Pavement Instrumentation and Data Acquisition

LTRC's Pavement Research Facility

Port Allen, LA

Centerpiece of Data Acquisition

MEGADAC 3000 Series
Up to 25,000 Samples/Second

- ☑ 256 Megabytes of On-Board Memory
- ☑ Memory Expandable to 1 Gigabyte
- ☑ Field Expandable to 512 Input Channels
- ☑ Alarm Settings on Every Channel
- ☑ User Defined Sample Rates
- ☑ Intelligent Data Triggering
- ☑ System Gain 1:1 to 4000:1
- ☑ Autobalance Sensor Offsets
- ☑ IEEE-488 and Serial Communications
- ☑ Internal or External Synchronization

Megadac 3415AC

OPTIM Electronics

MEGADAC Features:
Data Acquisition Hardware Solutions

The MEGADAC family of high performance, extremely high reliability data acquisition and signal conditioning equipment has been designed to meet demanding applications in the automotive, aerospace and structural testing communities. With its modular design and programmable input and output modules, the MEGADAC is field expandable to 512 channels and offers 1 Gigabyte of on-board memory. MEGADAC's are available in desk-top, rack-mount and portable DC configurations for measuring both active and passive transducers.

Modules

AD 694SH

. 4 Input Channels

. 4 Independent Analog Output Channels

. Integrated Voltage Excitation, and Signal Conditioning

.± 10 Volts Full Scale (Input & Output)

.(Up to ± 210 Volts)

. Computer Controlled: Gains from 1 to 4000,

Sensor Excitation Programmable 8-pole Filter

VCAL & Shunt CAL

Auto Balance & Auto Zero

. Increased Balance Range

. Remote Sense for Excitation

. Full Differential Inputs

. Simultaneous Sample & Hold

. Unipolar Excitation

. Input Protection

. D-Subminiature (37) Pin Connector Kit

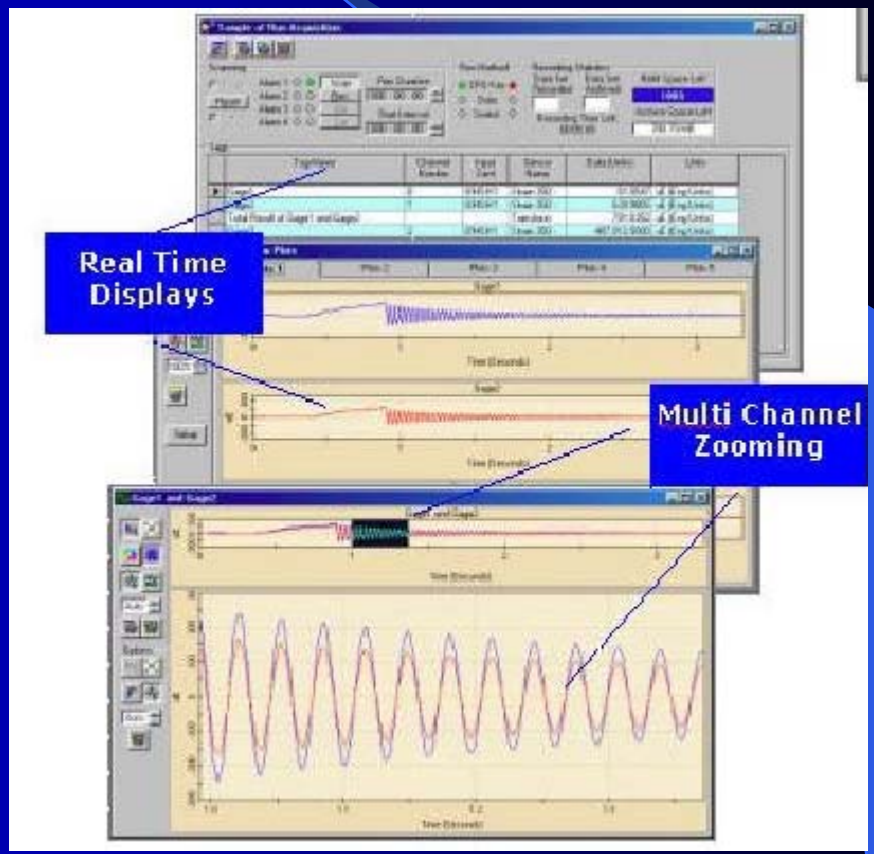
Data Acquisition Software

TEST CONTROL SOFTWARE (TCS)

- Optim's Test Control Software (TCS) operates on Windows. 95/98/NT platforms. A true 32-bit application,
- TCS is designed to take full advantage of today's most powerful desktops, notebooks and computer workstations.
- No programming skills are necessary, since TCS is a fully integrated package simplifying the entire process of defining
- MEGADAC test setups and converting results into valid information.

Easy Set-up & Measurement

In addition to user defined sample rates, TCS and the MEGADAC provide various methods to satisfy recording criteria. Recording can be initiated via timers, by an operator, through a remote switch, or with intelligent triggers where data values exceeding thresholds automatically initiate recording.



Test Definition

Tag Name
Min/Max Range

TCS for Windows - D:\Exp II Data\Lane 1 @ 750K OCT 31 2000.tcs - [Tag & Channel Definitions]

File Options Information Define Test Check Test Validity Run & Review Test Window Help

Tags & Channels

Tag Identification				Input Information				
Tag Name			Desc	Channel	Input Card	Sensor		
Max Full Scale	Min Full Scale	Resolution	Unit	C-Gain	P-Gain	Cal Type	Cal Target	Balance
Embankment Pressure Cell				18	684SH1	Embankment (44915)		
128.424 psi	-124.500 psi	~0.00385938 psi	psi	80	1	RCal	0.00000 psi	Yes
Stone Pressure Cell				17	684SH1	Base Pressure Cell (44918)		
128.571 psi	-125.648 psi	~0.00387914 psi	psi	80	1	RCal	0.00000 psi	Yes
Black Base Pressure Cell				16	684SH1	Black Base(44914)		
129.002 psi	-125.151 psi	~0.00387813 psi	psi	80	1	RCal	0.00000 psi	Yes
Black Base Right				20	684SH1	Black Base H-Bar (KZ8574)		
2,559.92 uE	-2,560.00 uE	0.0781250 uE	uE	200	1	RCal	-435.974 uE	Yes
Stone Left				21	684SH1	Base H-Bar (KZ8578)		
2,559.92 uE	-2,560.00 uE	0.0781250 uE	uE	200	1	RCal	-435.974 uE	Yes
Black Base Left				22	684SH1	Black Base H-Bar (KZ8575)		
2,559.92 uE	-2,560.00 uE	0.0781250 uE	uE	200	1	RCal	-435.974 uE	Yes
Stone Right				23	684SH1	Base H-Bar (KZ8577)		
2,559.92 uE	-2,560.00 uE	0.0781250 uE	uE	200	1	RCal	-435.974 uE	Yes

Engineering Units

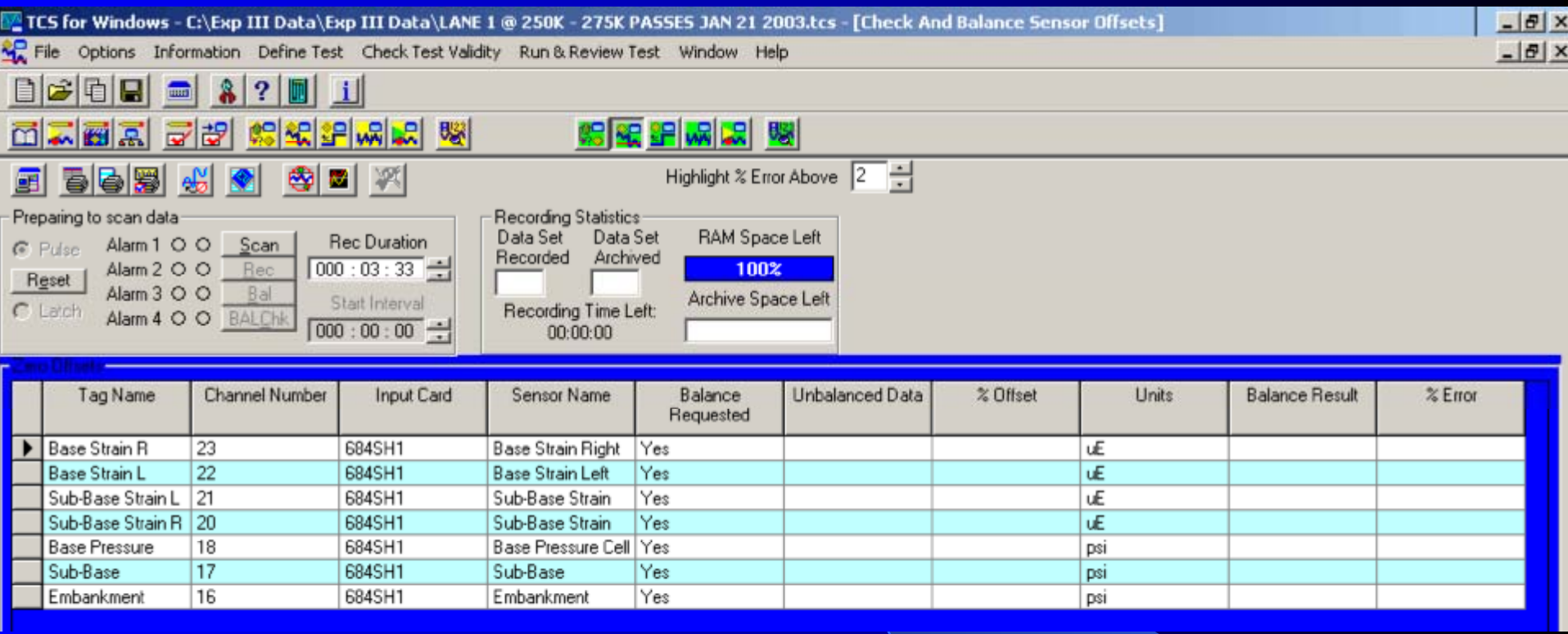
Gain & Chnl

Sensor Calibration

Input Information | Pseudo | Digital | Start Triggers | Stop Triggers | MEGADAC Alarms | Outputs | Display Preferences

4/3/2003 9:25 PM INS CAPS NUM

Data Collection



Tag Name	Channel Number	Input Card	Sensor Name	Balance Requested	Unbalanced Data	% Offset	Units	Balance Result	% Error
Base Strain R	23	684SH1	Base Strain Right	Yes			uE		
Base Strain L	22	684SH1	Base Strain Left	Yes			uE		
Sub-Base Strain L	21	684SH1	Sub-Base Strain	Yes			uE		
Sub-Base Strain R	20	684SH1	Sub-Base Strain	Yes			uE		
Base Pressure	18	684SH1	Base Pressure Cell	Yes			psi		
Sub-Base	17	684SH1	Sub-Base	Yes			psi		
Embankment	16	684SH1	Embankment	Yes			psi		

TCS provides sensor libraries to simplify the entire process of converting digital and analog voltage signals into engineering unit terminology. Sensors can be categorized based on measurement types, ranges, manufacturers or capabilities.

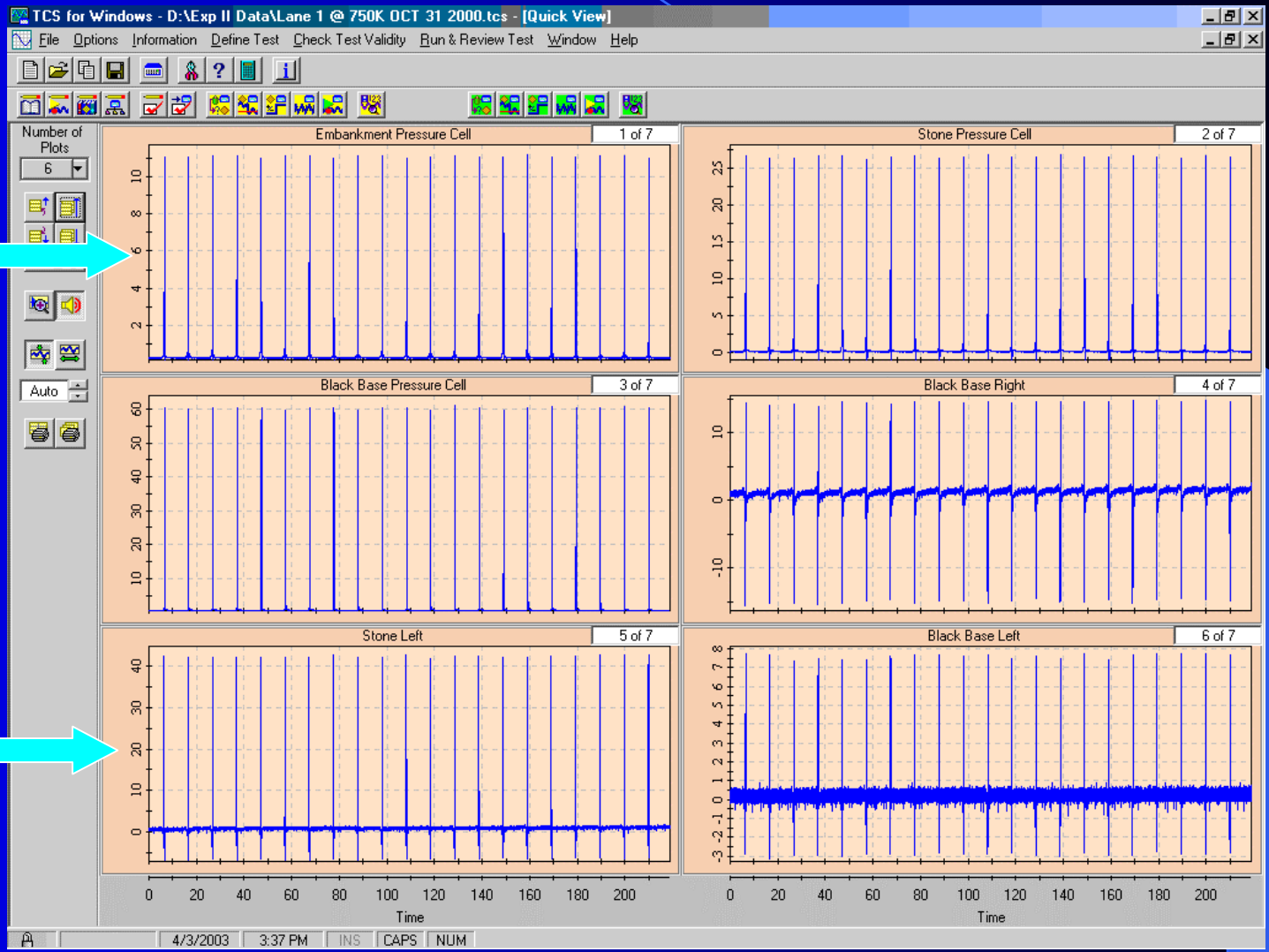
Gauge Layout

- Base Course
  - Tokyo Sokki KM 5000 Embedment Strain Gauge
- Subbase
  - Tokyo Sokki KM 5000 Embedment Strain Gauge
  - Geokon Model 3500 Earth Pressure Cell
- Embankment
  - Geokon Model 3500 Earth Pressure Cell

Data As Collected

Pressure Cells

Strain Gauges

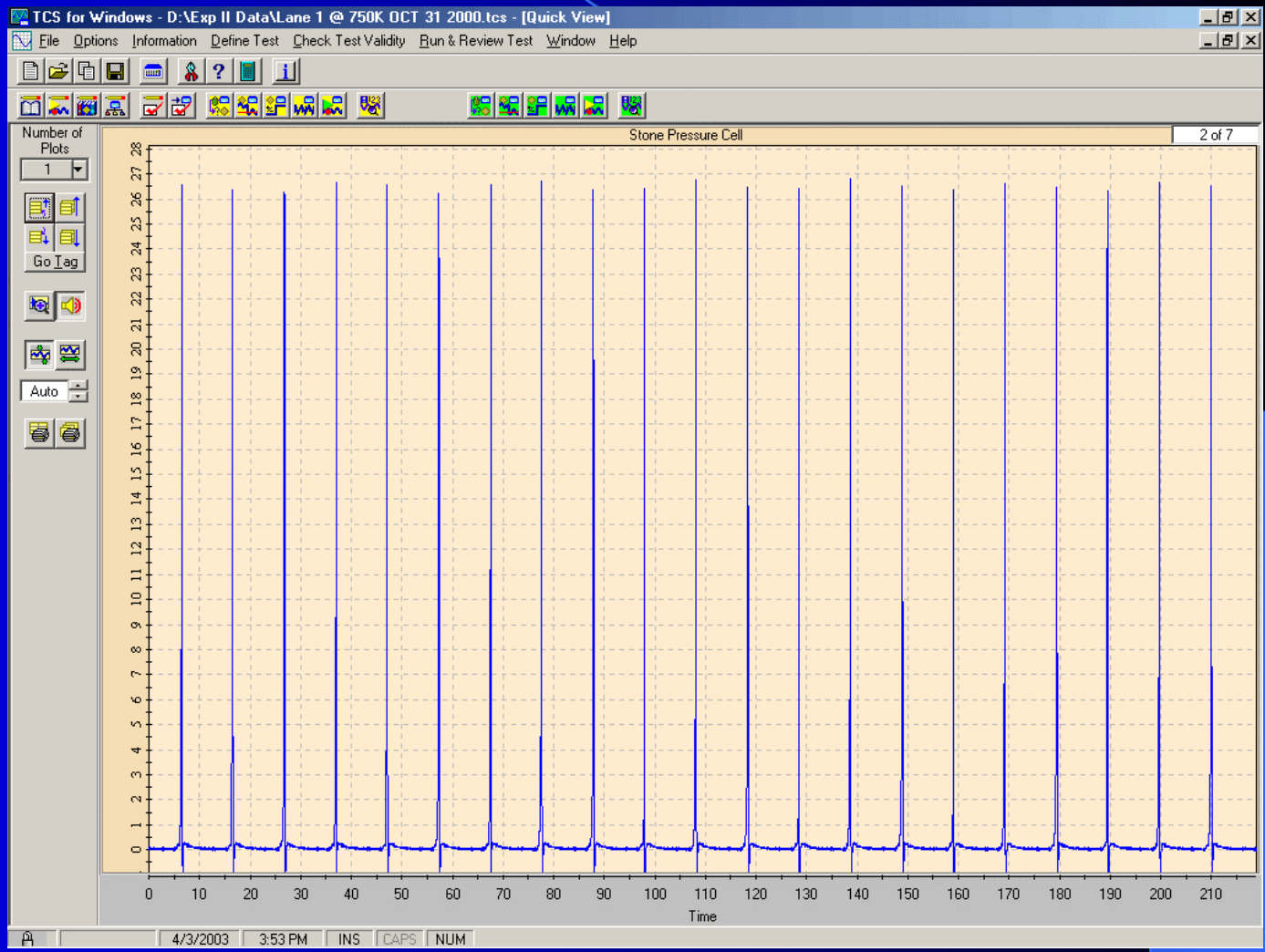


Typical Pressure Cell Data

Gauge @
750K Passes

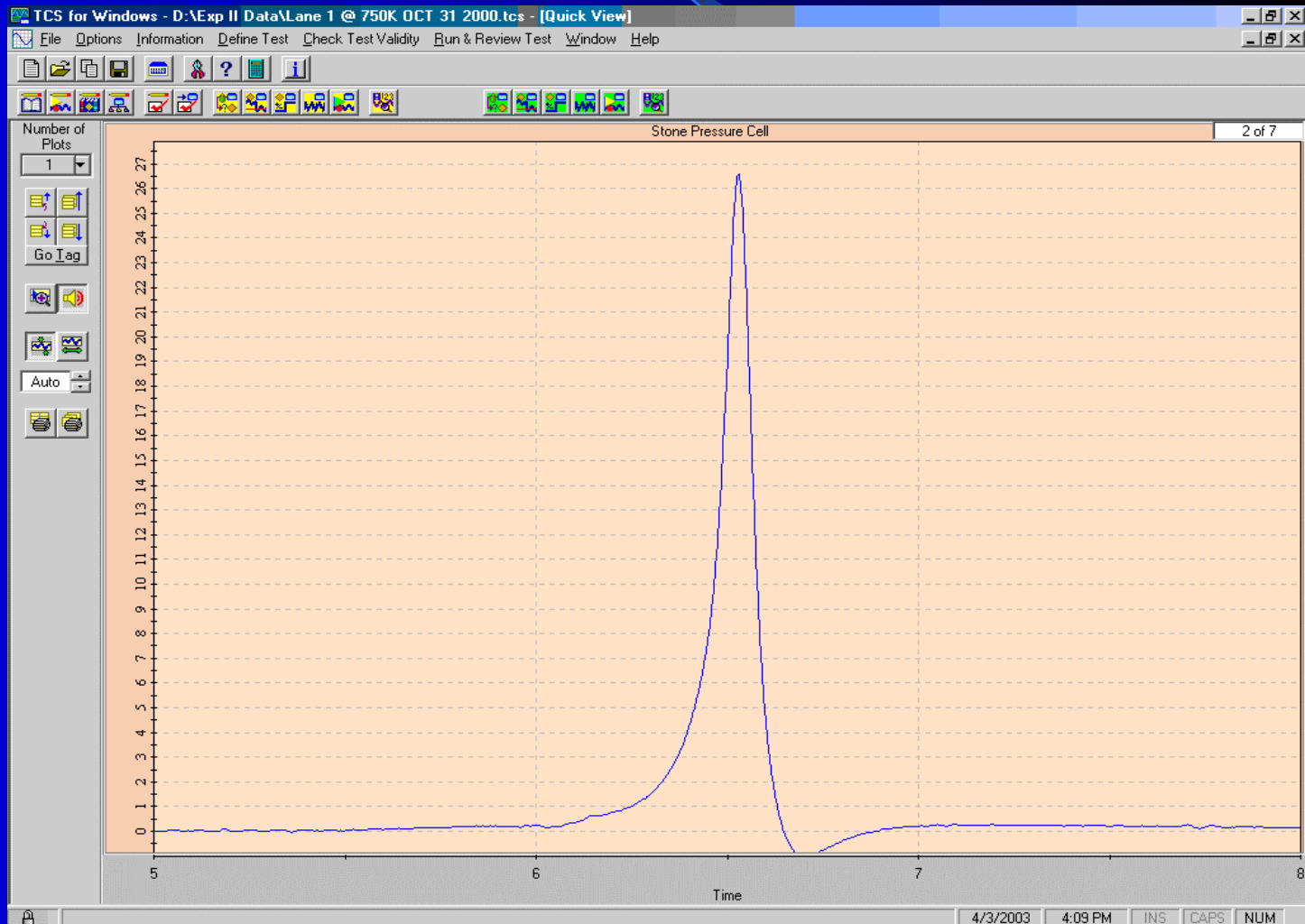
- 20 Passes of ALF
- Gauge located 12” below surface.

Average psi = 26.5



Single Pass Pressure Cell

Three seconds of data collection

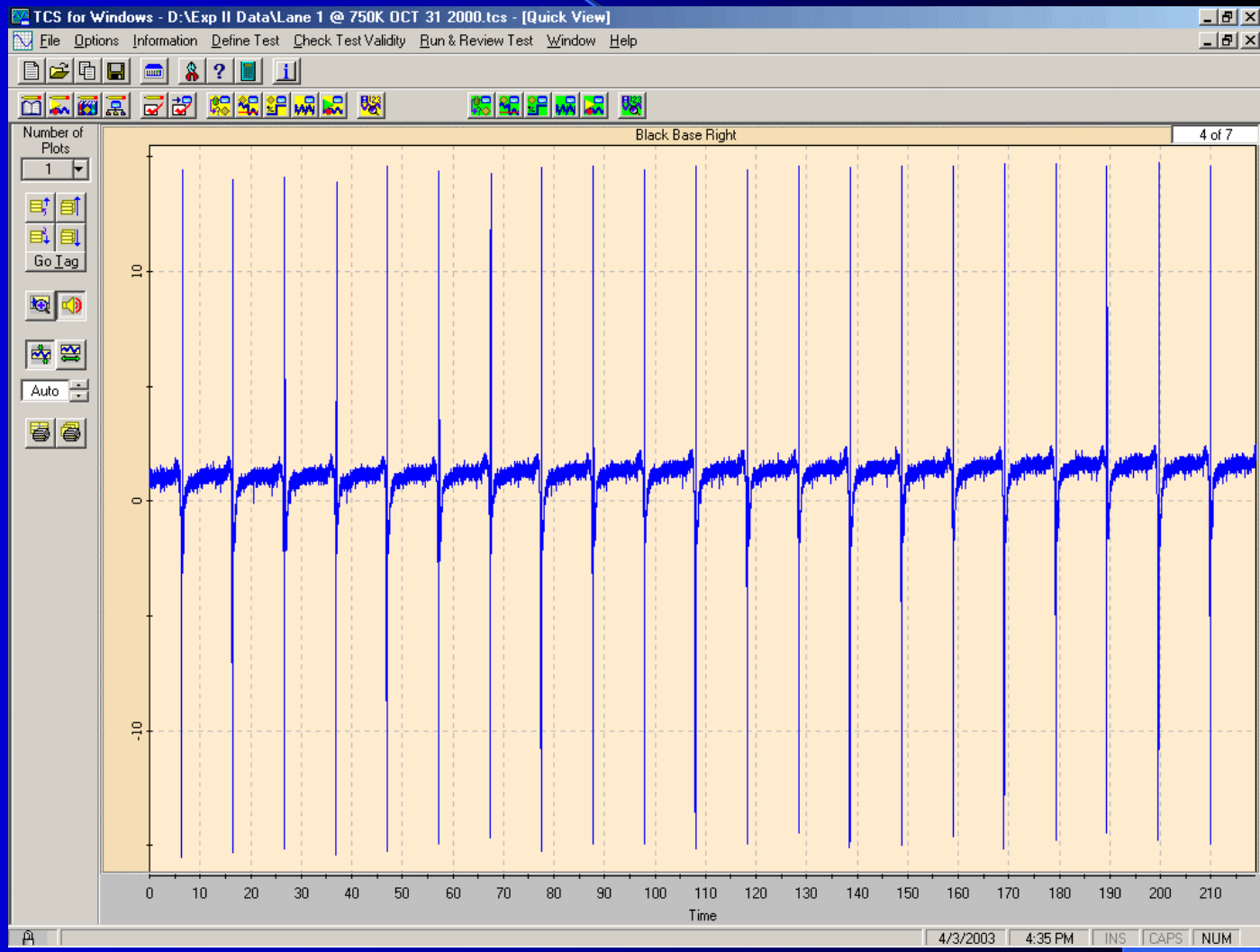


Typical Strain Gauge Data

Gauge @
750K Passes

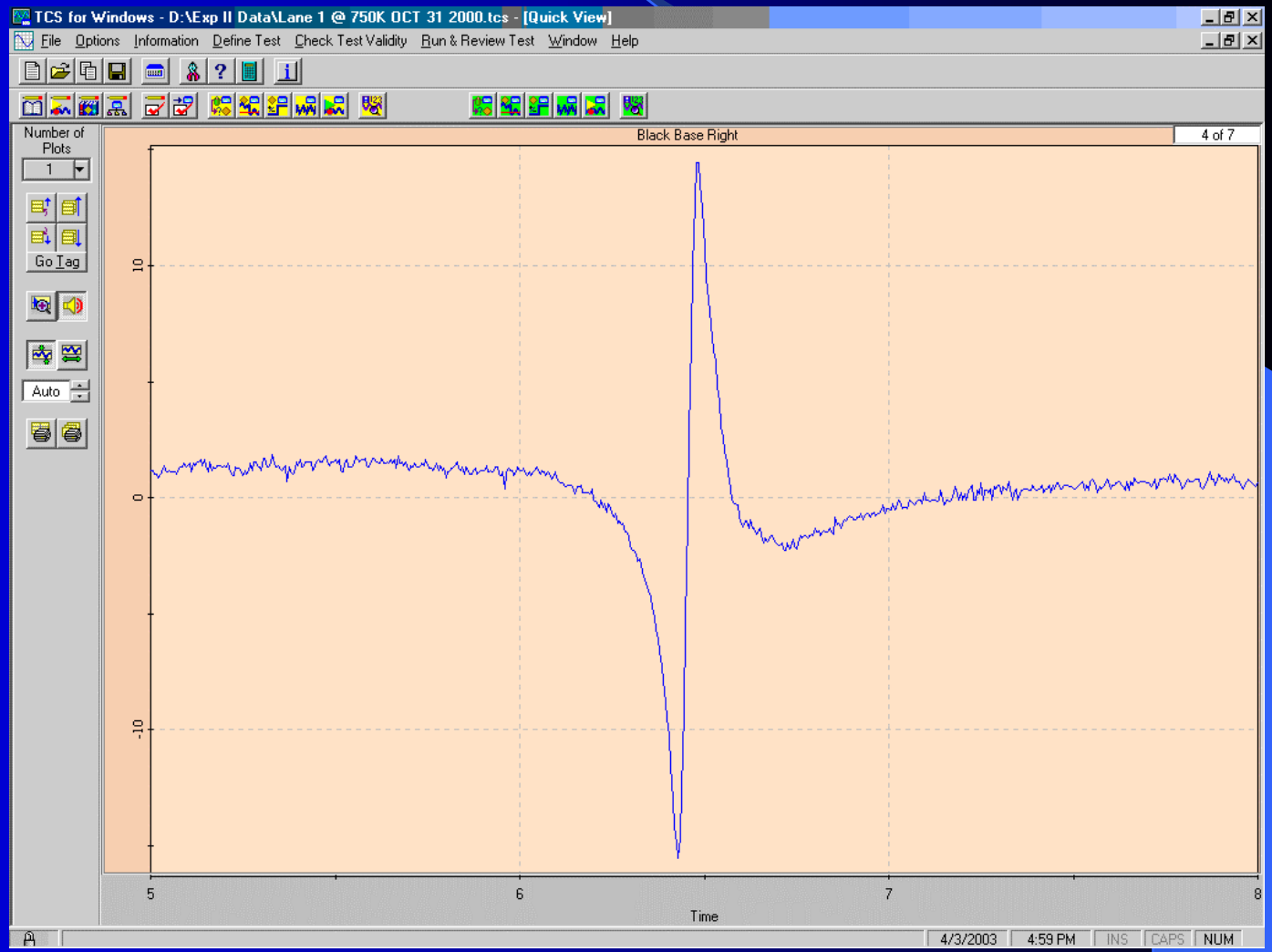
- 20 Passes of ALF
- Gauge located 3.5” below surface.

Avg uStrain = 30



Single Pass Strain Gauge

Three seconds of data collection



Operational Assessment

- Performance of Megadac
  - No board failures
  - Consistent results
- Performance of Gauges
  - Eighty percent of all gauges still operational after 750,000 actual passes of Accelerated Loading Facility (ALF)