure 19)*

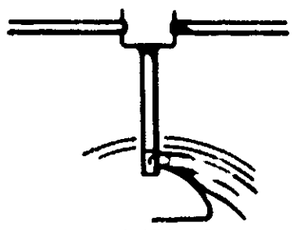


FIGURE 19

2 ADJUSTING NEEDLE BAR HEIGHT

- Loosen screw (A) *(Figure 18)* and adjust needle bar up or down to proper position Tighten screw (A) securely while holding needle bar in the proper orientation
- Check adjustment rotating handwheel

3 CHECKING NEEDLE BAR ORIENTATION

Needle bar orientation is within specification when right side bar of gauge No 68933 is between zero and 060 inch (1 5 mm) of parallel line with front edge of needle plate *See Figures 20 21 and 22*

- The 060 inches (1 5 mm) position will improve machine performance when using stretch threads *(Figures 21 and 22)* This 060 inch twist given to the needle bar will make it easier for the hook tip to pick up the thread loop
- In no case should the left hand rod (rather than the right rod) be closer to the plate edge *(Figure 22)*

4 ADJUSTING NEEDLE BAR ORIENTATION

- To adjust, loosen screw (A) *(Figure 20)* and rotate the needle bar as required for proper adjustment Be careful not to change needle bar height Tighten screw (A) securely Remove gauge and reinstall bobbin case needle needle plate presser foot and bobbin case stop
- Adjust the position of bobbin case stop Refer to Section 2C 2 3

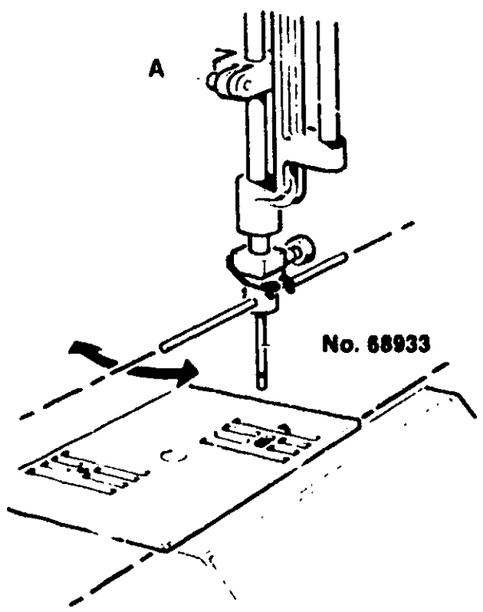


FIGURE 20

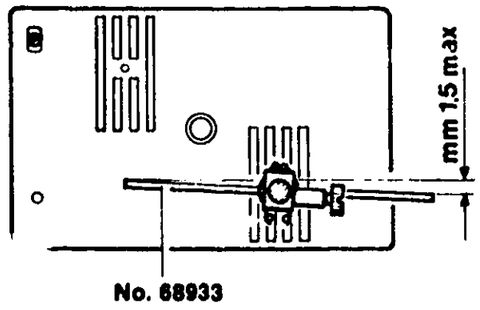


FIGURE 21

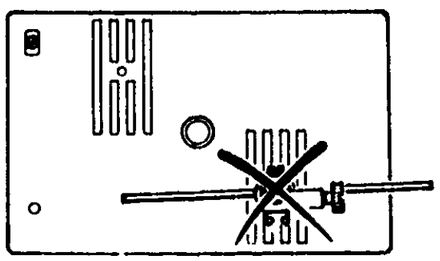


FIGURE 22

1. CHECKING THE CLEARANCE

- Clearance between the small stud protruding from upper portion of bobbin case holder and the bottom of slot in bobbin case stop must be 015 022 inch
- To check clearance, use wire feeler gauges *(Figure 24)* The 015 gauge should enter clearance and the 022 gauge should be too thick to enter

2 ADJUSTING CLEARANCE

Loosen screws (A) and adjust the stop position Tighten screws securely after adjustment

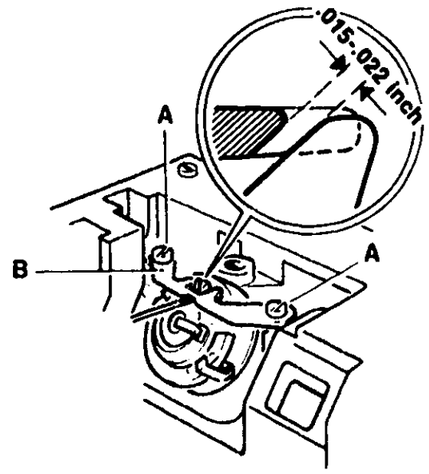


FIGURE 24

2C.2.4 NEEDLE POSITION AT STRAIGHT STITCHING

To obtain correct alignment both mechanical and electrical zero positions must be properly set

1 CHECKING MECHANICAL ZERO POSITION

- To verify set needle plate with straight stitch hole under needle
- Place gauge No 68936 into needle bar actuator *(Figure 25)*
- Remove needle and attach gauge No 68933 to needle bar as illustrated
- Rotate handwheel to slowly move needle bar down
- The mechanical zero position is correct if gauge rod penetrates the needle hole without touching hole edge

2 ADJUSTING MECHANICAL ZERO POSITION

- If needle is just slightly off center then simply loosen screw (B) *(Figure 25)* and turn eccentric screw (C) until needle is centered right and left Tighten screw (B) securely after adjustment
- If needle centering cannot be obtained with eccentric screw (C) slightly loosen screws (A) and move needle bar actuator toward front or back of machine until gauge rod centers in needle hole Tighten screws (A) securely after adjustment

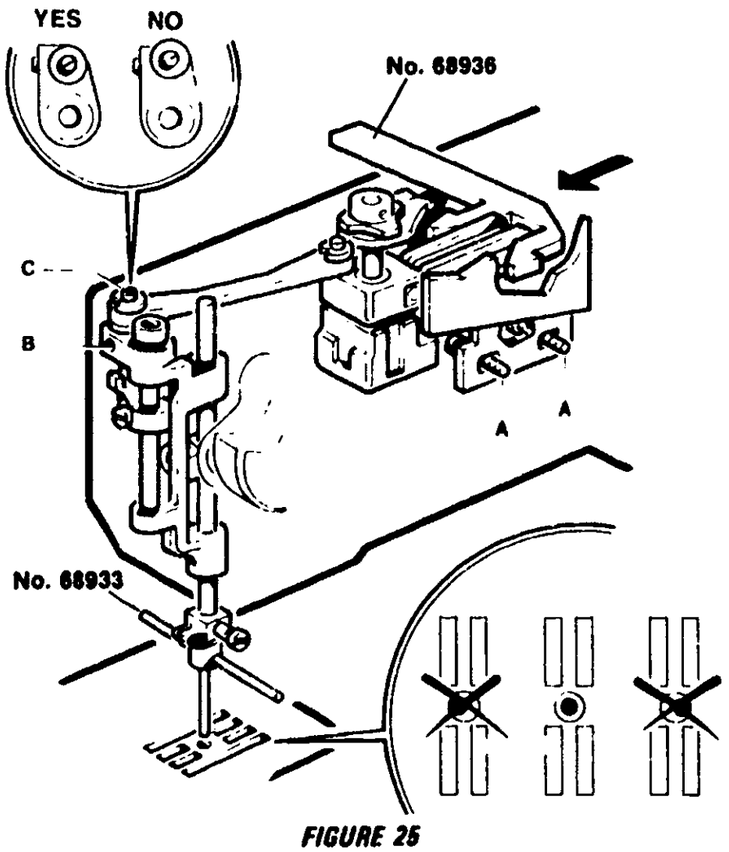


FIGURE 25

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2C.2.4 NEEDLE POSITION AT STRAIGHT STITCHING

- If adjustment is needed because needle is not centered front to back in needle hole adjust eccentric in needle plate screw (A) *(Figure 26)*

3 CHECKING ELECTRICAL ZERO POSITION

- Remove gauge from needle bar actuator
- Rotate handwheel to raise needle bar to upper position
- Turn machine "on" and program it for straight stitching
- Rotate handwheel to lower the needle bar
- The rod of gauge No 68933 should penetrate the straight stitch needle hole in the center and should not contact the needle plate

4. ADJUSTING THE ELECTRICAL ZERO POSITION

- If electrical centering is not correct as described above it will be necessary to adjust the potentiometer Refer to Section 2C 4 5

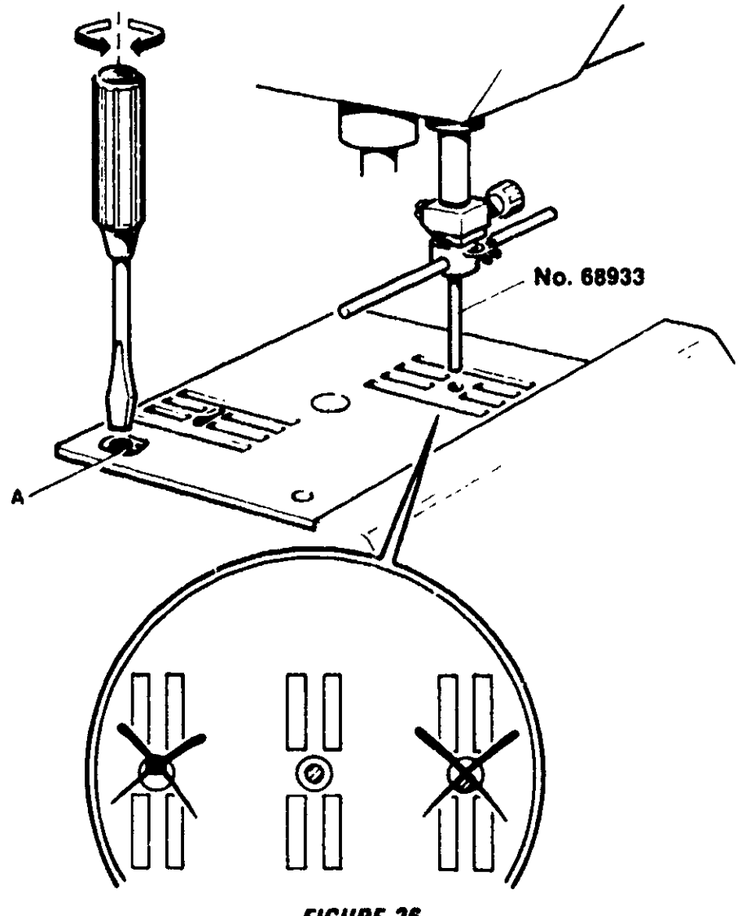

FIGURE 26

1 CHECKING ZIGZAG TIMING

- Zigzag timing is correct if needle starts its side motion when its tip is 340 inch (8 5 mm) above the needle plate This measurement is taken when the needle is being raised toward its upper position Check this measurement as follows
- Position needle plate for zigzag stitching
- Install a size 14 needle
- Turn the machine "on" and program it for zigzag stitching at maximum width
- Lower feed dogs
- Manually rotate the handwheel toward you at least one complete turn then stop with needle in upper position
- Place gauge No 68931 on needle plate Make sure that gauge is directly centered over zigzag needle hole as shown in *Figure 27a*
- Manually rotate handwheel toward you and observe that needle passes over the second step of the gauge without touching it *(Figure 27a)* Then, slide the gauge toward the front of the machine, so that the third step is positioned under the needle The side motion of the needle should cause the gauge to tip over when handwheel is being rotated *(Figure 27b)*

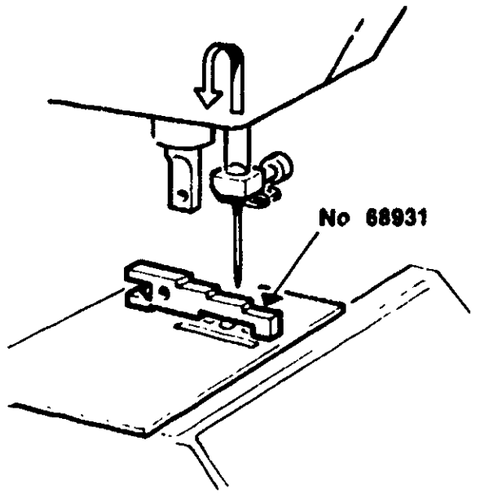

FIGURE 27a

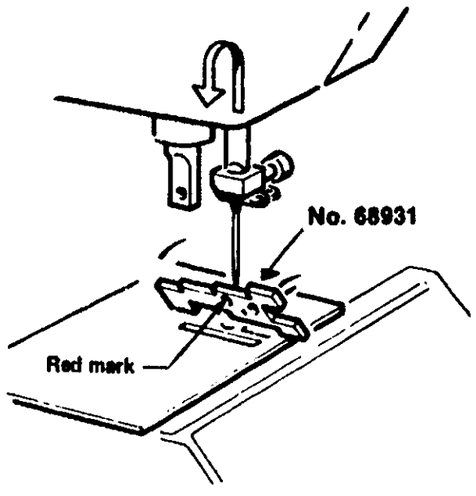

FIGURE 27b

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2C.2.5 CHECKING TIMING AND WIDTH OF ZIGZAG

2. ADJUSTING ZIGZAG TIMING

- To adjust, slightly loosen screw (A) of lever (B) on machine lower shaft (F) *(Figure 28)* Rotate lever (B) on the shaft to obtain the correct setting Recheck needle bite with gauge No 68931 When setting is correct, tighten screw (A) securely
- Remove gauge and turn off the machine
- Rotate handwheel and check the clearance between board and magnet (C) *(Figure 28)* The clearance should be 012 040 inch between magnet (C) and each of the two magnistors (D) and (E) Check this clearance with feeler gauges
- Recheck needle bite using gauge No 68931

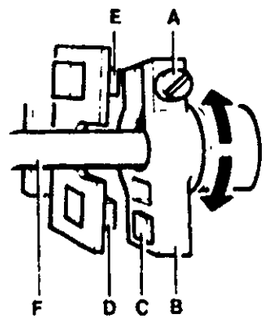

FIGURE 28

3. CHECKING ZIGZAG WIDTH

- Maximum zigzag width (8 0 on readout) should allow the needle a bite between 7 5 and 7 8 millimeters when operated manually with the handwheel
- To verify this position needle plate for zigzag stitching
- Install a number 14 needle
- Lower feed dogs
- Turn machine "on" and program for widest zigzag stitch
- Check needle bite clearance using gauge No 68931 *(Figure 27)*
- Manually rotate handwheel toward you through one complete zigzag cycle and observe needle bar holder (A) and pivot (B) *(Figure 29)* The clearances between pivot (B) and each of the limiting devices (C) must be equal Also limiter (C) must be 020 032 inches below holder (A) *(Figure 29)* Check clearances with feeler gauges
- If adjustment is required loosen screw (D) slightly and rotate limits After adjustment tighten screw (D) securely and recheck clearances

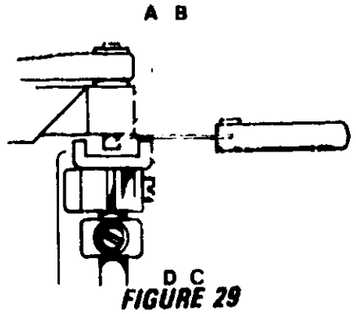

FIGURE 29

2C 2.5 CHECKING TIMING AND WIDTH OF ZIGZAG

- Place a firm piece of paper over needle plate. Manually rotate handwheel toward you through one complete zigzag cycle. Remove the paper and measure the distance between the two holes. The correct distance will be 7.5 7.8 mm *(Figure 30)*

4 ADJUSTING ZIGZAG WIDTH

If needle hole spacing is not correct, adjustment of potentiometer is needed. Refer to Section 2C 4.5

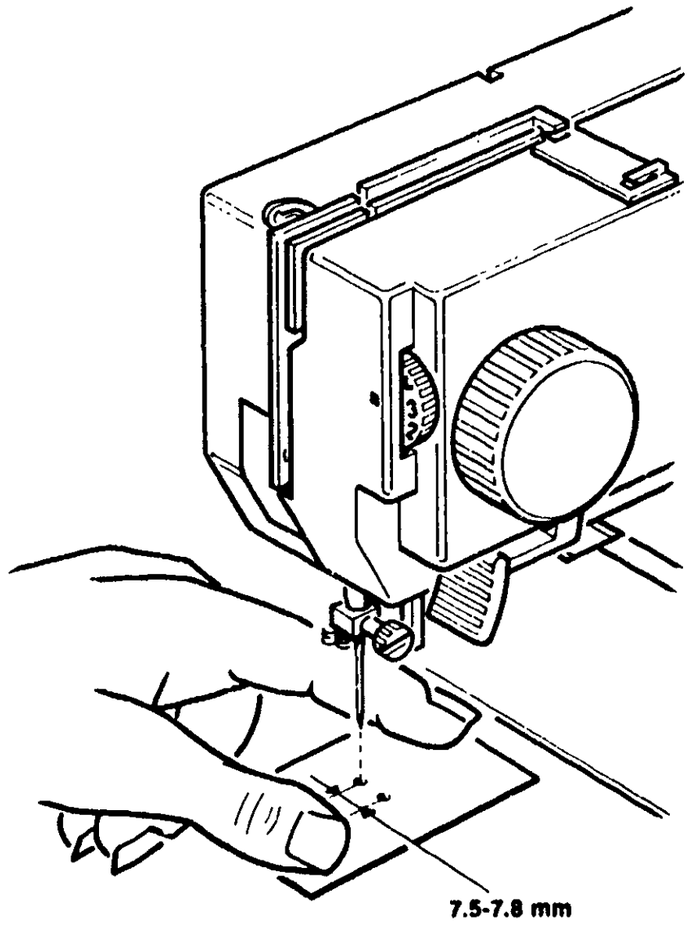

FIGURE 30

2C 2.6 NEEDLE BAR SUPPORT

1. REMOVING THE SUPPORT

- Remove "E" clips (A) *(Figure 31)* and remove connecting rod (B) off of pivots of actuator and needle bar support
- Loosen screws holding ring (C). Remove ring
- Loosen screw (D) of limiting device (E)
- Loosen screw (F) lower pivot (G), remove E clip (H) and slip out pivot (G)
- Remove needle bar support (I) from machine

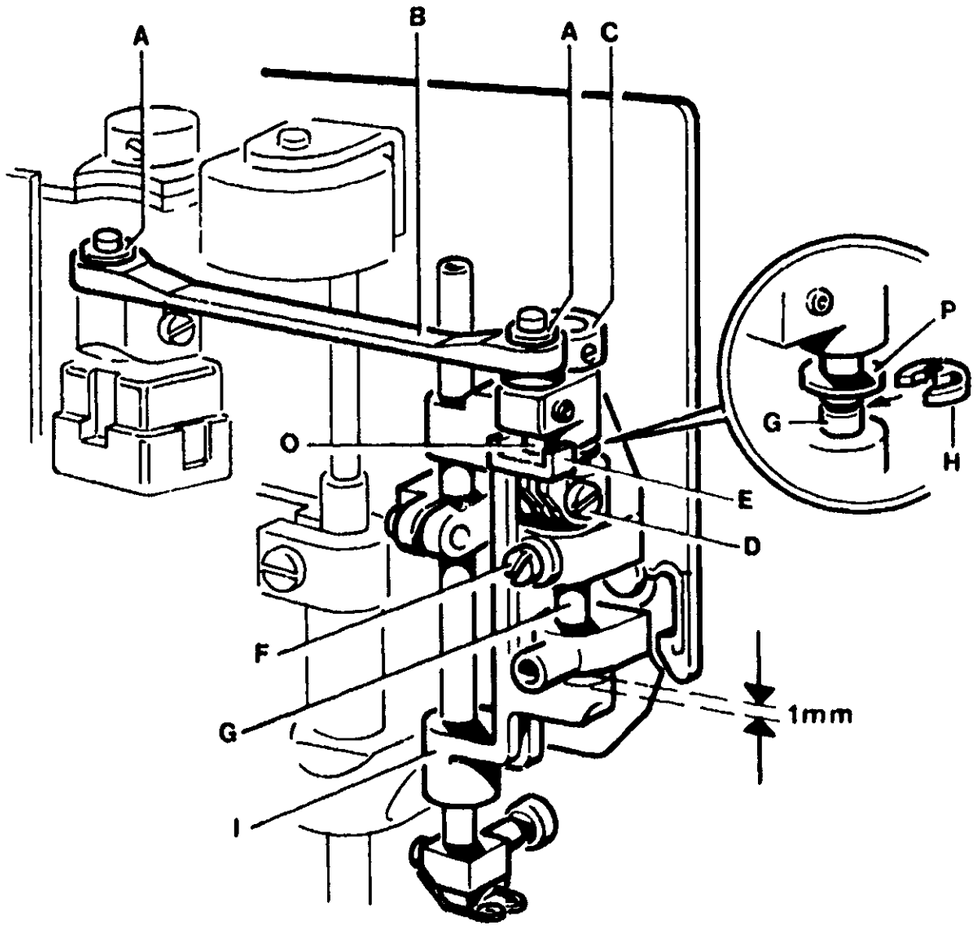

FIGURE 31

2 INSTALLING THE SUPPORT

- Manually turn handwheel until take up lever is at its highest position Insert pivot rod from block (L) *(Figure 32)* into the articulated joint (floating bushing) (M) in rod (N)

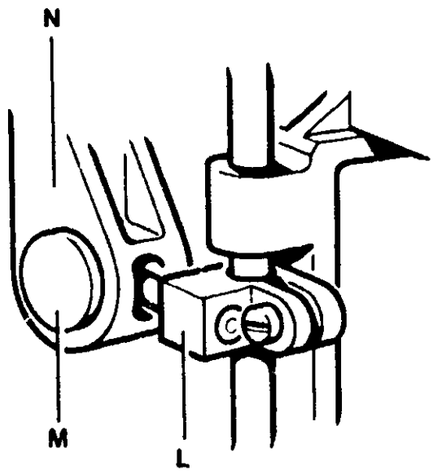

FIGURE 32

- Insert pivot (G) through the bottom of the needle bar support Before pivot reaches the highest portion of needle bar support locate the limiting device (E) Be sure that pivot (O) is between the two stops of the limiting device (E) Place elastic washer (P) on pivot (G)
- Reinstall 'E' clip (H) *(Figure 31)* into slot in pivot (G) Be sure that elastic washer (P) is above 'E' clip (H) While maintaining an upward pressure on the bottom of pivot (G), install the retainer ring (C)
- The wider opening of the ring should be up Tighten screws securely
- Clearance between bottom of needle bar support and mainframe section should be 040 (1 mm) inch *(Figure 31)* Check clearance with feeler gauge then tighten screw (F)
- Manually move needle bar support back and forth to be sure it operates smoothly and does not have any vertical play If vertical play exists, loosen screws holding retainer ring (C) adjust ring level and tighten screws securely
- Install connecting rod (B) as illustrated in *Figure 33a Figure 33b* shows connecting rod incorrectly installed Reinstall the 'E' clips (A) *(Figure 31)*

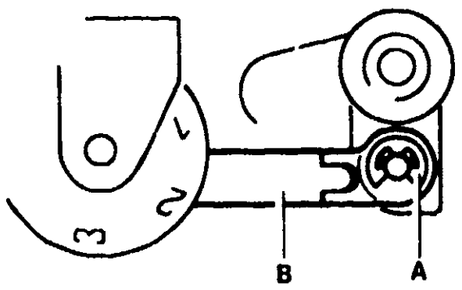

FIGURE 33a

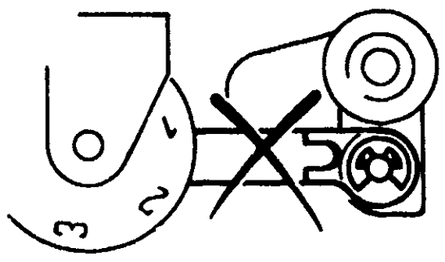

FIGURE 33b

340 1991180
2C 2 6 NEEDLE BAR SUPPORT

- Turn machine on and program it for maximum zigzag width Manually rotate handwheel toward you through one complete zigzag cycle while observing pivot (O) and limiting devices (E) The clearance between the pivot and each stop should be equal *(Figure 34)* Check the clearance between tip of both stops and needle bar support using feeler gauge The correct clearance will be 020 032 inch If adjustment is required loosen screw (D) and reposition limit device E *NOTE Be sure pivot does not hit or bind on limiting device 'E*

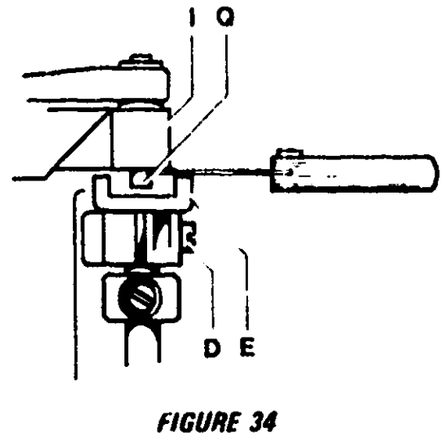

FIGURE 34

1 REMOVING THE SHUTTLE HOOK ASSEMBLY

- Remove needle presser foot needle plate and bobbin case holder
- Loosen screws (B) and remove bobbin case stop (A) *(Figure 36)*

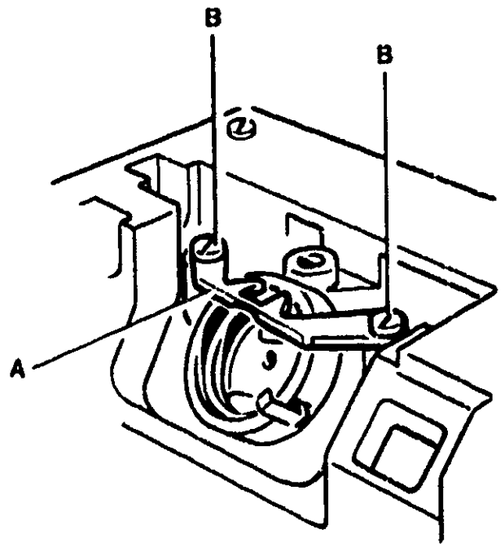

FIGURE 36

- Loosen screws (C) *(Figure 37)* and slide crown gear (D) away from shuttle hook pinion gear (E)
- Turn handwheel manually to bring take up lever to its lowest position
- Loosen screws (F) *(Figure 37)* and remove shuttle hook pinion gear (E) Loosen screws (G) slightly

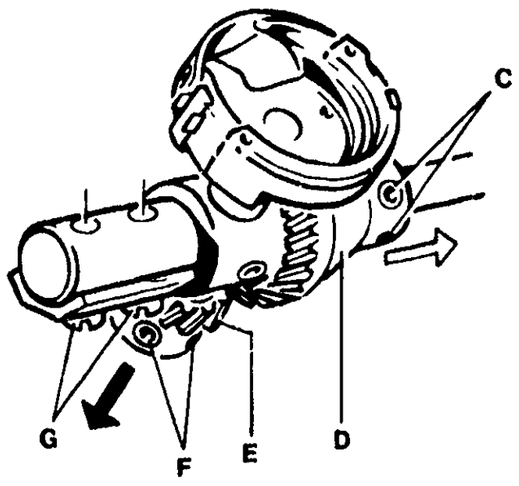

FIGURE 37

- Lift and push back feed dog bracket (H) *(Figure 38)* then remove shuttle hook

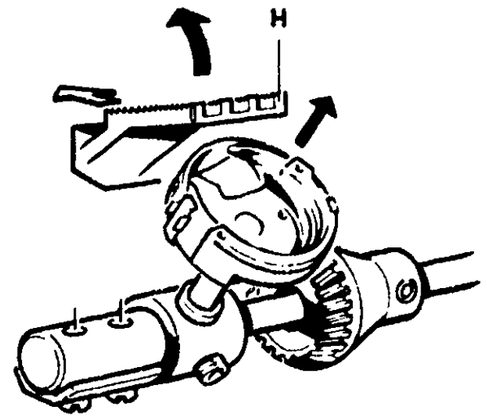

FIGURE 38

2. REMOVING THE SHUTTLE HOOK DRIVE BUSHING

After removing the shuttle assembly, the bushing can be removed by loosening screw (I) slightly and sliding out the shuttle hook drive bushing (L) *(Figure 39)*

3. REMOVING THE CROWN DRIVE GEAR

- Turn handwheel by hand to bring take up lever to its lowest position
- Remove screws (G) *(Figure 39)* remove bracket (M) and slide bushing holder (N) off of lower shaft

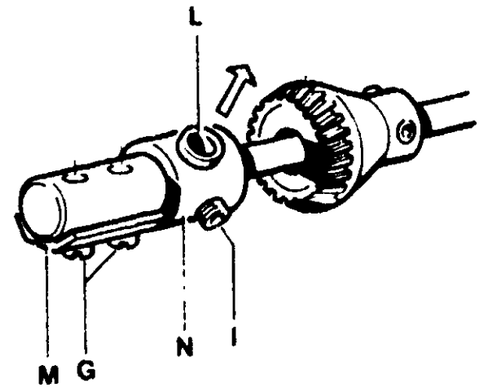

FIGURE 39

● Carefully pull lower shaft (O) downward. Watch for sector block (P) which may come out of guide (R). Remove crown gear (D). *(Figure 40)*

4 INSTALLING CROWN GEAR

● Holding lower shaft (O), slide on the crown gear (D), then bushing holder (N). *(Figure 41)*

● Verify that block (P) is properly located in guide (R) and reposition lower shaft into its mounting position. *(Figure 40)*

● Position bracket (M). *(Figure 39)* and loosely install screws (G).

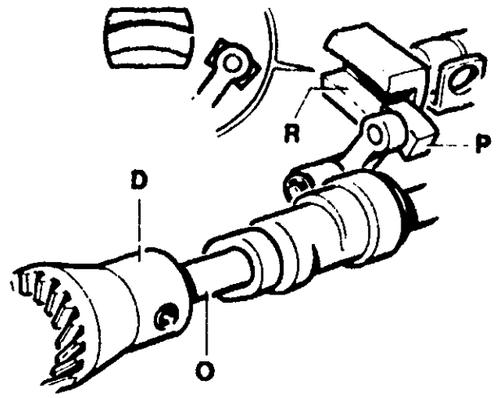

FIGURE 40

5 INSTALLING HOOK BUSHING

Install shuttle hook bushing (L) *(Figure 41)* into bushing holder (N). Bushing should be positioned so that its beveled end (S) enters the top of the bushing holder and protrudes from the bottom of the holder, and its flat side (T) is facing crown gear (D). *(Figure 41)*. Only the beveled end (S) of the bushing should protrude below the holder. Tighten screw (I).

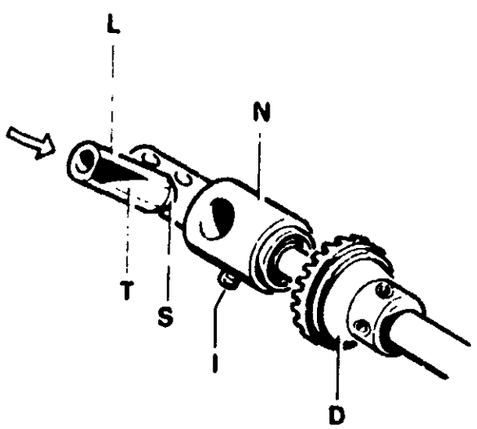

FIGURE 41

340 1991188
2C 2 7 REPLACING THE SHUTTLE HOOK AND RELATED GEARS

6 INSTALLING THE SHUTTLE HOOK

● Verify that the take up lever is still in its lowest position. Lift and push backward on the feed dogs (H). *(Figure 42)*. Slip shuttle hook into its bushing and apply pinion gear (E) to the end of shuttle hook shaft. Press pinion gear and shuttle hook firmly together as shown in *Figure 43*. Be sure that one of the two screws (F) is located over the flat side of the shuttle hook shaft. Keeping firm pressure with your fingers on the shuttle hook and pinion gear, tighten screws (F) securely.

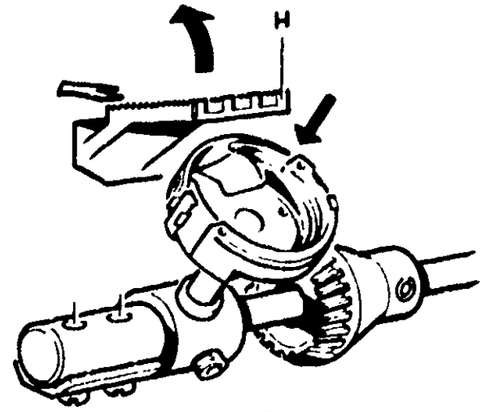

FIGURE 42

● Turn shuttle hook by hand to be sure that it turns freely and does not have any vertical play. Tighten screws (G). *(Figure 43)*.

● Turn machine 'on.' While machine is running lightly and repeatedly hit machine lower shaft with screwdriver handle to help self aligning bushings adjust themselves.

● Switch machine off. Check that the shuttle hook angle is set correctly. Check shuttle hook and positioning. Check needle timing to shuttle hook. Refer to Section 2C 2.

● Install bobbin case stop. Refer to Section 2C 2 3.

● Install needle plate and needle.

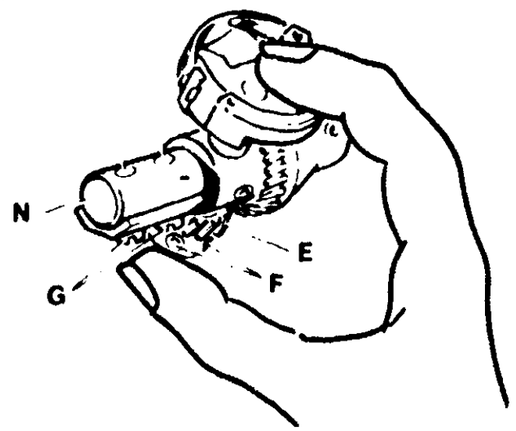

FIGURE 43

2C 3 FEED MECHANISM

2C 3 1 NEEDLE TIMING TO FEED

1 CHECKING NEEDLE TIMING TO FEED

- Needle timing to feed is correct when, after having moved the needle bar to its lowest position, you can verify both of the following conditions
- FIRST CONDITION— The tip (A) impressed on toothed wheel (B) *(Figure 44)* pegged to machine lower shaft (D) must be facing support (C) which protrudes from mainframe
- SECOND CONDITION— The protruding eccentric portion of feed eccentric (E) must be oriented in the same direction as tip (A) (They must be oriented opposite of operator.) *(Figure 44)*

2 ADJUSTING NEEDLE TIMING TO FEED

- If the first of these two conditions cannot be verified, it means that the cinematic mechanism linking the needle bar to the lower shaft motions is out of timing. This may have happened if the cogged belt connecting upper and lower shafts and/or cogged belt connecting upper shaft and needle bar unit had been removed and improperly installed (for belt to pulley timing, refer to Section 2C 4 4)
- If the second condition cannot be verified, it means that feed eccentric (E) *(Figure 44)* was removed from lower shaft (D) and later installed with the wrong orientation (that is, turned 180 degrees). To properly reposition feed eccentric, loosen screw (F) slightly, rotate feed eccentric 180 degrees and tighten screw (F) securely.

NOTE Be sure to recheck both conditions expressed in paragraph 1.

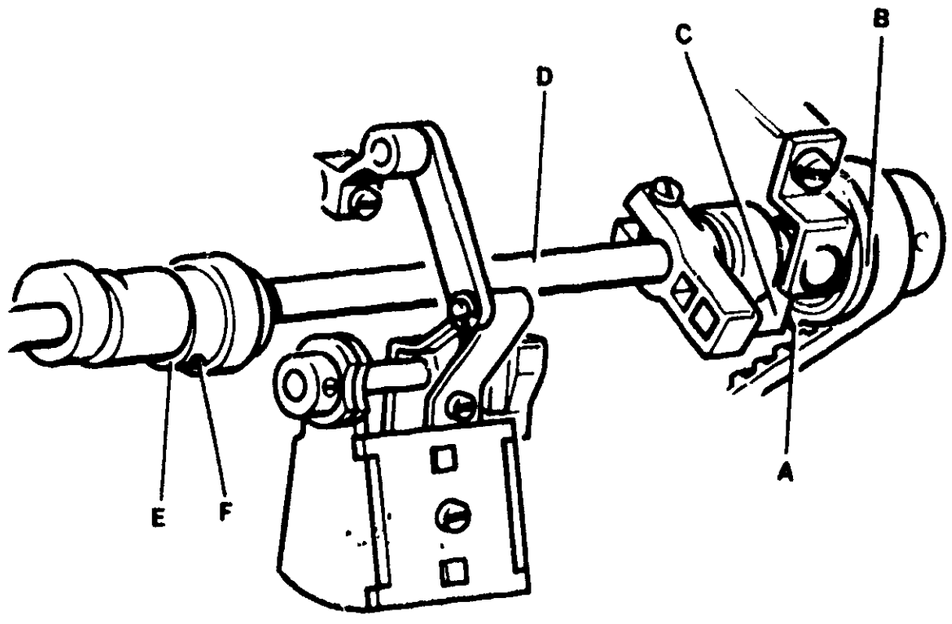

FIGURE 44

2C.3.2 FEED DOGS CENTERING AND HEIGHT

1 CHECXING FEED DOGS CENTERING

- Feed dogs are correctly positioned when the clearance between the edges of needle plate windows and the feed dogs is at least .002 inch (.05 mm).
- To check clearance, remove needle and presser foot.
- Turn handwheel by hand to bring feed dogs to their highest position above the needle plate.
- Check to see that the .002 inch (.05 mm) blade of the feeler gauge can be inserted between each side of feed dogs and the facing needle plate edge *(Figure 45)*.

2 ADJUSTING FEED DOGS CENTERING

Loosen both screws (A) slightly and adjust position of feed shaft pins (B) together with feed holder (C). Be sure not to leave any play between feed holder and feed shaft pins. Tighten screws (A) securely after adjustment.

3 CHECKING FEED DOG HEIGHT

- With feed dogs raised to the highest position, the tips of feed dog teeth should be .036 inch (.9 mm) above needle plate level.
- Switch machine 'on' and program it for straight stitching at maximum stitch length.

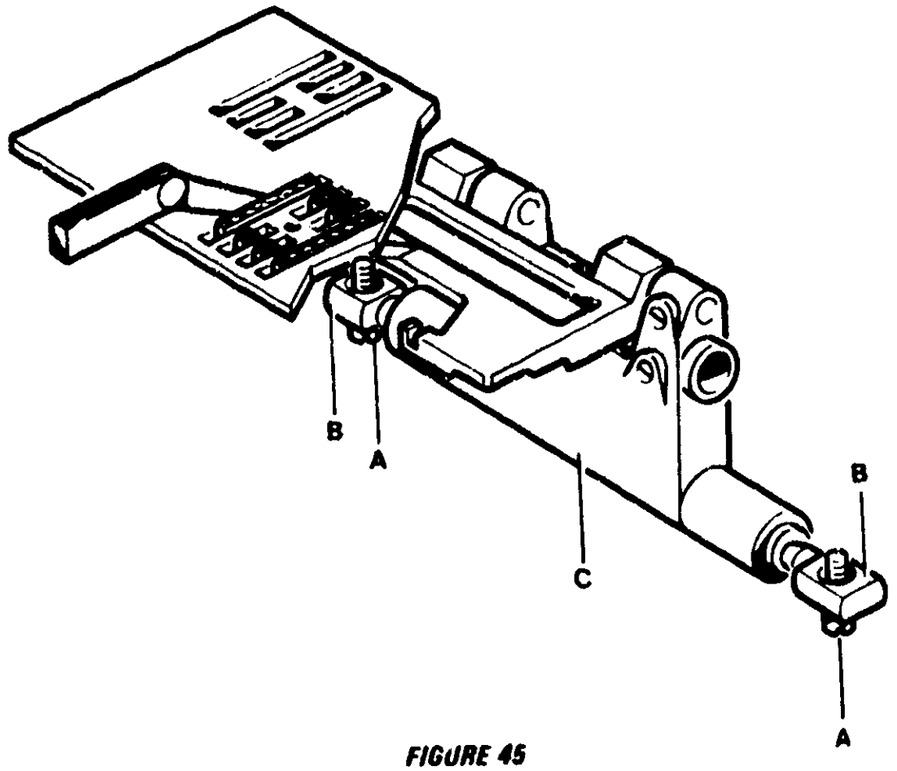

FIGURE 45

- Place gauge No. 68931 across feed dog opening as shown in *Figure 46* with red mark right above feed dog teeth *(Figure 46a)*. Manually rotate handwheel toward you. The feed dog teeth should lift the gauge.
- Slide gauge so that red mark is beyond feed dog teeth *(Figure 46b)*. Turn handwheel again. The teeth should not lift the gauge.

4. ADJUSTING FEED DOG HEIGHT

- Loosen screw (A) slightly *(Figure 46)* and adjust eccentric pivot (B) located in the feed lifting lever. When test described in preceding paragraph 3 can be successfully performed, tighten screw (A) securely.
- Repeat test again. Turn machine off and install presser foot and needle.

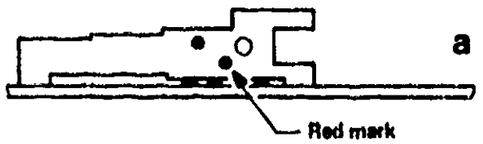

FIGURE 46a

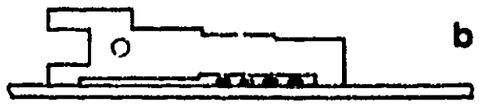

FIGURE 46b

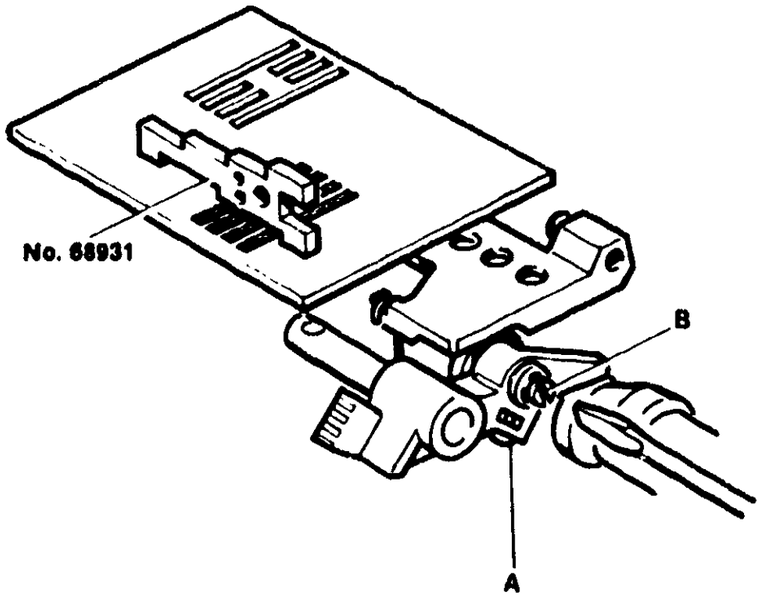

FIGURE 46

Zero feed positioning is properly set when the feeding mechanism causes a lifting motion only, without any feeding at all. For the correct zero feed positioning, both mechanical and electrical zero positions must be properly set.

1. CHECKING MECHANICAL ZERO POSITION

- Place one thickness of fabric (with a series of parallel lines drawn) under the presser foot *(Figure 47)*.

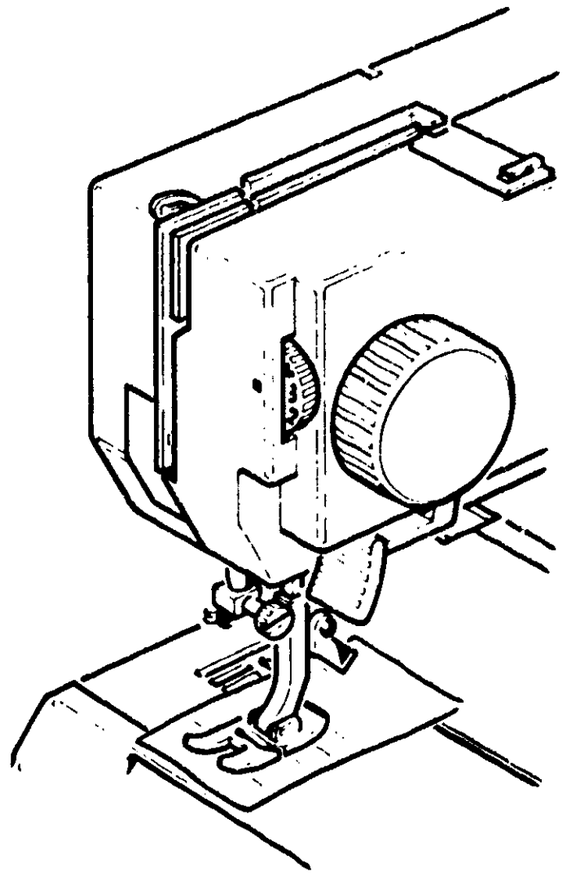

FIGURE 47

- Attach gauge No 68936 to feed actuator *(Figure 48)*
- Manually rotate handwheel several turns and watch the lines drawn on the fabric They should not move

2 ADJUSTING MECHANICAL ZERO POSITION

- Attach gauge No 68936 to feed actuator
- Loosen screw (A) slightly and rotate block sector guide (B) until zero feed is obtained *(Figure 48)* Tighten screw (A) Remove gauge from feed actuator

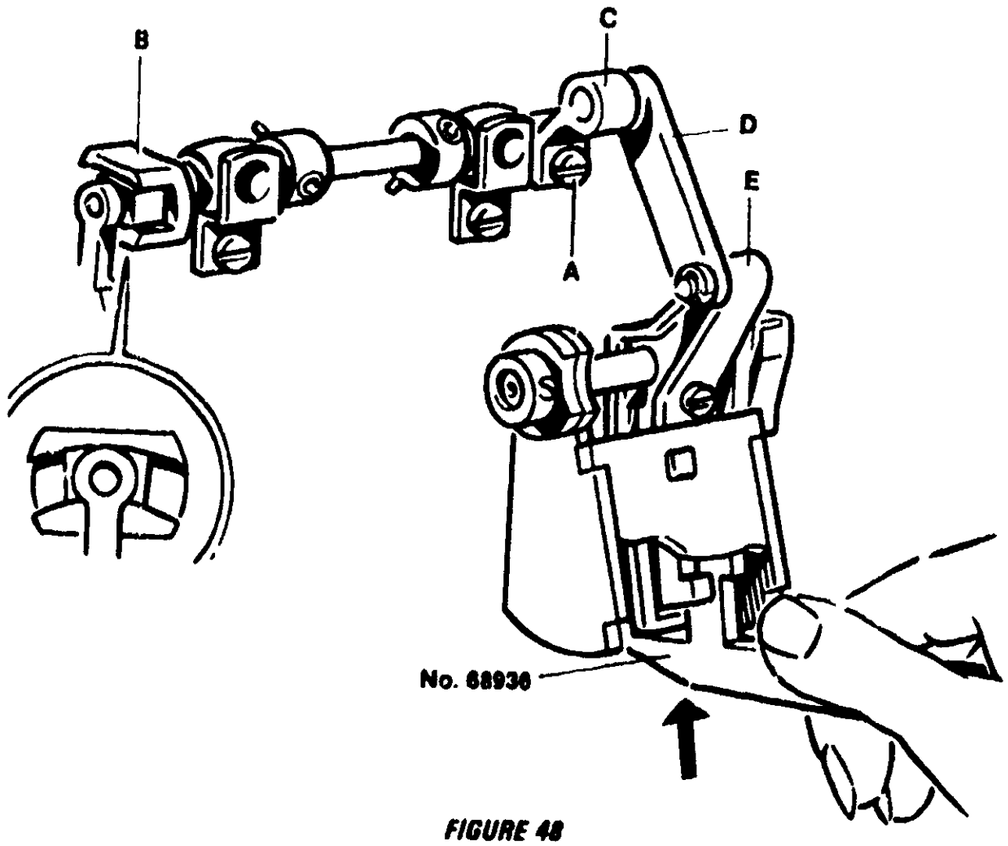

FIGURE 48

- Loosen screws (C) and (F) slightly from retaining rings (D) and (G) *(Figure 49)*
- Move the actuator lever (X) toward top of machine Insert a cardboard shim .020 .032 inch (.5 .8 mm) into opening in actuator *(Figure 49)*
- Move actuator lever (X) toward bottom of machine until actuator coil rests against shim Place .004 inch feeler gauge blade between block sector (M) and lever (N) Move shaft to right or left until the correct clearance exists between block sector (M) and lever (N)
- With actuator coil held snugly against cardboard shim rotate retaining ring (D) until its stop stud (E) touches rib on machine frame
- Push retaining ring (D) against bushing (O) and tighten screw (C) securely Recheck .004 inch clearance block sector (M) and lever (N)
- Move cardboard shim to opposite end of opening and move actuator lever (X) until coil rests against shim
- Position retaining ring (G) so that stop stud (H) touches rib on machine frame and is tight against bushing (P) Tighten screw (F) securely Recheck .004 inch clearance between lever (N) and block sector (M)
- Recheck actuator coil clearance Place cardboard shim in the actuator openings and move actuator lever (X) The limit studs (E) and (H) should limit the actuator coil movement Coil must not hit actuator housing Check the movement of actuator lever (X) and verify that it can smoothly operate the feed mechanism

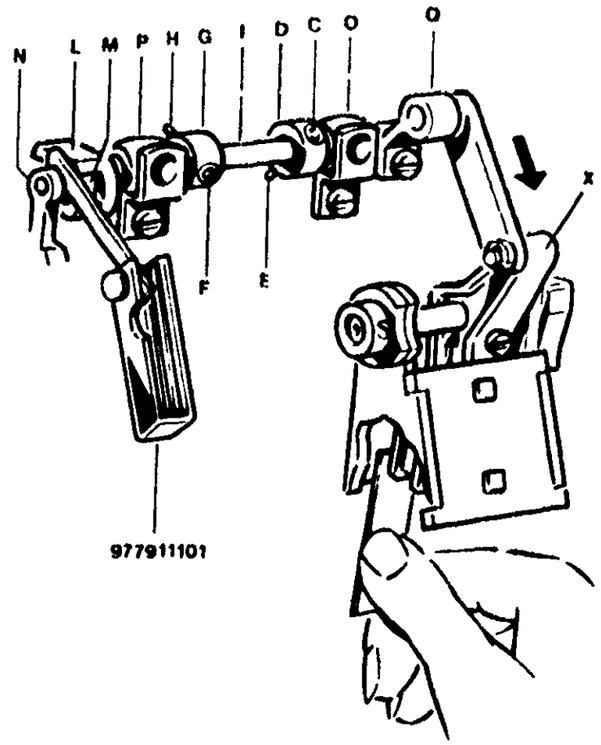

FIGURE 49

2C 3 3 ZERO FEED POSITIONING, STITCH LENGTH

3 CHECKING ELECTRICAL ZERO POSITION

- Place one thickness of fabric (with a series of parallel lines drawn) under the presser foot *(Figure 47)*
- Turn machine on Program machine for straight stitching with zero stitch length
- Set speed selector to low speed
- Run the machine watching the parallel lines drawn on the fabric They should not move

4 ADJUSTING ELECTRICAL ZERO POSITION

- If electrical zero feed is incorrect (fabric moving) adjustment of potentiometer is required Refer to Section 2C 4 5

5 CHECKING STITCH LENGTH

- Stitch must be of the same length as indicated on the keyboard display
- Check feed dog height Refer to Section 2C 3 2
- Install size 14 needle
- Set presser foot control knob to position 3
- Thread machine with cotton wrapped polyester thread
- Check and if necessary adjust upper and lower tensions
- Place two layers of fabric under the presser foot
- Turn machine on" Enter straight stitching program
- Set stitch length at 4 0 mm
- Set speed selector lever for low speed Run machine
- Measure ten stitches in the middle of the seam eleven holes *(Figure 50)* The measurement should be 1 44 1 60 inches (36 40 mm)

6 ADJUSTING STITCH LENGTH

If stitch length is not correct adjustment of potentiometer is required Refer to Section 2C 4 5

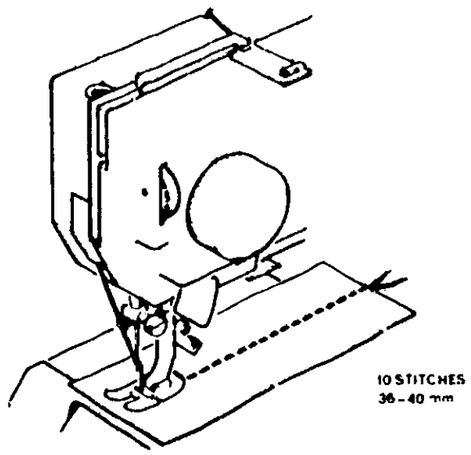

FIGURE 50

2C 3 4 REPAIRING FEED LIFTING LEVER (FEED DOG DROP)

- Check to see that feed lifting lever (A) holds firmly in position whenever it is engaged or disengaged *(Figure 51)*
- Check to see that spring (B) is being correctly installed into notch (C) and snaps into recess (D) whenever feed unit is disengaged
- Replace spring (B) if damaged or weak

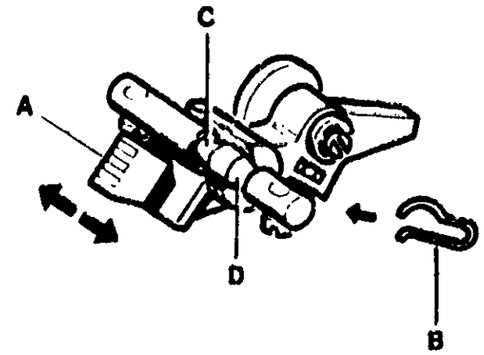

FIGURE 51

1 CHECKING CORRECT THREAD WINDING

- Bobbin is properly wound when the thread fills the bobbin evenly
- A properly filled bobbin will have a cylindrical shape (even) and stop winding when the thread is approximately .080 inch (2 mm) inside the outer diameter of the bobbin disc

2 ADJUSTING BOBBIN WINDING AND FILL

- If bobbin does not wind evenly loosen screw (B) slightly and adjust tension unit (A) upward or downward as necessary *(Figure 52)* Tighten screw (B) securely
- If bobbin fill is incorrect loosen screw (D) slightly and adjust position of eccentric (C) with slight partial rotation Tighten screw (D) securely

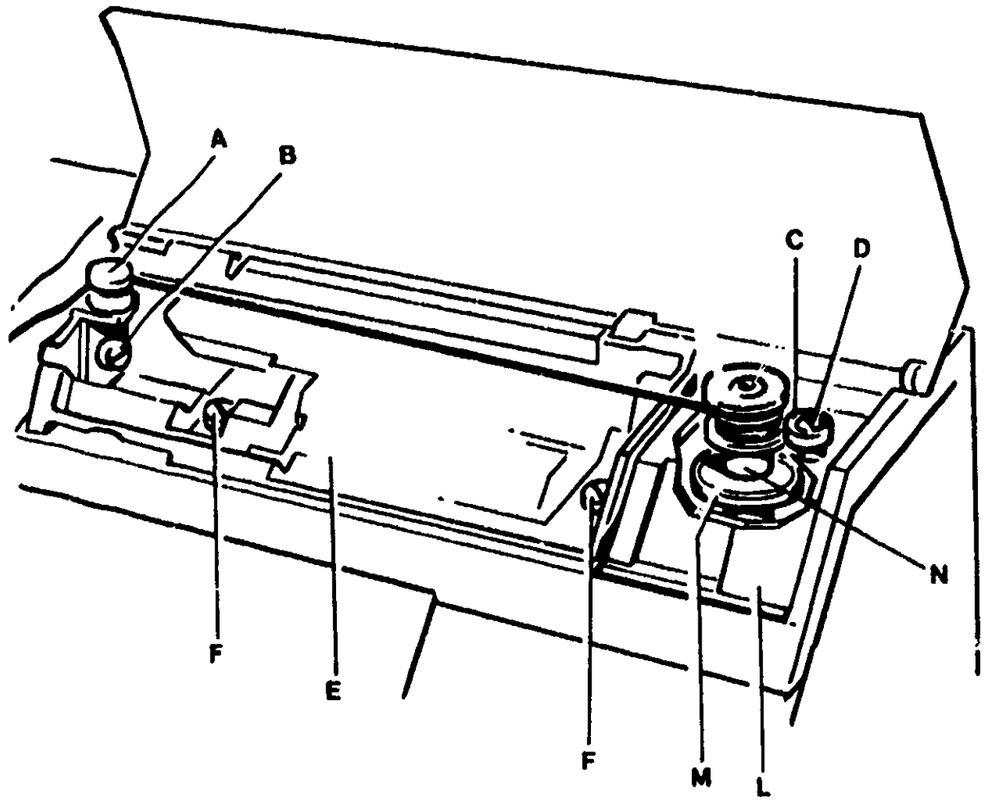

FIGURE 52

340.1931100
2C.4 MISCELLANEOUS
2C.4.1 BOBBIN WINDER

3 CHECKING BOBBIN WINDER AND WINDER CLUTCH

- When winder is engaged motor will drive only the winder The rest of machine will remain inoperative
- When bobbin winder lever is in the disengaged position motor motion is transmitted only to machine sewing parts Bobbin winder will not operate
- Be sure the winder shank rotates smoothly and does not jump or bounce
- If winder does not operate smoothly check the condition of rubber friction ring (F) *(Figure 52)* Remove screw (D) and stopping knob (C) *(Figure 52)* Lift off bobbin winder cover plate (L) Bobbin winder ring is now accessible Refer to paragraph 4 below if bobbin winder assembly requires repair
- If winder does not engage or disengage properly as described above check condition of connecting spring (E) located in the clutch unit *(Figure 56)* To check the spring it is necessary to remove machine upper shaft and clutch unit

4. REMOVING MACHINE UPPER SHAFT WITH BOBBIN WINDER ASSEMBLY

- Loosen motor mounting screws (A) slightly *(Figure 53)* Raise motor (B) and remove drive belt (C)
- Loosen screws (D) slightly to reduce tension on timing belt (F)

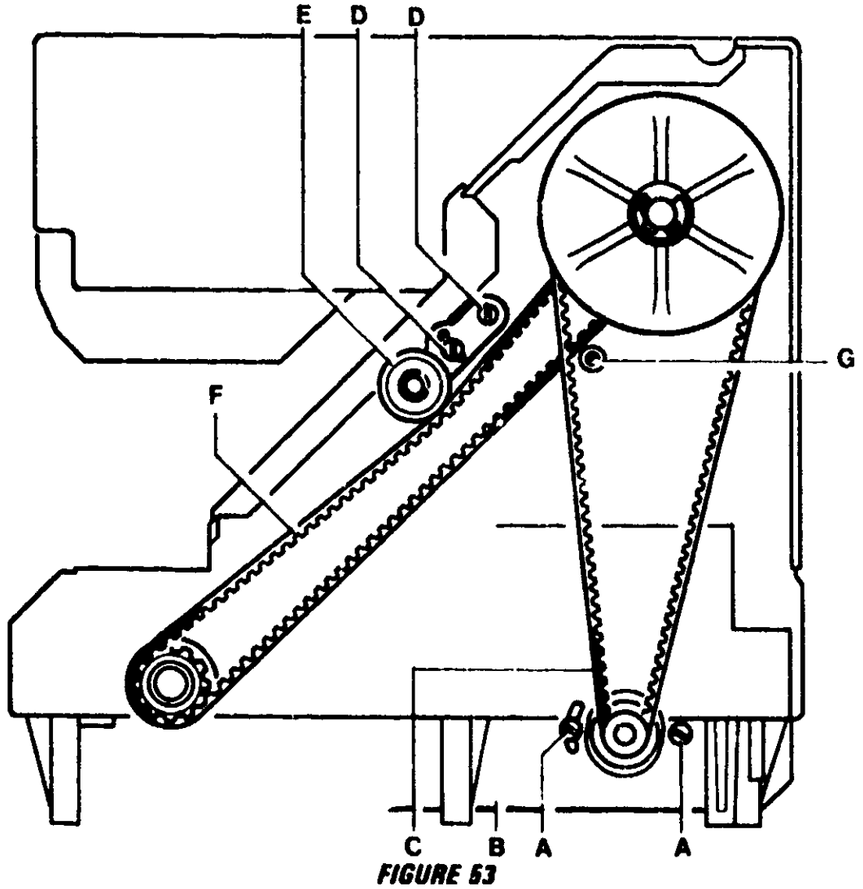

FIGURE 53

2C.4.1 BOBBIN WINDER AND CLUTCH

- Working on left side of machine *(Figure 54)* remove screws (A) and remove upper shaft support (B) Slip timing belt (C) off its upper shaft toothed pulley

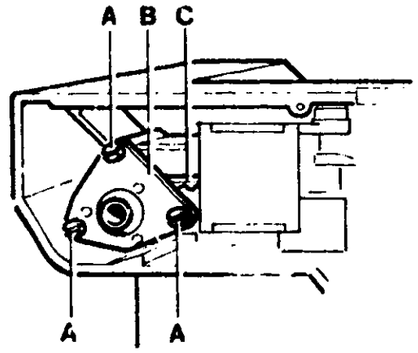

FIGURE 54

- Working on the right side of machine *(Figure 55)* remove screws (A) to remove support (C) from mainframe Slip timing belt off lower shaft toothed pulley and pull out upper shaft (B) complete with bobbin winder clutch and cogged belt

5 REMOVING MACHINE CLUTCH UNIT

- Loosen screws (E) slightly *(Figure 55)* and slide retaining ring (D) and support (C) away from clutch unit

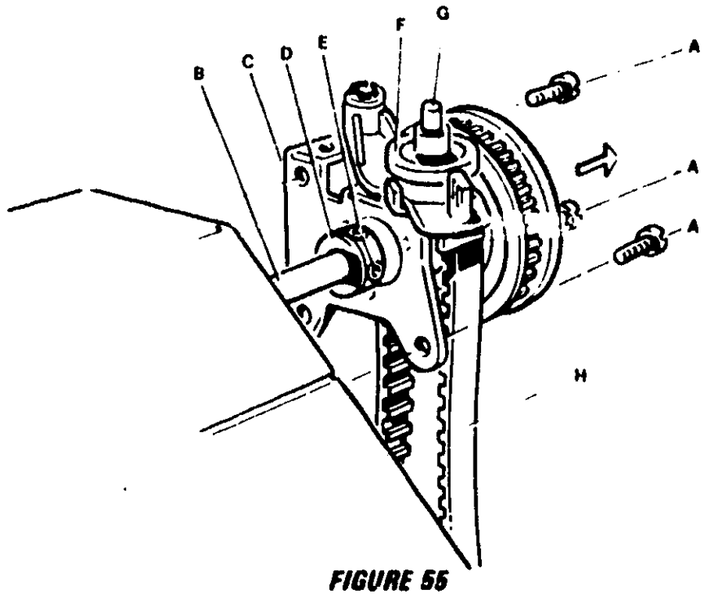

FIGURE 55

340.1991180
2C.4 MISCELLANEOUS

2C.4.1 BOBBIN WINDER AND CLUTCH

- Remove the four screws (A) *(Figure 56)* Slide the flange (B) the toothed ring (C) and spring (E) along the main shaft away from pu...

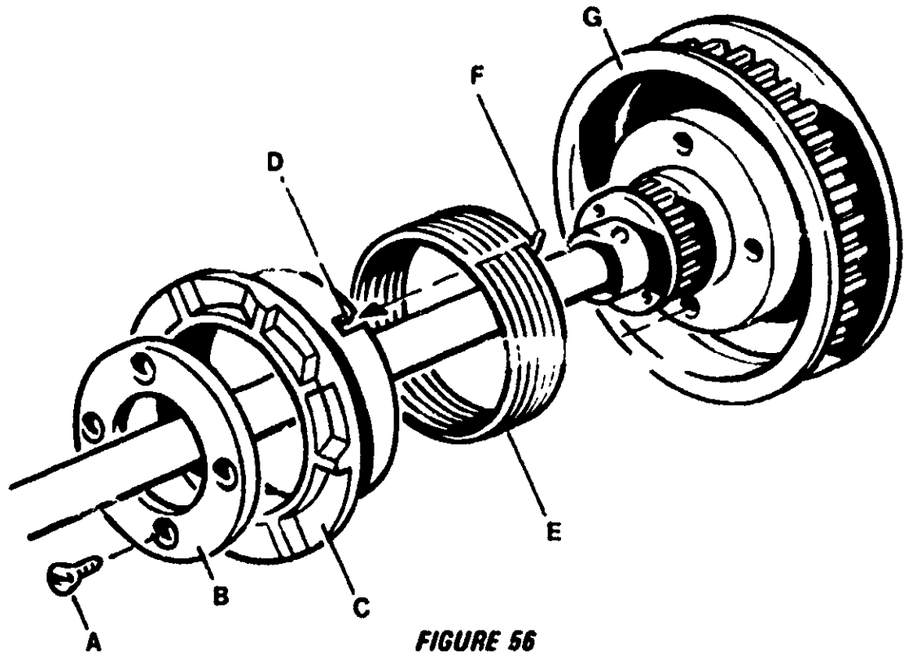

FIGURE 56

- Check the condition of spring (E) and its hooked end (F) Replace if needed To replace spring remove E' clip (L) *(Figure 57)* Slip off toothed pulley (H) and remove spring (E) by slipping it around pulley (G)

6 RE-ASSEMBLING MACHINE CLUTCH UNIT

- Ensure hook (F) and spring (E) are installed as shown in *Figure 56*
- Reinstall toothed pulley (H) and E clip (L) *(Figure 57)*

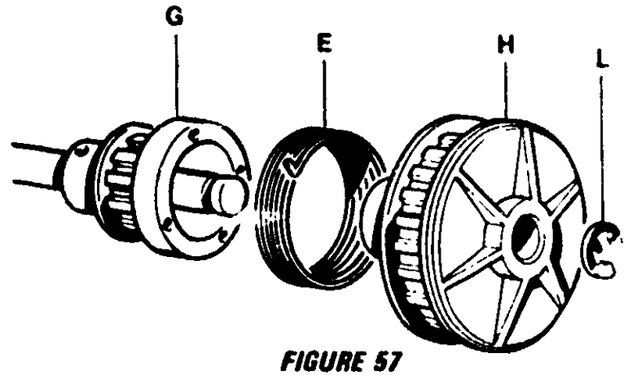

FIGURE 57

2C 4 1 BOBBIN WINDER AND CLUTCH

- To reinstall spring (E) *(Figure 58)* wrap some of its coils around pulley (G) so that a screwdriver blade will guide all spring coils around toothed wheel (H) inner sleeve

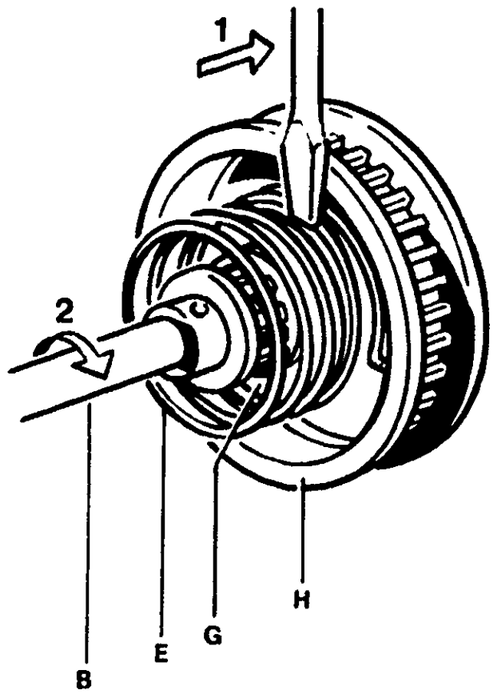

FIGURE 58

- Install toothed ring (C) *(Figure 56)* and rotate it until spring hook end (F) enters slot (D) Install flange (B) and tighten the four screws (A) securely
- Slide support (C) *(Figure 55)* against toothed pulley and position retaining ring (D) against bushing in support (C) Tighten screws (E) securely Be sure that support (C) has no side to side movement

7 INSTALLING MACHINE UPPER SHAFT

- To reinstall upper shaft reverse the disassembly procedure Be sure that timing belt (F) is located above stud (G) *(Figure 53)*
- Before tightening screws (A) securely *(Figure 55)* make sure that the right side support (C) of upper shaft is positioned so that the bobbin winder shaft (G) is correctly located in the corresponding slot of the bobbin winder cover plate
- After installing timing belt needle timing to feed must be checked For needle timing to feed and proper tension of belts (F) and (C) *(Figure 53)* refer to Section 2C 4 4
- Switch machine on and let it run for a while to allow the self adjusting bushing to set into proper position Operation may be accelerated by repeatedly knocking (lightly) the upper mainshaft with an aluminum or brass bar To do so remove accessory tray (E) by loosening screws (F) *(Figure 52)* Upper shaft may then be reached through a shroud hole

1 CHECKING THE BUTTONHOLE FOOT

- Check foot before installing it on the machine Be sure that sole (A) slides smoothly along its guide and lever (B) swings without any jump *(Figure 59)*
- Be sure that springs have the right tension to reposition both sole (A) and lever (B) properly
- If buttonhole foot does not function as described above it should be replaced

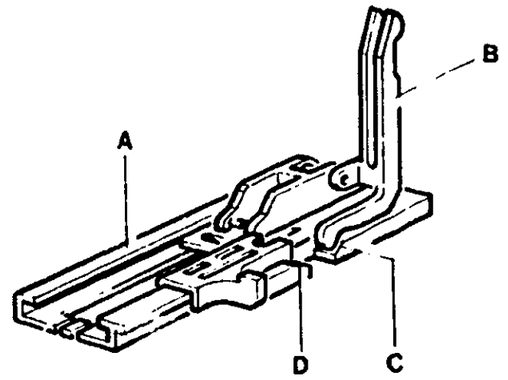

FIGURE 59

- Install buttonhole foot and make sure that sole slant allows lever (B) to be properly positioned in front of lever (E) *(Figure 60)*

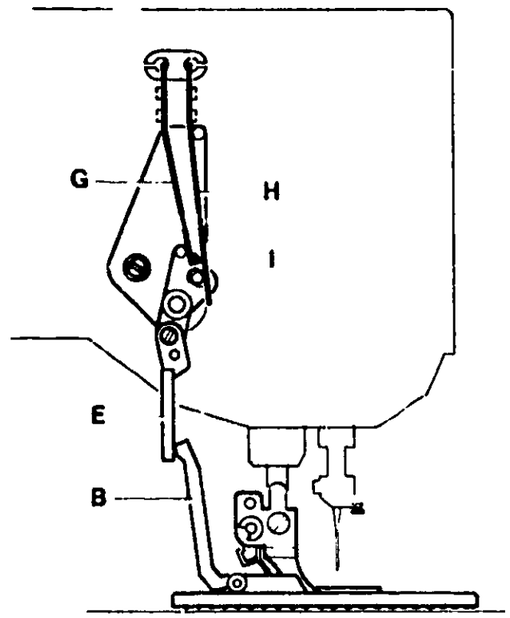

FIGURE 60

- When the sole (A) is moved so that lever (B) is between slants (C) and (D) *(Figure 59)* lever (B) should not be putting any pressure on lever (E) which allows the commutator bar (G) to move away from commutator bar (H) *(Figure 61)*
- There must be a .020 inch (.5 mm) clearance between lever (B) and lever (E) Use feeler gauge to check clearance

2 ADJUSTING BUTTONHOLE FOOT

- If buttonhole foot does not function as described above it should be replaced
- If the clearances described above are not met loosen screw (F) and adjust lever (E) *(Figure 61)* Tighten screw (F) and recheck

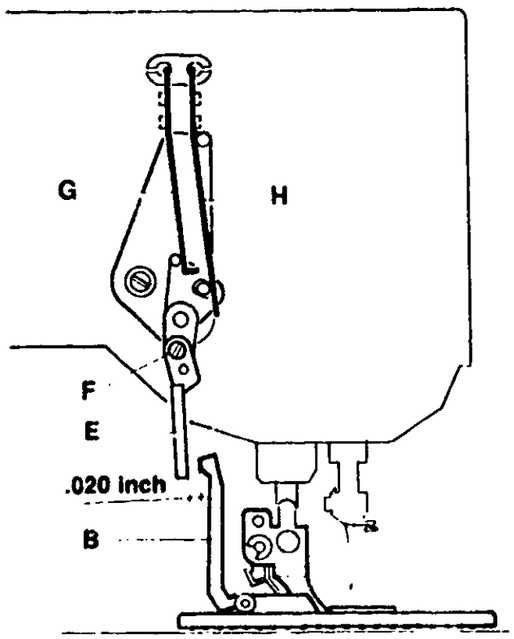

FIGURE 61

1 CHECKING PRESSER FOOT HEIGHT

- When presser foot is raised clearance between its sole and needle plate should be 0 3 inch (7 5 mm)
- To check above requirement disengage feed dog
- Manually rotate handwheel toward you to raise needle bar to its highest position
- Raise presser foot using lever (A) *(Figure 63)* and remove needle and presser foot
- Attach gauge No 68934 to needle bar *(Figure 62)*
- If clearance is correct it should be possible to insert only the lowest of the four steps of gauge No 68931 between the sole of gauge No 68934 and the needle plate

2. ADJUSTING PRESSER FOOT HEIGHT

- If clearance is too low, raise presser foot further by pushing down more on presser foot lever (A) Place gauges as illustrated in *Figure 62*
- Loosen screw (D) slightly and slide the presser bar guide (C) up or down until it touches cam (B) *(Figure 62)* Be careful not to allow the presser bar to rotate tighten screw (D) securely
- Recheck presser foot height then remove gauges

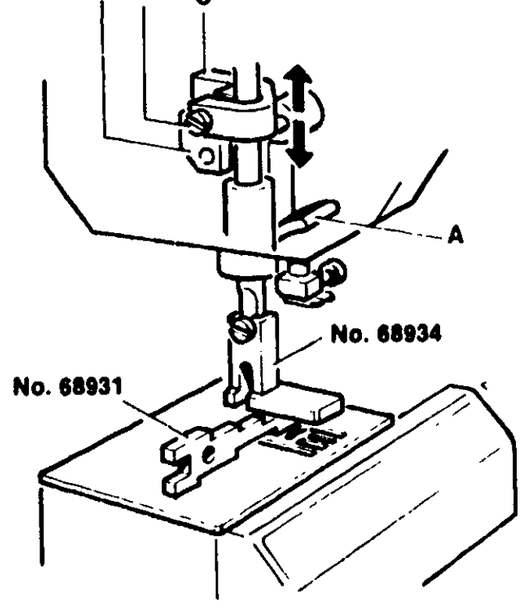

FIGURE 62

3 PRESSER FOOT ANGULAR POSITION

- Presser foot angular position is correct when the sole of presser foot is perfectly aligned with feed dog openings in the needle plate
- To check disengage (drop) th feed dogs Attach gauge No 68934 to presser foot bar Lower bar and visually check alignment of gauge sides with feed dog openings

4 ADJUSTING ANGULAR POSITION

- Loosen screw (D) slightly *(Figure 63)* and adjust orientation of presser foot bar until proper alignment is achieved Be careful not to allow presser foot bar (C) to move vertically Tighten screw (D) securely
- Remove gauge install presser foot and needle Engage feed dogs

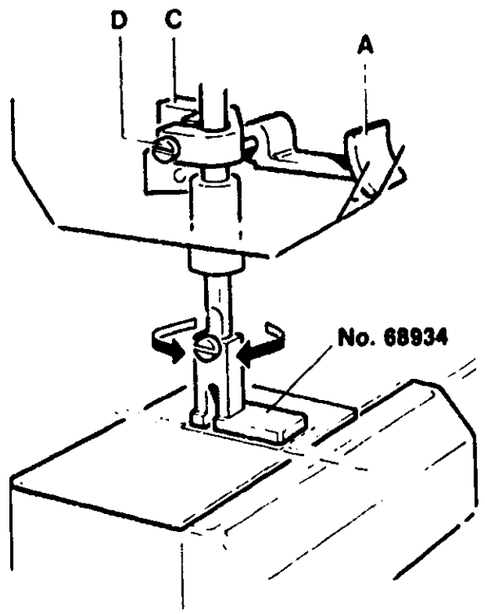

FIGURE 63

1 COGGED DRIVE BELT

- Removing the cogged drive belt

  Loosen screws (A) and move motor and bracket (B) upward *(Figure 64)*

  Remove belt (C) first slipping it off the toothed motor wheel and then off the mainshaft toothed wheel

- Installing cogged drive belt

  Place belt (C) over mainshaft toothed wheel *(Figure 64)* Move motor and bracket (B) upward and place belt around motor toothed wheel Lower motor bracket and tighten screws (A) securely

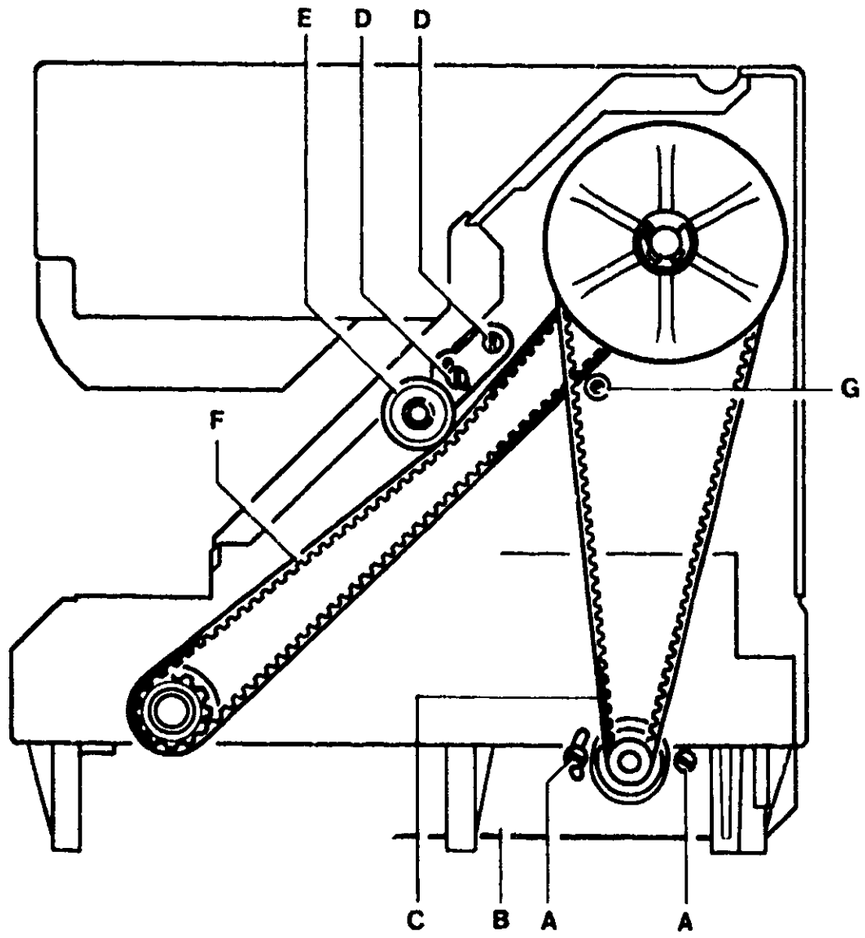

FIGURE 64

Check belt tension Proper adjustment will allow the belt to be pushed inward for about 240 inch (6 mm) with light finger pressure *(Figure 65)* If tension is incorrect, loosen screws (A) and move motor unit (B) upward or downward

NOTE When belts are too tight the machine gets stiff and bearings overheat When belts are too loose machine gets noisy

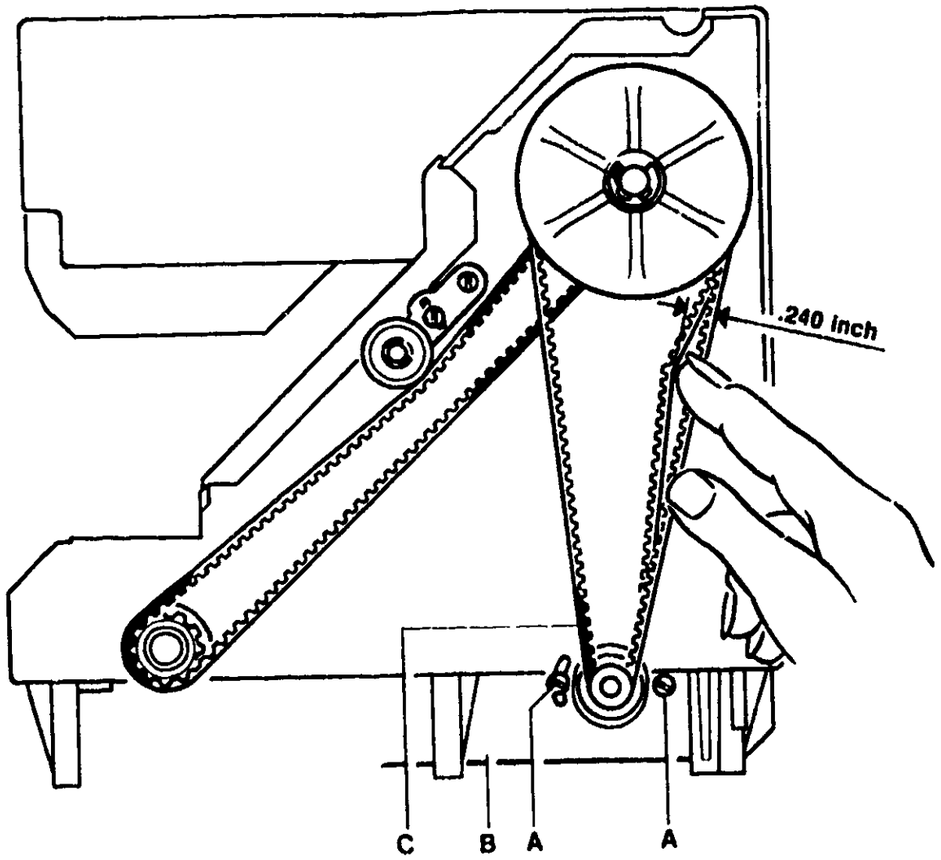

FIGURE 65

340.1991180
2C.4 4 REPLACING THE BELTS

2 **UPPER TO LOWER SHAFT TIMING BELT**

- Removing upper to lower shaft timing belt

  Remove drive belt (C) as explained in preceding paragraph Loosen screws (D) and move tension pulley (E) upward *(Figure 64)*

  Remove belt (F) from lower shaft toothed wheel

  Slip belt (F) *(Figure 66)* between upper shaft toothed wheel (G) and bobbin winder and remove it

- Installing upper to lower shaft timing belt

  Place belt (F) over upper shaft (G) toothed wheel Slip belt between wheel and bobbin winder and make sure belt is positioned around toothed wheel (H) of upper shaft *(Figure 66)*

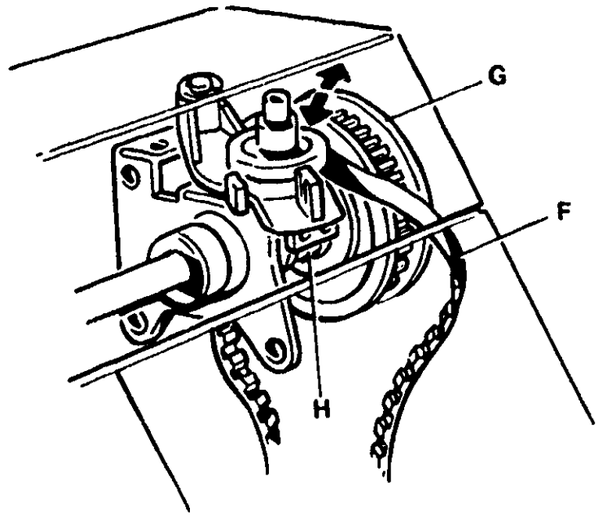

FIGURE 66

In order to keep the correct needle timing to feed upper to lower shaft timing belt must be properly positioned

Rotate handwheel manually to bring needle bar to its lowest position Attach gauge No 68932 to needle bar tight against needle bar support Manually rotate toothed wheel (A) until its tip (B) is facing that part of mainframe indicated by (C) in *Figure 67* Hold toothed wheel stationary while placing belt (F) around it Make sure that belt (F) is placed above stud (G) and then put tension on belt through tension pulley (E) and tighten screws (D)

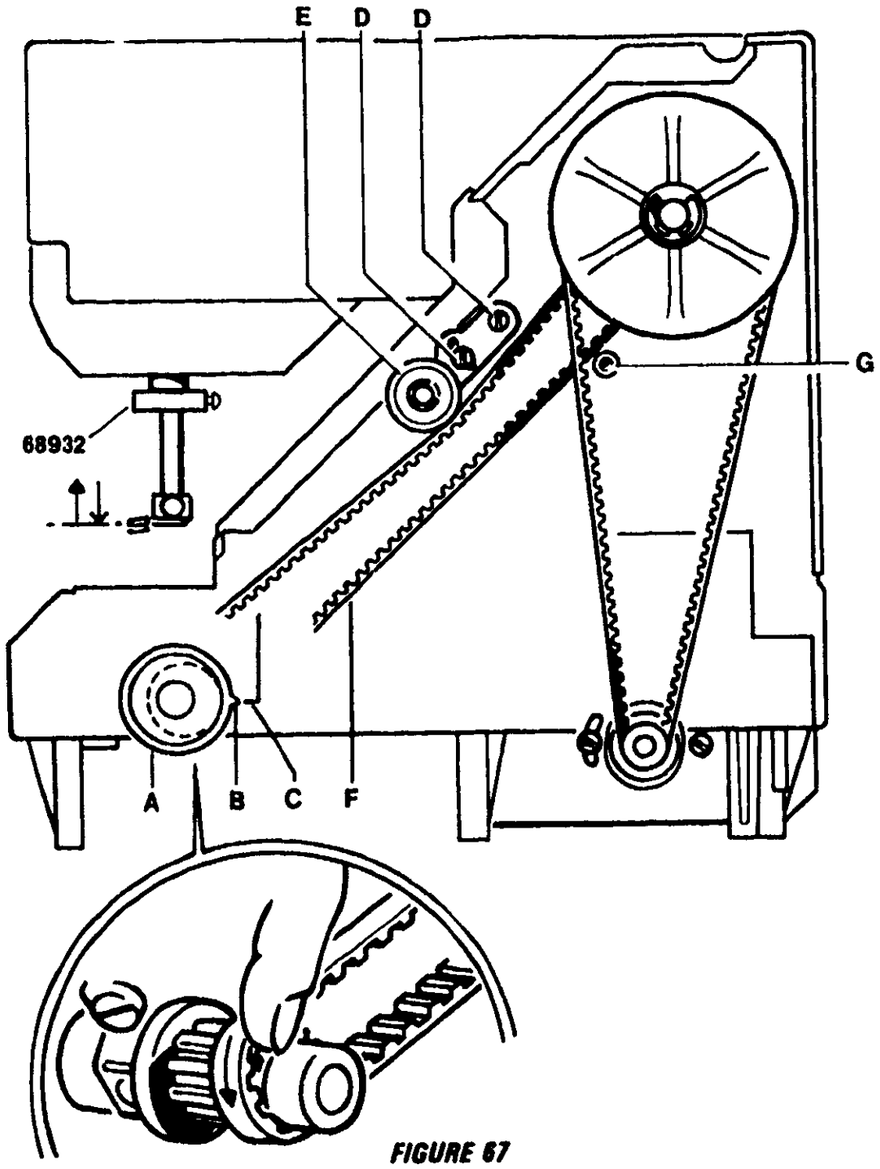

FIGURE 67

Check belt tension A light finger pressure *(Figure 68)* should push belt 160 inch (4 mm) upward If necessary adjust position of tension pulley (E) Tighten screws (D) securely

Check once more to see that tip (B) is still facing (C) *(Figure 67)* If it is not repeat operation loosen screws (D), release belt tension remove belt (F) from wheel (A) and carefully follow instructions in the two preceding paragraphs When completed remove gauge from needle bar

NOTE When belts are too tight machine gets stiff and bearings overheat When belts are too loose machine gets noisy

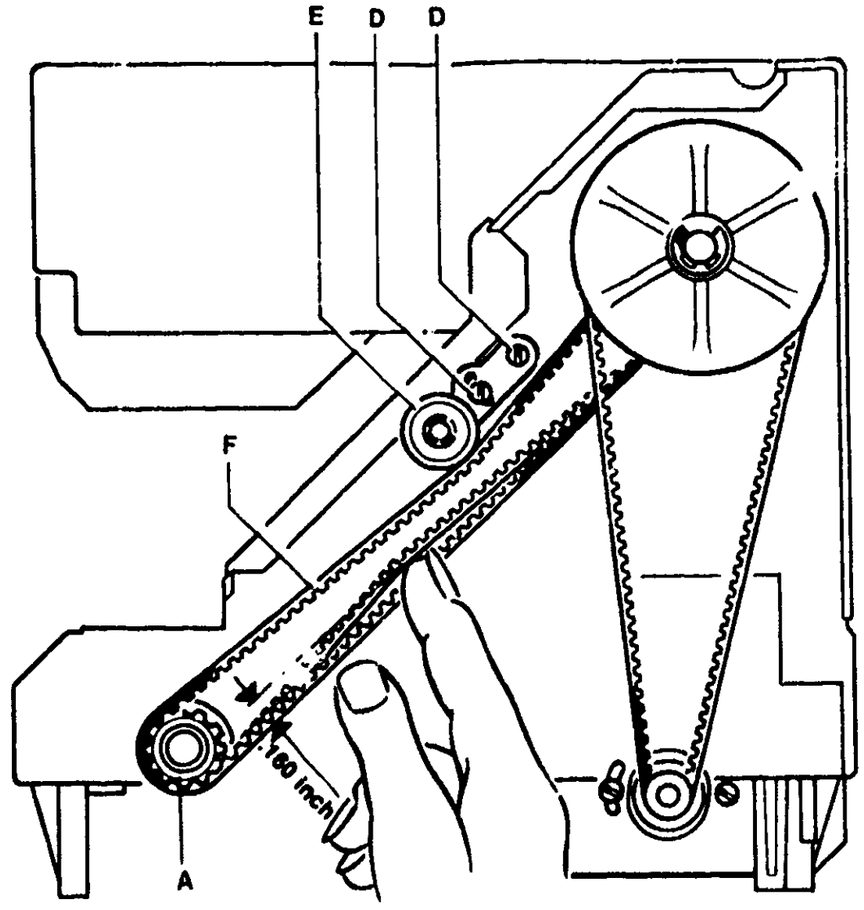

FIGURE 68

3 UPPER-SHAFT-TO-COUNTERWEIGHT TIMING BELT

● Removing belt

Remove needle bar support Refer to Section 2C 2 6

Remove screw (B) and remove lampholder unit (A) *(Figure 69)*

Disconnect wiring connectors (D) and (E)

Remove screws (C) and remove needle bar actuator

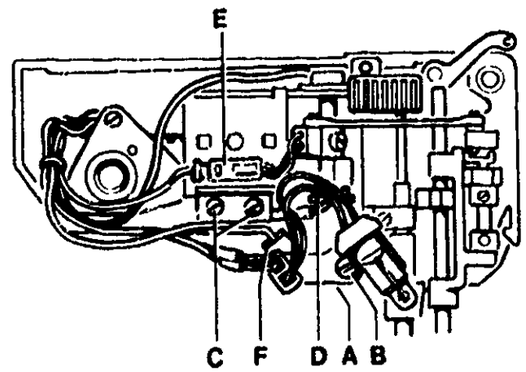

FIGURE 69

Remove screw (B) *(Figure 70)* and remove buttonholer contact unit (A)

Raise presser foot Rotate pressure control knob to zero position Loosen screw (C) and remove support (D) by pushing its lower portion to the left and then up Remove rod (E)

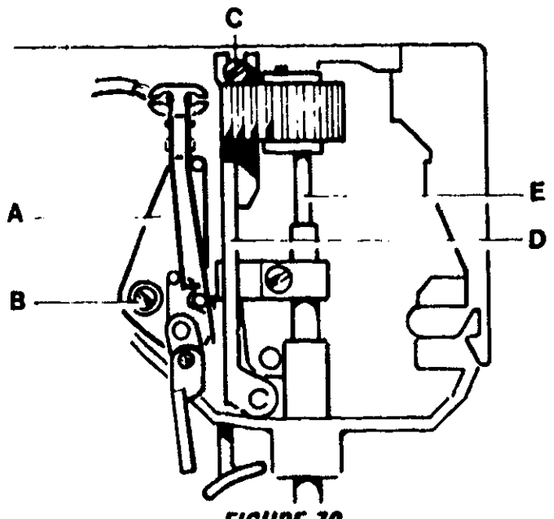

FIGURE 70

340.1991188
2C.4.4 REPLACING THE BELTS

Insert screwdriver blade into slot in connecting rod (A) *(Figure 71)* Slightly rotate screwdriver to open up the connecting rod bushing Slip rod (A) and takeup lever off of the shafts

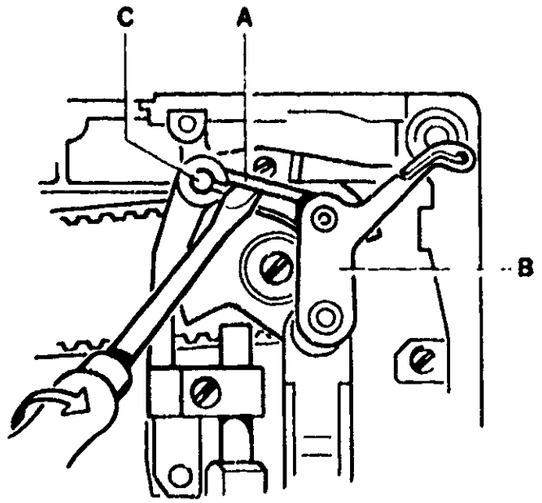

FIGURE 71

Loosen screws (L) *(Figure 72)* and remove upper shaft support (M) Slip cogged belt (N) off of the upper shaft toothed wheel

Rotate counterweight (R) so that the belt can slip off between the counterweight and the tension discs lever (S)

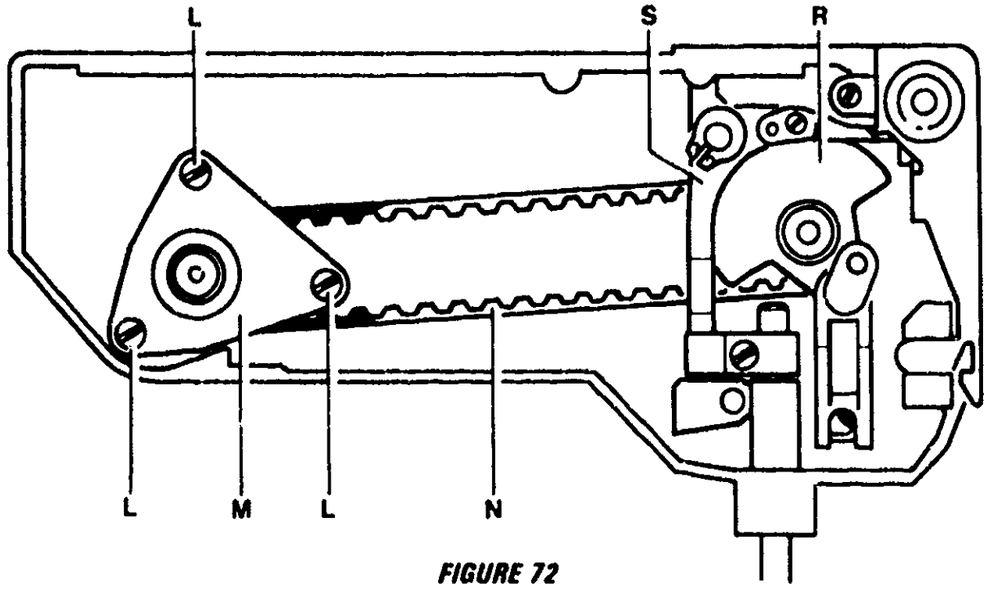

FIGURE 72

● Installing belt

Install belt and replace support (M) and screws (L) Adjust and check the belt tension Correctly set, the belt may be pushed down about 120 inch (3 mm) with slight finger pressure *(Figure 73)* If belt tension is not correct, loosen screws (L) slightly and adjust support (M) Then tighten screws (L) securely

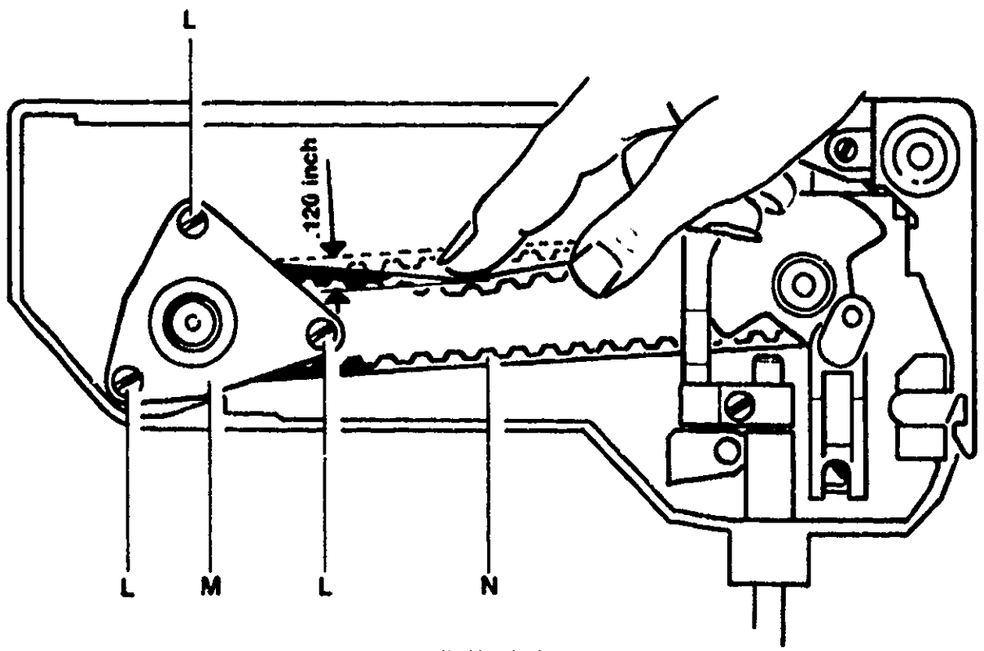

FIGURE 73

Reassemble by following disassembly procedure in reverse Be sure that connecting rod (A) *(Figure 71)* is properly positioned on its pivot (C) Connecting rod (A) should snap into place When installing the lampholder (A) *(Figure 69)* be sure that the small fork (F) clips over the mainframe

Loosen screws (D) *(Figure 67)* slightly Lift tension pulley (E) and remove belt (F) from toothed wheel (A) Reset needle timing to feed as explained below

Rotate handwheel manually to bring needle bar to its lowest position Attach gauge No 68932 to needle bar tight against needle bar support Manually rotate toothed wheel (A) until its tip (B) is facing that part of mainframe indicated by (C) in *Figure 67* Hold toothed wheel stationary while placing belt (F) around it Make sure that belt (F) is placed above stud (G) and then adjust tension on belt through tension pulley (E) and tighten screws (D)

Check belt tension A light finger pressure *(Figure 68)* should push belt 160 inch (4 mm) upward If necessary adjust position of tension pulley (E) Tighten screws (D) securely

Check needle position at straight stitching Refer to Section 2C 2 4

Turn machine "on" and let it run to allow self adjusting bushings to assume proper position With light, aluminum or brass bar, knock against upper shaft to speed up bushings self adjustment To do so loosen screws (F) and remove accessory tray (E) *(Figure 74)* Insert bar in small mainframe opening

NOTE When belts are too tight machine gets stiff and bearings overheat When belts are too loose machine gets noisy

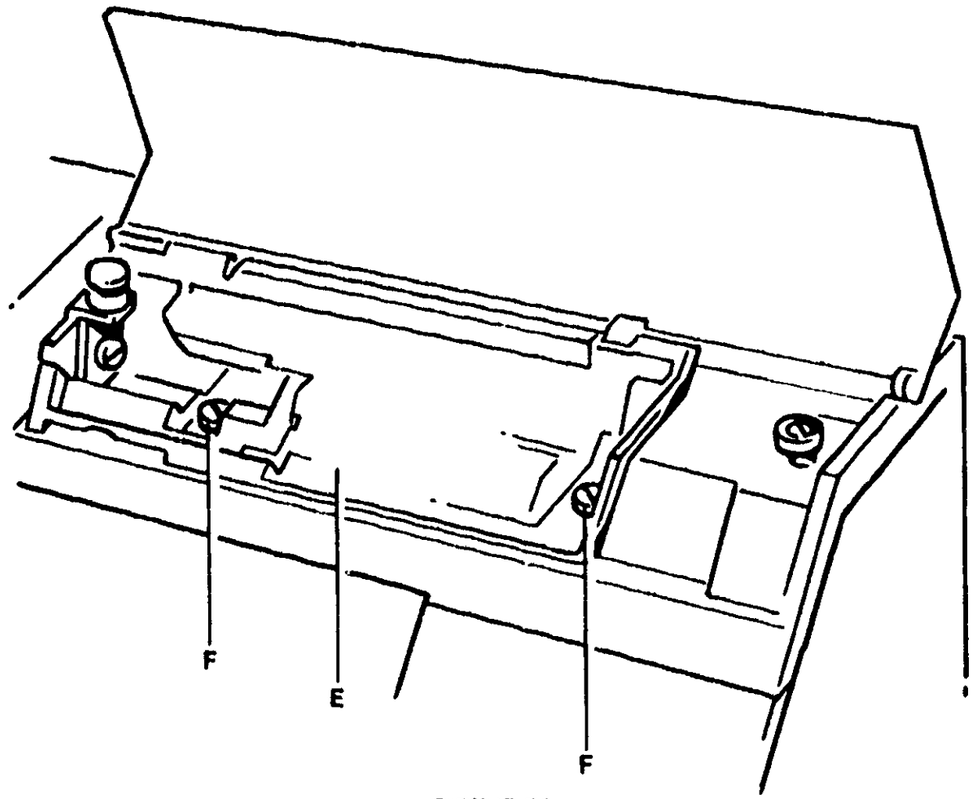

FIGURE 74

1 ADJUSTING MOTOR TOP SPEED

- **WARNING Whenever making adjustments on pots, use insulated screwdrivers only, to avoid short-circuiting machine**
- Machine top speed should reach 950/1000 r p m s with speed selector set at maximum speed position and foot control pressed all the way down
- Apply a speed indicator (tachometer) to handwheel and check top speed Make necessary adjustments on pot (B) *(Figure 75)* which is located on motor control board (A)

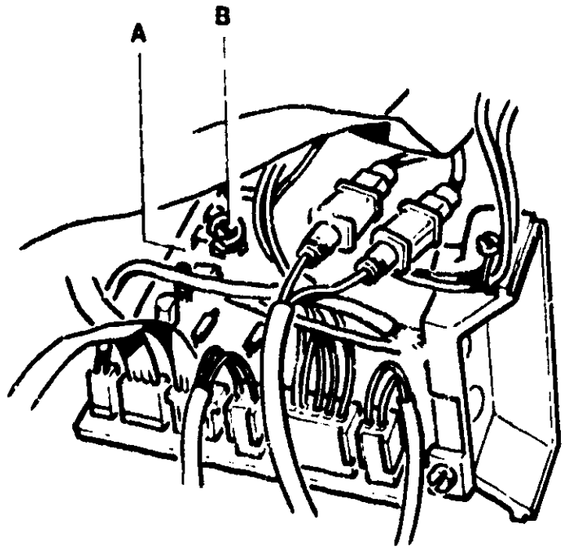

FIGURE 75

340.1991180
2C.4.5 ADJUSTING THE POTENTIOMETERS (POTS)

2 ADJUSTING NEEDLE POSITION IN STRAIGHT STITCHING

- To set mechanical zero position refer to Section 2C 2 4
- To set electrical zero position adjust pot (B) *(Figure 76)* located on closed loop control board (A)

3 ADJUSTING ZIGZAG WIDTH

- After performing mechanical adjustments as described in Section 2C 2 5 adjust pot (C) *(Figure 76)* located on closed loop control board (A)
- After adjusting pot controlling zigzag width, check needle position in straight stitching which could have been accidentally upset while adjusting zigzag width If this is the case adjust both pots (B) and (C) *(Figure 76)* alternately until you succeed by trial and error

4. ADJUSTING ELECTRIC ZERO FEED POSITION

- After performing checks and adjustments of the mechanical zero feed (Section 2C 3 3) proceed with adjustment of the electrical zero position
- Adjust pot (D) *(Figure 76)* located on closed loop control board (A)

5. ADJUSTING STITCH LENGTH

- Perform checks and mechanical adjustments as indicated in Section 2C 3 3
- Adjust pot (E) *(Figure 76)* located on closed loop control board (A)
- After adjustments of stitch length pot, check electrical zero feed positioning which could have been accidentally upset If necessary, readjust pot (D) *(Figure 76)*
- In order to check results of adjustments on stitch length enter program 26 into machine (little star pattern) Stitch at medium speed Take a close look at some of the star patterns particularly the alignment of stitches coming out from the center They should be at a 45° angle
- A line of ten star patterns should be 3 6 4 4 inches long If you do not obtain the correct total length adjust stitch length pot (E) *(Figure 76)*
- Another visual check for correct stitch length may be obtained by programming and stitching patterns 21, 22, 71 72

WARNING: Pots (M) and (N) settings are factory adjusted Their adjustments should never be modified

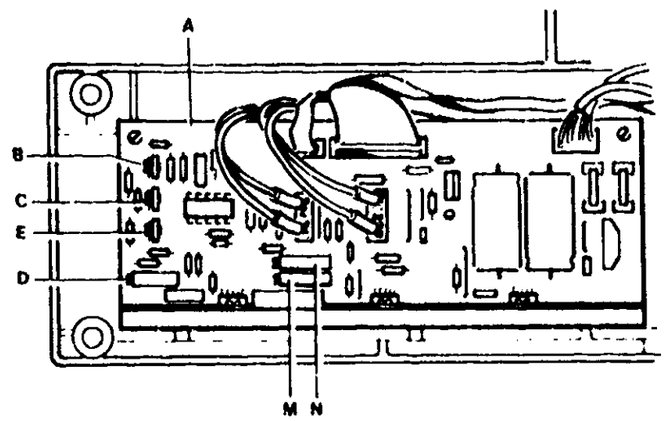

FIGURE 76

WARNING: Unplug machine from wall socket any time you work on motor unit and motor control board

1 REMOVING MOTOR FROM MACHINE

- Disconnect motor (D) *(Figure 77)* and interruptor (C) connectors form motor control board (A)
- Unplug ground connector (E) from motor
- Remove screws (F) and (G) Remove drive belt and then remove motor from motor bracket (H)

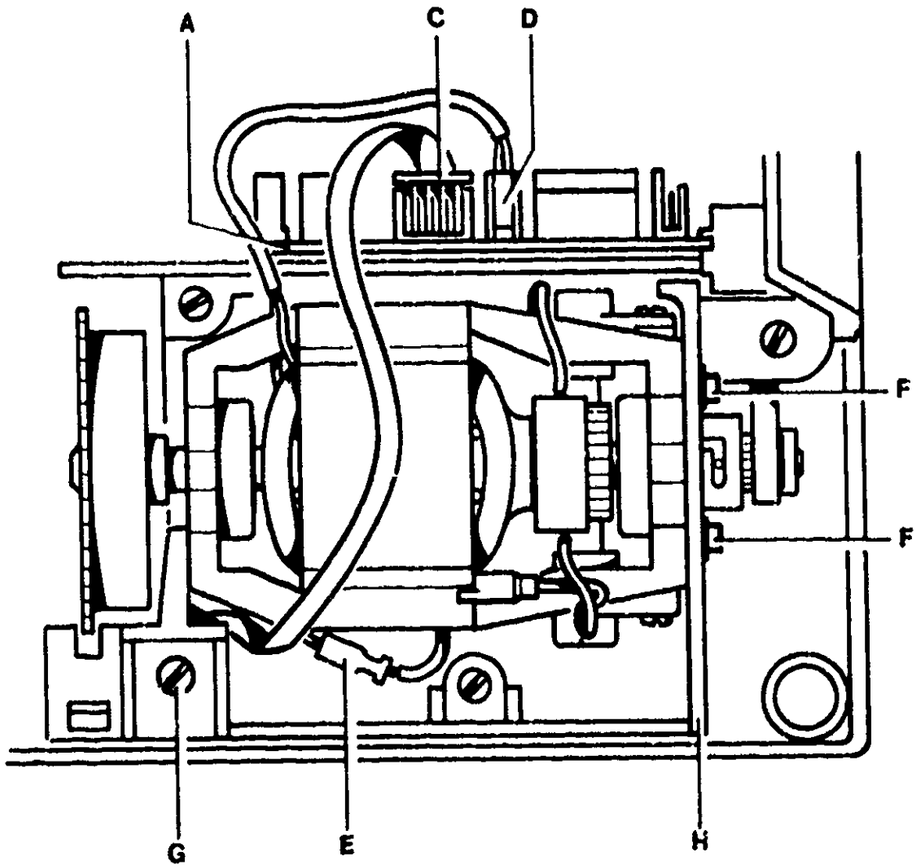

FIGURE 77

2 REPLACING MOTOR BRUSHES AND SPRINGS

- Loosen caps (A) *(Figure 78)* Remove brushes (C) and replace them
- Install caps (A) making sure that terminals (F) and (G) are positioned between brush spring (B) and cap
- *NOTE Motor should be replaced whenever one or more commutator bars (D) show corrosion because of excessive arcing from brushes*

3 INSTALLING MOTOR ON MACHINE

To install reverse procedure in paragraph 1 Verify that belt has proper tension Refer to Section 2C 4 4

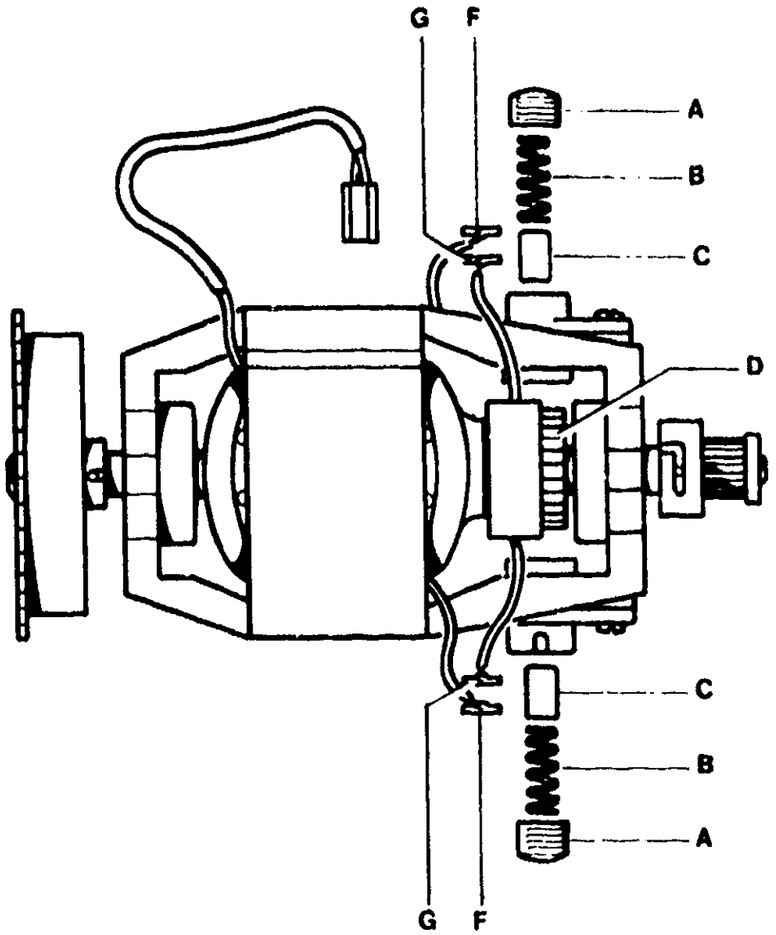

FIGURE 78

1 CLOSE LOOP CONTROL BOARD *(Figure 79)*

A from secondary winding of transformer
B from logic board
C to motor control board
D to feed actuator
E to needle bar actuator
F protective fuses

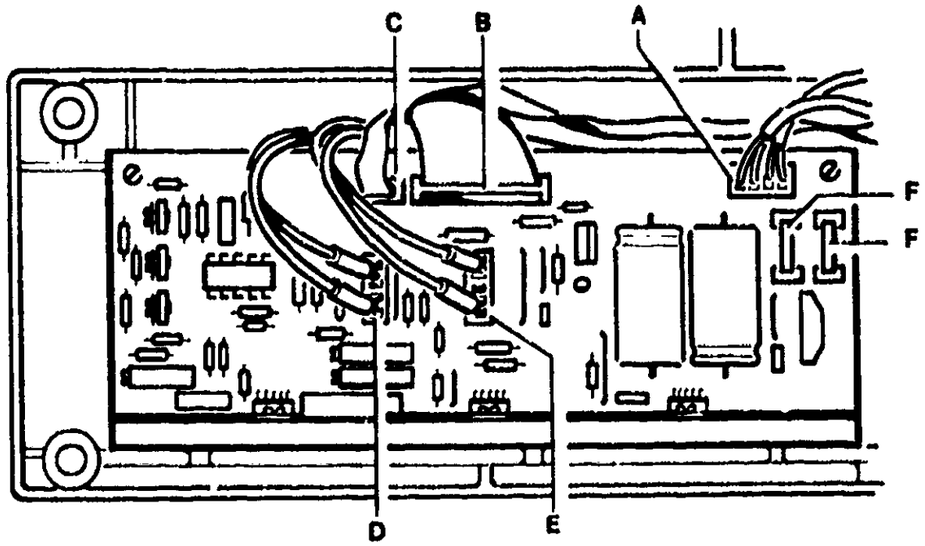

FIGURE 79

2 SYNCHRONISM BOARD *(Figure 80)*

A from buttonhole sensors
B to logic board

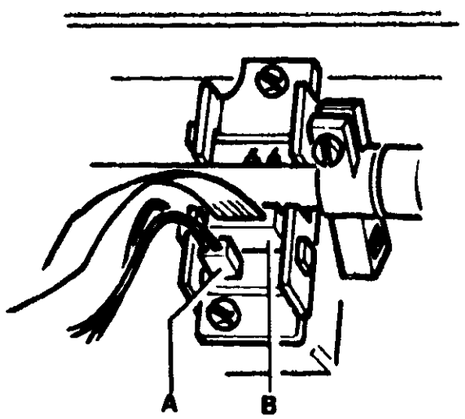

FIGURE 80

340.1991100
2C47 POSITIONING OF CONNECTORS

3 LOGIC BOARD *(Figure 81)*

'A from synchronism board
B to close loop board

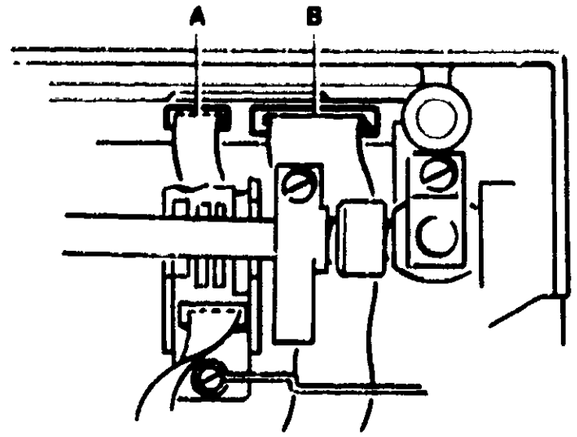

FIGURE 81

4 MOTOR CONTROL BOARD *(Figure 82)*

"B" from foot pedal
"C" from closed loop board
"D" to the motor
"E" to transformer primary winding
"F" from mains through main switch

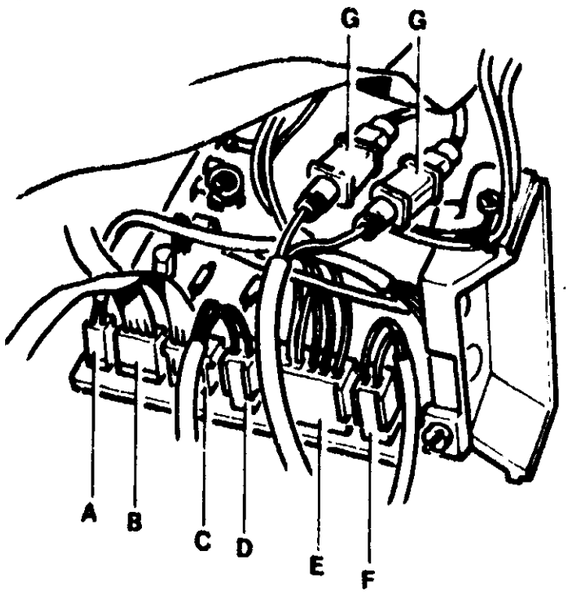

FIGURE 82

5 OUT-OF-BOARD CONNECTORS

A *(Figure 83)* to needle bar actuator coil (L)
B *(Figure 83)* from needle bar actuator pot (L)

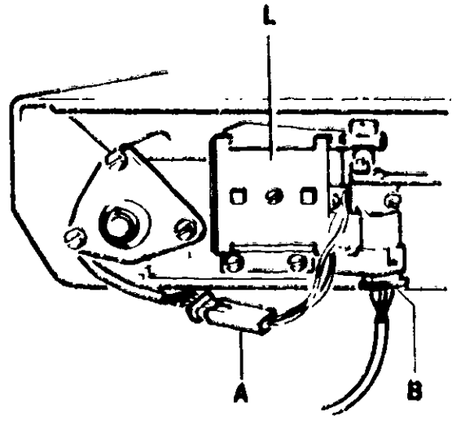

FIGURE 83

C *(Figure 84)* from feed actuator pot (M)
G *(Figure 82)* to the machine bulbs

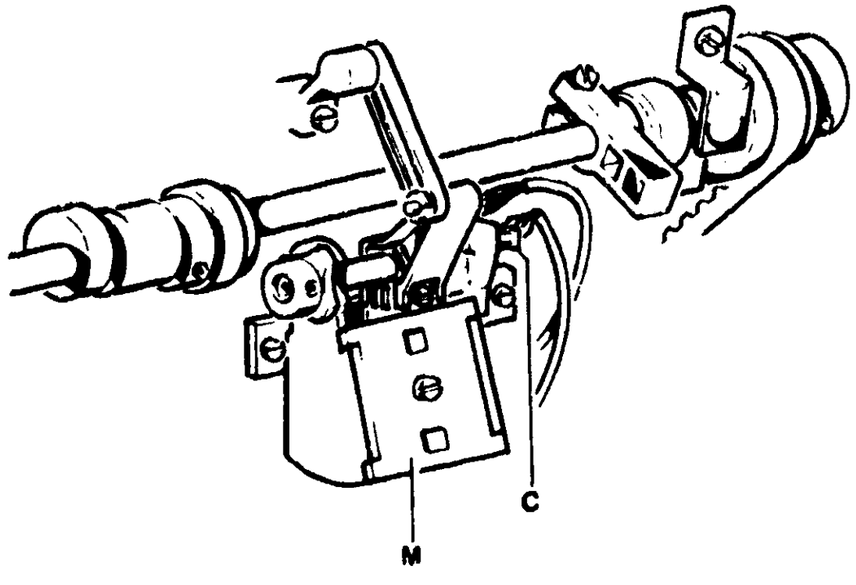

FIGURE 84

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SECTION 3.

ELECTRONIC CIRCUIT SERVICE

EXACT DIAGNOSIS OF ANY SOURCE OF TROUBLES MUST REPRESENT THE FIRST TARGET FOR THE SERVICE TECHNICIAN: FOR THIS REASON WE HAVE WRITTEN A SPECIAL SECTION OF "CHECK POINTS" (SEE FOLLOWING PARAGRAPH 3A).

WE WOULD SUGGEST YOU USE THE "CHECK POINTS" SECTION NOT ONLY FOR DIAGNOSIS PURPOSES, BUT ALSO TO CHECK CONDITIONS OF MACHINE, BEFORE DELIVERING IT BACK TO CUSTOMER.

RECOMMENDED EQUIPMENT FOR ELECTRONIC CIRCUIT REPAIRS:

VOLT- OHM-METER - DIGITAL

- SOLDERING IRON (PENCIL)
- CIRCUIT BOARD FOIL CUTTER.

SPECIAL NOTE:

ELECTRONIC BOARD REPAIR IS NOT RECOMMENDED AT THE LOCAL SERVICE DEPARTMENT LEVEL.

THE FOLLOWING ELECTRIC SERVICE INFORMATION SHOULD ONLY BE USED FOR ISOLATING A DEFECTIVE BOARD OR DIAGNOSING AND REPAIRING NON BOARD MALFUNCTIONS.

MALFUNCTIONING BOARDS SHOULD BE REPLACED AND RETURNED TO SPECIALTY REPAIR CENTER IN MELROSE PARK IL. SEE CODE "40" ON MICROFICHE.

NOTE: ELECTRONIC BOARD REPAIRS NOT RECOMMENDED IN THE FIELD. SEE SPECIAL NOTE CONTAINED ON 1ST PAGE OF SECTION 3.

3.A CHECK POINTS.

VERIFY THAT AS SOON AS MAIN SWITCH IS TURNED ON, BOTH SEWING LIGHT BULBS UNDERNEATH MACHINE ARM AS WELL AS THE LED ABOVE POWER-ON CONTROL KEY LIGHT UP; ACTUATORS COILS SHOULD ACTIVATE TO THEIR CENTRAL POSITION; FOOT CONTROL, EVEN IF PRESSED, MUST REMAIN INOPERATIVE UNTIL A STITCHING PROGRAM IS ENTERED.

DO POWER-ON LED AND SEWING LIGHT BULBS REMAIN OFF?
NO — YES
YES → REFER TO SECT. 3 B.1

ARE ONE OR BOTH SEWING BULBS OFF?
NO — YES
YES → REFER TO SECT. 3 B.6

DO YOU HEAR NOISY VIBRATION FROM THE ACTUATORS COILS?
NO — YES
YES → REFER TO SECT. 3 B.7

IS NEEDLE BAR POSITIONED AT ONE EXTREME OF ITS SWING?
NO — YES
YES → REFER TO SECT. 3 B.10

IS FEED ACTUATOR COIL POSITIONED EITHER ALL THE WAY TO THE RIGHT OR LEFT OF ITS OSCILLATION FIELD?
NO — YES
YES → REFER TO SECT. 3 B.9

IS MACHINE RUNNING EVEN WHEN FOOT CONTROL IS NOT BEING PRESSED? OR DOES MACHINE RUN EVEN WHEN NO STITCHING PROGRAM WAS ENTERED?
NO — YES
YES → REFER TO SECT. 3 B.11

ENTER ANY STITCH PATTERN: DO CORRESPONDING LED'S AND DISPLAY LIGHT UP?
YES — NO
NO → REFER TO SECT. 3 B.2

ENTER STRAIGHT STITCHING, THEN ZIGZAG STITCHING. DO BOTH LED'S LIGHT UP CORRECTLY?
YES — NO
NO → REFER TO SECT. 3 B.3

ENTER ANY STITCH PATTERN: DOES MACHINE START SEWING, WITHOUT FOOT CONTROL BEING PRESSED?
NO — YES
YES → REFER TO SECT. 3 B.11

WHEN PRESSING FOOT CONTROL DOES MOTOR RUN?
YES — NO
NO → REFER TO SECT. 3 B.5

NOTE: ELECTRONIC BOARD REPAIRS NOT RECOMMENDED IN THE FIELD. SEE SPECIAL NOTE CONTAINED ON 1ST PAGE OF SECTION 3.

DOES MOTOR RUN AT IRREGULAR SPEED?
NO — YES → REFER TO SECT. 3 B.5

SWITCH SPEED SELECTOR, DOES MOTOR PROMPTLY REACT?
YES — NO → REFER TO SECT. 3 B.5

ENTER ZIGZAG STITCHING; SEW SOME STITCHES ON FABRIC. DO YOU SPOT SUDDEN CHANGES IN STITCH LENGTH OR WIDTH?
NO — YES → REFER TO SECT. 3 B.8

ENTER PROGRAM 26 (LITTLE STARS) AND STITCH A FEW PATTERNS ON FABRIC: ARE THEY PROPERLY SEWN?
YES — NO → IF YOU SUSPECT FAULTY ADJUSTMENTS CONCERNING CENTRAL POSITIONING OF ACTUATORS COILS OR THE GAIN IN THE ACTUATORS, ADJUST THEIR POTENTIOMETERS: P201 FOR THE ZERO POSITIONING OF NEEDLE BAR ACTUATOR; P202 FOR ZERO POSITIONING OF FEED ACTUATOR; P203 FOR THE GAIN ADJUSTMENT IN NEEDLE BAR ACTUATOR; P204 FOR THE GAIN ADJUSTMENT OF FEED ACTUATOR. IF PROBLEMS CONCERNING COIL POSITIONING OF ACTUATORS REMAINS, REFER TO SECT. 3 B.4.

KEEP PROGRAM 26 OPERATIVE, BUT SET BOTH STITCH LENGTH AND WIDTH AT MAX. VALUES (6 MM. AND 8 MM.).
DO YOU HEAR EITHER OR BOTH ACTUATORS BANGING?
NO → YES → REFER TO SECT. 3 B.4

ENTER BUTTONHOLING PROGRAM NUMBER 4; INSTALL BUTTON-HOLER FOOT AND SEW.
IS BUTTONHOLE PROPERLY SEWN?
YES → NO → REFER TO SECT. 3 B.13

ENTER PROGRAM 71 AND 72 FOR ALTERNATING STITCHING (71+72); SEW, AND CHECK WHETHER BALANCE CONTROL KEY "B" OF KEYBOARD WORKS PROPERLY.
IS EVERYTHING ALL RIGHT?
YES → NO → REFER TO SECT. 3 B.4

ENTER PROGRAM NUMBER 40, AND CHANGE PATTERN LENGTH.

IS PATTERN ELONGATION BEING ACCEPTED BY KEYBOARD, AND CORRECTLY SEWN BY MACHINE?
YES → THE MACHINE IS OK.
NO → REFER TO SECT. 3B.4

FOR PROBLEMS AFFECTING FOOT CONTROL, REFER TO SECT. 3B.12.

NOTE: ELECTRONIC BOARD REPAIRS NOT RECOMMENDED IN THE FIELD. SEE SPECIAL NOTE CONTAINED ON 1ST PAGE OF SECTION 3.

TABLE OF CONTENTS — SEE SECTION

NOTE: ELECTRONIC BOARD REPAIRS NOT RECOMMENDED IN THE FIELD. SEE SPECIAL NOTE CONTAINED ON 1ST PAGE OF SECTION 3.

3 B.1 - MACHINE REMAINS TOTALLY "OFF" ("POWER ON" LED AND SEWING LIGHTS ARE DEAD).

PLUG-IN MACHINE AND TURN MAIN SWITCH "ON".

TOUCH STRAIGHT STITCH CONTROL KEY.

DOES LED OVER STRAIGHT STITCH KEY LIGHT:

NO → REPLACE POWER-ON LED AND BULBS

YES

IS ELECTRICAL CORD IN GOOD CONDITION

NO → REPLACE

YES

IS FUSE (F301), LOCATED ON MOTOR CONTROL BOARD OPEN? (SEE WIRING DIAGRAM SECTION 4)

NO

YES → REPLACE FUSE, DISCONNECT SP314A AND SP315A, TURN MACHINE "ON"

DOES FUSE (F) BLOW

NO → REINSTALL SP314A, TURN MACHINE "ON"

YES → REPLACE LINE FILTER (FI301)

DOES FUSE F301 BLOW?

NO → RECONNECT SP315, TURN MACHINE "ON" AND ENTER STRAIGHT STITCH. PRESS FOOT CONTROL

YES → REPLACE TRANSFORMER

DOES FUSE (F) BLOW

NO → MACHINE O.K.

YES → REPLACE MOTOR

IS 120 VOLTS A.C. REACHING CONNECTOR 313?

NO → REPLACE ON/OFF SWITCH

YES → CHECK CONTINUITY OF TRANSFORMER PRIMARY WINDING (PINS 2, 4, AND ' IF OPEN, REPLACE TRANSFORMER

NOTE: ELECTRONIC BOARD REPAIRS NOT RECOMMENDED IN THE FIELD. SEE SPECIAL NOTE CONTAINED ON 1ST PAGE OF SECTIONS 3.

3 B.2 - MACHINE IS INOPERATIVE: KEYBOARD DOES NOT RESPOND, LED'S ' DISPLAY REMAIN OFF.

BY SAYING KEYBOARD DOESN'T RESPOND, WE MEAN THAT EITHER THE KEYBOARD REMAINS DEAD OR LED'S LIGHT UP EVEN IF THEY DO NOT CORRESPOND TO THE CONTROL KEYS WHICH WERE PRESSED. IN THE LATTER CASE THE TROUBLE IS PROBABLY IN THE LOGIC BOARD: REFER TO SECT. 3 B.14 WHEN KEYBOARD REMAINS DEAD, CHECK FUSES ON CLOSED LOOP CONTROL BOARD. SEE WIRING DIAGRAM - SECTION 4

ARE THE FUSES OPEN?

NO

YES → SWITCH MACHINE OFF
DISCONNECT CONNECTORS SP205 AND SP209 OF CLOSED LOOP BOARD; AND REPLACE FUSES.

SWITCH MACHINE ON.
ARE FUSES HOLDING?

NO

YES → IS KEYBOARD NOW WORKING?

NO → TROUBLE IS PROBABLY IN LOGIC BOARD: REFER TO SECT. 3 B.14.

YES → SWITCH MACHINE OFF AND CONNECT SP205 AND SP209; SWITCH MACHINE ON; FUSES STILL HOLDING?

NO → REPLACE CLOSED LOOP BOARD, REFER TO SECT. 3 B.14.

YES → SWITCH MACHINE OFF AND DISCONNECT SP?? CONNECTOR OF MOTOR CONTROL BOARD (SEE WIRING DIAGRAM SECT. 4). REPLACE FUSES, THEN TURN MACHINE ON. ARE ' HOLDING'

NO → REPLACE MOTOR CONTROL BOARD.

YES → REPLACE LOGIC BOARD: REFER TO SECT. 3 B.14.

IS A.C. VOLTAGE REACHING SP.08 OF THE CLOSED LOOP CONTROL BOARD? (SEE WIRING DIAGRAMS - SECT. 4).

YES

NO → CHECK CONNECTIONS BETWEEN BOARD AND TRANSFORMER: IF THEY ARE O.K., THEN TRANSFORMER MUST BE REPLACED.

CAN YOU READ A +5V AT PIN 5 OF SP 206A? REFER TO WIRING DIAGRAM SECTION 4

YES

NO → REPLACE CLOSED LOOP BOARD. (REFER TO SECT. 3 B.14)

CHECK CONNECTIONS BETWEEN CLOSED LOOP BOARD AND LOGIC BOARD.

NOTE: ELECTRONIC BOARD REPAIRS NOT RECOMMENDED IN THE FIELD. SEE SPECIAL NOTE CONTAINED ON 1ST PAGE OF SECTION 3.

3 B.3 - MACHINE IS ONLY STITCHING CERTAIN PATTERNS.

MACHINE CAN CORRECTLY STITCH ZIGZAG AND ALL PATTERNS HAVING A CODE NUMBER UP TO 65; STRAIGHT STITCHING AND CODE NUMBERED PATTERNS ABOVE 65 CAUSE MACHINE TO BECOME INOPERATIVE.
THIS MALFUNCTION INDICATES FAULTY DATA COMMUNICATIONS BETWEEN THE TWO MICROPROCESSORS: REPLACE IN THE LOGIC BOARD - REFER TO SECT. 3 B.14

NOTE: ELECTRONIC BOARD REPAIRS NOT RECOMMENDED IN THE FIELD. SEE SPECIAL NOTE CONTAINED ON 1ST PAGE OF SECTION 3.

3 B.4 - SEAMS AND STITCH PATTERNS POORLY SEWN.

ANY STITCH PATTERN CAN BE ENTERED, AND SELECTION IS PROPERLY CONFIRMED ON THE DISPLAY - BUT THE STITCHED PATTERNS ARE IRREGULARLY SEWN, OR DIFFERENT FROM WHAT THEY SHOULD BE.

TURN MACHINE ON, AND MANUALLY MOVE NEEDLE BAR ALL THE WAY TO THE LEFT: CHECK TO SEE THAT OUTPUT FROM PIN 16 OF SP101LOCATED ON THE LOGIC BOARD (SEE DIAGRAM SECT. 4) - IS ABOUT +2.5VD.C. (USING A SCOPE OR DIGITAL VOLT METER)

MANUALLY MOVE NEEDLE BAR ALL THE WAY TO THE LEFT AND CHECK TO SEE THAT OUTPUT FROM PIN 16 OF SP101 IS NOW "0" VOLTS.

IS VOLTAGE ON SP101 PIN 16 CHANGING WITHIN ABOVE INDICATED VALUES?

YES

TURN MACHINE OFF AND DISCONNECT SP209A FROM CLOSE LOOP CONTROL BOARD: TAKE RESISTANCE READINGS BETWEEN PIN 6 AND PIN 5 OF SP209A, WITH OHM-METER (R x 1).

IS RESISTANCE READING 4?

YES

TURN MACHINE OFF AND DISCONNECT SP209A FROM CLOSE LOOP CONTROL BOARD: TAKE RESISTANCE READINGS BETWEEN PIN 6 AND PIN 5 OF SP209A, WITH OHM-METER (R x 1).

NO

CHECK CONNECTIONS OF NEEDLE BAR ACTUATOR COIL: IF NECESSARY, REPLACE ACTUATOR.

NO

SWITCH MACHINE OFF: DISCONNECT SP209 FROM CLOSED LOOP CONTROL BOARD (SEE DIAGRAM 3). MANUALLY MOVE NEEDLE BAR FROM ONE EXTREME STOP OF ITS RIGHT TO THE OTHER, AND TAKE READINGS WITH OHM-METER (Rx10) BETWEEN PIN 1 AND PIN 3 OF SP 209A: DO RESISTANCE VALUES VARY BETWEEN 330Ω 20% , AND 860Ω 20%?

YES

CONNECT SP209A. CONNECT TO 120 V.A.C. AND TURN MACHINE ON. MANUALLY MOVE NEEDLE BAR FROM ONE END TO THE OTHER. DOES VOLTAGE READING AT PIN 14 OF SP206 ON CLOSE LOOP BOARD VARY BETWEEN +2.5 AND 0 V USING A SCOPE OR DIGITAL VOLT METER?

NO

REPLACE CLOSED LOOP BOARD REFER TO SECT. 3 B.14

YES

REPLACE LOGIC BOARD REFER TO SECT. 3 B.14

NO

CHECK THE CONNECTIONS AND CONTINUITY OF POTENTIOMETER CONTROLLING THE NEEDLE BAR ACTUATOR. IF NO BREAK IS FOUND, REPLACE ACTUATOR (REFER TO WIRING DIAGRAM, SECTION 4)

NOTE: ELECTRONIC BOARD REPAIRS NOT RECOMMENDED IN THE FIELD. SEE SPECIAL NOTE CONTAINED ON 1ST PAGE OF SECTION 3.

↓

SWITCH MACHINE ON AND MANUALLY MOVE FEED ACTUATOR COIL FROM END TO END: VOLTAGE READING AT PIN 16 OF SP101 SHOULD VARY BETWEEN +2.5 AND 0 V. USING A SCOPE OR DIGITAL VOLT METER.

IS VOLTAGE READING WITHIN ABOVE VALUES?

YES

NO

SWITCH MACHINE OFF AND DISCONNECT SP205A FROM CLOSED LOOP CONTROL BOARD. TAKE READINGS WITH OHM-METER (R x 10) BETWEEN PIN 1 AND PIN 2 OF SP205A, WHILE MOVING FEED ACTUATOR COIL FROM END TO END. DO READINGS VARY BETWEEN 330Ω ± 20% AND 800Ω ± 20% ?

YES

NO

RECONNECT SP205A AND TURN MACHINE "ON". MANUALLY MOVE NEEDLE BAR FROM END TO END. DOES VOLTAGE READING AT PIN 16 OF SP206. (LOCATED ON CLOSED LOOP BOARD) VARY BETWEEN +2.5 AND 0 V USING A SCOPE OR DIGITAL VOLT METER?

NO
REPLACE CLOSED LOOP BOARD REFER TO SECT. 3 B.14

YES
REPLACE LOGIC BOARD REFER TO SECT. 3 B.14.

CHECK ELECTRICAL CONTINUITY OF CONNECTIONS OF FEED ACTUATOR CONTROLLING POTENTIOMETER. IF YOU FIND BREAK IN THE CONNECTIONS, REPLACE ACTUATOR: REFER TO WIRING DIAGRAM - SECTION 4.

SWITCH MACHINE OFF AND DISCONNECT SP205A FROM CLOSED LOOP BOARD. TAKE READINGS OF RESISTANCE BETWEEN PIN 6 AND PIN 5 OF SP205A, WITH OHM-METER (R x 1).

IS RESISTANCE READING EQUAL TO 4?

YES
REPLACE CLOSED LOOP BOARD. REFER TO SECT. 3 B.14.

NO

↓

CHECK CONNECTIONS OF FEED ACTUATOR COIL: IF NECESSARY, REPLACE ACTUATOR.

3 B.5 - SPEED PROBLEMS OF ELECTRICAL MOTOR.

3 B.5.A - MOTOR DOES NOT RUN. DISCONNECT SP315A AND CHECK MOTOR FOR OPEN CIRCUIT.

IS MOTOR OPEN?

YES
REPLACE MOTOR

NO
IS +5VDC AVAILABLE ON PIN 2 of SP317A?

YES
REPLACE MOTOR CONTROL BOARD

NO
IS +5VDC PRESENT ON PIN #2 OF SP2[illegible]?

YES
LOCATE AND REPAIR BROKEN OR LOOSE CONNECTION

NO
REPLACE CLOSED LOOP BOARD (REFER TO 3 B.14)

3 B.5.B - MOTOR RUNS AT TOP SPEED REGARDLESS OF ANY PRESSURE APPLIED TO FOOT CONTROL.

REPLACE MOTOR CONTROL BOARD.

3 B.5.C - MOTOR DOES NOT REACH TOP SPEED. WHILE OPERATING MACHINE, MOVE SPEED SWITCH FROM HIGH TO LOW POSITION.

DOES MOTOR SPEED CHANGE?

YES
IS 11 VOLTS A.C. PRESENT ACROSS PINS 4 AND 5 OF SP314?

YES
REPLACE MOTOR CONTROL BOARD

NO
REPLACE TRANSFORMER

NO
CHECK CONNECTIONS BETWEEN SWITCH AND MOTOR CONTROL BOARD.

3 B.5.D - MOTOR SPEED IS IRREGULAR.

CHECK FOOT CONTROL FOR INTERMITTANT CIRCUIT.

IS FOOT CONTROL O.K.?

YES
REPLACE MOTOR CONTROL BOARD

NO
REPLACE FOOT CONTROL

3 B.5.1 - MOTOR RUNS WHENEVER FOOT CONTROL IS PRESSED DOWN ALTHOUGH NO PROGRAM WAS ENTERED IN THE MACHINE.

IS A HIGH LOGIC LEVEL OF +5 VOLTS (MEASURED WITH A SCOPE) PRESENT AT PIN #1 OF SP317?

NO	YES
REPLACE LOGIC BOARD (REFER TO SECTION 3 B.14)	REPLACE MOTOR CONTROL BOARD

3 B.6 - MACHINE WORKS PROPERLY - BUT ONE OR BOTH BULBS ARE NOT ON.

IN CASE ONE OF THE TWO BULBS (EVEN THOUGH REPLACED) DOES NOT LIGHT, CHECK THE ELECTRICAL CONNECTIONS AND THE LAMPHOLDERS.

IN CASE BOTH BULBS (EVEN THOUGH REPLACED) ARE NOT LIGHTING, CHECK THE LAMP FUSE WHICH IS LOCATED ON THE TRANSFORMER.

IS THE FUSE OPEN?

NO	YES
DO YOU FIND ANY BREAK IN THE CONNECTOR BETWEEN TRANSFORMER AND BULBS?	REPLACE IT AND MAKE SURE LAMPHOLDER IS NOT SHORT-CIRCUITING.

NO	YES
REPLACE TRANSFORMER	REPAIR CONNECTOR.

3 B.7 - NEEDLE BAR AND FEED UNIT ARE NOISILY VIBRATING AROUND THEIR CENTRAL POSITION. REPLACE CLOSED LOOP BOARD REFER TO 3B.14

3 B.8 - SUDDEN VARIATION IN STITCH LENGTH OR WIDTH WHILE SEWING ZIGZAG OR SELECTED PATTERNS.

CLOSE LOOP CONTROL BOARD

FAULTY PERFORMANCE OF CLOSE LOOP BOARD CAUSES BOTH ACTUATORS TO REMAIN INOPERATIVE.
TO LOCATE THE POSSIBLE TROUBLE FOLLOW THIS PROCEDURE:
DO YOU READ A +5 VOLTS D.C. ON PINS OF SP410A?

YES	NO
TURN HANDWHEEL MANUALLY TO POSITION MAGNET (PLACED ON TIP OF ARM ON MACHINE LOWER SHAFT) MIDWAY BETWEEN THE TWO MAGNISTORS.	CHECK CONNECTIONS WITH LOGIC BOARD (REFER TO WIRING DIAGRAMS SECTION 4)

CAN YOU READ +5 VOLTS D.C. ON PINS 6 AND 8 OF SP410A?

YES	NO
TURN HAND WHEEL, TO POSITION MAGNET TO FACE MAG401. DOES PIN8 OF SP410A SHOW ZERO VOLTS?	CHECK TO SEE THAT RESISTORS TO R401 AND R402 CONNECTING PINS 3 OF MAG401 AND MAG402 TO +5 VOLTS ARE PROPERLY CONNECTED, AND NOT OPEN. IF NECESSARY, REPLACE FAULTY RESISTOR. THEN CHECK TO SEE THAT THE MAGNISTOR WHICH DOES NOT SHOW A +5 VOLTS IS NOT SHORTED BETWEEN PIN2 AND PIN3. REPLACE MAGNISTOR IF NECESSARY.

YES	NO
FURTHER ROTATE HANDWHEEL TO POSITION MAGNET TO FACE MAG402 DOES PIN6 OF SP410A SHOW ZERO VOLTS?	REPLACE MAG401

YES	NO
REPLACE LOGIC BOARD	REPLACE MAG402

3 B.9 - MACHINE IS FEEDING IN ONLY ONE DIRECTION AT MAXIMUM STITCH LENGTH, AND NOT PERFORMING DIFFERENT REQUIREMENTS OF THE SELECTED STITCH PATTERN.
CHECK ACTUATOR - IF O.K. REPLACE CLOSED LOOP BOARD.
(REFER TO SEC. 3 B.14)

3 B.10 - NEEDLE BAR REMAINS POSITIONED AT ONE END OF ITS RIGHT.
CHECK ACTUATOR - IF O.K. REPLACE CLOSED LOOP BOARD.
(REFER TO SEC. 3 B.14)

3 B.11 - AS SOON AS A STITCH PATTERN IS ENTERED, MACHINE WILL RUN WITHOUT FOOT CONTROL BEING PRESSED.
REPLACE MOTOR CONTROL BOARD.

3 B.12 - PROBLEMS RELATED TO FOOT CONTROL.
CHECK FOOT CONTROL. IF FOOT CONTROL O.K., REPLACE MOTOR CONTROL BOARD
(REFER TO WIRING DIAGRAM SET 4)

3 B.13 - IMPROPER BUTTONHOLES.

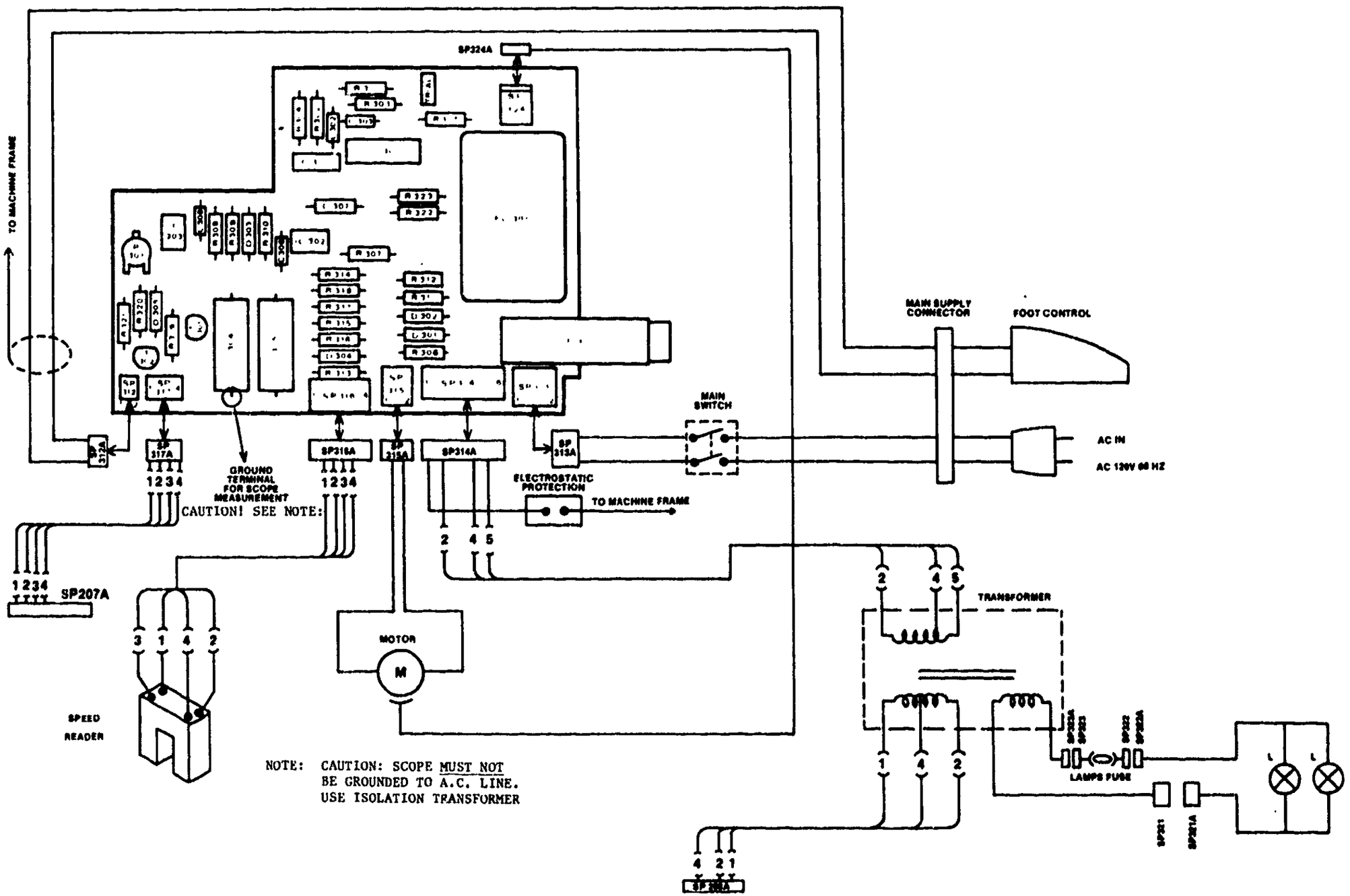
THE MACHINE WILL SEW BUTTONHOLES IN THE FOLLOWING SEQUENCE:
(1) LEFT SIDE; (2) ACROSS TO RIGHT SIDE AND THEN REVERSE IN STRAIGHT STITCHING; (3) UPPER BAR TACK; (4) RIGHT SIDE; (5) LOWER BAR TACK.
SIGNALS TO START THE ELECTRONIC SYSTEM TO DIRECT THE BUTTONHOLING SEQUENCE ORIGINATE FROM TWO CONTACT POINTS LOCATED CLOSE TO THE NEEDLE BAR ACTUATOR. THESE CONTACT POINTS ARE ACTIVATED BY THE MOVEMENT OF BUTTONHOLER FOOT.
CHECK TO SEE THAT THERE IS ELECTRICAL CONTINUITY IN THE WIRES FROM THE CONTACT POINTS TO CONNECTOR SP411 OF SYNCHRONISM BOARD. RESTORE CONNECTIONS IF NECESSARY. CLEAN CONTACT POINTS: IF YOU MUST REPLACE THEM, REFER TO SECT. 2 C.4.2.
CHECK CONNECTIONS BETWEEN SP411A AND SP411 RESTORE CONNECTIONS, IF NECESSARY. IF CONNECTIONS ARE OF., REPLACE LOGIC BOARD.
(REFER TO SECTION 3B.14.)

3 B.14 - REQUIRED ADJUSTMENTS WHENEVER LOGIC BOARD OR CLOSED LOOP BOARD IS REPLACED.

NOTE: POTENTIOMETERS P205 AND P206 ("M" AND "N" ON FIGURE 76 IN SECTION 2C.4.5) ARE FACTORY ADJUSTED AND SHOULD NOT REQUIRE ADJUSTMENT UNLESS A LOGIC OR ANALOGIC (CLOSED LOOP BOARD) IS REPLACED.

- ADJUSTMENT OF THESE TWO POTENTIOMETERS WHEN REQUIRED WILL ENSURE CORRECTLY MATCHING (INTERFACING) THE LOGIC AND ANALOGIC BOARD.
- REMOVE FEED ACTUATOR FROM MACHINE IF ANOTHER ACTUATOR IS NOT AVAILABLE.
- LAY ACTUATOR ON IT'S SIDE SO THAT THE INTERNAL COIL (ARMATURE) MOVES IN A HORIZONTAL PLANE. BE SURE LEAD WIRES DO NOT RESTRICT FREE MOVEMENT OF COIL.
- PLUG ACTUATOR CONNECTOR INTO SOCKET SP205 (P) TO ADJUST POTENTIOMETER P206 (N) OR CONNECT TO SOCKET SP209 TO ADJUST POTENTIOMETER P205.
- TURN MACHINE "ON".
- TOUCH STRAIGHT STITCH KEY ON CONTROL BOARD.
- WATCH ACTUATOR COIL. IT WILL MOVE TO A CENTRAL POSITION AND STOP.
- CONTINUE TO WATCH COIL FOR 5 SECONDS.
- IF COIL CHANGES POSITION WITHIN 5 SECONDS POTENTIOMETER IS NOT CORRECTLY ADJUSTED. CONTINUE TO MAKE SLIGHT ADJUSTMENTS UNTIL COIL NO LONGER MOVES AFTER STRAIGHT STITCH KEY IS TOUCHED.

MOTOR CONTROL BOARD



NOTE: CAUTION: SCOPE MUST NOT BE GROUNDED TO A.C. LINE. USE ISOLATION TRANSFORMER

CIRCUIT BOARDS AND RELATED CIRCUITS

Motor Control Board

FUNCTIONS:

- Filters 120 VAC line voltage to prevent spikes, etc., which could damage electronic components
- Controls motor speed by sensing pressure applied to foot control, and motor rpm's as sensed via pulses from the speed reader

VOLTAGE AND COMPONENT CHECKS

- TRANSFORMER

  Primary—Plug SP314A pins 2 to 4—120VAC

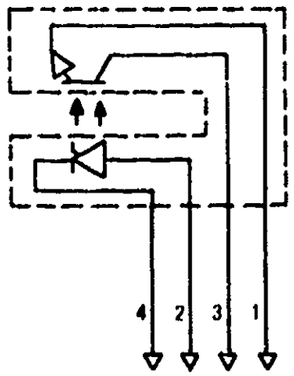
  Secondary outputs

  Lamp circuit—12VAC

  SP208A
  Pins 1 to 2—22VAC
  Pins 4 to 1—11VAC
  Pins 4 to 2—11VAC

- MOTOR

  SP315A—60 to 120VAC—varies with pressure on foot control and torque of machine



Sp318A

- SPEED READER

  Component Check
  SP316A—Pin 2 to 4 is an LED
  Pin 4 output is a sine wave whose frequency varies with motor speed

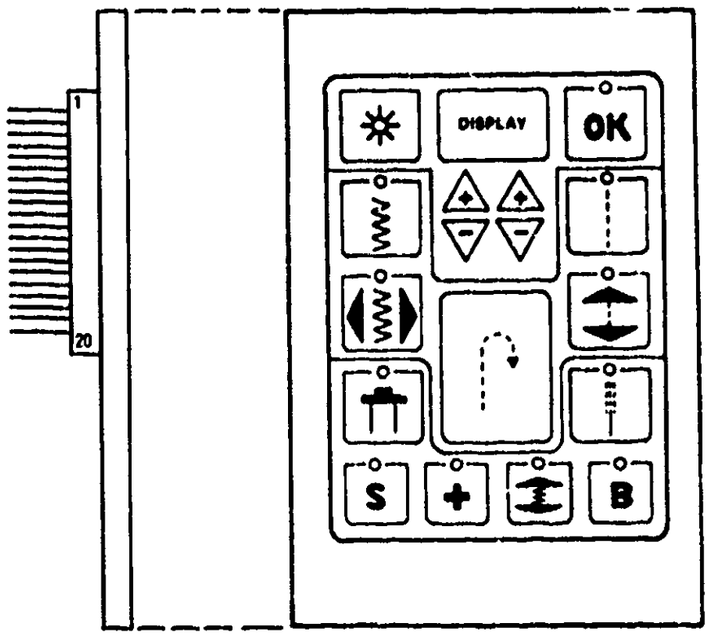
- SP317A INPUTS FROM ANALOGIC BOARD

  Pin 1—+5 VDC logic level (must measure with scope)
  Pin 2—+5VDC
  Pin 3—D C Gnd
  Pin 4—from motor speed switch

Keyboard

FUNCTIONS:

- Instructions to the microcomputer are through the keyboard's switches
- LED's indicate that selection has been accepted by the microcomputer



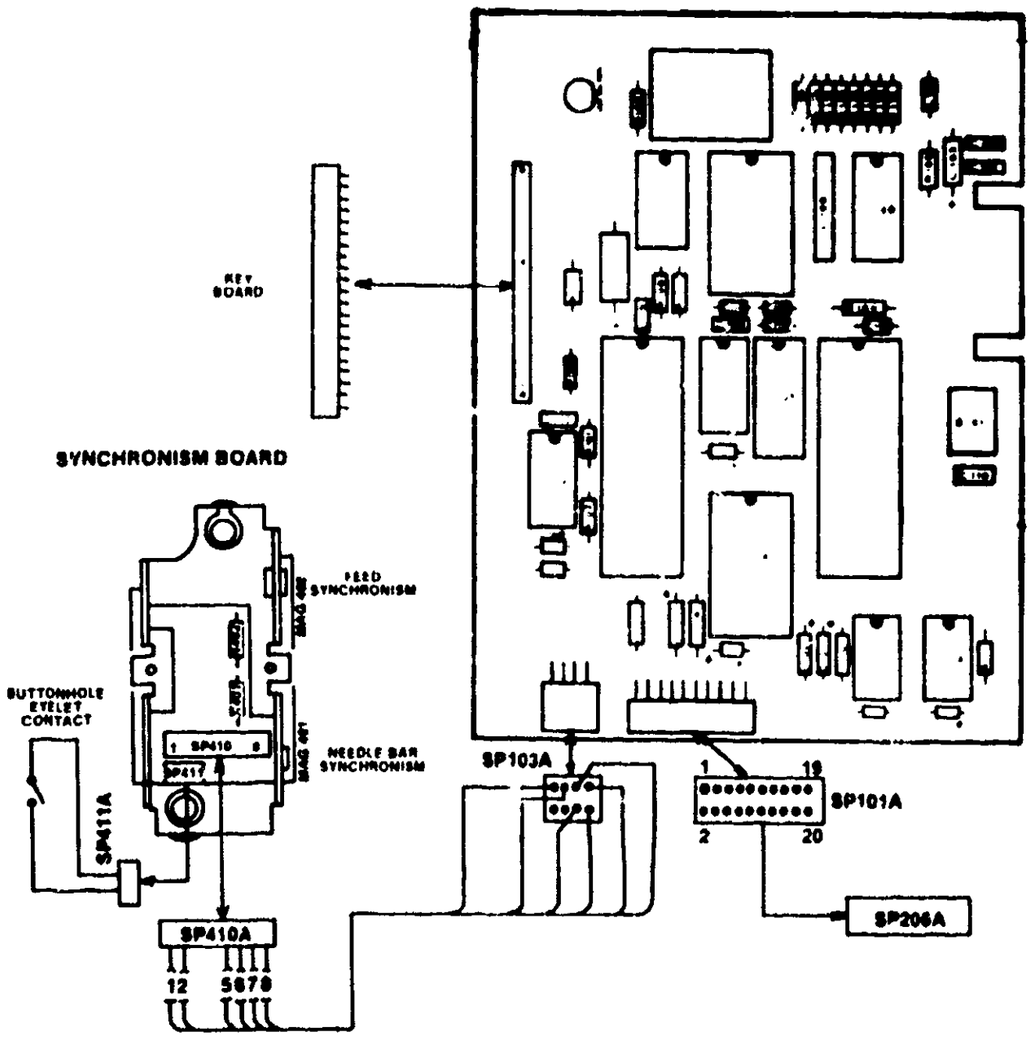
SIDE FRONT

Keyboard Continuity Chart

Example of use When ■ is depressed, continuity should exist between pins 10 and 6 on the keyboard

	2	3	4	5	6	7	8	9
1	OK	+	S					
10	Left	Left	Right	Right	B			

LOGICAL BOARD



Logical Board

FUNCTIONS:

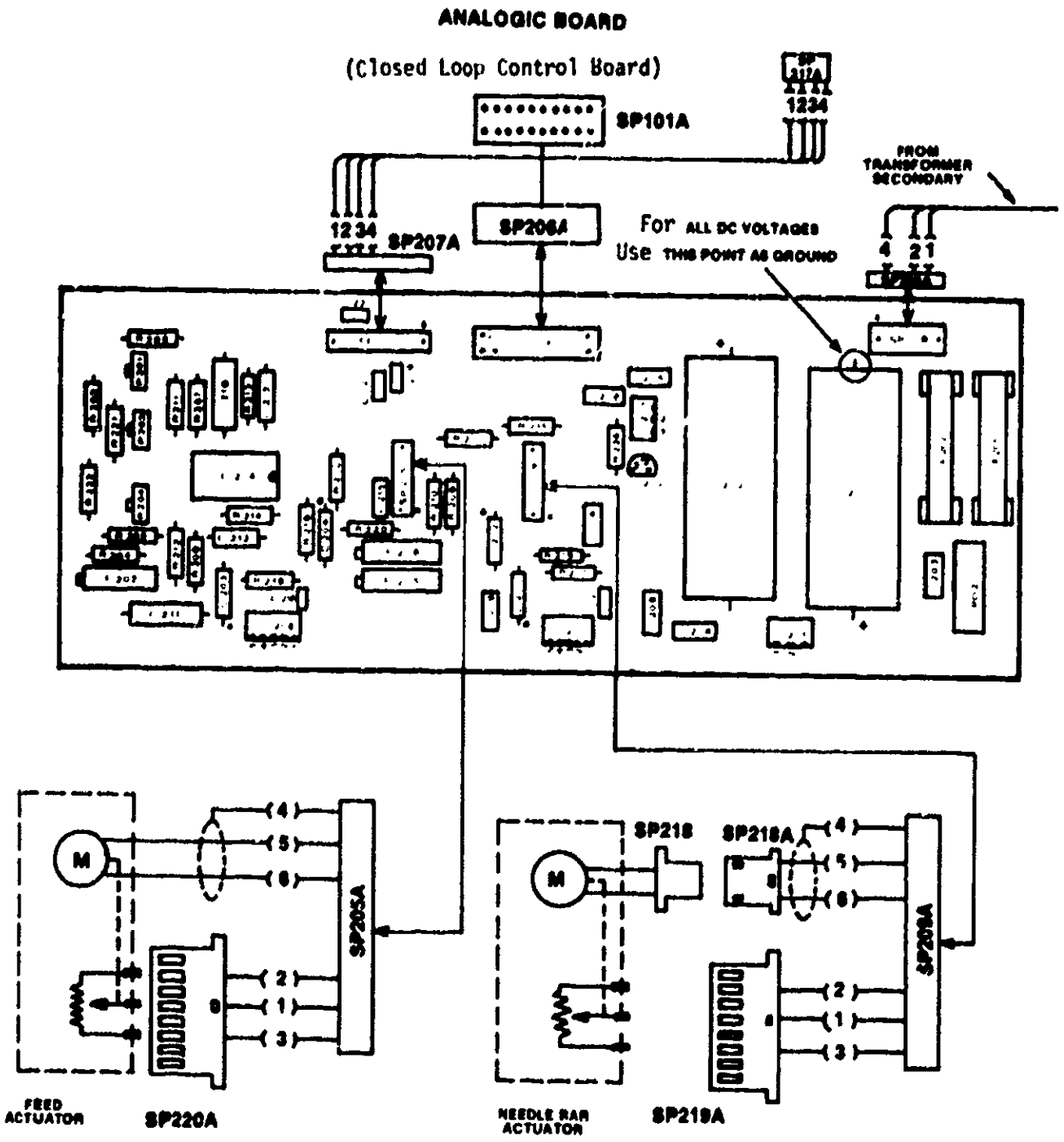
- Microcomputer
- Synchronizes feed and needle movement by sensing pulses from synchronism board

VOLTAGE INPUTS: All DC voltages to gnd.
(Located On Closed Loop Board)

SP101A
- Pin 2—-5VDC
- Pin 4—+2.6VDC
- Pin 5—+5VDC
- Pin 7—+5VDC
- Pin 9—+5VDC

Synchronism Board SP410A
- Pin 5—+5VDC
- Pin 6*—0 or +5VDC
- Pin 7—Gnd
- Pin 8*—0 or +5VDC

*When magnet is facing Mag 402, Pin 6 will be 0
When magnet is facing Mag 401 Pin 8 will be 0



Analogic Board (closed loop control board)

FUNCTIONS:

- DC power supply
- Amplifies output from logic board
- Controls movement of feed and needle bar actuators
- Monitors position of actuator levers via potentiometers built into actuators

VOLTAGE INPUTS:

SP209A
Pins 1 to 2—22VAC
Pins 4 to 1—11VAC
Pins 4 to 2—11VAC

VOLTAGE OUTPUTS: All DC voltages to D.C gnd (Located On Closed Loop Board)

SP206
Pin 2—-5VDC
Pin 4—+2 6VDC
Pin 5—+5VDC
Pin 7—+5VDC
Pin 9—+5VDC

SP207—Pin 2—+5VDC

SP205—Pin 3—+2 5 to 3VDC (measured with scope)

SP209—Pin 3—+2 5 to 3VDC (measured with scope)

ACTUATOR RESISTANCE CHECKS:

Pins 5 to 6—4Ω
Pins 1 to 2—330 to 860Ω ± 20%
Pins 1 to 3—330 to 860Ω ± 20%

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