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KAIREI CRUISE (KR98-04)

Seismic Survey

off Fukushima- Miyagi

（1998 年　福島-宮城県沖調査）

Cruise Report

(April 16. 1998 - May 5,1998)

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Summary

The KR98-04 cruise was conducted as a part of the following researches :

(1) Frontier research program for subduction dynamics ·

(2) Ocean bottom dynamics research

which are being carried out by Japan Marine Science and Technology Center (JAMSTEC). Main objective of the cruise is to make geophysical and geological observations of subduction zones off FUKUSHIMA-MIYAGI where is known as one of the most active seismogenic zone in Japan, in support of revealing the mechanism of subduction zone earthquakes.

During the cruise we used the R/V "KAIREI" of JAMSTEC to conduct a high-resolution seismic survey offshore the FUKUSHIMA and MIYAGI prefectures of northeastern Japan from 16 April to 6 May, 1998. The survey area is shown in Figure 1.

We acquired 866.65 Km of seismic reflection data by a 120-channel digital streamer cable. Four 1000 cubic inch air guns were used as the seismic energy source. The survey line is shown in Figure 2. An onbord-processing result of the Line FK102 was shown in Figure 3.

Refraction data were also obtained by 15 ocean bottom seismometers (OBSs). The OBSswere deployed around the fore-arc region, in cross and parallel direction to the trench axis. The OBS coordinates are listed in Table 1. Furthermore, we observed gravity and 3-component geomagnetic data during the cruise.

1. Survey outline

1.1 Survey area

The survey area of KR98-04 cruise is located around the Japan Trench off Fukushima and Miyagi prefectures, as shown in Figure 1. Large earthquakes associated with subduction of the Pacific Plate at the Japan trench sometimes occur.

As shown in Figure 2, the following four survey lines were planed and observed.

Line Name	Direction	Length planed	Length observed
FK101	WNW-ESE	314 Km	209.15 Km
FK102	WNW-ESE	294 Km	264.10 Km
FK201	NNE-SSW	180 Km	186.45 Km
FK202	NNE-SSW	180 Km	206.95 Km
Total Line Length		968 Km	866.65 Km

The line length mentioned above is that of data acquisition with a streamer cable. These four lines were indicated as solid lines in the Figure 2. Both multi-channel seismic (MCS) reflection survey and refraction survey by ocean bottom seismometer (OBS) have been made by using air-guns as a seismic energy source, on the line FK102 and FK201. Only MCS survey has been done on the line FK101 and 202. In the Figure 2, a dot line indicates a shooting by 200 m interval, without a streamer cable, for acquisition of only seismic refraction data by the OBS.

The OBSs were deployed in the fore-arc region, from 1500m to 5000m in water depth. These locations are listed in Table 1.

1.2 Time schedule

The R/V KAIREI has left the JAMSTEC Natsushima port on 16 April 1998, and has come back to the JAMSTEC port on 5 May 1998 in this cruise. The survey duration was totally 20 days.

On 17 April, we deployed OBSs on the line FK102 and 201, from 1500m to 5000m in depth. It takes 15 hours for the deployment work.

Data acquisition work has been conducted from 19 April to 30 April. The survey lines were shown in Figure 2.

We have carried out a work of picking up OBSs from 1 May to 4 May. Unfortunately,

OBS9 could not be recovered, due to no response of a transponder. We are investigating detailed of this problem.

A detailed time schedule is shown in Table 2.

1.3 Weather and sea status

Fortunately, weather in the survey area has been almost fine through the survey, so that sea status has been very stable excluding only a few days. We had only one stop shooting, at this voyage, on the line FK202 by bad weather with high wind.

1.4 Participan ts

Participant researchers on KR98-04 cruise are as follows:

Tetsuro TSURU, Frontier research program of subduction dynamics, JAMSTEC (Chief scientist)
Shuichi KODAIRA, Deep sea research department , JAMSTEC
Seiichi MIURA, Frontier research program of subduction dynamics, JAMSTEC
Ayako NAKANISHI, Frontier research program of subduction dynamics, JAMSTEC

Participants who have taken the vessel as engineers, officers and crew are shown in Table 3.

2. Observation system

The observation systems for MCS reflect ion survey are as follows:

- Streamer cable: Syntron Digital Streamer
- Air gun: Bolt par airgun
- Recording system: Syntron SYNTRAK 480
- Navigation system: Magnavox MX9212/9112 (Differential GPS), JGI C-NAV
- Processing software: JGI iXL

Detailed infor mation of the above systems are shown in the Attachment 1.

The observation systems for seismic refraction survey by the OBS are as follows:

- OBS: Katsushima Co., Ltd. POBS-100, 4-component digital OBS
- OBS setting system: CloverTech MC1460
- Shot tim e recording system: True Time XL-AK, CloverTech MC1460

・Air gun: Bolt par airgun

Detailed information of the above systems are shown in the Attachment 2.

Furthermore, we used the following systems for observing geoscience data.

・Shipboard three compo nent magnetometer: Tierra Technica, SFG-11214

・Proton precession magnet meter: Kawasaki Geological Engineering Co., LTD, PRT10 magnetometer

・Gravity meter: BODENSEEWERK, KSS31 marine gravity meter

・Multi-narrow beam : SeaBeem Instruments, SEA BEAM 2112

3. Survey specifications

The specifications of MCS reflection data acquisition and refraction data acquisition by OBS are shown in Table 4 and Table 5, respectively.

4. MCS onboard-processing result

We have conducted onboard processing of MCS data by the iXL software. Figure 3 shows a CDP stacked section of the line FK102.

In this figure, subducting configuration of the oceanic crust at the Japan trench is clearly visible. However, we can not see any horst and graben, on FK102, which have been observed at offshore Sanriku area, while some sea mounts are recognized in this survey area.

Undulation at the top of the oceanic crust land ward of the trench axis is recognized on the seismic section. Such structural irregularity at the top of the oceanic plate may play a role in coupling of the plate boundary where subduction-related earthquakes are generated.

Furthermore, the Moho discontinuity is recognized as a more remarkable acoustic impedance boundary on the seismic section seaward of the trench than landward one. Subduction-related deformation in sediments landward of the trench axis is visible.

5. OBS preliminary result

Examples of wide-angle OBS data are shown Figure 4. Wide-angle arrivals from oceanic Moho are clearly identified. It is expected that to image a subducting Pacific plate down to the Japanese Island by combing data from land stations.

Table 1. OBS positions

<Deployment>

OBS No.	Day	Hour	Minute	Second	Lat° Lat´	Lon° Lon´	Water depth(m)
1	4 17	10	33	50	36 42.8958	141 46.3760	1886
2	4 17	9	51	50	36 40.1330	141 52.1179	2316
3	4 17	9	6	30	36 37.3103	141 57.9022	2486
4	4 17	8	14	25	36 34.5176	142 3.6708	2563
5	4 17	7	28	35	36 31.7232	142 9.4046	2931
6	4 17	6	45	13	36 28.8944	142 15.0659	3508
7	4 17	6	3	5	36 26.1116	142 20.7679	3337
8	4 17	4	25	30	36 23.2356	142 26.4679	4218
9	4 17	2	19	16	36 20.4257	142 32.1665	4951
10	4 16	23	59	40	36 43.8294	142 10.4916	2552
11	4 16	22	59	43	36 53.1065	142 17.3264	2805
12	4 16	22	4	5	37 2.3475	142 24.2188	2320
13	4 16	21	8	45	37 11.6224	142 31.0914	1779
14	4 16	20	11	53	37 21.0019	142 38.0862	1615
15	4 16	19	9	35	37 30.2367	142 45.0765	2290

<Recovery>

OBS No.	Day	Hour	Minute	Second	Lat° Lat´	Lon° Lon´	Water depth(m)
1	5	1	13	52	36 42.9051	141 46.2179	1874
2	5	1	14	36	36 40.2261	141 52.2073	2314
3	5	1	17	24	36 37.3881	141 57.8659	2483
4	5	1	19	12	36 34.5288	142 03.7340	2567
5	5	1	21	03	36 31.8539	142 09.4999	2931
6	5	2	5	45	36 29.0052	142 15.0789	3506
7	5	2	7	50	36 26.2400	142 20.9476	3324
8	5	2	10	15	36 23.3012	142 26.5161	4190
9	Not recovered.Leave the position 16:30*						
10	5	4	13	1	36 43.7781	142 10.4541	2549
11	5	4	11	7	36 53.0020	142 17.2568	2801
12	5	4	9	32	37 2.1324	142 24.1130	2310
13	5	4	7	34	37 11.5085	142 31.0206	1779
14	5	4	5	34	37 20.9317	142 37.9563	1596
15	5	4	3	56	37 30.0677	142 45.0710	2295

* We received no reply from a transponder. A release command has been transmitted and we then waited for its coming up for 2 hours, which is more than usual coming up time. We received no radio signal from the OBS and could not find the OBS around where it has been deployed.

Table 2. 調査日程表

月日	時刻	作業項目	備考
4/16	09:00	センター出港	
4/17	01:00	測線 FK201 の北端付近着	
		三成分地磁気観測のための８の字走行実施	
	02:15	OBS コマンダー作動確認作業	
	03:00	OBS 投入作業開始	OBS No.8,9 のみ着底確認作業実施
	19:30	OBS 投入作業終了	15 個全て投入
		SeaBeem による海底地形調査実施	NE-SW の 4 測線
4/18	09:00	小名浜港にて人員の乗下船	
	10:30	移動開始	測線 FK102 東端まで
		警戒船調査海域に到着 プロトン投入	
4/19	04:00	測線 FK102 東端付近で８の字走行実施	
	05:00	プロトン揚収	
	06:00	ストリーマー巻き出し ケーブル（active section） 2 本交換 モジュール（active module） 2 個交換 ケロシン注入１２箇所	
	13:00	ストリーマー巻き出し終了	
		エアガン投入	
	15:00	測線 FK102 の観測作業開始	東端より開始
		測線の一部でデータ通信（伝送）エラーによる lost shot 発生。潮流が速い場所では 10shot 中に 1 回の割合で記録されない事態が発生した。 エアガンは順調に作動した。	エラーに対する対処は、本測線終了後実施することとした。
4/21	18:00	測線 FK102 の観測終了	
		ストリーマー約 10 チャンネル分揚収、 各 section 毎に active module を挿入し、再度曳航してデータ通信エラーの発生箇所を調査した。	
		データ通信エラー発生箇所の補修作業実施。	

		ケーブル（active section）5本交換 モジュール（active module）1個交換	
4/22	7:00	エアガン調整作業 ジャンパーケーブル1本交換	
	10:00	ガン投入	
	10:30	FK201 測線の観測を開始	
4/23	12:00	FK201 測線の観測終了	
		ストリーマーを曳航したまま移動	移動先：FK202 北端
		FK202 測線の観測を開始	
4/25	17:00	FK202 測線の観測を中断	波高 3m、風速 15m
		エアガン揚収、 ストリーマー巻き上げ	
	21:00	FK202 測線の南端へ移動しながら荒天待機	待機時間：約 10 時間
4/25	7:00	ストリーマー巻き出し ケーブル（active section）1本交換 ストレッチングセクション1本交換 ケロシン注入5箇所	
	10:30	ガン投入	
	11:30	FK202 測線の測定を再開	南端より測定開始
	22:40	エアガン制御装置（GUN Network）トラブル発生。 FK202 測線の測定を終了	
		ガン揚収 ストリーマーを曳航したまま移動 エアガン制御装置の修理作業を実施	移動先：FK101 西端
4/26	23:00	ガン投入	
4/27	0:00	FK101 測線の観測を開始	水深約 1500m 地点から東側へ向けて測定を開始
4/28	6:00	FK101 測線の観測終了	
		ストリーマー巻き上げ 警戒船調査海域を離れる	
		FK102 測線の東端より約 70km 地点へ移動	
	14:00	ガン投入	
	14:30	OBS 専用データの測定を開始	200m 間隔で発振
4/30	12:00	OBS 専用データの測定終了	

	13:00	エアガン曳航テスト実施	片舷 2 本のトーイングバーを降下してのテストを行う。
	14:30	FK102 測線西端で 8 の字走行実施	
5/1	9:00	小名浜港にて人員の乗下船	
		移動	
	13:00	OBS 回収作業を開始	
5/4	16:20	OBS 回収作業を終了	
	16:30	調査海域を離れる	
5/5	9:00	センター帰港	

Table 3. 参加者リスト

主席研究員　鶴哲郎（JAMSTEC）	次席研究員　小平秀一（JAMSTEC）
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観測技術員　小寺透（日本海洋事業）	観測技術員　片山健（日本海洋事業）
観測技術員　柏瀬憲彦（日本海洋事業）	観測技術員　横井大作（日本海洋事業）
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三機士　船江幸司（日本海洋事業）	通信長　那須東輝登（日本海洋事業）
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司厨手　芳川輝幸（日本海洋事業）	司厨員　高津忠幸（日本海洋事業）
総　計　５２名	

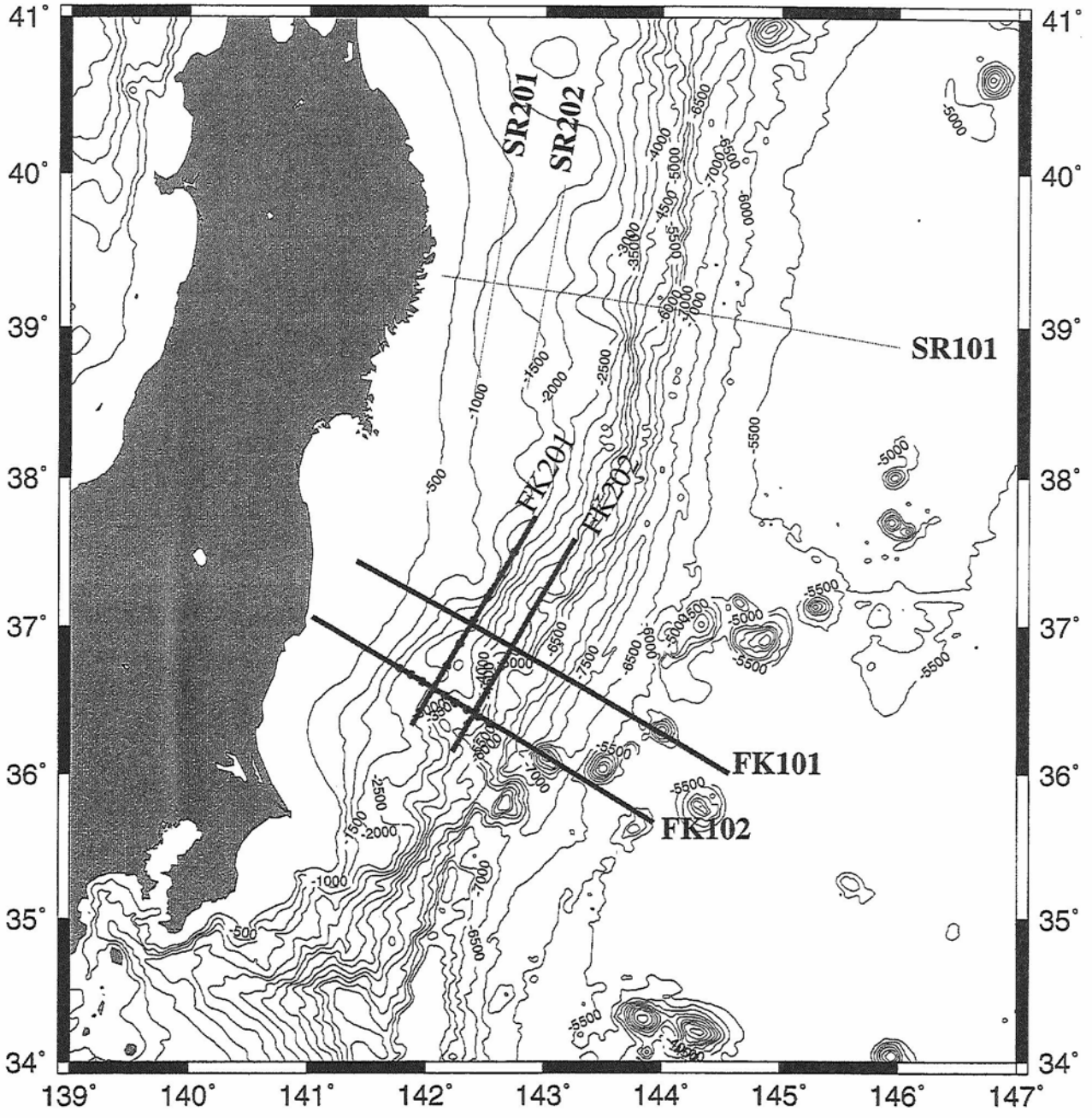
Table 4. Specification of MCS data acquisition

Shot interval	50 m
Group interval	25 m
Total channel number	120 ch
Minimum offset	220 m (standard)
Maximum offset	3200 m (standard)
Source type	Airgun, 4×1000 cu.in., 2000 psi
Receiver type	Hydrophone, 16 bit digital streamer
Source depth	8 m (standard)
Source offset	20 - 31m
Receiver depth	15 m (standard)
Record length	13.5 sec
Sampling interval	4 msec
Water delay	0 sec (Wate r depth < 3000 m) 2 sec (3000 ≦ Water depth < 7000 m) 3 sec (7000 m ≦ Water depth)
Recording system	Syntrak 480
Filter @ recording	Low cut 3 Hz (6dB/Oct.), High cut 102 Hz (209 dB/Oct.)
Output tape format	SEG-D
Navigation	Differential GPS

Table 5. Specification of seismic refraction data acquisition by OBS

Shot interval	50 m (200 m only on FK102)
Source type	Airgun, 4×1000 cu.in., 2000 psi
Source depth	8m (standard)
Source offset	20 - 31m
OBS interval	ca. 9 km on FK102, ca. 20 km on FK201
Sampling interval	10 msec
No. of channels	4 ch. V, H1, H2 and Hydrophone
Recording period	17 days continuos recording
Analog amp gain	60 dB
Navigation	Differential GPS
Shot time recording	True-Time XL-AK, CloverTech MC1460

福島・宮城県沖日本海溝周辺での調査海域図



観測予定測線（太実線）、海底地震計設置予定点（黒丸）
細実線は「かいれい」によるMCS運用調査訓練（KR97-07）で実施した測線である。

Figure 1. Survey area

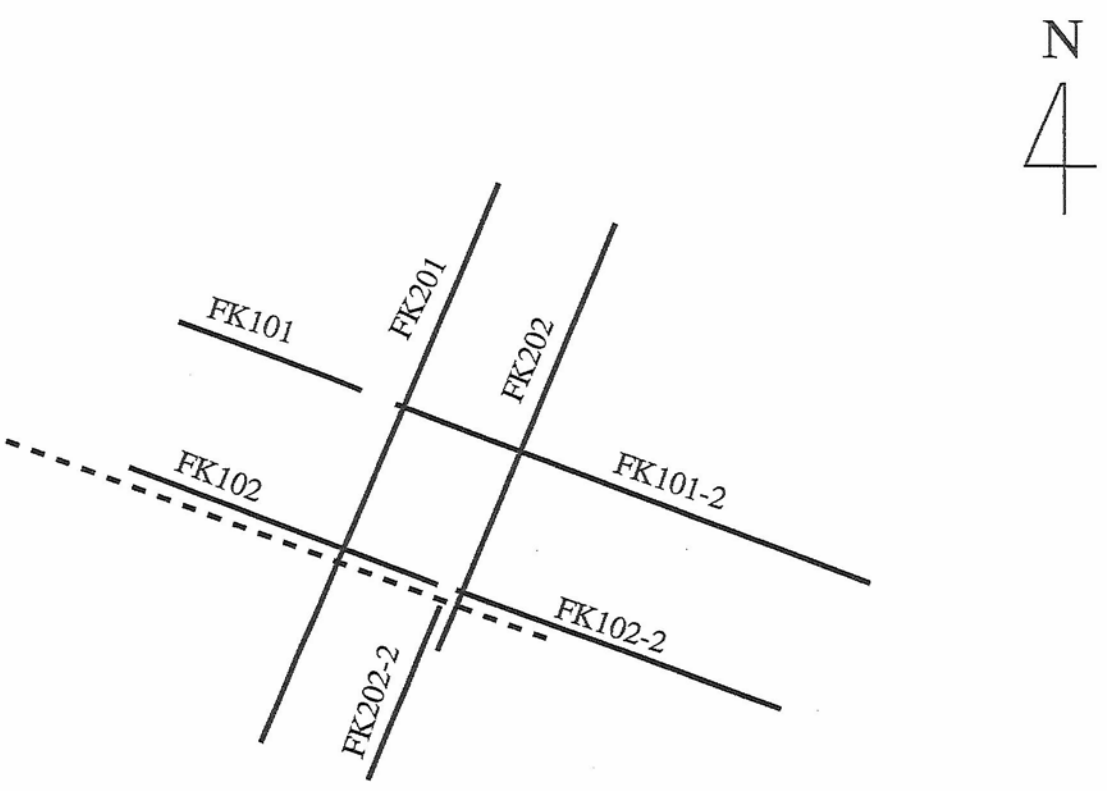


Figure 2. Line map
Solid lines show seismic survey lines with a streamer cable. A dot line is one for only OBS observation without the cable.

<Line FK101>	<101>						
SP No. at each segment	1001	1102		<101-2>			
			1001				5081
Sequential SP No.	1001	1102	1261				5341
<Line FK102>	< 102>						
SP No. at each segment	1001		1397	<102-2>			
				1001			5885
			1397				
Sequential SP No.	1001		1430				6314
<Line FK201>	no segment						
SP No. at each segment	1001					4729	
Sequential SP No.	1001					4729	
<Line FK202>	<202>						
SP No. at each segment	1001		3107	3564	<202-2>		
			2575	2118			1001
Sequential SP No.	1001		3107	3564			4681

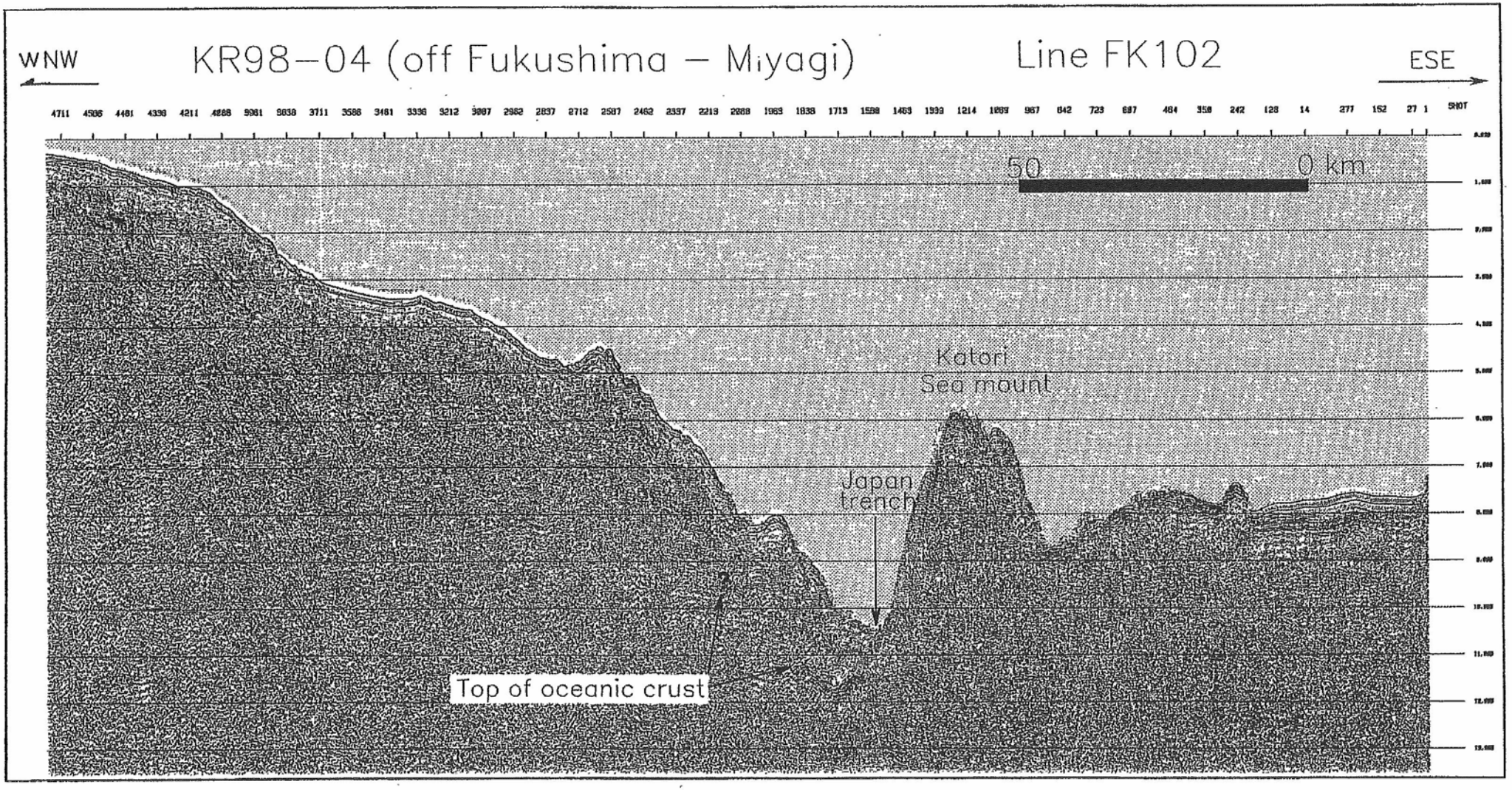


Figure 3. Onbord-processing example of MCS data on Line FK102

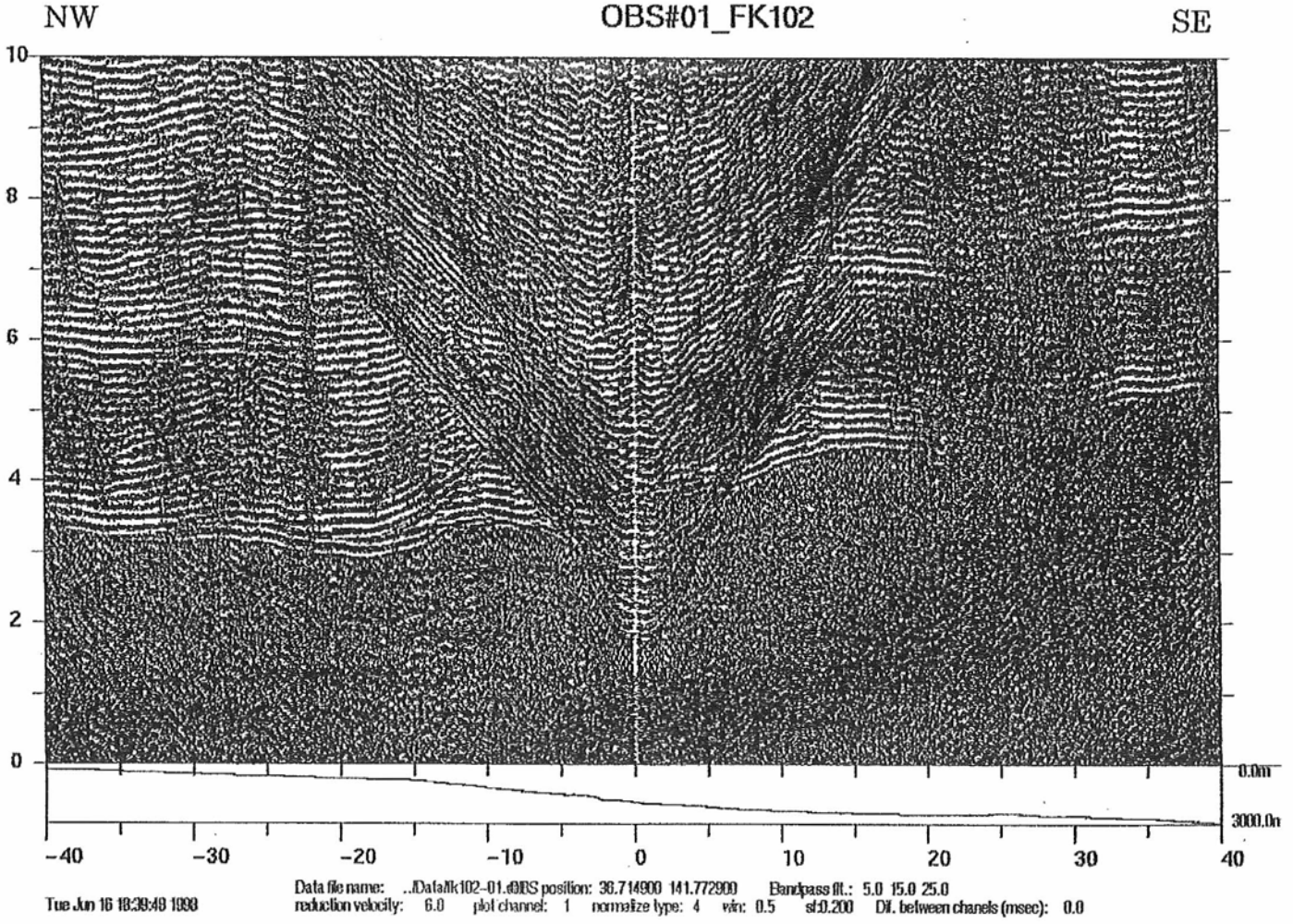


Figure 4. Example of OBS – Airgun data, vertical component signal applied 5 – 25 Hz band-pass filter, maximum amplitude normalized. Horizontal axis is offset distance (km) from OBS#01. Right side of this figure is southeast. Vertical axis is travel time (s) reduced by reduction velocity 6.0 km/s. OBS#01 is the westernmost site on Line FK102. Bathymetry is also displayed below data section.

1　システムの概要

本システムは、主として海上におけるマルチチャネル反射法地震探査を行なうために設計されたものであり、

震源部
受振システム部
測位部
データ解析部

から成っている。

本システムは，海洋底研究、地震防災等の為の海洋地殻構造調査に使用され、深部地殻探査能力の他に、海底掘削地点等の高分解能地殻探査能力も兼ね備えるものである。

このシステムでは、水中に曳航される震源から発生され地殻の中の地層境界から反射してきた地震波を、最大３０００メートルの長さの水中ケーブルに内蔵された多数の受振器により検出し、これをデジタル録音する。また、発震位置を等間隔で正確に制御するためＧＰＳを利用し地震探査専用に構成された測位システムを用いる。また、デジタル録音されたデータは、船上において品質管理のための予備解析が行われる。

また本システムは、調査のたびに適切な調査船に艤装され調査後には取り外せることを前提としており、システムの主要部は海上コンテナーに装備されている。（ポータブル性）

システムの構成はFIG. 1-1に示される。

震源部は、

水中に曳航される震源本体（エアガン）、
これに圧縮空気を送るコンプレッサー（エンジン付き）、
発震を制御する震源制御器

から成っている。深部探査用としては、ボルト社の大容量エアガン（波形制御器付き770立方ｲﾝﾁ）を船の左右から合計４ケ、すなわち、３０８０立方ｲﾝﾁ（５０ﾘｯﾄﾙ）で使用できるものである。システムのポータブル性の要求から、いわゆる調和配列のエアガンアレーは採用されていない。また、高分解能調査用としては、ＳＳＩ社のＧガン（３００立方ｲﾝﾁのクラスター式を２組使用。合計６００立方ｲﾝﾁ）が用意されている。各エアガンの発振時のばらつきは、ＭＡＣＨＡ社の震源制御器により、自動的に調整される。
コンプレッサーについては、最大容量のエアガンのとき、２０００ＰＳＩ（１４０気圧）の圧力、平均船速４ノットで５０ｍ間隔で発振できるよう、４００ＳＣＦＭ（１８９ﾘｯﾄﾙ/SECの吐出量）のもの２台が用意されている。
コンプレッサーのマニホールドは、８ケのガンまで扱える用設計されている。また、コンプレッサーの汚濁水はドレインセパレータで処理された後、排水される。

受振部は、

受振器を内蔵したデジタル型ストリーマケーブル、
中央制御および記録装置
ケーブル深度調整器とその制御器
ケーブル巻き取りリール（電動油圧モーター付き）

から成る。受振器の間隔は、通常２５ｍであるが、プログラムプラグにより、１２．５ｍ，６．２５ｍも可能である。チャネル数は１２０であるが、予備品を増加させれば、４８０チャネルまで拡張できる。ケーブル深度は、中央からの指令により自動的に制御され、モニター上で監視できる。ケーブル深度制御器には、磁気コンパスも装備されており、船のコースに対するケーブルのドリフトモニターできる。ケーブルの最大長は３０００ｍ（２５ｘ１２０）である。

中央制御器は４８０チャネルまでのデータを、１、２、３、４ミリ秒のサンプル間隔で８０００サンプル（４ミリのサンプルレートで３２秒）の記録長が扱える。

測位部は、

ＧＰＳ受信器

これから受けた位置情報から発震位置を作り出す測位制御システム

から成る。但し、本プロジェクトでは、複合ナビゲーションシステムの構築、または、リアルタイムのデイファレンシアルＧＰＳナビゲーションを行なうことは仕様にはなく、単体のＧＰＳによるナビゲーションを行ない、必要に応じて陸上レファレンス観測によるポストプロセスのデイファレンシアル処理が行なえるように設計されている。

以上のシステムは装置は有機的に結合され、以下のような手順で記録が得られる。

a　測位部は調査船が一定距離進む毎（距離モード）に、開始信号を受振部の中央制御装置に送る。
b　中央制御装置が記録可能状態であることを確認し、震源制御器に発震命令を出し
c　震源が発震される。震源制御器は震源装置に取り付けられた発震検出器から返された信号を確認しこれを中央制御装置に送り返す。
d　これによって、ストリーマケーブルで受振された地震波の記録が開始される。
e　これらの手順と、記録は中央制御器に取り付けられたデイスプレー上でモニターされ、記録はＩＢＭ３４８０互換の磁気テープ上に記録される。

単体のＧＰＳ受信器の精度は、約数十メートルであり、位置測量としては大きな問題はないが、この位置データから求めた時間でエアガンの発振信号を出すことは、ＧＰＳの受信状況が悪い場合には問題となり、このため時間モードの発振方法も用意されている。

データ解析部は、

小型コンピュータシステム（ＭＩＴ社のＩＸＬシステム）

地震探査データ処理ソフトウエア（ＩＸＬソフトウエア）

から成り、上記のシステムとは直接結合せず、得られたデータの船上に置ける品質の管理や、予備的解析を行うものである。このシステムは陸上にも１セットが設置され、バックアップ用および研究的解析に使用される。ハードウェアは、ＰＥＮＴＩＵＭ　９０ＭＨＺのＣＰＵを用いたＡＬＲ社のＰＣを中心にＭＩＴ社で構成され、ＵＮＩＸ　ＯＳで動くものである。ソフトウェアは、反射法の標準処理および特殊処理の機能が用意されている。この他に、

震源波形テスト装置

も用意され、震源波形を水深３００ｍに降下したハイドロホンで観測し、解析を行なうことができる。

表１－１にはシステムの主要性能を、表１－２には各システム構成要素とその数量を示す.

表１－１　マルチチャネルシステム　主要性能

番号	項目	型式	主要性能
A	震源部		
A－1	大容量ｴｱｶﾞﾝ	BOLT PAR AIRGUN 1500CT	合計容量：約3000立方ｲﾝﾁ（49ﾘｯﾄﾙ） 動作圧力：2000psi 波形制御ｷｯﾄ付き 曳航装備：ﾌﾞｲ付き簡易型　（2分割）
A－2	高分解能ｴｱｶﾞﾝ	SSI G-GUN	ﾀｲﾌﾟ：　ﾊﾞﾌﾞﾙ抑制型 合計容量：約600立方ｲﾝﾁ 動作圧力：2000psi 曳航装備：ﾌﾞｲ付き簡易型
A－3	ｴｱｶﾞﾝ制御器	MACHA THE GUN NETWORK	取扱いｶﾞﾝ数：8ｹ 時間制御：自動および手動 時間制御精度：100ﾏｲｸﾛ秒
A－4	ｺﾝﾌﾟﾚｯｻｰ	加地ﾃｯｸ/ ｻｰﾋﾞｽｴﾝｼﾞﾆｱ H4-180	合計吐出量：約800SCFM １台の吐出量：約400SCFM 動作圧力：2000PSI ｴｱｶﾞﾝ発震ｻｲｸﾙ：約20SEC／3000立方ｲﾝ 動力：ｼﾞｰｾﾞﾙｴﾝｼﾞﾝ（ﾏﾘﾝｼﾞｰｾﾞﾙ油） 冷却法：水冷，ﾎﾟﾝﾌﾟ付き ﾏﾆﾎｰﾙﾄﾞ：8ｶﾞﾝ用
A－5	ｴｱｶﾞﾝ降下 装置	地科研	電動ｳｨﾝﾁ付き、 釣り上げ重量：500KG
B	受振部		
B－1	受振ｹｰﾌﾞﾙ	SYNTRON SYNTRAK 480	ﾀｲﾌﾟ：ﾃﾞｼﾞﾀﾙｽﾄﾘｰﾏｹｰﾌﾞﾙ ﾁｬﾈﾙ数X受振器間隔： 120X25m、 120X12.5m 120x6.25m 最大ｹｰﾌﾞﾙ長：3000m 増幅ﾀｲﾌﾟ：IFP型、15ﾋﾞｯﾄ　AD出力＋ 3ﾋﾞｯﾄX12dbｹﾞｲﾝ ﾃﾞｼﾞﾀﾙ化ｻﾝﾌﾟﾙﾚｰﾄ：1msec ｴﾘｱｽﾌｨﾙﾀ：250hz
B－2	中央制御／ 記録装置	SYNTRON SYNTRAK 480	最大取扱いﾁｬﾈﾙ数：480 ｻﾝﾌﾟﾙﾚｰﾄ変換：1、2、4　msec 磁気ﾃｰﾌﾟ：IBM3480互換ｶｰﾄﾘｯｼﾞ ﾌﾟﾛｯﾀｰ：感熱型、24ｲﾝﾁ幅

			ｸﾞﾗﾌｨｯｸ ﾃﾞｽﾌﾟﾚｰ：1280x1024 ﾄﾞｯﾄ
Ｂ－３	ｹｰﾌﾞﾙ深度調整/制御器	SYNTRON MULTITRAK	取付法：ｹｰﾌﾞﾙ外部 制御法：中央制御、ｲﾝﾀﾞｸｼｮﾝｺｲﾙによる磁気ｺﾝﾊﾟｽ付き
Ｂ－４	ｹｰﾌﾞﾙﾘｰﾙ	FRAZER STREAMER REEL H1402	取扱いｹｰﾌﾞﾙ長：3900m、径3ｲﾝﾁｹｰﾌﾞﾙ 回転制御：0-10RPM 動力：電動油圧　25HP
Ｃ	測位部		
Ｃ－１	ＧＰＳ受信器	MAGNAVOX MX9212/9112	台数：3（１台：ﾌﾞﾘｯｼﾞ専用） ﾁｬﾈﾙ数：12 位置更新周期：約１秒 受信周波数：Ｌ１，Ｃ／Ａｺｰﾄﾞ 出力ﾃﾞｰﾀ：NMEA0183ﾌｫｰﾏｯﾄ
Ｃ－２	測位制御装置	地科研 C-NAV	ＣＰＵ：ＩＢＭ互換ＰＣ（COMPAQ） 航跡表示：ＸＹまたは測線準拠表示 信号発振ﾓｰﾄﾞ：当時間、等距離、等距離投影、ﾏﾆｭｱﾙ ﾃﾞｰﾀ記録：ﾌﾟﾘﾝﾀｰ、磁気ﾃﾞｽｸ ﾃﾞｰﾀﾌｫｰﾏｯﾄ：ＳＥＧ－Ｐ１ 応用ｿﾌﾄ：測線図作成
Ｄ	ﾃﾞｰﾀ解析部		
Ｄ－１	ﾃﾞｰﾀ処理装置	MIT IXL	会話型地震探査処理ｼｽﾃﾑ CPU：ALR/PENTIUM　90MHZ MEMORY：64MB ﾊｰﾄﾞﾃﾞｽｸ：3GB ｶﾗｰﾃﾞｽﾌﾟﾚｰ：1280X1024 ﾊｰﾄﾞｺﾋﾟｰ：11ｲﾝﾁ幅，ｶｯﾄ紙および連続 ﾌﾟﾛｯﾀｰ：24ｲﾝﾁ感熱型 磁気テープ：IBM3480互換 9ﾄﾗｯｸ6250BPI 大容量ﾃｰﾌﾟ：8MM,5GBYTE ｵﾍﾟﾚｰﾃｲﾝｸﾞｼｽﾃﾑ：UNIX／WINNDOWS 応用ｿﾌﾄ：反射法標準および特殊処理
Ｄ－２	波形ﾃｽﾄ装置	REF-TEK17 ﾄｰﾖｰｺｰｹﾝ　MA-5 GAGE/SCOPE	校正済みﾊｲﾄﾞﾛﾎﾝ 降下装置、ｹｰﾌﾞﾙ：300m 波形記録／解析器
Ｅ	海上ｺﾝﾃﾅｰ		20X8X8ﾌｨｰﾄ 記録室、測位室、ｶﾞﾝﾙｰﾑ、倉庫 40X8X8ﾌｨｰﾄ

マルチチャンネル地震探査システム

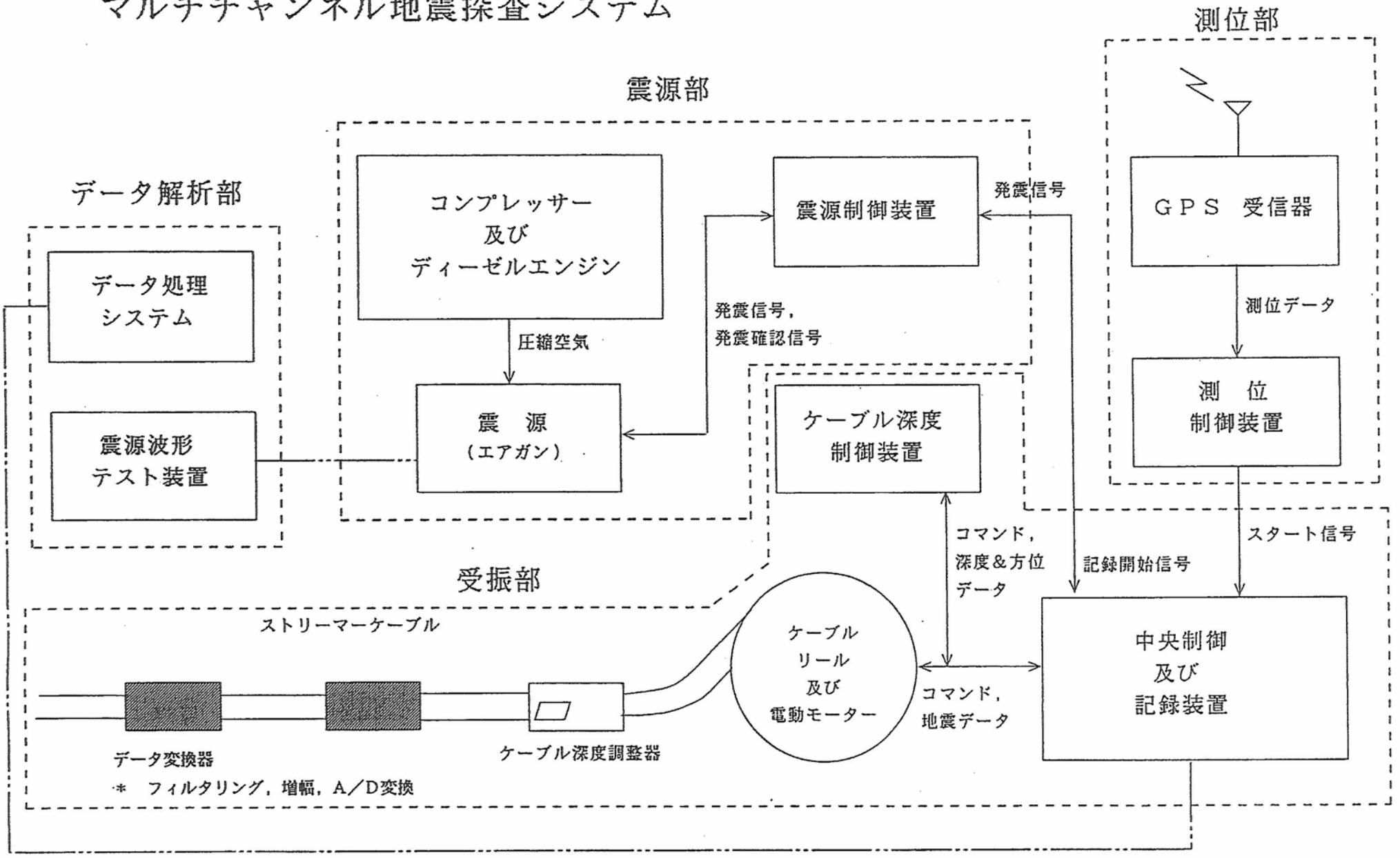
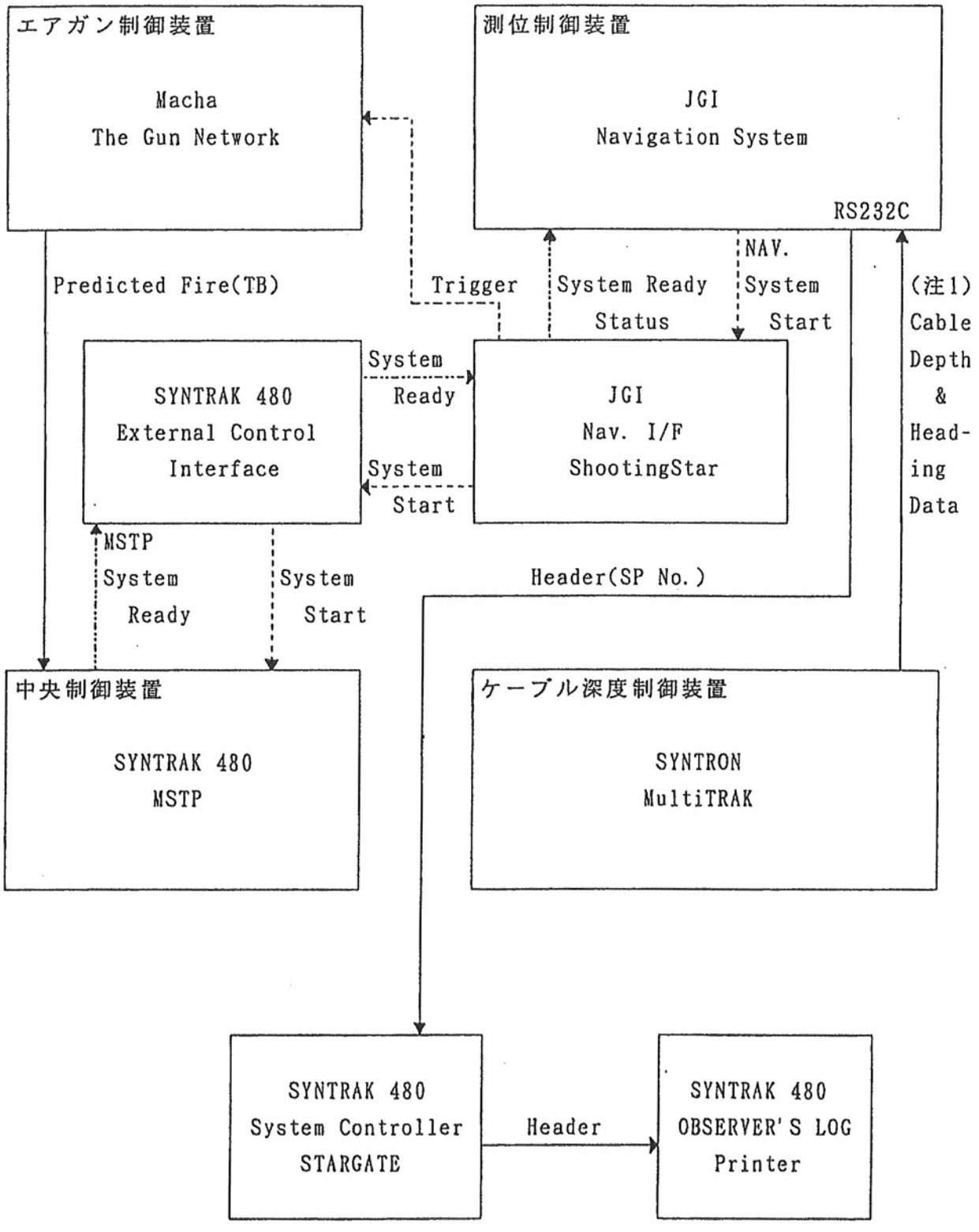


FIG. 1－1



注 1) Cable Depth & Heading Data については、現在接続されていない。
測位制御装置のソフトウェア変更によって、測位データと共に毎発震点の深度データ等を記録する事が可能となる。

Fig. 3－2　BLOCK DIAGRAM
(NAV. SYSTEM / GUN NETWORK / SYNTRAK 480 / MultiTRAK)

Attachment 2

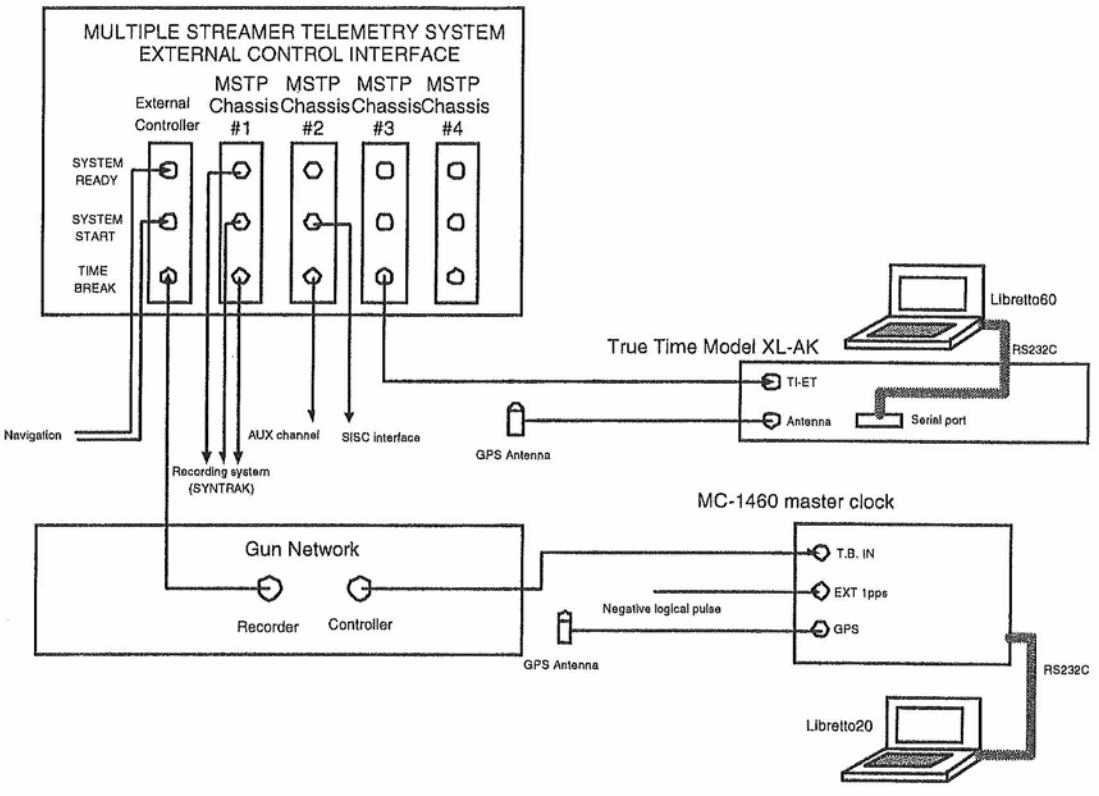
2-1 OBS technical specification (Shinohara et al., 1993)

- Sensor 3-component seismometer (MarkProducts L25B, 4.5Hz) with gimbal mechanism. Hydorophone (Benthos ??)
- Reocrder

CPU	8-bit (HD64180)
RAM	SRAM 1MB (Memory card)
ROM	EPROM 32 DB (27C256)
Number of ch.	4 ch
Analog amp gain	Variable (20, 40, 60 dB)
A/D resolution	16 bit(CS5102)
Max. input sinbal	4.5Vp-p
Sampling rate	Variable (100, 200 500 Hz/ch)
Recording media	DAT
Recording capacity	1GB
Recording period	17 days (100 Hz sampling on 4 ch, continuous recording)

- Power supply 32 alkaline dry cells
- Pressure vessel 17 inch glass sphere (BENTHOS)
- Release mechanism Electric dissolution by acoustic commands
- Weight 88 km at deployment, 48 km at recovery
- Size 1.0m (L) 0.7 m(W), 0.5m(H)

2-2 Shot time recording system



Attachment 3 (1/9)

JGI MARINE SURVEY GENERAL INFORMATION

GENERAL

CLIENT: JAMSTEC
PROSPECT: KR98-04
AREA: 福島宮城沖日本海溝
LINE: FK101 E 118°
DIRECTION: W ~~W~~ → E W (~~298~~°)
DATE: 26 Apr. 98 ~ 27. Apr. 98
WEATHER: ◎
WIND: 9.0 m/sec.
SEA CONDITION: 4

FIRST SP No. 1001 FILE No. 0
TIME 23 H 56 M
LAST SP No. 1102 FILE No. 101
TIME 00 H 53 M

Number of Channels: 120
Channel Interval: 6.25, 12.5, (25) m
Shot Point Interval: 50 m
CDP Fold: 3000 %
Cable Depth: 15 m

SOURCE

TYPE: Par AIRGUN, G GUN
LINEAR CLUSTER: SINGLE, DOUBLE, NO
No. of Strings: 1, 2, 3, (4)
Configuration: 1000 cu. in. × 4
cu. in. ×
Total Volume: 4000 cu. in.
GUN Depth: ~~12~~ 10 m
GUN Separation: 12 m
Air Pressure: 2000 PSIG

RECORDING

INSTRUMENTS

SYNTRAK 480 Digital Streamer System
MultiTRAK Streamer Cable Utility System
The GUN NETWORK GUN Controller System
GS-624 Thermal Plotter

RECORDING

SAMPLE RATE: 1, 2, (4) msec
RECORD LENGTH: 13.5 sec
WATER DELAY: ~~0~~ 0 msec
LOW CUT FILTER: 3 Hz, 6 dB/oct.
HIGH CUT FILTER: 102 Hz, 209 dB/oct.
PRE-AMPLIFIER GAIN: 12 dB
GAIN CONTROL: Floating Point
84 dB, 12 dB step

TAPE FORMAT

DIGITAL TAPE FORMAT: 8015 SEG-D
2.5 Byte Binary DEMUX
RECORDING FORMAT: Double Density, GCR
DATA DENSITY: 37871 BPI
AUX. CH CONTENTS
AUX. 1: T.B.
AUX. 2: W.B1
AUX. 3: W.B2
AUX. 4: Gun Monitor Hyd
~~AUX. 5:~~
~~AUX. 6:~~

MONITOR

PLAYBACK GAIN AGC, PGC, FIXED(60 dB)
SINGLE TRACE PLOT CHANNEL TRACE No. 120

NAVIGATION

PRIMARY: DGPS
BACK-UP:
SHOT MODE: (DISTANCE), TIME: sec

REMARKS

CABLE NOISE μBar
SOL. TAPE No. 104 FILE No. 0
F SOL. TAPE No. 104 FILE No. 101

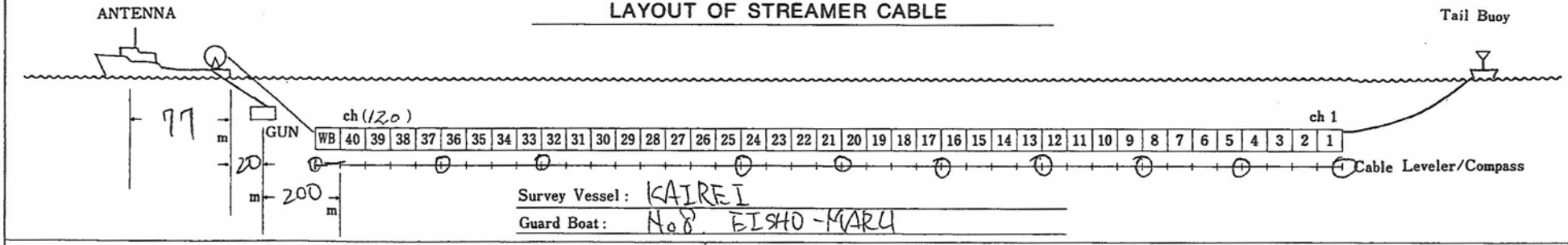
DEAD TRACE:
WILD TRACE:
WEAK TRACE:

SP1102 で途中終了
(中央制御部 MSTP ハングアップのため)

STREAMER

ACTIVE STREAMER: 75m × 40
HYDROPHONE TYPE: TELEDYNE Model T-2
SENSITIVITY: -194dB re 1V/μPa(20μV/μ Bar)
No. of HYDROPHONE in GROUP: 8, 16, (32)
FRONT STRETCH SECTION: 50m × 2
TAIL STRETCH SECTION: 50m × 2

LAYOUT OF STREAMER CABLE



Survey Vessel: KAIREI
Guard Boat: No8. EISHO-MARU

OBSERVER: KASHIWASE, KATAYAMA, YOKOI, (NME) SANGU (JGI)

FIELD TAPE No. OF THIS LINE: 104

Oct. '94

JGI MARINE SURVEY GENERAL INFORMATION

GENERAL

CLIENT	JAMSTEC
PROSPECT	KR98-04
AREA	福島宮城沖日本海溝
LINE	FK101-2 E 118°
DIRECTION	WE ~~W~~ → EW (298°)
DATE	27 Apr. '98 ~ 28 Apr. '98
WEATHER	雲
WIND	6 m/sec
SEA CONDITION	3

FIRST	SP No. 1001	FILE No. 1
	TIME	02 H 44 M
LAST	SP No. 5081	FILE No. 3980
	TIME	05 H 59 M

Number of Channels	120	
Channel Interval	6.25, 12.5, (25)	m
Shot Point Interval	50	m
CDP Fold	3000	%
Cable Depth	15	m

SOURCE

TYPE	Par ~~AIRGUN~~, G ~~GUN~~
LINEAR CLUSTER	~~SINGLE, DOUBLE,~~ NO
No. of Strings	1, 2, 3, (4)
Configuration	1000 cu. in. × 4
	cu. in. ×
Total Volume	4000 cu. in.
GUN Depth	10 m
GUN Separation	12 m
Air Pressure	2000 PSIG

RECORDING

INSTRUMENTS

SYNTRAK 480 Digital Streamer System
MultiTRAK Streamer Cable Utility System
The GUN NETWORK GUN Controller System
GS-624 Thermal Plotter

RECORDING

SAMPLE RATE	1, 2, (4)	msec
RECORD LENGTH	13.5	sec
WATER DELAY	(Remarks)	msec
LOW CUT FILTER	3 Hz, 6	dB/oct.
HIGH CUT FILTER	102 Hz, 209	dB/oct.
PRE-AMPLIFIER GAIN	12 dB	
GAIN CONTROL	Floating Point 84 dB, 12 dB step	

TAPE FORMAT

DIGITAL TAPE FORMAT	8015 SEG-D 2.5 Byte Binary DEMUX
RECORDING FORMAT	Double Density, GCR
DATA DENSITY	37871 BPI
AUX. CH CONTENTS AUX. 1:	T.B
AUX. 2:	W.B1
AUX. 3:	W.B2
AUX. 4:	Gun Monitor Hyd
~~AUX. 5:~~	
~~AUX. 6:~~	

MONITOR

PLAYBACK GAIN AGC, PGC, FIXED(60 dB)

SINGLE TRACE PLOT CHANNEL TRACE No. 120

NAVIGATION

PRIMARY	DGPS
BACK-UP	
SHOT MODE	DISTANCE, ~~TIME~~: sec

REMARKS

CABLE NOISE μBar
SOL. TAPE No. 105 FILE No. 0
F SOL. TAPE No. 139 FILE No. 3981

DEAD TRACE
WILD TRACE
WEAK TRACE

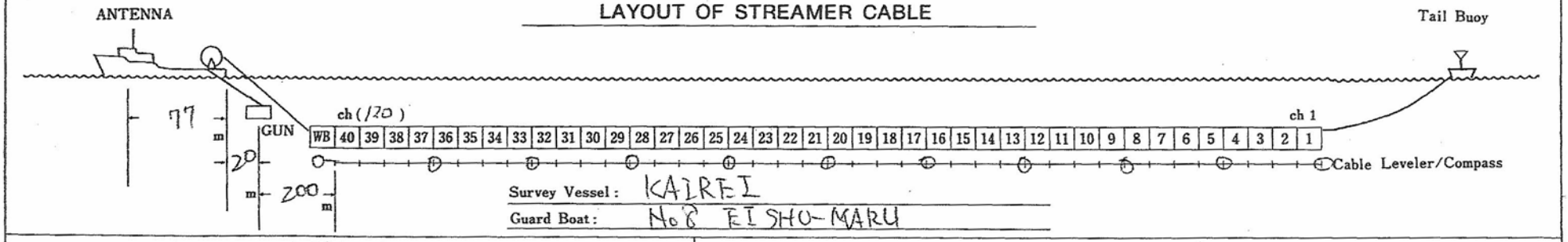
Water Delay File No. 658 SP 1661 (2秒)

コンプレッサー止め	1855	2859	(3秒)
4/28 00:00 ~ 1800PSIG 観測終了時まで	2346	3350	(2秒)
4/28 06:00 で観測終了 End of Line	2527	3539	(0秒)
	3980	5081	

STREAMER

ACTIVE STREAMER	75m × 40
HYDROPHONE TYPE	TELEDYNE Model T-2
SENSITIVITY	-194dB re 1V/μPa(20μV/μBar)
No. of HYDROPHONE in GROUP	8, 16, (32)
FRONT STRETCH SECTION	50m × 2
TAIL STRETCH SECTION	50m × 2

LAYOUT OF STREAMER CABLE



Survey Vessel: KAIREI
Guard Boat: No.8 EISHO-MARU

OBSERVER: KASHIWASE. KATAYAMA. YOKOI (NME) SANGU (JGI)

FIELD TAPE No. OF THIS LINE: 105 ~ 139

JGI MARINE SURVEY GENERAL INFORMATION

GENERAL

CLIENT: JAMSTEC
PROSPECT: KR98-04
AREA: 福島・宮城沖

LINE: FK102
DIRECTION: E ➡ W (303°)
DATE: 19-Apr-'98 ~ 19-Apr-'98
WEATHER: fc
WIND: North 6.7 m/sec
SEA CONDITION: 3

FIRST SP No. 1001 FILE No. 1
TIME 14 H 58 M
LAST SP No. 1397 FILE No. 368
TIME 19 H 48 M

Number of Channels	120
Channel Interval	6.25, 12.5, (25) m
Shot Point Interval	50 m
CDP Fold	3000 %
Cable Depth	15 m

SOURCE

TYPE	Par AIRGUN, G GUN
LINEAR CLUSTER	SINGLE, DOUBLE, (NO)
No. of Strings	1, 2, 3, (4)
Configuration	1000 cu. in. × 4
	cu. in. ×
Total Volume	4000 cu. in.
GUN Depth	10 m
GUN Separation	12 m
Air Pressure	2000 PSIG

RECORDING

INSTRUMENTS

SYNTRAK 480 Digital Streamer System
MultiTRAK Streamer Cable Utility System
The GUN NETWORK GUN Controller System
GS-624 Thermal Plotter

RECORDING

SAMPLE RATE	1, 2, (4) msec
RECORD LENGTH	13.5 sec
WATER DELAY	2000 msec
LOW CUT FILTER	3 Hz, 6 dB/oct.
HIGH CUT FILTER	102 Hz, 209 dB/oct.
PRE-AMPLIFIER GAIN	12 dB
GAIN CONTROL	Floating Point
	84 dB, 12 dB step

TAPE FORMAT

DIGITAL TAPE FORMAT	8015 SEG-D
	2.5 Byte Binary DEMUX
RECORDING FORMAT	Double Density, GCR
DATA DENSITY	37871 BPI
AUX. CH CONTENTS AUX. 1:	TB
AUX. 2:	WB1
AUX. 3:	WB2
AUX. 4:	Gun Monitor Hyd
~~AUX. 5:~~	
~~AUX. 6:~~	

MONITOR

PLAYBACK GAIN AGC, PGC, FIXED(60 dB)

SINGLE TRACE PLOT CHANNEL TRACE No. 120

NAVIGATION

PRIMARY: DGPS
BACK-UP:
SHOT MODE: (DISTANCE), TIME: sec

REMARKS

CABLE NOISE μBar
SOL. TAPE No. 1 FILE No. ~~100~~ 0
~~SOL. TAPE No. 3 FILE No. 368~~

DEAD TRACE
WILD TRACE
WEAK TRACE

water delay

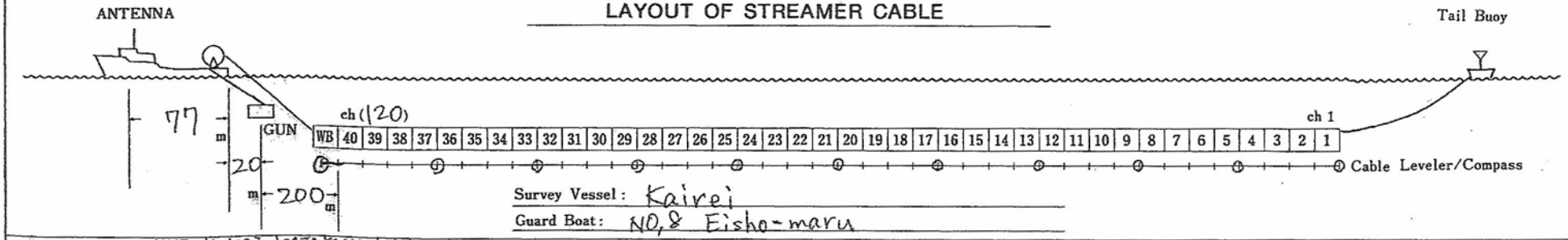
	Time Guard	Time Interval
水深 3000 m 以浅は 0秒	14秒	15秒
水深 3000~7000 m は 2秒	16秒	17秒
水深 7000 m 以深は 3秒	17秒	18秒

・Lost Sp 頻発. NAVS エラーにより、観測途中で終了

STREAMER

ACTIVE STREAMER	75m × 40
HYDROPHONE TYPE	TELEDYNE Model T-2
SENSITIVITY	-194dB re 1V/μPa(20μV/μBar)
No. of HYDROPHONE in GROUP	8, 16, (32)
FRONT STRETCH SECTION	50m × 2
TAIL STRETCH SECTION	50m × 2

LAYOUT OF STREAMER CABLE



Survey Vessel: Kairei
Guard Boat: NO,8 Eisho-maru

OBSERVER: NME: YOKOI. ICATAYAMA. ICASHIWASE
JGI: SANGU

FIELD TAPE No. OF THIS LINE: 1~3

JGI MARINE SURVEY GENERAL INFORMATION

(4/9)

GENERAL

CLIENT	JAMSTEC
PROSPECT	KR98-04
AREA	FUKUSHIMA JAPAN TRENCH
LINE	FK102-Z
DIRECTION	E ➡ W (303°)
DATE	19・Apr・'98 ~ 21・Apr・'98
WEATHER	bc
WIND	NE 2.0 m/sec
SEA CONDITION	2

FIRST	SP No. 1001	FILE No. 2
	TIME	20 H 50 M
LAST	SP No. 5885	FILE No. 4778
	TIME	17 H 59 M

Number of Channels	120	
Channel Interval	6.25, 12.5, (25)	m
Shot Point Interval	50	m
CDP Fold	3000	%
Cable Depth	15	m

SOURCE

TYPE	(Par AIRGUN) ~~G GUN~~	
LINEAR CLUSTER	~~SINGLE, DOUBLE,~~ (NO)	
No. of Strings	~~1, 2, 3,~~ (4)	
Configuration	1000 cu. in. × 4	
	cu. in. ×	
Total Volume	4000	cu. in.
GUN Depth	10	m
GUN Separation	12	m
Air Pressure	2000	PSIG

RECORDING

INSTRUMENTS

SYNTRAK 480 Digital Streamer System
MultiTRAK Streamer Cable Utility System
The GUN NETWORK GUN Controller System
GS-624 Thermal Plotter

RECORDING

SAMPLE RATE	1, 2, (4)	msec
RECORD LENGTH	13.5	sec
WATER DELAY	(Remarks)	msec
LOW CUT FILTER	3 Hz, 6	dB/oct.
HIGH CUT FILTER	102 Hz, 209	dB/oct.
PRE-AMPLIFIER GAIN	12 dB	
GAIN CONTROL	Floating Point 84 dB, 12 dB step	

TAPE FORMAT

DIGITAL TAPE FORMAT	8015 SEG-D 2.5 Byte Binary DEMUX
RECORDING FORMAT	Double Density, GCR
DATA DENSITY	37871 BPI
AUX. CH CONTENTS AUX. 1:	T.B.
AUX. 2:	W.B 1
AUX. 3:	W.B 2
AUX. 4:	Gun Monitor Hyd
~~AUX. 5:~~	
~~AUX. 6:~~	

MONITOR

PLAYBACK GAIN AGC, PGC, (FIXED) (60 dB)

SINGLE TRACE PLOT CHANNEL TRACE No. 120

NAVIGATION

PRIMARY	DGPS
BACK-UP	
SHOT MODE	(DISTANCE) TIME: sec

REMARKS

CABLE NOISE μBar
SOL. TAPE No. 4 FILE No. 1
~~F SOL. TAPE No.~~ ~~FILE No.~~

DEAD TRACE
WILD TRACE
WEAK TRACE

・Water Delay
SP1001 ~ 2580 : 2000msec.
2581 ~ 2950 : 3000
2951 ~ 4106 : 2000
4107 ~ : 0

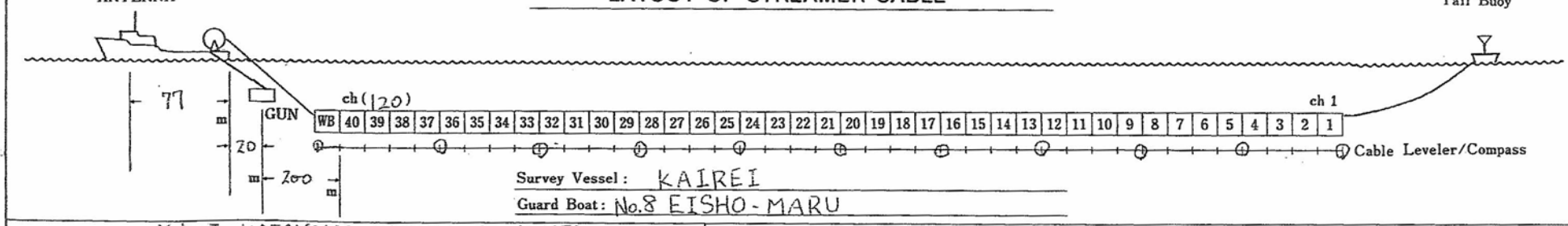
・ch49 信号不良(入ったり入らなかったりする) 112ch

・End of Line.

STREAMER

ACTIVE STREAMER	75m × 40
HYDROPHONE TYPE	TELEDYNE Model T-2
SENSITIVITY	−194dB re 1V/μPa(20μV/μBar)
No. of HYDROPHONE in GROUP	8, 16, (32)
FRONT STRETCH SECTION	50m × 2
TAIL STRETCH SECTION	50m × 2

LAYOUT OF STREAMER CABLE



Survey Vessel: KAIREI
Guard Boat: No.8 EISHO-MARU

OBSERVER: YokoI・KATAYAMA. KASHIWASE (NME) SANGU (JGI)

FIELD TAPE No. OF THIS LINE: 4 ~ 41

JGI MARINE SURVEY GENERAL INFORMATION

OBS専用データ (SP int.=20m, ストリーマー使用せず)

GENERAL

CLIENT: JAMSTEC
PROSPECT: KR98-04
AREA: 福島宮城沖日本海溝
LINE: FK 102-3
DIRECTION: E → W (300°)
DATE: 28·Apr·98 ~ 30·Apr·98
WEATHER: 晴
WIND: 6m/sec
SEA CONDITION: 3

FIRST SP No. 1001 FILE No. ——
TIME 14 H 23 M
LAST SP No. 2133 FILE No. ——
TIME 11 H 54 M

Number of Channels ——
Channel Interval ~~6.25, 12.5, 25~~ m
Shot Point Interval 200 m
CDP Fold —— %
Cable Depth —— m

SOURCE

TYPE: Par AIRGUN, ~~G GUN~~
LINEAR CLUSTER: ~~SINGLE, DOUBLE,~~ NO
No. of Strings: 1, 2, 3, (4)
Configuration: 1000 cu. in. × 4
cu. in. ×
Total Volume: 4000 cu. in.
GUN Depth: 10 m
GUN Separation: 12 m
Air Pressure: 2000 PSIG

RECORDING

INSTRUMENTS

SYNTRAK 480 Digital Streamer System
MultiTRAK Streamer Cable Utility System
The GUN NETWORK GUN Controller System
GS-624 Thermal Plotter

RECORDING

SAMPLE RATE ~~1, 2, 4~~ msec
RECORD LENGTH —— sec
WATER DELAY —— msec
LOW CUT FILTER ~~Hz,~~ ——dB/oct.
HIGH CUT FILTER ~~Hz,~~ ——dB/oct.
PRE-AMPLIFIER GAIN 12 dB
GAIN CONTROL Floating Point
84 dB, 12 dB step

TAPE FORMAT

DIGITAL TAPE FORMAT: 8015 SEG-D
2.5 Byte Binary DEMUX
RECORDING FORMAT: Double Density, GCR
DATA DENSITY: 37871 BPI
AUX. CH CONTENTS: ~~AUX. 1:~~
~~AUX. 2:~~
~~AUX. 3:~~
~~AUX. 4:~~
~~AUX. 5:~~
~~AUX. 6:~~

MONITOR

PLAYBACK GAIN AGC, PGC, FIXED(—— dB)

SINGLE TRACE PLOT CHANNEL TRACE No. ——

NAVIGATION

PRIMARY: DGPS
BACK-UP:
SHOT MODE: (DISTANCE), ~~TIME:~~ —— sec

REMARKS

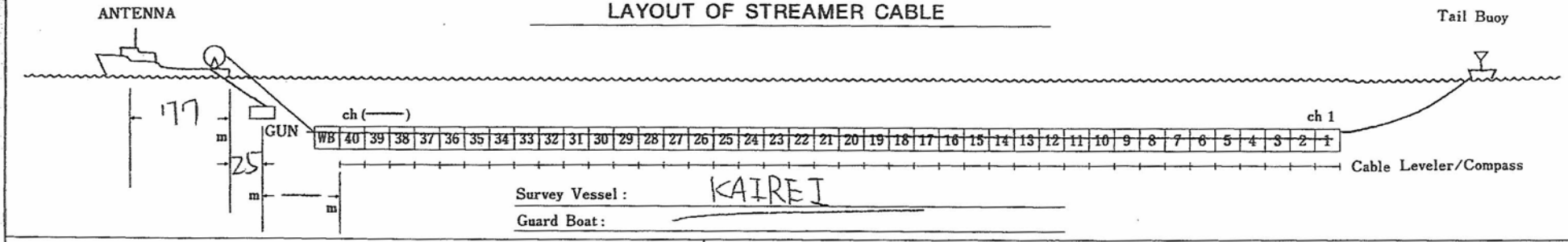
CABLE NOISE —— μBar
SOL. TAPE No. —— FILE No. ——
SOL. TAPE No. —— FILE No. ——

DEAD TRACE
WILD TRACE
WEAK TRACE

STREAMER

ACTIVE STREAMER ~~75m ×~~
HYDROPHONE TYPE TELEDYNE Model T-2
SENSITIVITY -194dB re 1V/μPa(20μV/μ Bar)
No. of HYDROPHONE in GROUP ~~8, 16, 32~~
FRONT STRETCH SECTION ~~50m ×~~
TAIL STRETCH SECTION ~~50m ×~~

LAYOUT OF STREAMER CABLE



Survey Vessel: KAIREI
Guard Boat:

OBSERVER:

FIELD TAPE No. OF THIS LINE:

JGI MARINE SURVEY GENERAL INFORMATION

(6/9)

GENERAL

CLIENT	JAMSTEC
PROSPECT	KR98-04
AREA	FUKUSHIMA JAPAN TRENCH
LINE	FK201
DIRECTION	S ~~&~~ W ➡ NE (30 °)
DATE	22 ·Apr·'98 ~ 23 ·Apr·'98
WEATHER	C
WIND	6.2 m/sec.
SEA CONDITION	2

FIRST	SP No. 1001	FILE No. 1
	TIME	10 H 18 M
LAST	SP No. 4729	FILE No. 3729
	TIME	12 H 1 M

Number of Channels	120	
Channel Interval	~~6.25, 12.5,~~ (25)	m
Shot Point Interval	50	m
CDP Fold	3000	%
Cable Depth	15	m

SOURCE

TYPE	(Par AIRGUN) ~~G GUN~~	
LINEAR CLUSTER	~~SINGLE, DOUBLE,~~ (NO)	
No. of Strings	1, 2, 3, (4)	
Configuration	1000 cu. in. × 4	
	cu. in. ×	
Total Volume	4000	cu. in.
GUN Depth	10	m
GUN Separation	12	m
Air Pressure	2000	PSIG

RECORDING

INSTRUMENTS

SYNTRAK 480 Digital Streamer System
MultiTRAK Streamer Cable Utility System
The GUN NETWORK GUN Controller System
GS-624 Thermal Plotter

RECORDING

SAMPLE RATE	1, 2, (4)	msec
RECORD LENGTH	13.5	sec
WATER DELAY	0	msec
LOW CUT FILTER	3 Hz, 6	dB/oct.
HIGH CUT FILTER	102 Hz, 209	dB/oct.
PRE-AMPLIFIER GAIN	12 dB	
GAIN CONTROL	Floating Point 84 dB, 12 dB step	

TAPE FORMAT

DIGITAL TAPE FORMAT	8015 SEG-D 2.5 Byte Binary DEMUX
RECORDING FORMAT	Double Density, GCR
DATA DENSITY	37871 BPI
AUX. CH CONTENTS	AUX. 1: T.B.
	AUX. 2: W.B. 1
	AUX. 3: W.B. 2
	AUX. 4: Gun Monitor Hyd.
	~~AUX. 5:~~
	~~AUX. 6:~~

MONITOR

PLAYBACK GAIN AGC, PGC, (FIXED) (60 dB)

SINGLE TRACE PLOT CHANNEL TRACE No. 120

NAVIGATION

PRIMARY	DGPS
BACK-UP	
SHOT MODE	(DISTANCE) TIME: sec

REMARKS

CABLE NOISE μBar
SOL. TAPE No. 42 FILE No. 0
F SOL. TAPE No. 70 FILE No. 3730

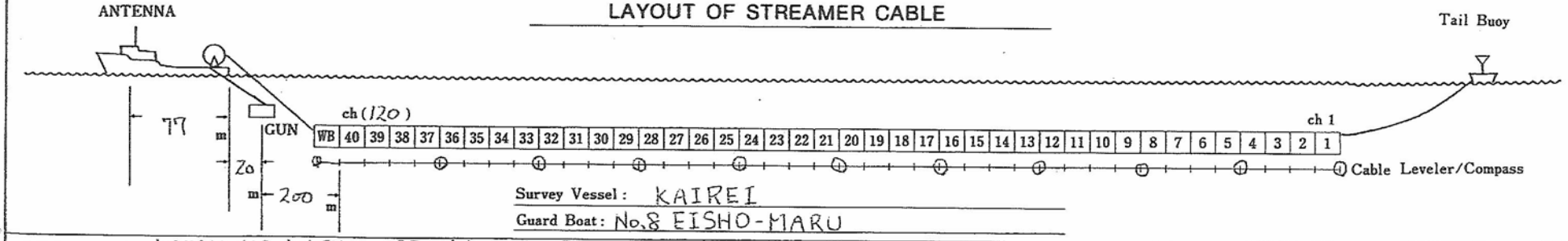
DEAD TRACE
WILD TRACE
WEAK TRACE

· End of Line. 終了

STREAMER

ACTIVE STREAMER	75m × 40
HYDROPHONE TYPE	TELEDYNE Model T-2
SENSITIVITY	−194dB re 1V/μPa(20μV/μ Bar)
No. of HYDROPHONE in GROUP	8, 16, (32)
FRONT STRETCH SECTION	50m × 2
TAIL STRETCH SECTION	50m × 2

LAYOUT OF STREAMER CABLE



Survey Vessel: KAIREI
Guard Boat: No.8 EISHO-MARU

OBSERVER: KATAYAMA. KASHIWASE. YOKOI (NME)
SANGU (JGI)

FIELD TAPE No. OF THIS LINE: 42 ~ 70

Oct. '94

JGI MARINE SURVEY GENERAL INFORMATION

(7/9)

GENERAL

CLIENT	JAMSTEC
PROSPECT	KR98-04
AREA	福島、宮城沖 日本海溝
LINE	FK202
DIRECTION	~~NE-NW~~ → ~~SE~~SW (210°)
DATE	23・Apr・1998 ~ 24・Apr・1998
WEATHER	fc
WIND	9.0 m/sec.
SEA CONDITION	4

FIRST	SP No. 1001	FILE No. 1
	TIME	19 H 39 M
LAST	SP No. 3564	FILE No. 2564
	TIME	16 H 42 M

Number of Channels	120	
Channel Interval	~~6.25, 12.5,~~ (25)	m
Shot Point Interval	50	m
CDP Fold	3000	%
Cable Depth	15	m

SOURCE

TYPE	(Par AIRGUN), ~~G GUN~~	
LINEAR CLUSTER	~~SINGLE, DOUBLE,~~ (NO)	
No. of Strings	~~1, 2, 3,~~ (4)	
Configuration	1000 cu. in. × 4	
	cu. in. ×	
Total Volume	4000	cu. in.
GUN Depth	10	m
GUN Separation	12	m
Air Pressure	2000	PSIG

RECORDING

INSTRUMENTS

SYNTRAK 480 Digital Streamer System
MultiTRAK Streamer Cable Utility System
The GUN NETWORK GUN Controller System
GS-624 Thermal Plotter

RECORDING

SAMPLE RATE	~~1, 2,~~ (4)	msec
RECORD LENGTH	13.5	sec
WATER DELAY	2000	msec
LOW CUT FILTER	3 Hz, 6	dB/oct.
HIGH CUT FILTER	102 Hz, 209	dB/oct.
PRE-AMPLIFIER GAIN	12 dB	
GAIN CONTROL	Floating Point 84 dB, 12 dB step	

TAPE FORMAT

DIGITAL TAPE FORMAT	8015 SEG-D 2.5 Byte Binary DEMUX
RECORDING FORMAT	Double Density, GCR
DATA DENSITY	37871 BPI
AUX. CH CONTENTS AUX. 1:	T.B.
AUX. 2:	W.B. 1
AUX. 3:	W.B. 2
AUX. 4:	Gun Monitor Hyd.
~~AUX. 5:~~	
~~AUX. 6:~~	

MONITOR

PLAYBACK GAIN ~~AGC, PGC,~~ (FIXED) 60 dB)

SINGLE TRACE PLOT CHANNEL TRACE No. 120

NAVIGATION

PRIMARY	DGPS
BACK-UP	
SHOT MODE	(DISTANCE) ~~TIME~~: sec

REMARKS

CABLE NOISE μBar
SOL. TAPE No. 71 FILE No. 0
F SOL. TAPE No. ~~90~~ 91 FILE No. 0

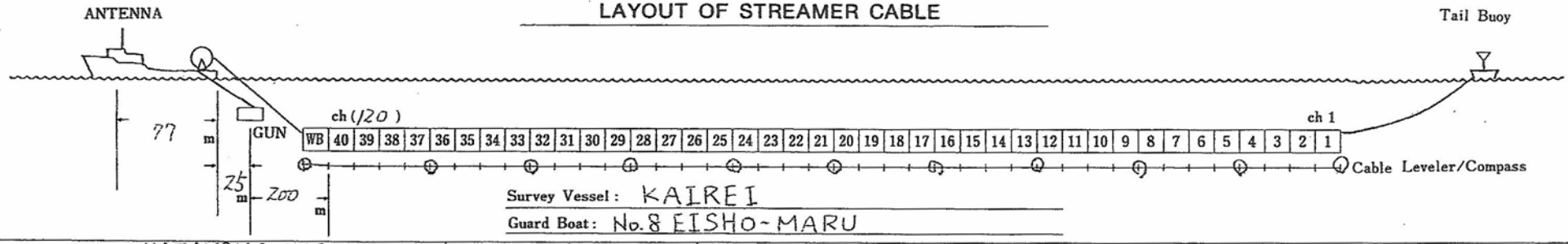
DEAD TRACE
WILD TRACE
WEAK TRACE

4/24. 14:00 SP3256 海況悪化
15:08 左舷ガン 25m まで巻きしめ. 31→25m
荒天のため SP3564 で観測終了
ch49：信号が入ったり入らなかったりする.

STREAMER

ACTIVE STREAMER	75m × 40
HYDROPHONE TYPE	TELEDYNE Model T-2
SENSITIVITY	-194dB re 1V/μPa(20μV/μBar)
No. of HYDROPHONE in GROUP	~~8, 16,~~ (32)
FRONT STRETCH SECTION	50m × 2
TAIL STRETCH SECTION	50m × 2

LAYOUT OF STREAMER CABLE



Survey Vessel: KAIREI
Guard Boat: No.8 EISHO-MARU

OBSERVER: KATAYAMA, KASHIWASE, YOKOI (NME)
SANGU (JGI)

FIELD TAPE No. OF THIS LINE: 71 ~ 91

JGI MARINE SURVEY GENERAL INFORMATION

(59)

GENERAL

CLIENT	JAMSTEC
PROSPECT	KR98-04
AREA	相島西方沖 日本海溝
LINE	FK202-2
DIRECTION	~~SNW~~ → NE (29°)
DATE	25·Apr·98 ~ 25·Apr·98
WEATHER	0
WIND	9 m/sec.
SEA CONDITION	4

FIRST	SP No. 1001	FILE No. 1
	TIME	11 H 47 M
LAST	SP No. 2575	FILE No. 1564
	TIME	22 H 43 M

Number of Channels	120
Channel Interval	~~6.25, 12.5,~~ (25) m
Shot Point Interval	50 m
CDP Fold	3000 %
Cable Depth	15 m

SOURCE

TYPE	~~Par~~ AIRGUN, ~~G GUN~~
LINEAR CLUSTER	~~SINGLE, DOUBLE,~~ ~~NO~~
No. of Strings	1, 2, 3, (4)
Configuration	1000 cu. in. × 4
	cu. in. ×
Total Volume	4000 cu. in.
GUN Depth	10 m
GUN Separation	12 m
Air Pressure	2000 PSIG

RECORDING

INSTRUMENTS

SYNTRAK 480 Digital Streamer System
MultiTRAK Streamer Cable Utility System
The GUN NETWORK GUN Controller System
GS-624 Thermal Plotter

RECORDING

SAMPLE RATE	1, 2, (4)	msec
RECORD LENGTH	135	sec
WATER DELAY	0.2000	msec
LOW CUT FILTER	3 Hz, 6	dB/oct.
HIGH CUT FILTER	102 Hz, 209	dB/oct.
PRE-AMPLIFIER GAIN	12 dB	
GAIN CONTROL	Floating Point 84 dB, 12 dB step	

TAPE FORMAT

DIGITAL TAPE FORMAT	8015 SEG-D 2.5 Byte Binary DEMUX
RECORDING FORMAT	Double Density, GCR
DATA DENSITY	37871 BPI
AUX. CH CONTENTS AUX. 1:	T.B
AUX. 2:	W.B1
AUX. 3:	W.B2
AUX. 4:	Gun Monitor Hyd
~~AUX. 5:~~	
~~AUX. 6:~~	

MONITOR

PLAYBACK GAIN AGC, PGC, FIXED(60 dB)

SINGLE TRACE PLOT CHANNEL TRACE No. 120

NAVIGATION

PRIMARY	DGPS
BACK-UP	
SHOT MODE	~~DISTANCE, TIME:~~ sec

REMARKS

CABLE NOISE μBar

SOL. TAPE No. 92 FILE No. 0

SOL. TAPE No. 103 FILE No. ≥1564

DEAD TRACE

WILD TRACE

WEAK TRACE

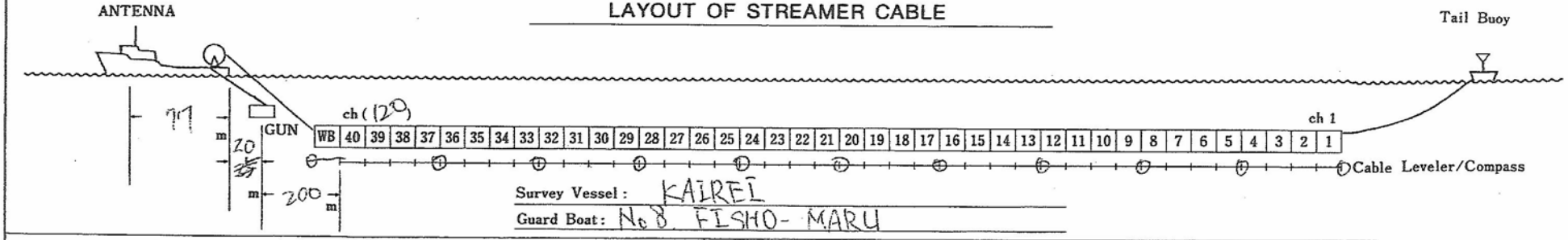
Water Delay SP No. 1 ~ 1025 : 2000 msec
1026 ~ : 0

・SP2576 ~ TGNからエラガンへ発震命令出ず
No Fire. 錆くため、観測を途中終了
FSP 2575

STREAMER

ACTIVE STREAMER	75m × 40
HYDROPHONE TYPE	TELEDYNE Model T-2
SENSITIVITY	-194dB re 1V/μPa(20μV/μBar)
No. of HYDROPHONE in GROUP	8, 16, (32)
FRONT STRETCH SECTION	50m × 2
TAIL STRETCH SECTION	50m × 2

LAYOUT OF STREAMER CABLE



OBSERVER: KASHIWASE, KATAYAMA, YOKOI, (NME) SANGU (JGI)

FIELD TAPE No. OF THIS LINE: 92 ~ 103

Oct. '94

Table of Shot Point No. of Seismic Lines at KR98-04

<Line FK101>

<101>

SP No. at each segment 1001 1102 <101-2>

1001 5081

Sequential SP No. 1001 1102 1261 5341

<Line FK102>

<102>

SP No. at each segment 1001 1397 <102-2>

1001 5885

1397

Sequential SP No. 1001 1430 6314

<Line FK201>

no segment

SP No. at each segment 1001 4729

Sequential SP No. 1001 4729

<Line FK202>

<202>

SP No. at each segment 1001 3107 3564 <202-2>

2575 2118 1001

Sequential SP No. 1001 3107 3564 4681

```
 DAT TIME SET  980415050543
 DAT CLOCK START  98/04/15 05:05:43
NOW DAT TIME SET CHECK  WAIT 10s PULSE
 MASTER  98/04/15 05:05:50.000
 DAT     98/04/15 05:05:50
DAT CLOCK ADJUST MODE END


>MYYMMDDHHMMSS
M 980417150300
>Z A/D DATA CHECK MODE ( RETURN HIT ANY KEY )
1:65535 2:65535 3:00000 4:32787
1:10712 2:00000 3:22219 4:32783
1:12235 2:31084 3:65535 4:32784
1:65535 2:51145 3:65535 4:32773
1:00000 2:45725 3:65535 4:32781
1:00000 2:65535 3:65535 4:32778
1:65535 2:00000 3:58980 4:32781
 A/D DATA CHECK MODE END
>S ------ DAT PROGRAM STATUS  ------
 DAT-2H Ver3.0  S/N 151
   REAL TIME CLOCK ( now )  98/04/15 05:06:24
   START TIME SET VALUE        04/17 15:03:00
   RECORDING MODE            4CH 100Hz
>E DAT POWER OFF
 END OF MONITOR ( SLEEP START )
SLEEP   05:06:30
 05:06:35
 05:06:40
 05:06:45
 05:06:50
 05:06:55
 05:07:00
 05:07:05
 05:07:10
 05:07:15
 05:07:20
 05:07:25
 05:07:30
 05:07:35
 05:07:40
 05:07:45
 05:07:50
 05:07:55
 05:08:00
 05:08:05
 05:08:10
 05:08:15
 05:08:20
 05:08:25
 05:08:30
 05:08:35
 05:08:40

== OBSG ==
 DAT POWER OFF
 START RECORDING
 37:7=:52
 37:7=:53
 37:7=:54
 37:7=:55

NOW DAT CLOCK ADJUST TO MASTER CLOCK
 MASTER CLOCK ADJUST TO EXT1PPS
 DAT MONITOR MODE
 DAT CLOCK STOP
 DAT TIME SET  980415051011
 DAT CLOCK START  98/04/15 05:10:11
NOW DAT TIME SET CHECK  WAIT 10s PULSE
 MASTER  98/04/15 05:10:20.000
```

```
 DAT      98/04/15 05:10:20
DAT CLOCK ADJUST MODE END


>MYYMMDDHHMMSS
M 980417150400
>Z A/D DATA CHECK MODE ( RETURN HIT ANY KEY )
1:65535 2:65535 3:22679 4:32822
1:65535 2:65535 3:09863 4:32809
1:65535 2:65535 3:10808 4:32812
1:65535 2:65535 3:02925 4:32821
1:10926 2:36781 3:61454 4:32801
1:08032 8:65535 3:07838 4:32832
1:00000 2:00000 3:00000 4:32819
1:00000 2:00000 3:27104 4:32812
1:16674 2:00000 3:00000 4:32788
1:65535 2:00000 3:47805 4:32811
1:00000 2:21426 3:46960 4:32800
1:65535 2:00000 3:27656 4:32791
 A/D DATA CHECK MODE END
>S ------ DAT PROGRAM STATUS  ------
 DAT-2H Ver3.0  S/N 215
   REAL TIME CLOCK ( now )  98/04/15 05:10:55
   START TIME SET VALUE        04/17 15:04:00
   RECORDING MODE           4CH 100Hz
>E DAT POWER OFF
 END OF MONITOR ( SLEEP START )
SLEEP   05:11:00
 05:11:05
 05:11:10
 05:11:15
 05:11:20
 05:11:25
 05:11:30
 05:11:35
 05:11:40
 05:11:45

05:11:50.000

== OBSH ==
 DAT POWER OFF
 START RECORDING
 00:48:51
 00:48:52
 00:48:53
 00:48:54
 00:48:55

NOW DAT CLOCK ADJUST TO MASTER CLOCK
 MASTER CLOCK ADJUST TO EXT1PPS
 DAT MONITOR MODE
 DAT CLOCK STOP
 DAT TIME SET  980415051313
 DAT CLOCK START  98/04/15 05:13:13
NOW DAT TIME SET CHECK  WAIT 10s PULSE
 MASTER  98/04/15 05:13:20.000
 DAT     98/04/15 05:13:20
DAT CLOCK ADJUST MODE END


>MYYMMDDHHMMSS
M 980417150500
>Z A/D DATA CHECK MODE ( RETURN HIT ANY KEY )
1:65535 2:03659 3:00000 4:32800
1:28318 2:43626 3:36191 4:32777
1:00000 2:13199 3:00000 4:32785
1:65535 2:65535 3:39226 4:32779
1:65535 2:00000 3:00000 4:32792
1:32378 65535 3:29083 4:32781
```

```
1:00000 2:00000 3:65535 4:32774
1:65535 2:00000 3:65535 4:32783
1:03577 2:20342 3:65535 4:32770
1:00000 2:00000 3:21275 4:32783
1:53167 2:00000 3:65535 4:32775
1:00000 2:38040 3:52150 4:32778
1:29534 2:00000 3:65535 4:32792
1:26390 2:65535 3:00000 4:32770
1:65535 2:65535 3:00000 4:32793
1:03540 2:65535 3:00000 4:32795
1:00000 2:52851 3:00000 4:32780
1:49441 2:31093 3:65535 4:32798
1:00000 2:15666 3:65535 4:32783
1:65535 2:27924 3:65535 4:32785
1:00000 2:53249 3:65535 4:32781
1:41231 2:65535 3:26851 4:32792
 A/D DATA CHECK MODE END
>S ------ DAT PROGRAM STATUS  ------
 DAT-2H Ver3.0  S/N 152
   REAL TIME CLOCK ( now )  98/04/15 05:13:57
   START TIME SET VALUE       04/17 15:05:00
   RECORDING MODE           4CH 100Hz
>E DAT POWER OFF
 END OF MONITOR ( SLEEP START )
SLEEP   05:14:00
 05:14:05
 05:14:10
 05:14:15
 05:14:20
 05:14:25
 05:14:30
 05:14:35
 05:14:40

05:14:50.000
```

```
== OBSF ==
 DAT POWER OFF
 START RECORDING
 28:48:51
 28:48:52
 28:48:53
 28:48:54

NOW DAT CLOCK ADJUST TO MASTER CLOCK
 MASTER CLOCK ADJUST TO EXT1PPS
 DAT MONITOR MODE
 DAT CLOCK STOP
 DAT TIME SET  980415051549
 DAT CLOCK START  98/04/15 05:15:49
NOW DAT TIME SET CHECK  WAIT 10s PULSE
 MASTER  98/04/15 05:16:00.000
 DAT     98/04/15 05:16:00
DAT CLOCK ADJUST MODE END


>MYYMMDDHHMMSS
M 980417150600
>Z A/D DATA CHECK MODE ( RETURN HIT ANY KEY )
1:11193 2:00000 3:00000 4:32809
1:00000 2:10780 3:27711 4:32807
1:00000 2:65535 3:23137 4:32805
1:65535 2:57351 3:65535 4:32815
1:00000 2:65535 3:65535 4:32809
1:25101 2:65535 3:65535 4:32816
1:64051 2:29206 3:00000 4:32795
 A/D DATA CHECK MODE END
>S ------ DAT PROGRAM STATUS  ------
 DAT-2H Ver3.0  S/N 154
   REAL TIME CLOCK ( now )  98/04/15 05:16:23
```

```
   START TIME SET VALUE         04/17 15:06:00
   RECORDING MODE            4CH 100Hz
>E DAT POWER OFF
 END OF MONITOR ( SLEEP START )
SLEEP   05:16:25
 05:16:30
 05:16:35
 05:16:40
 05:16:45
 05:16:50
 05:16:55
 05:17:00


05:17:10.000
 05:17:15
 05:17:20

== OBSE ==
 DAT POWER OFF
 START RECORDING
 28:48:51
 28:48:52
 28:48:53
 28:48:54
 28:48:55
 28:48:56
 28:48:57
 28:48:58

NOW DAT CLOCK ADJUST TO MASTER CLOCK
 MASTER CLOCK ADJUST TO EXT1PPS
 DAT MONITOR MODE
 DAT CLOCK STOP
 DAT TIME SET  980415051839
 DAT CLOCK START  98/04/15 05:18:39
NOW DAT TIME SET CHECK  WAIT 10s PULSE
 MASTER  98/04/15 05:18:50.000
 DAT     98/04/15 05:18:50
DAT CLOCK ADJUST MODE END


>MYYMMDDHHMMSS
M 980417150700
>Z A/D DATA CHECK MODE ( RETURN HIT ANY KEY )
1:05470 2:64484 3:50652 4:32795
1:00000 2:65535 3:00000 4:32776
1:18627 2:65535 3:23270 4:32774
1:04593 2:30564 3:05592 4:32779
1:65535 2:00000 3:65535 4:32797
1:50855 2:65535 3:00000 4:32790
 A/D DATA CHECK MODE END
>S ------ DAT PROGRAM STATUS  ------
 DAT-2H Ver3.0  S/N 158
   REAL TIME CLOCK ( now )  98/04/15 05:19:10
   START TIME SET VALUE        04/17 15:07:00
   RECORDING MODE           4CH 100Hz
>E DAT POWER OFF
 END OF MONITOR ( SLEEP START )
SLEEP   05:19:15
 05:19:20
 05:19:25
 05:19:30
 05:19:35
 05:19:40
 05:19:45
 05:19:50
 05:19:55
 05:20:00
 05:20:05
```

```
 05:20:10

== OBSI ==
 DAT POWER OFF
 START RECORDING
 00:08:47
 00:08:48
 00:08:49
 00:08:50
 00:08:51
 00:08:52

NOW DAT CLOCK ADJUST TO MASTER CLOCK
 MASTER CLOCK ADJUST TO EXT1PPS
 DAT MONITOR MODE
 DAT CLOCK STOP

 DAT TIME SET  980415052124
 DAT CLOCK START  98/04/15 05:21:24
NOW DAT TIME SET CHECK  WAIT 10s PULSE
 MASTER  98/04/15 05:21:30.000
 DAT     98/04/15 05:21:30
DAT CLOCK ADJUST MODE END


>MYYMMDDHHMMSS
M 980417150800
>Z A/D DATA CHECK MODE ( RETURN HIT ANY KEY )
1:64424 2:65535 3:00000 4:32768
1:65535 2:65535 3:00000 4:32774
1:65535 2:65535 3:00000 4:32780
1:34061 2:56704 3:00000 4:32793
1:00000 2:08621 3:00000 4:32776
1:00000 2:00000 3:00000 4:32772
1:13881 2:39551 3:65535 4:32770
 A/D DATA CHECK MODE END
>S ------ DAT PROGRAM STATUS  ------
 DAT-2H Ver3.0  S/N 150
   REAL TIME CLOCK ( now )  98/04/15 05:21:56
   START TIME SET VALUE       04/17 15:08:00
   RECORDING MODE           4CH 100Hz
>E DAT POWER OFF
 END OF MONITOR ( SLEEP START )
SLEEP   05:22:00
 05:22:05
 05:22:10
 05:22:15
 05:22:20
 05:22:25
 05:22:30
 05:22:35
 05:22:40
 05:22:45
 05:22:50
 05:22:55
 05:23:00

== OBSN ==
 DAT POWER OFF
 START RECORDING
 00:48:51
 00:48:52
 00:48:53
 00:48:54
 00:48:55
 00:48:56

NOW DAT CLOCK ADJUST TO MASTER CLOCK
 MASTER CLOCK ADJUST TO EXT1PPS
 DAT MONITOR MODE
```

```
 DAT CLOCK STOP
 DAT TIME SET  980415052535
 DAT CLOCK START  98/04/15 05:25:35
NOW DAT TIME SET CHECK  WAIT 10s PULSE
 MASTER  98/04/15 05:25:40.000
 DAT     98/04/15 05:25:40
DAT CLOCK ADJUST MODE END


>MYYMMDDHHMMSS
M 980417150900
>Z A/D DATA CHECK MODE ( RETURN HIT ANY KEY )
1:65535 2:44636 3:00000 4:32836
1:00000 2:11881 3:08926 4:32830
1:00000 2:60621 3:00881 4:32832
1:00000 2:65535 3:34711 4:32831
1:00000 2:00000 3:08918 4:32830
1:65535 2:65535 3:65535 4:32831
1:65535 2:31771 3:65535 4:32833
1:65535 2:22129 3:65535 4:32834
1:65535 2:00000 3:65535 4:32831
1:65535 2:03168 3:13327 4:32831
¥
 A/D DATA CHECK MODE END
>S ------ DAT PROGRAM STATUS  ------
 DAT-2H Ver3.0  S/N 146
   REAL TIME CLOCK ( now )  98/04/15 05:26:21
   START TIME SET VALUE        04/17 15:09:00
   RECORDING MODE           4CH 100Hz
>E DAT POWER OFF
 END OF MONITOR ( SLEEP START )
SLEEP   05:26:25
 05:26:30
 05:26:35
 05:26:40
 05:26:45
 05:26:50
 05:26:55
 05:27:00
 05:27:05
 05:27:10
 05:27:15
 05:27:20
 05:27:25
 05:27:30
 05:27:35

== OBSD ==
 DAT POWER OFF
 START RECORDING
 00:48:41
 00:48:42
 00:48:43

 00:48:44
 00:48:45
 00:48:46
 00:48:47
 00:48:48
 00:48:49

NOW DAT CLOCK ADJUST TO MASTER CLOCK
 MASTER CLOCK ADJUST TO EXT1PPS
 DAT MONITOR MODE
 DAT CLOCK STOP
 DAT TIME SET  980415052901
 DAT CLOCK START  98/04/15 05:29:01
NOW DAT TIME SET CHECK  WAIT 10s PULSE
 MASTER  98/04/15 05:29:10.000
 DAT     98/04/15 05:29:10
```

```
DAT CLOCK ADJUST MODE END


>MYYMMDDHHMMSS
M 980417151000
>Z A/D DATA CHECK MODE ( RETURN HIT ANY KEY )
1:00000 2:65535 3:37828 4:32842
1:46944 2:65535 3:65535 4:32838
1:45478 2:35790 3:00000 4:32835
1:56992 2:65535 3:00000 4:32837
1:00000 2:00000 3:00000 4:32841
1:05776 2:38378 3:00000 4:32847
1:00000 2:00000 3:65535 4:32842
1:65535 2:31081 3:00000 4:32841
¥
 A/D DATA CHECK MODE END
>S ------ DAT PROGRAM STATUS  ------
 DAT-2H Ver3.0  S/N 147
   REAL TIME CLOCK ( now )  98/04/15 05:29:48
   START TIME SET VALUE        04/17 15:10:00
   RECORDING MODE           4CH 100Hz
>E DAT POWER OFF
 END OF MONITOR ( SLEEP START )
SLEEP   05:29:50
 05:29:55
 05:30:00
 05:30:05
 05:30:10
 05:30:15
 05:30:20
 05:30:25
 05:30:30
 05:30:35
 05:30:40
 05:30:45
```

```
== OBSO ==
 DAT POWER OFF
 START RECORDING
 00:48:52
 00:48:53
 00:48:54
 00:48:55
 00:48:56
 00:48:57
 00:48:58
 00:48:59
 00:49:00
 00:49:01
 00:49:02
 00:49:03

NOW DAT CLOCK ADJUST TO MASTER CLOCK
 MASTER CLOCK ADJUST TO EXT1PPS
 DAT MONITOR MODE
 DAT CLOCK STOP
 DAT TIME SET  980415053222
 DAT CLOCK START  98/04/15 05:32:22
NOW DAT TIME SET CHECK  WAIT 10s PULSE
 MASTER  98/04/15 05:32:30.000
 DAT     98/04/15 05:32:30
DAT CLOCK ADJUST MODE END


>MYYMMDDHHMMSS
M 980417151100
>Z A/D DATA CHECK MODE ( RETURN HIT ANY KEY )
1:00000 2:00000 3:33644 4:32719
1:65535 2:37609 3:55863 4:32712
1:65535 2:10985 3:62179 4:32706
```

```
1:65535 2:00000 3:65535 4:32697
1:58526 2:23330 3:65535 4:32722
1:59077 2:65535 3:00000 4:32688
1:00000 2:65535 3:43335 4:32743
1:65535 2:65535 3:08610 4:32707
1:47010 2:65535 3:00000 4:32703
1:24173 2:00000 3:25269 4:32692
1:00000 2:13211 3:40576 4:32712
1:00000 2:00000 3:65535 4:32721
1:00000 2:00000 3:65535 4:32721
1:64566 2:60204 3:36060 4:32707
1:46613 2:41659 3:30222 4:32706
1:45065 2:00000 3:00530 4:32722
1:00000 2:00000 3:00000 4:32725
1:00000 2:00000 3:00000 4:32714
1:00000 2:25798 3:65535 4:32708
1:65535 2:06007 3:65535 4:32715
1:65535 2:53955 3:65535 4:32708
1:65535 2:65535 3:04496 4:32717
¥
 A/D DATA CHECK MODE END
>S ------ DAT PROGRAM STATUS  ------
 DAT-2H Ver3.0  S/N 148
   REAL TIME CLOCK ( now )  98/04/15 05:33:16
   START TIME SET VALUE        04/17 15:11:00
   RECORDING MODE           4CH 100Hz
>E DAT POWER OFF
 END OF MONITOR ( SLEEP START )
SLEEP   05:33:20
 05:33:25
 05:33:30
 05:33:35
 05:33:40
 05:33:45
 05:33:50
 05:33:55
 05:34:00
 05:34:05
 05:34:10
 05:34:15
 05:34:20
 05:34:25

== OBSC ==
 DAT POWER OFF
 START RECORDING
 00:48:47
 00:48:48
 00:48:49
 00:48:50
 00:48:51

NOW DAT CLOCK ADJUST TO MASTER CLOCK
 MASTER CLOCK ADJUST TO EXT1PPS
 DAT MONITOR MODE
 DAT CLOCK STOP
 DAT TIME SET  980415053549
 DAT CLOCK START  98/04/15 05:35:49
NOW DAT TIME SET CHECK  WAIT 10s PULSE
 MASTER  98/04/15 05:36:00.000
 DAT     98/04/15 05:36:00
DAT CLOCK ADJUST MODE END


>MYYMMDDHHMMSS
M 980417151200
>Z A/D DATA CHECK MODE ( RETURN HIT ANY KEY )
1:00000 2:65535 3:65535 4:32779
1:65535 2:65535 3:00000 4:32772
1:65535 2:26326 3:00000 4:32780
```

```
1:65535 2:04223 3:00000 4:32778
1:24730 2:00000 3:00000 4:32763
1:00000 2:26235 3:15812 4:32766
1:19898 2:05625 3:65535 4:32778
1:00000 2:12508 3:65535 4:32773
1:15718 2:51696 3:65535 4:32790
1:22984 2:00000 3:24690 4:32760
1:64695 2:61237 3:00000 4:32788
¥
 A/D DATA CHECK MODE END
>S ------ DAT PROGRAM STATUS  ------
 DAT-2H Ver3.0  S/N 157
   REAL TIME CLOCK ( now )  98/04/15 05:36:32
   START TIME SET VALUE        04/17 15:12:00
   RECORDING MODE            4CH 100Hz
>E DAT POWER OFF
 END OF MONITOR ( SLEEP START )
SLEEP   05:36:35
 05:36:40
 05:36:45
 05:36:50
 05:36:55
 05:37:00
 05:37:05
 05:37:10
 05:37:15
 05:37:20
 05:37:25
 05:37:30

== OBSM ==
 DAT POWER OFF
 START RECORDING
 00:48:51
 00:48:52
 00:48:53
 00:48:54

NOW DAT CLOCK ADJUST TO MASTER CLOCK
 MASTER CLOCK ADJUST TO EXT1PPS
 DAT MONITOR MODE
 DAT CLOCK STOP
 DAT TIME SET  980415053838
 DAT CLOCK START  98/04/15 05:38:38
NOW DAT TIME SET CHECK  WAIT 10s PULSE
 MASTER  98/04/15 05:38:40.000
 DAT     98/04/15 05:38:40
DAT CLOCK ADJUST MODE END


>MYYMMDDHHMMSS
M 980417151300
>Z A/D DATA CHECK MODE ( RETURN HIT ANY KEY )
1:00000 2:65535 3:14718 4:32790
1:30938 2:65535 3:00000 4:32772
1:12793 2:00000 3:65535 4:32785
1:65535 2:00000 3:38491 4:32775
1:00000 2:00000 3:15026 4:32781
1:65535 2:65535 3:63791 4:32787
1:00000 2:51847 3:08151 4:32777
1:65535 2:00000 3:40582 4:32786
¥
 A/D DATA CHECK MODE END
>S ------ DAT PROGRAM STATUS  ------
 DAT-2H Ver3.0  S/N 156
   REAL TIME CLOCK ( now )  98/04/15 05:39:15
   START TIME SET VALUE        04/17 15:13:00
   RECORDING MODE            4CH 100Hz
>E DAT POWER OFF
 END OF MONITOR ( SLEEP START )
```

```
SLEEP   05:39:20
 05:39:25
 05:39:30
 05:39:35
 05:39:40
 05:39:45
 05:39:50
 05:39:55
 05:40:00
 05:40:05

== OBSB ==
 DAT POWER OFF
 START RECORDING
 3?:78:41
 3?:78:42
 3?:78:43
 3?:78:44

NOW DAT CLOCK ADJUST TO MASTER CLOCK
 MASTER CLOCK ADJUST TO EXT1PPS
 DAT MONITOR MODE
 DAT CLOCK STOP
 DAT TIME SET  980415054127
 DAT CLOCK START  98/04/15 05:41:27
NOW DAT TIME SET CHECK  WAIT 10s PULSE
 MASTER  98/04/15 05:41:30.000
 DAT     98/04/15 05:41:30
DAT CLOCK ADJUST MODE END


>MYYMMDDHHMMSS
M 980417151400
>Z A/D DATA CHECK MODE ( RETURN HIT ANY KEY )
1:00000 2:00000 3:34610 4:32758
1:08982 2:65535 3:49288 4:32767
1:53945 2:00000 3:65535 4:32770
1:07738 2:00000 3:65535 4:32761
1:65535 2:65535 3:58355 4:32783
1:00000 2:03075 3:56733 4:32793
1:00000 2:65535 3:00000 4:32784
¥
 A/D DATA CHECK MODE END
>S ------ DAT PROGRAM STATUS  ------
 DAT-2H Ver3.0  S/N 149
   REAL TIME CLOCK ( now )  98/04/15 05:42:00
   START TIME SET VALUE        04/17 15:14:00
   RECORDING MODE            4CH 100Hz
>E DAT POWER OFF
 END OF MONITOR ( SLEEP START )
SLEEP   05:42:05
 05:42:10
 05:42:15
 05:42:20
 05:42:25
 05:42:30
 05:42:35
 05:42:40
 05:42:45
 05:42:50
 05:42:55
 05:43:00
 05:43:05
 05:43:10

05:43:20.000
05:43:30.000
05:43:40.000
05:43:50.000
```

Attachment 6 OBS deployment and recovery check lists

OBS Clock Calibration Log (UTC)

== OBSK #3 ==
98/04/15 04:52:40Power On
4/16
00:17:19.935
00:17:29.935
00:17:39.935
00:17:49.935
00:17:59.935
00:18:09.935
00:18:19.935
4/17 (Deployment)
08:27:49.809
08:27:59.809
08:28:09.809
08:28:19.809
08:28:29.809
08:28:39.809
5/1 (Recovery)
08:41:48.129
08:41:58.129
08:42:08.129
08:42:18.129
08:42:28.129
08:42:38.129
08:42:48.129
08:42:58.129
5/3
08:49:57.961
08:50:07.961
08:50:17.961
08:50:27.961
08:50:37.961
08:50:47.961
08:50:57.961
08:51:07.961
08:51:17.961
08:51:27.961
08:51:37.961
08:51:47.961
08:51:57.961
08:52:07.961
5/4
22:57:57.821
22:58:07.821
22:58:17.821
22:58:27.821
22:58:37.821
22:58:47.821
22:58:57.821

== OBSJ #1 ==
98/04/15 04:56:22Power On
4/16
00:19:23.702
00:19:23.715
00:19:23.965
00:19:29.945
00:19:39.945
00:19:49.945
00:19:59.945
00:20:09.945
4/17 (Deployment)
10:00:49.837
10:00:59.837
10:01:09.837
10:01:19.837
10:01:29.837
10:01:39.837
10:01:49.837
5/1 (Recovery)
05:11:38.480
05:11:48.480
05:11:58.480
05:12:08.480
05:12:18.480
05:12:28.480
05:12:38.480
05:12:48.480
05:12:58.480
5/3
08:46:48.318
08:46:58.318
08:47:08.318
08:47:18.318
08:47:28.318
08:47:38.318
08:47:48.318
08:47:58.318
08:48:08.318

08:48:18.318
5/4

== OBSA #2 ==
98/04/15 05:02:36Power On
4/16
00:20:47.791
00:20:50.015
00:21:00.015
00:21:10.015
00:21:20.015
00:21:30.015
00:21:40.015
00:21:50.015
00:22:00.015
4/17
09:15:40.013
09:15:50.013
09:16:00.013
09:16:10.013
09:16:20.013
5/1 (Recovery)
06:53:09.384
06:53:19.384
06:53:29.384
06:53:39.384
06:53:49.384
5/3
08:48:49.417
08:48:59.417
08:49:09.417
08:49:19.417
08:49:29.417
08:49:39.417
5/4
22:59:39.430
22:59:49.430
22:59:59.430
23:00:09.430
23:00:19.430
23:00:29.430

== OBSL #4 ==
98/04/15 05:05:50Power On
4/16
00:22:19.941
00:22:29.941
00:22:39.941
00:22:49.941
00:22:59.941
00:23:09.941
00:23:19.941
00:23:29.941
00:23:39.941
00:23:49.941
4/17(Deployment)
07:38:19.841
07:38:29.841
07:38:39.841
07:38:49.841
07:38:59.841
5/1 (Recovery)
10:28:38.835
10:28:48.835
10:28:58.835
10:29:08.835
10:29:18.835
5/3
08:53:38.683
08:53:48.683
08:53:58.683
08:54:08.683
08:54:18.683
08:54:28.683
08:54:38.683
5/4
23:02:38.559
23:02:48.559
23:02:58.559
23:03:08.559
23:03:18.559
23:03:28.559
== OBSG #6 ==
98/04/15 05:10:20Power On
4/16
00:24:30.050
00:24:40.050
00:24:50.050
00:25:00.050
00:25:10.050
00:25:20.050
00:25:30.050
00:25:40.050

00:25:50.050
00:26:00.050
00:26:10.050
00:26:20.050
00:26:30.050
4/17 (Deployment)
06:11:50.122
06:12:00.122
06:12:10.122
06:12:20.122
06:12:30.122
06:12:40.123
5/1 (Recovery)
21:06:20.666
21:06:30.666
21:06:40.666
21:06:50.666
21:07:00.666
21:07:10.666
21:07:20.666
21:07:30.666
21:07:40.666
21:08:40.666
21:08:50.666
21:09:00.666
5/3
08:52:20.750
08:52:30.750
08:52:40.750
08:52:50.750
08:53:00.750
08:53:10.750
08:53:20.750
08:53:30.750
5/4
23:00:50.841
23:01:00.841
23:01:10.841
23:01:20.841
23:01:30.841
23:01:40.841
23:01:50.841
23:02:00.841
23:02:10.841
23:02:20.841

== OBSH #5 ==
98/04/15 05:13:20Power On
4/16
01:28:19.881
01:28:29.881
01:28:39.881
01:28:49.881
01:28:59.881
01:29:09.881
01:29:19.881
01:29:29.881
01:29:39.881
01:29:49.881
01:29:59.881
01:30:09.881
01:30:19.881
01:30:29.881
01:30:39.881
01:30:49.880
01:30:59.880
01:31:09.880
01:31:19.880
01:31:29.880
01:31:39.880
01:31:49.880
01:31:59.880
01:32:09.880
01:32:19.880
01:32:29.880
01:32:39.880
01:32:49.880
01:32:59.880
01:33:09.880
01:33:19.880
01:33:29.880
01:33:39.880
4/17 (Deployment)
06:54:29.700
06:54:39.700
06:54:49.700
06:54:59.700
06:55:09.700
06:55:19.700
5/1 (Recovery)
12:27:17.285
12:27:27.285
12:27:37.285

12:27:47.285
12:27:57.285
12:28:07.285
12:28:17.285
12:28:27.285
5/3
08:45:37.011
08:45:47.011
08:45:57.011
08:46:07.011
08:46:17.011
08:46:27.011
5/4
22:54:36.777
22:54:46.777
22:54:56.777
22:55:06.777
22:55:16.777
22:55:26.777
22:55:36.777
22:55:46.777
22:55:56.777
22:56:06.777
22:56:16.777
22:56:26.777

== OBSF #7 ==
98/04/15 05:16:00Power On
4/16
01:34:09.988
01:34:19.988
01:34:29.988
01:34:39.988
01:34:49.988
01:34:59.988
01:35:09.988
01:35:19.988
01:35:29.988
4/17 (Deployment)
05:27:09.967
05:27:19.967
05:27:29.967
05:27:39.967
05:27:49.967
05:27:59.967
5/1 (Recovery)
23:03:19.707
23:03:29.707
23:03:39.707
23:03:49.707
23:03:59.707
23:04:09.707
5/3
08:56:09.682
08:56:19.682
08:56:29.682
08:56:39.682
08:56:49.682
08:56:59.682
5/4
23:04:49.653
23:04:59.653
23:05:09.653
23:05:19.653
23:05:29.653
23:05:39.653

== OBSE #8 ==
98/04/15 05:18:50Power On
4/16
01:35:49.973
01:35:59.973
01:36:09.973
01:36:19.973
01:36:29.973
01:36:39.973
01:36:49.973
01:36:59.973
01:37:09.973
4/17 (Deployment)
03:57:09.918
03:57:19.918
03:57:29.918
03:57:39.918
03:57:49.918
03:57:59.918
03:58:09.918
03:58:19.918
03:58:29.918
03:58:39.918
03:58:49.918
03:58:59.918
03:59:09.918

03:59:19.918
03:59:29.918
03:59:39.918
03:59:49.918
03:59:59.918
04:00:09.918
04:00:19.918
04:00:29.918
04:00:39.918
04:00:49.918
04:00:59.918
04:01:09.918
5/2 (Recovery)
01:39:48.134
01:39:58.134
01:40:08.134
01:40:18.134
01:40:28.134
01:40:38.134
01:40:48.134
01:40:58.134
01:41:08.134
01:41:18.134
01:41:28.134
5/3
08:54:58.090
08:55:08.090
08:55:18.090
08:55:28.090
08:55:38.090
08:55:48.090
5/4
23:03:48.019
23:03:58.019
23:04:08.019
23:04:18.019
23:04:28.019

== OBSI #13 ==
98/04/15 05:21:30Power On
4/16
01:37:40.018
01:37:50.018
01:38:00.018
01:38:10.018
01:38:20.018
01:38:30.018
01:38:40.018
01:38:50.018
4/16 (Deployment)
20:37:50.022
20:38:00.022
20:38:10.022
20:38:20.022
20:38:30.022
20:38:40.022
5/4 (Recovery)
01:21:08.627
01:21:18.627
01:21:28.627
01:21:38.627
01:21:48.627
01:21:58.627
5/4
22:56:48.201
22:56:58.201
22:57:08.201
22:57:18.201
22:57:28.201
22:57:38.201
22:57:48.201
5/4
23:08:38.612
23:08:48.612
23:08:58.612
23:09:08.612
23:09:18.612

== OBSN #10 ==
98/04/15 05:25:40Power On
4/16
01:39:09.906
01:39:19.906
01:39:29.906
01:39:39.906
01:39:49.906
01:39:59.906
01:40:09.906
4/16 (Deployment)
23:20:19.795
23:20:29.795
23:20:39.795
23:20:49.795

23:20:59.795
23:21:09.795
23:21:19.795
23:21:29.795
23:21:39.795
5/4 (Recovery)
07:12:56.742
07:13:06.742
07:13:16.742
07:13:26.742
07:13:36.742
07:13:46.742
07:13:56.742
07:14:06.742
07:14:16.742
07:14:26.742
07:14:36.742
5/4
23:10:26.646
23:10:36.646
23:10:46.646
23:10:56.646
23:11:06.646
23:11:16.646
23:11:26.646
23:11:36.646
23:11:46.646

== OBSD ==
98/04/15 05:29:10Power On
4/16
01:40:29.829
01:40:39.829
01:40:49.828
01:40:59.828
01:41:09.828
01:41:19.828
01:41:29.828
01:41:39.828
4/17 (Deployment)
01:32:59.622
01:33:09.622
01:33:19.622
01:33:29.622
01:33:39.622
01:33:49.622
01:33:59.622
01:34:09.622
01:34:19.622
01:34:29.622
01:34:39.621
01:34:49.621

== OBSC #11 ==
98/04/15 05:36:00
4/16
01:42:30.006
01:42:40.006
01:42:50.006
01:43:00.006
01:43:10.006
01:43:20.006
01:43:30.006
4/16 (Deployment)
22:20:40.008
22:20:50.008
22:21:00.008
22:21:10.008
22:21:20.008
22:21:30.008
22:21:40.008
22:21:50.008
22:22:00.008
22:22:10.008
22:22:20.008
22:22:30.008
5/4 (Recovery)
05:21:09.504
05:21:19.504
05:21:29.504
05:21:39.504
05:21:49.504
5/4
23:09:39.497
23:09:49.497
23:09:59.497
23:10:09.497
23:10:19.497

== OBSO #14 ==
98/04/15 05:32:30Power On
4/16
01:44:39.957

01:44:49.957
01:44:59.957
01:45:09.957
01:45:19.957
01:45:29.957
01:45:39.957
4/16 (Deployment)
19:36:49.911
19:37:09.911
19:37:19.911
19:37:29.911
19:37:39.911
19:37:49.911
19:37:59.911
19:38:09.911
19:38:19.911
19:38:29.911
19:38:39.911
19:38:49.911
19:38:59.911
19:39:09.911
19:39:19.911
19:39:29.911
19:39:39.911
19:39:49.911
19:39:59.911
19:40:09.911
5/3 (Recovery)
23:24:57.885
23:25:07.885
23:25:17.885
23:25:27.885
23:25:37.885
5/4
23:05:57.809
23:06:07.809
23:06:17.809
23:06:27.809

== OBSM #12 ==
98/04/15 05:38:40Power On
4/16
01:46:29.914
01:46:39.914
01:46:49.914
01:46:59.914
01:47:09.914
01:47:19.914
01:47:29.914
4/16 (Deployment)
21:34:39.828
21:34:49.828
21:34:59.828
21:35:09.828
21:35:19.828
21:35:29.828
21:35:39.828
21:35:49.828
21:35:59.828
21:36:09.828
21:36:19.828
21:36:29.828
21:36:39.828
21:36:49.828
21:36:59.828
21:37:09.828
5/4 (Recovery)
03:24:17.939
03:24:27.939
03:24:37.939
03:24:47.939
03:24:57.939
03:25:07.938
03:25:17.938
5/4
23:07:47.843
23:07:57.843
23:08:07.843
23:08:17.843
23:08:27.843

== OBSB #15 ==
98/04/15 05:41:30Power On
4/16
01:48:19.971
01:48:29.971
01:48:39.971
01:48:49.971
01:48:59.971
01:49:09.971
01:49:19.971
4/16 (Deployment)
18:40:09.948

Attachment 5 OBS set-up and calibration data

4-1 OBS set-up data

=== OBS setup log. *(Italic comments)* ===

== OBSK (No. log file of OBS K due to late start up of TerraTerm Log. The following is copied from a Log note) ==

```
>MYYMMDDHHMMSS
M 980417150000
>Z A/D DATA CHECK MODE ( RETURN HIT ANY KEY )
A/D DATA CHECK MODE END
>S ------ DAT PROGRAM STATUS  ------
 DAT-2H Ver3.0  S/N 153
   REAL TIME CLOCK ( now )  98/04/15 04:52:40
   START TIME SET VALUE        04/17 15:00:00
   RECORDING MODE            4CH 100Hz
>E DAT POWER OFF
 END OF MONITOR ( SLEEP START )
SLEEP   OK
```

== OBSJ (No. log file of OBS J due to late start up of TerraTerm Log. The following is copied from a Log note) ==

```
>MYYMMDDHHMMSS
M 980417150100
>Z A/D DATA CHECK MODE ( RETURN HIT ANY KEY )
A/D DATA CHECK MODE END
>S ------ DAT PROGRAM STATUS  ------
 DAT-2H Ver3.0  S/N 145
   REAL TIME CLOCK ( now )  98/04/15 04:56:22
   START TIME SET VALUE        04/17 15:01:00
   RECORDING MODE            4CH 100Hz
>E DAT POWER OFF
 END OF MONITOR ( SLEEP START )
SLEEP   OK
```

== OBSA (No. log file of OBS A due to late start up of TerraTerm Log. The following is copied from a Log note) ==

```
>MYYMMDDHHMMSS
M 980417150200
>Z A/D DATA CHECK MODE ( RETURN HIT ANY KEY )
A/D DATA CHECK MODE END
>S ------ DAT PROGRAM STATUS  ------
 DAT-2H Ver3.0  S/N 155
   REAL TIME CLOCK ( now )  98/04/15 05:02:36
   START TIME SET VALUE        04/17 15:02:00
   RECORDING MODE            4CH 100Hz
>E DAT POWER OFF
 END OF MONITOR ( SLEEP START )
SLEEP   OK
```

== OBSL ==

```
 DAT POWER OFF
 START RECORDING
 37:44:52
 37:44:53
 37:44:54
 37:44:55
 37:44:56

NOW DAT CLOCK ADJUST TO MASTER CLOCK
 MASTER CLOCK ADJUST TO EXT1PPS
 DAT MONITOR MODE
 DAT CLOCK STOP
```

18:40:19.948
18:40:29.948
18:40:39.948
18:40:49.948
18:40:59.948
18:41:09.948
18:41:19.948
18:41:29.948
18:41:39.948
18:41:49.948
18:41:59.948
18:42:09.948
18:42:19.948
18:42:29.948
5/3 (Recovery)
21:21:19.479
21:21:29.479
21:21:39.479
21:21:49.479
21:21:59.479
21:22:09.479
21:22:19.479
5/4
23:06:49.437
23:06:59.437
23:07:09.437
23:07:19.437
23:07:29.437