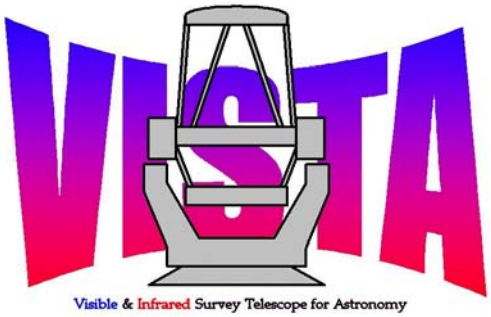

IR CAMERA

Document Title: **AIT Report on Detector Module #43**

Document Number: **VIS-TRE-RAL-06036-0101**

Issue: **0.2**

Date: **2 December 2006**

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Change Record

Issue	Date	Section(s) Affected	Description of Change/Change Request Reference/Remarks
0.1	01/12/06	All	Created by Guy Woodhouse
0.2	01/12/06	All	Minor edits by AKW

Notification List

The following people should be notified by email that a new version of this document has been issued and is available on the IR Camera Sharepoint database:

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TABLE OF CONTENTS

1 SCOPE

This document describes the performance of detector #43 during Camera AIT 'all-up tests b'.

2 ACRONYMS AND ABBREVIATIONS

ADxx	Applicable Document number xx
ADU	Analog-to-Digital Unit
AIT	Assembly Integration and Test
ATC	UK Astronomy Technology Centre
CDS	Correlated Double Sampling
FPA	Focal Plane Assembly
IRACE	Infrared Array Control Electronics
PCB	Printed Circuit Board
RAL	Rutherford Appleton Laboratory
RDxx	Reference Document number xx
RTD	Real Time Display
RVS	Raytheon Vision Systems
UoD	University of Durham
VIRCAM	VISTA IR Camera
VISTA	Visible and Infrared Survey Telescope for Astronomy
VPO	VISTA Project Office

3 APPLICABLE DOCUMENTS

AD 1	VISTA IR Camera Tech Spec	VIS-SPC-ATC-60000-00004
AD 2	IR Camera Focal plane assembly Sub-system Requirements Specification	VIS-SPE-RAL-06030-0010
AD 3	Detector Controller Technical Specification	VIS-SPE-RAL-06035-0005

4 REFERENCES

RD 1	RVS Test Data Pack for VISTA Detector Module Serial No.: VM301-nn-SCA.	
RD 2	VIRGO Module SCA-43 Test Report	VIS-TRE-ATC-06043-1032
RD 3	Stray Light Observations and Mitigations	VIS-TRE-RAL-06012-3001
RD 4	Summary of Final Dark measurements on VISTA during final testing (3).doc	
RD 5	Dark Exposure Properties of VIRCAM Detectors	VDF-TRE-IOA-00008-0012 (Draft 20061021)
RD 6	Flat Exposure Properties of VIRCAM Detectors	VDF-TRE-IOA-00008-0013 (Draft 20061122)
RD 7	FPA AIT Test Results	VIS-TRE-RAL-06036-0100

5 INTRODUCTION

During Camera AIT ‘all-up tests b, in September 2006, dark and flat field images were taken and analysed at Cambridge [RD 5, RD 6] and RAL [RD 7]. RD 5 showed that channel 12 of detector 14 (module #43 in position 4B) was inconsistent with the other channels. This inconsistency is seen as a ‘stripe’ in the detector module #43 images. Another feature of this inconsistency is that is does not cancel out when two images are subtracted.

This report describes the effect in further detail.

6 INSPECTION OF IMAGES

Figure 1 shows an uncorrelated 1sec dark image taken during ‘all-up tests b’.

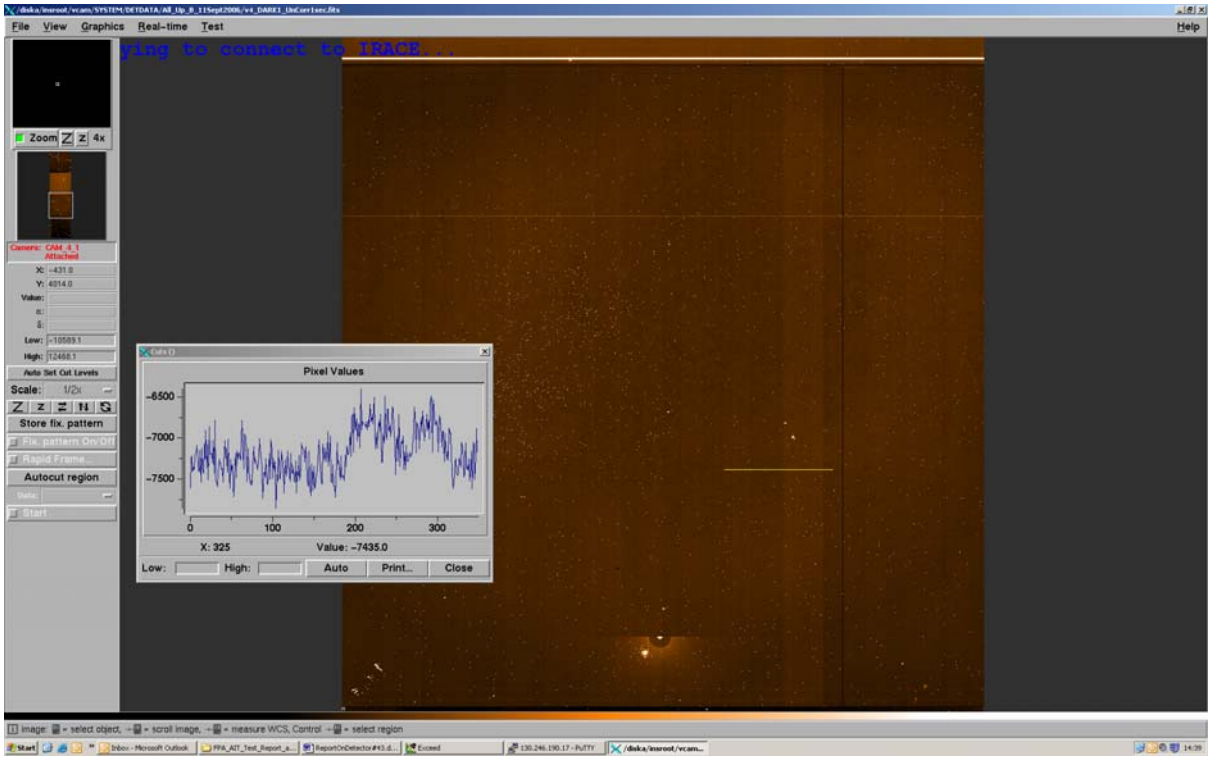

Figure 1 Uncorrelated 1 sec dark exposure taken with detector #43, on 11 Sept 2006, during Camera ‘all-up tests b’

Figure 2 shows a double correlated 1 second dark exposure taken with detector module #43 on 11 Sept 2006.

Although the 'stripe' is clearly visible, in fig 2, a zoomed slice through the image shows that there is no significant change in DC level or noise in channel 12, compared to adjacent channels.

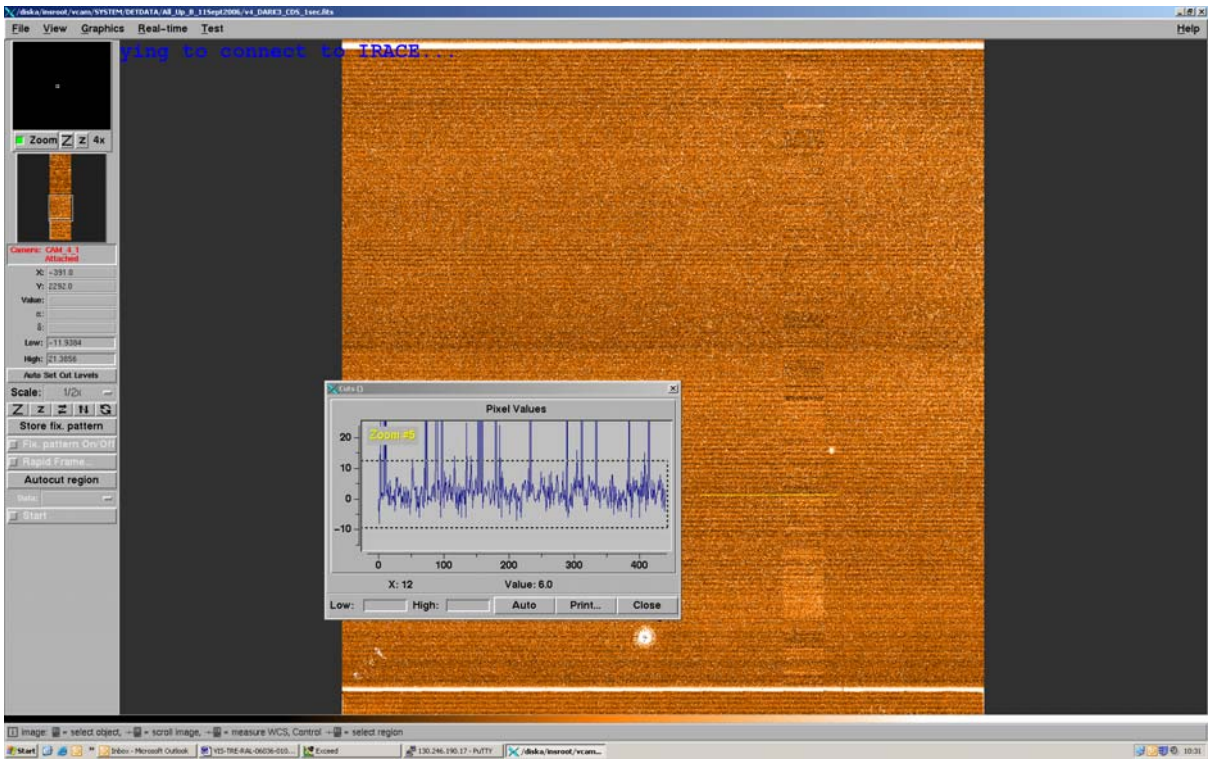

Figure 2 Double correlated 1 sec dark exposure taken with detector #43, on 11 Sept 2006, during Camera 'all-up tests b'

Figure 3 shows a 1 sec dark CDS image taken on 13 Sept 2006, from which a 1 sec dark CDS image taken on 11 Sept 2006 has been subtracted.

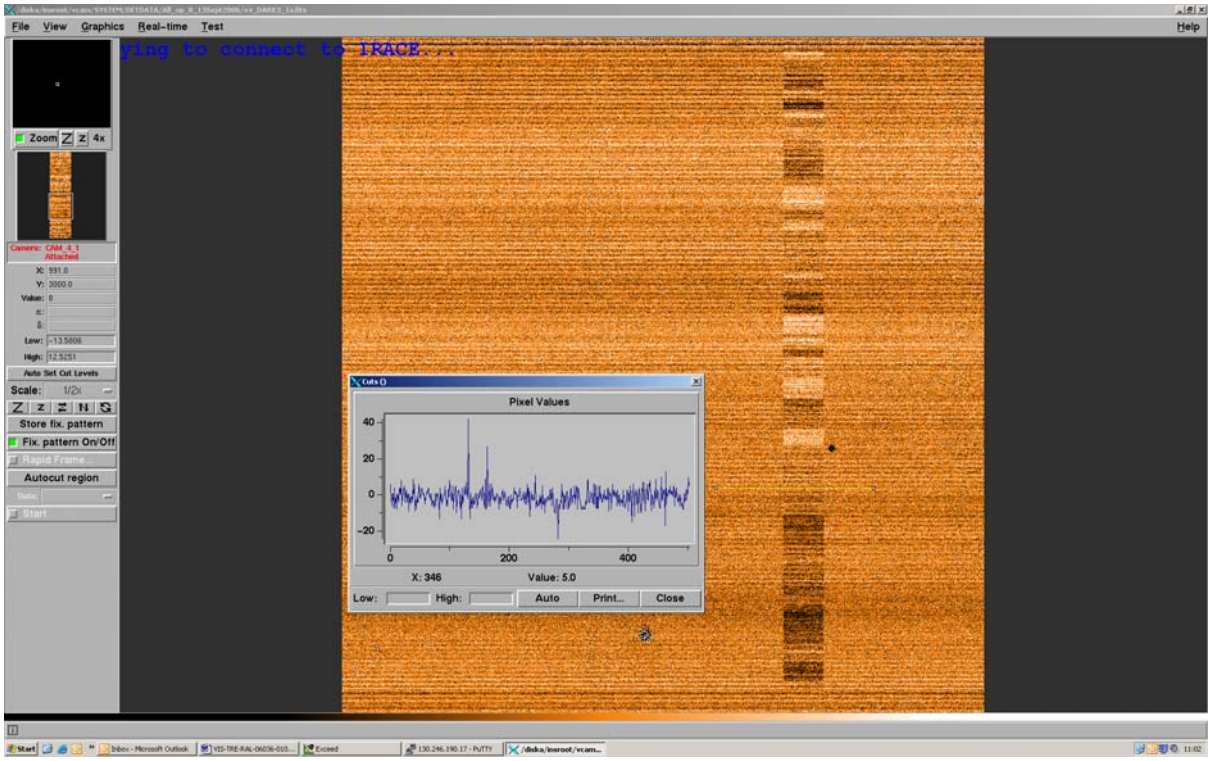

Figure 3 Double correlated 1 sec dark exposure taken on 13 Sept 2006, with 1 sec dark exposure taken on 11 Sept 2006 subtracted from it.

As reported earlier [RD 5] the stripe does not cancel out and is clearly visible in figure 3. A cut through the image, however, shows that there is no detectable difference in the DC level or noise in channel 12, as compared to adjacent channels.

The statistics feature of the IRACE RTD was used to calculate the standard deviation, in 100 x 1500 pixel boxes, for channels 11, 12 and 13 for the images shown in figures 2 and 3.

The statistics results are shown in table 1.

Image	Channel 11 noise standard deviation in a 100 x 1500 box	Channel 12 noise standard deviation in a 100 x 1500 box	Channel 13 noise standard deviation in a 100 x 1500 box
Figure 2	216.0 ADUs	216.0 ADUs	216.0 ADUs
Figure 3	45.6 ADUs	42.4 ADUs	44.7 ADUs

Table 1 Standard deviation measured from the images shown in Fig 2 & 3

Again it is shown there is no significant difference between channel 12 and the adjacent channels.

7 SUMMARY

This report confirms that there is a small ‘stripe’ effect in channel 12 of detector 14 (module #43 in position 4B), as previously pointed out in RD 5 and RD 7.

Further investigation of the images has shown that this is a very small effect, which is not expected to significantly degrade the noise or cosmetic performance of the camera.

8 DISCUSSION AND RECOMMENDATIONS

The FPA AIT Report, RD 7, confirms that the stripe in module #43 (Detector No 14) can be seen and states that this effect will be monitored and investigated further in Paranal, during checkout in the IPR and during commissioning.

The level of the effect has been looked at and while it is relatively easy to see by eye in the images, it is at a level where it is not particularly easy to pick it up in the data.

Four possibilities for the source of the problem have been identified:

a) in the IRACE

b) in the warm cable

c) in the cold electronics

d) on the motherboard of detector #43.

It is only possible to identify the difference between a) or b) and c) or d) when the Camera is cold.

If it is a) or b) it can be easily fixed external to the Camera.

If it is c) or d) it will require removal and disassembly of the keg and swapping of hardware (probably the module itself to a different place on the FPA) followed by second cold cycle to determine whether it is c) or d).

If it is found to be c) it will require further disassembly of the keg to replace a cold PCB and then at least one more cold cycle to confirm a fix.

If the problem turns out to be d) then there is nothing that can be done other than replacing the module.

This has been discussed with the VISTA Project Scientist. Given the very small level of the effect and the potential risk associated with tracking it down on the cold side, the proposal is that the warm-cable tests should be done when the camera is cold in the IPR, but that removal and disassembly of the keg should not be attempted unless or until there is some other vital reason for removing it.

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