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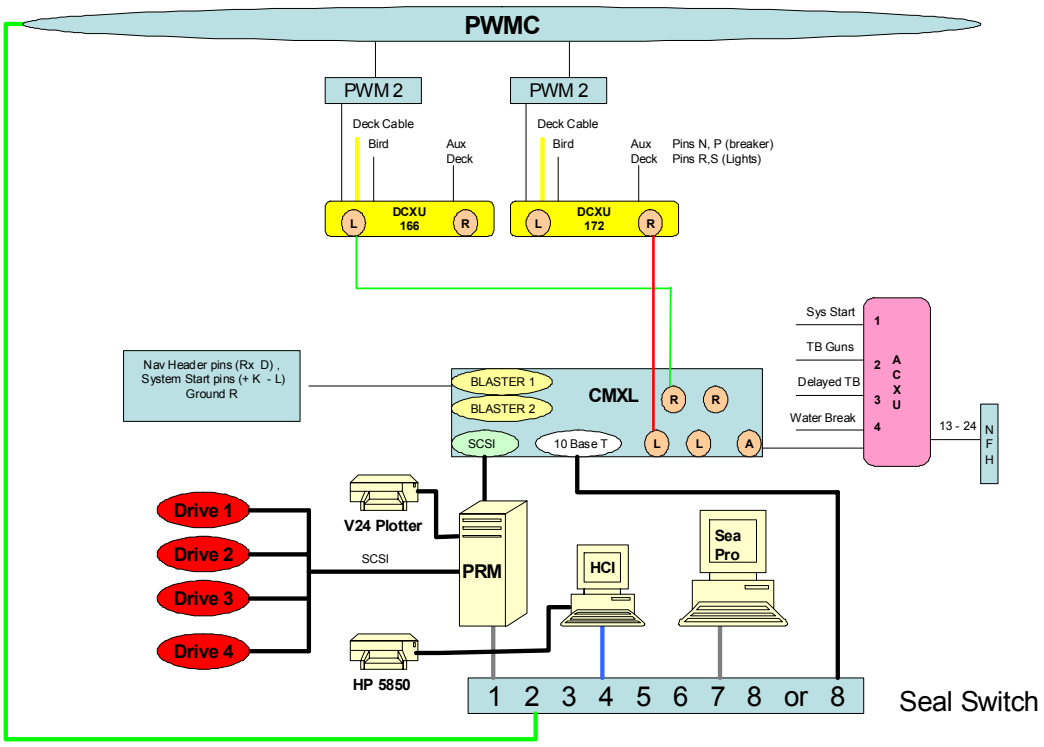


UNIT	MANUFACTURER	SOFTWARE VERSION
Recording	Seal	Seal v. 4.28
Plotter	Veritas 24	N/A
Tape drives	IBM 3590	N/A
Onboard QC	SeaPro QC	SeaPro QC v. 4.0
Source Controller	Gunlink 2000	v. 2.3.0
Auxiliary Systems	Seal ACXU	N/A
Bird Controller	Digicourse DMU + PC	Sys3w01
Tension Monitor	Seal	HAU (head auxiliary unit)
Bird Type	Digicourse	5011

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.

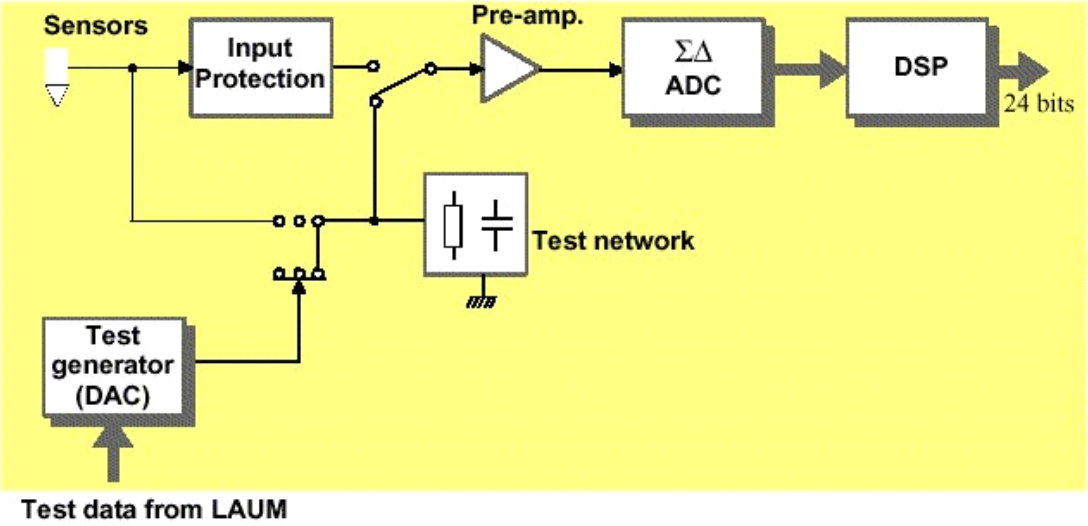
Following tests are only recorded on 3590 Tape and do not have a digital copy: Instrument Pulse and Sensor Impulse.
Following tests are only have digital data and are not recorded to 3590 data cartridge: Sensor Capacitance and Sensor Cut-off.

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.

		Instruments						Field					
Date	**Test**	**Noise**	**Pulse**	**Distortion**	**Cross Talk**	**Gain / Phase**	**Common Mode**	**Impulse**	**Capacitance**	**Cutoff**	**Noise**	**Hydro Leakage**	**Comments**
4 Feb 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
5 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
6 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
7 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
8 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
9 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.

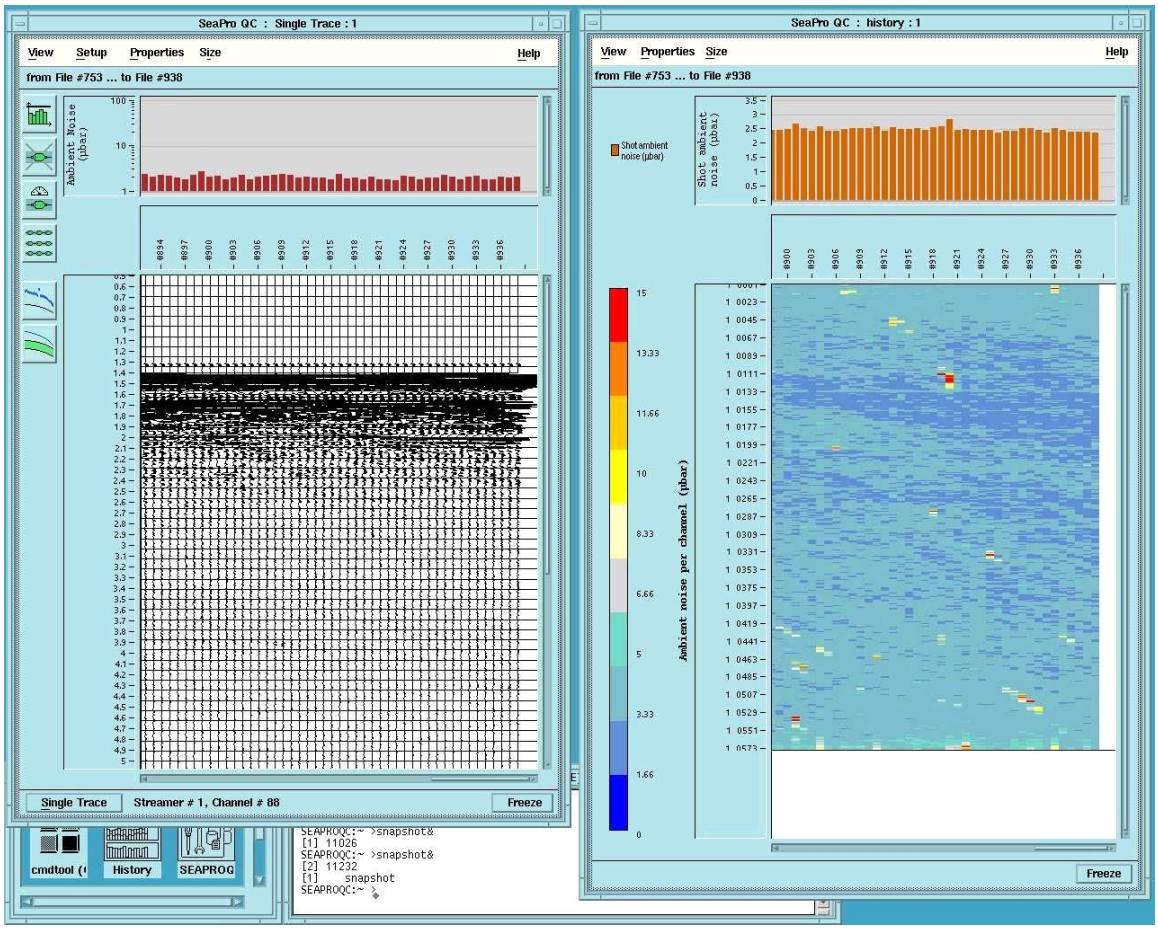
3. QC Products and Processing Sequence

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.

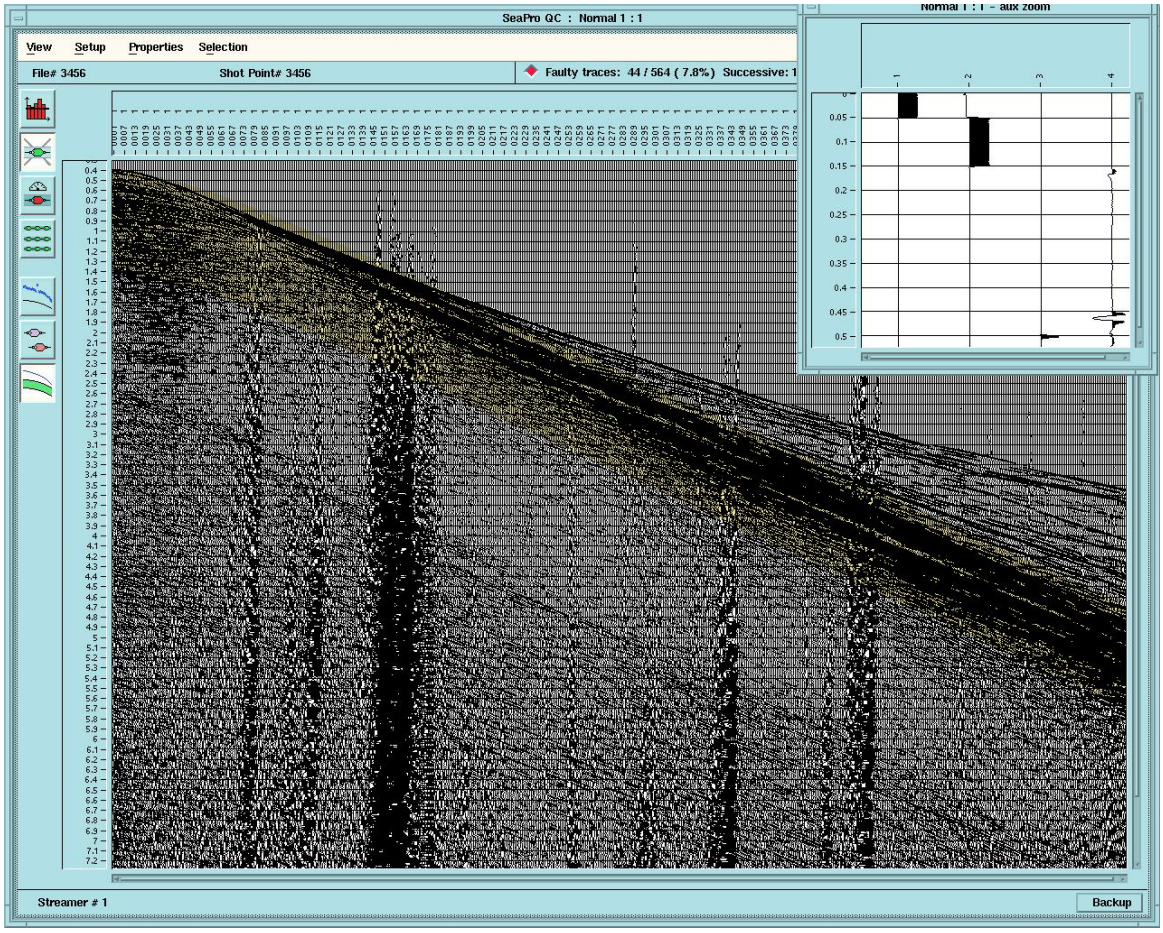
A ProMax system was in use during the survey to further monitor the quality of the Seismic data, and to produce brute stacks.

See separate report in Section 6.

3.1. SeaPro QC Screen 1



3.2. SeaPro QC Screen 2



3.3. Tape Log

Client	SANTOS	**BOX 1**	
Area	Victoria Coast, Australia		
Survey	VIC_P55	**Vessel**	**M/V Pacific Titan**

Date	Line Name	Tape	Seq	FF	LF	FSP	LSP	Comments
4/2/05	GISN05-27-01-001	001	001	979	1723	981	1722	Complete
4/2/05	GISN05-23-01-002	002	002	979	1043	981	1043	NTBP
5/2/05	GISN05-23-02-003	003	003	979	1722	981	1721	Complete
5/2/05	GISN05-19-01-004	004	004	979	1763	981	1762	Complete
5/2/05	GISN05-25-01-005	005	005	979	1727	981	1726	Complete
5/2/05	GISN05-21-01-006	006	006	979	1721	981	1721	Complete
6/2/05	GISN05-21-01-007	007	007	979	1510	981	1509	Complete
6/2/05	GISN05-04-01-008	008	008	979	1289	981	1289	SOL
6/2/05	GISN05-04-01-008	009	008	1289	1518	1289	1517	Complete
6/2/05	GISN05-13-01-009	010	009	979	1635	981	1634	Complete
6/2/05	GISN05-17-01-010	011	010	979	1760	981	1759	Complete
7/2/05	GISN05-11-01-011	012	011	979	2177	981	2176	Complete
7/2/05	GISN05-03-01-012	013	012	979	1737	981	1737	SOL
7/2/05	GISN05-03-01-012	014	012	1738	1908	1738	1907	Complete
7/2/05	GISN05-07-01-013	015	013	979	1866	981	1865	Complete
7/2/05	GISN05-01-01-014	016	014	979	1906	981	1905	Complete
7/2/05	GISN05-05-01-015	017	015	979	1907	981	1906	Complete
8/2/05	GISN05-15-01-016	018	016	979	2178	981	2178	Complete
8/2/05	GISN05-09-01-017	019	017	979	1708	981	1707	Complete
8/2/05	GISN05-08-01-018	020	018	979	1817	981	1816	Complete
8/2/05	GISN05-06-01-019	021	019	979	2032	981	2031	Complete
		END OF JOB						