AR1FS Debugging Guide Critical Components

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**Note that this is a work in progress and will be updated from time to time. Example plots for a variety of detected problems may be found at :

higgs.hep.upenn.edu/systest/TRT/dsm/dev/GALLERY

Introduction

Diagnostic test programs often indicate symptoms that are not sufficient to uniquely identify board problems. This guide provides expected measured values at key locations on AR1FS for chip and board control functions. Since all active roof boards use the same ASIC triplet, values will be the same for all boards although topology will be different. It should be a simple matter to identify locations on other boards by using silk screen indicators and measured values from this guide to match up with locations on the board of interest.

AR1FS DTMROC Side UP



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AR1FS Termination Area

Each Leg of the termination resistors connects through a 50 ohm resistor to a common node. BX, Cin have a 0 ohm in series with 50 ohm

Cin +,- .86V, 1.2V BX +,- .99V, 1.02V Reset +,- .88, 1.2V

TEST (pwr off) across +,- nodes Without data cable plugged in 100 ohms. Test at far end of Cable for full continuity test Add ~ 20 ohms for cable.

Cout +,- 1.12V, 1.13V Two 60 ohm resistors to independent node. **TEST** (pwr off) Across +,- connection data cable unplugged 120 ohms, plugged to patch panel = 60 ohms Active Roof Repair Aids

LED

BX CTN

AR1FS (top) DTMROC Control



Data Out Resistor 120 ohms Data Connector "off" 60 ohms Data Connector "on" and attached to PP Active Roof Repair Aids

AR1FS (top) DTMROC Control

Pos # 8 In other layouts Threshold resistors can be here



1FS Bottom Side Resistors

Stuffing errors that affect the performance of a whole ASDBLR ASIC.



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ASDBLR Chipwide problems

Symptom: Outputs High for one (or more) ASDBLR's (Whole Chip)

- → 12K resistor shown (red box) on previous page broken disconnected to ball of ASDBLR.
- \rightarrow OR Low Threshold problem shorted to gnd or open.

Check:

Measure resistance. 12k? If yes then...

Measure voltage on each side of 12K (+3 and -1.99V)

missing -1.99 V at +3V \rightarrow chip is not connected or bad resistor solder joint.

one side at $-2.3V \rightarrow$ broken resistor or bad solder joint to +3V.

- if OK power up board and check 1K threshold resistors for 1.28V on both sides.
- if OK then measure V across 1K resistor, look for more than 1mV drop. If no drop ASDBLR ball is not connected.

ASDBLR chipwide problems

Symptom - very low gain, low noise all channels. PROBLEM \rightarrow Unstuffed 4.7 ohm resistor. Check preamp input pins for expected value of >700mV, if resistor is not stuffed, expect ~0mV.