CENTER FOR NUCLEAR WASTE
REGULATORY ANALYSES

Jason R Mack

x-6249

Project #: 20-1402-671

project No. 20-1402-671, Book No. 357

Title Triaxial Compressive tests of rock and backfill materials

Objective: To determine rock and backfall properties. These properties include mechanical and strength values

Jason R. Mock x6249
Simon Hsiung x5029
Amit Ghosh x3314

Simon Hsiung 7/9/99

I ordered 10' of 2.5" clear shrink tubing and 10' of 4" shrink tubing. The requisition number is 487111. The purchase order # is 9418536. The company's information follows: Insulation Products Corp
(630) 512-9600 $371.7

I ordered the same heat gun that SBEL uses. It is a Master Heat Gun 1740 Watts with S# 861-1605. I also ordered a Shrink Tubing Attachment with S# 861-1670. The company info is: Carlton Bates Company
800-433-5700 $109.2

Requisition #: 487116, Purchase #: 9419276

I ordered the pore pressure tubing. This consisted of 1/16 by 0.030 Stainless Steel Tubing, Glands for 1/16" tubing, and Sleeves for 1/16" tubing.

Glands: 15-2-AM1 High Pressure Equipment Co.
Sleeves: 15-2-A1 (814) 838-2028 Larry
10 ksi Tubing: 15-9-A1-030

Jason R Mock 7/12/99

$43

I have been having trouble with the ultrasonic velocity software. I contacted the company that wrote the software.

GCTS
(480) 456-0110
support@gcts.com

I was having the following error when I tried to load the program: "Fatal error FONT NOT FOUND"
I talked to Manuel at GCTS and he told me to add these two lines to the autoexec.bat.

set test= C:\sys\
set tmp= c:\

The program worked fine after these corrections. I also emailed him to ask how to perform the test to get the face-to-face delay times. He sent me this email.

From: Jmpgcts@aol.com Save Address Block Sender
To: jasonrmock@hotmail.com
Subject: Re: Face to Face times
Date: Mon, 12 Jul 1999 20:34:40 EDT

Reply | Reply All | Forward | Delete | Previous | Next | Close

Jason:

I am glad my suggestion worked. The face-to-face delays are entered in the Default screen. You first have to enter a 0.0 arrival time for both, the P and S in the Default screen. Then set the platens Face-to-face and measure the arrival time. Use the vertical cursor to find the exact first arrival time. Write down this time and manually enter it in the Default screen. All new arrival time readings will reflect the face-to-face arrival time.

All this info is in the Instructions Manual that should have been provided by SBEL. Do not hesitate to contact me for further assistance.

Sincerely,

Manuel Padilla
GCTS
mpadilla@gcts.com
www.gcts.com

Reply | Reply All | Forward | Delete | Previous | Next | Close

J Mock

I had to use my personal email address because my swri account is not working properly.
I had another error when I tried to apply his advice. To execute a test the program requires the height, diameter, and mass of the specimen be inputted first. Obviously there is no specimen in a face-to-face delay test. I emailed Manuel at GCTS to ask how to get around this problem.

Jason R Mock 7/13/99

Here is his response email for the dimensions concern.

Date: 7/13/99
Sender: <Jmpgcts@aol.com >
To: jmock@swri.edu
bcc: Jason Mock
Priority: Normal
Subject: Re: Face-to-Face delay time

Jason:

I am sorry I forgot to tell you about the specimen dimensions. Enter 1 inch as a specimen length and diameter and keep the face-to-face times equal to zero. The program always try to calculate the wave velocity and therefore it always require the specimen length. Just use the time delay for the first arrival and disregard the wave velocity.

Let me know if you any other problem.

Manuel Padilla
GCTS

J Mock

Inserting 1 mm into both the length and diameter allows the test to run. I believe Manuel meant 1 mm instead of 1 in. because the units are in mm.
A major contact for this project is SBEL. They designed and built the system.

SBEL
(602) 272-0274
(602) 233-9295 fax

Tony for most questions
Richard for electronic questions

Jason R Mock 7/14/99

I calibrated the Keithley DAC-02 board this morning. I had to take the case off the computer and attach the 25 pin ribbon test cable to the board. I accessed the calibration program in this directory: C:\DAC02\. The program is CAL02.exe. The program tells you to adjust potentiometers while checking voltages on the test cable. After calibrating the board I ran the windows DAC02 program to check the board. The output was always within 2 mV of the input. I only had access to a 4½ digit voltmeter for this test were as a 6½ digit would have been preferred.

Jason Mock 7/20/99

The electricians wired up the power for the heater system today. It is a temporary setup were the cord is plugged into an outlet in the next room and run through the wall to the Tinius Olsen machine. The heater is spec'ed for 28 A @ 220 V single phase. The current circuit is 208V single phase but it can handle 50 A. Richard @ SBEL said running the heater on 208V instead of 220V will just mean that the max temp of 200C might not be attainable.

The requisition number for the new 15' pump hose & 25' PT cord is: 507633

PO# 993105W

Jason Mock 7/21/99

The Tinius Olsen was fixed today and deemed usable. The signal conditioner, LVDTs, & the 25' PT cable are all shipped as of yesterday. UPS Ground T# 1Z8428280310000921

Jason Mock 7/22/99

I emailed GCTS on the 26th to get some help withe the ultrasonic velocity system. I asked mainly how the software and the system are supposed to work. Here is the first reply.

Date: 7/28/99
Sender: <Petergcts@aol.com >
To: jmock@swri.edu
cc: Jmpgcts@aol.com
bcc: Jason Mock
Priority: Normal
Subject: Ultrasonic Velocity System

Hi Jason,

First of all, I'm assuming SBEL has not provided any support or training on the operation / function of the ultrasonic velocity system that you've purchased.....so I'll start at the beginning.

The DAC-02 board sends out a 10 volt DC pulse when ever the software (Get Wave function) is selected. This low voltage pulse is then amplified by the power amplifier 20x so that a 200 VDC is exciting the transmitting P or S wave crystals in your test platens (depending on which you have connected). This excitation will generate a wave that travels to the other platen
and the receiving crystal converts the detected wave into a DC voltage signal. This voltage is then read by the GageScope board, which converts the signal from an analog to digital signal, and can then be interpreted by the software. .....a Reader's Digest version of what happens, but I hope this explains the fundamentals of how the system should operate.

You have many questions and I'll try to help - can you provide a basic connection diagram of how you've connected your oscilliscope?

I will look over all the questions you have and provide answers - I should be able to
get back to you by tomorrow. How long have you had the system?

Please keep in mind that we are not affiliated with SBEL - we did sell them the
software but we configure our systems with different hardware.

Sincerely,

Peter A. Goguen
Technical Support Department, GCTS

c.c. Dr. J.M. Padilla - President, GCTS

One problem I have been having is the power amplifier. It is stuck at an output of 200V. Even with no input or a 0V input, the output always goes to 200V. I sent the amplifier back to SBEL on the 27th. Richard said he would try to fix it.

This is another reply from GCTS answering questions.

Date: 7/29/99
Sender: <Petergcts@aol.com >
To: jmock@swri.edu
cc: Jmpgcts@aol.com
bcc: Jason Mock
Priority: Normal
Subject: More Information

Hi Jason,

I hope the information I sent yesterday was useful. The following are further comments that I can provide for your previous questions:

Q "In the systems default page there is a line that reads:
Define Channel __ as the average of Channel __ and Channel __
A What do I put in these boxes?".....this selection is for choosing an average channel when dealing with (2) lvdt's. It does not have an effect on how the ultrasonic software acquires a waveform.

Q "How many data points do I need in a waveform (1024,...)?" The larger this
A selection, the greater detail you will see in your wave form. You can play with this to see what best fits your application. Selecting a greater number of data points will increase the data file size.

Q "What is the graph in the wave analysis graphing (what vs. what)?" It is graphing
A voltage vs. time.

Q "What should an ultrasonic velocity test wave look like ?" I am attaching an
A example of a typical wave form. -> Next page

Q "What does the sample rate key do (5 Mhz, 1 Mhz)?" This provides greater
A detail and zooms in to the wave form. Play with the selection so that you can select a sampling rate that best displays the portion of the waveform of interest.

Q "What does input range do (1 V, 0.2 V)?" Select a large Input Gain (0.2V) when
A the input signal is weak.

Q "What does receiver gain do (dB)?" This selection makes it possible to boosts the
A signal that the receiver sees

Q "Do I need analog filters?" This depends on the quality of your wave form. This
A is a selection that you will have to experiment with to best optimize your test results.

Q "Where do I measure on the graph the face to face delay time?" I would have to
A see an example of your date to determine where the first arrival is.

Q "How does the software tell the DAC-02 board to send out a pulse?" The DAC-02
A board is an digital to analog board.....it converts the digital signal

triggered by the software (when selected) and converts it into a 10 volt DC pulse which is then amplified by the PCB amplifier.

Q "How does the gagescope board know to pick up the wave?" The GageScope
A board is an A/D board that can detect low level DC voltage at a sampling rate fast enough to provide the data interpreted by the ultrasonic software.

I hope these comments provide some useful information.

Sincerely,

Peter A. Goguen
Technical Support Department, GCTS

c.c. Dr. J.M. Padilla - President, GCTS


RFC822.TXT


EXAMPL~1.DOC

The following four screenshots from the PS wave software are examples of a typical waveform.

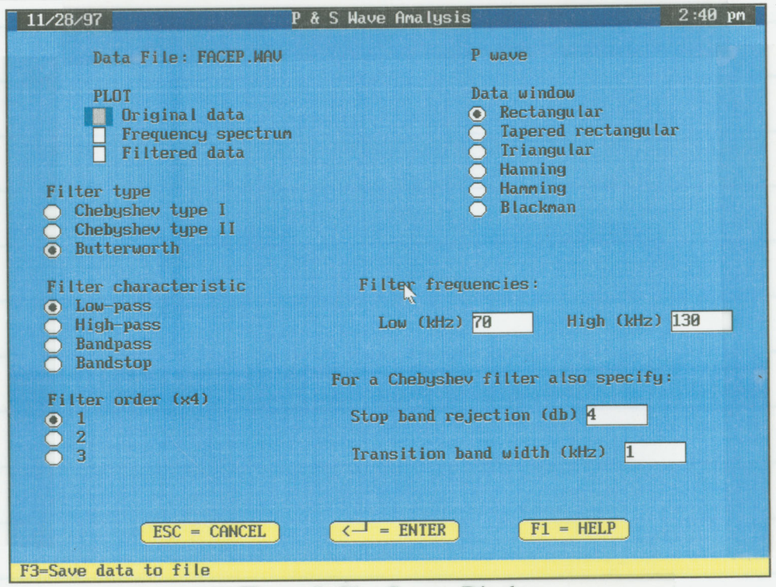

Figure 9- Plot Screen Display

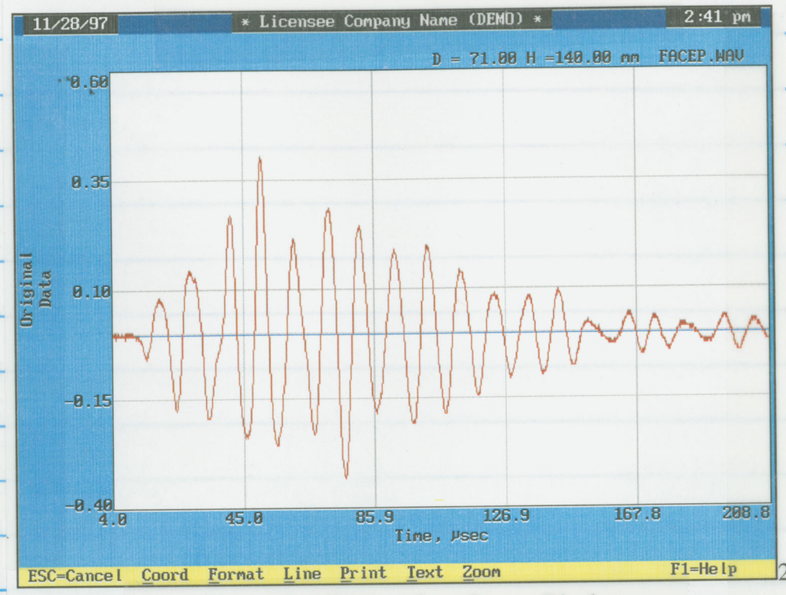

Figure 10 – Original Data Screen Display

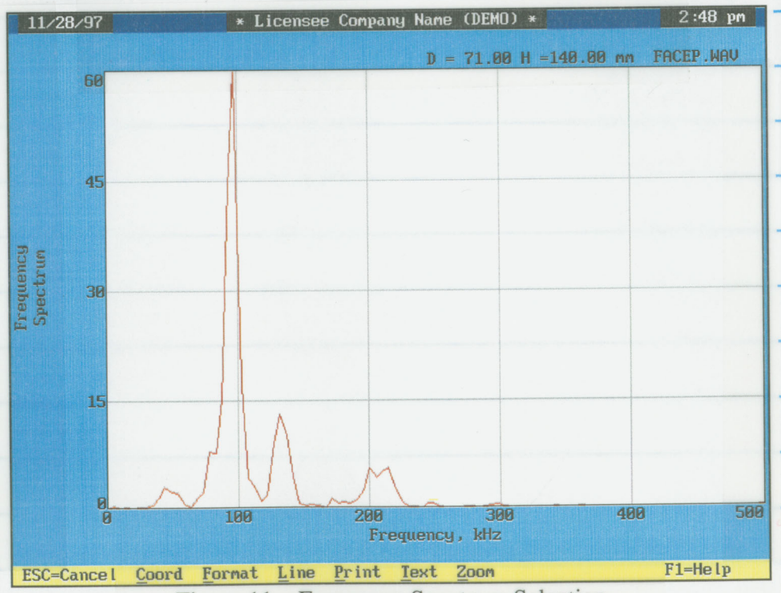

Figure 11 – Frequency Spectrum Selection

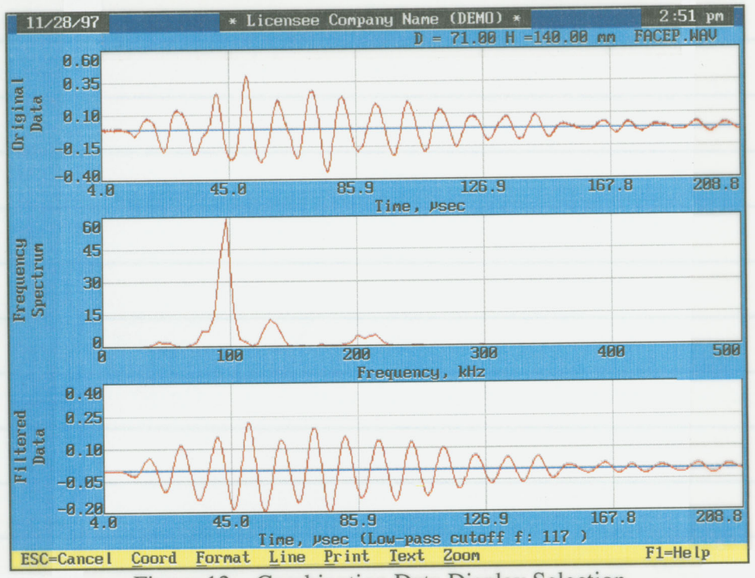

Figure 12 – Combination Data Display Selection

Another problem that I have been having involves the LVDTs. I checked the output of all three LVDTs using the METER BNC connection on the Signal Condition. All three LVDTs worked fine. Apparently this METER connection is the output for whatever channel is selected. This is apparent because adjusting the gain or null for the specified channel changes the value. Therefore this is an output signal.

The problem is that the A/D board in the computer does not show the output for LVDT #1. The output does not move and stays at 3.5 V.

I checked the ribbon cable and A/D board with a power supply. I hooked a variable power supply to the ribbon cable and checked all of the channels. Everything

worked fine with all channels displaying what the power supply was outputting.

I next checked the 37-D connection on the signal conditioner that outputs to the A/D board. Channel 4, which corresponds to LVDT #1, showed no response to the LVDT input. Channels 5 & 6, which correspond to LVDT #2 & #3, worked fine. The problem seems to be a break in the transmission of Channel 4 somewhere in the signal conditioner.

Jason R Mock 7/29/99

I have reviewed this scientific notebook and find it in compliance with QAP-001. There is sufficient information regarding procedures used for conducting tests, acquiring and analyzing data so that another qualified individual could repeat the activity

Manager - MGFE

7/16/00