SHIVAKI™

STRIP CHART RECORDER
OPERATING MANUAL

INTRODUCTION

SHIVAKI Pontentiometric Strip Chart Recorder is a rugged and compact, panel mountable instrument making use of D. C. Linear servo motor principal that gives long term reliability and better performance over the conventional servo motors. The indicating pointer, writing pen and slide wire contact are directly carried by the sliding block of the servo motor. This results in better accuracy and fast response. The electronics circuits used herein make use of all silicon transistors and modern integrated circuits that are very reliable and have better performance in wide ambient temperature variations.

SHIVAKI Recorder can record almost any process variables like temperature, pH, Conductivity, weight, Humidity pressure that can be converted into an electrical signal. And Hence this finds many applications in industries like paper, plants, cement, textile, heat treatment, food, sugar factories, research institute, fertilizer plants, chemical and pharmaceutical, plastic and rubber, glass mining iron and effluent treatment plants etc.

SONICS CONTROL SYSTEMS

B-114, First Floor, G. T. Karnal Road Industrial Area,
Near Shakti Nagar Tele. Exch., New Delhi-110033 INDIA
Telefax- +91 11 47884753 Mobile - 09312261932
Email - scs.shivaki@gmail.com scs.shivaki@hotmail.com
WWW.SHIVAKI.IN

SYMPTOM	POSSIBLE TROUBLE	CHECK FOR REMEDY
9. Pen drives to full scale or zero	a) Over range signal b) Reverse signal input c) Zero setting incorrect d) Bad component on amplifier e) Damaged slide wire	a) Check input signal polarity b) Check input signal polarity c) Recalibrate d) Locate and reaplace faulty component e) Replace slide wire
10 Error in scale and chart reading	a) Scale not aligned properly	a) Align scale

SYMPTOM	POSSIBLE TROUBLE	CHECK FOR REMEDY
7. Recording not linear	a) Contaminants in pen carriage assembly b) Degradation of Preamplifire linearisation network component	a) Clean pen carriage assembly b) Locate and replace faulty component
8. Dead Zone in Recording	a) Contaminants in pen carriage assembly b) Cable overlapping or too loose c) Degradation of Servo amplifier drive circuit components	a) Clean pen carriage assembly b) Adjust motor drive pully c) Locate faulty components

SPECIFICATIONS

* Inputs Signal	:	From Resistance thermometer (min.25 Change in Resistance) Thermocouple D.C. mA/ mV or D.C. volts input (for 5mV D.C. Min)
* Intrinsic Error	:	± 0.5 % span maximum
* Total response time	:	Less than one second
* Dead Band	:	± 0.3 % span maximum
* Chart	:	Writing width 100/120mm length 17.5/10 mtrs.
* Chart Speed	:	20 mm / hr STD with Synchronous motor drv. (For other speeds, consult factory) (Stepper motor drive - 15,30,60,120,240,480 & 960 mm / hr)
* Accuracy of chart speed	:	± 2 % for Synchronous motor ± 0.5 % for Stepper motor
* Operating temperature limits	:	0 to 55°C
* Operating humidity limits	:	0 to 80 % R. H.

* Zero error due to ambient temperature variation : ± 0.05% Span/ °C Variation

* A.C.J.C. : Auto Cold junction compensation thermoelectric Instruments typical error arising from ACJC Circuit in ambient temp.

* Disposable Pens are available in red or Black colour.

* Maximum Source resistance : 1 Kilo - ohm without B.S.P.P. 100 E With broken sensor protection for 3 wire connections of RTD maximum of 5 ohms resistance per lead.

* Power Supply Voltage: and Frequency : 230 Vlots / 50 Hz standard ± 10% variation

* Error due to Power Supply : ± 0.2 % of span max. for ± 10% variation

* Power Consumption : 27 VA approx.

* Standing Current through source : 100 mA typical

* Panel Cut Out : Width w X height h X Depth d (mm.) - Ref. Table - 1

SYMPTOM	POSSIBLE TROUBLE	CHECK FOR REMEDY
4. Recorder dead	a) Fuse burnt out b) Faulty power supply	a) Check mains voltage and transformer connections. b) Check wiring completely, check transformer, locate and replace faulty components
5. Jitter at all points of trace	a) Open signal input (in case of EMF Range Recorder) b) Noisy signal c) Heavy ripple in power supply	a) Shunt with a jumper or connect proper signal b) Remove noise from signal c) Check power supply section on Servo Amplifier board.
6. Jitter at one point of trace	a) Harmonics in signal input b) Contaminants on slide wire	a) Check input signal on oscilloscope at jitter point b) Clean slide wire

SYMPTOM	POSSIBLE TROUBLE	CHECK FOR REMEDY
1. Pen won't write or trace too light	a) Insufficient pen pressure	a) Adjust pen pressure
	b) Pen tip not touching paper	b) Adjust pen stopper screw
2. Pen trace too dark and board.	a) Excessive pen pressure	a) Adjust pen pressure
	b) Pen not properly installed	b) Refit pen properly
3. Chart won't advance	a) Mains on/off switch in off position	a) Switch :On' mains
	b) Chart roll not loaded properly	b) Load chart properly
	c) Chart transport assembly not fitted.	c) Reset chart assembly using latching lever
	d) In case of Electronic chart drive faulty component	d) Locate and replace faulty component.

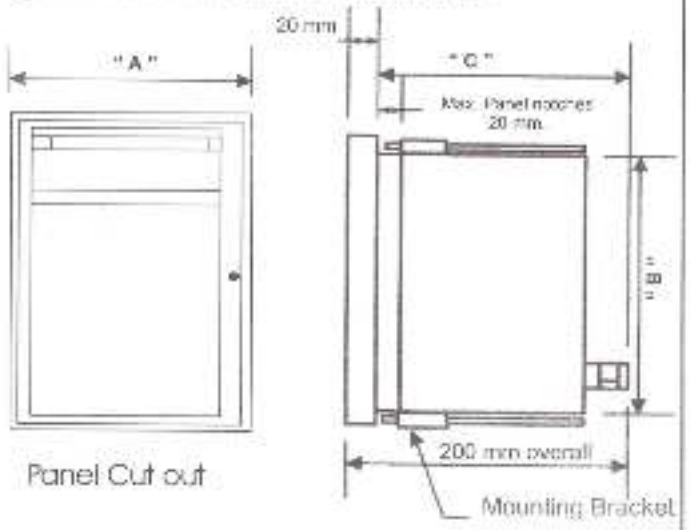
Fig. 2 Recommended Spacing between Recorder Cut outs

Fig. 3 Mounting and panel Cut-out Dimensions

Table 1 : Dimensional Details for various models

Model No.	Panel Cut Out A(w) B(h) C(d)	Overall Size W H	Weight Kg.
SCS - 100 - R	165 X 165 X 250	205 X 181	8
SCS- 120 - R	188 X 260 X 250	230 X 275	10
SCS- 120 - TP	188 X 260 X 250	230 X 375	12
SCS- 120 - RM	188 X 260 X 250	230 X 275	13
SCS- 180 - R	245 X 255 X 250	285 X 270	16
SCS- 180 - RTP	245 X 255 X 250	285 X 270	17
SCS- 180 - R - 3 P	245 X 255 X 250	285 X 270	19
SCS- 250 - R	355 X 255 X 245	380 X 280	18
SCS- 250 - TP	355 X 255 X 245	380 X 280	28

Fig. 1 Overall dimensions of the recorder



adjust the full scale of range reading.

2. Adjust the resistances corresponding to full scale of range and with the help of 'Span' potentiometer, adjust the full scale of range reading.

3. Once again carry out the step (1) and then (2) till both the end gets adjusted.

For every instrument, two potentiometers identified as "Span" and "Zero" are provided. For SCS- 100 - R these potentiometers are provided inside the chart cassette i.e. midplate of the SCS- 100 - R .

LIST OF SPARES

Sr. No.	Description	Part No.
1	Disposable Red Pen Pack of 2 Nos. Disposable pen 2 Red & 2 Black for 2 pen recorder	
2	Separate chart drive motor is available in different speeds - 20, 120 mm / hr or any other as per specific order	Please specify the speed.

CALIBRATION AND ALIGNMENT PROCEDURE

A) For Thermocouple Inputs

1. Feed the millivolts, corrected for cold junction temperature corresponding to start of the range (which usually is 0 °Celsuis.) and with the help of Zero potentiometer adjust the start of range reading (which usually is 0° Celsius)
2. Feed the millivolts corrected for cold junction temperature, corresponding to full scale of range and with the help of "Span" potentiometer adjust the full scale of range.
3. Once again carry out step No. (1) and then (2) till both ends get adjusted. For feeding the corrected millivolts, one has to refer to appropriate reference table of thermocouple.

B) For Resistance Thermometer Input

In order to simulate 3 wire PRT, two wires "C" & "A" be taken from one terminal of the decade box and one wire "B" from the second terminal of decade box.

1. Connect the decade box "C", "A", "B" wires to the appropriate terminals on the back of the instrument. Adjust the resistance corresponding to start and scale (usually it is 0° Celsius) by referring resistance standard table and with the help of 'Zero Potentiometer.

INSTALLATION:

Unpacking : Inside the packing box a plastic bag contains the instruments. It also contains.

a. Two numbers of standard chart, (0 to 100 linear) fan fold type.

b. Operating instructions manual (One which is being read just now)

c. A pack containing disposable pens 2 Nos. red colour (2 Nos. Black tip for 2 pen recorder and Turret pen for model **SCS- 120 - RM**

d. Guarantee card.

e. One set of mounting bar with brackets. (4 Nos. / set.)

f. Test and Calibration certificate.

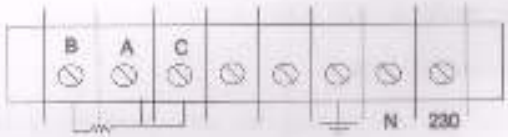
MOUNTING :

The instrument is meant for panel mounting. The panel should be provided with a cut out of the dimensions as specified in Table 1. (Ref. Fig 1) Insert the instrument into the cut out from and then from backside of the panel instrument can be clamped by inserting the mounting bars with its bracket one on top and one on bottom side and two on both side of the instrument and then mounting bars are to be screwed in tight against the panel, that have a maximum thickness of 30 mm.

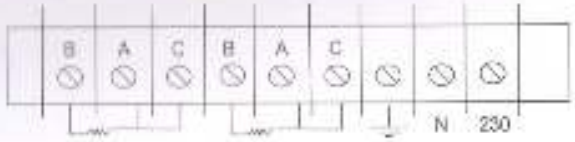
Fig. 4 : Electrical Connections

A) Only for DC, mV OR mA input

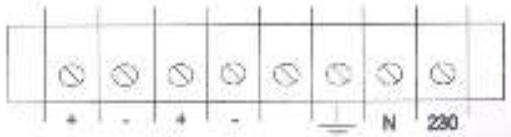
B) Only for PRT Bulb input (Three Wire System)



c) only for PRT Bulb input for 2 pen Recorder

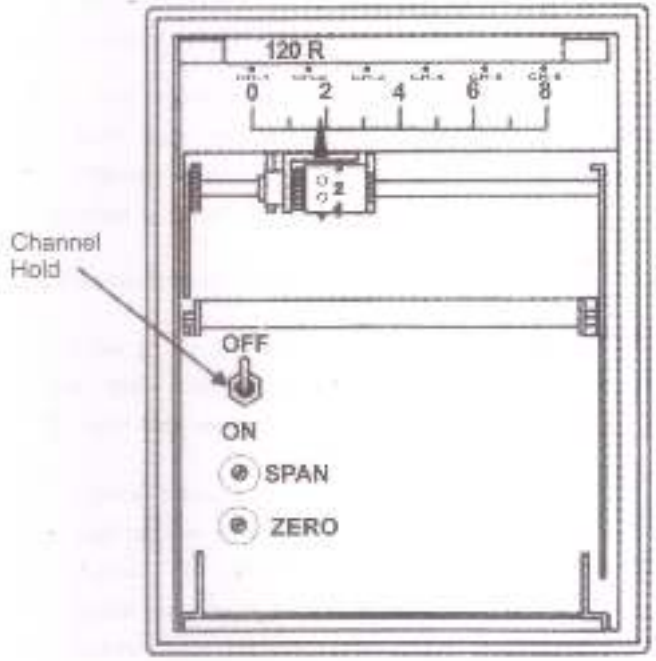


D) Only for DC mV / mA Voltage Single pen for 2 pen Recorder



the amplifier, then the turret assumes its corresponding positions, gets stabilised in that position and gets lowered down and gives a dot on paper and goes back to its position, gets indexed for next colour tip and so on. This process described above takes 10 seconds.

Fig. 11 Front view - Multipoint Recorder



PRINCIPLE OF OPERATION

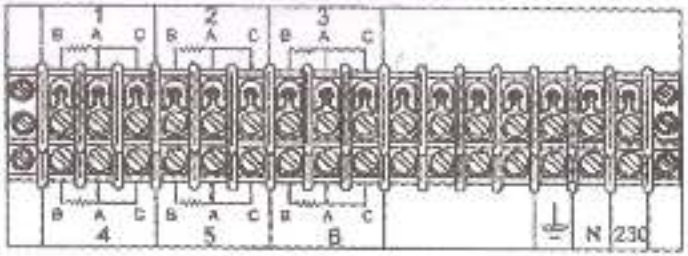
SHIVAKI can record almost any process variables like temperature, pH, conductivity, weight, humidity etc. that can be converted into an electric signal. This electric signal is fed through the filters of preamplifiers whose operating range can be suitably changed in range card. The amplified signal is compared with the reference voltage, picked up from a slide wire, energised by highly stabilised voltage supply. The difference in these two voltages is amplified by error signal amplifier which drives the potentiometers wiper via a servo motor in such a direction so as to reduce the error signal to zero. When error signal becomes less than the amplifier discrimination the servo motor stops and the pointer indicates the magnitude of the signal being measured passive transducers like resistance theremometers strain gauges etc. are used in bridge can excited by stable reference voltage. the bridge unbalanced is used as the input signal. Ensuring the proper connection of power supply and sensor leads, switch on the main supply and the indicating pointer will show correct reading, at the same time pen will start writing on the chart.

For SCS- 120 - RM In the case of multi point recorders, the signals are fed to the six input terminals. These signals are fed to a signal selector unit. The cycle time for all the six signals is one minute. Each signal is selected, fed to

CONNECTIONS :

All the connections to the instruments are provided at the back side of the instrument. Remove the cover provided at the back and connect the mains cable and input cable to the respective connectors. (Refer Fig. 4)

Fig. 5 A) Back terminal connection for PRT Bulb version for multipoint Recorder.



B) For mV / mA

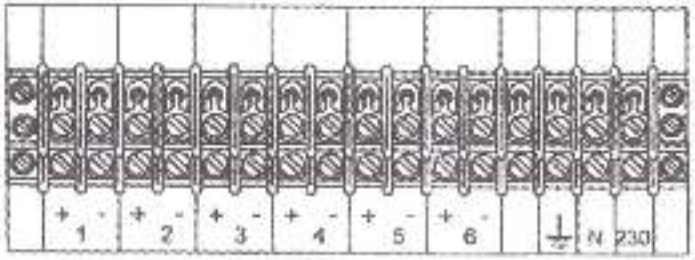


Fig. 6 : Chart paper loading

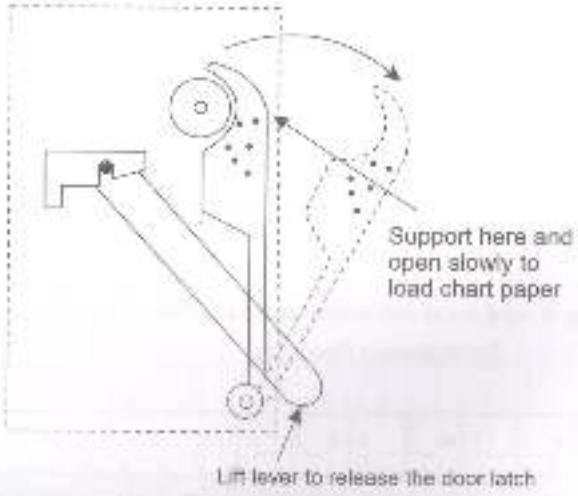
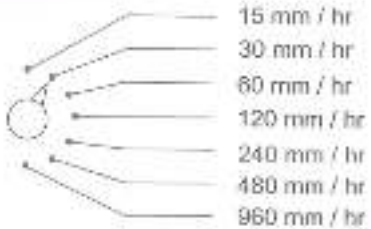


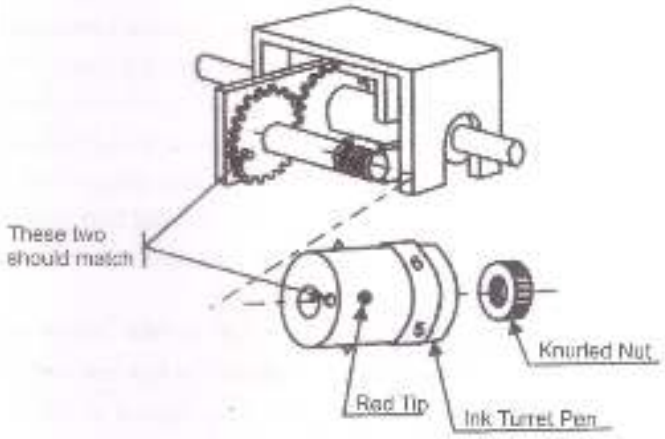
Chart Speed Selector Switch (for Stepper Motor Drive)



Replacing the Turret pen for SCS- 120 - RM

As shown in Fig. 10, unscrew the knurled nut holding the ink turret and remove it by right hand. Take a new ink turret pen and insert it on the holder shaft and put back the knurled nut. Ensure that the small pip projection on the gear face enters the small hole on the side of ink turret pen. This ensures the positive locking of turret and also proper placement of the pip position with respect to the channel being recorded. Tighten the knurled nut in this position moderately.

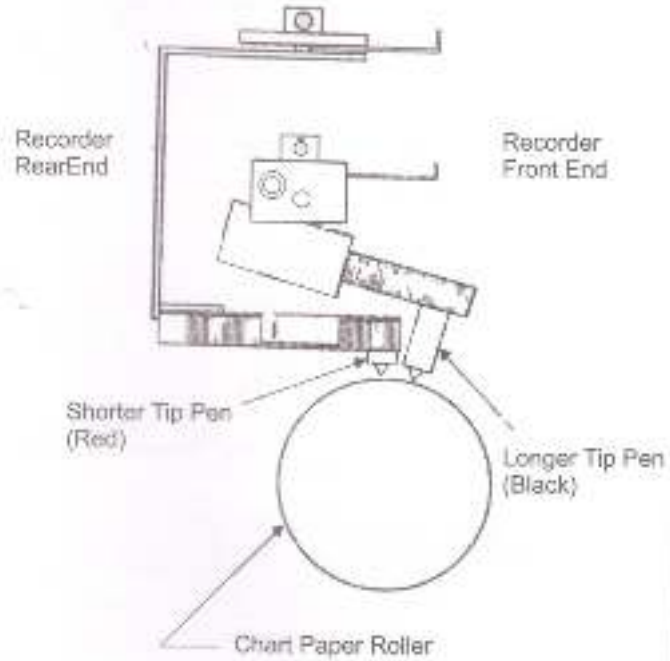
Fig. 10 : Turret Pen fixing arrangement



Fitting pen in 2 Pen Recorder :

Please ensure that the longer tip pen (Black) is fitted in the outer carriage and the shorter tip pen (Red) in the inner one (as shown in Fig. 9 below), so that the longer tip pen can slide freely over the shorter tip pen.

Fig. 9 : Two pen mounting arrangement



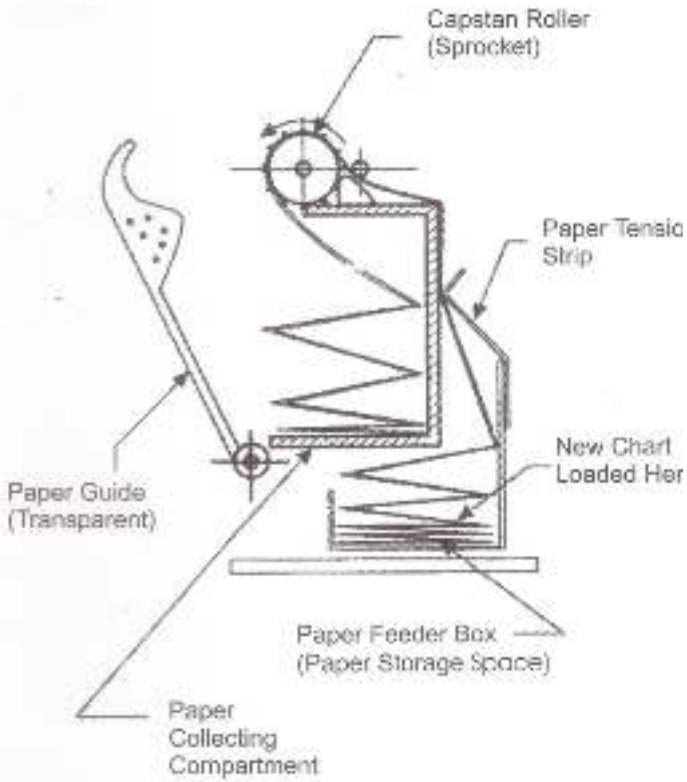
LOADING OF CHART CASSETTE:

Disengage the latching lever and tilt the chart cassette forward. Keep the new chart in the feeding box such that the triangular cut end faces upward and also ensure that the oblige holes of the chart are of the left hand side.

Shuttle about 7 to 8 folds of the chart and route it as shown in Fig. No. 7.

Leave the triangular end of charts along with few folds into the take up compartment. Close the transparent paper guide such that the holes on both side of the chart engage properly into the capstan roller (sprocket). Now tilt back the chart cassette back to its original position. Ensure its proper locking by pressing the latching lever down.

Fig. 7 : Chart paper routing for the Recorder



FITTING THE PEN :

The disposable pen is snap fitted into its carriage below the indicating pointer. The pen should be fitted or removed only when the chart cassette is outside the recorder. (Refer Fig. 8 below.)

Fig. 8 : Pen insertion procedure