SERVICE MANUAL

FOR TOYOTA PUNCH CARD KNITTER

MODEL K-747

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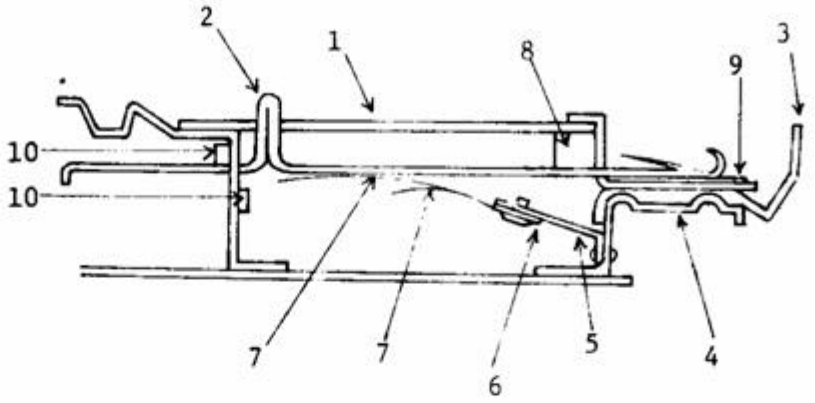
NEEDLE BED ASSEMBLY -- PARTS NOMENCLATURE

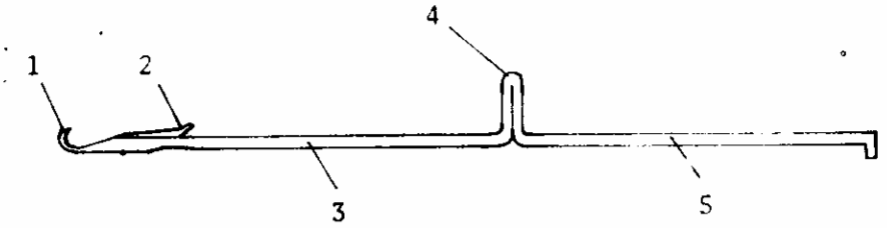
Needle Bed



No.	Parts	Function
1.	Needle Bed	Plate with guide grooves for latch needles. Front and back plates of the needle bed are attached to this plate.
2.	Latch Needle	Needle for making stitches. Shank and stem are specially disigned to increase efficiency of transfer operation of stitches.
3.	Sinking Comb	Needle to hold knitted fabric.
4.	Sinking Comb Presser	Plate that holds the needle bed and to which sinking comb is attached.
5.	Needle Spring Plate	Base plate on which needle spring is attached.
6.	Needle Spring Presser	Plate to stabilize needle spring.
7.	Needle Spring	Spring to set the needle in the proper position.
8.	Needle Presser	Presser to keep needles from falling out.
9.	Needle Bed Protection Film	Film to prevent friction wear at both ends of the needle bed.
10.	Oil Absorbers	Felt to absorb oil on the needle to prevent it from sticking to the S palte.

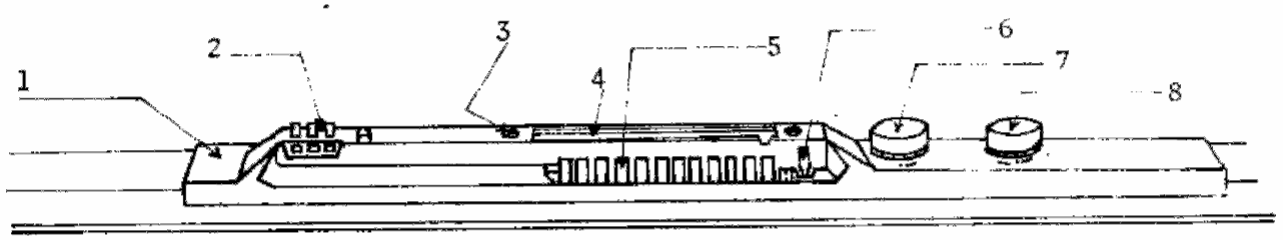
Latch Needle

No.	Parts
1.	Hook
2.	Latch
3.	Stem
4.	Butt
5.	Shank



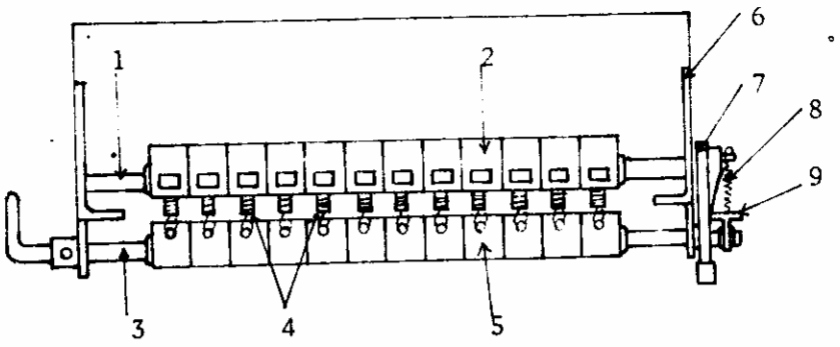
Needle Selector

(1) Structure of Panel Plate



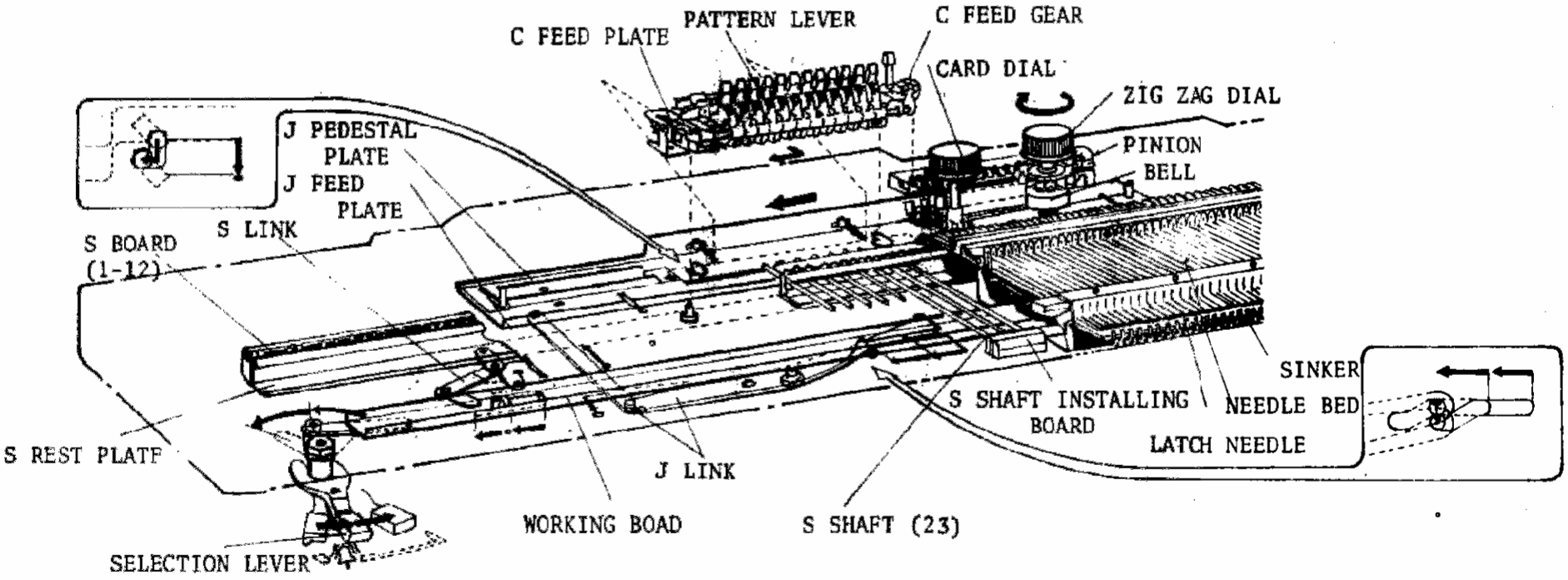
No.	Parts	Function
1.	Pattern Board	A board with row counter and card guide holder.
2.	Row Counter	Automatically records the number of rows knitted. Can start counting wherever necessary.
3.	Card Guide Holders	Holders for punched card guide.
4.	Card Insertion Slit	A slit to insert punched card.
5.	S Lever (Pattern Selector Lever)	These levers are used when doing pattern work by selecting needles manually.
6.	J Lever (Change Lever)	A change lever for three operative conditions, automatic, manual and return.
7.	Card Dial	A dial to set a punched card on the knitter.
8.	Zig Zag Dial	A dial to transfer the pattern to the right or to the left.

Structure of Pattern Work Lever

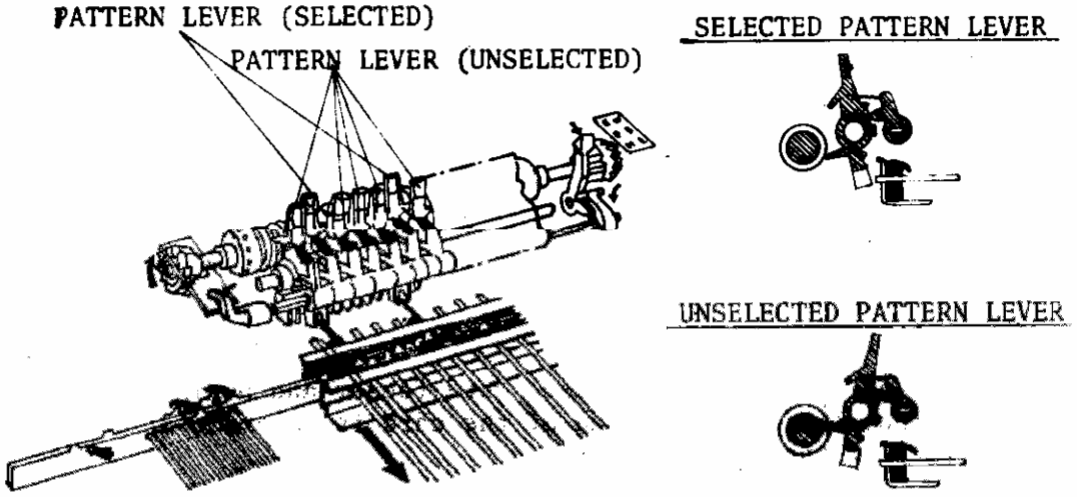


No.	Parts	Function
1.	S Lever Shaft	A shaft to which S lever is attached.
2.	S Lever (Pattern Selector Lever)	A lever used to work pattern stitch by manually selecting needles.
3.	J Shifter Shaft	A shaft to which S lever stopper is attached.
4.	S Lever Spring	Spring used to return S lever and S lever stopper to the original positions.
5.	S Lever Stopper	Geared to pattern selector lever and enables the change from automatic to manual and vice versa.
6.	J Board	A panel to which J shifter shaft and S lever shaft are attached.
7.	J Lever (Change Lever)	A change lever to select one of three operative conditions, automatic, manual or return.
8.	J Shifter Spring	Returns J change cam to original position.
9.	J Shifter Cam	A cam that works in link motion with change lever to operate J shifter shaft.

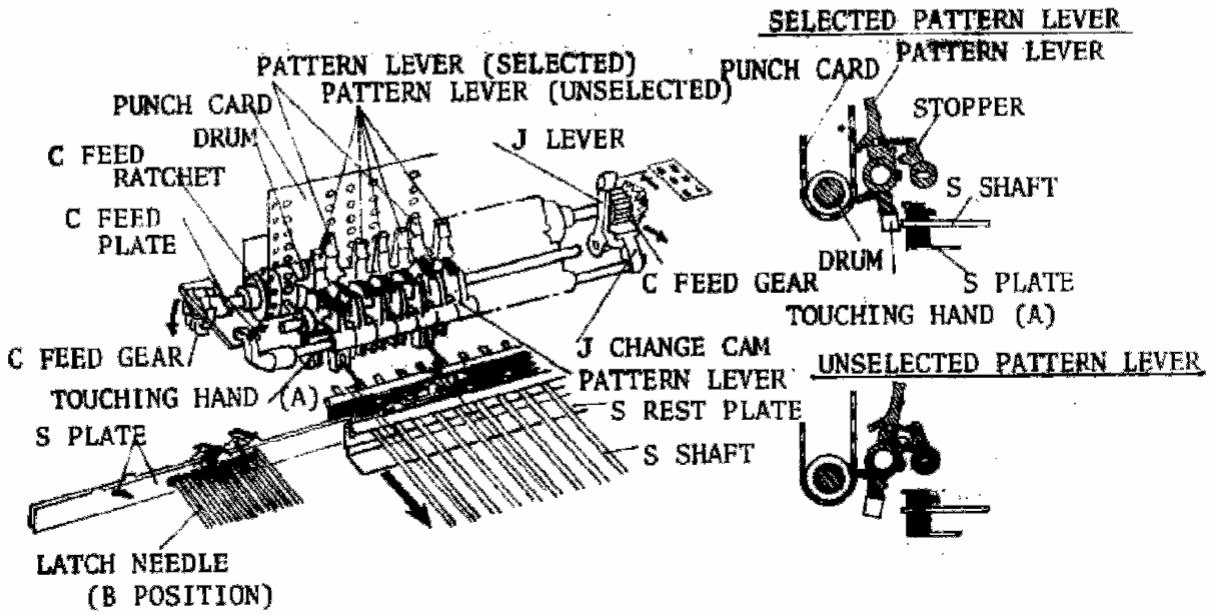
NEEDLE SELECTION MECHANISM

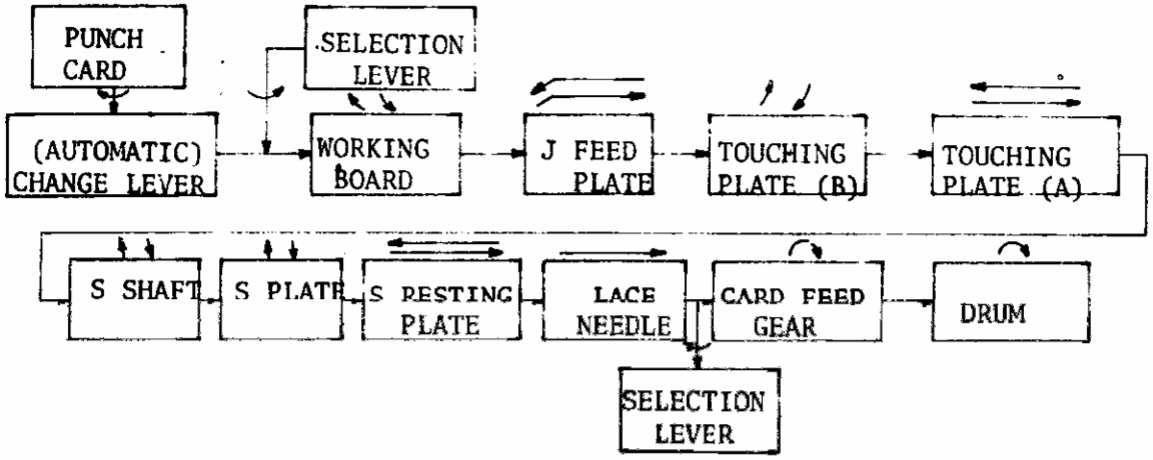


MANUAL NEEDLE SELECTION



AUTOMATIC NEEDLE SELECTION





Automatic Needle Selection

1. Put the Punch Card into the front punch card feeder and behind the punch card guide so that the red base line of the card is in exact alignment with the surface of the pattern board.

2. Turn the card dial so as to draw the punch card into the feeder and set the red mark - of punch card to the card feed indicator window.

3. Set the change lever at auto position.

4. Turn the needle selector as far as it will go.

5. By this movement the selector Drive Rod moved the "J" link toward the working board. The "J" link is connected with the "J" feed plate and the lower portion of the pattern selector buttons.

6. The selector pin holder moves in a horizontal direction and selector plate holder which is connected with selector pin will select the desired needles the action from the "J" link to the selector plate is simultaneous.

7. After the needles are selected return needle selector lever to original position. The punch card will be fed into the machine. • Move carriage either left or right and by turning the selector lever the needles will be selected according to pattern on card.

Manual Needle Selection

1. Move the change lever to manual position and make sure needles are in "B" position on needle bed.

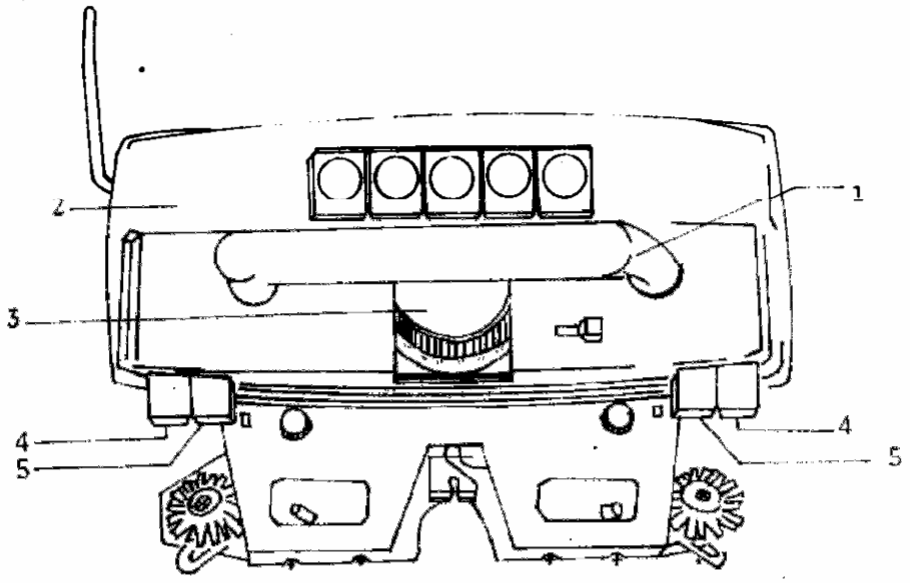
2. Push selector buttons and move needle selector lever to bring desired needles forward.

3. In this action the "S" stopper will be joined to the pattern lever and set.

4. After this operation the needle selection is done in same order as Auto needle selection, except buttons are used instead of card.

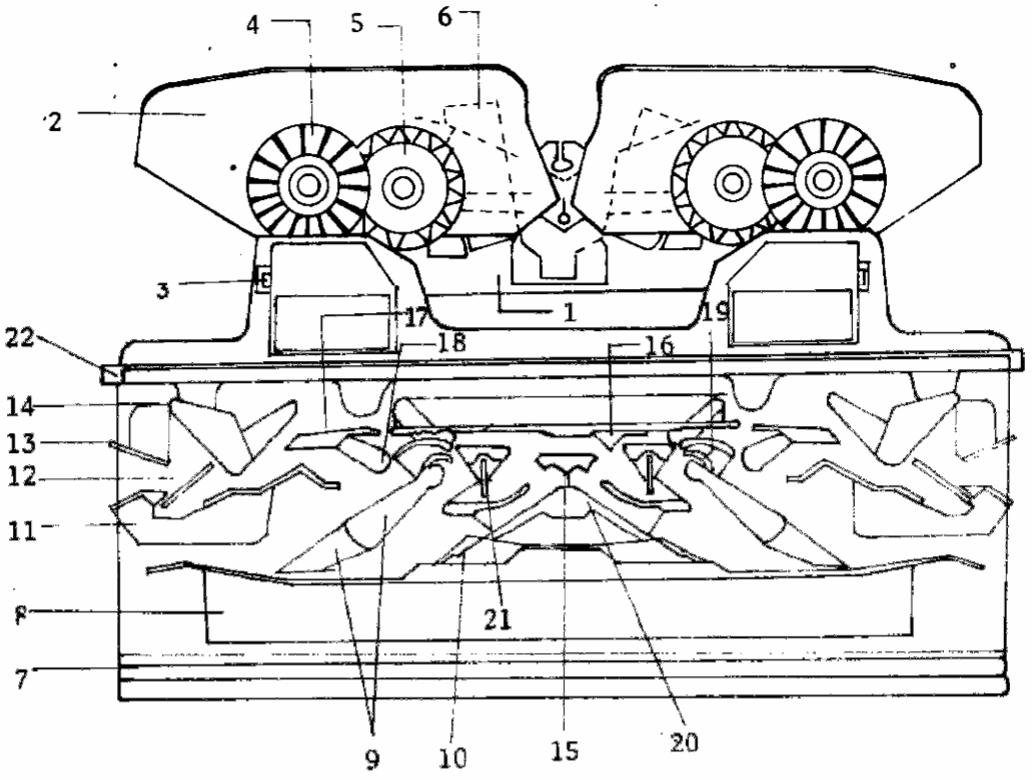
Structure of Carriage and Nomenclature

Front View of the Carriage



No.	Parts	Function
1.	Handle	A grip for sliding the carriage.
2.	Base Plate Cover	Ornament as well as a dust cover of the carriage.
3.	Stitch Adjusting Dial	Dial to adjust the stitch size according to the thickness of the yarn.
4.	Button I (Russel Button)	Press to work turning course knitting. Press induction cam button lightly to release russel button.
5.	Button II (Induction Cam Button)	Press button for tuck stitch knitting. Press russel button lightly to release induction cam button.

Back View of the Carriage and Its Mechanical Parts

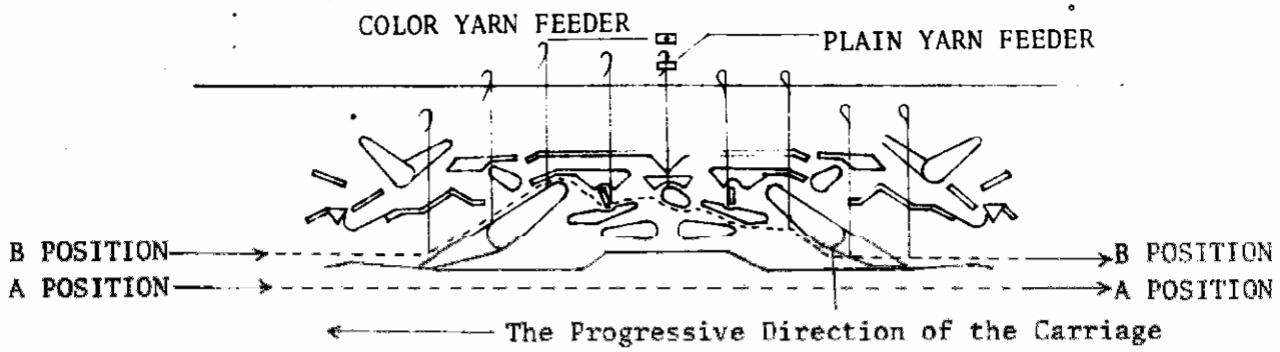


No.	Parts	Function
1.	Fabric Presser Mount	A plate to which thread wheel, fabric presser, yarn feeders and magnets are attached.
2.	Fabric Presser	Keeps fabric in position.
3.	Fabric Presser Holding Holes	Keep fabric presser from falling off while knitting.
4.	Brush Wheel	Keeps fabric in position.
5.	Fabric Presser Wheel	Same as above.
6.	Magnet	Opens the latch of latch needle and keeps it open until the loop is hooked.
7.	Back Leg of Base Plate Cover	Serves as a sliding guide for carriage at the same time stabilizing the carriage to prevent it from falling off.

8.	Butt Release	Keeps knitting needles at B position.
9.	RA Cam, KN Cam (Raising Cam, Knitting Cam)	Pulls up needles to knit position; lowers them to position specified on the Adjusting Dial.
10.	T Cam (Tuck Cam)	Pulls up knitting needles to C position when working tuck stitches.
11.	F Cam (Protection Cam)	Moves the needles to either C or D position.
12.	K Cam (Shift Cam)	When making continuous tuck stitches, this cam moves the needles at E position to C position.
13.	R Cam (Protection Cam)	Prevents selected needles from interfering with tuck needle knitting cam.
14.	R Cam (Tuck Needle Knitting Cam)	(Also called russel cam); return the needles at E position to knitting position when working tuck stitch or turning course knitting.
15.	Valve Cam	Guides needles to KN Cam.
16.	Sliding Cam	Guides the needles in color pattern knitting path for knitting position when knitting two color yarns.
17.	Y Cam (Induction Cam)	Guides needles selected at tuck stitch knitting to E position.
18.	A Cam	Guides selected needles to color pattern knitting path in two-color pattern knitting.
19.	Valiable Cam	Same as above.
20.	Guide Cam	A cam made of resin which has color pattern knitting path and stocking stitch path, and to which valve cam, sliding cam and swing cam are attached.
21.	Swing Cam	Guides selected needle to KN Cam.
22.	Front Foot of Base Plate Cover	Serves as a sliding guide for carriage at the same time stabilizing the carriage to prevent it from falling off.

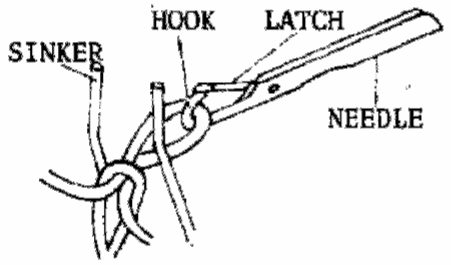
THE PRINCIPLE OF MACHINE KNITTING

PLAIN KNITTING



The loops are in the hooks of the latch needles and by movement of RA cam and KN cam the needle is pushed forward but the fabric is held against the fabric presser. As the needle comes forward, the yarn being held in place causes the latch to open and the yarn feeder passes over the needle it lays yarn into the hooks, the carriage pushes the needle back and as it does this, the yarn on the stem closes the latch as it passes over the hook and so a stitch is formed. Size of stitch will depend on the stroke of needle movement.

1.



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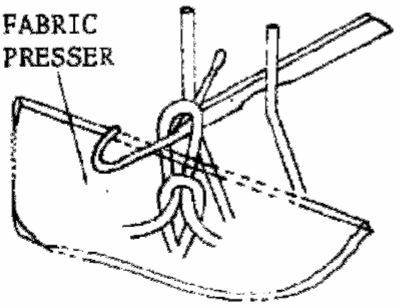

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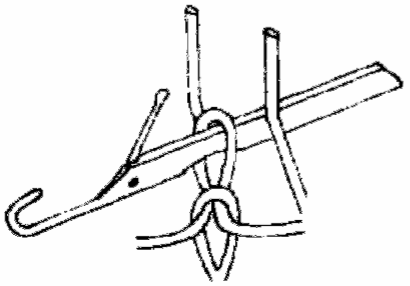

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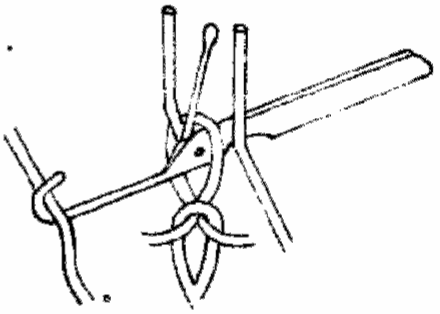

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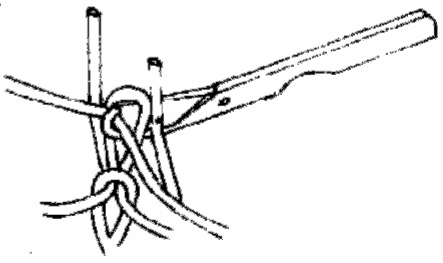

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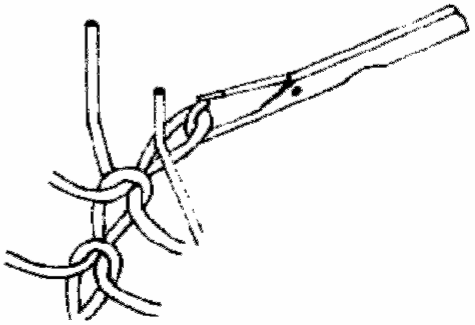
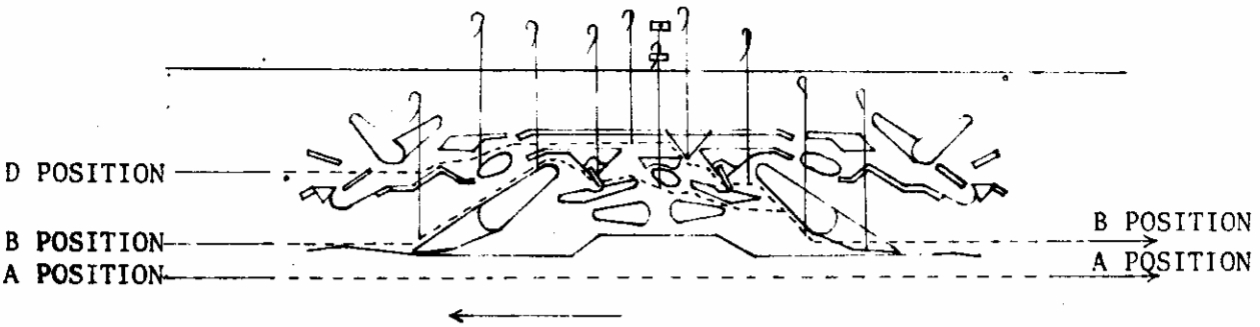


FAIR ISLE KNITTING



1. Set switch on carriage to colour.
   This pushes "A" cam and variable cam down.

2. Set the pattern selector buttons or if using punch card the selected needles that are at "A" position will move to the "D" position when needle selector is turned.

3. The needles at "B" position will make the loop stitches on all needles in this position.

4. The needles in the "D" position will carry the yarn past the "B" positioned needles and only knit on the selected needles.

5. One operation of the carriage makes it possible to knit two yarns at the same time through the plain and colour yarn feeders.

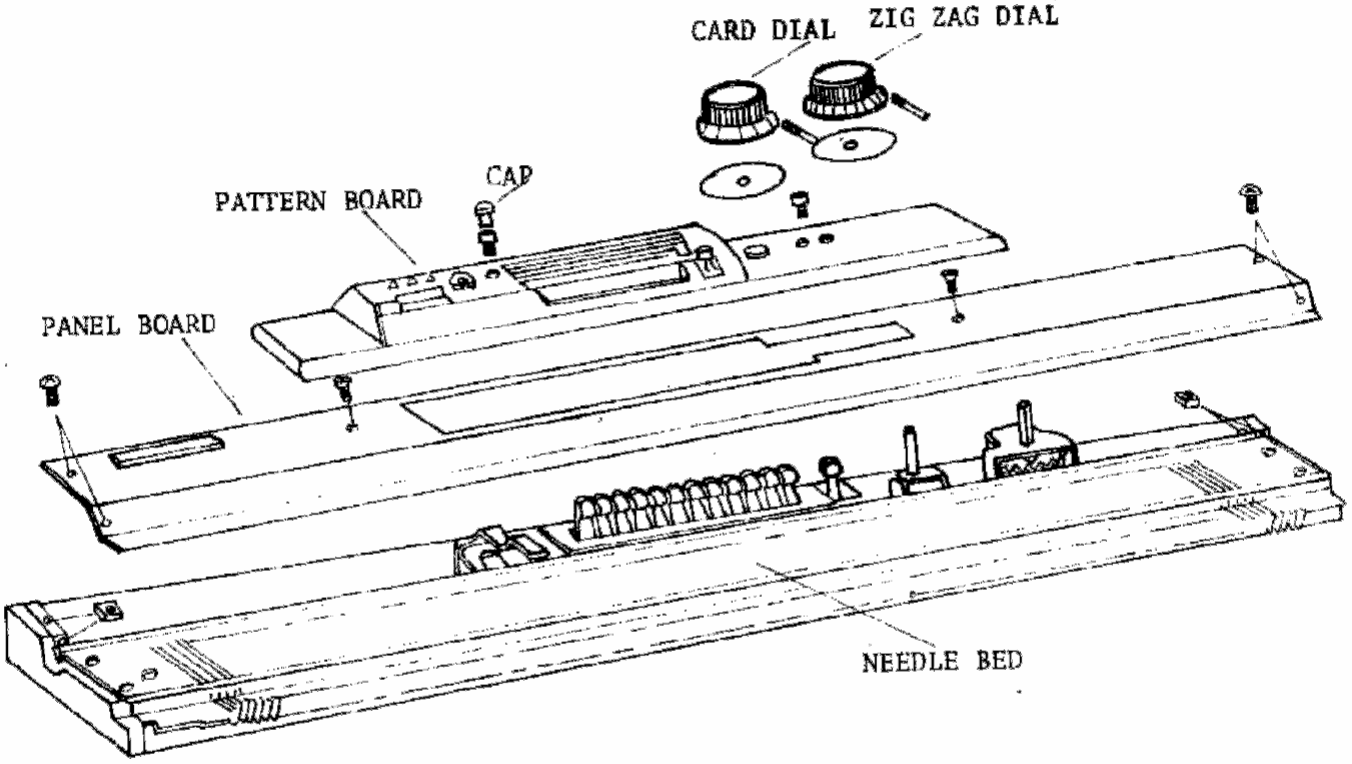
Other types of knitting can be accomplished by proper use of pattern buttons and knobs such as tuck patterns and many thread knitting patterns.

Procedures for dismantling, adjusting and assembling of Needle Selector Device and Needle Bed.

ADJUSTMENT OF PIN GUIDE PLATE

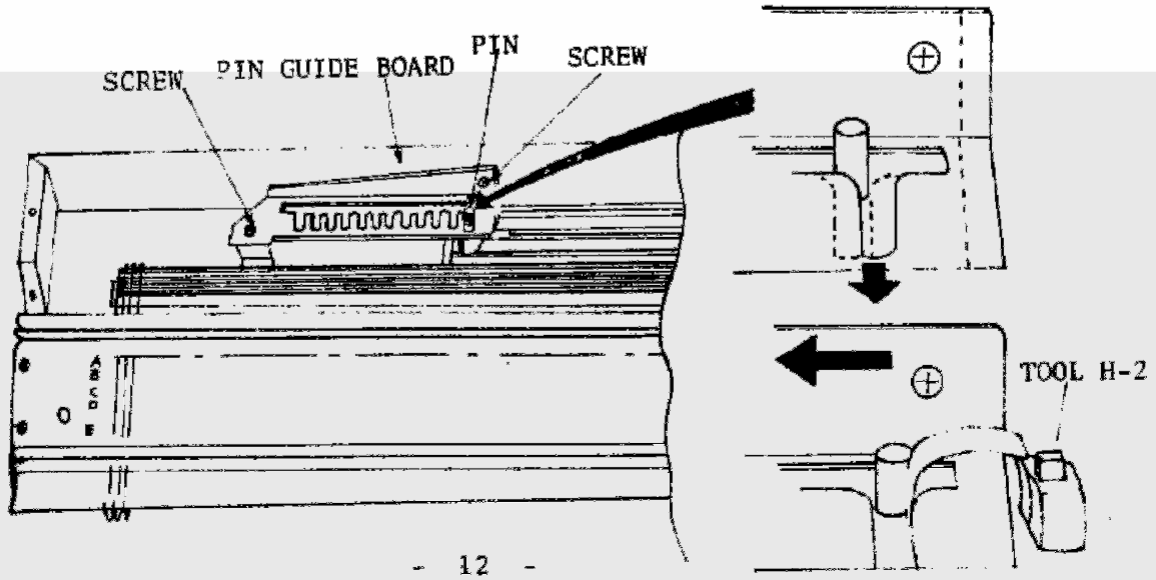
Detach zig zag dial and card dial by removing screws. Remove the plastic safety board. Remove two screws from pattern board. Pull out the card guide holder in order to remove screw. Remove 2 screws of the panel board and four screws on each end of the panel board. Remove the panel board.

You will now be able to adjust the position of the pin guide plate.



Check:

Move the needle selector lever. If the position of the pin guide plate is just as shown below, adjust this plate as follows:



Adjustment:

Loosen two screws holding the pin guide board. Attach the kit tool H-2 to the board as shown above. Set the zig zag dial on 1 pull the pin guide board to the left. Place the pin on the H-2 tool and tighten the pin guide board.

Note: This adjustment should only be made when improper needle selection is the problem. Make sure punch card is not damaged before taking machine apart.

To assemble, reverse procedure for dismantling.

ADJUSTMENT OF C FEED DEVICE

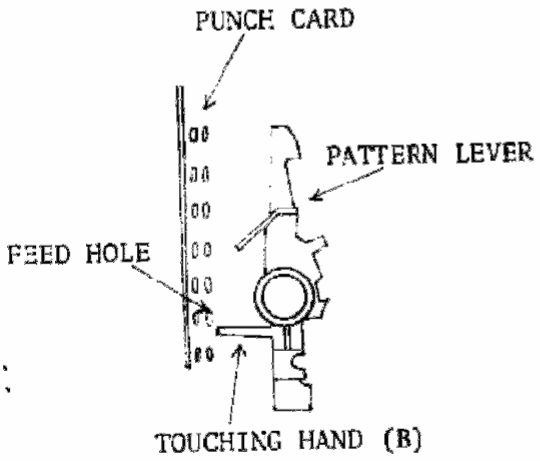
In case the needle is not selected as the pattern of punch card indicates and there is no damage to card, pin guide is properly adjusted then the ball guide or C feed plate is improperly positioned.

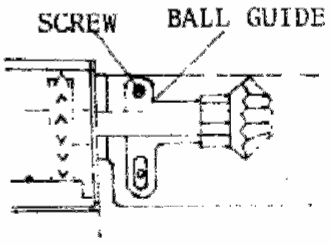
Procedure of Dismantling:

1. Remove the card dial and zig zag dial.
2. Remove pattern board.
3. Remove the panel board.

Check:

1. Set the punch card and turn card dial to make needle selection.
2. Move the needle selection lever slowly.
3. Make sure that plate "B" is in the center of the hole in punch card.
4. If not, adjust ball guide.



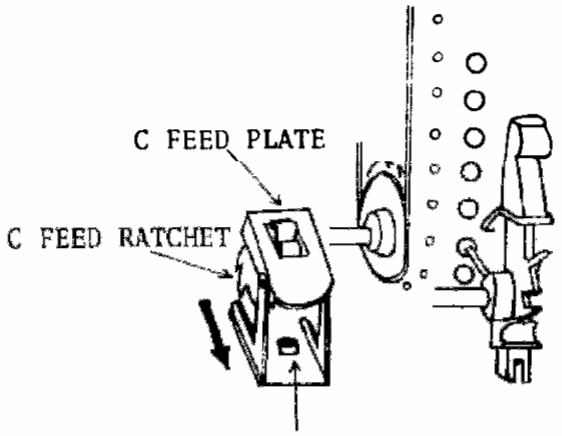


Adjustment:

1. Loosen screws of ball guide and adjust the ball guide position.
2. When you move the ball guide forward the punch card moves upward.
3. When you move the ball guide backward the punch card moves down.
4. Adjust by visual means.

Check:

Next set the change lever to Auto position. Now move the needle selector lever and do so on 2 or 2 cards. Then check the position of pattern holes and the touching hand of the pattern lever. If it is not in proper position adjust the C feeder device.



Adjustment:

Loosen the screws of C feeder device and adjust the position of this part. When you move forward the punch card moves in arrow direction as shown above. When you move it backward the punch card moves in opposite direction.

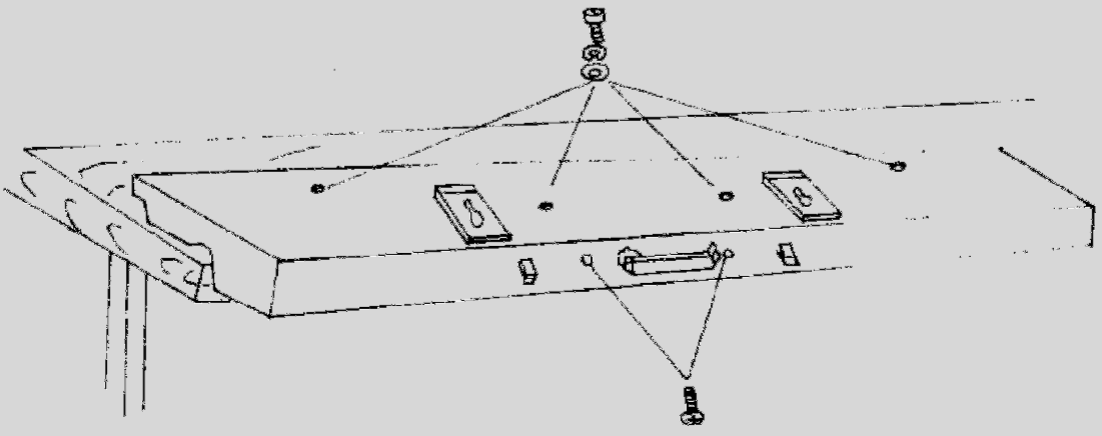
Note: If the punch card cannot be moved correctly it is because of improper position of the C feed plate. Adjust as stated above. This can also occur if the "J" link is loose. Adjustment procedure of "J" link follows.

ADJUSTMENT OF "J" LINK

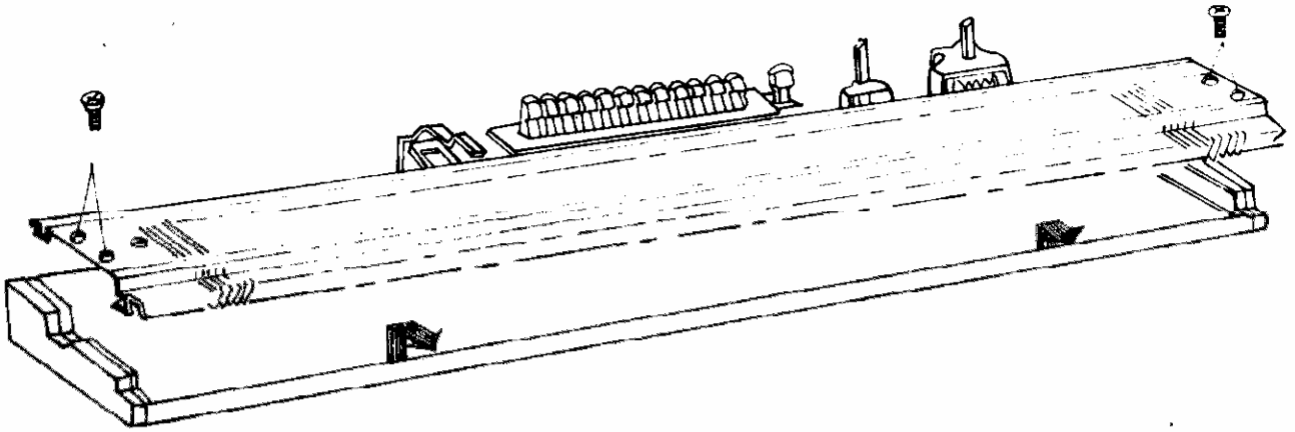
When you move the needle selector lever the "J" carrying board does not move back completely. (When you push down lightly by hand the carrying board moves back.)

Adjust in the following manner.

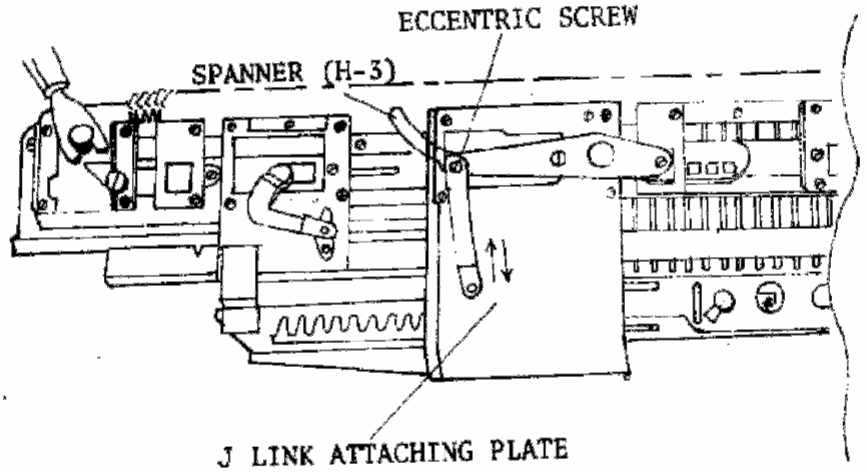
1. Carefully place needle bed upside down, remove four screws, the screws of the case handle on both right and left side.



2. Turn needle bed up and remove four screws on the 2 sides of the needle bed.
3. Lift the front part of the needle bed to free it from the case then pull needle bed from case.

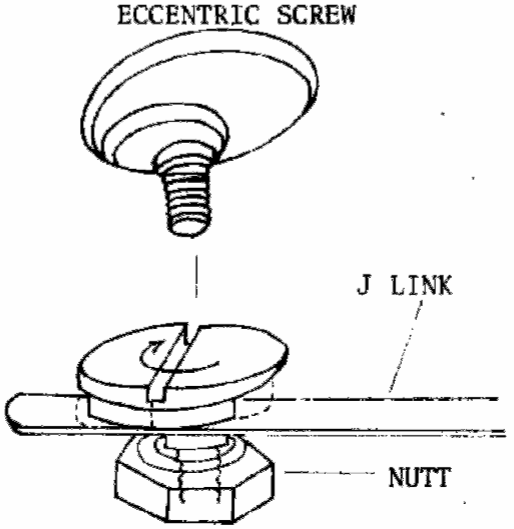


4. Turn needle bed down being very careful not to cause damage to bed.



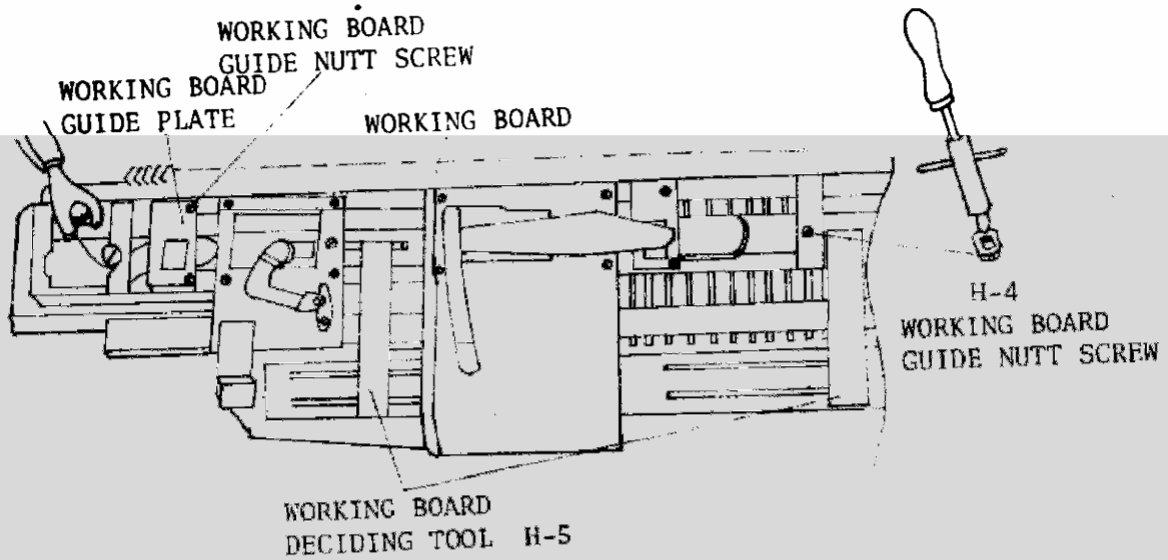
Adjustment:

Loosen the eccentric screws using the spanner H-3. Turn the screws as shown in picture so that "J" feed plate is in firm contact with "J" attaching plate. After making this adjustment, tighten nut underneath.



ADJUSTMENT OF WORKING BOARD

After you have properly adjusted the "J" link and it still does not function properly, adjust the position of the working board.



Check:

Set the zig zag dial on 12. Place the gage H-5 on the plate as shown above. Make sure that the projecting part of the gage is in hole of the connecting part. When it is out of the hole, adjust.

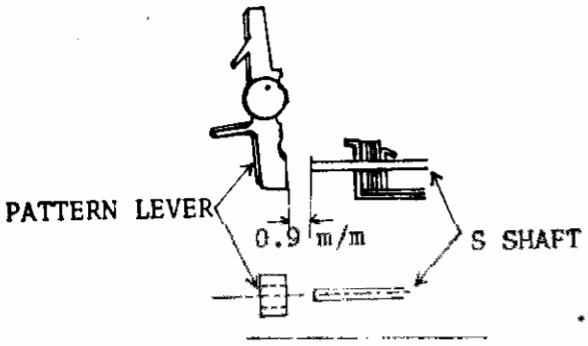
Adjustment:

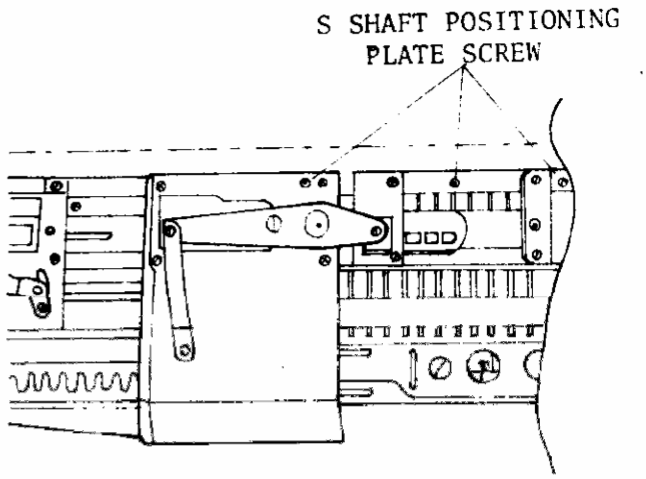
1. Loosen the screws of guide plate. There are 3 of them.
2. Loosen the nut of guide screw using box spanner H-5.
3. Place the gage H-5 so that the gage is in the hole properly.
4. Move the guide plate in the direction of the sinker hook as the gage projection comes out of the hole tighten the 3 screws.
5. Lighten the guide screw nut with the box spanner then loosen it about 90° degrees. While you hold the screw head with a screw driver tighten the nut.
6. After adjustment check needle selection to make sure it is proper and also to see that the screws are not too tight before putting needle bed back into case.

ADJUSTING POSITION OF S SHAFT & S PATTERN LEVER

When you adjust the "J" feeder mechanism the gap between the "S" lever and "S" shaft will change.

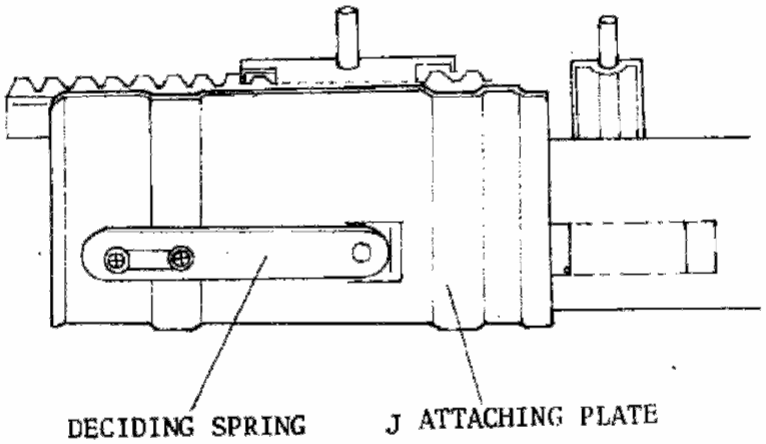
Make sure that the gap is 0.9 m/m and that the "S" shaft comes to the center of the "S" lever.





To adjust this gap loosen the three screws of "S" shaft. Then adjust position of the spring twice. Once when the zig zag dial is on number 1 and then again when it is on number 12.

The center of the "S" shaft and "S" lever is in the wrong position. Adjust the deciding spring on the "J" feeder.



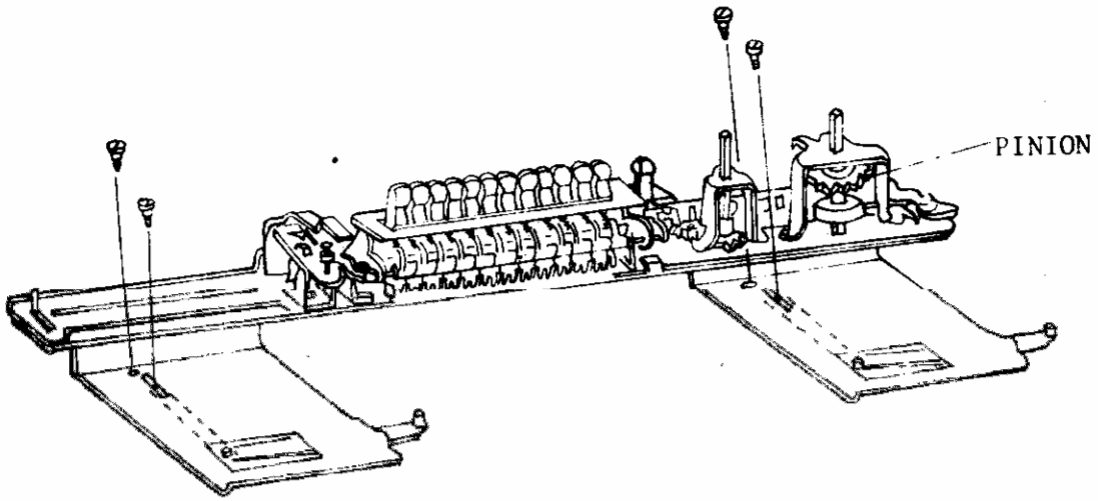
Adjustment:

Loosen the screws which hold dial positioning spring. Adjust position of "S" shaft so that it is centered on "S" pattern lever.

When you tighten the screws hold the spring so that it will not move. After this adjustment make certain that "J" feed plate pin does not make contact with pin guide.

EXCHANGE OF "J" WORKING PLATE

When you exchange the "J" working plate exchange by pair.

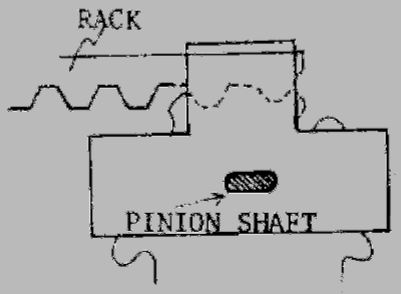


To detach "J" working plate, operate the needle selector lever and this will bring the working plate toward you.

1. Remove the "J" working plate connecting screws on the right.
2. Turn the zig zag dial to 4 or 5 and remove the "J" pedestal guide screws on the right.
3. You may remove "J" pedestal guide screws and "J" working plate connecting screws on the left at anytime.

Procedure of Assembling:

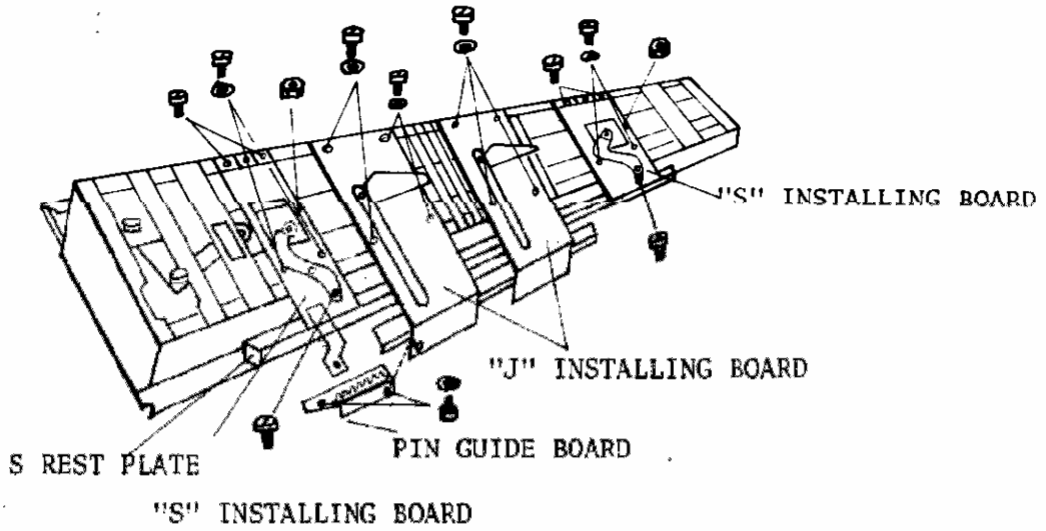
1. Place the gear of the transfer pinion and transfer rack as the picture on right indicates so that the shaft of the pinion is parallel to the gear. (The zig zag dial is at 1 in this case)
2. Place the "J" pedestal guide screws and tighten them. (Both sides)
3. Place the "J" working plate connecting screws in the hole of the "J" link and tighten.



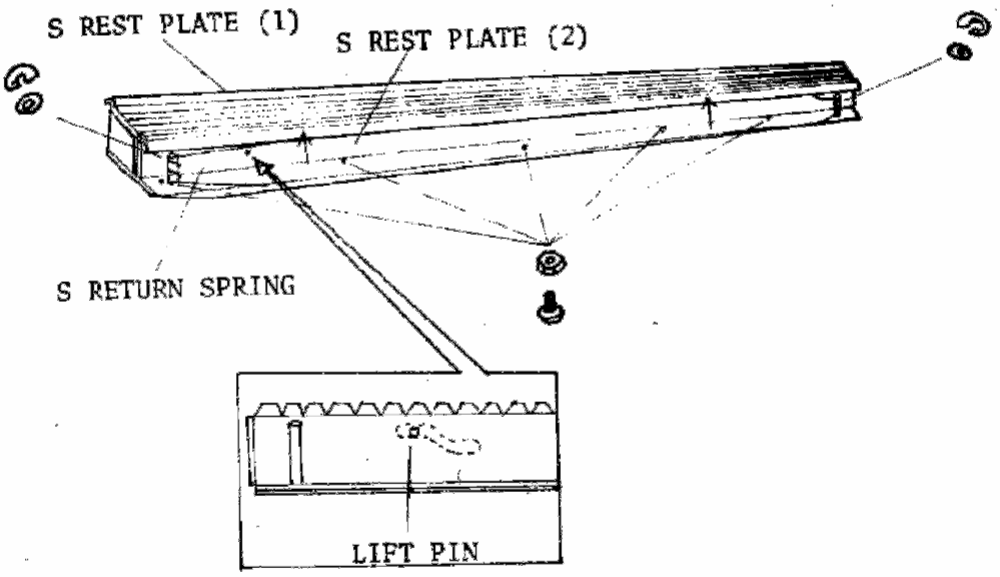
OILING AND CLEANING OF "S" BOARD

If you oil the butt of the latch needle or any where else on the needle bed with too much oil it will flow into the "S" boards and that will cause improper needle selection. It may be necessary to remove the "S" board and wipe away the excessive oil. Prior to taking board out try using white graphite and if oil is not overly excessive this will solve the problem. However should it fail then follow procedure for overhaul.

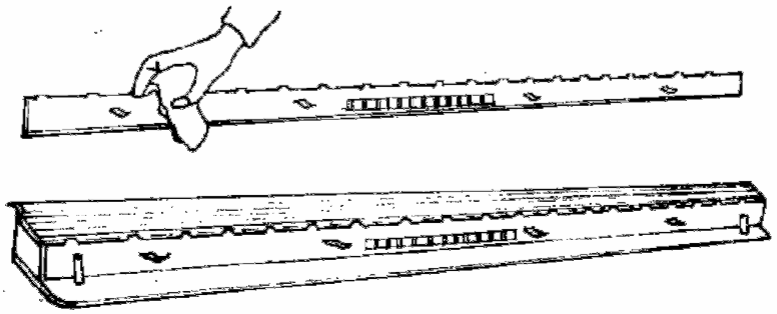
1. Take needle bed out of case.
2. Mark off both ends of "J" board and "S" installing board.
3. Remove the screws of the pin guide board and "S" installing board.



4. Pull the "S" rest plate out from the "S" shaft.



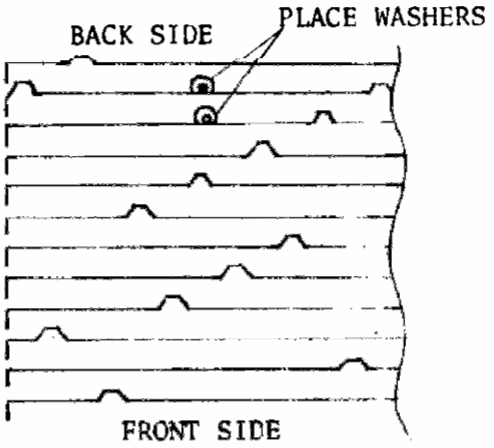
5. Remove "E" ring of "S" shaft spring (both sides) and the washer.
6. Remove the nuts from the screws in the support board and remove all the screws.
7. Remove the "S" rest plate from the lift pins, and from the shaft of "S" return spring.
8. Pull "S" board and 12 plates out from "S" rest plate.



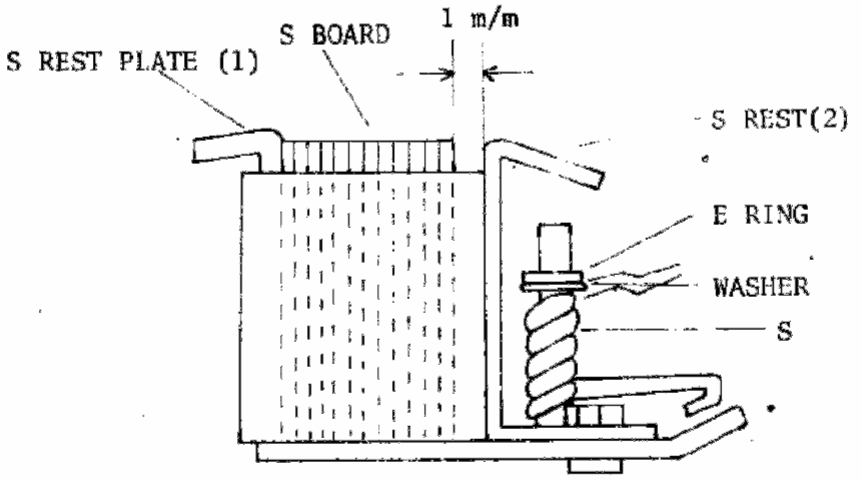
Note: Place "S" board in order so that you can easily follow the directions. DO NOT LOSE THE WASHERS OF THE LIFT PINS. Keeping plates in order wipe off excess oil.

Procedure of Assembling:

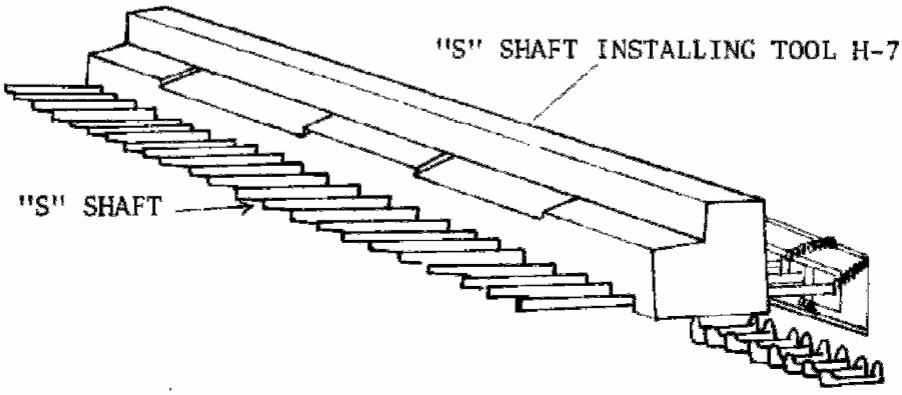
1. Assemble the "S" rest plate. Put everything back as you took it out. Place washers between 1-2 - 2-3 and so on.



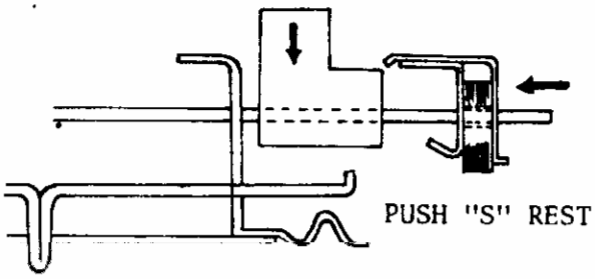
2. Place "S" return spring on the "S" support board in the place which was provided for it.
3. Make 1 m/m gap between "S" rest plate as pictured below.
4. Place the washer in the "S" returning spring and install "E" ring.



5. Bring the latch needles toward the sinker hooks. Place the spring presser plate on the "S" shaft.

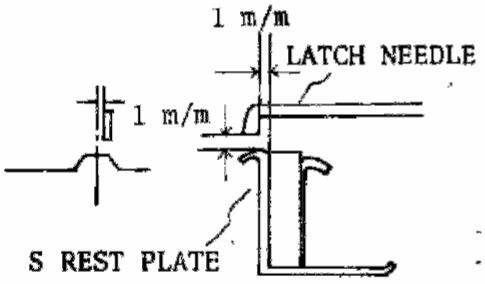


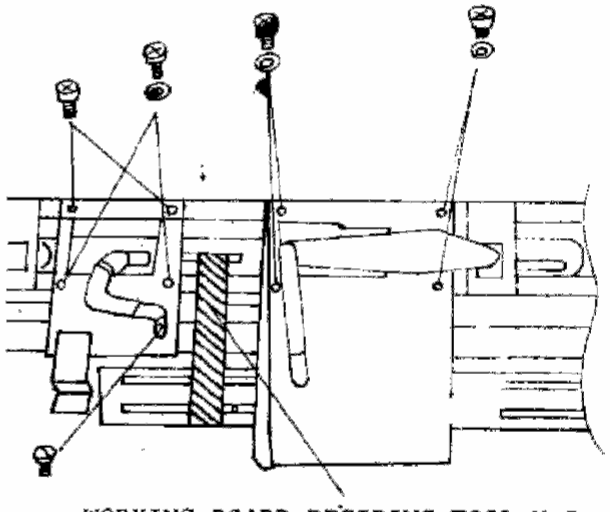
6. While you are holding the needle spring presser plate push "S" rest plate into the "S" shaft. Use tool H-7.



7. Push "S" rest plate into this portion of the "S" support board. Make sure to remove the "S" returning spring out of the needle bed.
8. Remove the "S" shaft installing tool H-7 taking care not to pull "S" board out of "S" shaft.

Note: Make sure that you do this entire operation with care and thought. It can be accomplished easily if careful.





WORKING BOARD DECIDING TOOL H-5

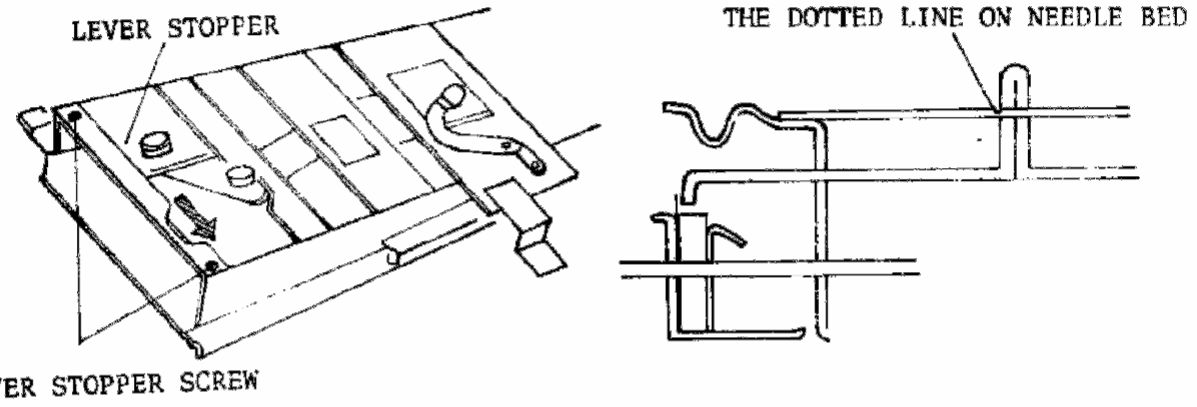
9. Place the "S" board according to your marks and tighten the screws on both ends. Be sure the "S" board is in the right place. If it is not the gap between the "S" board and the latch needles would be improper and could cause difficulties.
10. Attach the "S" board link and "S" rest plates by tightening the screws. Hook "S" returning spring onto the needle bed. Check that it moves slightly while you shake the "S" rest plate.
11. Place the "J" installing board according to your marks. But do not tighten the screws yet. Place the short screws on the mark X as in the picture on the right.
12. Set the zig zag dial 12. Place the working board deciding tool H-5 and tighten the screws on "J" installing board.
13. Tighten the guide screws & nuts of operating board.

ADJUSTING NEEDLE SELECTOR LEVER STOPPER

When needle selection lever is operated, the butt of the selected latch needle is too low or too high resulting in dropped stitches in lace patterns.

Check:

Make sure that the butt of selected needles are beyond the dotted line on needle bed after you have moved the selector lever. If the butt is behind the line or too far forward adjust the lever stopper position.



Adjust:

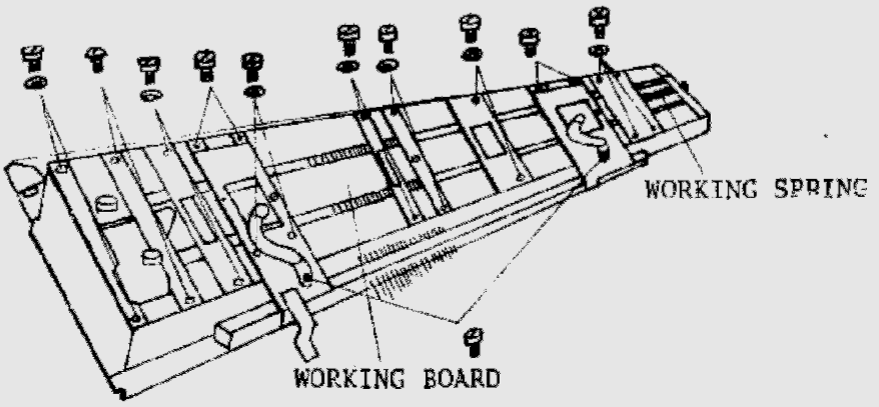
Loosen screw of lever stopper. When the needle is brought too far forward adjust the lever stopper in the arrow direction as per diagram ——→ . When the needle is not brought forward enough adjust the lever stopper in the opposite direction.

EXCHANGE NEEDLE SPRING

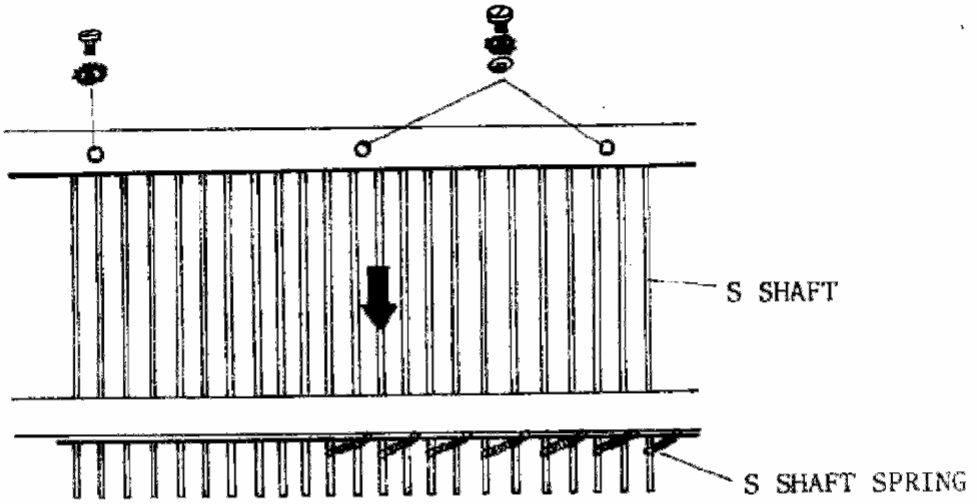
If this needle spring is out of shape or broken the needle selection will not work. The needle spring must be replaced.

Procedure:

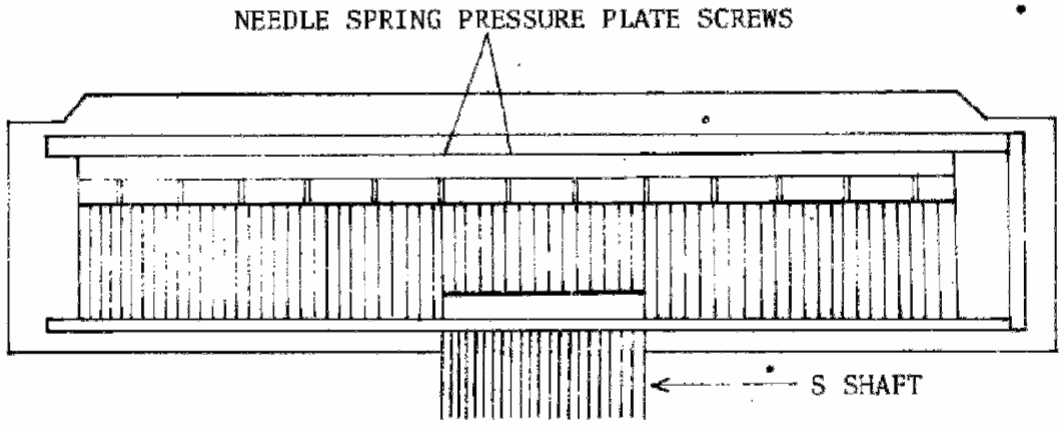
1. Take needle bed out of case.
2. Remove the "J" installing plate after marking its precise position.



3. Mark the positions of all parts then remove the working plate spring.
4. Remove all screws. Remove the working plate and "S" installing plate together from the needle bed.
5. Pull the "S" resting plate out from the "S" shaft.
6. Remove the screws of the "S" shaft plate. Move "S" installing board in the arrow direction as shown in diagram. When you remove "S" shaft, pull it all the way up until the "S" shaft installing baord comes out of needle bed. Note that "S" shaft will also come out at the same time.

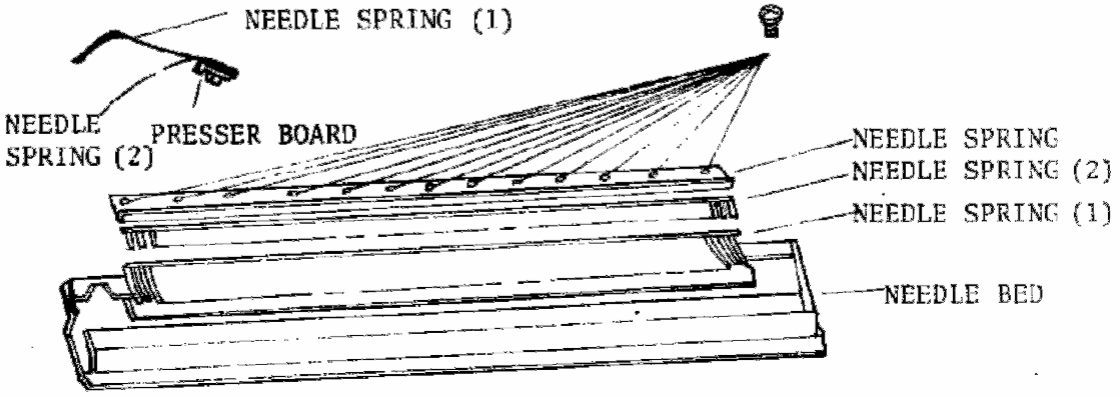


7. When you remove the screws of the needle spring presser plate you can easily remove the presser plate and needle spring (1) and needle spring (2).

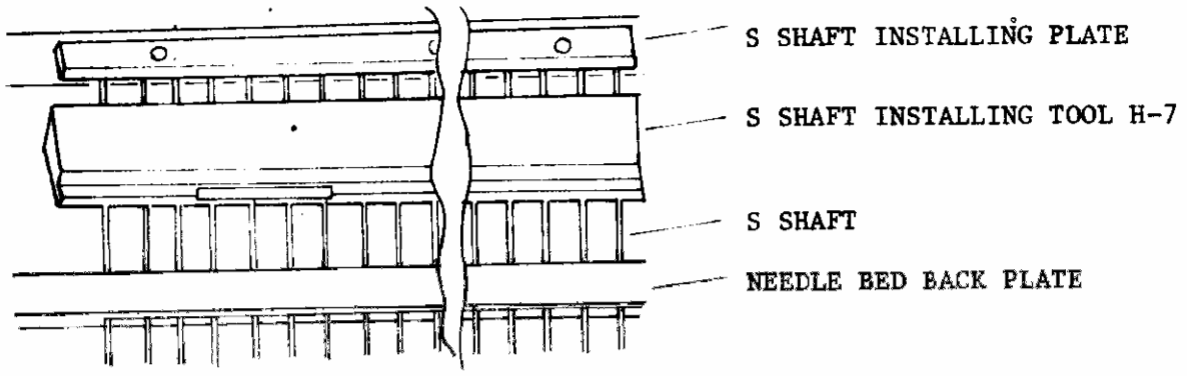


Assembling Procedure:

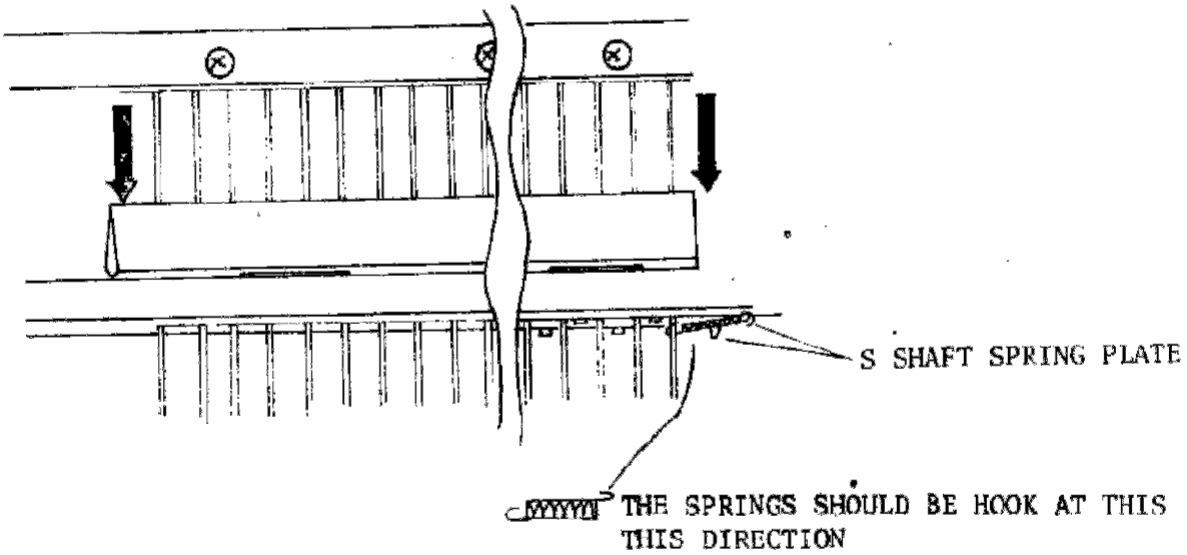
1. Place needle spring (1) needle spring (2) and presser board in this order and according to mark. Tighten the screws from the center to the sides.



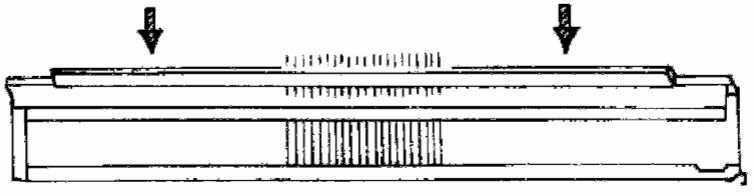
2. If you took "S" shaft installing board out push "S" shaft through the needle bed by using "S" shaft installing tool H-7.



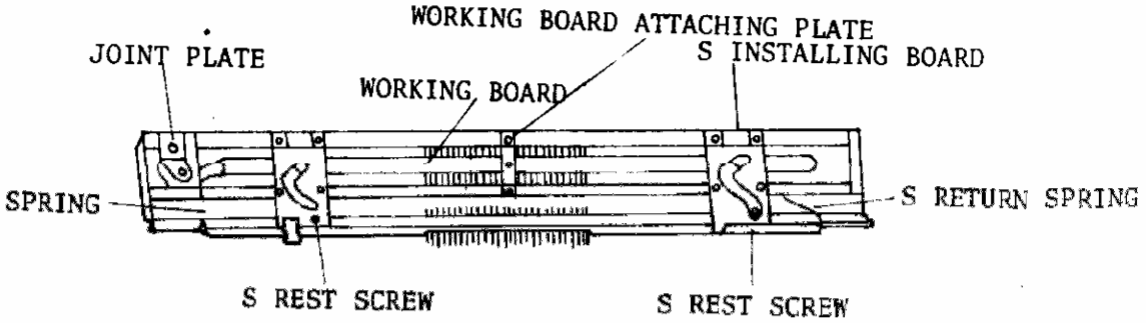
3. Insert the needle presser.
4. Place "S" shaft plate on the needle bed at proper position and tighten these screws temporarily.
5. Move the "S" shaft installing tool in the arrow direction as shown below and insert to the back portion of the needle bed. Be sure that "S" shafts are lined up straight.
6. Push "S" shaft spring through "S" shaft and hook onto "S" shaft spring board.



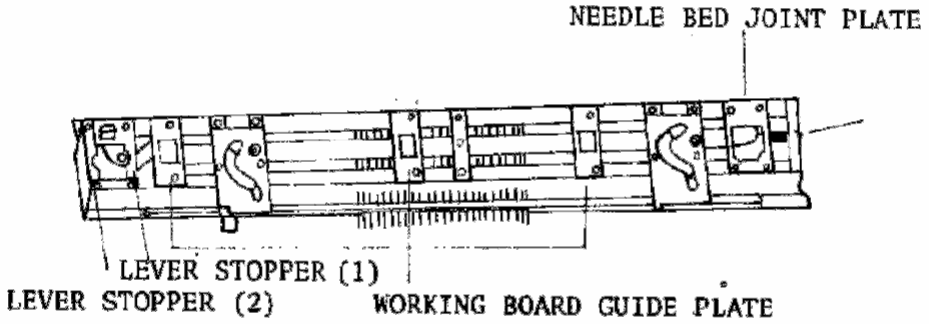
7. Push "S" resting plate into "S" shaft and remove "S" shaft installing tool. When you insert plate into "S" shaft see procedure as outlined in previous section.



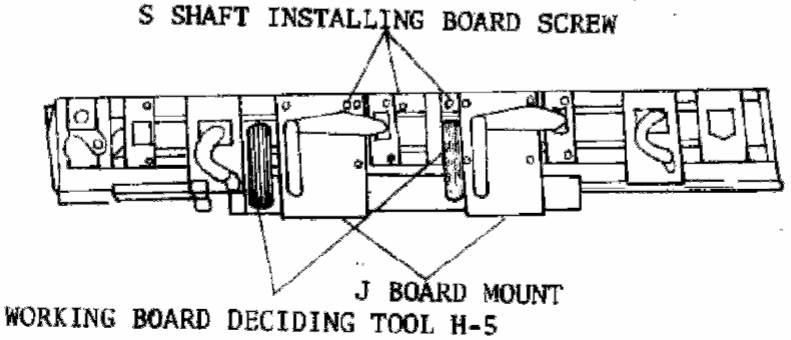
8. Attach the working plate complete ("S" installing plate, working board attaching plate and needle bed joint palte are fitted) on to the needle bed according to your marks.
9. Attach the link on "S" installing plate and "S" resting plate by tightening each rest screw. Hook "S" return spring onto the needle bed.



10. Place lever stopper (1) and (2) on the joint plate together. Tighten the lever stopper (2) temporarily so that you can check the degree of needle selection lever and adjust it later.
11. Place the guide plate according to your mark. Place this joint plate (right) on the installing position and tighten.
12. Hook the spring on the reinforcement board on the right.

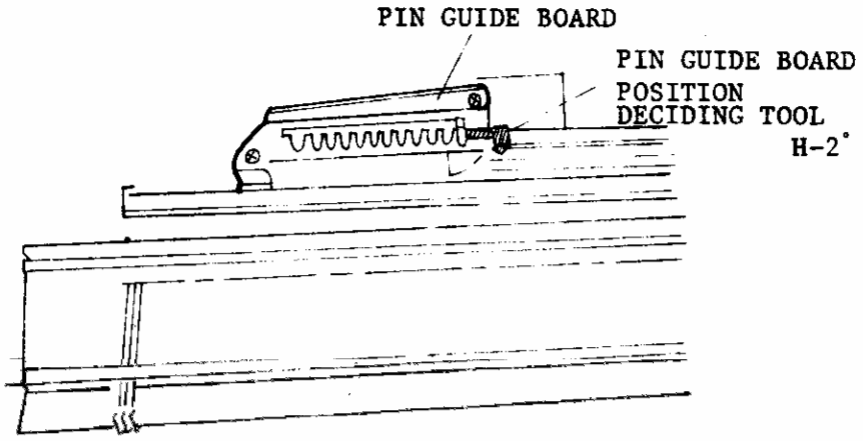


13. Place the "J" board mount temporarily and adjust the position by using gage H-5 and then tighten.
14. Adjust the gap between "S" shaft and pattern lever so that the gap is 0.9 m/m and tighten the "S" shaft installing board.

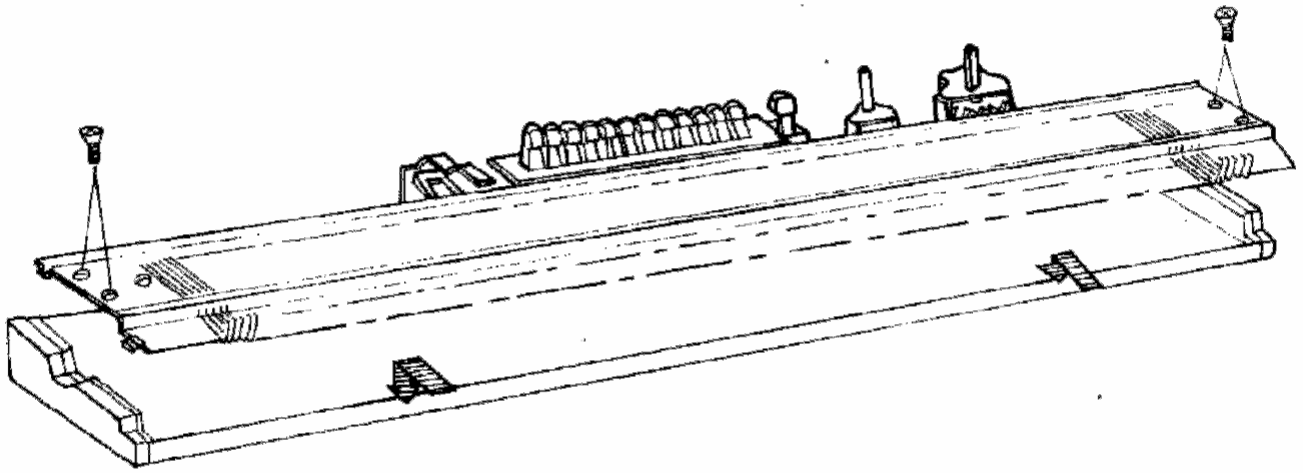


WORKING BOARD DECIDING TOOL H-5

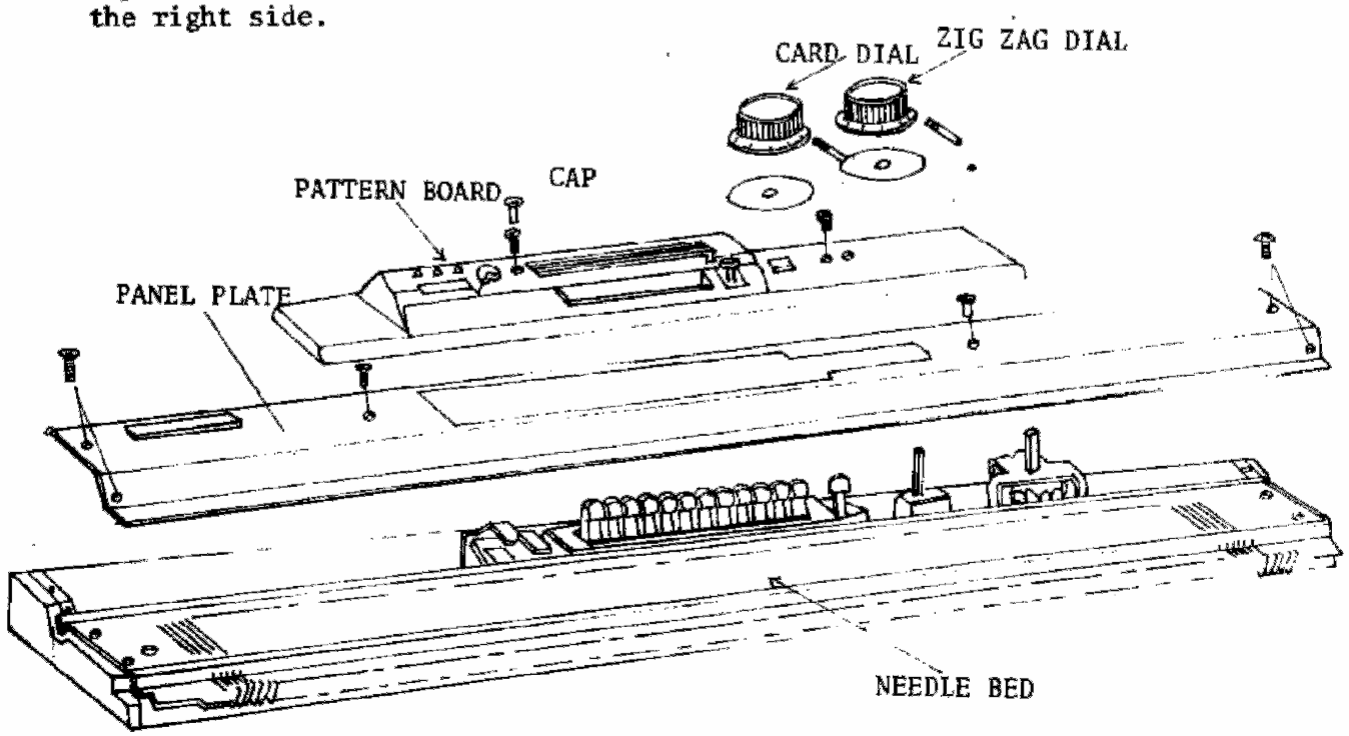
15. Turn the needle bed face up, using the pin guide board position deciding tool H-2. Tighten the pin guide baord. After assembling make sure no screws are loose. Operate the selector lever, check all moving parts to see that everything is all right before putting bed back into case.



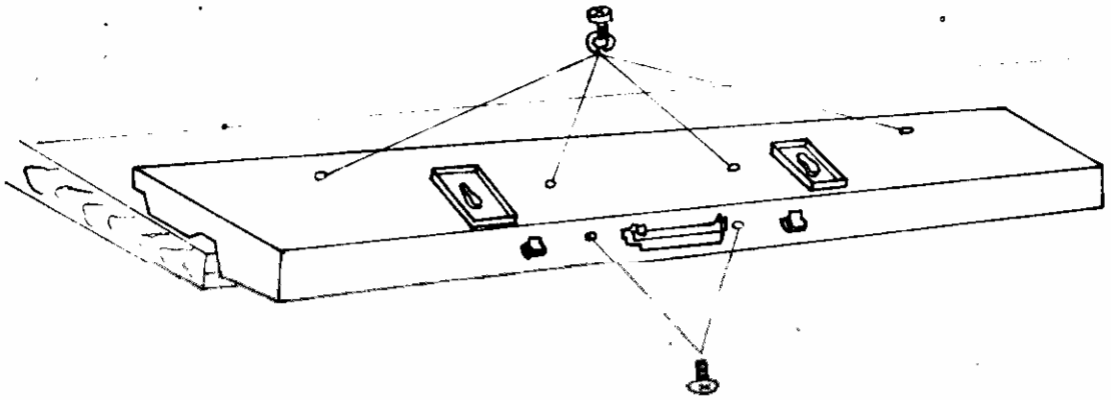
16. Put the needle bed into the case and tighten screws on both sides.



17. Replace the panel board and make sure the nut is at the position shown below.
18. Replace the pattern board. Put the cap in the hole on the left side.
19. Replace each dial. Set the zig zag dial at 1 when the moving position is at the right side.



20. Tighten screws on handle.
21. Turn case up side down carefully so as not to damage needle bed and tighten screws at the bottom of the case.



Now that you have assembled the knitting machine, do some knitting. Check each part you have adjusted to make sure it works well.

LATCH NEEDLE

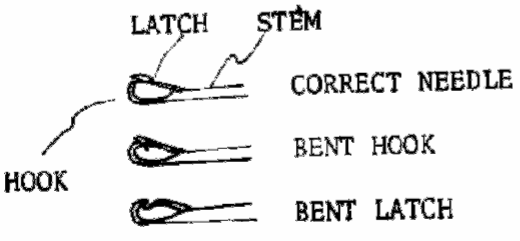
Check:

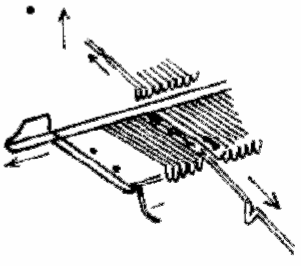
If hook or latch is bent or damaged in anyway the stitches will be dual or drop from these needles.

If the stem is bent the needle selection will not work.

Procedure of Exchanging Latch Needle:

1. Pull the needle presser out from either side.
2. Pull the damaged needle all the way forward then tilt down to clear pattern board (if needle is in that position) then push back to remove needle from bed.
3. Insert needle hook first through needle guide and push forward when shank clears end of needle guide let drop into bed and push back to insert needle.
4. Insert needle presser.



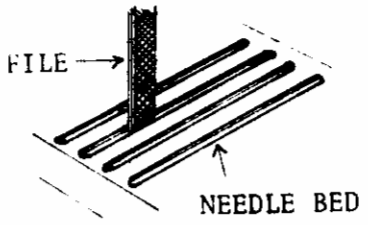


Repairing scratches on needle guide:

If the needle guides have some scratches on them the movement of the carriage will be heavier.

Method to correct:

Fix the scratches by using a fine file just enough to smooth out the needle guide.

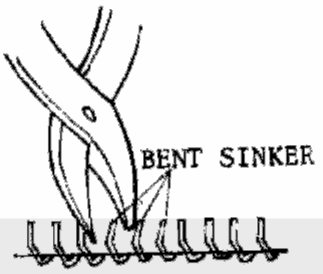


HOW TO REPAIR BENT SINKER HOOKS

If you have a bent sinker hook the stitch will be uneven.

Procedure:

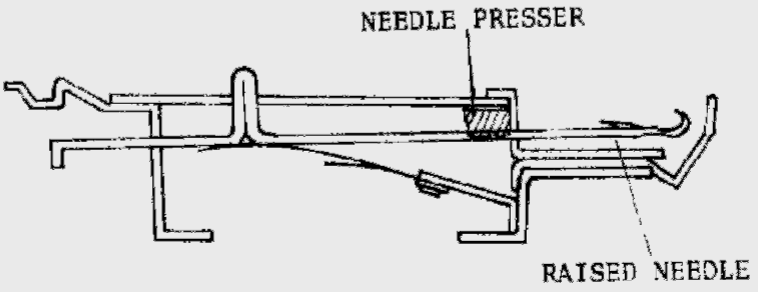
Adjust the bent hooks by using a small pair of pliers by visually straightening the bent hooks. Be careful not to make any scratches on the needle bed.



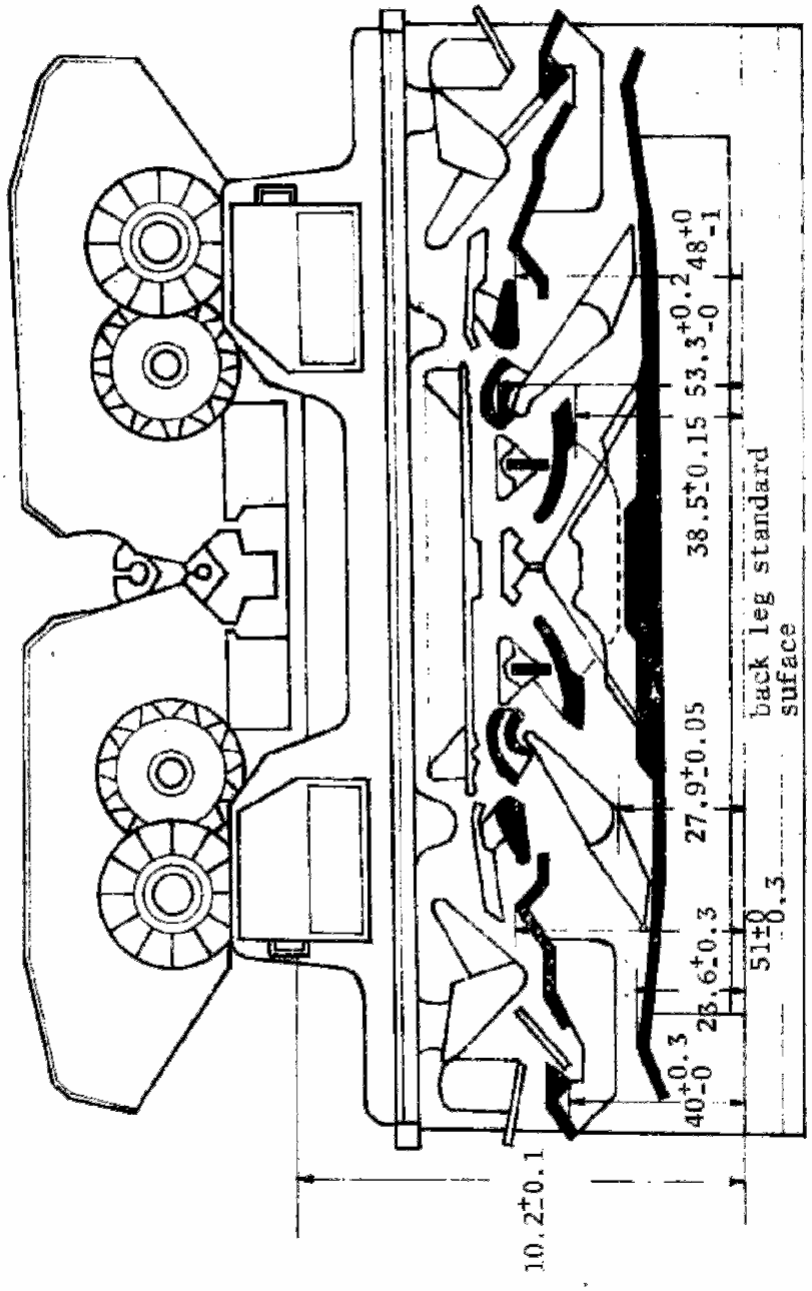
HOW TO REPLACE NEEDLE PRESSER

1. When the natural or chemical fabric is worn away on the needle presser the hooks of the needles will lift up. In this position they are certain to be damaged and cause very poor knitting.

   To replace the needle presser, slide it out from either end and carefully insert the new presser bar.



STANDARD MEASUREMENTS

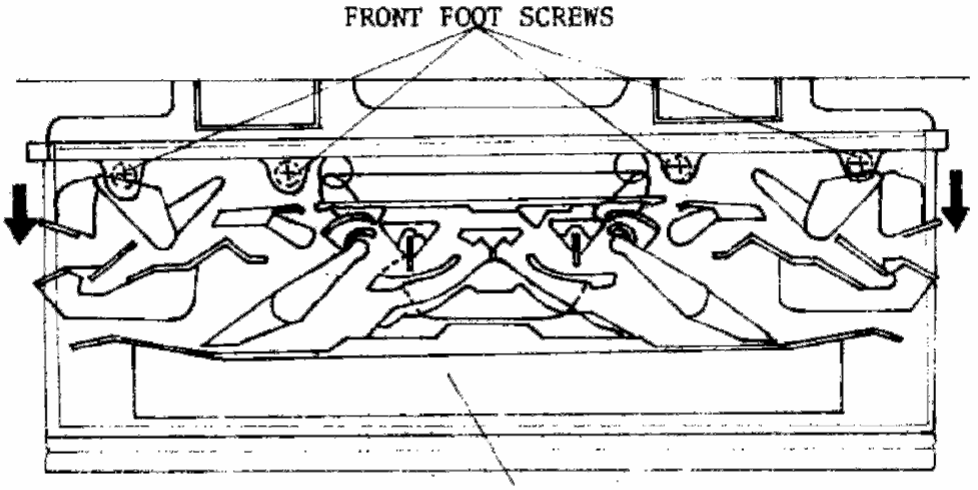


HOW TO ADJUST CARRIAGE TO NEEDLE BED

If the carriage has too much play in it while moving across the needle bed it will cause the knitting to be striped and uneven. If there is not enough play between carriage and needle bed it will be heavy to slide.

Adjusting:

Place front foot positioning tool C-5 as pictured below. Loosen the front foot screws make contact with the tool. Put carriage onto needle bed and slide it across, checking play and weights.



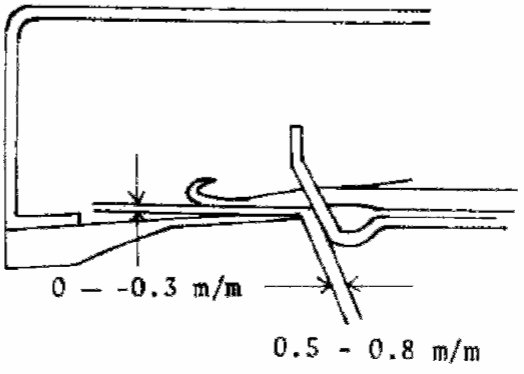
FRONT FOOT POSITIONING TOOL C-5

HOW TO ADJUST FABRIC PRESSER

Adjustment of gap between fabric presser and sinking comb. If gap is too wide between fabric presser and sinking comb the stitches will float and cannot be made because yarn will be excessively loose and will not come out of needle hooks. If the gap is too narrow carriage will be too heavy to slide.

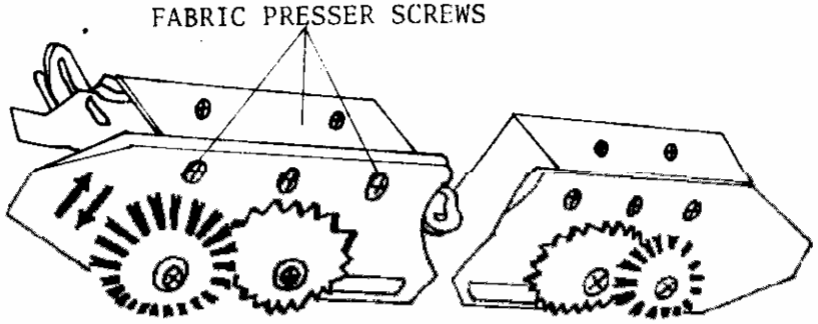
Check:

Gap between the fabric presser and sinking comb is 0.5 to 0.8 m/m. Check the fabric presser when you pull the fabric presser toward you.



Adjusting:

Loosen the screws fastening the fabric presser. If the gap is too wide adjust it toward the sinking comb. If the gap is too narrow adjust it away from the sinking comb.

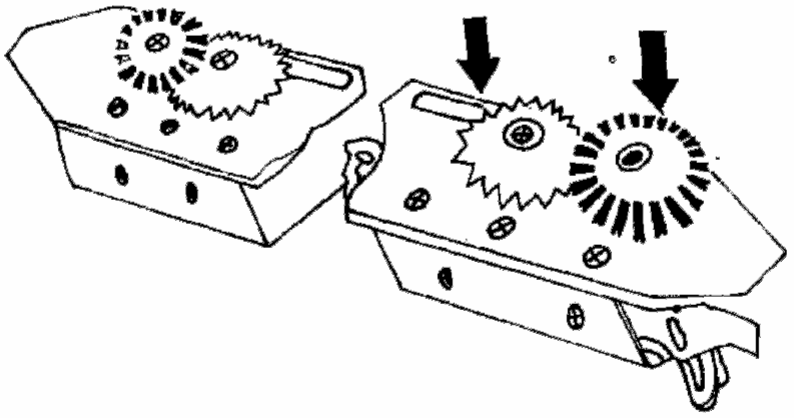


ADJUSTING GAP BETWEEN FABRIC PRESSER AND LATCH NEEDLES

If the gap is too wide, stitches will float and cause knitting to be uneven, drop stitches and can cause damage to the latch needles.

Check:

The gap between the fabric presser and the latch needle is 0 to 0.3 m/m. Check the gap at flat sides on the fabric presser.



Adjustment:

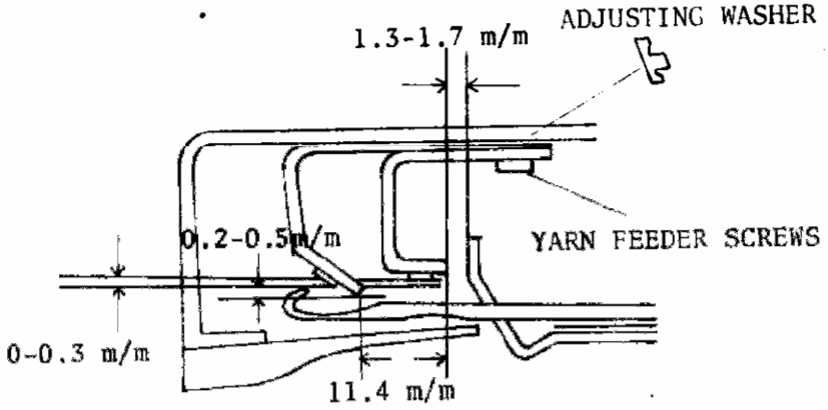
Take the fabric presser out of the carriage. If gap is too wide adjust by using pliers with pad to avoid causing right and left. Replace fabric presser on carriage and check adjustment.

ADJUSTING YARN FEEDERS

If the yarn feeder is too high or the sinking comb is too wide it may cause dropped stitches. If the yarn feeder is too low it may cause damage to the latch needles.

Check:

The gap between the down portion of the yarn feed and surface of latch needles is 0 to 0.3 m/m. The gap between the yarn feeder and the sinking comb is 1.3 to 1.7 m/m. The gap between the plain knit yarn feeder and back leg standard surface is 112/6 m/m.

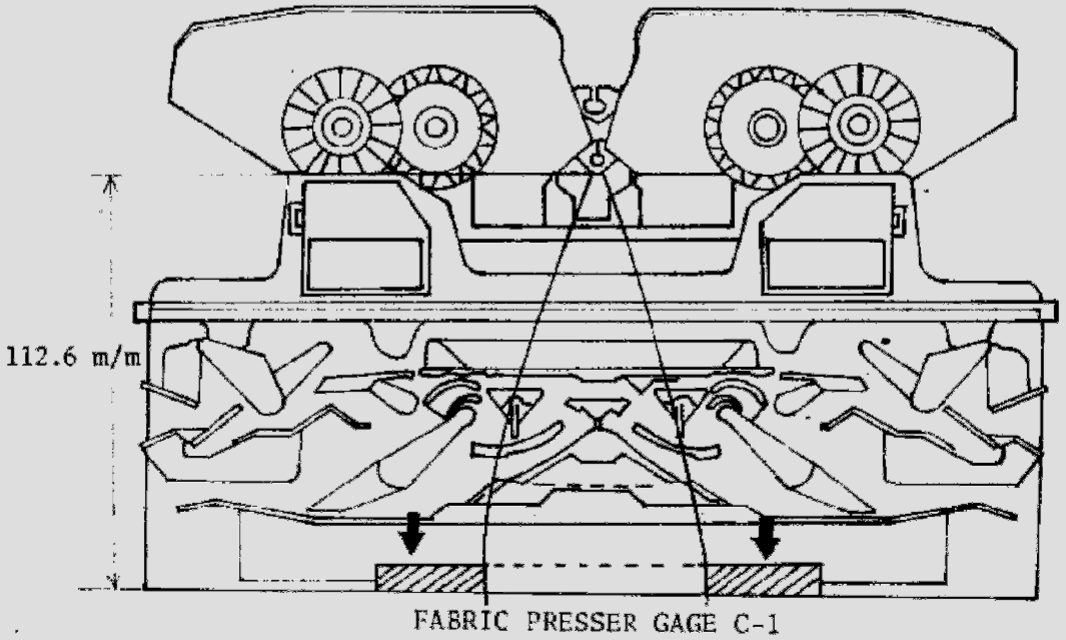


Adjustment:

Height of the yarn feeder. If it is too high, loosen the screws of yarn feeder and put adjusting washer between the yarn feeder and board mount to get correct adjustment. If it is too low take the washer out.

GAP BETWEEN YARN FEEDER AND SINKING COMB

Check the gap from sinking comb. However this adjustment is measured from the yarn feed to the back leg standard surface.



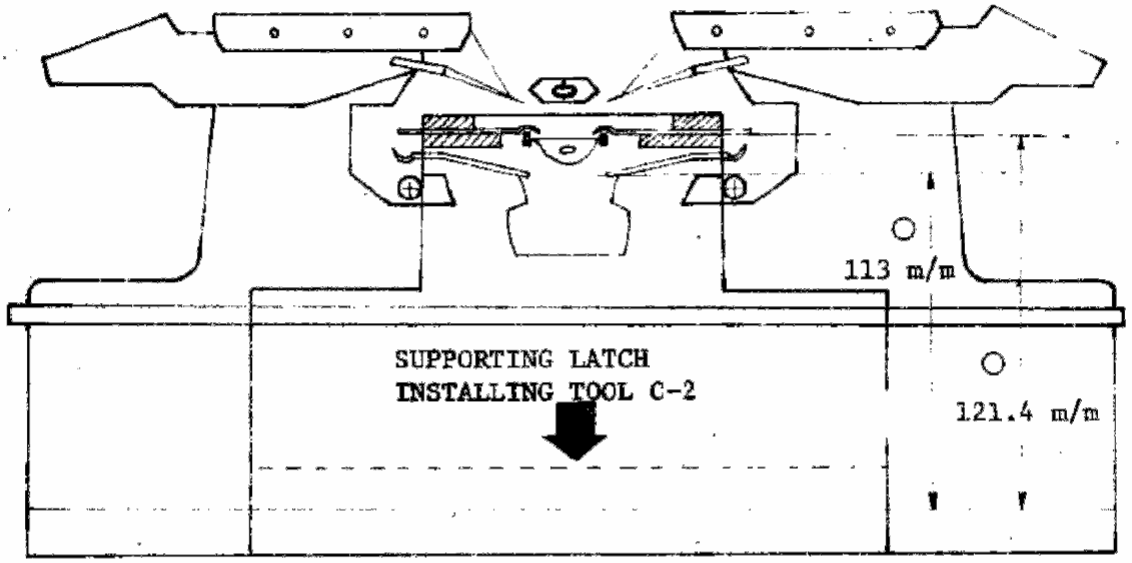
On the back of the carriage place the fabric presser gage C-1 on the back leg standard surface as the arrow direction is shown above. Place the side of the yarn feeder on the side of the gage. Make sure that the yarn feeder is not tilted.

ADJUSTING SUPPORTING LATCH

If the supporting latch is not at the proper position, it will cause damage to the latch needle.

Check:

The standard gap of the supporting latch and the back leg standard surface is 113 m/m to 121.4 m/m check to make sure during measurement there is no tilt.



Adjustment:

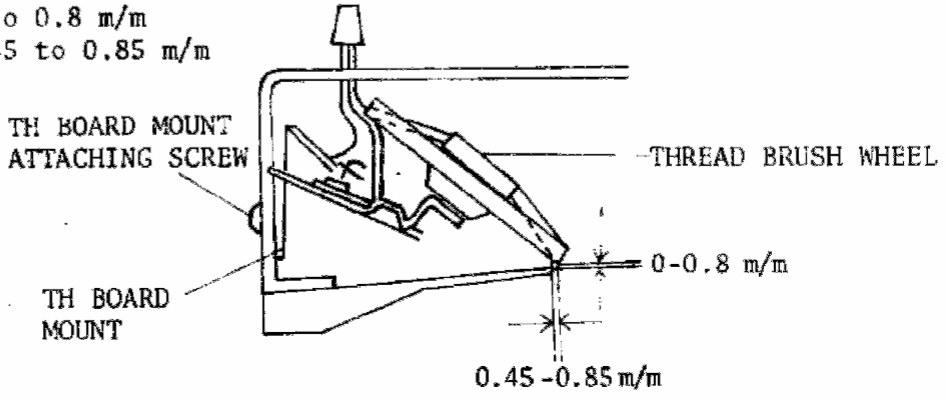
Take the fabric presser out. Loosen the screws of the supporting latch. Place the tool against the latch mount and move it in the arrow direction as shown above. Check that the supporting latch is in the dotted line shown above and tighten the screws. Replace the fabric presser and check the gap between the fabric presser and sinking comb. It should be 0.5 to 0.8 m/m.

ADJUSTING POSITION OF THREAD BRUSH

If the edge of the thread brush wheel is too high the thread will pass over the board. If the thread brush wheel is too low the yarn will split.

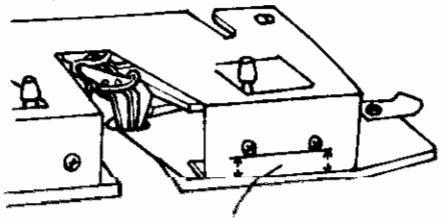
Check:

T Position: 0 to 0.8 m/m
A Position: 0.45 to 0.85 m/m



Adjustment:

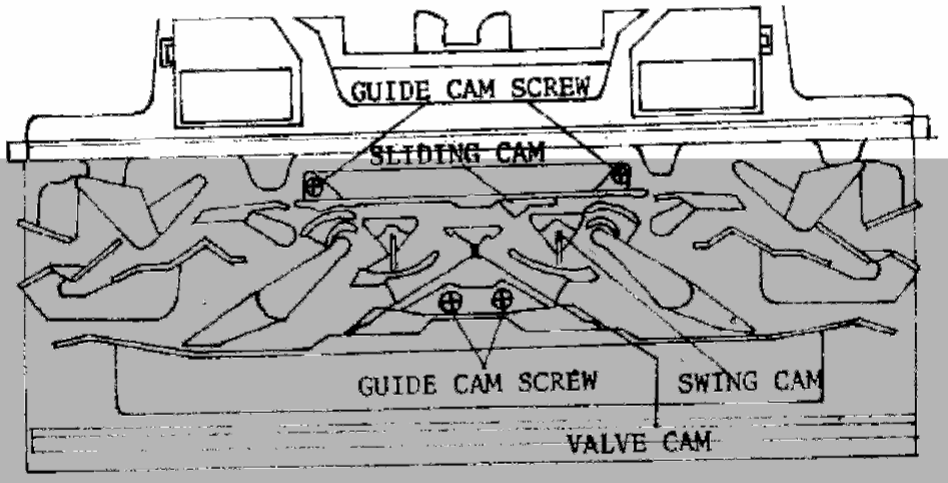
Loosen the screws of the TH board mount and adjust the edge of brush wheel by moving it up or down. Tighten the screws parallel so that TH board mount does not tilt.



TIGHTEN THE SCREWS PARALLEL

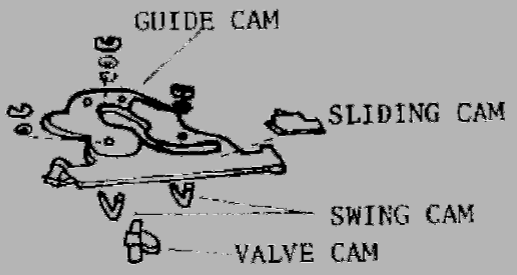
REPLACING GUIDE CAM

If there are any scratches on the butt surface of the guide cam it will make the carriage hard to slide. Should the scratches by slight then use fine sand paper to smooth out the butt surface. If the scratches are deep exchange the cam as follows:



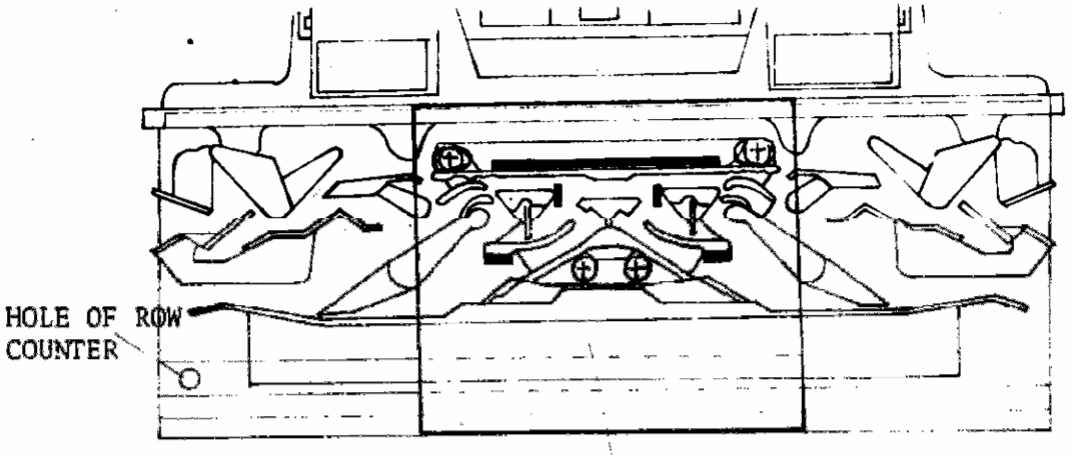
Procedure:

1. Remove four guide cam screws. Keep in mind that the two screws at the bottom are shorter than the others.
2. Take the guide cam out. At the same time the base plate will also come out.
3. Valve cam and sliding cams is attached on the "E" ring so remove the "E" ring from the guiding cam. A spring is attached to the valve cam so remove that also.

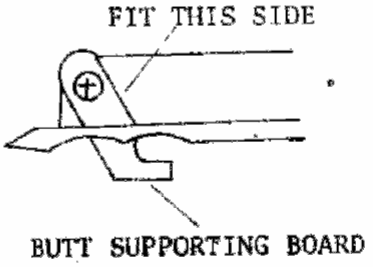


Assembling:

1. Fix the valve cam, valve cam spring and swing cam on the new guide cam.



2. Put the sliding cam under the guide cam and place them in position. Place the butt supporting board on them and stabilize the guide cam temporarily.
3. Set the tuck button and place the top part of guide cam installing tool C-3 into the hole of row counter and stabilize.
4. Place the guide cam, while you are holding the tool toward the back foot board. Make sure that the butt supporting board is attached to the stepped surface of the guide surface.



5. Push the plain stitch button which will release the tuck button.
6. Tighten all screws. If the butt supporting board is damaged the pattern will not be made.

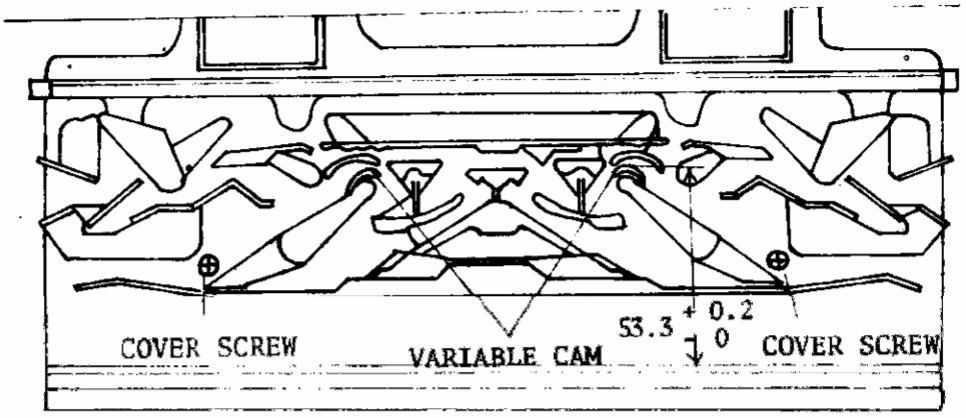
   Use above procedure to change this board.

ADJUSTING POSITION OF VARIABLE CAM

If the variable cam is too low the stitches will slip.

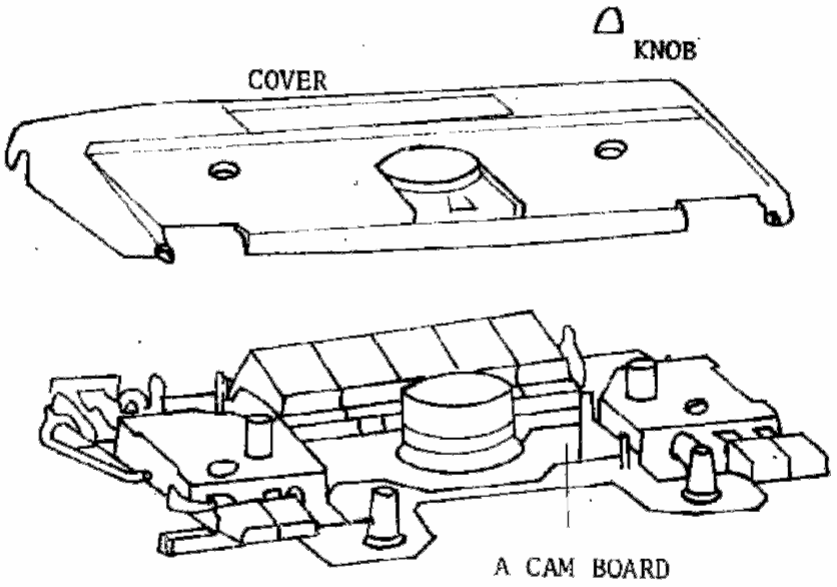
Check:

Position of the variable cam from the back leg standard board is 53.3 + 0.2 m/m. Make sure fairisle knob is in plain.



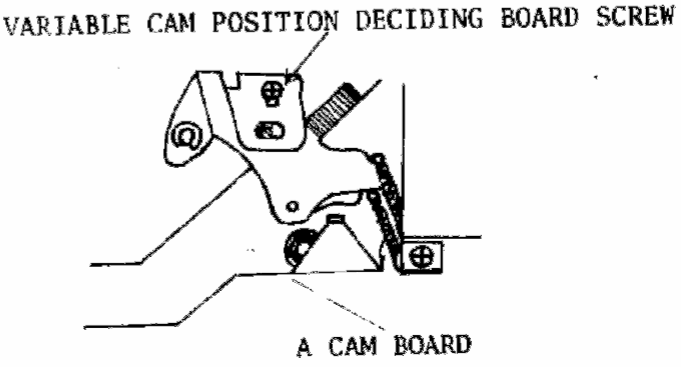
Procedure:

1. Pull the fairisle knob up.
2. Remove screws on both sides so that you can remove the cover adjustment.



Adjustment:

Loosen the screws of the variable cam position deciding board and adjust it by moving the board either back or forward as needed.



Assembling:

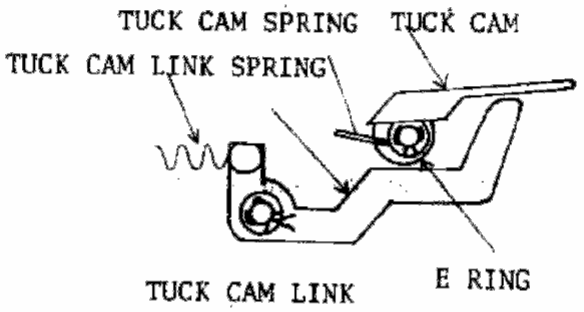
1. Place the cover in position. Tighten the screws.
2. Replace the fairisle knob.

EXCHANGING TUCK CAM

If the tuck cam or tuck cam spring is damaged you can not knit the tuck pattern, so exchange it as follows.

Procedure:

1. Remove "E" ring on the tuck cam and remove tuck cam spring.
2. Remove "E" ring under the spring so that you can remove the tuck cam.
3. If you remove the tuck cam link remove butt release first.
4. Remove the tuck cam link spring and remove the "E" ring.

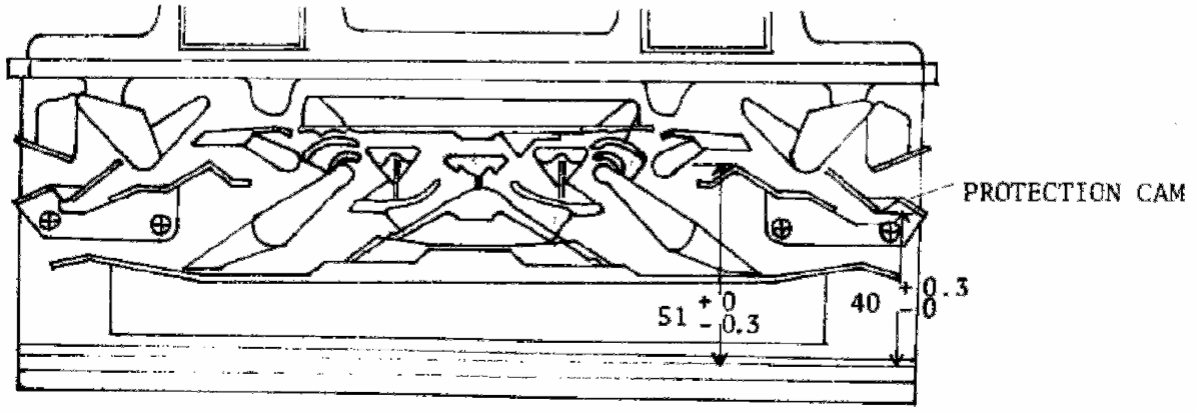


Assembling:

1. Assemble the tuck cam link and hook the tuck cam link spring.
2. Assemble the tuck cam and hook the tuck cam spring by the "E" ring.
3. Place the butt release. The position of the butt release is 23.3 to 23.9 m/m from the back leg standard surface.

ADJUSTING POSITION OF "R" CAM

Protection Cam



If "R" cam is not in proper position it causes the selected needle to jam against top of "R" cam and pattern can not be knitted.

Adjustment:

Loosen the screws of "R" cam and adjust the position of "R" cam as diagrammed in the previous page.

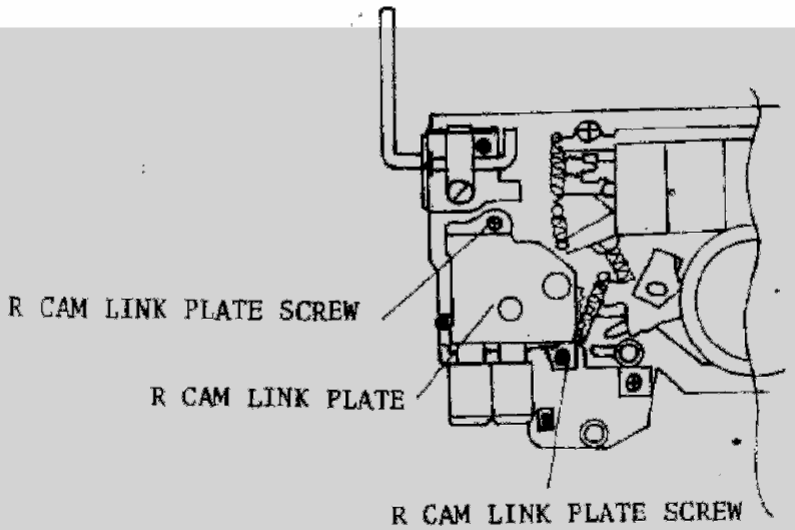
Make sure that the "R" cam leads the selected needle at the "D" position.

ADJUSTING "R" CAM LINK STAND

If you can not set by pulling up and down on the "R" cam link stand, adjust it as follows.

Procedure of detaching:

1. Take cover off.
2. Unhook the spring hanging on the "R" cam link stand.
3. Loosen the screws of "R" cam link stand.
4. Spring is hooked on the lever inside of "R" cam link stand and KN cam, so be careful not to pull it when you unhook the one side and remove the link stand.



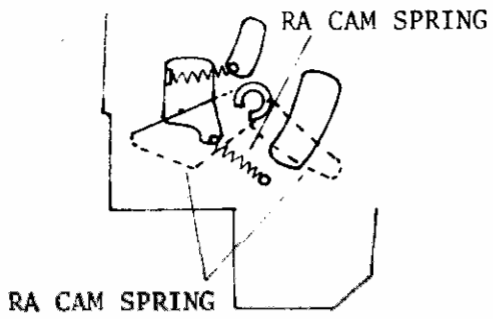
Adjustment:

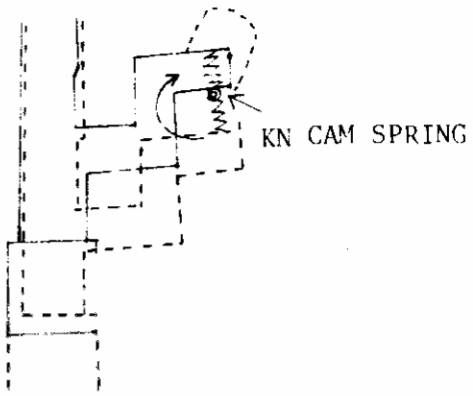
If the spring inside of "R" cam link is unhooked, hook it.

Remove the spring of KN cam and remove "E" ring and pull it down.

Assembling:

1. Replace the KN cam.
2. Hook the spring at the position shown by dotted line, turn the link plate as shown and place it.
3. Hook the spring on the link plate and replace the cover.





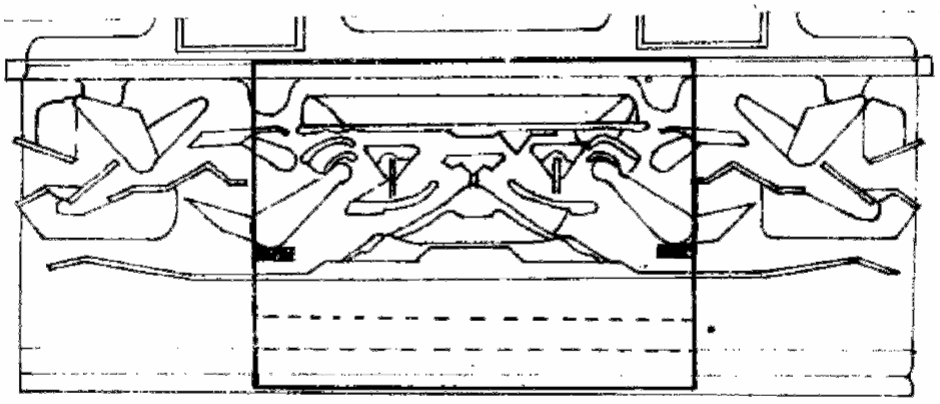
ADJUSTING POSITION OF KN CAM

If the position of KN cam is too far right or left your knitting will have stripes every other row.

Check:

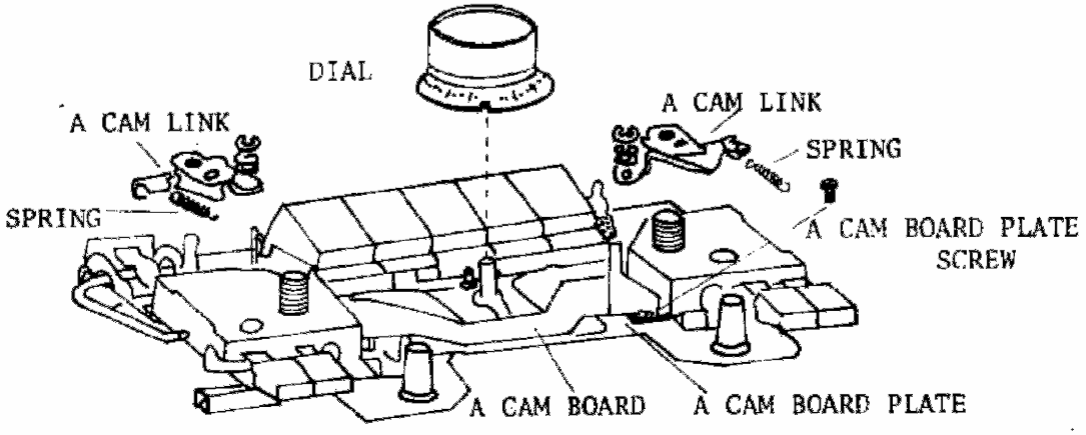
When you still have stripes even after you have sdjusted the gap between the needle bed and carriage so that the gap is within 0.2 m/m then measure the distance from the back leg standard to KN cam by using KN cam parallel jig C-4.

Set the tuck button and attach the jig on the back side. Turn the zig zag dial from 0 to 10 and check the gap between the face of the jig and bottom part of the KN cam. If there is a gap on one side adjust as follows:



KN CAM PARALLEL JIG C-4

Procedure:

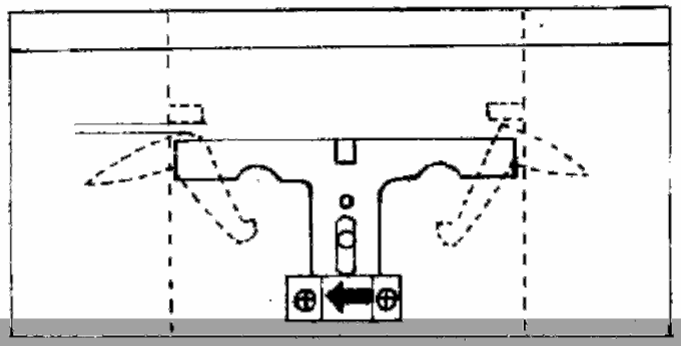


Procedure:

1. Take cover off.
2. Turn the zig zag dial to the "O" and pull it up.
3. Unhook the spring from the "A" cam link and remove "E" link from "A" cam link. Then remove "A" cam link.
4. Mark the position of "A" cam plate mount. Loosen the screws of "A" cam plate mount on both sides and remove the "A" cam plate mount.

Adjusting:

1. Put the stitch adjust dail into the shaft.
2. Set the empty button.
3. Attach KN cam parallel tool C-4 and turn the stitch adjust dial to the direction of O. Loosen screws on the guide plate support. If there is a gap on the right side like shown below move the guide plate support in the arrow direction as shown but just slightly.



KN CAM GUIDE BOARD SUPPORT

Assembling:

1. Remove the stitch adjust dial and fasten "A" cam board mount to your mark.
2. Put "A" cam link into the shaft and fasten it by "E" ring. Do not forget washer.
3. Hook the spring on the "A" cam link. Place "A" cam board at the position of "adjustor".

   Check the position of "A" cam. If it is not in the proper position adjust the "A" cam board mount back and forth whichever is needed.

   The position of the "A" cam from the back leg standard surface to the top of "A" cam is 47 to 48 m/m.

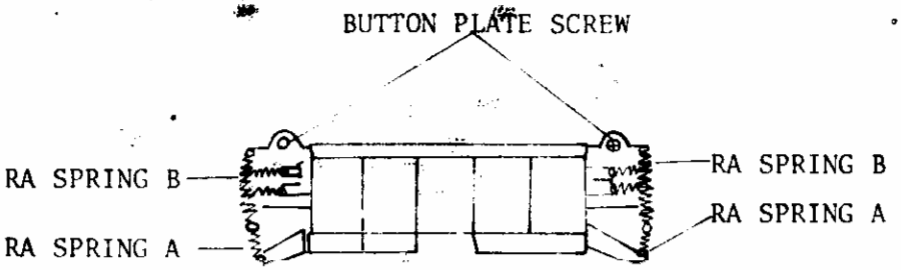
EXCHANGING RA CAM AND KN CAM

If there are any scratches on RA cam or KN cam the carriage will not slide freely. If the damage to the cams is minor use an oiled grind stone to smooth out rough spots. However, if the scratches are deep exchange as follows:

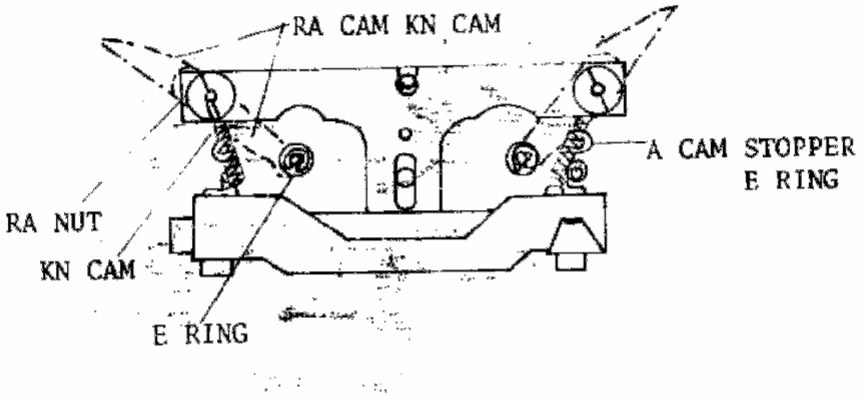
Procedure:

1. Take the cover off.
2. Pull the stitch adjust dial up.
3. Remove "A" cam link. (See page 39)

4. Remove RA springs A & B from RA shaft.
5. Remove the screws on the button plate and remove the button plate.

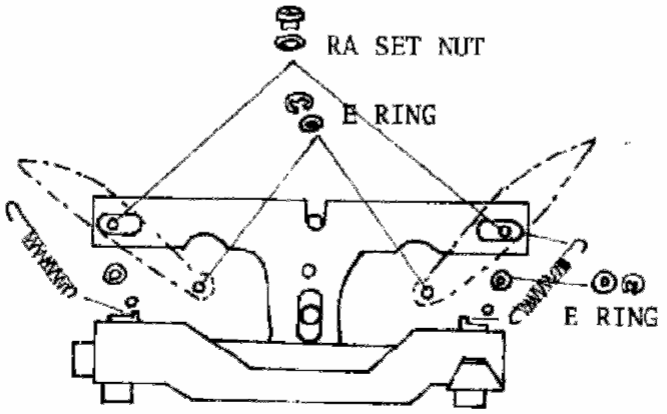


6. Remove the KN cam spring and "E" ring of "A" cam.
7. Remove "E" ring of KN cam and RA set nut using tool C-6 and C-7.
8. Remove RA cam, KN cam, variable cam and "A" cam.



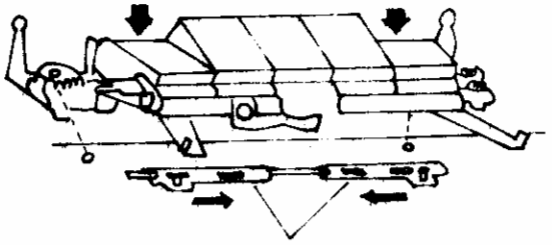
Assembling:

1. Replace KN cam, RA cam, valuable cam and "A" cam in this order.
2. Replace "E" ring on "A" cam shaft. Do not forget adjusting washer. In case there is too much play add washes so as to be well.
3. Replace adjusting washer and RA set nut on the shaft of RA and KN cams.
4. Replace the spring of KN cam.



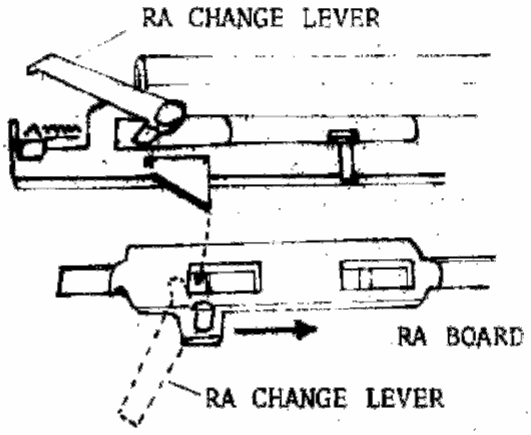
5. Check the position of KN cam by using tool lowering cam parallel jig C-4. If tilted, remove "A" cam board mount and adjust the guide plate support.

6. Replace the button plate. Move RA plate in arrow direction as shown below.



RA PLATE

Replace the nail of lower position of tuck button to the guide of RA board. Push the plain stitch button to clear tuck button. Move RA board inward so that RA change lever is outside of pin of the RA board.



7. Hook the RA springs A & B onto the shaft (See page 41).
8. Replace "A" cam link then hook the spring.
9. Push the stitch adjust button into the shaft.
10. Put the cover back.

TECHNICAL TERMS

The technical terms for hand knitters established by Japan Industrial Standard are as follow:

Terms	Meanings
Knitting	To knit
Fabric	Fabric made by knitting
Garment Knitting	Stitch work to be made on the fabric
Loose Course Knitting	Knitted rows in the beginning or at the end which are not part of the garment
Stitch	Loop made by knitting
Knit	Stitch made by drawing a new loop through a previous loop
Purl	A stitch made by drawing a new loop through a previous loop in the other direction
Horizontal Row	A row of sidewise stitches
Vertical Row (Wale)	A row of lengthwise stitches
Needle Loop	A loop drawn
Sinker Loop	A loop between two needle loops
Number of Stitches	Number of stitches on one horizontal row
Number of Rows	Number or rows in one vertical row
Knitting Width	Horizontal length of the fabric
Knitting Length	Vertical lenght of the fabric
Knitting Gauge	Number of stitches and number of rows per one 10 centimeter square fabric (stitches x rows)

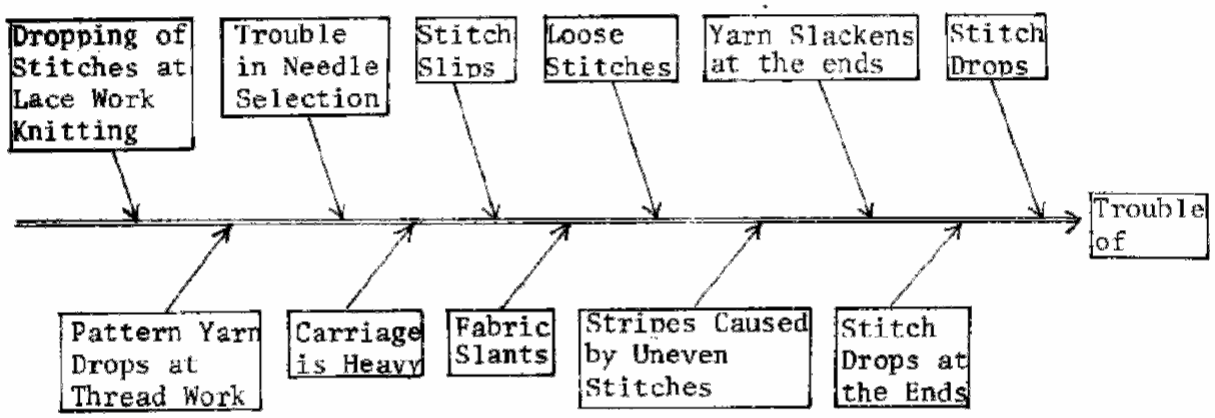
Terms	Meanings
Plain Stitch Work	Fabric consisting only of Knit stitches of purl stitches
Rib Stitch Work	Fabric consisting of repetition of Knit stitch and purl stitch on vertical rows
Purl Stitch	Fabric made by alternate repetition of Knit stitch and purl stitch on each horizontal row
Pattern Stitch	Pattern Knitted fabric
Lace Work	Openwork Knitting like that of lace fabric
Tuck Stitch Work	Knitting the pulled up stitches
Float Stitch Work	Knitting the floating stitches
Platting	Knitting with more than two yarns laid in line
Turning Course	Knitting horizontal row and turning back before finishing the row; then, Knitting forward again
Color Pattern Knitting	Knitting Pattern with more than two different colored yarns
Circular Knitting Work	Knitting in cylindrical form
Decrease	Decreasing the number of stitches
Increase	Increasing the number of stitches
Picking Up Stitches	Hooking the lost loops on the needle
Transter a Stitch	Transferring a loop to another needle
Laddering	Unlacing the unhooked loops in the vertical direction to give ladder like appearance
Bind Off	Binding off the end to prevent Unlacing
Fashioning	Shaping by decreasing and increasing the end stitches

Terms	Meanings
Linking	Linking by picking up stitches
Seaming	Seaming the fabric
Course Stripes	Uneven stitches on each horizontal row resulting in uneven stripes on the fabric
Sinker Line	Uneven stitches on wale rows producing uneven stripes
Inoperative Needles	Needles which are not used for knitting
Operative Needles	Needles which are used for knitting
Working Needles	Needles making loops
Resting Needles	Needles with loops but not knitting presently
Needle Head	Head formed by the back of latch and hook
Push Behind Latch	Moving the loop from hook to stem by opening the latch

A long service life of K747 can be enjoyed if users follow the instructions in this booklet and do not neglect maintenance cares. However, after many years, unexpected troubles from misoperation or wear of some mechanical parts may be unavoidable.

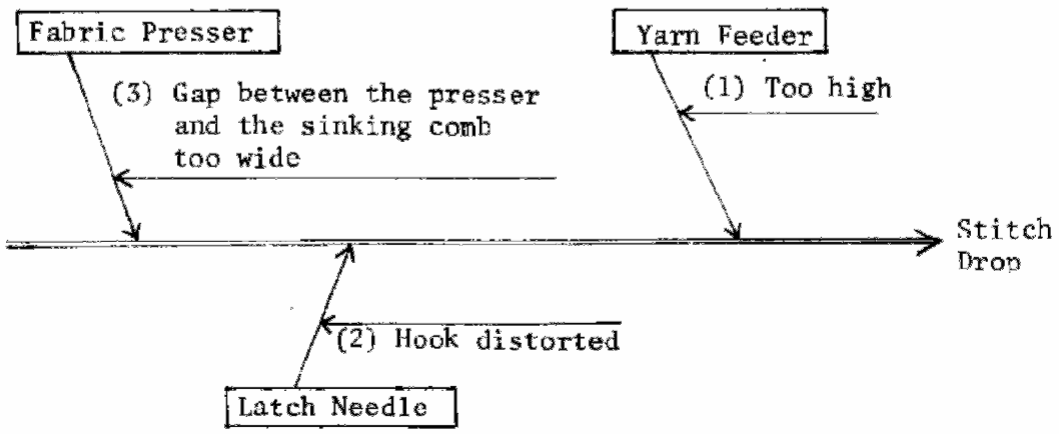
This chapter, therefore, deals with necessary measures that should be taken when trouble occurs.

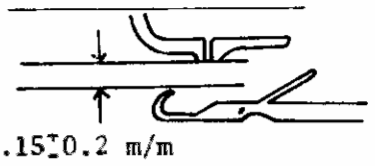
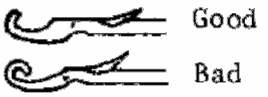
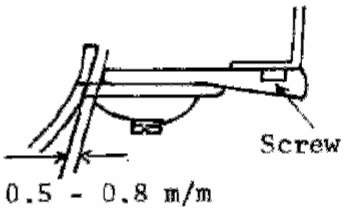
Following are major troubles that may occur on Toyota Knitter K747.



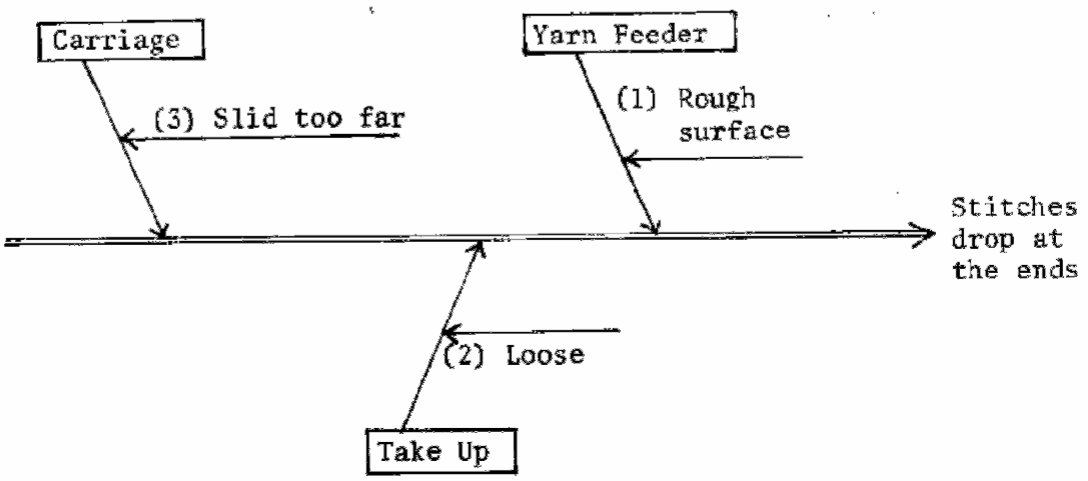
Check the above possible trouble to find the cause. When the cause is revealed make adjustments.

1. Stitch Drops



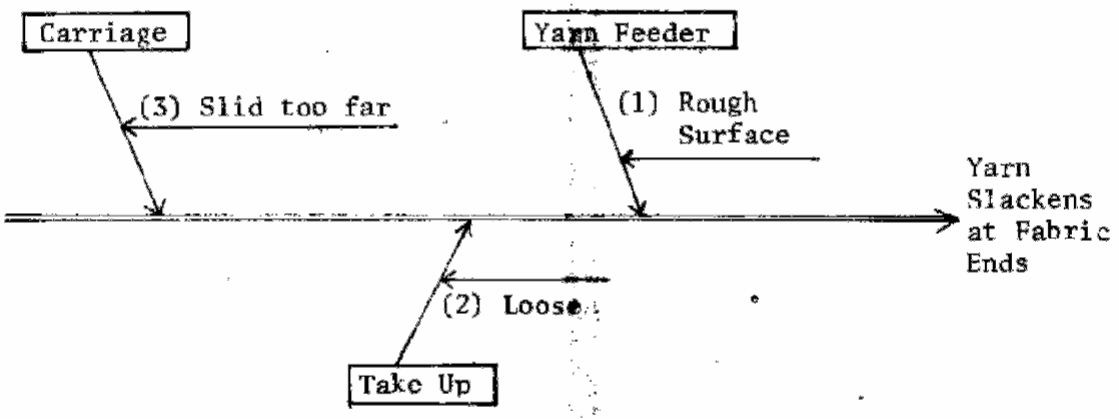
Cause	Remedy
(1) The gap between bottom surface of the yarn feeder and top surface of the needle hook is too wide.	Adjust the gap 1.15±0.2 m/m by inserting washer underneath the yarn feeder. 
(2) Stitch drops from certain needles. Inspect latch needles.	Replace the needles with hooks bending too much 
(3) The gap between sinking comb and fabric presser is too wide.	Adjust the gap by loosening screw to 0.5 m/m to 0.8 m/m. 

2. Stitch Drops at the Ends



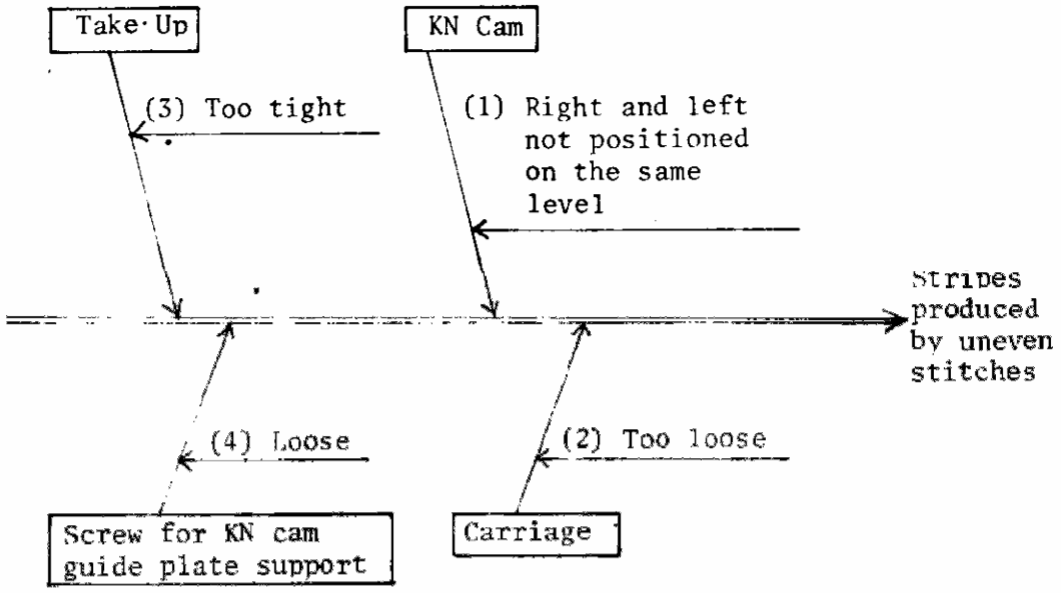
Cause	Remedy
(1) Find the rough part by pulling the yarn with the yarn slackened at both ends.	After smoothing the surface with fine file, polish with oil whetstone.
(2) Pull the yarn lightly and check if the tip of take up spring comes up to the same height as front yarn guide.	Adjust by adjusting dial. Set the red mark at "+" if the yarn is lightweight (3 ply) and at "-" if it is heavyweight.
(3) This often happens to beginners.	Slide the carriage until a click is heard. If slid further, yarn will slacken.

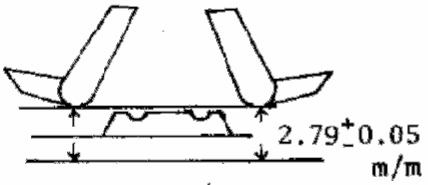
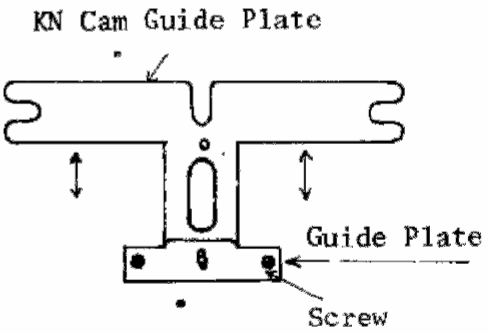
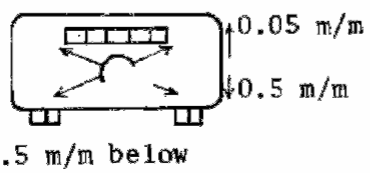
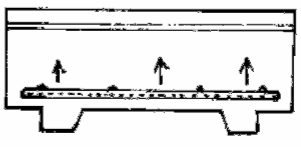
3. Yarn Slackens at Fabric Ends



Cause	Remedy
(1) Find the roughened part by pulling the yarn with the yarn slackened at both ends.	After smoothing the surface with finely grain file, polish with oil whetstone.
(2) Check if the tip of take up spring comes up to the same height as front yarn guide when finished knitting.	Adjust by adjusting dial. Set the red make at "+" side if the yarn is light-weight yarn (3 ply) and at "-" if the yarn is heavyweight.
(3) This often happens with beginners.	Slide the carriage until a click is heard. If slid further, yarn will slacken.

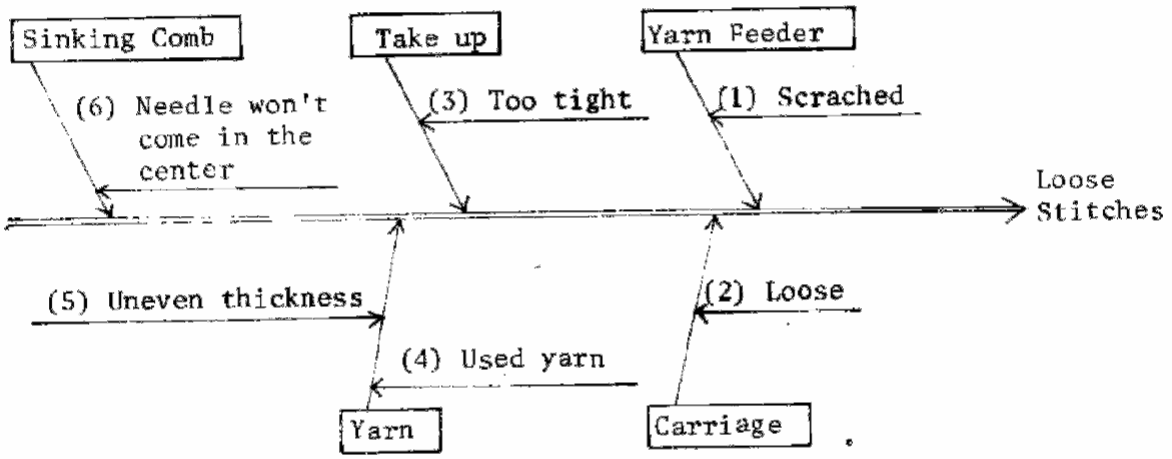
4. Stripes Caused by Uneven Stitches



Cause	Remedy
(1) Measure the distance between the rail surface and the bottom surface of the knitting cam. 	Loosen the screw fastening the KN cam guide plate support, and adjust by pushing the guide plate right and left. 
(2) By holding the 4 corners of the carriage, move it up, down and diagonally. 	Loosen the screws and adjust by making the base plate front leg facing inward. 

Cause	Remedy
(3) When finished knitting, check if the tip of take up spring comes up to the same height as the front yarn guide.	Adjust with stitch adjusting dial. If the yarn lightweight, set the dial at "+" and if it is heavyweight, set it at "-".
(4) Check to make sure the screws of knitting cam guide plate support are not loose.	If screws are loose, tighten. (Note) Tighten the screws after making the right and left KN cam rest on the same level.

5. Loose Stitches

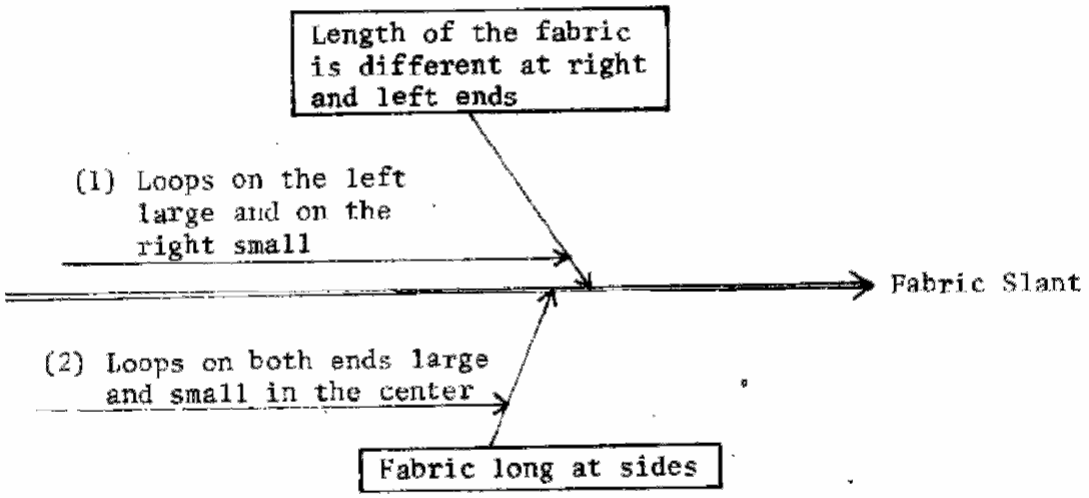


(Note) Such yarns as crochet yarn, bulky yarn and lace yarn will produce loose stitches because they are high ply yarns. Therefore, there is no adjustment necessary.

Cause	Remedy
(1) Pull the yarn with both ends slackened to find the roughened surface.	Smooth the rough surface with fine grained file and polish with oil whetstone.
(2) Hold up the carriage and move it up, down and diagonally.	Put the carriage back again by making the base plate front leg facing inward. (Ref. Stripes made by uneven stitches.)
(3) When finished knitting, check if the tip of take up spring comes up to the same height as the front yarn guide.	Adjust by adjusting dial.

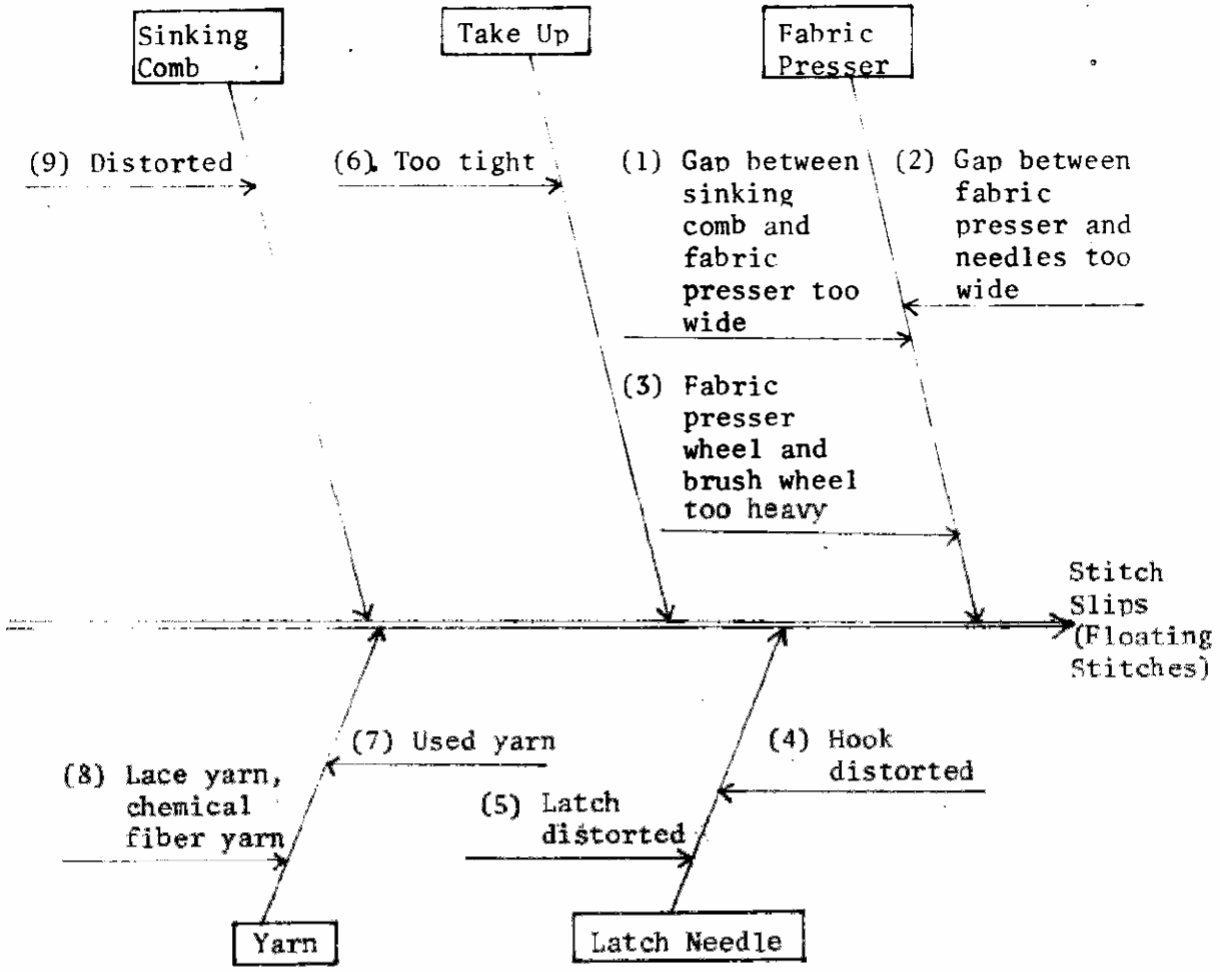
Cause	Remedy
(4) Check if the used yarn has been put through hot water to straighten.	Straighten the curled yarn.
(5) Check if the thickness of the yarn is even.	Be careful when knitting with yarn of uneven thickness.

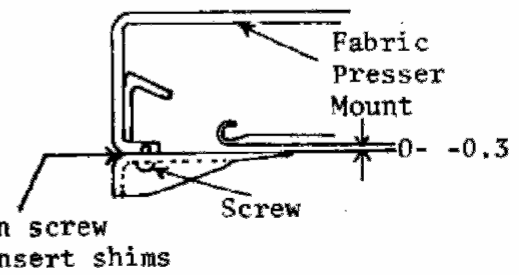
6. Fabric Slants



Cause	Remedy
(1) Hang a weight of 1 kilogram and knit for 30 rows. The difference in the length at right and left ends should be less than 3 m/m at 100 m/m inside.	This is caused by the difference in the gap between opposite rail of needle bed and sinking comb at the right and the left. Either pull out the sinking comb at the shorter end of the fabric or push in the sinking comb at the longer end.
(2) Knit for 30 rows with 1 kilogram of weight applied, and measure the length at both ends 100 m/m inside as well as at the center.	Either push in the sinking comb at both ends or pull out the comb at the center, if loops of the fablic on both ends large.

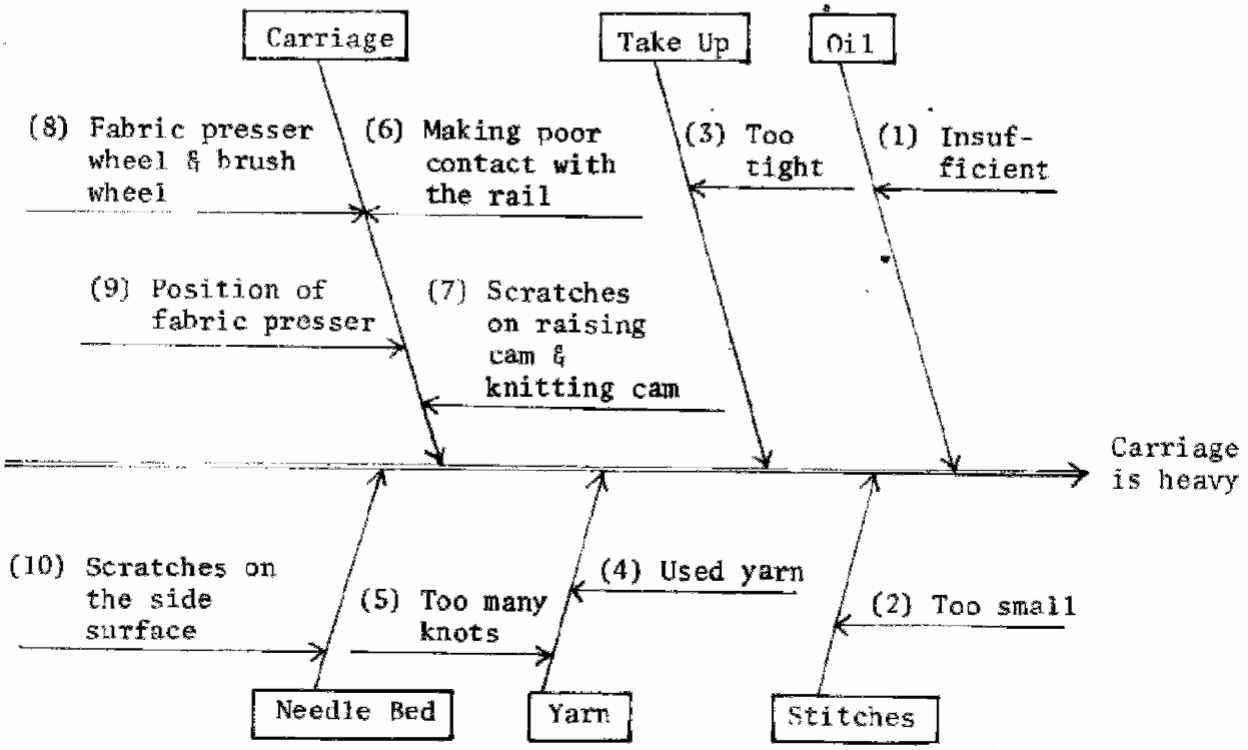
7. Stitches Slip (Floating Stitches)



Cause	Remedy
(1) The gap between fabric presser and sinking comb is too wide.	Loosen the fabric presser positioner screw and push in the presser to make the gap 0.5 - 0.8 m/m.
(2) The gap between fabric presser and latch needle should be 0 - -0.3 m/m.	Insert adjusting shims between the fabric presser and the presser mount. 

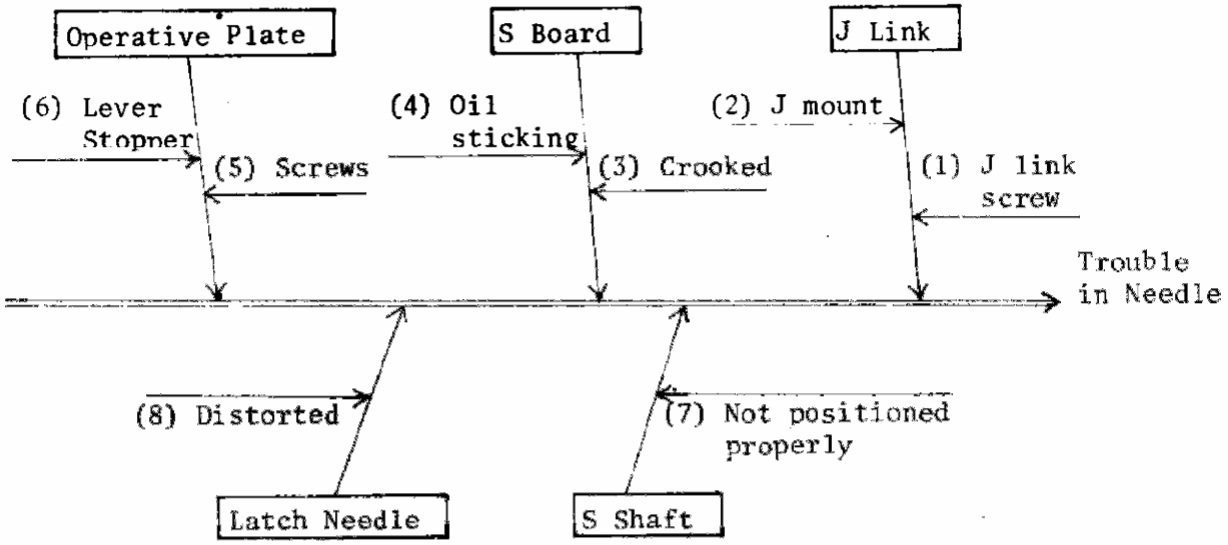
Cause	Remedy
(3) Check if it will move smoothly and is not worn by friction.	Remove dirt or if worn, replace part.
(4) Hook and latch distorted. (5)	Replace.
(6) When finished knitting, see if the tip of take up spring comes up to the same level as the front yarn guide.	Adjust by adjusting dial. If the yarn used is lightweight (3 ply) set the dial at "+" and if heavyweight, set at "-".
(7) Knitting with used yarn, (8) lace yarn and chemical fiber yarn without giving necessary treatment.	When knitting with such yarn as mentioned here, apply paraffin to the take up. Use knitting weight for fabric ends.
(9) Distorted here and there.	Repair with sinking comb repairing tool.

8. Carriage Is Heavy



<table>
<tr><th>Cause</th><th>Remedy</th></tr>
<tr><td>(1) Check if the machine is sufficiently lubricated.</td><td>Apply oil with oiled cloth to front and back legs in back of carriage, KN cam, RA cam and surfaces of other cams, sliding surface of the rail and needle butts.</td></tr>
<tr><td>(2) Check the stitch adjustment dial.</td><td><table><tr><td>Yarn</td><td>Very Thin</td><td>Medium Thin</td><td>Thick</td><td>Very Thick</td></tr><tr><td>Dial</td><td>1 - 3</td><td>3 - 6</td><td>6 - 9</td><td>9 - 10</td></tr></table>Do not knit with stitches smaller than specified above.</td></tr>
<tr><td>(3) When finished knitting check if the tip of take up spring and front yarn guide come up to the same height.</td><td>Adjust by adjusting dial.</td></tr>
<tr><td>(4) Used yarn is used without receiving necessary treatment.</td><td>Rinse yarn and apply paraffin to take up.</td></tr>
<tr><td>(5) Knots are too large.</td><td>Make knots smaller by tightening.</td></tr>
<tr><td>(6) Hold the carriage at 4 corners and move.</td><td>Adjust by loosening the fastening screw of base plate front leg.</td></tr>
<tr><td>(7) Scratches on KN cam and RA cam.</td><td>Smooth with oil whetstone.</td></tr>
<tr><td>(8) Check if dirt of yarn scraps are not sticking to fabric presser wheel or brush wheel.</td><td>Clean by removing the screws of each wheel.
Yarn scraps can be removed by transfer needle.</td></tr>
<tr><td>(9) Gap between fabric presser and sinking comb too narrow.</td><td>Adjust it so that the gap will be 0.5 m/m to 0.8 m/m.</td></tr>
<tr><td>(10) Scratches on the needle bed side surfaces.</td><td>Smooth with fine grained file, then, polish with oil whetstone.</td></tr>
</table>

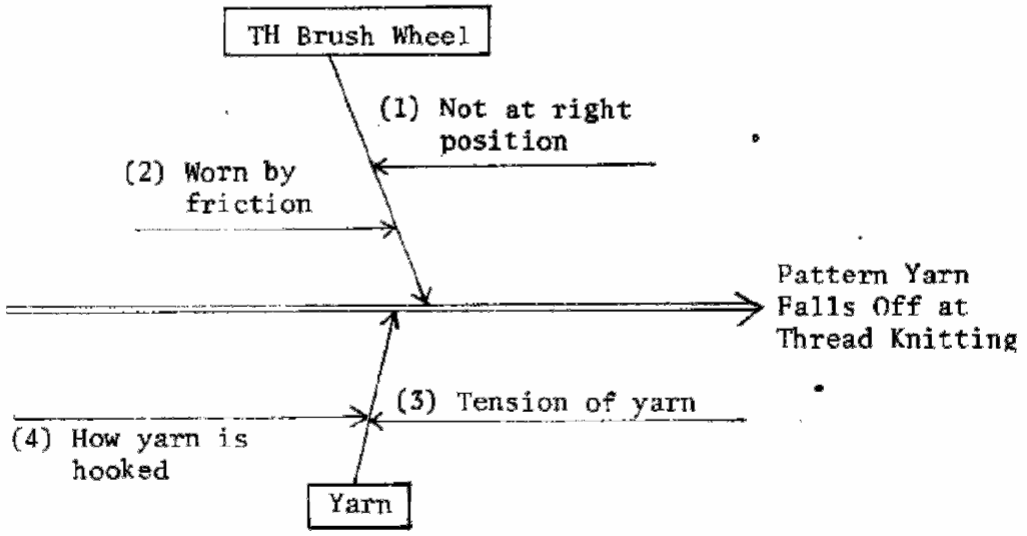
9. Trouble in Needle Selection



Cause	Remedy
(1) Check that the J link fastening screw is not loose.	If loose, J feed plate and other related parts will miss their original position interfering with proper needle selection. Adjust the position of J feed plate and fasten tightly with screw.
(2) Check if J mount screw is not loose.	If loose, the same trouble as mentioned above occurs. Correct the position of J mount and tighten the screws.
(3) Check that the S board is not crooked.	Straighten the board.
(4) Check that to see if there is oil on the S board	If there is oil on the S board, wipe off.
(5) Check to make sure that screws of operative plate and related parts are not loose.	Check operative board joint arm screw, operative plate guide plate fastening screw and operative plate guide rest screw, and if loose, tighten.

Cause	Remedy
(6) Check to make sure that the lever stopper screws are not loose and the stopper is in the right position.	When needle selection lever is returned, operative plate joint arm fastening screw hits the lever stopper and J feed plate does not go down completely. If needles stick out too high when needle selection lever is turned adjust the position of the lever stopper.
(7) S shaft and pattern lever are not positioned properly.	With S shaft mount, adjust the gap between S shaft and pattern lever to 1 m/m. If center of S shaft and pattern lever do not coincide, adjust it at positioning spring.
(8) Check to make sure that the latch needles are not bent.	Replace if certain needles are not selected or only certain needles are selected.

10. Pattern Yarn Falls Off at thread Knitting



Cause	Remedy
(1) Check to make sure that the position of TH brush wheel is correct.	If TH spring is too weak make it tighter, or replace.
(2) Check if TH brush wheel is worn from friction.	If worn, replace.

Cause	Remedy
(3) Check if pattern yarn passed through the take up.	If not, pass the yarn through take up. (Note) If held by hand, the yarn is sometimes pulled too tight and falls off.
(4) Check if the pattern yarn is hooked on to latch needle along the sinking comb.	If not, hook it along the sinking comb.

<table>
<tr><th></th><th>Trouble</th><th>Cause</th><th>Remedy</th></tr>
<tr><td>1</td><td>When color pattern knitting, selected needles drop stitches.</td><td>Pattern yarn is not passed through the color pattern yarn feeder.</td><td>Don't forget to pass the yarn through the yarn feeder.</td></tr>
<tr><td>2</td><td>Color pattern work knitting, needles selected make stockinet stitches.</td><td>Color pattern work dial is not set at color pattern work position.</td><td>Set the dial to proper position. In all other cases set the dial to plain stitch work.</td></tr>
<tr><td>3</td><td>Punched card is stuck.</td><td>Change lever is not set at "Automatic."</td><td>Always set the change lever at "Automatic" after inserting punched card.</td></tr>
<tr><td>4</td><td>Yarn falls off from the yarn feeder.</td><td>Yarn is not passed through the yarn feeder spring</td><td>Pass the yarn through the spring.</td></tr>
<tr><td>5</td><td>Slip stitch button and tuck button do not work.</td><td>Color pattern work dial is set at color pattern work, or raising cam button is depressed.</td><td>Set the color pattern work dial to plain stitch work. Release the raising cam button.</td></tr>
<tr><td rowspan="2">6</td><td rowspan="2">Carriage is heavy and will not slide.</td><td>Stitch adjusting dial is set at improper position.</td><td>Refer to the table below for proper adjustment of the dial.
<table>
<tr><td>Dial</td><td>0 - 3</td><td>3 - 5</td></tr>
<tr><td>Yarn Size</td><td>Two ply</td><td>Three ply</td></tr>
</table>
<table>
<tr><td>Dial</td><td>4 - 7</td><td>8 -</td></tr>
<tr><td>Yarn Size</td><td>Four ply</td><td>Double knitting</td></tr>
</table></td></tr>
<tr><td>Lubrication is insufficient.</td><td>Apply oil on needle bed rails, needle butts, and knitting cam surface.
Do not apply too much.</td></tr>
</table>