

Infrasound Test Preparations - Sandia Facility for Acceptance Calibration and Testing

US Infrasound Calibration
Team Meeting

Albuquerque, NM

August 13-14, 2013



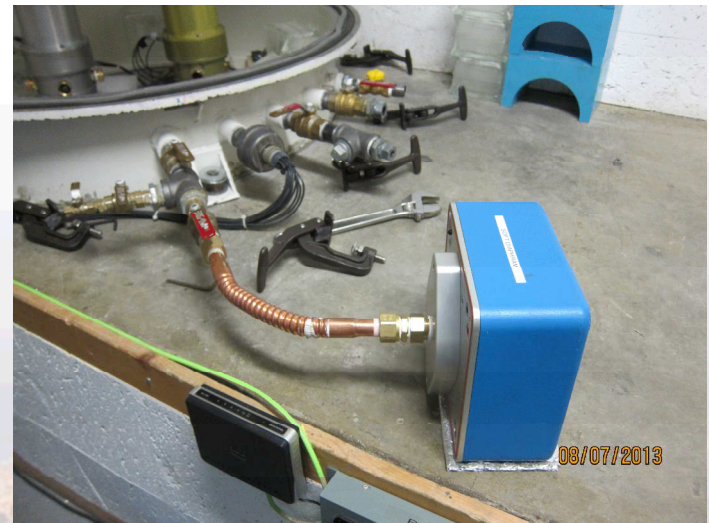
Outline:

- **Vault Preparation**
- **SmartGeoHub Configuration**
- **Smart24 Automated Calibrator (SAC2012)**



Vault Preparation

Select of Piston-Phone: Hard of Soft Diaphragm



Vault Preparation

Install sensors into chamber, make wiring connections for power and signal and organize cabling.

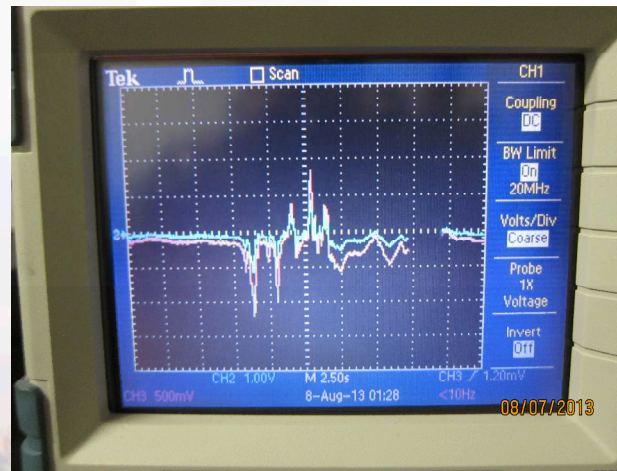
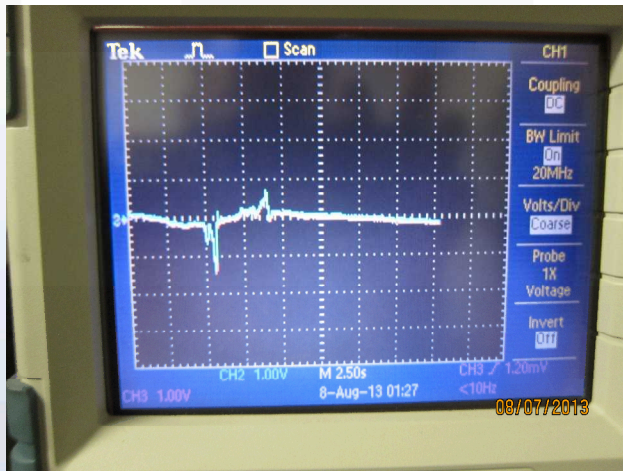
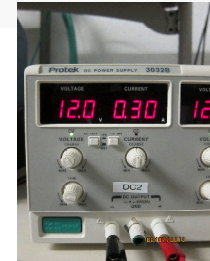


Vault Preparation

Connect oscilloscope to reference and sensors under test (SUT).

Apply power to reference and sensors under test.

Review output from sensors with acoustic excitation – taking note of any polarity and scaling differences.



Vault Preparation

Make connection between signal source and Piston-Phone electronics box.

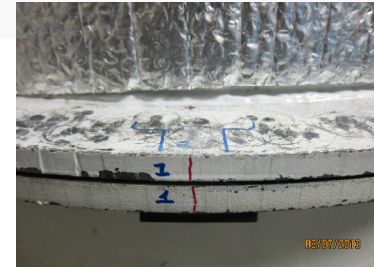
If needed, oscilloscope can be used to adjust gain on Piston-Phone electronics box.

Make connection between electronics box and mechanical portion of acoustic source.

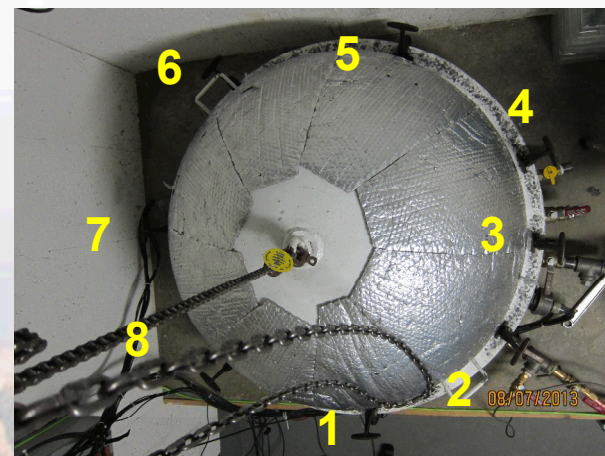


Vault Preparation

Lower chamber lid and align for clamping.



Alignment marks for clamping repeatability.



Use pull-action latch clamps to seal chamber ~2800 lbf



Vault Preparation

Verify valve orientation for testing, close if necessary.

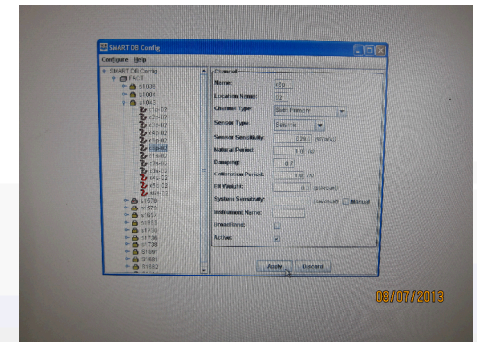
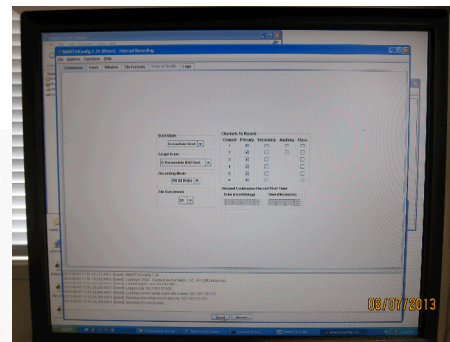
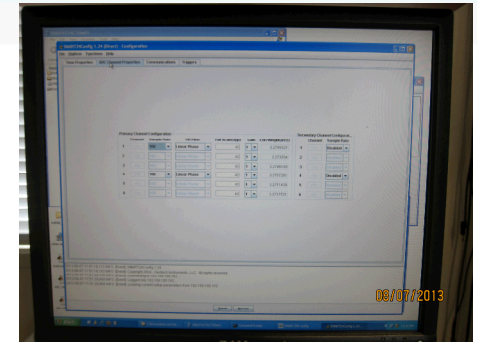
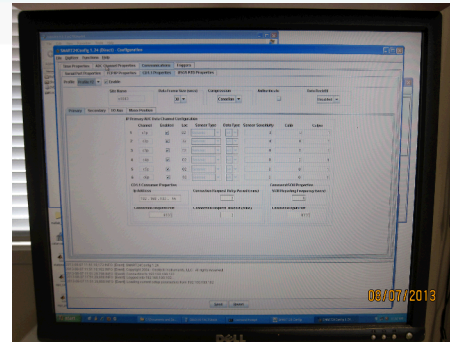


Make note of Vaisala
BP, T and RH%



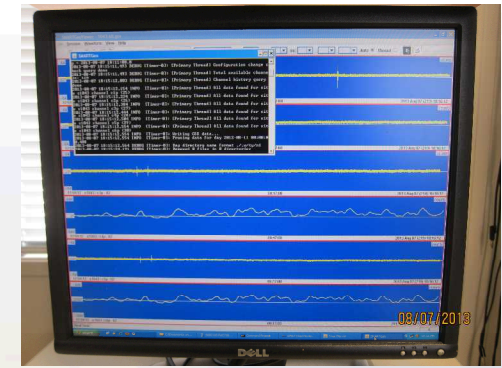
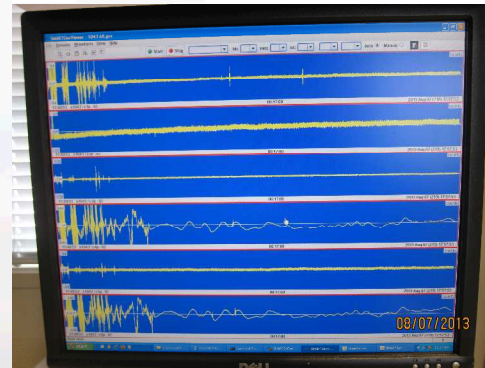
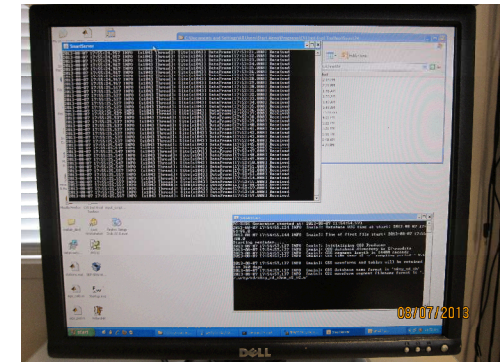
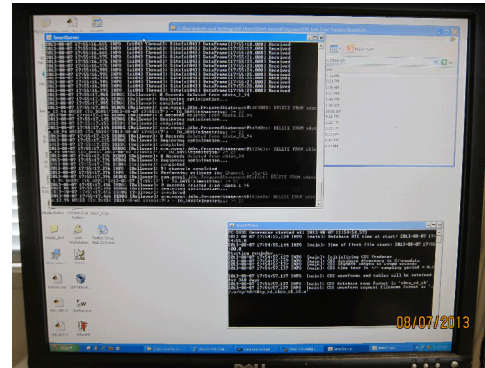
SmartGeoHub Configuration

- Enable channel recording
- Check sample rate
- ADC board configuration
- Internal recoding turned on
- Database configuration
“Active” for testbed digitizer



SmartGeoHub Configuration

- Start SmartGenServer
- Start SmatGen database archive
- Confirm data feed is active
- Confirm data stored to database



SAC2012 Configuration

- Smart24 Automated Calibrator
- Command-&-Control of Smart24 DAC
- Queue test sequence
- Delay start for overnight testing

The screenshot shows the SAC 2012 software interface. The window title is "SAC 2012" and it has a menu bar with "File", "Digitizer", and "Help".

Tests: A list of test configurations is shown in a scrollable area:

- NASA-PLV FullScale Test
- NASA - FAPV
- NASA - FAR
- NASA - PLV
- IML-T - FAR small chamber
- IML-T - PLV small chamber
- IML-T - FAPV small chamber
- IML-T - PLV small chamber copy
- CHAP 50 - FAR
- CHAP 50 - PLV
- CHAP 50 - FAPV
- CHAP 50 - PLV - short duration
- CHAP 50 - FAPV - 1/2 hour

Below the list are icons for adding (+), deleting (x), editing (pencil), and copying (document) tests. There are also buttons for "Add to Queue -->" and "Clear Queue".

Test queue: A table with columns: Signal Type, Amplitude(V), Freq(Hz), Pulse Width(s), and Duration(s). The table is currently empty.

Below the table are controls for "Delay start time" (set to 8/7/13 11:55 AM) and "Command Separation (s)" (set to 60). There are "Start", "Pause", and "Cancel" buttons. The status shows "0 commands" and "Total runtime: 0 secs".

Log display: A text area showing "Loaded file: C:\Smart24AutoCalibrator\SAC8-3-2012\default.sac".

At the bottom of the window, the file path "C:\Smart24AutoCalibrator\SAC8-3-2012\default.sac" is displayed on the left, and "No digitizer connected" is displayed on the right.



SAC2012 Configuration

SAC 2012

File Digitizer Help

Test queue:

Signal Type	Amplitude(V)	Freq(Hz)	Pulse Width(s)	Duration(s)
-------------	--------------	----------	----------------	-------------

Delay start time: 8/7/13 11:55 AM Command Separation (s): 60

Start Pause Cancel

0 commands
Total runtime: 0 secs

Log display:

```
Loaded file: C:\Smart24AutoCalibrator\SAC8-3-2012\default.sac
```

C:\Smart24AutoCalibrator\SAC8-3-2012\default.sac No digitizer connected



SAC2012 Configuration

SAC 2012

File Digitizer Help

Test queue:

Signal Type	Amplitude(V)	Freq(Hz)	Pulse Width(s)	Duration(s)
-------------	--------------	----------	----------------	-------------

Delay start time: 8/7/13 11:55 AM Command Separation (s): 60

Start Pause Cancel

0 commands
Total runtime: 0 secs

Log display:

```
Loaded file: C:\Smart24AutoCalibrator\SAC8-3-2012\default.sac
```

C:\Smart24AutoCalibrator\SAC8-3-2012\default.sac No digitizer connected



SAC2012 Configuration

SAC 2012

File Digitizer Help

Test queue:

Signal Type	Amplitude(V)	Freq(Hz)	Pulse Width(s)	Duration(s)
-------------	--------------	----------	----------------	-------------

Log display:

Loaded file: C:\Smart24\AutoCalibrator\SAC8-3-2012\default.sac

C:\Smart24\AutoCalibrator\SAC8-3-2012\default.sac No digitizer connected

Digitizer Viewer

Serial: s1043

IP Address: 192.168.100.102

Username: smart24

Password: factsite

Station: FACT

Location:

Connect Cancel



SAC2012 Configuration

The screenshot shows the SAC 2012 software interface. The window title is "SAC 2012" and it has a menu bar with "File", "Digitizer", and "Help".

Tests: A list of tests is shown in a scrollable area:

- NASA-PLV FullScale Test
- NASA - FAPV
- NASA - FAR
- NASA - PLV
- IML-T - FAR small chamber
- IML-T - PLV small chamber
- IML-T - FAPV small chamber
- IML-T - PLV small chamber copy
- CHAP 50 - FAR
- CHAP 50 - PLV
- CHAP 50 - FAPV
- CHAP 50 - PLV - short duration
- CHAP 50 - FAPV - 1/2 hour

Below the list are icons for adding (+), deleting (x), editing (pencil), and copying (document). Buttons for "Add to Queue -->" and "Clear Queue" are also present.

Test queue: A table with the following columns: Signal Type, Amplitude(V), Freq(Hz), Pulse Width(s), and Duration(s). The table is currently empty.

Below the table are controls for "Delay start time" (set to 8/7/13 11:55 AM), "Command Separation (s)" (set to 60), and "Start", "Pause", and "Cancel" buttons. The status shows "0 commands" and "Total runtime: 0 secs".

Log display: A text area showing the following log output:

```
Loaded file: C:\Smart24AutoCalibrator\SAC8-3-2012\default.sac
Creating socket connection to 192.168.100.102 on port 8000....
Socket connection
Created successful connection with s1043
```

The status bar at the bottom shows the file path "C:\Smart24AutoCalibrator\SAC8-3-2012\default.sac" and the connection status "Connected to digitizer: s1043".



SAC2012 Configuration

SAC 2012

File Digitizer Help

Test queue:

Signal Type	Amplitude(V)	Freq(Hz)	Pulse Width(s)	Duration(s)
-------------	--------------	----------	----------------	-------------

Log display:

Loaded file: C:\Smart24AutoCalibrator\SAC8-3-2012\default.sac

C:\Smart24AutoCalibrator\SAC8-3-2012\default.sac No digitizer connected

Digitizer Channel Relay States

Digitizer: s1043

Channel 1: Sensor

Channel 2: Disabled

Channel 3: Disabled

Channel 4: Disabled

Channel 5: Disabled

Channel 6: Disabled

Apply Cancel



SAC2012 Configuration

The screenshot shows the SAC 2012 software interface. The window title is "SAC 2012" and the menu bar includes "File", "Digitizer", and "Help".

Tests: A list of test configurations is shown on the left. The selected test is "MB2000 I556".

Test queue: A table displays the test queue configuration:

Signal Type	Amplitude(V)	Freq(Hz)	Pulse Width(s)	Duration(s)
MB2000 I556				
Sine Wave	0.1	1.4	N/A	30
Sine Wave	0.5	1.4	N/A	30
Sine Wave	1.0	1.4	N/A	30
Sine Wave	1.5	1.4	N/A	30
Sine Wave	2.0	1.4	N/A	30
Sine Wave	2.5	1.4	N/A	30

Below the table, there are controls for "Delay start time" (set to 8/7/13 11:55 AM), "Command Separation (s)" (set to 60), and buttons for "Start", "Pause", and "Cancel". The status bar indicates "6 commands" and "Total runtime: 9 mins, 0 secs".

Log display: A text area shows the following log output:

```
Loaded file: C:\Smart24AutoCalibrator\SAC8-3-2012\default.sac
Creating socket connection to 192.168.100.102 on port 8000....
Socket connection
Created successful connection with s1043
C&S I,1,?

C&S I,1,2 false
C&S I,2,?

C&S I,2,0 false
C&S I,3,?

C&S I,3,0 false
```

Add or
remove tests
from queue.



SAC2012 Configuration

The screenshot shows the SAC 2012 software interface. The window title is "SAC 2012" and it has a menu bar with "File", "Digitizer", and "Help".

Tests: A list of test sequences is shown on the left. The selected test is "MB2000 IS56 8 steps".

Test queue: A table displays the configuration for the selected test sequence.

Signal Type	Amplitude(V)	Freq(Hz)	Pulse Width(s)	Duration(s)
MB2000 IS56 8				
Sine Wave	0.1	1.4	N/A	30
Sine Wave	0.5	1.4	N/A	30
Sine Wave	1.0	1.4	N/A	30
Sine Wave	1.5	1.4	N/A	30
Sine Wave	2.0	1.4	N/A	30
Sine Wave	2.5	1.4	N/A	30
Sine Wave	3.0	1.4	N/A	30
Sine Wave	3.5	1.4	N/A	30

Below the table, there are controls for "Delay start time" (set to 8/7/13 11:55 AM), "Command Separation (s)" (set to 60), and buttons for "Start", "Pause", and "Cancel". The status bar indicates "8 commands" and "Total runtime: 12 mins, 0 secs".

Log display: A text area shows the following log output:

```
Loaded file: C:\Smart24AutoCalibrator\SAC8-3-2012\default.sac
Creating socket connection to 192.168.100.102 on port 8000....
Socket connection
Created successful connection with s1043
C&S I,1,?

C&S I,1,2 false
C&S I,2,?

C&S I,2,0 false
C&S I,3,?

C&S I,3,0 false
```

The status bar at the bottom shows the file path "C:\Smart24AutoCalibrator\SAC8-3-2012\default.sac" and the connection status "Connected to digitizer: s1043".

One test sequence loaded.



SAC2012 Configuration

The screenshot shows the SAC 2012 software interface. The window title is "SAC 2012" and it has a menu bar with "File", "Digitizer", and "Help".

Tests: A list of test sequences is shown on the left. The selected test is "chap 50A LDSine". Other tests include "Paro WN three values", "Paro PLV 0.1 Hz", "Paro PLV 0.5 Hz", "Paro PLV 1.4 Hz", "Paro PLV 5 Hz", "Paro PLV 8 Hz", "IS59 CHAP 50A - PLV IS59", "IS59 CHAP 50A - PLV - short dur", "IS59 CHAP 50A - PLV - 30sec. IS", "IS59 CHAP 50A - FAPV", and "Small amplitude gap sequence".

Test queue: A table displays the test queue with the following columns: Signal Type, Amplitude(V), Freq(Hz), Pulse Width(s), and Duration(s).

Signal Type	Amplitude(V)	Freq(Hz)	Pulse Width(s)	Duration(s)
Sine wave	2.5	1.0	N/A	180
MB2000 IS56 8				
Sine Wave	0.1	1.4	N/A	30
Sine Wave	0.5	1.4	N/A	30
Sine Wave	1.0	1.4	N/A	30
Sine Wave	1.5	1.4	N/A	30
Sine Wave	2.0	1.4	N/A	30
Sine Wave	2.5	1.4	N/A	30
Sine Wave	3.0	1.4	N/A	30
Sine Wave	3.5	1.4	N/A	30
chap 50A LDSine				
Sine Wave	1.5	1.4	N/A	15000

Below the table, there is a checkbox for "Delay start time:" with a value of "8/7/13 11:55 AM". To the right, "Command Separation (s):" is set to "60".

Buttons for "Start", "Pause", and "Cancel" are visible. Below them, the text reads "24 commands" and "Total runtime: 7 hrs, 21 mins, 20 secs".

Log display: A text area shows the following log output:

```
Loaded file: C:\Smart24AutoCalibrator\SAC8-3-2012\default.sac
Creating socket connection to 192.168.100.102 on port 8000....
Socket connection
Created successful connection with s1043
C&S I,1,?

C&S I,1,2 false
C&S I,2,?

C&S I,2,0 false
C&S I,3,?

C&S I,3,0 false
```

The status bar at the bottom shows "C:\Smart24AutoCalibrator\SAC8-3-2012\default.sac" and "Connected to digitizer: s1043".

Six test sequences loaded, for total test duration of: ~7 hrs and 21 minutes



SAC2012 Configuration

The screenshot shows the SAC 2012 software interface. The window title is "SAC 2012" and the menu bar includes "File", "Digitizer", and "Help".

Tests: A list of test configurations is shown on the left. The selected test is "chap 50A LDSine".

Test queue: A table displays the test queue with columns for Signal Type, Amplitude(V), Freq(Hz), Pulse Width(s), and Duration(s).

Signal Type	Amplitude(V)	Freq(Hz)	Pulse Width(s)	Duration(s)
Sine wave	2.5	1.0	N/A	180
MB2000 IS56 8				
Sine Wave	0.1	1.4	N/A	30
Sine Wave	0.5	1.4	N/A	30
Sine Wave	1.0	1.4	N/A	30
Sine Wave	1.5	1.4	N/A	30
Sine Wave	2.0	1.4	N/A	30
Sine Wave	2.5	1.4	N/A	30
Sine Wave	3.0	1.4	N/A	30
Sine Wave	3.5	1.4	N/A	30
chap 50A LDSine				
Sine Wave	1.5	1.4	N/A	15000

Delay start time: 8/7/13 10:58 PM

Command Separation (s): 60

24 commands
Total runtime: 7 hrs, 21 mins, 20 secs

Log display:

```
Loaded file: C:\Smart24AutoCalibrator\SAC8-3-2012\default.sac
Creating socket connection to 192.168.100.102 on port 8000....
Socket connection
Created successful connection with s1043
CAS I,1,?

CAS I,1,2 false
CAS I,2,?

CAS I,2,0 false
CAS I,3,?

CAS I,3,0 false
```

C:\Smart24AutoCalibrator\SAC8-3-2012\default.sac Connected to digitizer: s1043

Activate and set “Delay start time”, by selecting check box and editing time field.



SAC2012 Configuration

The screenshot shows the SAC 2012 software interface. The window title is "SAC 2012" and it has a menu bar with "File", "Digitizer", and "Help".

Tests: A list of test configurations is shown on the left, including "chapg 50A LDSine" which is currently selected.

Test queue: A table displays the test queue with the following data:

Signal Type	Amplitude(V)	Freq(Hz)	Pulse Width(s)	Duration(s)	Status
Sine wave	2.5	1.0	N/A	180	Queued
MB2000 I556 8					
Sine Wave	0.1	1.4	N/A	30	Queued
Sine Wave	0.5	1.4	N/A	30	Queued
Sine Wave	1.0	1.4	N/A	30	Queued
Sine Wave	1.5	1.4	N/A	30	Queued
Sine Wave	2.0	1.4	N/A	30	Queued
Sine Wave	2.5	1.4	N/A	30	Queued
Sine Wave	3.0	1.4	N/A	30	Queued
Sine Wave	3.5	1.4	N/A	30	Queued
chapg 50A					
Sine Wave	1.5	1.4	N/A	15000	Queued

Below the table, there is a checkbox for "Delay start time:" set to "8/7/13 10:58 PM". A "Command Separation (s):" field is set to "60".

Buttons for "Start", "Pause", and "Cancel" are visible. The "Pause" button is currently active.

Summary statistics: "24 commands" and "Total runtime: 7 hrs, 21 mins, 20 secs".

Log display: A text area shows the following log output:

```
Loaded file: C:\Smart24AutoCalibrator\SAC8-3-2012\default.sac
Creating socket connection to 192.168.100.102 on port 8000....
Socket connection
Created successful connection with s1043
C&S I,1,?

C&S I,1,2 false
C&S I,2,?

C&S I,2,0 false
C&S I,3,?

C&S I,3,0 false
```

The status bar at the bottom shows the file path "C:\Smart24AutoCalibrator\SAC8-3-2012\default.sac" and the connection status "Connected to digitizer: s1043".

Start process, by selecting start button. Head home and get some rest, test data will be waiting for processing the following morning.

