

Report on Module Test October 2003 TK Week

Not enough time today for:

- Full US results: Joe's in this meeting
- Discussion on leaky strips: see sensor meeting report
- Marcello's talk on noise behaviour of leaky strips: too deep for a couple of slides shot ! It needs more time
- We have to deal with the problem of SPARES: almost no problem for ARC, but there is some concern for LT

Procedures for Module Testing

- Task force work: the "Procedures for Module Testing Using ARC Systems" are on web since Oct 13th in:
hep.fi.infn.it/CMS/moduletest/tkwoct03/test_procedures.pdf

A screenshot of
ModTest webpage

Module Test Working Group

Last Upd.

LINK to:

[Task Force: New Test Procedures with ARC \(.ps\) \(.pdf\) \(Oct. 2003\)](#)

[Updated Macros and config. files \(from Firenze website\),](#)

[K-MUX "how to" info page from P. Gartung,](#)

[Macros and Results \(July 2003, Torino\);](#)

[Cross Calibration Pages](#)

[Test Results Pages](#) of Laboratories involved in Module Test

Link on Electrometer to be
added soon

Big Effort to Propagate Correct Info

- From module test web page you find also:
 - Official cuts corresponding to new procedures
 - Settings files for ARC to be used with TIB modules (TOB and TEC are default in ARCS)
 - Configuration files to be used with 'task force macros'

Modules bonded in Firenze

Official cuts for modules

A screenshot of Firenze production webpage

ARCS 6.2.1 OFFICIAL Configuration file for TIB modules

Download Tony's macros for ARCS 6.1 and later

Download configuration file for Tony's macros:

- TIB modules
- TOB and TEC modules

Channel Fault Key

Created by Antanix

Users Feedback: More and More (needed...)

- **Absolutely needed:** feedback from users to spot possible problems (again!!). Developers (both ARC and LT) need **you** fully use sw and study in detail all features to make fast progress. **Beta testers** (Lino, Patrick, Cristiano etc.) cannot give the 'full picture'
- Satisfactory on ARC, and sw team reacts fast
- LT team is doing the same, but feedback from users must increase

Operations Sequence 1-3

Extracted from New Procedures (ARC)

'with safety features'

A.0.1 First step: module arrival

First of all, perform optical inspection; then, with hybrid + PA cuts, perform:

- a complete FAST TEST;
- a subset of ALL TEST: pedestal, noise, pulse shape, pipeline.

Save data!

A.0.2 Second step: HV bonding

Bond all needed HV connections, then perform, again with hybrid + PA cuts:

- an IV curve;
- a complete FAST TEST;
- a subset of ALL TEST: pedestal, noise, pulse shape, pipeline.

Save data!

A.0.3 Third step: strip to PA bonding

Bond sensor to PA then, using full module (1 or 2 sensors) cuts:

- perform an IV curve;
- set bias at 400 V;
- perform a complete FAST TEST;
- perform a subset of ALL TEST: pedestal, noise, pulse shape, pipeline, led, pinhole (for this test set HV current limit to 400 μ A).

1' waiting @450V
after each IV

Save data!

Operations Sequence 4-5

A.0.4 Fourth step: passive cooling

The module must be cooled down to -20 °C (with no readout) and then back to room temperature. Then, using full module (1 or 2 sensors) cuts:

- perform an IV curve;
- set bias at 400 V;
- perform a complete FAST TEST;
- perform a subset of ALL TEST: pedestal, noise, pulse shape, pipeline, led, pinhole (for this test set HV current limit to 400 μ A).

Save data!

A.0.5 Fifth step: database

Data taken after passive cooling must be written into the database. The xml is produced using the xml parser included in ARCS, taking the appropriate record from the ROOT file. All the data must be kept also in local files for future reference, and made accessible from the web.

See local files storage example in Firenze in <http://hep.fi.infn.it/CMS/marchett/production/production.html>

Utmost importance !

On Module Grading

Quoting from Procedures:

Module grading as of now is fairly simple.

- A module is Grade A if the module has less than 1% bad channels (a channel with any testing failing in any mode).
- A module is Grade B if the module has 1–2% bad channels.

In both cases the module's IV test has to pass selection.

Otherwise it will be marked as suspicious (grade C).

- Any module with more the 2% bad channels is grade F.

Do not discard modules at this stage!
Put them aside and store carefully: they can be recovered in the future (or even needed...)

Unbond/Bond to G.R. Leaky strips?

Do we Find Module Anomalies?

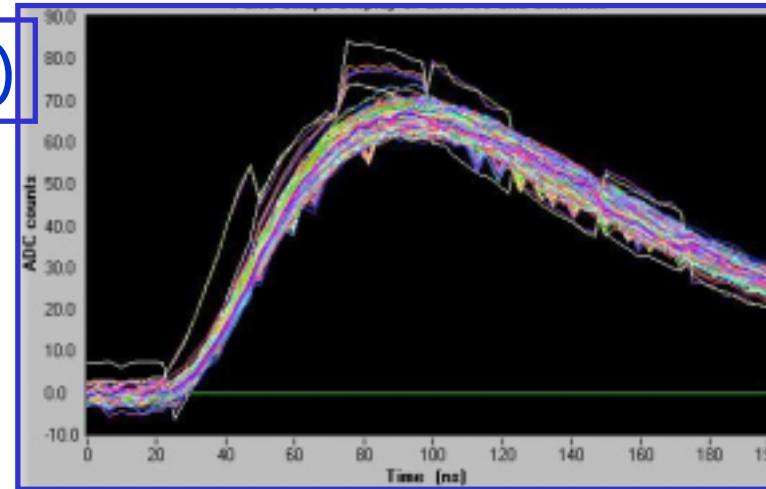
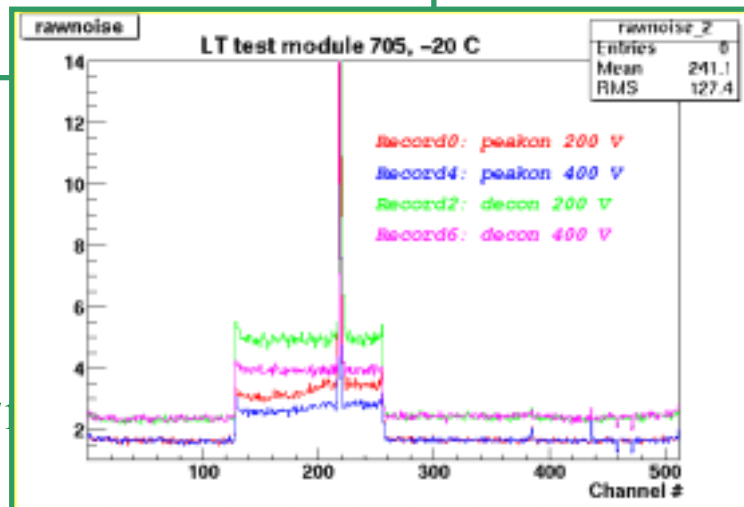
- Using the HW & SW & Procedures the answer is **YES!**

A few examples:

Cracks on Kapton cables found during testing in both gantry and bonding centres

Pipeline problems (US, Aachen etc)

High leakage strips (seen first by common mode behaviour)



LT new functionality (Wim Beaumont)

- F-MUX integration
- Root file compatible with ARC system
- DCU -id readout

ps:

The developments are done on RedHat 7.2 but up to now no problems are reported for RedHat 7.3 (used at CERN) .

Carefully read and follow Wim's instructions !

LT status and next steps (Wim Beaumont)

- beta version is under test in Torino and USBC.
- missing save of information in one record.
- waiting for definitive data base tables before going to production data base.
 - To be fixed after this meeting (additional meeting)
 - implementation this week.
- release of version It_1_20

Meeting held, results already presented at DB, and on web in

<http://www-ekp.physik.uni-karlsruhe.de/~zhukov/Cms/database.html>

- After this tuning of the threshold levels (TIB, TEC 1 module, 2 modules , TOB == TEC?) .
- IF levels change, eventual rerun the root file and download the new results again to the data base ?

Tests done so far (with the complete system)

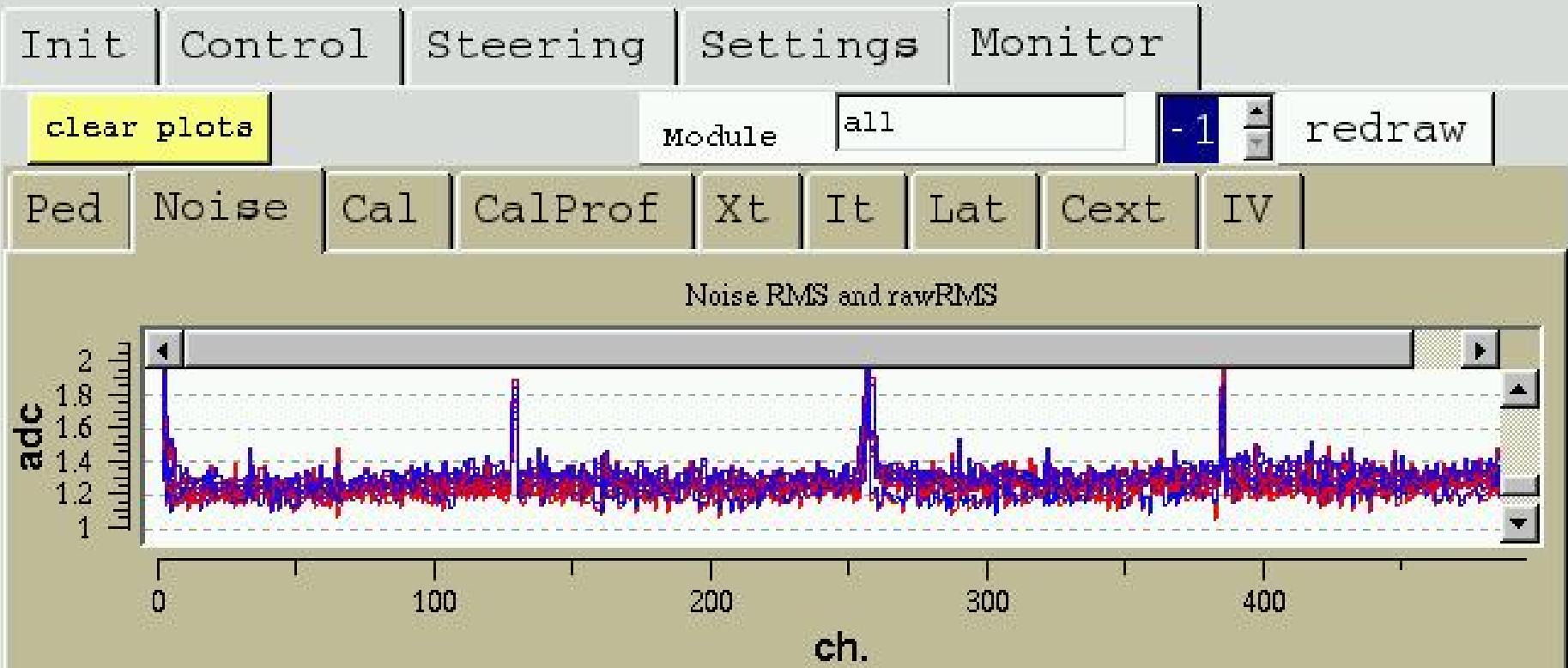
...with Lt_1_15 software version

- 1) **1.5 days with 4 modules** (with old hybrids)
3 cycles from 23C to -5C, RH=10-30%
Bias=0V, 200V, 400V

- 2) **2.7 days with 6 modules** (2 old, 4 new hybrids)
5 cycles from 23C to -5C, RH < 2%
Bias=0V, 400V

Noise

LT in Torino, Lino Demaria



Huge noise at edges

CM noise with Peak InvOff = 0.6 ADC

Known problem → grounding needs optimisation,
but no influence from K-MUX

Init | Control | Steering | Settings

clear plots

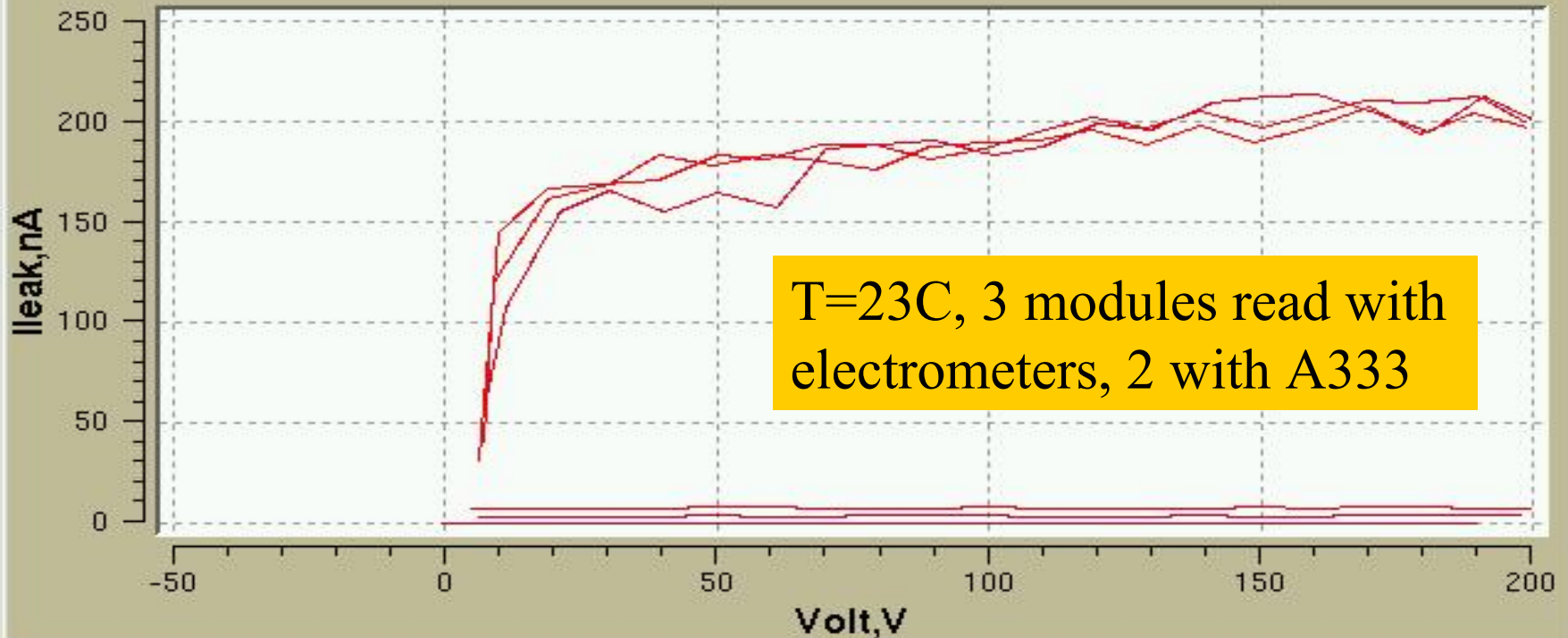
Module all

-1

redraw

Ped | Noise | Cal | CalProf | Xt | It | Lat | Cext | IV

IV



elapsed time

QUIT

99999

```

.....start initialization, please wait.....
Time:39 .....Construct Setup.....
Time:59 demanded PedRun

```



Test with ARC after Lt:

ALL modules perfectly fine:

no change in IV

no pinholes

no new bad channels

ARC v621 readout

Temperature Measurement in
Firenze, Riccardo Ranieri

- Readout of the DCU with ARC system
 - version 6.2.1
 - directory **Environment** of the Root output file
 - output of the DCU 12-bit ADC from:
 - Sensor thermistor read through the DCU: **TempSenNtc1DCU**
 - Hybrid thermistor read by DCU only: **TempHybNtc**
 - » (for the moment stored with the name **TempHybDCU**, to be fixed)

ARC

- conversion $ADC^{out} \rightarrow V_{in} \rightarrow R_x = V_{in} / \langle I \rangle \rightarrow T_x = T(R_x)$
 - measurement of Sensor and Hybrid Temperatures with DCU NTC thermistors
 - error propagation

Sensor Temperature

Temperature Measurement in Firenze, Riccardo Ranieri

ADC ^{out} [ch]	$T_x^{Sen} \pm \Delta T_x^{Sen}$ [°C]	T _{ref} [°C]	$T_x^{Sen} - T_{ref}$ [°C]
445	23.8±0.6	24.6	-0.8
568	17.6±0.6	18.6	-1.0
845	8.0±0.6	9.1	-1.1
1107	1.9±0.6	3.5	-1.6
1552	-5.5±0.6	-5.0	-0.5
2026	-11.0±0.6	-10.9	-0.4
2802	-17.4±0.6	-17.8	+0.4

Good agreement between the two measurements:

1. DCU NTC (T_x^{Sen})
2. Vienna Box T probes (T_{ref})

$V_{in} = 0.9 \text{ V}$

$V_{in} = 1.3 \text{ V}$

- ARC system turned on for only 1 minute
 - to minimize effects on Sensor Temperature

Temperature Measurement in Firenze, Riccardo Ranieri

- Using ARC system and DCU NTC+ADC
Temperature measurements on Hybrid and
Sensors are made with 0.5°C uncertainty
 - we can better compensate the Silicon current changes with a more accurate rescaling of $I(T)$

Update on Module Test Pisa Client

R.Dell'Orso – INFN Pisa

- **Pisa Client**
 - It is NOT an alternative to LT software
 - A useful debugging tool: example TRHX client
 - Data Base link: stable version released
 - New developments: interface to XDAQ
 - Ask roberto.dellorso@pi.infn.it for info
- **Little Browser (by Daniel Sentenac)**
 - A summary page browser for Lyon DB

<http://cms.pi.infn.it:8088/DB/trkdb.html>