SERVICE MANUAL FOR MODEL 500 KNITTER

FOR REPAIR CENTRE

Printed in Japan

SCOPE OF MANUAL

This manual describes testing and repair procedures for the electronic area of the SK-500 knitting machine with the use of the sophisticated test equipments.

Mechanical repair and adjustment are covered in the Service Manual for the Field Mechanics.

REVISED OR CHANGED ELECTRONIC PARTS LIST

The old electronic parts replaced by the new parts are listed below.

OBSOLETE PARTS	PART NO.	NEW PARTS	PART NO.	COMPATIBILITY
μPC339C		AN6912		compatible

CONTENTS

[1] PRELIMINARY CONSIDERATIONS

1. Correct operational procedures.

   Correct operational procedures for the knitting machine is the first step to presuppose and locate the defective parts in short time.

2. Before testing the Machine

   Depending on type of failure, a few hours of operation of the machine will be needed before the same problems recur.

   Depending on type of failure, the machine will return to normal condition after a few hours of operation.

   Voltage level at each Test Point (TP) indicate standard level with a tolerance.

3. Test Equipments.

   Multimeter (analog type, less than 3V)

   Oscilloscope (2 channel, w/trigger mode)

4. Repair Tools

   Soldering Iron
   Soldawick
   Insulated Screwdriver (plastic) (large & small)※
   Adjusting Screwdriver for CR Sensor※
   IC test clip with testing terminals※
   Curl Cord with testing terminals※
   Wire Stripper
   Pincers
   Long-nose Pliers

※ To be supplied by Silver.

[2] TRANSFORMER UNIT (ADAPTER UNIT)

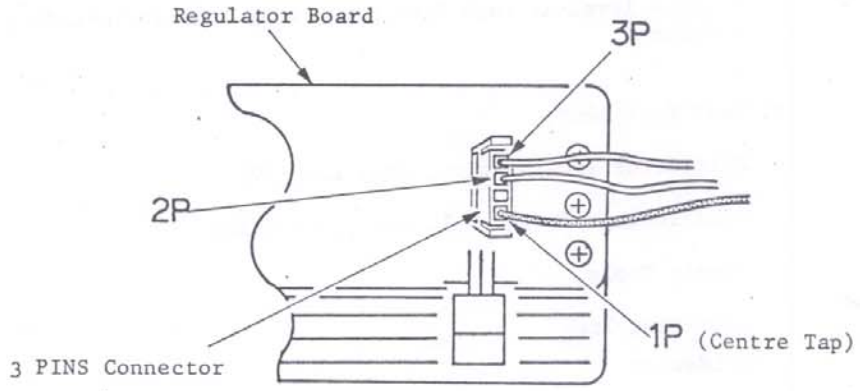
1. Failure

a. Buzzer does not sound when the machine is connected to electricity.
b. All the LED's do not light on.
c. Abnormal feeding of Pattern Card/Design Card
d. CR Sensor does not move.
f. Wrong needle selection occurs.

2. Checking procedures

a. Connect the Transformer to wall outlet and machine.

b. Turn on the power, and set the tester to measure AC voltage, and measure the output voltage from the transformer.



(Fig.1)

Contact the test leads to pins, black test lead to 1P, and red lead to other pins.

The readings across the potential difference are as follows:-

Potential difference between 1P and 2P is AC8.5V - 11.5V
Potential difference between 1P and 3P is AC8.5V - 11.5V

3. If the transformer is malfunctioning, replace whole the transformer, since it is irreparable.

[3] REGULATOR BOARD

3-1 Checking list

The following list enables you to presuppose which circuit is malfunctionig.

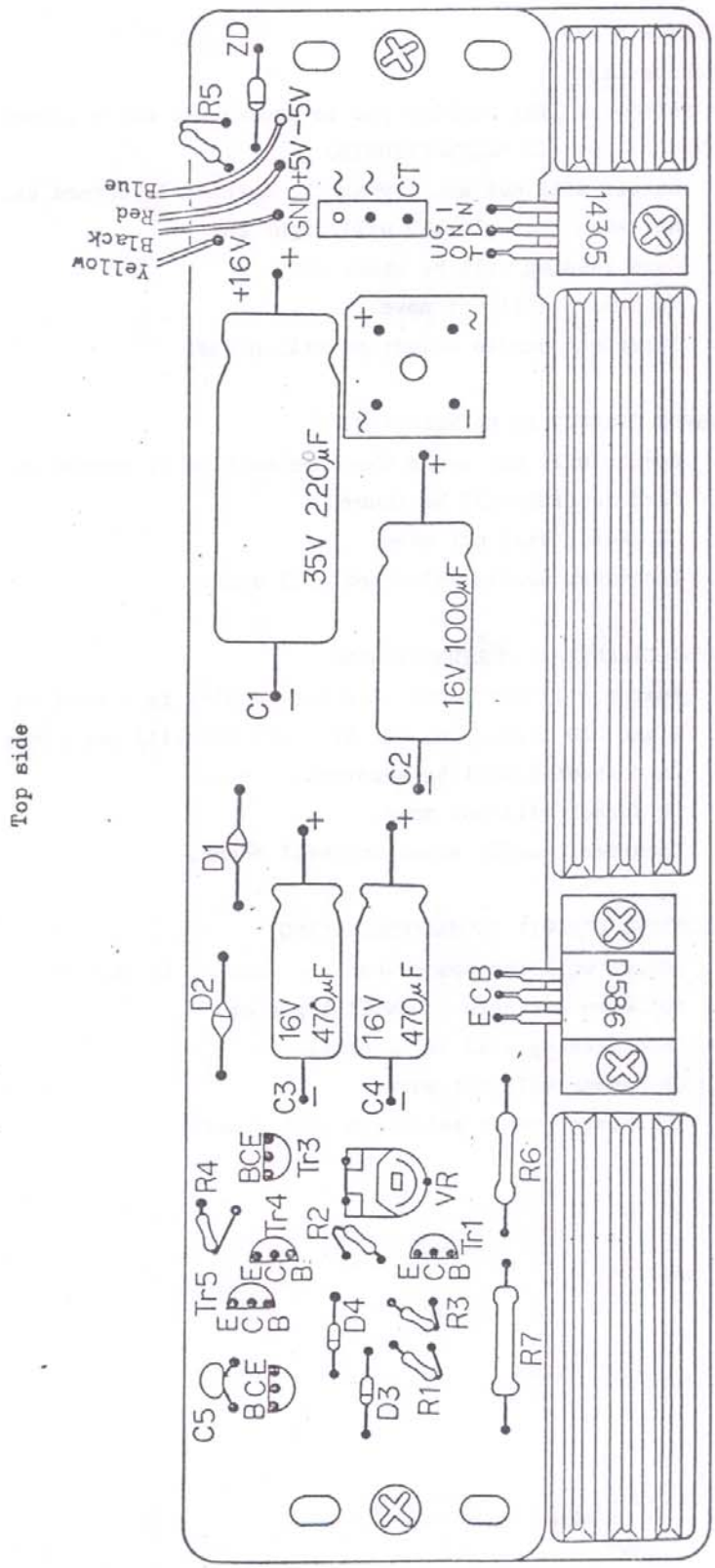
1. +5VDC CIRCUIT IS MALFUNCTIONING
   a. Buzzer will not sound when the machine is turned on.
   b. Not even a single LED will light on.
   c. Card feeding will be abnormal.
   d. CR Sensor will not move.
   e. Incorrect needle selection will occur.

2. +16VDC CIRCUIT IS MALFUNCTIONING
   a. Buzzer will not sound when the machine is turned on.
   b. Card feeding will be abnormal.
   c. CR Sensor will not move.
   d. Incorrect needle selection will occur.

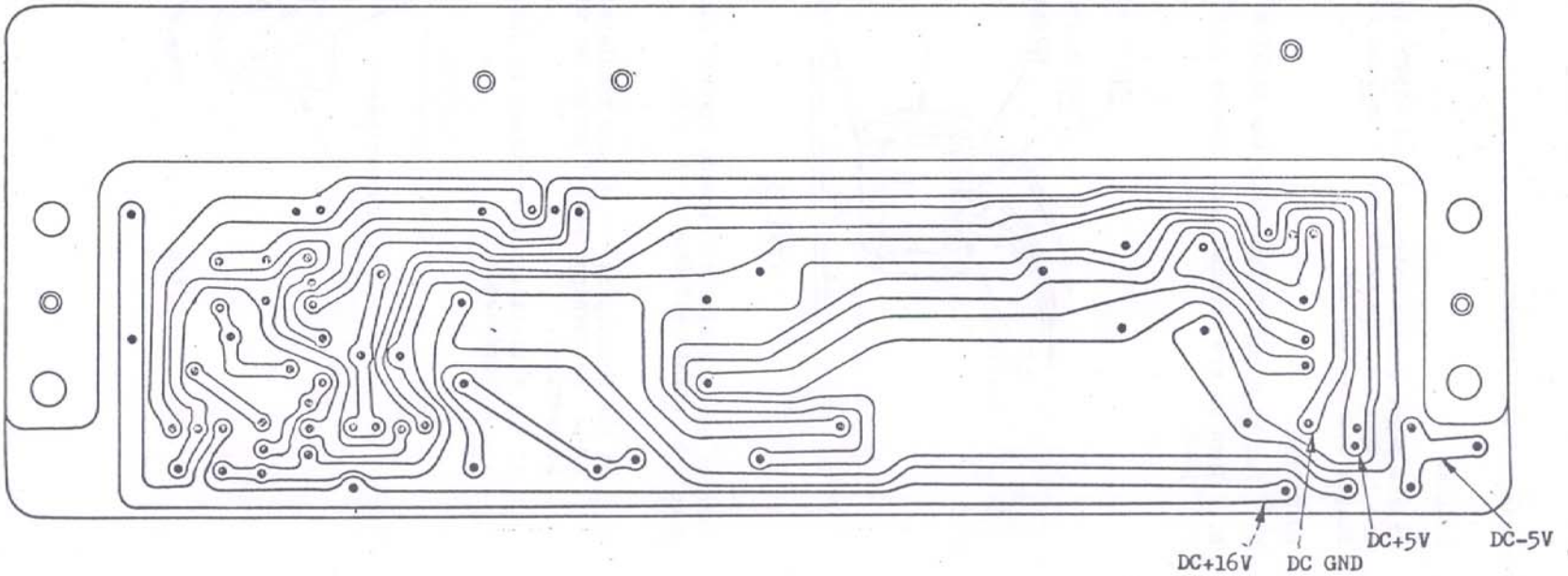
3. -5VDC CIRCUIT IS MALFUNCTIONING
   a. Buzzer will not sound when the machine is turned on.
   b. Right LED lights on, but its left LED will not light on.
   c. Card feeding will be abnormal.
   d. CR Sensor will not move.
   e. Incorrect needle selection will occur.

4. GROUNDING CIRCUIT IS MALFUNCTIONING
   a. Buzzer will not sound when the machine is turned on.
   b. Not even a single LED will light on.
   c. Card feeding will be abnormal.
   d. CR Sensor will not move.
   e. Incorrect needle selection will occur.

3-2 PARTS LOCATION DIAGRAM OF THE REGULATOR BOARD (Fig. 2)



Bottom side



3-3 Adjusting +16VDC Circuit

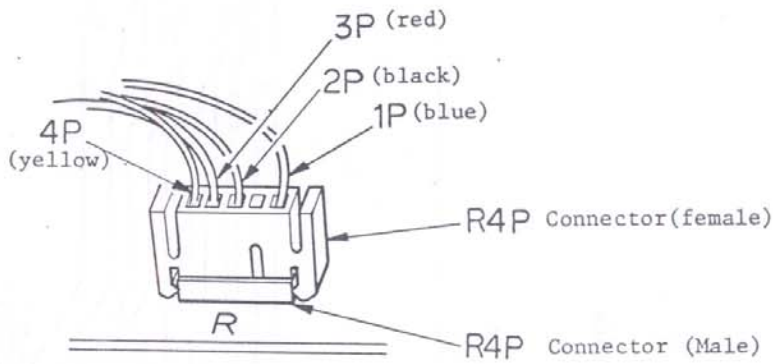
1. FAILURE

   If the power source voltage level +16VDC is lower than the standard level, speed of the CR Sensor is reduced but card feeding is normal. Buzzer sounds very low.

2. ADJUSTING

   a. Put back the CR Unit into the machine.

   b. Turn on the machine, and measure potential difference across the pins.

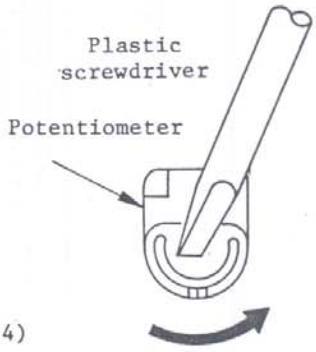


(Fig. 3)

Reading of potential difference across pins, 2P(GND) and 4P(+16VDC) should be within +15.8VDC - +16.2VDC.

c. If the reading is out of the regulated range, adjust the voltage level by turning the Potentiometer with the use of the Plastic screwdriver.

   If the Potentiometer is turned in the arrowed direction, voltage level increases.



(Fig. 4)

3-4 Checking the Regulator Board

1. CHECKING PRELIMINARIES

   * Use the tester for checking the circuit.
   * Set all the connectors in position to complete the system and measure the voltage level.
   * Refer to Fig. 3 for R4P connector plug.

2. CHECKING PROCEDURES

   Apply the power to the machine and measure the potential difference across the following points.

   a. Potential difference across 2P & 4P ..... +DC15.8V- +DC16.2V

   b. Potential difference across 2P & 3P ..... +DC3.75V - DC5.25V

   c. Potential difference across 2P & 1P ..... -DC5.6V - -DC4.4V

   If the above readings are not in the standard range, replace whole the Regulator Board.

[4] CPU (CENTRAL PROCESSING UNIT) BOARD

4-1 Checking List

The Check List below will serve you to presuppose the defective area and provide fast access to the defective parts.

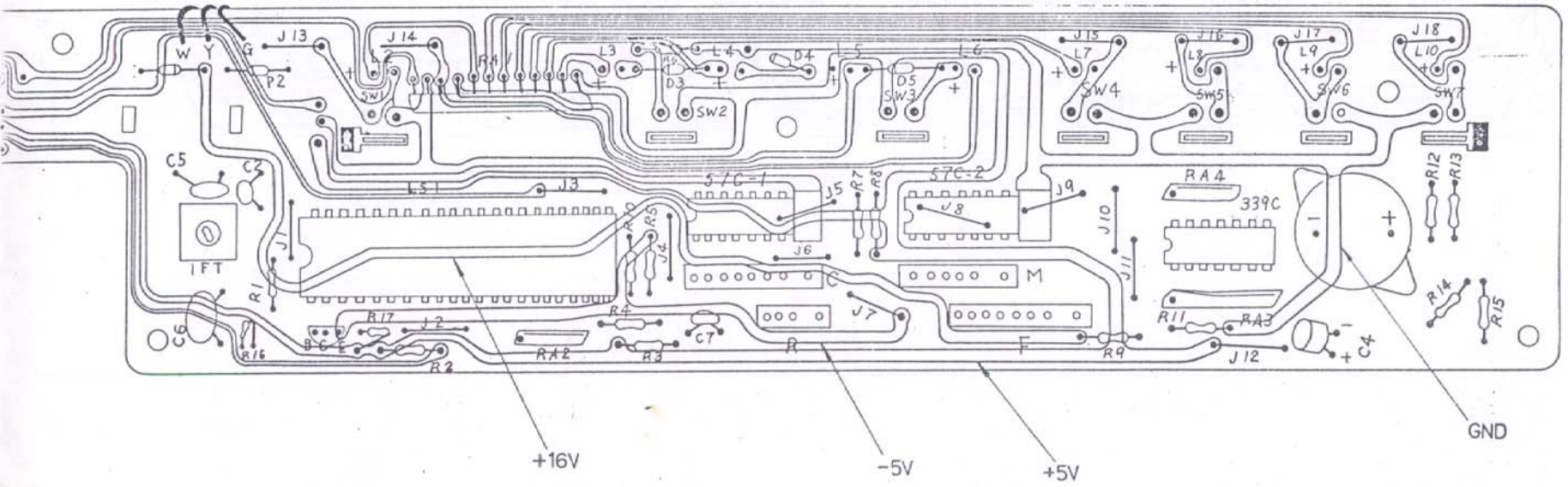
	CHARACTERISTIC OF FAILURE	POSSIBLE CAUSE	PAGE
1	Direction Pointer stays at one side or card feeding direction is abnormal, or card moves up and down at every other row.	1. Hall IC on the Direction Pointer has wrong clearance 2. CPU Board	9
2	Inspection Button and Pattern Buttons 1 thru 6 are malfunctioning.	1. Buttons 2. CPU Board	10
3	LED's on the Inspection Button and Pattern Buttons are malfunctioning.	1. LED's 2. CPU Board	12
4	Buzzer does not sound, keeps on sounding, sounds low.	1. Buzzer 2. CPU Board	14
5	When the power is applied to the machine, Buzzer does not sound, left LED of Button 1 does not light on. All other functions are out of order.	CPU Board	
6	CR Sensor stops at left side or right side irregularly.		
7	Pulse Motor does not function or does not rotate with dragging noise.		
8	Pattern is knitted out of position or no pattern is knitted on the fabric.		
9	CR Sensor keeps on moving, or incorrect pattern reading occur.		
10	Incorrect pattern reading, incorrect reading of marks on the Instruction Columns.		

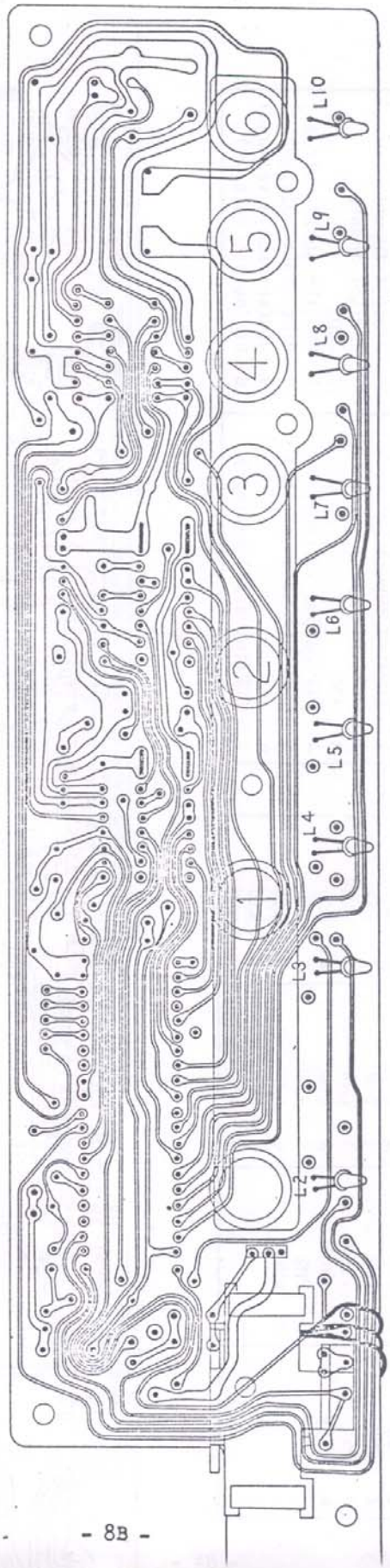
4-2 PARTS LOCATION DIAGRAM OF THE CPU BOARD (Fig. 5)

R4P CONNECTOR		M6P CONNECTOR		F8P CONNECTOR		C8P CONNECTOR	
1	-5V	1	PM1	1	PCP	1	GND
2	GND	2	PM3	2	DIN	2	+5V
3	+5V	3	+16V	3	GND	3	+16V
4	+16V	4	(NC)	4	GND	4	CCP
		5	PM2	5	+16V	5	HOK
		6	PM4	6	LML	6	ND1
				7	LMR	7	KSL
				8	+5V	8	DOB

TERMINALS OF μPC339C(AN6912)

1	CCP(LSI input)	14	DIN(LSI input)
2	PCP(LSI input)	13	PSD(LSI input)
3	+5V	12	GND
4	PCP(output voltage)	11	PSD(threshold voltage)
5	PCP(threshold voltage)	10	DIN(output voltage)
6	CCP	9	DIN(threshold voltage)
7	CCP(threshold voltage)	8	DIN(output voltage)




L10
L9
L8
L7
L6
L5
L4
L3
L2
1
2
3
4
5
6

4-3 Clearance between Hall IC and Direction Pointer Magnet

1. FAILURE

If there is excessive clearance between the Hall IC and the Direction Pointer Magnet, the Hall IC can not sense the magnetic flux, and FED(11 pin) signal will not be produced, and can not actuate feeding of the card correctly.

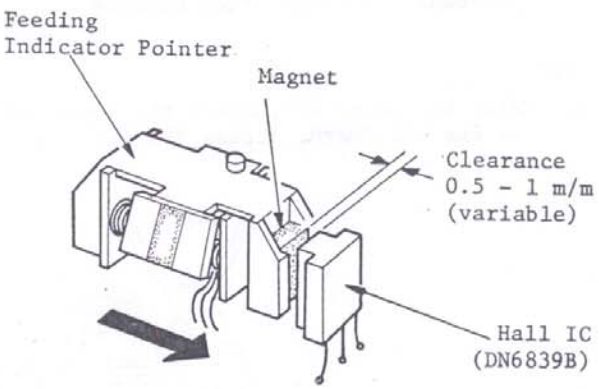
2. ADJUSTING PROCEDURES

a. Remove the CPU Board from the CR Panel and turn it over.

b. Adjust the clearance between the Hall IC and the Direction Pointer Magnet into the range of 0.5m/m - 1m/m by bending the leads of the Hall IC.

* The clearnace between the Hall IC and the magnet when it moves close to the IC is regulated to 0.5 m/m - 1.0 m/m, but depending on the magnetic flux density and sensitivity of the IC, the clearance is not constant.

c. Check the proper operation of the card feeding.



(Fig. 6)

3. If the correct adjustment of the clearance still makes the same problem, replace whole the CPU Board.

4-4 Inspection Button and Pattern Buttons

1. FAILURE

a. If the Inspection Button is malfunctioning, operation of the button will be followed by moving up or down of the Pattern Card by 10 rows twice.

LED of the Inspection Button will be off, or flash.

b. If the Pattern Buttons 1 and 2 are malfunctioning, the pattern will not respond to the operation of the buttons, and their LED's lights on or off.

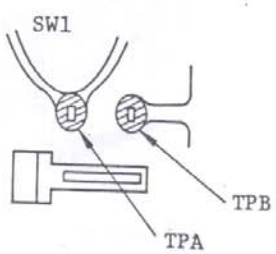
c. If the Pattern Buttons 3 through 6 are malfunctioning, the pattern will not respond to the selection of the buttons, and their LED's light on or off.

2. CHECKING AND REPLACEMENT

- Refer to parts location diagram(Fig.5) of the CPU Board.
- Set the tester ready.
- Checking of the Inspection Button is explained, so follow this procedure to check other buttons.

STEP 1

a. With the power off, check the continuity of SW1 on the top side of the CPU Board, across TPA and TPB.



(Fig. 7)

b. Set the tester for Ohmmeter and its range 1Ω, push its test lead against the soldered part through flux.

c. Depress the Inspection Button down and up, and check the resistance across the two points.

Inspection Button, Depressed down ..... resistance, infinite
Inspection Button, depressed up ..... resistance, minimum

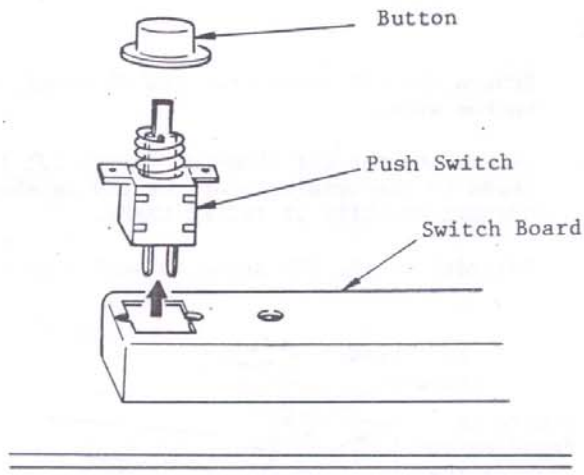
*If the resistance is not shown as above, replace the switch in the procedures described below.
(If the switch functions correctly, LED or CPU may be malfunctioning

STEP 2 Replacing the switch.

a. Remove the CPU Board from the CR Panel.

b. Remove the solder from TPA and TPB using a soldering iron and soldawick.

c. Turn over the CPU Board to the bottom side, and take out the switch and replace it with new one.



(Fig. 8)

4-5 Checking the LED's

1. FAILURE

LED at each button will not light on or will be dark.

2. CHECKING AND REPLACEMENT

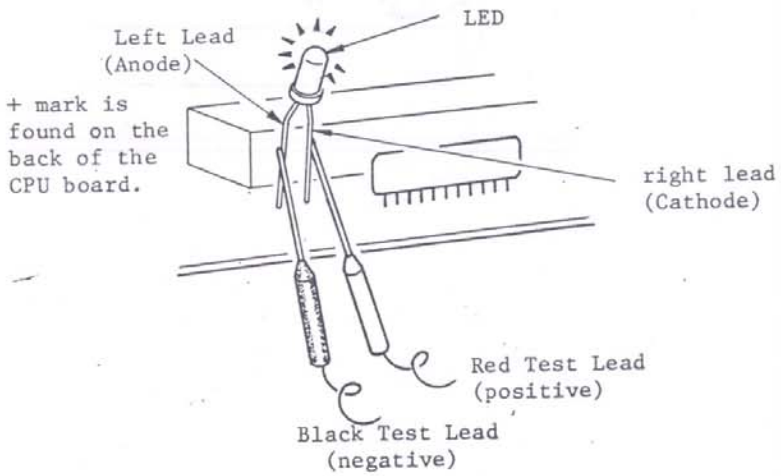
- Refer to the parts location diagram (Fig.5) for the CPU Board.
- Set the tester for ohmmeter.
- Checking of LED for the Inspection Button is explained, follow the same procedure for checking the other LED's.

STEP 1

a. Remove the CPU Broad from the CR Panel, and turn it over to the bottom side.

b. Set the tester for Ohmmeter (range 1Ω), and connect its test leads to the terminals of the LED as shown.
OBSERVE POLARITY OF TESTER LEADS.

Polarity of the LED leads is marked on the board as (+) or (-).



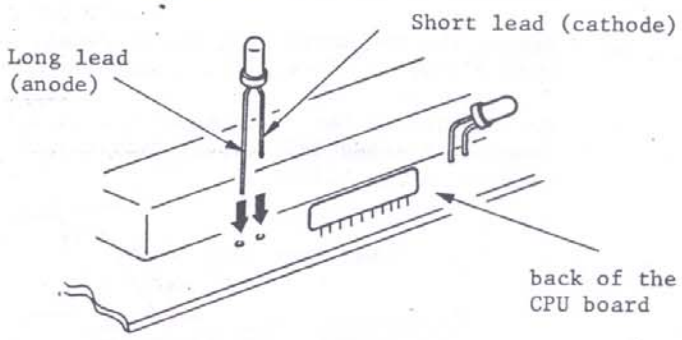
(Fig. 9)

If the LED is defective, it will not light on.
If the porality of the test leads is reversed, the LED will not light on.

STEP 2 REPLACEMENT OF LED

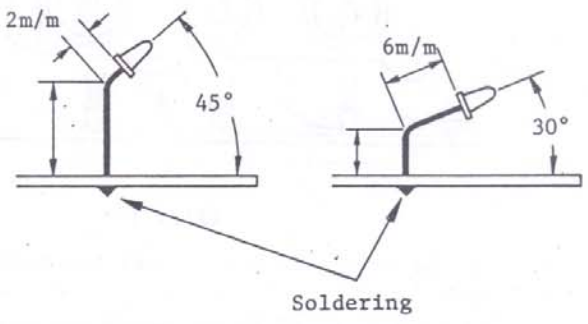
a. Overturn the CPU Board to the top side, remove the solder using the soldering iron and a soldawick at L2(Inspection Button LED) and remove the LED from the board.

b. When replacing the LED on the CPU Board, solder its two leads to the Board as shown below.
Its porality is should be observed.



(Fig. 10)

c. When soldering the LED to the CPU Board, bend its leads as shown below.



(Fig. 11)

4-6 Checking the Buzzer

1. FAILURE

   Buzzer does not sound or its sound is very low.

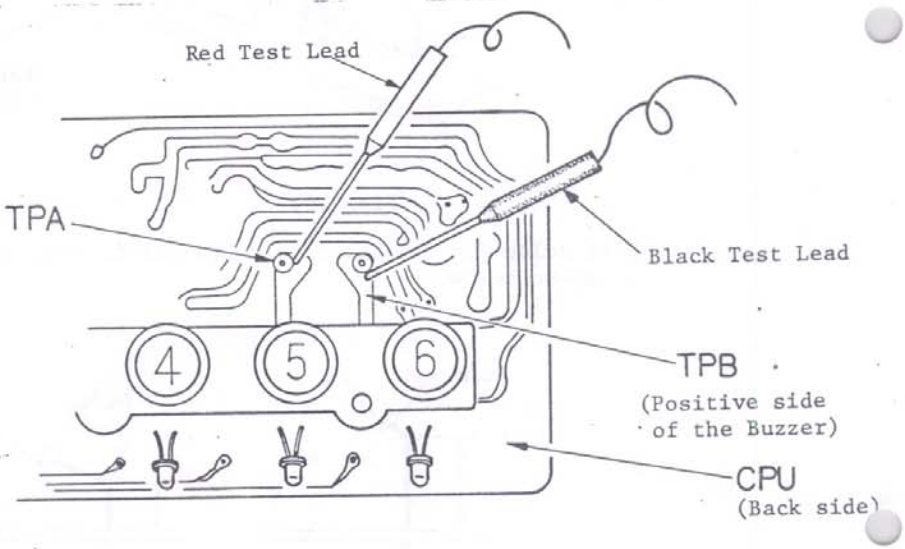
2. CHECKING AND REPLACEMENT

   - Refer to the parts location diagram (Fig.5) of the CPU Board.
   - Use a multimeter

STEP 1 CHECKING THE BUZZER

a. Remove the CPU Board from the CR Panel, and turn it over to the bottom side.

b. Set the Tester for Ohmmeter (range 1Ω), and connect its test leads to TPA and TPB respectively.
Observe the porality.



(Fig. 12)

If the buzzer is in a proper function, it will sound, but the sound is low.

If the buzzer is in an improper function, it will not sound.

c. If the buzzer sounds low, buzzer itself is functioning correctly, but the CPU is faulty, so replace the CPU board.

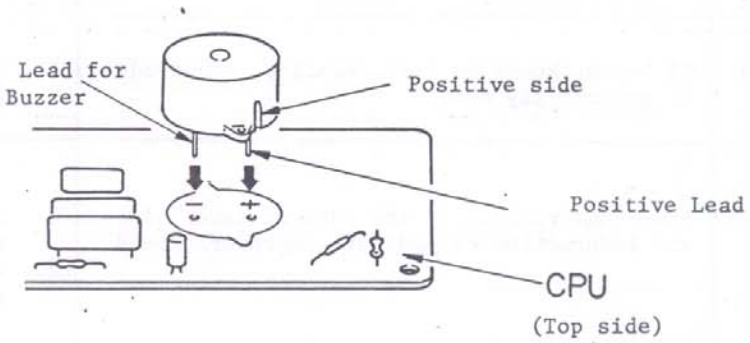
If the Buzzer does not sound, replace it in the following procedure.

STEP 2 REPLACING THE BUZZER

a. Remove the solder at TPA and TPB on the back of the CPU board with a soldering iron and soldawick.

b. Remove the Buzzer from the CPU board.

c. When placing a new buzzer, porality of the leads should be observed.



(Fig. 13)

[5] CARD READER UNIT

5-1 Checking List

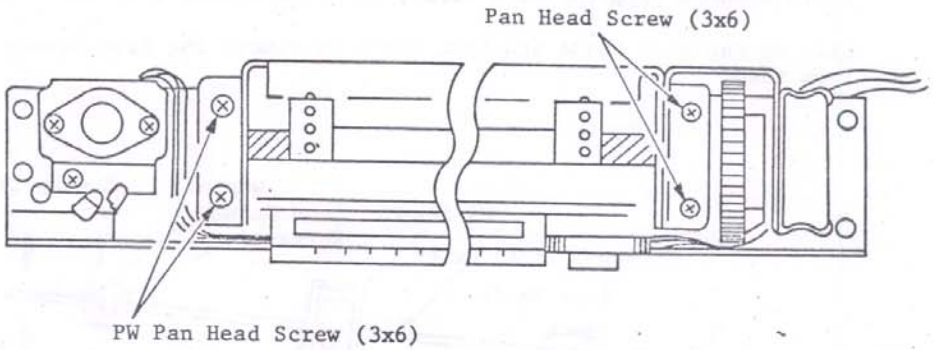
The Check List below will serve you to presuppose the defective area and provide fast access to defective parts.

	CHARACERISTICS OF FAILURE	POSSIBLE CAUSES	PAGE
1	CR Sensor keeps on reciprocating, and reading is incorrectly done.	1. PCP voltage level 2. PCP Circuit	21
2	Incorrect reading of the pattern takes place, and Instruction columns are improperly read.	1. Lint over the reading window. 2. Vertical positon of the card against the reading window 3. Horizontal position of Card Holder. 4. DIN level 5. CR Sensor(DIN) positioning. 6. DIN Circuit 7. PCP Interrupter 8. Vertical position of Pulse Motor	24 25 26 27 31 32 41
3	Buzzer sounds on every row when the Width Indicator is set at 60.	1. Mirror positioning 2. Indicator Guide positioning	3 39
4	Pattern knitted in 60 stitches wide regardless of setting of Pattern Width.	1. PSD level	34
5	CR Sensor stays at the left end and will not move. CR Sensor stops at the right end and will not return to the left end.	1. Linear Motor circuit	40
6	Card feeding is abnormal, Pulse Motor does not rotate. Every 10 or so rows, card is fed irregularly.	1. Vertical position of Pulse Motor. 2. Pulse Motor circuit	41 42

5-2 Removing CR Sensor Holder

Remove the CR Sensor Holder in the following procedure.

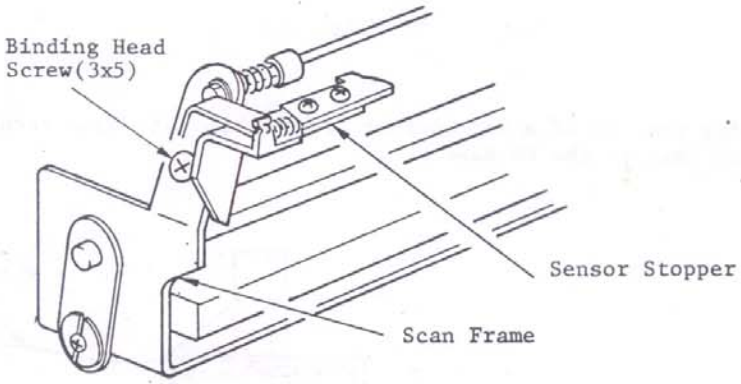
1. Remove four pan head screws(3x6) securing the CR Box to the CR Base.



(Fig. 14)

2. Lift up the CR Box separating from the CR Base.

3. Remove the binding head screw(3x5) securing the Sensor Stopper Unit at the left side of the Scan frame.

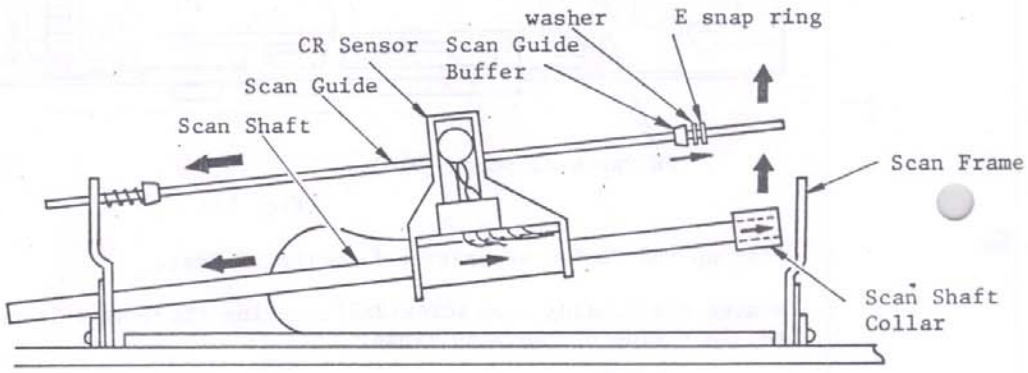


(Fig. 15)

4. Remove the E snap ring from the Scan Guide.

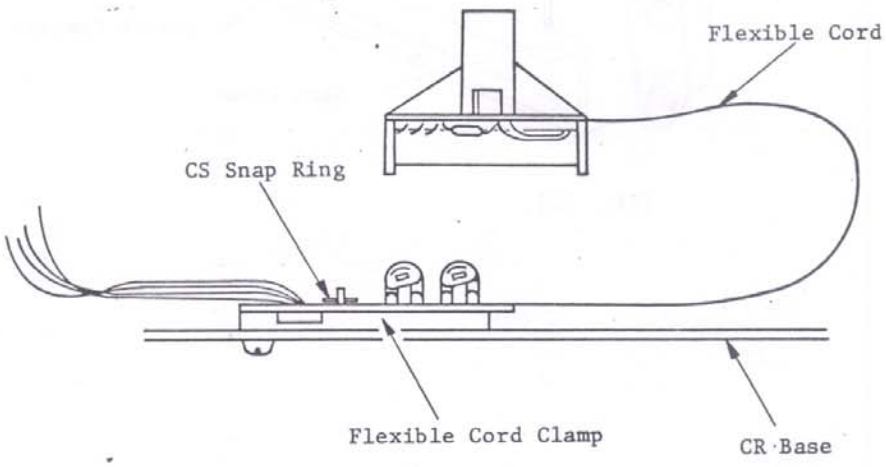
Bring the Scan Guide, and Scan Shaft toward the left, and disconnect their right ends from the Scan Frame, remove the Scan Guide Buffer, and Plain Washers from the Scan Guide, the Scan Collar from the Scan Shaft.

Lift up the Scan Guide and Scan Shaft to remove the Scan Sensor Holder from them.



(Fig. 16)

5. Using the tip of a screwdriver, remove the C.S. Snap securing the Flexible Cord Unit to the CR Base.

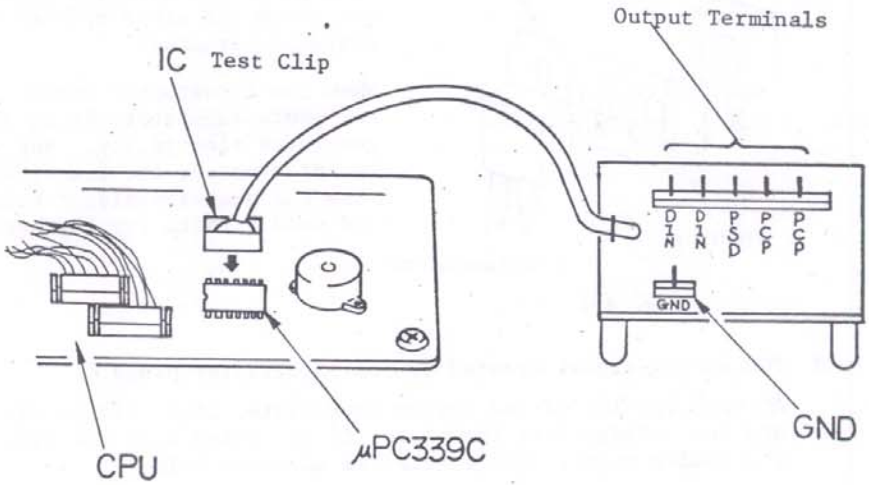


(Fig. 17)

5-3 How to use the IC Clip for testing

This IC Clip is provided with test terminals and used to take the signals PCP, DIN, and PSD for testing on the oscilloscope.

a. With the power off, connect the IC clip to the μPC339C on the CPU board. 1p of the IC clip should be connected to the 1p of the μPC339C.



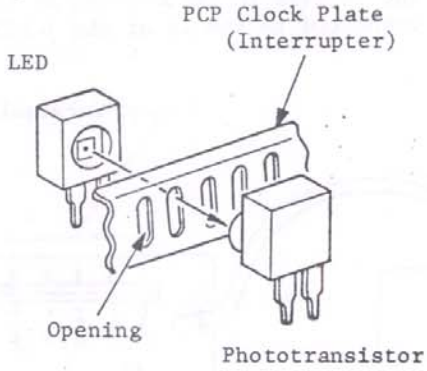
(Fig. 18)

b. Connect the test probe of the oscilloscope to the GND terminal and other necessary terminal.

5-4 PCP Output Voltage Level

A) Principles of PCP Signal

1. PCP Interrupter Sensor



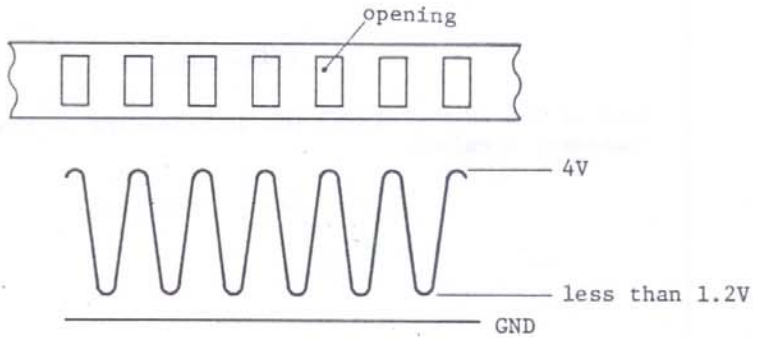
(Fig. 19)

Continuous infra-red light from LED(Light Emitting Diode) is interrupted, or goes through to actuates the phototransistor placed on the other side of the PCP clock plate(Interrupter).

When the interrupter admits the light to the phototransistor, it is actuated and generates electricity, and when the light is interrupted, the transistor stays off. Thus the phototransistor creates pulses and send them to further processing.

2. PCP analog signal created by the interrupter plate

At each opening of the interrupter plate, high voltage(4V) is generated, and low voltage(less than 1.2V) is generated when the light is interrupted. The analog signal thus created is as shown below.



(Fig. 20)

3. PCP digital signal created by the comparator circuit (μPC339C)

When the analog signal passes through the comparator circuit(μPC339C), it is converted into digital signal, as shown below.

PCP threshold voltage waveform PCP input waveform to LSI

(Fig. 21)

B) PCP Level

1. FAILURE

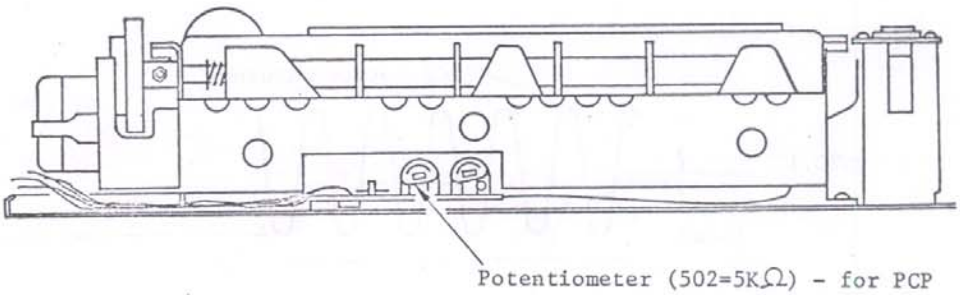
If the PCP output voltage is too low against its threshold voltage, CR Sensor Holder will not move and card reading will be done incorrectly.

2. ADJUSTMENT

a. Put back the CR Unit into the machine.

b. Connect the IC Clip to the μPC339C on the CPU Board, and connect the test probes to the output terminal of PCP and GND.

c. Adjust the PCP output voltage level by turning the potentiometer at the back of the CR Unit.

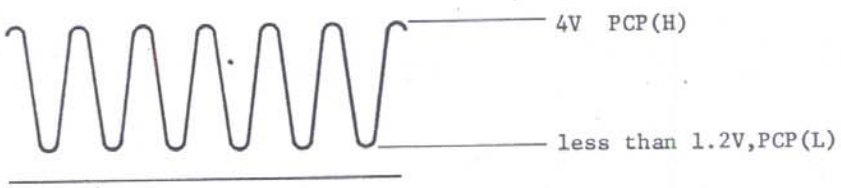


(Fig.22)

d. With the power on, depress the Inspection Button or move the Carriage across the needle bed to check the waveform when the CR Sensor moves from left to right.

As illustrated, adjust the level of the output voltage to 4V by turning the potentiometer.

Check if the minimum level of the PCP is 1.2V, if it exceeds 1.2V, adjust the maximum level to within 3.7V - 5V so as to minimum level comes less than 1.2V.



(Fig. 23)

C) Checking PCP Circuit

1. FAILURE

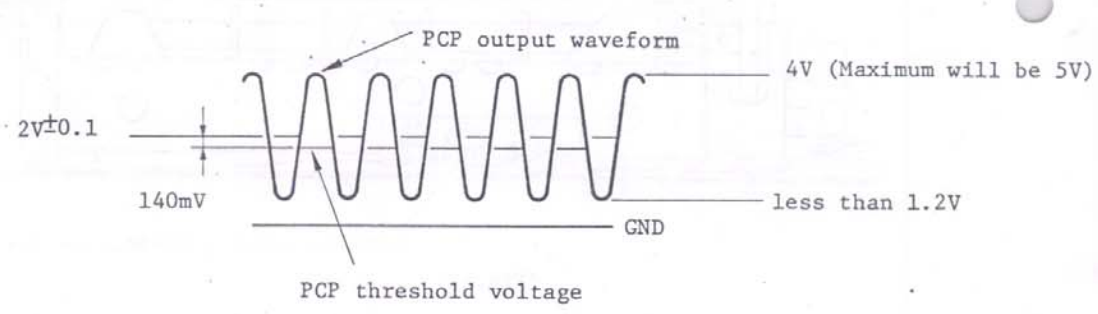
If the PCP circuit is malfunctioning, CR Sensor keeps on moving and the card reading will be incorrect.

2. CIRCUIT CHECKING PROCEDURE

a. Put back the CR Unit into the machine.

b. Connect the IC Clip to the μPC339C on the CPU Board, and connect the test probes to the output terminal of PCP and GND.

c. With the power on, check the PCP output voltage level on its waveform as the CR Sensor reciprocates.



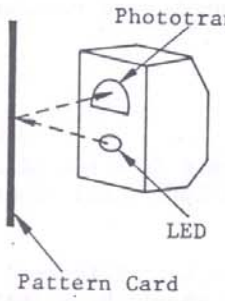
(Fig. 24)

d. Adjusting the potentiometer can not obtain the regulated waveform, PCP circuit in the CR Unit is malfunctioning, so replace the CR Sensor Holder.

5-5 DIN Output Voltage

A) Principles of DIN Signal

1. DIN Sensor



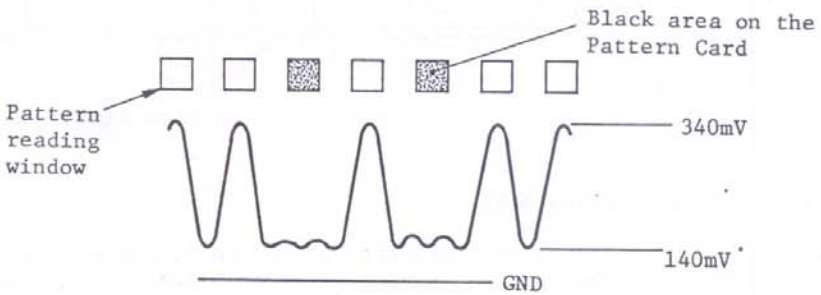
Continuous infra-red light from the LED (Light Emitting Diode) is reflected at the surface of the Pattern Card, and sensed by Phototransistor.

The white area on the Pattern Card reflects the light and actuates the Phototransistor, and the black area absorbs the light, thus the Phototransistor creates analog signal according to the pattern information on the Pattern Card.

(Fig. 25)

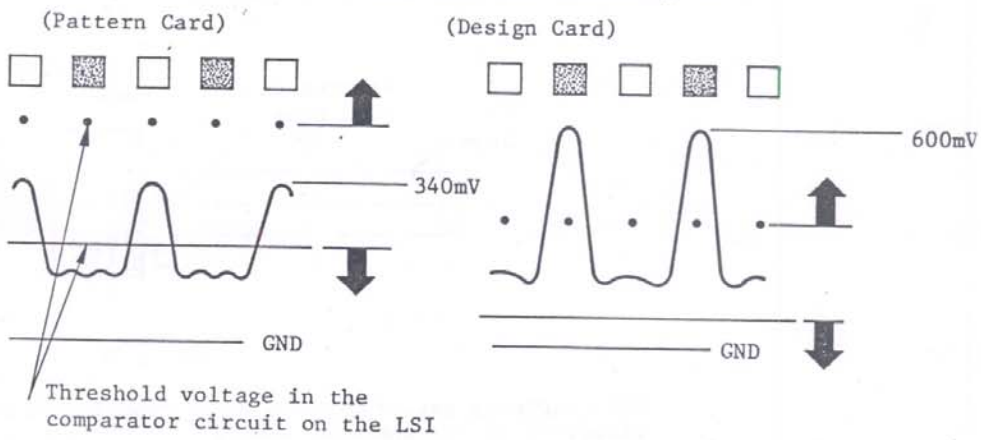
2. Analog waveform by the Pattern Card (DIN output voltage)

White area generates high voltage and black area generates low voltage.



(Fig. 26)

3. Output voltage by the Pattern Card and the Design Card.



Signals inside the arrowmark are ignored by logic, signals outside the arrowmarks are effective for DIN signals.

4. Analog signal is converted into digital signal when it passes the comparator circuit (μPC339C).

B) Vertical positioning of Pattern Card

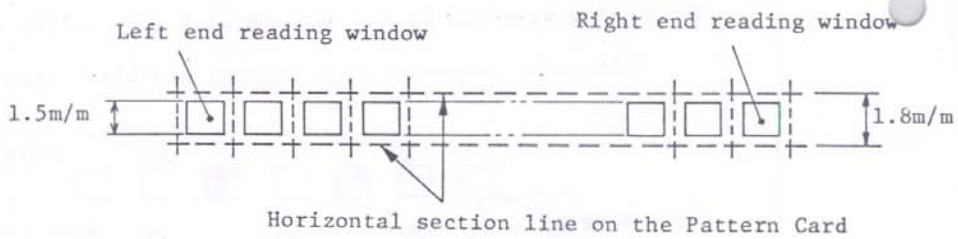
1. FAILURE

If the card stops out of the position, or the card is not parallel with the pattern reading windows, card reading will be done incorrectly.

2. CHECKING METHOD

With the power on, insert a card into the CR Unit, and move the card up or down to see if its horizontal lines are seen through the windows.

If the horizontal line(0.15m/m thick) is seen through the windows, the stopping position of the card should be adjusted.



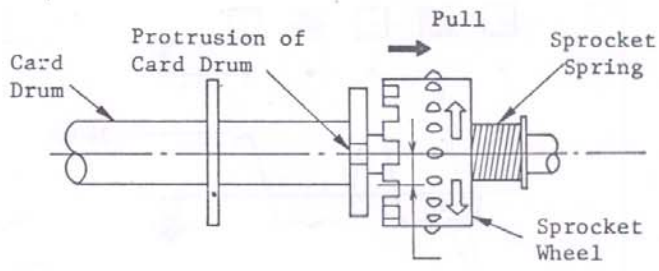
(Fig. 28)

3. ADJUSTMENT

Remove the card from the CR Unit, and pull the sprocket wheel toward the sprocket spring so as to disengage its teeth from the card drum.

Shift the engagement of the teeth with the card drum.

Shift by one tooth position will move the stopping position of the card by 0.15m/m upwards or downwards.



(Fig. 29)

Card stopping position moves up or down in reverse to the shifting direction of the sprocket wheel.

Sprocket wheel ⬆ direction.... card moves downwards
Sprocket wheel ⇩ direction.... card moves upwards.

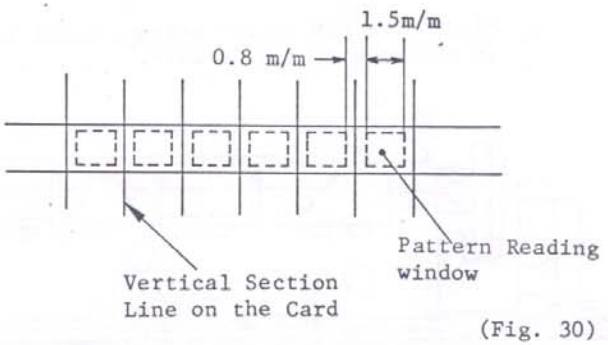
C) Horizontal positioning of the Card Holder

1. FAILURE

If the vertical section lines on the pattern card are seen through the pattern reading windows, pattern reading will not be done correctly.

2. CHECKING METHOD

Insert the Design Card into the CR Unit, and check visually the horizontal position of the card against the pattern reading windows through the back of the Card Reader Unit.

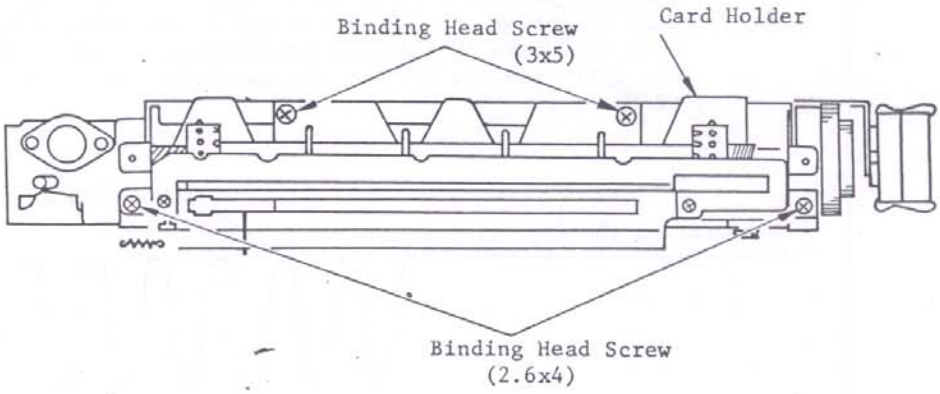


(Fig. 30)

3. ADJUSTMENT

Loosen two binding head screws(2.6x4) and two binding head screws(3x5) securing the Card Holder to the CR Box.

Move the card holder to right or left so as to bring the vertical section lines to the centre of the intervals between two windows. Then fasten those screws.



(Fig. 31)

4. When the horizontal positioning of the Card Holder has been finished, check the positioning of the CR Sensor. (Refer to page 27)

D) DIN Level

1. FAILURE

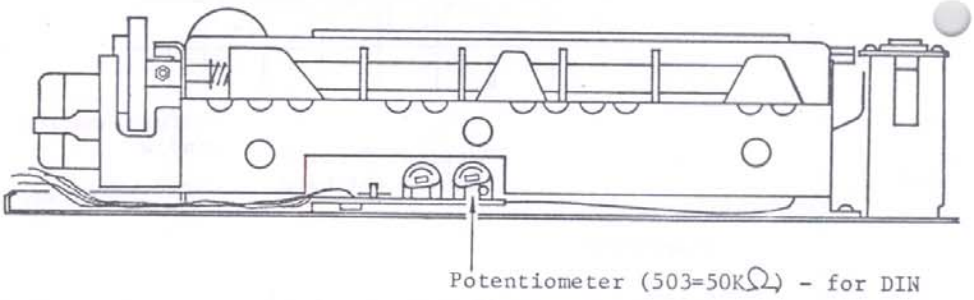
Excessive DIN output level will cause the buzzer to sound on every row, incorrect pattern reading or CR Sensor to stop at the right side.

2. ADJUSTMENT

a. Put back the CR Unit into the machine.

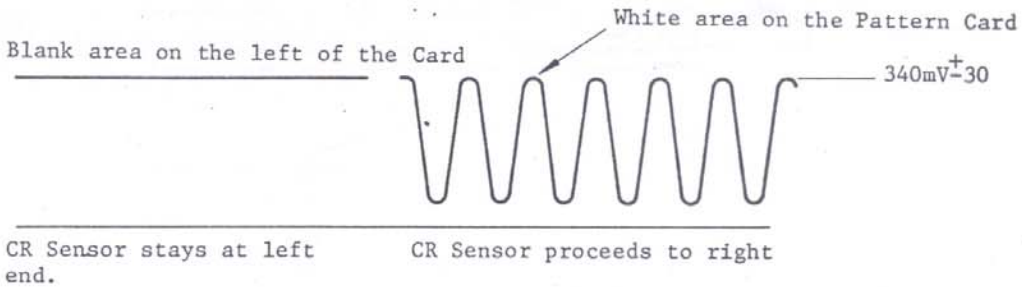
b. Connect the IC Clip to the μPC339C on the CPU Board, and connect the test probes to DIN output terminal and GND.

c. Adjust the DIN output voltage level by turning the potentiometer at the back of the CR Unit.



(Fig. 32)

d. Insert a pattern card without stain into the Card Reader Unit. With the power on, adjust the DIN output voltage level to 340mV with 30mV more or less for tolerance when the CR Sensor stays at the left side, by turning the potentiometer at the back of the CR Unit.



(Fig. 33)

E) Three Dimensional Positioning of the CR Sensor(DIN)

1. FAILURES

If the posioning of the CR Sensor is incorrectly adjusted, the DIN output voltage level declines to one side, and pattern or instructions on the card are incorrectly read.

2. ADJUSTMENT

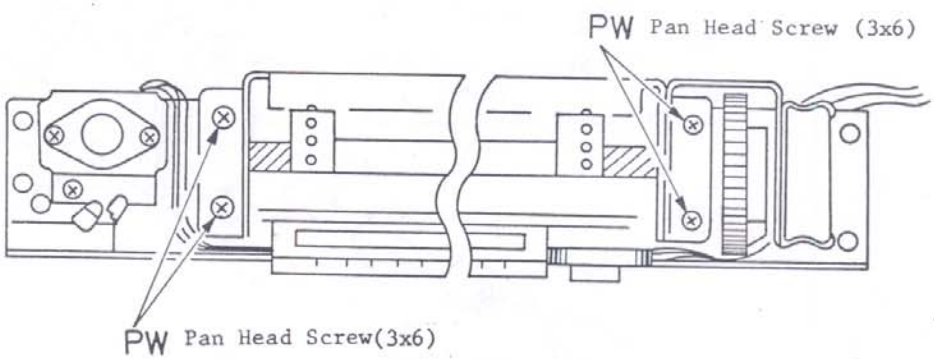
a. Put back the CR Unit into the machine.

b. Use the oscilloscope

c. When replacing the CR Sensor Holder, or removing the CR Box, follow the same procedure described below.

STEP 1 FORWARD AND BACKWARD POSITIONING

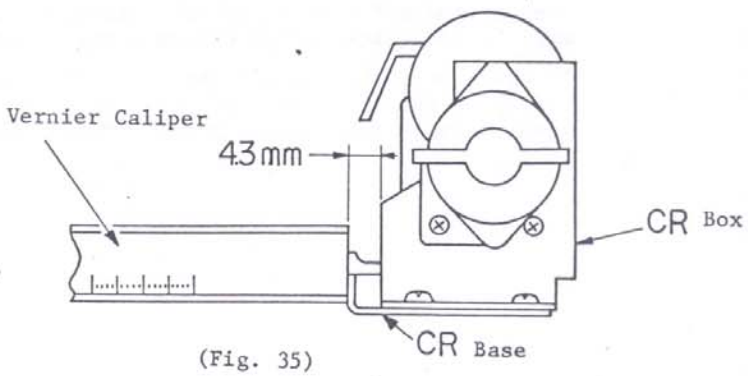
a. Loosen four PW Pan Head screws (3x6) securing the CR Box to the CR Base..



(Fig. 34)

b. Measure and adjust the distance between the front rise of the CR Base and the CR Box to 4.3m/m at the both sides of them, and fasten those screws.

Place the mirror at the left end and right end and confirm it will not touch the CR Sensor. If it touches the CR Sensor, move the CR Box backward and then fasten those screws.



(Fig. 35)

STEP 2 UP-DOWN POSITIONING

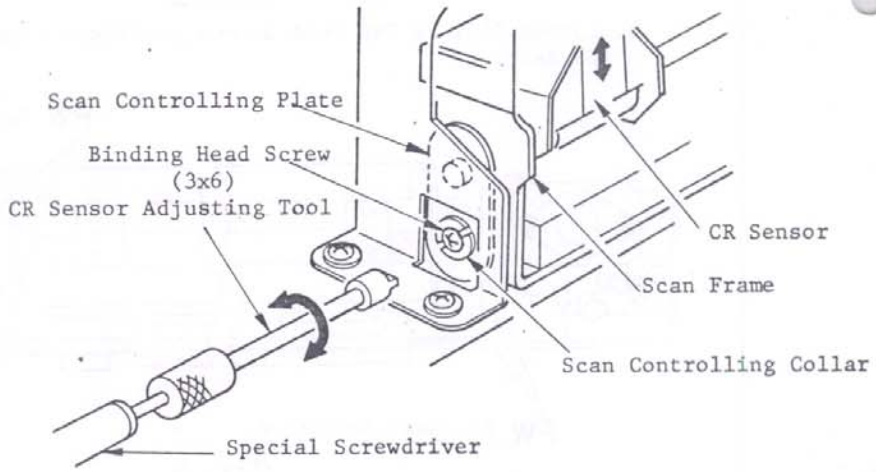
a. Push the capacitor (100 μF), and cord at the left side of the CR Base a little forward.

b. Connect the IC Clip to the μPC339C on the CPU Board, and connect the test probes of the oscilloscope with the DIN(output) and DIN (threshold) and GND.

c. Set a clean pattern card into the CR Unit and place it on a flat surface horizontally.

d. With the power on, and keep the CR Sensor at the left end. Using a philips screwdriver, loosen the binding head screw(3x6) securing the Scan Collar at the left side of the Scan Frame.

Watching the waveform of the DIN output in the oscilloscope screen, rotate the Scan Controlling Collar with the special screwdriver, and when the output voltage reaches its highest level, fasten the collar securely.



(Fig. 36)

Note: The binding head screw(3x6) and the Scan Controlling Collar are secured with lock-tight, so if they are too tightly fixed, replace the whole of the screw and the collar and then adjust the collar.

e. Push on and off the Inspection Button and let the sensor read the mark in the Quick Motion Column - the Sensor stops at the right end

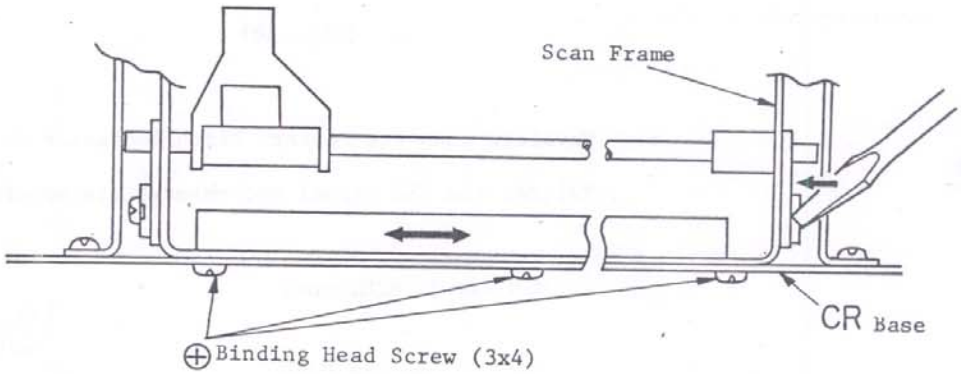
In the same method as for the left side, adjust the scan controllin collar on the right side of the Scan Frame so as the DIN output level becomes its highest level. Then fasten the screw.

STEP 3 RIGHT-LEFT POSITIONING

a. Loosen three binding head screws(3x4) securing the Scan Frame to the CR Base.

b. With the CR Sensor at the left end, measure the output level of the DIN on the screen of the oscilloscope moving the Scan Frame to the right or left with a screwdriver.

When the Scan Frame is moved to right and left, the DIN output will peak at two places. But fasten the screw at the place the DIN output peaks when the Scan Frame is moved toward right.



(Fig. 37)

STEP 4 RIGHT-LEFT DIFFERENCE OF DIN LEVEL

a. With the CR Sensor at the left end, adjust the potentiometer at the back of the CR Unit to have the DIN output voltage level within 340mV±30mV.

b. If the DIN output voltage level at the right side is different from that at the left side more than 30mV, readjust the UP-DOWN POSITIONING(STEP2) and reduce the difference by increasing the lower voltage level.

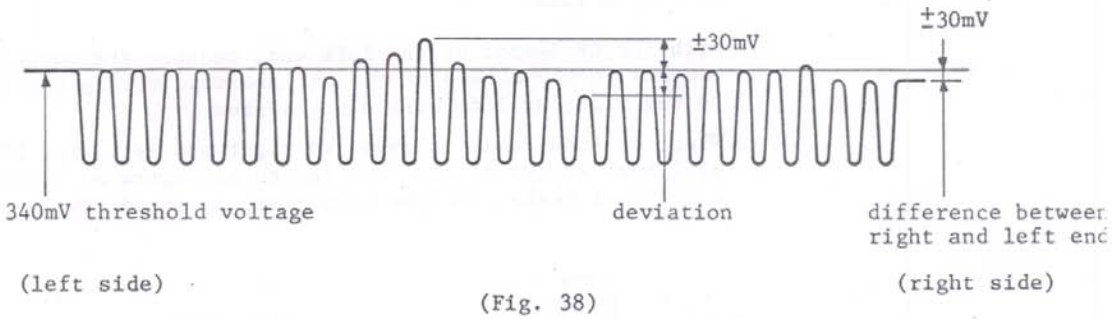
If the voltage levels are still different each other more than 30mV, readjust the FORWARD-BACKWARD POSITIONING(STEP 1) and adjust the difference within 30mV.

STEP 5 DECLINATION OF VOLTAGE LEVEL OF THE DIN

a. Check the positional voltage difference of the DIN between the right and left sides. Adjust the voltage level at left side to 340mV, and check its level at right side is within 340±30mV.

b. To check each waveform through the traverse of the CR Sensor, trigger the Mirror signal, and check the output deviation with the Pattern Width set at 1, 12, 30, 48 and 60.

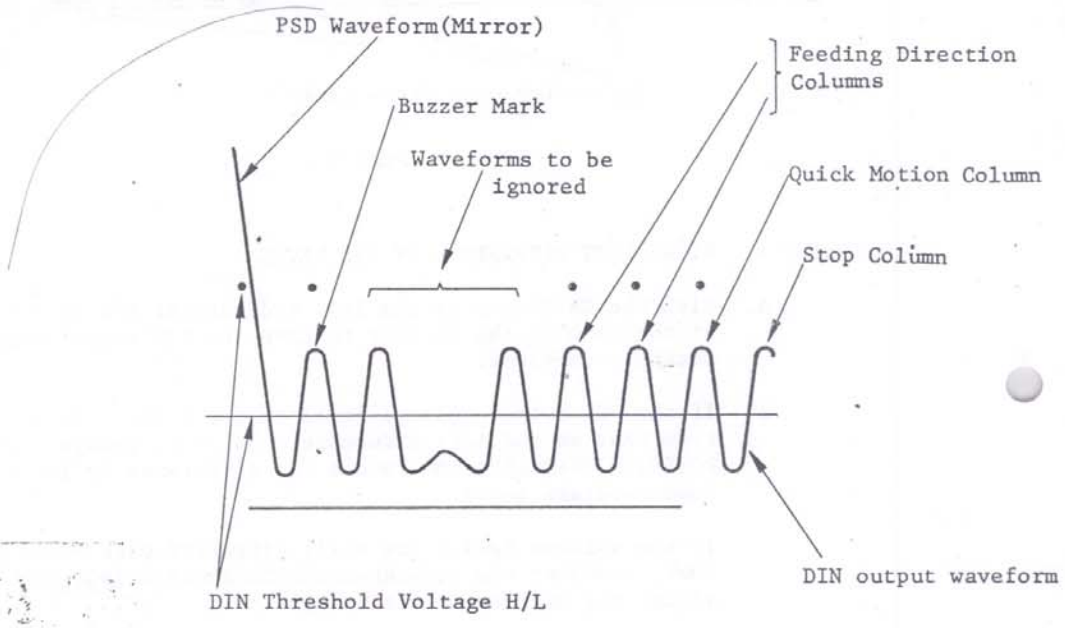
WAVEFORM OF THE DIN OUTPUT VOLTAGE



(Fig. 38)

c. Waveform when the Pattern Width Indicator is set at 60.

Trigger the PSD signal and observe its waveform.



(Fig. 39)

The above sample waveform is produeced when there is no mark in the instruction columns, and Buzzer Column.

F) Checking the DIN Circuit

1. FAILURE

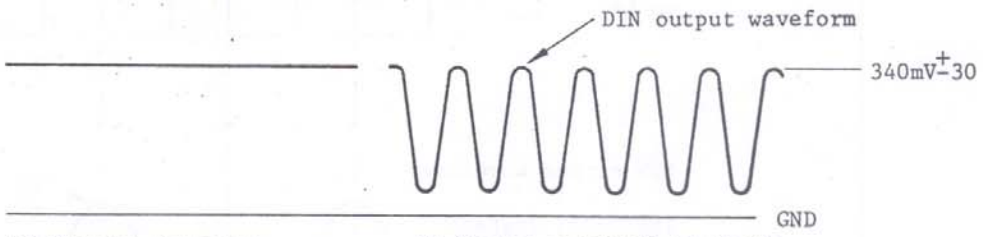
If the DIN Circuit is malfuncitoning, pattern reading is incorrect and also the buzzer and other instruction marks are read incorrectly.

2. CHECKING PROCEDURE

a. Put back the CR Unit into the machine.

b. Connect the μPC339C to the IC clip and connect the test probes to the DIN output and GND.

c. Set a clean pattern card into the CR Unit.
With the power on, check the DIN output waveform when the CR Sensor is at the left end and when the Sensor moves from left to right.



(Fig. 40)

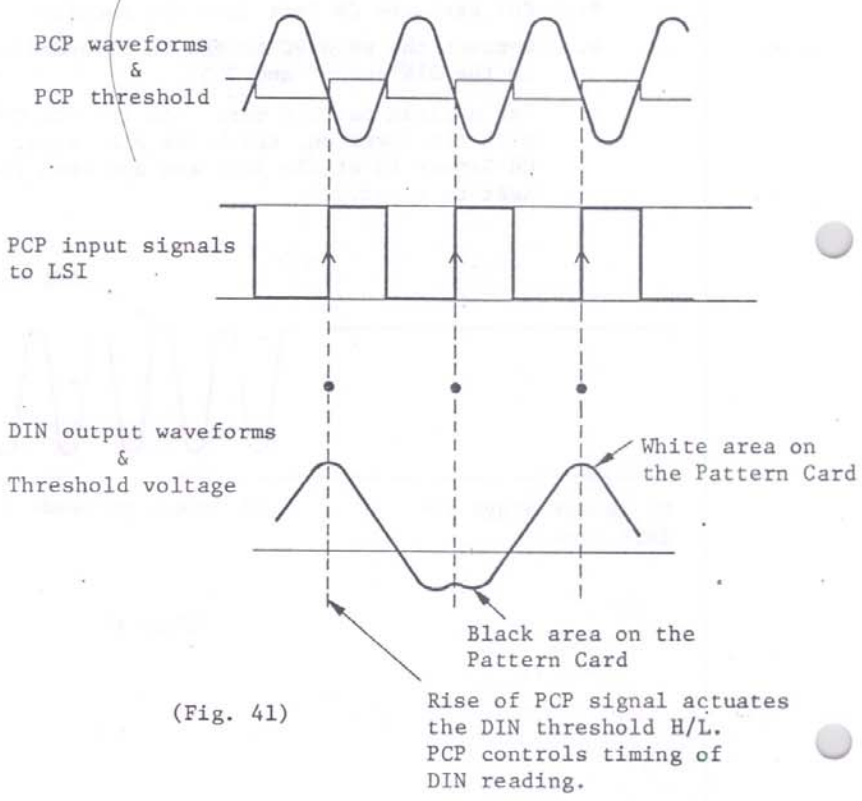
d. Adjust the output voltage of the DIN by turning the potentiometer on the CR Unit.
But if the above voltage level can not be obtained by adjusting the potentiometer, replace the whole CR Sensor Holder Unit, since PCP circuit is malfunctioning.

5-6 Adjusting the PCP Clock Plate (interrupter)
(Adjustment of timing of DIN with PCP)

1. FAILURE

If the timing of DIN with PCP is out of order, the patterns, buzzer marks and instruction marks on the card are not be read correctly.

2. RELATION OF DIN WITH PCP SIGNALS



(Fig. 41)

Above illustration indicates correct timing of PCP with DIN signal.

If the PCP Clock Plate is moved to right or left, the relation of PCP with DIN signals will be out of timing.

3. ADJUSTMENT

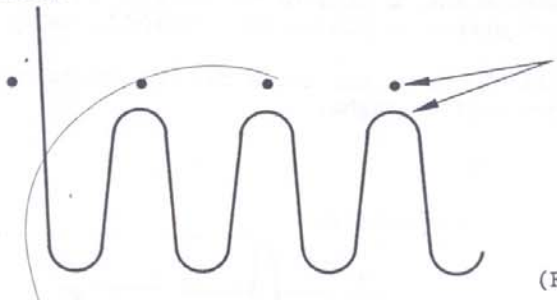
a. Put back the CR Unit into the machine.

b. Connect the IC Test Clip to the μPC339C, and connect the probes to DIN(output), DIN(threshold) and GND.

c. Insert a clean Pattern Card into the CR Unit.

d. Project to the screen of the oscilloscope DIN output signal and DIN threshold voltage.

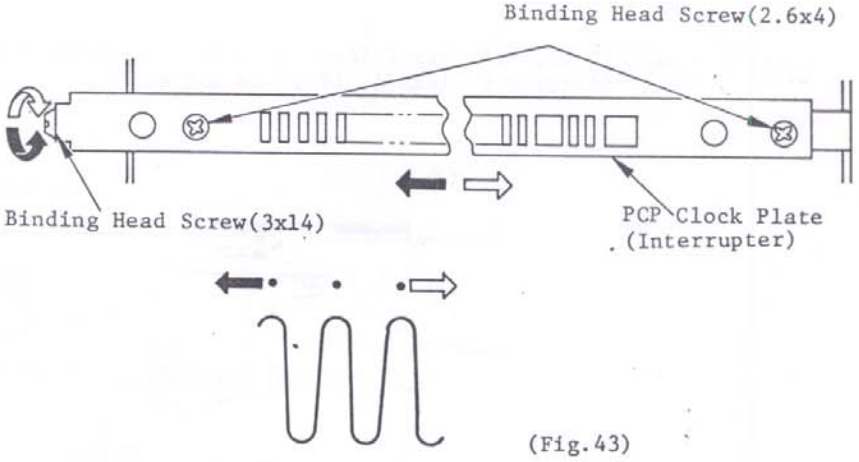
Trigger the Mirror voltage waveform, and check each DIN output waveform.



(Fig. 42)

Check the waveform with the Pattern Width at 1, 30, 60.

e. Loosen two binding head screws(2.6x4) securing the PCP clock plate to the CR Box.
Turn the binding head screw(3x14) at the left side of the PCP Clock Plate in the arrowed direction, so as to move the Clock Plate to right or left, and bring the timing of the DIN threshold voltage to the peak of the DIN output signal.



(Fig.43)

Turning direction of the binding head screw(3x14)

- clockwise ..... DIN threshold voltage clock shifts toward right.
- anticlockwise.... DIN threshold voltage clock shifts toward left.

After the adjustment, hold the PCP clock plate and fasten the binding head screw (3x14) securely.

5-7 PSD Signals

A) PSD Level

1. FAILURE

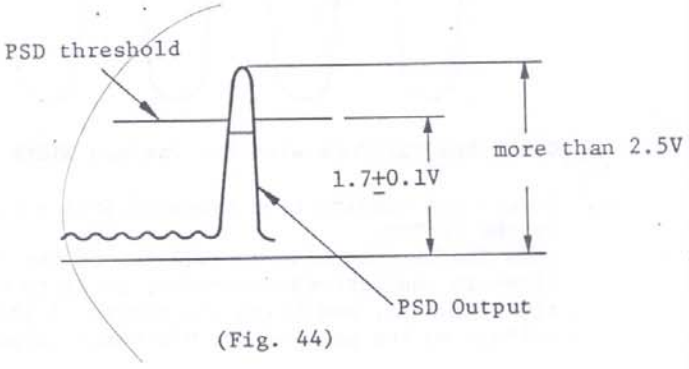
If the PSD output voltage is lower than its required level(more than 2.5V) in light of its threshold voltage(1.7±0.1V), the pattern width is knitted to 60 stitches wide regardless of the setting of the Pattern Width.

2. CHECKING THE MIRROR

a. Put back the CR Unit into the machine.

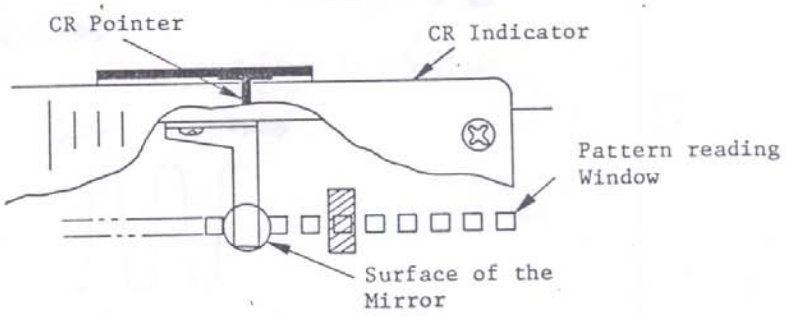
b. Connect the IC Clip to the μPC339C on the CPU Board, and connect the test probes to DIN(output), PSD(threshold) and GND.

c. With the power on, check the PSD waveform when the CR Sensor moves from left to right.



(Fig. 44)

d. If the PSD output level is more than 2.5V, check the surface of the mirror and clean it if it is dirty.

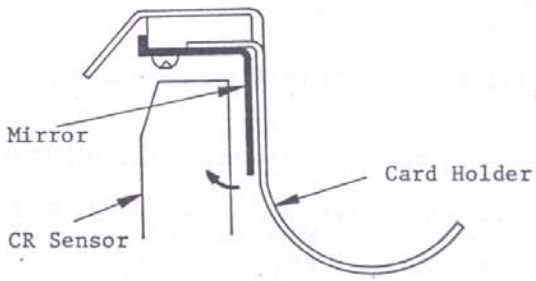


(Fig. 45)

3. FORWARD AND BACKWARD POSITIONING OF MIRROR

a. If the PSD output level is less than 2.5V, bend the mirror to move it close to the CR Sensor, but not to contact, so as to obtain higher PSD output level.
The mirror must be parallel to the sensor when it is bent.

Check the PSD Output level at three places, 1, 30 and 60 of pattern width setting.



(Fig. 46)

Note: If the DIN output level is incorrect, PSD output level becomes incorrect as well.

B) Right-Left positioning of the Mirror

1. FAILURE

If the position of the Mirror shifts toward left, incorrect pattern knitting will occur at constant intervals.

If the position of the Mirror shifts toward right, the Buzzer will sound on every row when the Pattern Width is set at 60.

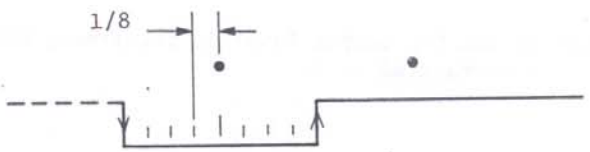
2. ADJUSTMENT

a. Put back the CR Unit into the machine.

b. Connect the IC Clip to the μPC339C on the CPU Board, and connect the probes to PSD(threshold), DIN(threshold) and GND.

c. With the Pattern Width set at 60, trigger the fall of the thresh voltage of the Mirror(PSD) so as to check the DIN threshold clock pulse with the PSD waveform simultaneously.

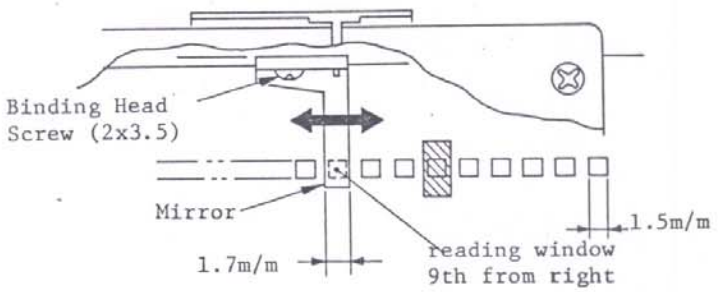
DIN clock pulse must come to the centre of a set of fall and rise of the PSD threshold waveform.



(Fig. 47)

Adjust the timing of the DIN with PSD within 1/8 toward the left of the centre between the fall and rise of the PSD threshold voltage waveform.

d. To adjust the position of the Mirror, loosen the screw(2x3.5) securing the Mirror, and move it to left or right so as the DIN clock pulse com within the range as required above. (Fig.47)



(Fig.48)

e. Hold to Mirror and fasten the screw.
Check the timing with the Pattern Width set at 1, 30, and 60 respectively.

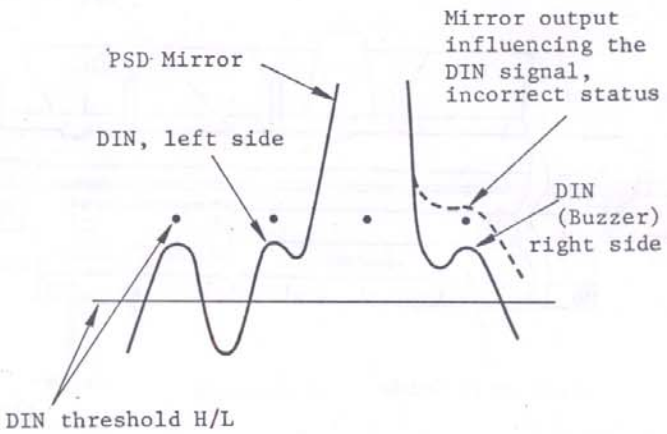
3. CHECKING THE DIN OUTPUT WAVEFORM AT BOTH SIDES OF PSD OUTPUT WAVEFORM

a. Connect the IC Clip to the μPC339C and connect the probes to DIN(output), DIN(threshold) and GND.

b. With the accessory pencil, fill the 58th column of pattern area of a clean pattern card up to 10 rows, and insert it into the CR Unit. Set the Pattern Width at 60.

c. Trigger the output from the column drawn by the pencil so as to check the output voltage waveform of PSD and threshold voltage(H/L) of DIN simultaneously.

If the Mirror output influences either its left or right DIN output level, correct the position of the Mirror.



(Fig. 49)

5-8 Indicator Guide and CR Paper Guide

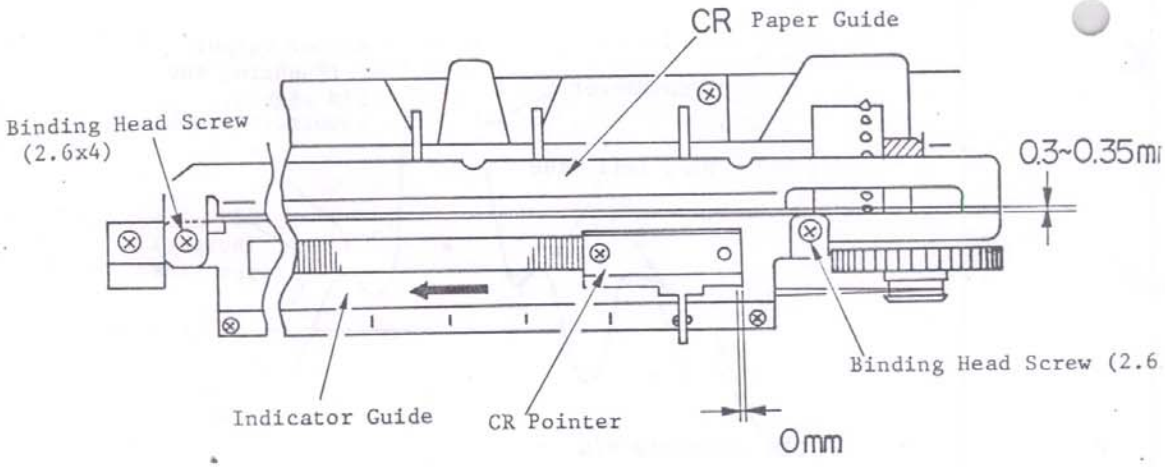
1. FAILURE

The Buzzer sounds when the Sensor is actuated with the Pattern Width set at 60.

2. ADJUSTMENT

a. Turn the Dial to set the Mirror at the 9th reading window from the right side.

b. Loosen two screws(2.6x4) securing the Indicator Guide and the CR Paper Guide to the CR Box. Move the Indicator Guide to eliminate the clearance between the right edge of the CR Pointer and right stopping edge of the Indicator Guide.



(Fig. 50)

c. Measure and adjust the Clearance between the CR Paper Guide and the CR Box to 0.3 - 0.35, using a feeler gauge, by moving the Indicator Guide. Then fasten the screws.

d. After the adjustment has been finished, set the Pattern Width at 60, turn on the power, and confirm that the Buzzer will not sound when the sensor moves.

If the Buzzer still sounds on every row, position of the Mirror must be readjusted.

5-9 Adjusting the CR Indicator

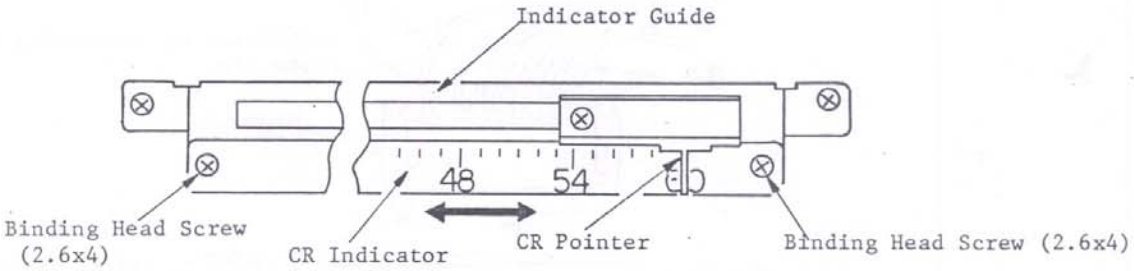
1. FAILURE

If the CR Pointer is not in a correct position with the CR Indicator, setting of the Pattern Width will not be read correctly.

2. ADJUSTMENT

a. By turning the Dial, bring the CR Pointer to the right end.

b. Loosen two screws (2.6x4) securing the CR Indicator, and adjust so as the Pointer and CR Indicator become in proper position.



(Fig. 51)

5-10 Checking the Linear Motor Circuit

1. FAILURE

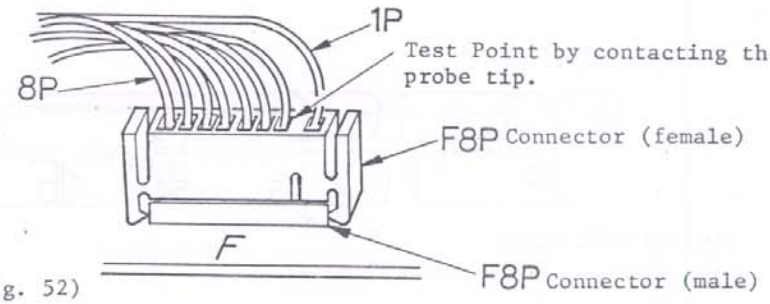
CR Sensor remains at the left end, or at the right end of its traverse.

2. CHECKING PROCEDURES

a. Put back the CR Unit into the machine.

b. Connect the IC Test Clip to the μPC339C on the CPU Board and connect the earth lead on the probe to the GND terminal.
Attach the probe tip to the probe.

c. With the power on, contact the probe tip to the test points as shown below while the CR Sensor stops.

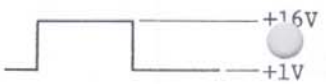


(Fig. 52)

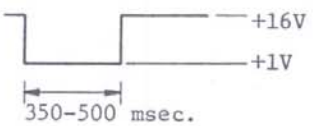
i. 5P of the F8P connector(female) ..... +16VDC
ii. 6P(LML) of the F8P connector(female)..... +1VDC
iii. 7P(LMR) of the F8P connector(female)..... +16VDC

d. Check the voltage level at the following test points when the CR Sensor is moved by operating the Carriage or the Inspection Button.

i. 6P(LML) of the F8P connector(female) ——



ii. 7P(LMR) of the F8P connector(female) ——



e. If the required voltage level is not measured as specified in steps c & d, replace the CR Sensor Holder Unit. (Refer to page 18).

5-11 Pulse Motor

A) Up-Down positioning of the Pulse Motor

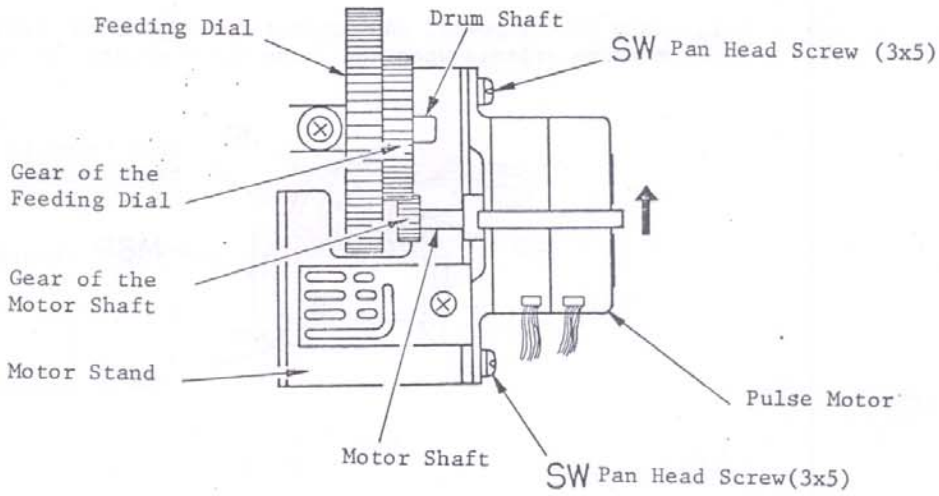
1. FAILURE

The position of the card against the Pattern Reading Window slips out of position.

2. ADJUSTMENT

a. Loosen two screws (3x5) securing the Pulse Motor to the Motor Stand.

Move the Pulse Motor up slightly and fasten those screws temporarily.



(Fig. 53)

b. Hold the Motor Shaft preventing it from rotating, adjust by feel the engagement of the Pulse Motor and the Feeding Dial Gear so as their engagement is not too tight or not too loose, and fasten the screws tightly.

c. After the adjustment has been finished, insert a pattern card into the CR Unit, and check if the card is fed upward or downward properly.
If the card stops out of position, readjust the engagement.

d. When the Pulse Motor is adjusted, check the up-and-down stopping position of the card against the pattern reading windows.

B) Checking the Pulse Motor Circuit

1. FAILURE

a. Pattern Card is fed incorrectly at a interval of several tens of rows.

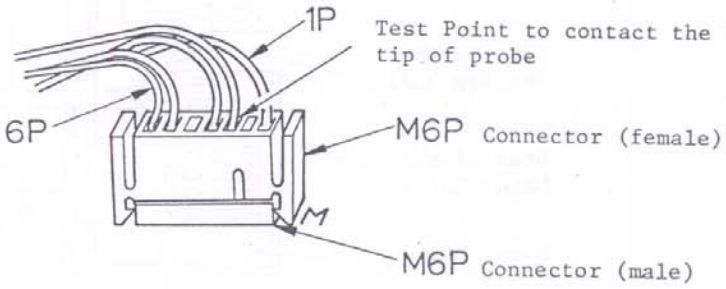
b. If the Pulse Motor Circuit is malfunctioning, the Motor will not rotate, or drags

2. CHECKING PROCEDURES.

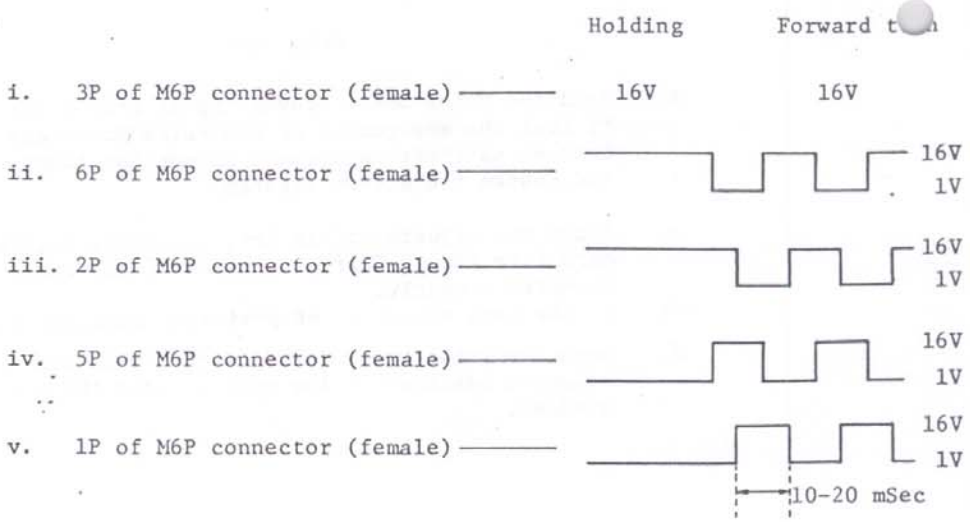
a. Put back the CR Unit into the machine.

b. Connect the IC Clip to the μPC339C on the CPU Board, and connect the earth lead on the probe to GND, and the other probe to the probe tip.

c. Turn on the power, and contact the tip to the following point to measure voltage when the Pulse Motor rotates or stops.



(Fig. 54)

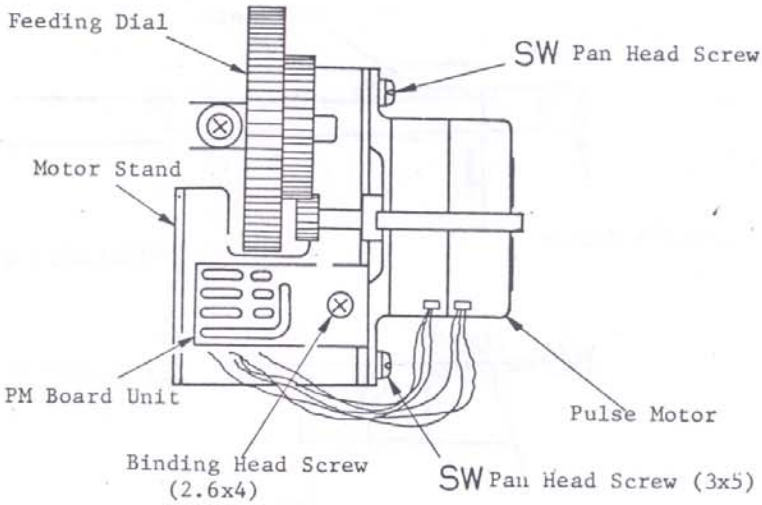


If incorrect voltage is measured, replace the pulse motor unit in the following procedure.

3. REPLACEMENT OF PULSE MOTOR UNIT

a. Remove two screws (3x5) securing the Pulse Motor to the Motor Stand. The Motor comes off the stand.

b. Remove a screw (2.6x4) securing PM Board to the the Motor Stand. The PM Board comes off.



(Fig. 55)

c. After the replacement of the Pulse Motor has been finished, check up and down positionig of the Motor.

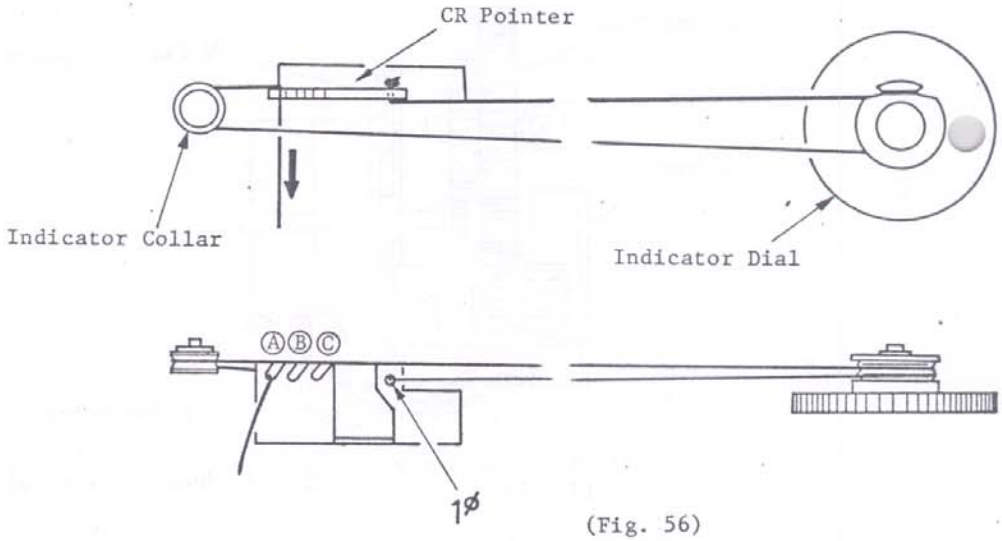
5-12 Attaching the Indicator Thread

Incorrect adjustment of the Indicator Thread will cause the CR Pointer to stop out of position against the CR Indicator.

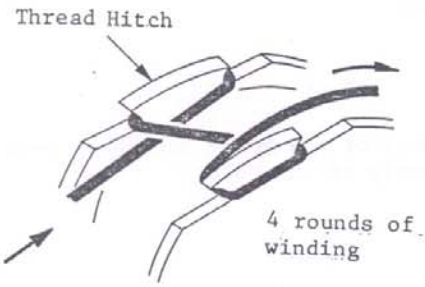
Attachning Method

a. Insert the Indicator Thread through the opening of the CR Indicator and make double knot at its end.

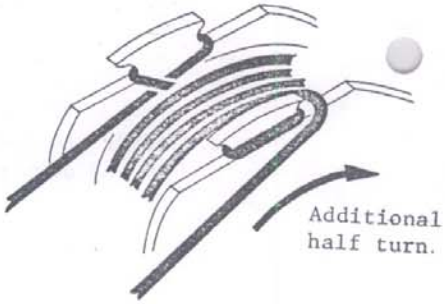
b. Bring the CR Point to the left end, and wind the Thread around the Dial 4.5 times.
As shown in Fig. 56, guide the Thread around the Indicator Collar and hook it at A, and bend the Thread to mark it for later use.



(Fig. 56)



(Fig. 57)



(Fig. 58)

c. Take the Thread off the Indicator Collar and make knots at the marked point.

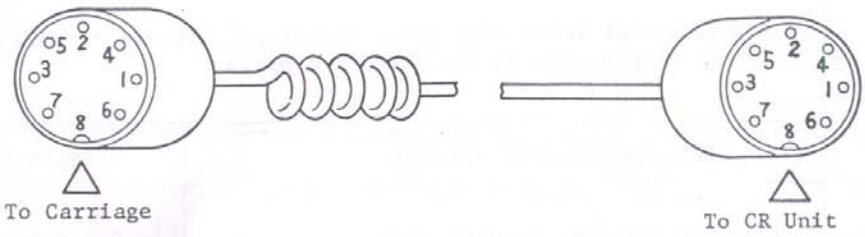
d. Bring the CR Point to the left at its extremity, and hook the knot at A then guide it around the Indicator Collar.

Wind the Thread around the Dial 4.5 times as shown.

e. Adjust the tension of the Thread by hook it on the notch at B or C.

[6] CURL CORD

1. Terminals in the Curl Cord.



(Fig. 59)

1P	ND1	1P
2P	KSL	2P
3P	DOB	3P
4P	CCP	4P
5P	HOK	5P
6P	+16V	6P
7P	+5V	7P
8P	GND	8P

2. Checking continuity of the Cord.

Set the tester for ohmmeter (Range 1Ω) and contact its test leads to each terminal on both ends of the Curl Cord.

Infinite resistance means that lead in the Curl Cord is open.

If the lead in the Curl Cord is open, replace the whole Cord.

3. If the Curl Cord has relaxed, rewind the cord in the reversed direction.

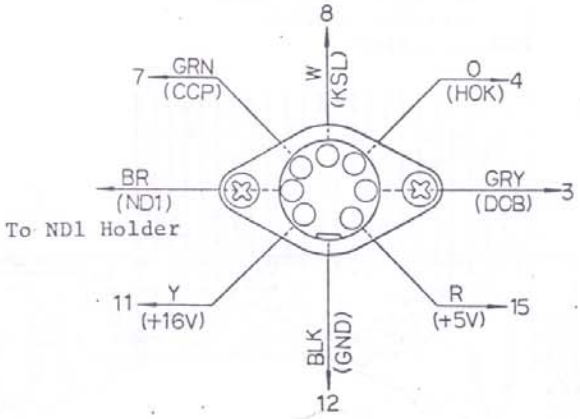
[7] CARRIAGE

7-1 Checking List

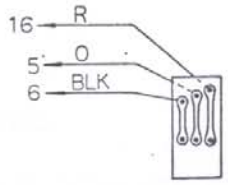
The Check List below will serve you to presuppose the defective area and provide fast access to the defective parts.

	CHARACTERISTIC OF FAILURE	POSSIBLE CAUSES	PAGE
1.	When the carriage is operated, the pattern card is not fed, pattern reading is not be done, alarming buzzer sounds, and incorrect needle selection occurs.	1. CCP output level 2. CCP circuit 3. KSL circuit 4. HOK circuit 5. Slider Magnet	55 56 60 71 72
2.	Pattern on the fabric is knitted out of position.	1. CCP-KSL timing 2. CCP-ND1 timing 3. ND1 circuit	61 67 69
3.	In quick and slow speed of knitting, incorrect needle selection occurs at random intervals.	1. CCP selection timing 2. Lack of lubricant in the needle selection area	59
4.	When the Carraige proceeds either to left or right, incorrect needle selection occurs or it occurs on every row.	1. DOB circuit	75

7-2 PARTS LOCATION DIAGRAM OF THE CARRIAGE (Fig. 60)



Round-shaped Connector



H Board

TERMINALS OF PC74157C

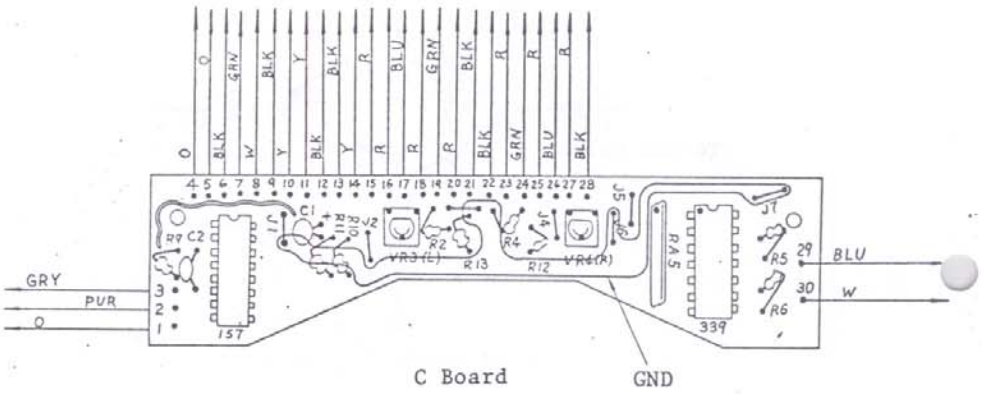
1	HOK	16	+5V
2	GND	15	GND
3	DOB	14	KSL(R)
4	DOB(L)	13	KSL(L)
5	DOB	12	KSL
6	GND	11	CCP(R)
7	DOB(R)	10	CCP(L)
8	GND	9	CCP

TERMINALS OF μPC339C (AN6912)

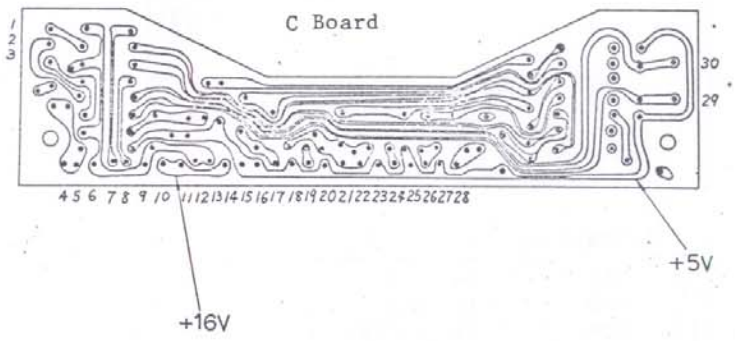
1	CCP(L)	14	(NC)
2	CCP(R)	13	(NC)
3	+5V	12	GND
4	CCP(output R)	11	(NC)
5	CCP(threshold R)	10	(NC)
6	CCP(output L)	9	(NC)
7	CCP(threshold L)	8	(NC)

O.....Orange
BLK.....Black(GND)
GRN.....Green
W.....White
Y.....Yellow (+16VDC)
R.....Red (+5VDC)
BLU.....Blue

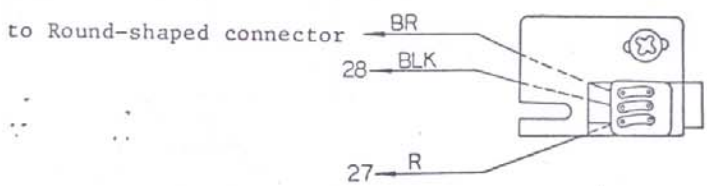
PUR.....Purple
GRY.....Gray
BR.....Brown



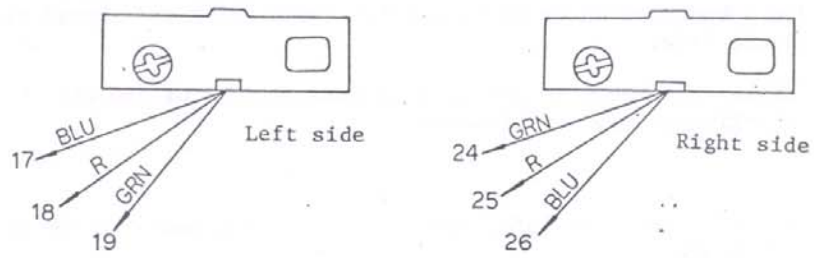
C Board



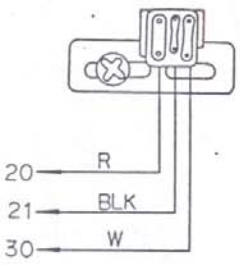
ND1 Holder



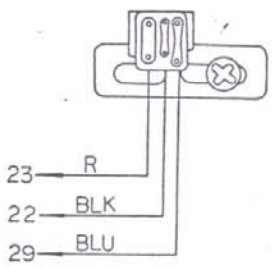
Interrupter Sensor



KSL Holder (L)

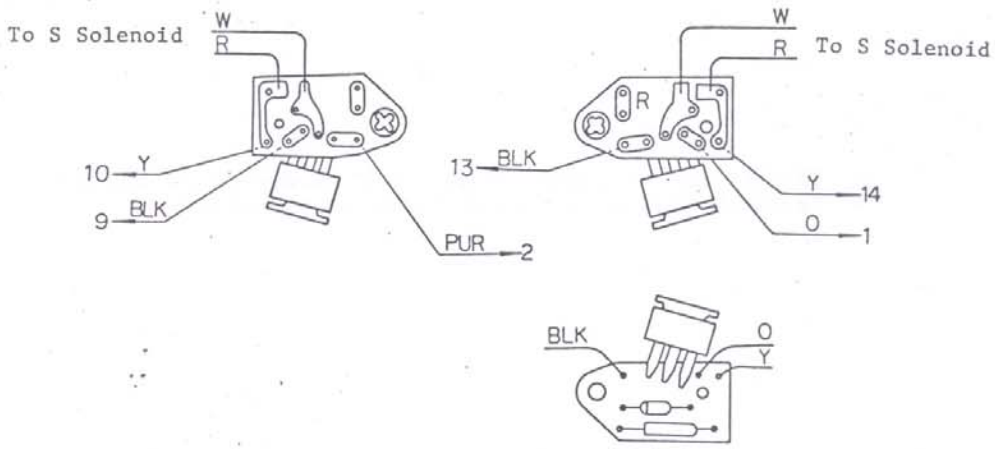


KSL Holder (R)



S Board(L)

S Board(R)

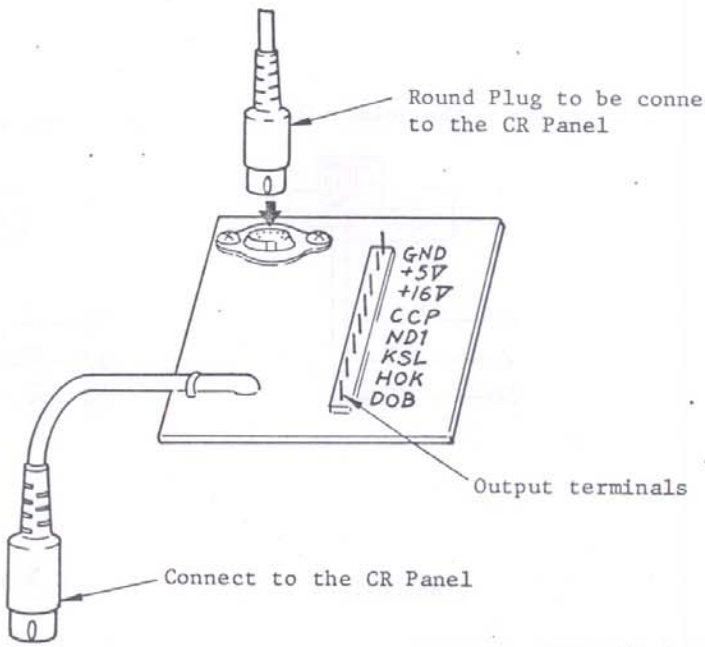


7-3 Connecting output terminals of the Curl Cord.

For the convenience of testing, test terminals of the Curl Cord are given on a board which is to be put inbetween the Round-shaped connector and the Round Plug.

These test terminal are used to take signals of the CCP, KSL, and ND1 for checking on the oscilloscope.

1. With the power off, connect the testing board to the curl cord as shown below.

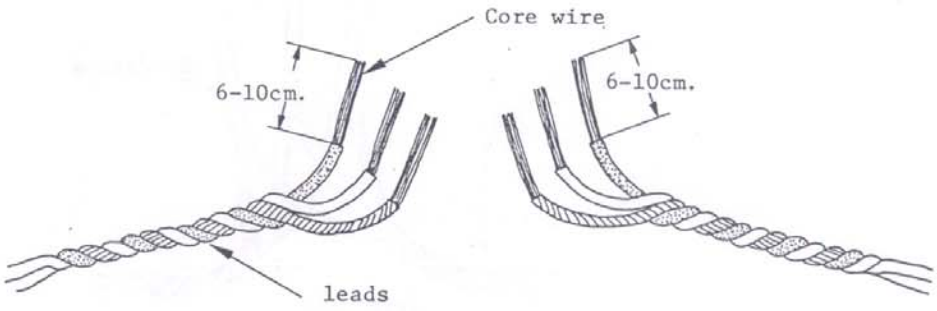


(Fig. 61)

2. Connect the test probe of the oscilloscope to the GND and other required terminal to check its waveform on the oscilloscope.

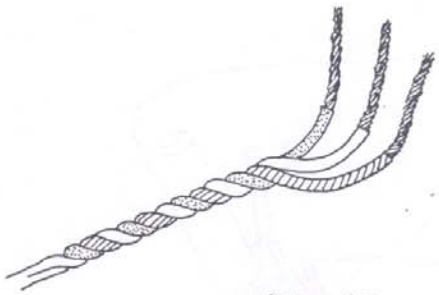
7-4 Connecting wires

1. As shown below, strip off insulation of about 6-10cm. from the end of wire.
   Use a wire stripper of #26 AWG or #28AWG to strip off the wire of #30 AWG wire.



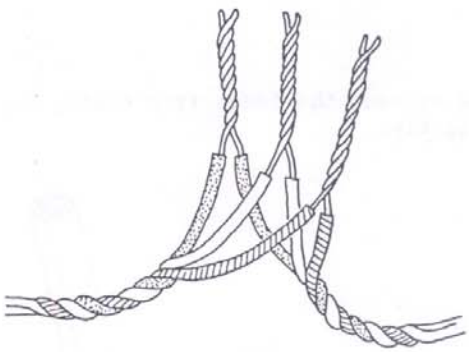
(Fig. 62)

2. Strand the wires of a lead as shown.



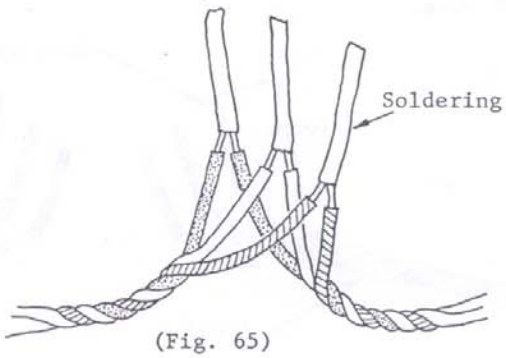
(Fig. 63)

3. Connect the leads of the same colour by intertwisting them.



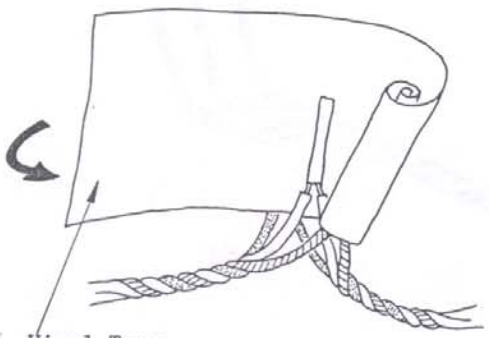
(Fig. 64)

4. Solder the intertwisted portion of the leads.

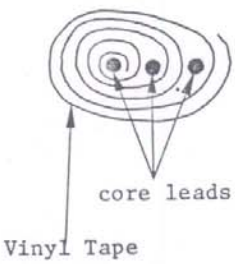


(Fig. 65)

5. To insulate the bare leads from each other, wrap the connected portion with a vinyl tape twice as shown.

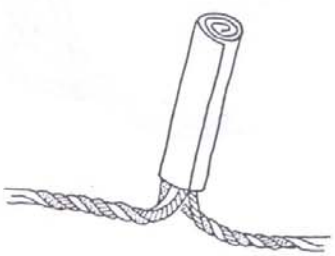


(Fig. 66)



(Fig. 67)

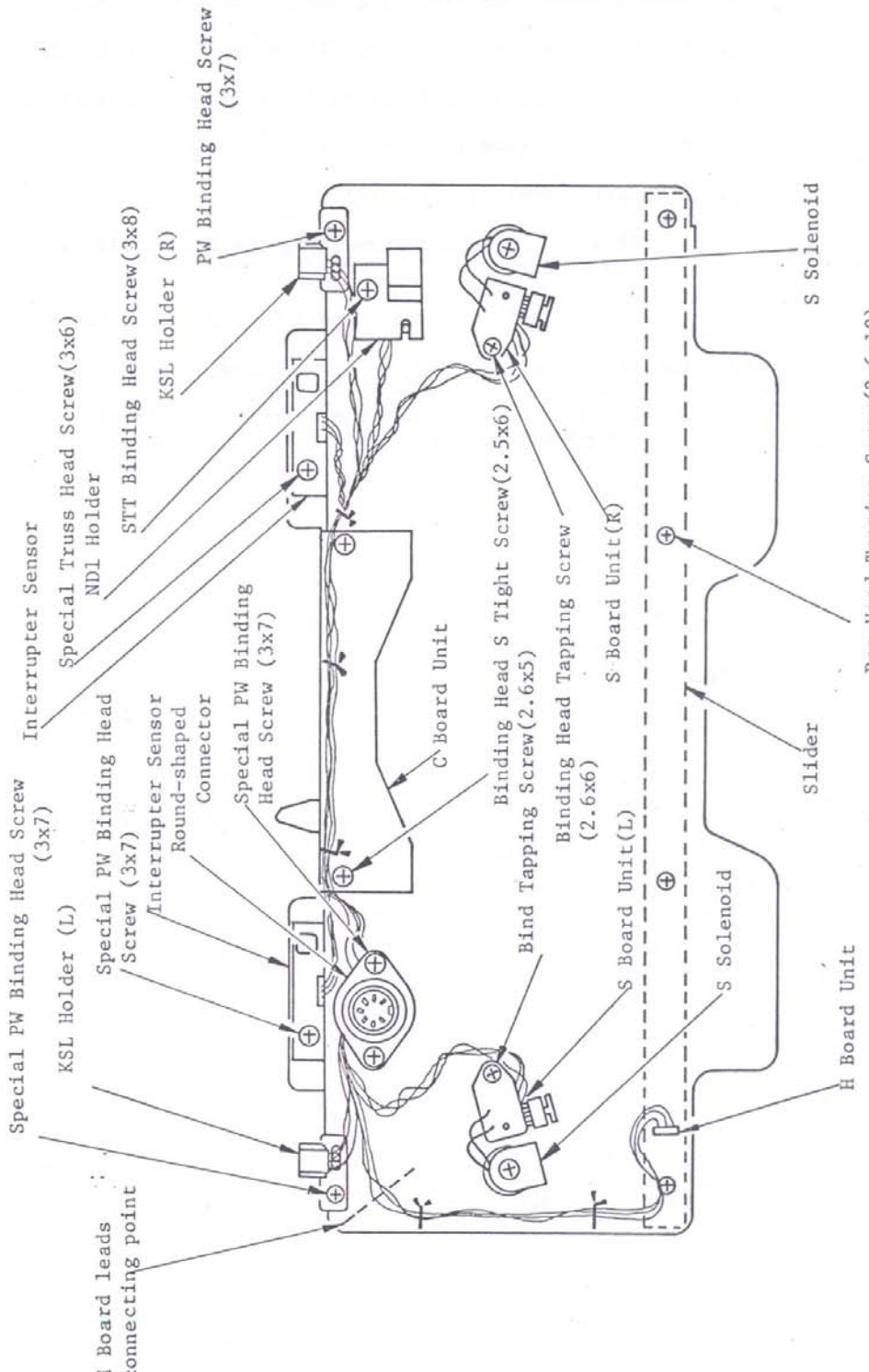
6. To prevent the leads from coming out of the vinyl tape, press the tape tightly.



(Fig. 68)

7-5 Replacing the C Board

1. On the C Board Unit, C Board, Interrupter Sensor, KSL Holder, ND1 Holder S Board are located as shown below.



(Fig. 69)

2. Removing each parts

a. Remove two screws(2.5x6) securing the C board to the Carriage.

b. Remove screw (3x6) securing the Interrupter Sensor (CCP Sensor).

c. Remove screw (3x7) securing KSL Holder R and L to the Carriage.

d. Remove a screw (3x8) securing the ND1 sensor holder to the Carriage.

e. Remove two screws (3x7) securing the round connector to the Carriage.

f. Removing S Board (L) and (R)

i. Remove the solder connecting the S Solenoid leads (red and white) to S Board.

ii. Remove self tapping screw(2.6x6) securing the S Board (R) & (L).

g. Cut the leads connected to the H board.

Referring to Fig. 69, cut the connecting part of the leads of the H Board giving more length to the H board leads.

3. Attaching new C Board.

a. Attach new parts referring to the parts location diagram on pages 47 & 51.

b. Attach the C Board.

c. Attach the Interrupter Sensor (L) and (R).

d. Attach the KSL Holder (L) and (R).

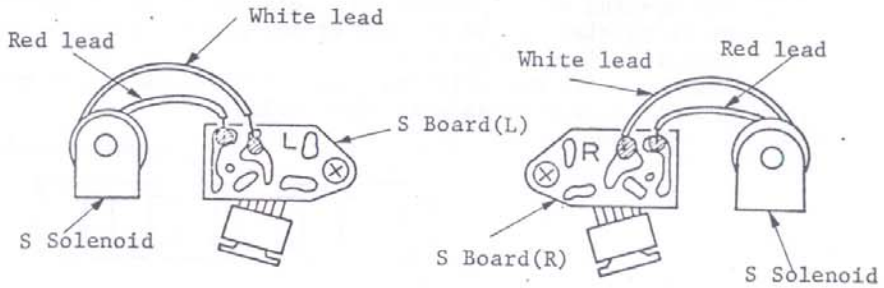
e. ND1 Sensor Holder

f. Attach the round connector with its GND terminal facing to you.

g. Attaching the S Board (R) & (L)

i. Attach the S Board (R) & (L).

ii. Solder the leads on the S Solenoid (Red and White) to the S Board.



(Fig. 70)

h. Attaching the leads of the H Board.

Cut off the leads (red, black & orange) leaving the length of 140m/m from the C Board.

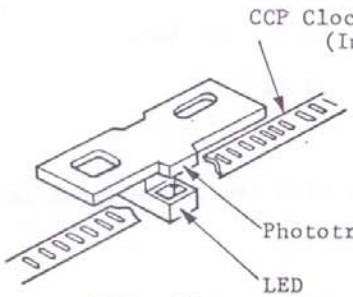
Connect the leads to the leads from H Board (red, black & orange).

The leads are of #30AWG in their diameter.

7-6 CCP Signals

A) Principles of the CCP Signal

1. CCP Interrupter Sensor



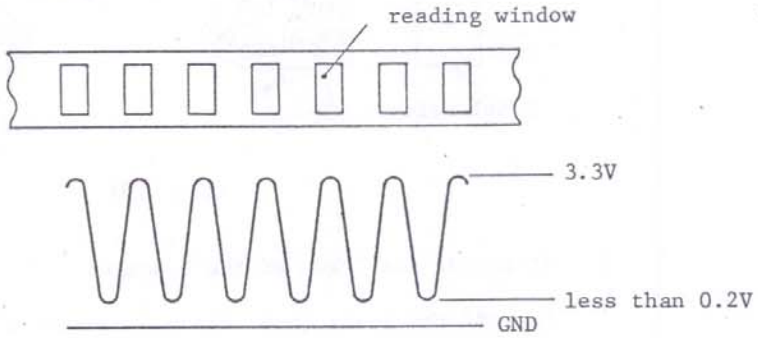
(Fig. 71)

Continuous infra-red light from the LED(Light Emitting Diode) placed across the interrupter plate is detected by the phototransistor on the other side of the plate.

When the Phototransistor senses the light from the LED, it generates high voltage, and the light is interrupted, it stays off and voltage is low.

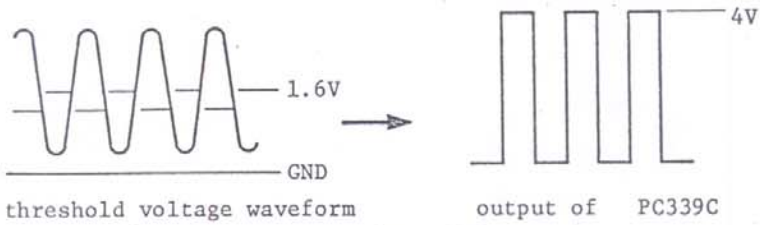
2. Analog signals created by the Interrupter (CCP Clock Plate)

The opening of the interrupter lets the light go through and actuate the phototransistor, and closing of the plate interrupt the light and the phototransistor stays off.
Thus on(3.3V) and off(less than 0.2V) states of the phototransistor creates the CCP analog signals as shown below.



(Fig. 72)

3. When the analog signals pass through the comparator circuit (μPC339C), the analog signals are converted into digital signals.



(Fig. 73)

4. The signal selector circuit (μPB74157C) selects either of the CCP(R) or CCP(L) according to the proceeding direction of the Carriage, and send the selected signal to LSI.

B) CCP Level

1. FAILURE

If the CCP output level is low or high excessively againt its threshold voltage, pattern card will not be fed when the Carriage passes the forward Point Cam(s) and pattern reading will not be done when the Carriage passes the rear Point Cam(s).

2. ADJUSTMENT

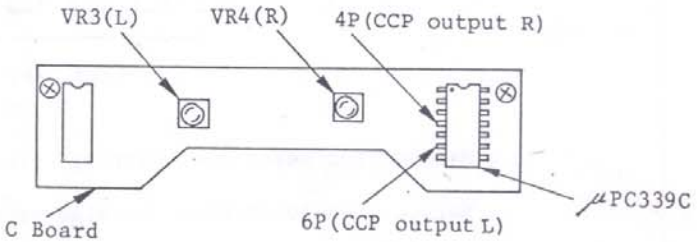
a. Put back the Carriage to the machine.

b. Connect the Curl Cord to the body, and connect the earth lead of the oscilloscope to the GND of the Curl Cord. (Refer to Fig.61)

c. Turn on the power, connect the probe to the 4 pin of the μPC339C on the C Board, and move the Carriage from left ot right to check the CCP(R).

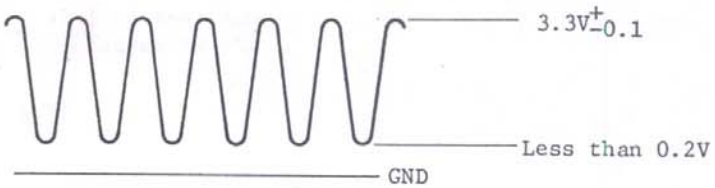
Carraige proceeds to right.... CCP(R)... 4 pin of μPC339C...VR4(R)

Carriage proceeds to left.... CCP(L)... 6 pin of μPC339C...VR3(L)



(Fig. 74)

d. Adjust the Potentiometers VR4(R) and VR3(L) to set the CCP maximum level to 3.3±0.1V.



(Fig. 75)

C) Checking the CCP Level

1. FAILURE

Card will not fed when the Carriage passes the forward Point Cam and pattern will not be read when the Carriage passes the rear Point Cam.

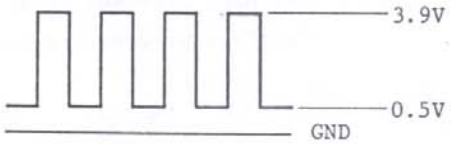
Alarming buzzer sounds, and incorrect needle selection occurs.

2. CHECKING METHOD

a. Put back the Carriage to the machine.

b. Connect the Curl Cord to the body, and connect the probes to the CCP output and GND.
(Refer to Fig. 61)

c. With the power on, check the CCP output voltage level moving the Carriage to right or left.



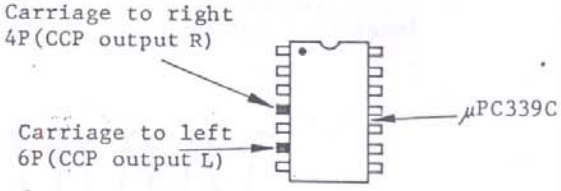
(Fig. 76)

Malfunction noted when carriage proceeds to right...Adjust CCP(R)

Malfunction noted when Carraige proceeds to left....Adjust CCP(L)

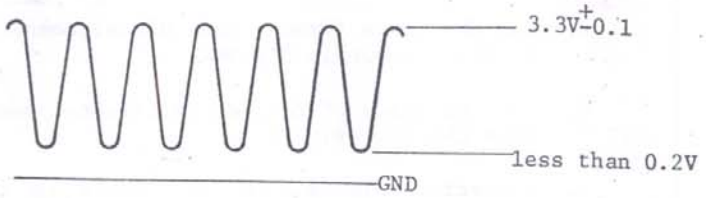
d. Connect the earth lead on the probe to GND of the Curl Cord.

Turn on the power, and contact the probe to the following points of the μPC339C on the C board, while moving the Carriage.



(Fig. 77)

e. Normal waveform of the CCP output signal.



(Fig. 79)

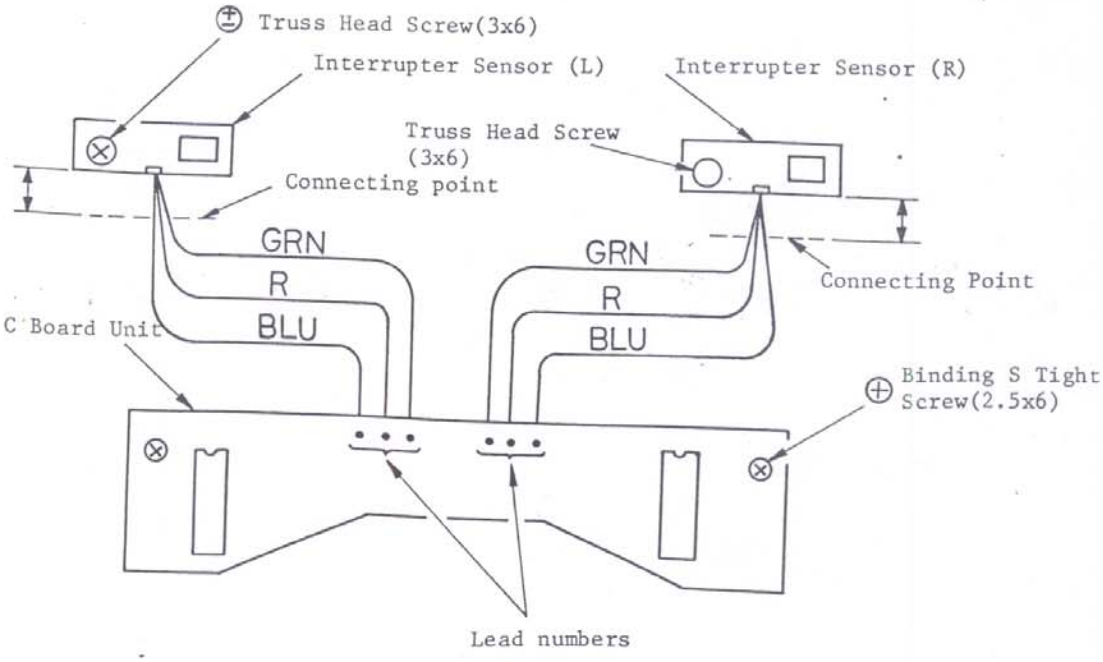
Waveform at 4 pin(CCP output,right)
is abnormal..... Interrupter Sensor (R) be replaced

Waveform at 6 pin(CCP output,left)
is abnormal..... Interrupter Sensor (L) be replaced

Waveforms at 4 pin and 6 pin
are normal, but step c is incorrect...Replace the whole C Board

3. REPLACING THE CCP SENSOR (Interrupter Sensor)

a. Interrupter sensors (L) and (R) are connected to C Board as shown below.



(Fig. 80)

b. Remove a truss head screw (3x6) securing the defective interrupter sensor.

c. Cut the leads (Green, Red, Black),connected to the C board, at the position shown in Fig. 80.

d. Cut the leads of the new interrupter sensor for 40 - 50m/m in length from the sensor.

f. Connect the leads from the C Board to the leads from the new sensor as instructed on page 49.

g. Secure the new sensor to the Carriage with the screw.

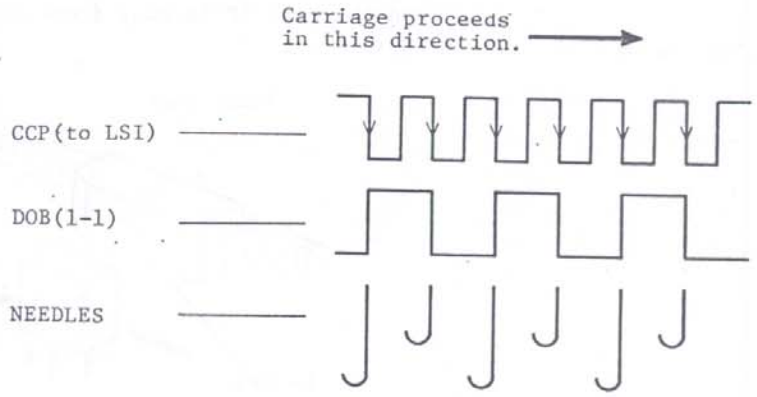
h. Check the CCP signals and adjust the CCP level, CCP Needle selection timing and CCP-KSL timing.

7-7 CCP Needle Selection timing

1. FAILURE

Needle Selection signals to the solenoids lag behind or lead ahead of timing, and incorrect needle selection will occur at random intervals.

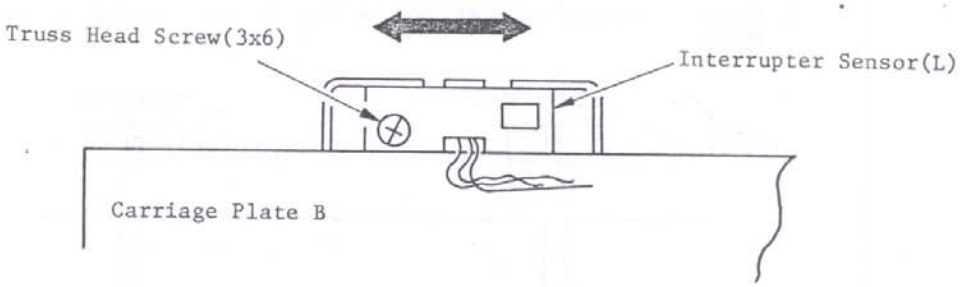
2. PULSE RELATIONS AMONG CCP, DOB AND NEEDLE



(Fig. 81)

3. ADJUSTMENT

a. Loosen truss head screw (3x6) securing the CCP Sensor Holder.



(Fig. 82)

b. Move the CCP Sensor Holder using the tip of a screwdriver to right or left.

Move the sensor outward..... better result in quick operation.

Move the sensor inward ..... better result in slow operation.

c. Check the position of the Sensor by moving the Carriage both in quick speed (150 stitches/55 rows/min.) or slow speed over the needles in selection type of 3-1 pattern.

Check the right sensor when Carriage proceeds to right, and adjust it.

Check the left sensor when Carriage proceeds to left, and adjust it.

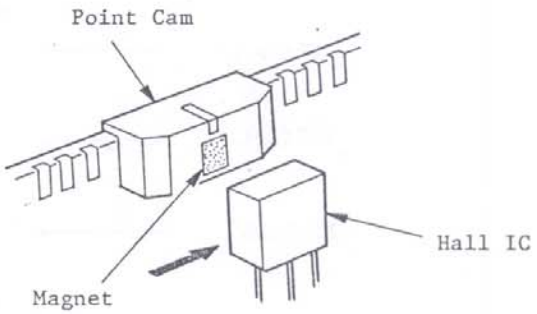
7-8 KSL Signals

A) Principles of KSL (Hall IC)

1. Hall effect : Small voltage is generated across a conductor carrying current in an external magnetic field. The applied flux must be perpendicular to the direction of current.

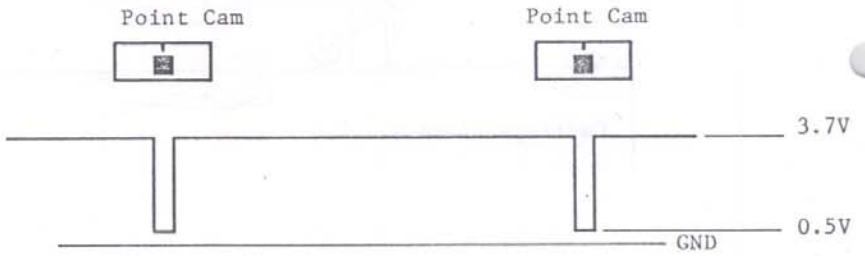
When the Hall IC on the KSL Holder comes close to the magnet on the Point Cam, potential difference is generated and current runs through the IC ... voltage is low.

When the Hall IC is away from the magnet, voltage becomes high.



(Fig. 83)

2. Digital signals created by the Hall IC (on the KSL Holder) and the Point Cams.



(Fig. 84)

3. Signal selector (μPC74157 C) on the C board selects either of the KSL(R) or KSL(L) according to the proceeding direction of the Carriage.

When the Carraige proceeds to right, KSL(R) is selected and sent to LSI and when the Carriage proceeds to left, KSL(L) is selected and sent to LSI.

B) CCP-KSL timing

1. FAILURE

If the timing of the KSL signal against CCP signal is out of control, the position of pattern slips out of position against the Point Cams.

2. ADJUSTMENT

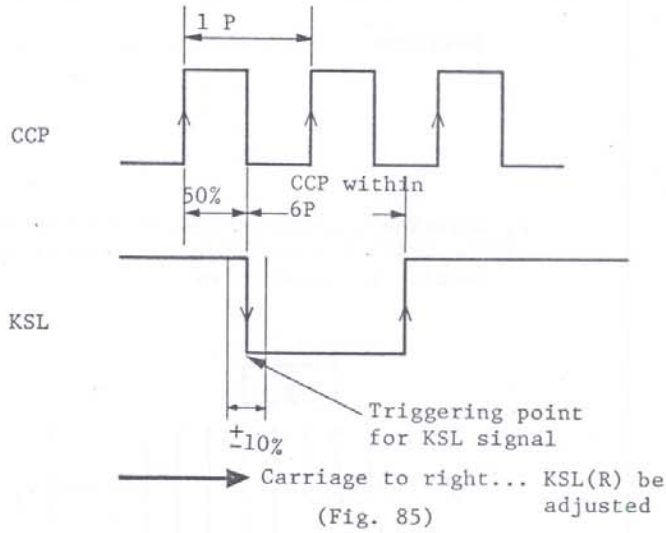
a. Put back the Carriage to the machine.

b. Connect the Curl Cord to the machine body, and connect the probes to the CCP(output), KSL(output) and GND.

c. Set a pair of Point Cam on the Needle Bed.

d. With the power on,check the waveforms of KSL and CCP simultaneously.

Trigger the KSL signal when it falls from high to low, and check it with the CCP signals, and adjust the timing as shown below. (Display mode of the oscilloscope at Chopper.)

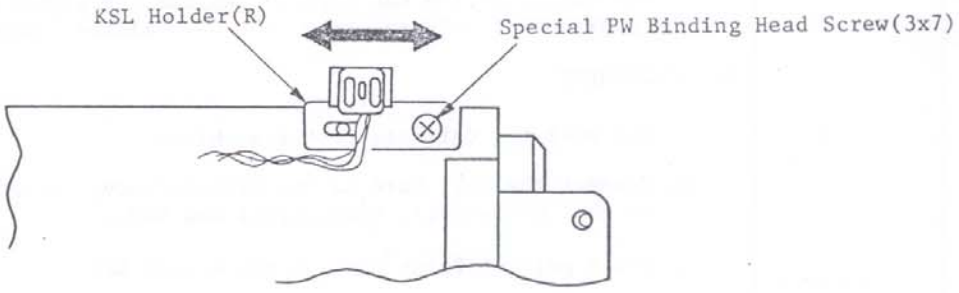


(Fig. 85)

Fall of the KSL must be timed to within 50%±10% of one pitch of CCP signal.

Adjust the KSL Holder (L) moving the Carriage from right to left.

e. Loosen the PW binding head screw (3x7) securing the KSL Holder to the Carriage and move the Hoder to right or left.

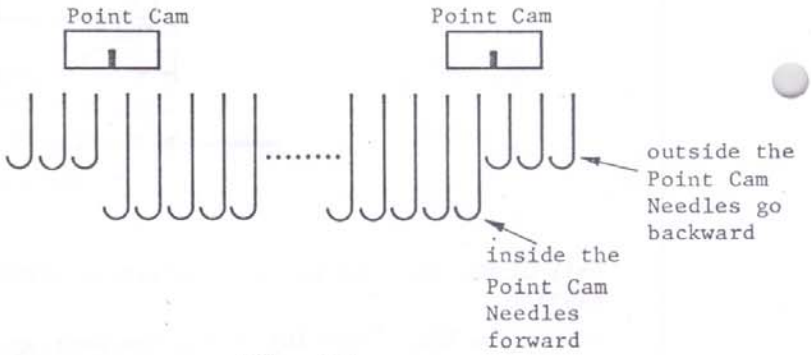


(Fig. 86)

Carriage towards right ..... Check and adjust KSL Holder(R)

Carriage towards left ..... Check and adjust KSL Holder(L)

f. Adjustable range of KSL Holder positioning is limited to 1 pitch, so check if its position is ahead or behind by 1 pitch by selecting needles as shown below.



(Fig. 87)

If the position is incorrect, the needle outside the Point Cam will be selected, or second inside needle from the Point Cam will be selected.

C) Checking the KSL Circuit

1. FAILURE

If the KSL Circuit is malfunctioning, the Pattern Card will not be moved with the operation of the Carraige.

Incorrect needle selection will occur and alarming buzzer will sound.

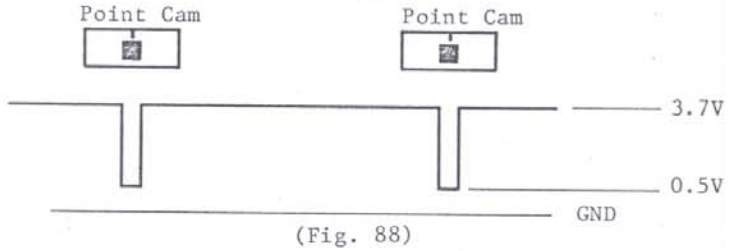
2. ADJUSTMENT

a. Put back the Carriage to the machine.

b. Connect the Curl Cord to the machine body, and connect the probes to KSL(output) and GND terminals.

c. Set a pair of the Point Cam on the Needle Bed.

d. With the power on, operate the Carriage to right and left to check the output voltage of the KSL signal.



(Fig. 88)

Carriage proceeds to right ..... check KSL (R)

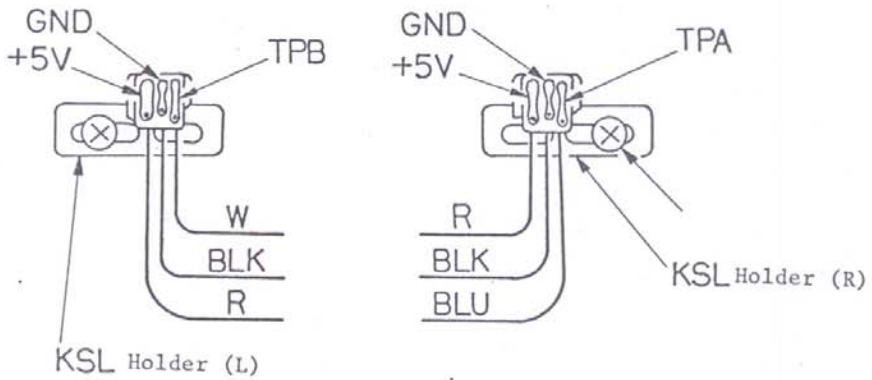
Carriage proceeds to left ..... check KSL (L)

e. Connect the earth lead on the oscilloscope to the GND terminal on the Curl Cord.

Turn on the power, contact the probe to the points on the KSL Holder (L) and (R), moving the Carriage, as shown.

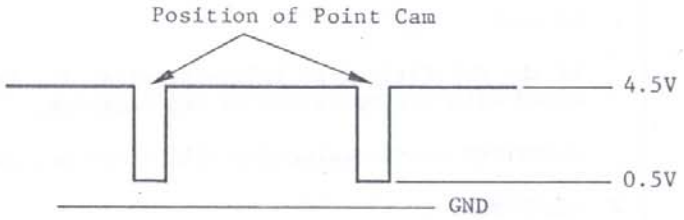
Carriage towards right ... Voltage at TPA of KSL Holder (R)

Carriage towards left .... Voltage at TPB of KSL Holder (L)



(Fig. 89)

f. Correct waveforms of the KSL at TPA and TPB.



(Fig. 90)

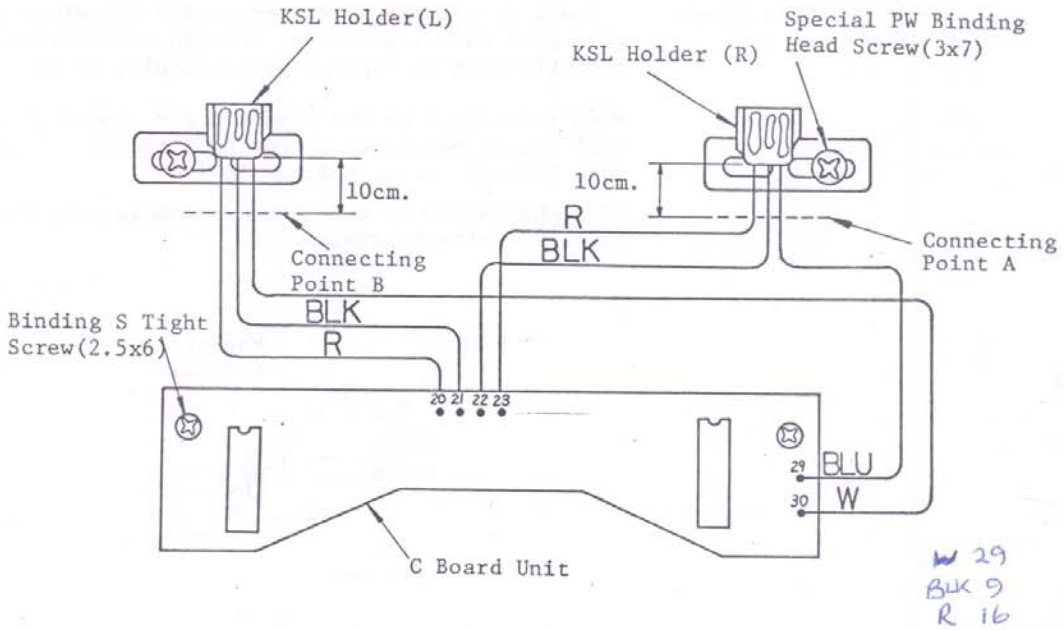
i. KSL HOLDER (R) malfunctioning..... replace KSL HOLDER (R)

ii. KSL HOLDER (L) malfunctioning..... replace KSL HOLDER (L)

iii. KSL HOLDER (L) & (R) are good but step d is wrong. ..... replace the whole C board. (Refer to page 51)

3. REPLACING THE KSL HOLDER

a. KSL HOLDERS (R) & (L) are connected to C board as shown below.



(Fig. 91)

b. Remove the PW binding head screw(3x7) securing the defective KSL Holder.

c. Cut the leads conncecting the Holder and the C Board at the point A or B as shown above.

KSL HOLDER (R) ... connecting point A three leads(red,black,blue)

KSL HOLDER (L) ... connecting point B three leads(red,black,,white)

d. Cut the leads of the new KSL Holder leaving 40 - 50m/m.

e. Connect the leads with the leads from the C board by intertwisting them.

f. Place the new Holder to the Carriage with the screw

g. Check the KSL signal again, and adjust the KSL-CCP timing.

7-9 ND1 Signal

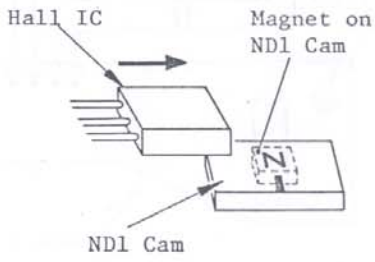
A) Principles of ND1

1. ND1 HOLDER (Hall IC)

Hall effect: A small voltage is generated across the width of a conductor carrying current through its length, when magnetic flux is applied perpendicular to the current.

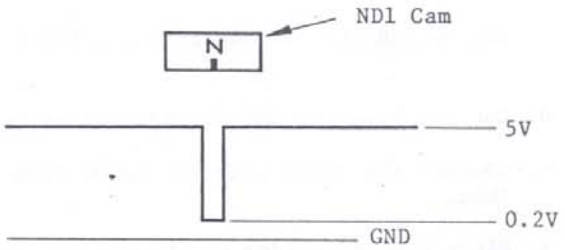
When the magnet on the Needle 1 cam comes close to the Hall IC, it generates potential difference, and current runs through it.... voltage is low.

When the magnet on the Needle 1 Cam is away from the Hall IC, voltage is high.



(Fig. 92)

2. Digital waveform created by the Hall IC and the Needle 1 Cam.



(Fig. 93)

B) CCP-ND1 timing

1. FAILURE

If the timing of the ND1 against the CCP is out of control, the position of the pattern on the fabric slips out of position.

2. ADJUSTMENT

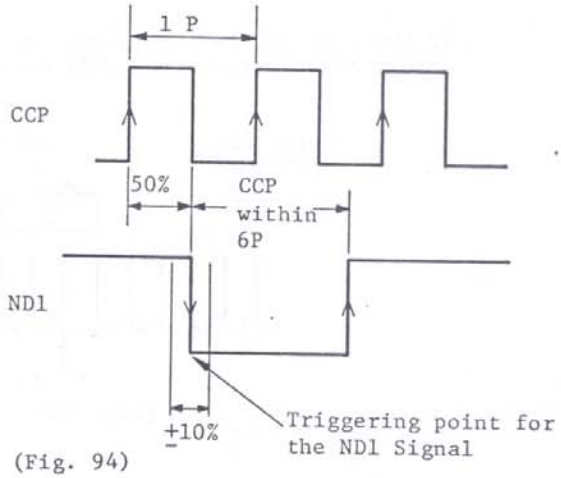
a. Put back the Carriage to the machine.

b. Connect the Curl Cord to the machine body and connect the probes to CCP(output), ND1, and GND.

c. Set the ND1 Cam on the needle bed.

d. Turn on the power, and check the ND1 signal and CCP signal at the same time.

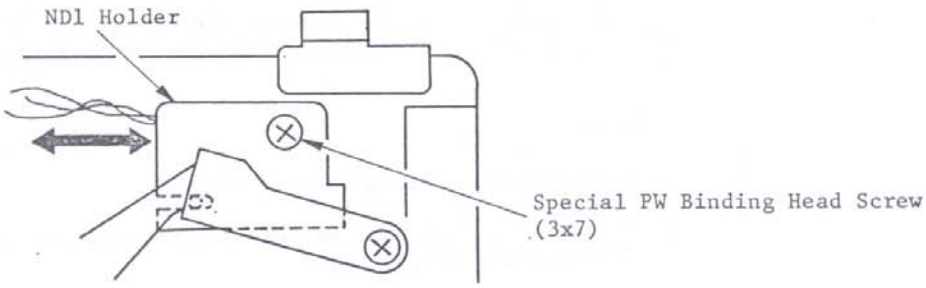
Trigger the ND1 signal when it falls, and check its timing when the Carriage moves from left to right, and check the ND1 signal and the CCP signal on the oscilloscope.



(Fig. 94)

Fall of the ND1 signal must be adjusted to fall of the CCP siganal (at 50% of a complete pitch of CCP), and the allowance is limited to 10% ahead of behind the fall of the CCP signal, as shown above.

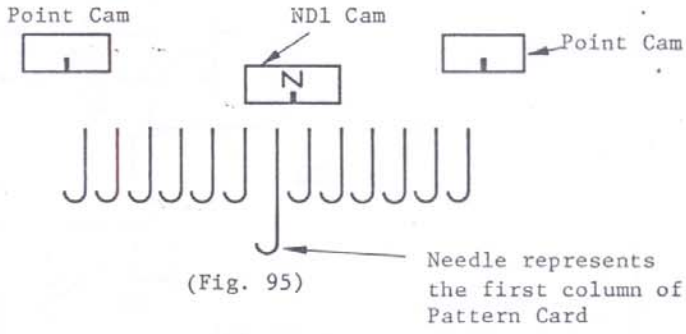
e. Loosen PW binding head screw(3x7) securing the ND1 Holder to the Carriage Plate B, and move to ot right or left.



(Fig. 95)

f. Adjustable range of the ND1 Holder is limited to 1 pitch, so check if the position of the ND1 Holder against the CCP is beyond 1 pitch ahead or behind the ND1 Cam position.

If the position is incorrect, the reference needle to knit the 1st column of a Pattern Card will shift to right or left by 1 pitch.



(Fig. 95)

C) Checking the ND1 Circuit

1. FAILURE

If the ND1 circuit is malfunctioning, the pattern on the fabric will not start at the position of the ND1 Cam.

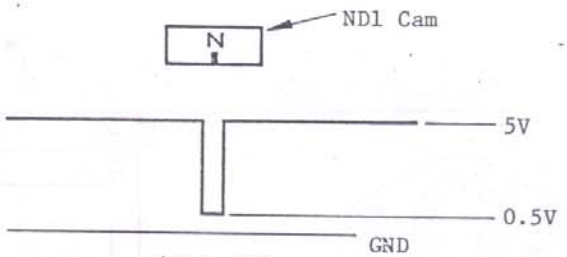
2. CHECKING PROCEDURES

a. Put back the Carriage to the machine.

b. Connect the Curl Cord to the machine body, and connect the probes to ND1(output) and GND.

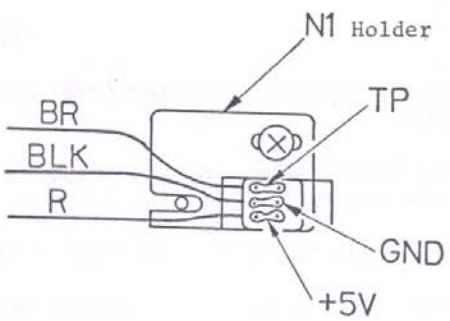
c. Set the ND1 Cam on the Needle Bed.

d. Turn on the power, and operate the Carriage to see the ND1 signal when the Carriage proceeds to right.



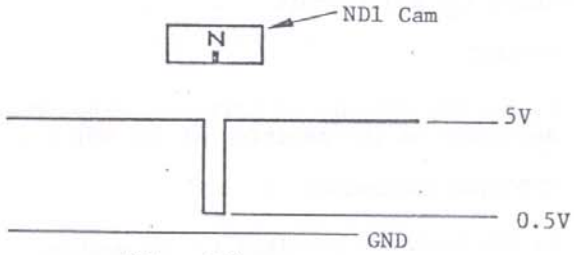
(Fig. 97)

e. Connect the earth lead on the probe to the GND of the Curl Cord. With the power on, contact the probe to the TP on the ND1 Holder and check the ND1 signal moving the Carriage.



(Fig. 98)

f. Correct waveform of ND1 at TP.



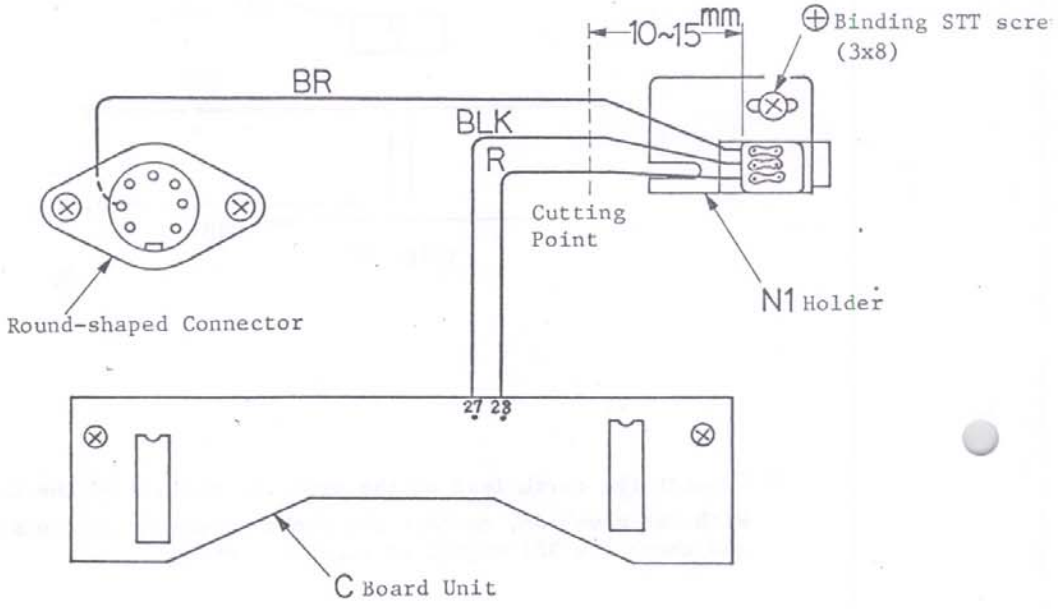
(Fig. 99)

i. If the output of the ND1 is wrong, replace the ND1 Holder.

ii. If the output of the ND1 is correct, but step e is incorrect, replace whole the C Board.

3. REPLACING THE ND1 HOLDER

a. ND1 Holder is connected to the C Board as shown below.



(Fig. 100)

b. Remove the Binding STT screw (3x8) securing the ND1 Holder to the Carriage.

c. Cut the leads connecting the Holder to the C Board leaving 10-15m/m from the Holder.

d. Cut the leads of the new ND1 Holder leaving 40-50m/m.

e. Intertwist the leads of the Holder and the C Board.

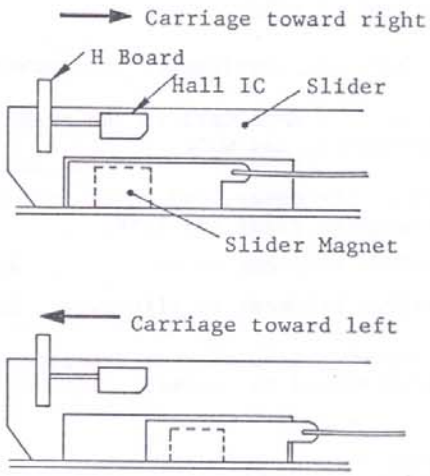
f. Secure the new Holder to the Carriage with the screw.

g. Check the ND1 signal and adjust the ND1-CCP timing.

7-10 HOK Circuit

A) Principles of HOK (Hall IC)

1. Hall effect: See page 60 .



(Fig. 101)

Carriage moves from right to left ..... HOK voltage, high

Carriage moves from left to right ..... HOK voltage, low

2. HOK and SIGNAL SELECTOR

HOK signal goes to LSI and also actuates the signal selector μPB74157C and let it select either of CCP(L) or (R), KSL(L) or (R) DOB(L) or (R).

Carriage proceeds to left ... HOK, high .... CCP(L), KSL(L), DOB(L) are effective.

Carriage proceeds to right .. HOK, low ..... CCP(R), KSL(R), DOB(R) are effective.

B) Checking HOK Circuit

1. FAILURE

Card will not be fed or pattern will not be read when the Carriage is operated, and incorrect needle selection occurs.

2. CHECKING PROCEDURES

a. Put back the Carriage to the machine.

b. Connect the Curl Cord to the machine body, and connect the probes to HOK(output), and GND.

c. Turn on the power, and check the HOK voltage level moving the Carriage to right and left.

Carriage proceeds to left ..... 4.6V (HOK output)

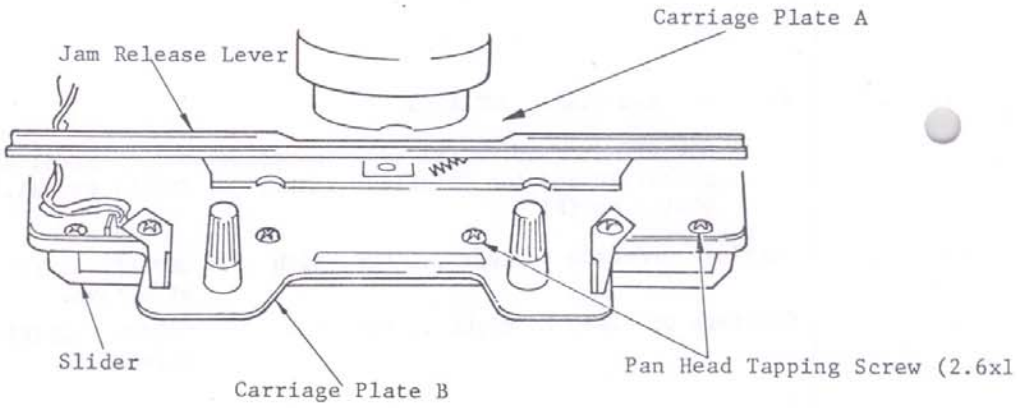
Carriage proceeds to right..... 0.3V (HOK output)

If the HOK circuit is malfuncitoning, C board,or H board on the slider should be checked.

3. Referring to page 51, replace the C Board unit, and connect it to the H board on the slider by soldering the leads.

4. REPLACING THE SLIDER UNIT

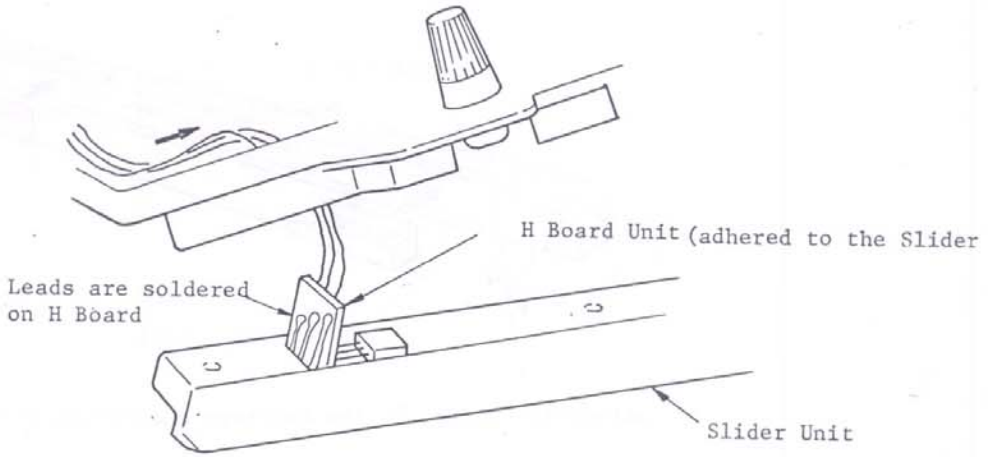
a. Push the jam release lever and lift up the Carriage Plate A.



(Fig. 102)

b. Remove four tapping screws(2.6x10) securing the slider to the Carriage.

c. Pull the leads toward the H Board, and remove the slider from the Carriage Plate with the leads.

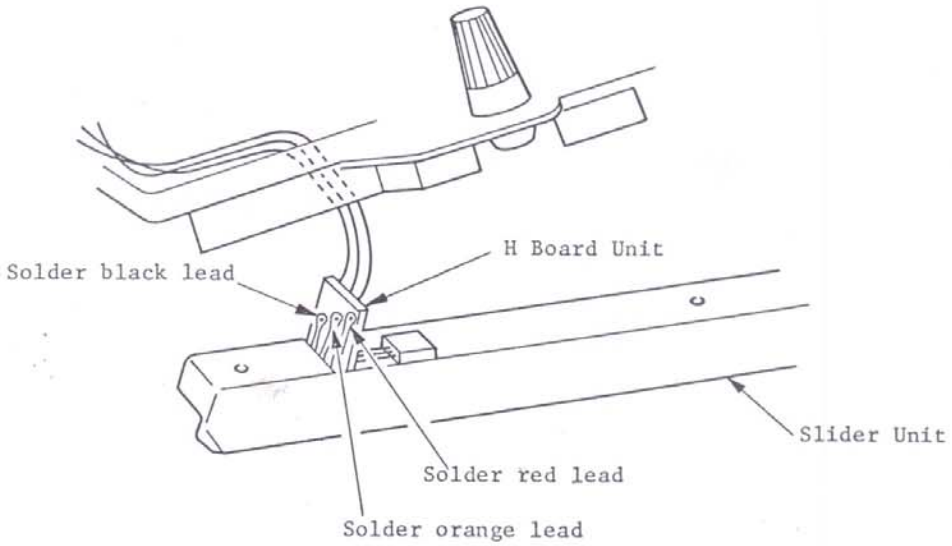


(Fig. 103)

d. Disconnect the leads from the H Board with a soldering iron and soldawick.

e. Connect three leads of the replaced slider unit and the leads from the C Board Unit (black, red and orange).

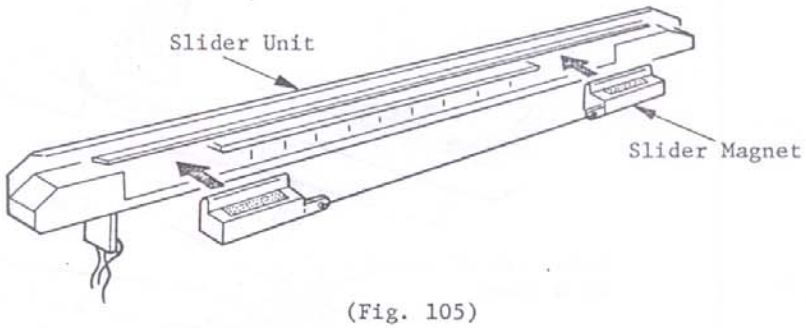
i. Guide three leads from the C Board unit through the opening of the Carriage Plate B.



(Fig. 104)

ii. Solder three leads to the H Board as shown in Fig. 103 .

iii. Turn the Carriage upside down, set the Slider Magnet in the slider as shown below.



(Fig. 105)

iv. Attach the slider to the Carriage and secure it with the screws.

7-11 DOB (Data Out Buffer) Signals

1. FAILURE

If the DOB circuit is malfunctioning, incorrect needle selection will occur when the Carriage proceeds either to right or left.

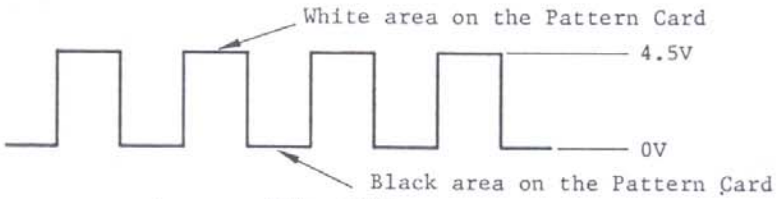
2. CHECKING PROCEDURES

a. Put back the Carriage to the machine.

b. Connect the Curl Cord to the machine body, and connect the probes to DOB and GND terminals.

c. Set a pair of the Point Cam on the Needle Bed.
Push on the left lamp of the Button 1.
Set the Pattern Width at 24, and insert a pattern card No. 1(1) into the CR unit.

d. Turn on the power, move the Carriage slowly and check the output level of the DOB in between the Point Cams.



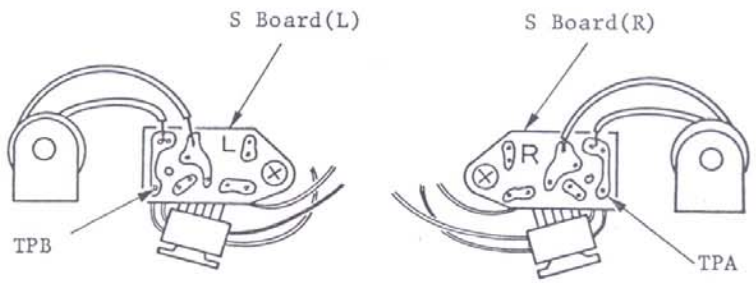
(Fig. 106)

If the Carriage stops inside the Point Cams or outside the Point Cams for 30 seconds, the DOB signals will fade away. (high voltage changes into low voltage)
When the Carriage is restarted, the DOB signal is restored.

e. Connect the earth lead on the probe to the GND of the Curl Cord. Turn on the power, contact the probe to the S board (R) & (L) at the predetermined points as shown, and check the DOB signals moving the Carriage.

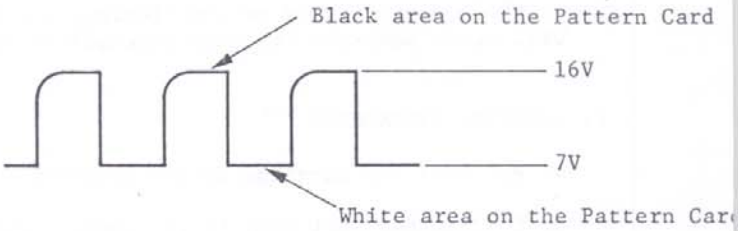
Carriage proceeds to right ..... Check voltage at TPA on S Board (R)

Carriage proceeds to left..... Check voltage at TPB on S Board (L)



(Fig. 107)

f. Correct waveform of DOB at TPA and TPB.



(Fig. 108)

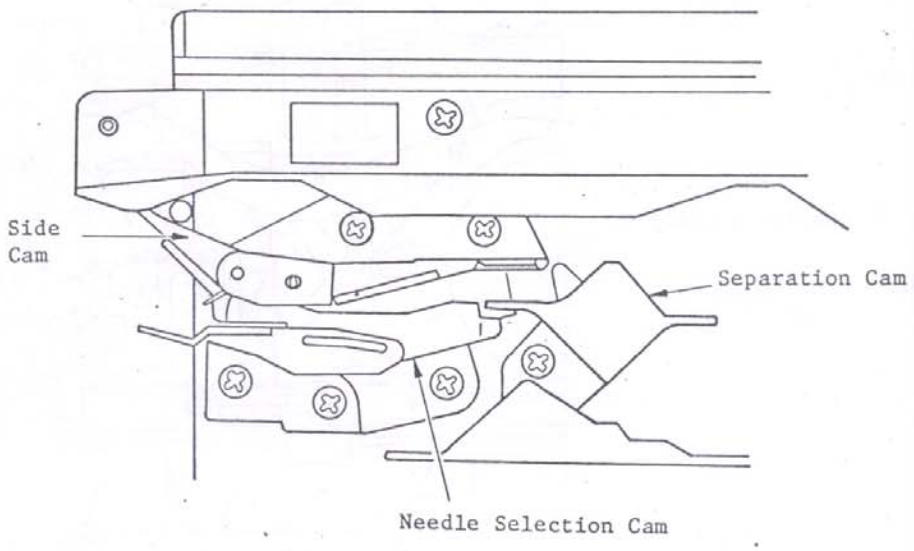
If the waveform of the DOB is incorrect, replace the whole C bo
since DOB circuit is mulfunctioning.

7-12 Needle Selection Cams

Failures caused by lack of lubticant and wear out.

1. FAILURE

Lack of lubricant or wear out because of lack of lubricant will cause incorrect needle selection at random intervals.



(Fig. 109)

2. CHECKING PROCEDURES

a. Push 150 needles to B position and set the Point Cams at the end needles.

b. Turn on the power, set the Carriage so as those needles are selected backward.

c. Operate the Carriage very quickly and slowly and check if incorrect needle selection occur at random intervals.

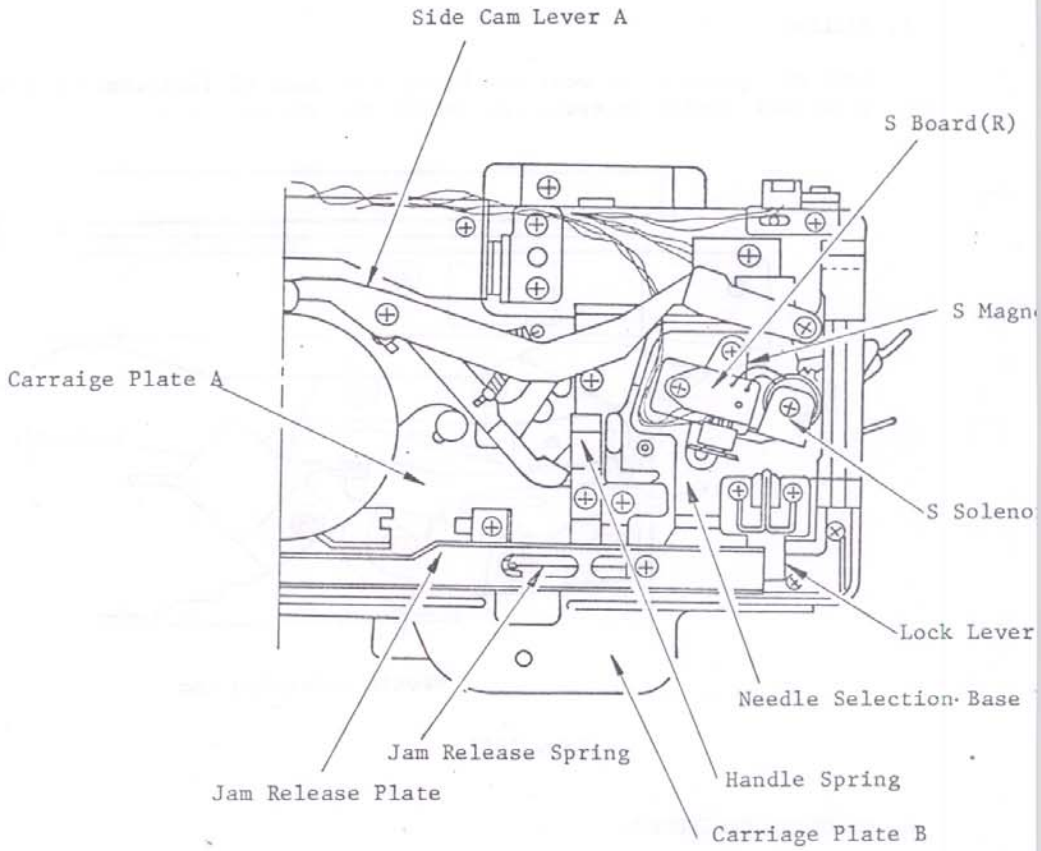
3. MEASURES

a. Apply lubricant to the needle selection cams, and test again.

b. If the incorrect needle selection occur after application of lubricant, replace the whole needle selection base.

7-13 Replacing the Needle Selection Base

1. Principal parts in the Needle Selection Base



(Fig. 110)

2. Removing the Needle Selection Base

a. Remove two screws securing the Jam Release Plate to the Needl Selection Base, and take off the Plate.

b. Disengage the tip of the Jam Release Spring from the Needle Selection Base.

c. Remove the bindind head screw(3x5) securing the Handle Spring, take it off.

d. Disconnect two leads (red, white) from the S Solenoid.

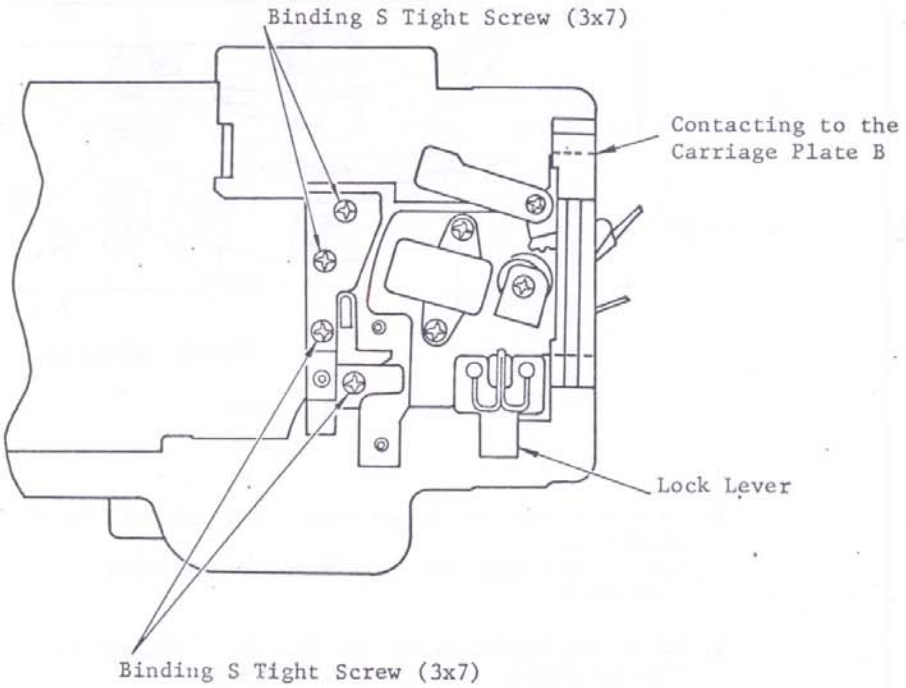
Note: Soldering after replacing the Needle Selection Base must be with care.

e. Remove the tapping screw (2.6x6) securing the S board to the S Magnet Case, and remove the S board.

f. Remove the binding head screw(2.5x6) securing the Side Cam Lever A to the Carriage Plate A, and take the Lever off.

g. Remove four S Tight Screws (3x7) securing the Needle Selection Base to the Carriage Plate A.

. Push the Lock Lever, take the Needle Selection Base lifting it up.

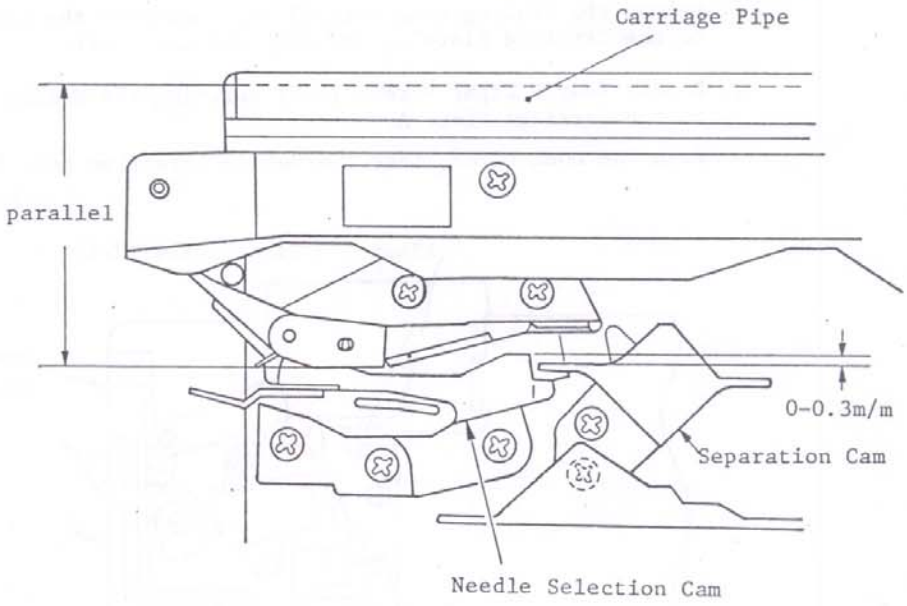


(Fig. 111)

3. Cautions when replacing the Needle Selection Base

a. Secure the Needle Selection Base while pushing toward the Carriage Pipe, and also eliminating clearance between the Base and the Carriage Plate B with the screws.

b. Check the parallelism of the Carriage Pipe with the Needle Selectic
Check forward and backward positioning of the Separation Cam.



(Fig. 112)

c. Do not solder two leads from the S Solenoid to the S Board to wrong position.
(Red lead comes near to the end of the Carriage and the white lead inside.)

d. After the Needle Selection Base has been attached, check CCP timing CCP-KSL timing, and CCP-ND1 timing. If they are incorrect, readjus them.

CHECKING POINTS AFTER REPAIR AND ADJUSTMENT

- Connect all the connectors.
- Check each unit in the numbered order below.

1. REGULATOR BOARD.

   a. Check the +16VDC circuit and adjustment

   b. Check the +5VDC and -5VDC

2. CR UNIT

   a. PCP output voltage checking and adjustment

   b. PCP threshold voltage

   c. DIN output voltage

   d. DIN output voltage deviation

   e. PSD output voltage

   f. PSD threshold voltage

   g. PCP-DIN timing (PCP clock plate adjustment)

3. CARRIAGE

   a. CCP output voltage

   b. CCP threshold voltage

   c. CCP needle selection timing

   d. Needle Selection Cams

   e. CCP-KSL timing

   f. CCP-NDL timing

4. CPU BOARD

   Not in particular

After adjustment, check the needle selection without knitting over 150 needles.