

ADB Tester

ADB Tester

Short technical data of the ADB from the testing point of view

32 single ended current inputs from MDT wires (J1, 64-pin socket).

32 Balanced logical current outputs to MDC for digitizing (J2, 80-pin socket).

ADB requires power supply of +5V and -5V (J3, 4-pin socket).

Four 8-channel amplifier ICs and four 8-channel discriminator ICs on one ADB.

Common to all channels built-in facilities

Digital Test Pulse Input that defines the duration of the test pulse.

Analog Test Pulse Level that defines the current amplitude of the test pulse.

Analog Threshold Level that defines the threshold for all discriminators.

Auxiliary circuits

Digital output +5/-5V Power OK.

On-board voltage regulator +5V to +1V to supply pull-up resistors at the output of the discriminators.

On-board voltage regulator to supply default bias for Test Pulse Level and Threshold inputs.

Power circuits including fuses, C-L-C filters and LED voltage indicators for +5V and -5V.

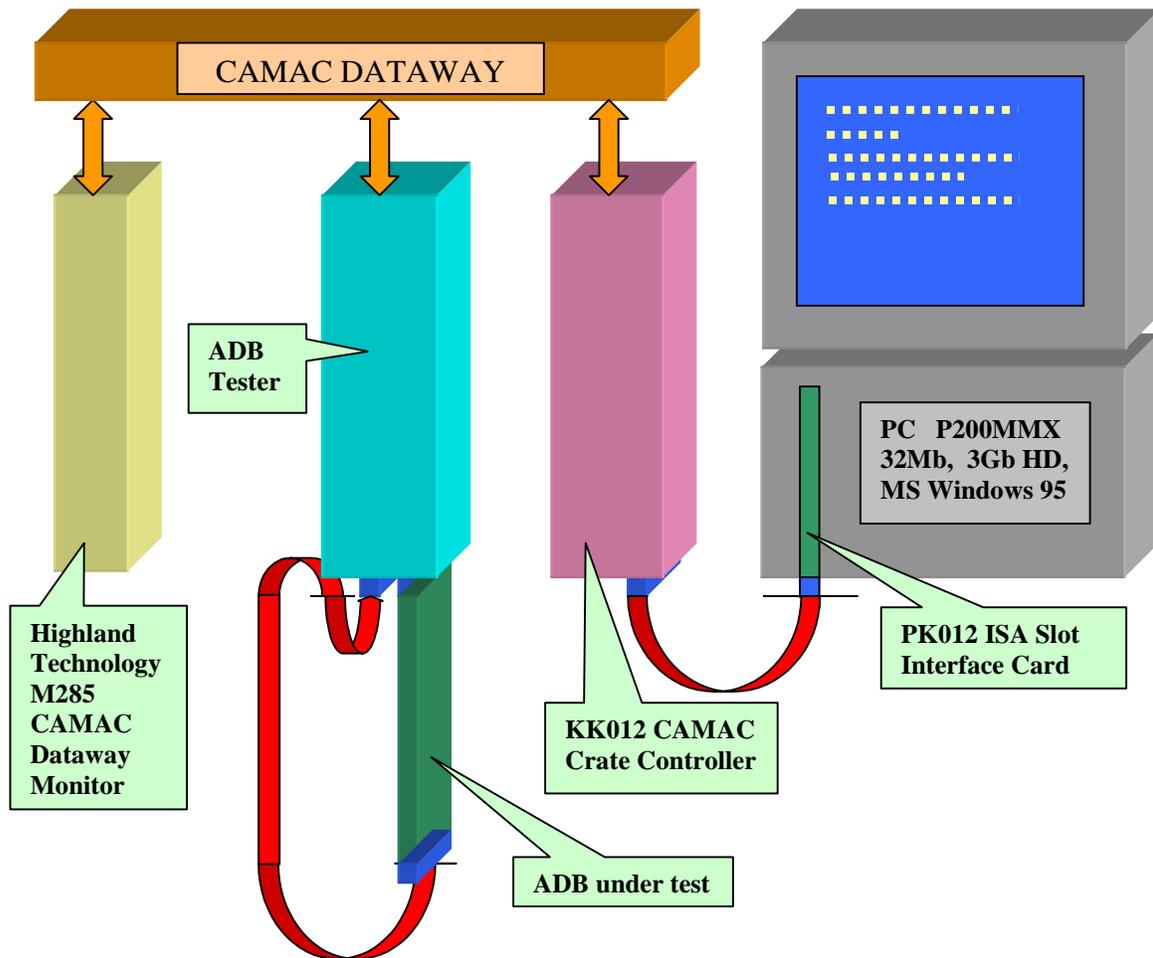
ADB Tester

Requirements to the tester

- 1. The tester must provide a design for fast, easy, reliable and safe mounting of the ADB on the tester itself.**
- 2. The tester must be on-line with a computer to provide execution of test procedures allowing user-friendly interface, archiving and statistics tasks.**
- 3. The general test procedure consists of setting a current pulse for every channel by means of tester DACs, setting the ADB threshold level, generating test pulse and reading output pattern from discriminators.**
- 4. The tester must inject test currents to every ADB input in the range of 0..22 μ A.**
- 5. The tester must accept output signals of the discriminators and latch them in a register.**
- 6. The tester must provide the check for all embedded ADB test features i.e. Test Pulse, Test Pulse Level and Threshold inputs and Power OK output.**

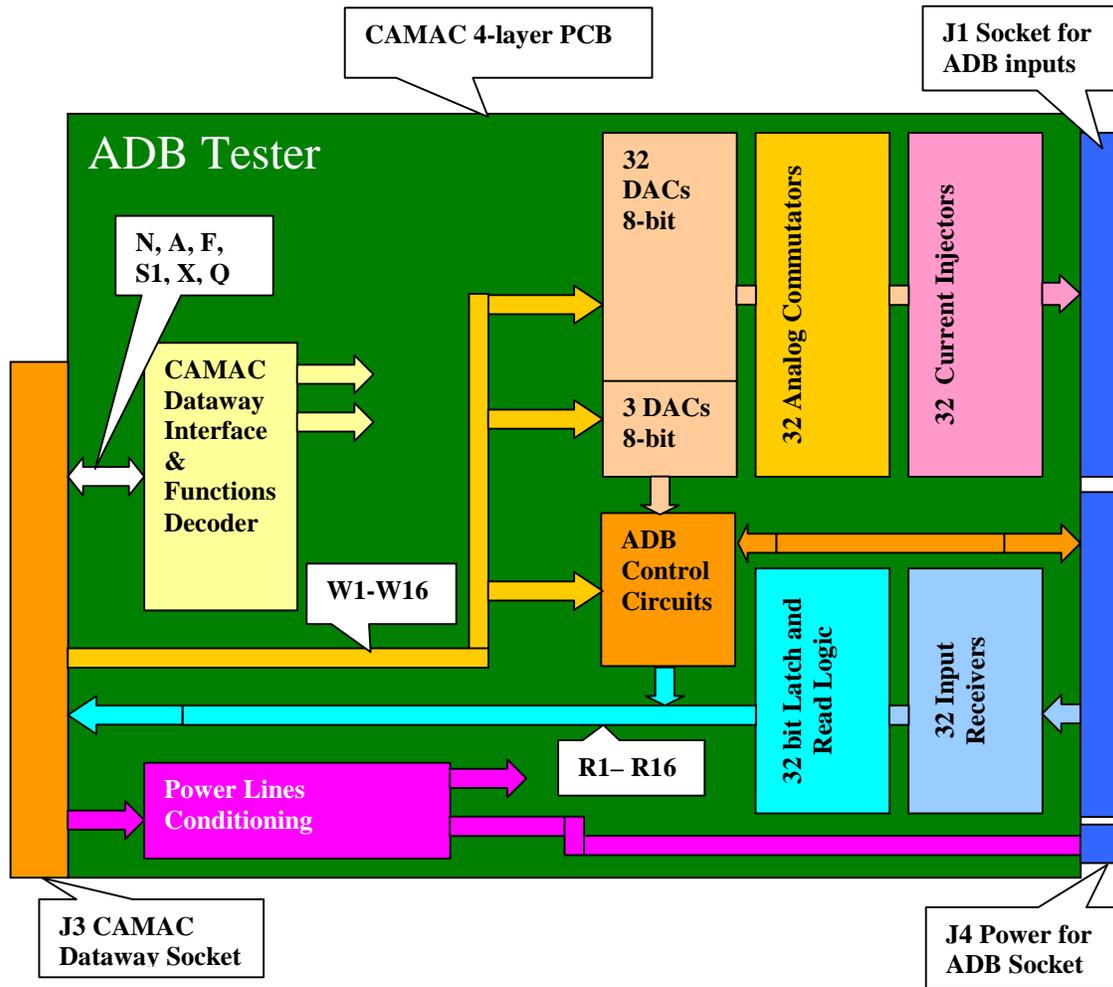
ADB Tester

Block diagram of the ADB test system



ADB Tester

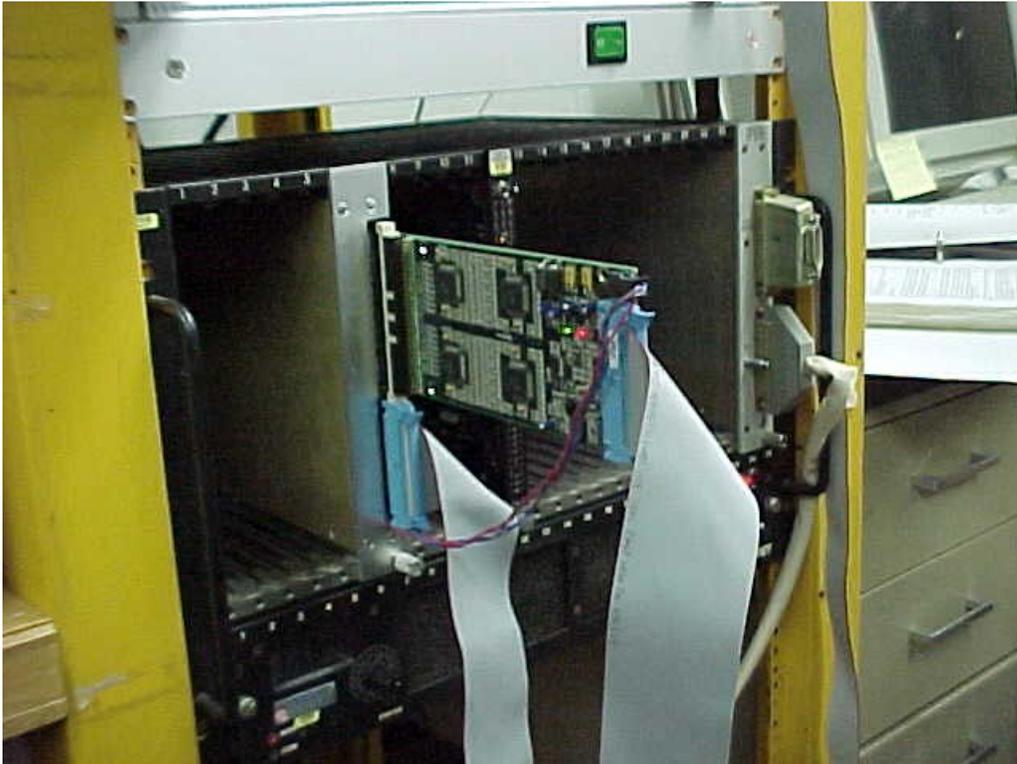
Block diagram of the ADB tester



Current pulse amplitude may be changed by $0.086 \mu\text{A}$
Threshold may be changed by $0.046 \mu\text{A}$

ADB Tester

ADB Tester in use



General view of the ADB test system

ADB Tester

TADB executes the following CAMAC Functions

F(16)A(0)S1	Write Data/Control word	Q=1, X=1
F(0)A(0)	Read Ch1-Ch16 ADB Discr.	Q=1, X=1
F(0)A(1)	Read Ch17-Ch32 ADB Discr.	Q=1, X=1
F(0)A2)	Read STATUS word	Q=1, X=1

Write Data/Control Word Format

Not Used	Chip Selection and Control Bits	Internal DAC selection	Data
15 14 13 12 11	10 09 08	07 06 05 04 03 02 01 00	
1. Write to DAC from group of 0-7			
X	0	Internal DAC #	DAC Amplitude, 256 steps
2. Write to DAC from group of 8-15			
X	1	Internal DAC #	DAC Amplitude, 256 steps
3. Write to DAC from group of 16-23			
X	2	Internal DAC #	DAC Amplitude, 256 steps
4. Write to DAC from group of 24-31			
X	3	Internal DAC #	DAC Amplitude, 256 steps
5. Write to DAC from group of 32-34			
X	4	Internal DAC #	DAC Amplitude, 256 steps
6. Start measurement with current pulses from the tester			
X	6	X	X
7. Start measurement with built-in internal current pulses			
X	7	X	X

Read Data/Status Word Format

15 14 13 12 11	10 09 08 07 06 05 04 03 02 01 00	
1. F(0)A(0) - Read the state of ADB discriminators 1-16		
16 15 14 13 12 11 10 09 08 07 06 05 04 03 02 01		
2. F(0)A(1) – Read the state of ADB discriminators 17-32		
32 31 30 29 28 27 26 25 24 23 22 21 20 19 18 17		
3. F(0)A(2) – Read the ADB and tester STATUS Word		
X X X X X X X X X X X X X X	+5	ok

ADB Tester

Design of the tester for ADB

The tester is designed as a double width CAMAC module with one 4-layer PCB assembled with SMD components and sockets.

On the front panel there are following parts.

Socket J1 for supplying test input currents (the ADB is inserted into J1).

Socket J2 for acquisition of discriminators' outputs connected to ADB J2 socket by the 80 wires flat cable.

Socket J3 for ADB power lines.

ADB Tester

Test procedures for ADB

- 1. Inject all 32 fixed current pulses at fixed threshold using ADB embedded feature, then read the pattern. Repeat 32 times.**
- 2. Inject fixed current at fixed threshold sequentially into every channel, then read the pattern (test of running 1's). Repeat for every channel.**
- 3. Measure uniformity of thresholds. Rise current pulse amplitude for selected channel at fixed threshold until ADB discriminator of this channel will respond with 1 (**A-mode**). Repeat 256 times for every channel and record the patterns. Compute mean amplitude value and RMS for every channel.**
- 4. Measure uniformity of thresholds. Rise threshold at fixed current pulse amplitude for selected channel until ADB discriminator will respond with 0 (**T-mode**). Repeat 256 times for every channel and record the patterns. Compute mean threshold value and RMS for every channel.**
- 5. Observe crosstalks at normal threshold and with big injected currents.**
- 6. Measure +5V current, evaluate -5V current, check Power OK bit.**

Implementation

- 1. MS Visual Basic 6.0 for user interface and data visualization**

ADB Tester

ADB Tester software package

Tadbwin.exe Main program

- ◆ user's graphic interface
- ◆ data visualization
- ◆ main menu
- ◆ sets parameters, writes to Tadb.ini
- ◆ calls CAMAC crate controller test
- ◆ calls Tadb.exe in two modes:
 - interactive ADB debug mode
 - full ADB acceptance test (confidence test)

Ftkk012.exe CAMAC crate controller test

Tadb.exe ADB Test program

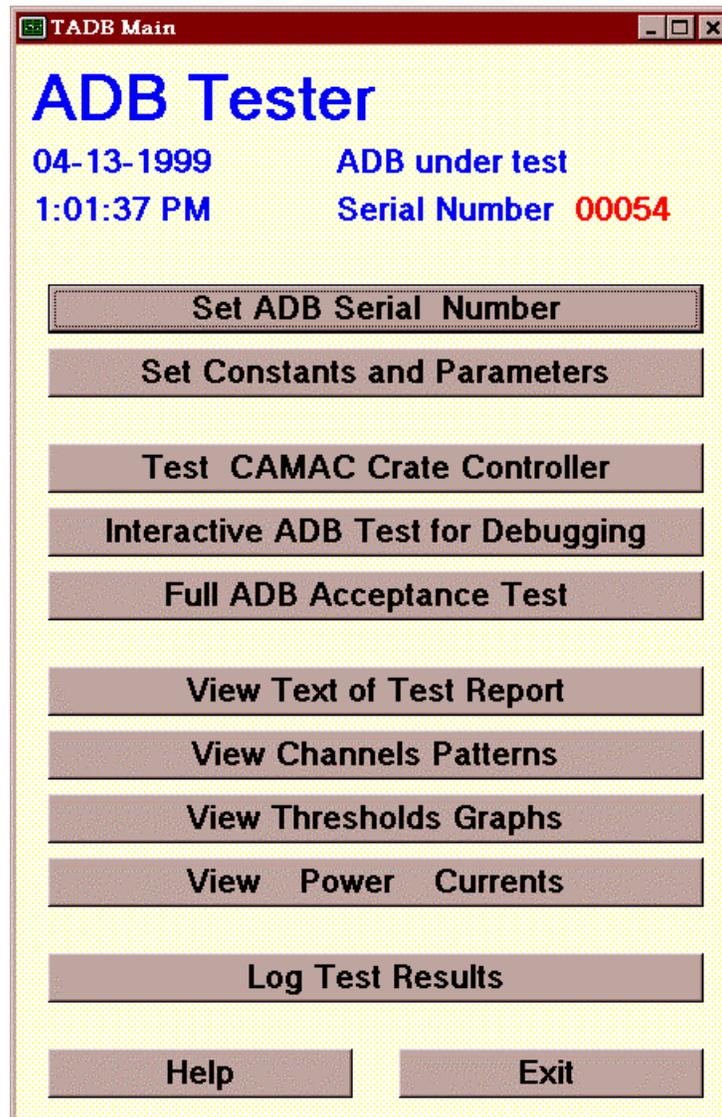
- ◆ reads from command line ADB number and mode
- ◆ reads initialization and calibration files
- ◆ executes ADB test
- ◆ produces file report

Tadb.ini Initialization file for Tadb.exe

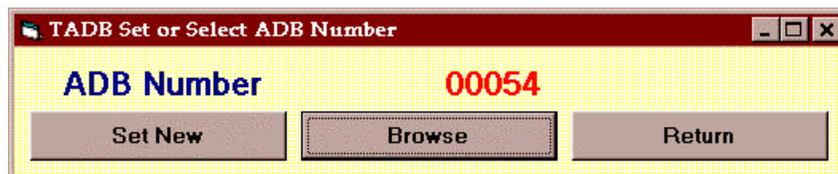
Tadb.cal Calibration file for Tadb.exe

T00000.adb T65535.adb test report files

ADB Tester



The main menu of the TADB program



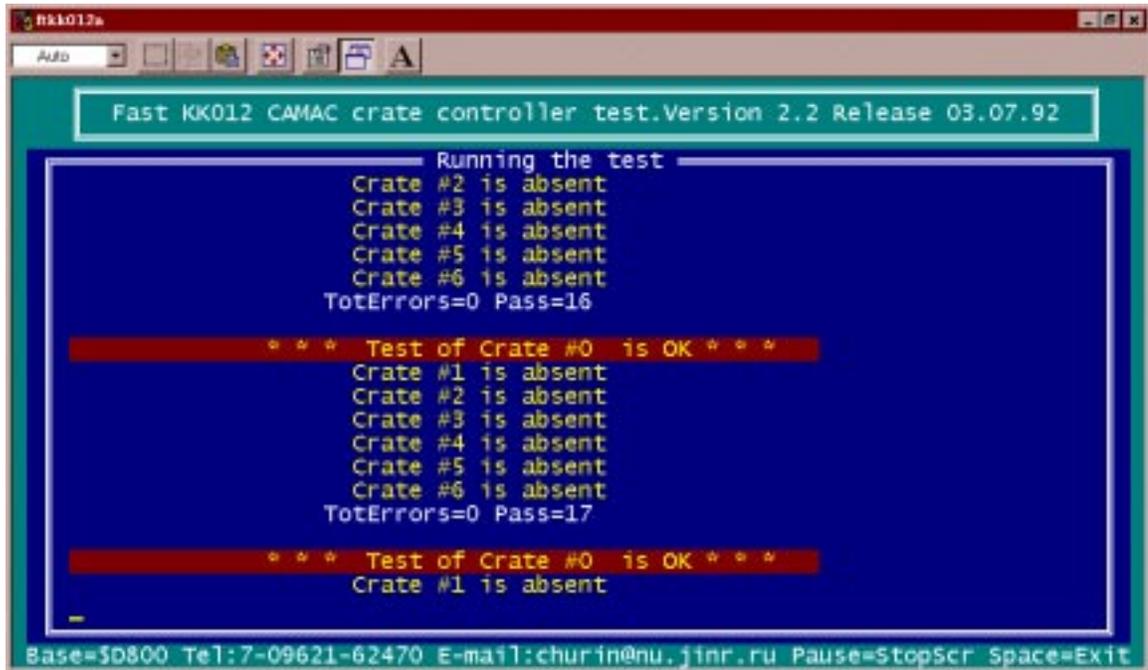
Set or select ADB number Menu

ADB Tester

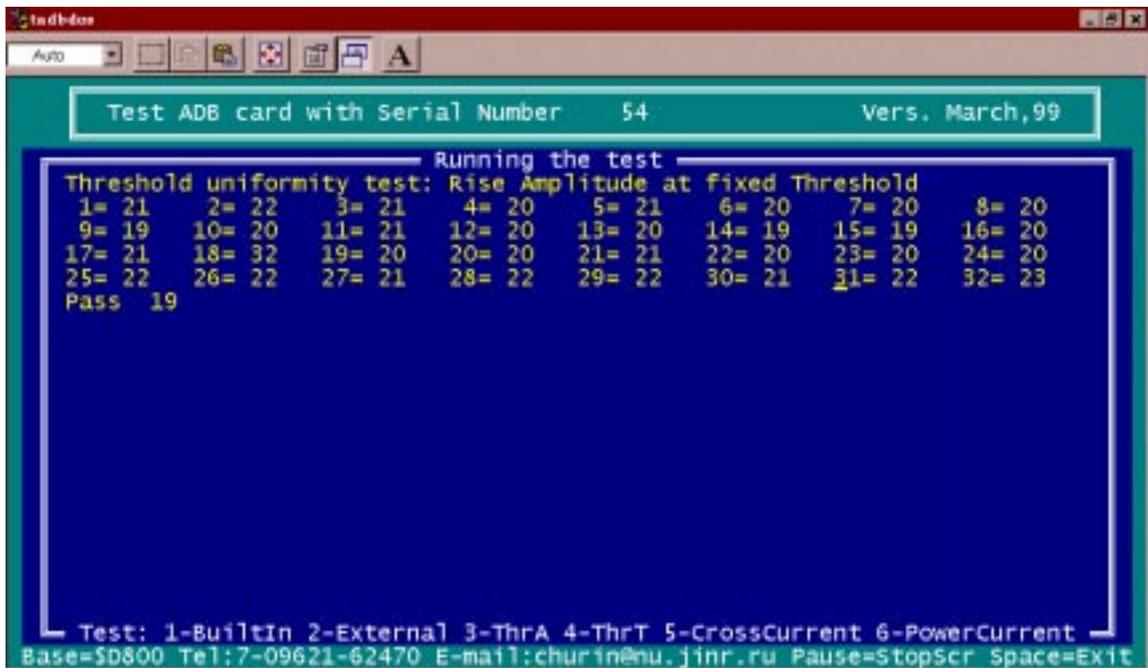
TADB Set Tests Parameters			
Test 1: Inject all 32 fixed currents at fixed threshold using ADB embedded test feature	Threshold	(μ A)	1.0
	Amplitude	(μ A)	3.0
Test 2: Inject fixed current at fixed threshold sequentially into every channel (Running '1')	Threshold	(μ A)	1.0
	Amplitude	(μ A)	3.0
Test 3: Measure uniformity of thresholds. Rise amplitude at fixed threshold until ADB discriminator will give 1 (A-Mode)	Threshold	(μ A)	2.0
	Amplitude MIN	(μ A)	1.0
	Amplitude MAX	(μ A)	5.0
Test 4: Measure uniformity of thresholds. Rise threshold at fixed amplitude until ADB discriminator will give 0. (T-Mode)	Threshold MIN	(μ A)	1.0
	Threshold MAX	(μ A)	5.0
	Amplitude	(μ A)	2.0
Test 5: Observe Cross Currents at normal threshold with big injected currents	Threshold	(μ A)	1.0
	Amplitude	(μ A)	22.0
Set Base CAMAC Address as selected in KK012 switch and TADB Station Number in Crate	Base CAMAC Address		D800
	TADB Station Number		19
Select or enter the name of operator and location of workshop	Operators Name		Tokmenin
	Location Name		D0-DAB FN

Set or select test parameters

ADB Tester

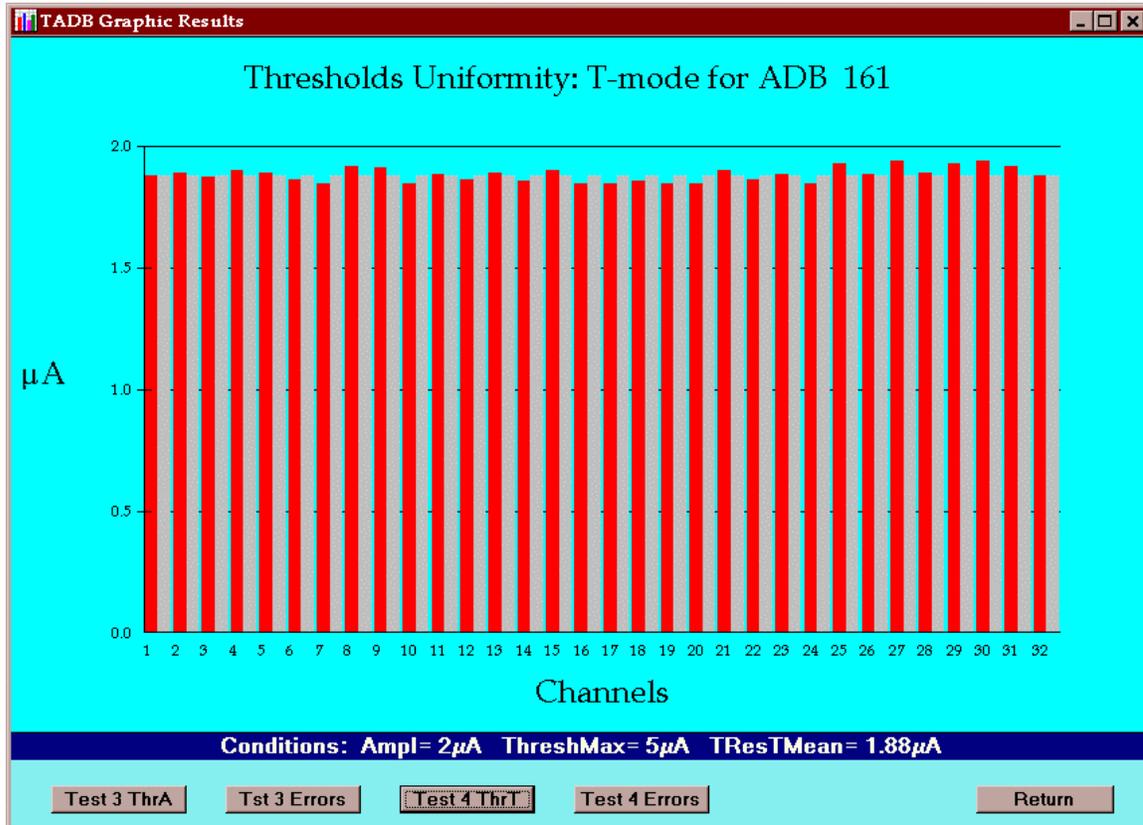


Test CAMAC Crate Controller Window



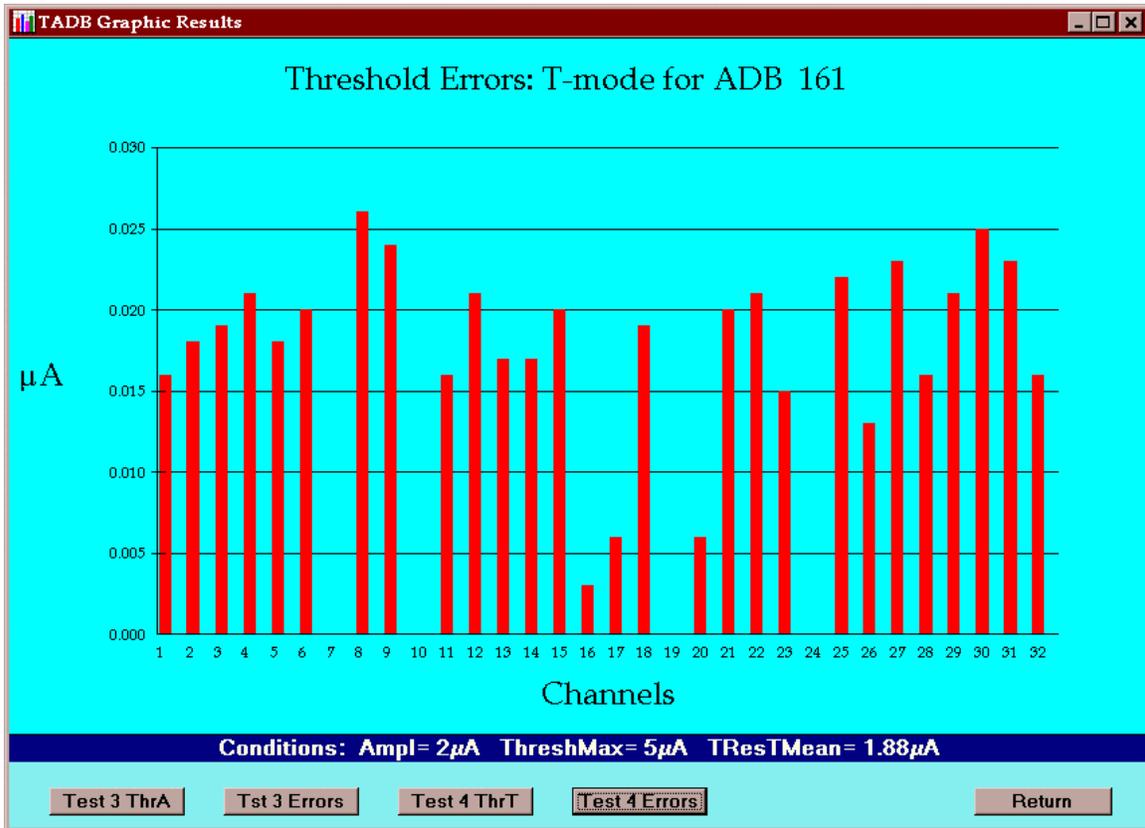
Running the test

ADB Tester



View thresholds graphs window

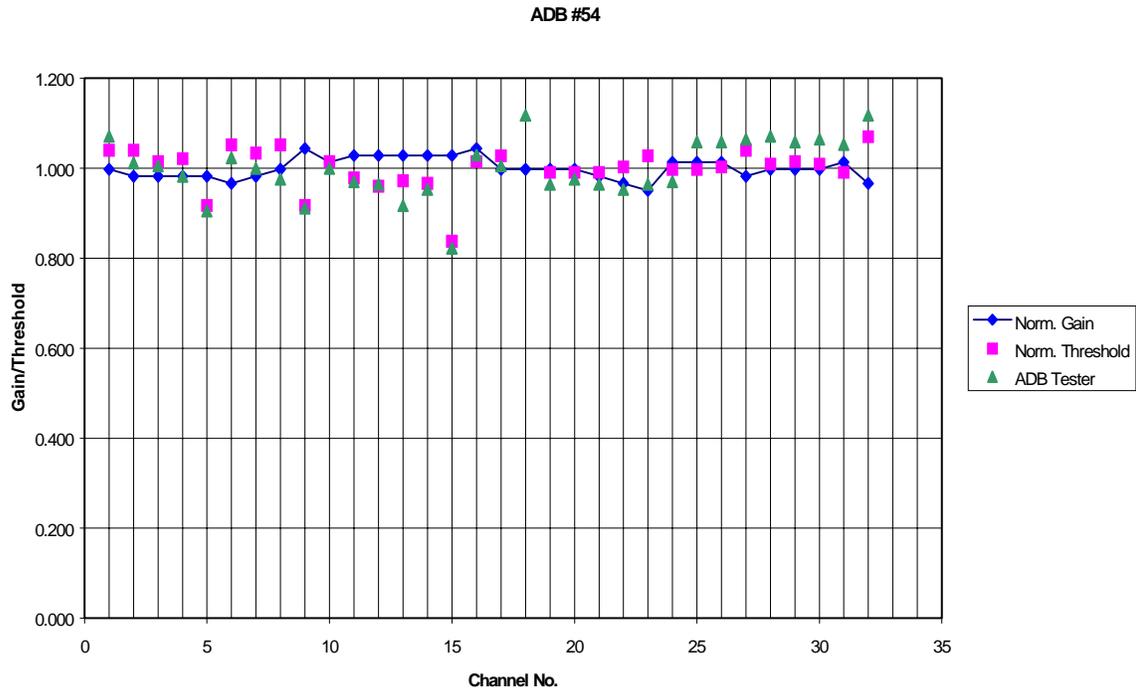
ADB Tester



Plot of RMS for ADB channels

ADB Tester

Comparison of results



Measured manually with HP8130 Pulse Generator and Tektronix TDS744A Digitizing oscilloscope	
Blue diamonds	Normalized gain of the amplifier
Pink squares	Normalized threshold

Measured automatically by ADB Tester	
Green triangles	Normalized thresholds