



## INSTALLATION GUIDE

**FAR115-60A05**

AMP CHART RECORDER

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## 1. OVERVIEW

### 1.1. GENERAL

FANOX make potentiometric Circular Chart Recorder is a rugged and compact panel mountable instrument making use of servo motor principle that gives long term reliability and better performance.

The indicating pointer, writing pen and gear unit are directly controlled by the servo amplifier. This results in better accuracy and fast response.

The electronic circuits used here in make use of all silicon transistors and modern integrated circuits that are very reliable and have better performance in wide ambient temperature variations.

These units are powered by a 110 VAC/60Hz ( $\pm 10\%$ ) supply. Standard input is 0-5 Amp, AC Current.

High accuracy, maximum flexibility, fast response and a simple interface are the main benefits of the FAR115-60A05 recorder.

## 2. INSTALLATION



Dangerous voltages capable of causing serious injury or death are sometimes present in this instrument.



Before installation or beginning any troubleshooting procedures, the power of all equipment must be switched off and isolated. More than one power disconnection may be required.



Units suspected of being faulty must be disconnected and removed to a properly equipped workshop for testing and repair. Component replacement and internal adjustments must be made by qualified maintenance personnel only.



To minimize the possibility of fire or shock hazards, do not expose this instrument to rain or excessive moisture.



Do not use this instrument in areas under hazardous conditions such as excessive shock, vibration, dirt, moisture, corrosive gases or oil. The ambient temperature of the areas should not exceed the maximum rating specified in Chapter 5.

## **2.1. UNPACKING**

The device must only be handled by qualified personnel and special care must be taken to protect all of their parts from any damage while they are being unpacked and installed. The use of good illumination is recommended to facilitate the equipment visual inspection.

Upon receipt of the shipment remove the unit from the carton and inspect the unit for shipping damage.

If any damage due to transit, report and claim with the carrier write down the model number, serial number, and date code for future reference when corresponding with our service centre. The serial number (sr.no.) and calibration date are labelled on the box. Make sure that all items are accounted for:

1. 50 (7 DAYS: 25 NO'S /1DAY: 25 NO'S) Standard Circular Charts.
2. Operating / Installation manual.
3. Pack containing disposable pens.

## **2.2. CASE LOCATION**

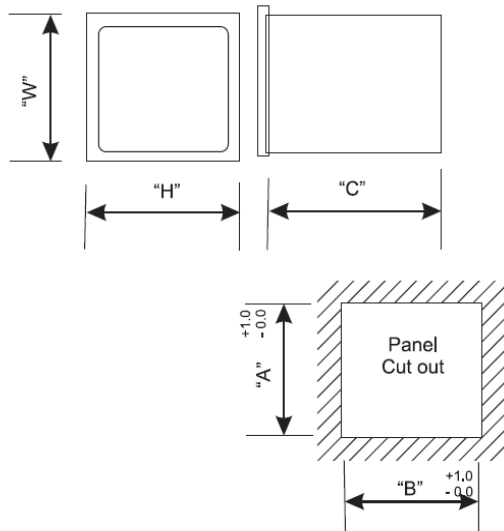
Upon unpacking, find a suitable location to mount the recorder before wiring power to the unit.

Select a location that is well lighted, free from dust, dirt, or corrosive fumes. The recorder should not be located near any sources of heat or be subjected to sudden or extreme temperature changes. It should be mounted on a rigid support that is not subject to vibration.

## **2.3. MOUNTING**

For panel mountable instruments install both mounting clamps and insert the case into the panel cut out. The instrument will be mounted on wall using fasteners provided with it. The four holes are provided on the enclosure back side for mounting purpose.

### Mounting and panel Cut-out Dimensions



#### Panel Cut-out :

A (w) = 344,

B (h) = 255,

C (d) = 120

#### Overall Size :

Width = 278

Height = 370

## 2.4. WIRING PRECAUTIONS

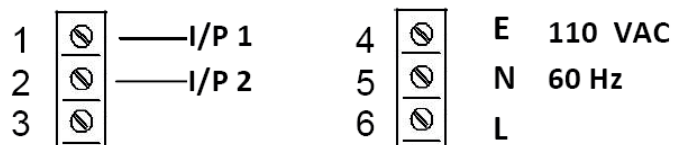
- ⚠ Before wiring, verify the label for correct model number and options. Switch the power off when the check has been done..
- ⚠ Care must be taken to ensure that maximum voltage rating specified on the label is not exceeded.
- ⚠ It is recommended that the power of these units to be protected by fuses or circuit breakers at the minimum value possible.
- ⚠ All units should be installed inside a suitably grounded metal enclosure to prevent live parts being accessible from human hands and metal tools.
- ⚠ All wiring must conform to appropriate standards of good practice and local codes and regulations. Wiring must be suitable for maximum voltage, current, and temperature rating of the system.
- ⚠ Take care not to over-tighten the terminal screws.
- ⚠ Unused control terminals should not be used as jumper points as they may be internally connected, causing damage to the unit.
- ⚠ Verify that the ratings of the output devices and the inputs as specified in Chapter 5 are not exceeded.
- ⚠ Electric power in industrial environments contains a certain amount of noise in the form of transient voltage and spikes. This electrical noise can enter and adversely affect the operation of microprocessor-based controls.

## 2.5. POWER WIRING

The unit is supplied to operate at 110VAC/60Hz ( $\pm 10\%$ ). Check that the installation voltage corresponds with the power rating indicated on the product label before connecting power to the unit.

The recorder uses AC power when it is operating. In order to connect the recorder to the main AC power, firstly you must open the front door of recorder. Your recorder will have a chart plate on which stepper motor PCB is placed as well as stepper motor is fixed. Open the chart plate. If you are not sure how to access to the back of the chart plate. remove the 2 screws which are located on the right hand side.

AC & Input Terminals



The AC power connections are made to terminal block located on the back side of the chart plate of the recorder. Refer to Figure 2-2 for proper connection to the main AC power.

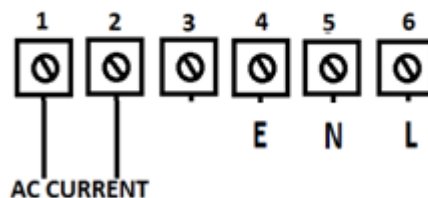


This equipment is designed for installation in an enclosure which provides adequate protection against electric shock. The enclosure must be connected to earth ground.

Local requirements regarding electrical installation should be rigidly observed. Consideration should be given to prevent unauthorized or accidental access to the power terminals.

## 2.6. AC CURRENT INPUT WIRING

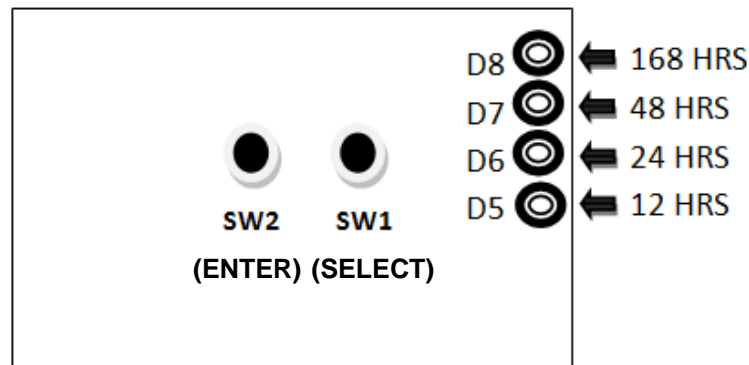
The two leads of AC current can be connected to any of terminal between 4 and 5



## 2.7. STEPPER MOTOR DRIVE

The Procedure to change the speed of stepper motor is given as below:

1. Press SW1 (SEL) to select required HRS. The RED LED will glow for respective HRS (speed).
2. Then press SW2 (ENTER) to confirm the HRS (speed).



**CAUTION! DO NOT TOUCH** the terminals of the transformer while the recorder is connected to the main AC power supply. To avoid the risk of possible electric shock, unplug or disconnect the recorder from the main power supply before attempting to access the terminals of the relay.



The recorder has a hinged chart plate held in place by screws located on the right/left hand side of the chart plate. Remove these screws and open the hinged chart plate.

## 2.8. CHANGING THE CHART

After opening the front door, lift up the pen.

### *UNLOADING OF THE CHART:*

The above action ensures that the pen does not remain in contact with the chart. After this, loosen the screw in the centre of the chart due to which the chart will become loose and come forward.

Firstly, remove the pen, then carefully insert the chart below the pen holder and adjust in such a way that the centre hole of the chart fits over the centre shaft.

#### *LOADING OF THE CHART:*

Firstly, remove the pen, then carefully insert the chart below the pen holder and adjust in such a way that the centre hole of the chart fits over the centre shaft.

Once the screw is tightened lift the chart at three corners to engage them in the grooves provided. This will ensure proper revolving of the chart without coming forward from the back surface.

## **2.9. CHART PENS**

The chart pen consists of a self contained ink reservoir with a porous plastic stylus which is fastened around the outer edge of the pen arm.

A pen cap is provided to extend the life of the ink pen during shipping or when the recorder is not in service. To remove the pen cap, lift gently the pen arm away from the chart paper. Remove the black plastic pen cap to expose the fiber tip of the ink pen and place carefully the pen back onto the chart paper. Do not let the pen arm “snap” back onto the chart paper. This will flatten the fiber tip of the pen and will not give you a fine line marking on the chart paper. Place the pen cap in a safe place for future use.

If the stylus does not touch the chart, adjustment can be made by bending slightly the metal pen arm in the centre towards the chart paper. Do not use more pressure than it is necessary to create a fine line marking on the chart paper. Note: As the pen ink supply runs out, the pen colour will become lighter. This indicates that the pen should be replaced.

## **2.10. PEN INSTALLATION / REPLACEMENT**

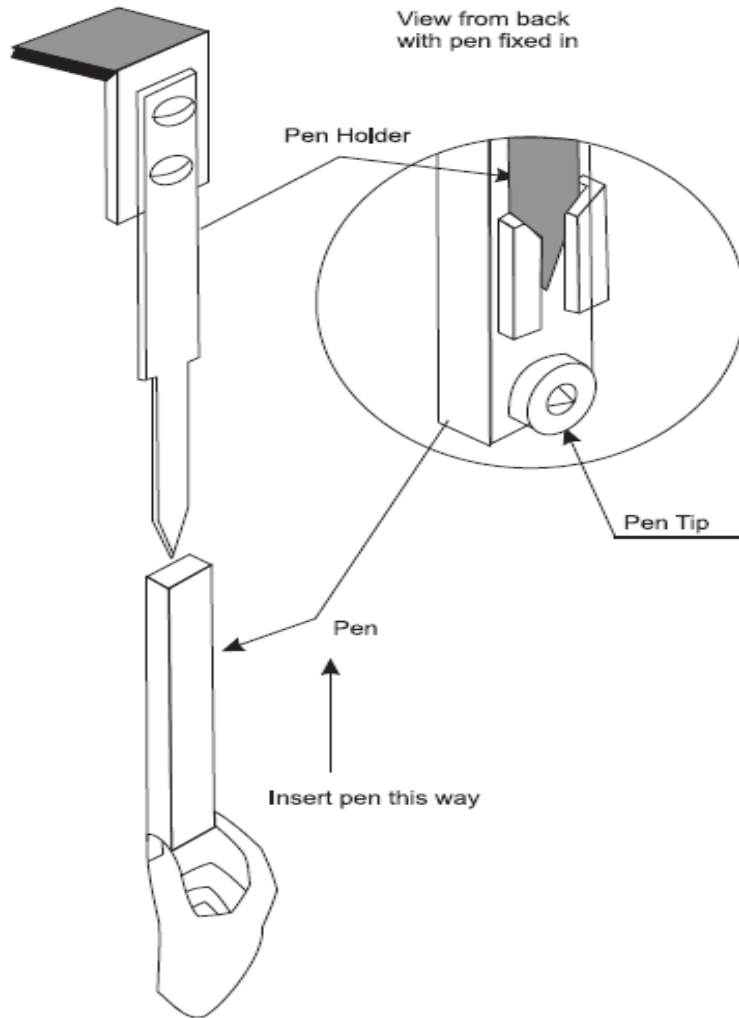
Recorders that are equipped with fiber tipped cartridge pens will have a cartridge that is colour coded “red” for Pen.

The pen cartridge is securely inserted into the metal pen arm/ pen holder.

Open the front door and remove the pen cartridge from the metal pen arm holder, and discard it. Replace the new cartridge by inserting new pen into the pen arm holder as shown:



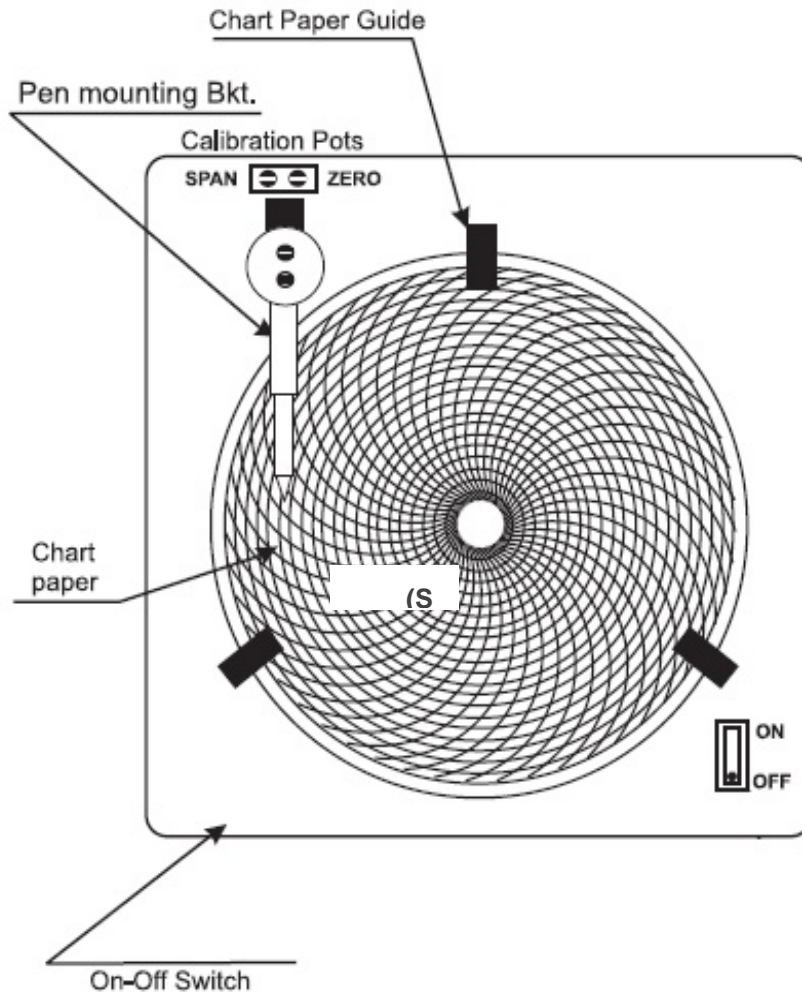
**Pen Mounting**



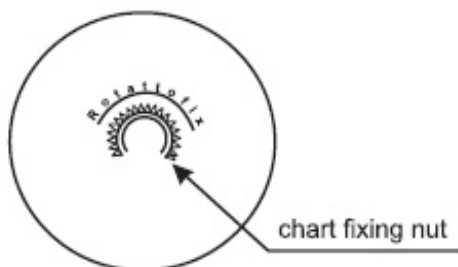
## 2.11. FRONT SIDE OF RECORDER

Two Potentiometers are provided for calibration purpose:

Front view Recorder



Direction of Chart Fixing Nut



### 3. PRINCIPLE OF OPERATION

FANOX Circular Chart Recorder can record almost any process variable like temperature, pH, conductivity, weight, humidity, AC current etc. that can be converted into an electrical signal. This electrical signal is fed through the filters to preamplifier whose operating range can be suitably changed. The amplified signal is compared with the reference voltage, picked from the slide wire energised by a highly stabilised voltage supply. The difference between these two voltages is amplified by error signal amplifier which drives the potentiometer's 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 that is being measured. Passive transducers like resistance thermometer, strains gauges etc. are used in bridge configuration, excited by stable reference voltage. The bridge unbalanced is used as the input signal.

To ensure the proper connections of power supply and AC current leads, switch the mains supply on and the indicating pointer will show the correct reading. At the same time, the pen will start writing on the chart.



**CAUTION! DO NOT TOUCH** the terminals of the transformer while the recorder is connected to the main AC power supply.



To avoid the risk of possible electric shock, unplug or disconnect the recorder from the main power supply before attempting to access the terminals of the relay.

The recorder has a hinged chart plate held in place by screws located on the right/left hand side of the chart plate. Remove these screws and open the hinged chart plate.

### 4. CALIBRATION

#### 4.1. PEN ARM CALIBRATION

Normally, before the dispatch, all the instruments are properly calibrated. In case of another calibration is needed, one can proceed as follows.

For every instrument, two potentiometers, identified as "S" for SPAN and "Z" for ZERO, are provided.

To carry out the calibration, a source calibrator and digital multimeter are required.

- Connect the source to the recorder and make the source read zero.
- Make the pen arm and display (if it is available) point to the zero position by adjusting the "ZERO" potentiometer.

- Make the source read the maximum value (5 Amp) and then adjust “SPAN” potentiometer to make the pen arm and display (if it is available) point to maximum position.
- Re-check calibration points for zero and span position.

Each time the chart paper or fiber tip pen cartridge is changed; you should make sure that the pen stops either at the inner or the outer graduations of the chart paper. Otherwise, this pen offset can cause the unit to record an incorrect value on the chart.

## **4.2. OFFSET ADJUSTMENT (CALIBRATION)**

This recorder is accurately calibrated at the factory. However, if any adjustment is required, perform the following procedure:

1. Place a certified test indicator alongside the recorder’s sensor/ input probe.
2. Once the input has been levelled out, compare the position of the pen on the recorder to the reading on the test device.
3. If an adjustment is required, firstly, set the source to zero and using the ZERO pot. Then adjust the pen position to zero on the chart. After that, using SPAN pot, adjust the pen position to give 100% Span on the chart. Re-check and repeat the same procedure 2 times. If the pen shows proper position for respective input then, the calibration has been done properly.

After the calibration, check all the points by setting the respective inputs from source.

## **5. SPECIFICATIONS**

Input 1:

Process: 0 to 5 Amps, AC Current

Recording:

Chart Size: 77.5 mm (Chart outer diameter : 190 mm)

Recording Accuracy:  $\pm 1.5\%$  of span (100 division span)

Chart Speed: 12, 24, 48, 168 hour rotation (168 hours = 7 days).

Power:

Line Voltage: 110/223 VAC  $\pm 10\%$ , 50~60 Hz.

Common Mode Rejection: >123db @ 60Hz.

Normal Mode Rejection: 85dB @ 60 Hz.

Power Consumption: 23 VA maximum.

Operational and Physical:

Operating Temperature: 0 to 60°C (32 to 140°F)

Storage Temperature: -40 to 65°C (-40 to 150°F)

Humidity: 0 to 90% RH (non-condensing)

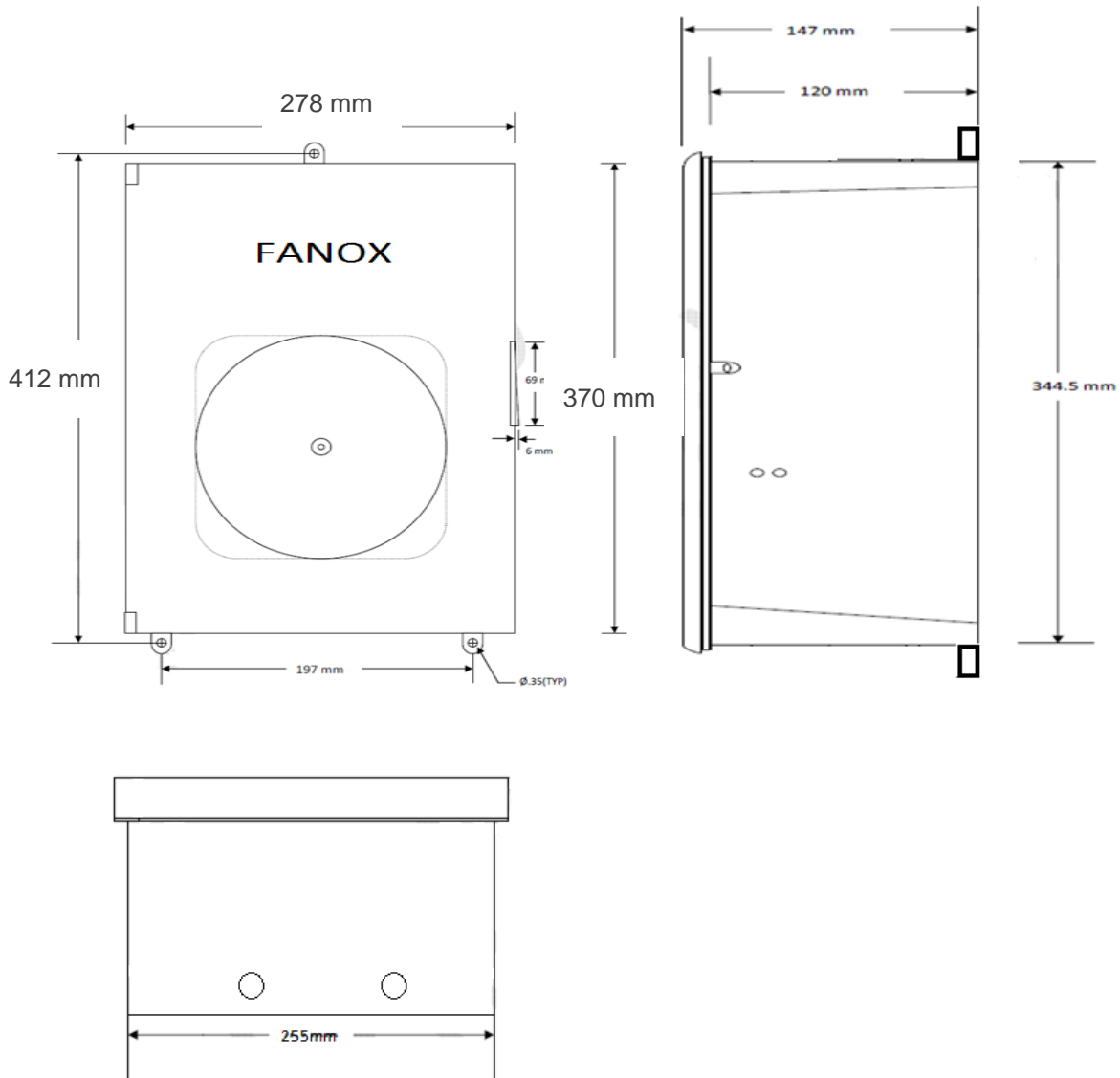
Vibration: 0.3 to 100 Hz @ 0.2g

IP Protection Degree: IP 65

Mounting: ±23 degrees of vertical, ±10 degrees of horizontal.

Weight: 6.6 kg maximum.

## 6. DIMENSIONS



## 7. TROUBLESHOOTING GUIDE

SYMPTOM	POSSIBLE TROUBLE	CHECK FOR SOLUTION
1. Pen won't write or trace too light	<ul style="list-style-type: none"> <li>a) Insufficient pen pressure</li> <li>b) Pen tip not touching paper</li> </ul>	<ul style="list-style-type: none"> <li>a) Adjust Pen pressure</li> <li>b) Adjust Pen stopper screw</li> </ul>
2. Pen trace too dark and broad.	<ul style="list-style-type: none"> <li>a) Excessive pen pressure</li> <li>b) Pen not properly installed</li> </ul>	<ul style="list-style-type: none"> <li>a) Adjust pen pressure</li> <li>b) Refit pen properly</li> </ul>
3. Chart won't advance	<ul style="list-style-type: none"> <li>a) Main ON/OFF switch in OFF position</li> <li>b) Chart roll not loaded properly</li> <li>c) In case of electronic chart drive faulty component</li> </ul>	<ul style="list-style-type: none"> <li>a) Switch 'ON' main switch</li> <li>b) Load chart properly</li> <li>c) Locate and replace faulty component</li> </ul>
4. Recorder dead	<ul style="list-style-type: none"> <li>a) Fuse burnt out</li> <li>b) Faulty power supply</li> </ul>	<ul style="list-style-type: none"> <li>a) Check mains voltage and transformer connections</li> <li>b) Check transformer wiring locate and replace faulty components</li> </ul>
5. Jitter at all points of trace	<ul style="list-style-type: none"> <li>a) Open single input (In case of EMF range recorder)</li> <li>b) Noisy Signal</li> </ul>	<ul style="list-style-type: none"> <li>a) Shunt with a jumper or connect proper signal</li> <li>b) Remove noise from signal</li> </ul>

<p>6. Jitter at one point of trace</p>	<p>a) Harmonics in input signal b) Contaminants on slide wire</p>	<p>a) Check input signal on oscilloscope at jitter point b) Clean slide wire</p>
<p>7. Recording not linear</p>	<p>a) Contaminants in pen carriages assembly b) Degradation of preamplifier at n/w component</p>	<p>a) Clean pen carriage assembly b) Locate and replace faulty component</p>
<p>8. Dead zone in recording</p>	<p>a) Contaminants in pen carriage assembly b) Cable overlapping too loose</p>	<p>a) Clean pen carriage assembly b) Adjust motor drive pulley c) Location faulty components</p>
<p>9. Pen drives to full scale or zero</p>	<p>a) Over range signal b) Reserve signal input c) Zero setting incorrect d) Bad component on amplifier e) Damaged slide wire</p>	<p>a) Check input signal polarity b) Check input signal polarity c) Recalibrate d) Locate and replace faulty component e) Replace slide wire</p>
<p>10. Error in scale and chart reading</p>	<p>a) Scale not aligned properly</p>	<p>a) Align scale</p>

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