SERVICE MANUAL

FOR

MODEL 560 KNITTER

SCOPE OF THIS MANUAL

This manual presents the methods for diagnosing and repairing the defective electronic components brought back from the customer's house, using an oscilloscope and multi-meter, following the flow chart given for each component.

For the problems in the mechanical parts of the knitting machine, refer to toe service manuals for the Punch Card Knitting machines, since mechanical adjustments or repair for the electronic knitting machine are the same as for the punch card knitters.

The Service Manual for the Model 500 knitter is also an indispensable aid when you repair this knitting machine.

CONTENTS

1 PRECAUTIONS

1 - 1 PRECAUTIONS IN REPAIRING

1-1-1 Model 560 Knitter has standard Carriage and Lace Carriage, but electronic parts and systems are same to both Carriages.

1-1-2 The measured value indicated at each test point is a standard value, but depending on the meter used, ambient temperature and humidity, ignorable scatter in quality of electronic parts, the read out value will be variant.

1 - 2 PRECAUTIONS IN USING METERS

1-2-1 Oscilloscope (SS-5100)

According to the voltage of A.C. mains, change the LINE VOLTAGE at the back of the oscilloscope.

1-2-2 Multi-tester (AX-303TR)

As power supply, use two dry batteries (type:) and when the batterries have aged, replace both of the batteries with new ones.

Batteries in use

Type: Battery(1.5V x 2)
006P dry battery: (9V x 1)

1 - 3 HOW TO USE THIS MANUAL

1-3-1 How this manual consists

This manual consists of the following main divisions and sub divisions.

Main Division I : Each Manin Divisior is given to each electronic component.

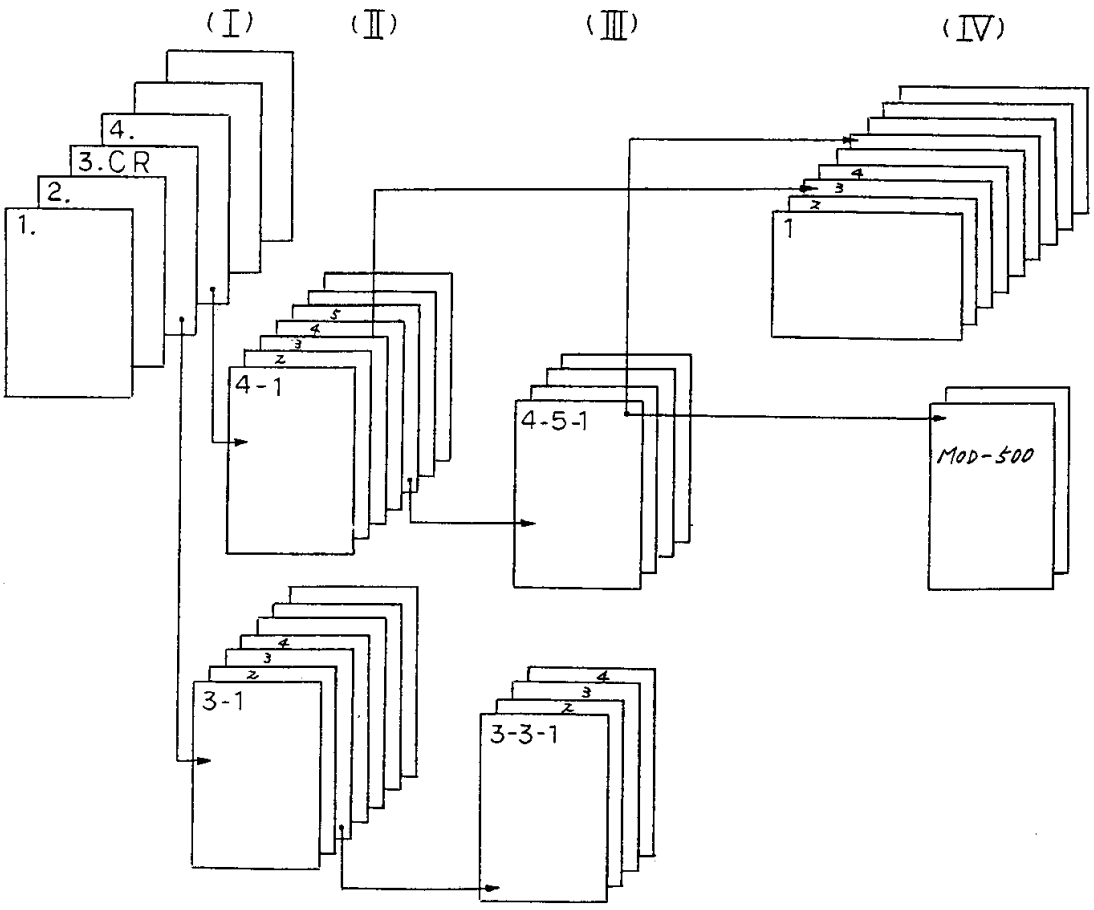
Division II : Classifies into each designated signal.

Section III : Devoted to repairemnt of each signal circuit.

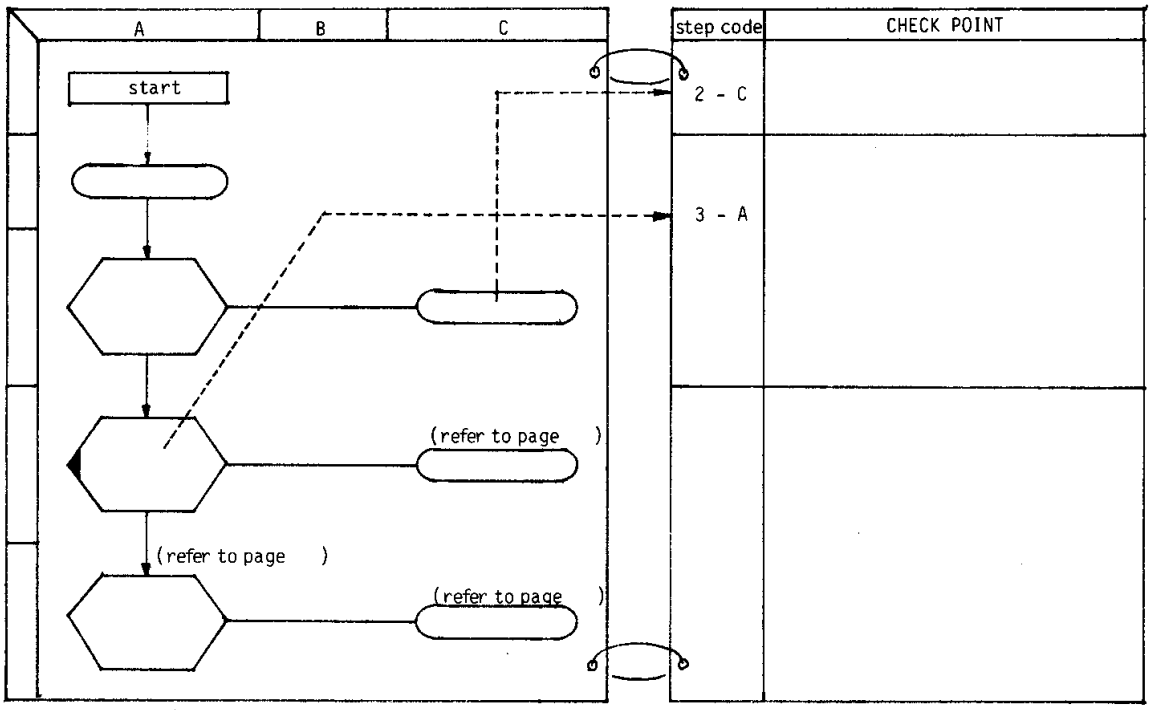
Note 1 : This section describes the use of oscilloscope at necessary step in testing.

2 : This section requires reference to the service manual for the Model 500 knitter.

Sub Section IV : Operation Tables for oscilloscope.



1-3-2 How to use the diagnostic flow chart



Explanation of each block

1. —— Prerequisite operation for checking.

2. —— Indicates the result of testing, details is given in "Check Point".

3. (refer to page) —— Indicates the result of testing, details for the results are given on page indicated.

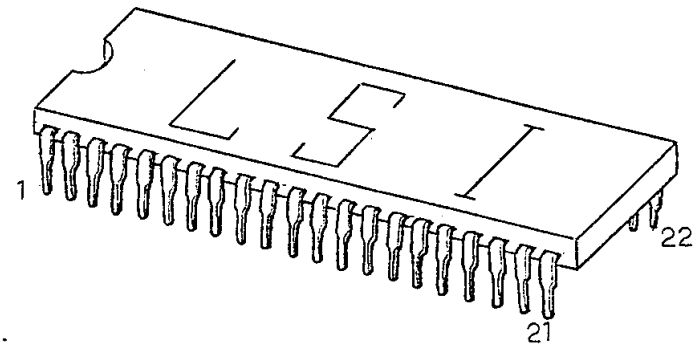
4. —— Testing operation for judging which step to take next. Details are given in "Check Point".
4.9V – Indicates expected measured value.

(refer to page) Judging method is given on the indicated page.
test result is given.
2.0V / 0.1
Reference waveform to judge
Indicates judgement

2 CPU UNIT

2 - 1 L S I (LARGE SCALE INTERGATED CIRCUIT)

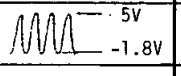
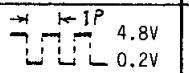
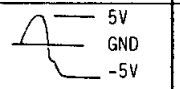
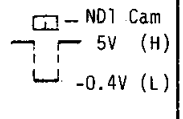
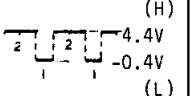
The LSI used on the Model 500 and 560 is consisted of input unit, memory unit, arithmetic unit and output unit.

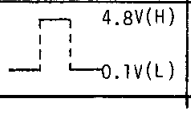
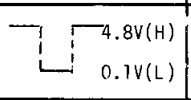
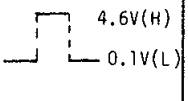
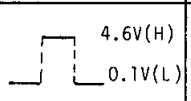
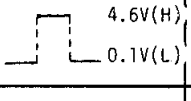
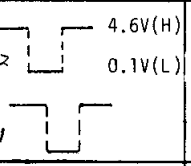
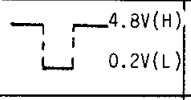
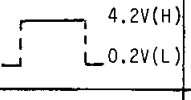
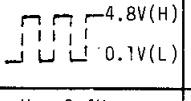


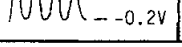
pin NO.

1	C L 1	C L Q	42
2	R L	− 5 V	41
3	P N	W K	40
4	—	M R	39
5	—	Y B	38
6	C C P	T B	37
7	R E S	P C P	36
8	H O K	K S L	35
9	N D 1	P S D	34
10	S T P	D I N	33
11	F E D	—	32
12	D O B	P M 2	31
13	D O B	P M 1	30
14	—	B Z R	29
15	—	L P N	28
16	B I T Q	B F M	27
17	B I T 1	F F M	26
18	B I T 2	—	25
19	B I T 3	L M L	24
20	T S T	L M R	23
21	+ 5 V	L S C	22

2-1-1 Symbol and description of each signal at each pin of LSI

Pin	SYMBOL	Description	Waveform/Voltage	Function
1	C L 1	clock 1	 5V -1.8V	Connected with IFT. Generate clock frequency of 440KHz to govern the timing of signals throughout the systems.
2	R L	right.left	R: 3V (H) L: 0.1V (L)	Controls the direction of pattern. Pattern Button ② "DOWN" R(H) "UP" L(L)
3	P N	Positive. Negative	P: 0.1V (L) N: 5V (H)	Exchanges the colour of contrast and background yarns. Pattern Button ① "DOWN" N(H) "UP" P(L)
4	——			
5	——			
6	C C P	Carriage clock pulse	 1P 4.8V 0.2V	Represents number of needles. 1 signal represents 1 needle.
7	R E S	reset	 5V GND -5V	Set the LSI ready for programming.
8	H O K	direction	R: 0.4V (L) L: 4.2V (H)	Detects the proceeding direction of Carriage To right: L To left: H
9	N D 1	Needle 1	 ND1 Cam 5V (H) -0.4V (L)	Sets the position of the pattern. Normally (H), when the N1 Holder senses, signal is (L).
10	S T P	stop	H: 3.5V L: 0.1V	Stops the pattern reading and pattern card. Normally (H), Inspection Button "ON" —— (L) pattern card moves up. "ON","OFF" ———— (H) scanning
11	F E D	Feed	H: 3.3V L: 0.1V	Governs the direction of the pattern card. Card Button ON (H), downward Card Button OFF (L), upward
12 13	D O B D O B	data out buffer	 (H) 4.4V -0.4V (L)	Output of needle selection signal. Pattern Card, white area (H) Pattern Card, black area (L)
14	——			
15	——			
16 17 18 19	B I T 0 B I T 1 B I T 2 B I T 3	bit 0 bit 1 bit 2 bit 3	H:4.8V L:0.2V H: " L: " H: " L: " H: " L: "	Set the voltage band through the combination of resistance.
20	T S T	test	5V	Used the test the logic circuit in the LSI.
21	+ 5 V		5V	Driving current for the LSI.

Pin	SYMBOL	Description	Waveform/Voltage	Function
22	L S C	Lamp Scan	———	not used
23	L M R	Linear Motor right		Move the CR sensor from left to right. Activated when the Inspection Button is pushed on or off, and when the Carriage passes the second Point Cam.
24	L M L	Linear Motor left		Move the CR Sensor from right to left. Detects the quick motion mark, and if not detected, (H) signal is generated.
25	———			
26	F F M	forward feed magnet		Indicates forward direction of Card. detects the mark in ↓ column. Pin 11 —— H
27	B M F	backward feed magnet		Indicates backward direction of the Card. Detects the mark in ↑ column. Pin 11 —— L
28	L P N	Posi. Nega. Lamp	H: 4.8V L: 0.1V	Displays the state of Button 1 "DOWN" —— (L): Negative "UP" ——— (H): Positive
29	B Z R	Buzzer		Activates the Buzzer.
30	P M 1	Pulse Motor 1		Governs the turning direction of the pulse motor. Both PM1.PM2 are high---stationary. When the Carriage passes the first Point Cam or Inspection Button ON - OFF, (L) signal is generated.
31	P M 2	Pulse Motor 2		
32	———			
33	D I N	data in		Signal generated by the patterns on the Pattern Card. (Sample waveform is from the Pattern Card.)
34	P S D	preset data		Detects the Pattern Width. At the point that the Mirror voltage exceeds the reference voltage.
35	K S L	Point Cam		Detects the pattern knitting width. (L) signal between the Point Cams.
36	P C P	Pattern clock pulse		Set the timing to read the pattern. Number of pulse: 64 pulses.
37	T B	Vertical expansion	H: 3.4V L: 0.1V	Double the pattern vertically Pattern Button 3 ON ——— (L) Pattern Button 3 OFF —— (H)
38	Y B	Horizontal expansion	H: 3.4V L: 0.1V	Double the pattern horizontally. Pattern Button 4 ON ——— (L) Pattern Button 4 OFF —— (H)
39	M R	Mirror repeat	H: 3.4V L: 0.1V	Pattern knitted in a mirror image. Pattern Button 5 ON ——— (L) Pattern Button 5 OFF —— (H)

Pin	SYMBOL	Description	Waveform/Voltage	Function
40	W K	Double Jacquard	H: 3.4V L: 0.1V	Used in double jacquard. Pattern Button 6 ON ——— (L) Pattern Button 6 OFF —— (H)
41	- 5 V		-5V	Driving voltage for the LSI.
42	C L O	Clock O		Connected with the IFT and generates the clock frequency of 440 KHz, and controls the timing throughout the systems.

2-1-2 Input voltage necessary for the logic circuit

Logic signal for the logic circuit is consisted of high and low signals, abbreviated as H and L respectively.

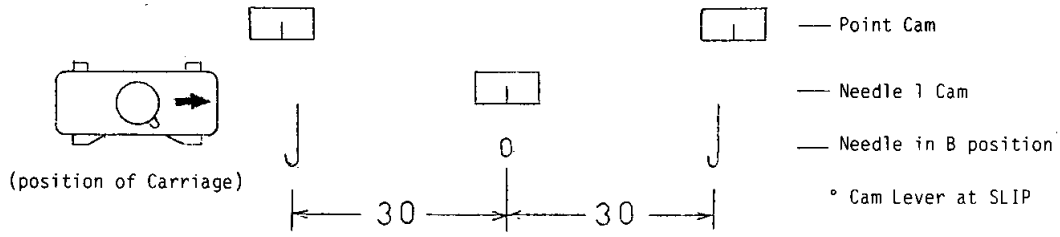
The voltage required for the logic circuit of the Model 500 and Model 560 are as follows:-

H: ——— $2.4V \leqq H \leqq 5V$

L: ——— $-5V \leqq L \leqq 0.7V$

2 - 2 PREREQUISITES FOR REPAIRING THE CPU BOARD

2-2-1 Setting the knitting machine



2-2-2 Card and Pattern Width setting

1. Card: Insert the test card into the CR Unit, and set it to "D".
2. Pattern Width: Set the Pattern Width at 30.

2-2-3 Setting the Oscilloscope

1. Probes

   CH1: Connect the ground lead to the GND test terminal on the CPU board.
   CH2: Set the straight pin tip on the probe before checking.

2. Initial setting of the oscilloscope

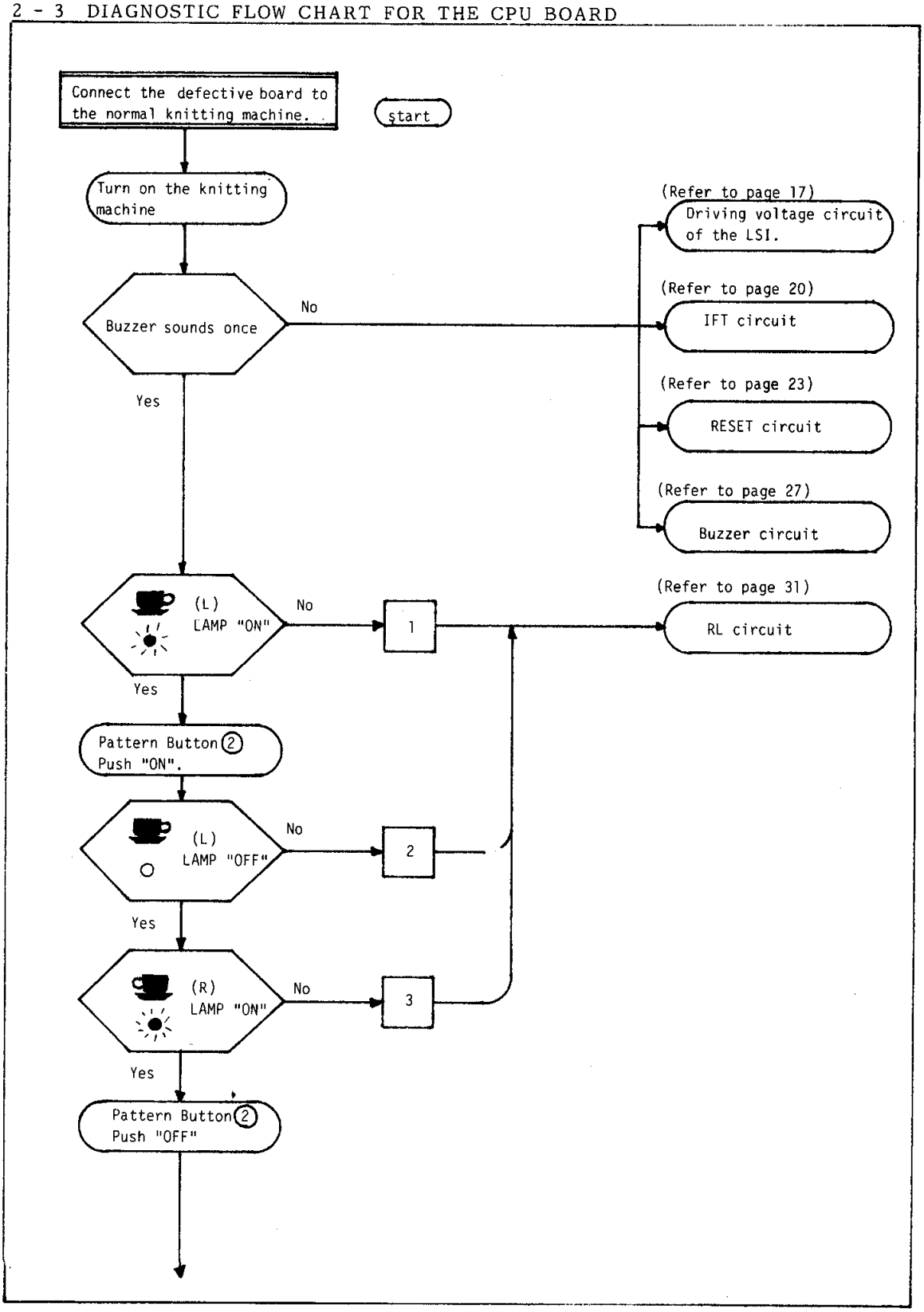
   Following the separate operation table [INITIAL SETTING -1 & 2], set the oscilloscope, then follow the [CPU -1].

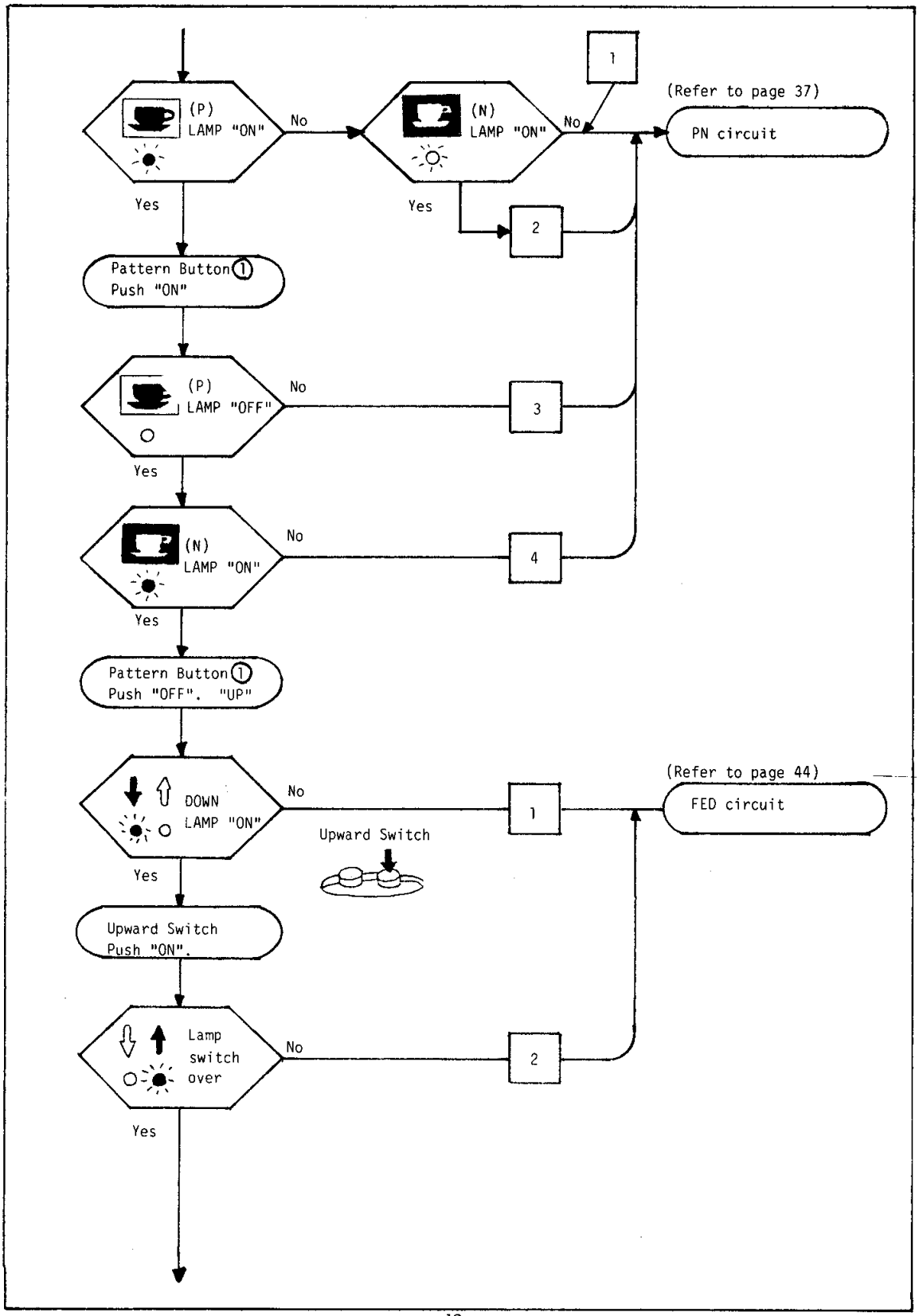
   Other settings are described in each testing step.

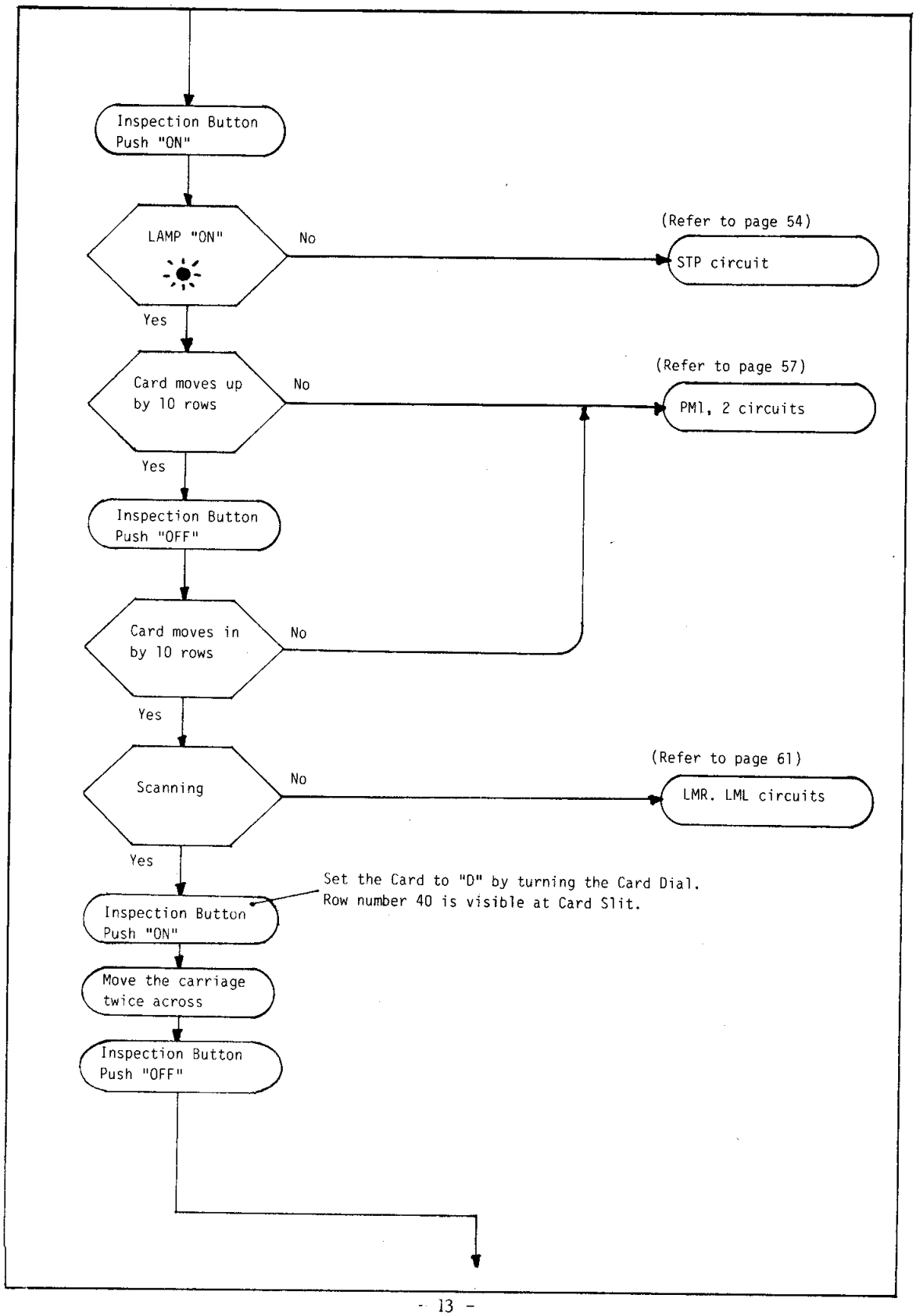
2-2-4 Setting the CPU board

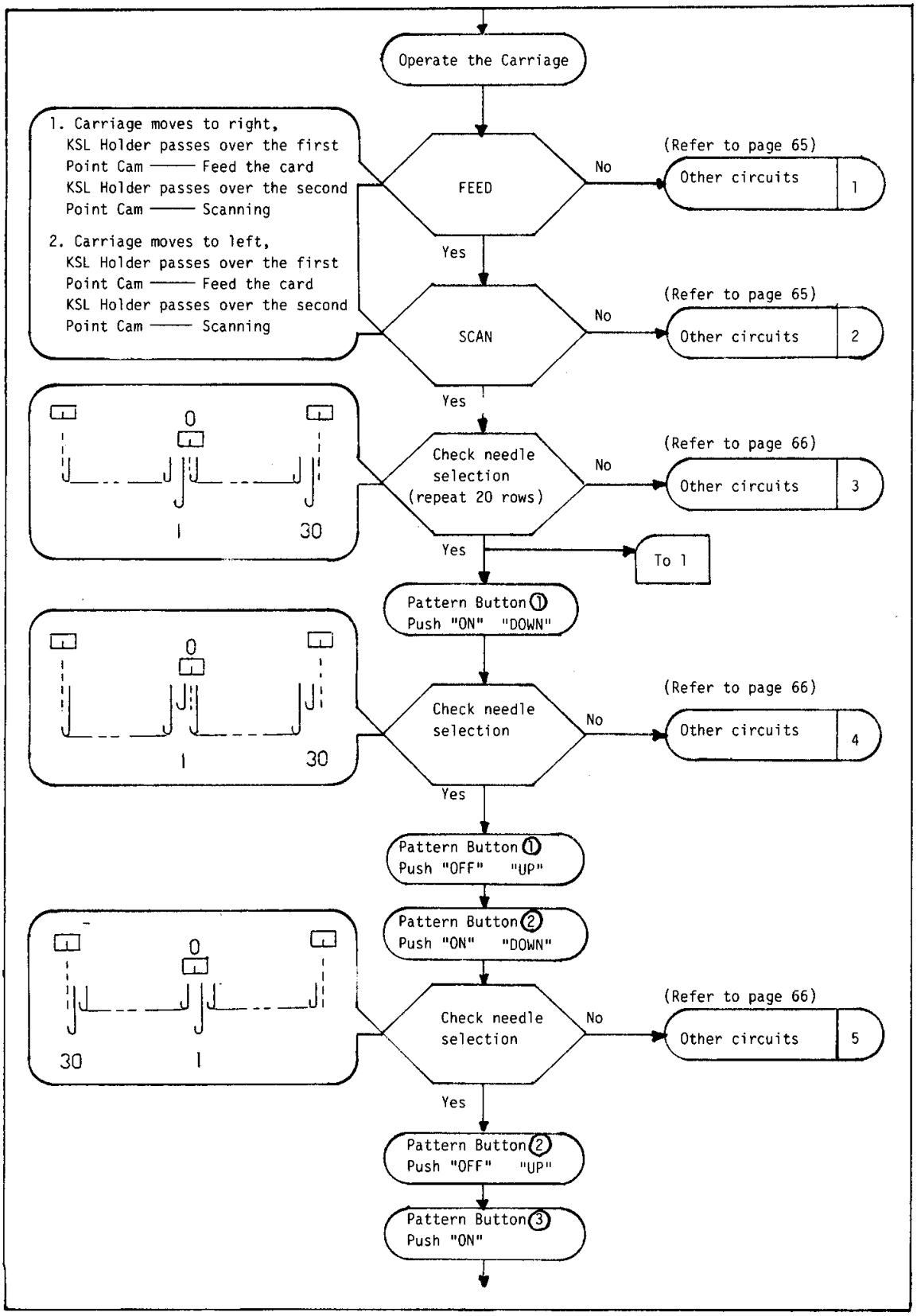
Set all the Pattern Buttons in "UP" position.

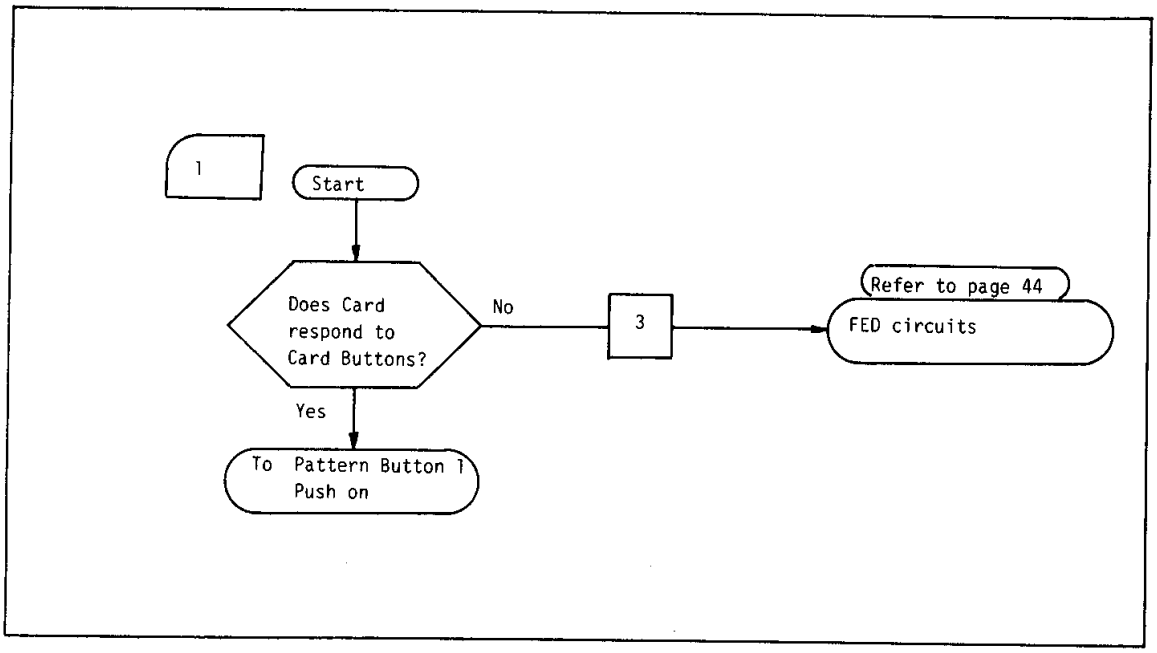
2 - 3 DIAGNOSTIC FLOW CHART FOR THE CPU BOARD

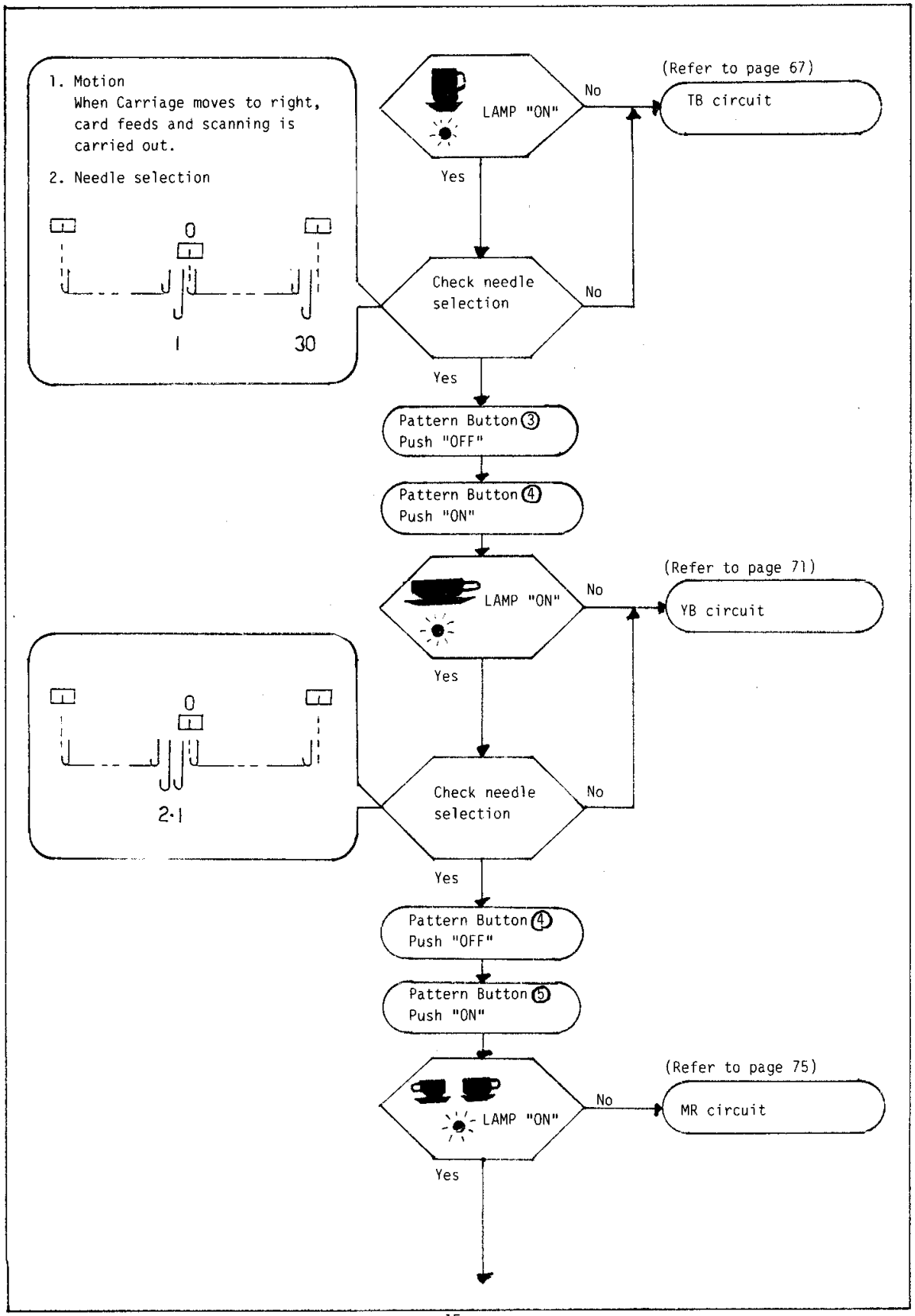


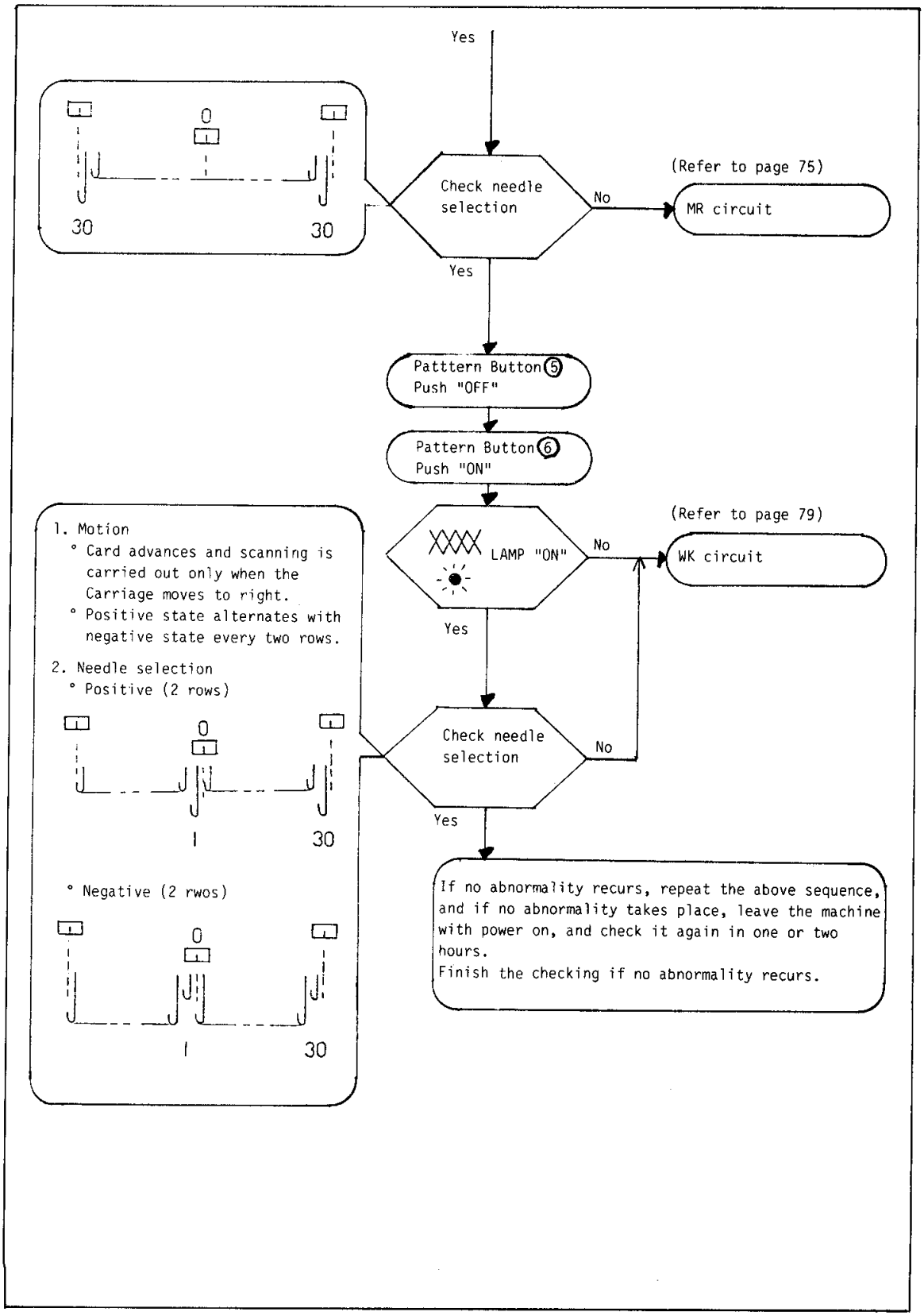

(P)
LAMP "ON"
No
(N)
LAMP "ON"
No
1
(Refer to page 37)
PN circuit
Yes
Yes
2
Pattern Button ①
Push "ON"
(P)
LAMP "OFF"
No
3
Yes
(N)
LAMP "ON"
No
4
Yes
Pattern Button ①
Push "OFF", "UP"
DOWN
LAMP "ON"
No
1
(Refer to page 44)
FED circuit
Upward Switch
Yes
Upward Switch
Push "ON".
Lamp
switch
over
No
2
Yes


Inspection Button
Push "ON"
LAMP "ON"
No
(Refer to page 54)
STP circuit
Yes
Card moves up
by 10 rows
No
(Refer to page 57)
PM1, 2 circuits
Yes
Inspection Button
Push "OFF"
Card moves in
by 10 rows
No
Yes
Scanning
No
(Refer to page 61)
LMR. LML circuits
Yes
Set the Card to "D" by turning the Card Dial.
Row number 40 is visible at Card Slit.
Inspection Button
Push "ON"
Move the carriage
twice across
Inspection Button
Push "OFF"


Operate the Carriage
1. Carriage moves to right,
KSL Holder passes over the first
Point Cam —— Feed the card
KSL Holder passes over the second
Point Cam —— Scanning
2. Carriage moves to left,
KSL Holder passes over the first
Point Cam —— Feed the card
KSL Holder passes over the second
Point Cam —— Scanning
FEED
No
(Refer to page 65)
Other circuits
1
Yes
SCAN
No
(Refer to page 65)
Other circuits
2
Yes
0
1
30
Check needle selection (repeat 20 rows)
No
(Refer to page 66)
Other circuits
3
Yes
To 1
Pattern Button ① Push "ON" "DOWN"
0
1
30
Check needle selection
No
(Refer to page 66)
Other circuits
4
Yes
Pattern Button ① Push "OFF" "UP"
Pattern Button ② Push "ON" "DOWN"
0
30
1
Check needle selection
No
(Refer to page 66)
Other circuits
5
Yes
Pattern Button ② Push "OFF" "UP"
Pattern Button ③ Push "ON"


1
Start
Does Card respond to Card Buttons?
No
3
Refer to page 44
FED circuits
Yes
To Pattern Button 1 Push on


1. Motion
When Carriage moves to right, card feeds and scanning is carried out.
2. Needle selection
0
1
30
LAMP "ON"
No
(Refer to page 67)
TB circuit
Yes
Check needle selection
No
Yes
Pattern Button ③ Push "OFF"
Pattern Button ④ Push "ON"
LAMP "ON"
No
(Refer to page 71)
YB circuit
Yes
0
2·1
Check needle selection
No
Yes
Pattern Button ④ Push "OFF"
Pattern Button ⑤ Push "ON"
LAMP "ON"
No
(Refer to page 75)
MR circuit
Yes


Yes
0
30
30
Check needle selection
No
(Refer to page 75)
MR circuit
Yes
Patttern Button ⑤ Push "OFF"
Pattern Button ⑥ Push "ON"
1. Motion
° Card advances and scanning is carried out only when the Carriage moves to right.
° Positive state alternates with negative state every two rows.
2. Needle selection
° Positive (2 rows)
0
1
30
° Negative (2 rwos)
0
1
30
LAMP "ON"
No
(Refer to page 79)
WK circuit
Yes
Check needle selection
No
Yes
If no abnormality recurs, repeat the above sequence, and if no abnormality takes place, leave the machine with power on, and check it again in one or two hours.
Finish the checking if no abnormality recurs.

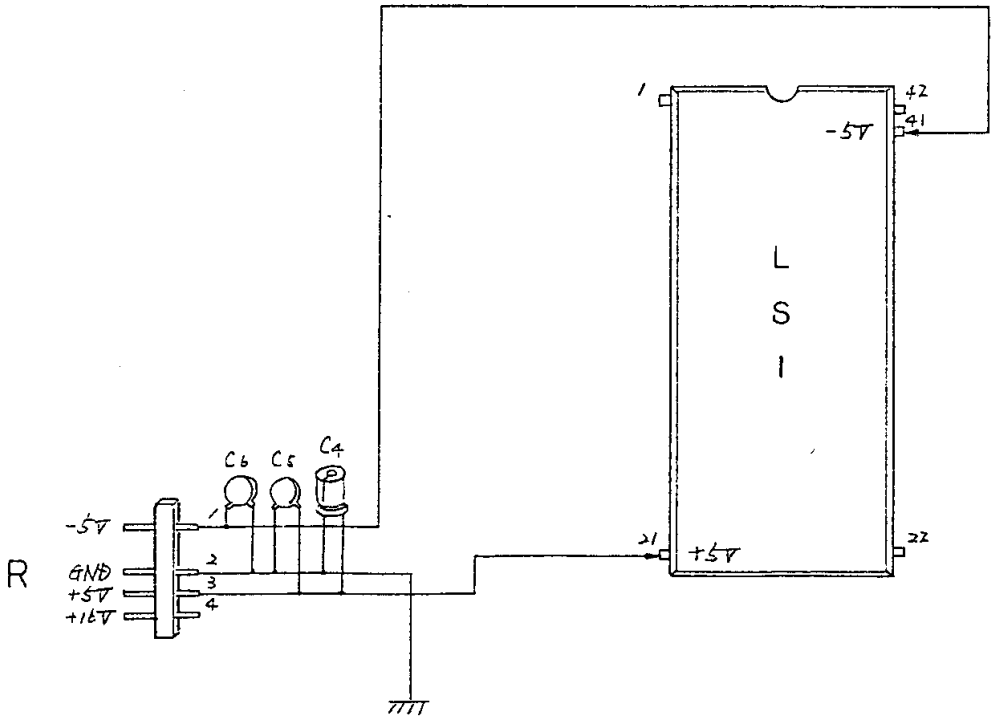
2 - 4 LSI DRIVING VOLTAGE CIRCUIT

2-4-1 Flow of signal

1.1 +5V
The voltage +5V is generated in the Regulator board, and goes into Pin 21 of the LSI through Pin 3 of the connector R on the CPU board.

1.2 -5V
The voltage -5V is generated in the Regulator board, and goes into Pin 41 of the LSI throught Pin 1 of the connector R on the CPU board.

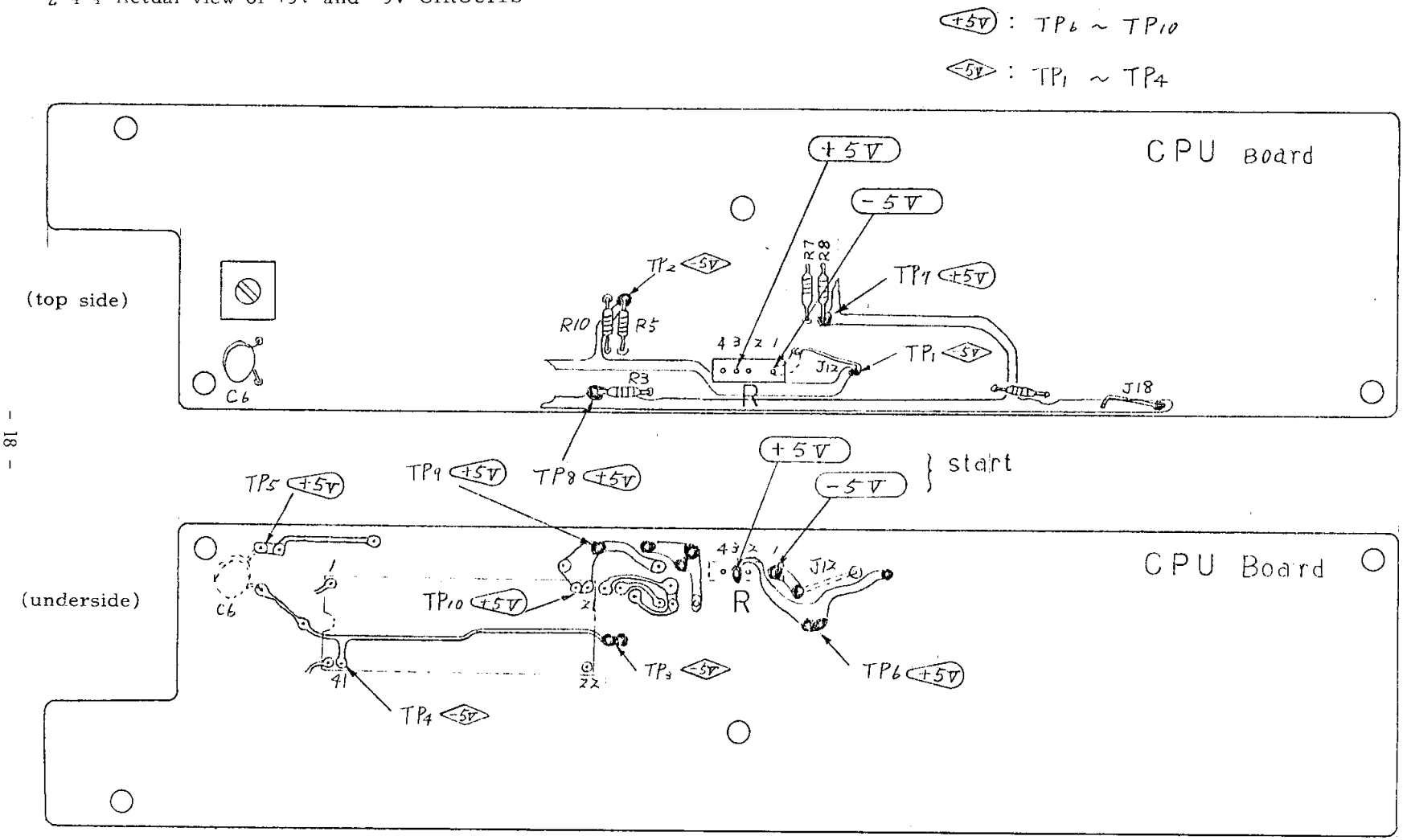
2-4-2 +5V Circuit, -5V Circuit (Schematic)



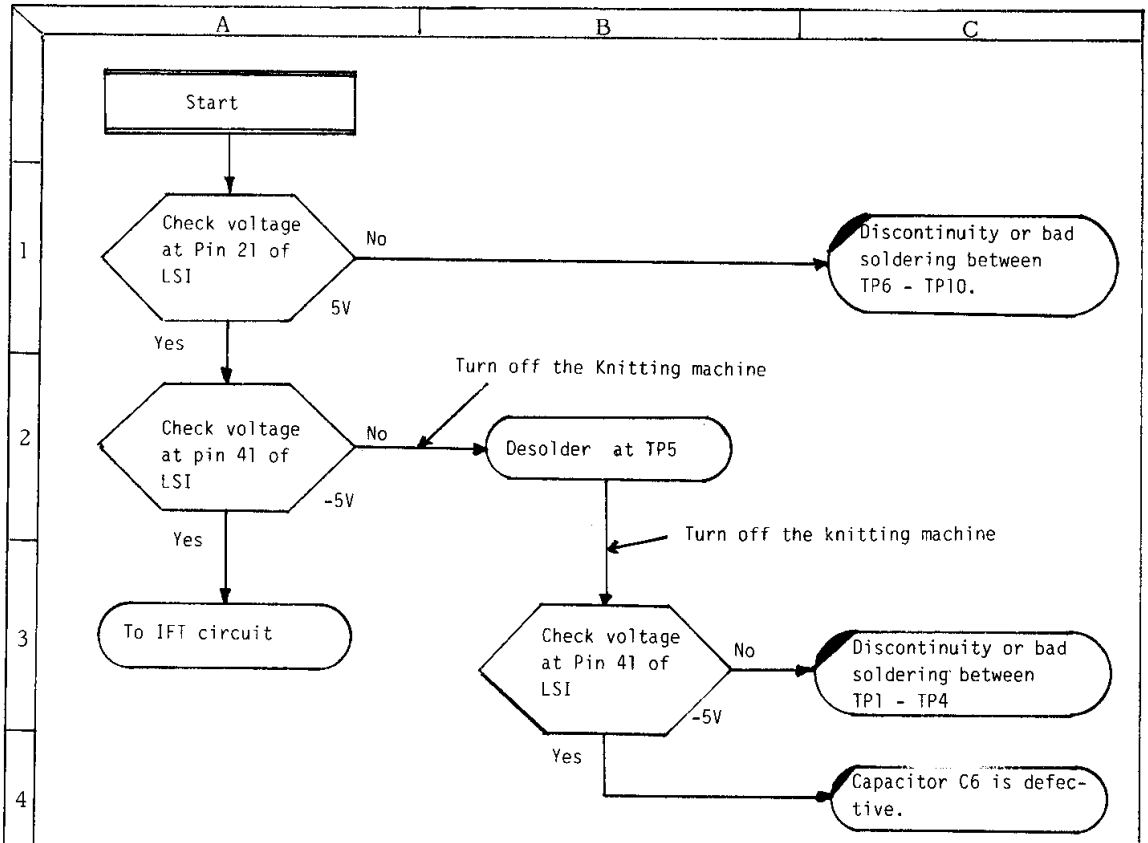
2-4-3 Setting the oscilloscope

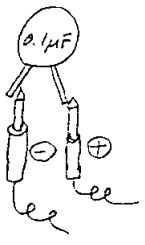
Checking with the CH2 probe (with straight pin tip) contacted to each testing point.

2-4-4 Actual view of +5V and -5V CIRCUITS



2-4-5 Diagnostic flow chart for the LSI



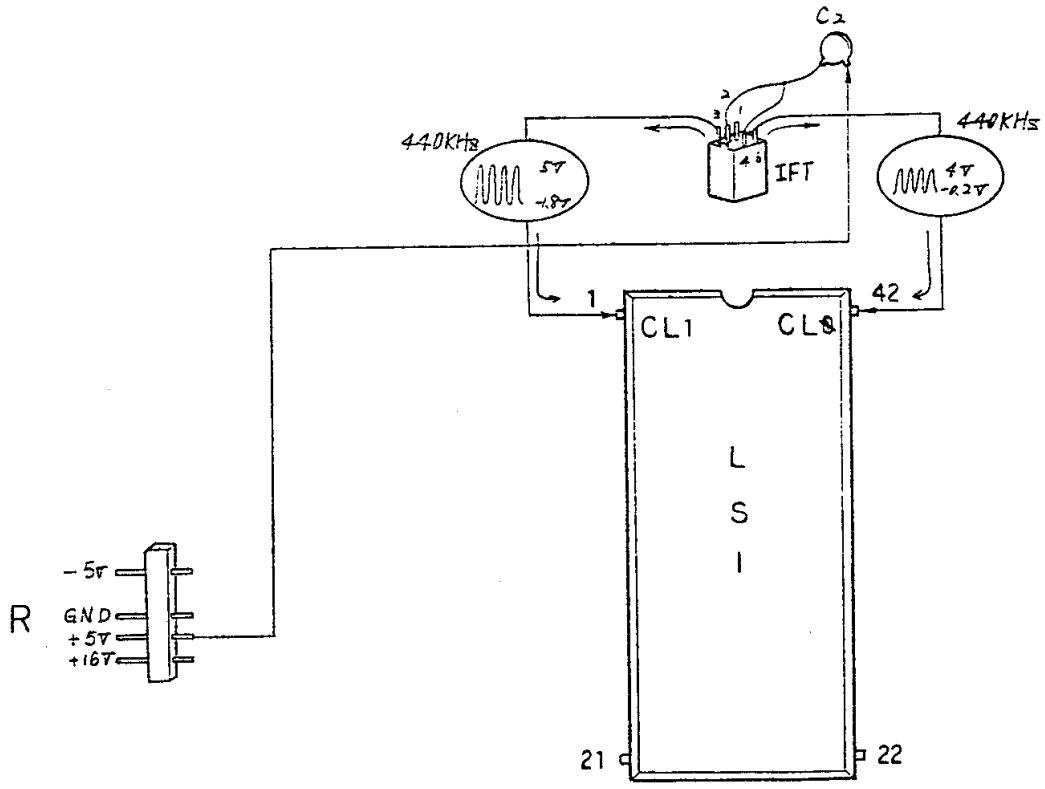
step code	CHECK POINT
1 - C	Check the voltages at each test point, from TP10 to TP 8.. If any test point shows less than **5V**, repair the discontinuity of bad soldering. Note: Press the probe against each test point, as they are covered with flux.
3 - C	Check voltages at test points, from TP4 to TP1. Take cares when checking as described in 1 - C.
4 - C	Diagnosing the capacitor C6 for replacement. Set the ohm range of the multi-tester to xl0KΩ .  Connect the test leads of the tester to leads of the capacitor as shown below, and the pointer of the tester shows..... If the capacitor is normal, 1. Instantly points at 200, and return to indifinite resistance. When the positive and negative test leads are reversed, the point of the tester shows the same motion. 2. The pointer stays at indifinite resistance.

2 - 5 IFT CIRCUIT

2-5-1 Signal flow

IFT is constructed of coil and capacitor. It generates pulses accurately at a specific frequencies (440KHz) and is connected to Pin 1 (CL1) and Pin 42 (CL0) of the LSI.

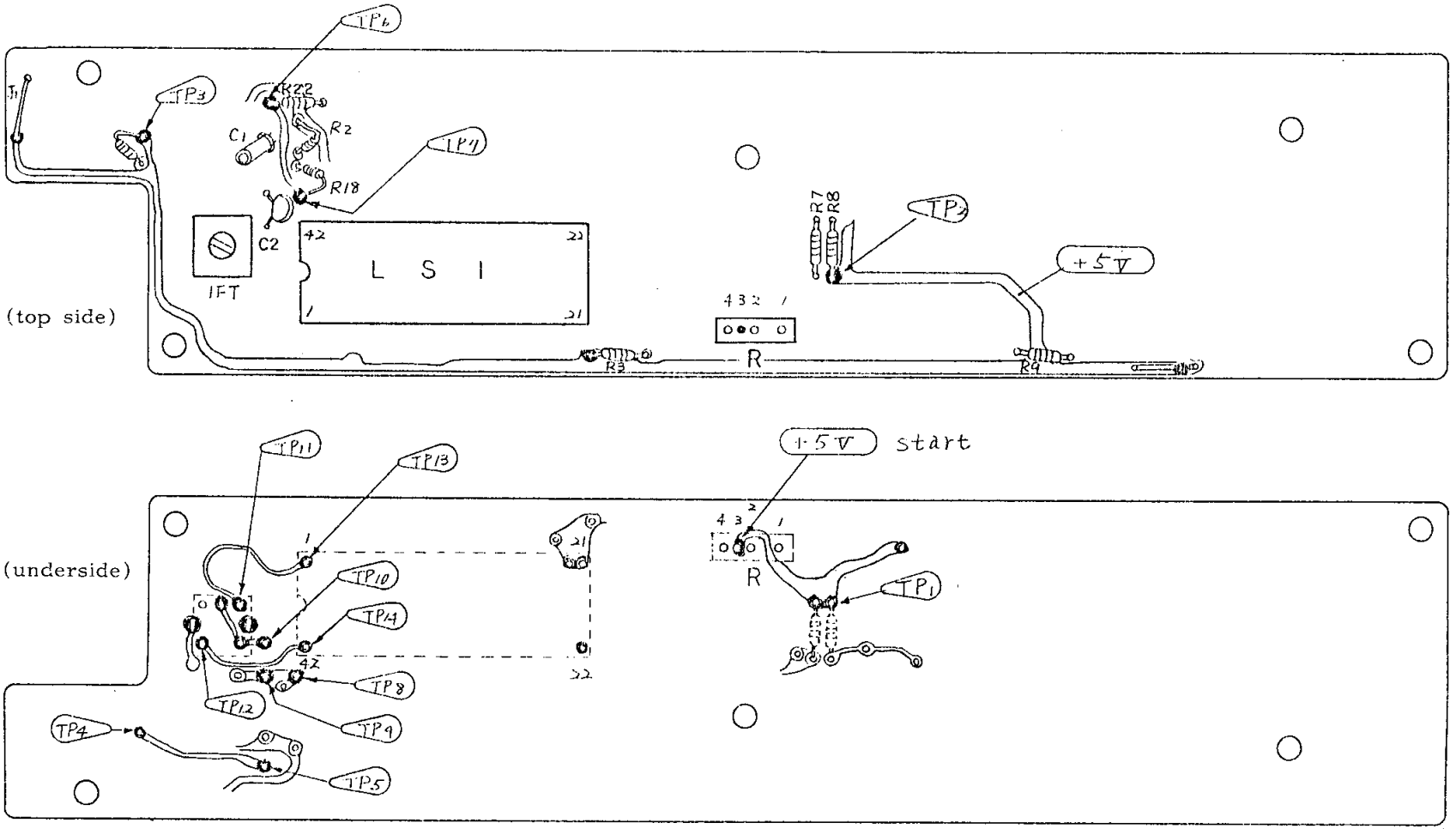
2-5-2 IFT circuit (schematic)



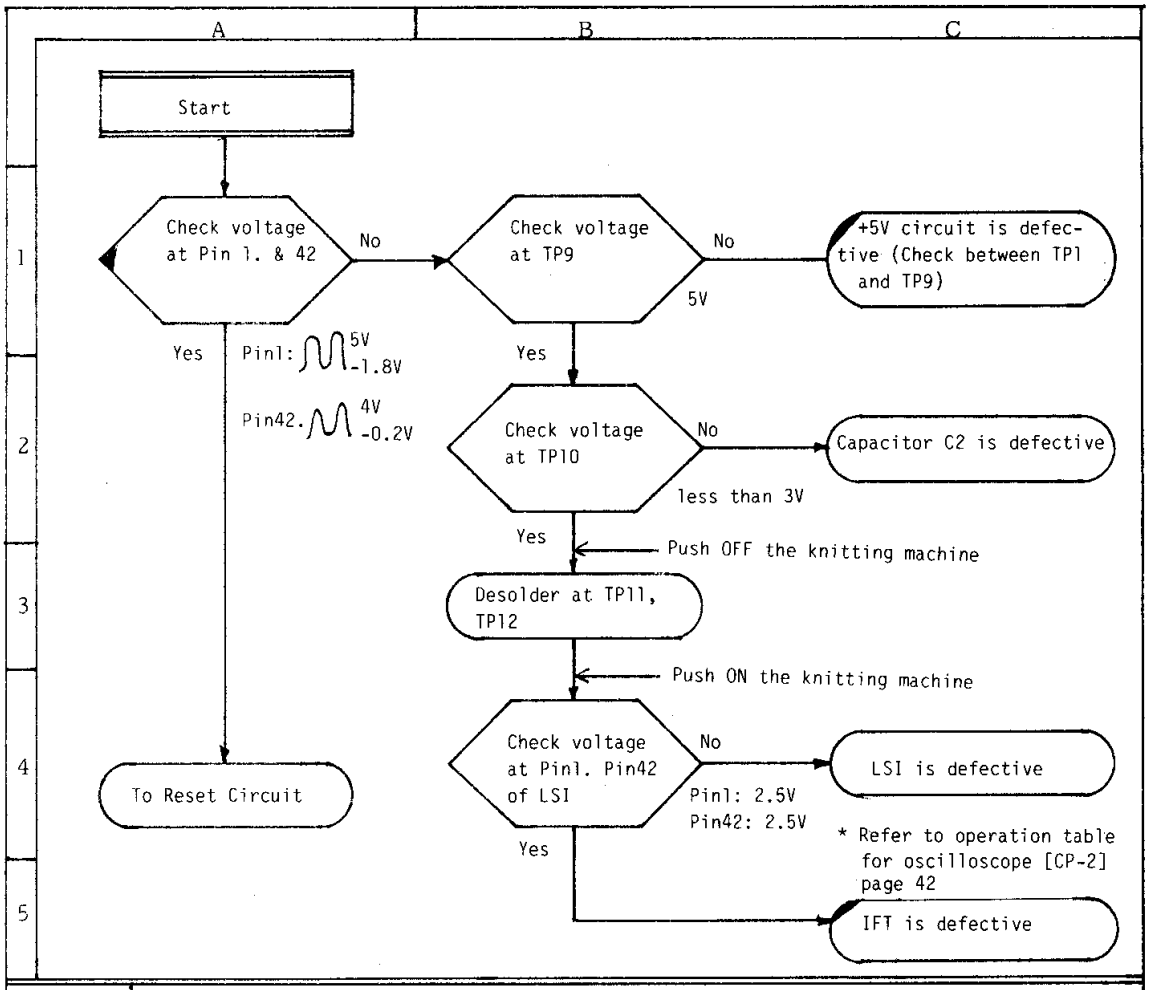
2-5-3 Setting the oscilloscope

1. TIME/CM: set to 5μSEC
2. VOLTS/CM: set to .5

2-5-4 Actual view of IFT circuit



2-5-5 Diagnostic flow chart for the IFT Circuit



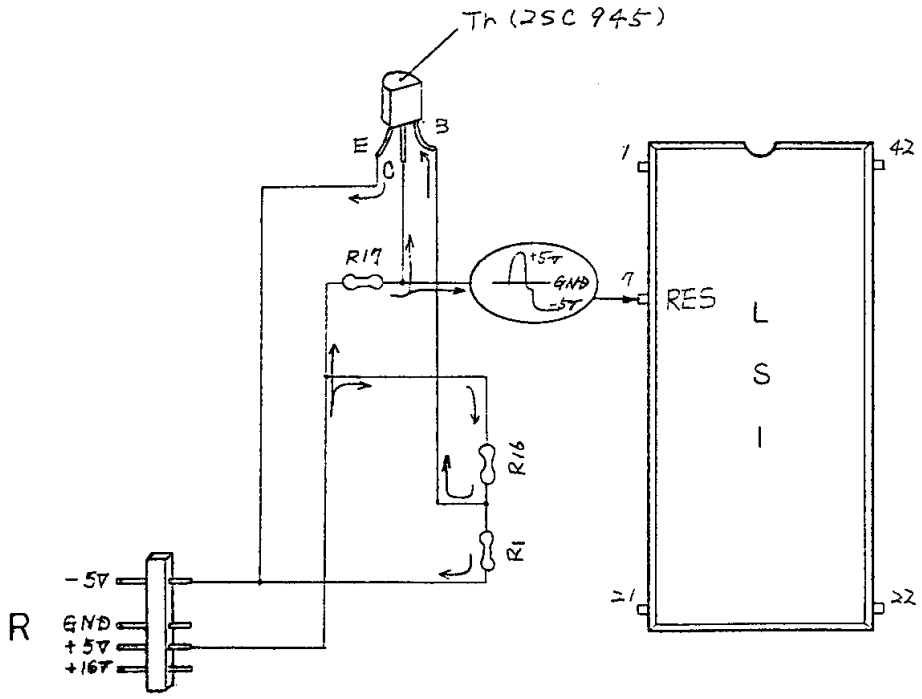
step code	CHECK POINT
1 - A	When checking the Pin 1 & 42, check the deflection of the waveform as well as the voltages. 1.  —— Normal 2.  —— Abnormal 3.  —— Abnormal
1 - C	Check the voltages at test points in the order of TP9, TP8, TP7. If the test point indicates less than 5V, correct the soldering or repair the discontinuity. Note: When checking each test point, press the tip of probe at each test point in order to eliminate improper contact.

2 - 6 RESET CIRCUIT

2-6-1 Flow of signal

When the knitting machine is turned on, the voltage at the collector lead of the transistor (2SC945) immediately changes into -5V from +5V. This change is sensed as reset signal by the LSI, and the LSI is ready for programming.

2-6-2 Reset circuit (Schematic)

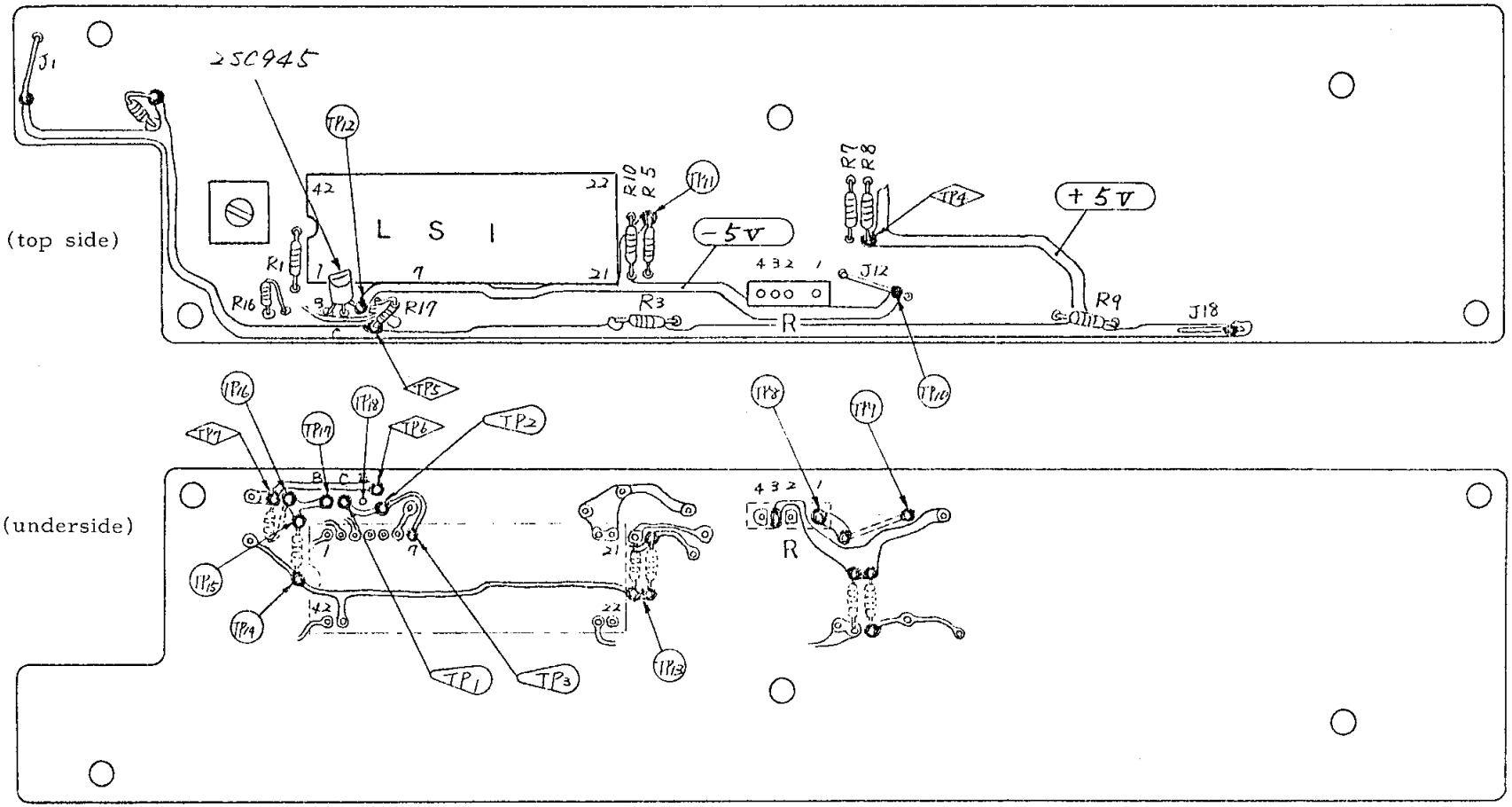


2-6-3 Setting the oscilloscope

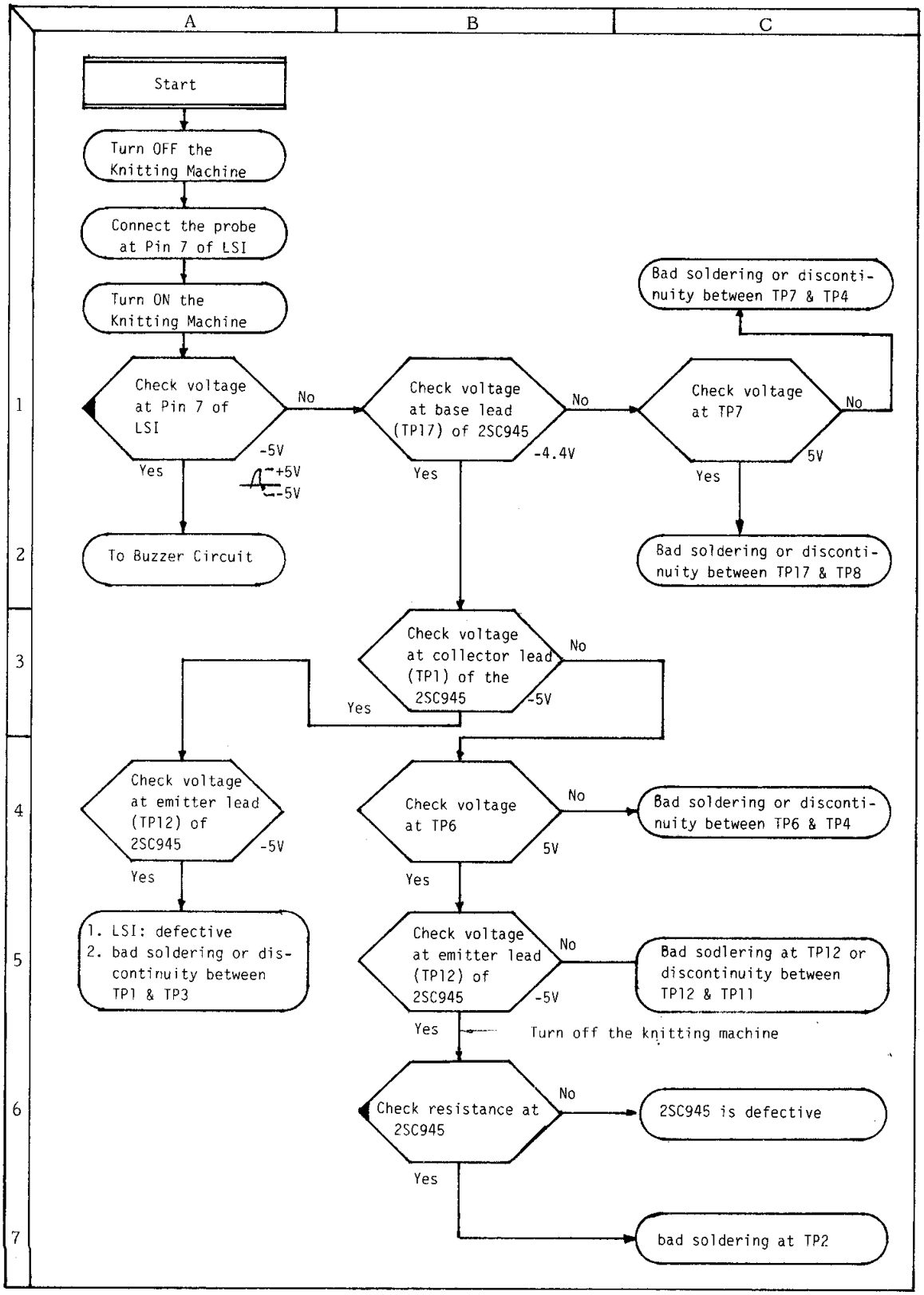
1. TIME/CM ——→ .2 SEC (when checking the RESET signal)
   .5 mSEC (when checking voltage)

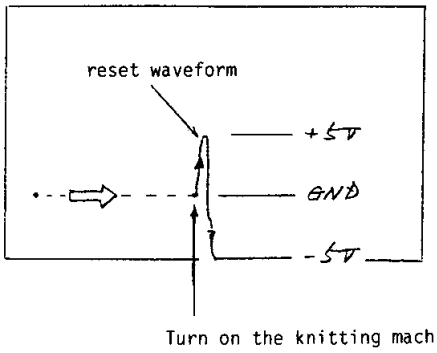
2. VOLTS/CM on CH2 ——→ .5

2-6-4 Actual view of RESET circuit



2-6-5 Diagnostic flow chart for the Reset Circuit



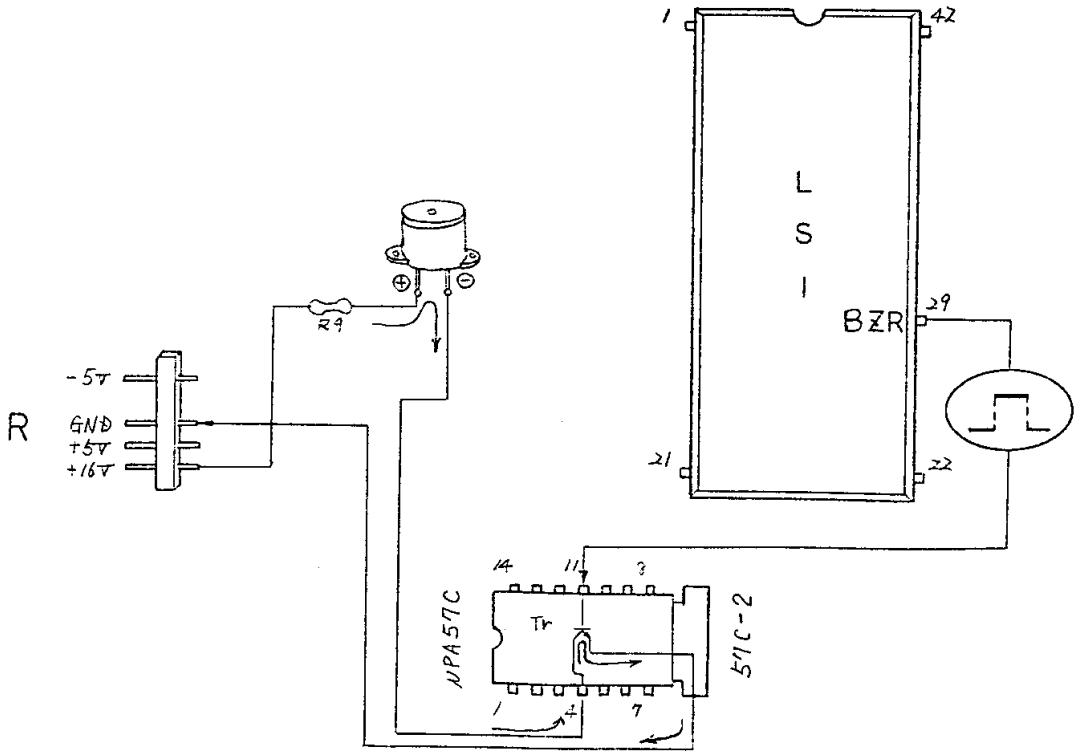
step code	CHECK POINT
1 - A	Setting the oscilloscope 1. TIME/CM ———— .2 SEC 2. VOLTS/CM ——— .5 Trace of the CH2 flows from left to right as a dot, when the dot comes to the centre of the CRT screen, turn on the knitting machine. When checking again, turn off the machine and in a few minutes later, Waveform changes from +5V to -5V immediately.  After the checking, set the TIME/CM to .5mSEC
6 - B	Set the range Ω xl on the multi-tester ⊖lead / ⊕lead / resistance TP17 / TP1 / 7~10Ω TP17 / TP18 / 7~10Ω TP1 / TP17 / 200~∞ TP18 / TP17 / 200~∞ If the above values are measured, the 2SC945 is normal.

2 - 7 BUZZER CIRCUT

2-7-1 Flow of signal

When the knitting machine is turned on or when the CR sensor detects the buzzer mark in its column, high voltage is sent out from the pin 29(BZR) of LSI (mSEC).
This signal is input into pin 11 of the 57C-2 (transistor array), and turns on the transistor.
When the transistor is turned on, the driving voltage (+16V) runs through the 57C-2, and activates the buzzer.

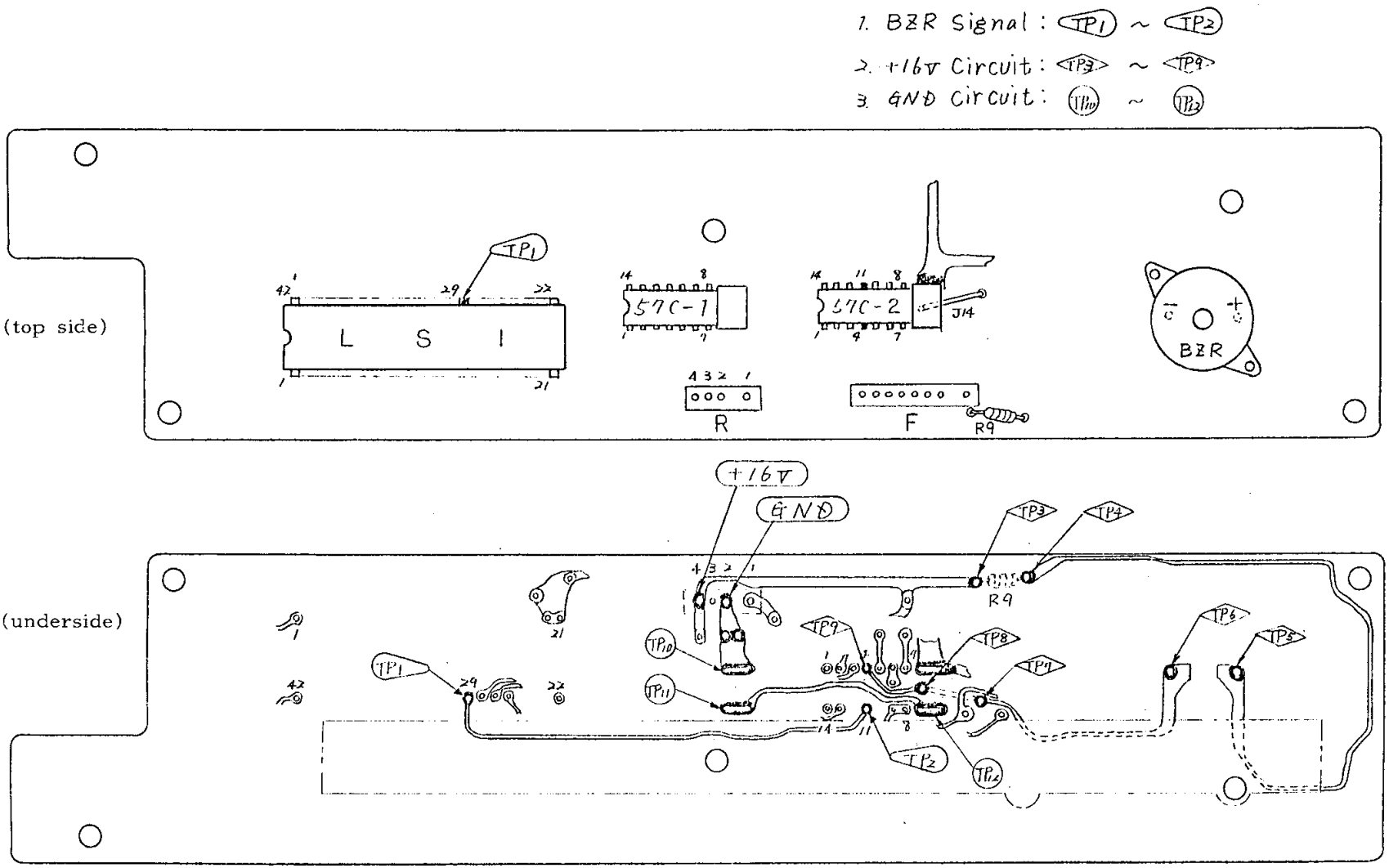
2-7-2 Buzzer circuit (Schematic)



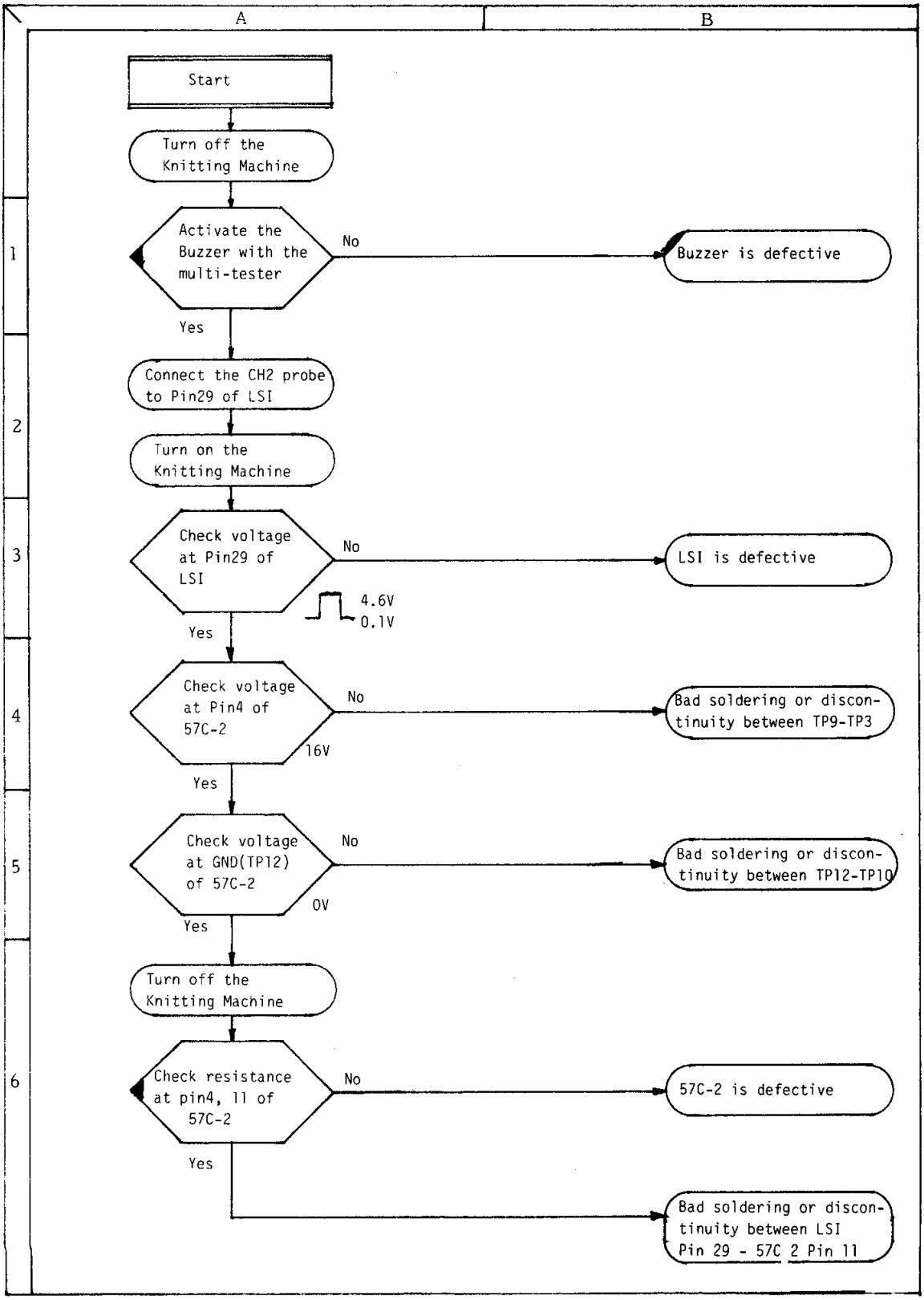
2-7-3 Setting the oscilloscope

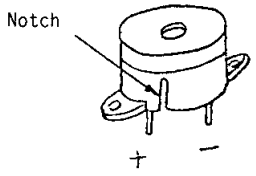
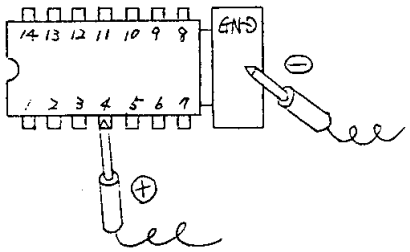
1. TIME/CM ——→ .2SEC
2. VOLTS/CM on CH2 ——→ .5

2-7-4 Actual view of the Buzzer Circuit



2-7-5 Diagnostic flow chart for the Buzzer Circuit



step code	CHECK POINT
1 - A	Set the range to Ω X1 on the multi-tester. ⊖ test lead to TP5 ⊕ test lead to TP6 1. Buzzer sounds - Buzzer is normal 2. Buzzer does not sound - Buzzer is abnormal
1 - B	Cares in replacing the Buzzer  When attaching a new buzzer on the CPU board, the notch must come to the side of positive polarity.
6 - A	Set the range to Ω x1 on the multi-tester. Connect the test leads as shown to for checking. (57C-2)  Values of resistance in normal condition

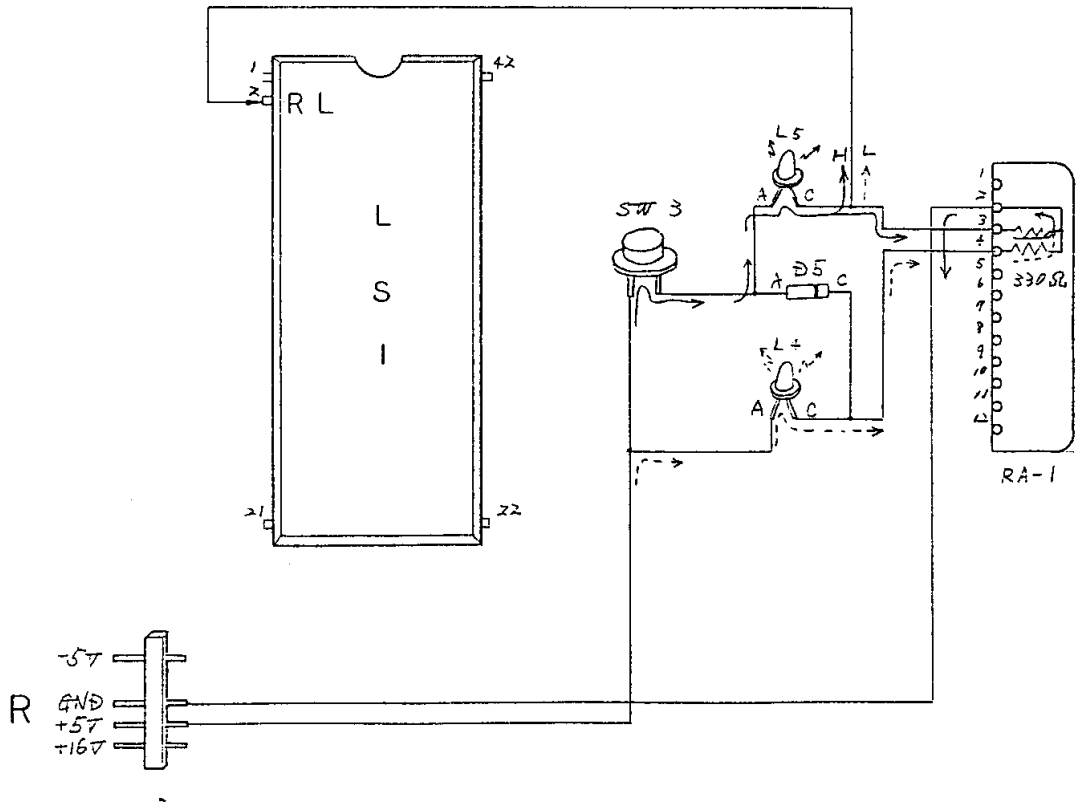
⊖ lead	⊕ lead	resistance (Ω)
GND	Pin 4	7 ~ 11
GND	Pin 11	12 ~ 15

2 - 8 RL (RIGHT, LEFT) CIRCUIT

2-8-1 Flow of signal in the RL circuit

As the Pattern Button 2 is pushed ON or OFF, high or low signal is input into LSI through Pin2.
When the Pattern Button is pushed ON, high signal goes into the LSI, and the LED is turned on.

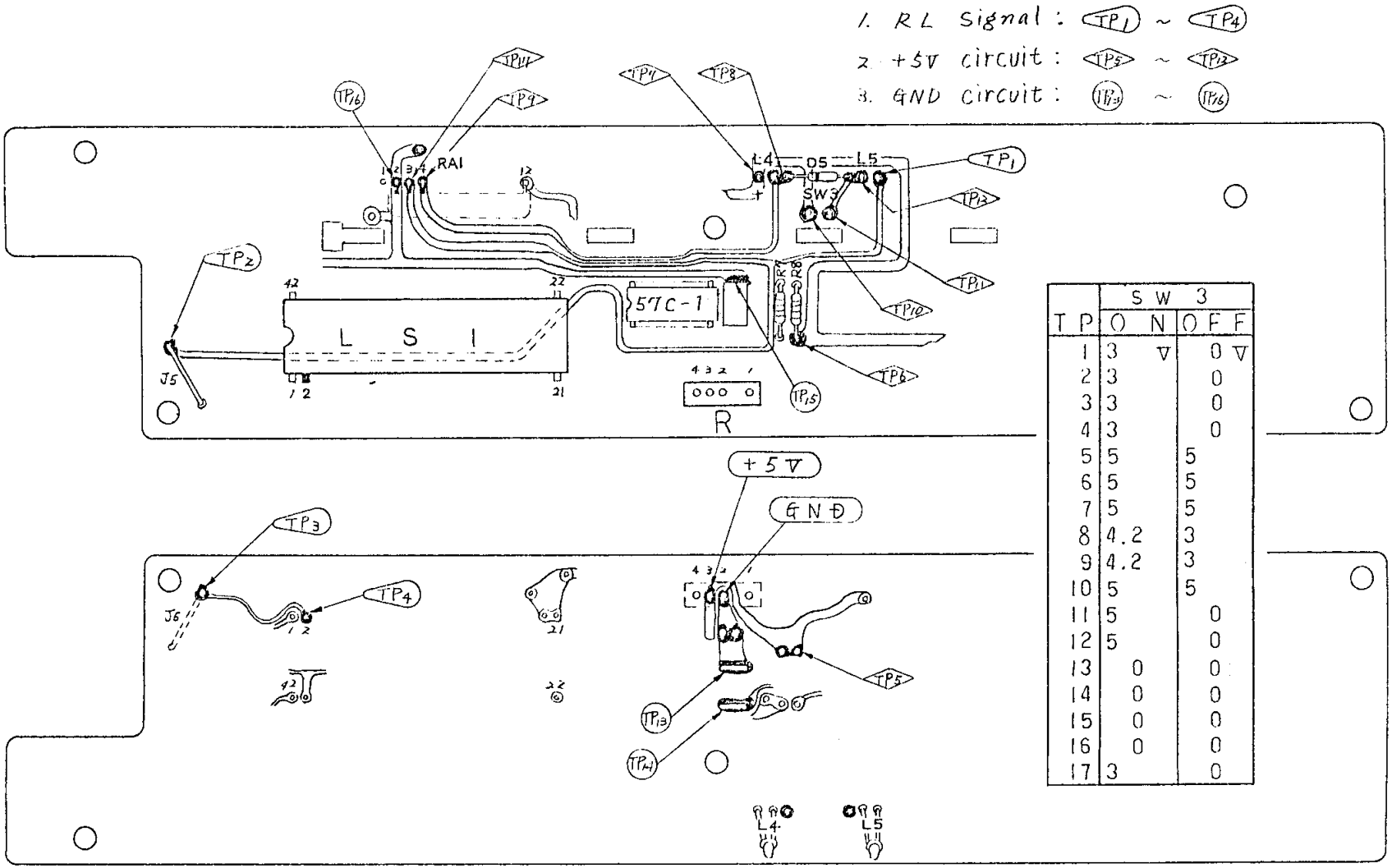
2-8-2 RL Circuit (Schematic)



2-8-3 Setting the oscilloscope

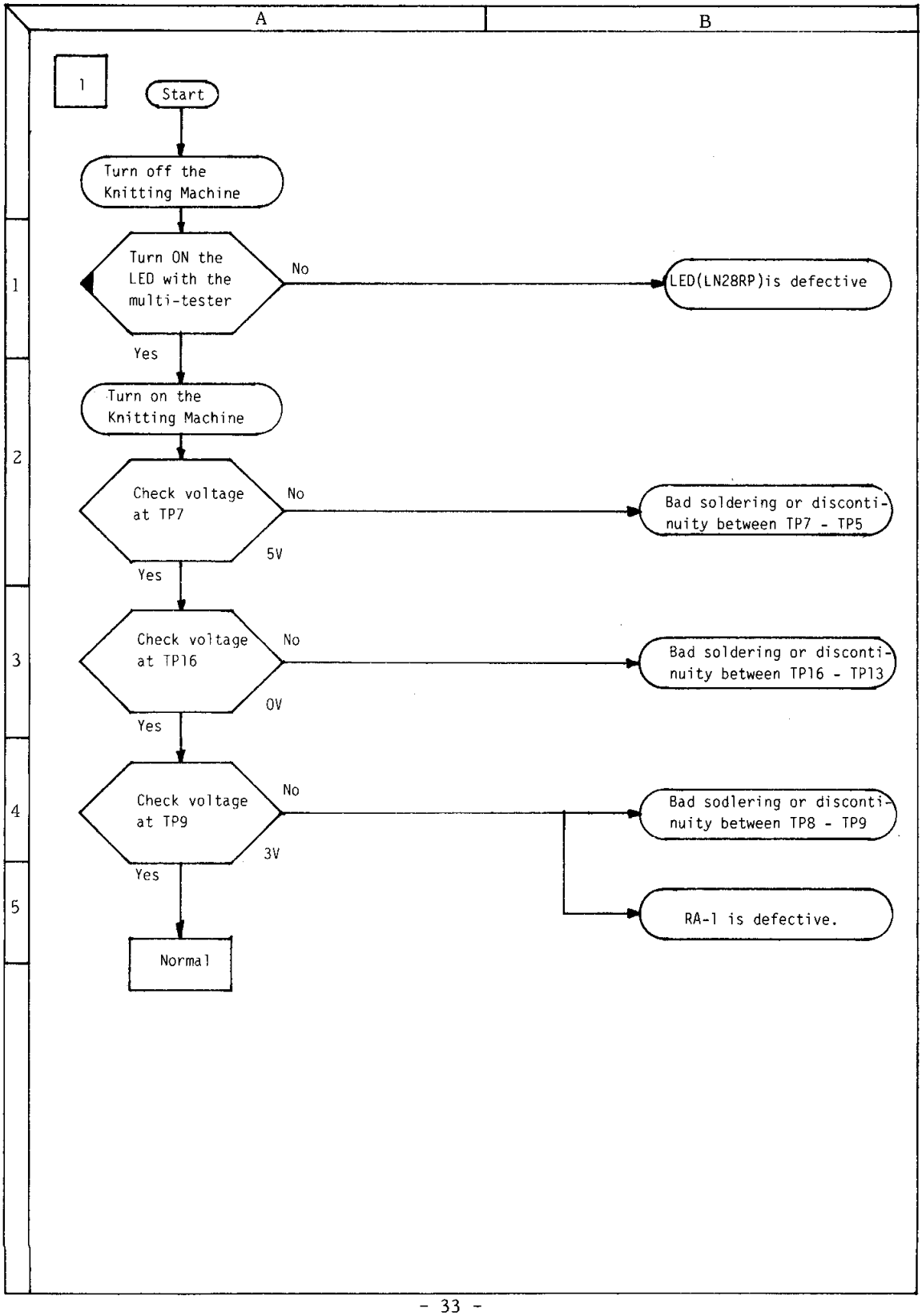
1. TIME/CM ———— 20mSEC
2. VOLTS/CM on CH2 ———— .1

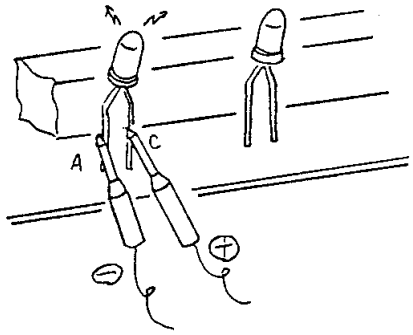
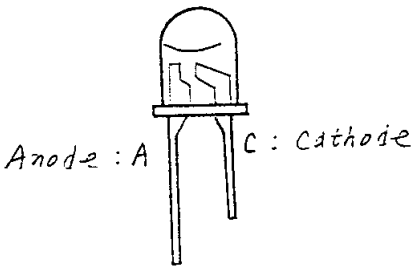
2-8-4 Actual view of the RL Circuit



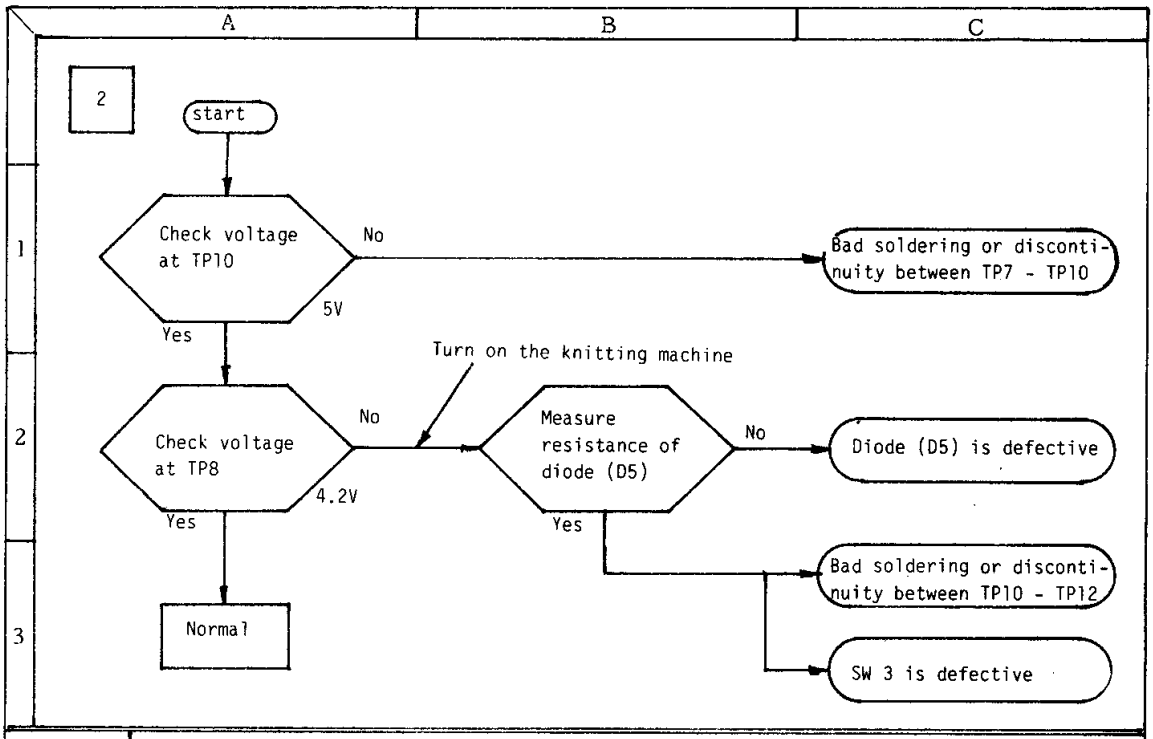
TP	SW3 ON	SW3 OFF
1	3 V	0 V
2	3	0
3	3	0
4	3	0
5	5	5
6	5	5
7	5	5
8	4.2	3
9	4.2	3
10	5	5
11	5	0
12	5	0
13	0	0
14	0	0
15	0	0
16	0	0
17	3	0

2-8-5 Diagnostic flow chart for RL Circuit

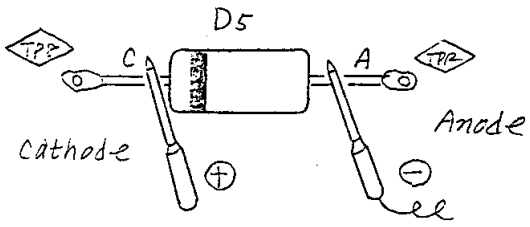


	CHECK POINT
1 - A	Set the range to Ω x1 on the multi-tester. Connect the test leads as shown below. 1. LED on ———————— normal 2. LED remains off ———— abnormal (Refer to Service Manual for Model 500 for replacing.)  [LED 1N28RP] 
5 - B	Check resistance of RA-1 (pin 3. 4) 1. Desolder at Pin3 and 4 of the RA-1. 2. Set the range to Ω x10 on the multi-tester. Check the resistance by connecting the test leads as in the table below. [values of resistance in normal condition] Note: It is advised ot disconnect the resistor from the circuit or desolder at the test points before checking resistance, because it often happnes that incorrect value will be measured if the resistor is connected to the circuit.

⊖ lead	⊕ lead	resistance (Ω)
TP16	TP17	290~360
TP16	TP 9	290~360
TP17	TP 9	550~700

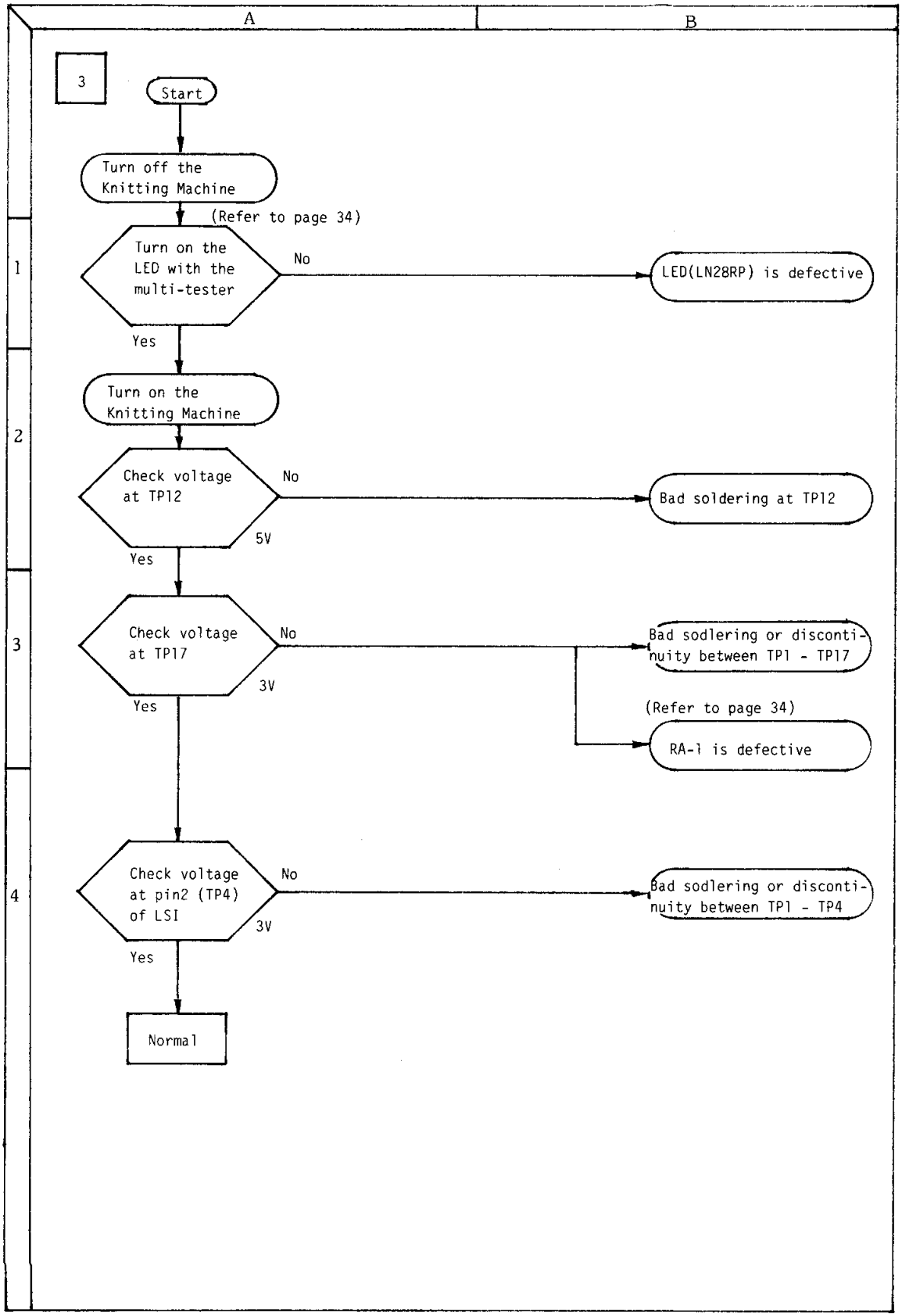


stop code	CHECK POINT
2 - B	○ Set the range to Ωxl on the multi-tester Connect the test leads as shown below to measure resistance.



[values of resistance in normal condition]

⊖ lead	⊕ lead	resistance
A	C	8~11 Ω
C	A	200~ Ω

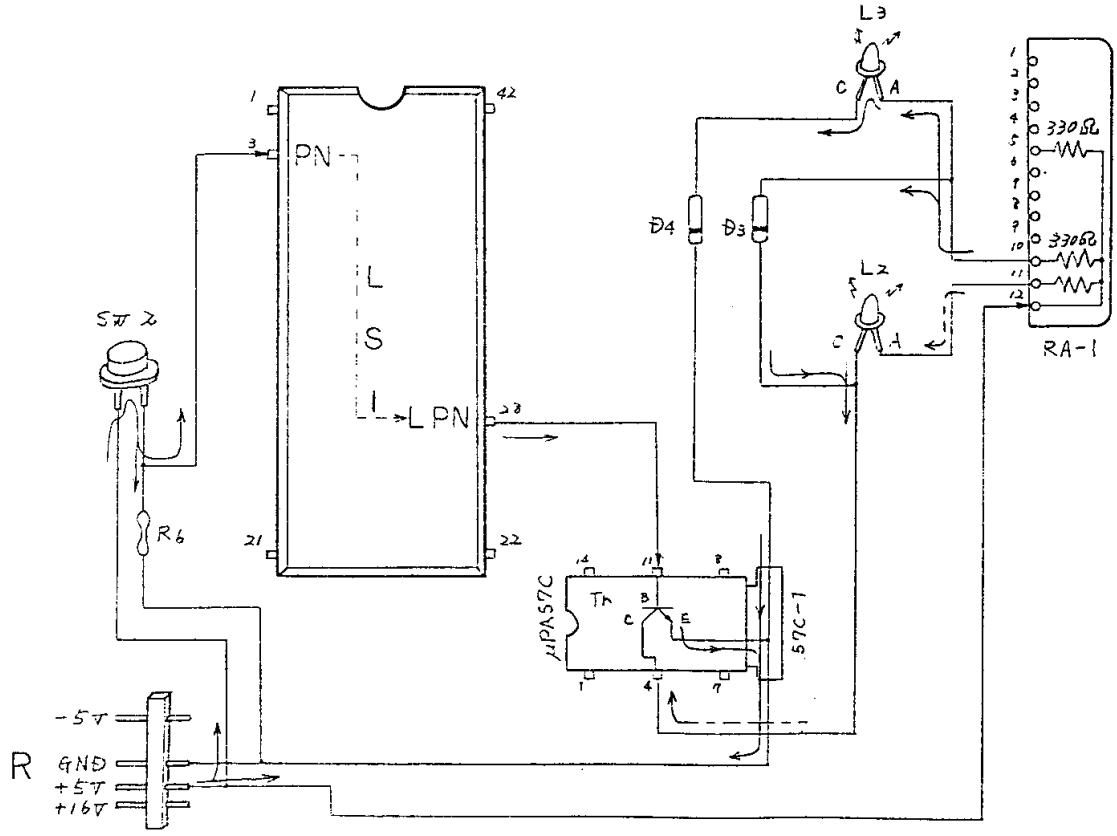

A
B
3
Start
Turn off the Knitting Machine
(Refer to page 34)
Turn on the LED with the multi-tester
No
LED(LN28RP) is defective
Yes
Turn on the Knitting Machine
Check voltage at TP12
No
Bad soldering at TP12
5V
Yes
Check voltage at TP17
No
Bad sodlering or disconti-nuity between TP1 - TP17
3V
Yes
(Refer to page 34)
RA-1 is defective
Check voltage at pin2 (TP4) of LSI
No
Bad sodlering or disconti-nuity between TP1 - TP4
3V
Yes
Normal
1
2
3
4

2 - 9 PN (POSITIVE AND NEGATIVE) CIRCUITS

2-9-1 Flow of signal in the PN circuit

When the Pattern Button 1 is pushed ON or OFF, the pin3 of LSI receives high or low signal. When the Pattern Button 1 is pushed ON, the pin3 receives high signal and nagative state is set.
This signal is sent out from pin28 as low voltage and goes into pin 11 of 57C-1 to turn on LED for colour invert display.
When the Pattern Button 1 is pushed off, the signal is reversed.

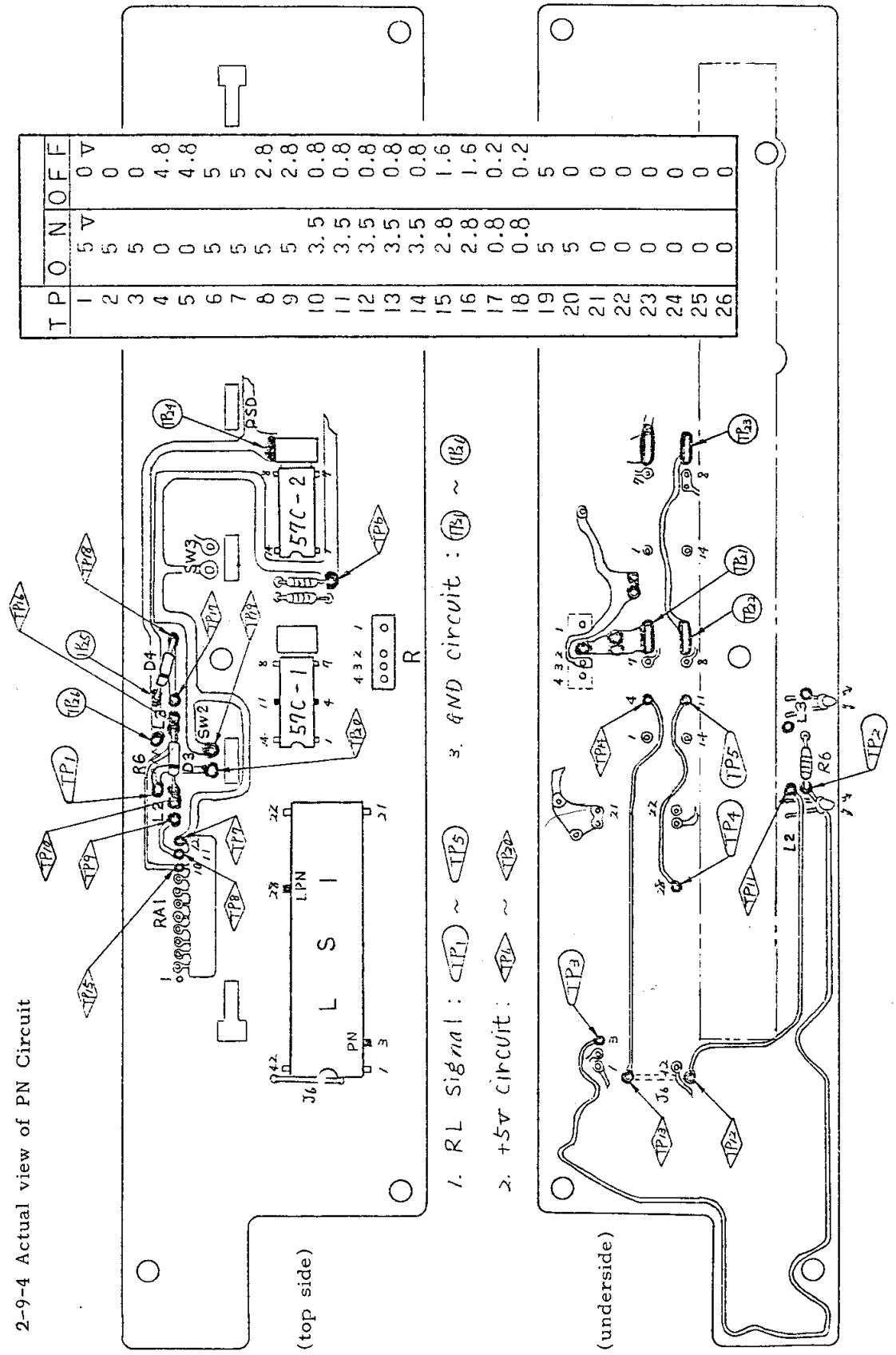
2-9-2 PN Circuit (Schematic)

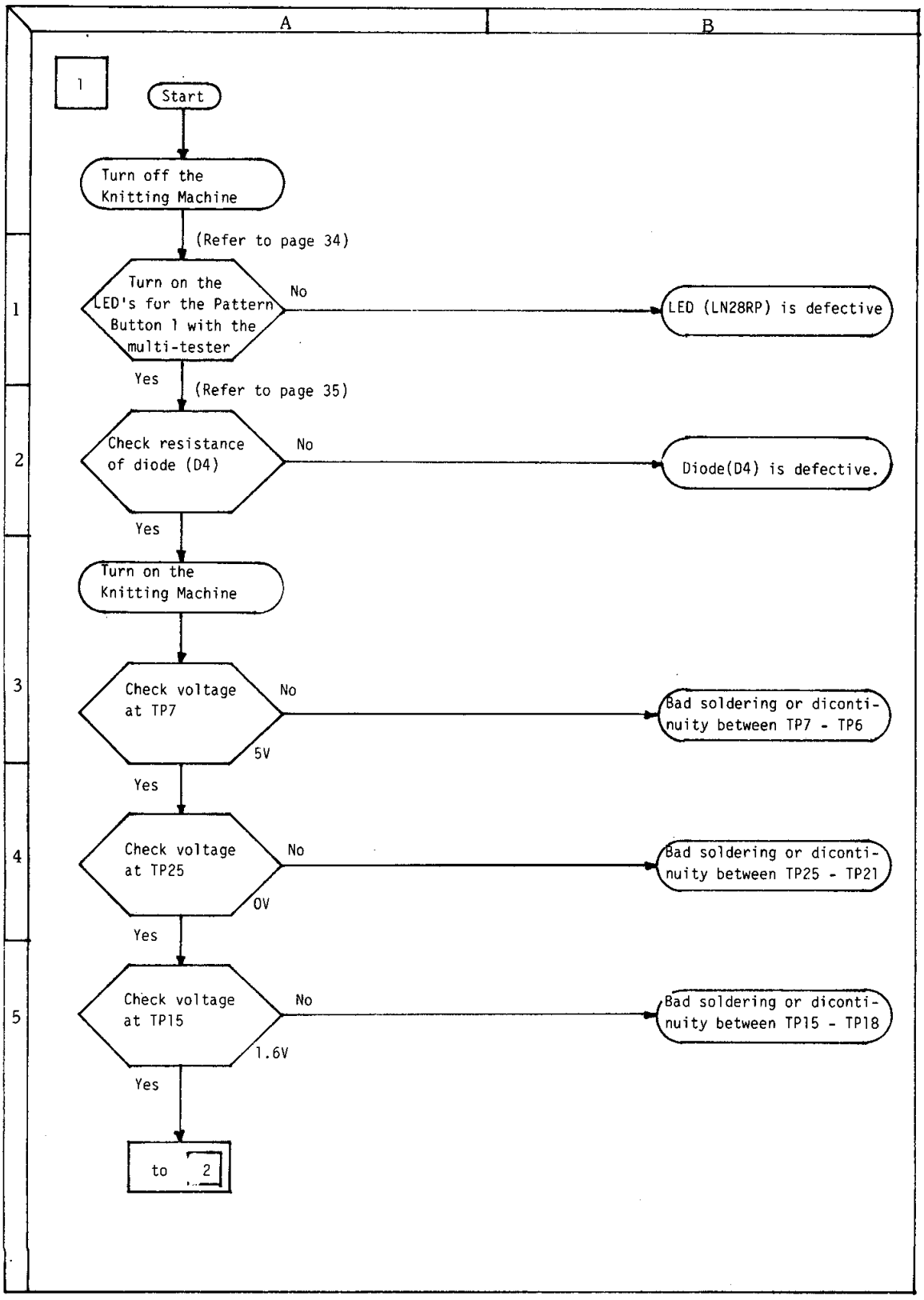


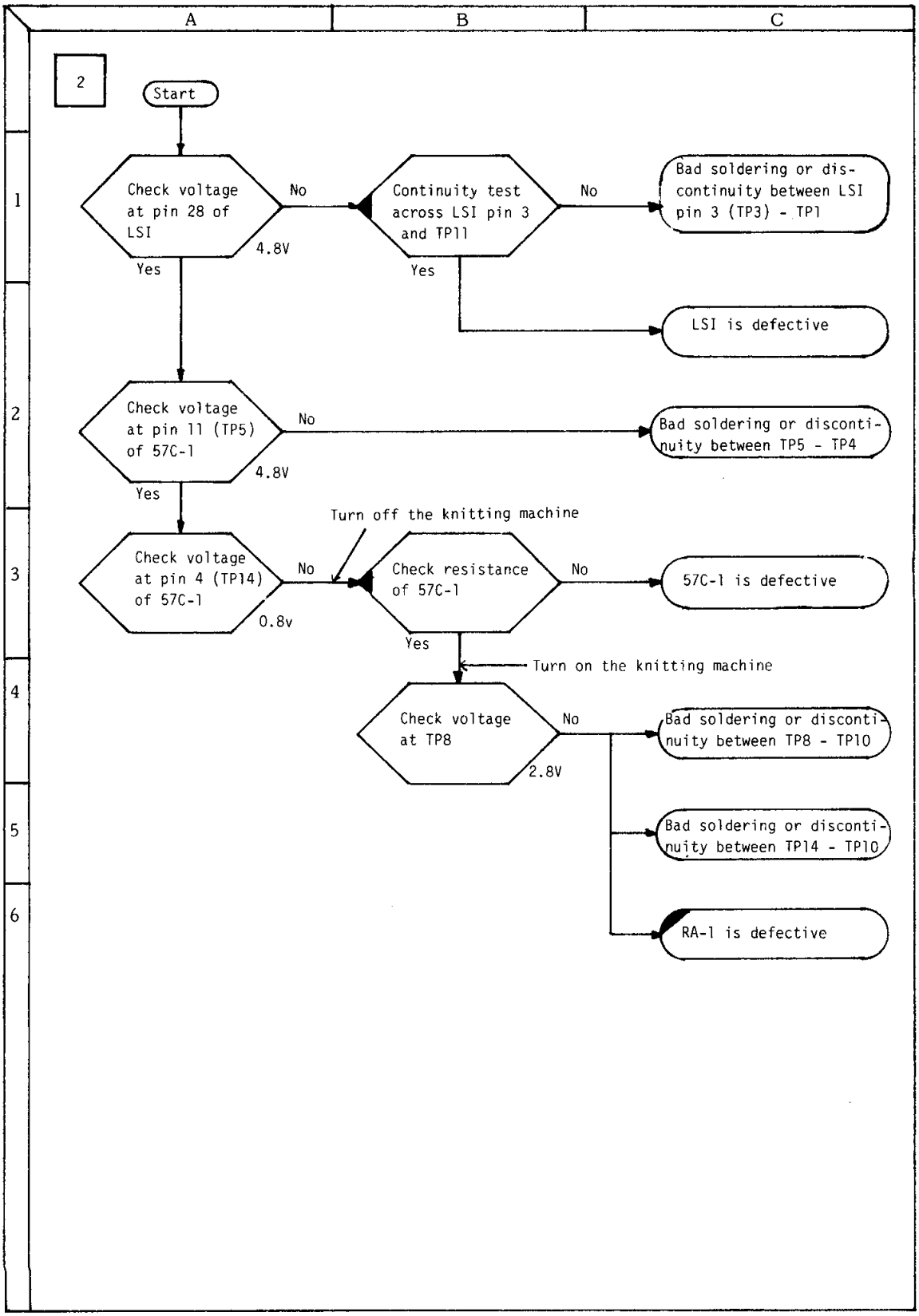
2-9-3 Setting the oscilloscope

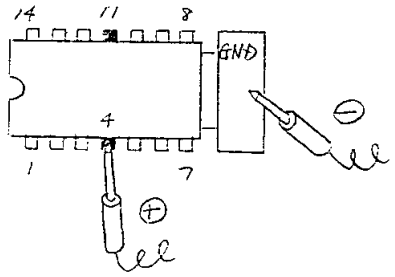
1. TIME/CM ———— 20mSEC
2. VOLTS/CM on CH2 ———— .1

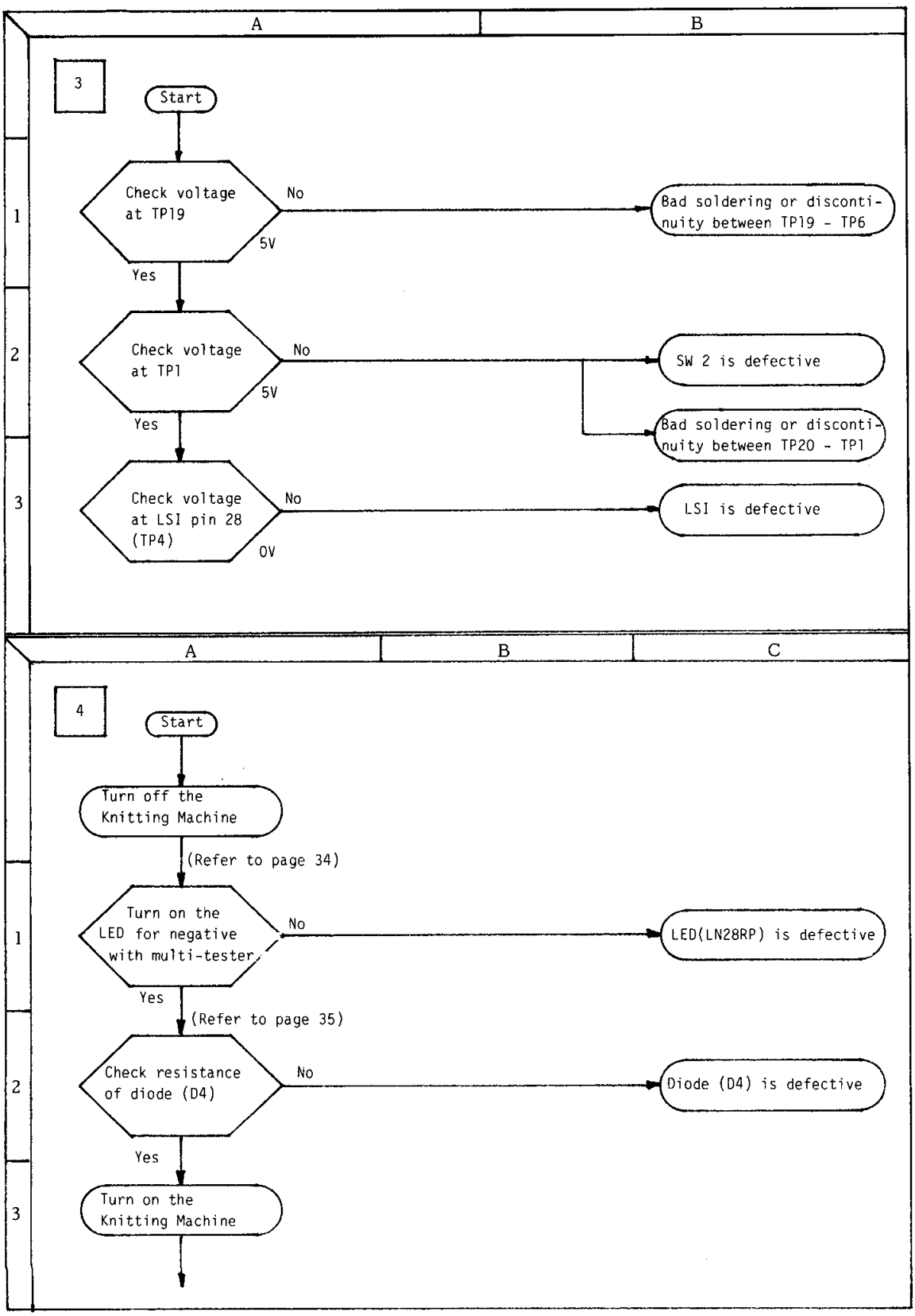
2-9-4 Actual view of PN Circuit

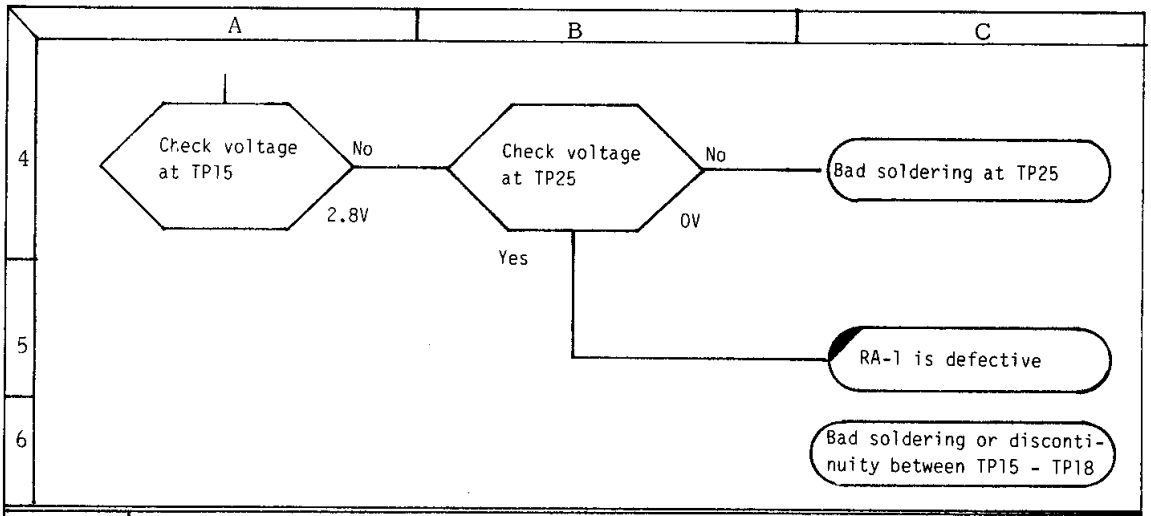



A
B
1
Start
Turn off the Knitting Machine
(Refer to page 34)
Turn on the LED's for the Pattern Button 1 with the multi-tester
No
LED (LN28RP) is defective
Yes
(Refer to page 35)
Check resistance of diode (D4)
No
Diode(D4) is defective.
Yes
Turn on the Knitting Machine
Check voltage at TP7
No
Bad soldering or diconti-nuity between TP7 - TP6
5V
Yes
Check voltage at TP25
No
Bad soldering or diconti-nuity between TP25 - TP21
0V
Yes
Check voltage at TP15
No
Bad soldering or diconti-nuity between TP15 - TP18
1.6V
Yes
to 2
1
2
3
4
5


A
B
C
1
2
3
4
5
6
2
Start
Check voltage at pin 28 of LSI
No
4.8V
Yes
Continuity test across LSI pin 3 and TP11
No
Yes
Bad soldering or discontinuity between LSI pin 3 (TP3) - TP1
LSI is defective
Check voltage at pin 11 (TP5) of 57C-1
No
4.8V
Yes
Bad soldering or discontinuity between TP5 - TP4
Turn off the knitting machine
Check voltage at pin 4 (TP14) of 57C-1
No
0.8v
Check resistance of 57C-1
No
Yes
57C-1 is defective
Turn on the knitting machine
Check voltage at TP8
No
2.8V
Bad soldering or discontinuity between TP8 - TP10
Bad soldering or discontinuity between TP14 - TP10
RA-1 is defective

	CHECK POINTS
3 - B	° Set the range to Ω x1 on the multi-tester Connect the test leads as shown below. [57C-1]  [values of resistance in normal condition] ⊖ lead / ⊕ lead / resistance (Ω): GND / Pin 4 / 7 ~ 11; GND / Pin 11 / 12 ~ 15
1 - B	° Set the range to Ω x1 on the multi-tester. Polarity of the test leads does not matter. Pointer of the multi-tester reads..... 1. 0 ohm ——— short circuited (normal) 2. infinite ohm ——— open (discontinuity)
6 - C	° Check resistance of RA-1 (TP8. TP15) Set the range to Ω x10 on the multi-tester. Connect the test leads as given below. [values of resistance in normal condition] ⊖ lead / ⊕ lead / resistance (Ω): TP 7 / TP 8 / 290 ~ 360; TP 7 / TP 15 / 290 ~ 360


A
B
3
Start
Check voltage at TP19
No
5V
Bad soldering or discontinuity between TP19 - TP6
Yes
Check voltage at TP1
No
5V
SW 2 is defective
Bad soldering or discontinuity between TP20 - TP1
Yes
Check voltage at LSI pin 28 (TP4)
No
0V
LSI is defective
1
2
3
A
B
C
4
Start
Turn off the Knitting Machine
(Refer to page 34)
Turn on the LED for negative with multi-tester
No
LED(LN28RP) is defective
Yes
(Refer to page 35)
Check resistance of diode (D4)
No
Diode (D4) is defective
Yes
Turn on the Knitting Machine
1
2
3



step code	CHECK POINTS
5 - C	° Check resistance of RA-1 (TP8. TP15) Set the range to Ω x10 on multi-tester. Connect the test leads as given below. [values of resistance in normal condition.]

⊖ lead	⊕ lead	resistance (Ω)
TP7	TP8	290~360
TP7	TP15	290~360

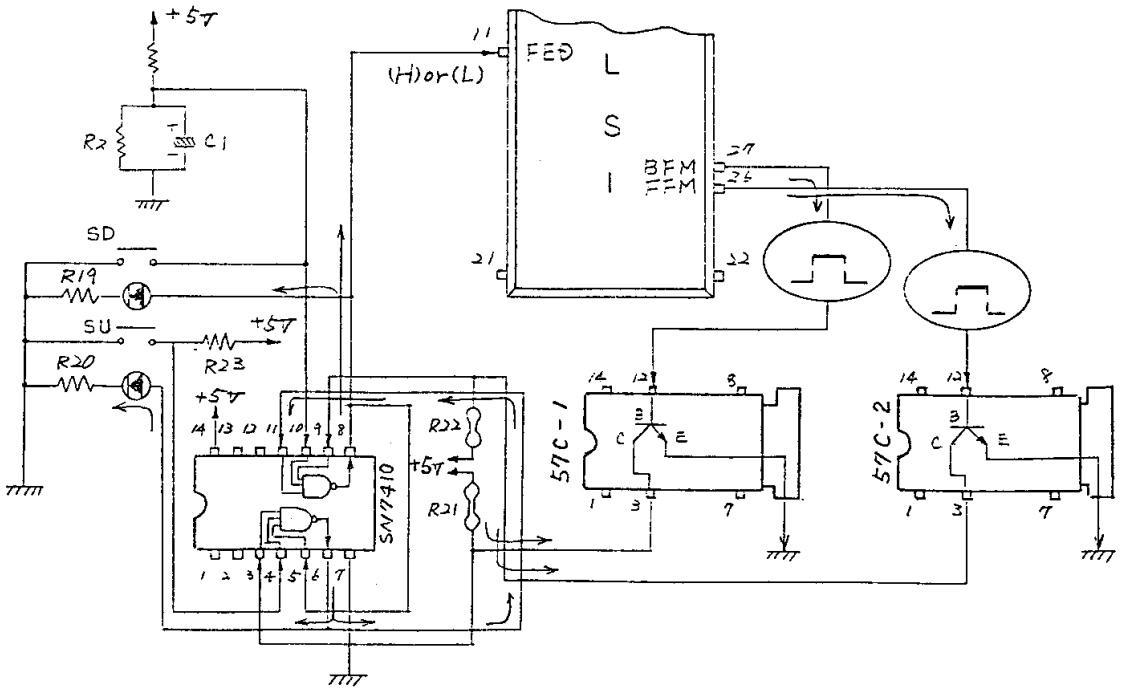
2 - 10 FED CIRCUIT (FFM, BFM CIRCUITS ARE INCLUDED.)

2-10-1 Flow of signal

FED circuit generate the signal for controling the feeding direction of the pattern card. The signal is sent out from pin 8 of SN7410 and goes into pin 11 (FED) of LSI.
When the Card Button for ↓ is pushed, or when the CR sensor detects the mark in ↓ column, the signal at SN7410 pin8 is high, and FED teminal receives a high signal.
On the contrary, when the Card Button for ↑ is pushed, the signal at FED terminal of LSI will be high.

FED terminal H: forward feeding ↓
L: backward feeding ↑

2-10-2 FED Circuit (Schematic)

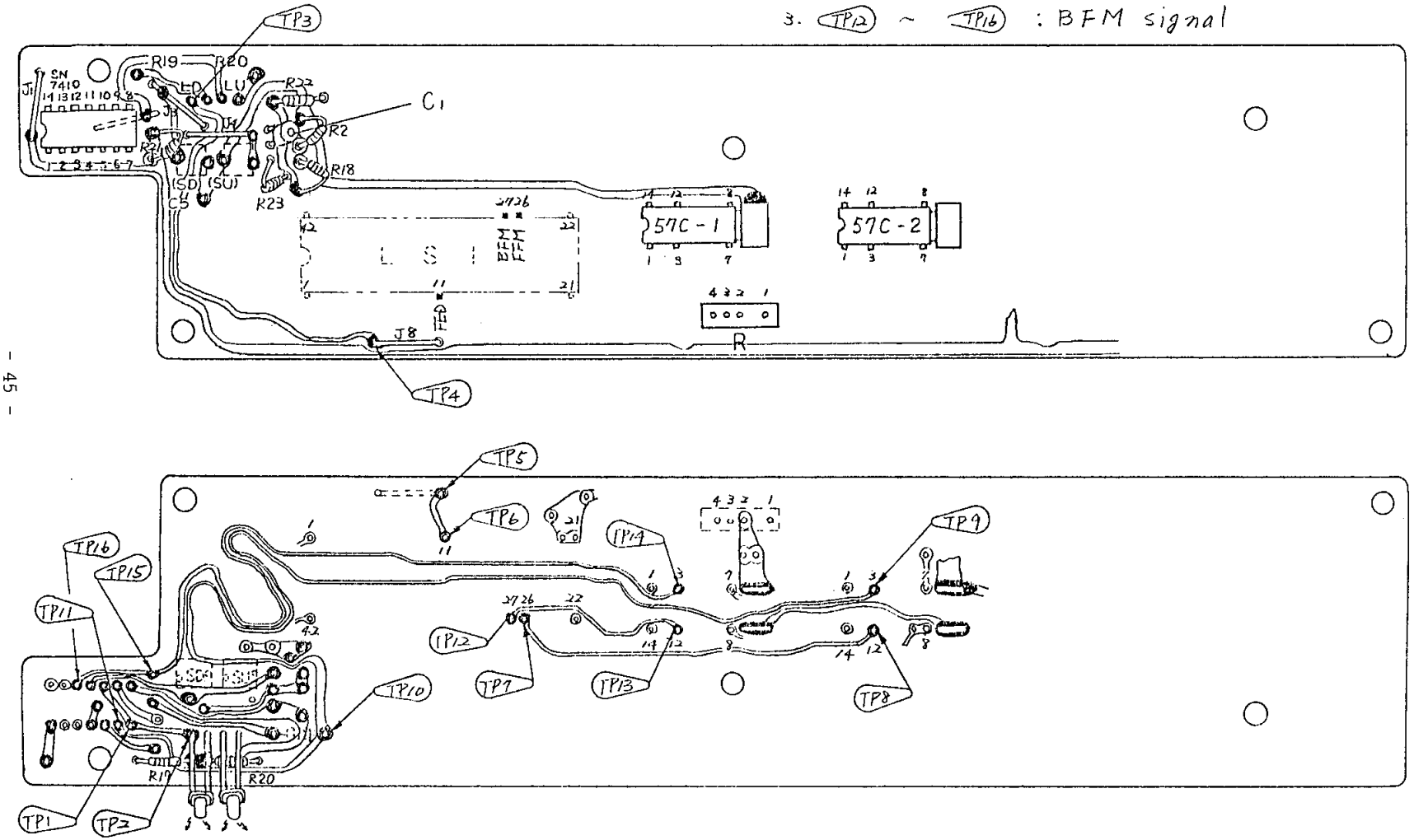


2-10-3 Setting the oscilloscope

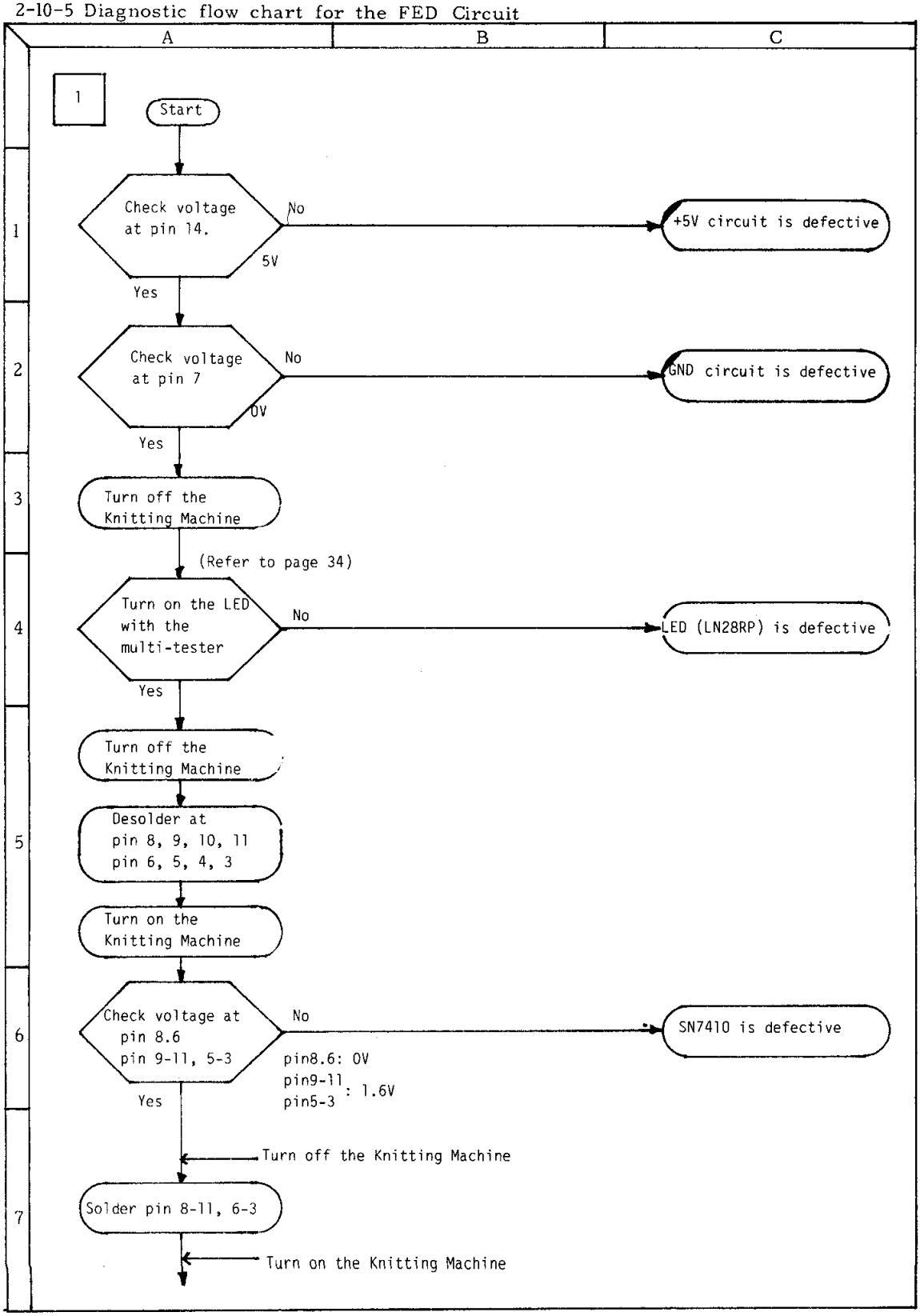
1. TIME/CM ———— 20mSEC
2. VOLTS/CM on CH2 ———— .1

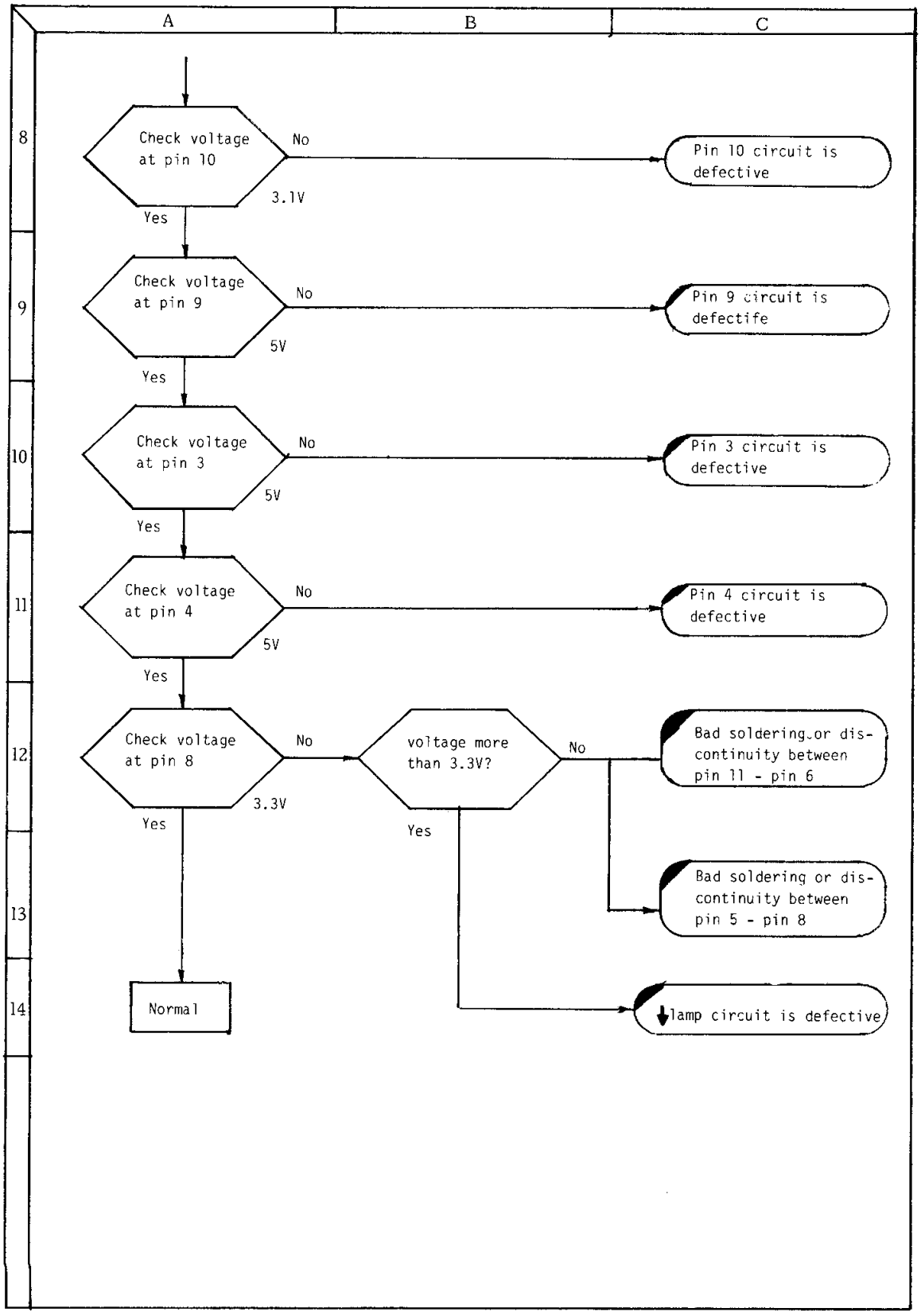
2-10-4 Actual view of FED Circuit

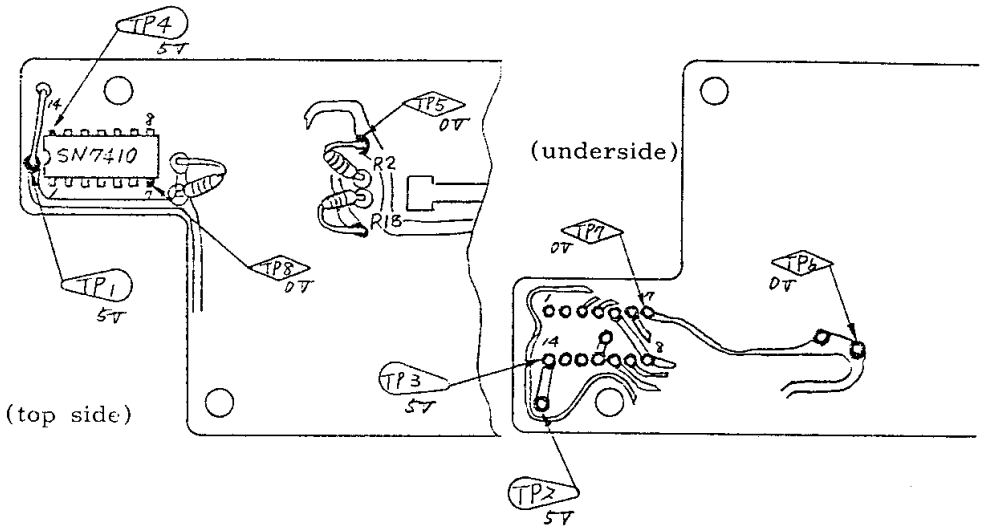
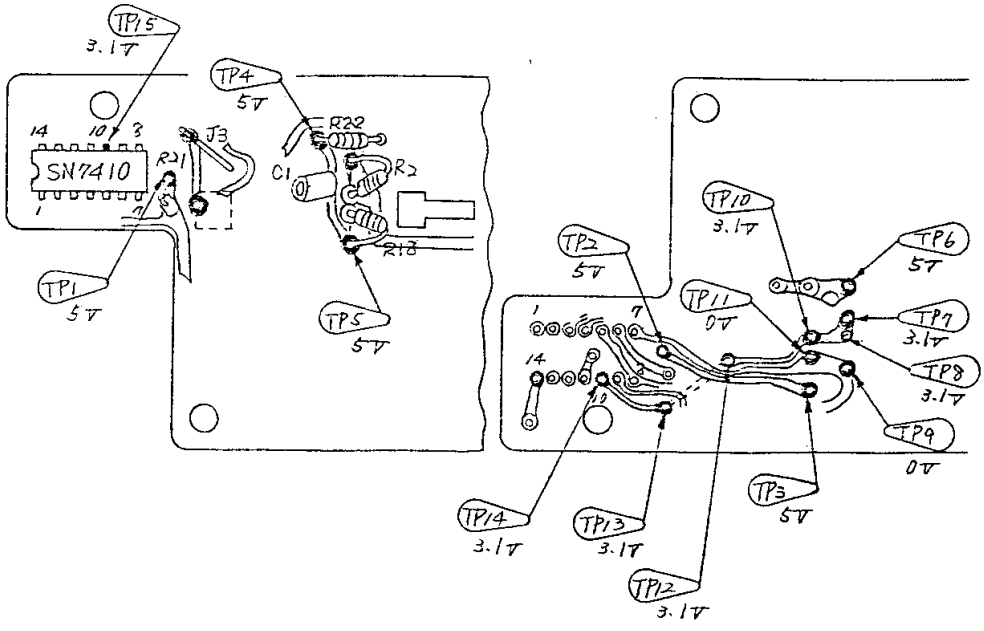
1. TP1 ~ TP6 : FED signal
2. TP4 ~ TP11 : FFM signal
3. TP12 ~ TP16 : BFM signal

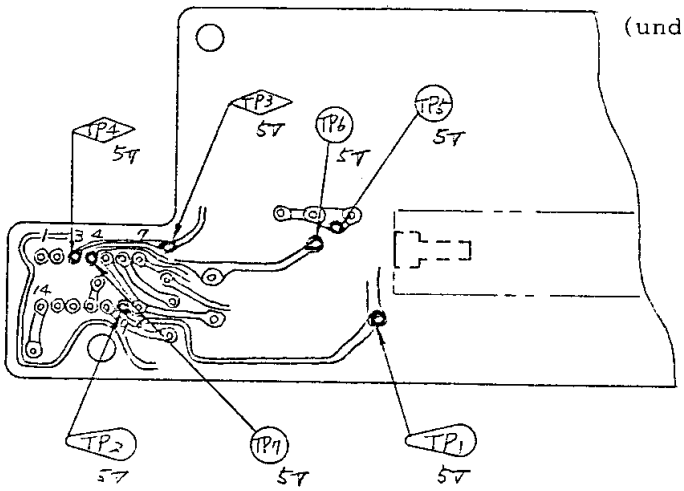
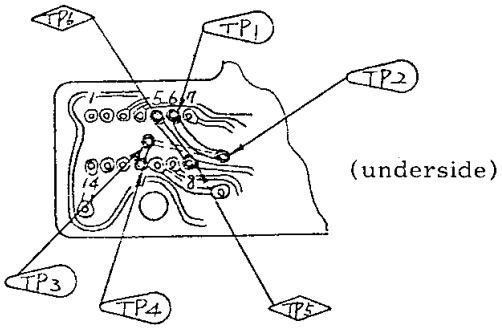


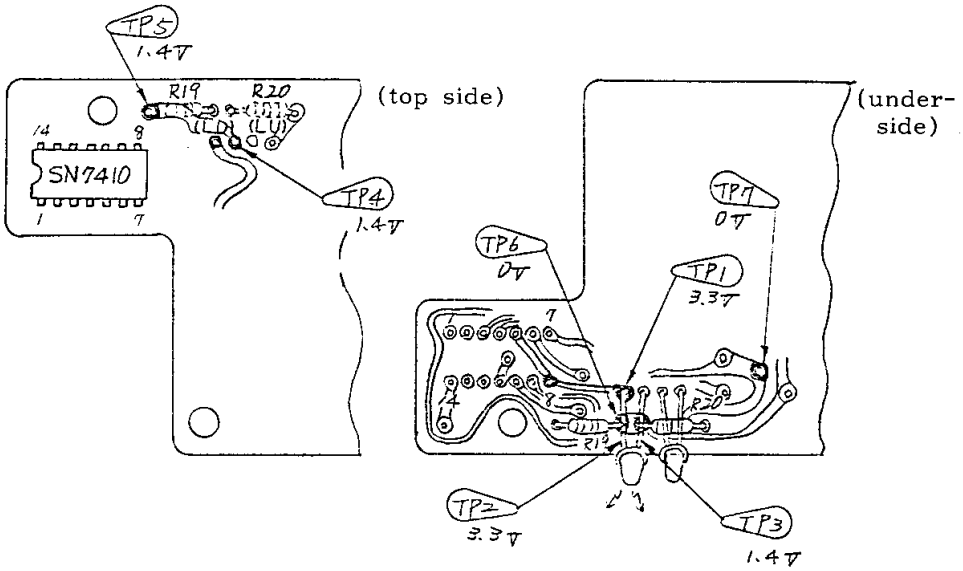
2-10-5 Diagnostic flow chart for the FED Circuit

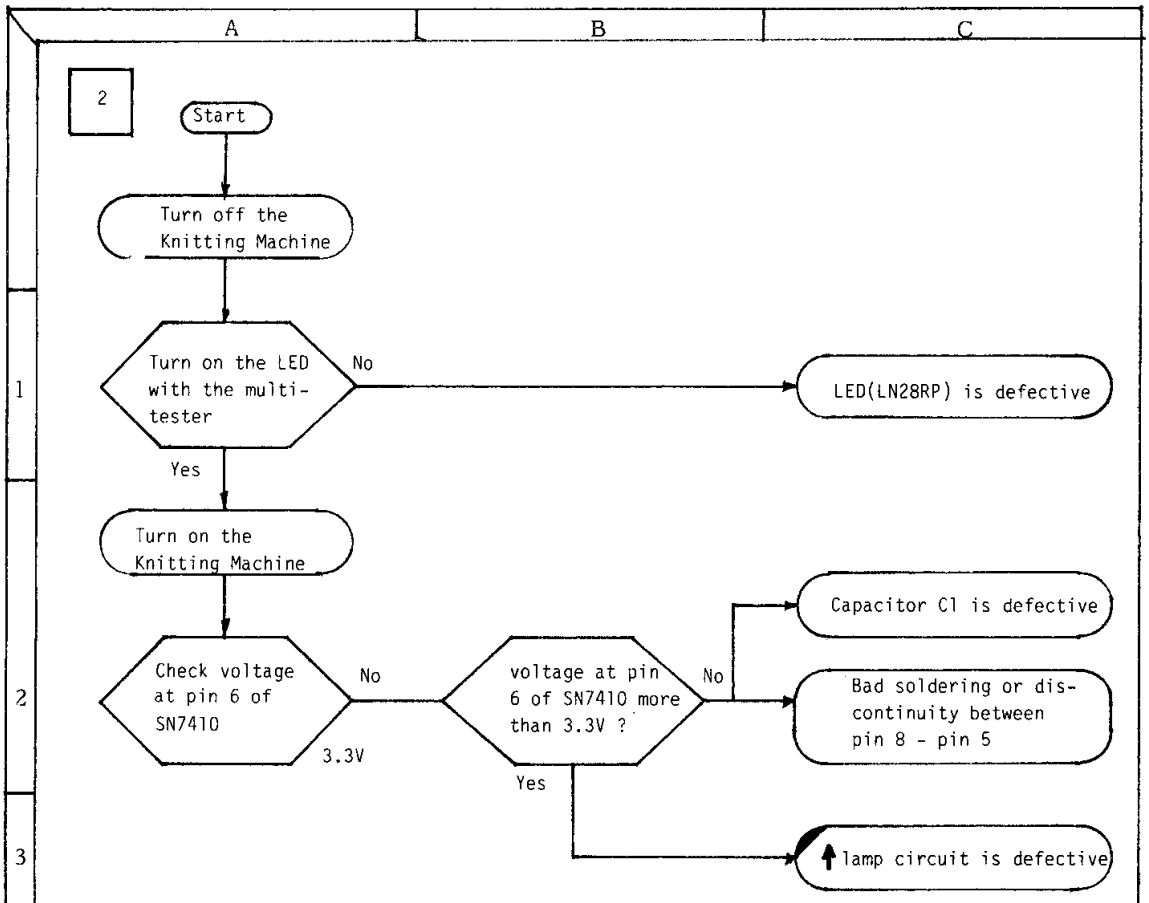



A
B
C
8
9
10
11
12
13
14
Check voltage at pin 10
No
3.1V
Yes
Pin 10 circuit is defective
Check voltage at pin 9
No
5V
Yes
Pin 9 circuit is defectife
Check voltage at pin 3
No
5V
Yes
Pin 3 circuit is defective
Check voltage at pin 4
No
5V
Yes
Pin 4 circuit is defective
Check voltage at pin 8
No
3.3V
Yes
voltage more than 3.3V?
No
Yes
Bad soldering or discontinuity between pin 11 - pin 6
Bad soldering or discontinuity between pin 5 - pin 8
Normal
lamp circuit is defective

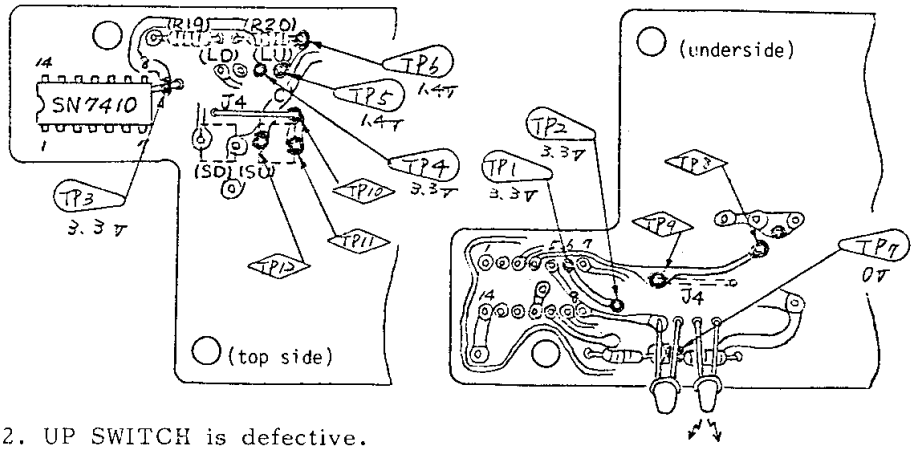
step code	CHECK POINTS
1 - A	° Check voltage at the test points in the sequence of TP1 - TP4. The section which does not measure the indicated voltage is defective. 
1 - B	° Check voltage at the test points in the sequence of TP5 - TP8. the section which does not measure the indicated voltage is defective.
8 - C	° Check voltage at the test points in the sequence of TP1 - TP15. The section which does not measure the indicated voltage is defective. 

step code	CHECK POINTS
9 - C	° Check voltage at TP1 and TP2. The section which does not measure the indicated voltage is defective. 
10 - C	° Check voltage at TP3 - TP7. The section which does not show the indicated voltage is defective.
11 - C	° Check voltage at TP5 - TP7. The section which does not show the indicated voltage is defective.
12 - C	° Check voltage at TP1 - TP4. The section not showing the indicated voltage is defective. 
13 - C	° Check voltage at TP5 - TP6. The section not showing the indicated voltage is defective.

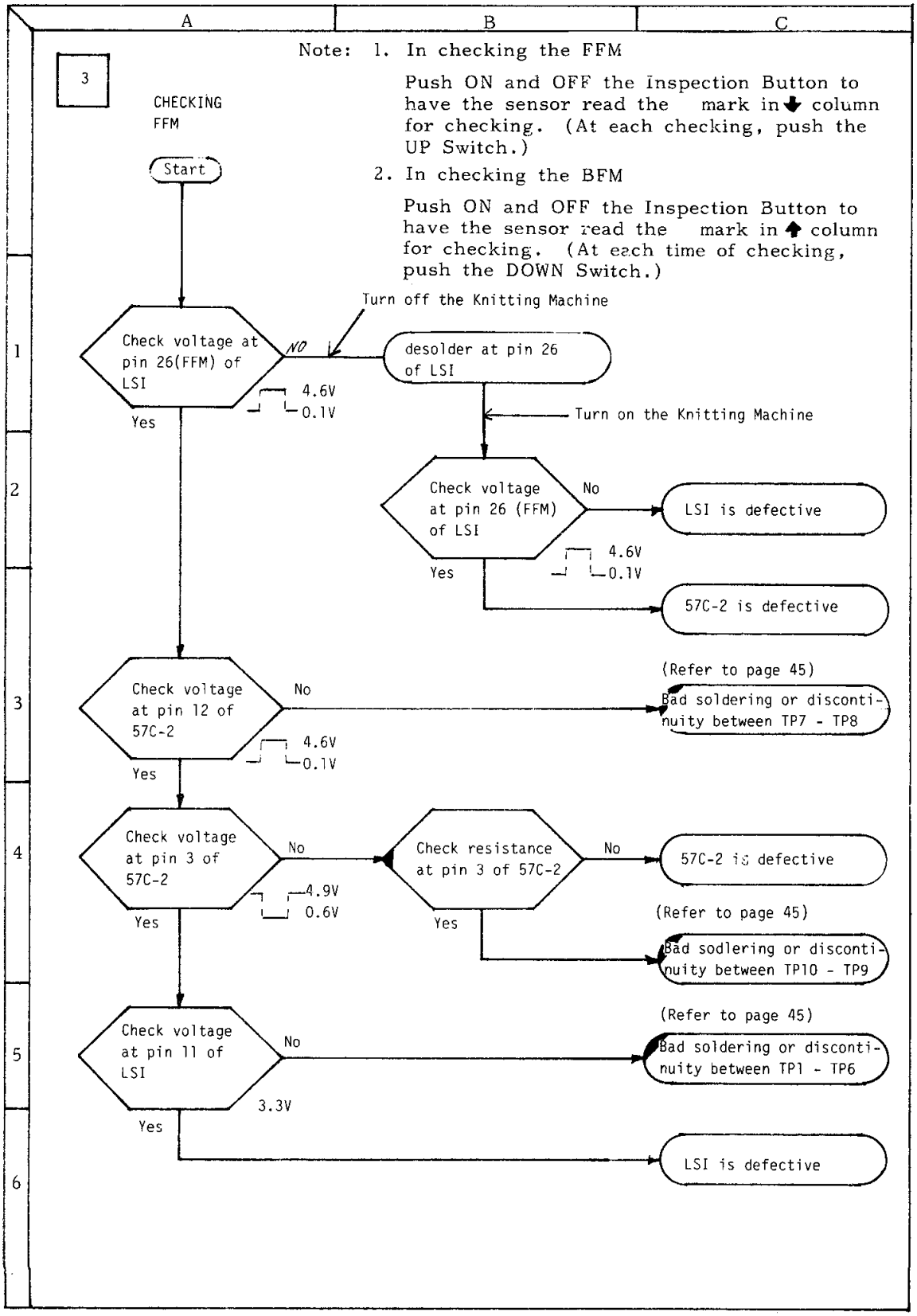
step code	CHECK POINTS
14 - C	° The voltage in normal condition is given at each test point (LED on). If the voltage at pin 8 of SN7410 shows more than 3.3V, bad soldering will be a cause. So with power off, check the soldering at TP7, TP6 .....back to TP1. 

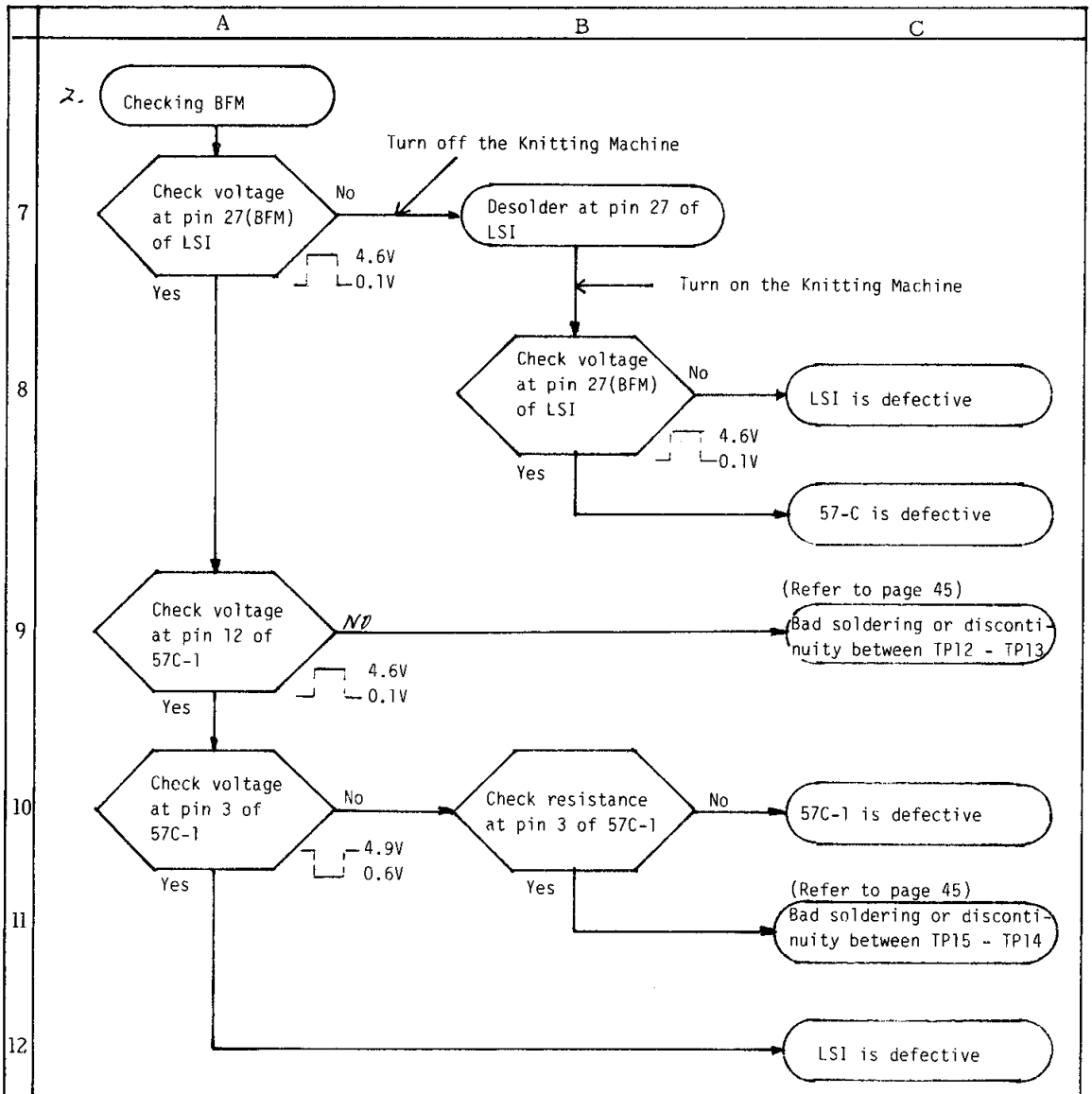


step code	CHECK POINTS
3 - C	1. The voltage in normal condition is given at each test points, TP1 - TP7 (↑ lamp circuit), and TP8 - TP12 (↑ SW circuit). If the voltage at pin 6 is more than 3.3V, bad soldering at each test point will be a cause.



2. UP SWITCH is defective.


A
B
C
1
2
3
4
5
6
3
CHECKING FFM
Note: 1. In checking the FFM
Push ON and OFF the Inspection Button to have the sensor read the mark in ↓ column for checking. (At each checking, push the UP Switch.)
2. In checking the BFM
Push ON and OFF the Inspection Button to have the sensor read the mark in ↑ column for checking. (At each time of checking, push the DOWN Switch.)
Start
Turn off the Knitting Machine
Check voltage at pin 26(FFM) of LSI
NO
desolder at pin 26 of LSI
4.6V
0.1V
Yes
Turn on the Knitting Machine
Check voltage at pin 26 (FFM) of LSI
No
LSI is defective
4.6V
0.1V
Yes
57C-2 is defective
(Refer to page 45)
Check voltage at pin 12 of 57C-2
No
Bad soldering or discontinuity between TP7 - TP8
4.6V
0.1V
Yes
Check voltage at pin 3 of 57C-2
No
Check resistance at pin 3 of 57C-2
No
57C-2 is defective
4.9V
0.6V
Yes
Yes
(Refer to page 45)
Bad sodlering or discontinuity between TP10 - TP9
(Refer to page 45)
Check voltage at pin 11 of LSI
No
Bad soldering or discontinuity between TP1 - TP6
3.3V
Yes
LSI is defective



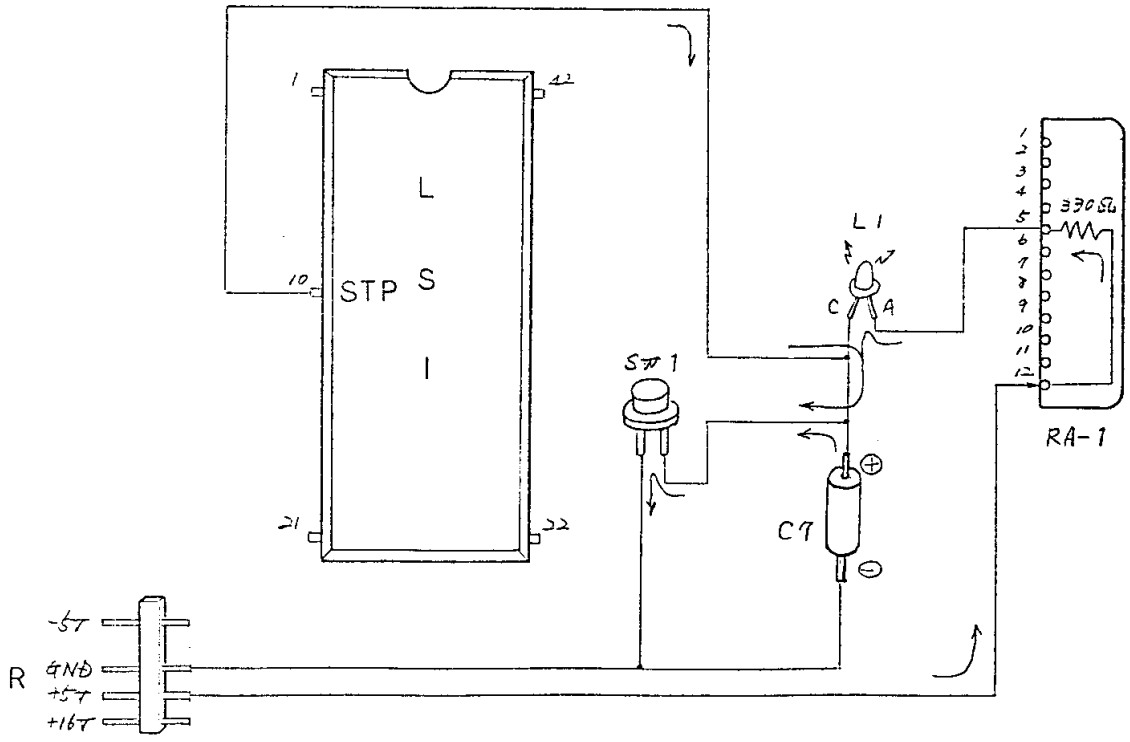
step code	CHECK POINTS
4 - B 10 - B	1. Set the range to Ωxl on the multi-tester. 2. Connect ⊖ test lead to GND Connect ⊕ test lead to pin 3 of either of 57C-1 or 57C-2. Value of resistance: 7-11 ohm if it is normal (refer to P.41)

2 - 11 STP (STOP) CIRCUIT

2-11-1 Flow of signal in the STP circuit

Voltage at pin 10(STP) of the LSI is high when the Inspection Button is pushed off. When the Inspection Button is pushed on, the driving voltage (+5V) goes into pin 12 of RA-1 and out from pin 5 as GND for the LED to turn it on, and teh STP terminal will receive low voltage. The change of voltage at STP terminal, from high to low activates the pulse motor to move the Card upward by 10 rows.

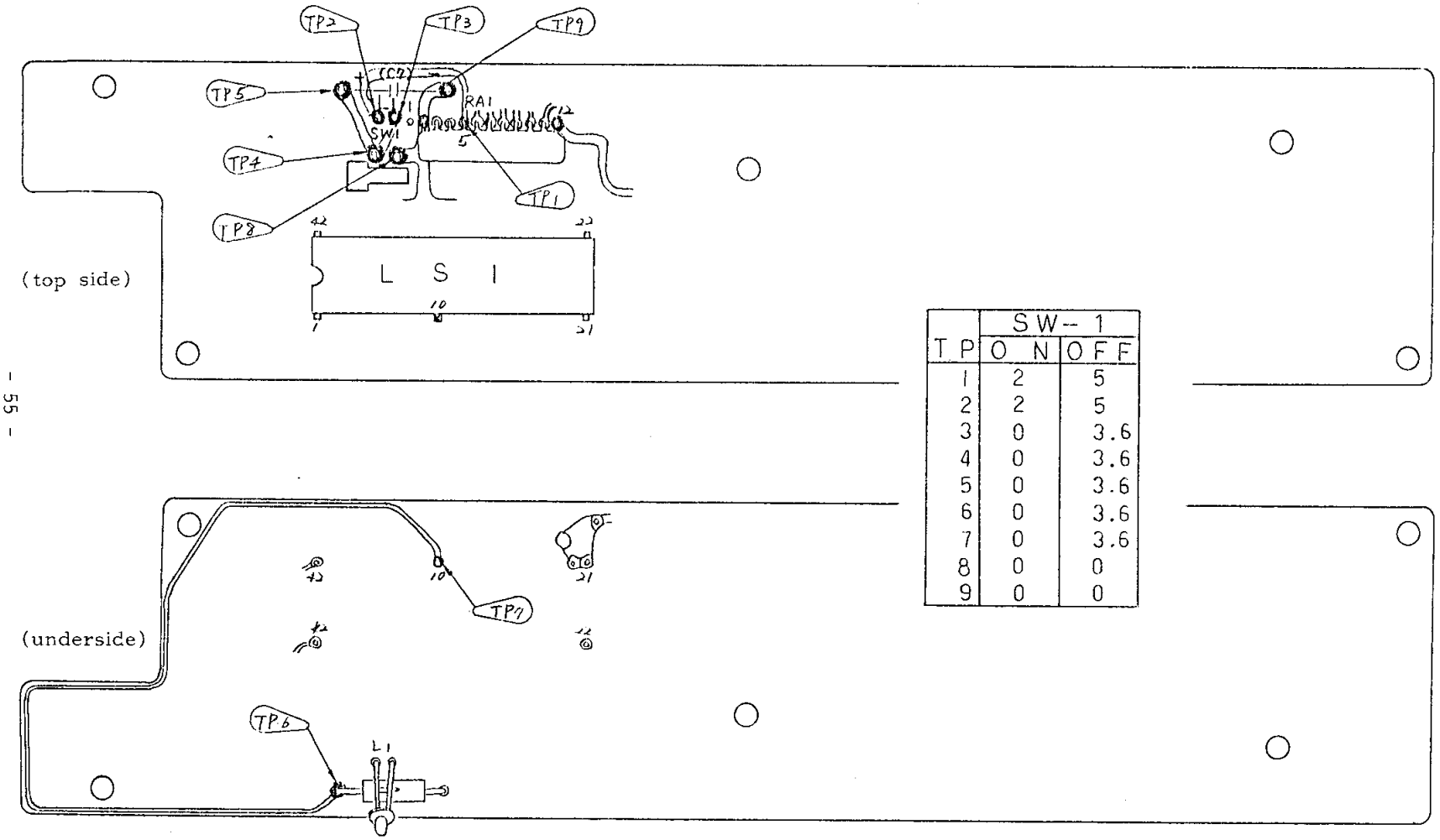
2-11-2 STP Circuit (Schematic)



2-11-3 Setting the oscilloscope

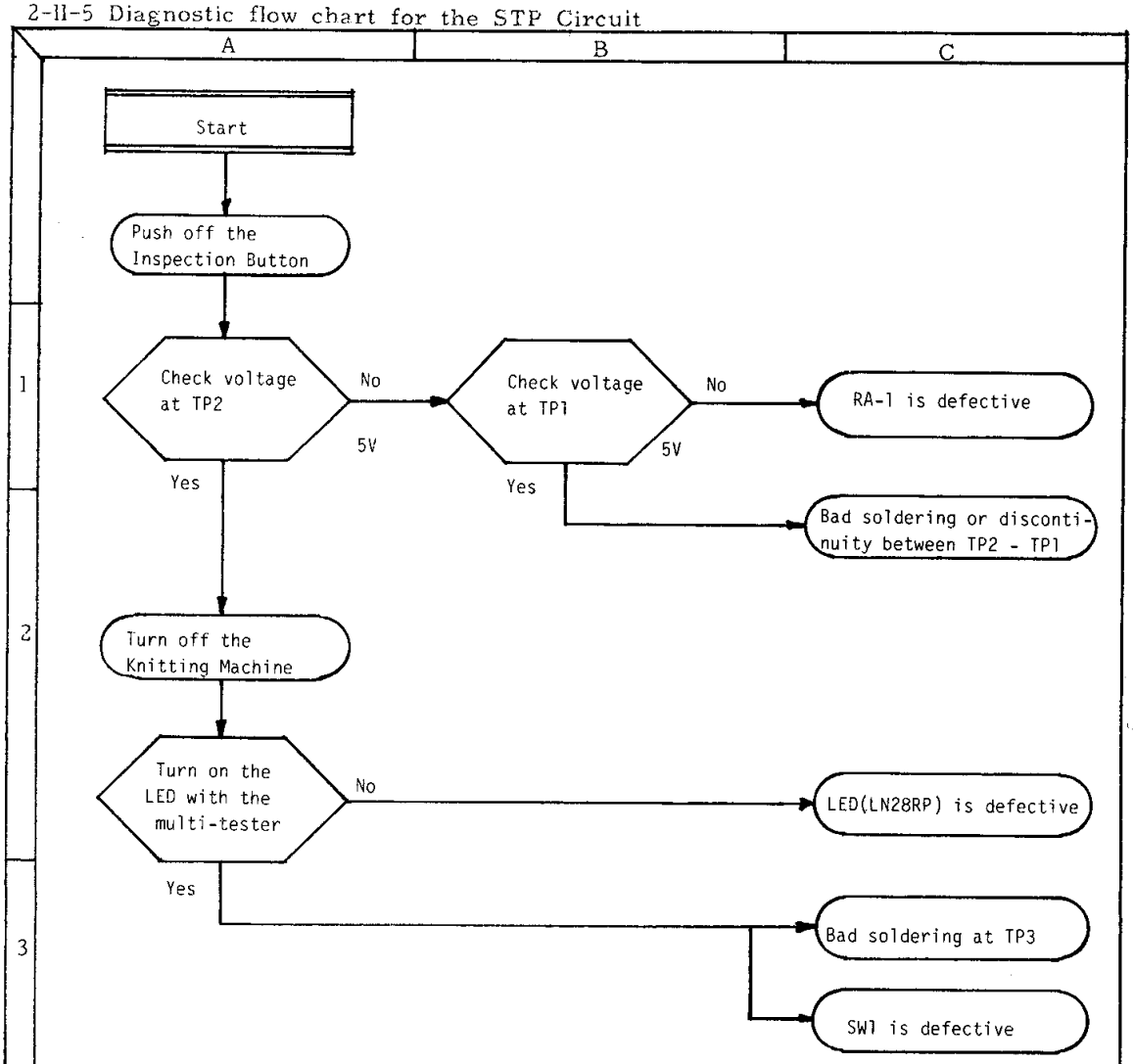
1. TIME/CM ———— 20mSEC
2. VOLTS/CM———— .1

2-11-4 Actual view of STP Circuit



TP	SW-1 ON	SW-1 OFF
1	2	5
2	2	5
3	0	3.6
4	0	3.6
5	0	3.6
6	0	3.6
7	0	3.6
8	0	0
9	0	0

2-11-5 Diagnostic flow chart for the STP Circuit



[Points to confirm]

Turn off the knitting machine and confirm the following points.

1. Confirm the change of voltage at pin 10 of LSI(STP terminal)

   Push ON ——— 0V (L)

   Push OFF —— 3.6V (H)

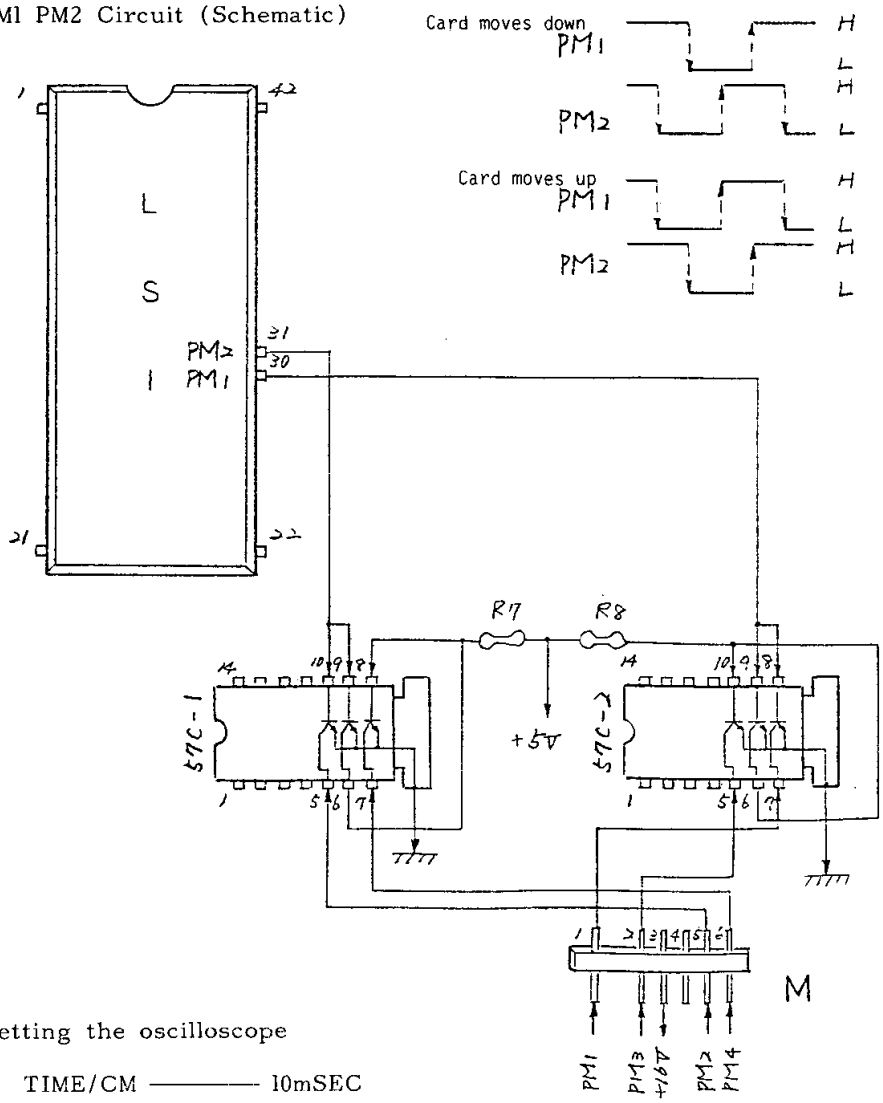
   If it is abnormal, bad soldering or discontinuity between TP5 - TP7 may be a cause.

2 - 12 PM1 PM2 CIRCUITS

2-12-1 Flow of signal

When the Inspection Button is pushed ON, the voltage at pin 10 (STP) of LSI changes from high to low voltage.
By the change of voltage at the pin, the PM1 and PM2 pins of the LSI send out signal to 57C-1(Pin 9.10) and 57C-2 (Pin 8.9) for moving up the card by 10 rows, and drive the pulse motor connected to 57C-1 & 2.
When the Inspection Button is pushed OFF, the output signal of PM1 and PM2 are reversed.

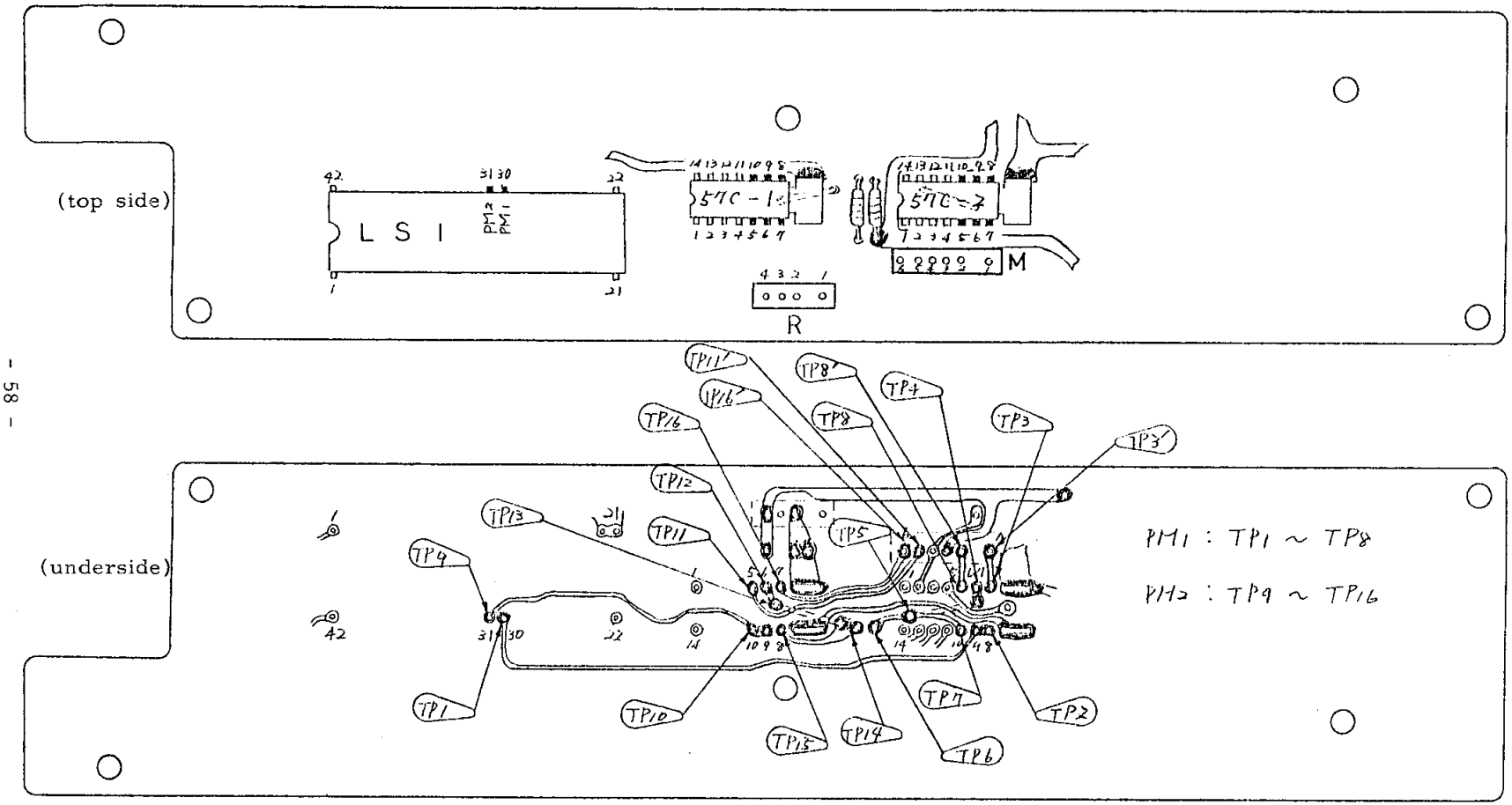
2-12-2 PM1 PM2 Circuit (Schematic)



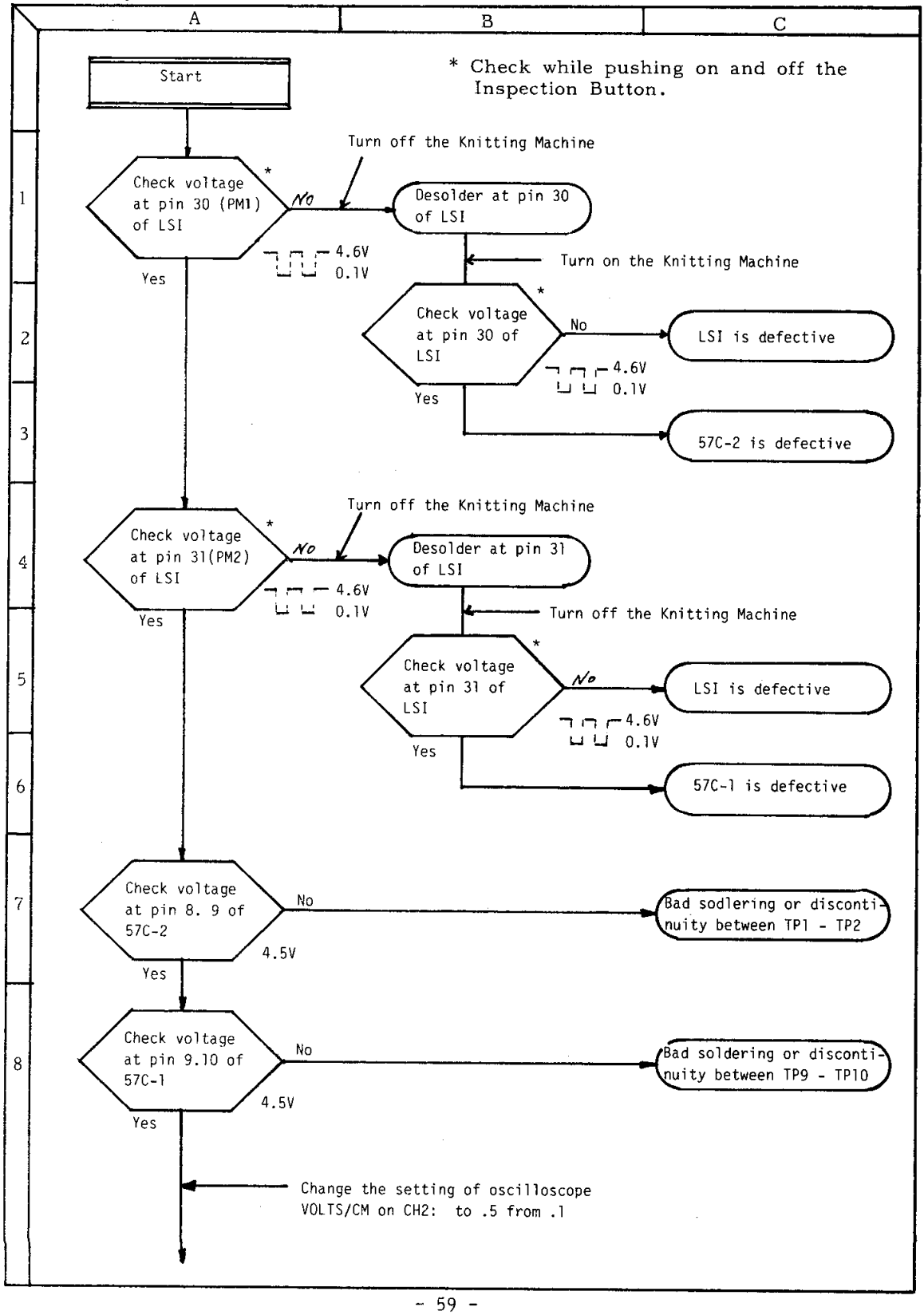
2-12-3 Setting the oscilloscope

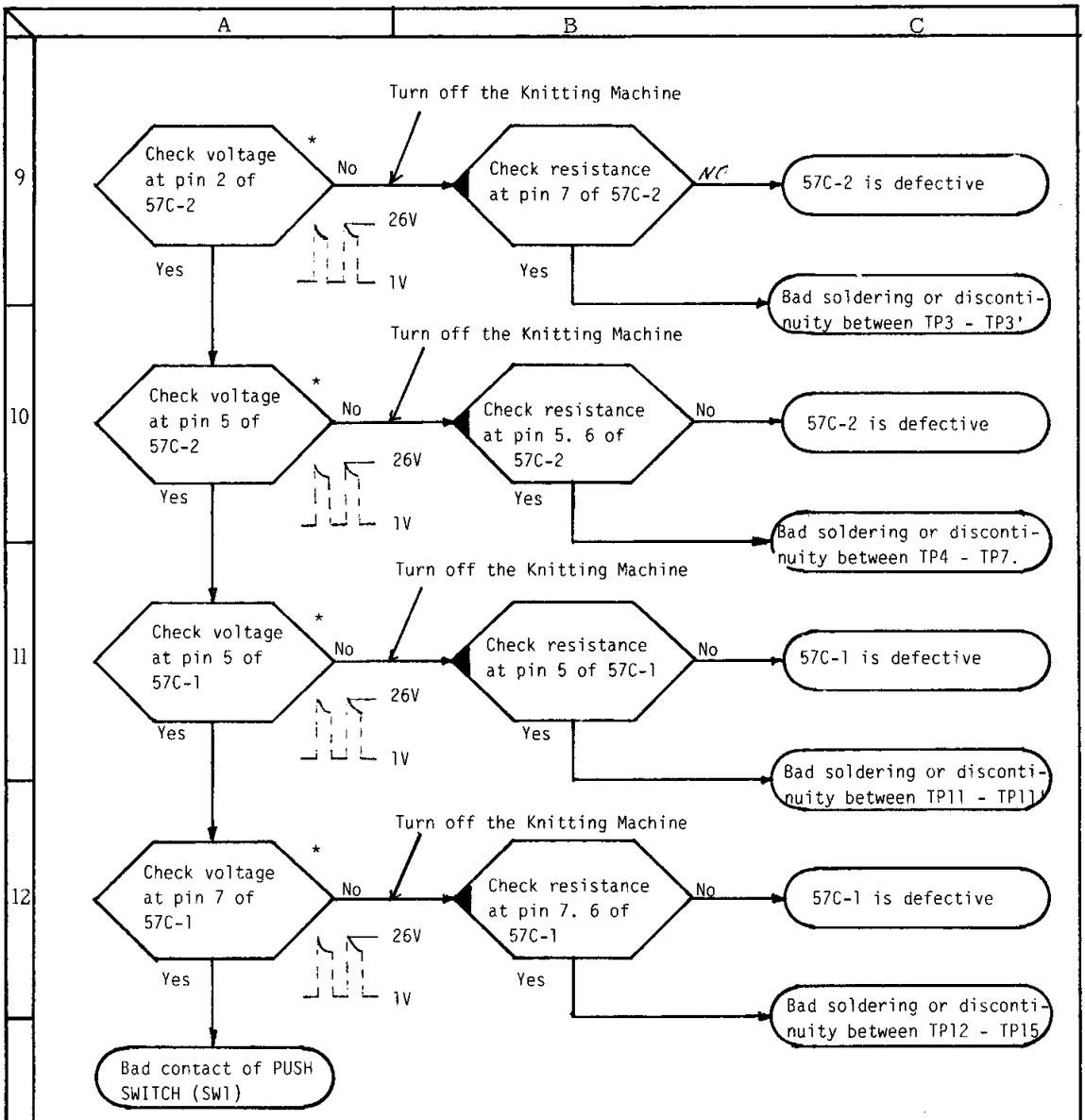
1. TIME/CM ———— 10mSEC
2. VOLTS/CM on CH12 ———— .1

2-12-4 Actual view of PM1 and PM2 Circuit



2-12-5 Diagnostic flow chart for PM1 and PM2 Circuit

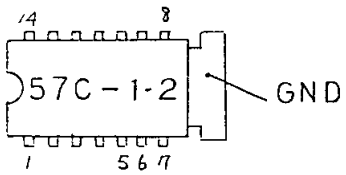




step code
9 - B
10 - B
11 - B
12 - B

CHECK POINTS

1. Set the range to Ω xl on the multi-tester.
2. Connect the ⊖ lead to GND
   Connect the ⊕ lead to each pin.



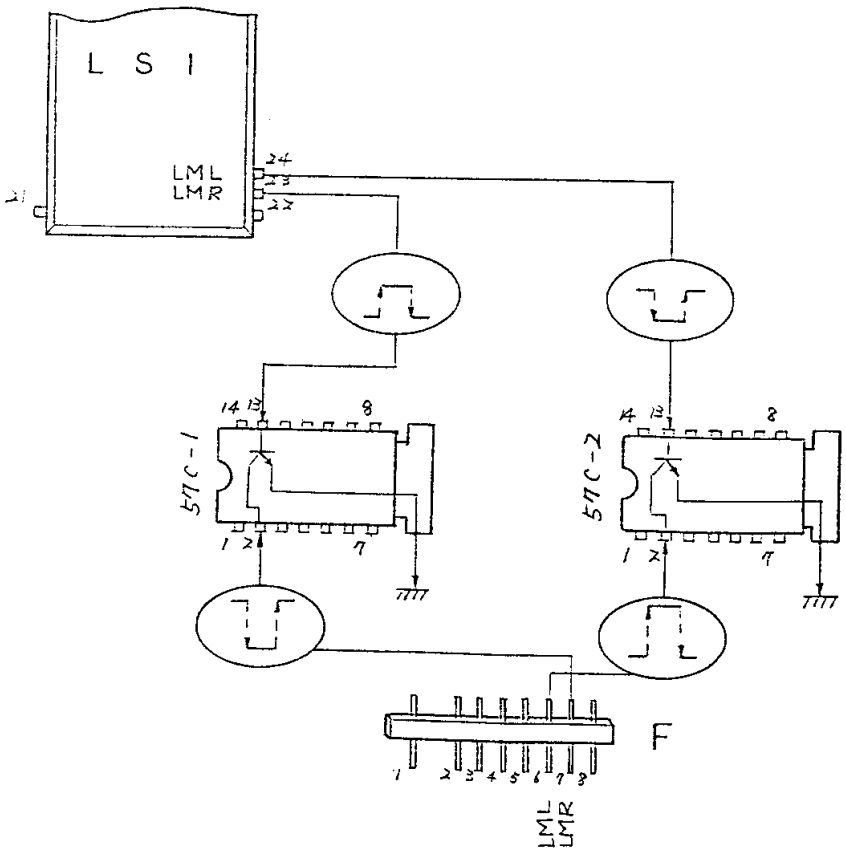
I C	⊖ lead	⊕ lead	resistance
57C-2	GND	Pin 7	7 ~ 11
2	GND	6	7 ~ 11
2	GND	5	7 ~ 11
57C-1	GND	Pin 7	7 ~ 11
1	GND	6	7 ~ 11
1	GND	5	7 ~ 11

2 - 13 LMR. LML CIRCUIT

2-13-1 Flow of signal

When the Inspection Button is pushed on then off, the voltage at pin 10 of LSI changes from L to H. This change of signal activates the pulse motor to rotate in the forward direction.
At the same time, the signal, functions as command signal for activating the linear motor, is sent out from LMR. LML terminal and goes into Pin 13 (LMR) of 57C-1, and pin 13(LML) of 57C-2, and activate them.
Thus the scanning is carried out.

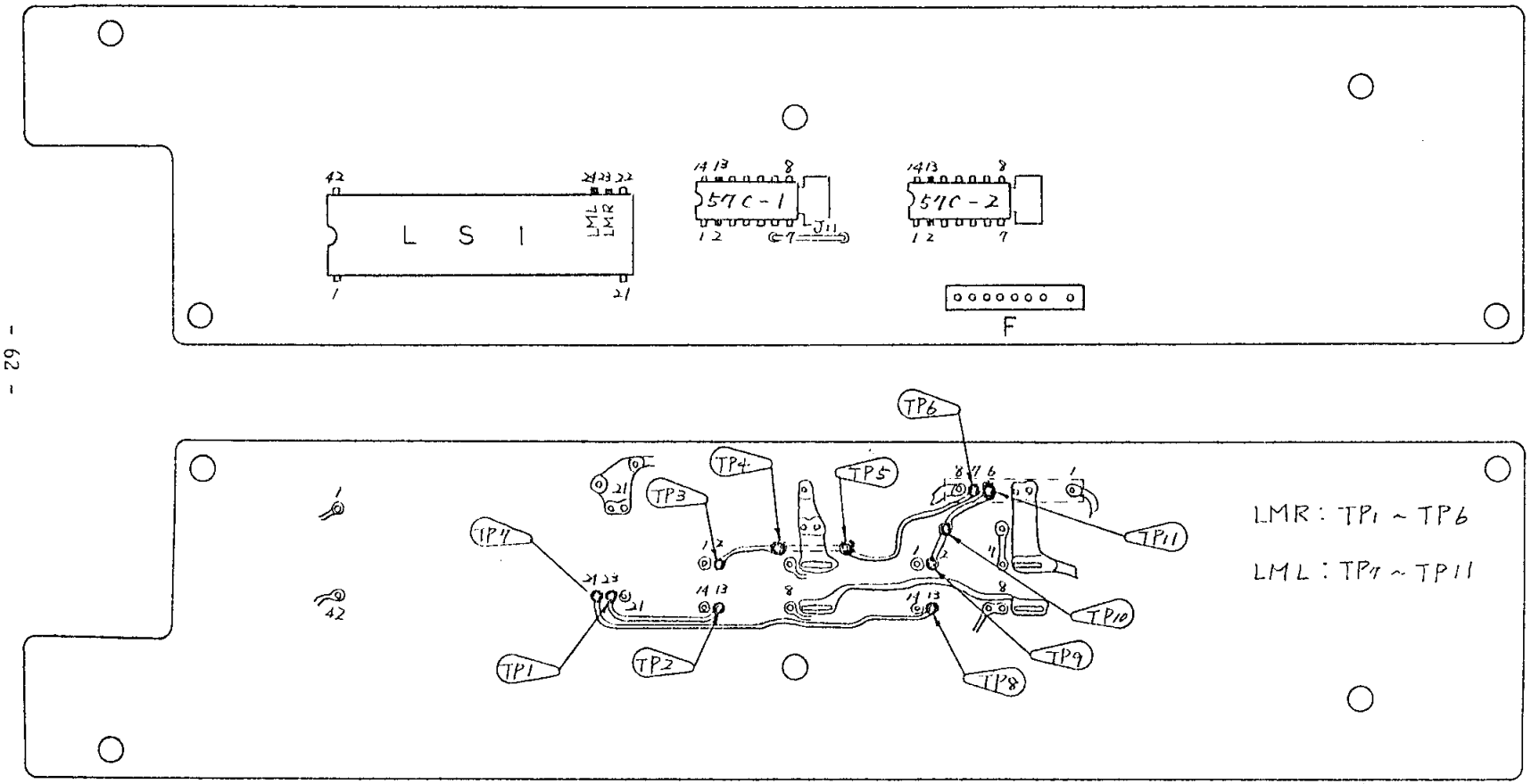
2-13-2 LMR. LML Circuit (Schematic)



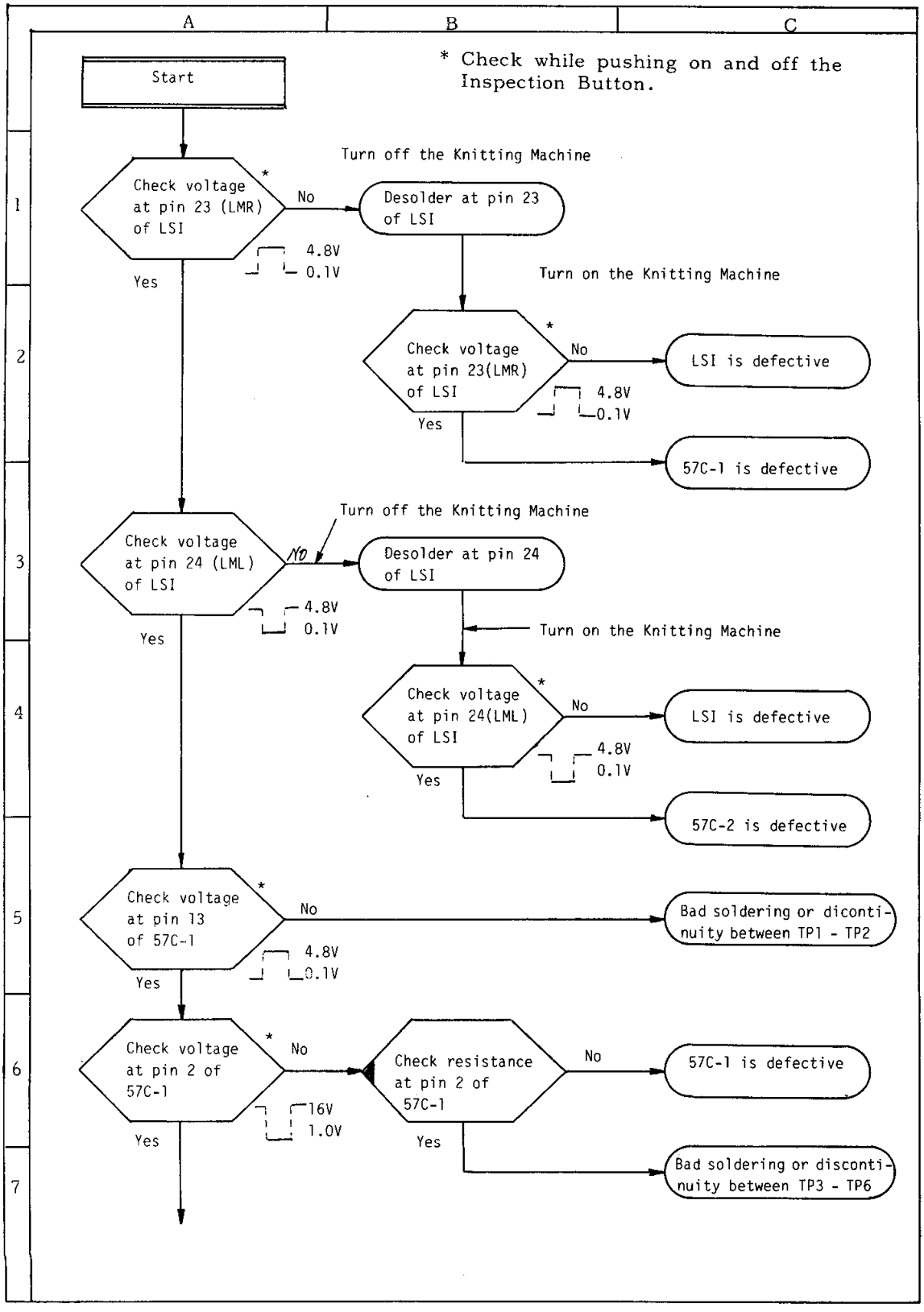
2-13-3 Setting the oscilloscope

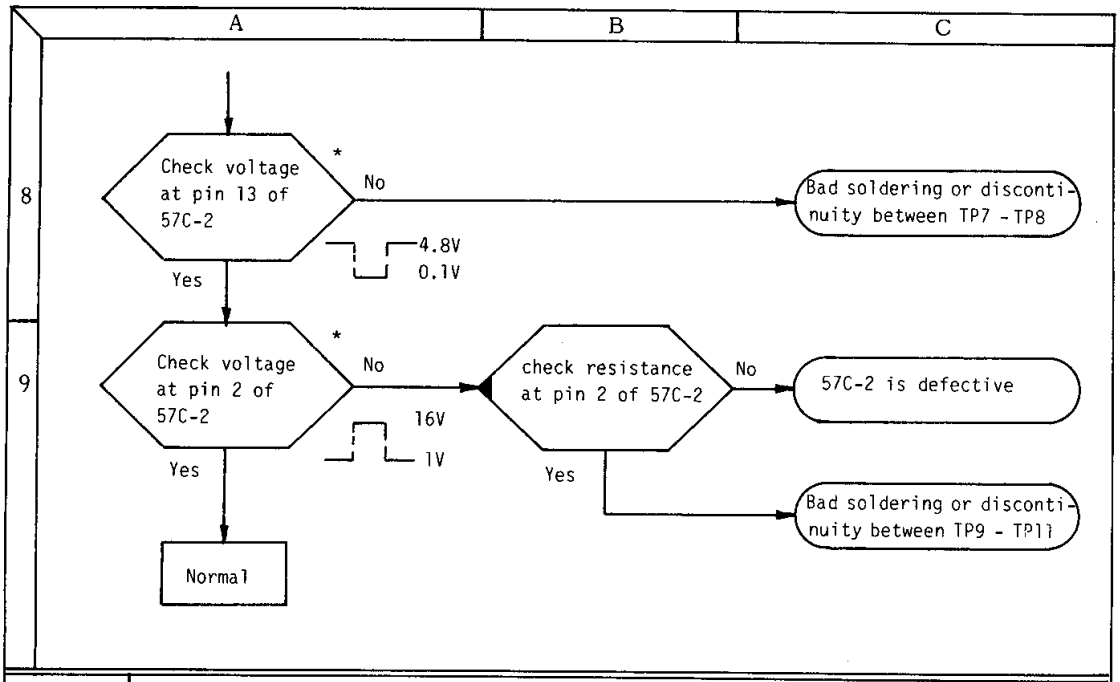
1. TIME/CM ———— 20mSEC
2. VOLTS/CM on CH2 ———— .1 & .5

2-13-4 Actual view of LMR, LML Circuits



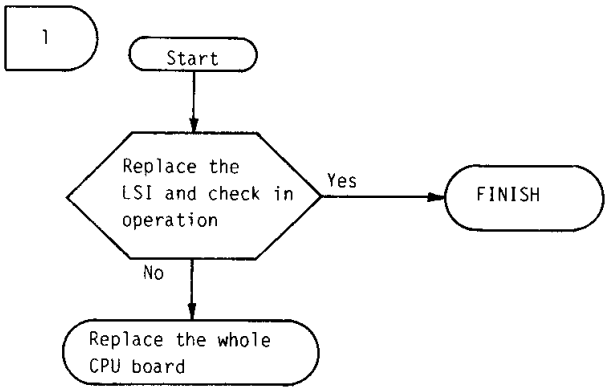
2-13-5 Diagnostic flow chart for LMR. LML Circuits

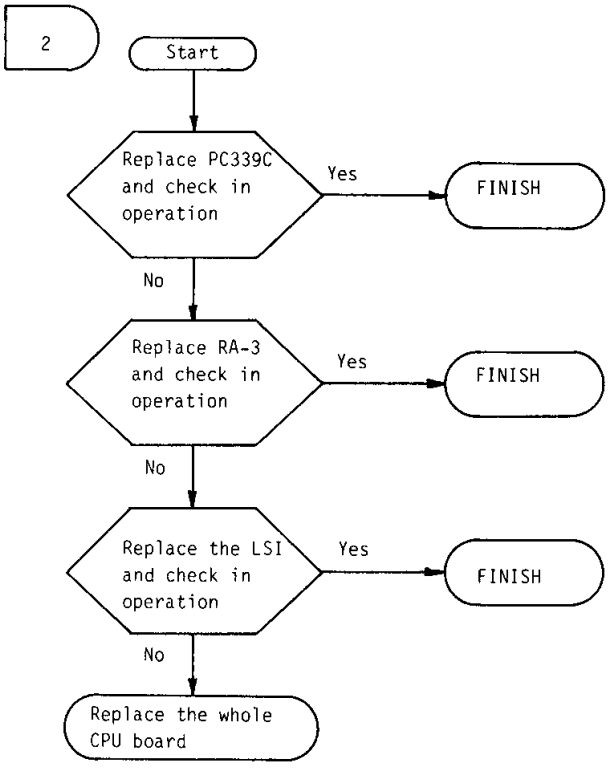


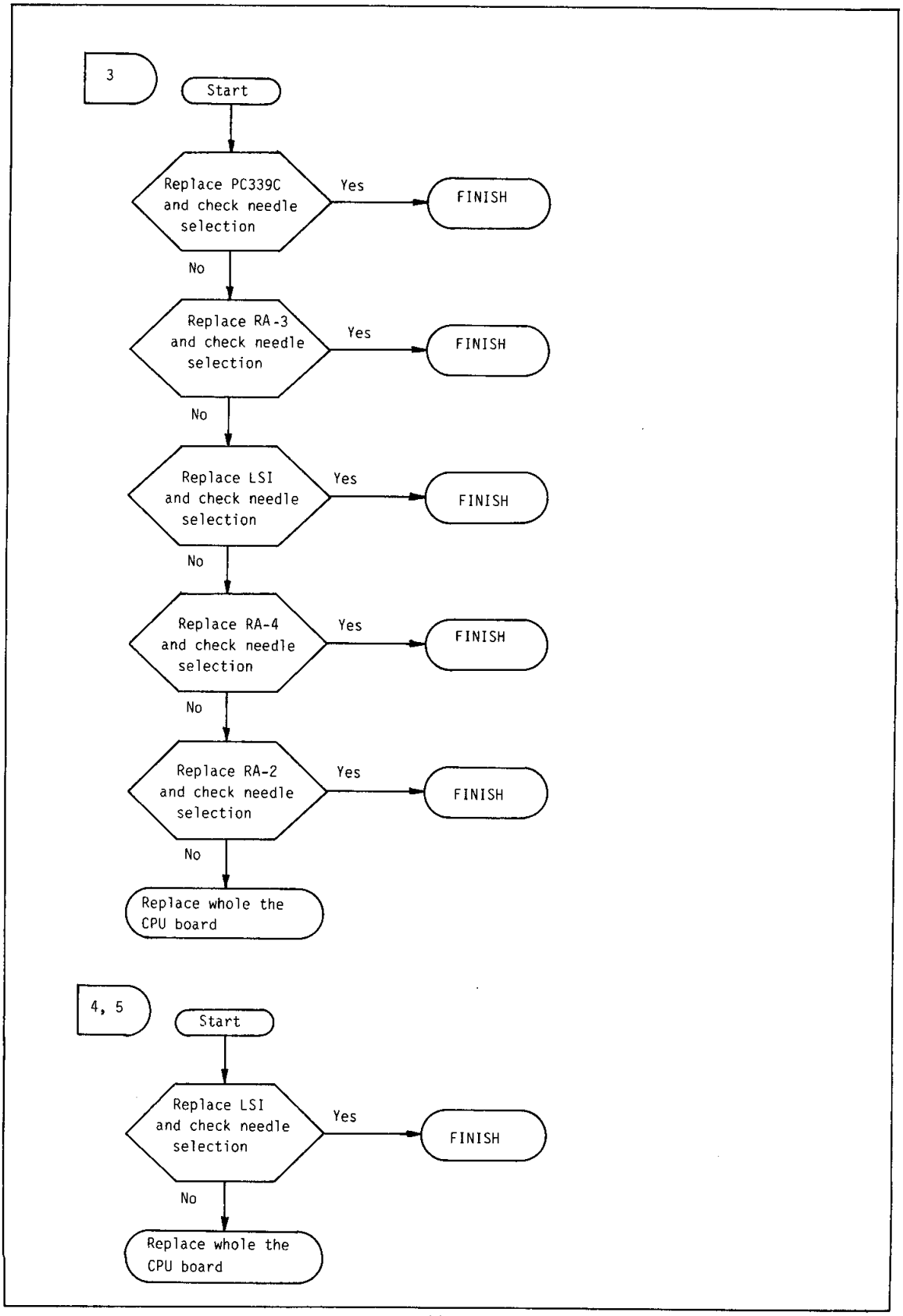


	CHECK POINTS
6 - B	1. Set the range to Ω xl on the multi-tester. 2. Connect ⊖ lead to GND Connect ⊕ lead to pin 2 of either the 57C-1 or 57C-2. If the resistance shows 7-11 ohm, the circuit is normal. (Refer to page 60)

2 - 14 DIAGNOSTIC FLOW CHART FOR THE OTHER CIRCUITS





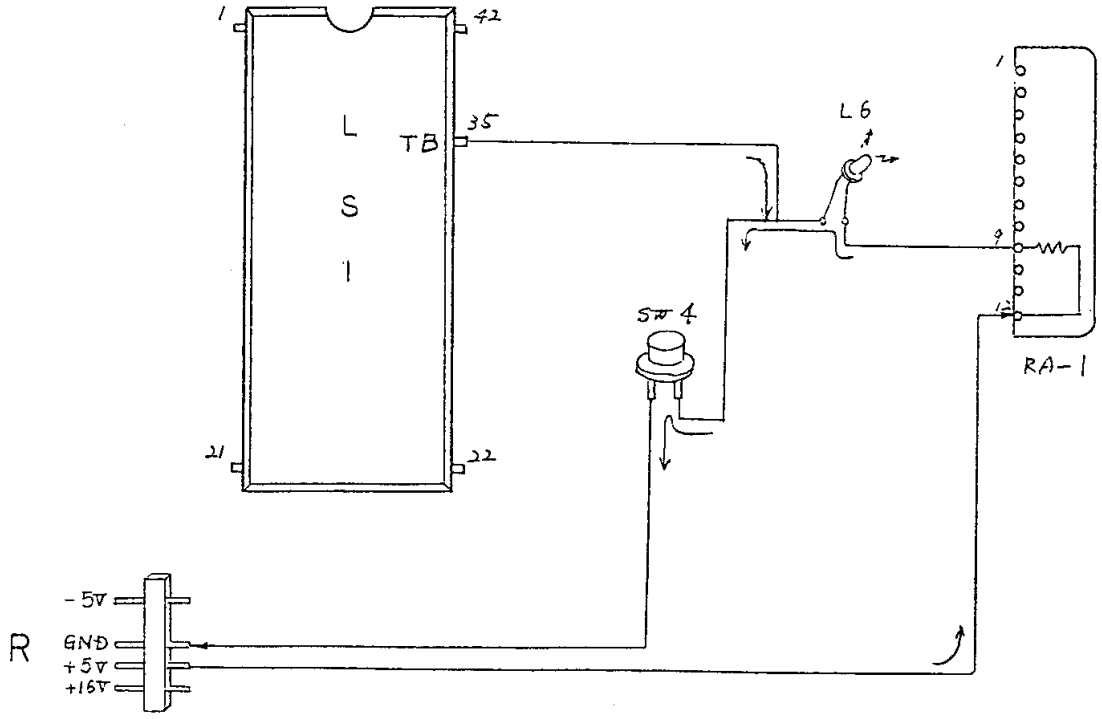

3
Start
Replace PC339C and check needle selection
Yes
FINISH
No
Replace RA-3 and check needle selection
Yes
FINISH
No
Replace LSI and check needle selection
Yes
FINISH
No
Replace RA-4 and check needle selection
Yes
FINISH
No
Replace RA-2 and check needle selection
Yes
FINISH
No
Replace whole the CPU board
4, 5
Start
Replace LSI and check needle selection
Yes
FINISH
No
Replace whole the CPU board

2 - 15 TB (VERTICAL EXPANSION) CIRCUIT

2-15-1 Flow of signal

Driving votlage +5V (RA-1 pin 12) is connected to LSI pin 37(TB) through Pattern Button 3 (SW4).
When the Pattern is pushed off, the voltage at TB terminal of the LSI is high voltage, and when the Button is pushed on, the voltage becomes low and the LED is turned on.

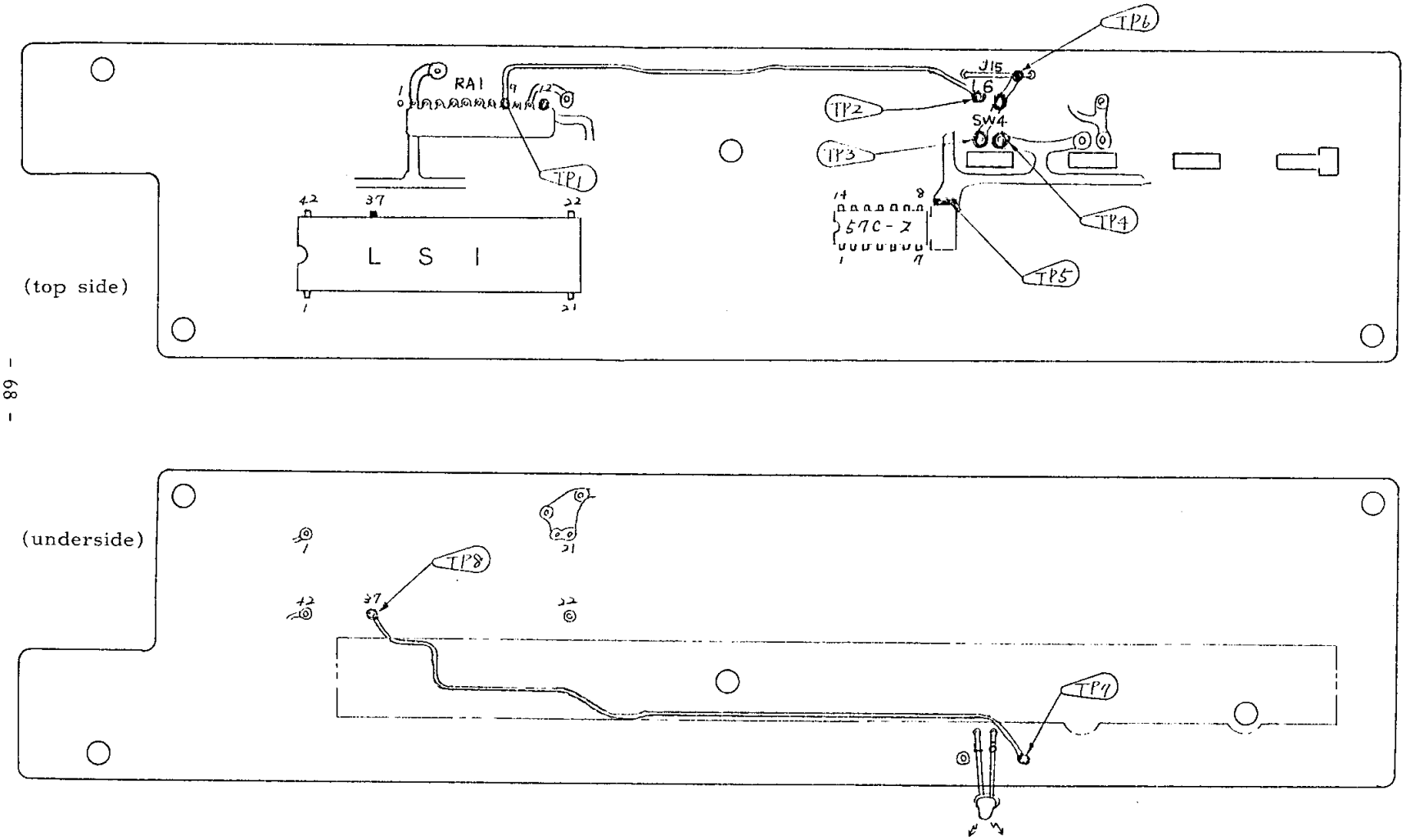
2-15-2 TB Circuit (Schematic)



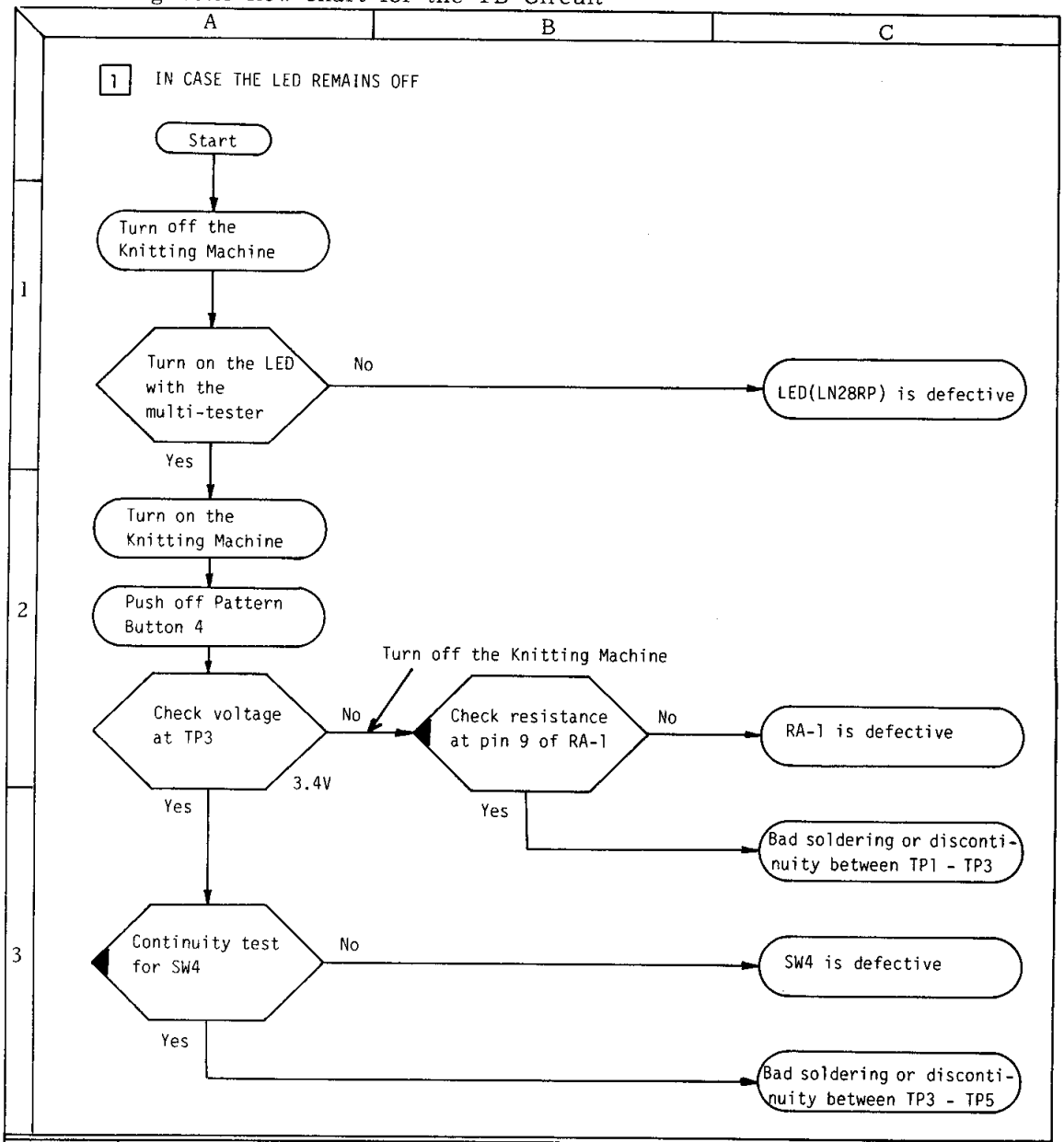
2-15-3 Setting the oscilloscope

1. TIME/CM ———— 20mSEC
2. VOLTS/CM on CH2 ———— .1

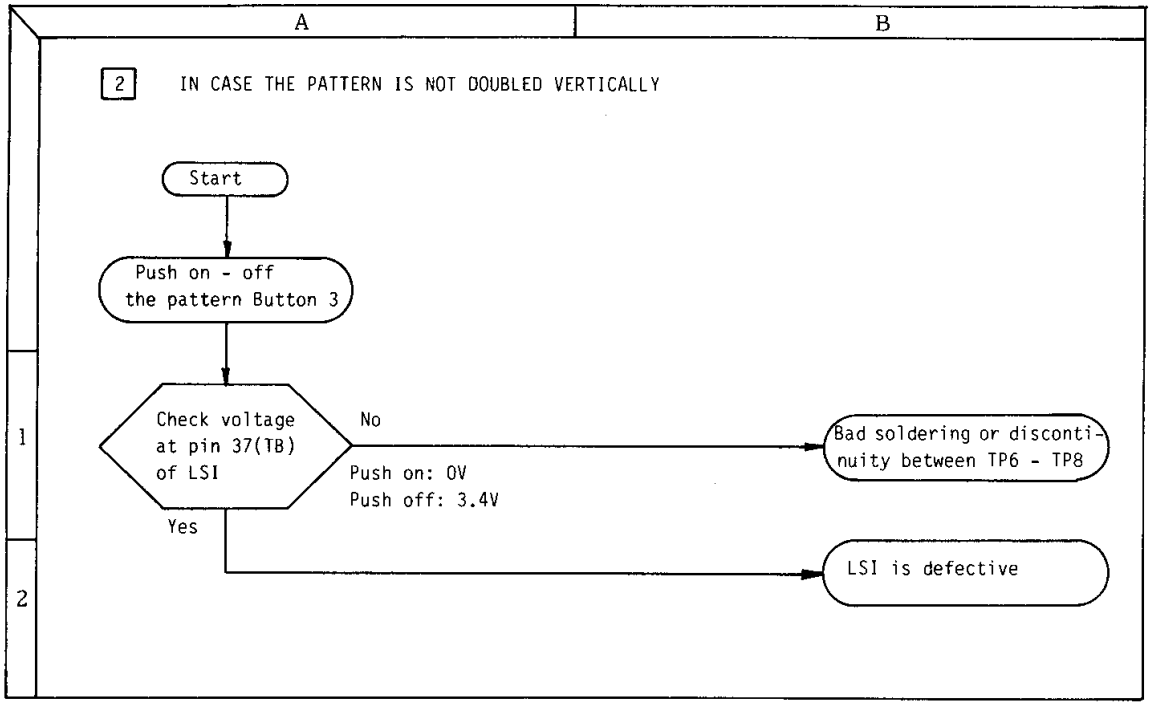
2-15-4 Actual view of TB circuit



2-15-5 Diagnostic flow chart for the TB Circuit



	CHECK POINTS
2 - B	1. Set the range to Ω x10 on the multi-tester. 2. Connect - lead to RA-1 pin 9, + lead to pin 12. Value of resistance should 290 - 360 ohm
3 - A	1. Set the range to Ωx1 on the multi-tester. 2. Connect the test lead to TP3 and TP4. Pattern Button 3 OFF: 200 - infinite ohm (individual part gives infinite ohm) ON: 0 ohm

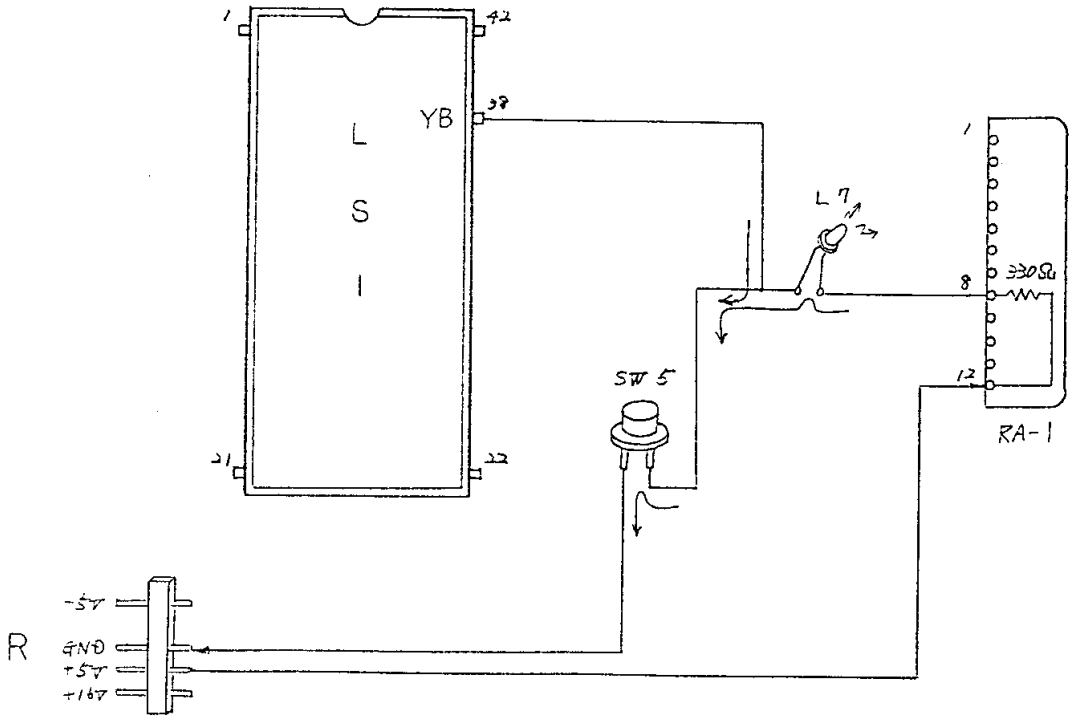

A
B
2
IN CASE THE PATTERN IS NOT DOUBLED VERTICALLY
Start
Push on - off
the pattern Button 3
Check voltage
at pin 37(TB)
of LSI
No
Push on: 0V
Push off: 3.4V
Bad soldering or disconti-
nuity between TP6 - TP8
Yes
LSI is defective
1
2

2 - 16 YB (HORIZONTAL EXPANSION) CIRCUIT

2-16-1 Flow of signal

Driving voltage +5V (RA-1 pin 12) is connected to LSI pin 38 (YB) through Pattern Button 4 (SW5).
When the Pattern Button is pushed off, the voltage at YB terminal of the LSI is high voltage, and when the Button is pushed on, the voltage becomes low and LED is turned on.

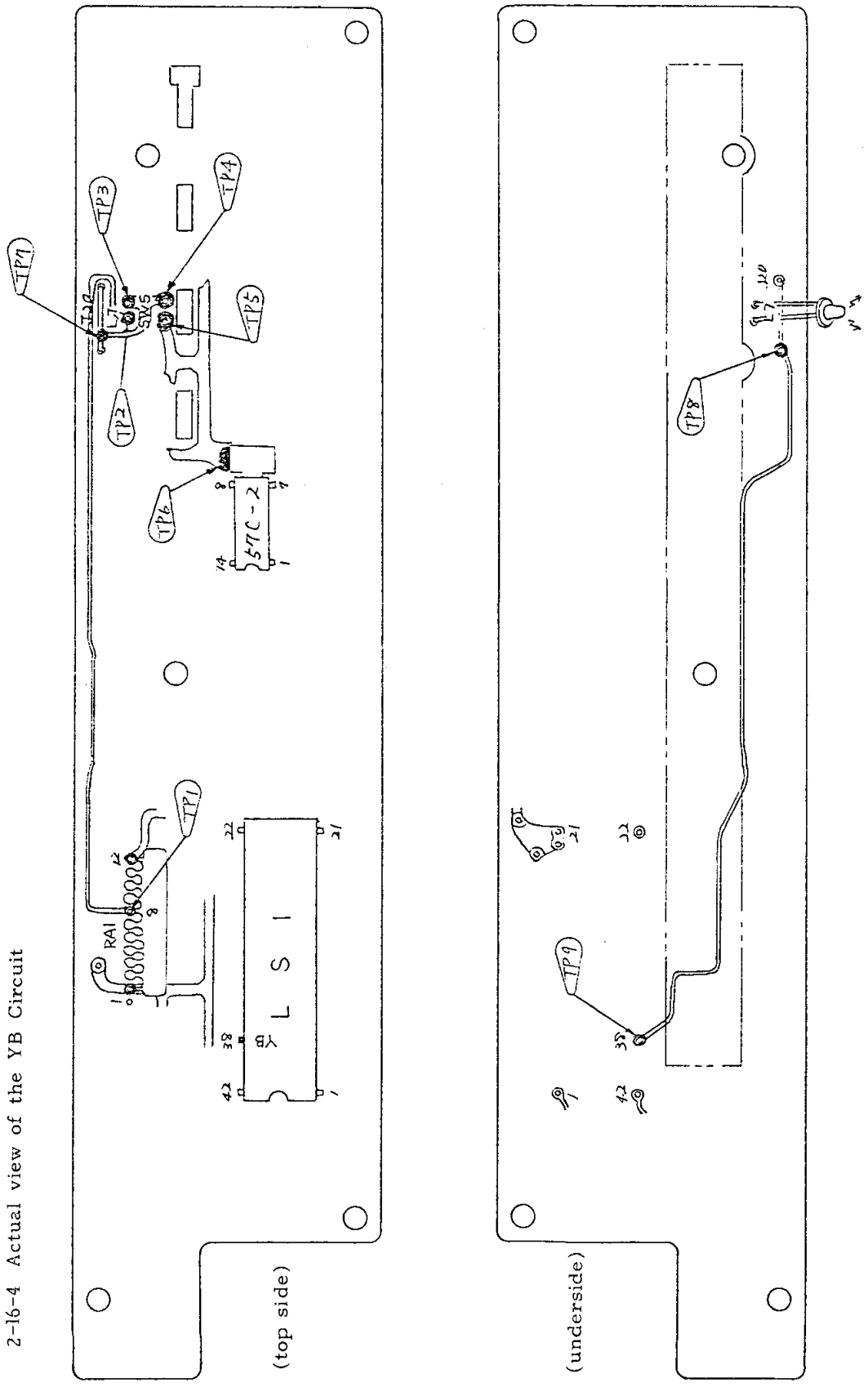
2-16-2 YB Circuit (Schematic)

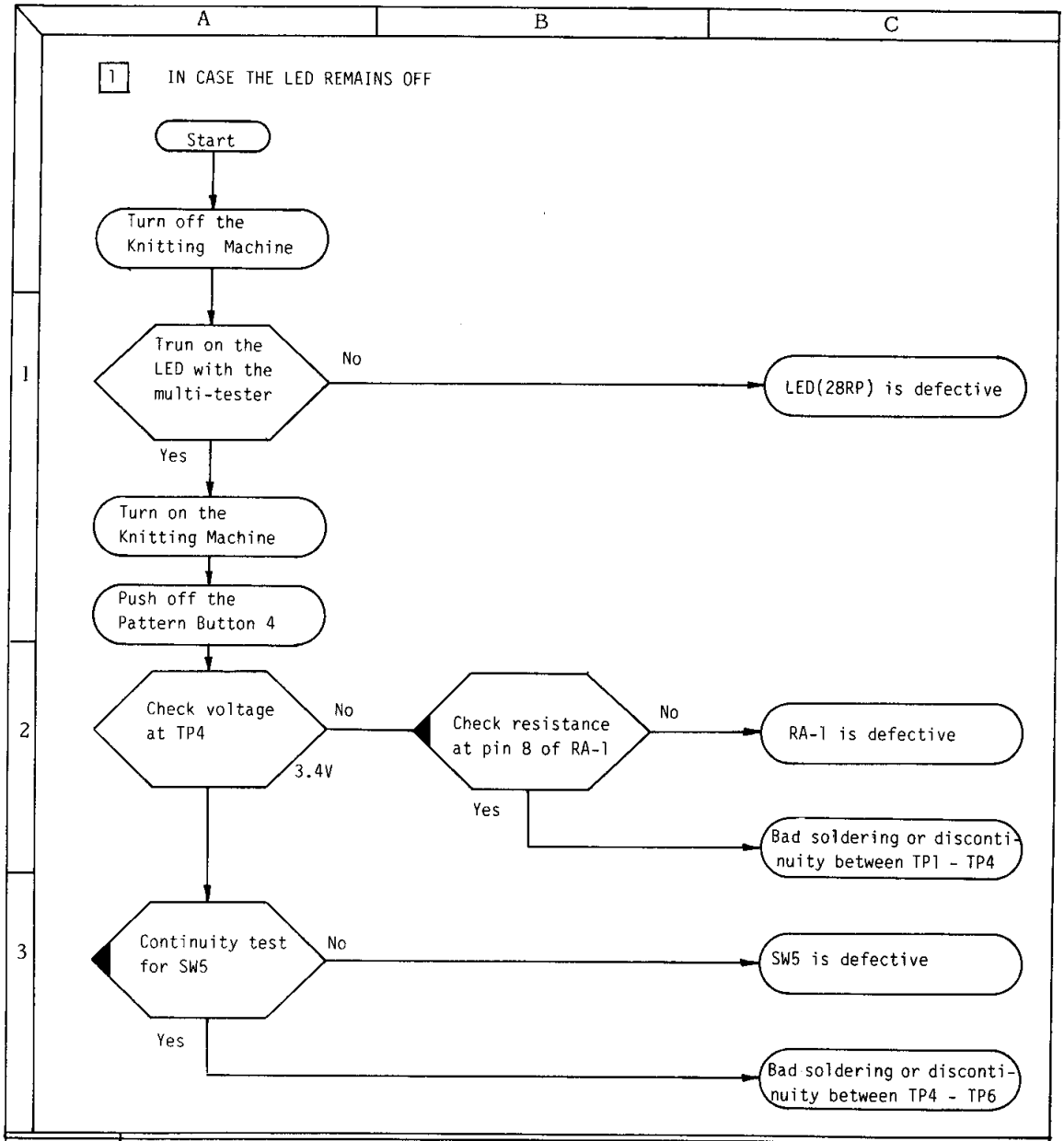


2-16-3 Setting the oscilloscope

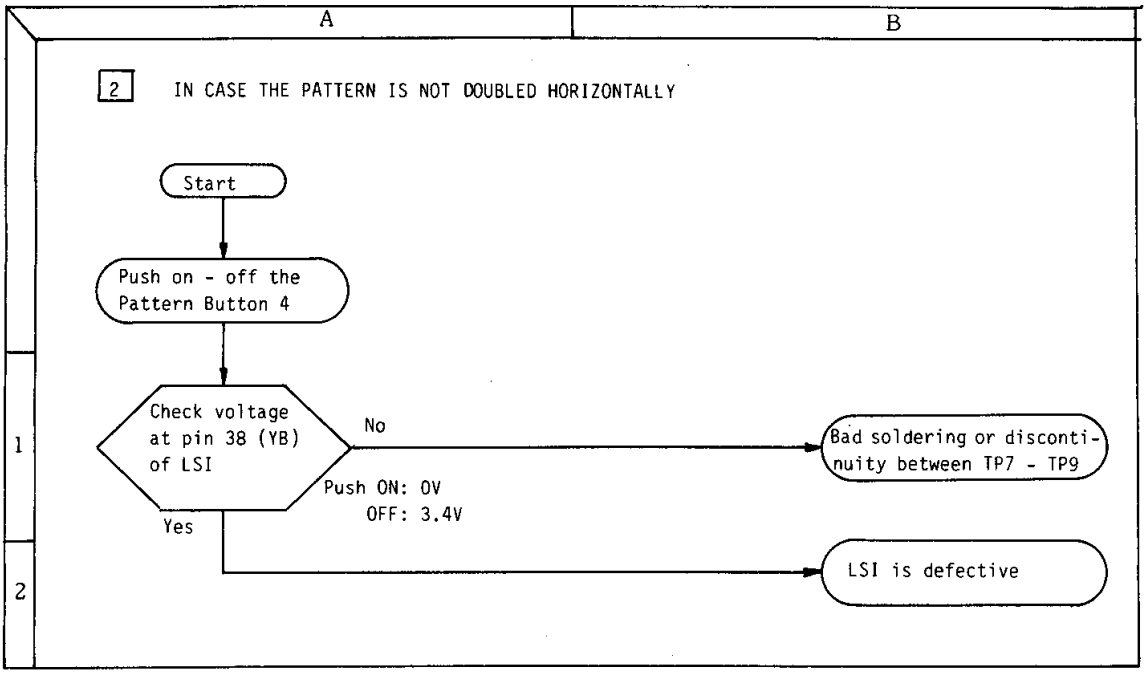
1. TIME/CM ———— 20mSEC
2. VOLTS/CM on CH2 ———— .1

2-16-4 Actual view of the YB Circuit





step code	CHECK POINTS
2 - B	1. Set the range to Ω x10 on the multi-tester. 2. Connect ⊖ test lead to RA-1 pin 8, and ⊕ test lead to pin 12. Resistance value should be 290 - 360 ohm.
3 - A	1. Set the range to Ω x1 on the multi-tester 2. Connect the test lead to TP5 and TP4 respectively. Pattern Button 4 OFF: 200 - infinite ohm (individual part shows infinite ohm) ON: 0 ohm in normal condition

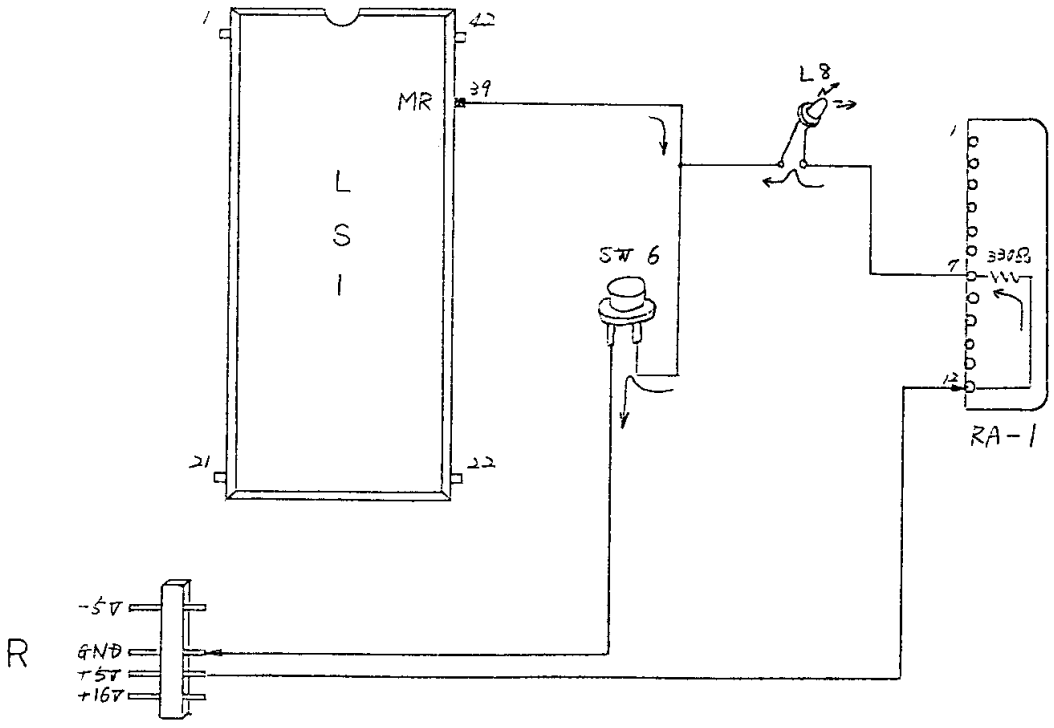

A
B
2
IN CASE THE PATTERN IS NOT DOUBLED HORIZONTALLY
Start
Push on - off the Pattern Button 4
Check voltage at pin 38 (YB) of LSI
No
Push ON: 0V
OFF: 3.4V
Yes
Bad soldering or discontinuity between TP7 - TP9
LSI is defective
1
2

2 - 17 MR(MIRROR REPEAT) CIRCUIT

2-17-1 Flow of signal

Driving voltage +5V (RA-1 pin 12) is connected to LSI pin 29 (MR) through Pattern Button 5 (SW6).
When the Pattern Button is pusehd off, the voltage at MR termianl of the LSI is high voltage, and when the Button is pushed on, the voltage becomes low and the LED is turned on.

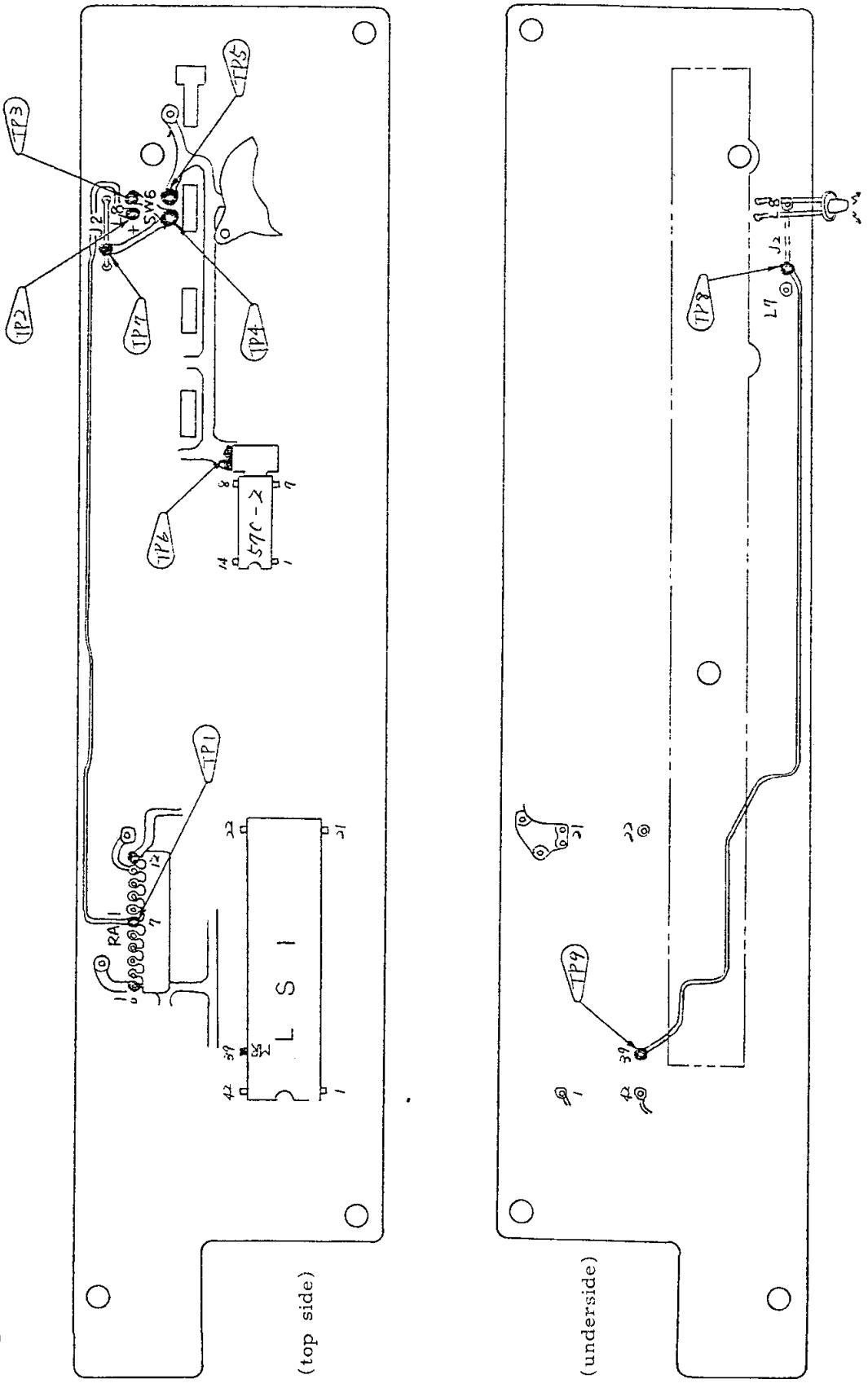
2-17-2 MR Circuit (Schematic)



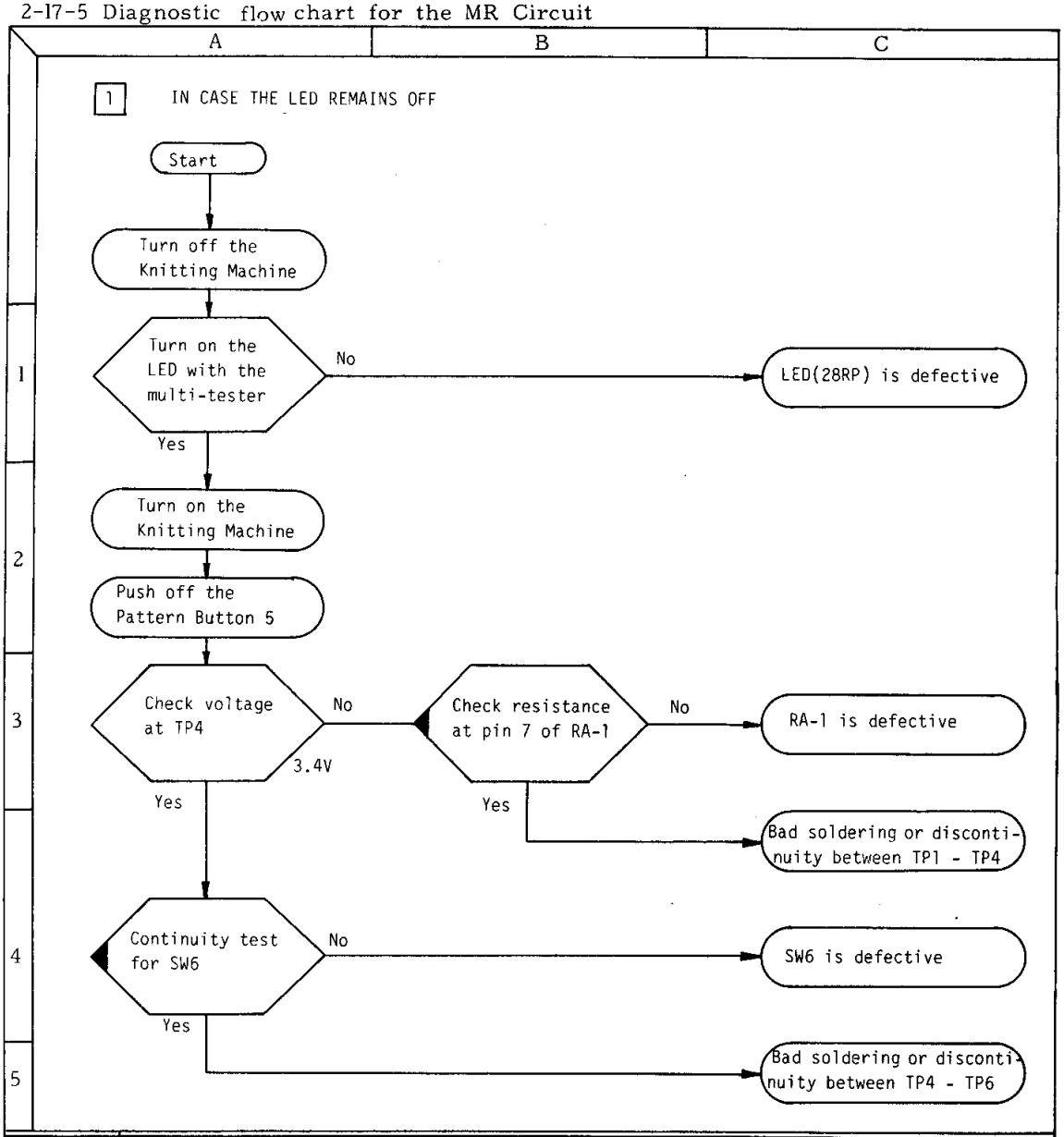
2-17-3 Setting the oscilloscope

1. TIME/CM ———— 20mSEC
2. VOLTS/CM on CH2 ———— .1

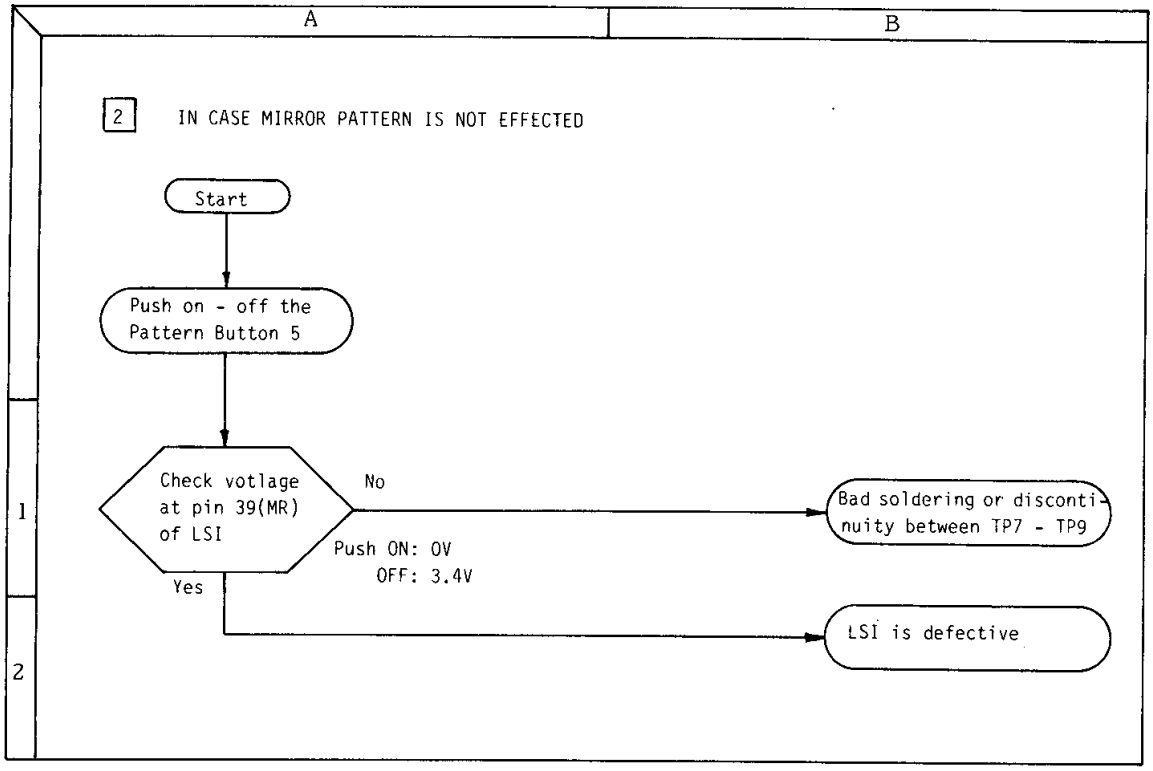
2-17-4 Actual view of MR Circuit



2-17-5 Diagnostic flow chart for the MR Circuit



step code	CHECK POINTS
3 - B	1. Set the range to Ω x10 on the multi-tester 2. Connect the ⊖ test lead to RA-1 pin 7, and ⊕ test lead to pin 12. Resistance value should be 290 - 360 ohm.
4 - A	1. Set the range to Ω x1 on the multi-tester. 2. Connect the test lead to TP5 and TP4 respectively. Pattern Button 5 OFF: 200 - infinite ohm (individual part shows infinite ohm) ON: 0 ohm in normal condition

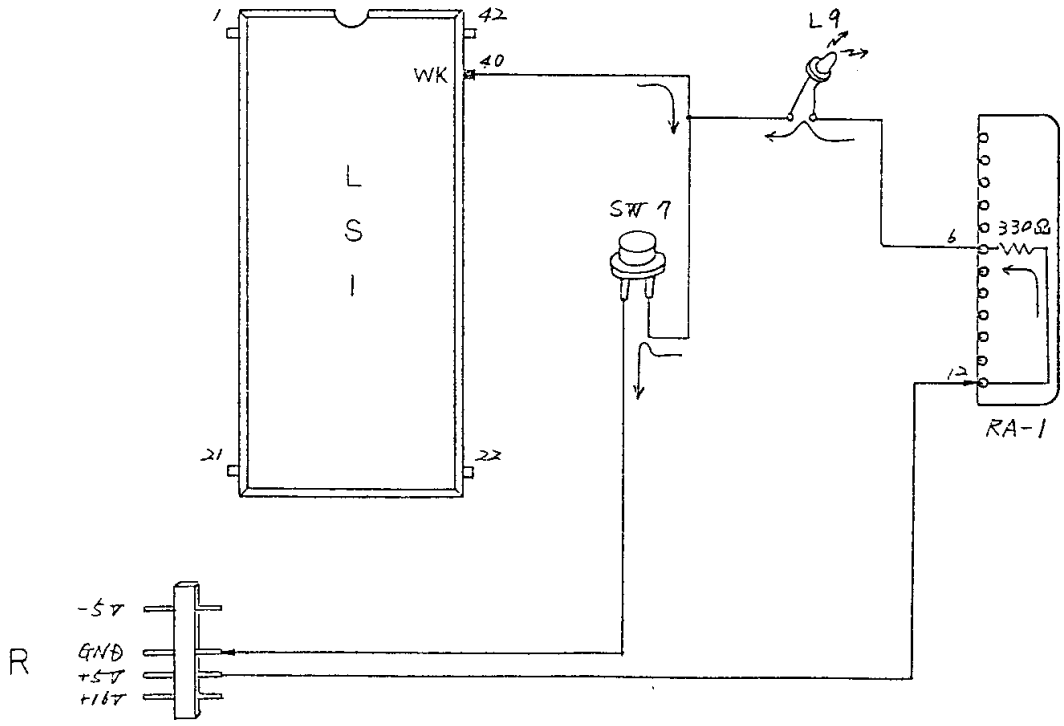

A
B
2
IN CASE MIRROR PATTERN IS NOT EFFECTED
Start
Push on - off the Pattern Button 5
Check votlage at pin 39(MR) of LSI
No
Push ON: OV
OFF: 3.4V
Yes
Bad soldering or disconti-nuity between TP7 - TP9
LSI is defective
1
2

2 - 18 WK(DOUBLE JACQUARD) CIRCUIT

2-18-1 Flow of signal

Driving voltage + 5V(RA-1 pin 12) is connected to LSI pin 40(WK) through Pattern Button 6 (SW7).
When the Pattern Button 6 is pushed off, the voltage at WK terminal of the LSI is high voltage, and when the Button is pushed on, the voltage becomes low and the LED is turned on.

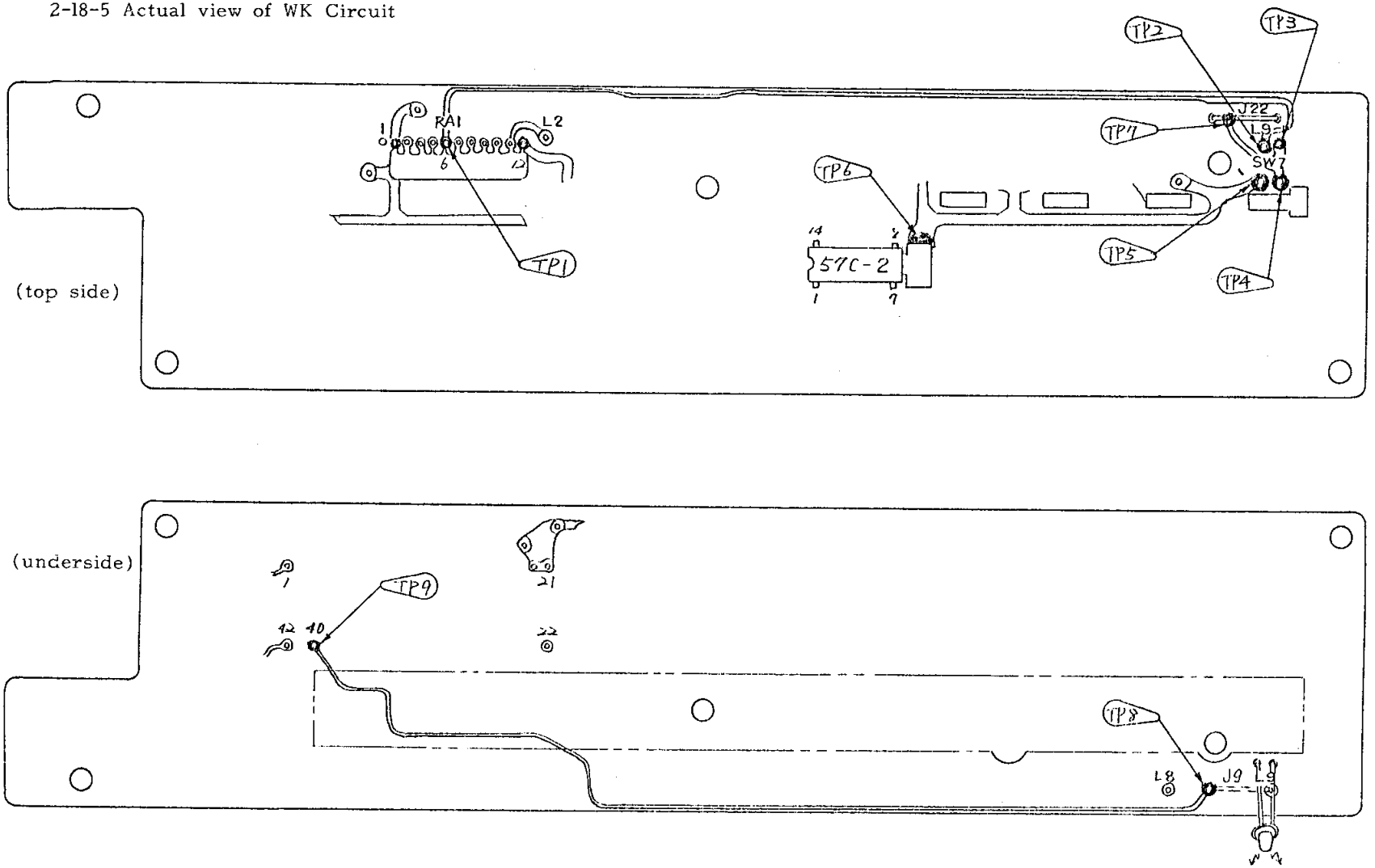
2-18-2 WK Circuit (Schematic)

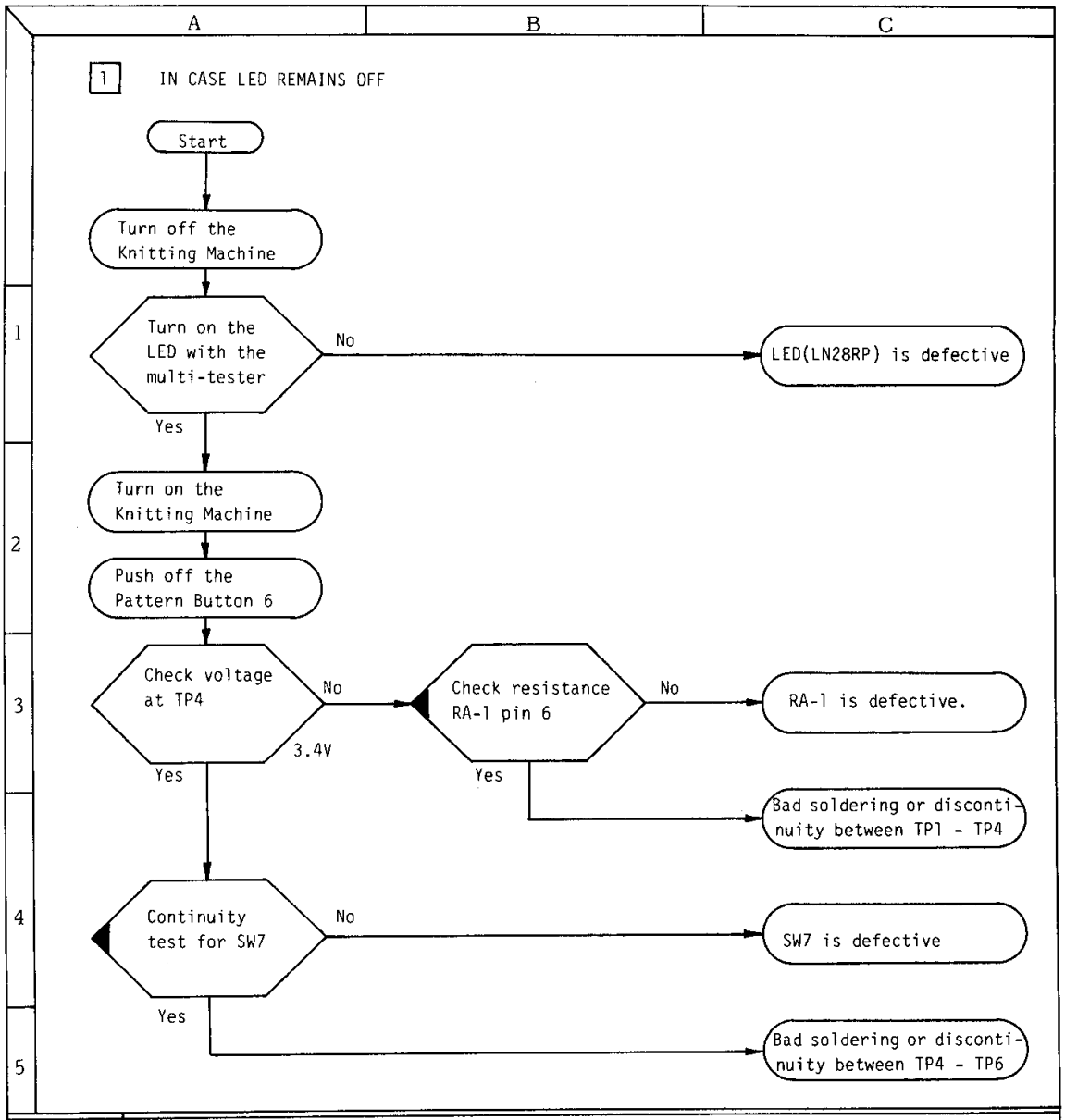


2-18-3 Setting the oscilloscope

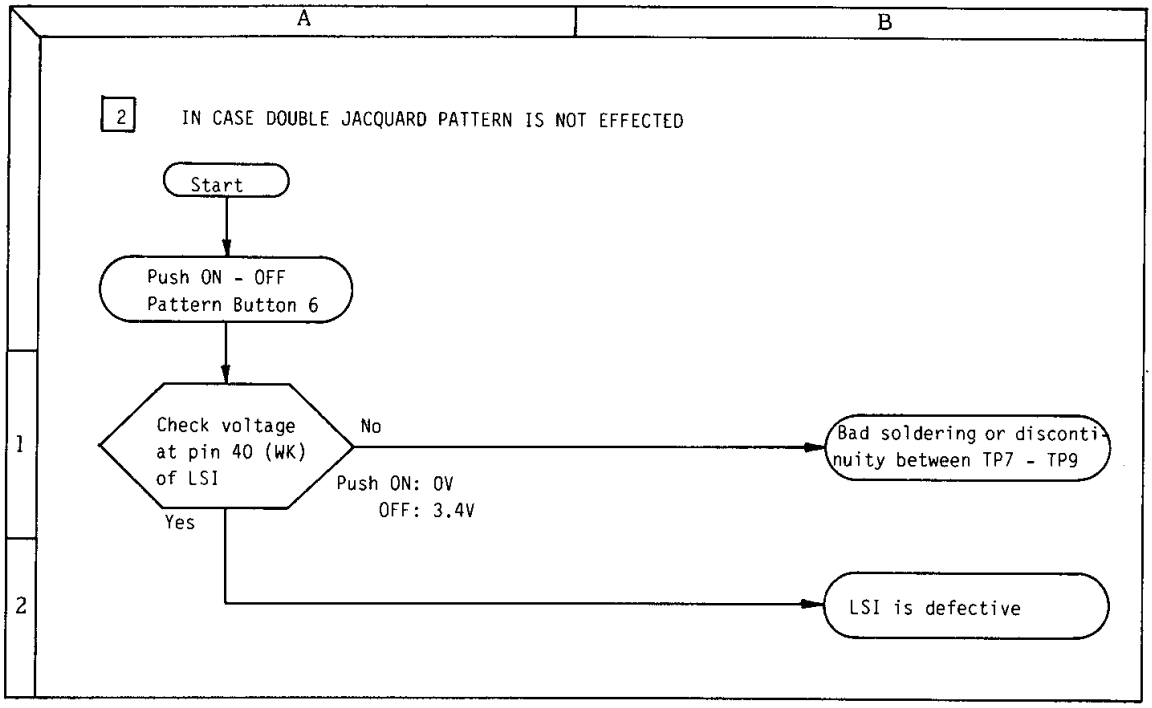
1. TIME/CM ———— 20mSEC
2. VOLTS/CM on CH2 ———— .1

2-18-5 Actual view of WK Circuit





step code	CHECK POINTS
3 - B	1. Set the range to Ω x10 on the multi-tester. 2. Connect the ⊖ test lead to RA-1 pin 6, and ⊕ test lead to pin 12. Resistance value should be 290 - 360 ohm in normal condition.
4 - A	1. Set the range to Ω x1 on the multi-tester. 2. Connect the test lead to TP5 and TP6 respectively. Pattern Button 6 OFF: 200 - infinite resistance (individual part shows infinite ohm) ON: 0 ohm in normal condition


A
B
2
IN CASE DOUBLE JACQUARD PATTERN IS NOT EFFECTED
Start
Push ON - OFF
Pattern Button 6
Check voltage
at pin 40 (WK)
of LSI
No
Push ON: 0V
OFF: 3.4V
Yes
Bad soldering or disconti-
nuity between TP7 - TP9
LSI is defective
1
2

3 CARD READER UNIT

** Preparations for repairing the Card Reader Unit/

(1) Setting of the Oscilloscope

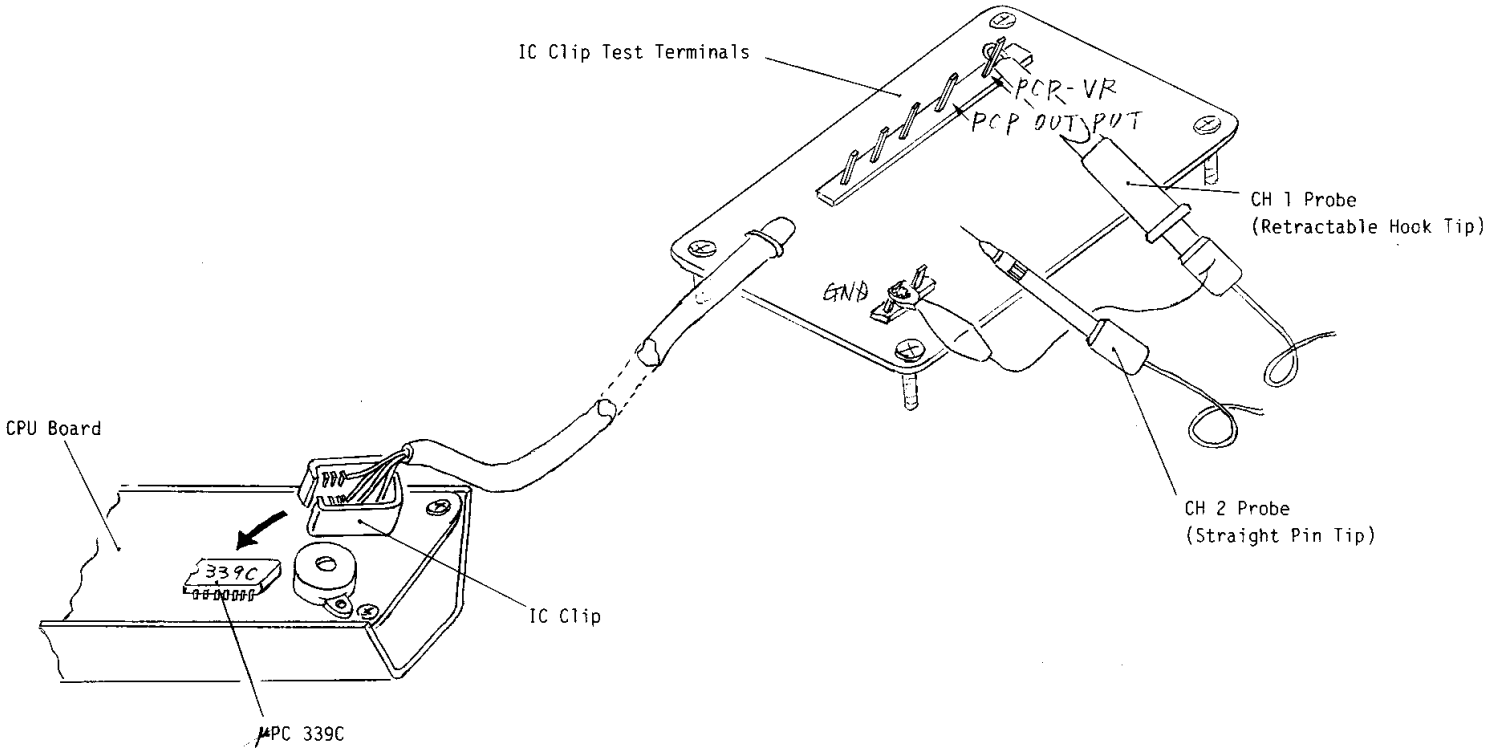
Referring to the Setting Chart, set the Oscilloscope.

(2) Connecting the IC Clip Test Terminals

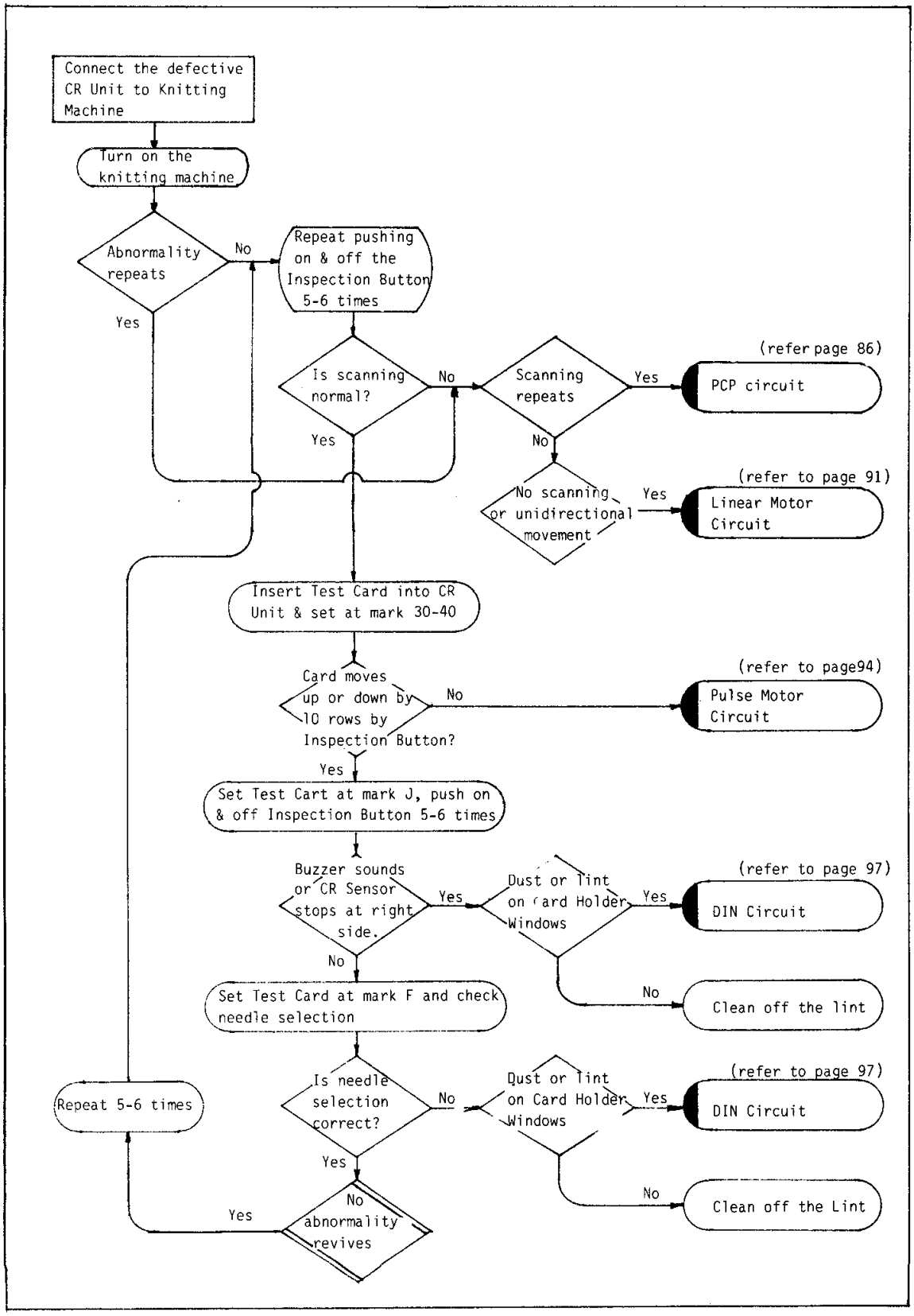
Connect the Test Terminals with the μPC339C on the CPU Board.

Complete the above preparations before repairing the Card Reader Unit.

3 - 1 HOW TO CONNECT THE IC CLIP TEST TERMINALS



3 - 2 DIAGNOSTIC FLOW CHART FOR THE CARD READER UNIT

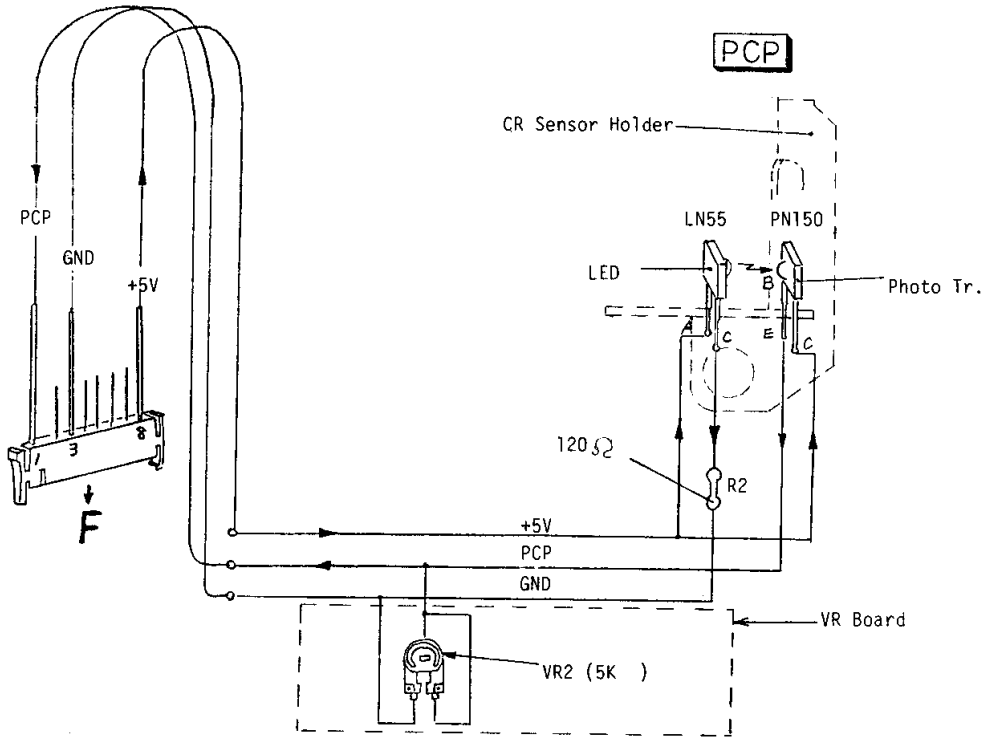


3 - 3 PCP (PATTERN CLOCK PULSE) CIRCUIT

3-3-1 Flow of signal in the PCP circuit

When voltage of +5V is applied across the anode and the cathode of the LED (LN55), the LED emmits light in proportion to current. The fixed resistor R2 (120Ω) regulates the current to the rated level. The emmited light is sensed by the Photo-Transister PN150 and converted into current and regulated by the Potentiometer (VR2). The current comes out from F connector(pin 1) as PCP signal.
The clock plate interrupts the current at regular intervals.

3-3-2 PCP CIRCUIT

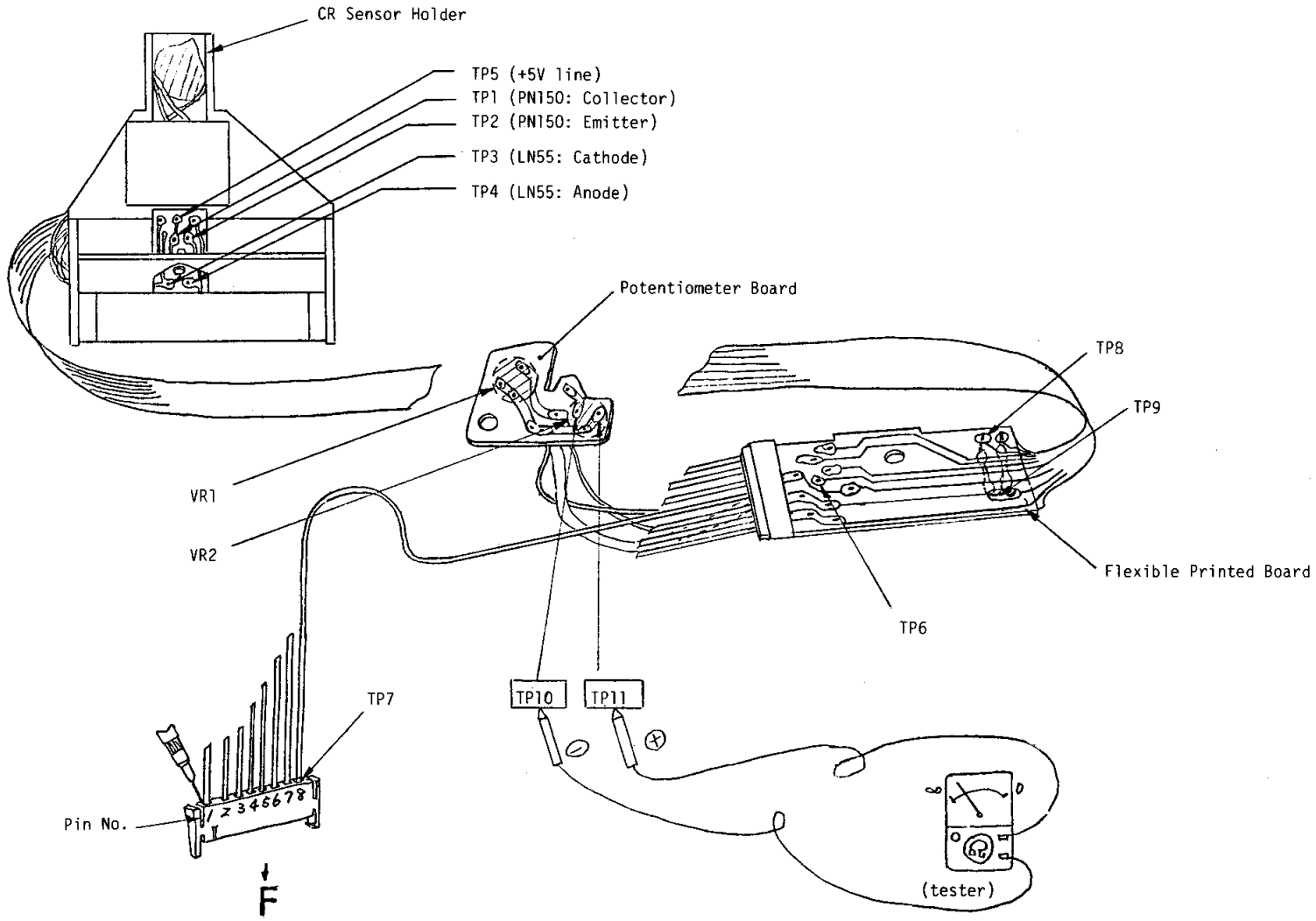


(Fig 3-2)

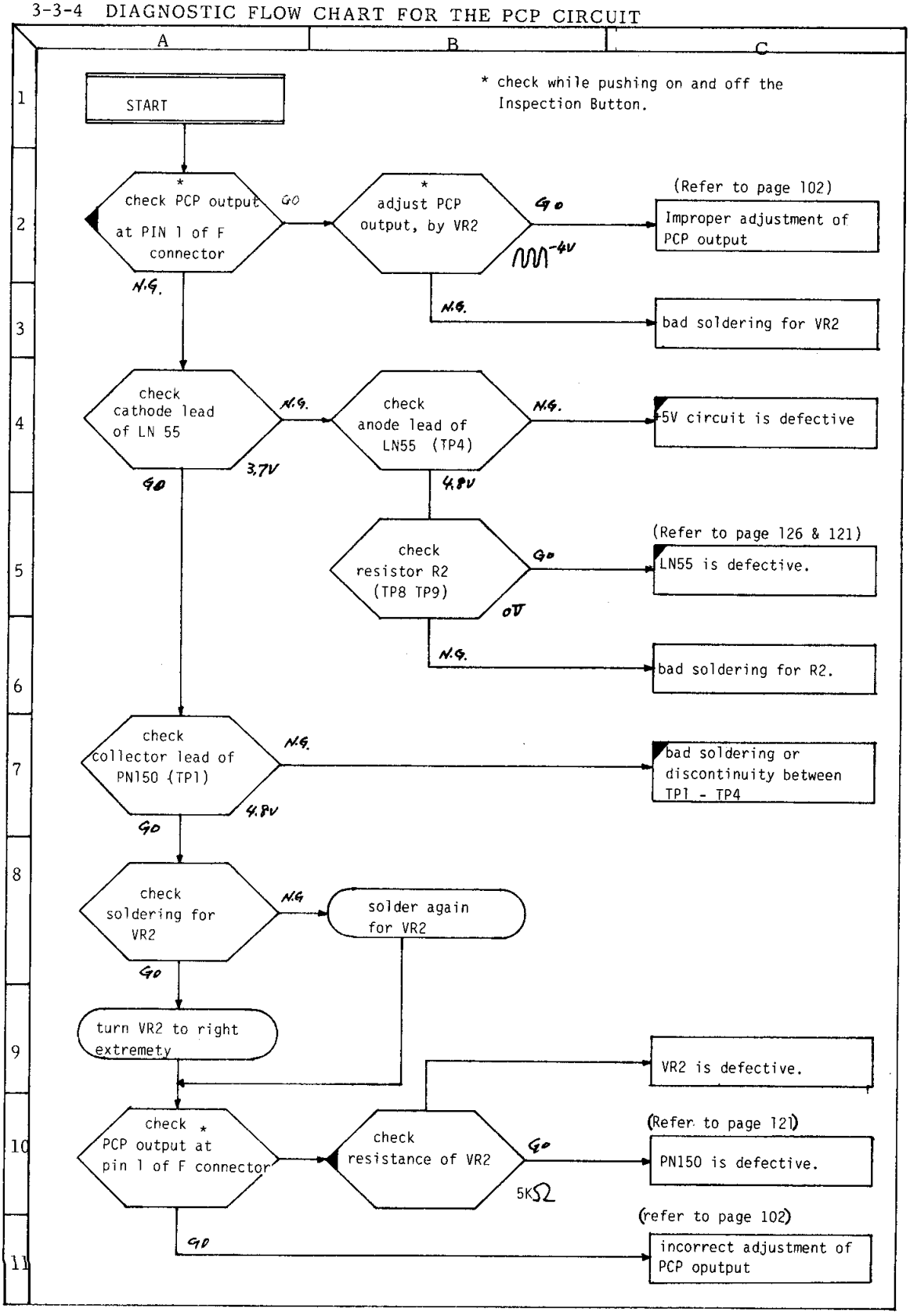
3-3-3 HOW TO CHECK THE PCP CIRCUIT

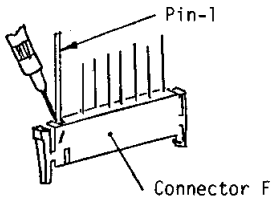
1. SETTING THE OSCILLOSCOPE
   a. AC-GND-DC Lever on CH 2 to DC
   b. MODE buttons to CH 2
2. Check the machine following the diagnostic Flow Chart.
3. Use the CH 2 Probe (straight pin tip) to check the circuit.
4. When the checking is finished, reset the oscilloscope as instructed on the INITIAL SETTING - 1 & 2.

Actual view of PCP circuit



3-3-4 DIAGNOSTIC FLOW CHART FOR THE PCP CIRCUIT



	CHECK POINT
2 - A	 Contact the Probe of straight pin tip with the PIN 1 of the Connector F and check the waveform. 4V-- ∧∧∧ .... permissible if waveform is observed. (Output voltage is disregarded.)
4 - C	1. On the +5V circuit, check the voltage (approx. 4.8V) following the test points, TP7 - TP6 - TP5 - TP1. In this step, press the probe against each test point. Measured value is approx. 4.8V 2. If the circuit is diagnosed as no good, check the continuity of the circuit. a) Turn off the knitting machine. b) Set ready the multi-tester, and set the range of resistance to x 1 KΩ. c) Zero ohm Adjustment. d) TP7 - TP6 TP6 - TP4 TP4 - TP1 Read the resistance across the two test points. (Polarity of the test leads does not matter.) Resistance : 0Ω .....normal " ∞Ω .....abnormal (Bad contact across the two test points owing to bad soldering.
5 - C	1. Refer to page if the LN55 in abnormal. 2. Recheck the replaced LN55.
7 - C	1. Check continuity across TP1 and TP2 in the same manner as described in 4-C,2.
10 - B	1. Turn off the knitting machine. 2. Set ready the multi-tester, and set the range of resistance to 1 KΩ. 3. Adjust the ohmmeter to zero ohm. Check the resistance across TP10 and TP11. (Refer to Fig.) 4. Turn the potentiometer VR2 to the extremity in right turn: 5KΩ Turn the potentiometer VR2 to the extremity in left turn : 0Ω-Normal

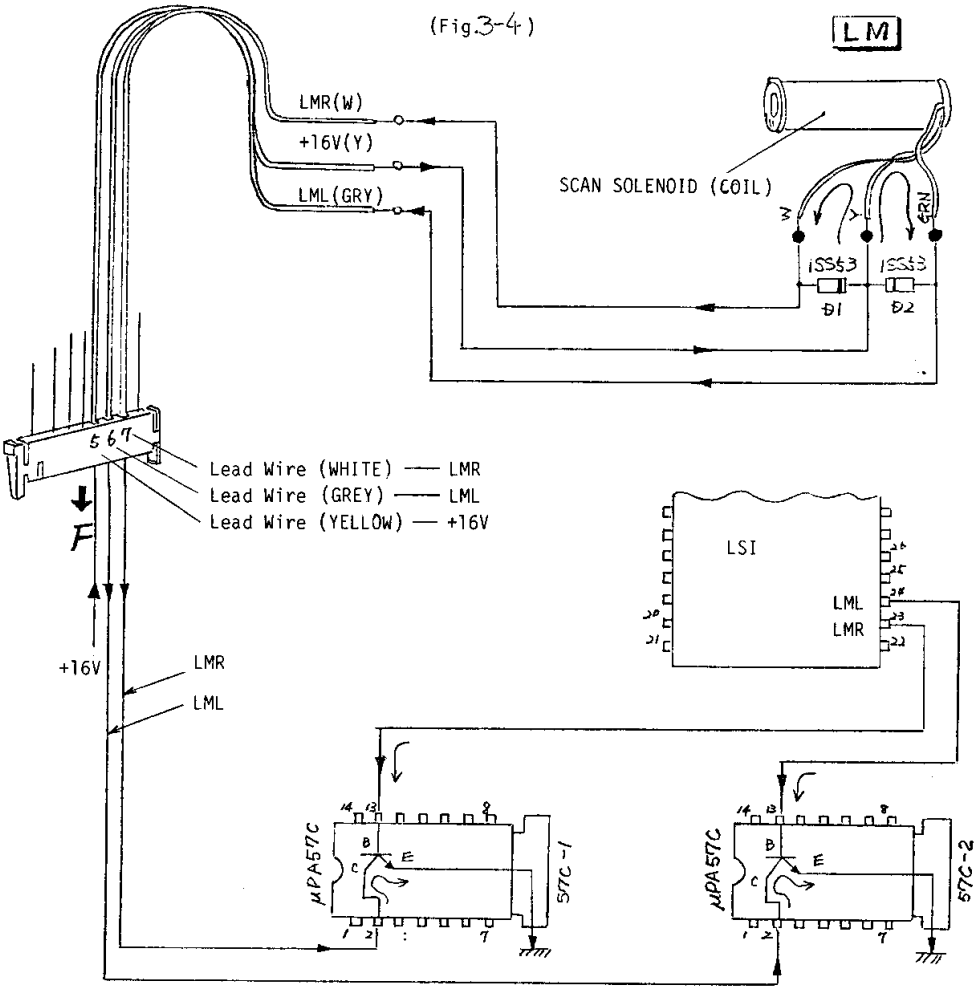
3 - 4 LINEAR MOTOR CIRCUIT

3-4-1 Signals in the Linear Motor Circuit

When the Inspection Button is operated or when the Carriage passes the second Point Cam, LMR signal (+5V) is sent out from PIN 23 of the LSI. This signal goes into the PIN 13 of the 57C-1 and sets on the transistor. When the transistor is set on, current flows from PIN 5(+16V) of the connector F to Pin 7 of the connector F through the Scan Coil, and the CR Sensor Holder moves from left to right.
When the current flows from Pin 5(+16V) of the connector F to Pin 6 (LML) through Scan Coil, the CR Sensor Holder moves from right to left.

3-4-2 Linear Motor Circuit (Schematic)

(Fig.3-4)



3-4-3 HOW TO CHECK THE LINEAR MOTOR CIRCUIT

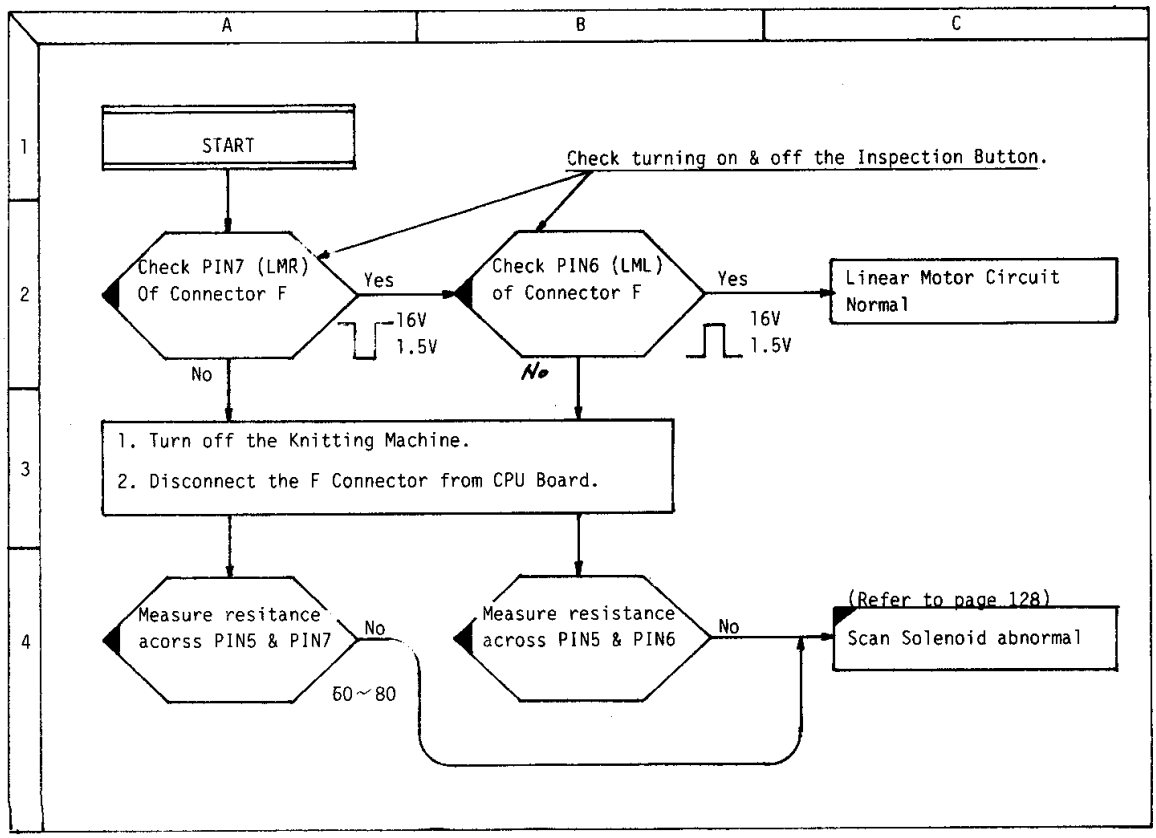
1. Setting the Oscilloscope
   a) Change the MODE from CHOP to CH 2.
   b) VOLTS/CM on CH 2 to .5 from .1.
   c) Set the AC-GND-DC on CH 2 lever to DC.

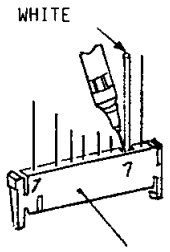
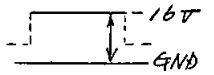
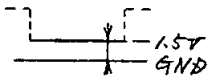
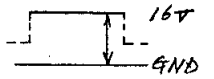
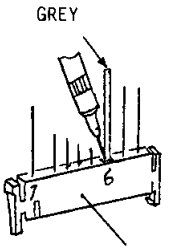
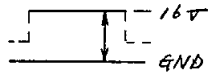
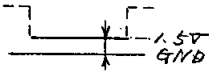
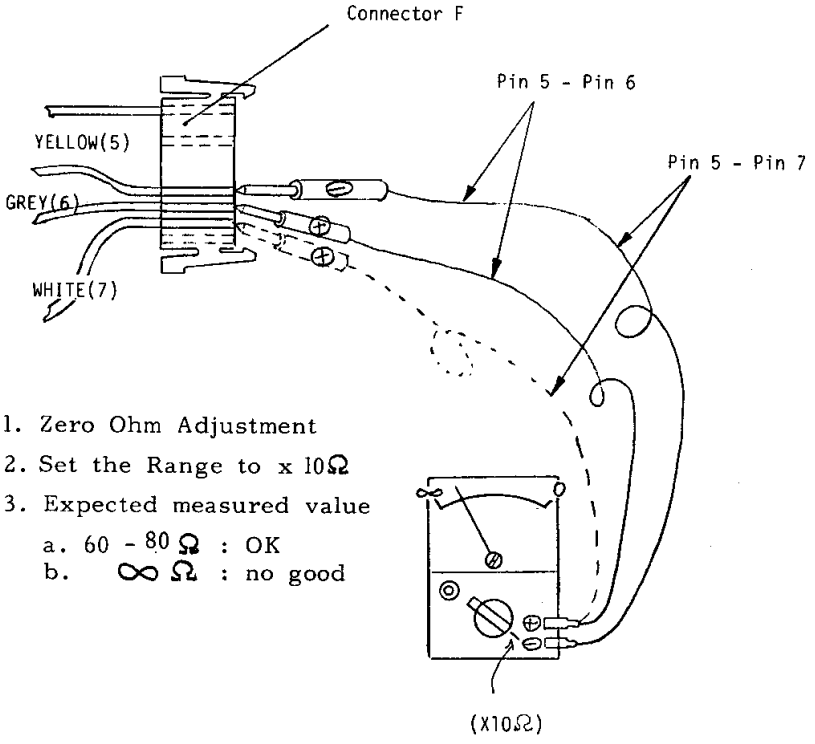
2. Following the diagnostic flow chart, check the linear motor circuit.

3. Use the straight pin tip probe on CH 2 for the checking.

4. When the checking is completed, set the oscilloscope as instructed on the separate operation [INITIAL SETTING 1&2].

3-4-4 Diagnostic flow chart for the Linear Motor Circuit



	CHECK POINT
2 - A	 Cange of voltage and the movement of the CR Sensor. 1. Stationary at the left side  2. Moving from left to right.  3. Moving from right to left. 
2 - B	 Change of voltage and the movement of the CR Sensor. 1. Stationary at the right side.  2. Moving from left to right.  3. Moving from right to left. 
4 - A 4 - B	 1. Zero Ohm Adjustment 2. Set the Range to x 10Ω 3. Expected measured value a. 60 - 80 Ω : OK b. ∞ Ω : no good

3 - 5 PULSE MOTOR CIRCUIT

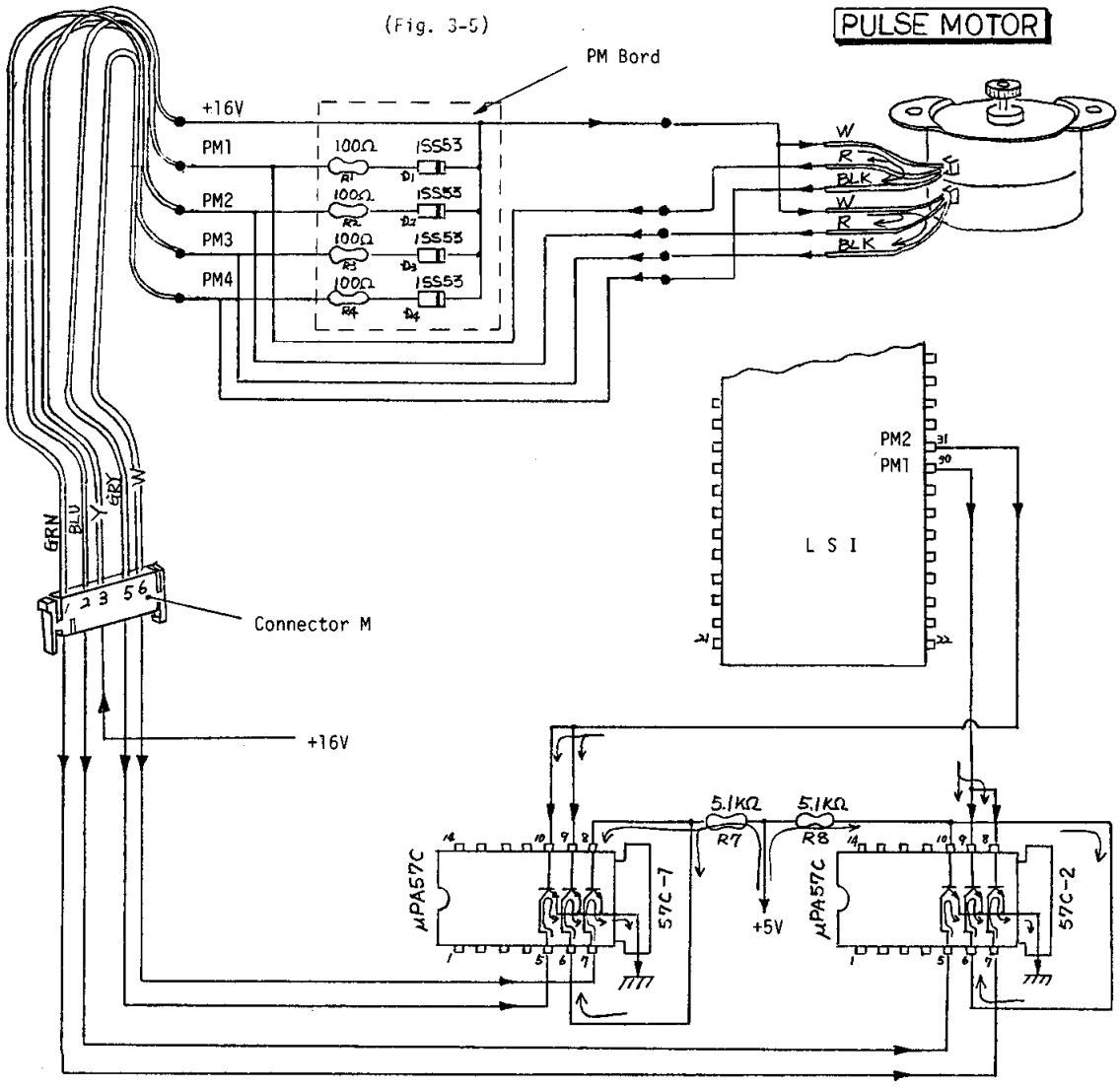
3-5-1 Flow of signal in the PULSE MOTOR CIRCUIT

When the Inspection Button is operated or the Carriage passes the first Point Cam, the signals PM1 and PM2 are sent out from pin30 and pin 31 the LSI respectively.
The signal PM1 goes into PIN8 and PIN9 of the 57C-2, PM2 into PIN9 and PIN10 of the 57C-1 respectively.

57C-1 & 2 are IC's constructed with transistors. Those input signals set on those transistors and drive the Pulse Motor with +16V.

3-5-2 PULSE MOTOR CIRCUIT

(Fig. 3-5)



3-5-3 How to diagnose the PULSE MOTOR CIRCUIT

1. Setting the Oscilloscope

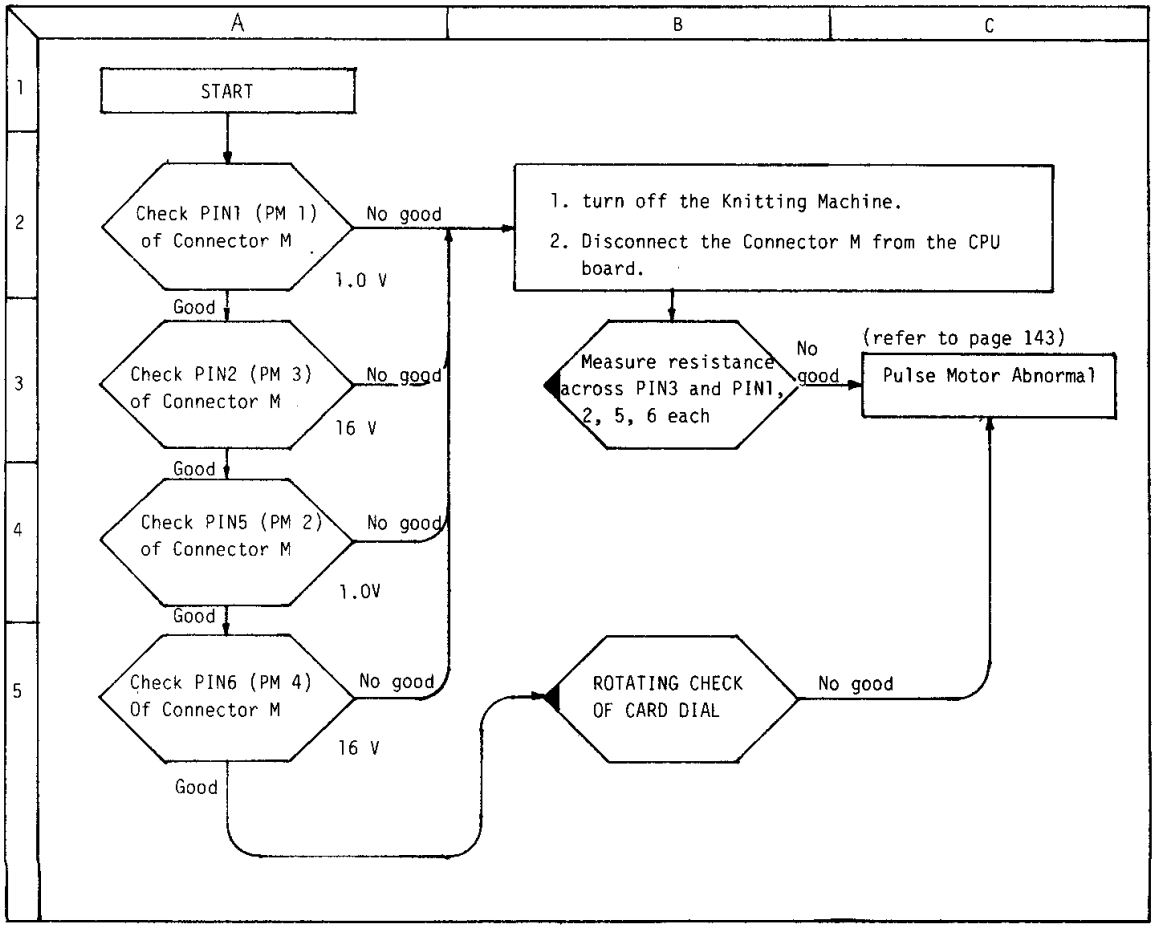
   a. Mode Buttons: from CHOP to CH 2
   b. VOLTS/CM on CH 2: from .1 to .5
   c. AC-GND-DC on CH 2: DC

2. Check the Pulse Motor Circuit following the diagnostic flow chart.

3. Use the straight tip pin on CH 2 for checking the circuit.

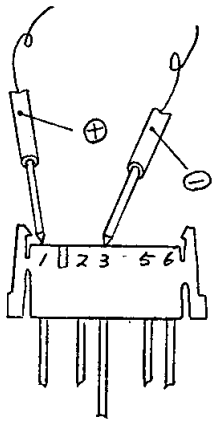
4. After completion of checking, change the settings of the oscilloscope as in the INITIAL SETTINGS - 1 & 2.

3-5-4 Diagnostic flow Chart for the Pulse Motor Circuit



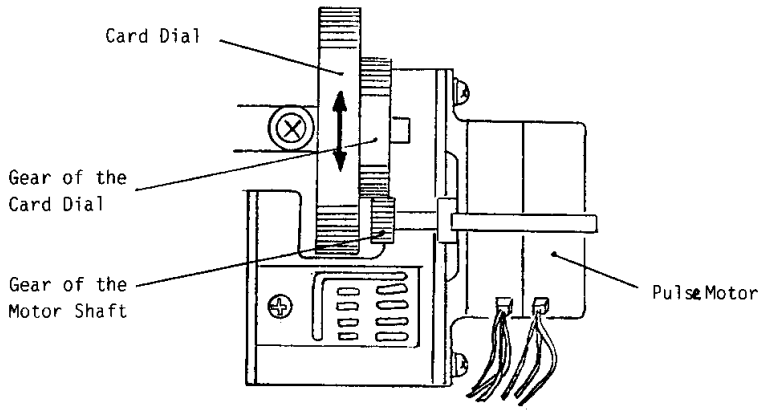
	CHECK POINT
3 - B	1. Make ready the Multi-Tester by setting the range selector to x 10Ω. 2. Zero ohm adjustment for the Multi-Tester. 3. Measure the resistance in the following manner. (Connector M)

	Test Lead (black) (Negatived)	Test Lead (Red) (Positive)	Expected Values(Ω)
PM 1	Pin 3	Pin 1	110 - 160
PM 3	Pin 3	Pin 2	110 - 160
PM 2	Pin 3	Pin 5	110 - 160
PM 4	Pin 3	Pin 6	110 - 160



(Connector M)

5 - B	1. Turn on the knitting machine, and turn the Card Dial forward and backward with your finger, and check the backlash of the Dial. * Backlash imperceptible amount is permissible.



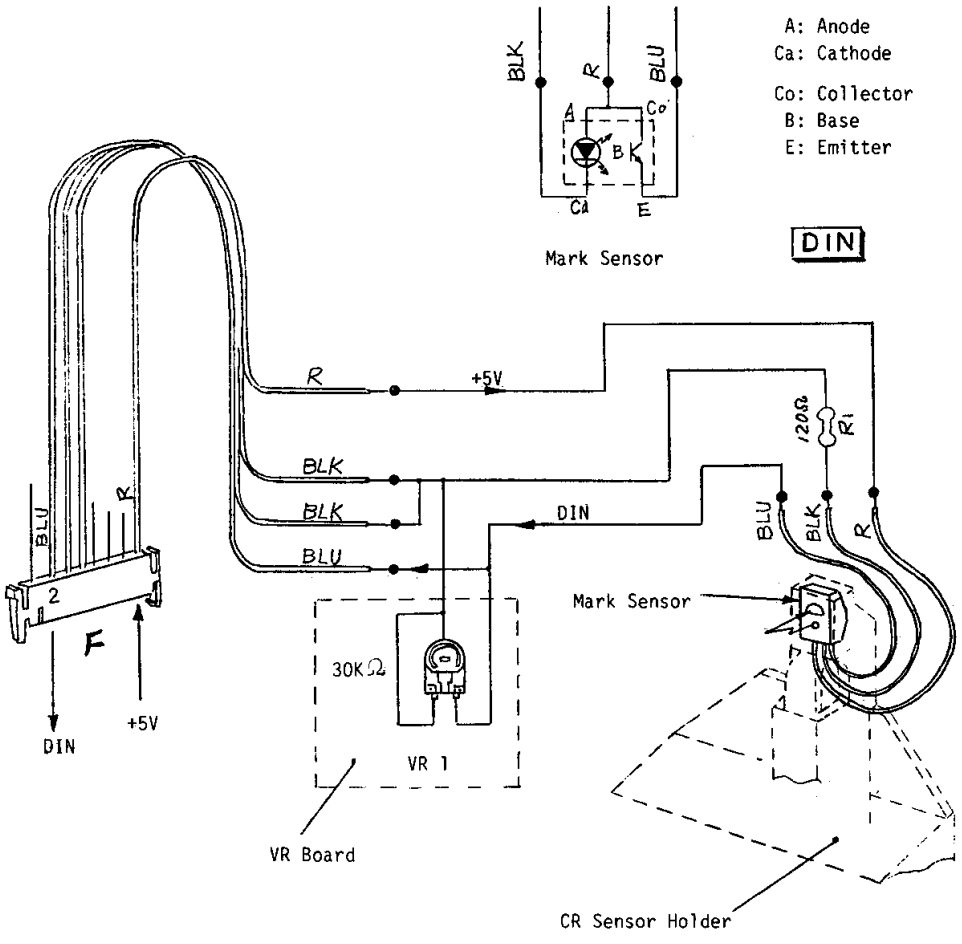
2. Turn off the knitting machine, and insert a Pattern Card into the CR Unit, and check the rotation of the Card Dial.
   * No interference to the rotation is permitted.

3 - 6 DIN (DATA IN) CIRCUIT

3-6-1 Flow of signals in the DIN Circuit

DIN signals are produced by the Mark Sensor. The Mark sensor is constructed with a photo-transistor and a LED confronting with each other. When a voltage(+ 5V) is applied to the anode of the LED, and the collector of the photo-transistor, current flows from anode to cathode on the LED and it emitts light (infra-red light). The potentiometer VR1 regulates the current. The light emitted from the LED is reflected on the surface of the Pattern Card and sensed by the photo-transistor. The photo-transistor is activated by the light and produces current which is regulated by the potentiometer VR 1. The signal is sent out from PIN 2 of the Connector F.

3-6-2 DIN CIRCUIT



(Fig.3-6)

3-6-3 How to check the DIN circuit

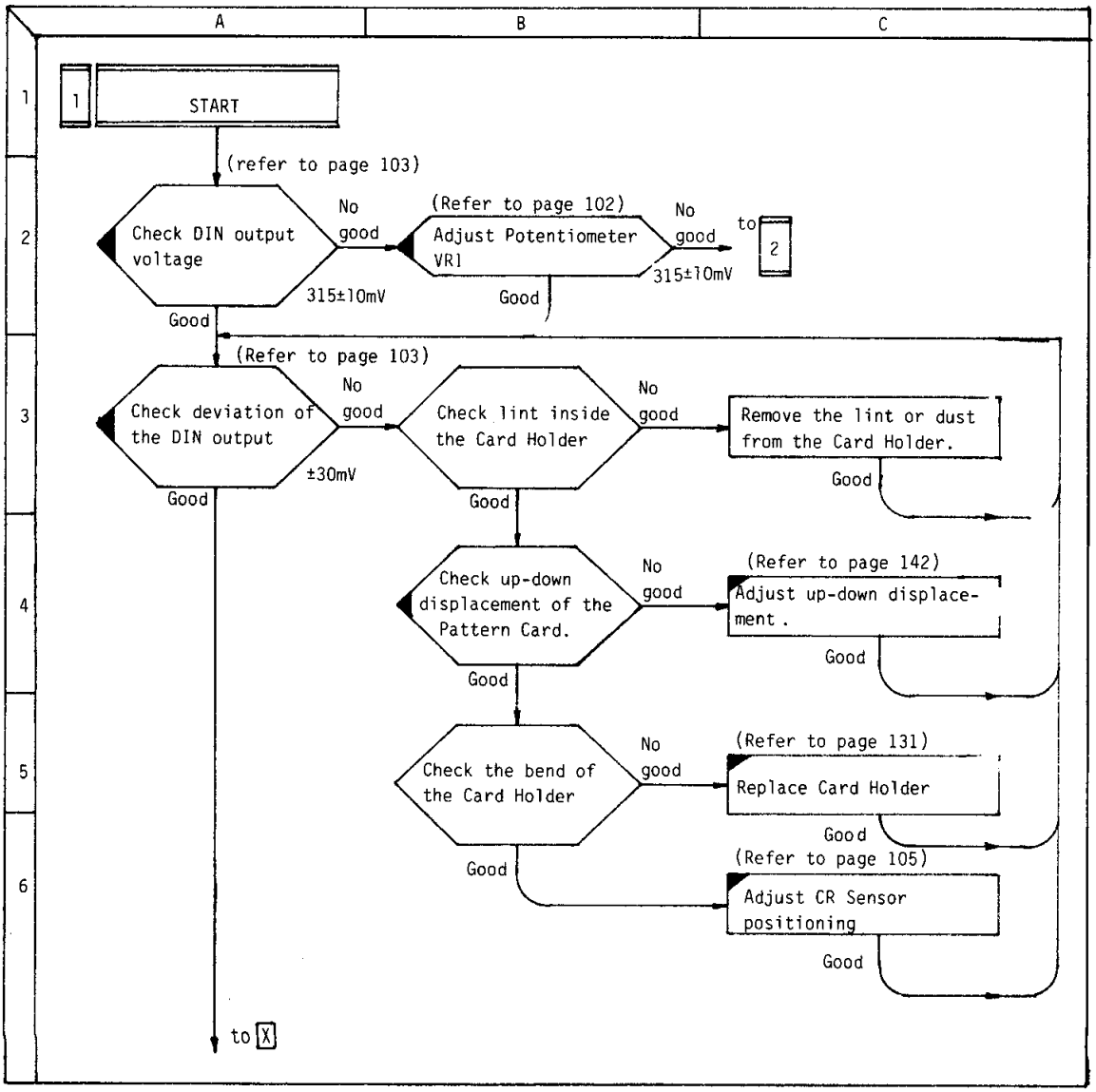
1. Setting the Oscilloscope

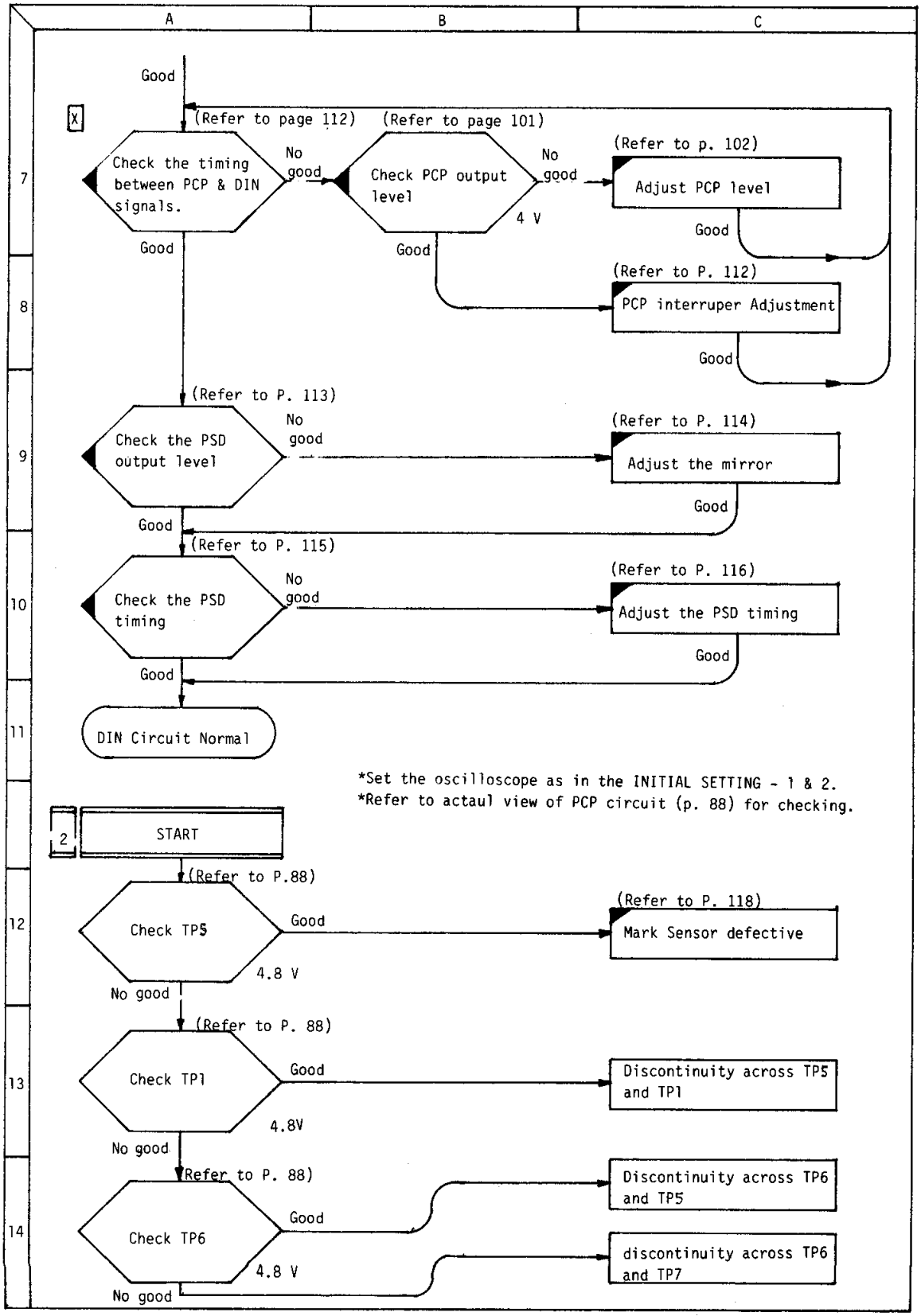
   a) Set the oscilloscope as instructed in the Flow Chart.

2. Check following the Diagnostic Flow Chart for the DIN circuit.

3. Change the setting of the oscilloscope as instructed on the separate operation table.

3-6-4 Diagnostic Flow Chart for the DIN circuit.

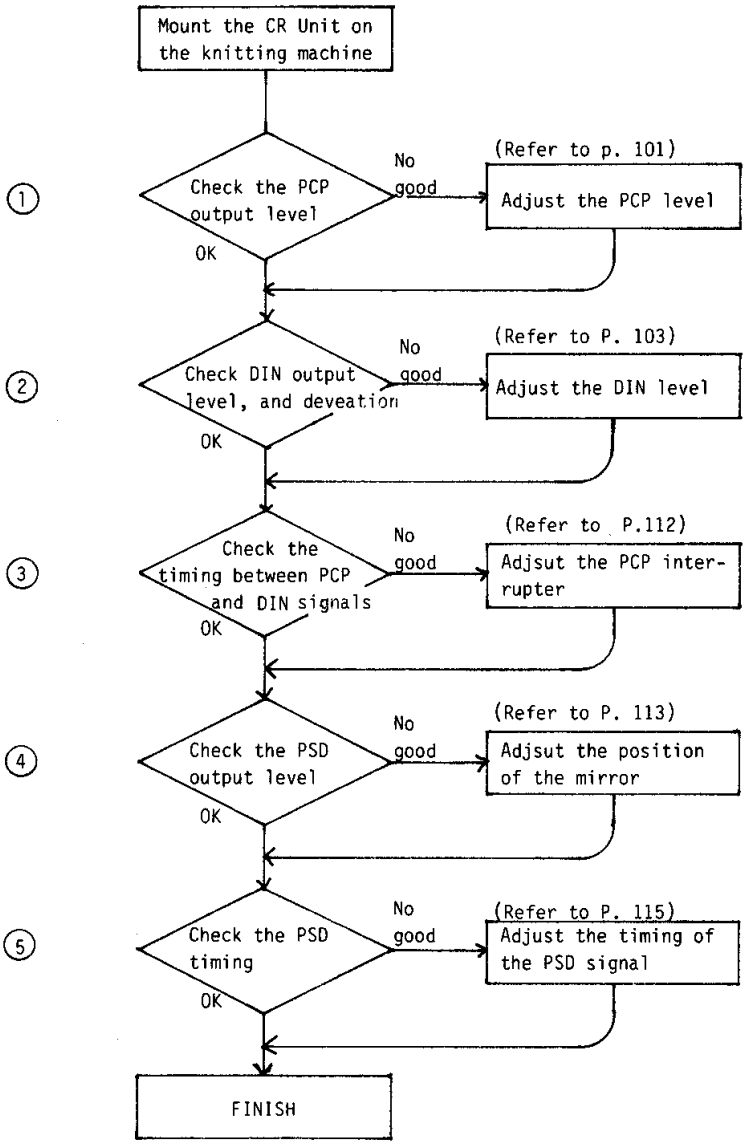



A
B
C
7
8
9
10
11
12
13
14
Good
X
(Refer to page 112)
(Refer to page 101)
Check the timing between PCP & DIN signals.
No good
Check PCP output level
No good
4 V
(Refer to p. 102)
Adjust PCP level
Good
Good
Good
(Refer to P. 112)
PCP interruper Adjustment
Good
(Refer to P. 113)
Check the PSD output level
No good
(Refer to P. 114)
Adjust the mirror
Good
Good
(Refer to P. 115)
Check the PSD timing
No good
(Refer to P. 116)
Adjust the PSD timing
Good
Good
DIN Circuit Normal
*Set the oscilloscope as in the INITIAL SETTING - 1 & 2.
*Refer to actaul view of PCP circuit (p. 88) for checking.
2
START
(Refer to P.88)
Check TP5
Good
(Refer to P. 118)
Mark Sensor defective
4.8 V
No good
(Refer to P. 88)
Check TP1
Good
Discontinuity across TP5 and TP1
4.8V
No good
Refer to P. 88)
Check TP6
Good
Discontinuity across TP6 and TP5
4.8 V
discontinuity across TP6 and TP7
No good

3 - 7 CHECK AND ADJUSTMENT OF THE CR UNIT AFTER ITS REPLACEMENT

When the CR unit is replaced, check it following the chart below, and readjust it if necessary.

3-7-1 Checking flow chart

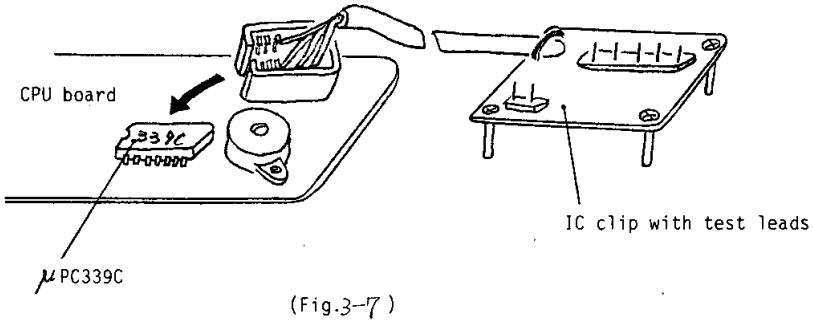


3-7-2 Checking and adjusting the PCP level

2.1: Checking the PCP Level

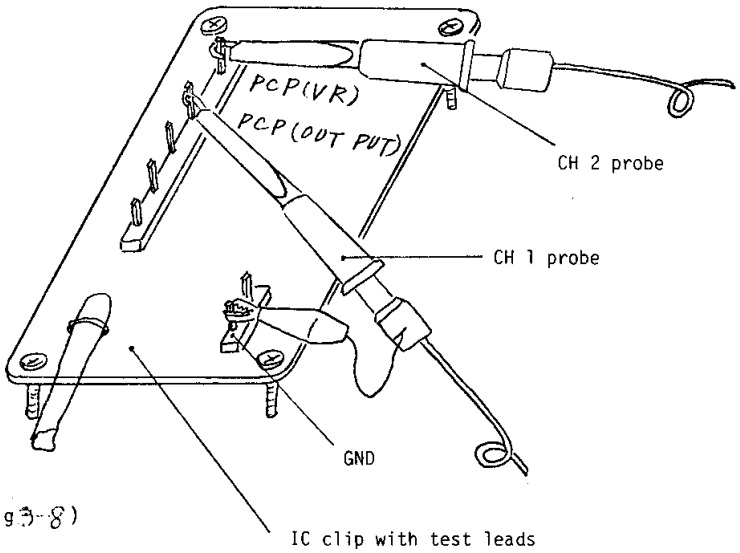
1) Connect the C R Unit to the knitting machine.

2) Connect the IC clip with test leads to the μPC339C.



(Fig.3-7)

3) Connect the probe of the oscilloscope to the IC Clip.

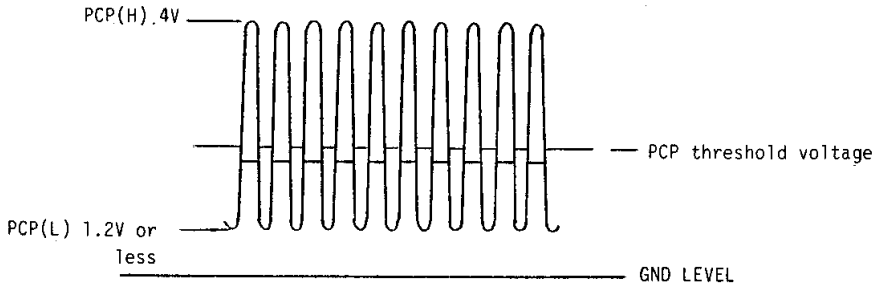


(Fig.3-8)

4) Turn on the knitting machine.

5) Set the oscilloscope for testing the PCP signal referring to the operation table.

6) Repeat pushing on or off the Inspection Button. The CR Sensor traverses and PCP signal is displayed on the screen of the oscilloscope.



(Fig.3-9)

7) Check the PCP waveform on the screen with the fig. above.

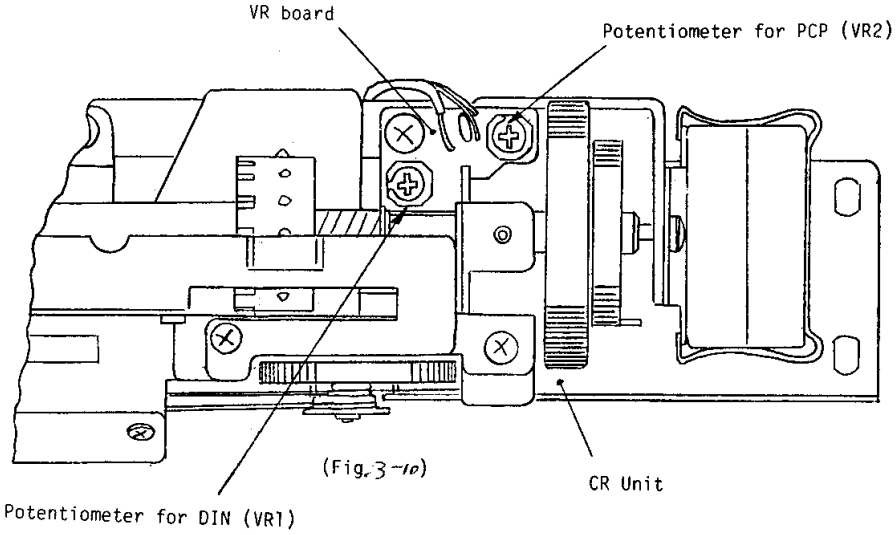
PCP(H) ——— 4V

PCP(L) ——— 1.2V or less.

To keep the PCP(L) less than 1.2V, the PCP(H) of some machine is adjusted to the range 3.7V to 4V.

2.2: Adjusting the PCP level

While repeating to pushing on and off the Inspection Button, adjust the level and the PCP by turning the potentiometer VR2.

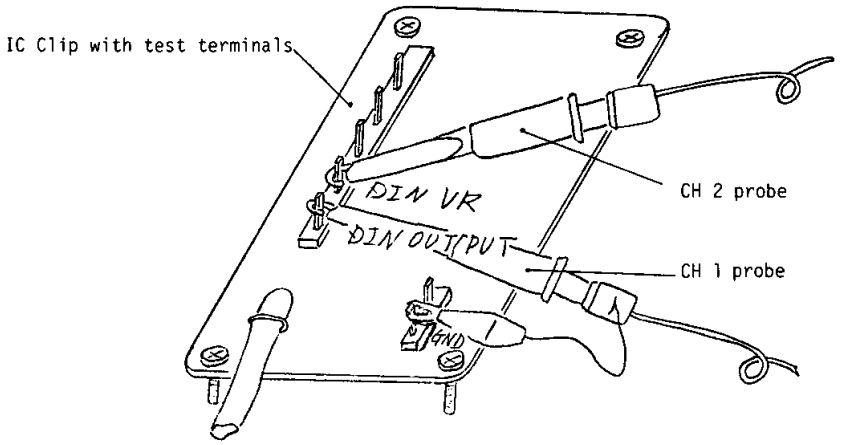


(Fig.3-10)

3-7-3 Checking and adjusting the DIN Level

3.1: Checking the DIN Level

1) Connect the CR Unit to the knitting machine.
2) Connect the IC Clip with test terminals to the μPC339C. (Refer to page 84, Fig. 3-1)
3) Connect the probe of the oscilloscope to the test terminal on the IC Clip.



(Fig.3-11)

4) Insert the Test Card into the CR Unit, and set it to "J".
5) Set the Pattern Width to "1".
6) Turn on the knitting machine.
7) Set the oscilloscope for testing the DIN signals referring to DIN - 1 & DIN - 2.

8) In the setting of the oscilloscope as instructed on the operation table "DIN-2", the CRT screen will display the reference voltage. The reference voltage is produced when the CR Sensor stays at the left end.

The reference voltage of the DIN Level is;

315mV±10mV.

If adjustment is needed, refer to page102.

9) By turning the Card Dial, set the test card to "K", and let the CR Sensor to detect the mark in QUICK MOTION column by operating the Inspection Button. At this time, the CR sensor stops at the right end and the CRT screen displays the DIN output level.

The voltage at the left end (reference voltage 315mV) minus the voltage at the right end is deviation.

The deviation must be within ±30mV.

If adjustment is needed, refer to page105.

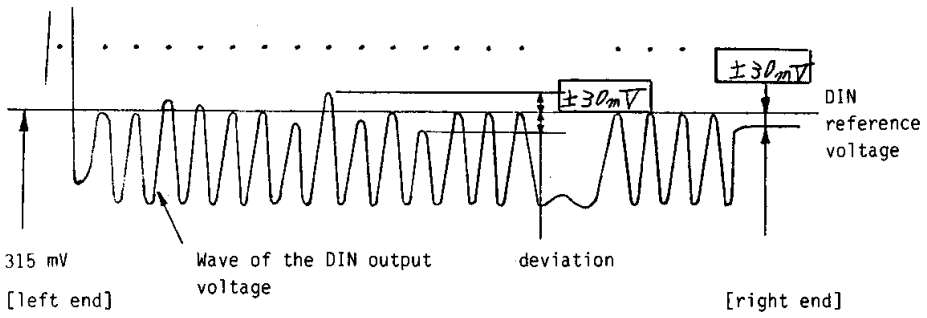
10) By turning the Card Dial, set the test card to "J".

11) Set the oscilloscope as instructed on the operation table (DIN-3 and DIN-4) for checking the DIN signals.

CH 2 probe ———— DIN VR
CH 1 probe ———— DIN out

12) Check and confirm that the deviation of the DIN output voltage is within more or less 30mV against the reference voltage 315mV.

If adjustment is needed, refer to page105.



(Fig. 3-12)

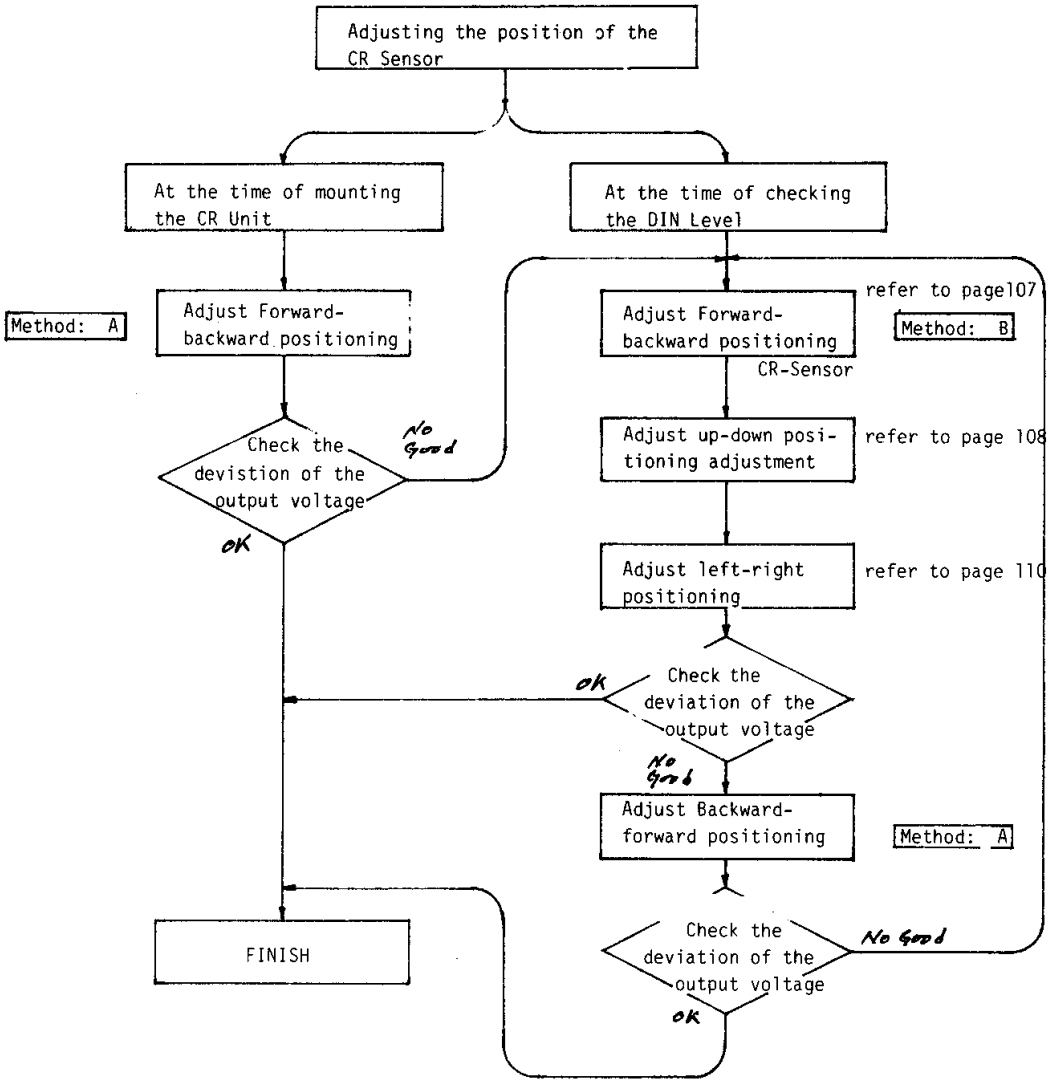
3.2; Adjusting the DIN Level

3.2.1 Adjusting the DIN output voltage (315mV)

In a state that the CR Sensor is at the left end, adjust the DIN output level to 315mV±10mV by turning the potemtiometer(VR1) on the VR board.

3.2.2 Positioning adjustment of the CR Sensor

If the DIN level notably deviates, (exceeding the range of ±30mV) adjust the position of the CR Sensor following the chart given below.

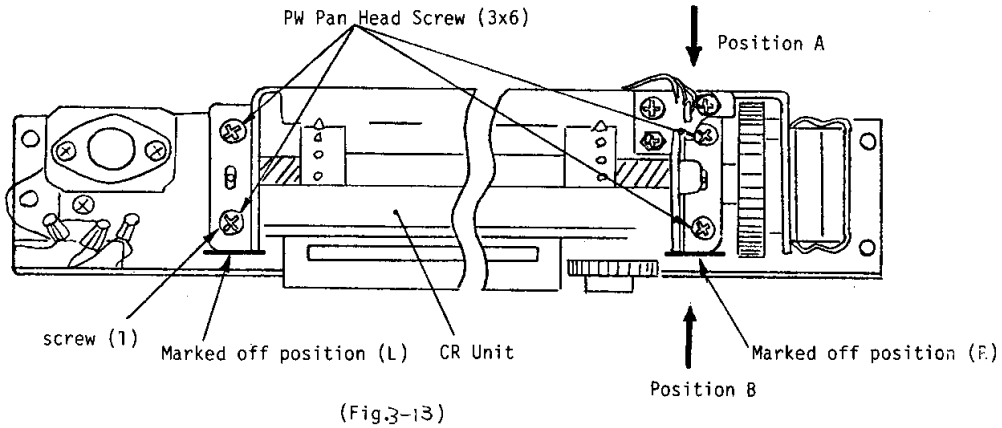


2.2.1 Adjusting Forward-Backward positioning of the CR Sensor

Method: A

1) Change the SEEP MODE of the oscilloscope from NORM to AUTO.

2) Mount the CR Unit at the same position where it was marked off before removing, and secure with one PW Pan Head Screw and other threee screws are temporarily fastened.



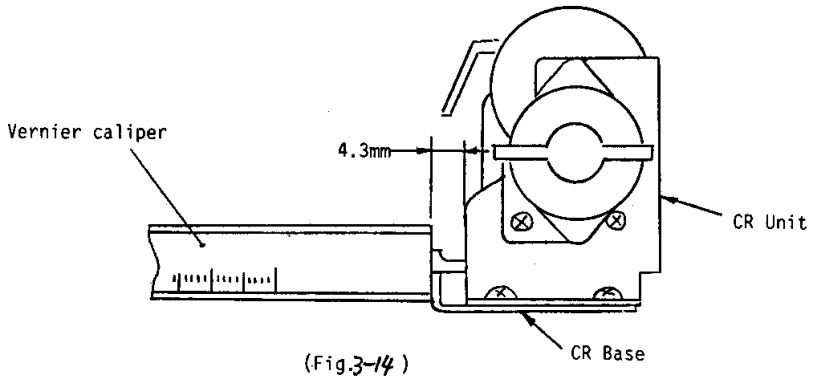
(Fig.3-13)

3) While repeating to push on and off the Inspection Button, observe the waveforms on the CRT Screen, adjust the deviation of the output voltage to the permissible range, ±30mV, by patting the position A or B with a screwdriver. Then fasten the four screws securely.

4) Adjust the DIN output level to 315mV±10mV by turning the potentiometer (VR1).

Method: B 1) Loosen slightly the four PW Pan Head Screws securing the CR Unit. (Refer to fig. 3-13).

2) Measure the distance between the rise at the front of the CR Base to the front of the CR Unit with a vernier caliper and adjust it to 4.3mm, and fasten four PW Pan Head Screws(3x6) (Refer to Fig. 3-14)

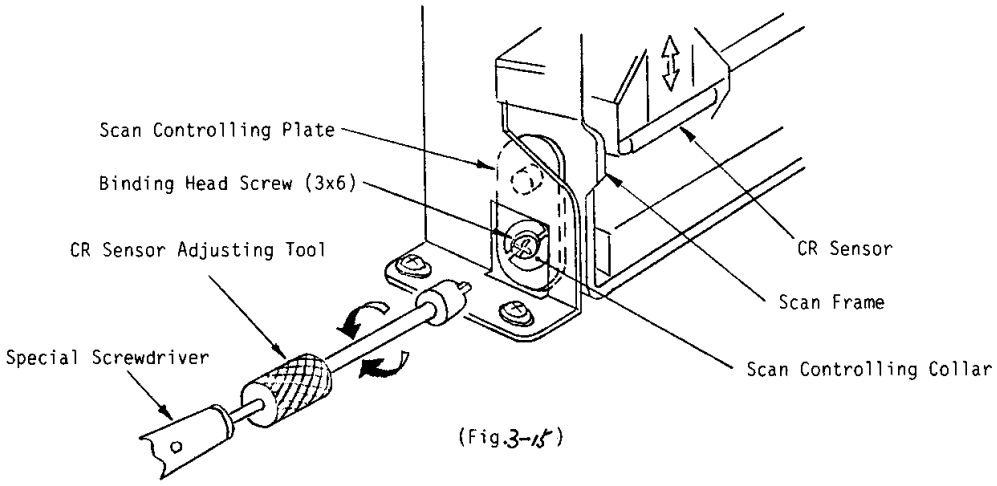


(Fig.3-14)

3) Check to see if the mirror contacts the CR Sensor or not. If the mirror touches the Sensor, move backward the CR Unit as much as they are not contact each other, but should stay as close as possible.

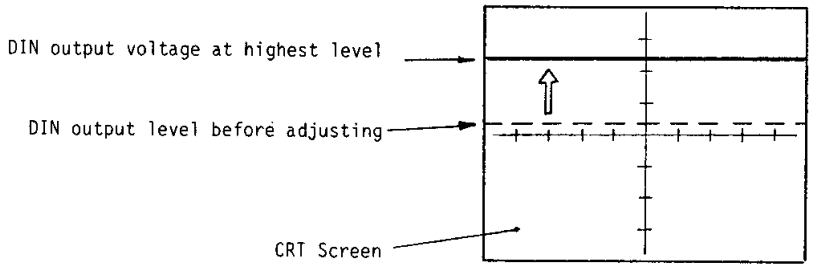
2.2.2 Up-Down positioning of the CR Sensor.

1) Set the oscilloscope as instructed in DIN - 4.
2) Set the SWEEP MODE to AUTO from NORM, and MODE buttons to CH1 from CHOP.
3) Set the test card into the CR Unit, and advance it to "K" by turning the Card Dial. Quick Motion Mark detects.
4) Set the special screw driver into the CR Sensor adjusting tool.
5) In a state that the CR Sensor stays at the left end, check and adjust the DIN level in the following procedure.
   a) Lossen the binding head screw(3x6) indicated in the illustration using the special screw driver.
   b) Fit the tip of the CR Sensor Adjusting Tool to the slot of the Scan Controlling Collar.



(Fig.3-15)

   c) While observing the DIN output level on the CRT screen, turn the Scan Controlling Collar, and adjust the DIN output level to its maximum level. Then tighten the screw.



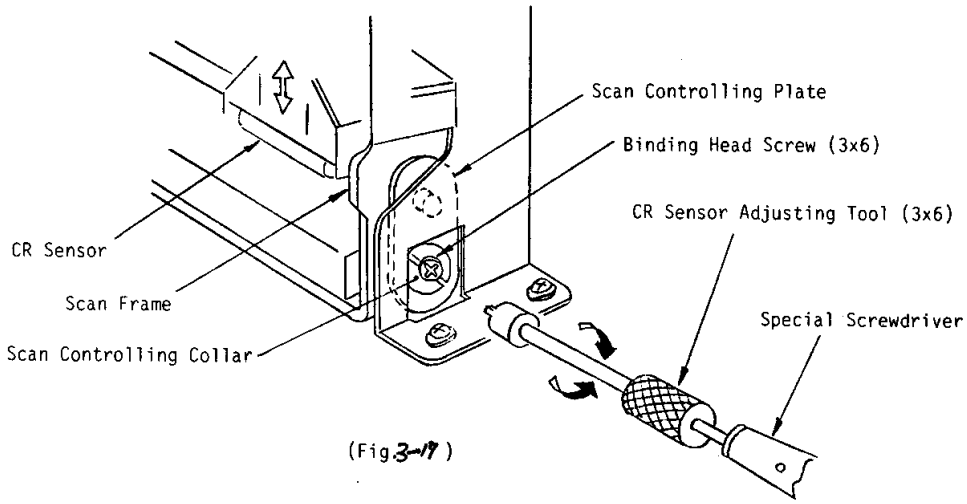
(Fig.3-16)

6) Push off the Inspection Button, the CR Sensor read out the stop mark on the test Card, and stops at the right end.

7) In a state that the CR Sensor stops at the right end, check and adjust the DIN output level in the same manner as done on the left side.

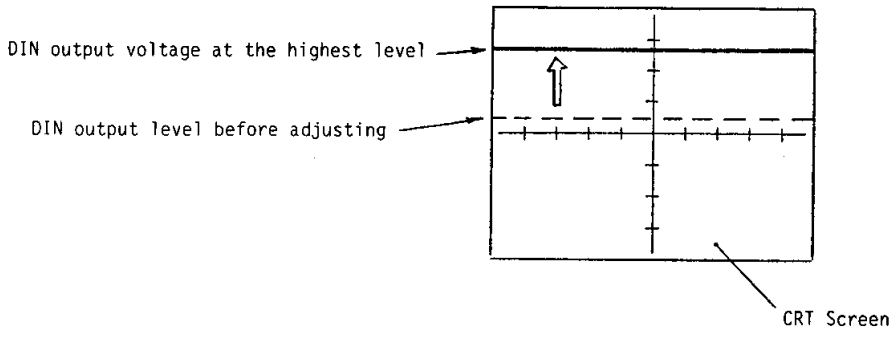
a) Loosen the Binding Head Screw(3x6) with the special screwdriver.

b) Fit the CR Sensor Adjusting Tool to the Scan Controlling Collar.



(Fig.3-17)

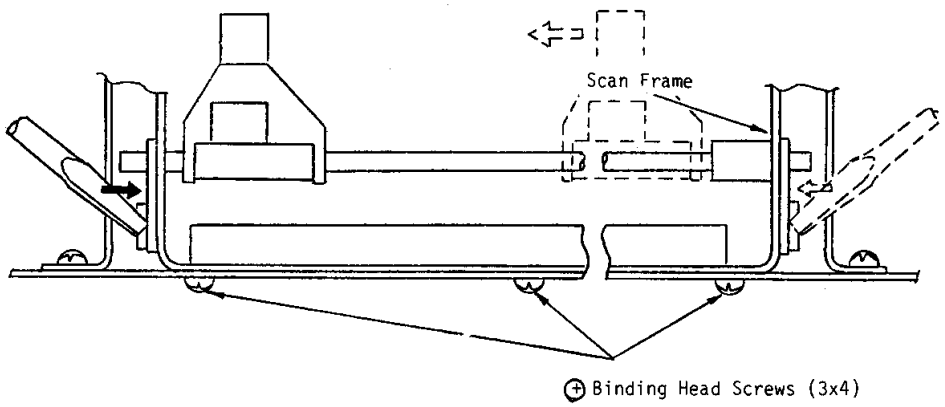
c) While observing the DIN output level on the CRT screen, turn the Collar with the Tool, and adjust the DIN output voltage to its highest level. Then tighten the screw.



(Fig.3-18)

2.2.3 Adjusting RIGHT-LEFT positioning of CR Sensor

1) Loosen three binding head screws(3x4) securing the Scan Frame to the CR Base. (refer to fig. 3-19)

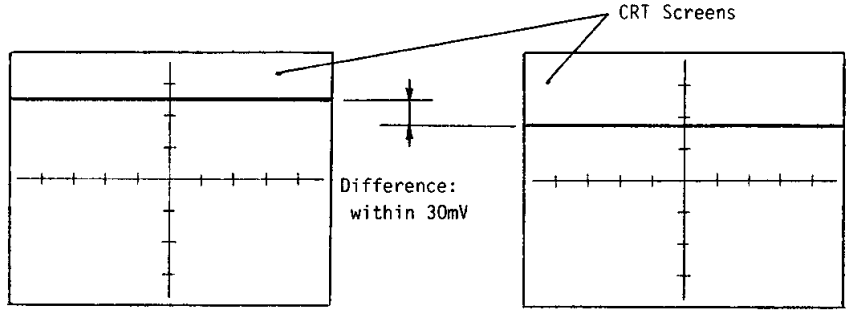


(Fig.3-19)

2) Push the Inspection Button off to keep the CR Sensor at the left end.

3) In a state that the CR Sensor is staying at the left end, while observing the DIN output voltage level on the CRT screen, slide the Scan Frame to the right or left using the tip of a screwdriver. There are two positions to give the maximum level to the DIN output voltage, but select a position when the Scan Frame is moved toward the right, and tighten the screws.

4) While repeating to push on and off the Inspection Button, check the deviation of the DIN output level at the right and left ends. The deviation must stay within 30mV.



[DIN output voltage level at left end]

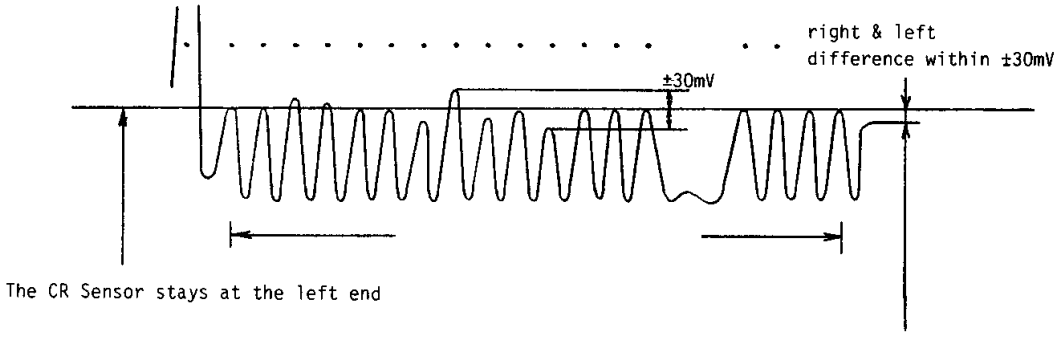
[DIN output voltage level at right end.]

(Fig.3-20)

5) In a state that the CR sensor stays at the left end, adjust the DIN output voltage by turning the potentiometer (VR1) to 315±10mV.

6) Set the oscilloscope : SWEEP MODE to NORM from AUTO, and MODE Button to CHOP from CH 1.

7) While repeating to push on and off the Inspection Button, check the deviation of the DIN output voltage level which must be within ±30mV while the CR Sensor is traversing.



(Fig.3-21)

8) If the DIN output voltage level shows the deviation more than ±30mV, in the check at the steps 4) and 7), adjust the CR Sensor again following the Method A, and bring the deviation within ±30mV.

3-7-4 Checking and adjusting the timing between PCP & DIN

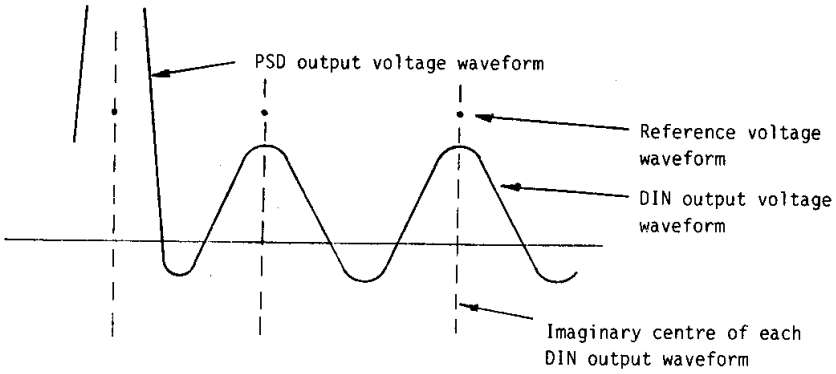
4.1: Check the timing between PCP & DIN

Perform the 12 steps given under 3-7-3, 3.1 before proceeding with the steps given set forth below. DIN-5

1) Set the oscilloscope referring to the operation table used to check the DIN signals. DIN-5

2) Set the Pattern Width to 30.

3) The relation between the DIN output voltage and the reference level is illustrated as shown below; the reference voltage comes to the centre of each peak of the DIN output voltage.



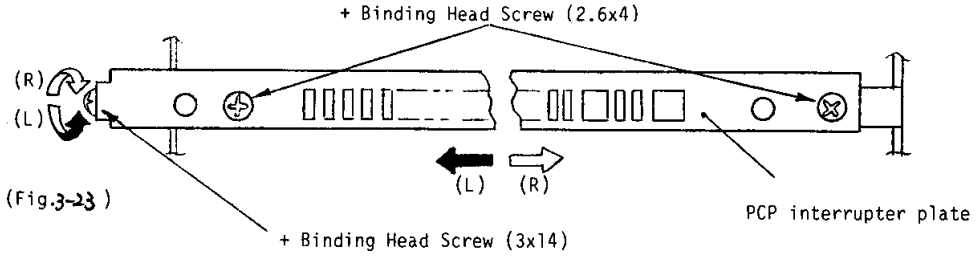
(Fig.3-22)

4) The same relation can be observed in the CRT screen when you set the Pattern Width to 1 or 60.

4.2: Adjusting the timing between PCP & DIN

1) Loosen two binding head screws(2.6x4) fixing the PCP interrupter.

2) Turn the binding head screw(3x14) at the left end of the interrupter plate, and adjust the reference level to come to the centre of each peak of the DIN signal.



(Fig.3-23)

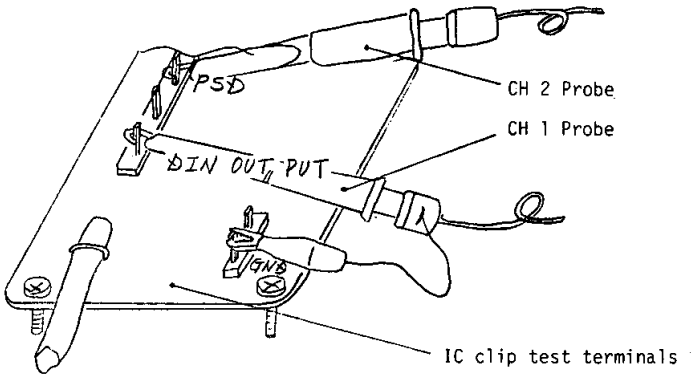
3-7-5 Checking and Adjusting the PSD level

5.1: Checking the PSD level

1) Connect the CR Unit to the knitting machine.

2) Connect the IC clip test terminals to μPC339C.(Refer to Fig.3-1.P.84)

3) Connect the probe of the oscilloscope to the IC clip test terminal.



(Fig.3-24)

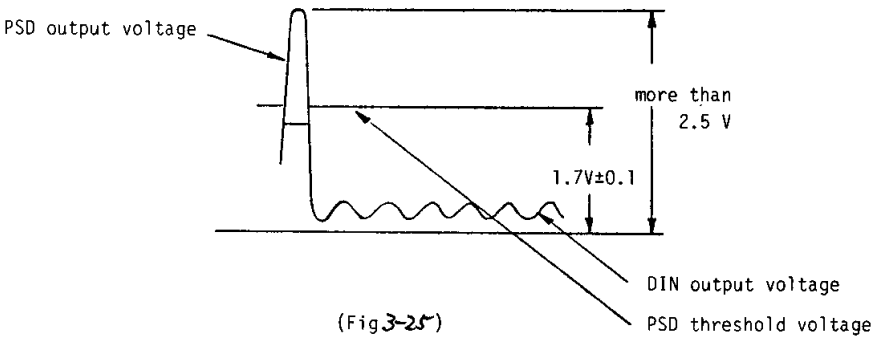
4) Insert the test card into the CR Unit, and set it to "J".

5) Set the Pattern Width to "1".

6) Turn on the knitting machine.

7) Set the oscilloscope as instructed in the operation table for checking the PSD signal. [PSD-1&2]

8) Confirm that the waveform of the PSD output voltage is observed on the CRT screen as illustrated below.



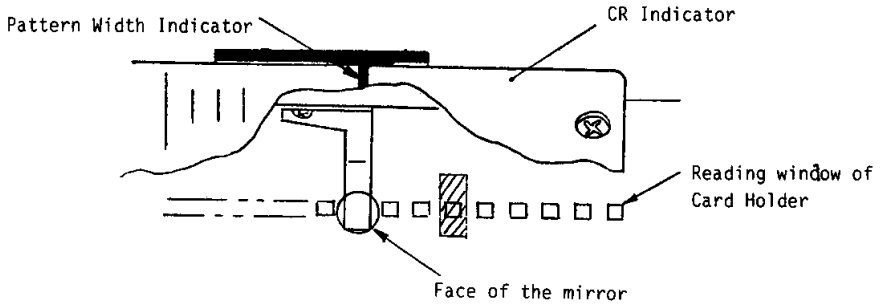
(Fig.3-25)

9) Set the Pattern Width 30, and 60, and confirm that same waveform is shown on the CRT screen.

5;2: Adjusting the PSD Level

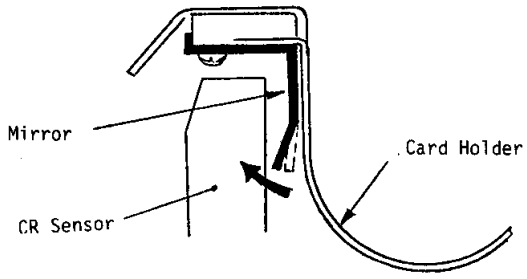
PSD level is produced by the mirror, positioned at the front of the CR Unit, when a light is reflected on the mirror and sensed by the CR Sensor.

1) If the PSD level is less than 2.5V, check to see if the mirror is dirty, and if so, wipe it clean with an alcohol damped cloth or using the sensor cleaner.



(Fig.3-26)

2) If the PSD output voltage is still less than 2.5V after the mirror has been cleaned, bring the mirror near to the CR Sensor by bending it as illustrated.



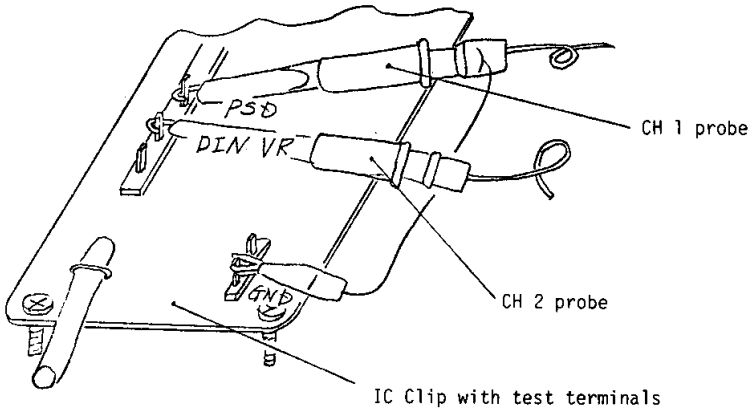
(Fig.3-27).

3) If the PSD output voltage is still less than 2.5V after the mirror has been brought near to the CR Sensor, replace the mirror with new one.

3-7-6 Checking and Adjusting PSD Timing

6.1: Checking the PSD Timing

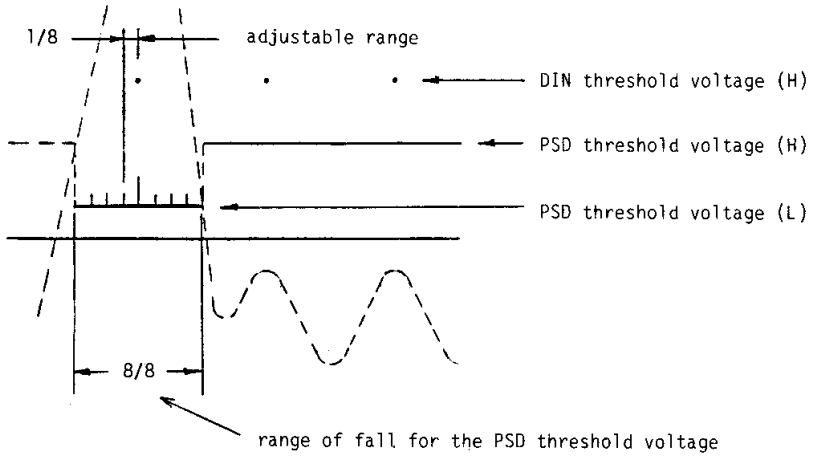
1) Connect the CR Unit to the knitting machine.
2) Connect the IC Clip with test terminals to μPC339C. (P.84 Fig. 3-1)
3) Insert the test card into the CR Unit, and set it to "J".
4) Set the Pattern Width to 60.
5) Connect the probe of the oscilloscope to the test terminal as shown.



(Fig.3-29)

6) Turn on the knitting machine.
7) Set the oscilloscope as instructed on the operation table for checking the PSD timing (PSD-3, PSD-4).

8) Confirm that the DIN reference voltage(H) is at the centre between the fall and the rise of the PSD reference voltage.



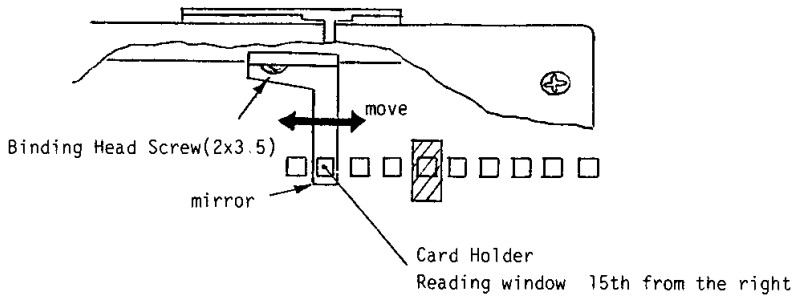
(Fig.3-29)

9) Set the Pattern Width to 30 and 1, then confirm the relation between the DIN reference voltage and the PSD reference voltage in the same manner.

6.2: Adjusting the PSD Timing

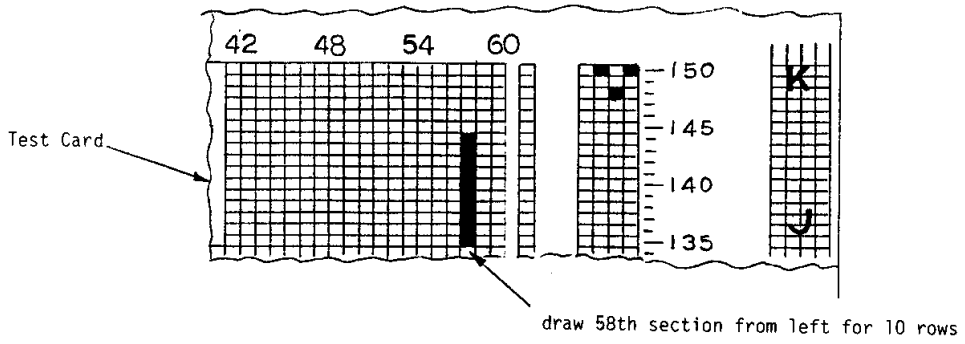
1) Set the Pattern Width to 60.

2) Loosen the binding head screw (2x3.5) slightly securing the mirror, and move the mirror to right or left so as the DIN reference voltage comes to the permissible range.



3) When fastening the screw, take care not to move the mirror to right or left, and also the mirror must be placed in parallel with the Card Holder.

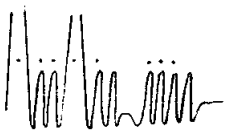
4) Fill the 58th section of the test Card for about 10 rows with the accessory pencil, at around 140th row. Insert the Card into the CR Unit, and set it to allow the CR Sensor to read the marking.



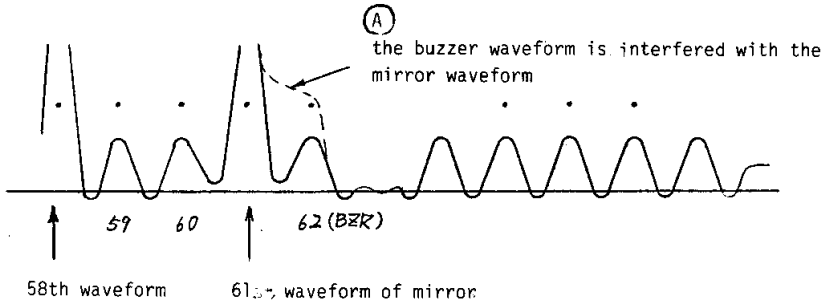
(Fig.3-30)

5) Connect the probes of the oscilloscope as in fig.3-11 .

6) Operate the oscilloscope following the operation table "DIN-1 - DIN-4". You can observe the waveform in the CRT Screen as shown below, since the Pattern Width is set at 60.



7) After the waveform is observed in the CRT Screen, change the setting of TIME/CM to 2mSEC from 20mSEC, and the waveform will be magnified as illustrated below.



(Fig.3-31)

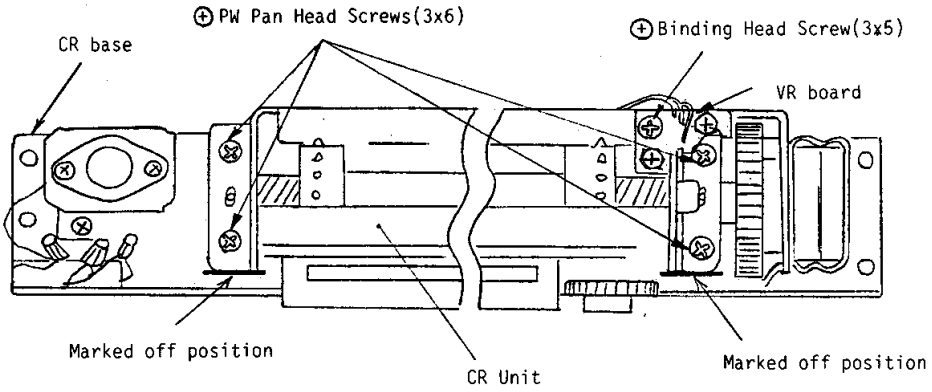
8) Check to see if the waveform of the mirror(61st) interferes with the waveform of the Buzzer waveform(62nd). If both waveforms are interefering with each other, readjust the position of the mirror.

If the buzzer waveform is interefered with the mirror waveform, it causes the buaaer to be actuated even if the buzzer mark does not exist.

3 - 8 HOW TO REPLACE THE CR SENSOR HOLDER UNIT

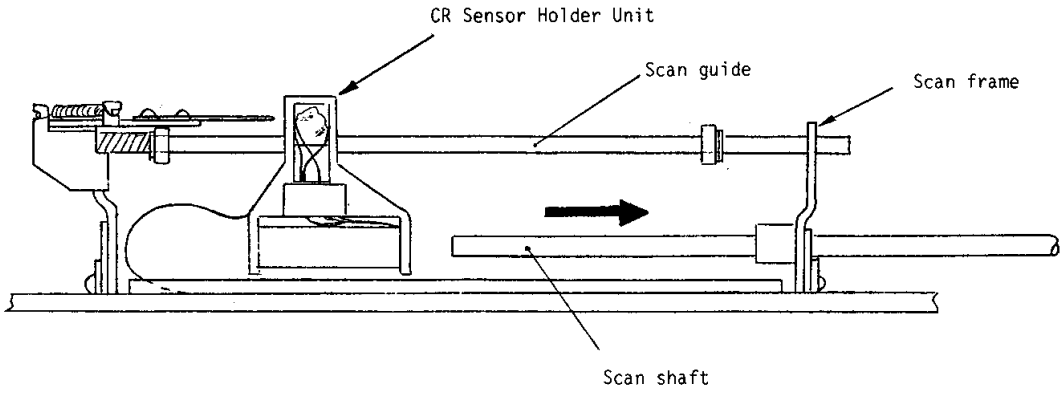
3-8-1 How to remove the CR Sensor Holder Unit.

1. Before removing the CR Sensor Holder Unit, mark the contour on the CR Base. The mark will be used when putting back the CR Unit.



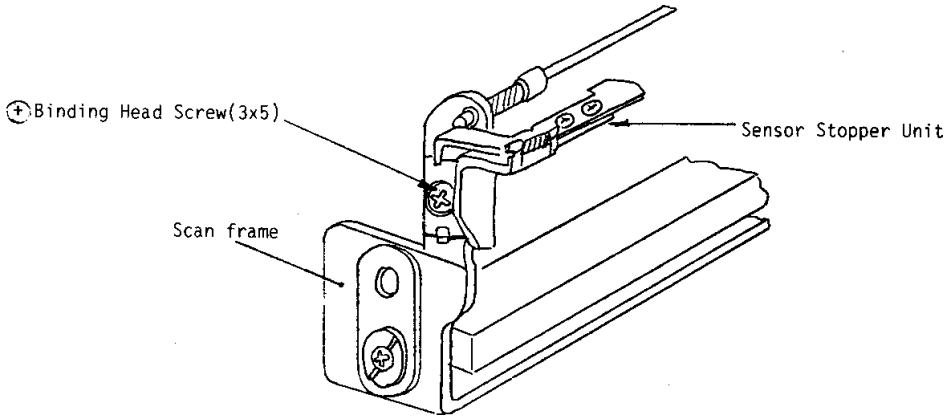
(Fig 3-32)

2. Remove one binding head screw(3x5) fixing the VR board.
3. Remove four pan head screws(3x6) fixing the CR Unit on the CR base.
4. Lift up the CR Unit to remove it from the CR base, taking a care for the lead lines.
5. Pull out the Scan Shaft in the direction indicated by an arrow mark about half the length of the Shaft.



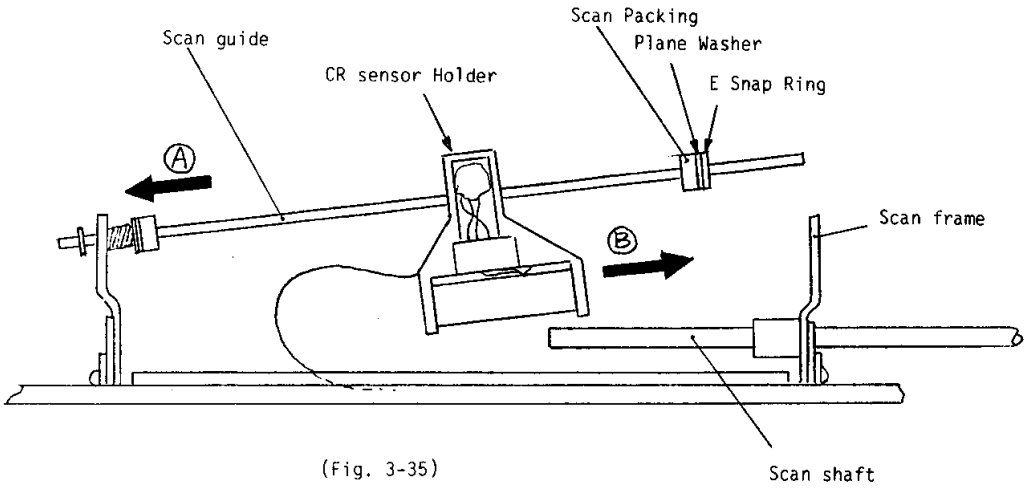
(Fig. 3-33)

6. Remove the Sensor Stopper Unit.



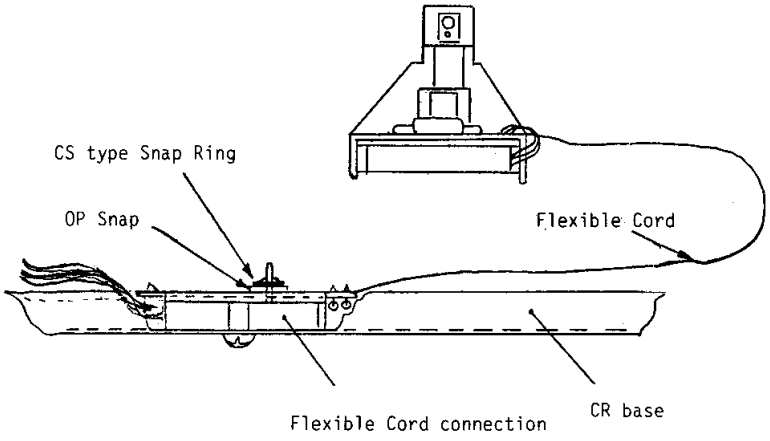
(Fig. 3-34)

7. Remove the E Snap Ring at the right side of the Scan Guide.
8. Push out the Scan Guide in the direction indicated by an arrow mark through the Scan Frame.
9. Remove the E Snap Ring, Washer, and Scan Packing from the Scan Guide before removing the CR Sensor Holder.



(Fig. 3-35)

10. Using the tip of a screwdriver, remove the CS type snap ring securing the flexible cord.



(Fig 3-36)

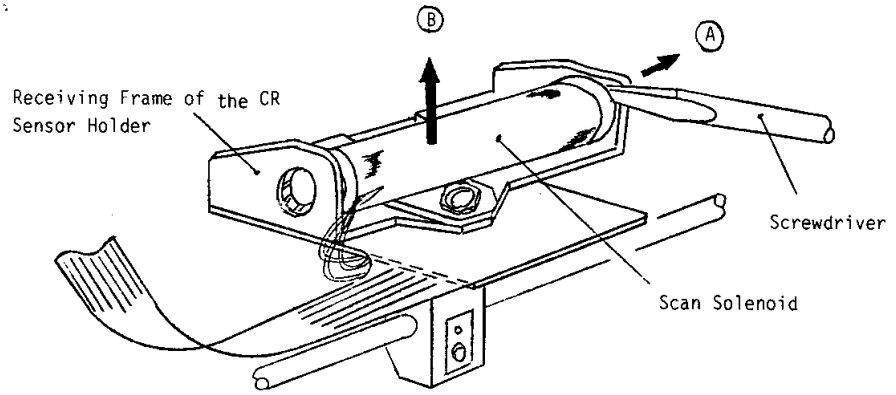
3-8-2 How to attach the CR Sensor Holder

Reverse the procedure applied to remove the CR Sensor Holder for attaching the CR Sensor Holder
Cares in attaching the CR Sensor Holder are described below.

1) CS type snap must be exchanged for new one.
2) CR Box must be attached to the position marked when removing.
3) When attaching the CR Unit has been completed, check and adjust the CR Box referring to page 100 .

3 - 9 HOW TO REPLACE THE PCP SENSOR (PN150, LED LN55)

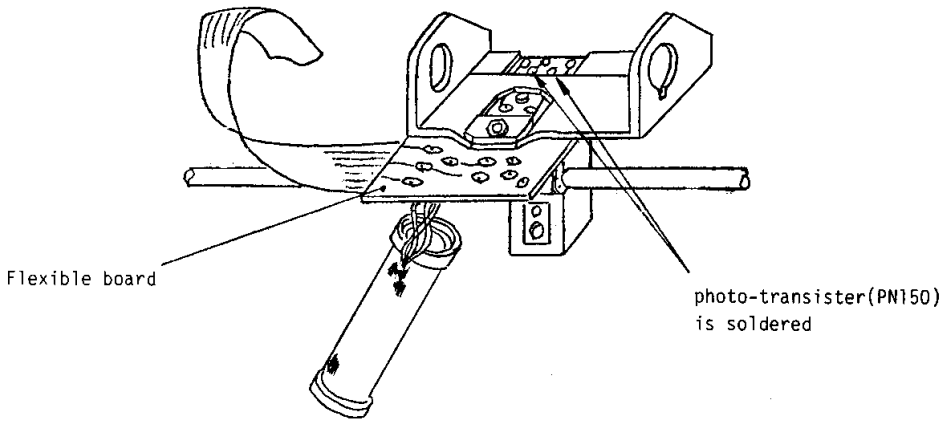
1. Referring to the steps 1 through 5, disassemble the CR Sensor Holder to the state as illustrated in Fig.3-~~35~~. P.118.
2. As illustrated in Fig.3-37, widen the receiving frame of the CR Sensor Holder as shown, and lift up the solenoid to remove it.



(Fig.3-37)

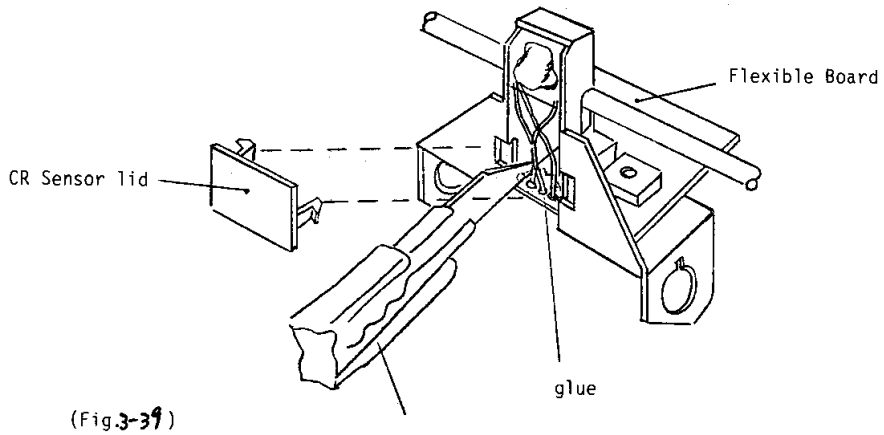
3-9-1 How to replace the Phto-transistor(PN150).

3. Desolder two joints where the photo-transistor(PN150) is connected to the flexible board.



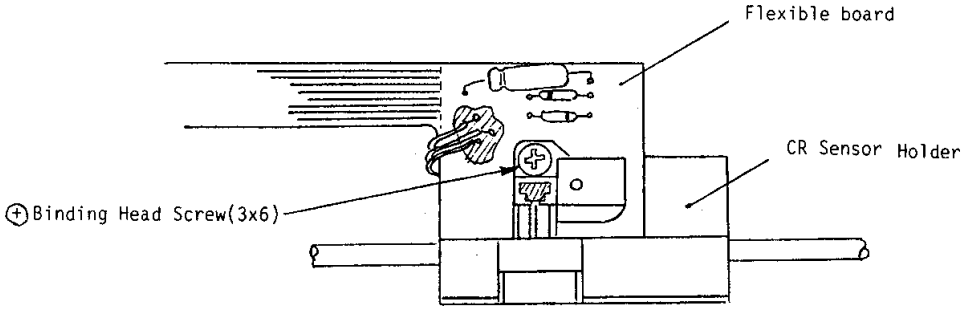
(Fig.3-38)

4. Place the CR Sensor Holder back to the original position.
5. Take off the lid of the CR Sensor, make a cut at the joints where the CR Sensor Holder is connected to the flexible board.



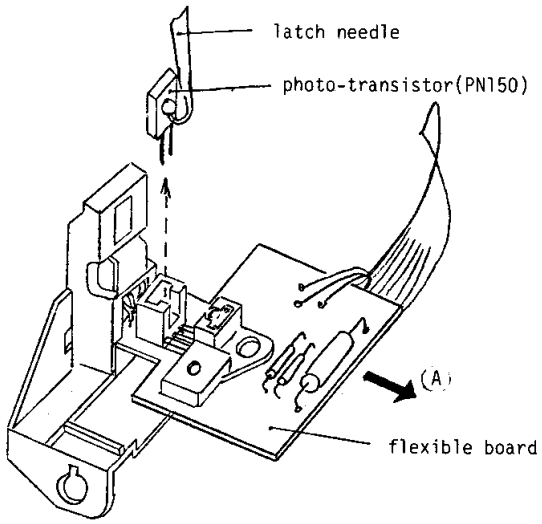
(Fig.3-39)

6. Remove the binding head screw(3x6) fixing the CR Sensor Holder to flexible board. (Hexagonal nut will come off at the same time.)



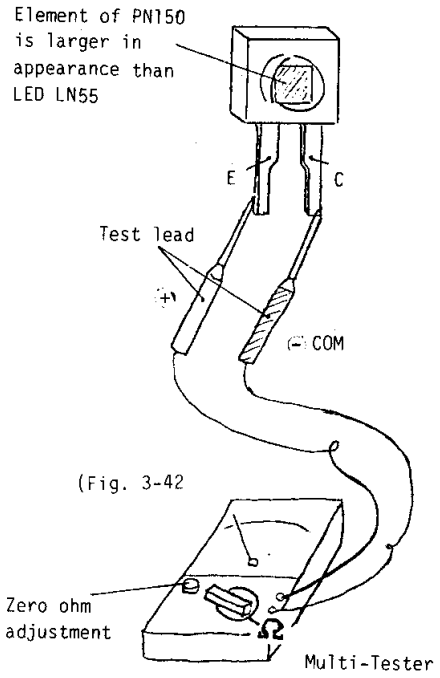
(Fig.3-40)

7. Pull out with care the flexible board in the direction indicated by an arrow mark (A), and then lift up the photo-transistor using a hook of the latch needle.



(Fig. 3-41)

8. Make ready a new photo-transistor (PN150), and check its quality in the following manner.



(Fig. 3-42

(a) Set the scale of the multi-tester to xlKΩ.

(b) Perform zero ohm adjustment.

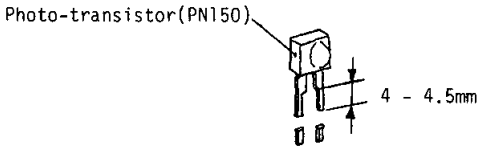
(c) Connect the ⊕ test lead to the collector terminal, and ⊖ test lead to emitter terminal of the photo-transistor.

(d) Pointer of the tester indecates 0 ohm when light strikes the photo-transister, and when the light is interrupted, the pointer indicates infinite resistance.

9. Cut off the leads of the photo-transistor to the length as indicated in the Fig.

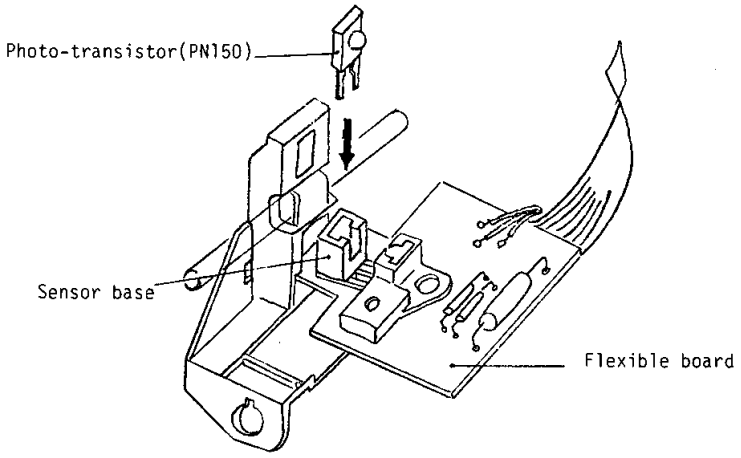
Note: If the leads are longer than the specified measurement, it will be hard to insert them into the sensor base.

If the leads are shorter than the specified measurement, it will be hard to join by soldering.



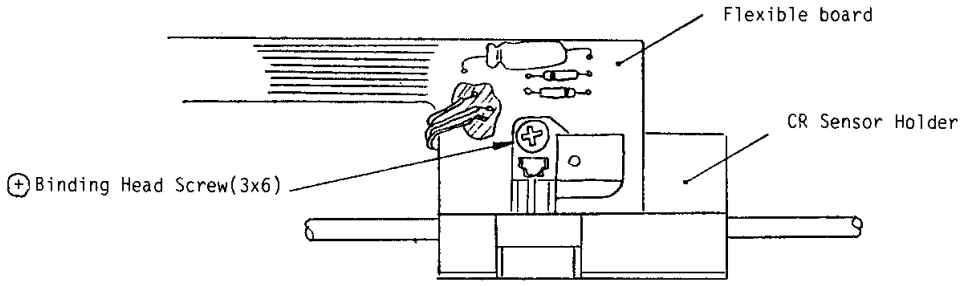
(Fig.3-43)

10. Fit the photo-transister into the sensor base. If the photo-transister is fit correctly, the top of the photo-transistor is flush with the top of the sensor base.



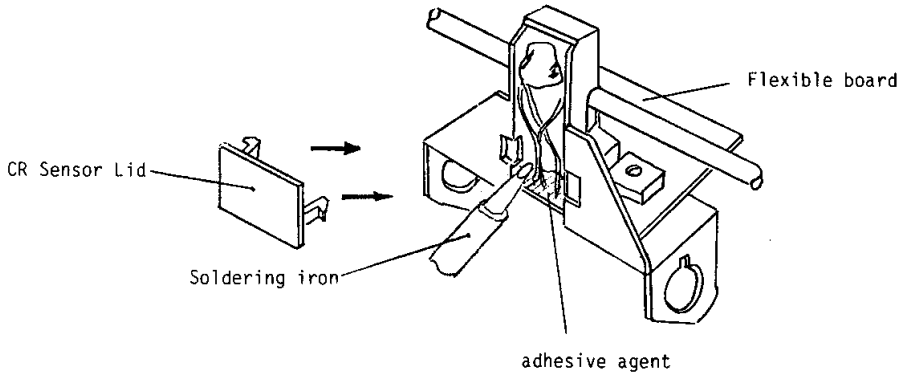
(Fig.3-44)

11. Attach the flexible board to the CR Sensor Holder, and tighten them together with binding head screw(3x6) and the hexagonal nut. (Apply locktight to the hexagonal nut.)



(Fig.3-45)

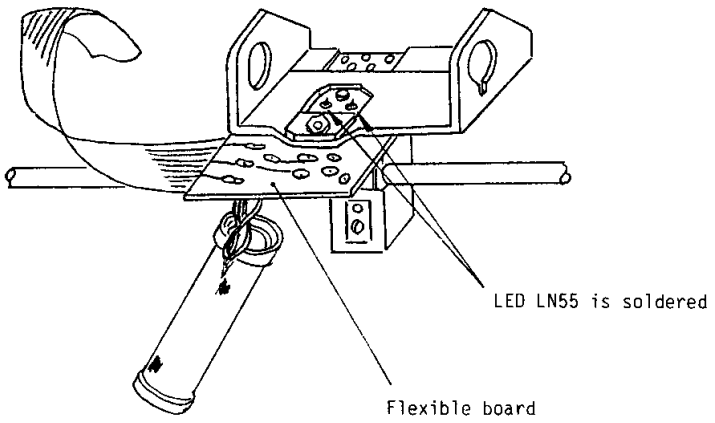
12. Solder the leads of the photo-transistor.
13. Place the soldering iron at the position where the CR Sensor Holder is joined to the flexible board, and melt the adhesive agent to join them again.



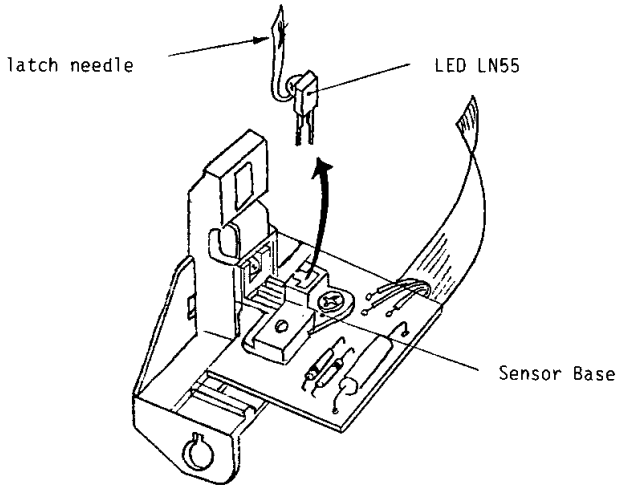
14. In the manner reversal to that for removing the Cr Sensor, complete the CR Unit, and attach it to the knitting machine.
15. when the CR Unit has been attached to the knitting machine, check and adjsut the CR Unit referring to page 100 .

3-9-2 How to replace the LED (LED LN55).

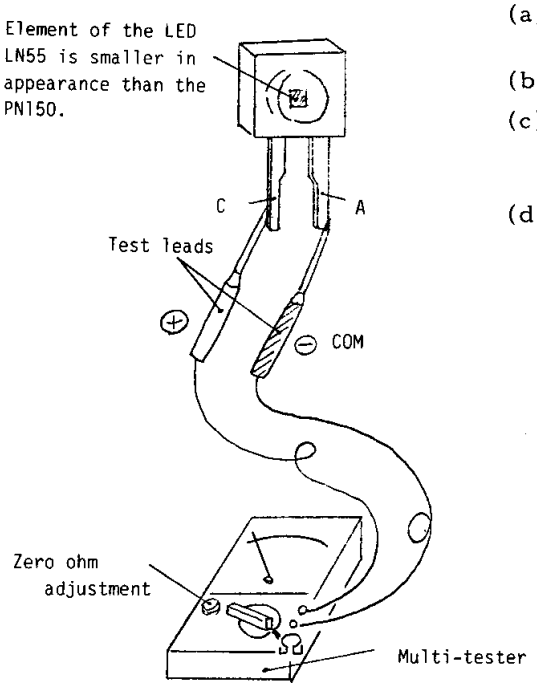
1. In the saem manner as for the photo-transistor(PN150), remove the Scan solenoid.
2. Desolder two points where the LED LN55 is joined to the flexible board.



3. Using the hook of a latch needle, pull out the LED LN55 from the sensor base. (Fig. 3-47).



4. Make ready a new LED LN55, and check its quality in the following manner.



(Fig.3-48)

(a) Set the range scale of the ohm meter to xlKΩ.

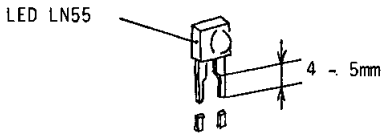
(b) Perform zero ohm adjustment.

(c) Connect ⊖ test lead to anode terminal, and ⊕ test lead to cathode terminal of the LED.

(d) If the quality of the LED is good, the pointer will read about 15Ω.

Note; If the pointer reads indefinite resistance or the pointer fluctuates, the quality of the LED is no good.

5. Cut off the leads of the LED LN55 to the measurement as indicated in the illustration.



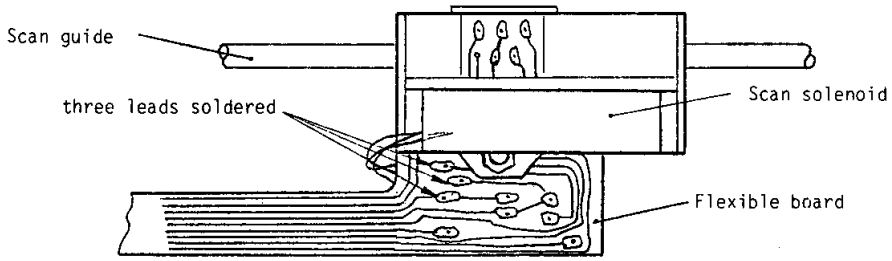
(Fig.3-49)

6. Fit the LED LN55 into the sensor base, and join by soldering.

7. In the manner reverse to that for disassembling, complete the CR Unit, and attach it to the knitting machine. Check and adjust the CR Unit referring to page 100.

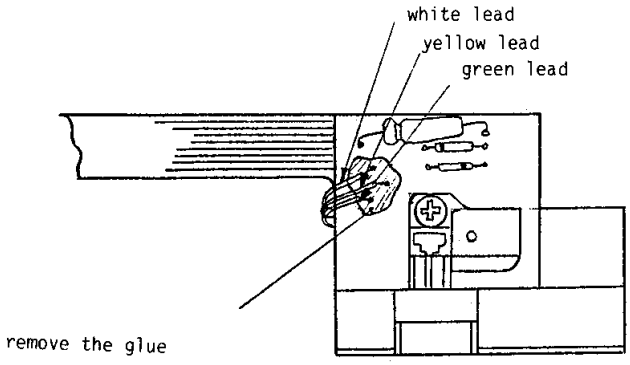
3 - 10 HOW TO REPLACE THE SCAN SOLENOID

1. Referring to page 118 , step 1 through 5, disassemble the CR Sensor Holder to the same state as illustrated in Fig.3-38.
2. Turn over the CR Sensor Holder, adn disconnect three leads(white, yellow, green) from the flexible board.

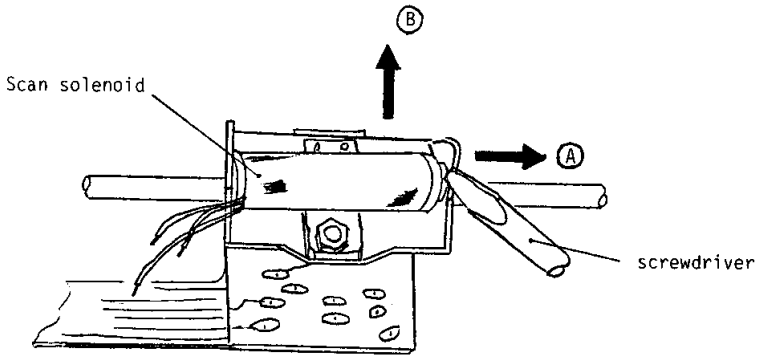


(Fig.3-50)

3. Turn the CR Sensor Holder to the top side, and remove teh adhesive agent at the point of joint of three leads, to disconnect the leads from the flexible board, using a cutter.

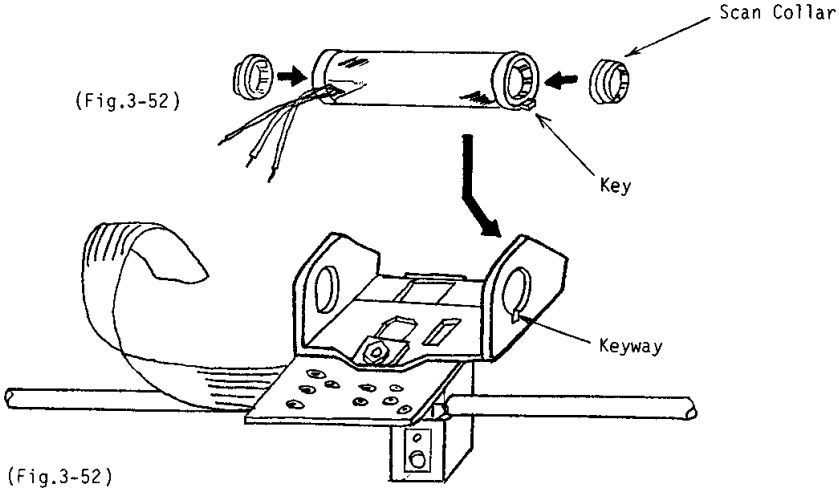


4. Turn over the CR Sensor Holder Unit, and widen the receiving frame of CR Sensor Holder and take out the solenoid in the direction indicated in the illustration.



(Fig.3-51)

5. Make ready a new scan solenoid, and fit scan collar on both sides.

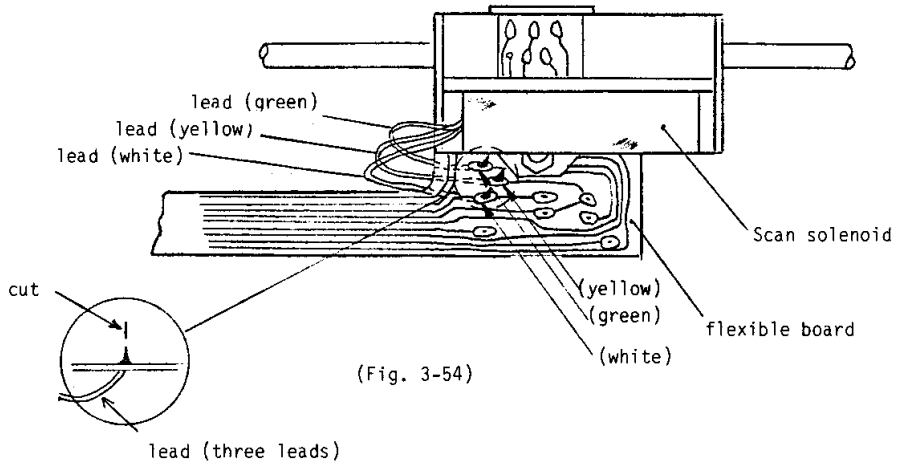


(Fig.3-52)

(Fig.3-52)

6. Fit the scan solenoid into the receiving frame so that the key on the solenoid locks into the keyway on the frame.

7. Solder the three leads from the solenoid to the flexible board.
   Solder each lead to the required position as distinguished by its colour.

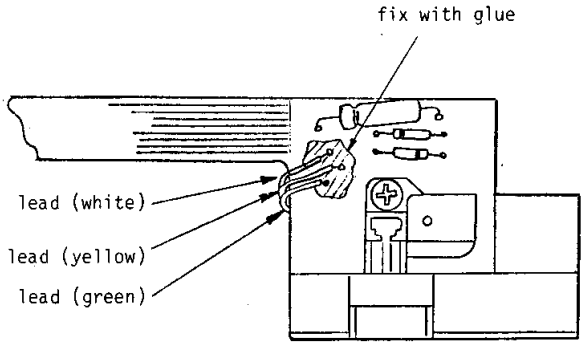


(Fig. 3-54)

(Fig. 3-55)

(Fig.)

8. Cut off the exessivle length of the lead on the other side of the flexible board.
9. Place the CR Sensor Holder back to the original position, and fix the lead with glue to the position.



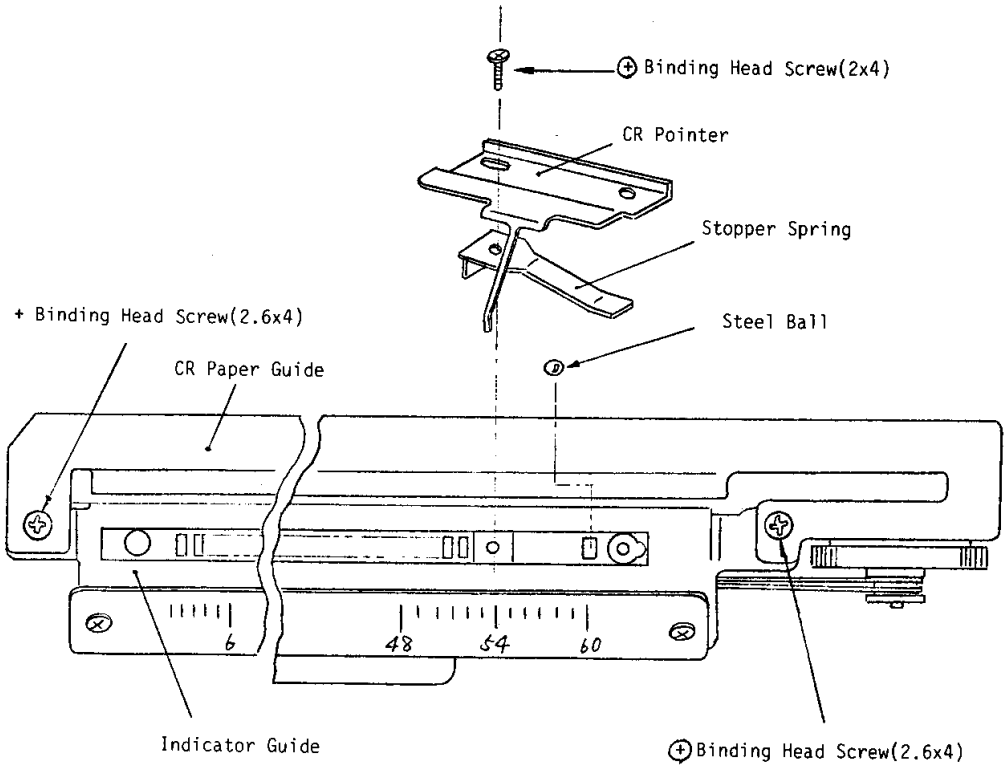
(Fig. 3-56)

10. Attach the CR Sensor Holder in the manner reverse to that for disassembling.
11. Attach the CR Unit on the machine, and check and adjust if necessary referring to the checking method.

3 - 11 HOW TO REPLACE THE CARD HOLDER

3-11-1 How to remove the Card Holder

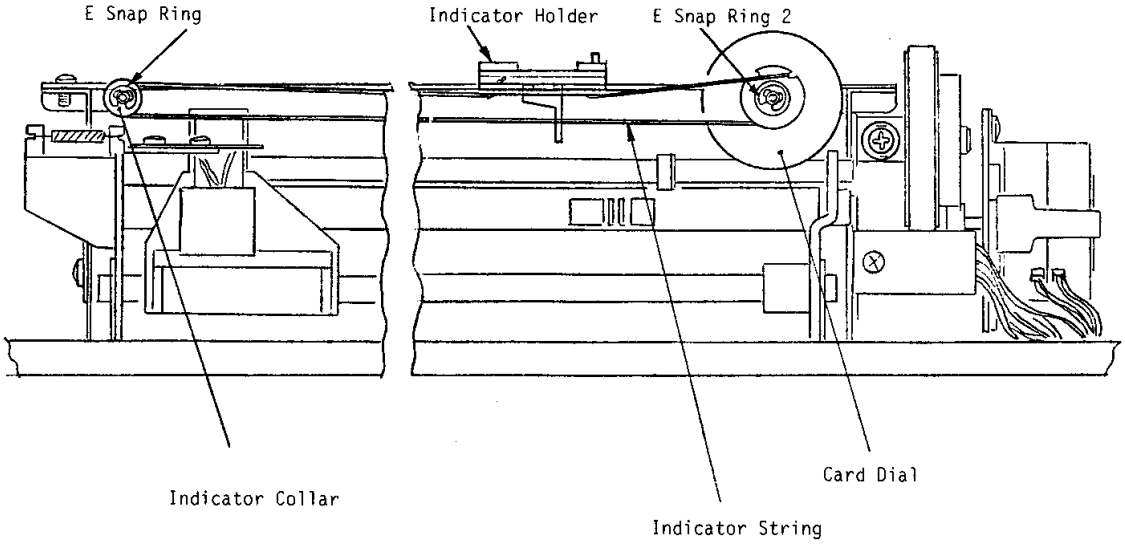
1. Remove the binding head screw(2x4) fixing the pattern width pointer, and take off the CR pointer, stopper spring and a steel ball.



(Fig. 3-57)

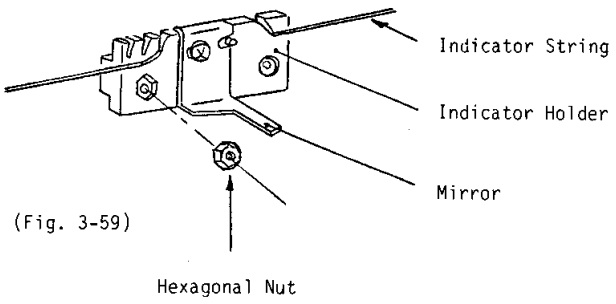
2. Remove the binding head screw(2.6x4) and take off the CR Paper Guide and the Indicator Guide.

3. Remove two E Snap Rings securing the Indicator Collar, and the Card Dial, and then remove them with the Indicator String wound on them.



(Fig. 3-58)

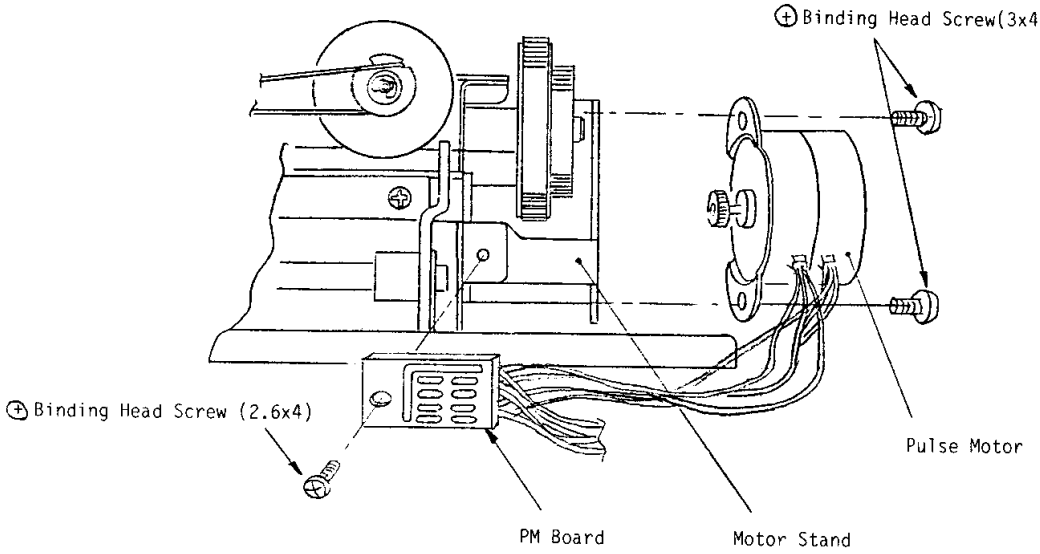
Note: a) When the E Snap Ring is removed, a plain washer under the Ring will come off. Take care not to lose it.
b) When the Indicator Holder is removed, a hexagonal nut under the Holder will come off. Take care not to lose it.



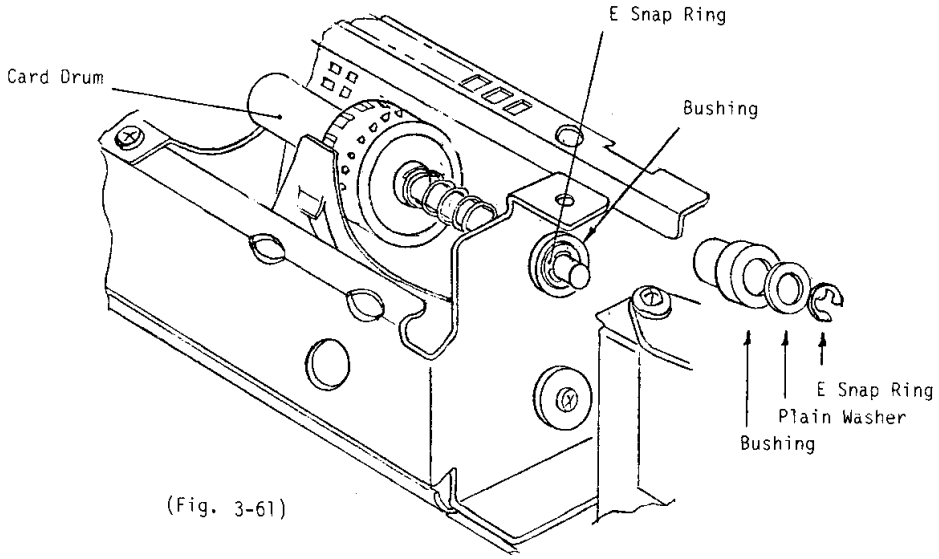
(Fig. 3-59)

4. Remove two binding head screws(3x4) fixing the Pulse Motor, and one binding head screw(2.6x4) fixing the PM Board. Pulse Motor unit will come off.

(Fig. 3-60)

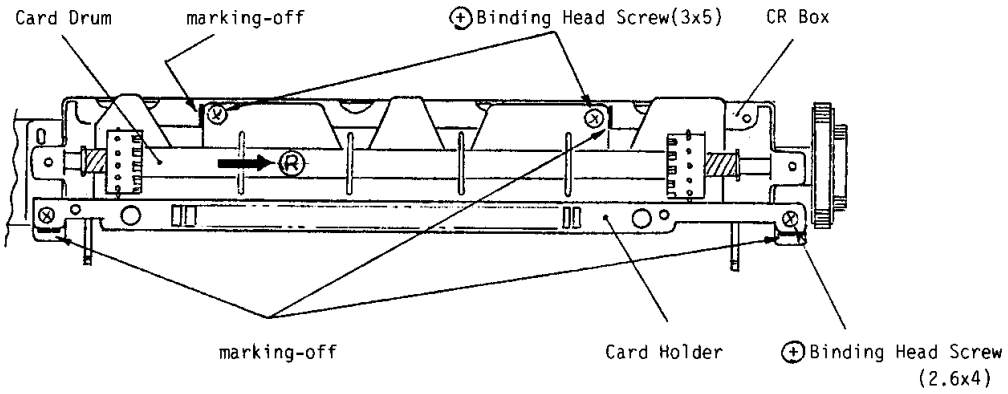


5. Remove two binding head screw(3x5) fixing the Motor Stand, and take off the Stand.
6. Remove the E Snap Ring before removing the plain washer and pushing from the end of the Card Drum shaft.



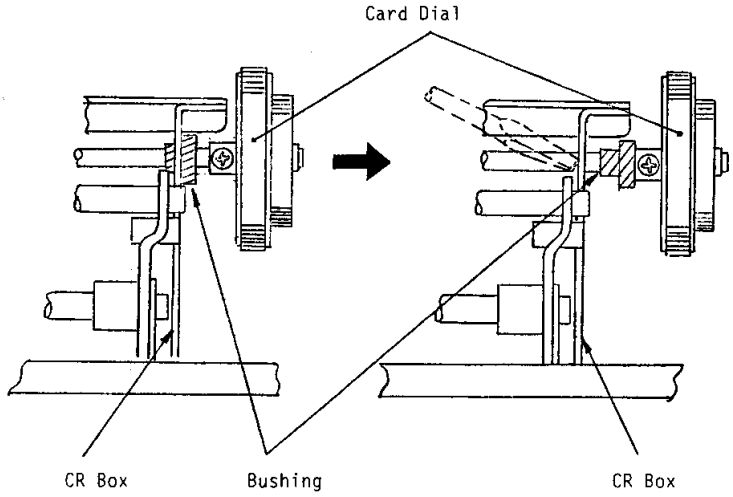
(Fig. 3-61)

7. As illustrated in the Fig.3-62, mark off the position of the Card Holder on the CR Box, and then remove two binding head screw(3x5), and two binding head screws(2.6x4).



(Fig. 3-62)

8. Pull the Card Drum toward the right, and disengage the Bushing toward the Card Dial.

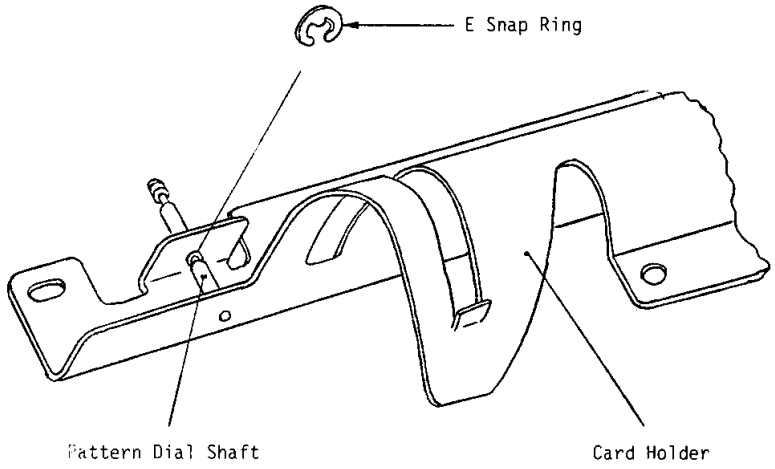


(Fig. 3-63)

9. When the Bushing has been disengaged from the CR Box, further pull the Card Drum toward the right, and the left end of the Card Drum will disengaged from the CR Box.
Lift up the left end of the Card Drum to remove the Card Holder.

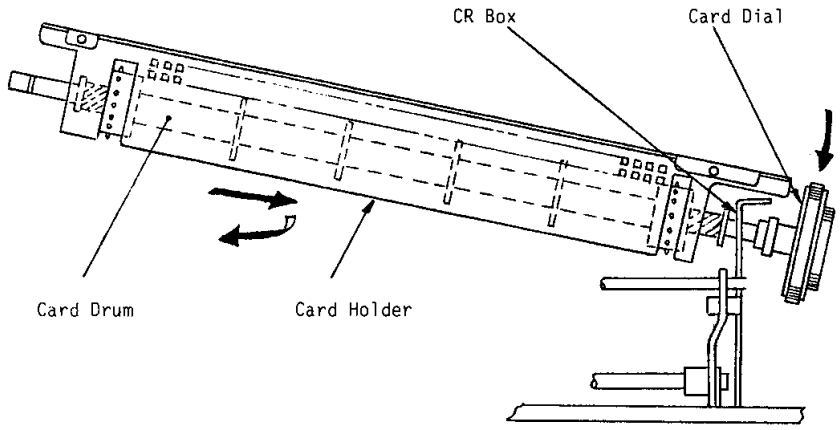
3-11-2 Attaching and adjusting the Card Holder

1. Remove the Pattern Dial shaft from the Card Holder, and fix it on the new Card Holder.



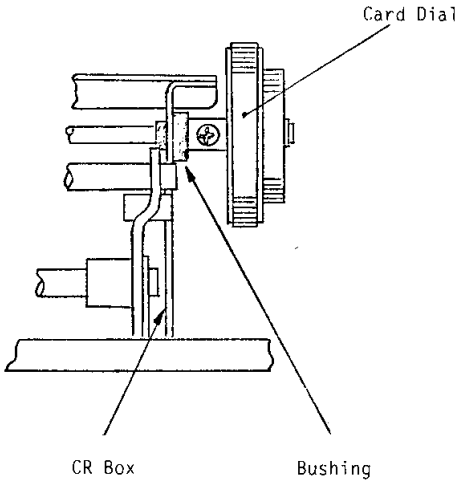
(Fig. 3-62)

2. While pushing the side with the Card Dial in the direction indicated by an arrow mark, fit the other side (left side) and place it on the CR Box.



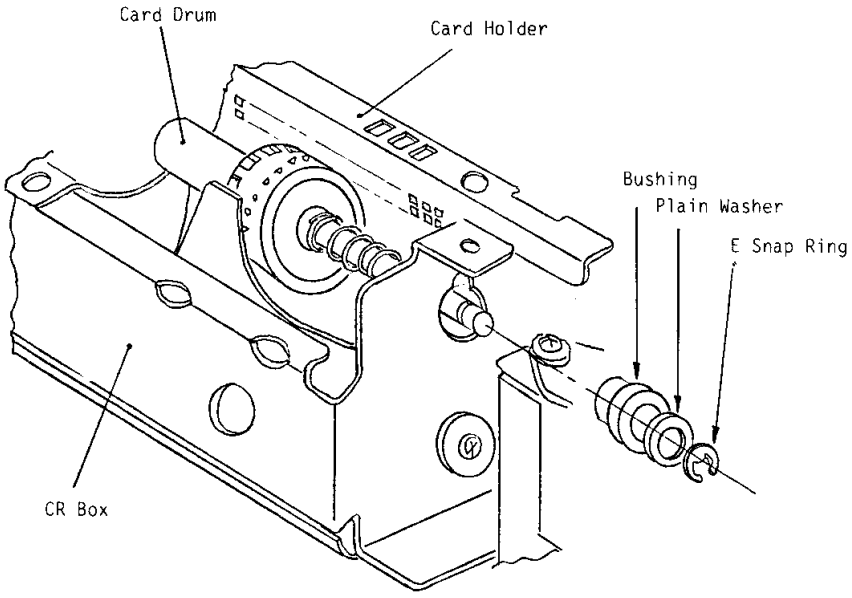
(Fig. 3-63)

3. Fit the Bushing on the side with the Card Dial into the CR Box.



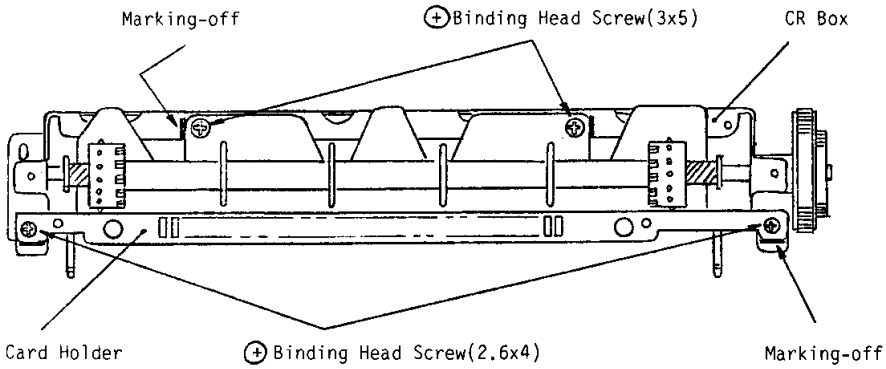
(Fig. 3-67)

4. On the left side, fit the Bushing and then fix the shaft with the plain washer and E Snap Ring.



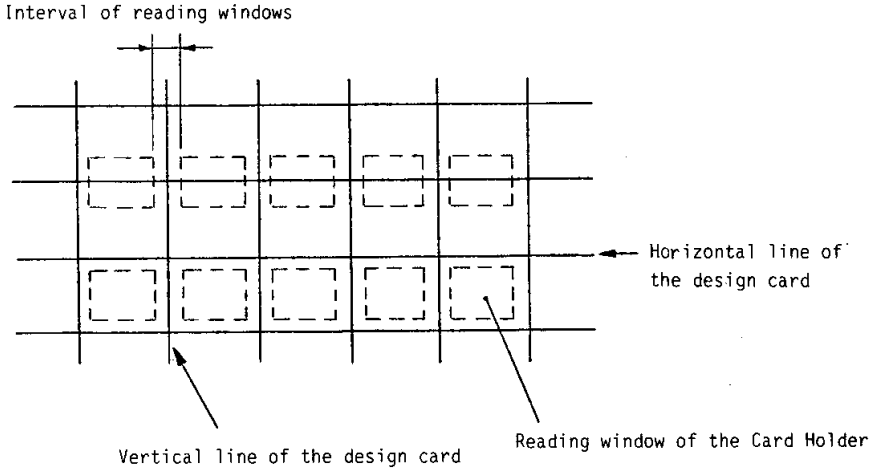
(Fig. 3-68)

5. Place the Card Holder to the position where the marking-off is made on the CR Box, and fix the Holder with two binding head screws(3x5) and two binding head screws(2.6x4).



(Fig. 3-69)

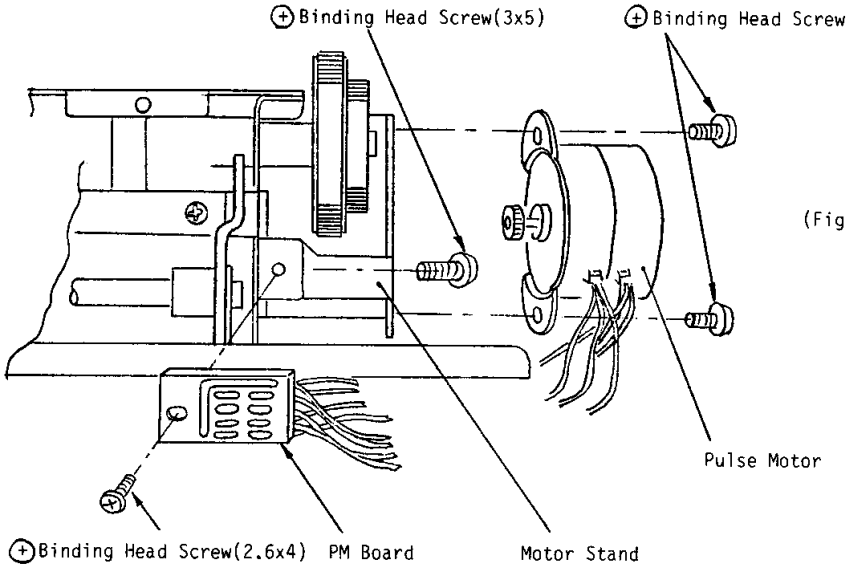
6. Insert a Design Card into the CR Unit, and check from the rear side the position of the sections on the Design Card against the position of the reading windows of the Card Holder to see if they are correctly aligned.



(Fig. 3-70)

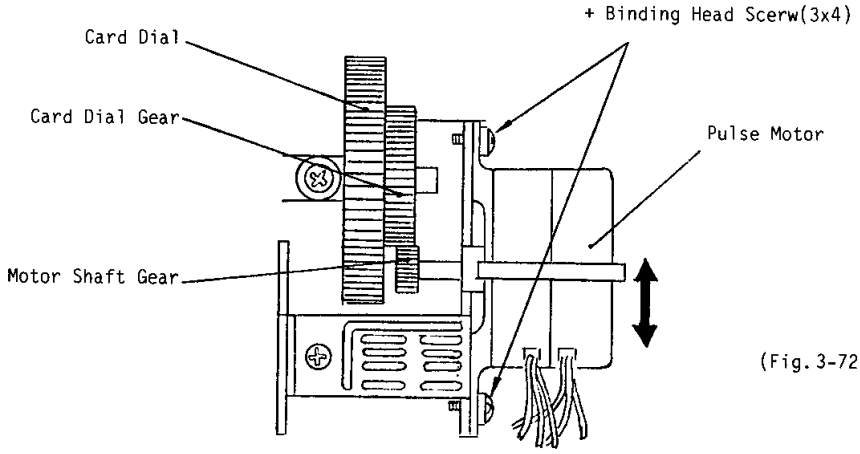
7. If the vertical lines of the Design Card are not at the centre of the interval of the reading windows, adjsut the position by moving the Card Holder to right or left. Then fasten the Holder with four screws.

8. Fix the Pulse Motor Stand with two binding head screws(3x5).
9. Fix the Pulse Motor and the PM Board to the Motor Stand. The screws for the Pulse Motor must be temporarily fastened.



(Fig. 3-71)

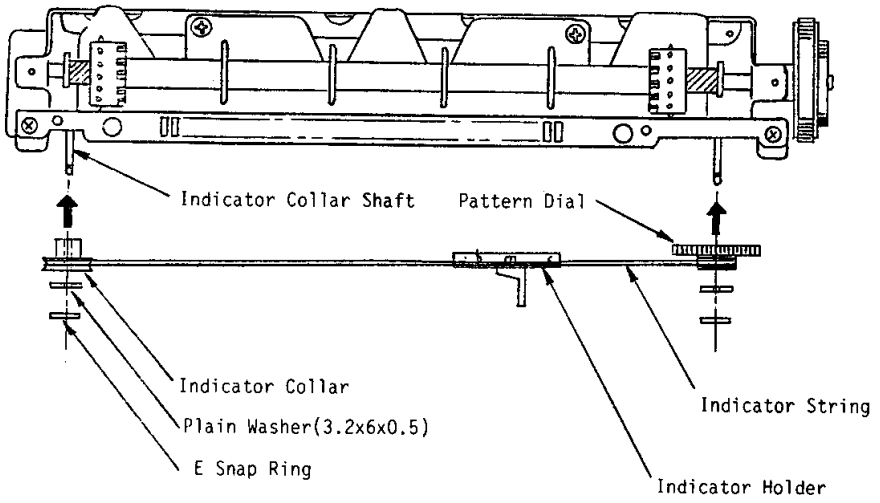
10. Adjust the up-down position of the Pulse Motor in the following manner.
    a) Connect the M Connector with the CPU Board and turn on the knitting machine.
    b) Move the Pulse Motor, and check by feeling the backlash between the Motor Shaft Gear and the Card Dial gear, and reduce the backlash to feeble amount.



(Fig. 3-72)

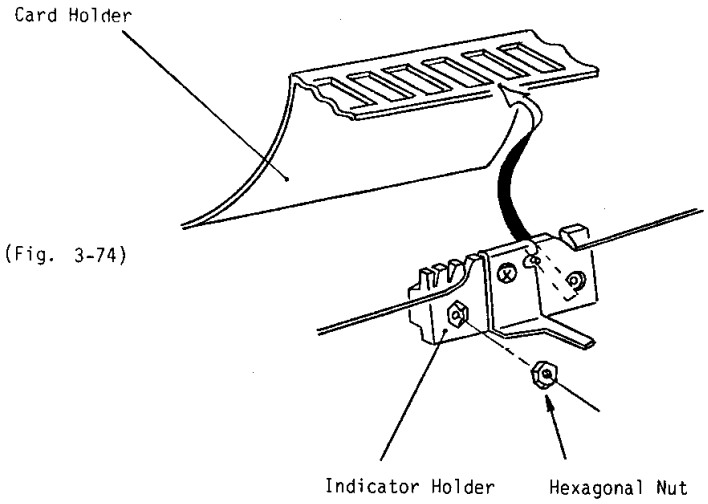
Note: Turn off the knitting machine when the adjustment has been completed.

11. Fit the Indicator Collar and the Pattern Dial to respective shaft with the Indicator String wound on them, and then secure them with the E Snap Rings.



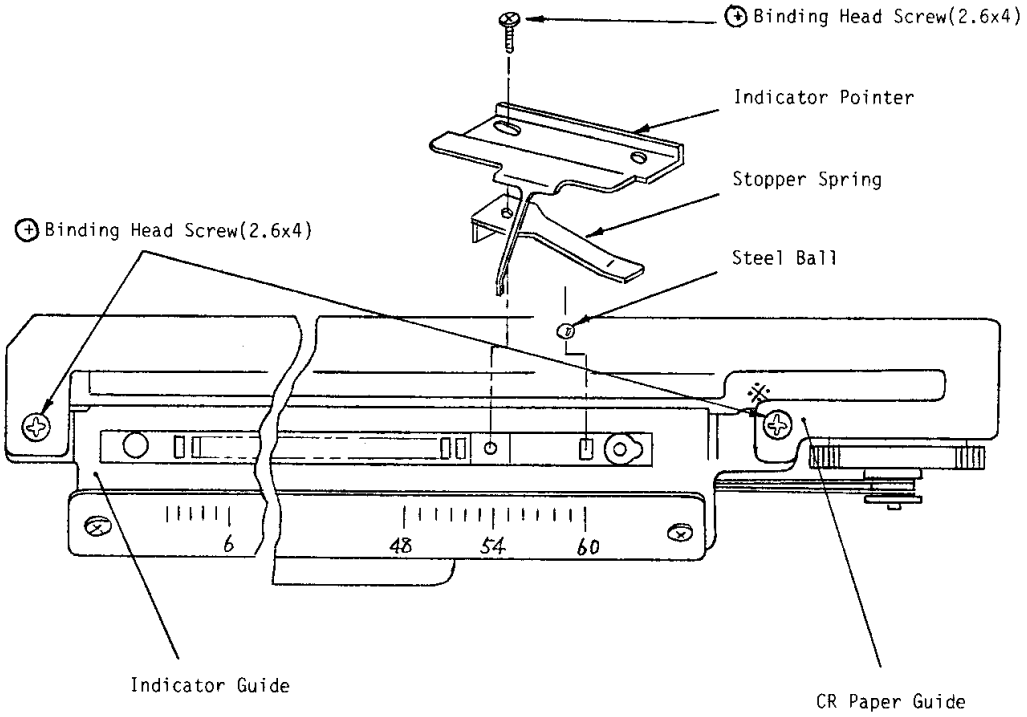
(Fig. 3-37)

12. Place the hexagonal nut under the Indicator Base and fit the Indicator Holder into the Card Holder.



(Fig. 3-74)

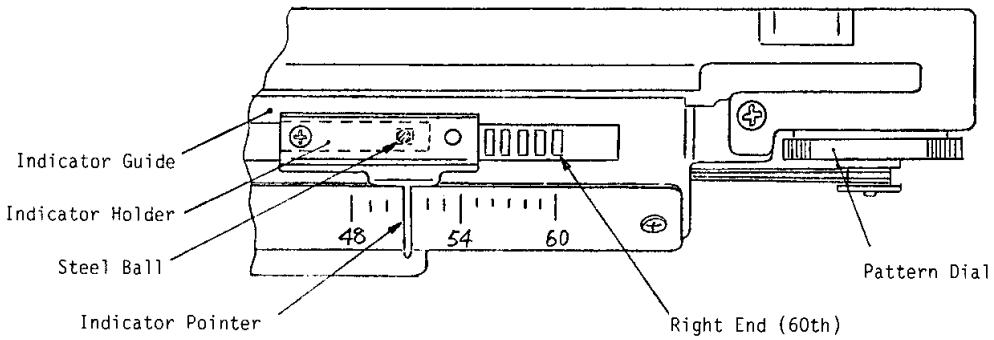
13. On the Card Holder, fix temporarily the Indicator Guide and CR Paper Guide, then fit the steel ball, place the Stopper Spring on it, and place the Indicator Pointer on top of the Spring, then fasten them with the binding screw(2x4).



(Fig. 3-75)

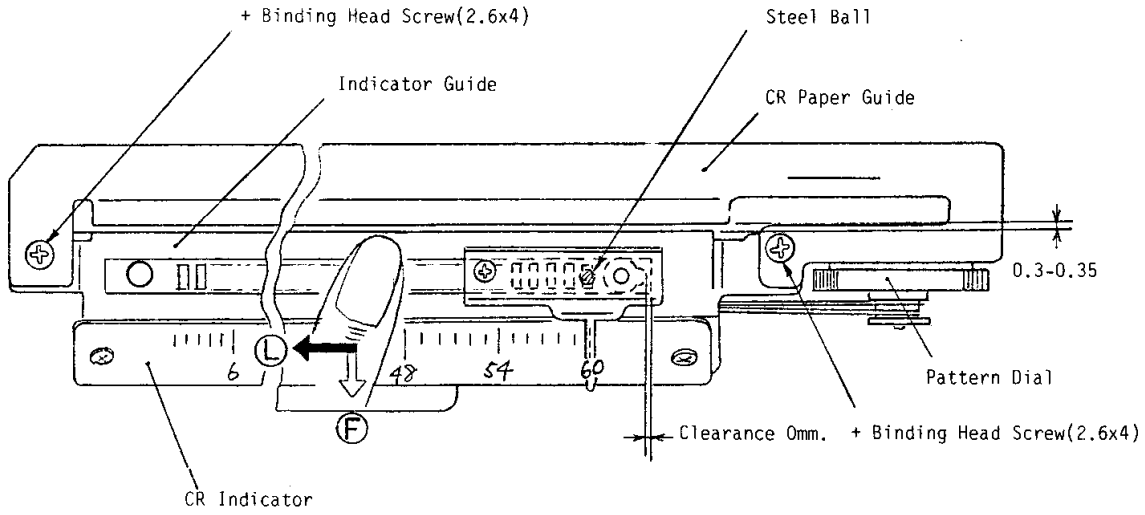
* When fastening the screw at the place, take care not to bend the Card Holder, by giving a aid of your hand.

14. Slide the Indicator Pointer till it stops at the right end (60th).



(Fig. 3-76)

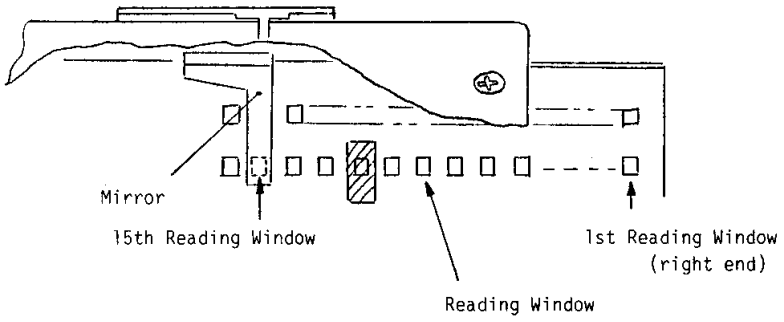
15. Move the Indicator Guide toward the side indicated by an arrow mark L, so as the protrusion of the Indicator Holder contacts the Indicator Guide (clearance is 0m/m). In this state pull the Indicator Guide toward you, and adjsut the clearance between the Card Holder and CR Paper Guide to the range of 0.3 - 0.35mm using a thickness gauge, and then fix with two binding head screws(2.6x4).



(Fig. 3-77)

Confirmation 1. The Indicator Pointer must be correctly pointing at 60 of the Indicator Scale. If not, loosen two binding head screws(2.6x4) and adjsut it to correct position.

Confirmation 2. The Indicator Point must be correctly at 15th reading window counted from the right side.



(Fig. 3-78)

16. Check and adjust the up-down positioning of the Pattern Card/Design Card against the reading windows in the following manner.

Checking 1. Connect the CR Unit to the CPU Board before inserting a Design Card into the CR Unit. (stop at arbiterary row)

2. Turn on the knitting machine.

3. Advance the Design Card by operating the Carriage, and check to see if a vertical line of the Design Card is visible through the reading windows. (check in both way, forwarding direction and backwarding direction.)

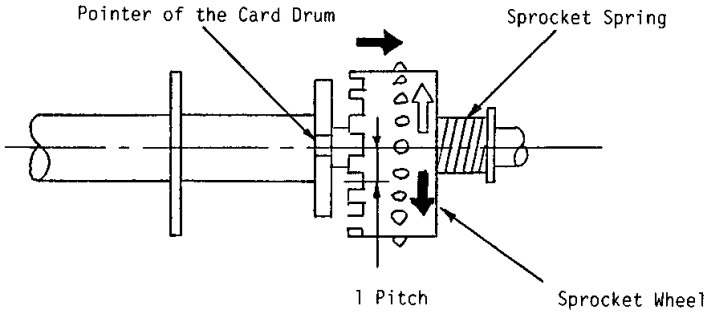
4. If the vertical line is visible through the reading windows, adjustment is required.

Adjusting 1. Remove the Design Card from the CR Unit.

2. Pull the sprocket wheel toward the sprocket spring and disengage the teeth from the Card Drum. Shift the engagement by 1 pitch.

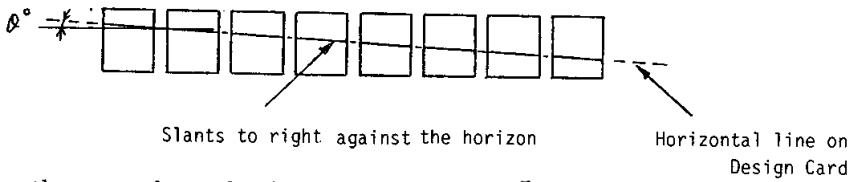
3. Insert the Design Card into the CR Unit and, recheck the position of the Card against the reading windows of the Card Holder.

4. Repeat steps 1 - 3 till the sections of the Design Card correctly correspond with the reading windows.

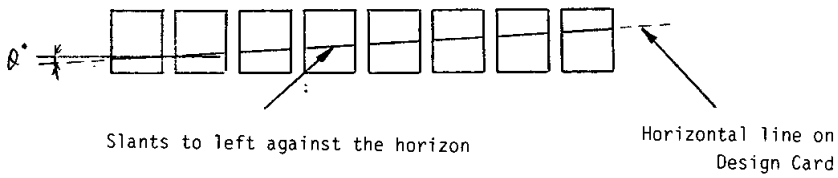


(Fig. 3-79)

* When the sprocket wheel is shifted in the ⇧ arrow direction, the horizontal lines of the Design Card moves as shown below in relation to the reading windows.



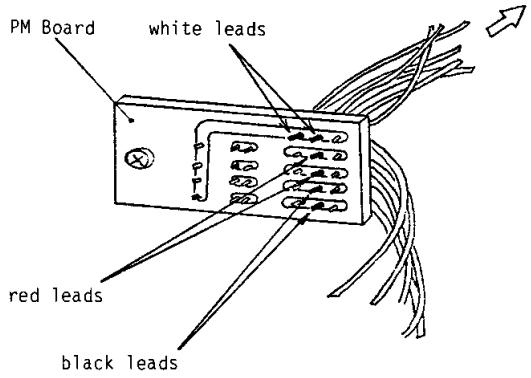
* When the sprocket wheel is shifted in the ⬇ arrow direction, the horizontal line on the Design Card moves as shown below in relation with the reading windows.



17. Referring to 3-7-6 "Checking and adjusting the PSD Timing" page 115 check the PSD timing, and adjust it if the timing is incorrect.

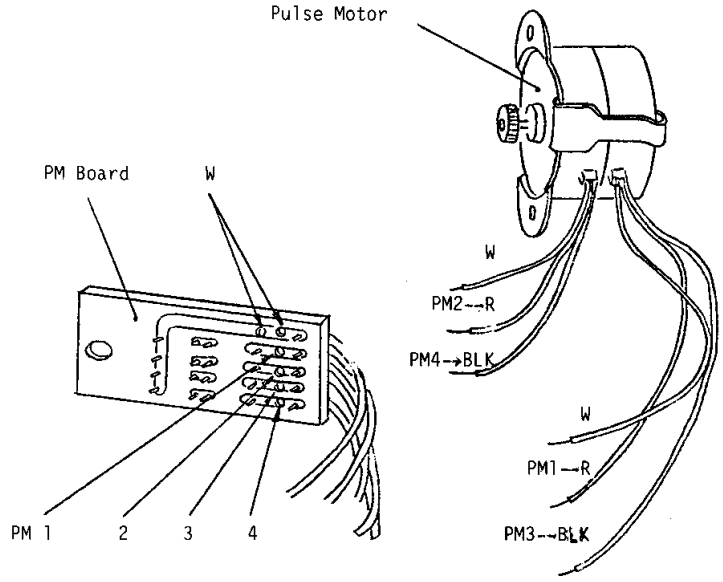
3 - 12 HOW TO REPLACE THE PULSE MOTOR (Refer to page 133 ④)

1. In a state that the PM Board is attached on the CR Unit, desolder to disconenct teh leads (2 white leads, 2 red leads, 2 black leads) from the PM Board.



(Fig. 3-80)

2. Remove the PM Boadrd, and the Pulse Motor from the CR Unit.
3. Pull out the leads, connected to the Pulse Motor, from the PM Board, and at the same places, insert the leads of a new Pulse Motor, and connect by soldering.



(Fig. 3-81)

4. Referring to page 138 , step 9 and 10, attach the Pulse Motor and adjust it.

5. Referring to page 142 , step 16, check the up-down position of the Design Card against the reading windows of the Card Holder.

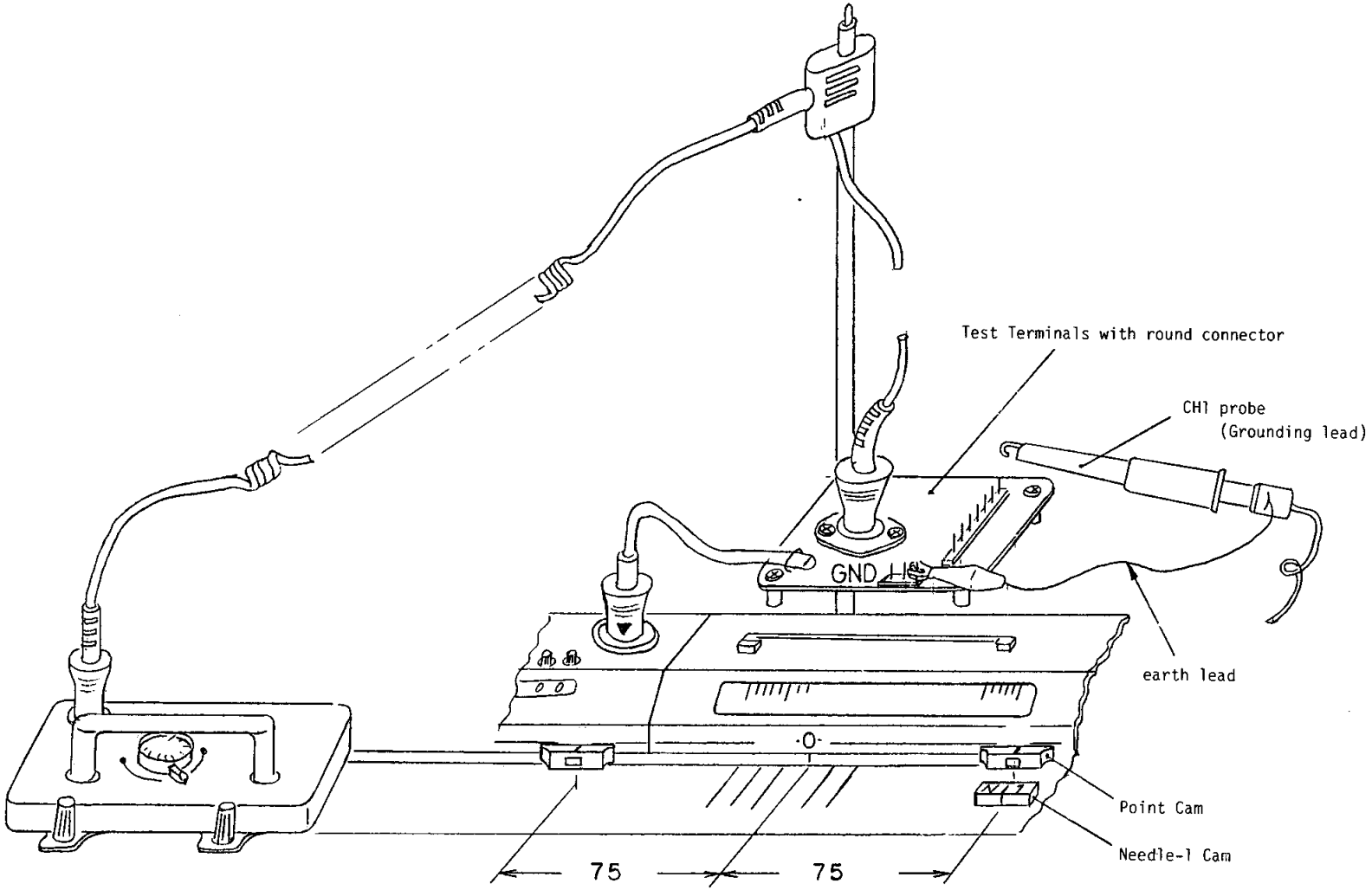
4 CARRIAGE (Standard Carriage)

** Precautions in repairing the Carriage

Following the procedures given in "preparatory operating procedure", make sure to complete the preparatory operation.

** The Model 560 knitter has two carriages, Standard Carriage and the Lace Carriage, the electronic adjustment for both Carriages is same.

4 - 1 Connecting the Curl cord, and setting the Point Cams and the Needle-1 Cam.

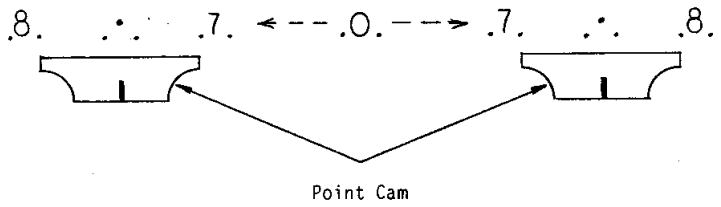


(Fig. 4-1)

4 - 2 PREPARATORY OPERATION FOR DIAGNOSE

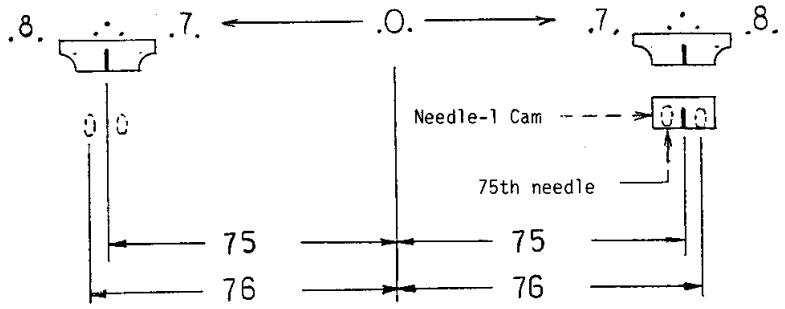
4-2-1 Setting the Point Cams

Set two Point Cams on the needle bed, each at 75th needle at both sides.



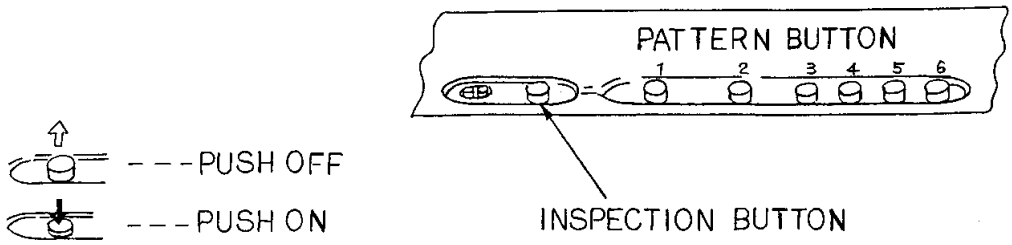
4-2-2 Setting the needles and the Needle-1 Cam

Push up 76 needles to B position at both sides of centre(0), and set the Needle-1 Cam at the 75th needle.



4-2-3 Setting the Inspection Button and the Pattern Button.

All the buttons must be in a "OFF" state - "UP" position.



4-2-4 Connecting the Test Terminals with round connector

Turn off the knitting machine, and connect the round connector at the straight end of the Curl Cord to the Test Terminal, referring to page 146.

4-2-5 Setting the Carriage

Remove the Carriage Cover from the Carriage, then set the Cam Lever and Stitch Dial on it, and place the Carriage on the outside of the Point Cams. Arm is not needed to be attached on the Carriage.

4-2-6 Setting the Oscilloscope

1. Connecting the probes (refer to page 146)

   Connect the ground lead on the CH 1 probe to the GND of round connector on the test terminals. Probes of the CH 1 and CH 2 must be connected in each step.

2. Initial setting of the Oscilloscope

   Referring to the operation table "Initial setting - 1.2", operate the Oscilloscope and then operate following instructions given under [Carriage - 1].

Preparatory operation has been completed for diagnosing.
Follow the instructions to follow for other operation.

4 - 3 DIAGNOSTIC FLOW CHART FOR THE CARRIAGE UNIT

start

Connect the defective unit to normal knitting machine.

Set Test Card into CR Unit.

Power Switch on

Push ON Inspection Button.

Move Carriage twice across the needle bed.

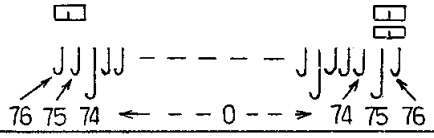
Push OFF Inspection Button.

1. Set the Test Card to "B"
2. Pattern Width to 60

1. Set the Test Card to the staring line for "B".

1. Set Cam Lever to "SLIP".

1. Check needle selection about 30-40 rows. (in quick and slow speed)
2. Correct needle selection in normal condition.

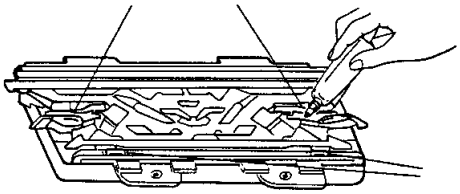


Check needle selection

Problem recurs — No

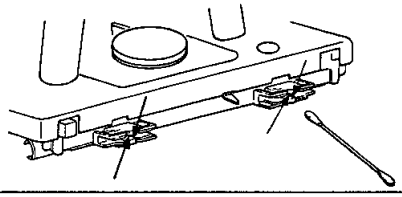
Yes

1. Apply lubricant to needle selection base (R/L).



2. Cleaning the Slider Magnet.

3. Cleaning the sensors

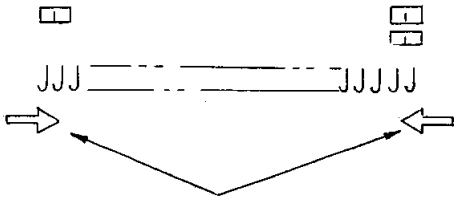


Cleaning the Carriage

Check needle selection

Problem recurs — No

Yes



1. No needle selection OR
2. Needle selection in one direction.

Yes

No

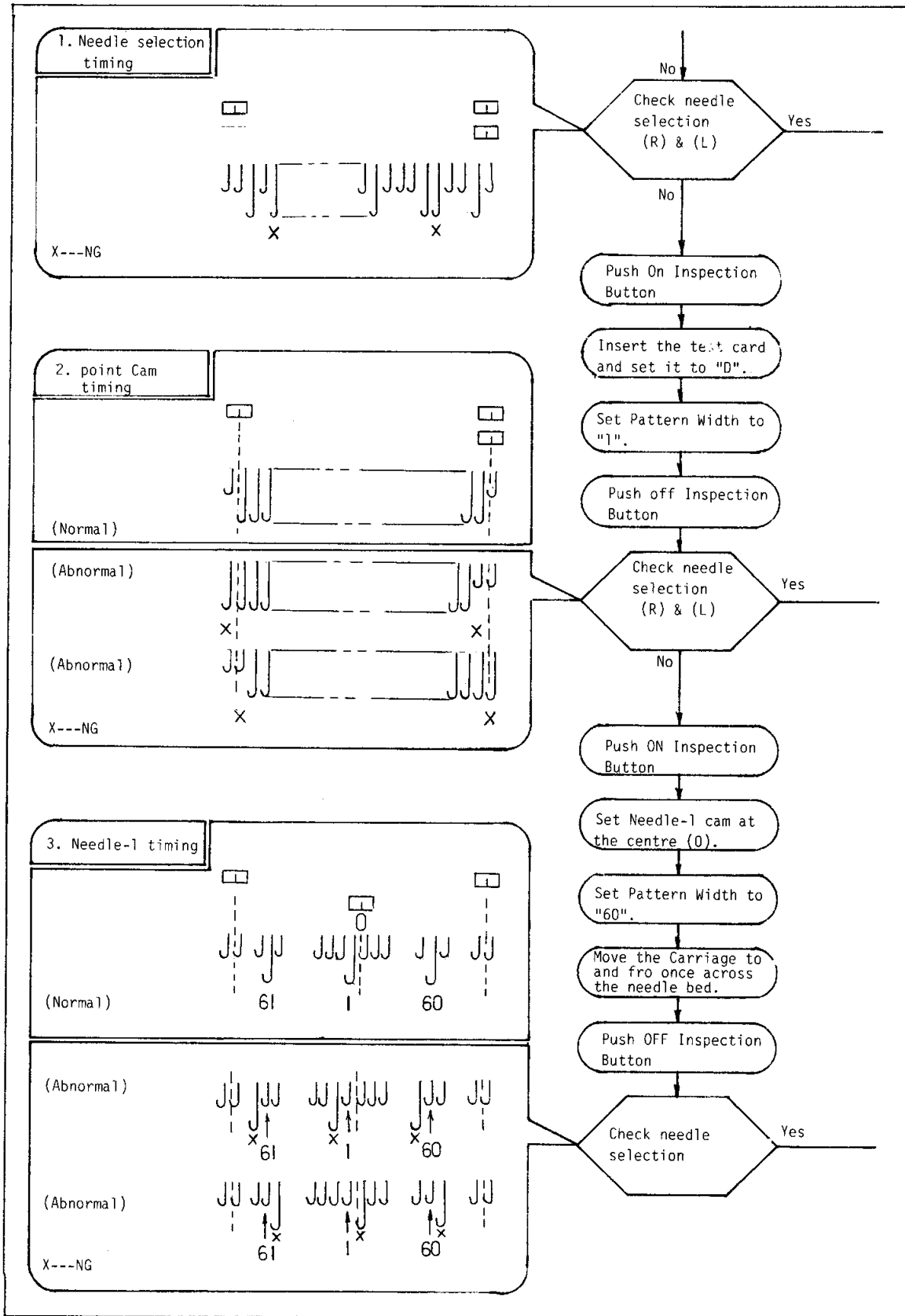
No

1. Check the needle selection repeatedly for 100 rows. and if the needle selection is still correct, leave the machine with power on and check the needle selection after one hour, and two hours. But if no abnormal needle selection recurs, finish the checking.
2. Clean the interruptor sensor and slider magnet, lubricate the needle selection cam.

No

Finish

To [1] (P.153)


1. Needle selection timing
X---NG
2. point Cam timing
(Normal)
(Abnormal)
(Abnormal)
X---NG
3. Needle-1 timing
(Normal)
61
1
60
(Abnormal)
(Abnormal)
X---NG
No
Check needle selection (R) & (L)
Yes
No
Push On Inspection Button
Insert the test card and set it to "D".
Set Pattern Width to "1".
Push off Inspection Button
Check needle selection (R) & (L)
Yes
No
Push ON Inspection Button
Set Needle-1 cam at the centre (0).
Set Pattern Width to "60".
Move the Carriage to and fro once across the needle bed.
Push OFF Inspection Button
Check needle selection
Yes

(Refer to page 181)

Yes → Incorrect CCP timing in either side (R) or (L) of the carriage

Note: When the CCP timing is adjusted, other electronical adjustments must be done at the same time. (Refer to page 181)

(Refer to page 181)

Yes → Incorrect KSL timing in either side, (R) or (L) of the carriage.

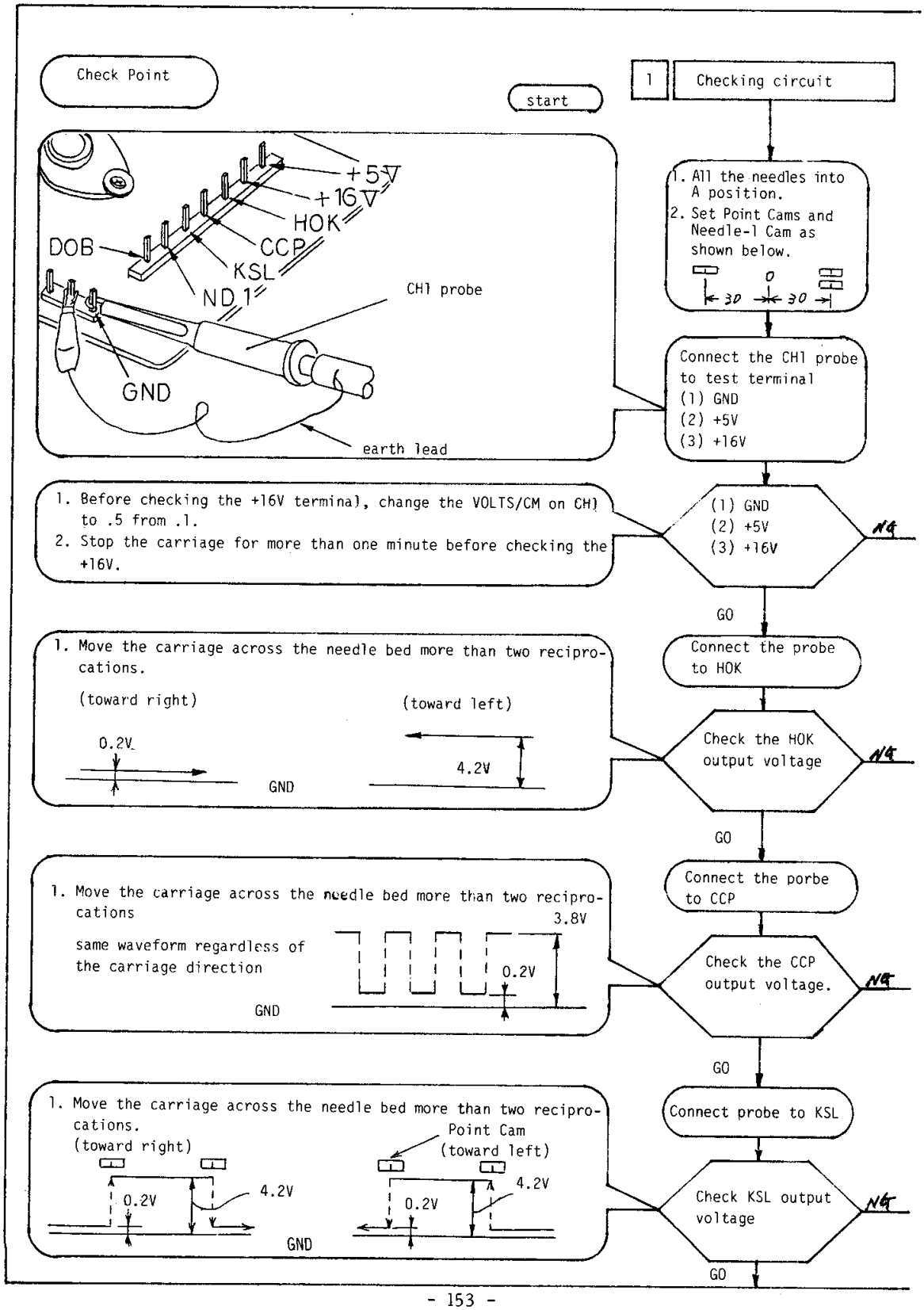
Note: When the KSL timing is adjusted, other electronical adjustments must be done at the same time. (Refer to page 181)

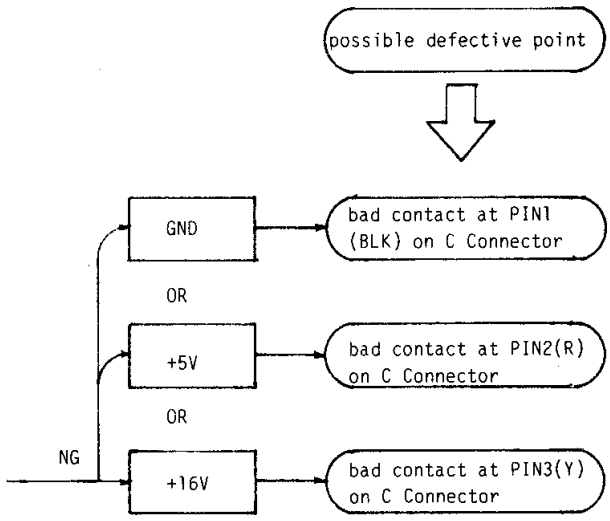
(Refer to page 181)

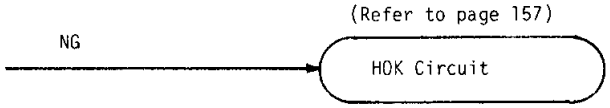
Yes → Incorrect Needle-1 timing

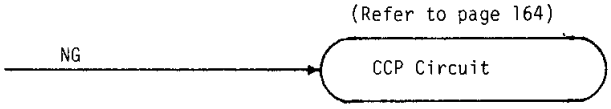
Note: When the Needle-1 timing is adjusted, other electronical adjustments must be done at the same time. (Refer to page 181).

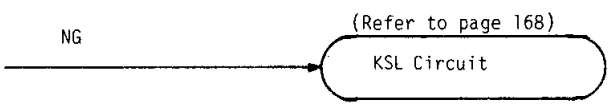
4 - 3 DIAGNOSTIC FLOW CHART FOR THE CARRIAGE UNIT

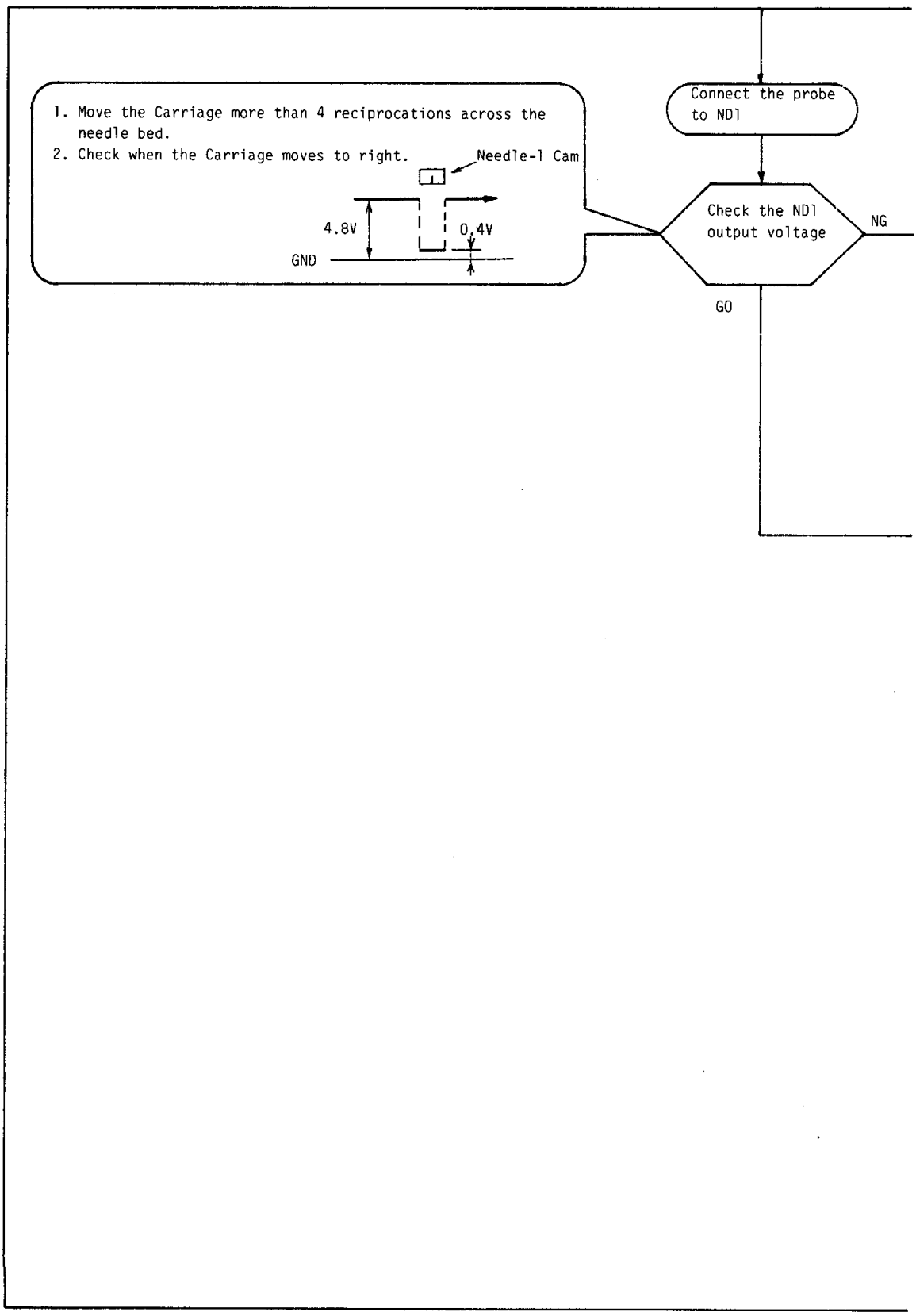


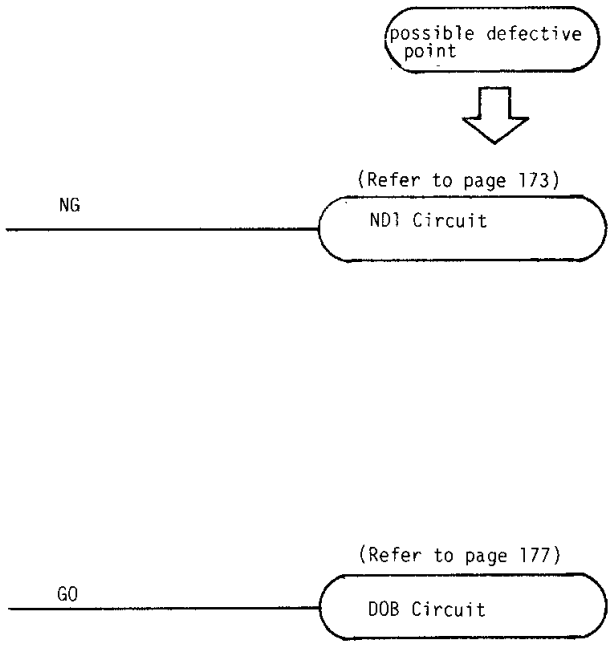

possible defective point
GND
bad contact at PIN1 (BLK) on C Connector
OR
+5V
bad contact at PIN2(R) on C Connector
OR
NG
+16V
bad contact at PIN3(Y) on C Connector


(Refer to page 157)
NG
HOK Circuit


(Refer to page 164)
NG
CCP Circuit


(Refer to page 168)
NG
KSL Circuit


1. Move the Carriage more than 4 reciprocations across the needle bed.
2. Check when the Carriage moves to right.
Needle-1 Cam
4.8V
0.4V
GND
Connect the probe to ND1
Check the ND1 output voltage
NG
GO

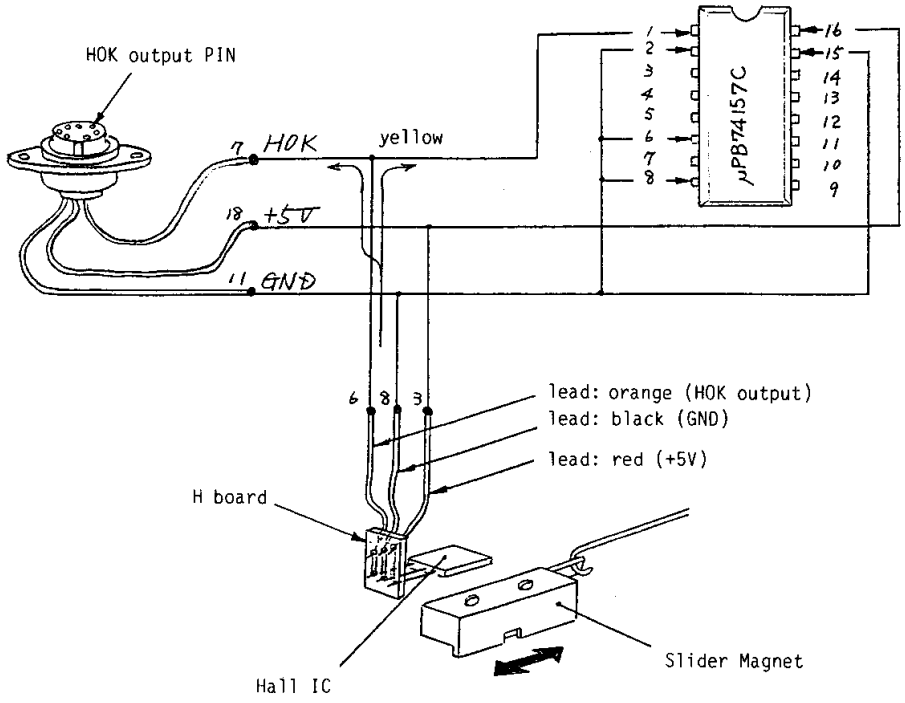

possible defective point
(Refer to page 173)
NG
ND1 Circuit
(Refer to page 177)
GO
DOB Circuit

4-4 HOK (DIRECTION) CIRCUITS

4-4-1 Signal flow in the HOK circuit

HOK singal is generated by the Hall IC built in the Slider, and the Slider Magnet.
When the Carriage moves toward right, Slider Magnet lags behind and comes near to the Hall IC to generate low voltage. When the Carriage moves toward the left, high voltage is generated by the Slider magnet and the Hall IC.
The signals go into the Pin 1 of the data selector (μPB74157C) on the Carriage board, and also into the PIN 8 of the LSI through the Curl Cord. The LSI recognizes the direction in which Carriage proceeds when either of the high or low signal goes into the LSI.

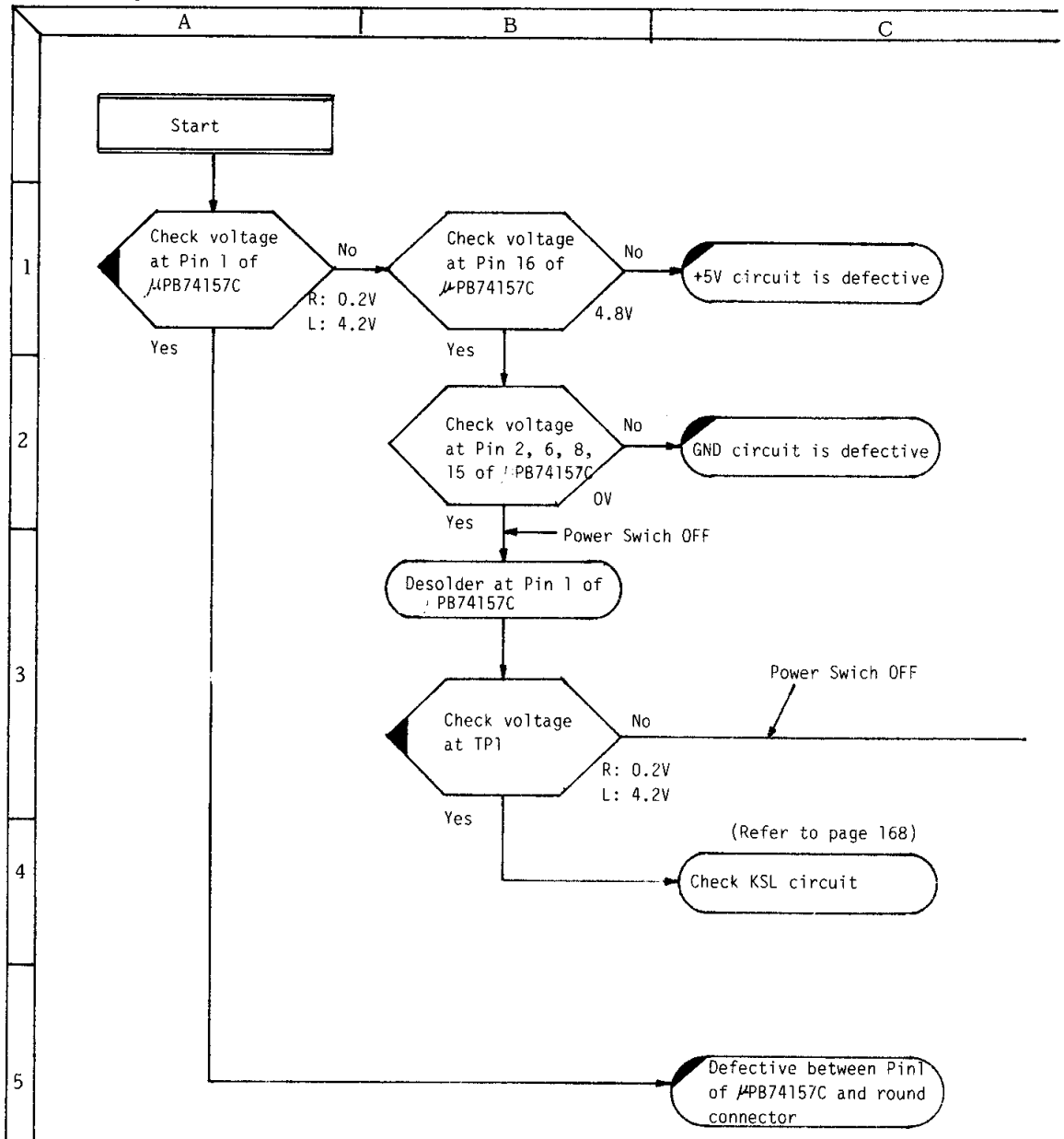
4-4-2 HOK Circuit (SCHEMATIC)



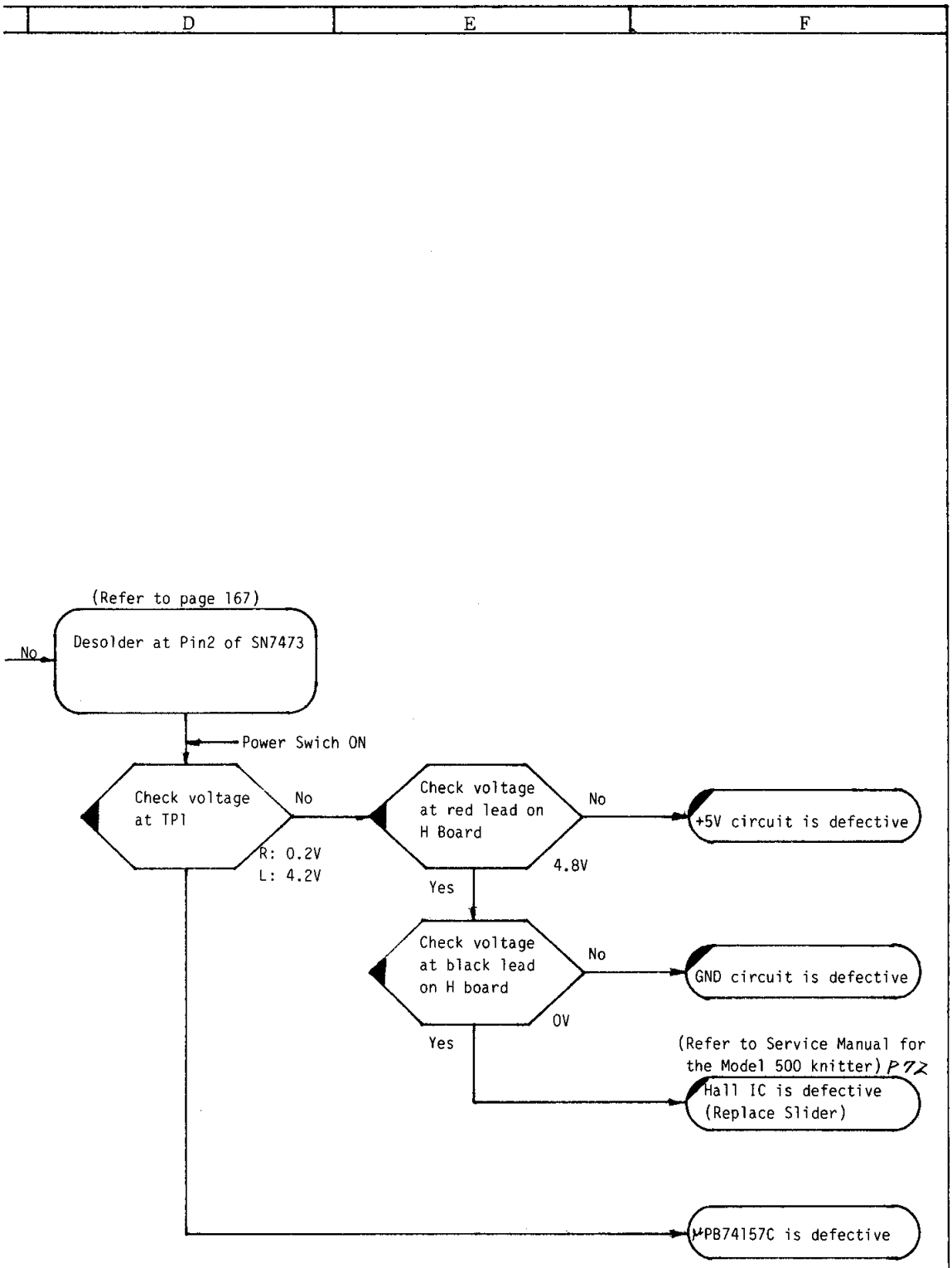
4-4-3 Diagnosing the HOK Circuit

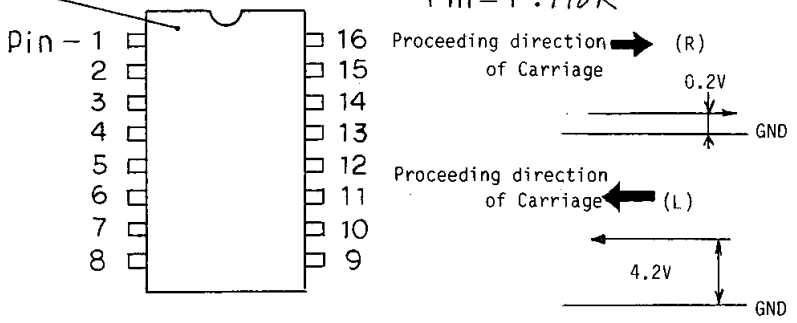
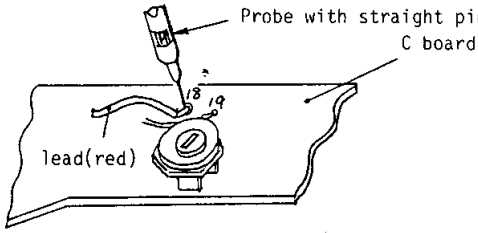
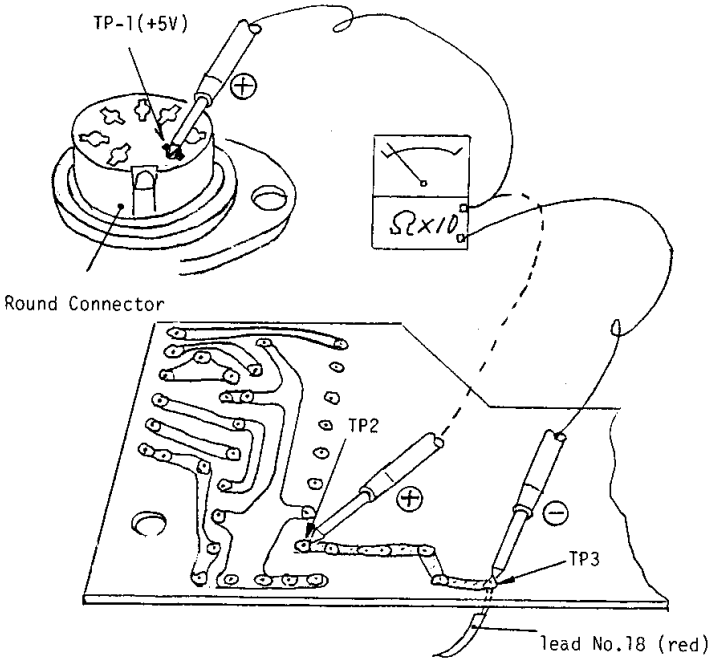
1. Initial setting of the oscilloscope
   (1) MODE: change to CH2 from CH1.
   (2) Set the AC-GND-DC lever to DC.
   (3) Change the tip of probe of the CH2 to straight pin tip
2. Checking sequence
   Check the HOK circuit following the flow chart.

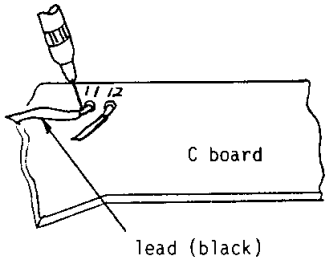
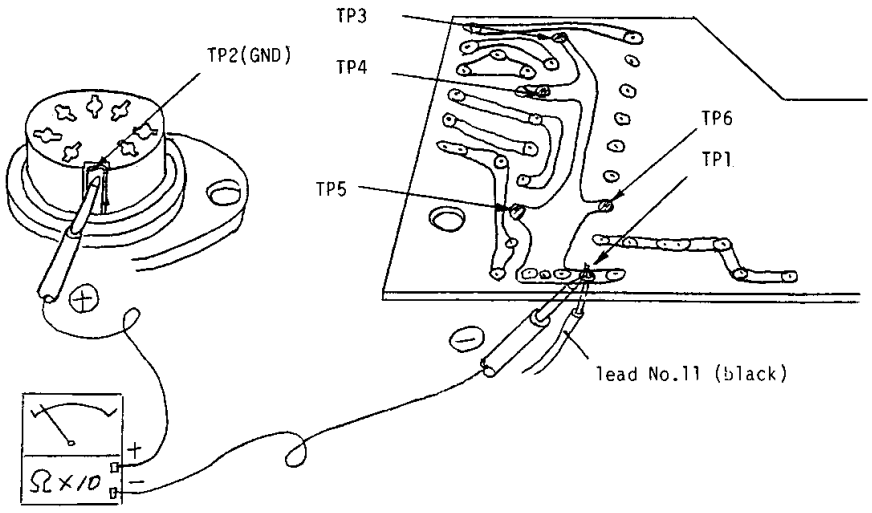
4-4-4 Diagnostic Flow chart for the HOK Circuit

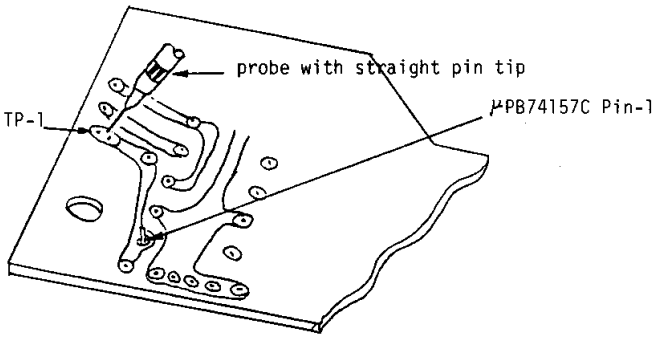
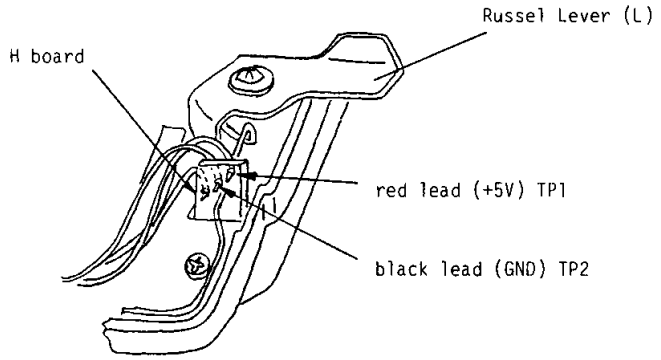


Note: When checking Pin1 of μPB74157C, if the signal is abnormal at the point of changing the direction of the Carriage, the Slider Magnet is required to be replaced.
(Refer to the Service Manual for the Model 500 knitter.) P72~P74

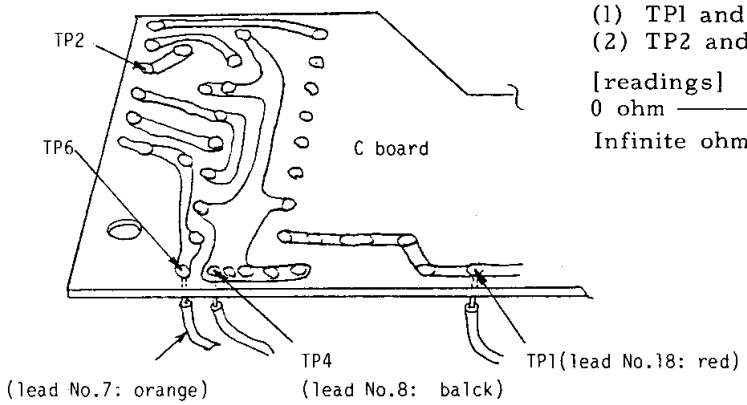

D
E
F
(Refer to page 167)
No
Desolder at Pin2 of SN7473
Power Swich ON
Check voltage at TP1
No
R: 0.2V
L: 4.2V
Check voltage at red lead on H Board
No
+5V circuit is defective
4.8V
Yes
Check voltage at black lead on H board
No
GND circuit is defective
0V
Yes
(Refer to Service Manual for the Model 500 knitter) P72
Hall IC is defective (Replace Slider)
μPB74157C is defective

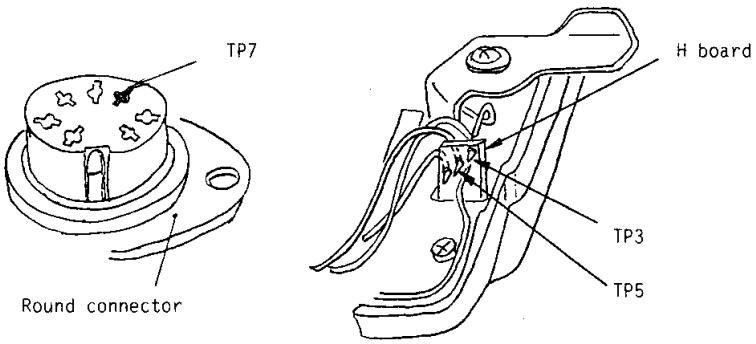
	CHECK POINT
1 - A	μPB74157C 
1 - C	1. With the power on check the voltage at No.18 red lead on the Carriage board.  2. Turn off the knitting machine, and carry out the following continuity test. (use the multitester: set range to x10) A: Measure the resistance across TP3 and TP2. (Infinite resistance is a result of a bad contact because of bad soldering. If the resistance is 0 ohm, the continuity is normal.) B: Measure the resistance across TP3 and TP1 (Infinite resistance is a result of bad contace because of bad soldering.) 

	CHECK POINT
2 - C	1. With power on, check the voltage at lead No.11(black) on the Carriage board.  If the value is other than 0V, check the section 2. If the value is 0V, check the section 3. 2. Continuity test (turn off the knitting machine, and set the range of the multitester to x10.) A: Measure resistance across TP1 and TP2 (Infinite resistance is a result of bad soldering. Zero(0) ohm means normal condition.)  3. Solder TP3 - TP6 again, and carry out continuity test across TP1 - TP3, TP1 - TP4, TP1 - TP5 and TP1 - TP6. * If the multitester measures 0 ohm, it is normal * If the multi-tester measures infinite resistance, check the soldering or carry out continuity test between each test point.

	CHECK POINT
3 - B	1. Turn off the knitting machine. 2. Desolder at Pin 1 of μPB74157C. 3. Turn on the knitting machine. 4. Connect the probe with straight pin tip to TP1, and check the HOK signals while moving the Carriage across the needle bed. Carriage toward right ⟶ Low voltage (0.2V) Carriage toward left ⟶ Hight voltage (4.2V)] Normal readings. 
4 - E 5 - E	1. By pushing the Release Lever on the Carriage, lift open the front of the Carriage. 2. Set the left Russel Lever to "I". 3. Mesure the voltage on red lead (carrying +5V) at TP1, or on black lead (GND) at TP2, using the prove with straight pin tip.  [Expected readings] TP1 ⟶ 4.8V (Normal) TP2 ⟶ 0V (Normal)

	CHECK POINT
4 - F 5 - F 5 - C	1. Turn off the knitting machine. 2. Mesure resistance across the following test points 4 - F : +5V circuit [checking] Measure resistance across (1) TP1 and TP2 (2) TP2 and TP3 [readings] 0 ohm ——— normal Infinite ohm——— bad soldering between the test points.





5 - F : GND circuit

[checking]
(1) Measure resistance across TP4 and TP5.

[reading]

0 ohm ——— normal
Infinite Ohm —— bad soldering or discontinuity across the test points.

5 - C : HOK output circuit

[checking]
(1) Measure resistance across TP6 and TP7.

[reading]

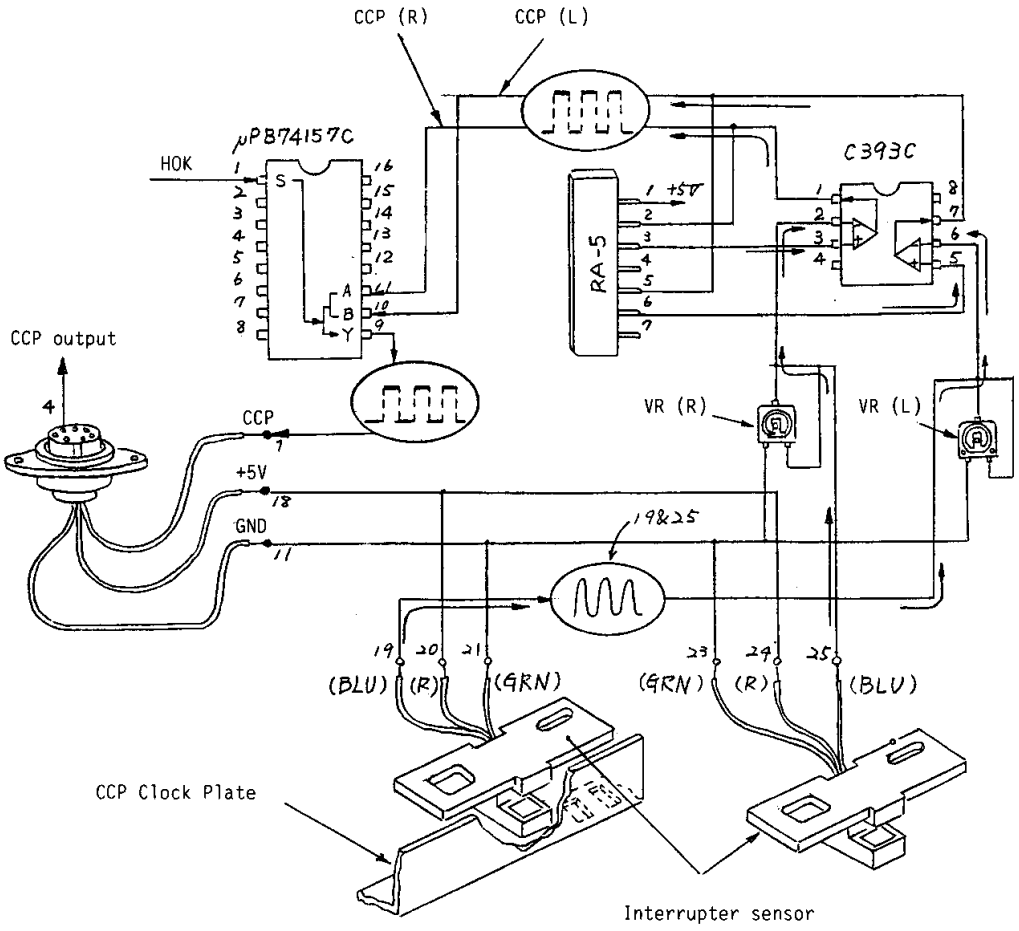
0 ohm ——— normal
Infinite Ohm —— bad soldering or discontinuity across the test points.

4 - 5 CCP (Carriage Clock Pulse) CIRCUIT

4-5-1 Flow of signal in the CCP circuit

CCP signal is generated by the interrupter sensor constructed with a photo-transistor and a LED.
The light emitted from the LED turns on the photo-transistor and generates high voltage. When the light is interrupted, the voltage becomes low.
Alternation of high and low voltages is regulated by the interrupter plate.
The signals thus generated are regulated to the specified level by the potentiometer, then go into Pin 2 of the C393C in case of the CCP signal when the Carriage goes toward to the right.
The analogue signal is converted into digital signal by the C393C (comparator) and then goes into Pin 11 of the data selector (μPB74157C).
The digital signal goes into the LSI, and one signal is recognized as one needle.

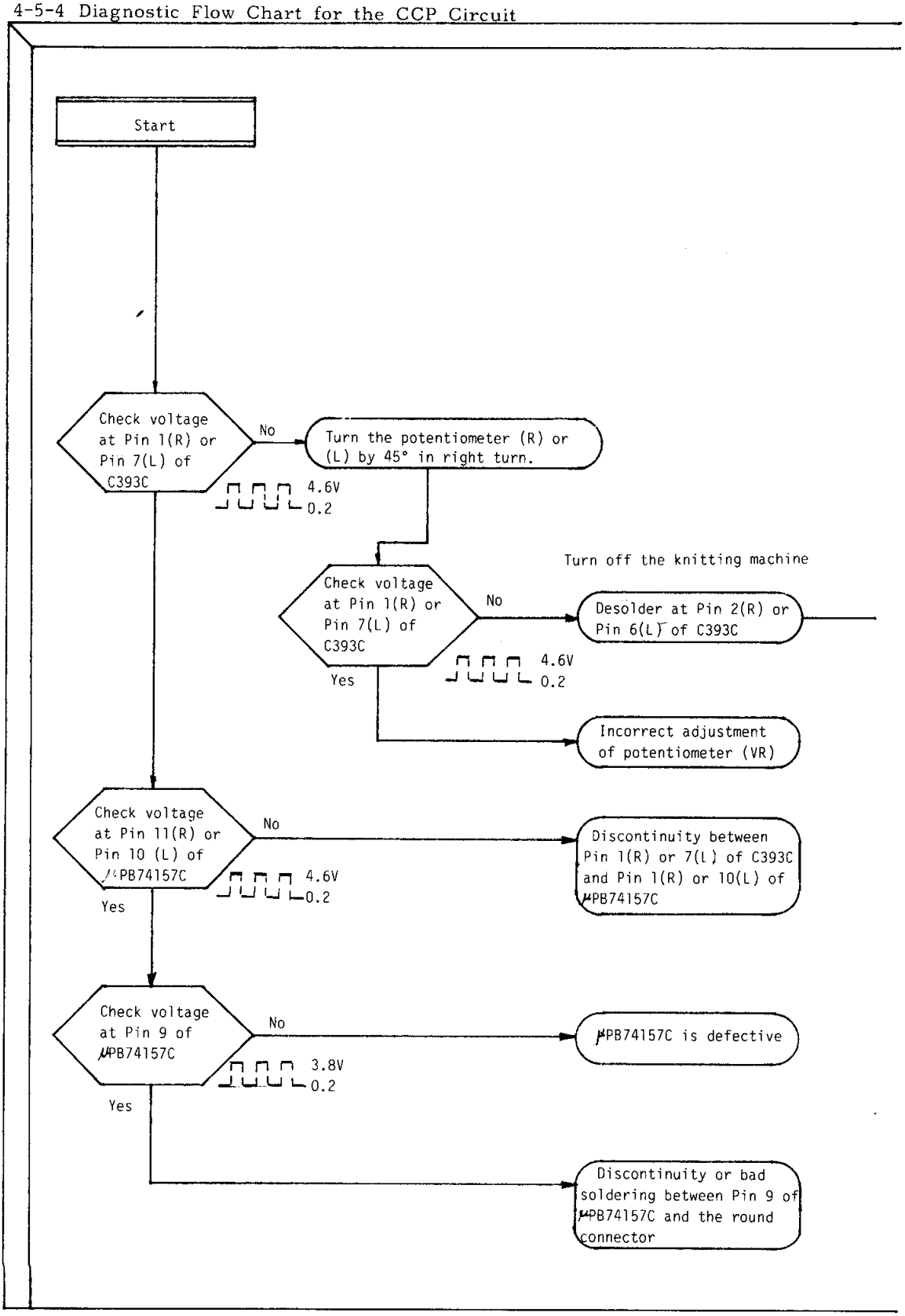
4-5-2 CCP circuit (schematic)



4-5-3 Before diagnosing the CCP circuit

1. Setting the oscilloscope
   1) Change the MODE to CH2 from CH1.
   2) Set the AC-GND-DC lever to "DC".
   3) Change the tip of CH2 probe to straight pin tip.
2. Checking sequence
   Follow the diagnostic flow chart for the CCP circuit.

4-5-4 Diagnostic Flow Chart for the CCP Circuit



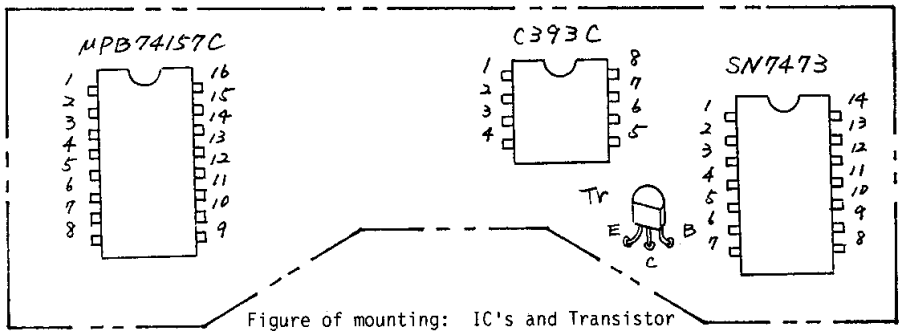
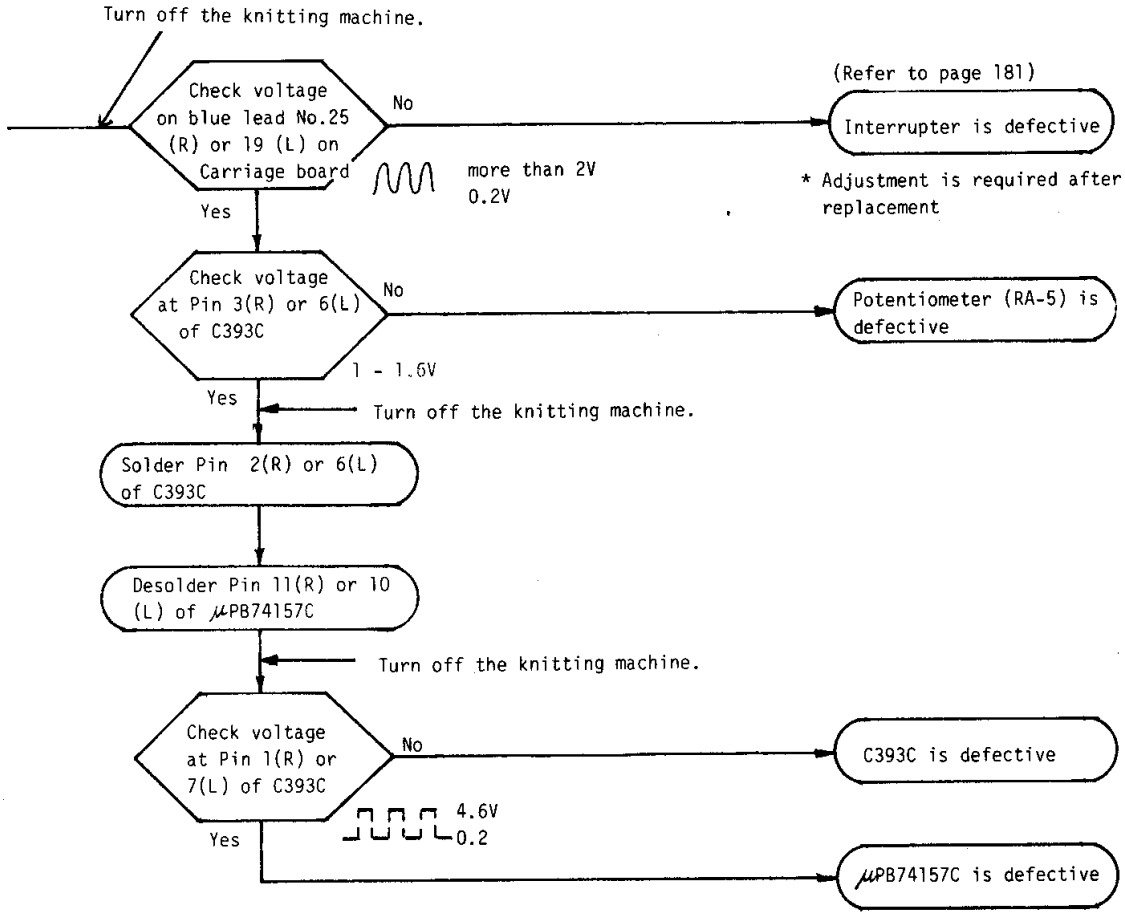


Figure of mounting: IC's and Transistor

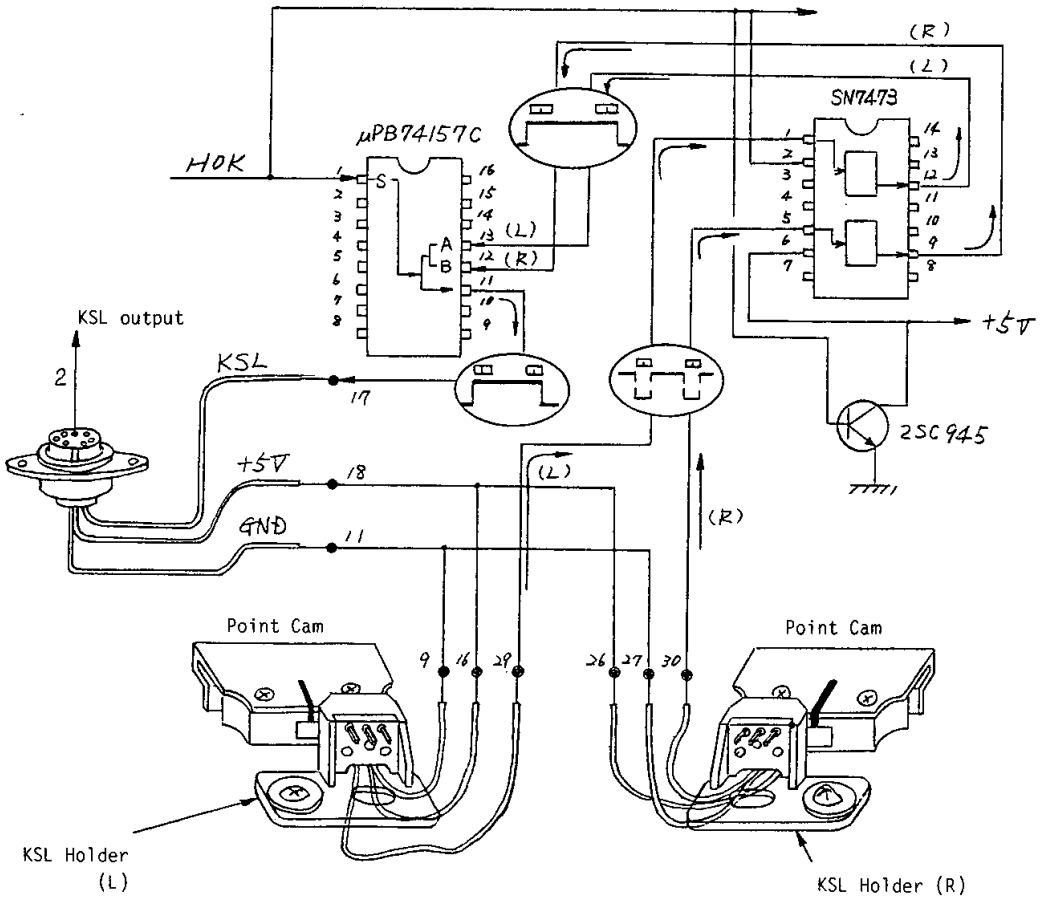


4 - 6 KSL(POINT CAM) CIRCUIT

4-6-1 Signal flow in the KSL(Point Cam) Circuit

KSL signal is generated by the combination of the Hall IC built in the KSL Holder and the magnet in the Point Cam.
When the Carriage proceeds to the right, and the KSL Holder on the leading side of the Carriage (right side) passes across the first Point Cam, low voltage (signal) is generated and goes into Pin 5 of SN7473 through the blue lead No. 30, and out from Pin 9 as converted into high signal.
And when the leading KSL Holder passes across the second Point Cam, low signal is again generated and goes into and out from the same pins, but the signal is low.
Thus the high signal is converted into low, and low is into high, by the SN7473 (JK type flip-flop).
LSI recognises that as far as the signal is high state, the needle selection is effective.

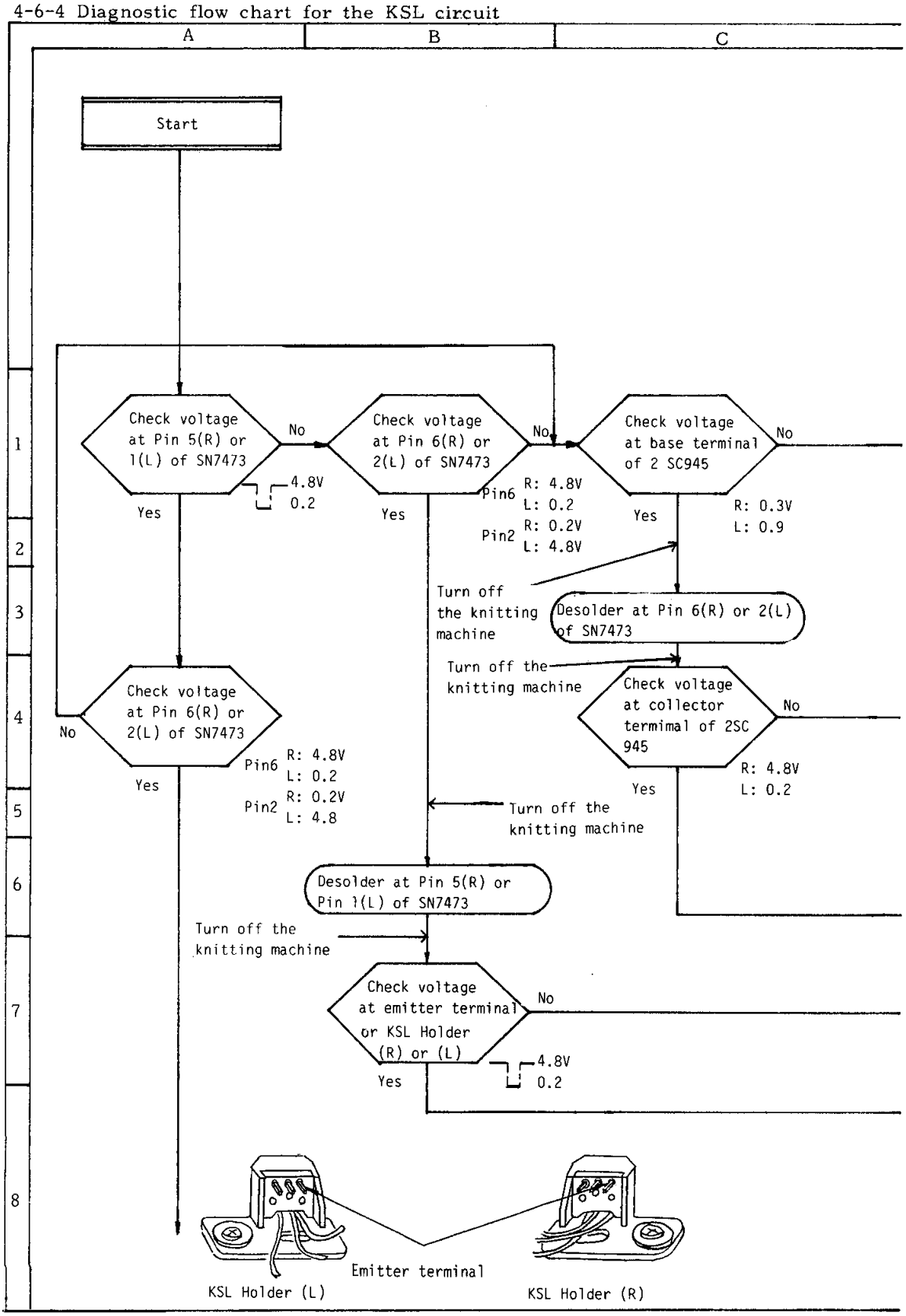
4-6-2 KSL CIRCUIT (Schematic)



4-6-3 Before diagnosing the KSL circuit

1. Setting the oscilloscope
   (1) Change the MODE to CH2 from CH1.
   (2) Set the AC-GND-DC lever to "DC".
   (3) Change the tip of CH2 probe to straight pin tip.
2. Checking sequence
   Flow the diagnostic flow chart for the KSL circuit.

4-6-4 Diagnostic flow chart for the KSL circuit



D	E	F

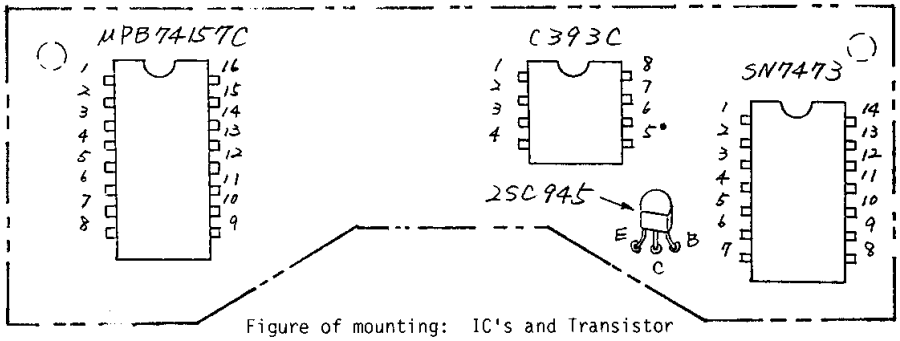
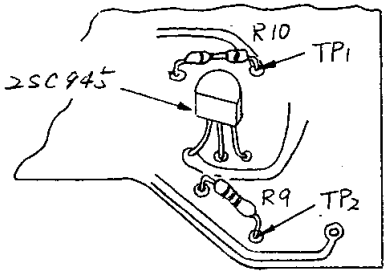
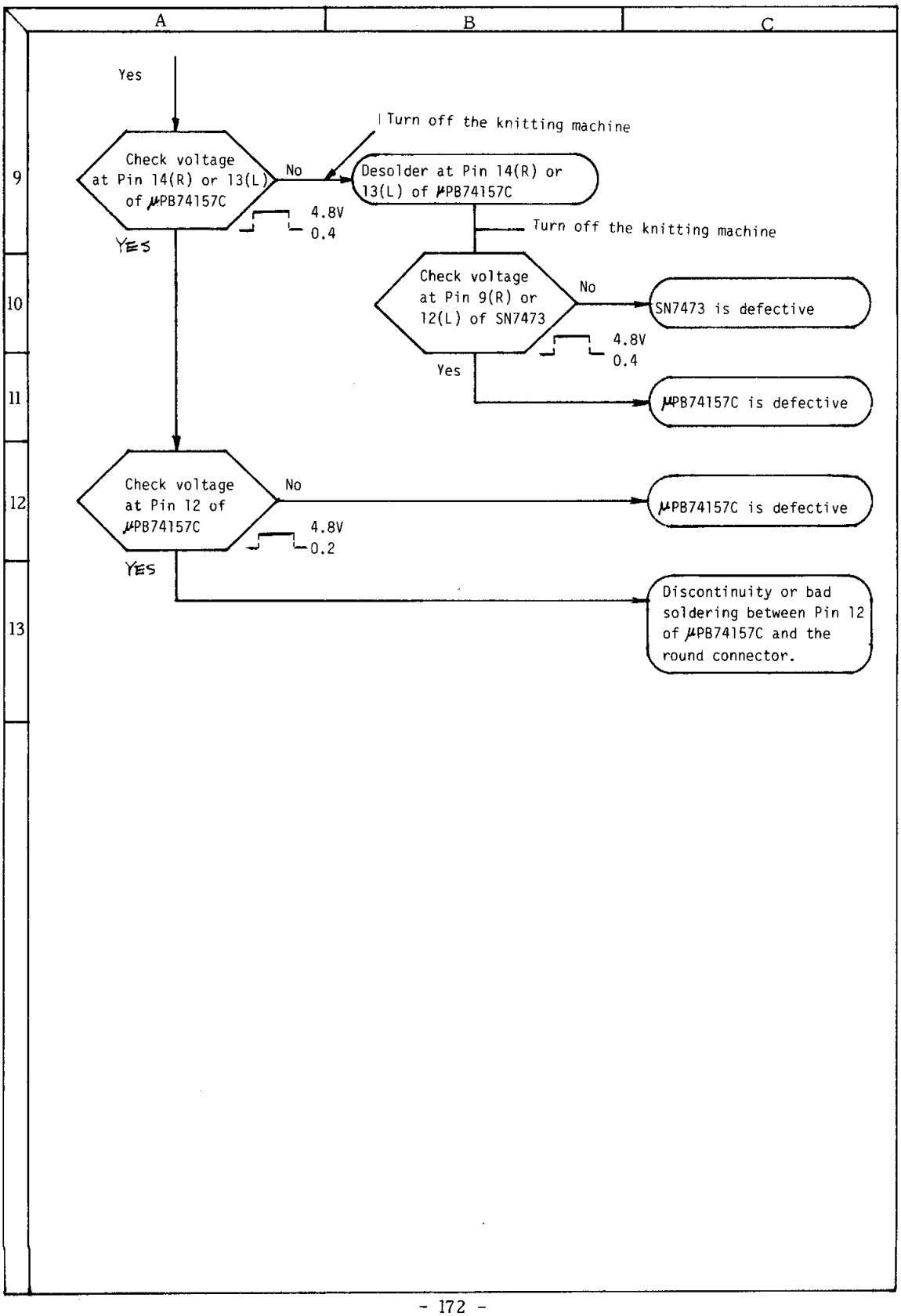


Figure of mounting: IC's and Transistor



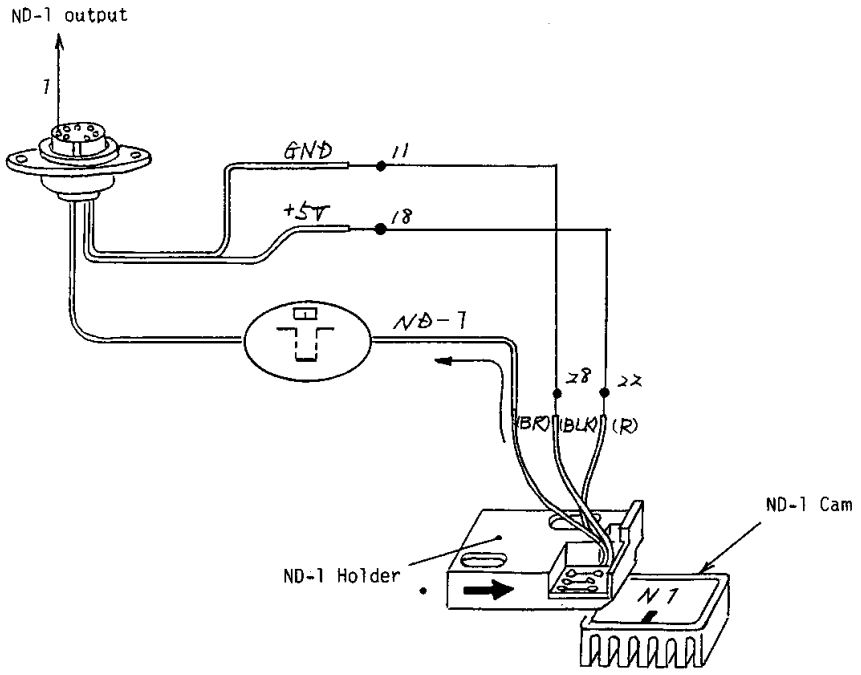

A
B
C
9
10
11
12
13
Yes
Check voltage at Pin 14(R) or 13(L) of μPB74157C
No
Turn off the knitting machine
Desolder at Pin 14(R) or 13(L) of μPB74157C
4.8V
0.4
YES
Turn off the knitting machine
Check voltage at Pin 9(R) or 12(L) of SN7473
No
SN7473 is defective
4.8V
0.4
Yes
μPB74157C is defective
Check voltage at Pin 12 of μPB74157C
No
μPB74157C is defective
4.8V
0.2
YES
Discontinuity or bad soldering between Pin 12 of μPB74157C and the round connector.

4 - 7 ND1 (NEEDLE-1) CIRCUIT

4-7-1 Signal Flow in the ND1 circuit

ND-1 signal is generated by the Hall IC in the ND1 Holder and the magnet on the Needle-1 Cam on the needle bed.
When the ND-1 Holder passes over the Needle-1 Cam, the ND-1 signal (low voltage) is generated, and the signal is effective only when the Carriage moves from left ot right, and goes into the LSI straightly through the Curl Cord.
The LSI recognize the starting position of needle selection when the ND-1 signal goes into it when the Carriage moves from left to right.

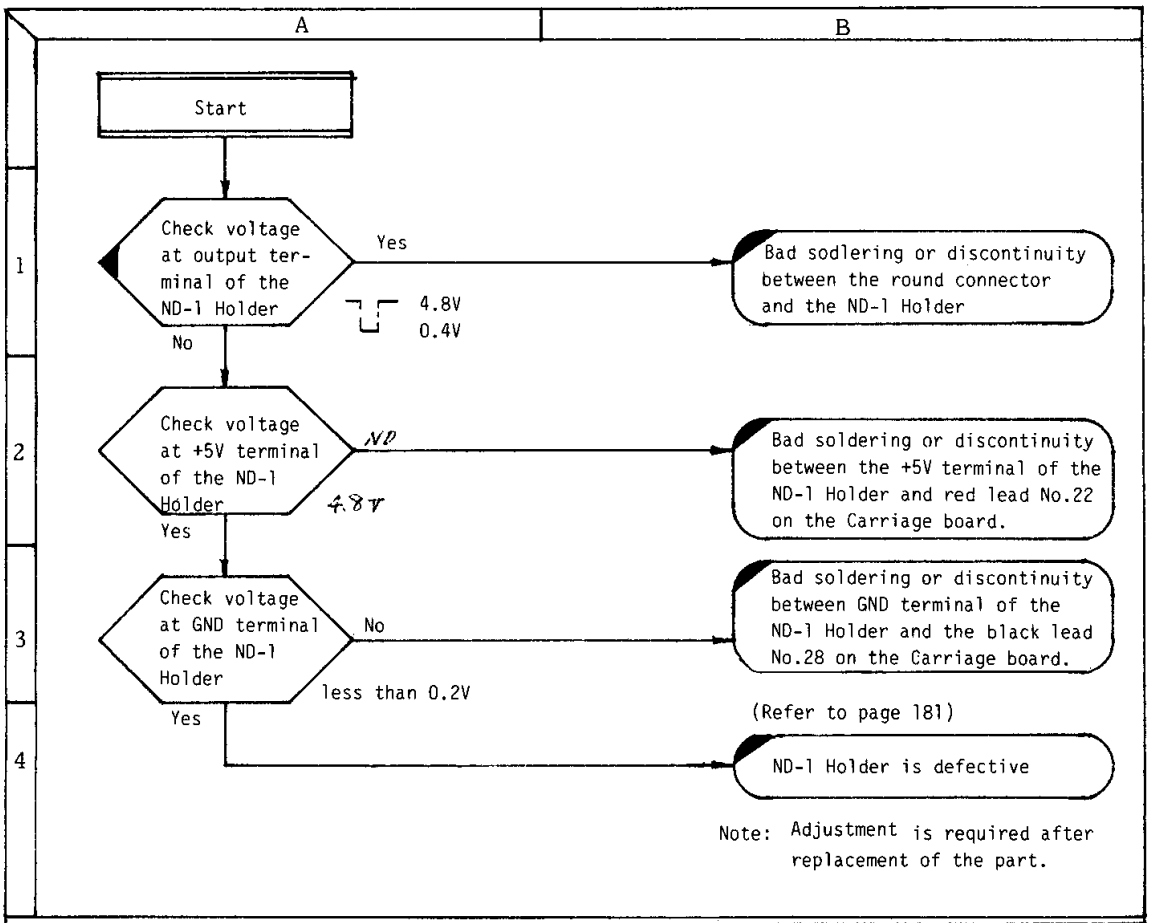
4-7-2 ND1 circuit



4-7-3 Before checking the ND1 circuit

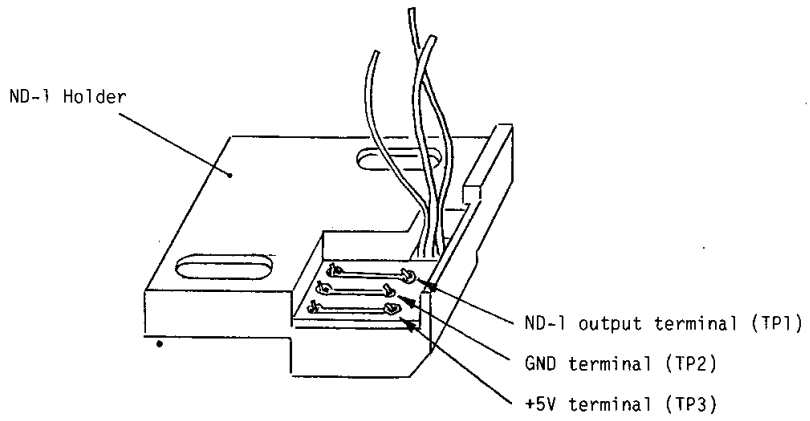
1. Setting the oscilloscope
   (1) Change the MODE to CH2 from CH1
   (2) Set the AC-GND-DC lever to "DC".
   (3) Change the tip of CH2 probe to straight pin tip.
2. Checking sequence
   Follow the diagnostic flow chart for the ND1 circuit.

4-7-4 Diagnostic flow chart for the ND-1 circuit

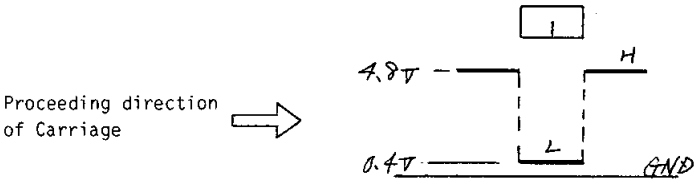
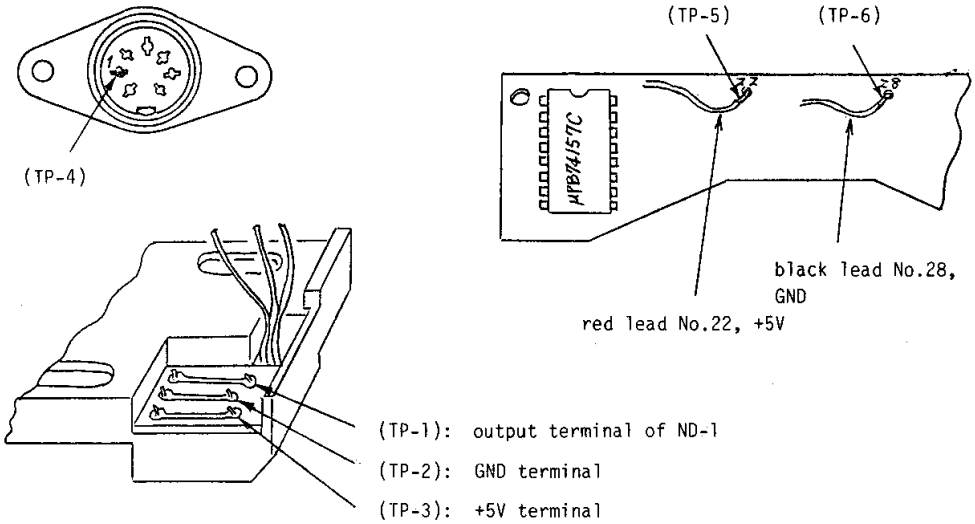


Note: Adjustment is required after replacement of the part.

CHECK POINT



ACTUAL VIEW OF ND-1 HOLDER

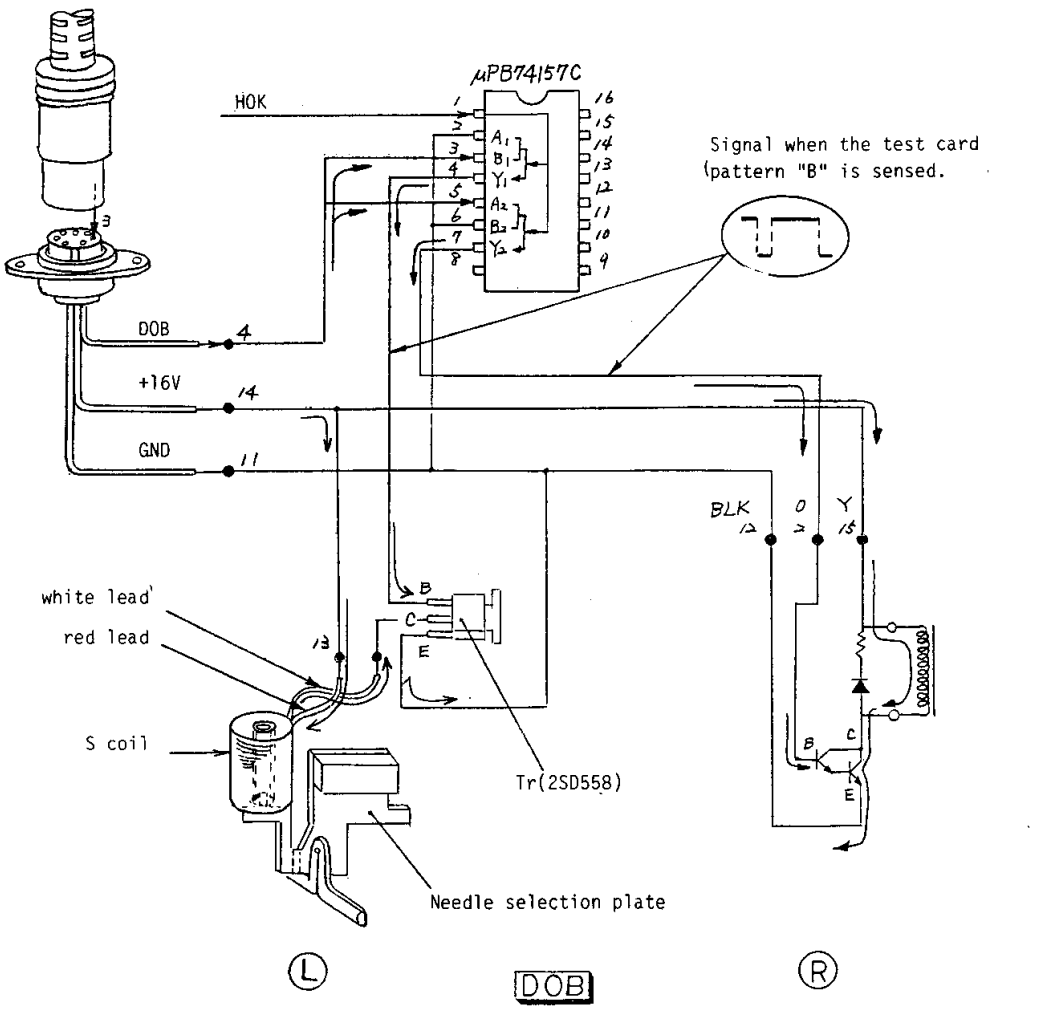
	CHECK POINT
1 - A	1. While connecting the tip of the probe to the ND1 output terminal of the ND1 Holder, move the Carriage to the right so as it passes over the Needle 1 Cam. 2. The output voltage when the Carriage passes over the Needle-1 Cam must be less than 0.2V. 
1 - B 2 - B 3 - B	1. Turn off the knitting machine. 2. Carry out continuity test between each test point(TP).  1 - B ° Measure resistance across TP-1 and TP-4 2 - B ° Measure resistance across TP-3 and TP-5 3 - B ° Measure resistance across TP-2 and TP-6 [Checking results] * 0 ohm ——————— normal * Infinite resistance ——— discontinuity or bad soldering between the checked test opints.

4 - 8 DOB (DATA OUT BUFFER) CIRCUIT

4-8-1 Signal flow in the DOB circuit

DOB signal is needle selection signal which is generated in the CR Unit, and processed in the LSI before it is sent out to the Carriage.
The DOB signal sent out from the LSI goes through the Curl Cord and into Pin5(R) and Pin3(L) of the μPB74157C on the Carriage board, and then out from Pin 17(R) and Pin 3 (L) in response to the HOK signal, to drive on or off the transistor on the S Board.
When the transistor is turned on, current runs into the solenoid and magnetizes the needle selection plate to atract the needle, and when the current stops, the solenoid is demagnetized and the needle comes forward.

4-8-2 DOB circuit (schematic)



4-8-3 Before checing the DOB circuit

1. Setting the oscilloscope

   (1) Change the MODE to CH2 from CH1.

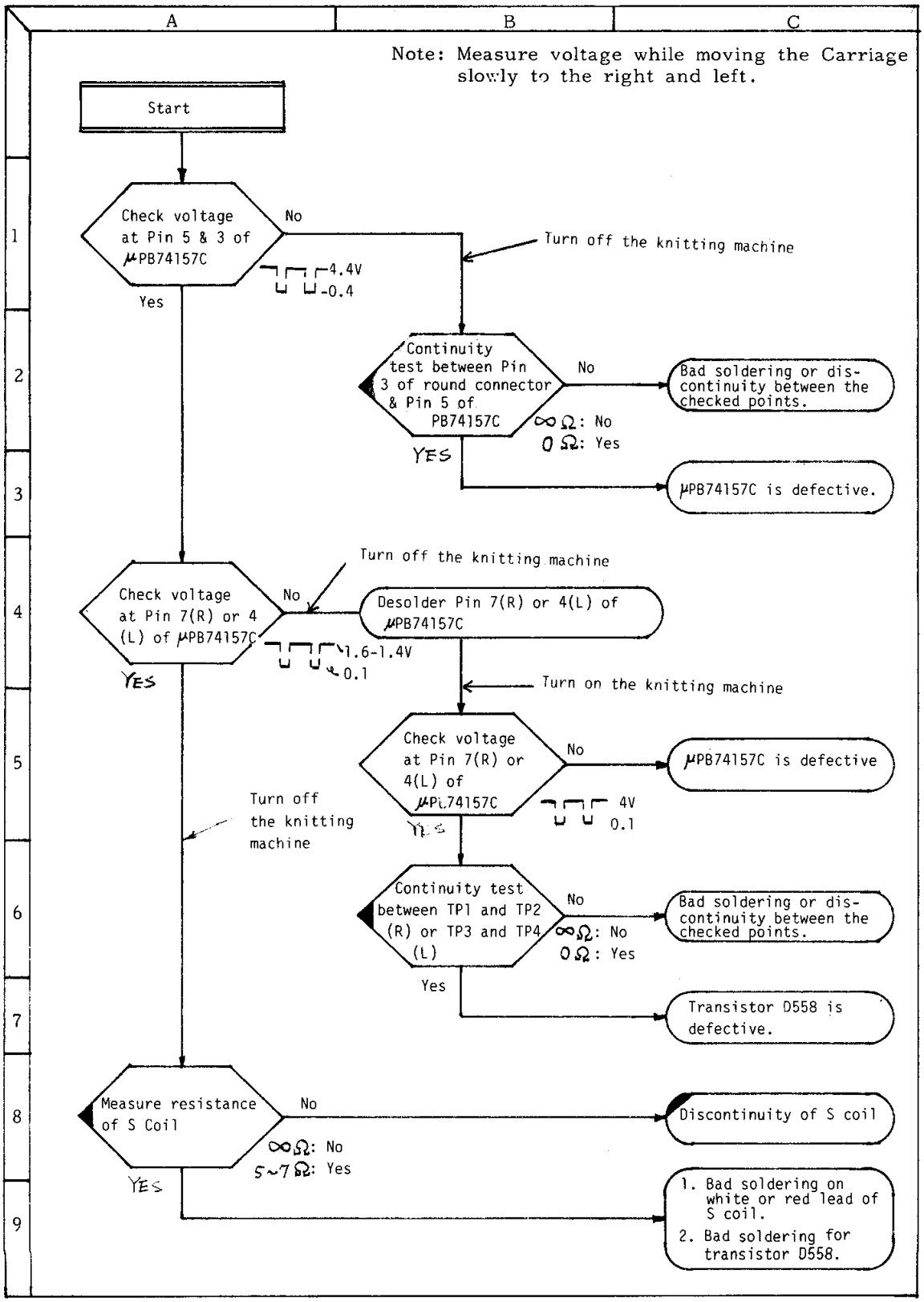
   (2) Set the AC-GND-DC lever to DC.

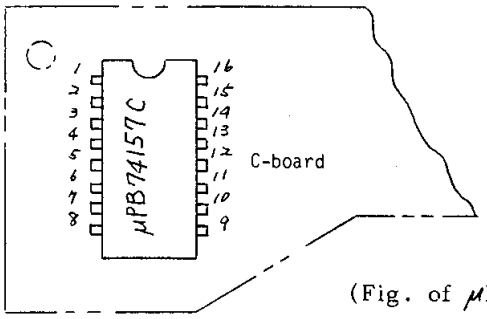
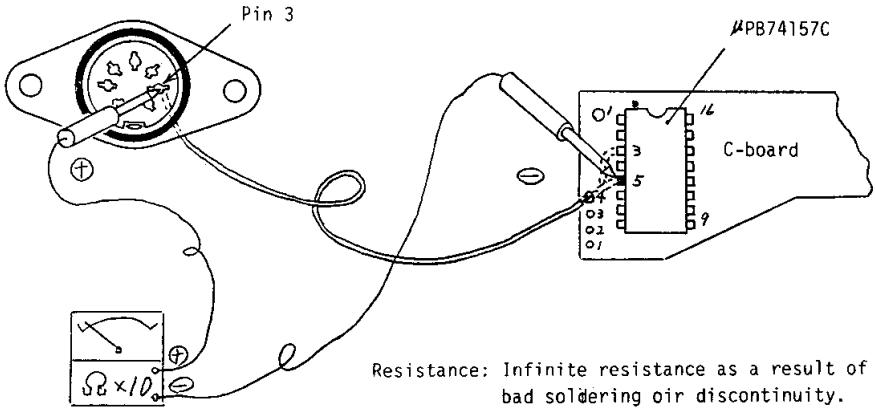
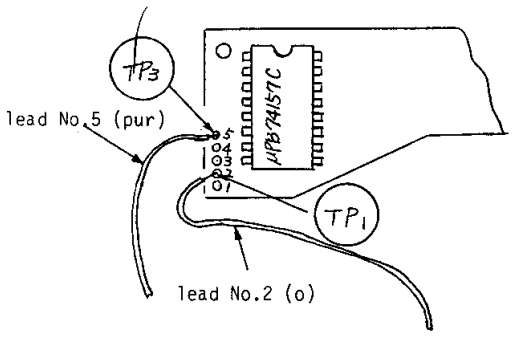
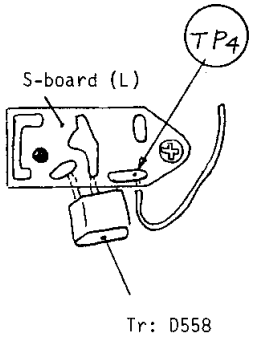
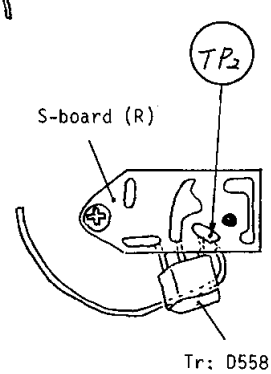
   (3) Exchange the tip of CH2 probe for the straight pin tip.

2. Checking sequence

   Follow the diagnostic flow chart for the DOB circuit.

4-8-4 Diagnostic flow chart for the DOB circuit



Step Cord	CHECK POINT
	 (Fig. of μPB74157C)
2 - B	 Resistance: Infinite resistance as a result of bad soldering oir discontinuity. Zero ohm: normal condition.
6 - B	 * Polarity of meter leads does not matter for measuring resistance, but with the power off.  

4 - 9 Checking and adjusting the electrical timing in the Carriage unit

In case the Carriage unit has been repaired, or in case of checking the carriage, follow the sequence set forth below to check and adjsut the electrical timing in the Carriage unit.

(Checking and adjusting sequence)

1. Check and adjust the CCP output level.
2. Check and adjust the needle selection timing of the CCP.
3. Check and adjust the needle selection timing of KSL.
4. Check and adjust the ND-1 timing.

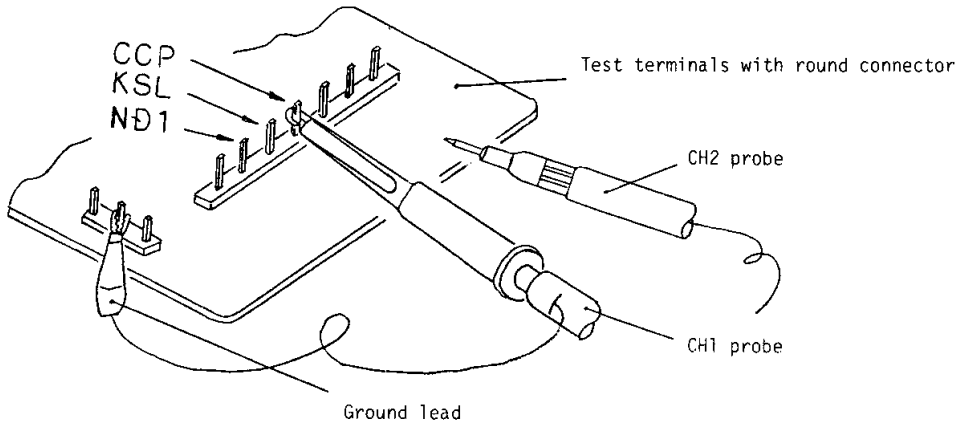
4-9-1 Check and adjust the CCP output voltage

CCP output voltage is a reference for adjusting the electric timing in the Carriage unit.
Follow the sequence set forth below to check and adjust the timing.

[A] Checking the CCP output voltage (All the needles in A position)

(1) Setting the oscilloscope

a. Connect the probes as shown below in (Fig. 4-2).



(Fig. 4-2)

b. Exchange the retractable hook tip on the CH 2 probe for the straight pin tip.

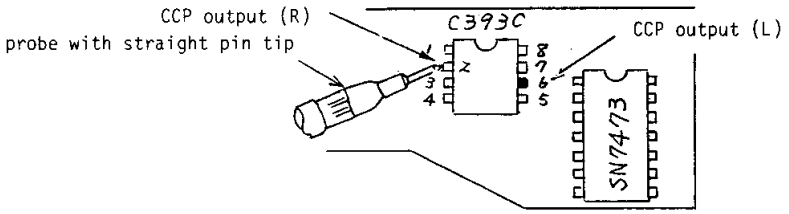
c. Set the oscilloscope as in the "Initial Setting - 1.2", and "Carriage 2" afterwards.

(2) Measuring

Connect the probe of CH 2 to the pin for CCP on the C393C, and measure as you move the Carriage to right and left.

d. In case of CCP output voltage (R)

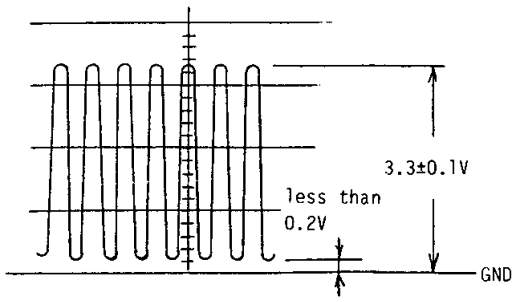
Connect the CH 2 probe to pin 2 of the C393C.



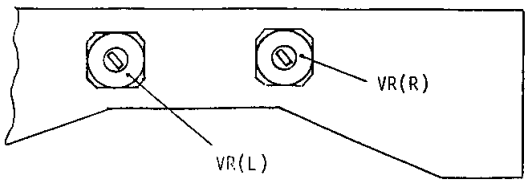
e. In case of CCP output voltage (L)

Connect the CH 2 probe to pin 6 of C393C.

f. Mesure and confirm that CCP output (R) and (L) are 3.3±0.1V.



[B] Adjsuting the CCP output voltage



1. Adjust the CCP output voltage (R) by turning the potentiometer, VR(R).
2. Adjust the CCP output voltage (L) by turning the potentiometer, VR(L).

4-9-2 Checking and adjusting the CCP Needle Selection timing.

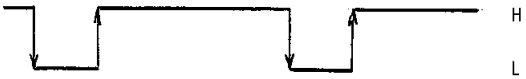
LSI sends out DOB signal to the solenoid on the Carriage in synchronism with the CCP signal when it comes into the LSI.
So, when the CCP signal is sensed by the LSI, a needle must be at the position of the needle selection magnet at the same time.
By moving the CCP sensor (interrupter sensor) to right or left, adjust the timing of the CCP signal against the position of each needle.

* Relation between CCP signal, DOB signal and a needle

1. CCP SIGNAL (input)

2. CCP SIGNAL (output)

3. DOB SIGNAL (1-3 selection)

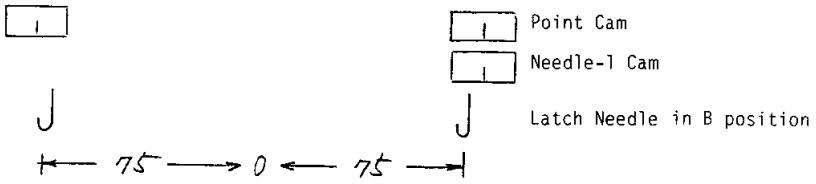


4. NEEDLE (1-3 selection)

[A] Checking the CCP timing

(1) Setting the knitting machine

a. Set the Point Cams, Needle-1 Cam and the needles as shown below.



b. Pattern Card

Insert the test card into the CR Unit, and set it to "B".

c. Setting the Pattern Width and Pattern Button.

Set the pattern width to "60", and all the pattern buttons to UP position.

d. Push on and off the inspection Button to have the CR Sensor to read the Pattern B on the Test Card.
Then push ON the Inspection Button. (in order to make sure the correct reading of pattern.)

e. Setting the Carriage

Set the Cam Lever to "SLIP", but do not attach the Arm.

(2) Move the Carriage as slow as possible, and check to see if the Carriage selects the needles correctly.

——— Check the needle selection in both directions.

(3) Move the Carriage quickly (as quick as 55 rows per minute over 150 needles.), and check to see if the Carriage selects the needles correctly.

——— Check the needle selection in both directions.

[B] Adjusting CCP signal for needle selection.

(1) Loosen truss head screws fixing the CCP sensor (interrupter sensor).

(2) Move the Sensor to the extreme right.

(3) Move the Sensor toward left a little, and check the needle selection in a slow speed.

(4) Repeat checking the needle selection as you move the Interrupter Sensor a little by little, and slightly beyond the correct position.

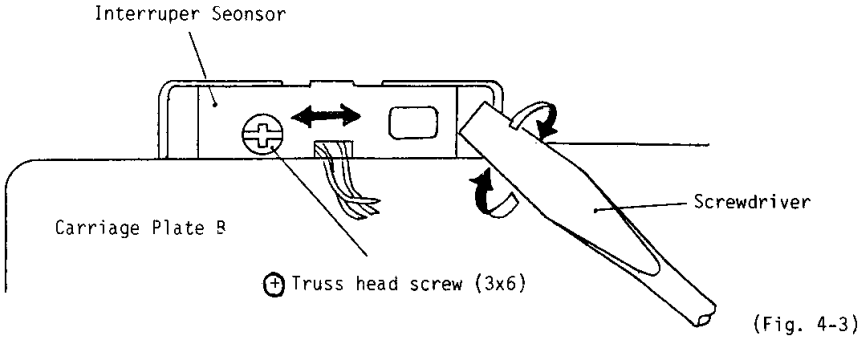
(5) When the Carriage starts to select incorrect needles, move back the Sensor slightly back to the right side, and check the needle selection in a slow speed.

(6) Repeat the step (5) till the needle selection becomes correct, and fix the Sensor with the truss head screw.

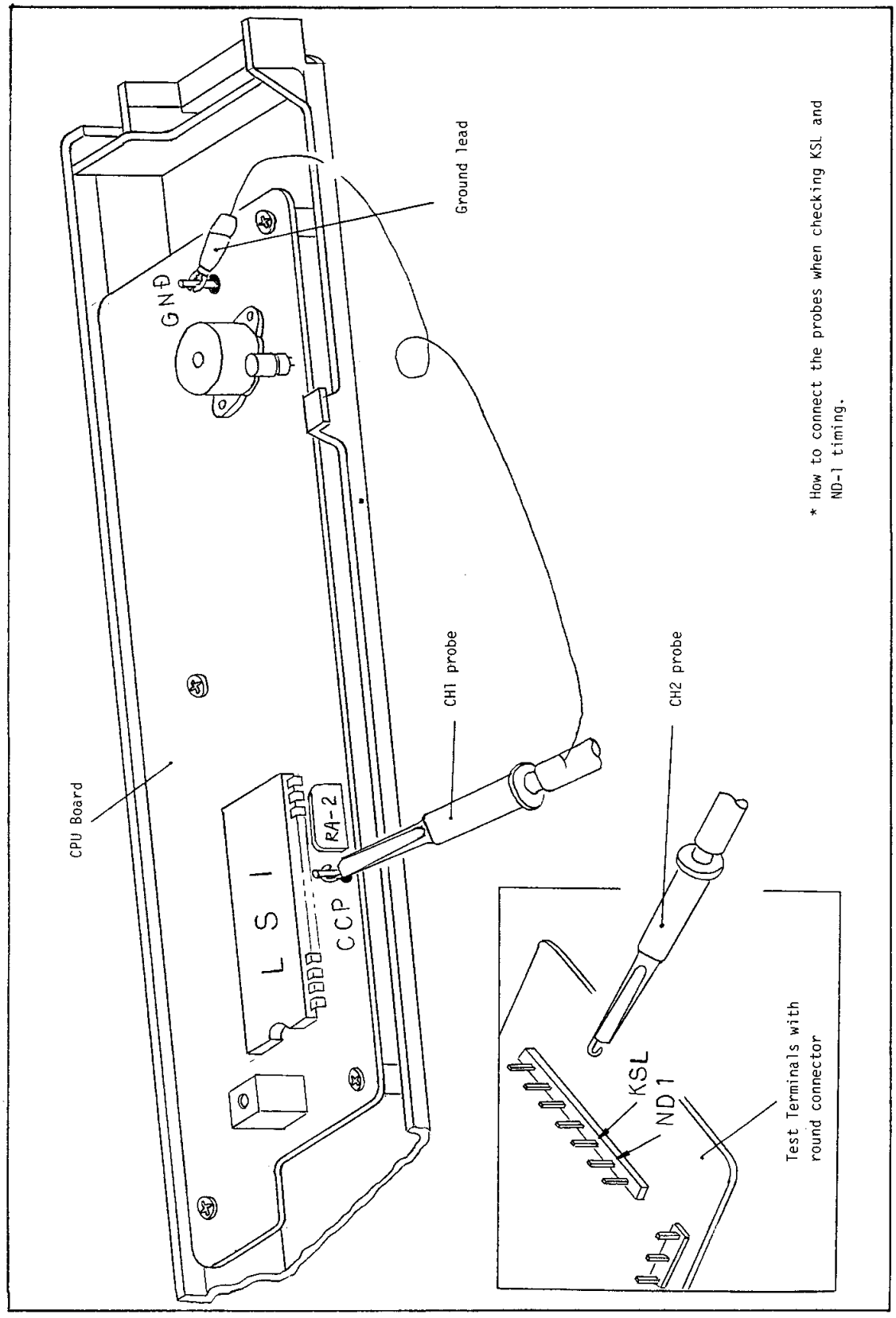
(7) Check the needle selection in a quick speed, (55 rows per minute over 150 needles.).

1) If the needle selection in a quick speed is correct, finish the checking.
2) If the needle selection in a quick speed is incorrect, replace the needle selection base on the side which causes the incorrect needle selection, and repeat the steps (1) through (7).

(Refer to service manual for Model 500 for replacing.) P 178 ~ P 186

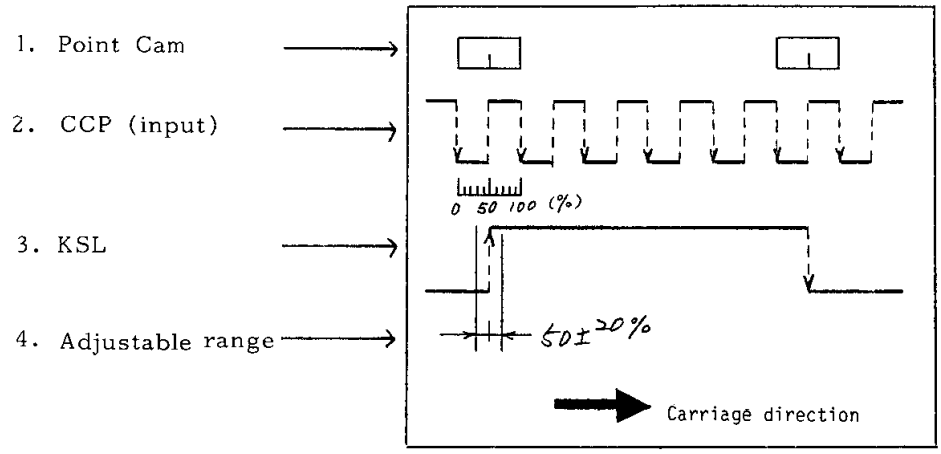


(Fig. 4-3)


Ground lead
GND
CPU Board
CH1 probe
CH2 probe
LSI
RA-2
CCP
KSL
ND 1
Test Terminals with round connector
* How to connect the probes when checking KSL and ND-1 timing.

4-9-3 Checking and adjusting the KSL timing

KSL timing is adjusted against the CCP signal (clock pulse) so that the needles inside the Point Cams are surely selected.



(Fig. 4-5)

[A] Checking the KSL timing

(1) Setting the knitting machine

Push all the needles back into A position.
Set the Point Cams at the same position as you placed for checking the needle selection timing.

(2) Setting the oscilloscope

a. Connecting the probes

° Connect the CH1 probe to the test terminal (CCP) on the CPU board, and connect the ground lead to the GND. —— Refer to page 185, Fig. 4-4

° Connect the CH2 probe to the KSL terminal on the test terminals with the round connector.

b. Operation of the oscilloscope

° Set the oscilloscope referring to the separate operation table [CARRIAGE -3 and 4].

(3) On the separate operation table [CARRIAGE -4], waveform for the KSL (R) is shown, and confirm that the KSL (L) is shown as in the illustrated below.

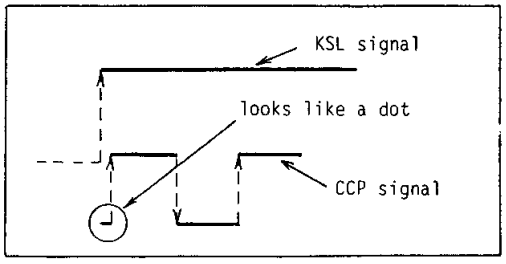


illustration for confirming the KSL signal

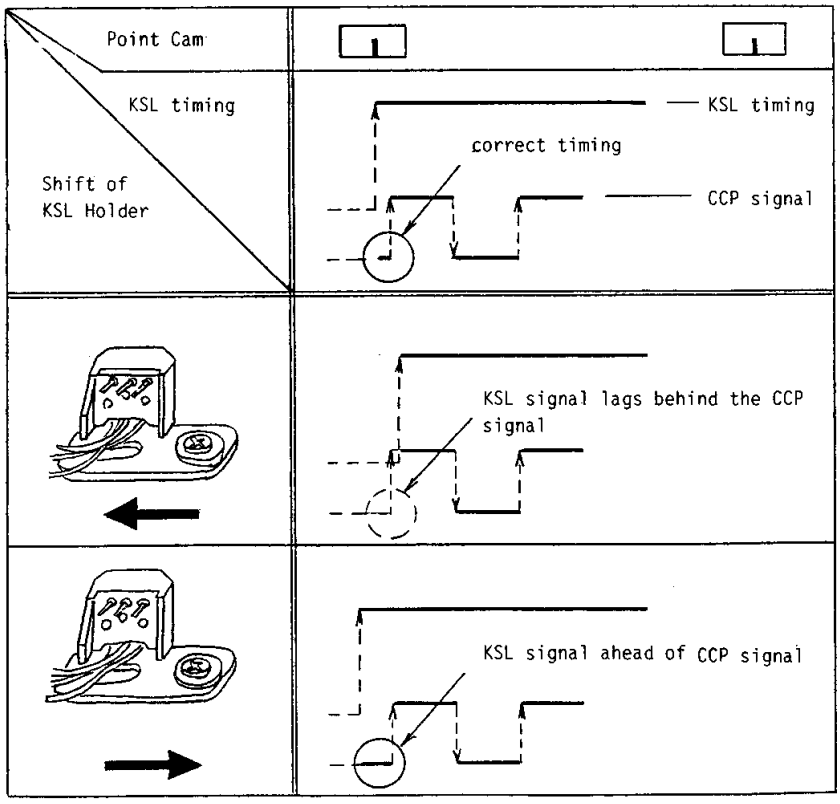
(Fig. 4-6)

[B] Adjusting the KSL timing

(1) Loosen the S tight screw (3x8) slightly which is fixing the KSL Holder.

(2) While watching the waveform on the CRT screen, move the KSL Holder to right or left to have the waveform as shown in the (Fig. 4-6).

* Shift of the KSL Holder and the CCP signal

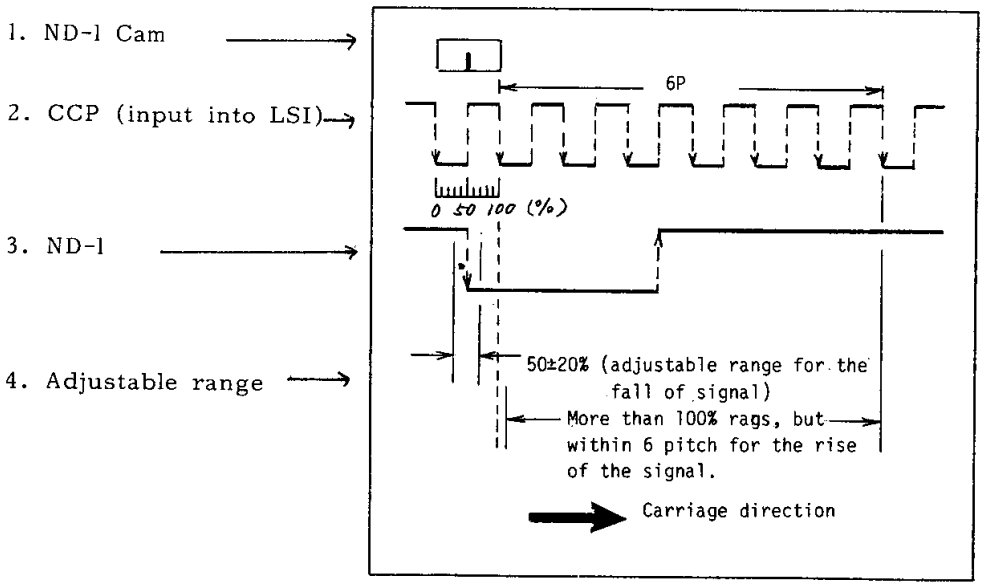


(Fig. 4-7)

4-9-4 Checking and adjusting the ND-1 timing

ND-1 timing is adjusted to the CCP signal (clock pulse) so that the start of pattern is correctly sensed by the LSI.

* Position of the Needle-1 Cam, ND-1 signal and CCP signal

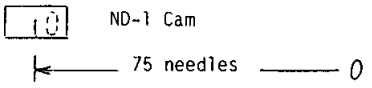


(Fig. 4-8)

[A] Checking the ND-1 timing

(1) Setting the knitting machine

Set the Needle-1 Cam at the 75th needle on the left side of the centre(0).



(2) Setting the oscilloscope

a. Connecting the probes

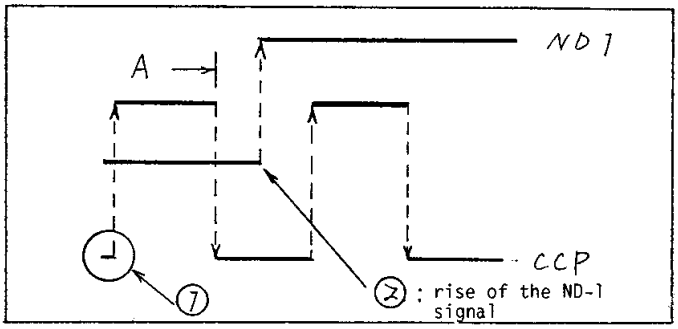
° Connect the CH1 probe to the ND-1 terminal on the test terminals with the round connector.

b. Operation of oscilloscope

° Referring to the separate operation table [CARRIAGE -5, 6, 7], change the setting for each checking.

(3) On the separate operation table [CARRIAGE -7], waveform for the ND-1 at the position of 75th needle is illustrated.
The waveform for the ND-1 at right 75th needle must be as shown below.

illustration for confirming the ND-1 signal



(Fig. 4-9)

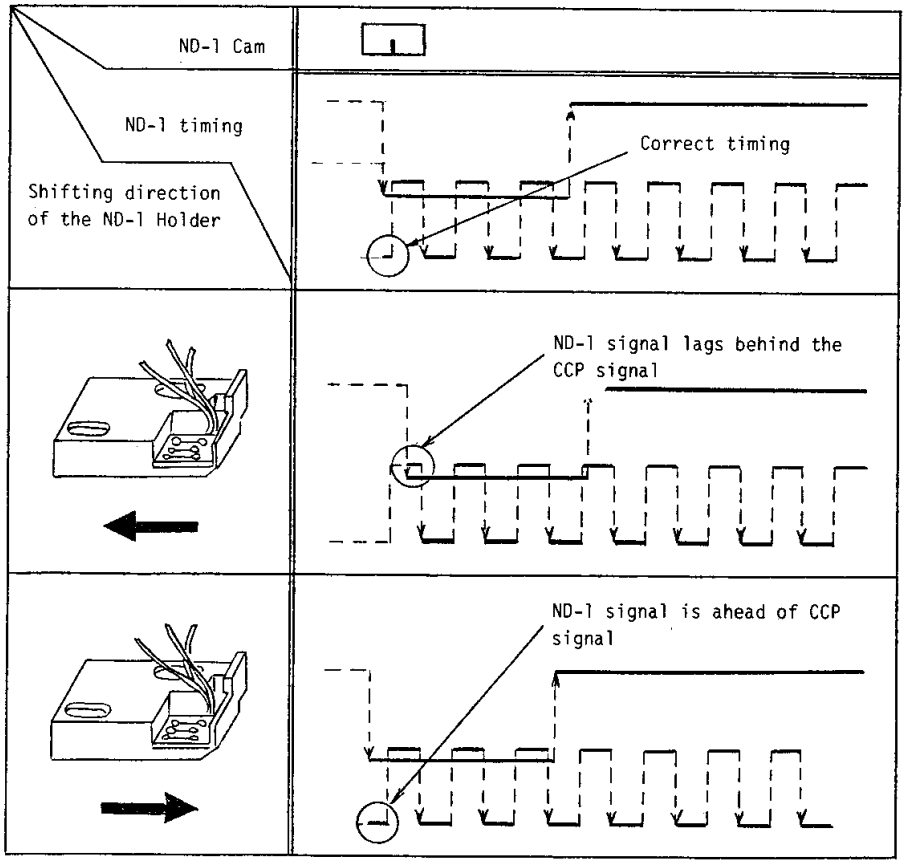
1) looks like a dot
2) The rise of the ND-1 signal must at the right side of the point A and within 6 pitches counted from the point A.

[B] Adjusting ND-1 timing

(1) Lossen S tight screw(3x8) fixing the ND-1 Holder.

(2) While watching the waveform of ND-1 Holder on the CRT screen, move the ND-1 Holder to right or left to have proper timing as shown below.

* Shift of ND-1 Holder and the CCP signal



(Fig. 4-10)

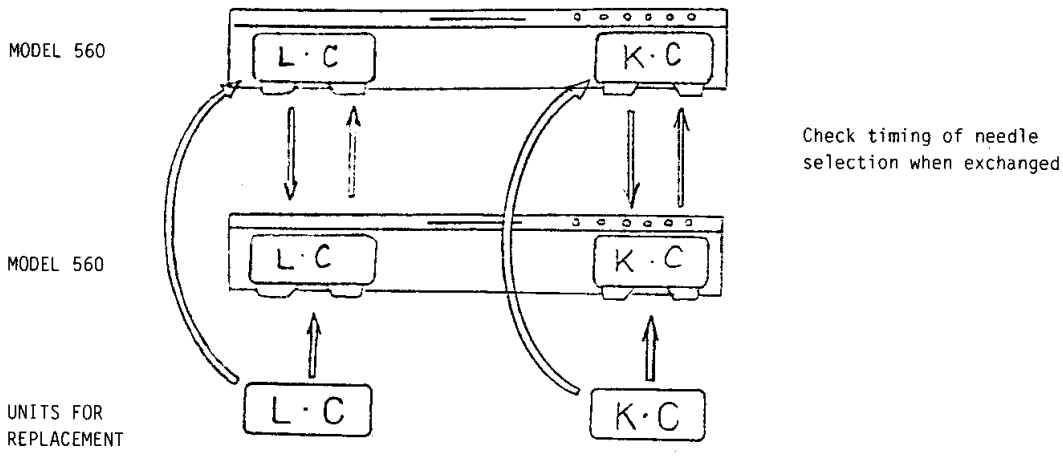
Note: When the fall of ND-1 signal is adjusted to the timing range of 50±20%, if the ND-1 signal does not rises within 6 pitches of the CCP signal, replace the Needle-1 Cam with new one.

5 INTERCHANGEABILITY

5 - 1 INTERCHANGEABILITY WITH THE MODEL 500 KNITTER

Because of improvement and revision of the electronic circuit for the Model 560 knitter, the interchangeability between the Model 560 and Model 500 is not possible.
The "TESTER" for the Model 500 knitter is not usable for the Model 560 knitter.

5 - 2 INTERCHANGEABILITY BETWEEN THE MODEL 560'S



(Fig. 5-1)

* When the CARRIAGES (Standard Carriage or Lace Carriage) are used on the different needle bed of Model 560 knitter, check the needle selection visually. If incorrect needle selection is recognized, adjust the needle selection timing.

5-2-1 In case the Standard Carriage is exchanged

Referring to page ??, for checking the CCP timing, check and adjust the the CCP needle selection timing.

5-2-2 In case the Lace Carriage is exchanged

1. Checking and adjusting

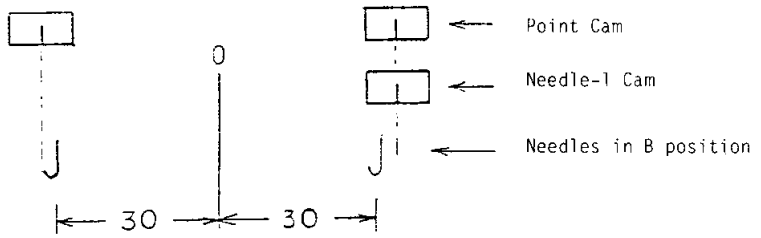
   Set the Cam Lever to "P", and check it in the same manner as for the standard carriage, referring to page ?? for checking the CCP needle selection timing.

2. Checking the Lace Arm

   Attach the Lace Arm to the Lace Carriage, and check the bending cam (amount of bending).
   (Refer to Service Manual for the Model 360/260 knitter.)

2.1 Adjusting the Bending Cam

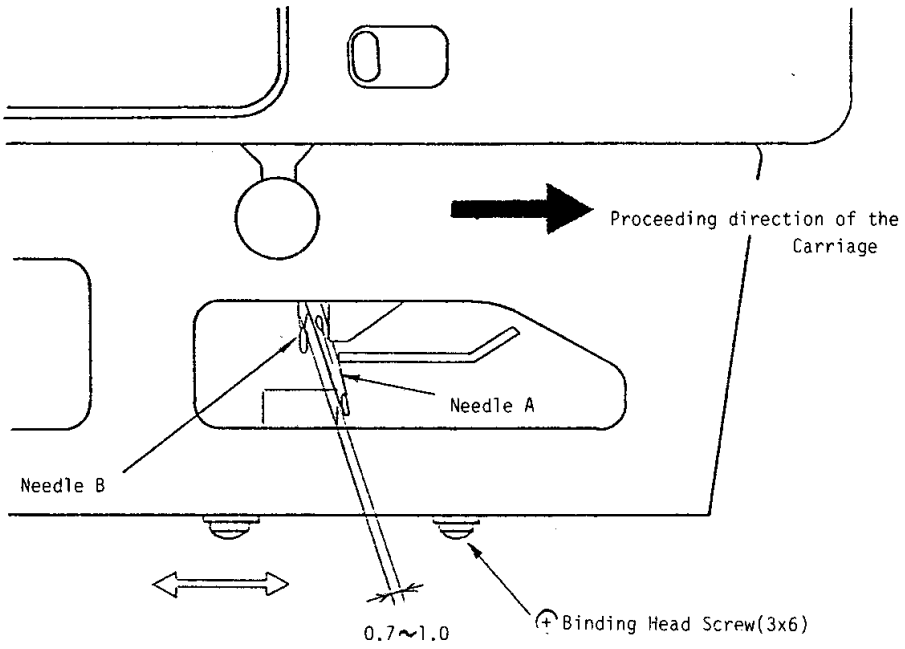
1. Set the Point Cams, Needle-1 Cam, and the needles as shown below.



2. Insert the Test Card into the CR Unit, and set it to "B".
   Set the Pattern Width to "60".
3. Turn on the knitting machine.
4. Push ON the Inspection Button.
5. Set the Cam Lever to "0". Move the carriage twice across the needles.
6. Push OFF the Inspection Button.
7. Set the Cam Lever to "P", and check the Bending Cam.

   Note: Be sure to open the latch of the needle before it reaches the Bending Cam.

2.2 How to adjust the Bending Cam



(Fig. 5-2)

Above illustration shows the state that the needle A is at the position immediately before it is released from the Bending cam.
At this point, the clearance between the needle A and B must be about 0.7mm.
Then pat the Carriage in its proceeding dierction, the needle A is released from the Bending Cam, adn cross with the needle B. At this time, the stitch on the needle A is to be transferred onto the needle B.

2.2.1 If the clearance is wider

Loosen two binding head screws (3x6), and move them slightly to the trailing side of the Carriage.

2.2.2 If the clearance is narrower

Move the screws slightly toward the leading side of the Carriage.

5 - 3 INTERCHANGEABILITY OF ELECTRONIC COMPONENTS

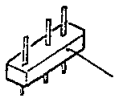
	TRANSFORMER	R BOARD	CPU BOARD	CR UNIT	CARRIAGE UNIT	CURL CORD
MODEL 500	○	✕	✕	△2	✕	
MODEL 560	○	△1	✕	△3	✕	
K CARRIAGE					△4	
L CARRIAGE					△4	

○ – – – interchangeable

△ – – – conditionally interchangeable

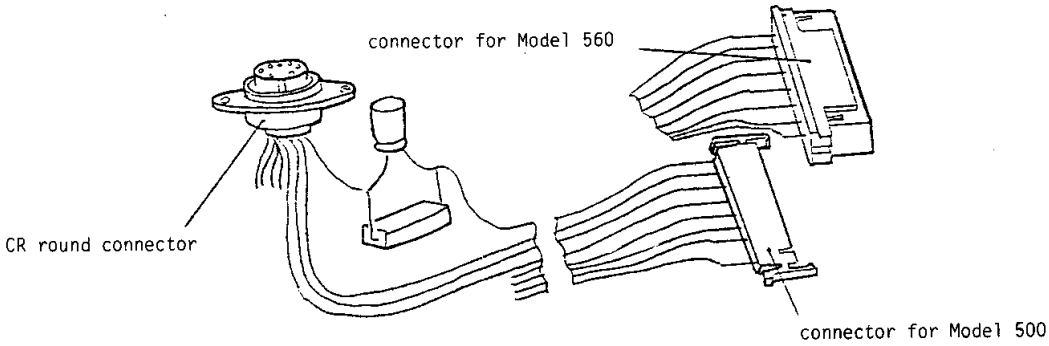
✕ – – – not interchangeable

△1 – – – Exchange the three pin connector on the R Board for that for the Model 500 knitter



three pin connector for Model 500

△2 – – – Exchange the CR round connector for that for the Model 560 knitter.



△3 – – – Exchange the CR round connector unit for that for the Model 500.

△4 – – – Electronic parts only are interchangeable.

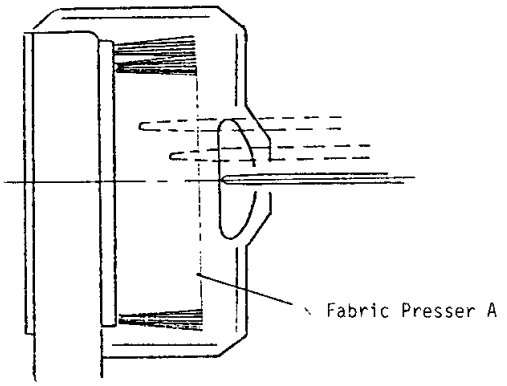
6 ADJUSTMENTS REQUIRED FOR MODEL 560 EXCLUSIVELY

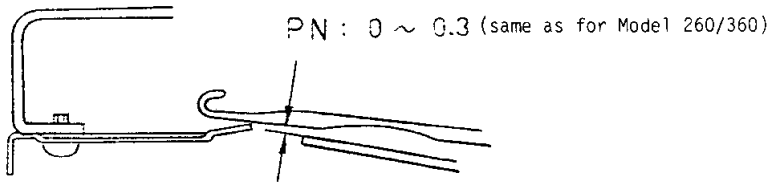
6 - 1 ADJUSTMENT FOR THE FABRIC PRESSERS

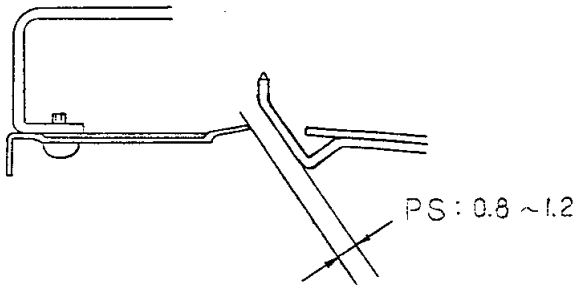
6-1-1 Lace Arm

1.1 Fabric Presser A

PN: 0 - 0.3
PS: 0.8 - 1.2



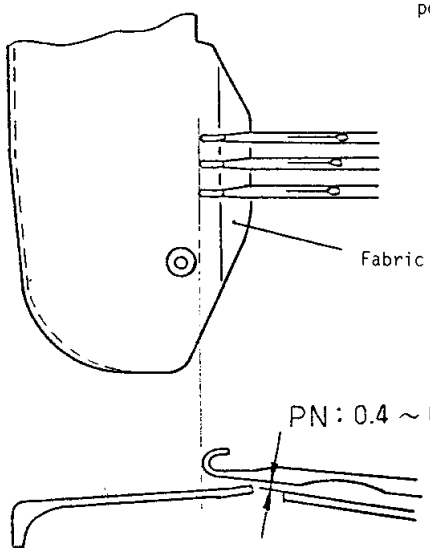




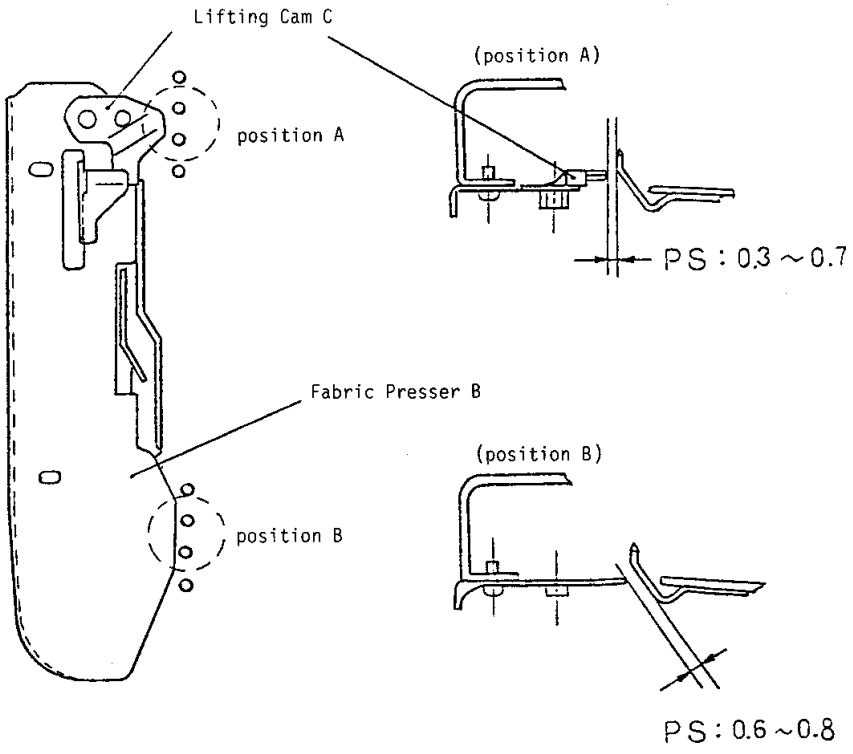
1.2 Fabric Presser B

PN: 0.4 - 0.6mm

PS position A:
position B: 0.6 - 0.8



If the needle is off the front edge of the needle bed, press it against the needle bed, and check the clearance.



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