

Table of Contents

1.	INSTRUMENTATION AND QC SYSTEM DESCRIPTION	2
2.	INSTRUMENTATION AND QC TESTS	3
2.1.	START-UP TESTS.....	3
2.2.	ADDITIONAL CLIENT TESTS	3
2.3.	INSTRUMENT AND SENSOR TESTS	3
2.4.	INSTRUMENT TEST AND SENSOR TEST DESCRIPTION	5
2.4.1.	<i>General</i>	5
2.4.2.	<i>Instrument Noise Test</i>	5
2.4.3.	<i>Instrument Gain and Phase Test</i>	5
2.4.4.	<i>Instrument Distortion Test</i>	6
2.4.5.	<i>Instrument CMRR Test</i>	6
2.4.6.	<i>Instrument Cross Talk Test</i>	6
2.4.7.	<i>Instrument Pulse Test</i>	6
2.4.8.	<i>Sensor Impulse Test</i>	6
2.4.9.	<i>Sensor Capacitance Test</i>	6
2.4.10.	<i>Sensor Cut-off Frequency Test</i>	6
2.4.11.	<i>Sensor Noise Test</i>	7
2.4.12.	<i>Sensor Leakage Test</i>	7
2.5.	END OF JOB TEST.....	7
3.	QC PRODUCTS AND PROCESSING SEQUENCE.....	8
3.1.	SEAPRO QC SCREEN 1	8
3.2.	SEAPRO QC SCREEN 2	9
3.3.	TAPE LOG	10

2. Instrumentation and QC Tests

2.1. Start-up Tests

Before the beginning of the survey a complete set of instrument tests was performed. These tests were as follows:

- Instrument Noise
- Instrument Pulse
- Instrument Distortion
- Instrument Crosstalk
- Instrument Gain/Phase
- Instrument Common Mode
- Field Impulse
- Field Hydrophone Leakage
- Field Capacitance
- Field Cut Off
- Field Noise

The start of contract tests were recorded to tape, and sent to the processing centre together with the seismic data. The result of the Start of Job Instrument tests was good, with all system tests well in specification and no bad seismic hydrophone groups on the streamer.

2.2. Additional Client Tests

No additional tests were required during the survey.

2.3. Instrument and Sensor Tests

The instrument test consists of 6 tests, and the Sensor test consists of 5 tests.

The daily test and monthly uses the same test setup. They were run on daily bases if time permitted.

Start of Job and End of Job test are recorded to 3590 tape including digital copy. All other days are recorded on CD.

Following tests are only recorded on 3590 Tape and do not have a digital copy: Instrument Pulse and Sensor Impulse.

Following tests are only have digital data and are not recorded to 3590 data cartridge: Sensor Capacitance and Sensor Cut-off.

Occasional high sensor noise levels were recorded during QC tests due to the inclement weather conditions. The high noise levels were random throughout the survey. Channel 98 failed Sensor leakage on the 17th Jan 05 but was well within specifications for all other days.

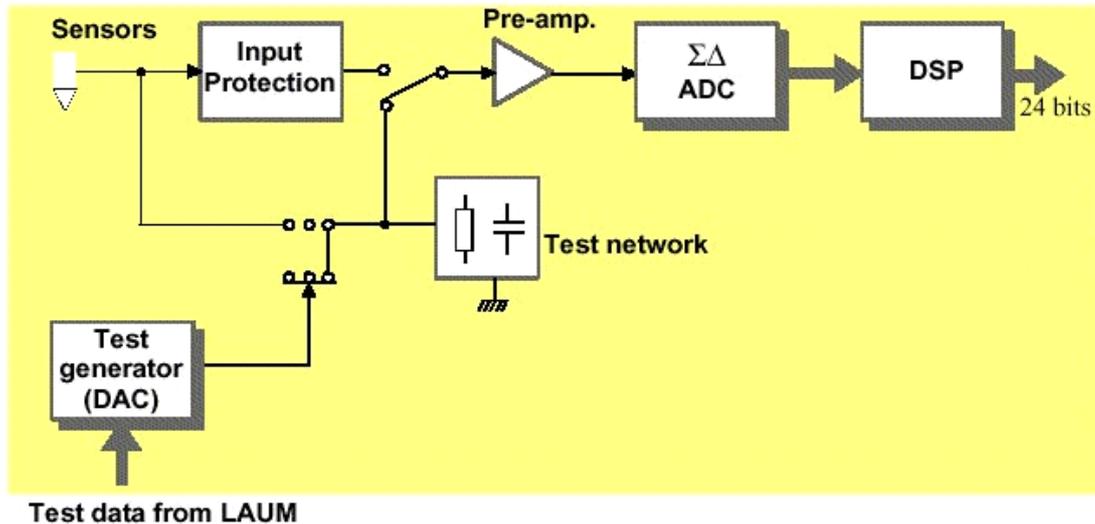
Section 5: Instrumentation and QC

Daily Tests and Results:

		Instruments						Field					
Date	Test	Noise	Pulse	Distortion	Cross Talk	Gain / Phase	Common Mode	Impulse	Capacitance	Cut-off	Noise	Hydro Leakage	Comments
09 Jan 05	Start up	O.K	O.K	O.K	O.K	O.K	O.K	O.K	O.K	O.K	O.K	O.K	All passed
10 Feb 05	Daily	O.K	O.K	O.K	O.K	O.K	O.K	O.K	O.K	O.K	O.K	O.K	All passed
17 Feb 05	Daily	O.K	O.K	O.K	O.K	O.K	O.K	O.K	O.K	O.K	O.K	O.K	98 failed
18 Feb 05	Daily	O.K	O.K	O.K	O.K	O.K	O.K	O.K	O.K	O.K	O.K	O.K	All passed
19 Feb 05	Daily	O.K	O.K	O.K	O.K	O.K	O.K	O.K	O.K	O.K	O.K	O.K	All passed
20 Feb 05	End of Job	O.K	O.K	O.K	O.K	O.K	O.K	O.K	O.K	O.K	O.K	O.K	All passed

2.4. Instrument Test and Sensor Test Description

2.4.1. General



Above is a simplified block diagram of the circuitry involved in each FDU addressed when launching Instrument or Sensor tests from the Seal. The test circuitry in each FDU mainly consists of a current generator (Digital-to-Analog Converter), and a test network. The input to acquisition channel is selected depending on the test function to carry out:

- Signal from the sensor (e.g. noise test)
- Signal from both sensor and the DAC (e.g. Field Impulse test)
- Signal from both the DAC and the test network (e.g. Gain test)

The necessary test signals (DC voltage, sine wave or pulse) are generated by the FDU's DAC from basic signals stored in LAUM's. The gain, filter type and sample rate parameters are user-selectable in Instrument tests, and system selected in most Field tests.

2.4.2. Instrument Noise Test

This test is to measure the noise of the ADC converter in the FDU. The converter's input is connected to the internal test network. A DFT is performed and the noise spectral power below 3Hz is computed. As the total energy of the output signal is known, the total noise within the bandwidth can be deduced.

2.4.3. Instrument Gain and Phase Test

This test is used to check for any drift of the gain and phase of the FDU's built in ADC converter within the band from DC to the filter's cut-off frequency.

The ADC supplies a pulse with known amplitude and width to the internal test network. The ADC input is connected to the internal test network. The voltage across the internal test network is measured. A DFT is computed on the DSP's output signal (for different test frequencies) and compared to a model computed with the same frequencies. The error is computed in terms of difference in amplitude and phase with respect to the model.

The test returns the maximum error computed in amplitude and phase.

2.4.4. Instrument Distortion Test

This test is used to check the FDU's built in ADC converter for linear response. A sine wave with known amplitude and frequency is applied to its input via the internal test network. The test returns the ratio of the spectral power of the output signal to the spectral power of all harmonics within the bandwidth determined by the selected filter.

2.4.5. Instrument CMRR Test

This test is used to measure the Common Mode Rejection Ratio of the FDU's built in ADC converter. A sine wave with known amplitude and frequency is applied to both of its inputs via the internal test network. The test returns the ratio of the RMS value of the output voltage, relative to the input, to the common mode voltage.

2.4.6. Instrument Cross Talk Test

This test is used to measure cross talk between FDU's. The test includes two sequences:

During the first sequence, the test generator applies a sine wave to the test network in each **even** FDU. The ADC converter in each **odd** FDU measures the resulting voltage across its own test network. (The test generator in odd FDU's is disabled).

Conversely, during the second test sequence, the test sine wave is fed to each **odd** FDU and the resulting voltage is measured across the test network in each **even** FDU.

The ratio of the measured voltage to the theoretical value of the test signal is computed and displayed as Instrument Cross talk for each FDU.

2.4.7. Instrument Pulse Test

This test is used to record the response of the instrument channel to a pulse (one sample long).

2.4.8. Sensor Impulse Test

This test is used for acquisition of the impulse response on each channel used in the spread.

The DAC (digital to Analogue Converter) supplies a known pulse to the seismic channel input, and the resulting signal at the ADC (Analogue to digital Converter) output is recorded.

2.4.9. Sensor Capacitance Test

This test is used to measure the capacitance of the seismic sensor connected on the channel input. The DAC supplies a sine wave with known frequency and amplitude to the channel input. The DftCorr of the output from the ADC is computed at the test frequency. Knowing the current supplied to the sensor, the total impedance can be computed.

The capacitance can finally be computed by using the imaginary part of the impedance.

2.4.10. Sensor Cut-off Frequency Test

With hydrophones as input sensors, measuring the cut-off frequency of the seismic channel is equivalent to determining the pulse response for the channel. The DAC supplies a pulse (with known amplitude and width) to the channel input. From the resulting voltage, measured by the ADC, the cut-off frequency of the channel is computed using a least-squares method.

2.4.11. Sensor Noise Test

In this test the noise picked by the hydrophones on each channel used in the spread is measured by performing data acquisition with no Firing Order.

2.4.12. Sensor Leakage Test

This test is used to measure the global leakage resistance between the seismic channel and the earth ground. During this test, the test generator creates a leak current at precisely determined points in the test network, via the FDU's earth resistance. The resulting voltage at particular points in the network is measured. As the output current of the test generator is known, the measurements allow the system to determine the leakage resistance on the positive and negative input paths of the channel. Finally the total resistance to ground can then be calculated.

2.5. End of Job Test

At the end of the survey a complete set of instrument tests was performed. These tests were as follows:

- Instrument Noise
- Instrument Pulse
- Instrument Distortion
- Instrument Crosstalk
- Instrument Gain/Phase
- Instrument Common Mode
- Field Impulse
- Field Hydrophone Leakage
- Field Capacitance
- Field Cut Off
- Field Noise

The result of the End of Job instrument tests was good and all tests were passed. Comparing results from all the instrument tests showed that the system was stable and in specification throughout the survey.

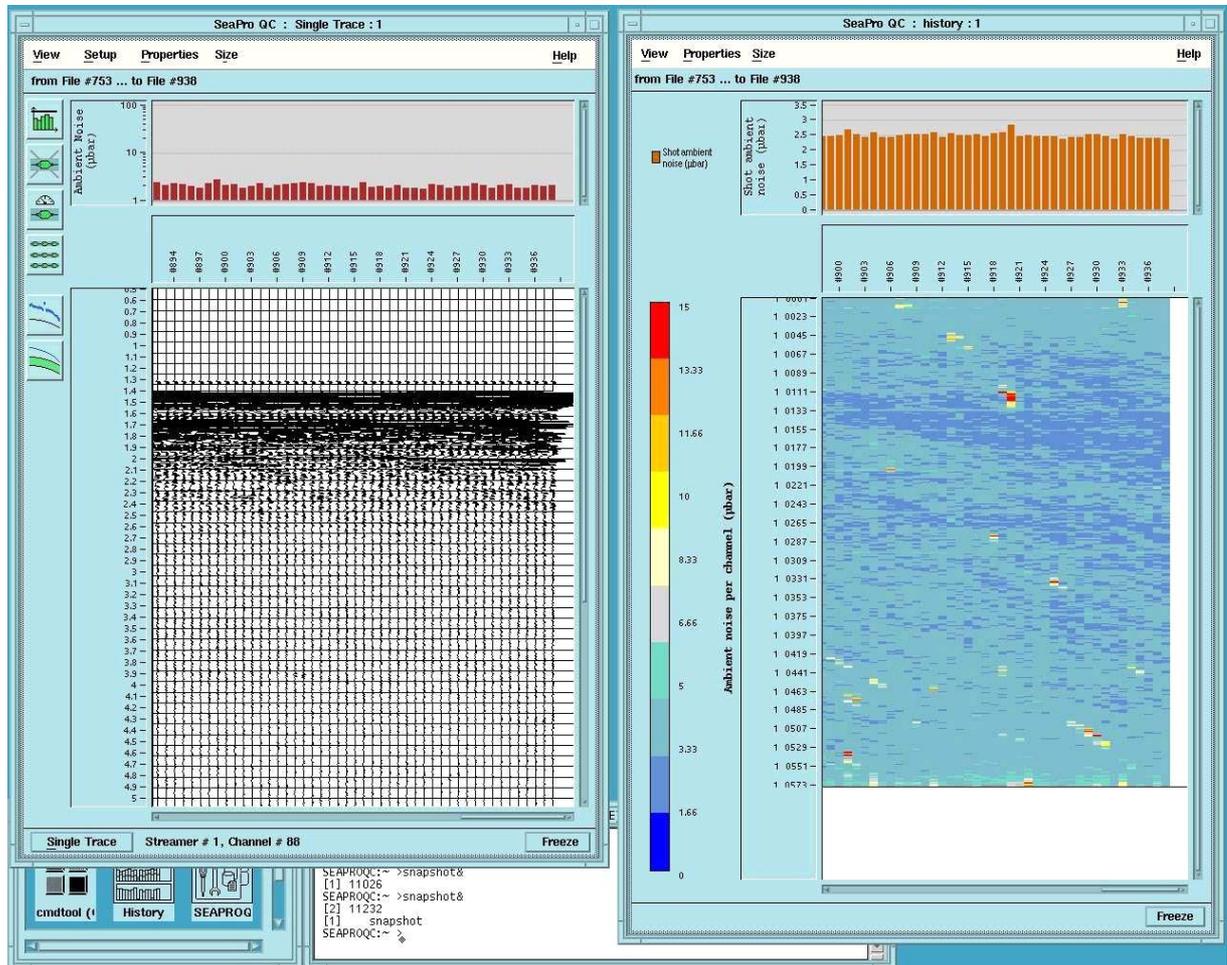
3. QC Products and Processing Sequence

SeaPro QC was used during this survey to perform online QC of the seismic data. The SeaPro was set up to produce a screen plot of all shots. It also displayed a Single Trace display and a noise versus channel/shot history. The auxiliary channels were displayed, with a zoomed in view of the timing.

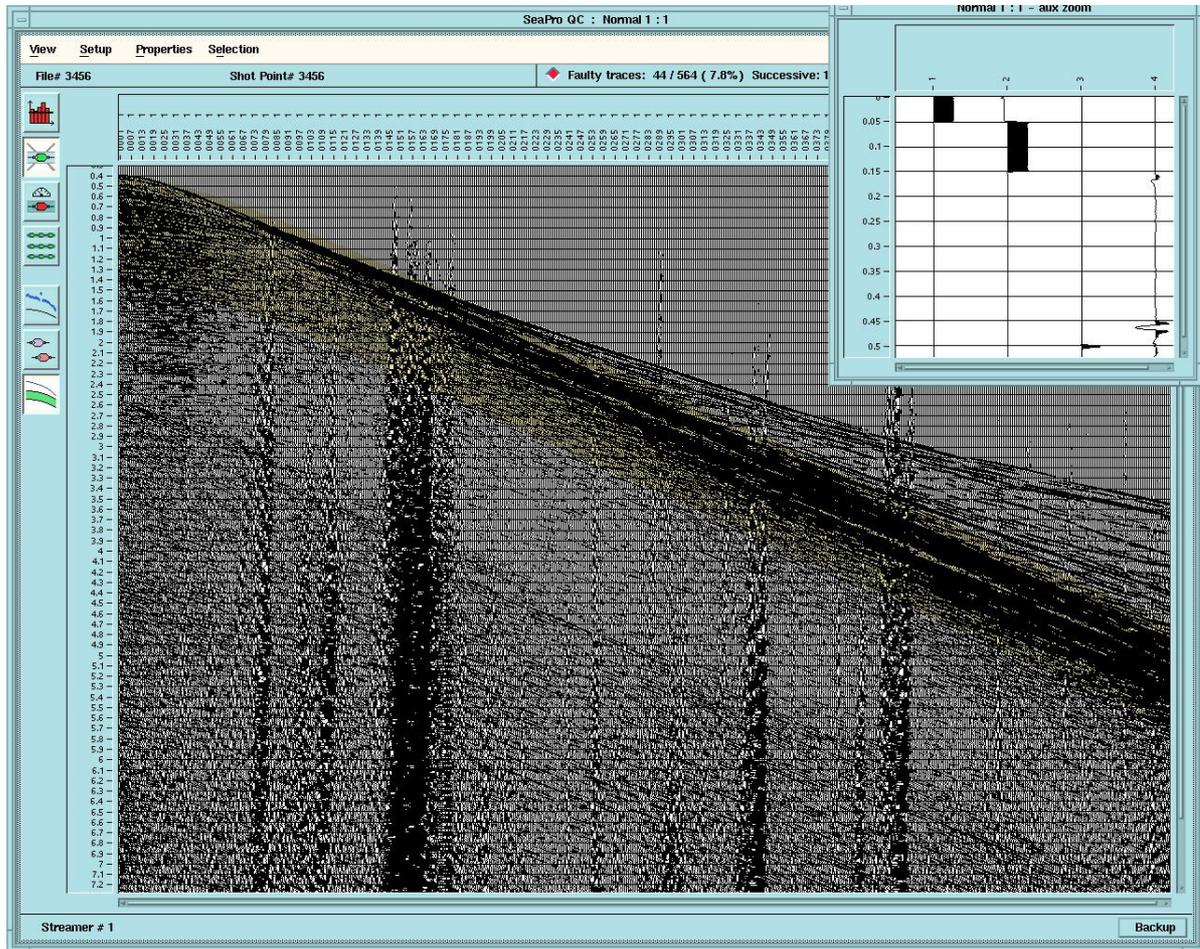
A ProMax system was in use during the survey to further monitor the quality of the Seismic data, and to produce brute stacks.

[See separate report in Section 6.](#)

3.1. SeaPro QC Screen 1



3.2. SeaPro QC Screen 2



Section 5: Instrumentation and QC

3.3. Tape Log

Client	SANTOS	BOX 1							
Area	Cape Sorell, Tasmania								
Survey	SS04 2DMMS	Vessel	MV Pacific Titan						
Date	Line Name	Tape	Seq	FF	LF	FSP	LSP	Comments	
8/1/05	SS04-02-001	001	1	979	1160	981	1160	Continue	
9/1/05	SS04-02-001	002	1	1161	2397	1161	2396	Incomplete	
9/1/05	Start of job tests	003	-	1	9	-	-	All tests passed	
9/1/05	SS04-02A-002	004	2	2243	2964	2245	2963	Incomplete	
9/1/05	SS04-02B-003	005	3	2810	4059	2812	4059	Continue	
9/1/05	SS04-02B-003	006	3	4060	5309	4060	5309	Continue	
9/1/05	SS04-02B-003	007	3	5310	5866	5310	5865	Complete	
9/1/05	SS04-019-004	008	4	979	1912	981	1911	Complete	
10/1/05	SS04-017-005	009	5	979	2178	981	2178	Continue	
10/1/05	SS04-017-005	010	5	2179	2189	2179	2188	Complete	
10/1/05	SS04-015-006	011	6	979	2178	981	2178	Continue	
10/1/05	SS04-015-006	012	6	2179	2503	2179	2502	Complete	
10/1/05	SS04-013-007	013	7	979	2178	981	2178	Continue	
10/1/05	SS04-013-007	014	7	2179	2616	2179	2615	Complete	
10/1/05	SS04-011-008	015	8	979	1409	981	1410	Incomplete	
17/1/05	SS04-001-009	016	9	979	2178	981	2178	Continue	
17/1/05	SS04-001-009	017	9	2179	3378	2179	3378	Continue	
17/1/05	SS04-001-009	018	9	3379	3616	3379	3615	Complete	
17/1/05	SS04-010-010	019	10	979	2178	981	2178	Continue	
17/1/05	SS04-010-010	020	10	2179	2456	2179	2455	Complete	
18/1/05	SS04-012-011	021	11	979	2178	981	2178	Continue	
18/1/05	SS04-012-011	022	11	2179	2292	2179	2291	Complete	
18/1/05	SS04-006-012	023	12	979	2178	981	2178	Continue	
18/1/05	SS04-006-012	024	12	2179	2743	2179	2742	Complete	
18/1/05	SS04-008-013	025	13	979	2178	981	2178	Continue	
18/1/05	SS04-008-013	026	13	2179	2435	2179	2434	Complete	
18/1/05	SS04-004-014	027	14	979	2178	981	2178	Continue	
19/1/05	SS04-004-014	028	14	2179	2277	2179	2276	Complete	
19/1/05	SS04-005-015	029	15	979	2178	981	2178	Continue	
19/1/05	SS04-005-015	030	16	2179	2273	2179	2271	Complete	

Client	SANTOS	BOX 2							
Area	Cape Sorell, Tasmania								
Survey	SS04 2DMMS	Vessel	MV Pacific Titan						
Date	Line Name	Tape	Seq	FF	LF	FSP	LSP	Comments	
19/1/05	SS04-003-016	031	16	979	2098	981	2097	Complete	
19/1/05	SS04-007-017	032	17	979	2178	981	2178	Continue	
19/1/05	SS04-007-017	033	17	2179	2353	2179	2352	Complete	
19/1/05	SS04-009-018	034	18	979	2178	981	2178	Continue	
19/1/05	SS04-009-018	035	18	2179	2425	2179	2424	Complete	
20/1/05	SS04-011A-019	036	19	1260	2459	1262	2459	Continue	
20/1/05	SS04-011A-019	037	19	2460	2745	2460	2744	Complete	
20/1/05	End of job tests	038	-	10	18	-	-	All test passed	