092C01

FINAL REPORT OF OPERATIONS AND FIELD WORK

AMOCO AUSTRALIA PETROLEUM COMPANY

PROSPECT AREA

WEST TASMANIA BASIN

DATE OF SURVEY

MARCH 1 - 16, 1981

WESTERN GEOPHYSICAL COMPANY OF AMERICA

"M/V" WESTERN ODYSSEY

PARTY 86

OK-092 (VOL 1)

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I. LOCALITY MAP

II. LINE MAP

III. FIGURES (6)

VOLUME 2

Location Map

Total Magnetic Intensity – Anomaly Map

Total Magnetic Intensity – Raw Magnetics (24 in total)
W81-1 to W81-11a
W81-12 to W81-18
W81-20
W81-22
W81-26
W81-28
W81-30

I. INTRODUCTION

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I. INTRODUCTION

This is a comprehensive report of the field operations conducted by Western Geophysical Company of America, Party 86, M/V WESTERN ODYSSEY, on behalf of AMOCO AUSTRALIA PETROLEUM COMPANY. The survey involved was conducted during the month of March 1981 off the West coast of Tasmania, Australia.

Contained in this report are descriptions of the survey area, the recording instruments and their parameters, the navigation system utilized, the energy source and a listing of key field personnel involved with the operation.

The report also contains a chronology of events pertaining to the operation, a statistical summary and a line summary taken from the recording room records of the operation.

II. DESCRIPTION OF SURVEY AREA

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The prospect was located off Strahan, Tasmania in the West Tasmania Basin. The survey consisted of 25 predesigned survey lines comprising a total of 785.650 kilometers, 30 of which were to be within the confines of the Macquarie Harbour near the mouth of the Gordon River.

The majority of the survey was conducted in water depths exceeding 20 fathoms, although the vessel did venture into shallower water past a steep rising shelf in order to complete the inshore positions of some lines. The presence of the shelf gave rise to strong currents and this, coupled with the fresh water effluent from the Macquarie Harbour, caused some problems with efforts to correctly balance the streamer cable.

There were no rigs or marker buoys in the prospect area at the time of the survey, and although Strahan is an important center in the Tasmania lobster industry, fishing activity caused no problems or delays to the operation.

III. OPERATIONS CHRONOLOGY

III. OPERTION CHRONOLOGY

DATE	EVENT
March 1	14:00 hrs. M/V WESTERN ODYSSEY departed previous area of operation and began making way to rendezvous point off Strahan, Tasmania.
March 2	Vessel en route to Strahan.
March 3	Vessel arrived prospect area, crew began work on an intermittant noise problem evident in the streamer cable.
March 4	Vessel on prospect, work continued on noise problem with cable. 06:45 hrs. Client representatives arrived on board vessel by helicopter. 17:20 hrs. Crew deployed cable in order to check balance of same. 19:30 hrs. Began bringing cable back on board to adjust balance.
March 5	02:45 hrs. Crew deployed cable to check balance, unsatisfactory results. 06:35 hrs. Cable on board, vessel en route to cut baselines and take three way fixes. 20:15 hrs. Cable out to check balance, further timming required. Crew continued to trim cable balance for remainder of day.

March 6 — 16:15 hrs. After further timming of weights and repair of one broken wire cable was deployed with depth indicators calibrated and a tap test conducted with good results.
21:34 hrs. Commenced production on line W81-04.

March 7 — In production, completed lines W81-04, W81-02, W81-06, W81-08, W81-12 and commenced line W81-10.

March 8 — In production, completed lines W81-10, W81-14, W81-16, W81-18 and W81-20.

March 9 — Two attempts to commence line W81-22 were aborted on run-in as the streamer cable was running too shallow. An attempt at line W81-28 was also aborted for the same reason.
07:23 hrs. In production, completed lines W81-15, W81-13, vessel was forced to circle off line W81-11 due to a problem with the airguns.

March 10 — In production, completed lines W81-11A and W81-09.
Four separate attempts to commence line W81-07 during the day. The first attempt was aborted due to a problem with the navigation system, the second attempt was abandoned on the run-in when the airgun string crossed over the lead-in. The third and fourth attempts failed as the streamer cable was running too shallow.

After the fourth attempt the cable was brought on board in order to check the depth controllers.

March 11 04:44 hrs. In production, completed lines W81-07, W81-03, W81-22 and commenced line W81-01.

March 12 In production, completed lines W81-01, W81-05, W81-32 and W81-30.

March 13 In production, completed line W81-28 although line was halted early due to shallow water. Attempts to shootline W81-26 were aborted as the weather deteriorated to such a degree that production could not continue.

March 14 05:39 hrs. In production, completed lines W81-26 and W81-24.
11:15 hrs. Started bringing equipment on board in order to cut baseline before entering Macquarie Harbour.
16:00 hrs. Pilot placed on board by helicopter in order to bring vessel through entrance to Macquarie Harbour.
17:00 hrs. Vessel along side at Strahan.

March 15 06:35 hrs. Departed Strahan wharf for harbour waters.
08:00 hrs. Commenced scouting survey line within harbour.
12:51 hrs. In production on line W81-17.
13:45 hrs. Completed line, forced to stop due to shallow water.
14:50 hrs. Equipment on board.

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17:20 hrs. Vessel cleared Macquarie Harbour, pilot off loaded by helicopter. En route to predefine demoblization point.

March 16 12:25 hrs. Vessel demoblized from Amoco prospect.

IV. GENERAL INFORMATION

A. Contractors

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IV. GENERAL INFORMATION

A. Contractors

The survey was conducted on behalf of AMOCO AUSTRALIA PETROLEUM COMPANY of Houston, Texas, a division of AMOCO INTERNATIONAL OIL COMPANY.

Amoco contracted WESTERN GEOPHYSICAL COMPANY OF AMERICA to conduct the survey. WESTERN GEOPHYSICAL is a Delaware corporation and a division of LITTON INDUSTRIES.

B. Location of Headquarters

IV. GENERAL INFORMATION (continued)

B. Location of Headquarters

The principal office of Amoco Australia Petroleum Company is located at 16825 Northchase Drive, Houston, Texas, U.S.A. It was to this office that all correspondence pertaining to the operation was directed.

The main office of Western Geophysical Company of America is located at 10001 Richmond Avenue, Houston, Texas, U.S.A. The survey detailed in this text was conducted out of Western Geophysical's South East Asia office located at Unit 301, Union Building, 37 Jalan Pemimpin, Singapore 2057, Singapore.

A temporary field office was established and maintained by Western Geophysical Company in the Four Seasons Motel in Zeehan, Tasmania in order to facilitate communciations and logistics involving the operation.

C. Communications

IV. GENERAL INFORMATION (continued)

C. Communications

Periodic production reports were issued to Amoco Australia's Houston office directly from the survey vessel by Amoco's onboard representative.

Production updates and vessel status were issued daily to Western Geophysical's Singapore office from the field office in Zeehan.

Radio communication between the vessel, base stations and field office were maintained throughout the operation with sheduled radio contact three times a day.

D. Weather

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IV. GENERAL INFORMATION (continued)

D. Weather

Moderate to strong winds dominated the weather conditions throughout the duration of the survey. These winds generated large swells and seas on numerous occasions, however condition only became severe enough to interrupt production for approximately 24 hours between March 13 and 14.

The presence of strong currents were recorded inshore near the island's shelf and near the mouth of the Macquarie Harbour. These currents and the effluence of fresh water in the vicinity of the harbour mouth proved to have an adverse effect on the streamer cable's balance and caused several delays to the operation.

E. Key Field Personnel

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IV. GENERAL INFORMATION (continued)

E. Key Field Personnel

AMOCO AUSTRALIA PETROLEUM COMPANY

Don Danz	:	Project Geophysicist; on board to assist with quality control.
Don Armstrong	:	Onboard client representative responsible for quality control of data.

WESTERN GEOPHYSICAL COMPANY

John T. Evans	:	Field Supervisor; normally based in Singapore, was present during majority of survey to assist with logistics and acquisition.
Paul J. Hughes	:	Operations Manager; based at field office, responsible for client liason and crew and vessel logistics.
Peter Rock	:	Marine Operations Co-ordinator; responsible for offshore operation of vessel including data quality and sequence of production.
Kevin Roberts	:	Instrument Technician
Terry Leighton	:	Observer
Dicky Chow	:	Observer
Phil Knight	:	Airgun Mechanic

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Mal Wetherspoon	:	Airgun Mechanic
Ian Branley	:	Mobile Navigator
James Green	:	Mobile Navigator

F. Disposition of Data

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IV. GENERAL INFORMATION (continued)

F. Disposition of Data

The recorded digital magnetic tapes were sent to Amoco International Oil Company in Houston, Texas, U.S.A. for processing. Included with the tape shipments were copies of the observer's line summary sheets, streamer cable and airgun configuration prints, co-ordinator's logs, LRS-100 computer printouts, E.P.C. rolls, camera monitor rolls, fathometer rolls and parameter reports.

The Maxiran navigaton data along with the secondary Satellite Navigation data was sent to Western Geophysical's Navigation Department in Singapore for processing.

G. Instrument Test

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IV. GENERAL INFORMATION (continued)

G. Instrument Test

Semi-monthly and monthly instrument test were conducted on the DFS V recording system as per the instrument manual's instructions. The results of these test were sent to Western Geophysical's processing center in Singapore for processing and initial interpretation, then forwarded to Western Geophysical's Hoston office for final analysis.

V. EQUIPMENT & INSTRUMENTATION

A. Survey Vessel

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V. EQUIPMENT AND INSTRUMENTATION

A. Survey Vessel

Name	:	M/V Wester Odyssey
Length	:	185 feet
Beam	:	39 feet
Draft	:	10 feet
Tonnage; gross/net	:	830/250
Engines	:	2 x Caterpillar D-399 TA 1090 HP each
Propulsion	:	2 x Kamewa 50 x f/4 Control Pitch Propellors
Generators	:	2 x 550 Kw - for Air Compressors 2 x 175 Kw - for Vessel's power 2 x 30 Kw - for Instrument's power
Radar	:	2 x Decca model 926, 48 mile range
Gyro Compass	:	Sperry model 227 with Auto Pilot
Bow Thruster	:	Kamewa SP 1300 with 350 HP Electric Motor
Stabilization	:	Flume type with Anti-Roll Blige Keel
Accomodation	:	36 persons
Endurance	:	35 days minimum
Official Number	:	8775
Call Letters	:	HO - 3498
Port of Registry	:	Panama
Helideck	:	40 feet x 50 feet

B. Seismic Equipment and Instrumentation

V. EQUIPMENT AND INSTRUMENTATION (continued)

B. Seismic Equipment and Instrumentation

Instruments	:	Digital Field System V
Main Cable	:	2400 meter streamer; 96 groups 25 m group spacing; 96 ch.mode 50 m group spacing; 48 ch.mode
Mini Streamer	:	8 or 12 groups, 12.5 m group spacing incorporated into main cable offset sections
Compressors	:	6 x Price 5000 psi electric drive compressors
Navigation		
Primary	:	MAXIRAN Interrogator/Beacon System
Secondary	:	LRS Phase IV Integrated Satellite Navigation system
Communications	:	Magnovox MARISAT satellite terminal with telex and telephone facilities
		Sailor 800 watt programmable SSB ship/shore radio
		Sailor VHS radio
		UTS 10S Auxillary
		SSB radio, 150 watts
Gravity Meter *	:	La Coste Romberg
Magnetometer	:	Geometrics G801/3
Ancillary Equipment	:	LRS Geoscience Data Acquisition System (Data Logger)
		EPC single trace plotter
		SIE ERC 100 monitor camera
		LRS-100 energy source synchronizer

LRS airgun solenoid controller

Kalamon M2A cable fault locator

Krupp-Altas model 6020 fathometer 2000 fathom range

Raython model DE750 fathometer 600 fathom range

Simrad model EX380 fathometer 100 fathom range

* Not in use during this survey.

C. Instrument Description

V. EQUIPMENT AND INSTRUMENTATION (continued)

C. Instrument Description

The WESTERN ODYSSEY is equipped with a DFS V seismic acquisition system consisting of two analog modules, a controller module and four tape transports. The system accepts analog inputs signals from the streamer cable and converts these to digital form for recording on magnetic tape.

Each analog module contains 60 pairs of wires available for data acquisition. These wires come directly from the streamer cable (through a deck cable leading from the cable reel to the instrument room). Each individual channel is passed through a line filter to mitigate the effects of ambient static picked up from the seismic lines. From this filter the signal is applied to a differential pre-amplifier, then an optional lowcut filter, an alias filter and finally through an optional 50 or 60 Hz notch filter.

After the filtration process the signals are time division multiplexed to a floating point amplifier to allow for scanning of all data channels within the specified sample interval. The particular channel which is to be connected to the amplifier in any time slot is determined by an address from the controller module. The floating point amplifier adjust its gain in steps of 4:1 to bring the amplified signal to the optimum level for application to the Analog-to-Digital Converter.

The Controller Module provides a stream of commands to the Analog Module that perform the following functions:

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1. Address the channels to be sampled.
2. Command the sending of status and zero offset data.
3. Control whether the gain ranging amplifier automatically selects its gain (AGC) or operates at a gain specified by the operator.
4. Control the source of input to the A/D converter.

In the normal data acquisition mode the floating point amplifier is commanded to be in it's automatic gain ranging mode, however the amplifier may be commanded to be in any of eight possible settings (particularly for test and calibration purposes). When in the normal data acquisition mode the A/D converter is commanded to derive it's input from the floating point amplifier but for various test and calibration procedures the A/D converter can derive its input from the internal test oscillator in the Analog Module, an external voltage source or ground.

The sequence of address sent out by the Controller to the Analog Module causes each individual analog channel to be sampled in sequence. Before commencement of a new sequence of addresses two time intervals occur that are reserved for specific purposes. During the first time interval, called First Start of Scan (SOS1), a special address is sent which causes the Analog Module to send back status information about the filter settings and gain constants of the Analog Module and to reset stabilize the floating point amplifier. During ensuing second interval, labled Second Start of Scan (SOS2), the input to the amplifier in the Analog Module is commanded to be short to ground. Thus the information returned to the Controller Module as a result of this

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command contains zero offset information. The sequence of addresses is generated continuously whenever the power is on. However when a time break (start of energy source discharge) is received the sequence is interrupted and command for a Data Start and SOS1 are transmitted to commence a new sequence.

The digital data from the Analog Module comes to the Controller Module in bit serial format. After conversion to parallel format, a number which represents the dc offset of the amplifier and A/D converter in the Analog Module is subtracted from each data word (each word represents the instantaneous voltage at the moment of sampling of a channel).

The number to be subtracted is derived from the information obtained during SOS2. Since the dc offset of the amplifier may be somewhat dependent on amplifier gain, the gain is set to a different value during the successive SOS2. A separate value of dc offset is stored in a memory for each of the gain settings of the amplifier. In normal operation, the amplifier sets its own gain and the gain value that it determines is received by the controller in three bits of the data word. These bits are an address in memory from which to obtain the proper number to subtract. It is not appropriate to completely update the memory every time a new sample of the zero offset is obtained because the new value received is exaggerated by the effect of noise and thus would cause values placed in memory to be erratic. Therefore, when a new offset sample is obtained, only a fraction of the difference between the new value and the old value is added to the memory. Thus, the quantity stored in memory is a long-term average of zero offset.

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The first filter removes those components of dc offset which are common to all channels but does not help the offset caused by the multiplexes of the individual channels. In order to remove the dc offset of the individual channels, it is necessary to have a memory location for each channel where a number can be stored which is to be subtracted from the data on that channel. The offset information for each channel can only be obtained from the data received from that particular channel. Thus, the number stored in memory for a particular channel is built up by adding (to the number in memory) a fraction of the difference between each new sample and the number stored in memory. Hence, the number to be subtracted is constantly changing. The net effect is the digital equivalent to a capacitor/resistor lowcut filter where the number stored in memory (which is subtracted) is analogous to the voltage across the capacitor in the analog realm. To perform this function in the analog realm would require a capacitor for each channel and switches for selecting the proper capacitors for each channel. Therefore, the digital method is much simpler. The filter time constant is 128 milliseconds.

The standard recording formats of the system are SEG-B and SEG-C. In both formats, each seismic event is recorded in a file consisting of a header block containing record constants and a data block containing seismic data values. The principal difference between the formats is the method of recording data values. Despite this difference, both header block tape formats are similar. The first 24 bytes of the header consist of record constants and processing information. The seismic channel fixed and early gain is recorded next for each channel. After this strip, the auxiliary channel identifier code is

recorded for each auxiliary channel, then any external data may be recorded at the operator's discretion.

In the SEG-B format, data is organized in 2 byte words with each byte consisting of 8 bits of information. The first of the data block comprise the sync group. Bits 0 through 5 of the sync group are recorded as "ones" for a normal time break and as "zeros" if the system is operated from an internal time break. Bit 6 indicates the number of seismic channels as designated in the following chart :

CHANNELS	1	2	3	4
24	0	0	0	0
36	0	1	0	0
48	0	0	0	1
others	1	1	1	1

The next five words after the sync group are the auxiliary channels. The first auxiliary channel is timing word. During the remainder of the scan, seismic channels are recorded. The gain for 4 seismic channels is combined in one data word by 4 data words containing the mantissa of each of the seismic channels. The magnitude representing the channel output is expressed as a binary number with negative values in one's or two's complement code.

In the SEG-C format, data is organised in four 32 bit words, each word containining the data value for one channel. The recorded data value is the actual channel input in millivolts expressed in IBM-compatible floating point notation. In this notation, a data value is represented by a sign bit, a 7 bit characteristic of exponent and a 24 bit fraction. The characteristic signifies a power of 16 in binary excess

64 code. The fraction is normalized to put the significant digit of the data within the uppermost 4 digits of the fraction.

The data coming from the offset filter (data in the form of a 16 bit two's complement number and a three bit gain for each sample) must be rearranged to be placed on the half inch 9 track (8 bits plus parity) tape. The logic which performs this function is called Format Logic. Only 15 of the 16 bits are actually used. The most significant bit is used to indicate overflow. The output of the Format Logic is a progression of 8 bit words arranged in accordance with either the SEG-B or SEG-C standard formats as chosen by the plug-in Format Logic board in the Controller Module. But after the words are generated, it is further necesssary to encode the bits according to either the NRZI or the Phase Encoded modes of writing on the tape. The logic that performs this is called the Write Logic. The Write Logic is on the NZ board for NRZI and on the PE board for Phase Encoded. There must be a timing buffer between the Format Logic and the Write Logic. That is, the data may not be available from the Format Logic at exactly the time when it is desired to feed information to the Write Logic. The average data rate will have to be equal. The required flexibility is provided by a first in/first out memory (FIFO). This device can load a number of words into its input and later read them out of the output in the same order as they were entered. This reading out can occur at different times. The controller Write Logic translates the "ones" and "zeros" of each word into appropriate flux direction signals to be sent to the Tape Transport for writing on tape. In the case of phase encoded signals, this requires two flux direction bits sent for each signal

bit. The data is rearranged into 8-bit-plus parity bit parallel words, and these are encoded into 8-bit-plus parity flux direction words. After this 4 command bits are added to each data, word and the resulting data command words are converted to bit serial form and sent to Tape Transport. Clock and sync signals are also sent to the Tape Transport. The communication from the Tape Transport to the Controller Module is divided into 2 parts :

1. The data read from the tape is communicated to the controller by 10 wire pairs which carry all 9 tracks from the tape and a read clock for NRZI to the controller in parallel.
2. The status information (tape rewind, end of tape, etc.) is carried over a serial interface.

The Tape Transport motion control commands are sent over the serial interface with the write data. The commands are issued by the Controller Module, but the means of executing the commands are in the Tape Transport Module. Before a record is written on tape, a header is written which contains file identification and a number of constants which are introduced from the controller. Also, there are pieces of information such as gain constants and filter settings which are received from the Analog Module. All this information is arranged into a procession of 8-bit-plus parity (the same as the data) and is arranged in a specified sequence by the header logic according to SEG-B or SEG-C format. The header information or the data information is selected at the appropriate time for feeding the FIFO. The Tape Transport Module is the means by which the digital data from the Controller Module is recorded on magnetic tape. Four transports are used in the system to facilitate dual recording

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where and when requested by clientele. Each of the 10 inch transports record the data on 1/2 inch tape using IBM-compatible 9-track dual gap heads. The recording can be either 800 bits per inch NRZI or 1600 BPI PE. The transports consists of the capstan drive, mechanical storage systems, supply and take up reel serve systems, record/reproduce head data electronics and tape position sensors.

D. Energy Source

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V. EQUIPMENT AND INSTRUMENTATION (continued)

D. Energy Source

The M/V WESTERN ODYSSEY's high pressure energy source system consists of twenty high pressure WESTERN airguns with reservoir capacities ranging from 10 to 100 cubic inches in 10 cu. in. intervals. In normal operating circumstances, 10 of the airguns are combined to form a 560 cu. in. tuned array. The airguns are operated at a pressure of 5,000 psi supplied from 4 of 6 available Price Air Gun Master Compressors.

For various reasons, most airguns have some inherent firing delay and do not fire immediately upon receipt of a "fire" command pulse. The amount of this delay tends to drift with time and naturally varies from unit to unit. To overcome this problem and to assure all airguns fire within specs required for an optimum energy pulse, the system is controlled by the LRS 100 Energy Source Synchronizer. The LRS 100 is a module microprocessor based system designed specifically to control the firing of a seismic energy source array so that all guns fire concurrently or in a pre-designated staggered time sequence. The system accomplished this by electronically sensing the individual gun delays and automatically establishing a firing sequence to compensate for the variations in delay. The basic sequence of operation is as follows :

1. The Controller Module receives a fire command which signals the start of the firing cycle. The fire command signal may be issued by the seismic system or the LRS 100 Cycle Controller.

2. At some pre-calculated point after receiving the fire command, the controller will issue a fire pulse to the solenoid power supply for each gun. The solenoid in turn triggers the release of the control pressure air. As this occurs, an imbalance is created between the control pressure reservoir and the high pressure reservoir that allows the high pressure air to force the seat and shuttle upward and expose the exhaust ports, thus releasing the pressure air.

3. Upon firing, a sensor on the guns produces a return signal which is detected by the controller. Ideally, this fire detect signal should occur at a pre-selected time referred to as the Aiming Point.

4. If the fire detect for any guns does not occur at the Aiming Point, the controller will correct the error by adjusting the time at which the next fire pulse is issued to the gun. These adjustments are computed from a filter applied to the previous error values.

Through this method of constant electronic adjustment, the energy source system delivers its optimum seismic signals.

E. Streamer Cable

V. EQUIPMENT AND INSTRUMENTATION (continued)

E. Streamer Cable

Modern seismic marine streamer cables originated from WW II anti-torpedo technology. The modern cables are 2.5 to 3 inches in diameter and, when filled with a special kerosene based fluid, are neutrally buoyant in the water column. As water density changes, the overall buoyancy of the streamer is adjusted by the addition or removal of thin lead weights taped onto the streamer at various intervals.

The streamer cable used by the WESTERN ODYSSEY is composed of 48 detachable and interchangeable LRS Marine Active Cable sections. Each section is 50 meters in length and contains two 25 meter groups of twenty WM2-036 hydrophones. This gives the streamer an overall length of 2400 meters excluding the lead-in and elastic sections.

The 500 foot nylon reinforced neoprene lead-in is heavily weighted in order to depress the front end of the streamer cable to the desired operating depth. It is also outfitted with neoprene florings for noise reduction. In normal operation, two 75 meter elastic sections are attached at the tail of the lead-in for additional noise reduction.

To maintain the streamer cable at the specified depth in the water column, a series of Syntron Depth Controller are employed at equal intervals along the cable. An electronic pulse

controls the angle of the wings and thus controls their influence on the cable's depth. The cable depth is monitored from the readouts of pressure sensitive transducers located at regular intervals along the streamer.

A tail buoy is connected at the far end of the cable and is tracked by the vessel's radar, making it possible to observe how closely the cable is trailing the vessel along its line of motion.

In order to give a further indication of the cables physical orientation along the line of motion, 6 of the 48 active sections contain Digicouse heading sensors. Each heading sensor will give the heading in degrees of the streamer at the point of location of the heading sensor. Using the length of the streamer out from the vessel and the heading from the sensors, a simple approximation of the shape of the streamer can be made by connecting the known points with straight lines.

VI. RECORDING PARAMETERS

A. Instrument Settings and Specifications

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VI. RECORDING PARAMETERS

A. Instrument Settings and Specifications

Model	:	DFS V
System Number	:	408
Format	:	SEG-B, 9 track
BPI Density	:	1600
Number of Channels Available	:	124
Number Seismic Channels	:	96 (plus 12 mini-streamer)
Auxiliary Channels	:	Timebreak - Channel 1 Waterbreak - Channel 2
Pre-Amp Gain	:	36 dB
Total Gain	:	120 dB
Lo Cut Filter	:	Out
Hi Cut Filter	:	128 Hz, slope - 70 dB/oct
Sample Rate	:	2 milliseconds
Record Length	:	5 seconds
Analog Module Specs		
Frequency Response	:	3 to 256 Hz
Maximum Gain	:	132 dB
Minimum Gain	:	24 dB
Input Impedence		
Difference Mode	:	20,000 ohm resistive in parallel with 0.035 microfarads
Common Mode	:	500 ohms parallel with the series combination of 0.02 microfarads and induction of 6 Henries

Max. Input Signal	Gain Constant	Voltage(mV RMS)
Difference Mode:	24	327.68
	26	81.92
	8	20.48

Common Mode:	F. Range (Hz)	Voltage(Peak)
	0 - 60	7
	60 - 700	3.5
	700 - 1,000	7
	1K - 3K	10
	3K - 10M	50

Distortion : 0.05% 3 to 256 Hz

Crossfeed Isolation : 80 dB between any 2 channels, feeding 1 channel only

Control Module Specs

Timing Accuracy : -0.005%

Data Word Rate : 64 kHz Max

B. Main Streamer Cable Parameters

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VI. RECORDING PARAMETERS(continued)

B. Main Streamer Cable Parameters

Present Coverage	:	48 fold
Pops per Km	:	40
Number of Groups	:	96
Depth Detectors at Head of Groups	:	2, 16, 32, 48, 64, 80, 96, head mini-streamer
Depth Controllers on Groups	:	Tail elastic, 2, 12, 26, 40, 54, 68, 82, 96, head mini-streamer
Length of Active Sections	:	50 meters
Number of Groups per Sections	:	2
Number of Hydrophones per Group	:	20
Center Enery Source to Center Near Group	:	200.7 meters
Center Near Group to Center Far Group	:	2,375 meters
Center Near Group to Maxiran Tower	:	278.6 meters

Following parameters are for line W81-17 only, changes made to allow production inside Macquarie Harbour.

No. of Groups	:	48
Center Energy Source to Center Near Group	:	200.7 meters
Center Near Group to Center Far Group	:	1,175 meters
Center Near Group to Maxiran Tower	:	278.6 meters

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Depth Detectors at Head of Group	:	2, 16, 32, 48, head mini-streamer
Depth Controllers at Groups	:	1st elastic, 2, 12, 26, 40, head mini

C. Mini Streamer Cable Parameters

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VI. RECORDING PARAMETERS(continued)

C. Mini Streamer Cable Parameters

Pre-Amp Gain	:	24 dB
Total Gain	:	108 dB
Lo Cut Filter	:	Out
Hi Cut Filter	:	256 Hz, slope 70 dB/oct
Sample Rate	:	1 millisecond
Record Length	:	5 seconds
Number of Groups	:	12
Number of Hydrophones Per Group	:	10
Center Energy Source to Center Near Group	:	44.45 meters
Center Near Group to Center Far Group	:	137.5 meters
Center Near Group to Maxiran Tower	:	122.35 meters

D. Airgun Configuration

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VI. RECORDING PARAMETERS(continued)

D. Airgun Configuration

Number of Guns in Array	:	10
Array Volume	:	555 cu. inches
Array Pressure	:	4500 psi
Shot Depth	:	6 meters
Shot Interval	:	25 meters

VII. STATISTICAL SUMMARY

092062

VII. STATISTICAL SUMMARY

DATE	LINE	SP - SP	PROFILES	KMS
March 06	W81-04	01 - 880	880	22.000
March 07	W81-04	881 - 1001	121	3.025
	W81-02	01 - 1255	1255	31.375
	W81-06	01 - 1270	1270	31.750
	W81-08	01 - 1503	1530	37.575
	W81-12	01 - 1496	1496	37.400
	W81-10	01 - 114	114	2.850
March 08	W81-10	115 - 1061	947	23.675
	W81-14	01 - 995	995	24.875
	W81-16	01 - 1523	1523	38.075
	W81-18	01 - 1190	1190	29.750
	W81-20	01 - 1068	1068	26.700
March 09	W81-15	01 - 1151	1151	28.775
	W81-13	01 - 1946	1946	48.650
	W81-11	01 - 838	838	20.950
March 10	W81-11A	788A- 2055	1217	30.425
	W81-09	01 - 2175	2175	54.375
March 11	W81-07	01 - 2097	2097	52.425
	W81-03	01 - 1269	1269	31.725
	W81-22	01 - 990	990	24.750
	W81-31	01 - 307	307	7.675
March 12	W81-31	308 - 932	625	15.625
	W81-05	01 - 2025	2025	50.625
	W81-32	01 - 645	645	16.125
	W81-30	01 - 827	827	20.675
March 13	W81-28	01 - 838	838	20.950
March 14	W81-26	01 - 878	878	21.950
	W81-24	223 - 1058	836	20.900
March 15	W81-17	01 - 400	400	10.000

Total Kilometers: 785.650

VIII. LINE SUMMARY

VIII. LINE SUMMARY

W81 - 01 12th March 1981	Start of line - gun array - guns 1, 2, 3, 5, 7, 8, 9, 10, 11, 15. Gun volume 555 cu/in. First reel 087752. First shotpoint - 001. Reel 087755 - SP 228. Gun 3 out - gun 14 in. SP 220 - parity errors. SP 181 - parity errors. SP 244 - parity errors. End of line - last reel 087766, last shotpoint 932.
W81 - 02 7th March 1981	Start of line - gun array - guns 1, 2, 3, 4, 5, 7, 8, 9, 10, 11. Gun volume 555 cu/in. First reel 087374. First shotpoint - 001. Reel 087374 - parity errors on SP 33. Reel 087375 - parity errors on SP 94. Reel 087376 - parity errors on SP 116. Reel 087378 - parity errors on SP 274. Reel 087382 - parity errors on SP 508. Reel 087384 - parity errors on SP 638.

092065

Reel 087386 - parity errors on SP 742.
Reel 087387 - parity errors on SP 843, 851.
End of line - last reel 087394, last shotpoint 1255.

W81 - 03
11th March 1981

Start of line - gun array - guns 1, 2, 12, 13, 15, 16, 18, 19, 20.
Gun volume 555 cu/in.
First reel 087715.
First shotpoint - 001.
Reel 087720 - SP 350 - gun 12 out - gun 7 in (volume 545 cu/in.).
Reel 087721 - SP 392 - gun 13 out - gun 8 in (volume 545 cu/in.).
SP 397, 398, 404, 406, 425 - misfires. Parity errors on SP 374.
Reel 087722 - SP 473, 474, 485, 487, 492 - misfires.
Reel 087725 - SP 630 - gun 15 out - gun 9 in.
SP 665 - misfire.
Reel 087726 - SP 746 - gun 13 in - gun 8 out. SP 746 - misfire.
Reel 087729 - SP 906, 925 - misfires.
Reel 087730 - SP 995 - parity errors.
Reel 087731 - SP 1021, 1058 - misfires.

SP 1063 - parity errors.
Reel 087732 - SP 1079 - misfire.
SP 1115 - parity errors.
Reel 087735 - SP 1268 - parity errors.
End of line - last reel 087735, last shotpoint 1269.

W81 - 04
6th March 1981

Start of line - gun array - guns 1, 2, 3, 4, 5, 7, 8, 9, 10, 11.
Gun volume 555 cu/in.
First reel 087357.
First shotpoint - 001.
SP 4, 5, 6, 38 missed due to tape deck problem.
Reel 087358 - parity errors on SP 114.
Reel 087359 - lost SP 158, 159.
Reel 087362 - parity errors on SP 326, 342.
SP 339 - radio interference.
Reel 087364 - parity errors on SP 479.
Reel 087365 - parity errors on SP 537.
SP 540 lost at reel change 087365 to 087366.
Reel 087368 - parity errors on SP 663, 680.
Reel 087370 - parity errors on SP 840.
Reel 087371 - parity errors on SP 910.
End of line - last reel 087373, last shotpoint 1001.

092067

W81 - 05 12th March 1981	Start of line - gun array - guns 7, 12, 13, 14, 15, 16, 17, 18, 19 . Gun volume 555 cu/in. First reel 087767. First shotpoint - 001. Reel 087768 - early change to reel 087769 due to tape deck power failure - SP 75, 76, 77 lost at deck change. Reel 087770 - SP 131 lost due to speed fluctuation. Reel 087771 - SP 206 misfire. SP 221 - parity errors. Reel 087774 - SP 363 - static shift. Reel 087783 - parity errors on SP 984. Reel 087791 - parity errors on SP 1447, 1448. End of line - last reel 087800, last shotpoint 2025. Line finished early due to shallow water.
W81 - 06 7th March 1981	Start of line - gun array - guns 6, 12, 13, 14, 15, 16, 17, 18, 19, 20. Gun volume 555 cu/in. First reel 087395. First shotpoint - 001. Reel 087395 - parity errors on SP 52, 10. Reel 087397 - parity errors on SP 141, 172.

Reel 087400 - parity errors on SP 363.
Reel 087403 - parity errors on SP 522.
Reel 087404 - parity errors on SP 619.
Reel 087407 - parity errors on SP 765, 785.
Reel 087414 - parity errors on SP 1246.
End of line - last reel 087415, last shotpoint 1270.

W81 - 07
11th March 1981

Start of line - gun array - guns 6, 8, 9, 10, 11, 17, 18, 19, 20.
Gun volume 555 cu/in.
First reel 087681.
First shotpoint - 001.
First 4 files recorded as March 10th - no date change.
Parity errors on SP 31, 15.
Reel 087682 - parity errors on SP 85.
Reel 087683 - misfire on SP 134.
Reel 087684 - SP 205 - gun 1 in.
SP 213 - guns 6, 9 out.
Reel 087685 - parity errors on SP 265.
Reel 087686 - parity errors on SP 334.
Reel 087687 - parity errors on SP 374.
SP 413 - gun 8 out - 13 in.

Reel 087688 - parity errors on SP 456, 459.
Reel 087689 - parity errors on SP 560.
Reel 087692 - parity errors on SP 703.
Reel 087697 - parity errors on SP 1024, 1057.
Reel 087698 - parity errors on SP 1095.
Reel 087700 - parity errors on SP 1248.
Reel 087701 - parity errors on SP 1283, 1300.
Reel 087704 - parity errors on SP 1465.
Reel 087707 - parity errors on SP 1668, 1707.
Reel 087708 - misfires - SP 1727, 1733, 1738, 1742, 1745.
SP 1735 - gun 17 out, gun 2 in.
Reel 087713 - parity errors on SP 2033, 2053, 2065.
End of line - last reel 087714, last shotpoint 2097.

W81 - 08
7th March 1981

Start of line - gun array - guns 6, 12, 13, 14, 15, 16, 17, 18, 19, 20.
Gun volume 555 cu/in.
First reel 087416.
First shotpoint - 001.
Reel 087417 - parity errors on SP 55, 61, 99.
Reel 087420 - parity errors on SP 262..

Reel 087421 - misfire on SP 319.
Reel 087422 - misfire on SP 373 - parity errors on SP 393.
Reel 087425 - parity errors on SP 576.
Reel 087427 - parity errors on SP 718, 737.
Reel 087432 - parity errors on SP 1024, 1033. Misfires on SP 1050, 1051, 1056, 1057.
End of line - last reel 087439, Last shotpoint 1503.

W81 - 09
10th March 1981

Start of line - gun arrray - guns 1, 3, 4, 5, 6, 11, 12, 13, 14, 15.
Gun volume 555 cu/in.
First reel 087645.
First shotpoint - 001.
Reel 087646 - parity errors on SP 102, 109.
Reel 087647 - misfire SP 119.
SP 133 - guns 3, 6 out - gun 16 in.
Reel 087649 - parity errors on SP 263.
Reel 087650 - parity errors on SP 332.
Reel 087651 - parity errors on SP 427.
Reel 087653 - parity errors on SP 499.
Reel 087656 - parity errors on SP 715, 732.

092071

Reel 087657 - SP 751, 752 - lost at tape change (087656 to 087657).
Reel 087658. Late header change - files to 783 recorded as reel 087657. Parity errors on SP 800.
Reel 087659 - parity errors on SP 884.
Reel 087660 - recorded as 087650. Second last digit not changed at reel change.
Reel 087661 - parity errors on SP 977.
Reel 087662 - parity errors on SP 1042.
Reel 087663 - parity errors on SP 1077, 1083, 1112, 1129.
Reel 087664 - parity errors on SP 1198.
Reel 087669 - parity errors on SP 1455, 1511.
Reel 087676 - parity errors on SP 1911.
End of line - last reel 087680, last shotpoint 2175.

W81 - 10
8th March 1981
9th March 1981

Start of line - gun array - guns 2, 3, 4, 5, 6, 7, 8, 9, 10, 16 .
Gun volume 55 cu/in.
First reel 087464.
First shotpoint - 001.
Reel 087465 - parity errors on SP 54, 56. SP 115 first shotpoint for 9th March 1981.

092072

Reel 087466 - parity errors on SP 118.
Reel 087467 - parity errors on SP 234, 237.
Reel 087469 - parity errors on SP 334, 341.
Reel 087470 - parity errors on SP 422.
Reel 087473 - parity errors on SP 568. Radio interference on SP 559.
Reel 087474 - parity errors on SP 661, 679.
Reel 087475 - parity errors on SP 687, 688, 689, 690, 692. Tape changed early due to consecutive parity errors.
Reel 087476 - late header change. To SP 709 recorded as reel 087475.
Reel 087477 - SP 765, gun 6 out - gun 17 in.
Reel 087479 - SP 903, 904 misfires.
End of line - last reel 087481, last shotpoint 1061.

W81 - 11
9th March 1981

Start of line - gun array - guns 6, 12, 13, 14, 15, 16, 17, 18, 19, 20.
Gun volume 55 cu/in.
First reel 087610.
First shotpoint - 001.
Reel 087613 - parity errors on SP 187.

Reel 087614 - parity errors on SP 277.
Reel 087615 - parity errors on SP 309.
Reel 087619 - misfires on SP 611, 612, 614, 615, 618, 619.
SP 611 - gun 6 out, gun 2 in.
Gun volume 545 cu/in.
SP 622 - parity errors.
Reel 087620 - SP 670 - gun 13 out, gun 7 in - 555 cu/in.
Reel 087621 - misfires on SP 744, 745.
Reel 087622 - SP 772 - misfires, gun 17 out - 11 in (565 cu/in.).
SP 778, 779, 784, 797, 798, 799, 811, 813 - misfires.
Line finished early due to gun problems - last good shotpoint - 838.
Last reel - 087623.
At start of line W81-11, gourp 1 of mini cable was intermittent, group 33 of main cable noisy.

W81 - 11A
10th March 1981

Start of line - gun array - guns 6, 12, 13, 14, 15, 16, 17, 18, 19, 20.
Gun volume 555 cu/in.
Start of line - trace 1 in mini cable intermittent. Main cable trace 33 noisy.
First reel 087624.
First shotpoint 778A.

SP 791A - parity errors.
Reel 087625 - last 'A', shotpoint - 838.
Reel 087626 - parity errors on SP 897.
Reel 087631 - SP 1237 - gun 6 out, gun 2 in.
Reel 087636 - radio interference on SP 1559.
Reel 087638 - parity errors on SP 1671.
Reel 087644 - parity errors on SP 2039.
End of line - last reel 087644, last shotpoint 2055.

W81 - 12
7th March 1981

Start of line - gun array - guns 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 12.
Gun volume 555 cu/in.
Group 45 and 33 noisy.
First reel 087440.
First shotpoint - 001.
Reel 087442 - parity errors on SP 130.
Reel 087444 - change to internal firing command on SP 305.
Reel 087445 - change back to external firing command on SP 357.
Reel 087446 - change to internal firing command on SP 396, change back to external firing command on SP 422.

092075

Reel 087447 - change to internal firing command on SP 468.
Parity errors on SP 470, 489.
Reel 087448 - parity errors on SP 528. Misfires on SP 530, 531, 533, 535, 539.
Reel 087449 - change back to external firing command on SP 629.
Sp 631 lost at reel change 087449 to 087450.
SP 710 - gun 8 out, 13 in.
Parity errors on SP 571.
Reel 087454 - parity errors on SP 938.
Reel 087461 - radio interference on SP 1368.
Reel 087463 - parity errors on SP 1489.
End of line - last reel 087463, last shotpoint 1496.

W81 - 13
9th March 1981

Start of line - gun array - guns 6, 12, 13, 14, 15, 16, 17, 18, 19, 20.
Gun volume 555 cu/in.
Groups 33 noisy, group 1 (mini cable) intermittent.
First reel 087579.
First shotpoint - 001.
Parity erros on SP 36, 38, 47, 51.
Reel 087580 - parity errors on SP 95.

092076

Reel 087581 - parity errors on SP 119, 135.
Reel 087585 - parity errors on SP 392.
Reel 087586 - parity errors on SP 484.
Reel 087589 - parity errors on SP 591.
Reel 087608 - parity errors on SP 1857, 1878.
End of line - last reel 087609, last shotpoint 1946.

W81 - 14
8th March 1981

Start of line - gun array - guns 2, 11, 12, 13, 14, 15, 16, 18, 19, 20.
Gun volume 555 cu/in.
First reel 087482.
First shotpoint - 001.
Start of line - groups 33, 45 noisy.
Reel 087484 - misfire on SP 122.
Reel 087486 - misfire on SP 249.
SP 371 lost at reel change 087487 to 087488.
Reel 087495 - parity errors on SP 855.
End of line - last reel 087497, last shotpoint 995.

W81 - 15
9th March 1981

Start of line - gun array - guns 1, 3, 4, 5, 6, 7, 8, 9, 10, 17.
Gun volume 555 cu/in.

Mini cable - group 1 intermittent.
First reel 087560.
First shotpoint - 001.
Parity erros on SP 42.
Reel 087561 - parity errors on SP 58, 62.
Reel 087562 - parity errors on SP 175.
Reel 087570 - SP 674, gun 3 out, gun 8 in.
Reel 087573 - parity errors on SP 837, 846, 851.
Reel 087575 - parity errors on SP 996.
Reel 087576 - parity errors on SP 1063.
End of line - last reel 087578, last shotpoint 1151.

W81 - 16
8th March 1981

Start of line - gun array - guns 6, 11, 12, 13, 14, 15, 16, 18, 19, 20.
Gun volume 555 cu/in.
Group 33 noisy.
First reel 087498.
First shotpoint - 001.
Reel 087499 - changed early, SP 60, 61 lost at tape change due to parity errors.
Reel 087502 - radio interference SP 245, 246.
Reel 087503 - parity errors on SP 292.
Reel 087504 - parity errors on SP 337.

092078

Reel 087506 - parity errors on SP 504.
Reel 087509 - parity errors on SP 640.
Reel 087514 - parity errors on SP 1006, 957.
Reel 087517 - parity errors on SP 1148, 1150, 1153, 1164.
SP 1144 - gun 6 out, gun 2 in.
SP 1160 - gun 2 out, gun 1 in.
SP 1166 - gun 14 out.
SP 1191 - gun 16 out, gun 7 in.
Reel 087519 - parity errors on SP 1323.
End of line - last reel 087523, last shotpoint 1523.

W81 - 17
15th March 1981

Start of line - gun array - guns 7, 11, 13, 14, 15, 16, 17, 18, 19, 20.
Gun volume 555 cu/in.
First reel 087689.
First shotpoint - 001.
Reel 087870 - parity errors on SP 117.
Reel 087873 - radio interference on SP 250.
Parity errors on SP 273, 282.
Reel 087874 - parity errors on SP 367.
Reel 087875 - parity errors on SP 389.
End of line - last reel 087875, last shotpoint 400.

W81 - 18 8th March 1981	Start of line - gun array - guns 1, 2, 3, 4, 5, 6, 8, 9, 10, 12. Gun volume 555 cu/in. First reel 087524. Group 33 noisy at start of line. First shotpoint - 001. Reel 087525 - parity errors on SP 114, 115. Reel 087526 - parity errors on SP 145. Reel 087529 - parity errors on SP 369. Reel 087536 - parity errors on SP 774. Reel 087538 - SP 879, gun 6 out, 13 in, volume 565 cu/in. Reel 087539 - SP 953 - gun 13 out, 6 in, volume 555 cu/in. Reel 087541 - SP 1075, gun 4 out 19 in, volume 555 cu/in. Reel 087542 - misfire on SP 1130. No automatic end of file or manual end of file on this reel. Misfire on SP 1141. End of line - last reel 087542, last shotpoint 1190. No overlaps due to shallow water.
W81 - 20 8th March 1981	Start of line - gun array - guns 2, 11, 12, 13, 14, 15, 16, 18, 19, 20. Gun volume 555 cu/in.

092080

Bend in cable at start of line due to short turn on line to avoid shallow water and fishing trawler.
Cable straight at SP 130.
Group 33 noisy at start of line.
First reel 087543.
First shotpoint - 001.
Reel 087549 - misfires on SP 411, 414, 415, 434.
Reel 087550 - misfires on SP 453, 454, 474, 475.
Reel 087553 - parity erros on SP 679.
Reel 087555 - parity errors on SP 778.
Reel 087557 - misfires on SP 887, 893. Parity errors on SP 896, 899, 934, 937, 942.
Reel 087558 - misfires on SP 995, 996, 997.
Reel 087559 - misfires on SP 1021, 1024, 1026.
End of line - last reel 087559, last shotpoint 1068.

W81 - 22
11th March 1981

Start of line - gun array - guns 6, 12, 13, 14, 15, 16, 17, 18, 19, 20.
Gun volume 555 cu/in.
Trace 16 intermittent at start of line.
First reel 087736.
First shotpoint - 001.
Misfires on SP 44, 47, 48, 50.

092081

Reel 087737 - parity errors on SP 55.
Reel 087739 - parity errors on SP 194.
Reel 087741 - parity errors on SP 327.
Reel 087743 - parity errors on SP 493.
Reel 087745 - parity errors on SP 589, 595, 601.
Reel 087751 - parity errors on SP 985.
End of line - last reel 087751, last shotpoint 990.

W81 - 24
14th March 1981

Start of line - gun array - guns 6, 7, 9, 11, 13, 14, 15, 17, 18, 19, 20.
Gun volume 555 cu/in.
Start of line - group 36 in, main cable intermittent - group 1 in, mini cable intermittent.
First reel 087855.
First shotpoint - 223.
Reel 087857 - LRS 100 changed to internal firing to facilitate Satnav. screen update.
SP 384 - LRS changed back to external firing cycle, three shotpoints gained whilst on internal cycle.
Reel 087858 - parity errors on SP 407.

Reel 087863 - parity errors on SP 777.
Reel 087867 - misfire on SP 1001.
End of line - last reel 087868, last shotpoint 1058.

W81 - 26
14th March 1981

Start of line - gun array - guns 6, 7, 9, 11, 13, 14, 15, 17, 18, 19, 20.
Gun volume 555 cu/in.
Trace 36 intermittent.
Trace 1 (mini cable) intermittent.
First reel 087840.
First shotpoint - 001.
Misfires on SP 3, 8, 11, 16.
Reel 087841 - misfire on SP 58, 71, 88.
Reel 087843 - parity errors on SP 227, 232.
Reel 087851 - parity errors on SP 714.
Reel 087853 - parity errors on SP 872.
End of line - last reel 087854, last shotpoint 878, early shut down due to shallow water.

W81 - 28
13th March 1981

Start of line - gun - array - guns 2, 5, 6, 7, 8, 9, 10, 13.
Gun volume 555 cu/in.
First reel 087826.
First shotpoint - 001.
Misfires on SP 3, 9, 15, 17.

Parity errors on SP 54.
Reel 087827 - parity errors on SP 57.
Reel 087828 - parity errors on SP 180.
Reel 087826 - SP 211, gun 10 out, gun 15 in.
Reel 087833 - parity errors on SP 448.
Reel 087834 - parity errors on SP 542.
End of line - last reel 087839, last shotpoint 838, shut down early due to shallow water.

W81 - 30
12th March 1981

Start of line - gun array - guns 7, 11, 13, 14, 15, 16, 17, 18, 19, 20.
Gun volume 555 cu/in.
Trace 36 intermittent.
First reel 087812.
First shotpoint - 002.
Parity errors on SP 51.
Reel 087814 - trace 36, open circuit - intermittent.
Reel 087824 - parity errors on SP 790.
End of line - last reel 087825, last shotpoint 827, early shut down due to shallow water.

W81 - 32
12th March 1981

Start of line - gun array - guns 7, 12, 13, 14, 15, 16, 17, 18, 19.

092084

Gun volume 555 cu/in.
First reel 087801.
First shotpoint - 001.
Reel 087805 - parity errors on SP 298.
Reel 087808 - radio interference on SP 453.
End of line - last reel 087811, last shotpoint 645, early shut down due to shallow water (18 overlaps only).

092085

APPENDIX A - NAVIGATION

I. MAXIRAN NAVIGATION SYSTEM DESCRIPTION

I. MAXIRAN NAVIGATION SYSTEM DESCRIPTION

The Maxiran System is a pulse transponder radio navigation system developed to provide an easily mobilized chain for accurate positioning in the petroleum exploration industry.

Maxiran is of all solid state design based on the highly desirable features of long range (XR) Shoran. However, with many countries now requiring a move from the 230 MHz band that Shoran used, Maxiran makes use of the 420 MHz band with many additional features that make it more compatible with today's seismic instrument technology.

These features include :

1. Monitor has built-in automatic or manual tracking of 3 stations simultaneously. Three way fixes are obtainable continously with 3 stations.

2. Ranges are displayed digitally and also on scope monitor.

3. Date, time, line number and shot number are all displayed digitally.

4. The monitor provides 2 serial and 2 parallel data output ports. The serial outputs are directly compatible to virtually all printers in general usage. Parallel outputs are TTL compatible thus providing interface directly to data loggers or computers.

092088

5. Base stations operate from 12V automative batteries. The base beacon weighs only 20 lbs. Continuous operation for 2 days before battery charge.

Mobile Station

This consists of the monitor, the interrogator beacon and associated antenna system. Additionally, linear amplifiers are available which increase the transmitter output from the 200 watt minimum up to a maximum of 20 kw, with power positions of 1 kw, 5 kw and 10 kw provided. Linears are normally used when extended ranges are anticipated during the survey. A 117V AC to be available if these amplifiers are used.

Various types of antenna are available, including a high gain 48-degree beam width log-periodic array, a 135-degree beam width Yagi antenna, or an omni-directional rod antenna. A dual antenna system is normally used on the mobile station to provide better reception when the shore stations are separated by a wide angle or when baseline crossings are run.

Base Stations

The base station comprises a beacon transmitter/receiver, a beacon control unit, 12V batteries, the antenna system with tower sections and normally a portable battery charger. The beacon unit is very compact, weighing 20 lbs and is essentially identical to the mobile interrogator except it operates on a different frequency. Similarly, linear amplifiers may be employed but this necessitates the provision of a 400 Hz generator. Antennae are identical to the mobile installation and may be interchanged.

092089

System Operation

In operation, the Monitor/Interrogator installation transmits a radio signal which contains a Beacon-select code which one of the base stations is set to. The signal is picked up by all the Beacon/Control Box installations. Each Beacon decodes the received signal and decides whether the Beacon-select code transmitted corresponds to that Beacon. If the Beacon-select code is correct for a Beacon, it responds by transmitting a radio signal reply. The Monitor measures the amount of time elapsed between the Interrogators transmission and the received reply sent by the Beacon. Since, for all practical purposes, radio signals travel at a known speed (Maxiran uses 229,700 km/sec), the time elapsed between transmission and response is a measure of the distance the radio signal travelled. The elapsed time is converted by the Monitor into distance and then displayed. By knowing the location of the land stations and the current distance from the ship to each of them, the position of the vessel can be readily calculated.

The transmission level of the system is 200 watts without linear amplifier. This is extremely low compared to the 12 kw employed by Shoran. However, ranges are compatible for both systems due to the high gain techniques used in the Maxiran system. The main factor contributing to this is the cor- relation technique used in the Beacon and Interrogator receivers. Initially, the Monitor generates a pulse which triggers the Interrogator. This in turn triggers a code generator which generates a 127 bit digital code. The code phase modulates the RF using a phase shift method. A 14 microsecond pulse is produced and this pulse is repeated at an interval of between 26 and

60 microseconds. The Beacon code number determines the period between the 2 pulses. On reception the Beacon amplifies the signal, converts it to an intermediate frequency (120 MHz) then passes the signal through a surface acoustical wave device. Correlation between the known 127 bit code and the received code is performed here and a single output pulse is generated for each 127 bit code received. The receiver then determines whether the spacing of the pulse pair is correct for that particular Beacon, and if so, the Beacon transmitter is triggered. Reception of the Beacon signal by the Interrogator also uses this process so that the same gain technique is used at both ends of the path. Correlation has the advantage of being able to pick a known signal which is virtually swamped in noise.

Propagation Mode

Maxiran signals are received at distances beyond line of sight by a ducting mode of propagation. It is generally known that frequencies between 50 MHz and 500 MHz can be propagated in the air-sea interface. Normally the refractive index of the atmosphere decreases with height so that radio waves travel more slowly near the sea surface than at higher altitudes. This variation in velocity with height results in bending of the radio waves. The decrease in the refractive index with height may be so great that the ray is bent down with a radius equal to that of the earth so that the ocean surface may then be considered to be flat. A further increase in the refractive index gradient results in the radio being bent down sufficiently to be "trapped" in a duct so formed between the reflecting layers which could be considered analogous to a wave guide extending over the sea

surface between transmitter and receiver.

When these conditions are favourable, they may give rise to the formation of a surface duct which can propagate radio waves over remarkable distances with very little attenuation.

The function of the sea surface refractivity gradient i.e. magnitude, vertical extent and horizontal continuity, can vary with time of day, month of the year and the distribution over the desired transmission path of the atmospheric elements. Meteorological considerations have the greatest bearing on the refractivity gradient of the layers.

Generally, 2 types of layers exist depending upon conditions. These are known as super-refractive and sub-refractive. The former provides a curvature to the radio wave path in the same sense as that of the earth so that the distance to the radio horizon over the sea surface would normally exceed the line of sight horizon. Sub-refractive layers are generally detrimental to radio wave propagation resulting in a reduction in the distance to the radio horizon relative to the line of sight horizon.

Over oceanic areas, evaporation always takes place from the sea into the air above it. This evaporation produces a shallow layer of air, immediately above the sea surface, within which water vapour content decreases rapidly with height. This occurrence results in the partial trapping of near-horizontal signals from the transmitter, and has the effect of increasing the range compared with line of sight conditions. These conditions are more prevalent than the "standard" line of sight mode.

Accentuated downward bending occurs when temperature decreases with height less rapidly, and/or when water vapour content decreases with height more rapidly than in the "standard" atmosphere. Either of these conditions (known as temperature lapse and humidity lapse respectively) will result in extended detection ranges; and if both occur simultaneously, the effect is even more pronounced. This is the super-refraction condition.

When warm and dry air from a land mass flows over a colder sea, a temperature inversion becomes established and there is evaporation into the lower layers of the air. Radio ducts are formed almost as soon as the air moves over the sea, and marked super-refraction may be the rule rather than the exception.

Sub-refractive layers would generally occur whenever warm moist air overlies a cooler sea surface and where both air and sea surface temperatures exceed 10 degrees centigrade. Should the density of the water vapour increase with height, fog and sub-refraction can be produced and would be in areas where warm and cold currents adjoin or even converge. Heavy rainfall between the stations may also product sub-refraction.

From the above, it can be seen that the extended range of the Maxiran system depends on ducting propagation. Therefore, it can be expected that the most favourable conditions may not always exist due to geographic location and meteorological conditions. However, field trials of the system give the impression that propagation over the horizon is more prevalent and robust than the textbook explanation of the ducting phenomenon suggests.

092093

System Range and Accuracy

The manufacturer claims range measurement to 650 kms with maximum range error of 20 meters and a resolution of 1 meter.

Ranges and accuracies approaching these figures have been achieved and documented during various offshore surveys in different parts of the word. Trials in Western Australia in 1977 achieved ranges in excess of 500 kms with errors calculated between all computed and observed distances not exceeding 12 meters.

092094

SYSTEM SPECIFICATIONS

INTERROGATOR

Transmitter Type	:	All solid state, crystal controlled oscillator and amplifier chain
Transmitted Signal	:	Pulsed Phase Coded
Frequency	:	441 MHz
Peak Power	:	200 watts minimum
Band Width	:	± 10 MHz to first null
Pulse Width	:	14.4 microseconds
Phase Code	:	Pseudo-random
Beacon Selection	:	Two pulses, spaced from 26.67 microseconds determined by Monitor
Pulse Group Rep. Rate	:	150 Hz nominal determined by Monitor
Receiver	:	Superhetrodyne with RF pre-amplifier, crystal controlled local oscillator matched filter IF and detector
Noise Figure	:	2.0 dB maximum at input of duplexer
Band Width	:	12 MHz
Sensitivity	:	-105 dBM for 50% probability of (Matched Signal) detection and 10^{-6} false alarm rate (10 noise pulses/second)
Power	:	12 VDC at approximately 2.0A from Monitor
Mechanical	:	6-5/8" diameter X 13" long cylinder with mounting handle and tripod socket, 15 lbs

092095

BEACON

Transmitter Type	:	All solid state, crystal controlled oscillator and amplifier chain
Transmitted Signal	:	Pulsed Phase Coded
Frequency	:	429 MHz
Peak Power	:	200 watts minimum
Band Width	:	± 10 MHz to first null
Pulse Width	:	14.4 microseconds
Phase Code	:	Pseudo-random
Pulse Code	:	Beacon responds with one pulse after receiving properly spaced pulse pair
Pulse Code Select	:	Internal switch selects one of six code spacing
Receiver	:	Superhetrodyne with RF pre-amplifier, crystal controlled local oscillator matched filter IF and detector
Noise Figure	:	2.0 dB maximum at input of duplexer
Band Width	:	12 MHz
Sensitivity	:	-105 dBM for 50% probability of (Matched Signal) detection and 10^{-6} false alarm rate (10 noise pulses/second)
Operator Controls	:	None (all on BEACON CONTROL BOX)
Power	:	12 VDC, 2.0A maximum from Monitor
Mechanical	:	6-5/8" diameter X 13" long cylinder with mounting handle and tripod socket, 15 lbs

092096

BEACON CONTROL BOX

Connects to Beacon by multiple conductor cable and to 12V battery by two-wire cable. Contains power switch reverse polarity and over-voltage protection, current meter, switched battery voltage / signal strength meter, AGC Manual Gain Switch, Manual Gain Control, a Beacon Receiver test point, and audible signal monitor.

MONITOR

Measures time interval, digitally, between trigger to Interrogator and reply from Interrogator and displays resultant range. Three independent channels allow three range measure ments. Each channel may be independently switched between gain control and AGC and between manual range track and automatic range trace. The processed receiver output is displayed on a 3-channel oscilloscope which has range displays of 1, 10, 100 and 1000 kilometers.

Range Displays	:	Three 1/2" high planar gas discharge displays to 990.000 km
Other Displays	:	Four 1/3" high planar gas discharge displays
Day	:	000 to 999
Time	:	24 hour clock, hours, minutes, seconds
Line	:	0000 to 9999
Shot	:	0000 to 9999

092097

Data Entry	:	Day, Line and Shot initial numbers entered from thumbwheel switch; Shot Increment from ± 1 to ± 9 by thumbwheel
Data Outputs	:	Two independent serial outputs compatible with teletype. Two parallel BCD outputs, for 21 column line printer, normally present three ranges, but can be sequenced to also print Day, Time, Line and Shot data. Contact closure or logic low increments shot counter, then initiates serial data and furnishes print command to parallel printer.
Power	:	105 - 103 VAC, 50 to 400 Hz, 2A max.
Mechanical	:	19" rack mount 10-1/2" high, 20" deep, furnished in cabinet approximately 60 lbs.

II. STATION DESCRIPTION

092099

II. STATION DESCRIPTION

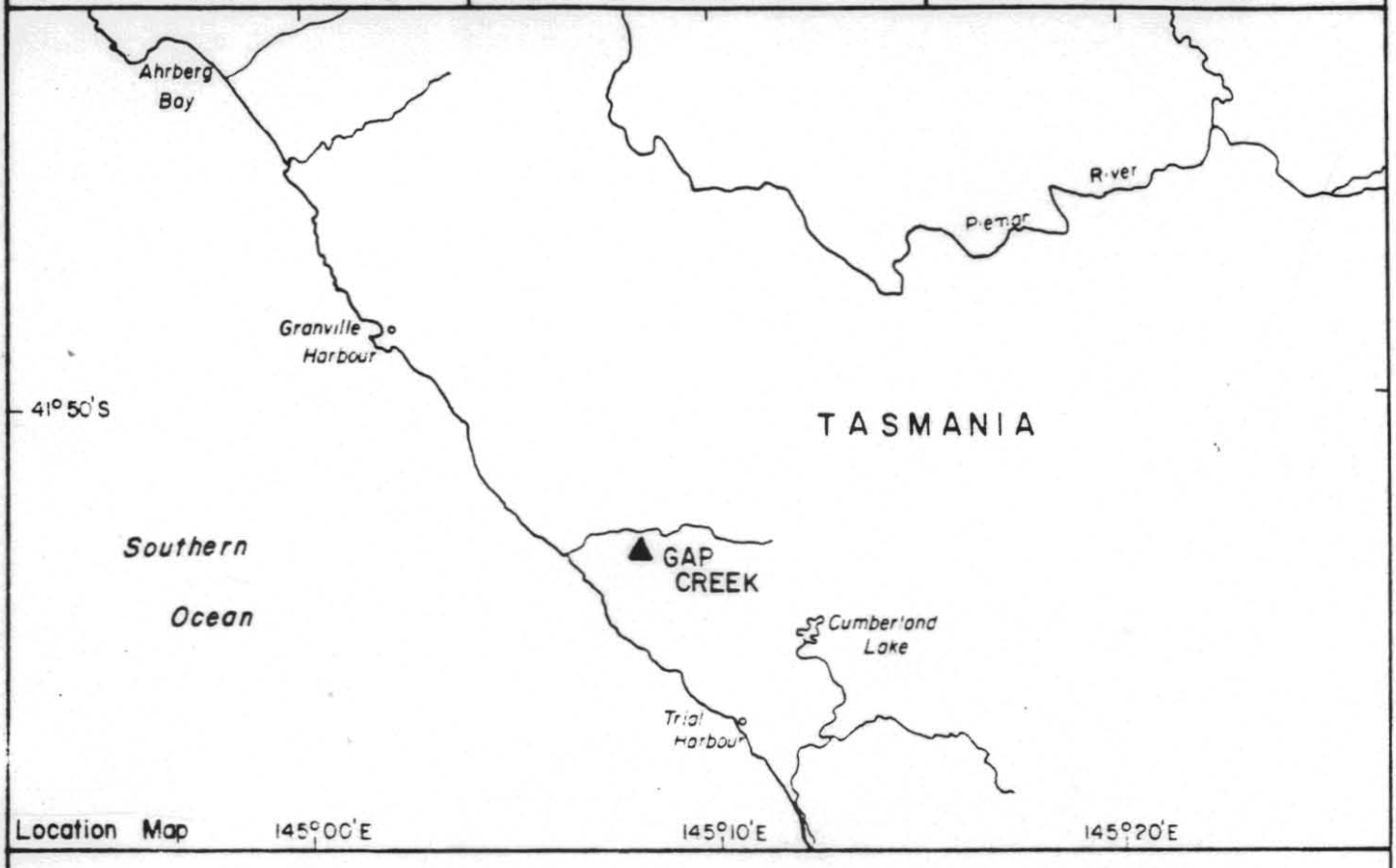
STATION	:	GAP CREEK (Offset)
OFFSET	:	35 meters at AZ 210°.
ELEVATION	:	205.2 meters.
SKETCH	:	Accompanied.

STATION CO-ORDINATES

LATITUDE	:	41° 52' 54.835" S
LONGITUDE	:	145° 07' 59.716" E
EASTING	:	345,111.45 m
NORTHING	:	5,361,635.20 m
SPHEROID	:	AUSTRALIAN NATIONAL
PROJECTION	:	U T M
ZONE	:	55
CENTRAL MERIDIAN	:	147° E
DATUM	:	AUSTRALIAN GEODETIC

092100

STATION NAME GAP CREEK (OFFSET)		COUNTRY TASMANIA
Latitude 41° 52' 54·835"S.	Easting 345,111·45 m	Datum AUST. GEODETIC
Longitude 145° 07' 59·716"E.	Northing 5,361,635·20 m	Elevation 205·2 m
Spheroid AUST. NATIONAL	Projection UTM	Zone or CM 147° E.



5 cm

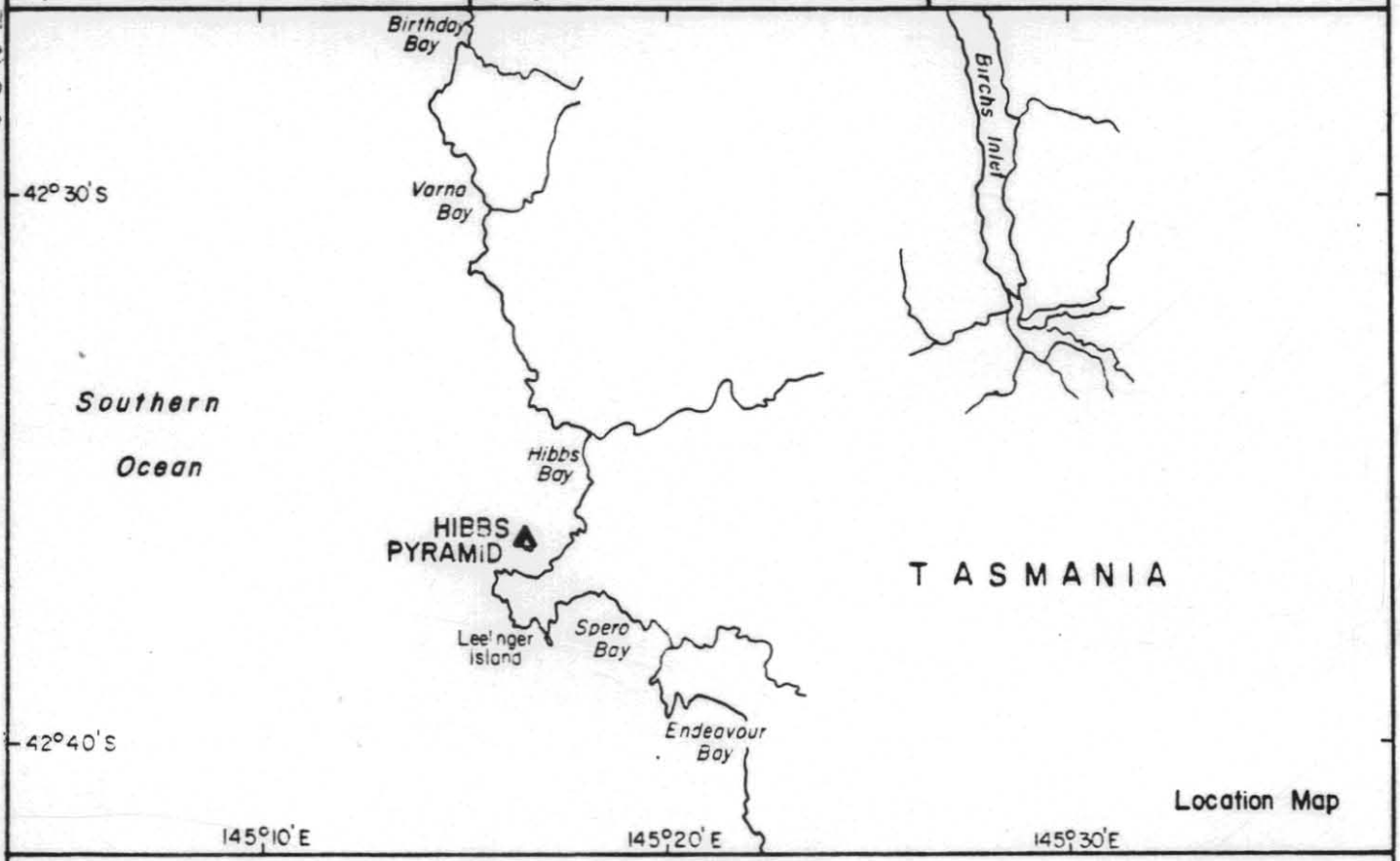
Litton WESTERN GEOPHYSICAL

STATION	:	HIBBS PYRAMID
OFFSET	:	Nil.
ELEVATION	:	70.6 meters.
SKETCH	:	Accompanied.

STATION CO-ORDINATES

LATITUDE	:	42° 36' 21.788" S
LONGITUDE	:	145° 16' 29.603" E
EASTING	:	358,491.80 m
NORTHING	:	5,281,472.07 m
SPHEROID	:	AUSTRALIAN NATIONAL
PROJECTION	:	U T M
ZONE	:	55
CENTRAL MERIDIAN	:	147° E
DATUM	:	AUSTRALIAN GEODETIC

STATION NAME	HIBBS PYRAMID	COUNTRY	TASMANIA
Latitude 42° 36' 21·788" S.	Easting 358,491·80 m	Datum	AUST. GEODETIC
Longitude 145° 16' 29·603" E.	Northing 5,281,472·07 m	Elevation	70·6 m.
Spheroid AUST. NATIONAL	Projection UTM	Zone or CM	147°E



5 cm

WESTERN GEOPHYSICA

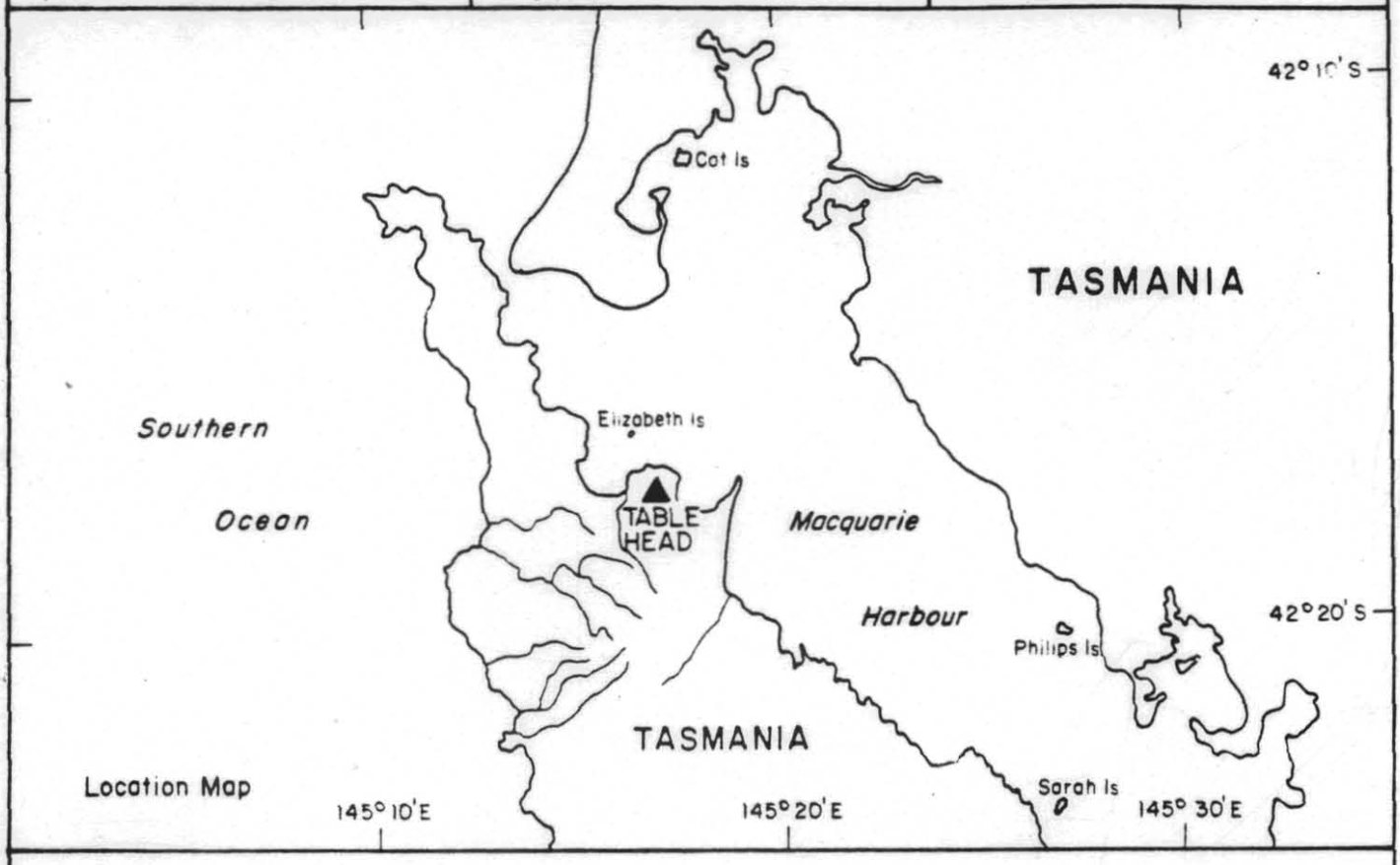
092103

STATION	:	TABLE HEAD (Offset)
OFFSET	:	35 meters at AZ 40°.
ELEVATION	:	197.1 meters.
SKETCH	:	Accompanied.

STATION CO-ORDINATES

LATITUDE	:	42° 17' 31.259" S
LONGITUDE	:	145° 16' 52.639" E
EASTING	:	358,310.49 m
NORTHING	:	5,316,354.11 m
SPHEROID	:	AUSTRALIAN NATIONAL
PROJECTION	:	U T M
ZONE	:	55
CENTRAL MERIDIAN	:	147° E
DATUM	:	AUSTRALIAN GEODETIC

STATION NAME TABLE HEAD (OFFSET)		COUNTRY TASMANIA
Latitude 42° 17' 31·259" S	Easting 358,310·49 m	Datum AUST. GEODETIC
Longitude 145° 16' 52·639" E	Northing 5,316,354·11 m	Elevation 197·1 m.
Spheroid AUST. NATIONAL	Projection U T M	Zone or CM 147° E

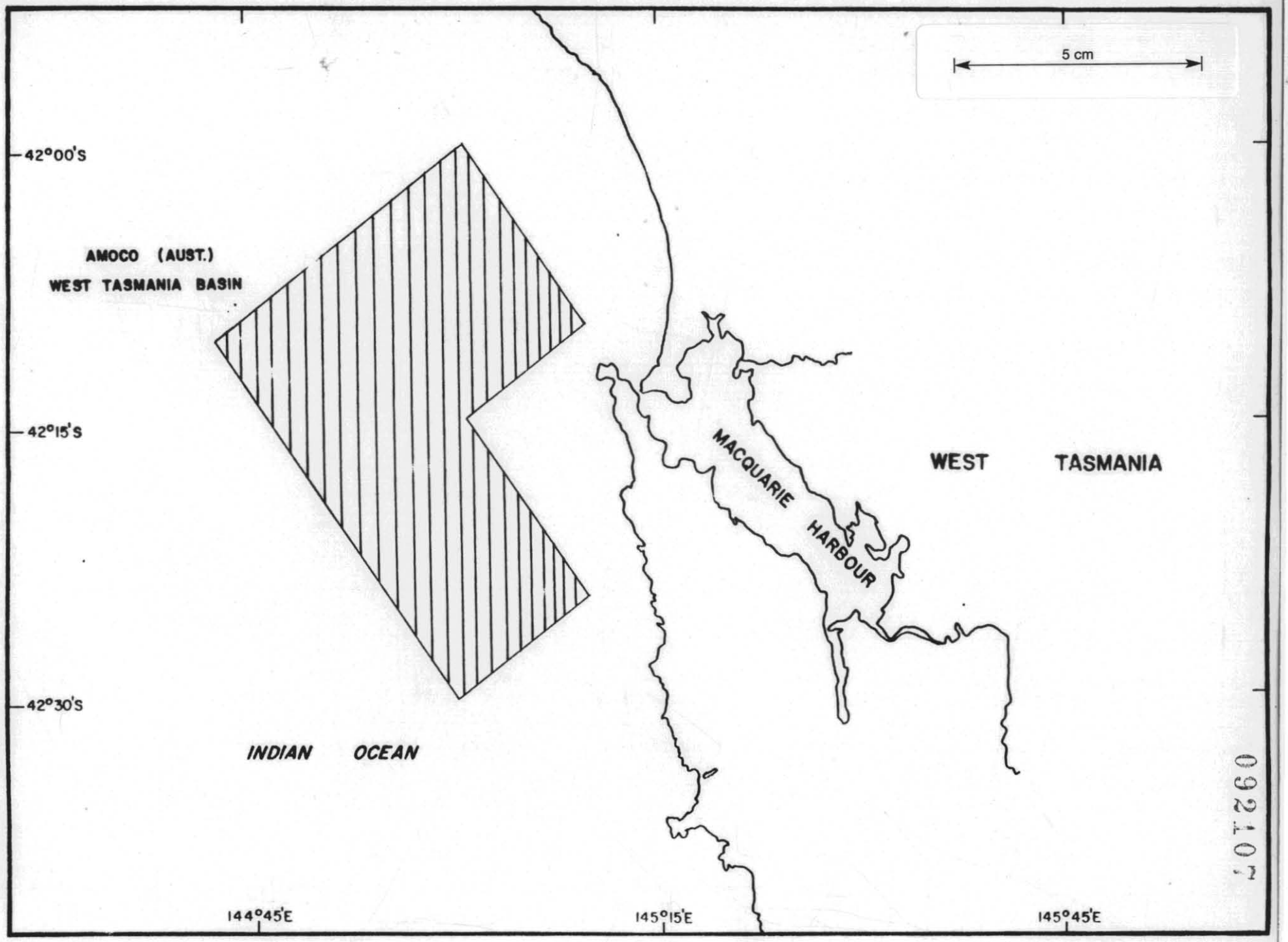


5 cm

Litton WESTERN GEOPHYSICAL

APPENDIX B - MAPS & FIGURES

I. LOCALITY MAP(S)



Litton
WESTERN GEOPHYSICAL

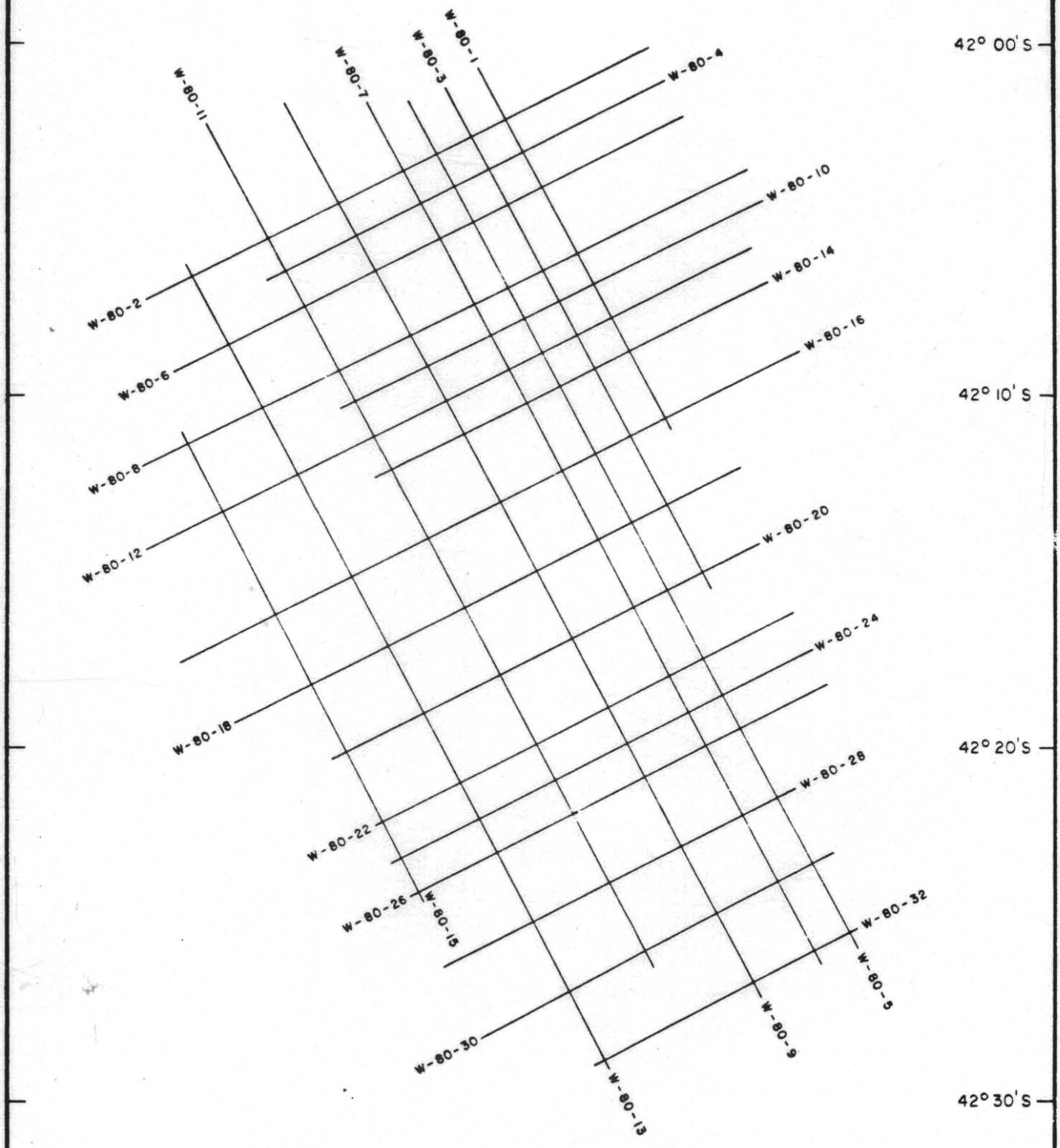
Appendix 6(1)
OR-092

092107

092108

II. LINE MAP(S)

092109



AMOCO AUSTRALIA PETROLEUM CO.

WEST TASMANIA BASIN

Appendix B II

5 cm

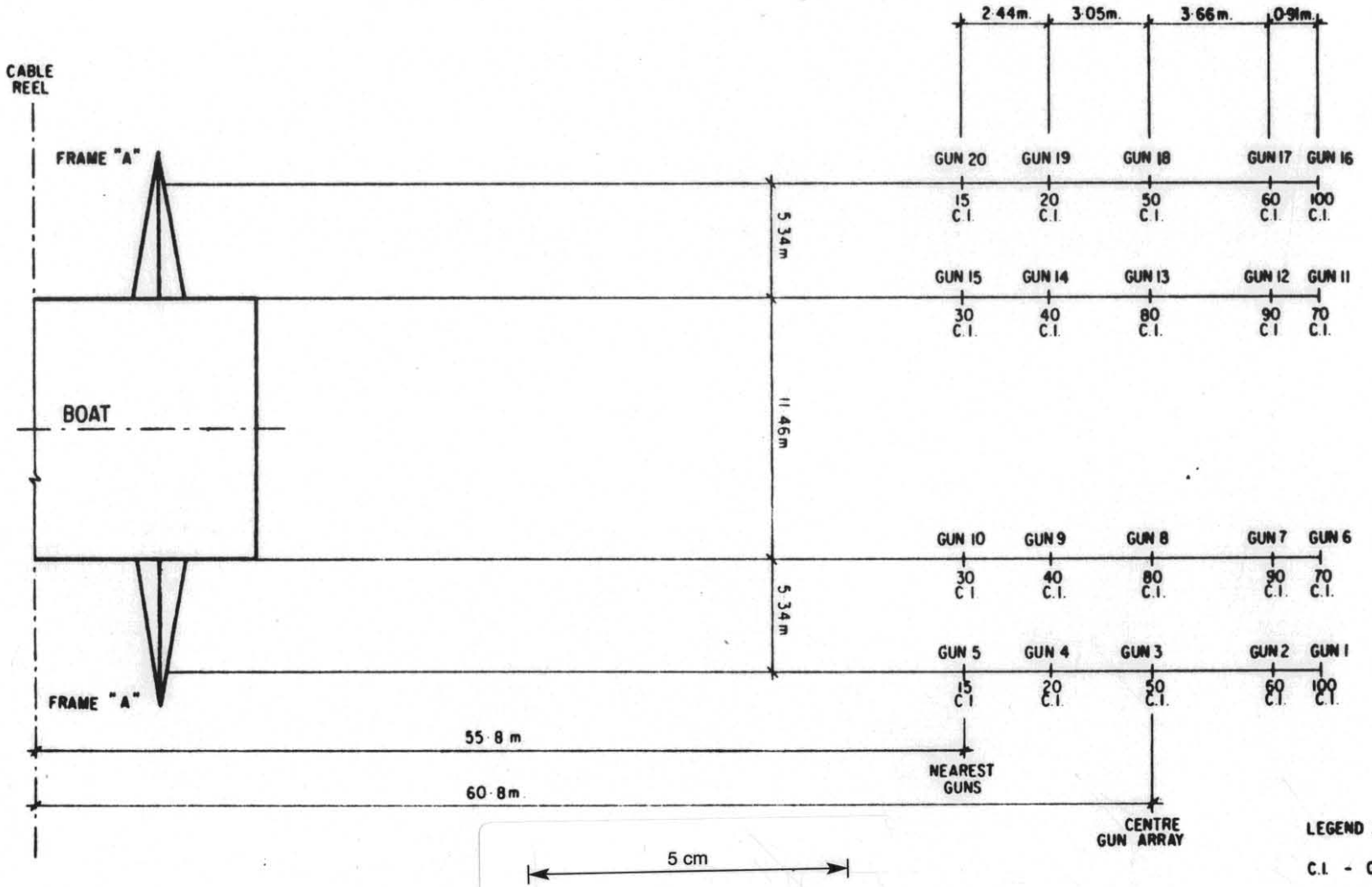
OR-092

Litton WESTERN GEOPHYSICAL

III. FIGURES

Fig 1

WESTERN ODYSSEY PARTY 86
GUN ARRAY CONFIGURATION



Litton

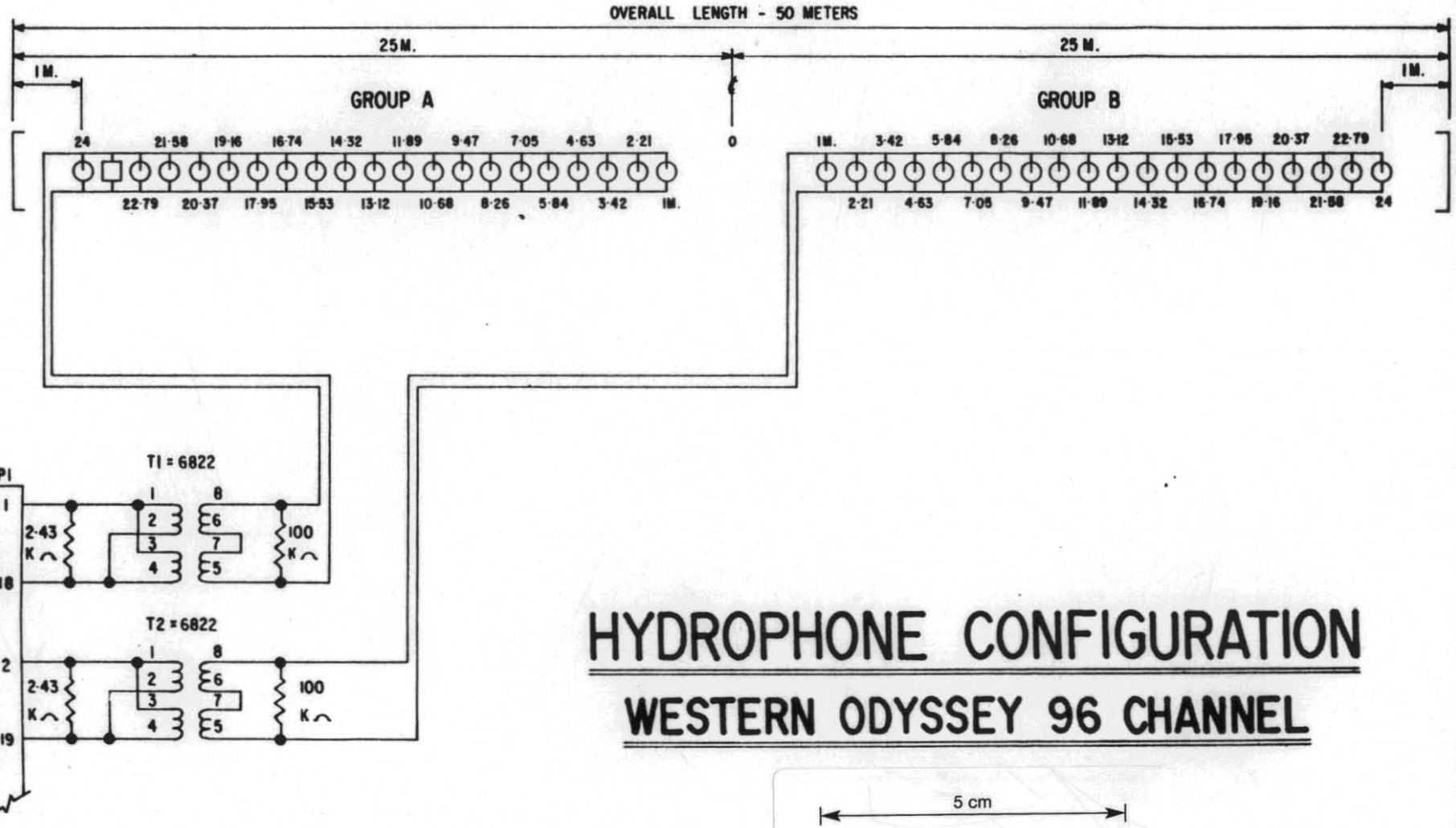
WESTERN GEOPHYSICAL

Appendix III

OR-082

0921111

Fig. 2



HYDROPHONE CONFIGURATION

WESTERN ODYSSEY 96 CHANNEL

5 cm

092112

Litton WESTERN GEOPHYSICAL

Appendix III
OR-092

092113

OPEN CIRCUIT SENSITIVITY 31 V/BAR

PHASE LEAD (DEG)

OUTPUT SENSITIVITY (V/BAR)

R_L = 10K

R_L = 20K

R_L = 20K

R_L = 10K

FREQUENCY (Hz)

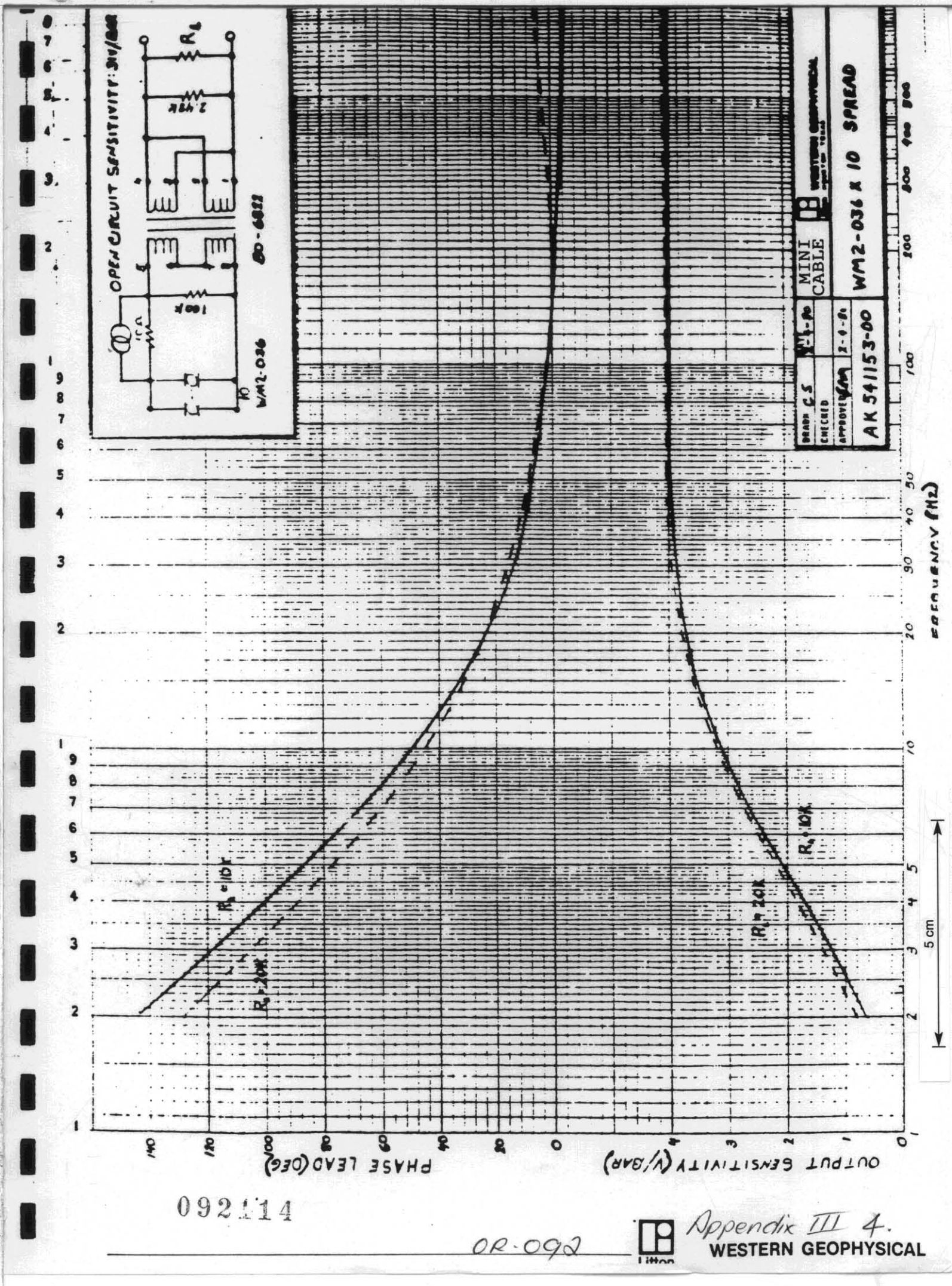
5 cm

DRAWN CS	DATE 2-3-90	MAIN CABLE	WESTERN GEOPHYSICAL HOUSTON TEXAS
CHECKED			
APPROVED	2-4-90		
AK541152-00		WM2-036 X 20 SPREAD	

OR-092

Appendix III 3.

Litton WESTERN GEOPHYSICAL



092114

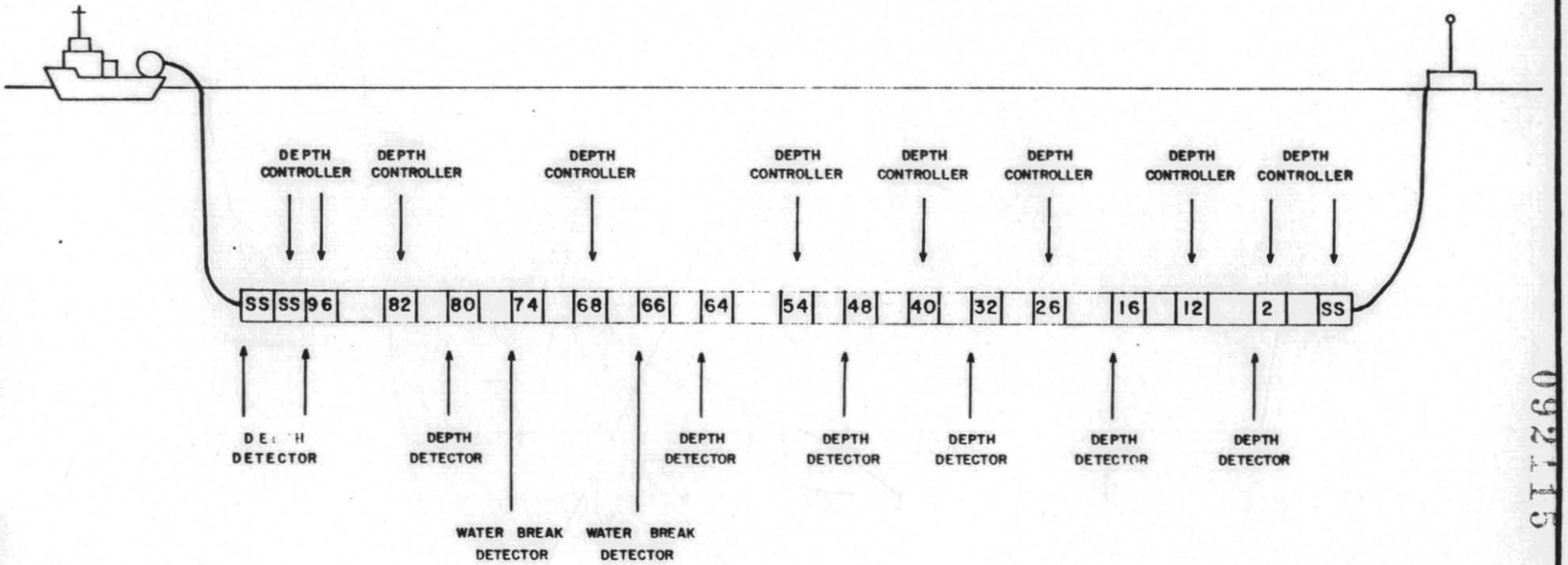
OR-092

Appendix III 4.

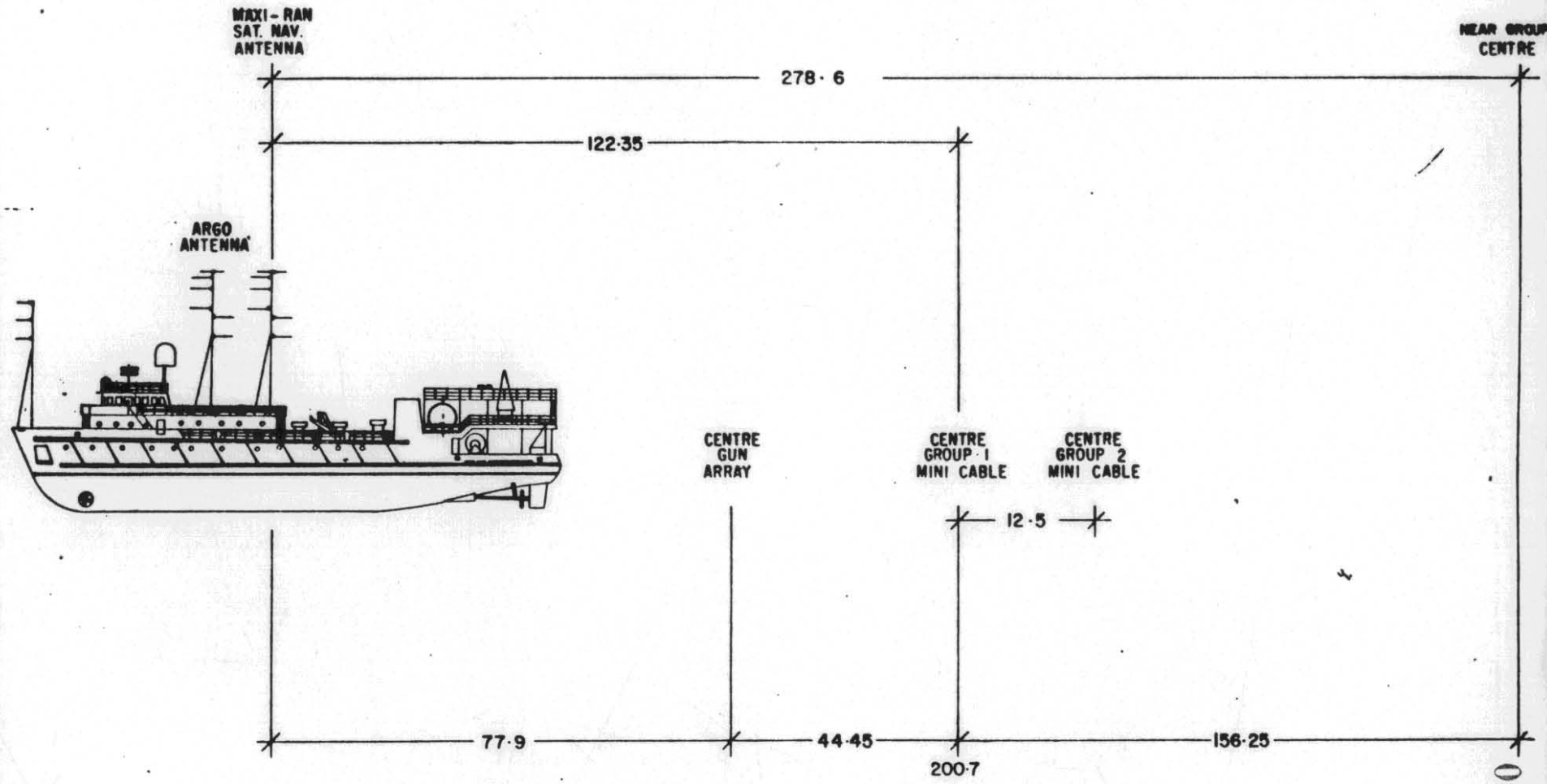
WESTERN GEOPHYSICAL

WESTERN ODYSSEY

96 GROUP CABLE CONFIGURATION



Appendix III
OR-082
WESTERN GEOPHYSICAL
5.
09215



WESTERN ODYSSEY PARTY 86

(DISTANCES IN METERS)

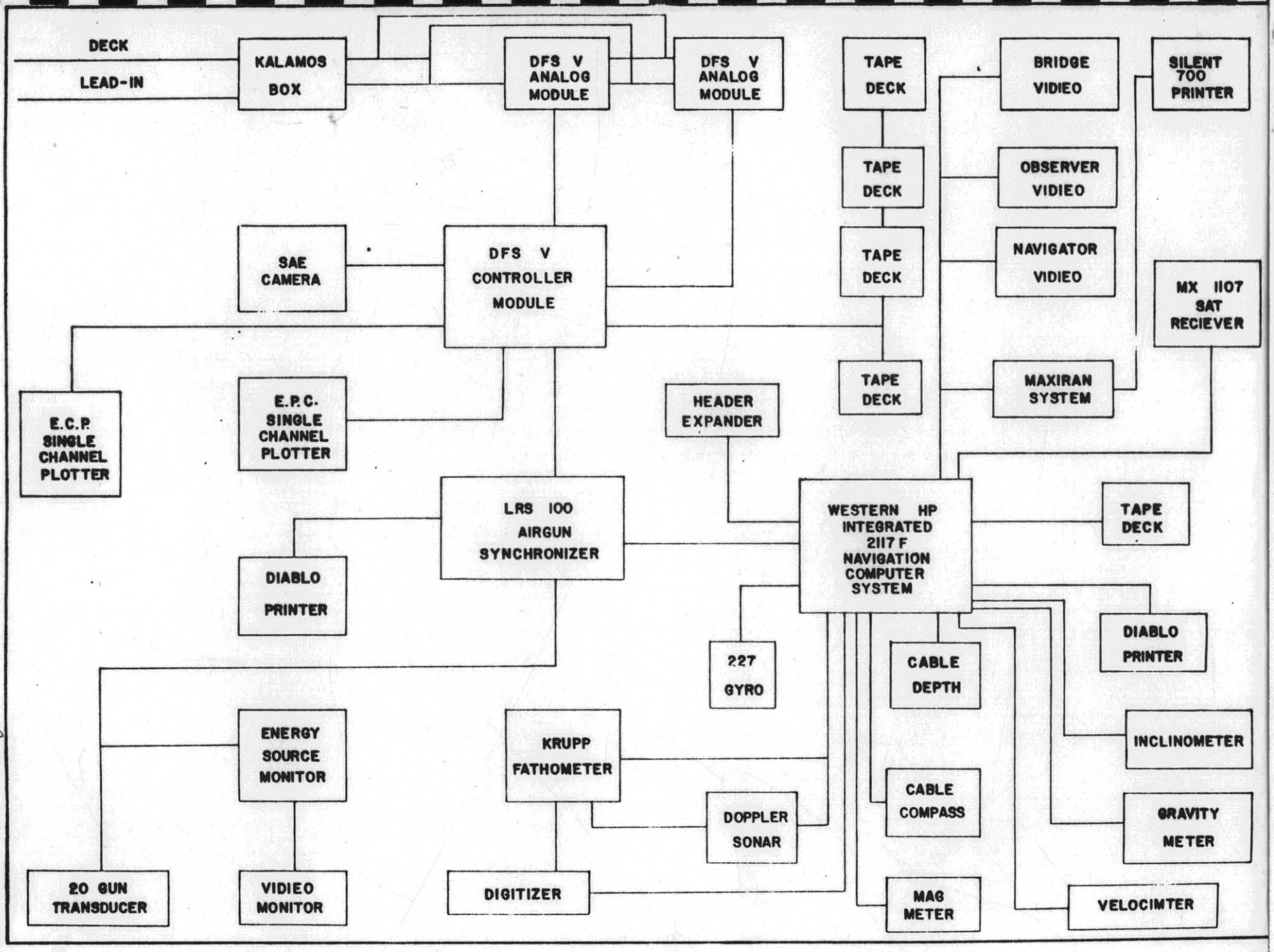
5 cm

WESTERN GEOPHYSICAL

Appendix III
OR-082

6

092116



BLOCK DIAGRAM

092117

Appendix III 7.

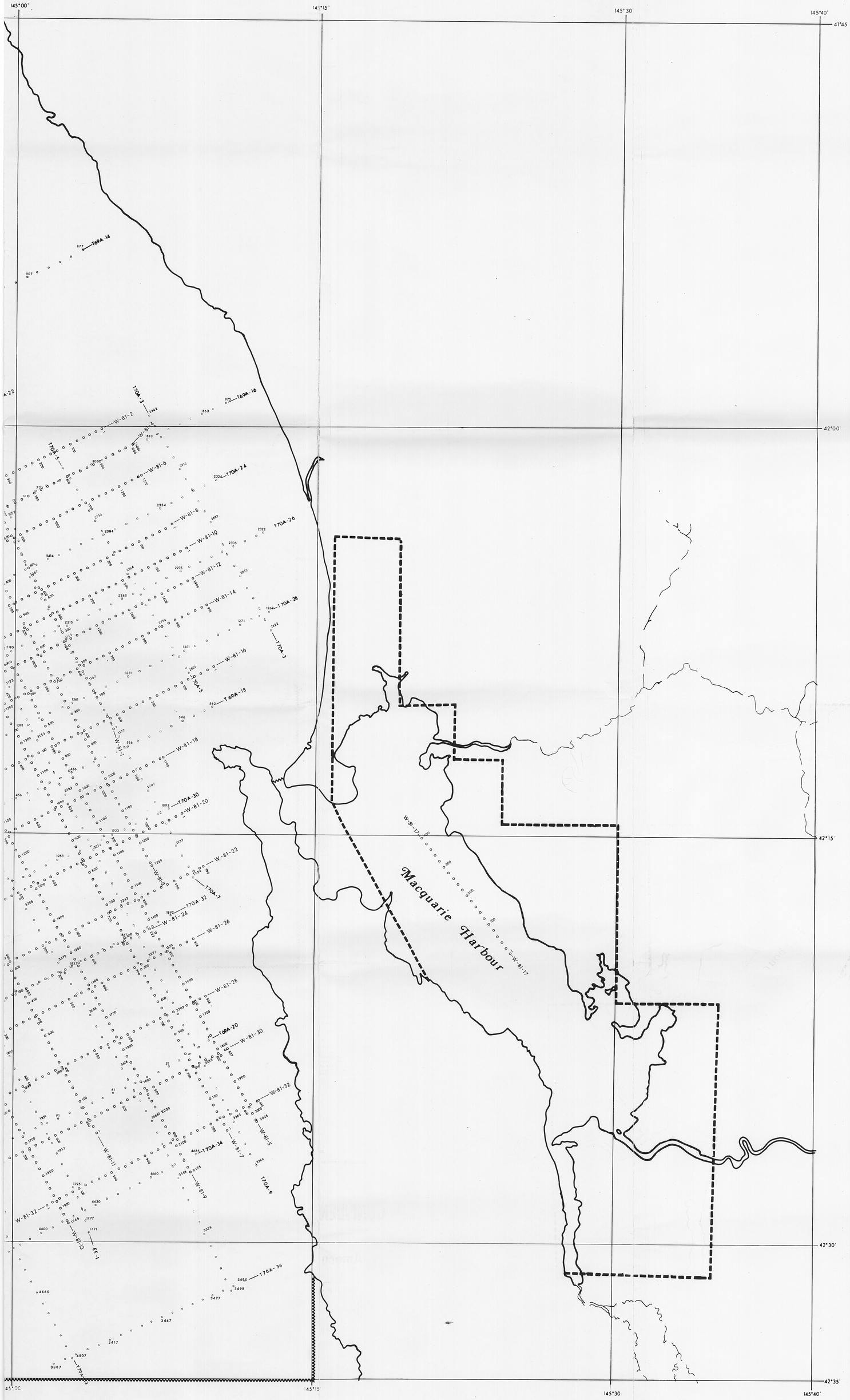
WESTERN GEOPHYSICAL

Macquarie Harbour

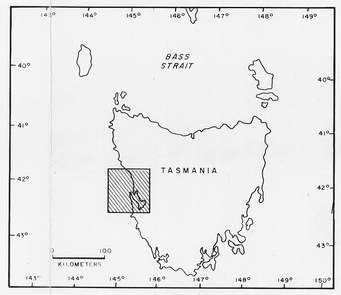
INDIAN OCEAN

145°30'
145°15'
145°00'
144°45'
144°30'
41°45'
42°00'
42°15'
42°30'
42°55'

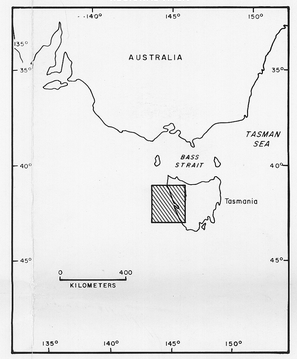
145°00'
145°15'
145°30'
145°40'
41°45
42°00'
42°15'
42°30'
42°35'



MAP QUAD INDEX



REGIONAL AREA



REGIONAL VELOCITY GRADIENT TO

HORIZON _____ OR TIME _____

HISTORY - SEISMIC COVERAGE

RECORDING					PROCESSING				INTERPRETATION		
IDENT	BY	FOR	FOLD	DATE	BY	FOR	FOLD	DATE	AUTHOR(S)	RPT No.	DATE

MAP REFERENCE DATA

MAP No. _____

NOTE: THIS MAP REPLACES MAP No. _____
WHICH IS TO BE DESTROYED; PLACED INNACTIVE FILE; OR _____
(Circle one)

DISTRIBUTION:

W/ LETTER _____
FILE No: _____
DATE: _____

WELL DATA

- LOCATION
- LOCATION ABANDONED
- DRILLING
- DRY HOLE
- OIL WELL
- OIL WELL ABANDONED
- GAS WELL
- WET GAS or CONDENSATE WELL
- WELL PENETRATED HORIZON
- VELOCITY SURVEY

WELL MISTIES

[-212] GEOLOGIC DEEPER THAN SEISMIC
[+161] SEISMIC DEEPER THAN GEOLOGIC

SEISMIC DATA

DATA QUALITY
G, F, P - RELIABLE DATA
VP, ? - UNRELIABLE DATA

QUALITY OF FAULT & DIRECT OR INDIRECT EVIDENCE
G, F, P, VP or ? + DIR or IND

CONTOURS — RELIABLE
CONTOURS - - - UNRELIABLE

SURVEY DATA

- SATELLITE FIX
- SHORAN STATION
- LINE INTERSECTION MONUMENT

ALL GEOLOGICAL AND GEOPHYSICAL DATA, INCLUDING THE INTERPRETATION THEREOF APPEARING ON THIS MAP IS THE PRIVATE AND CONFIDENTIAL PROPERTY OF AMOCO PHILIPPINES PETROLEUM COMPANY. THE PUBLICATION OR REPRODUCTION THEREOF WITHOUT THE WRITTEN PERMISSION OF SAID COMPANY IS STRICTLY PROHIBITED.

N

SCALE: 1:100,000

0 2 4 6 8 10 KILOMETERS
0 2 4 6 8 10 MILES

5 cm

CONFIDENTIAL CLASS 1

AMOCO

Amoco Australia Petroleum Company

Houston, Texas

Type of map: S.P. Doc.	
Horizon:	
Area: West Tasmania Basin	Map Quad:
Interpreter:	Date:
Scale:	Contour Interval:
Remarks:	

T/12P
TPR
092-092

092118

144°40 144°50 145°00 145°10 145°20 145°30 41°50

42°00 42°10 42°20 42°30 42°40

5,360,000 5,350,000 5,340,000 5,330,000 5,320,000 5,310,000 5,300,000 5,290,000 5,280,000

310,000 320,000 330,000 340,000 350,000 360,000 370,000

W-81-1 W-81-2 W-81-4 W-81-5 W-81-6 W-81-7 W-81-8 W-81-10 W-81-11 W-81-12 W-81-14 W-81-15 W-81-16 W-81-18 W-81-20 W-81-22 W-81-27 W-81-28 W-81-30 W-81-32

-70 -100 -150 -180 -200 -250 -310 -300 -240 -260 -220 -280 -230 -270 -183

605

-150 -100 -50 0 50 100 150 -260 -250 -100 -300 -200 -150 -100 50 0 0 -50 -100 -150 -200 -250 -250 -220

-150 -160 -160 120 -120 -150 -150 -100 0 100 250 260

5 cm

KILOMETERS 0 1 2 3 4 5 6 7 8 9 10

STATUTE MILES 0 1 2 3 4 5 6 7 8 9 10

NAUTICAL MILES 0 1 2 3 4 5 6 7 8 9 10

5 cm

092119

REVISIONS	
DATE	BY

AERO SERVICE DIVISION
WESTERN GEOPHYSICAL COMPANY OF AMERICA

CLIENT: AMOCO

SCALE: 1 : 100,000

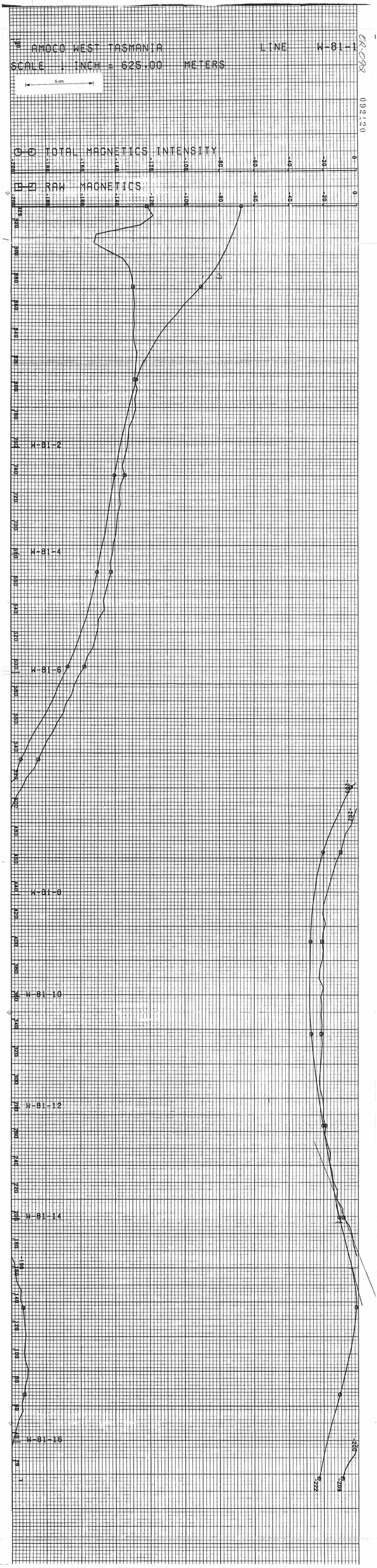
PROJECTION: MERCATOR
SPHEROID: AUSTRALIAN NAT.
SCALE AT EQUATOR: 147° 00

DATE: JUNE 1981

AREA: WEST TASMANIA

TOTAL MAGNETIC INTENSITY ANOMALY MAP
C.I. 10 GAMMAS.

OR-092.


AMOCO WEST TASMANIA
LINE W-81-1
SCALE 1 INCH = 625.00 METERS
5 cm
TOTAL MAGNETICS INTENSITY
RAW MAGNETICS
W-81-2
W-81-4
W-81-6
W-81-8
W-81-10
W-81-12
W-81-14
W-81-16
CR-092
092120

092121

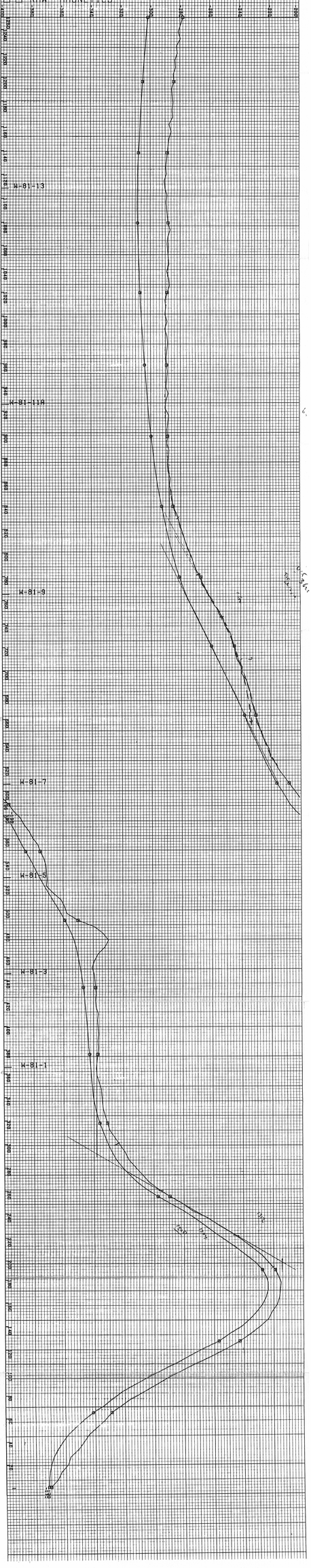
AMOCO WEST TASMANIA LINE W-81-2

SCALE 1 INCH = 625.00 METERS

5 cm

O-O TOTAL MAGNETICS INTENSITY

□-□ RAW MAGNETICS



092122

AMOCO WEST TASMANIA LINE W-81-3

SCALE 1 INCH = 625.00 METERS

5 cm

O-O TOTAL MAGNETICS INTENSITY

□-□ RAW MAGNETICS

W-81-2

W-81-4

W-81-6

W-81-8

W-81-10

W-81-12

W-81-14

W-81-16

W-81-18

W-81-20

092123

AMOCO WEST TASMANIA — LINE W-81-4

SCALE 1 INCH = 625.00 METERS

5 cm

○-○ TOTAL MAGNETICS INTENSITY

□-□ RAW MAGNETICS

W-81-11A

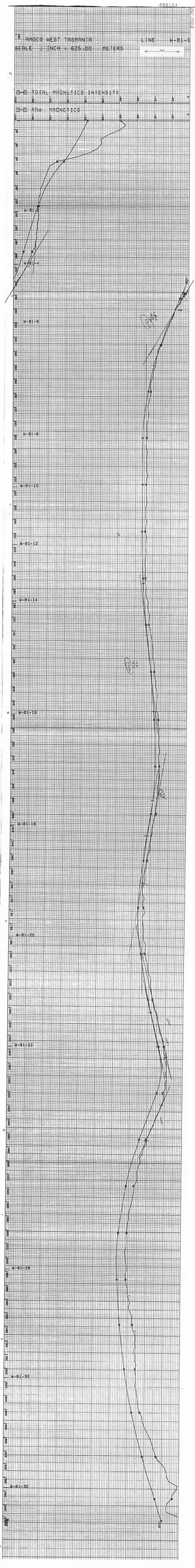
W-81-9

W-81-7

W-81-5

W-81-3

W-81-1


AMOCO WEST TASMANIA
SCALE : INCH = 625.00 METERS
LINE W-81-5
TOTAL MAGNETICS INTENSITY
RAW MAGNETICS
W-81-2
W-81-4
W-81-6
W-81-8
W-81-10
W-81-12
W-81-14
W-81-16
W-81-18
W-81-20
W-81-22
W-81-28
W-81-30
W-81-32

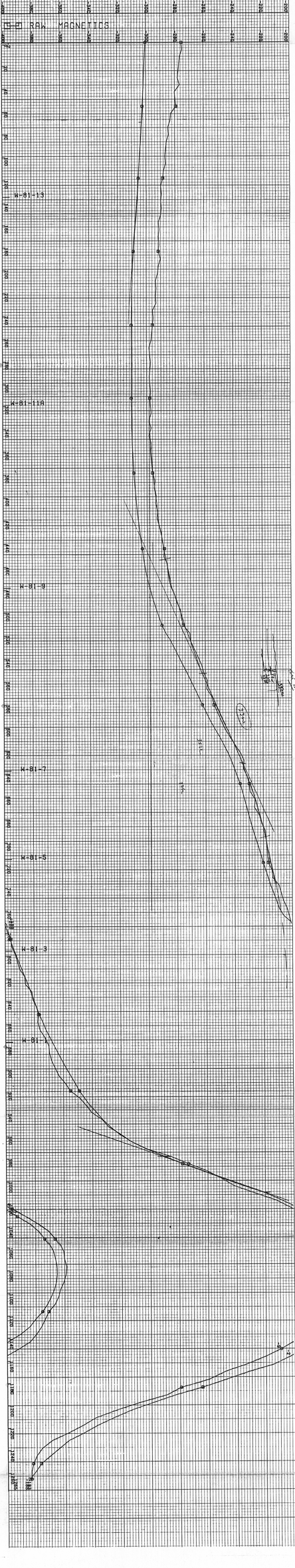
AMOCO WEST TASMANIA LINE W-81-6

SCALE 1 INCH = 625.00 METERS

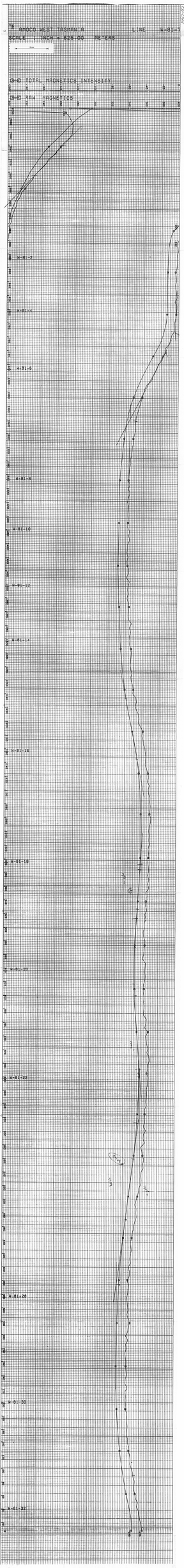
5 cm

B-D TOTAL MAGNETICS INTENSITY

B-E RAW MAGNETICS



092126


AMOCO WEST TASMANIA
LINE W-81-7
SCALE 1 INCH = 625.00 METERS
TOTAL MAGNETICS INTENSITY
RAW MAGNETICS
W-81-2
W-81-4
W-81-6
W-81-8
W-81-10
W-81-12
W-81-14
W-81-16
W-81-18
W-81-20
W-81-22
W-81-28
W-81-30
W-81-32

092127

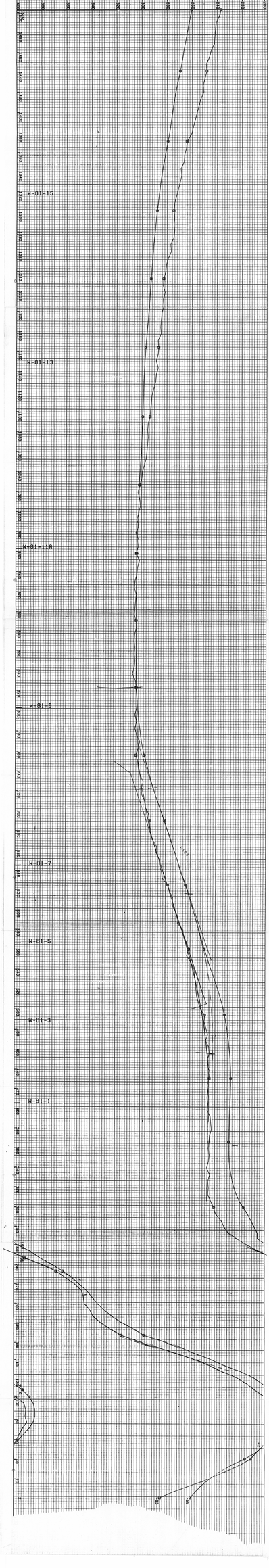
AMOCO WEST TASMANIA LINE W-81-B

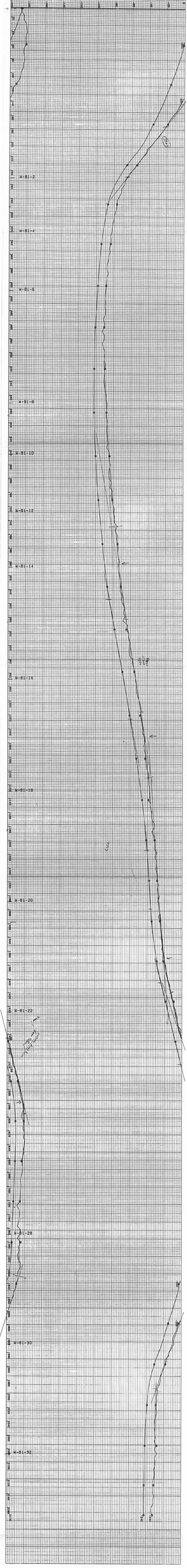
SCALE 1 INCH = 625.00 METERS

1 cm

(B-C) TOTAL MAGNETICS INTENSITY

(C-D) RAW MAGNETICS




AMOCO WEST TASMANIA
LINE W-81-9
SCALE 1 INCH = 625.00 METERS
TOTAL MAGNETICS INTENSITY
RAW MAGNETICS
W-81-2
W-81-4
W-81-6
W-81-8
W-81-10
W-81-12
W-81-14
W-81-16
W-81-18
W-81-20
W-81-22
W-81-28
W-81-30
W-81-32

AMOCO WEST TASMANIA LINE W-81-10

SCALE 1 INCH = 625.00 METERS

5 cm

⊕⊖ TOTAL MAGNETICS INTENSITY

⊟⊞ RAW MAGNETICS

W-81-11A

W-81-9

W-81-7

W-81-5

W-81-3

W-81-1

092130

AMOCO WEST TASMANIA LINE W-81-11

SCALE 1 INCH = 625.00 METERS

5 cm

TOTAL MAGNETICS INTENSITY

RAW MAGNETICS

W-81-20

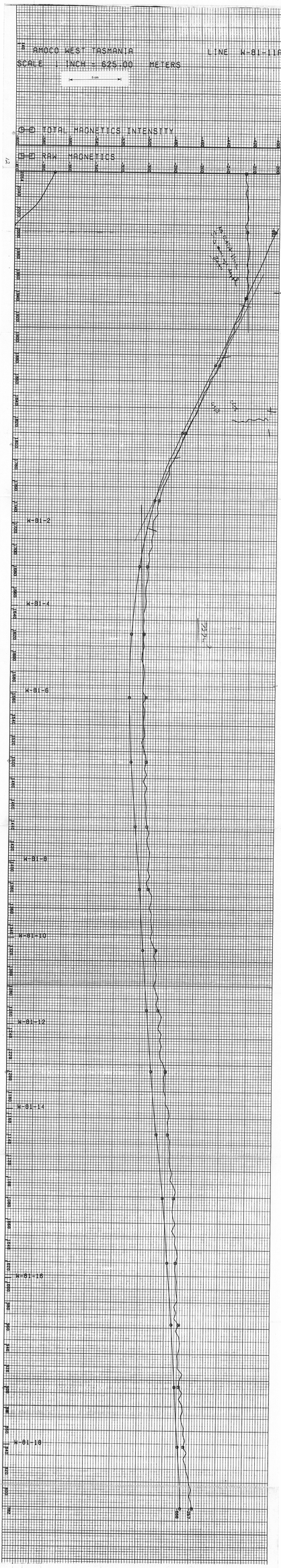
W-81-22

W-81-26

W-81-28

W-81-30

SYNTHETIC CURVE


AMOCO WEST TASMANIA
LINE W-81-11A
SCALE 1 INCH = 625.00 METERS
5 cm
TOTAL MAGNETICS INTENSITY
RAW MAGNETICS
W-81-2
W-81-4
W-81-6
W-81-8
W-81-10
W-81-12
W-81-14
W-81-16
W-81-18

AMOCO WEST TASMANIA LINE W-81-12

SCALE 1 INCH = 625.00 METERS

5 cm

○-○ TOTAL MAGNETICS INTENSITY

□-□ RAW MAGNETICS

W-81-15

W-81-13

W-81-11A

W-81-9

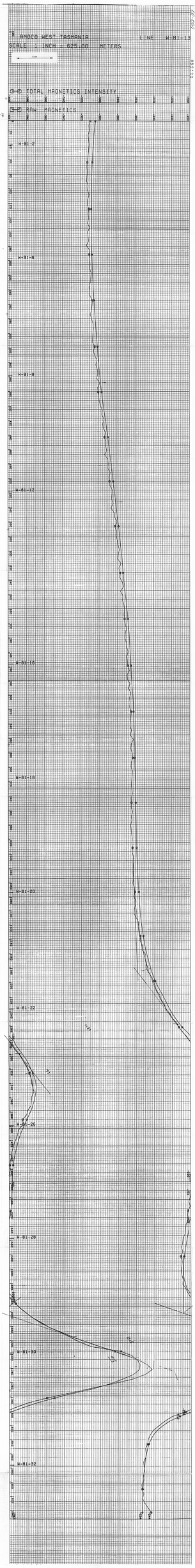
W-81-7

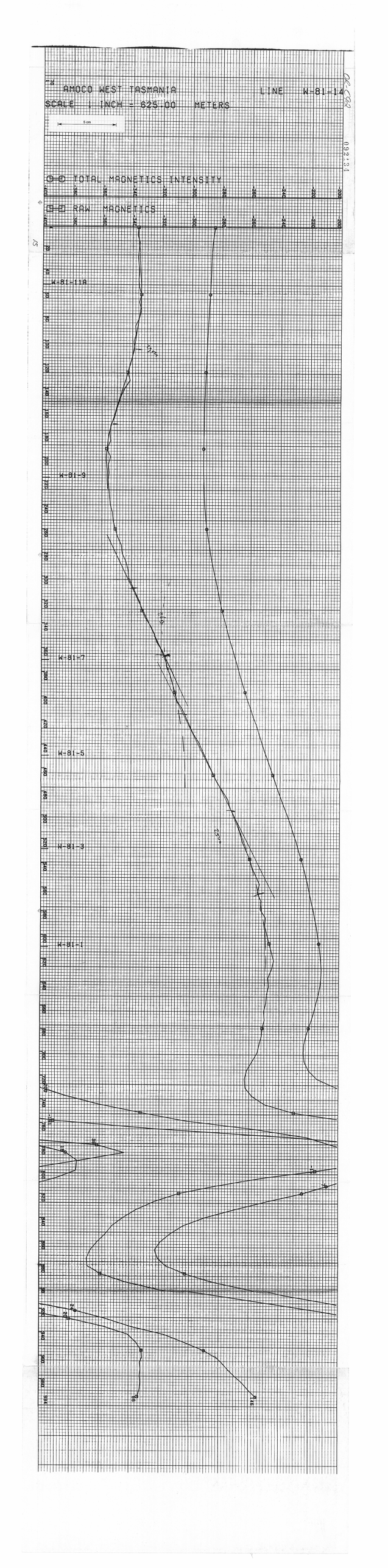
W-81-5

W-81-3

W-81-1

092132


AMOCO WEST TASMANIA
LINE W-81-13
SCALE 1 INCH = 625.00 METERS
1 km
TOTAL MAGNETICS INTENSITY
RAW MAGNETICS
W-81-2
W-81-6
W-81-8
W-81-12
W-81-16
W-81-18
W-81-20
W-81-22
W-81-26
W-81-28
W-81-30
W-81-32


AMOCO WEST TASMANIA
LINE W-81-14
SCALE 1 INCH = 625.00 METERS
5 cm
TOTAL MAGNETICS INTENSITY
RAW MAGNETICS
W-81-11A
W-81-9
W-81-7
W-81-5
W-81-3
W-81-1

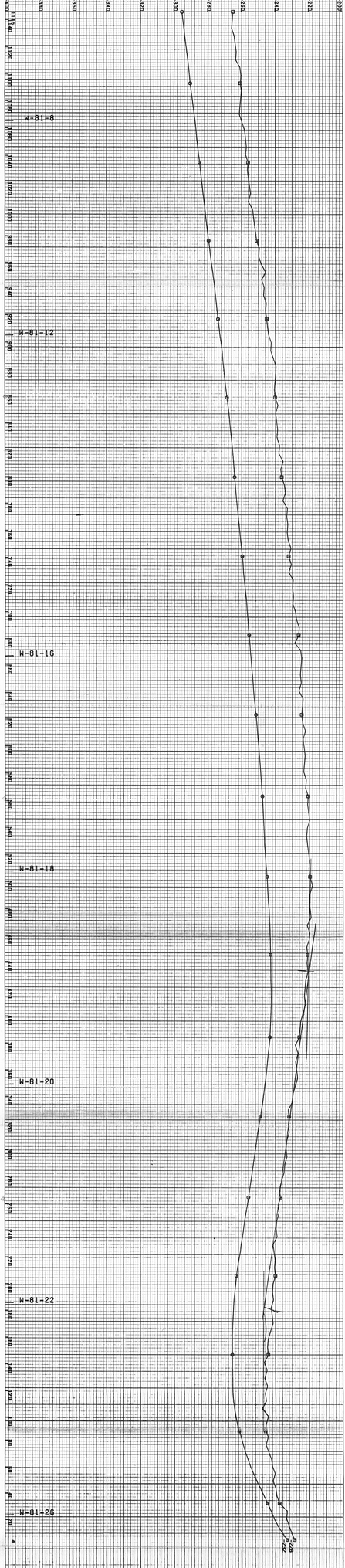
AMOCO WEST TASMANIA LINE W-81-15

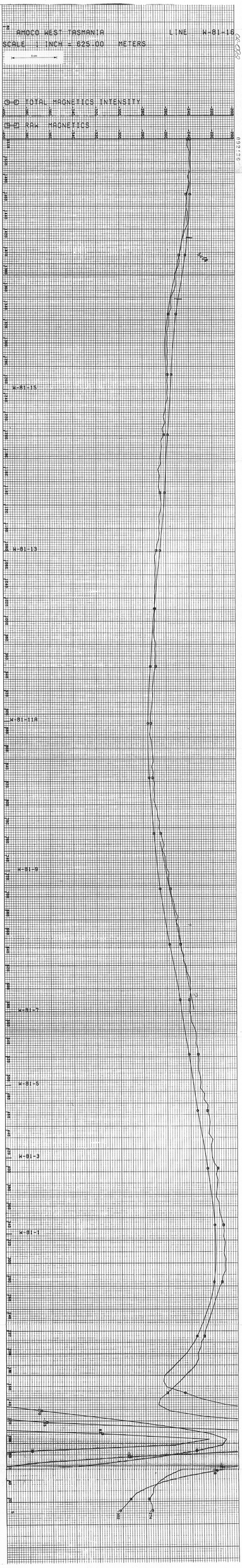
SCALE : INCH = 625.00 METERS

5 cm

O-O TOTAL MAGNETICS INTENSITY

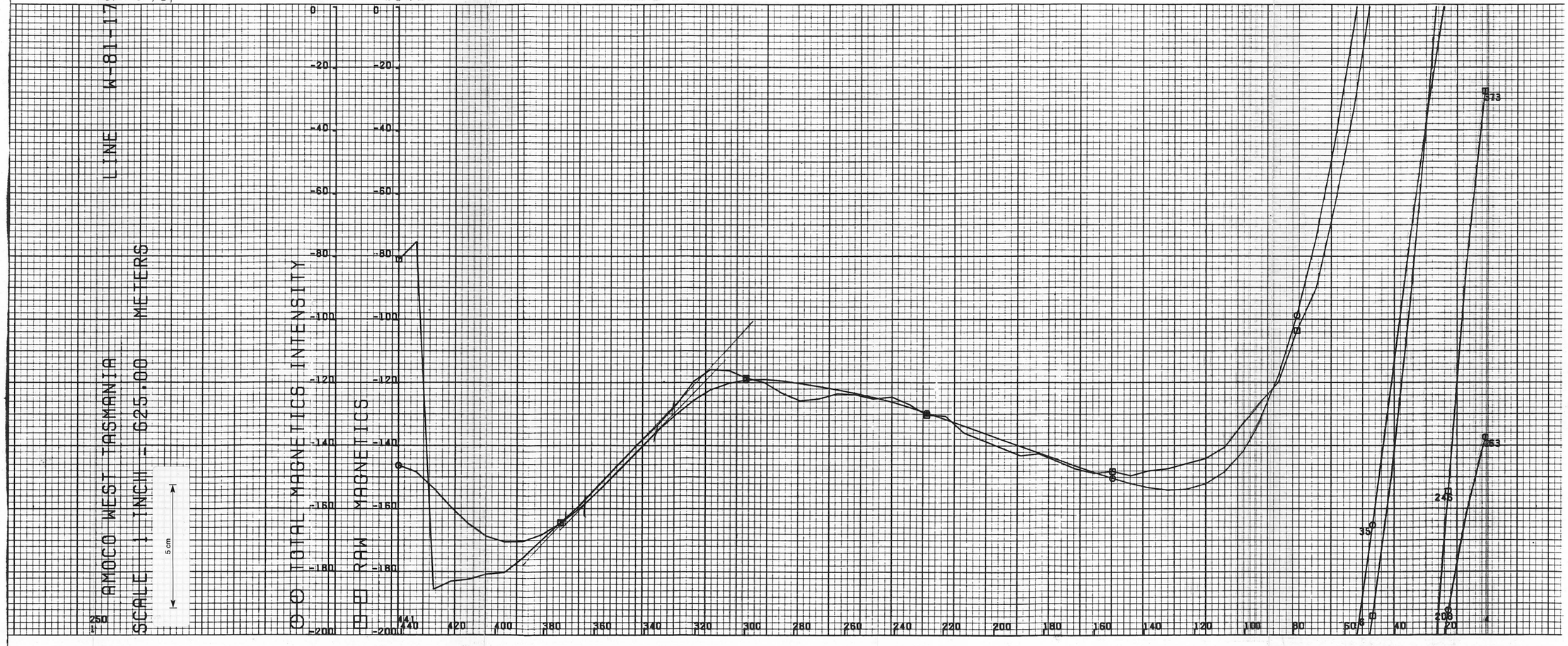
B-B RAW MAGNETICS




AMOCO WEST TASMANIA
LINE W-81-16
SCALE : INCH = 625.00 METERS
5 cm
TOTAL MAGNETICS INTENSITY
RAW MAGNETICS
W-81-15
W-81-13
W-81-11A
W-81-9
W-81-7
W-81-5
W-81-3
W-81-1

OR-C92

092137



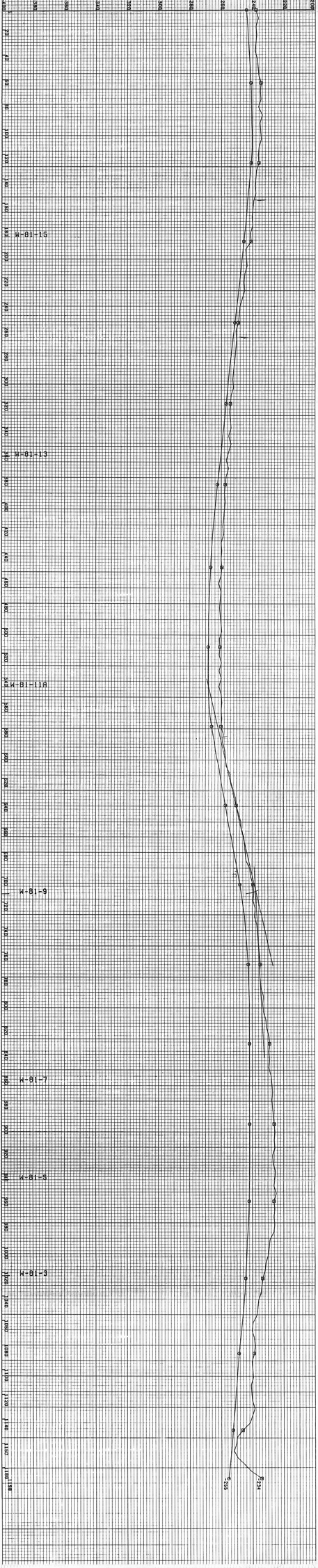
AMOCO WEST TASMANIA LINE W-81-18

SCALE 1 INCH = 625.00 METERS

5 cm

(D-D) TOTAL MAGNETICS INTENSITY

(E-E) RAW MAGNETICS



092139

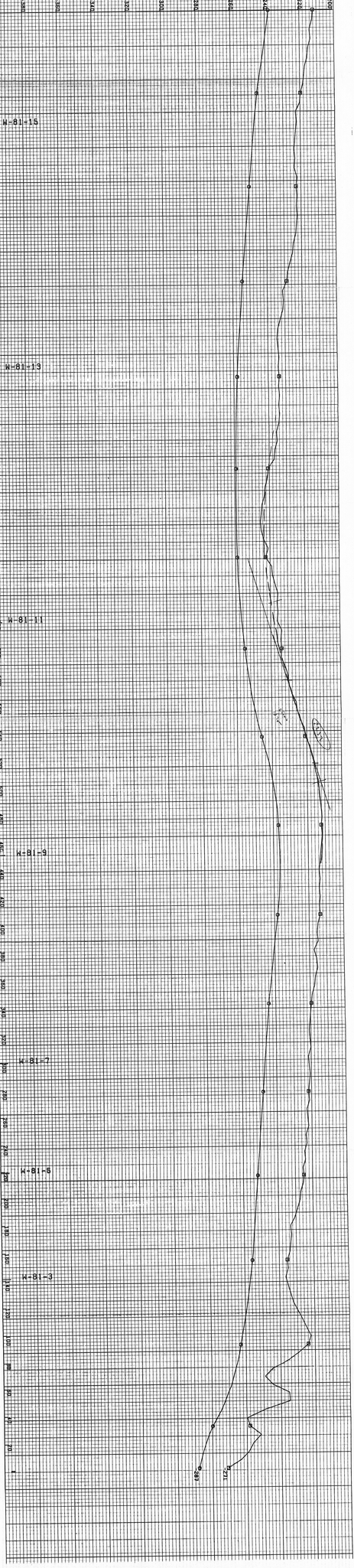
AMOCO WEST TASMANIA LINE W-81-20

SCALE 1 INCH = 625.00 METERS

5 cm

⊕-⊕ TOTAL MAGNETICS INTENSITY

⊡-⊡ RAW MAGNETICS



092140

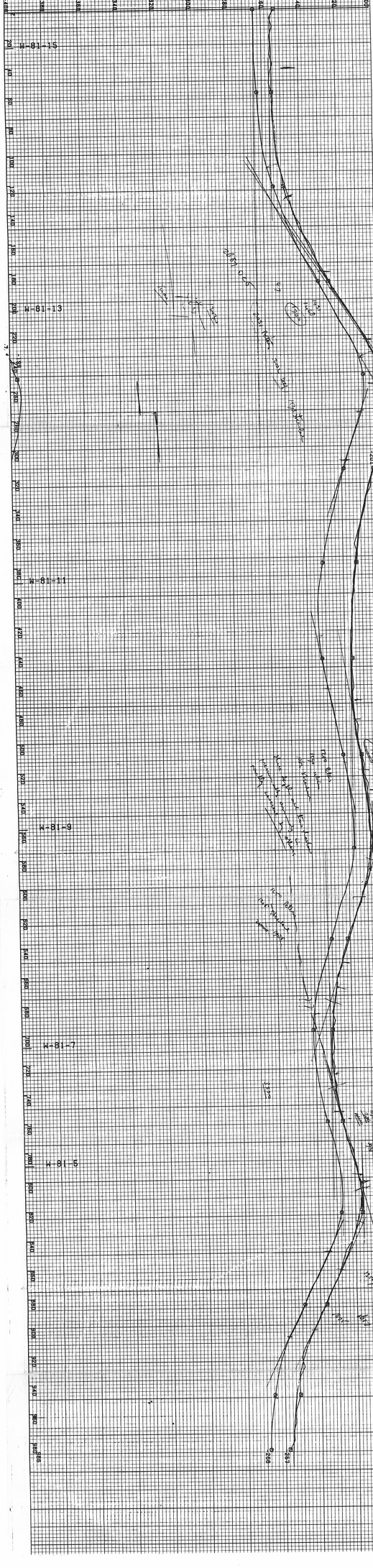
AMOCO WEST TASMANIA LINE W-81-22

SCALE 1 INCH = 625.00 METERS

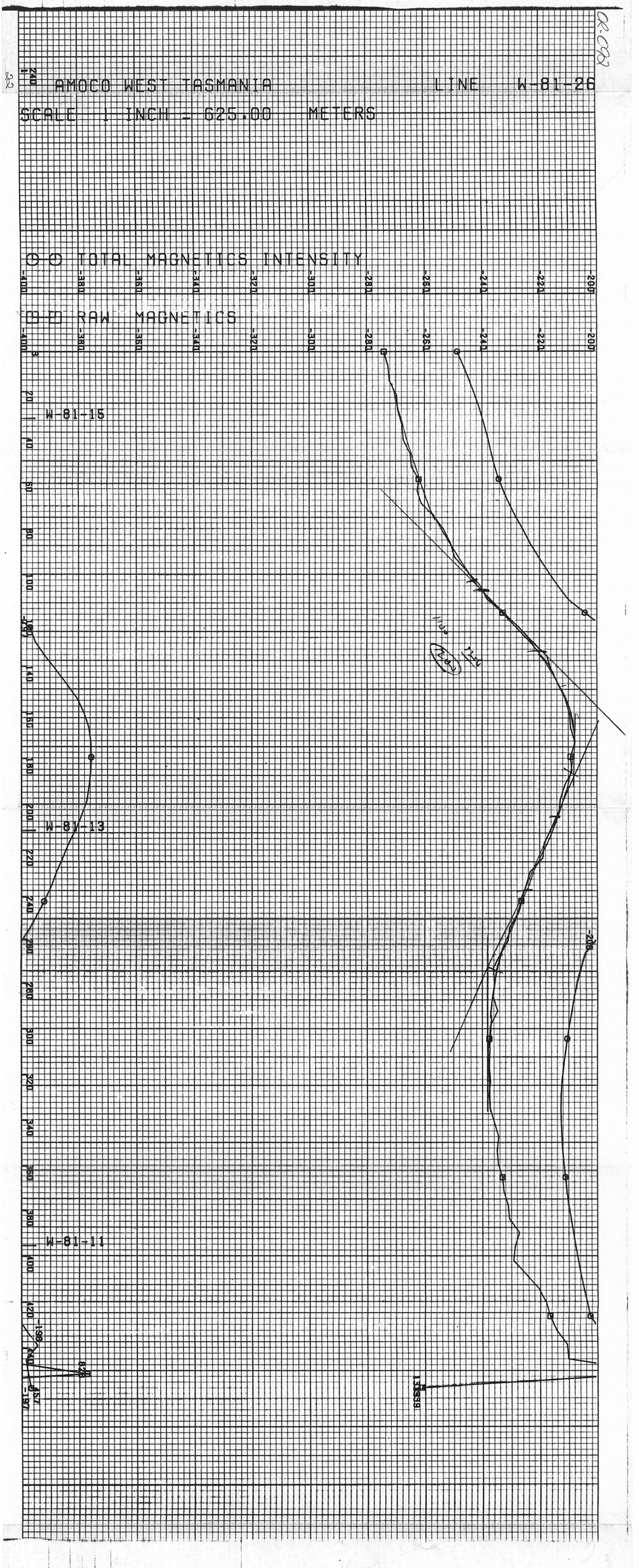
5 cm

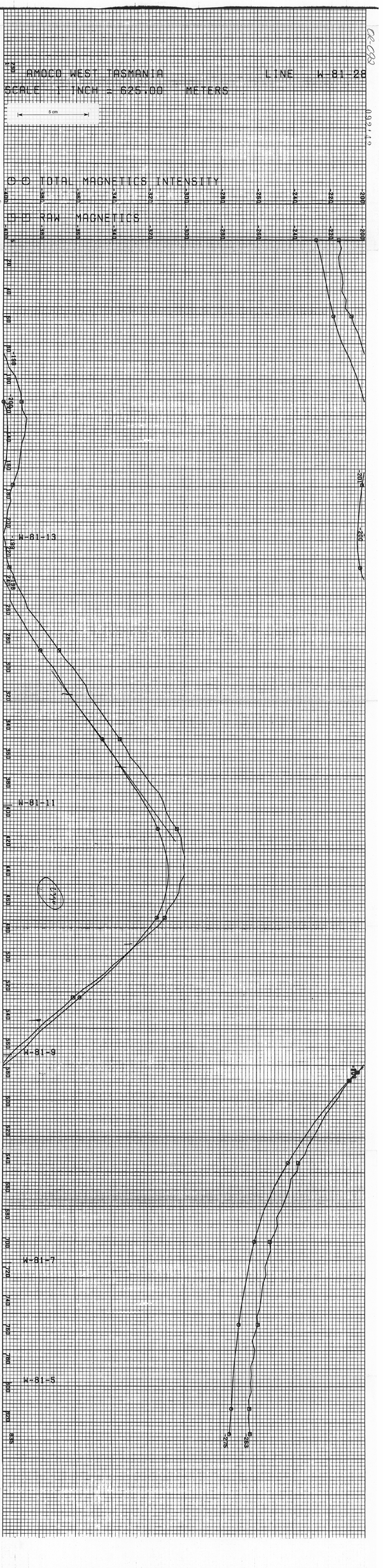
(-) TOTAL MAGNETICS INTENSITY

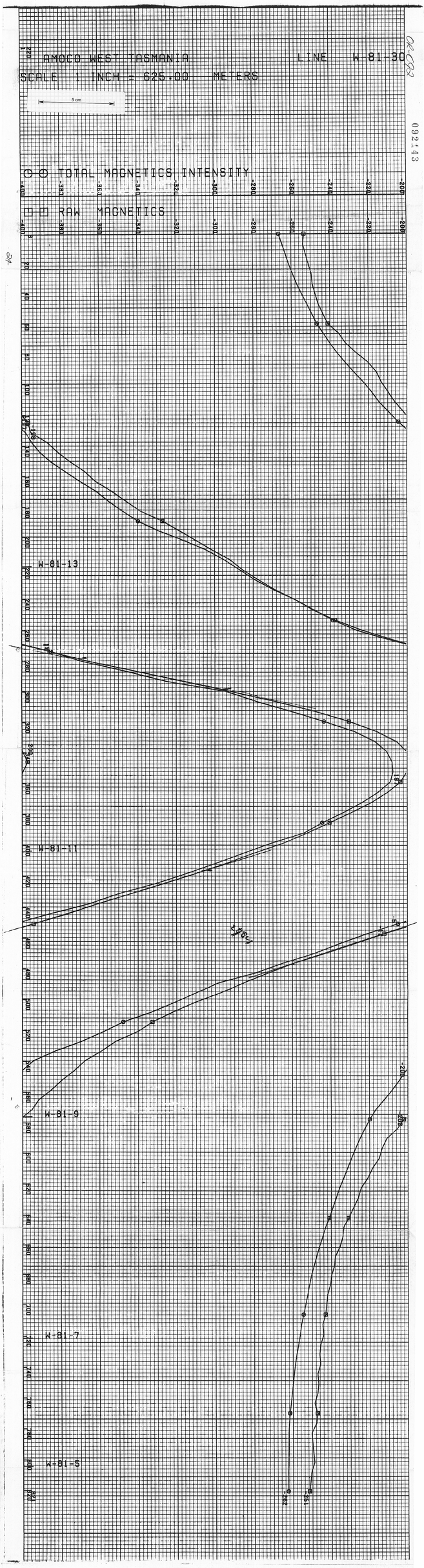
(-) RAW MAGNETICS



092141


AMOCO WEST TASMANIA
LINE W-81-26
SCALE 1 INCH = 625.00 METERS
O-O TOTAL MAGNETICS INTENSITY
□-□ RAW MAGNETICS
W-81-15
W-81-13
W-81-11


AMOCO WEST TASMANIA
LINE W 81-28
SCALE 1 INCH = 625.00 METERS
5 cm
O-O TOTAL MAGNETICS INTENSITY
□-□ RAW MAGNETICS
W-81-13
W-81-11
W-81-9
W-81-7
W-81-5



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