Straight Stitch Position	Attachment Dimension	Zigzag Bite	Foot Control
Left	Super High Bar	7.0	6819

*Left Needle Position is also referred to as "S" position.

Presser Foot Height

1) PLACE ZIGZAG PRESSER FOOT IN POSITION.
2) RAISE PRESSER BAR LIFTER (A).
3) TURNING HANDWHEEL, CHECK TO SEE IF NEEDLE CLAMP HITS THE PRESSER FOOT. IF THE NEEDLE CLAMP HITS PRESSER FOOT, PRESSER BAR IS TOO HIGH.
4) CHECK TO SEE IF THE HEIGHT OF PRESSER FOOT FROM NEEDLE PLATE IS 6.5 M/M (0.26 HIGH) AT THE MINIMUM. IF NOT, PRESSER BAR IS TOO LOW.

IF ADJUSTMENT IS NECESSARY, BRING NEEDLE BAR TO ITS LOWEST POSITION BY TURNING HANDWHEEL BY HAND. SET PRESSURE REGULATOR AT 0. LOOSEN TWO SCREWS (C) ON PRESSER GUIDE BRACKET (B). MOVING PRESSER BAR (D) BY HAND, ADJUST THE HEIGHT OF PRESSER FOOT SO THAT THERE IS A CLEARANCE OF 6.5 M/M (0.26 INCH) AT THE MINIMUM BETWEEN NEEDLE PLATE AND PRESSER FOOT, AND NEEDLE CLAMP DOESN'T TOUCH THE PRESSER FOOT. TIGHTEN TWO SCREWS (C) SECURELY AFTER ADJUSTMENT.

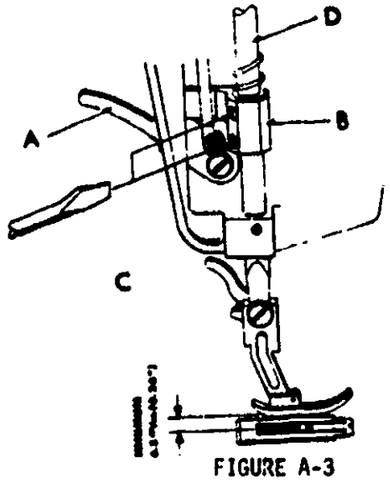


FIGURE A-3

Needle Bar Height

CHECKING NEEDLE BAR HEIGHT

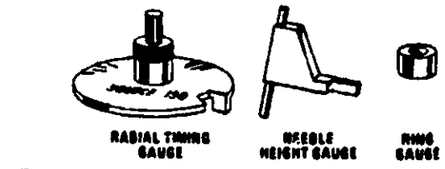
- Set the machine as follows.

  Special stitch selector – straight stitch position
  Stitch width control – 0 or red dot
  Stitch length control – any number
  Special stitch modifier – red dot

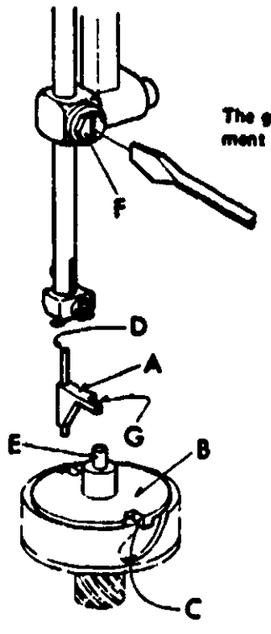
- Remove needle, presser foot, cover plate and needle plate.
- Remove bobbin case.
- Holding needle height gauge (A) with flat side (D) away from you, slip it all the way into the needle bar and tighten the needle clampscrew.
- Insert radial timing gauge (B) onto the shuttle, with needle height gauge at its highest position and pointed hook of shuttle rotated a little to the right as illustrated. In the case of S-needle position models, set ring gauge (H) onto the radial timing gauge (B).
- Turn radial timing gauge (B) so that the ear (C) of the gauge touches the pointed hook of shuttle.
- Turning handwheel slowly, check to see if the arm (G) of gauge (A) slightly touches the center pin (E) on gauge (B) or ring gauge (H). A clearance within 0.1 mm (0.004 inch) between (G) and (E) or between (G) and (H) is acceptable.
- Continue to turn handwheel until needle bar comes to its lowest position, and check to see if the bottom of gauge (A) slightly touches radial timing gauge (B). A clearance within 0.15 mm (0.006 inch) between (A) and (B) is acceptable.
- Adjust the position of needle bar if the rotation of handwheel becomes heavy or handwheel cannot be turned due to contact of arm (G) with center pin (E) or ring gauge (H) or contact of bottom of gauge (A) with radial timing gauge (B).

2. ADJUSTMENT

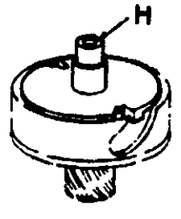
- Loosen screw (F) on needle bar clamp
- Adjust the position of needle bar so that arm (G) touches center pin (E) on gauge (B) or ring gauge (H) and the bottom of gauge (A) touches gauge (B).
- Tighten screw (F) securely.
- Check needle timing to shuttle after adjustment. (G-9)



The gauges as illustrated above are available through Department 206, Chicago only. The kit is identified as #68173.



C – POSITION



S – POSITION

FIGURE B-2

Distribution of Needle Swing

1. CHECKING DISTRIBUTION OF NEEDLE SWING

Check needle position at straight stitching before checking distribution of needle swing.

- Set the machine as follows:
  - Special stitch selector –
  - Stitch width control – 4
  - Stitch length control – any number
  - Special stitch modifier – red dot
- Use zigzag stitch needle plate.
- Turning handwheel, check to see if clearances between needle and edge of needle slot at left and right needle position (A and A') are nearly equal.

2. ADJUSTMENT

- Loosen screw (E) slightly.
- Insert eccentric tool (B) into hole (C).
- Shift zigzag guide bracket (D) to either direction by turning the eccentric tool (B) until you can obtain equal clearance between (A) and (A').
- Tighten screw (E) securely after adjustment.
- Check needle position for decorative stitching (C) and clearance between cam and cam follower (K) after adjustment.

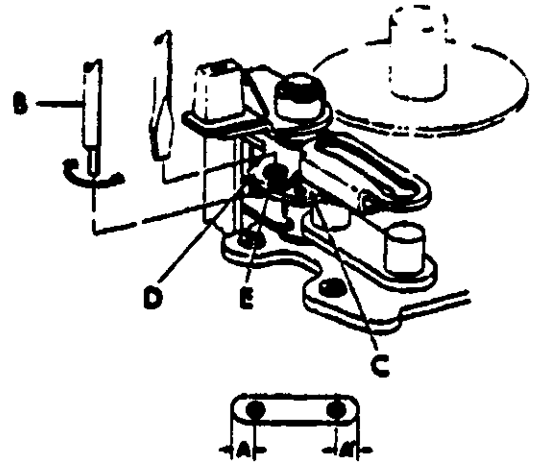


FIGURE C-21

Distribution of Needle Swing

1. CHECKING NEEDLE POSITION FOR DECORATIVE STITCHING

Check needle position at straight stitching before checking needle position for decorative stitching mentioned below.

- Set the machine as follows:
  - Special stitch selector – zigzag stitch position
  - Stitch width control – 4
  - Stitch length control – 0
  - Special stitch modifier – red dot
- Use zigzag stitch needle plate.
- Turning handwheel, check to see if clearances between the needle and edge of needle slot are equal at left and right side strokes of needle bar.
- Turn special stitch selector to cam position.
- With needle in right position, the needle should not touch the right edge of needle slot. The needle should be between right edge of needle slot and right needle position at zigzag stitching.
- With needle in left position, the needle should not touch the left edge of needle slot. The needle should be between left edge of needle slot and left needle position at zigzag stitching.

2. ADJUSTMENT

- Use screw (A) for right side stroke and screw (B) for left side.
- Turn handwheel by hand until the eye of needle is under needle plate.
- Loosen nut (C) slightly.
- Adjust needle position by turning screw (A) or (B) so that needle will not touch either edge of needle slot and needle is slightly beyond maximum width at zigzag stitching.
- Tighten nut (C) securely.
- After adjustment, check following points:
  Distribution of needle swing
  Clearance between cam and cam follower

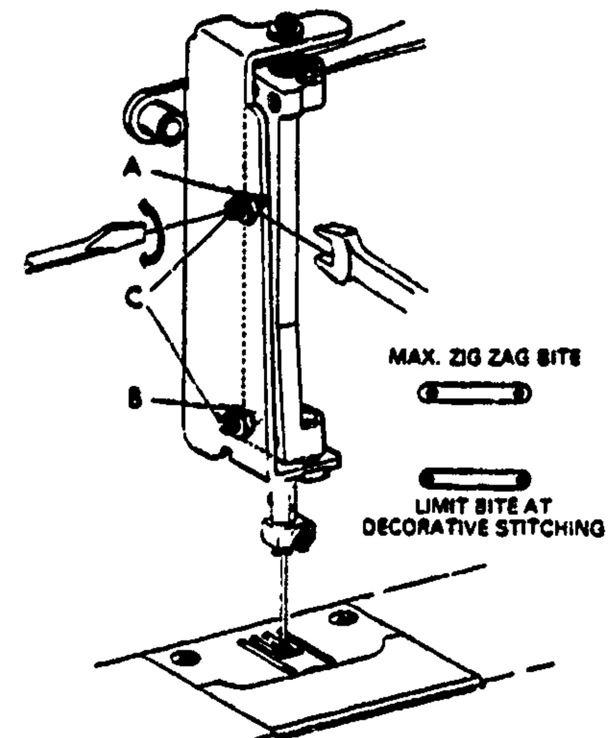


FIGURE C-22

Needle Position

1. CHECKING NEEDLE POSITION AT STRAIGHT STITCHING

Check needle side motion at straight stitching before checking needle position at straight stitching.

- Set the machine as follows:
  - Special stitch selector – straight stitch position
  - Stitch width control – 0 or red dot
  - Stitch length control – any number
  - Special stitch mudifier – red dot
- Use straight stitch needle plate.
- Lower needle bar by turning handwheel by hand.
- Check to see if needle centers on the needle hole of needle plate.

2. ADJUSTMENT

- Loosen screw (A) on needle bar support (C) slightly.
- Turn eccentric screw (B) which connects zigzag guide bar (D) with needle bar support (C), so that needle centers on the needle hole of needle plate.

  In adjusting eccentric screw (B), the front range as shown should be used. Don't turn around to the rear range.
- Tighten screw (B) securely.
- After adjustment, check following points:
  - Needle clearance to shuttle
  - Needle timing to shuttle
  - Distribution of needle swing
  - Clearance between cam and cam follower

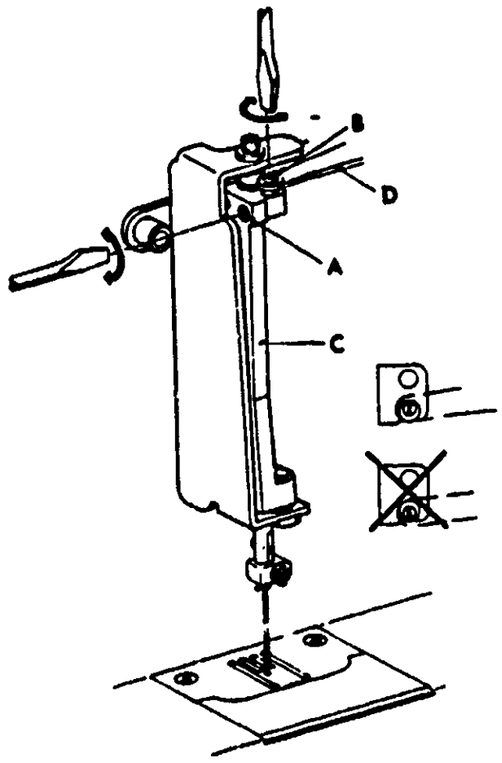


FIGURE D-6

Feed Dog Height

1. CHECKING FEEDDOG HEIGHT

- Set the machine as follows:
  - Special stitch selector – straight stitch position
  - Stitch width control – 0 or red dot
  - Stitch length control – 6
  - Special stitch modifier – red dot
- Place feeddog height gauge at the back of needle plate as shown (Figure 1).
- Turning handwheel, check feeddog height.

FEEDDOG HEIGHT GAUGE	GO SIDE (Facing needle plate)	NO-GO SIDE (Facing needle plate)
Correct	Not moving	Moving
Low	Not moving	Not moving
High	Moving	Moving

2. ADJUSTMENT

- Turning handwheel, align center of roller (C) on feed lifting link (B) with indicator line on feed lifting cam (A) (Figure 2).
- Place the feeddog height gauge with go-side facing needle plate (red on top) at the back of needle slot.

  Lower presser foot.
- Loosen screw (D) slightly.
- Turn eccentric screw (E) so that feeddog touches the gauge slightly.
- Tighten screw (D) securely.

NOTE

When adjusting, turn eccentric screw (E) with eccentric portion facing to the feeddog (to the left) (Figure 3).

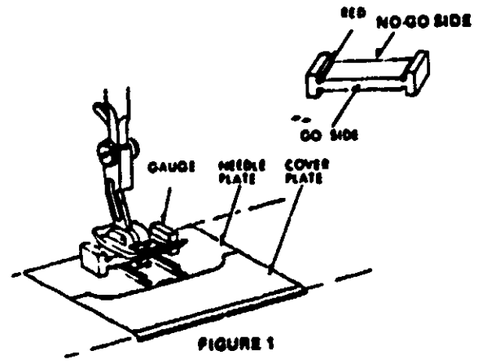


FIGURE 1

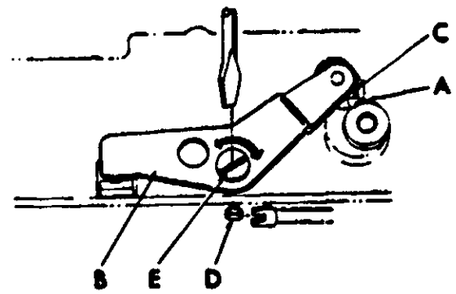


FIGURE 2

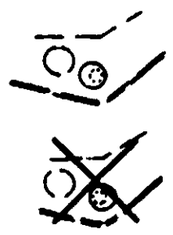


FIGURE 3

FIGURE E-3

Zero-Feeding

1. CHECKING O-FEEDING

- Set the machine as follows:

  Special stitch selector –
  Stitch width control – 0
  Stitch length control – 0
  Special stitch modifier – red dot

- Place paper on needle plate, lower presser foot and turn handwheel several times by hand (with needle, without thread). The needle hole left on the paper should be a single round hole.

  If not, adjust O-feeding.

2. ADJUSTMENT

- Using screw driver through window (B) provided on base plate (A), loosen screw (D) for feed link (C).
- Insert gauge pin (E) – 3 mm diameter – into round hole (F).
- While lightly depressing gauge pin (E) with finger, slowly and carefully move feed link (C) with screwdriver toward the left as indicated by the arrow.
- Finger on gauge pin may feel pin going further into the machine, and feed link (C) will not move further toward the left. Tighten screw (D) at this position of feed link (C). Remove gauge pin.

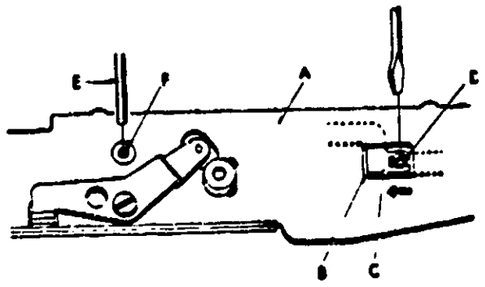


FIGURE F-13

Needle Timing to Shuttle

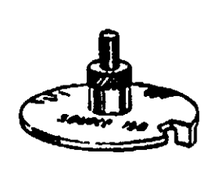
Check needle bar height (B-2) and needle position at straight stitching (D-8) before checking needle timing to shuttle.

CHECKING NEEDLE TIMING TO SHUTTLE

- Set the machine as follows:

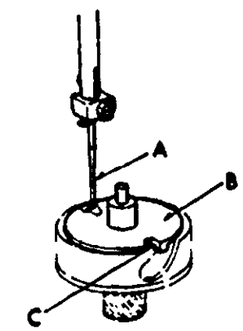
  Special stitch selector – straight stitch position
  Stitch width control – 0 or red dot
  Stitch length control – any number
  Special stitch modifier – red dot

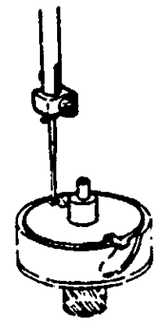
- Remove needle, presser foot, cover plate and needle plate.
- Remove bobbin case.
- Holding test pin (A) with flat side away from you, slip it into the needle bar and tighten the needle clamp screw.
- Insert radial timing gauge (B) into the shuttle.
- Turn gauge so that the ear (C) of the gauge touches the pointed hook of shuttle.
- Turn handwheel slowly until test pin touches the surface of radial timing gauge.
- Check to see if the point of test pin is within Mark (F) or (G).
- If this check indicates machine is out of time, contact
- If this check indicates machine is out of time, handle per Bulletin S-820.

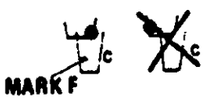


RADIAL TIMING GAUGE

TEST PIN







C–POSITION
FIGURE 1

S–POSITION
FIGURE 2

FIGURE G-9

Needle Clearance to Shuttle

Check needle position at straight stitching before checking needle clearance to shuttle.

- Set the machine as follows:

  Special stitch selector – zigzag stitch position
  Stitch width control – 4
  Stitch length control – any number
  Special stitch modifier – red dot

- Release clutch by pulling handwheel to the right.

- Remove needle, presser foot, cover plate and needle plate.

- Remove bobbin case.

- Holding test pin with flat side away from you, slip it into the needle bar and tighten the needle clamp screw.

- Turning handwheel slowly, check to see if the test pin clearance to the pointed hook of shuttle is within limits stated below. Check at right and left side strokes of needle bar.

  Minimum clearance – pointed hook doesn't contact with #14 needle but contacts slightly with test pin.

  Maximum clearance – up to 0.05 mm (0.002 inch)

NOTE: At the first stroke of needle bar, carefully observe test pin clearance to pointed hook of shuttle, turning handwheel very slowly. If the test pin should contact tightly with the pointed hook, proceed to adjustment step. Tight contact will result in damage to the test pin and pointed hook. At the factory, this timing is closely controlled to the extent that you may hear a feeble clicking sound, when handwheel is turned quickly back and forth. This is the maximum. Do not over-do.

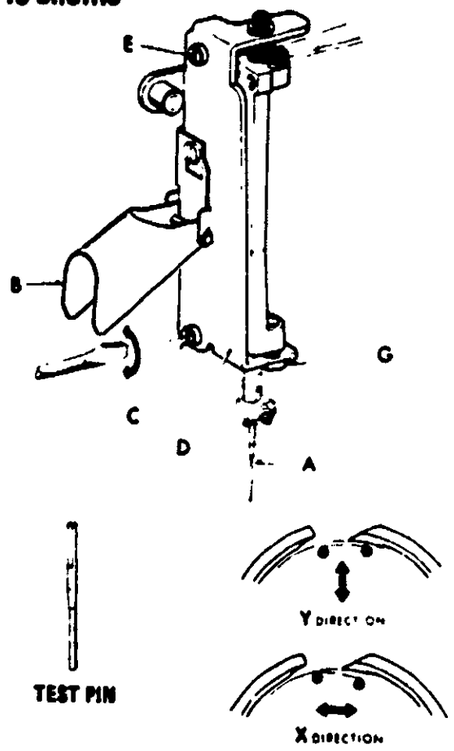


FIGURE G-10

ADJUSTMENT

To adjust clearance in X direction.

- To balance clearance between right and left side strokes of needle bar, turn triangular cam (G) on the bottom of support holder (D) with wrench. This adjustment shifts the needle in X direction.

To adjust clearance in Y direction:

- Raise lamp holder (B), remove bulb and loosen screw (C) slightly.

- Tap front or back edge of support holder with grip of screw driver to shift it Y direction. (See Figure.)

- X and Y direction adjustments should be made so that pointed hook may hit test pin with feather touch at both strokes of needle bar.

- Tighten screws (C) and (E) securely.

- Remove test pin and insert #14 needle. If pointed hook hits #14 needle, the Y direction adjustment is too close and further adjustment must be made to achieve the proper clearance.

Straight Stitch Position

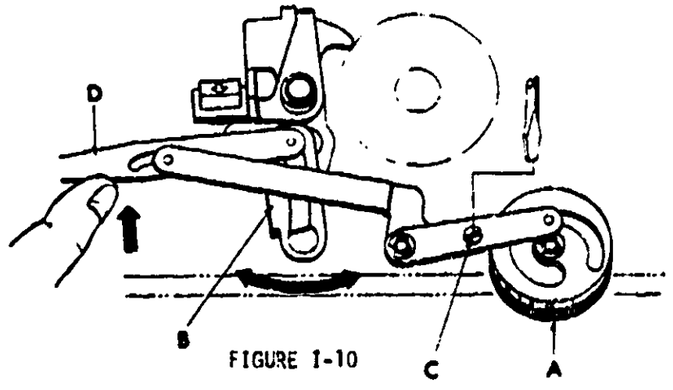


FIGURE I-10

SET STITCH WIDTH CONTROL (A) AT 0. TURNING HANDWHEEL, CHECK TO SEE IF ZIGZAG ROCKER (B) MOVES IN THE DIRECTION OF ARROW.

IF ADJUSTMENT IS NECESSARY, LOOSEN SET SCREW (C) SLIGHTLY. PRESS ZIGZAG GUIDE BAR (D) AGAINST THE END OF ZIGZAG ROCKER (B). TIGHTEN SET SCREW (C) SECURELY AFTER ADJUSTMENT.

NOTE: CHECK NEEDLE POSITION AT STRAIGHT STITCHING (D) AFTER ADJUSTMENT.

Automatic Reverse Stitching
Stretch Stitch

1. CHECKING STRETCH STITCHES

Adjust automatic reverse stitch by turning stitch modifier between S and L. If the adjustment is beyond this control range, adjust using the following procedure.

- Set the machine as follows.

  Special stitch selector – zigzag stich position
  Stitch width control – 4
  Stitch length control – 6
  Special stitch modifier – middle position between S and L (intermediate notched position)

- Use zigzag stitch needle plate.

- Place paper on the needle plate and lower presser foot.

- Turning handwheel, check to see if needle penetrates into the same hole (A1, A2, A3).

  If not, adjust as necessary.

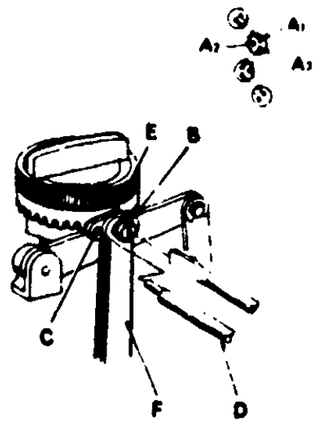


FIGURE 1A

2. ADJUSTMENT FOR FIGURE 1A

- Loosen screw (B) slightly.

- Insert eccentric tool (D) into hole (C) on lever (E). Adjust the position of lever (E) and (F) by turning the eccentric tool (D), until needle penetrates into the same hole (A1, A2, A3).

- Tighten screw (B) securely.

ADJUSTMENT FOR FIGURE 1B

- Adjust the position of levers (E) and (F) by turning screw (G), until needle penetrates into the same hole.

NOTE: At factory, this setting (feed balance) is fixed at the notch located at the center of modifier zone. In the owner's manual a fine adjustment by the modifier only for decorative stitching is suggested. Actually, this control range can be used on built-in utility stitches as well.

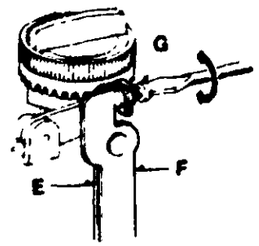


FIGURE 1B

FIGURE J-30

Automatic Reverse Stitching
Buttonhole

1. CHECKING BALANCE OF STITCHES

- Check O-feeding, following Section F 13

- Set the machine as follows

  Special stitch selector –
  Stitch width control – 1 to 1-1/2
  Stitch length control – red zone
  Special stitch modifier –

- Sew a buttonhole and check to see if pitches of forward and reverse stitches are balanced. If not balanced, adjust.

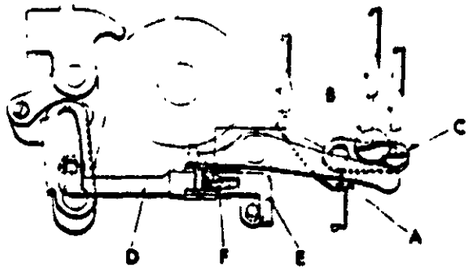


FIGURE 1

2. ADJUSTMENT

- Loosen screw (B) on buttonhole crank (A).

- Adjust the balance of forward and reverse stitches by turning eccentric screw (C). Turn eccentric screw (C) with eccentric portion away from buttonhole crank (A).

- Tighten screw (B) securely.

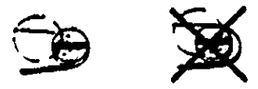


FIGURE 2

3. CHECKING BUTTONHOLE POSITIONING

Check needle position at straight stitching (D-5) before checking buttonhole positioning.

- Set the machine as follows:

  Special stitch selector –
  Stitch width control – 1 to 1-1/2
  Stitch length control – red zone
  Special stitch modifier –

- Use built-in buttonhole foot

- Sew a buttonhole and check to see if bartack is placed in the center of buttonhole foot (Figure 3).

  If not, adjust.

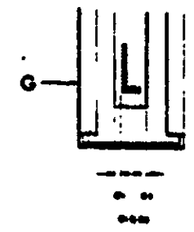


FIGURE 3

FIGURE J-31

4. ADJUSTMENT

- Loosen screw (F) and shift link (E) until the bartack is placed in the center of buttonhole foot.

- Tighten screw (F) securely.

Automatic Mechanism
Cam and Cam follower Mechanism

Check the following points before checking clearance between cam and cam follower.

Needle position for decorative stitching (C-22)
Needle position at straight stitching (D-6)
Cam selector guide plate setting (M-7)

1. CHECKING CLEARANCE BETWEEN CAM AND CAM FOLLOWER

- Set the machine as follows.

  Stitch width control – 4
  Stitch length control – any number
  Special stitch modifier – red dot

- Special stitch selector should turn smoothly.
- Turning special stitch selector, check if each pattern of stitches selected can be sewn.
- If not, adjust as necessary.

2. ADJUSTMENT

- Set special stitch selector at
- Loosen screw (D) slightly.
- Insert eccentric tool (E) into hole (H). Shift link (F) by turning eccentric tool (E), until you obtain about 0.2 mm (0.008 inch) clearance between cam follower (G) and the camming surface on the maximum diameter of the cam, when moving cam follower (G) away from the cam by turning special stitch selector slightly.
- Tighten screw (D) securely.

NOTE

If the above clearance is too wide, needle bar support will hit the screw which controls left side stroke of needle bar, when turning special stitch selector, and stitch selector will not turn or will not turn smoothly.

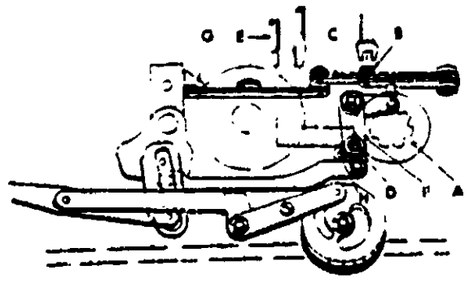


FIGURE K-22

Cam Selector Guide Plate Setting

1. CHECKING ALIGNMENT OF CAM FOLLOWER TO CAMS

- Set the machine as follows:

  Stitch width control – 4
  Stitch length control – any number
  Special stitch modifier – red dot

- Check if each pattern of stitches selected can be sewn.

2. ADJUSTMENT

- Set special stitch selector at
- Loosen screw (B) slightly and align cam follower with the highest zigzag cam below super cam by moving link (C) up and down.
- Tighten screw (B) securely.
- Check distribution of needle swing C-21 after adjustment.

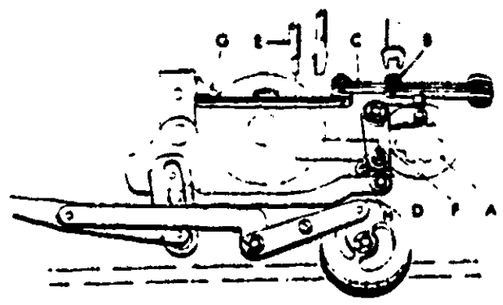


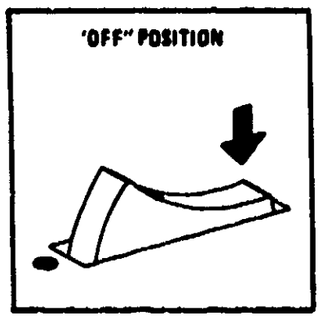
FIGURE M-7

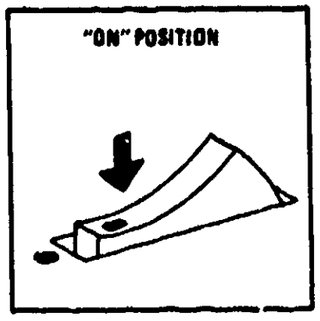
TROUBLE SHOOTING IN ELECTRIC/ELECTRONIC AREAS

MACHINE SETTINGS FOR TYPES OF STITCHING

	Cycle Control Switch	Machine Speed	Cycle Control Indicator	One Cycle Cams	Pattern Indicator
Normal sewing	OFF	Variable	OFF	NO	Red/Green
Basting	ON	Constant	ON	NO	Red
One cycle stitching	ON	Constant	ON	Cam Nos. 80 to 85	Green

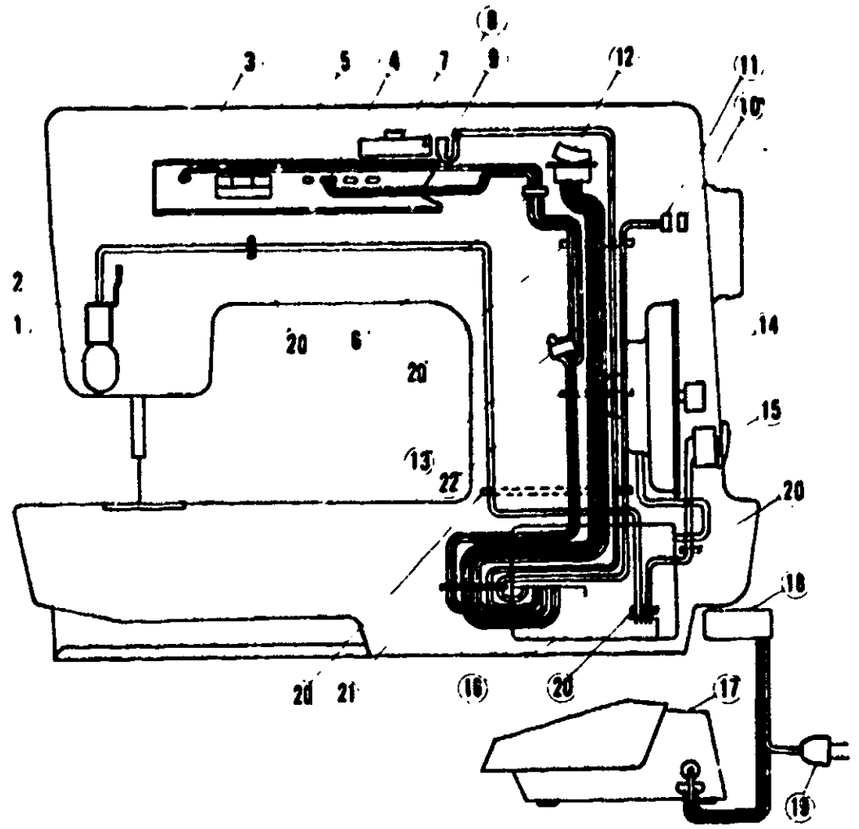
Cycle Control Switch:





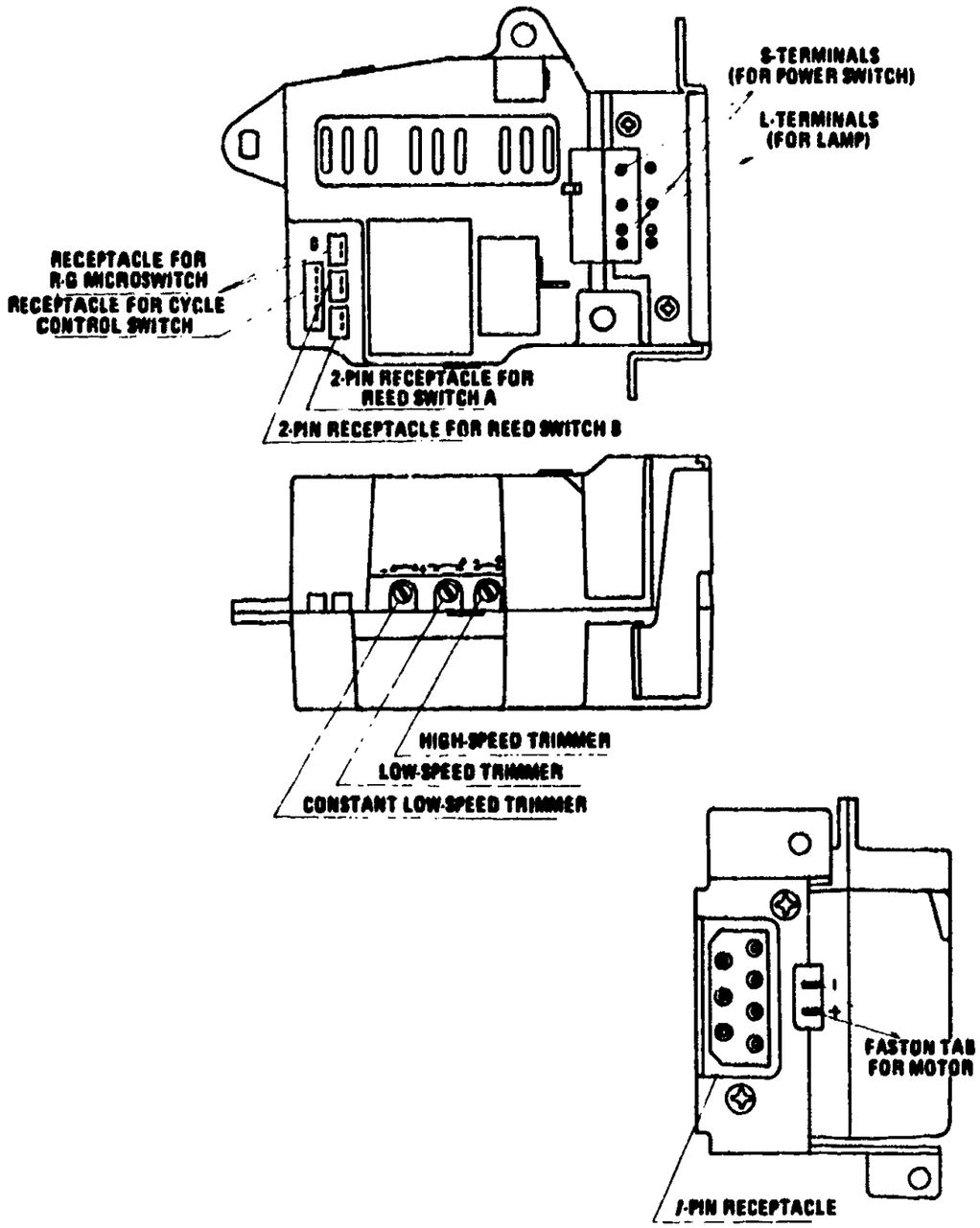
WIRING DIAGRAMS

SCHEMATIC DRAWING OF ELECTRIC COMPONENTS



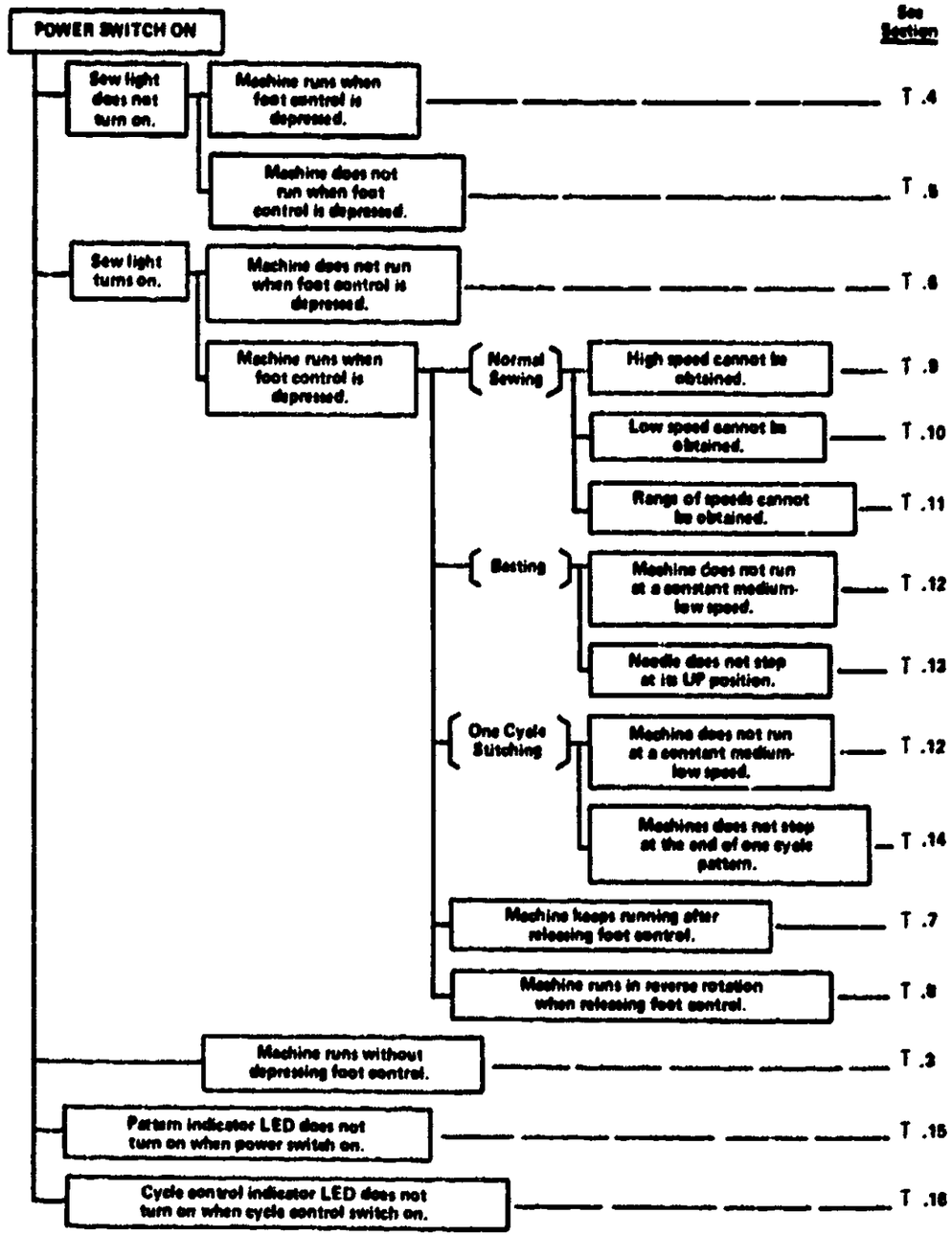
KEY	DESCRIPTION	KEY	DESCRIPTION
1	Lamp	13	R-G Microswitch (red/green)
2	Socket/harness	14	Flat motor
3	LED (Cycle Control)	15	Power Switch
4	LED (Pattern)	16	Main Control Box
5	Flexible Printed Circuit	17	Foot Control with Transformer
6	4-pin Connector	18	7-pin Connector Plug
7	One-cycle Cam	19	Main Plug
8	Magnet B	20	Cord Guard
9	Reed Switch B	21	Uni-tie Fastener
10	Magnet A	22	Cord Clamp
11	Reed Switch A		
12	Cycle Control Switch		

DRAWING OF MAIN CONTROL ASSEMBLY

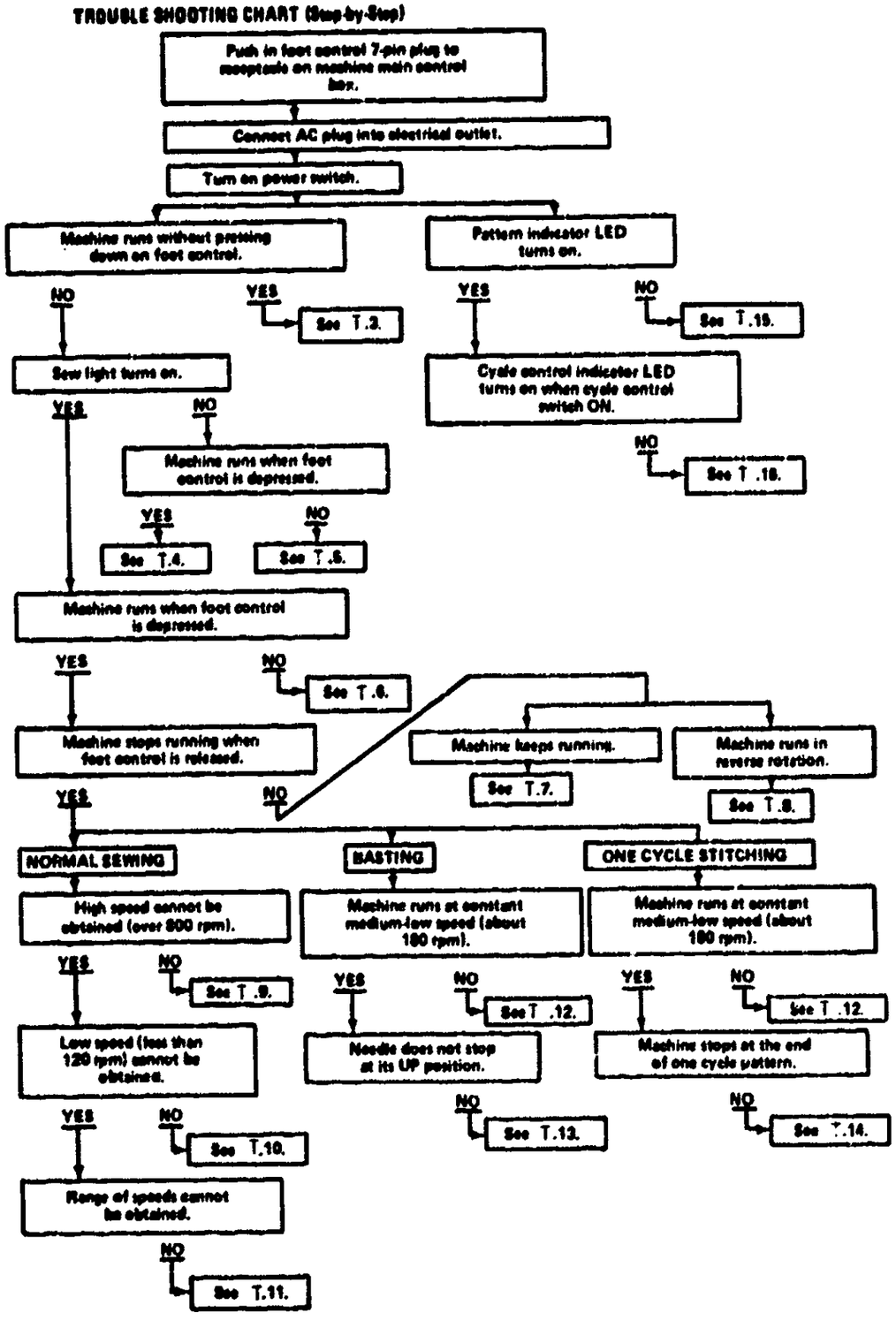


TROUBLE SHOOTING

REFERENCE CHART



TROUBLE SHOOTING CHART (Step-by-Step)



T.3 MACHINE RUNS WITHOUT DEPRESSING FOOT CONTROL

This could be caused by electric, or electronic problem either in control box or in foot control.

Replace foot control. Does problem still exist?

YES

↓

Replace main control box. See Section X.2.

T.4 SEW LIGHT DOES NOT TURN ON (MACHINE RUNS)

Turn on power switch, and depress foot control. If machine runs and sew light does not turn on, the main cause of the problem, could be the light bulb.

Replace the bulb.
Does sew light turn on?

NO

↓

Are ends of lamp harness securely connected to L-terminals in main control box?

YES

↓

Replace foot control.

T .5 SEW LIGHT DOES NOT TURN ON (MACHINE DOES NOT RUN)

This section covers the problem of sew light not turning on when power switch is on and the machine does not run when depressing the foot control.

Is foot control AC plug positively connected with power supply outlet?

YES → NO → Correct the condition.

Is 7-pin foot control plug positively connected into mating receptacle on main control box?

YES → NO → Correct the condition.

Are leads of power switch harness securely connected with S-terminals on main control box?

YES → NO → Correct the condition, and tighten screws in S-terminals.

Is continuity of power switch normal?

YES → Replace foot control. Does problem still exist?

YES → Replace main control box. See Section X.2.

NO → Remove leads of power switch harness from S-terminals on main control box.

Read resistance with switch in the ON position. (Meter range: R x 1 ohm). Reading must be zero ohms.

Replace power switch harness assembly. See Section X .3.

T .6 MACHINE DOES NOT RUN WHEN FOOT CONTROL IS DEPRESSED (POWER SWITCH ON)

Is foot control 7-pin plug securely connected into receptacle on main control box?

YES → NO → Correct the condition.

Are the two Faston clips on the motor leads securely inserted onto tabs in main control box?

YES → NO → Correct the condition.

Is motor in normal condition?

YES → After checking, insert Faston clips onto tabs in main control box securely. (Be sure: Red lead is to Plus, and Black is to Minus)

Replace foot control with new one. Does the problem still exist?

YES → Replace main control box with new one. See Section X.2.

NO

NO → Check the resistance between the two motor leads with ohmmeter. (Red lead -- Plus; Black lead -- minus)

Disconnect the two Faston clips from main control box, and insert test pins into clips.

Read resistance value between two test pins. (Meter Range: R x 1 ohm)

Reading must be below 20 ohms.

Replace motor. See Section X.4.

MACHINE DOES NOT STOP WHEN FOOT CONTROL IS RELEASED

Is foot control 7-pin plug securely connected into receptacle on main control box?

YES

NO → Correct the condition.

Is proper clearance maintained between Reed Switch A and facing magnet?

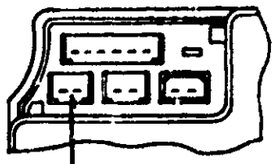
YES

NO → Loosen two screws and reposition magnet A to obtain proper clearance to Reed Switch A. Tighten screws after adjustment. Magnet should not be in contact with Reed Switch A. Clearance should not exceed thickness of No. 14 needle (not shank).

Is Reed Switch A functioning properly?

YES

NO → Remove 2-pin plug for Reed Switch A (black leads) from receptacle on main control box. Insert adaptor pins into the plug. Turn handwheel by hand until magnet comes in close proximity to Reed Switch A. Check resistance across two adaptor pins with meter (Meter range: R x 1 ohm). If Meter hand swings for approximately full scale, Reed Switch A is functioning properly.



RECEPTACLE FOR 2-PIN PLUG OF REED SWITCH A (BLACK LEADS)

→ Replace Reed Switch A. See Section X.5.

Replace foot control. Does the problem still exist?

YES

Replace main control box. See Section X.2.

T.8 MACHINE RUNS IN REVERSE ROTATION WHEN FOOT CONTROL IS RELEASED

Is foot control 7-pin plug securely inserted into receptacle of main control box?

YES

NO → Correct the condition.

Replace foot control. Does the problem still exist?

YES

Replace main control box. See Section X.2.

T.9 HIGH SPEED (OVER 750 RPM) CANNOT BE OBTAINED

Replace foot control. Does the problem still exist?

YES

Is high-speed trimmer on main control box properly adjusted?

YES

NO → Adjust high-speed trimmer according to Section X.10.

Replace motor. Does the problem still exist?

YES

Replace main control box. See Section X.2.

CAUTION!!

When adjusting the speed control trimmer, use a plastic screwdriver or any non-conducting type. A metal or non-insulated screwdriver may touch other metal parts or the casting and cause premature failure of the control box. Use extreme care.

T.10 LOW SPEED (UNDER 120 RPM) CANNOT BE OBTAINED

Replace foot control. Does the problem still exist?

YES

Is low-speed trimmer on main control box properly adjusted?

YES

NO → Adjust low-speed trimmer according to Section X.10.

Replace main control box. See Section X.2.

CAUTION!!

When adjusting the speed control trimmer, use a plastic screwdriver or any non-conducting type. A metal or non-insulated screwdriver may touch other metal parts or the casting and cause premature failure of the control box. Use extreme care.

T .11 RANGE OF SPEEDS CANNOT BE OBTAINED

Is cycle control switch in OFF position?

YES

NO → Set cycle control switch at OFF position.

Replace foot control. Does the problem still exist?

YES

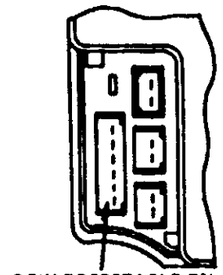
Replace main control box. See Section X.2.

T .12 CONSTANT MEDIUM-LOW SPEED (ABOUT 180 RPM) CANNOT BE MAINTAINED WITH CYCLE CONTROL SWITCH ON

Is 6-pin plug securely connected into receptacle on main control box?

YES

NO → Correct the condition.

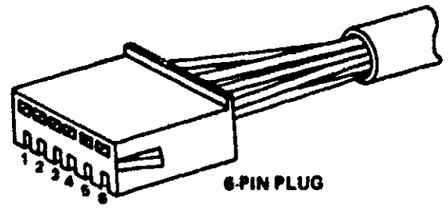


6-PIN RECEPTACLE ON MAIN CONTROL BOX

Is cycle control switch functioning properly?

YES

NO



6-PIN PLUG

Remove 6-pin plug from receptacle on main control box.

Check continuity of two terminals of the plug in the following sequence. (Meter range: R x 1 ohm)

Terminal No.	Cycle Control Switch	Meter Readings
(1) and (3)	ON	0
(2) and (3)	OFF	0
(4) and (6)	OFF	0
(5) and (6)	ON	0

Meter readings must be zero ohms.

Replace cycle control switch assembly. See Section X .6.

Is trimmer for constant low speed property adjusted? See Section X.10.

YES

NO → Adjust constant low-speed trimmer, following Section X .10.

Replace main control box. See Section X.2.

CAUTION!!

When adjusting the speed control trimmer, use a plastic screwdriver or any non-conducting type. A metal or non-insulated screwdriver may touch other metal parts or the casting and cause premature failure of the control box. Use extreme care.

T .13 NEEDLE DOES NOT STOP AT ITS "UP" POSITION (BASTING)
With Cycle Control Switch ON

Is Reed Switch A properly positioned?

YES

NO → Remove side cover, and reposition Reed Switch A within the allowance of the mounting bracket.

Is proper clearance maintained between Reed Switch A and facing magnet?

YES

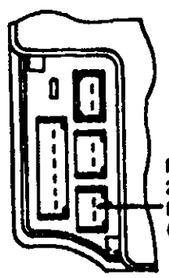
NO → Loosen two screws and reposition magnet A to obtain proper clearance to Reed Switch A. Tighten screws after adjustment.

Magnet should not be in contact with switch. Clearance should not exceed thickness of No. 14 needle (not shank).

Is 2-pin plug (black leads) of Reed Switch A securely connected with receptacle on main control box?

YES

NO → Correct the condition.



RECEPTACLE FOR 2-PIN PLUG OF REED SWITCH A (BLACK LEADS)

Is Reed Switch A functioning properly?

YES

NO → Replace Reed Switch A. See Section X .5.

Remove 2-pin plug from receptacle, and insert adapter pins to the plug.

Turn handwheel by hand until magnet comes in close proximity to Reed Switch A, and check resistance across two adapter pins with meter. (Meter range: R x 1 ohm).

If meter hand swings approximately full scale, the switch is functioning properly (zero ohms).

Replace main control box. See Section X.2.

T14 MACHINE DOES NOT STOP AT THE END OF ONE-CYCLE PATTERN

Is cycle control switch at ON position?

YES

NO → Turn on cycle control switch.

Is a one-cycle stitching cam used in machine?

YES

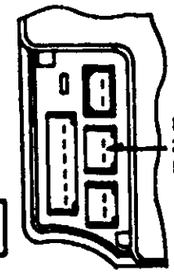
NO → Insert a green cam with magnet (Nos. 88-85).

Is magnet properly inserted in the one-cycle stitching cam?

YES

NO → Replace one-cycle stitching cam.

Is 2-pin plug of Reed Switch B securely connected with receptacle on main control box (white leads)?



RECEPTACLE FOR 2-PIN PLUG OF REED SWITCH B

YES

NO → Correct the condition.

Is proper clearance maintained between Reed Switch B and facing magnet?

YES

NO → Loosen screw and reposition Reed Switch B to obtain proper clearance to the facing magnet. Tighten screw after adjustment.

Reed Switch B should not be in contact with magnet. Clearance should not exceed thickness of No. 14 needle (not at shank).

Is Reed Switch B functioning properly?

YES

NO → Replace Reed Switch B See Section X .7.

Remove 2-pin plug of Reed Switch B (white leads) from receptacle on main control box, and insert adapter pins into the plug.

Check resistance across two adapter pins with a meter, when magnet comes in close proximity to Reed Switch B. (Meter range: R x 1 ohm)

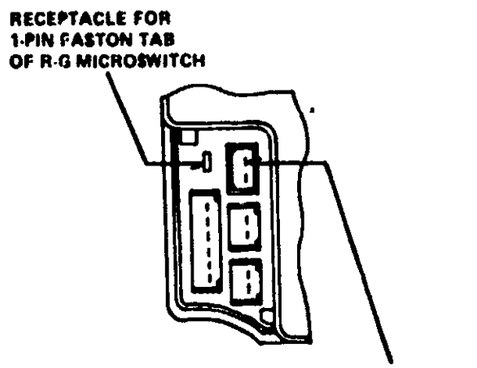
If meter hand swings approximately full scale, the switch is functioning properly (zero ohms).

Replace main control box. See Section X .2.

T.15. PATTERN INDICATOR LED DOES NOT TURN ON
PATTERN INDICATOR LED DOES NOT CHANGE ITS COLOR BETWEEN RED AND GREEN WHEN TURNING MODIFIER

Check for positive connections at the following points:

1. 2-pin plug of R-G microswitch (Brown/Red leads) at receptacle on main control box.
2. 1-pin Faston tab of R-G microswitch at receptacle on main control box.
3. 4-pin plug of R-G microswitch at receptacle on the back of control panel.



YES → NO → Correct the condition.

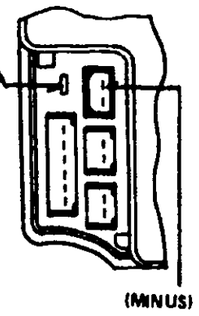
Is main control box functioning properly?

YES → NO →

Remove 2-pin plug and 1-pin Faston tab of R-G microswitch from receptacle on main control box.

Power switch on.

Measure voltage across two terminals as illustrated. (Meter range: 10VDC scale)



If meter reads about 7V, main control box is functioning properly.

Replace main control box.
See Section X .2.

Is R-G microswitch functioning properly?

YES → NO →

Set modifier at ● position.

Remove 4-pin plug of R-G microswitch from receptacle on the back of control panel.

Use adapter pins as illustrated.

Power switch on, and measure voltage across two adapter pins. (Meter range: 10VDC)

YES → If meter readings are:
about 7V when cycle control switch ON,
about 5V when cycle control switch OFF,
R-G microswitch is functioning properly.

NO → Replace R-G microswitch assembly.
See Section X .8.

Either LED or flexible printed circuitry may be defective. Replace control panel assembly.
See Section X .9.

NOTE: Pattern indicator must be Green when the modifier setting is in the range (L–S), and Red when the modifier is set at the Red dot.

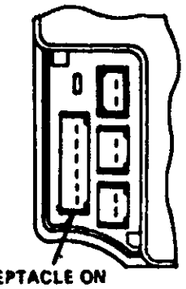
If LED changes color but not as indicated above, the R-G microswitch is not positioned correctly.

T.16 CYCLE CONTROL INDICATOR LED DOES NOT TURN ON

Is 6-pin plug securely connected into receptacle on main control box?

YES

NO → Correct the condition.

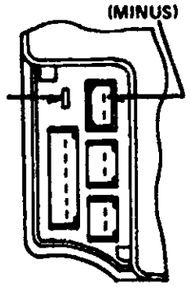


6-PIN RECEPTACLE ON MAIN CONTROL BOX.

Is main control box functioning properly?

YES

NO → Replace main control box. See Section X. 2.



Remove 2-pin plug and 1-pin Faston tab of R-G microswitch from receptacle on main control box.

Power switch on.

Measure voltage across two terminals as illustrated. (Meter range: 10VDC)

If meter reads about 7V, main control box is functioning properly.

Is R-G microswitch functioning properly?

YES

NO → Replace R-G microswitch assembly. See Section X.8.

Set modifier at ● position.

Remove 4-pin plug of R-G microswitch from receptacle on back of control panel.

Use adapter pins as illustrated.

Power switch on, and measure voltage across two adapter pins. (Meter range: 10VDC)

If meter readings are:

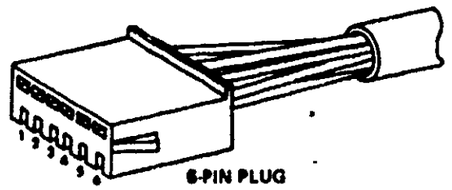
about 7V when cycle control switch ON,
about 5V when cycle control switch OFF,

R-G microswitch is functioning properly.

Is cycle control switch functioning properly?

YES

NO → Replace cycle control switch assembly. See Section X.8.



6-PIN PLUG

Remove 6-pin plug from receptacle on main control box.

Using adapter pins, check continuity between terminals in the plug in the following sequence. (Meter range: R x 1 ohm)

Terminal No.	Cycle Control Switch	Meter Readings
(1) and (3)	ON	0
(2) and (3)	OFF	0
(4) and (6)	OFF	0
(5) and (6)	ON	0

Meter readings must be zero ohms.

Either LED or flexible printed circuitry may be defective. Replace control panel assembly. See Section X.9.

X.2 REPLACEMENT OF MAIN CONTROL BOX

DISASSEMBLING

1. Disconnect the motor Faston clips (M) from the main control box.
2. Remove self-tapping screw (A), and take off cord guard (E).
3. Remove self-tapping screw (B), and take off terminal cover (C).
4. Loosen four screws (D) a few turns, and remove lamp harness and switch harness from main control box.
5. Pull out 4 plugs and 1 Faston clip from receptacles in section (P) of main control box.

   Plug with red/brown leads has a self-locking device. Pull it off while unlocking the device by using pliers or longnose pliers as illustrated in Figure 2.

6. Remove screws (F), (G) and (J) of main control box.
7. Remove screws (K) and (N) on bracket, and remove the main control box

ASSEMBLING

1. Place main control box in position in machine, in such a way that all the wires that are connected to the receptacles in section (P) come out between cast stud (Q) and adjacent cast stud where screw (F) goes in, and that lamp and power switch harnesses come out between cast stud (H) and adjacent cast stud where screw (G) goes in.
2. Position main control box with two screws (K) and (N). Leave the two screws slightly loose so that the box can be repositioned by hand.

   Main control box must be positioned so that its 7-pin receptacle is in good alignment with cut-out provided on machine base cover.

3. Secure main control box by tightening screws (F), (G) and (J), and then (D) and (E).

   The five screws must be evenly tightened little by little. Tightening one while others are loose will cause distortion of the main control box.

4. Connect 4 plugs and 1 Faston clip into receptacles in section (P) of main control box. They must be connected in correct receptacles, as shown on instruction label attached to main control box, and in the correct direction.
5. Connect lamp leads to terminals marked (L), and tighten screws (D)
6. Insert switch leads into terminals marked (S), and tighten screws (D).

   Be sure lamp harness and switch leads are connected to the correct terminals.

7. Place plastic terminal cover in position so that projections of terminal cover on both sides engage with recess provided on main control box Secure it with self-tapping screw (B).
8. Place lamp harness and switch harness in the corner cut-out of main control box Assemble cord guard (E) over them with self-tapping screw (A)

   Do not over-tighten self-tapping screws. Tightening them with extra force will break the screw threads.

9. Connect motor leads (M) to control box, **red lead to plus tab, and black lead to minus tab.**

TESTS AFTER ASSEMBLING

After assembling, connect 7-pin foot control plug into receptacle of main control box, and check the following points:

1. Turn on power switch and see if sew light turns on, and that pattern indicator LED is either Green or Red.
2. Turn cycle control switch on and see if cycle control indicator LED is Red.
3. Depress foot control and see if motor turns in correct direction (counterclockwise).
4. Sew one stitch and see if needle bar stops at its UP position (cycle control on).
5. Insert green one-cycle cam and see if machine automatically stops at the end of one cycle pattern

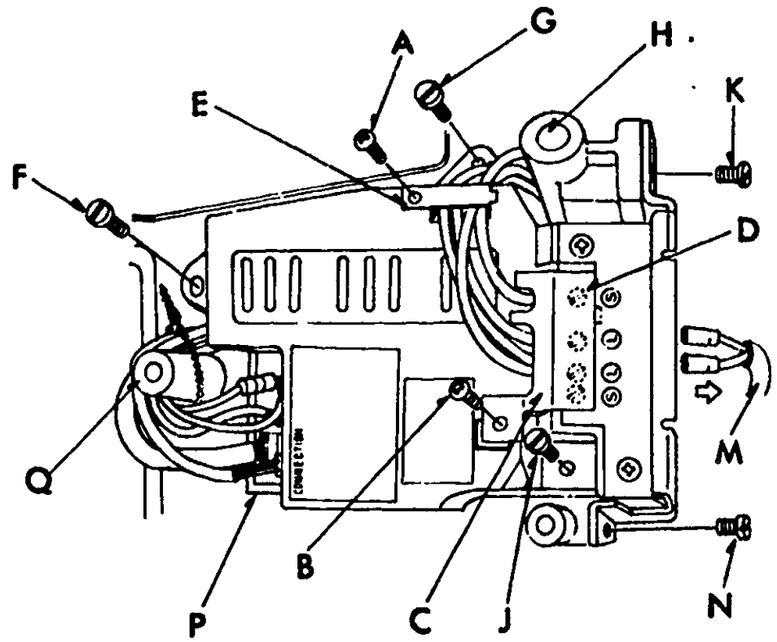


FIGURE 1

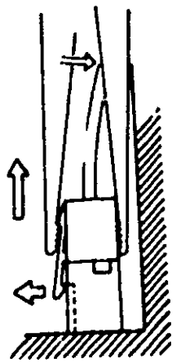


FIGURE 2

X.3 REPLACEMENT OF POWER SWITCH

DISASSEMBLING

1. Take off cord guard (D) by removing screw (H) and screw (F) on power bracket (G)

2 Take out cord guard (E) and terminal cover (C) by removing self tapping screws (A) and (B)

3. Loosen screws (J) at S terminals on main control box a few turns and pull off switch harness leads

4 Remove power switch assembly from machine by pulling switch upward.

ASSEMBLING

1. Route leads of new switch assembly passing behind casting bridge (K) toward main control box

   Be careful not to damage wire insulation with sharp corner of casting.

2 Assemble power switch to machine casting with screw (F)

   Make sure switch harness is not pressed against motor bracket.

   Switch must be positioned so that switch button is aligned with the cut-out provided on side cover.

3 Assemble cord guard (D) to machine casting with screw (H) and properly guide switch harness

4 Insert switch leads into S terminals on main control box, and tighten screws (J) Switch harness must be routed to pass left side of cast stud (L) to main control box

   Pull the wires lightly after tightening two screws (J) to be sure the switch wires are securely connected to the terminals.

5. Place terminal cover (C) in position and fasten it in place with self tapping screw (B)

6 Place switch harness in cut-out corner of main control box, together with lamp harness in position, and assemble cord guard (E) over the harnesses with self tapping screw (A).

TESTS AFTER ASSEMBLING

Insert 7 pin foot control plug into receptacle on main control box Turn on power switch and see if sew light turns on.

X.3 REPLACEMENT OF POWER SWITCH

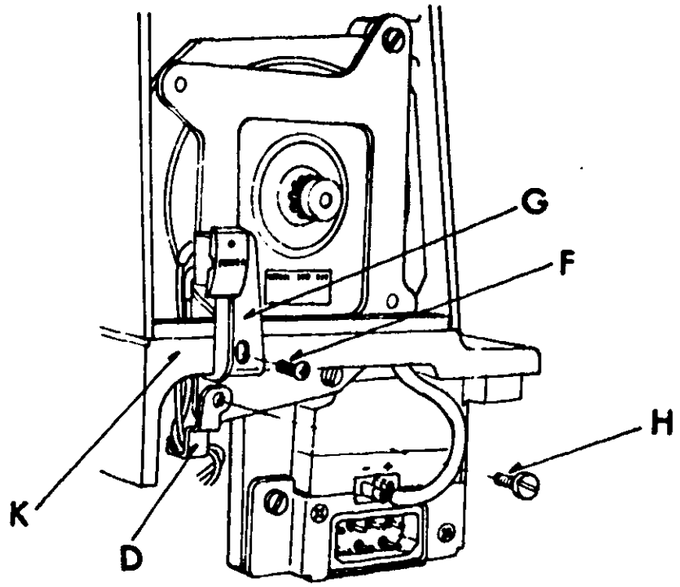


FIGURE 1

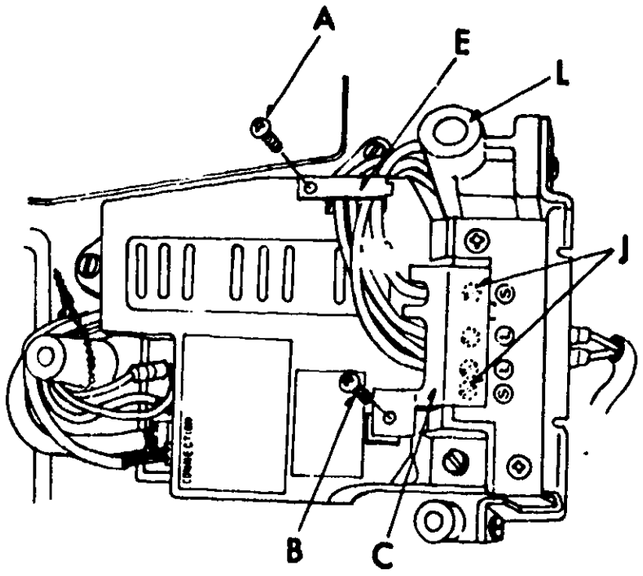


FIGURE 2

X.4 REPLACEMENT OF MOTOR

DISASSEMBLING

1. Remove motor leads (G) from the main control box.
2. Remove screw (A) of power switch assembly, and leave it hanging.
3. Remove screws (B), (C), and (J) of motor bracket, and remove motor (with bracket) from machine.
4. Remove 4 screws (E) and disassemble motor from bracket.
5. Loosen 2 screws (F) and remove motor pulley from motor shaft.

ASSEMBLING

1. Insert motor pulley onto shaft of new motor with the driving serrations facing motor (collar portion outside). Align two screw holes of pulley with recesses provided on motor shaft, and tighten two screws (F).
2. Assemble motor onto motor bracket with 4 screws (E) so that motor leads come out to the side of two holes on bottom of bracket. (See Figure 2.)
3. Place motor in machine and route motor leads downward, passing behind casting bridge (H) toward main control box.
4. Assemble motor to machine casting with 3 screws (B), (C), and (J). Cord guard (D) must be assembled with screw (B) at the same time.

   Tension of driving belt must be only the motor hanging weight.
5. Assemble power switch with screw (A), so that the switch button is aligned with cutout provided on side cover.
6. Reconnect motor lead Faston clips into the receptacle tabs on main control box. **Red lead to plus tab, and Black lead to minus tab.**

   Ensure positive connection of Faston clips and tabs. Tabs should not slip between metal part and plastic sleeve of Faston clip.

TESTS AFTER ASSEMBLING

Insert 7 pin plug of foot control into receptacle on main control box, turn on power switch (cycle control switch OFF), and check the following by depressing foot control.

1. See if motor runs.
2. See if motor runs in correct rotation (counter clockwise).
3. See if machine will run at maximum speed (over 750 rpm).

X.4 REPLACEMENT OF MOTOR

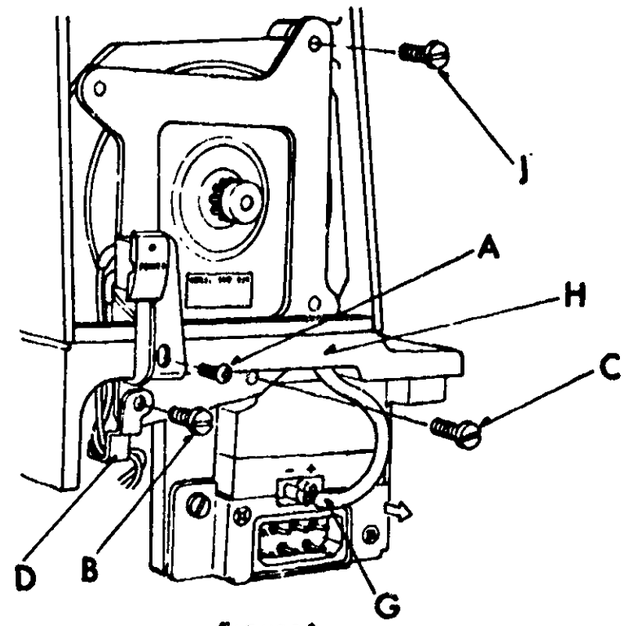


FIGURE 1

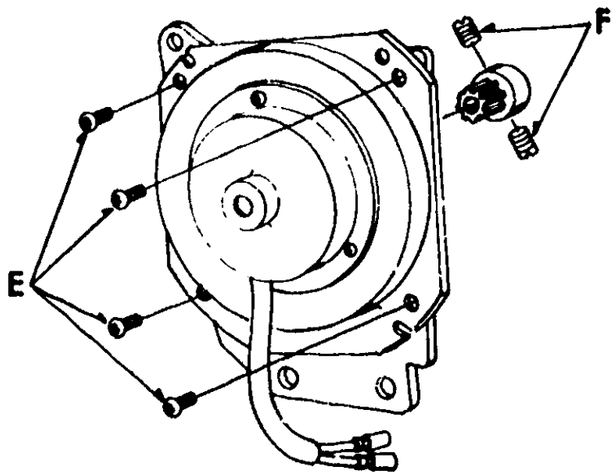


FIGURE 2

X.6 REPLACEMENT OF REED SWITCH (A)

DISASSEMBLING

1. Disassemble power switch and motor.

2 Remove screws (A) and (B) from mounting bracket (E) of Reed Switch A.

3 Release wires from clamp (G) inside machine arm column

4 Remove 2 pin plug (Q) (black leads) from receptacle in section (P) of main control box. (See Figure 2)

5. Disassemble main control box.

6. Take off cord guard (F) on back of casting behind control box

7 Remove Reed Switch A with wires by pulling upward

8 Disassemble Reed Switch A from mounting bracket (E), by removing two screws (C) and (D)

ASSEMBLING

1 Mount new Reed Switch A onto bracket (E) with two screws (C) and (D).

2 Route switch leads toward main control box, through the hole provided in machine casting

3 Assemble switch with bracket onto machine casting with two screws (A) and (B) Switch leads must come down behind the bracket.

Clearance between Reed Switch "A and magnet (H) when facing each other must be 0.5 – 1.0 mm (0.02 – 0.04 inches). Clearance should not exceed thickness of No. 14 needle (not shank)

4 Clamp switch leads together to the other wires with clamp (G) inside arm column

5 Secure all the wires to casting with cord guard (F) behind main control box

6 Assemble main control box,

7 Connect 2 pin plug (Q) into receptacle on main control box (Figure 2)

8 Assemble motor and power switch,

TESTS AFTER ASSEMBLING

Connect 7 pin foot control plug into receptacle on main control box, power switch on, cycle control switch on. Sew stitch by stitch, and see if needle stops at its UP position after each single stitch

X.6 REPLACEMENT OF REED SWITCH (A)

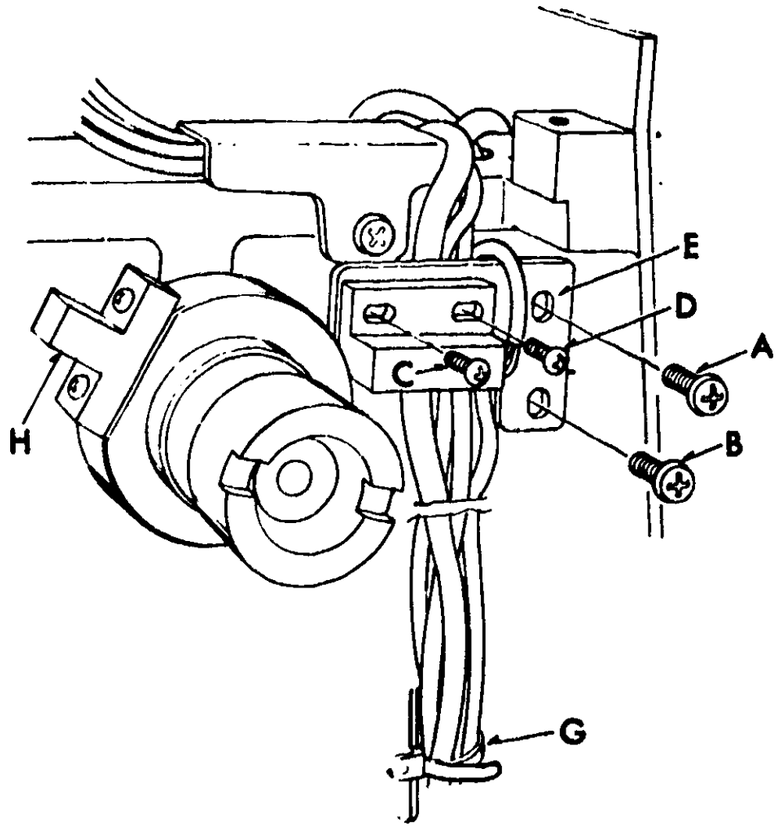


FIGURE 1

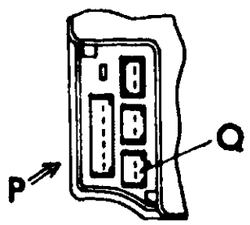


FIGURE 2

X.6 REPLACEMENT OF CYCLE CONTROL SWITCH

DISASSEMBLING

1. Disassemble motor and power switch,
2. Take out cord guard (C) by removing screw (A)
3. Remove switch bracket (E) from casting, by removing two screws (B) and (D)
4. Release wires from clamp (G) inside machine arm column
5. Pull 6-pin plug from receptacle (Q) on main control box (Figure 2)
6. Disassemble main control box,
7. Take off cord guard (F) on back of casting behind main control box
8. Take out cycle control switch assembly by pulling upward from machine
9. Disassemble cycle control switch from bracket (E) by removing 2 screws (H) and (J)

ASSEMBLING

1. Assemble new cycle control switch onto bracket (E) with 2 screws (H) and (J) Dot on switch button should come toward short end of bracket
2. Route leads of cycle control switch along casting bridge (K), downward inside housing, toward main control box through a hole provided on base casting
3. Assemble cycle control switch with bracket (E) onto casting with two screws (B) and (D) Position switch so that the switch button is aligned with cut out provided in top coverplate.
4. Press switch leads together with other wires along the casting Retain with cord guard (C) and screw (A)
5. Clamp all the wires together with clamp (G) inside arm column
6. Attach all the wires to casting with cord guard (F) behind main control box
7. Assemble main control box,
8. Insert 6-pin plug into receptacle (Q) on main control box
9. Assemble motor and power switch,

TESTS AFTER ASSEMBLING

Insert 7-pin foot control plug into receptacle on main control box, and turn on power switch.

1. Turn on cycle control switch and see if cycle control indicator LED is Red
2. Sew stitch by stitch, and see if needle stops at its UP position after each stitch (cycle control switch ON)

X.6 REPLACEMENT OF CYCLE CONTROL SWITCH

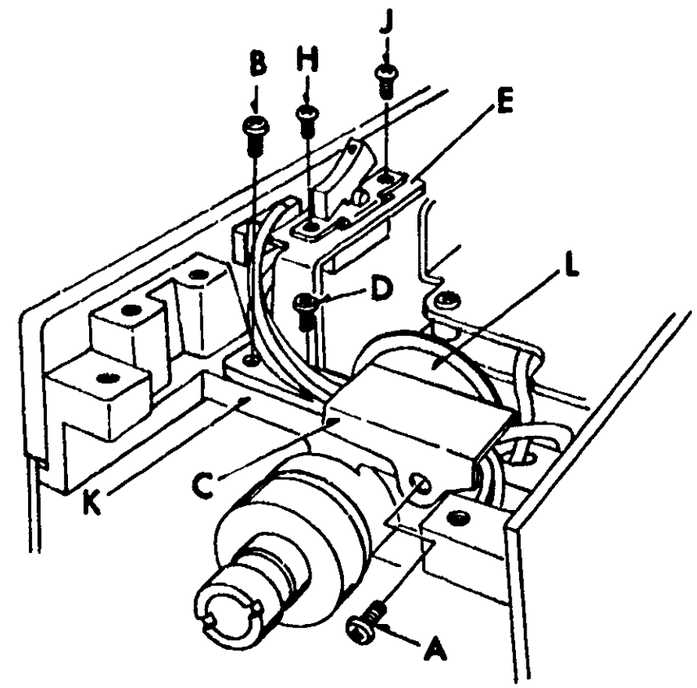


FIGURE 1

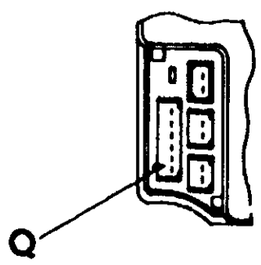


FIGURE 2

X.7 REPLACEMENT OF REED SWITCH (B)

DISASSEMBLING

1. Disassemble power switch and motor.
2. Release wires from clamp (G) inside machine arm column.
3. Pull 2-pin plug (Q) (White leads) from receptacle on main control box
4. Disassemble main control box.
5. Remove cord guard (F) on back of casting behind main control box
6. Pull leads of Reed Switch B upward through casting hole (H) until its 2-pin plug comes through.
7. In order to guide leads of new switch assembly underneath selector mechanism, attach about 2 feet of strong thread or fine copper wire securely to the 2-pin plug.
8. Remove screw (A) of switch bracket (D).
9. Take off Reed Switch B with bracket (D), by pulling it slowly in the direction shown with arrow in Figure 2
10. Disassemble Reed Switch B from bracket (D), by removing screws (B) and (C).
11. Detach guide thread, or fine wire, from 2-pin plug.

ASSEMBLING

1. Assemble new Reed Switch B onto bracket (D) with two screws (B) and (C).
2. Attach a guide thread, or fine wire, securely to 2-pin plug
3. Pulling the other end of guide thread (or wire), route leads of Reed Switch B from left to right, underneath selector assembly, until 2-pin plug comes out from right side of selector
4. Detach guide thread (or wire) from 2-pin plug, and further route leads of Reed Switch B downward through casting hole (H)
5. Assemble Reed Switch B with bracket onto stitch selector (E) assembly with screw (A).

   Insert one cycle cam onto cam shaft, and adjust clearance of Reed Switch B to the magnet in cycle cam to come within 0.5 – 1.0 mm (0.02 – 0.04 inches) Clearance should not exceed the thickness of No. 14 needle (not shank)
6. Route leads of Reed Switch B downward toward main control box through the hole provided on base casting
7. Clamp leads of Reed Switch B together with all other wires with clamp (G) inside machine arm column.
8. Dress all wires along casting with cord guard (F) behind main control box.
9. Assemble main control box.
10. Insert 2-pin plug (White leads) into receptacle (Q) of main control box (Figure 3).
11. Assemble power switch and motor.

TESTS AFTER ASSEMBLING

Insert 7-pin foot control plug into receptacle on main control box, and turn on power switch and cycle control switch. Insert one cycle cam and depress foot control. Check and see if machine automatically stops at the end of one complete design

X.7 REPLACEMENT OF REED SWITCH (B)

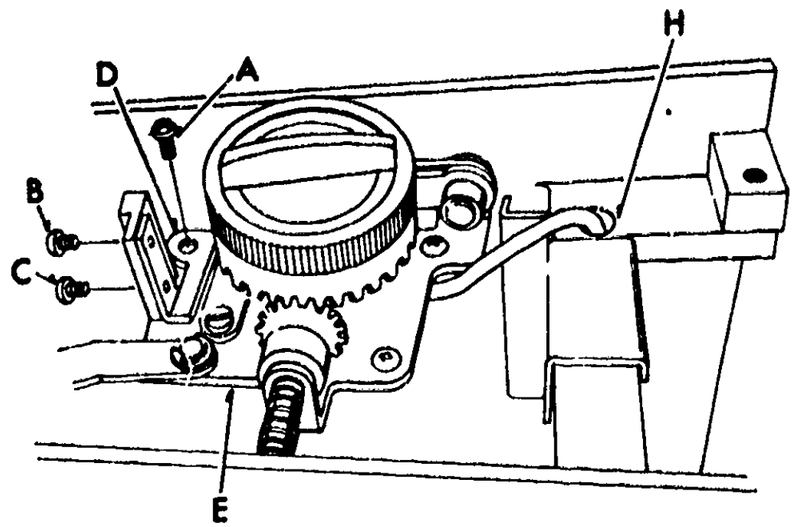


FIGURE 1

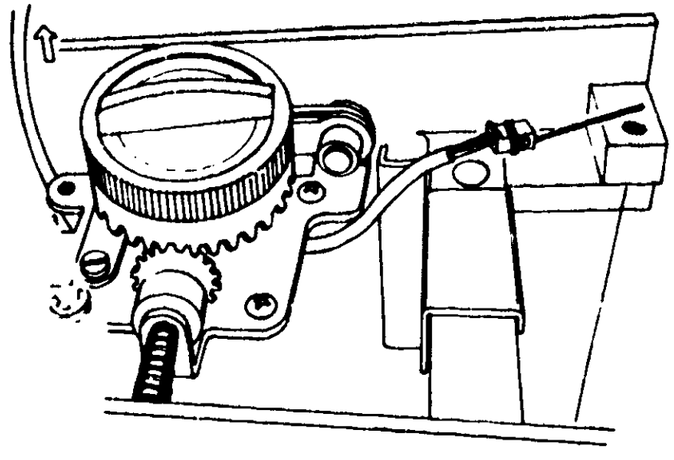


FIGURE 2

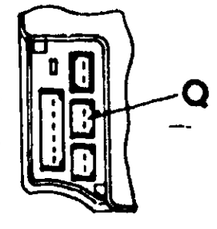


FIGURE 3

X.8 REPLACEMENT OF R-G MICROSWITCH

DISASSEMBLING

1 Disassemble power switch and motor.

2 Release all the wires from clamp (G) inside arm column.

3 Pull 2-pin plug (Brown/Red leads) from receptacle (H), and pull Faston clip from tab (J) of main control box

NOTE: Two-pin plug of Brown/Red leads should be pulled off while releasing self-locking device with pliers or long-nose pliers

4 Disassemble main control box.

5 Take off cord guard (F) on back of casting behind main control box

6 Pull 4-pin plug (K) from receptacle located between control panel and cycle control switch (Cycle control switch may have to be loosened.)

7 Take off cord guard (C) by removing screw (L)

8 Disassemble Reed Switch A by removing screws (M)

9 Unhook spring (E) from microswitch bracket (D)

10 Remove screws (A) and (B) and take out microswitch bracket from machine

ASSEMBLING

1. Assemble microswitch onto bracket with two screws (A) and (B).

2. Hook spring (E) into the hole on bent ear of microswitch bracket (D).

3 Insert 4-pin plug (K) into receptacle on the back of control panel. To ensure positive and correct connections of 4-pin plug and receptacle, disassemble cycle control switch bracket by removing two screws.

4 Dress all wires except the white leads along casting with cord guard (C) and setscrew (L)

5 Mount Reed Switch A with two screws (M)

6 Pull the 2-pin plug with Red Brown leads and Faston clip downward toward main control box through the hole provided on base casting

7 Clamp all the wires with clamp (G) inside arm column

8 Attach all the wires to casting with cord guard (F) behind control box, with screw

9 Assemble main control box.

10 Connect 2-pin plug (Brown/Red leads) and the Faston clip of microswitch into receptacle (H) and tab (J) of main control box

11 Connect 7-pin foot control plug into receptacle on main control box, and turn on power switch

Pattern indicator LED must be Red when the special stitch modifier is set at Red dot, and it must be Green when the special stitch modifier is set in Green lettering zone

If not, loosen two screws (A) and (B), and correct position of R-G microswitch

12 Assemble power switch and motor.

X.8 REPLACEMENT OF R-G MICROSWITCH

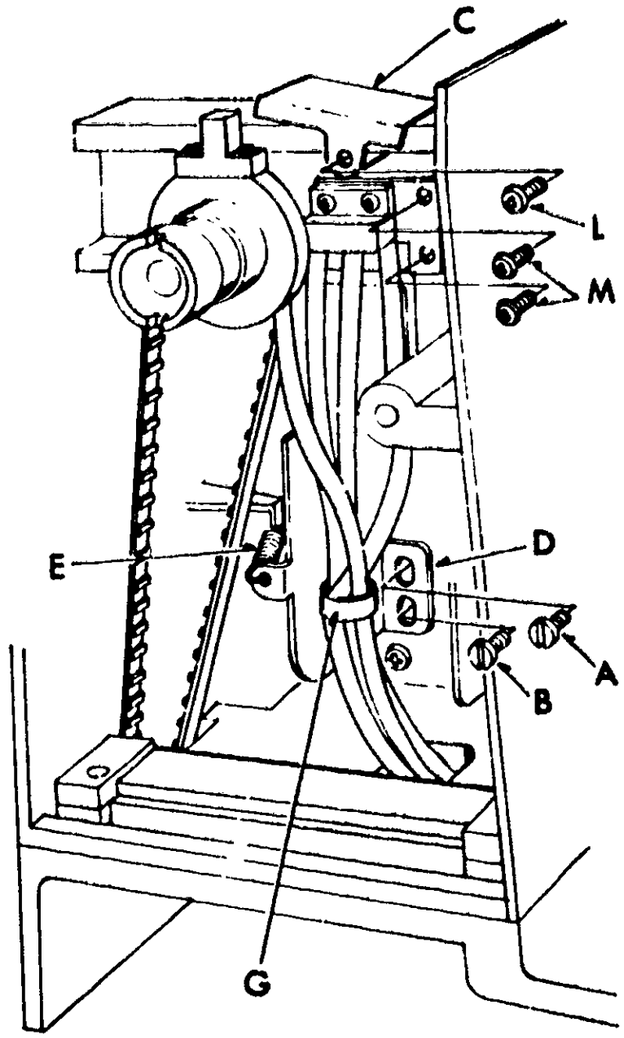


FIGURE 1

FIGURE 2

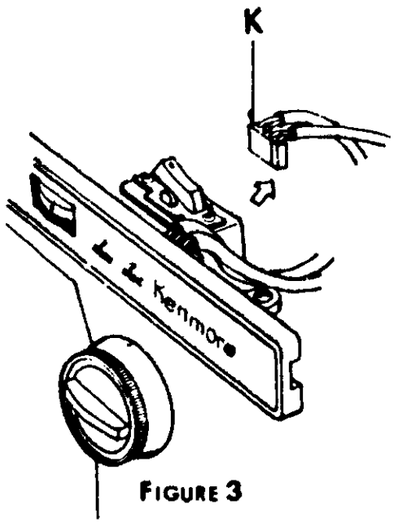


FIGURE 3

X.9 REPLACEMENT OF FLEXIBLE PRINTED CIRCUIT

Always replace the complete control panel assembly if a problem is detected anywhere in the control panel

DISASSEMBLING

1 Connect 7-pin foot control plug into receptacle on main control box, turn on power switch and set special stitch selector at $\frac{28}{58}$. Keep stitch selector in this position until replacement work is completed

2 Pull 4-pin plug (A) from receptacle on back of control panel

3. Remove screws (B), (C), (D) and (E), and remove control panel assembly (F) from machine.

ASSEMBLING

1 Be sure that special stitch selector has not been moved and it is set at $\frac{28}{58}$, and be sure that the pinion engaged rack, on back of replacement panel, is positioned at the extreme left end position as viewed from back

2. Assemble replacement control panel (F) in position, so that pinion gear on back of control panel engages with pinion from special stitch selector, keeping both pinions in position as described above

3 Fix control panel to arm casting with 4 screws (B), (C), (D), and (E).

4 Push in 4-pin plug (A) to receptacle on back of control panel

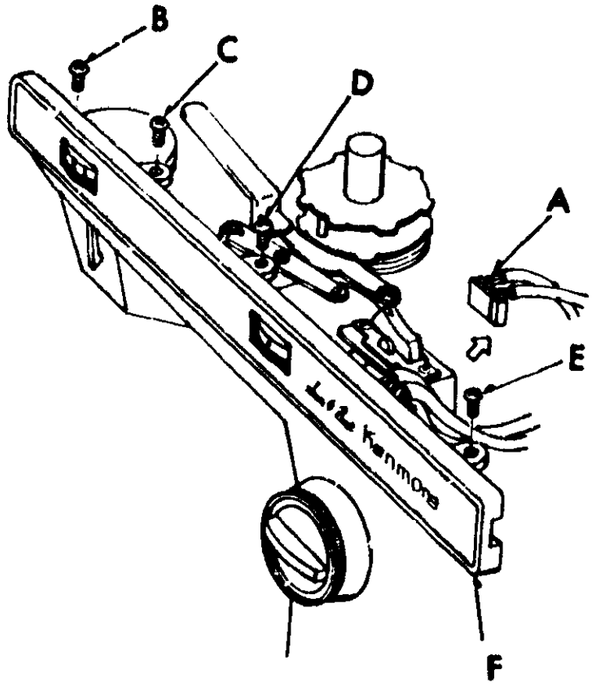
TESTS AFTER ASSEMBLING

Connect 7-pin foot control plug into receptacle on main control box and turn on power switch

1 Turn on cycle control switch, and see if cycle control indicator LED is Red

2 Check to see if pattern indicator LED is Red when special stitch modifier is set at Red dot, and that it is Green when special stitch modifier is set in Green lettering zone

3 Sew any one of built-in patterns and see if the pattern actually sewn is as indicated by LED. If not, pinion gear on the control panel and the special stitch selector have not been engaged in their correct position. See Step (1) of Assembling above



X.10 ADJUSTMENT OF SPEED CONTROL TRIMMER

1 Remove screw (A) and take out base locking device (B).

2 Adjust machine speed to meet the following table, by turning trimmer (Figure 2) with screwdriver either clockwise or counterclockwise. Turning trimmer clockwise will increase stitching speed, and turning it counterclockwise will decrease stitching speed. When adjusting any one of the trimmers, always check function of the other two trimmers

Machine Speed	Standard	Cycle Control
Maximum	Over 750 rpm	OFF
Minimum	Under 120 rpm	OFF
Constant	About 180 rpm	ON

3. Assemble base locking device (B) with setscrew (A). End of lever (C) must engage with the slot provided on the back of pushbutton (D).

CAUTION!!

When adjusting the speed control trimmer, use a plastic screwdriver or any non-conducting type. A metal or non-insulated screwdriver may touch other metal parts or the casting and cause premature failure of the control box. Use extreme care.

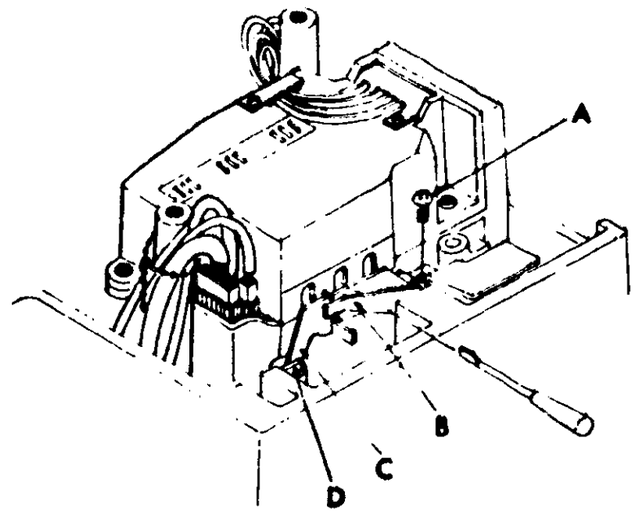
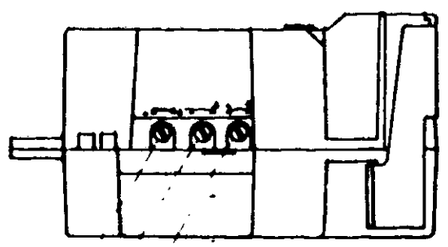


FIGURE 1



HIGH-SPEED TRIMMER
LOW-SPEED TRIMMER
CONSTANT LOW-SPEED TRIMMER

FIGURE 2