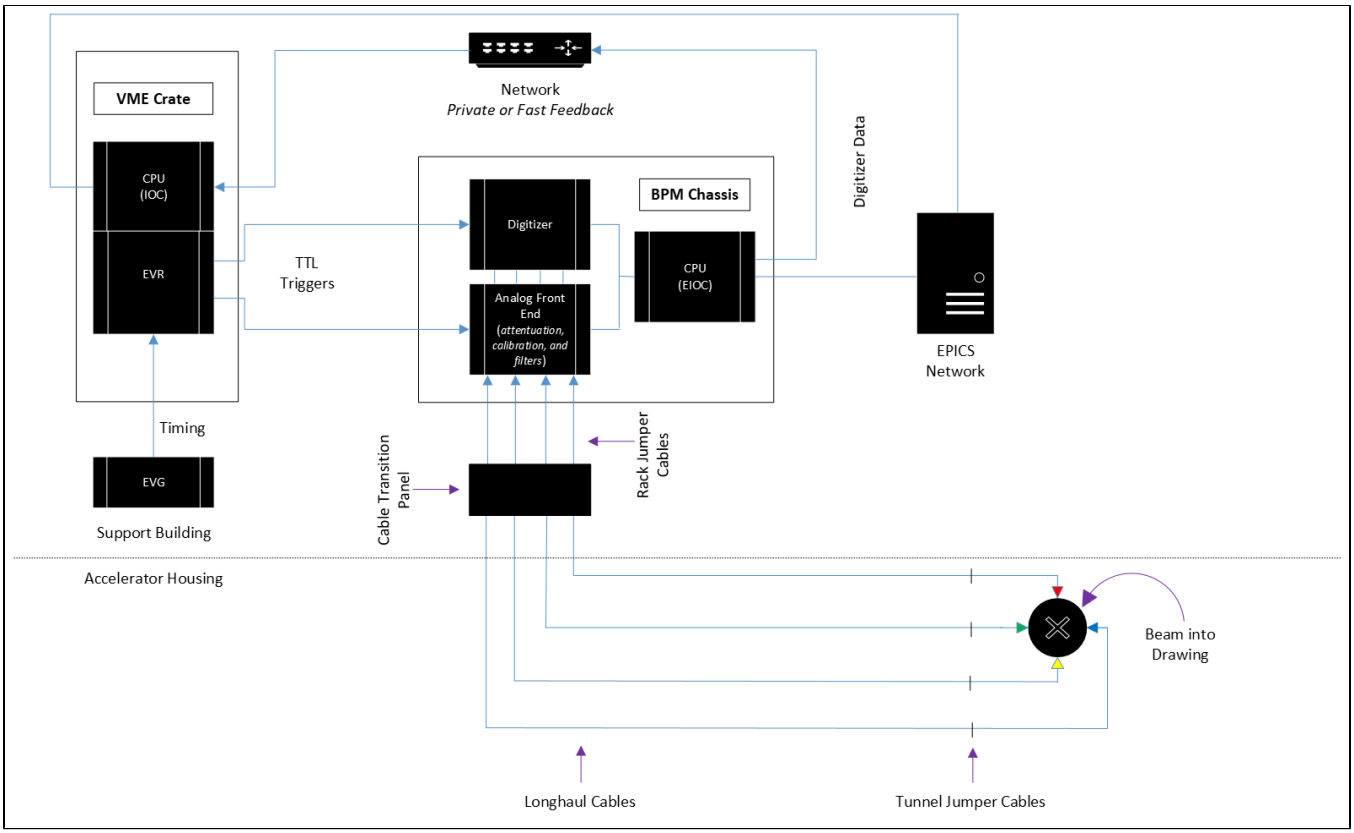
Troubleshooting Guide for BPMs

In the Accelerator housing their exists 3 different type of BPMs, they are as follows:
ATCA Based Stripline BPMs, VME Based Stripline BPMs, and ATCA Based Cavity BPMs. (Check)
This confluence page (**under development)** will serve as a source for diagnosing many BPM related issues as well as general information about overall hardware in the BPM diagnostic system.

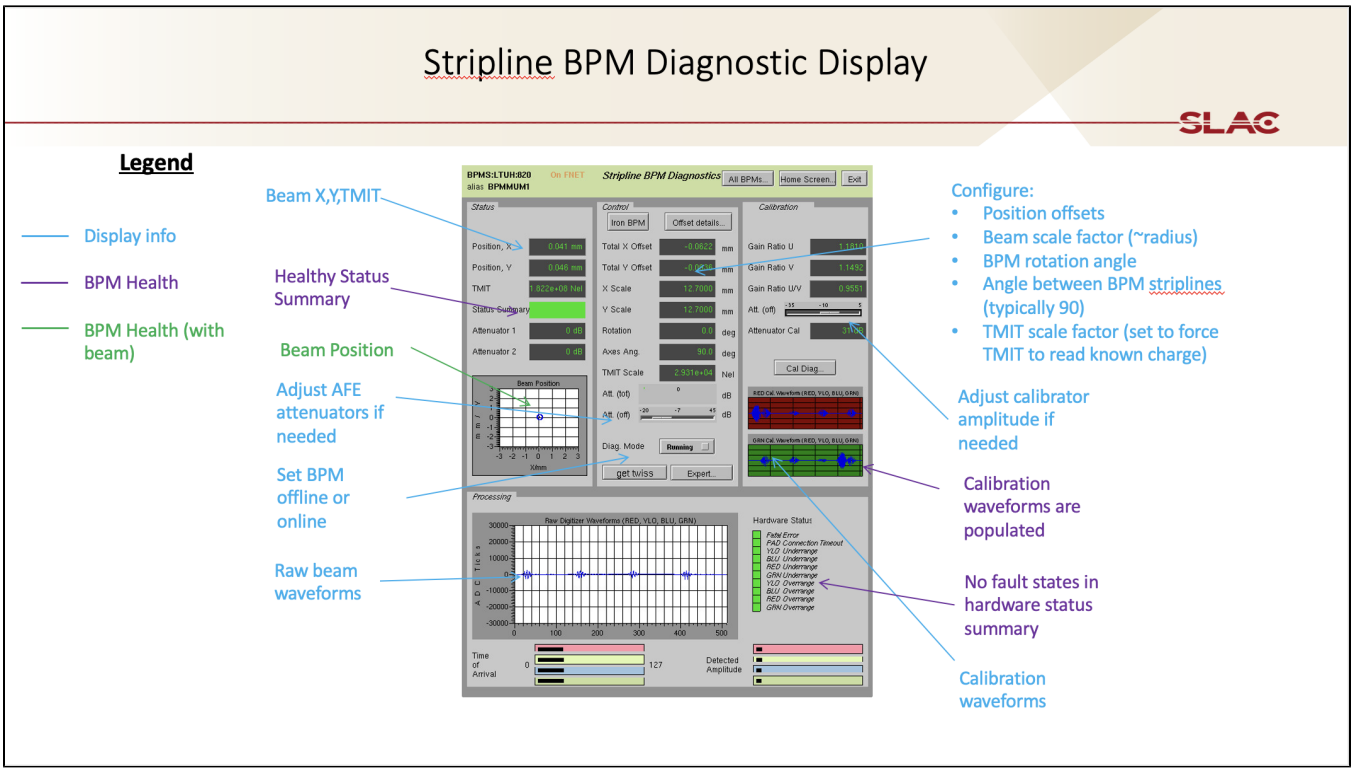
VME Based Stripline BPMs

The setup for the VME based Stripline BPMs can be found in Figure 1.



(Figure 1- Setup for VME based BPMs, note that the VME crate sends forward communication to the BPM chassis through the use of TTL triggers. The AFE (Analog Front End) of BPM chassis receives raw beam
data from the BPM living inside the accelerator housing and performs a series of tasks on the data before sending it to the digitizer * responsible for converting raw waveform data to digital signals* and the EIOC *Embedded IOC* living in side the BPM Chassis)

An Example of a Healthy Stripline BPM:

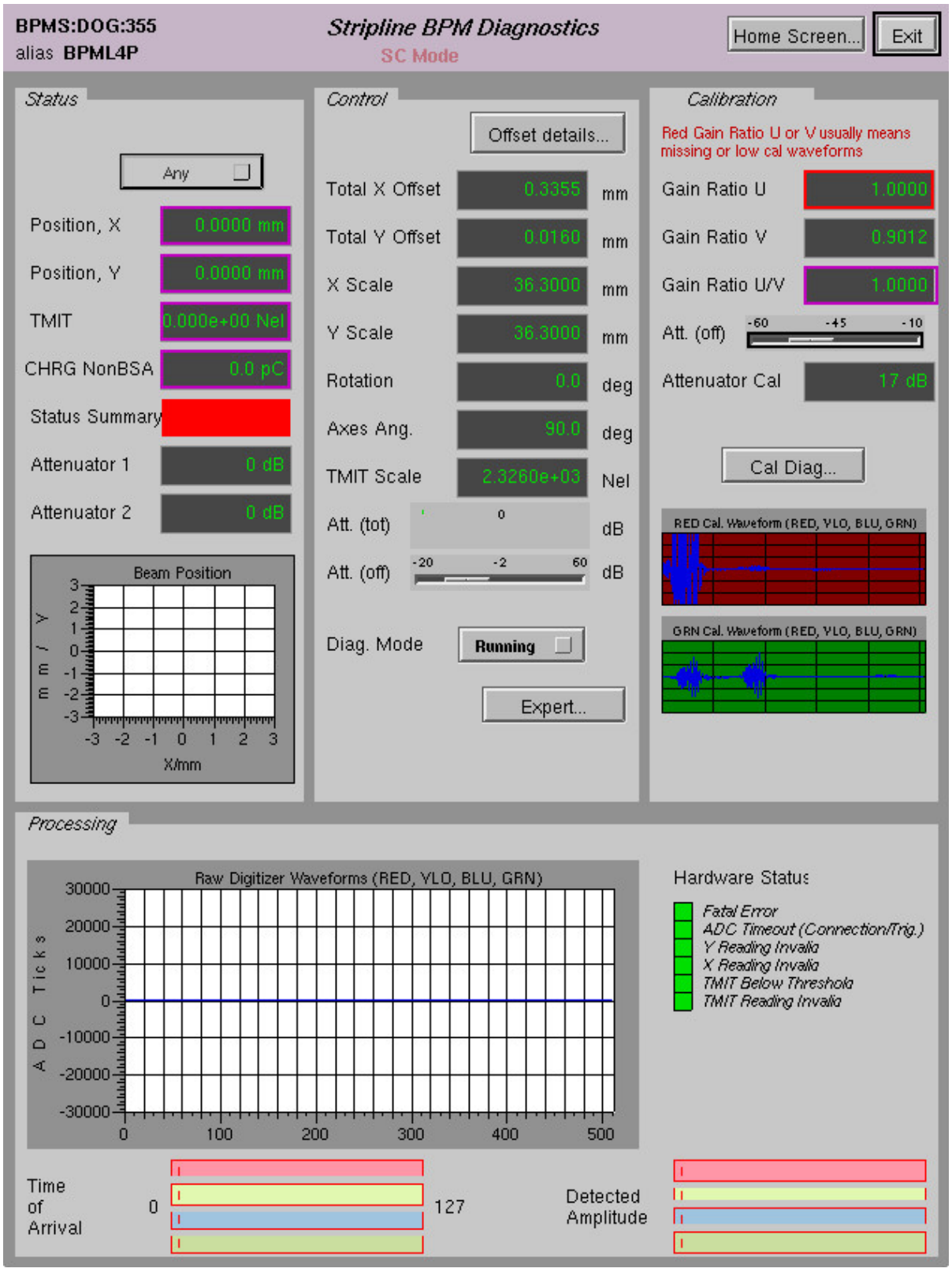


(Figure 2- An example of a healthy Stripline BPM with comments, blue comments in this figure are to provide the user with information about the display itself, purple comments are to provide information on what a healthy BPM *can* look like when there is no beamrate,

and finally green comments are to provide additional information on what BPM health looks like with beam after reviewing the purple comments.)

Examples of some common issues(VME Stripline BPMs, ATCA Stripline, and Cavity:

The figures below are examples of some common issues that can occur with the different BPMs.


BPMS:DOG:355
alias BPML4P
Stripline BPM Diagnostics
SC Mode
Home Screen...
Exit
Status
Any
Position, X
0.0000 mm
Position, Y
0.0000 mm
TMIT
0.000e+00 Nel
CHRG NonBSA
0.0 pC
Status Summary
Attenuator 1
0 dB
Attenuator 2
0 dB
Beam Position
m m / Y
X/mm
Control
Offset details...
Total X Offset
0.3355
mm
Total Y Offset
0.0160
mm
X Scale
36.3000
mm
Y Scale
36.3000
mm
Rotation
0.0
deg
Axes Ang.
90.0
deg
TMIT Scale
2.3260e+03
Nel
Att. (tot)
dB
Att. (off)
dB
Diag. Mode
Running
Expert...
Calibration
Red Gain Ratio U or V usually means missing or low cal waveforms
Gain Ratio U
1.0000
Gain Ratio V
0.9012
Gain Ratio U/V
1.0000
Att. (off)
Attenuator Cal
17 dB
Cal Diag...
RED Cal. Waveform (RED, YLO, BLU, GRN)
GRN Cal. Waveform (RED, YLO, BLU, GRN)
Processing
Raw Digitizer Waveforms (RED, YLO, BLU, GRN)
A D C Ticks
Hardware Status
Fatal Error
ADC Timeout (Connection/Trig.)
Y Reading Invalid
X Reading Invalid
TMIT Below Threshold
TMIT Reading Invalid
Time of Arrival
Detected Amplitude

BPMS:LTUH:820 On FNET

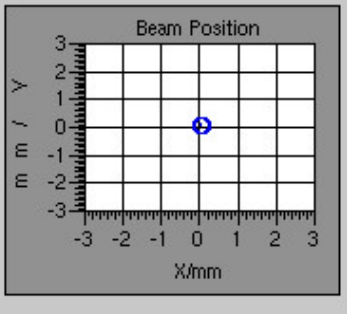
alias **BPMMUM1**

Stripline BPM Diagnostics

All BPMs... | Home Screen... | Exit

Status

Position, X	0.041 mm
Position, Y	0.046 mm
TMIT	1.822e+08 Nel
Status Summary	
Attenuator 1	0 dB
Attenuator 2	0 dB



Control

Iron BPM | Offset details...

Total X Offset	-0.0622	mm
Total Y Offset	-0.0936	mm
X Scale	12.7000	mm
Y Scale	12.7000	mm
Rotation	0.0	deg
Axes Ang.	90.0	deg
TMIT Scale	2.931e+04	Nel
Att. (tot)	0	dB
Att. (off)	-20 -7 45	dB

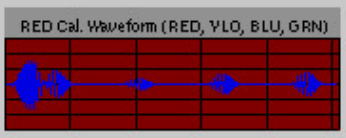
Diag. Mode: **Running**

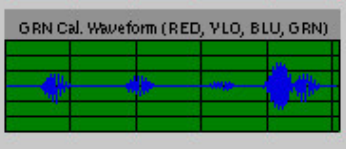
get twiss | Expert...

Calibration

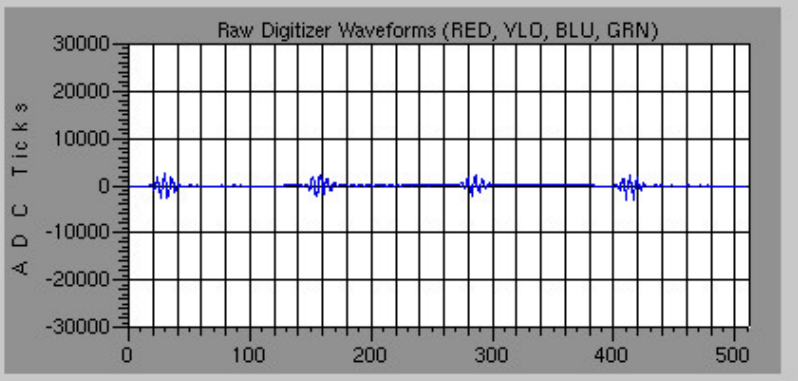
Gain Ratio U	1.1810
Gain Ratio V	1.1492
Gain Ratio U/V	0.9551
Att. (off)	-35 -10 5
Attenuator Cal	31 dB

Cal Diag...





Processing



Hardware Status

- *Fatal Error*
- *PAD Connection Timeout*
- *YLO Underrange*
- *BLU Underrange*
- *RED Underrange*
- *GRN Underrange*
- *YLO Overrange*
- *BLU Overrange*
- *RED Overrange*
- *GRN Overrange*

Time of Arrival 0 127

Detected Amplitude

BPMS:LTUH:590 On FNET

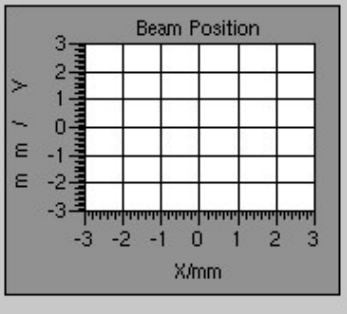
alias **BPMT42**

Stripline BPM Diagnostics

All BPMs... | Home Screen... | Exit

Status

Position, X	nan mm
Position, Y	nan mm
TMIT	nan Nel
Status Summary	
Attenuator 1	0 dB
Attenuator 2	0 dB



Control

Iron BPM | Offset details...

Total X Offset	0.0000	mm
Total Y Offset	0.0000	mm
X Scale	10.0000	mm
Y Scale	10.0000	mm
Rotation	0.0	deg
Axes Ang.	90.0	deg
TMIT Scale	3.370e+04	Nel
Att. (tot)	0	dB
Att. (off)	-20 -10 45	dB

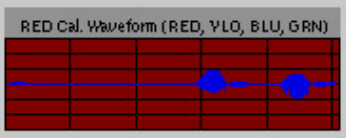
Diag. Mode: Running

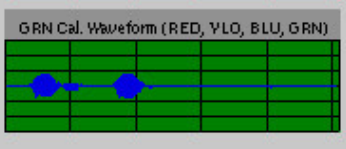
get twiss | Expert...

Calibration

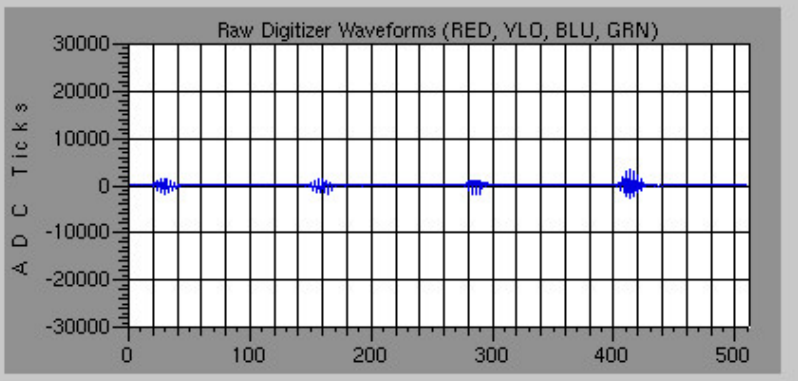
Gain Ratio U	0.9995
Gain Ratio V	0.9329
Gain Ratio U/V	1.0068
Att. (off)	-35 -28 5
Attenuator Cal	18 dB

Cal Diag...





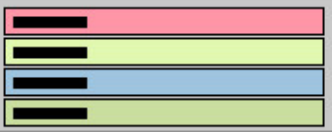
Processing



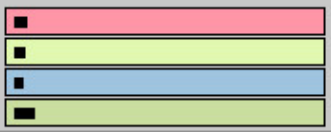
Hardware Status

- *Fatal Error*
- *PAD Connection Timeout*
- *YLO Underrange*
- *BLU Underrange*
- *RED Underrange*
- *GRN Underrange*
- *YLO Overrange*
- *BLU Overrange*
- *RED Overrange*
- *GRN Overrange*

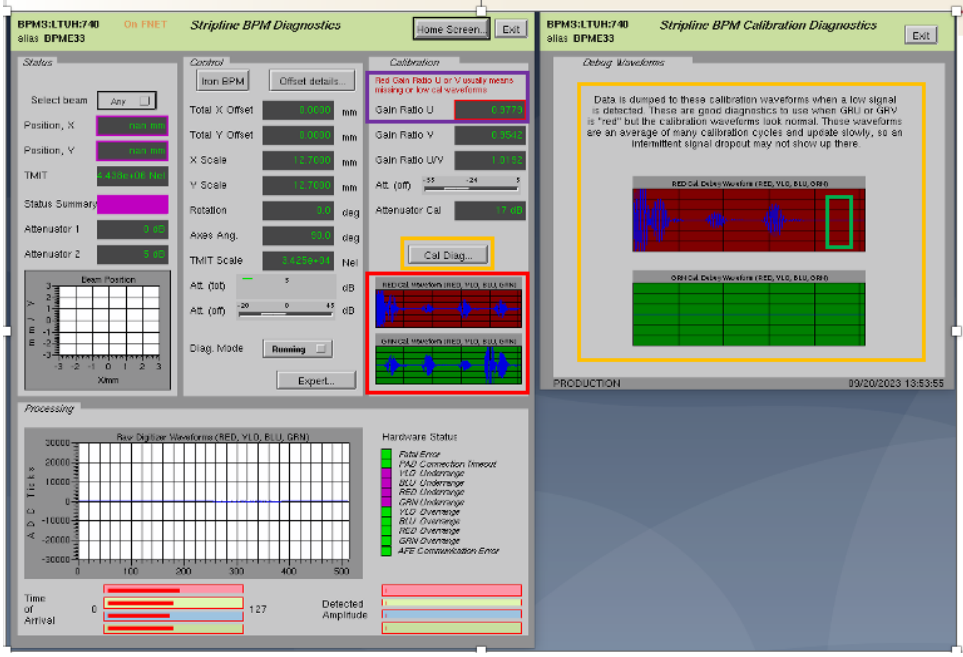
Time of Arrival 0 127



Detected Amplitude



Intermittent Failures : Example 1



SLAC

1.) Observe that gain ratio U is at Major Severity. Usually corresponds to missing or low cal waveforms.

2.) Observe that the Waveform plot does not appear to have missing or low cal waveforms, since the PV for this plot updates at 1Hz this is an indicator the problem is intermittent at may not always visible on these plots alone.

3.) By clicking the "Cal Diag" related display button a new display will appear with debug information. The data is scanned at the full 120 Hz beam rate but only dumped when to the PV a low signal is detected, it then freezes at that value until another low signal event happens.

4.) This failure is likely caused by faulty switches which intermittently block the transport of the signal (hardware issue).