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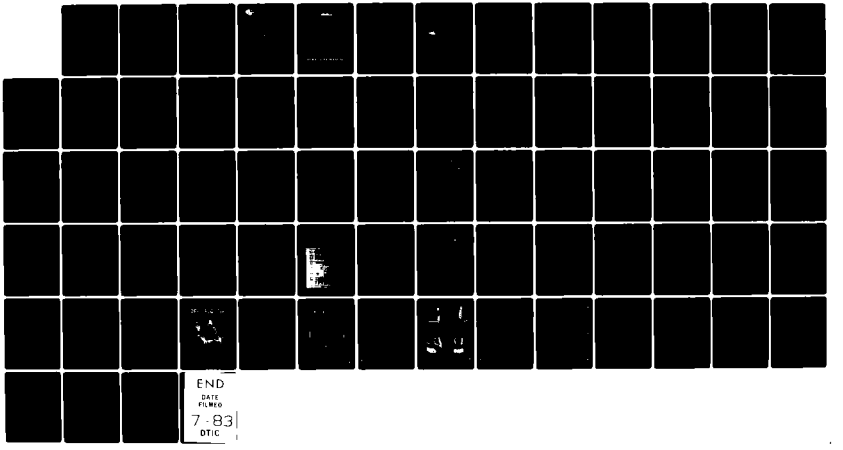

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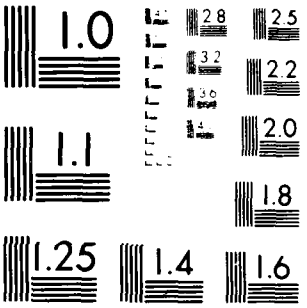

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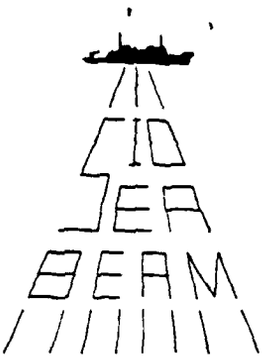

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SIO REFERENCE SERIES

SEA BEAM OPERATOR MANUAL

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By
S. M. Smith

JUL 1 1983
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REFERENCE 83-7

12 May 1983

GDC Sea Beam Series No. 1

University of California Scripps Institution of Oceanography

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This manual is written for use by the Sea Beam Principal Operator to start up and operate the Sea Beam system installed on the R/V Thomas Washington of the Scripps Institution of Oceanography.

The section on Controls and Indicators is taken, in large part verbatum from Chapter 3 of the SEABEAM Manual (Rev. A) as provided by the manufacturer, General Instruments Corp. The remaining sections, although based on the GI manual, have been...

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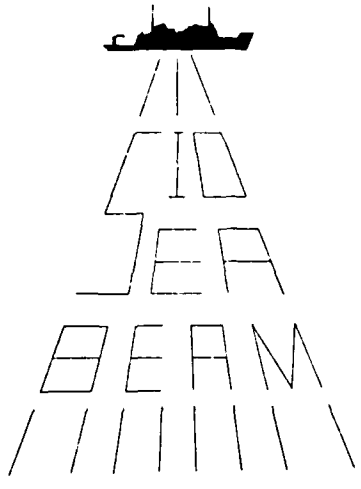
SEA BEAM SERIES NO. 1

SEA BEAM OPERATOR MANUAL

By S. M. Smith



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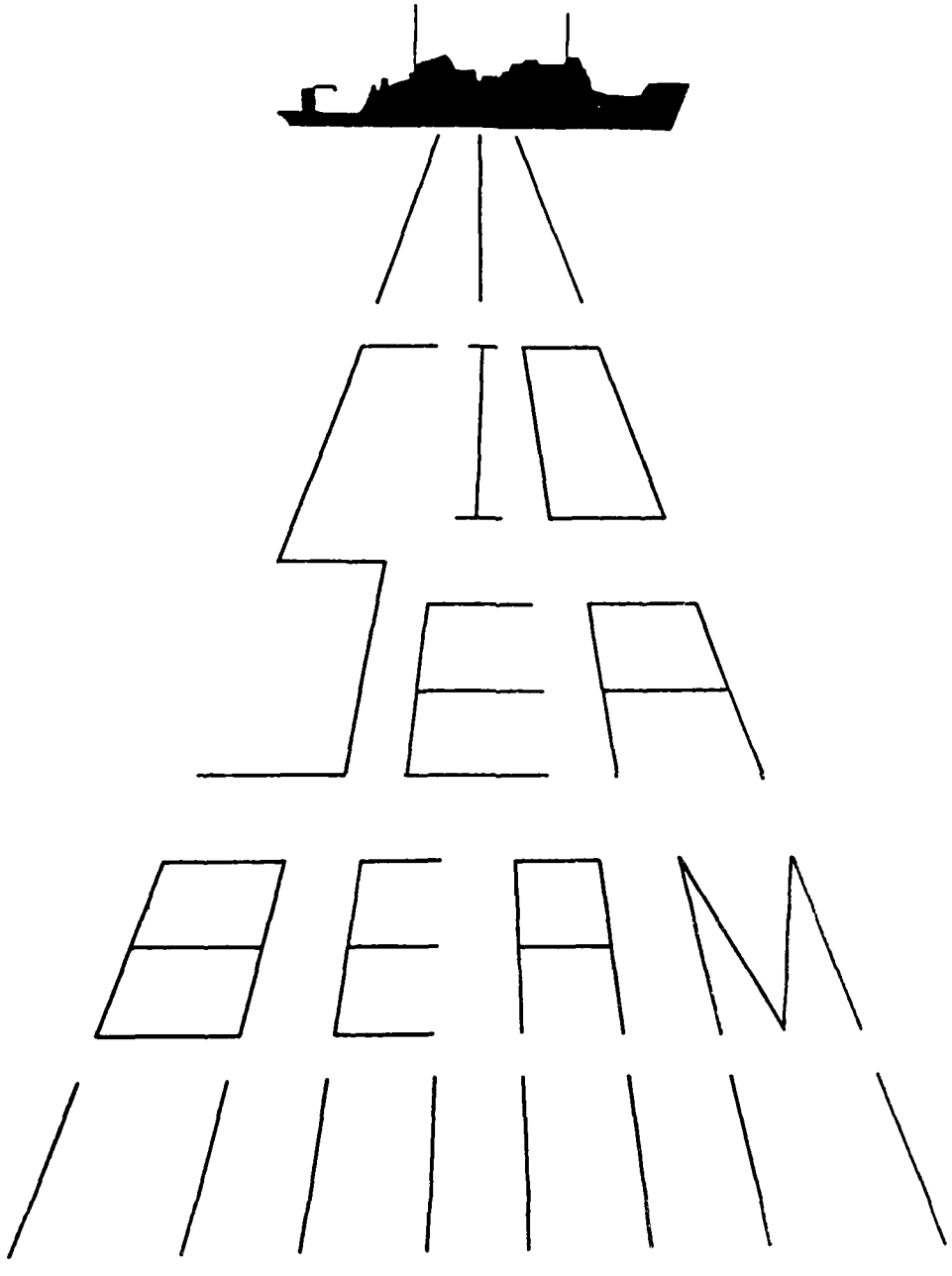
May 1983



OPERATIONS MANUAL

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PREFACE

This operator's manual, published here as SIO Reference 83-7, was originally written in March 1982. It was revised and printed in January 1983 as "Sea Beam Series No. 1", the first of a group of documents produced by the Geological Data Center (GDC) primarily for use within the institution.

During the next few years, we fully intend that the documentation efforts will keep up with the anticipated changes and improvements in hardware, software, and operational procedures associated with Sea Beam. These documentation changes, however, will occur in the form of updates and modifications to the local Sea Beam Series rather than as new publications in the SIO Reference Series. Therefore, the reader who needs to know the details of the present state of the system is advised to check with the Geological Data Center for the current documentation.

This manual has benefited from the advise and suggestions of James Charters, J. Lynn Abbott, and Patrick Downes of the Marine Technology Group and from GDC staff members, Uta Albright and Warren Smith, both of whom assisted in it's production. The illustrations were drawn by Lori Hydock.

Funding for producing the manual was provided, in part, by the grant to the Scripps Institution from the Office of Naval Research for setting up the Sea Beam system (USN N00014-80-C-0440; P. Lonsdale, J. Mammerickx, and R. Tyce principal investigators) as well as from Sea Beam daily rate recharges.

SIO Reference 83-7

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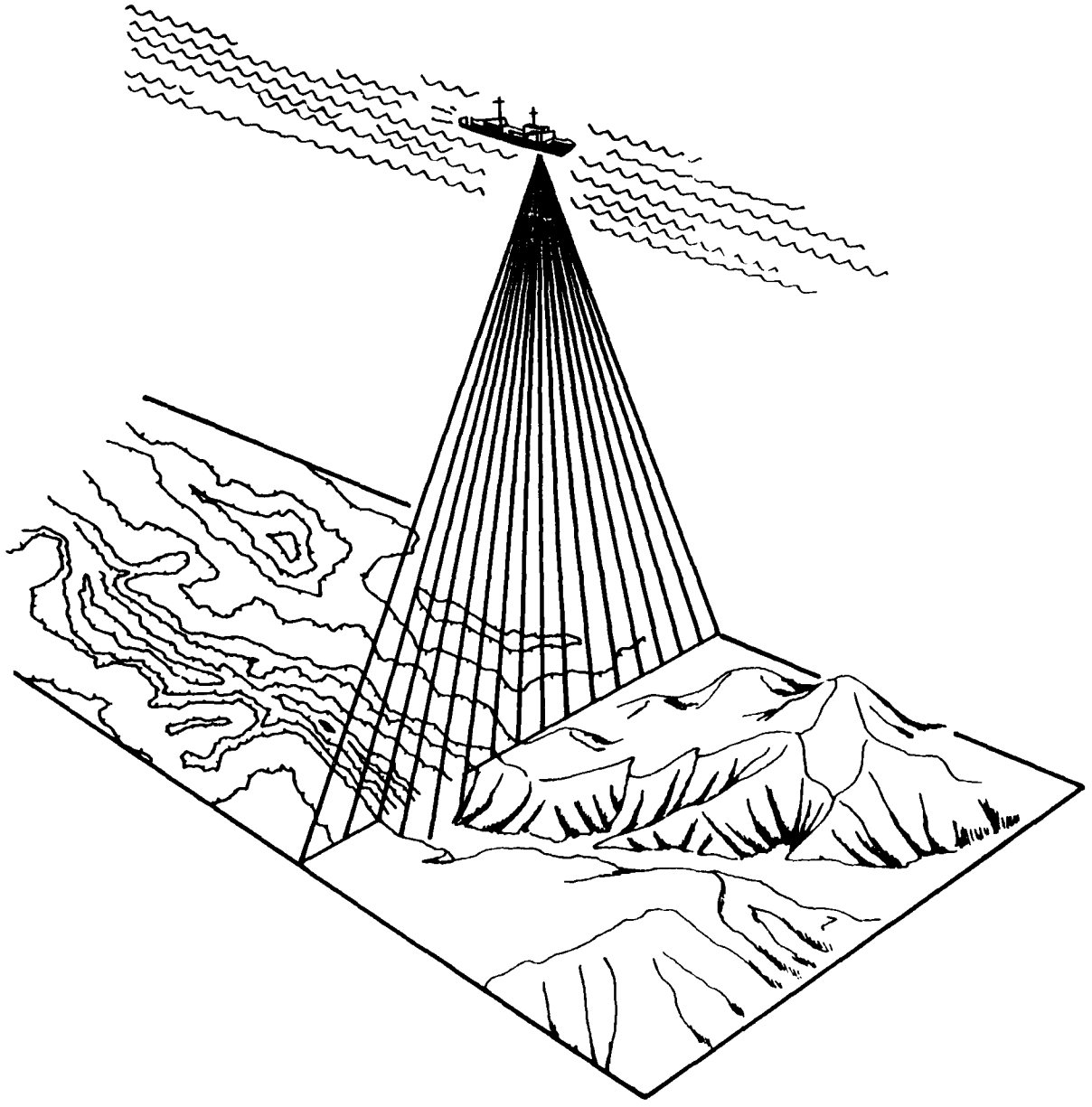

SCRIPPS SEA BEAM SYSTEM

SIO SEA BEAM

OPERATOR

MANUAL

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1.0 INTRODUCTION

This manual is written for use by the Sea Beam Principal Operator to start up and operate the Sea Beam system installed on the R/V Thomas Washington of the Scripps Institution of Oceanography.

The section on Controls and Indicators is taken, in large part verbatum from Chapter 3 of the SEABEAM Manual (Rev. A) as provided by the manufacturer, General Instruments Corp. The remaining sections, although based on the GI manual, have been extensively reorganized and ammended to provide specific instructions for the installation on the Washington.

This manual was originally written after only a few week experience with Sea Beam under relatively uniform conditions the Equatorial Pacific on ARIADNE Expedition, Leg 1. Minor r s- ions have been made, based on an additional six months use of system, but more changes can be expected, especially to the s n on operating procedures, as we gain more experience with diff nt conditions and scientific requirements.

Users are encouraged to make suggestions on the note sheets at the back of the manual and forward them to the Geological Data Center.

S.M. Smith
Geological Data Center
Scripps Institution of
Oceanography
La Jolla, California

24 March 1982

Revised:

3 January 1983

#

2.0 DESCRIPTION OF CONTROLS AND INDICATORS

NOTE: This section was taken from Chapter 3 of the General Instruments Sea Beam Manual. The section numbers of the original document have been changed and some additional comments included.

2.1 SONAR CABINET (Figure 2-1). The following controls or indicators are located on the front panel of the Sonar Rack.

A) 400Hz Power Switch. Controls the flow of reference current through the NBES servo circuitry. For systems supplied with a vertical gyro, it controls ship's power to the 400 Hz converter and the 28 V DC power for the gyro. Normally left on.

B) 400Hz Converter Switch.

C) SYSTEM POWER Circuit Breaker. Controls application of ship's prime power to the system. Normally left on.

D) Indicator Lamps. Illuminate when 400 Hz and ship's power is applied to the system and both breakers and power switch are all on. The 400 Hz indicator is illuminated by the 115 V 400 Hz power.

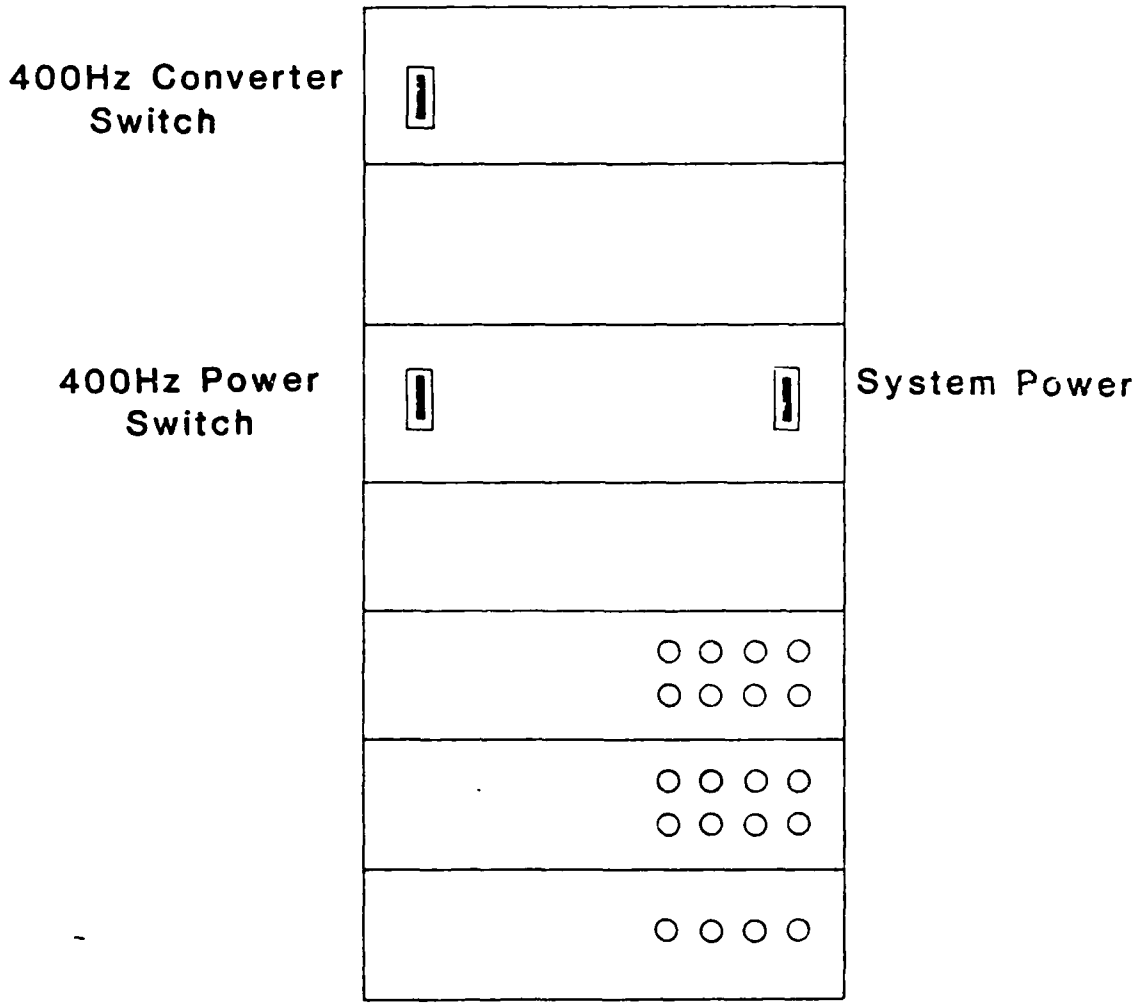
E) Power Amplifier Monitor Lamps. Illuminate when the appropriate power amplifier fails or when the projector is quenched.

F) Lamp Test Indicator Switches. Illuminate the P. A. Monitor lamps when depressed, to check for defective lamps.

2.2 SYSTEM CONTROL PANEL (Figure 2-2). The left half of the System Control Panel contains the controls and indicators associated with the Sonar. These may be utilized to operate the Sonar independently of the Echo Processor, utilizing the depth indicator read-out and the Universal Graphic Recorder (UGR). The controls and indicators associated with the Echo Processor are located on the right half of the System Control Panel, which is divided into three functional areas. These are: Echo Processor Controls, Display Controls, and Data Entry.

2.2.1 SONAR CONTROLS

S 1) Power Indicator/switch. Applies ship's prime power to the Sonar when depressed, and illuminates. (Alternate--action)



SONAR CABINET

Fig. 2-1

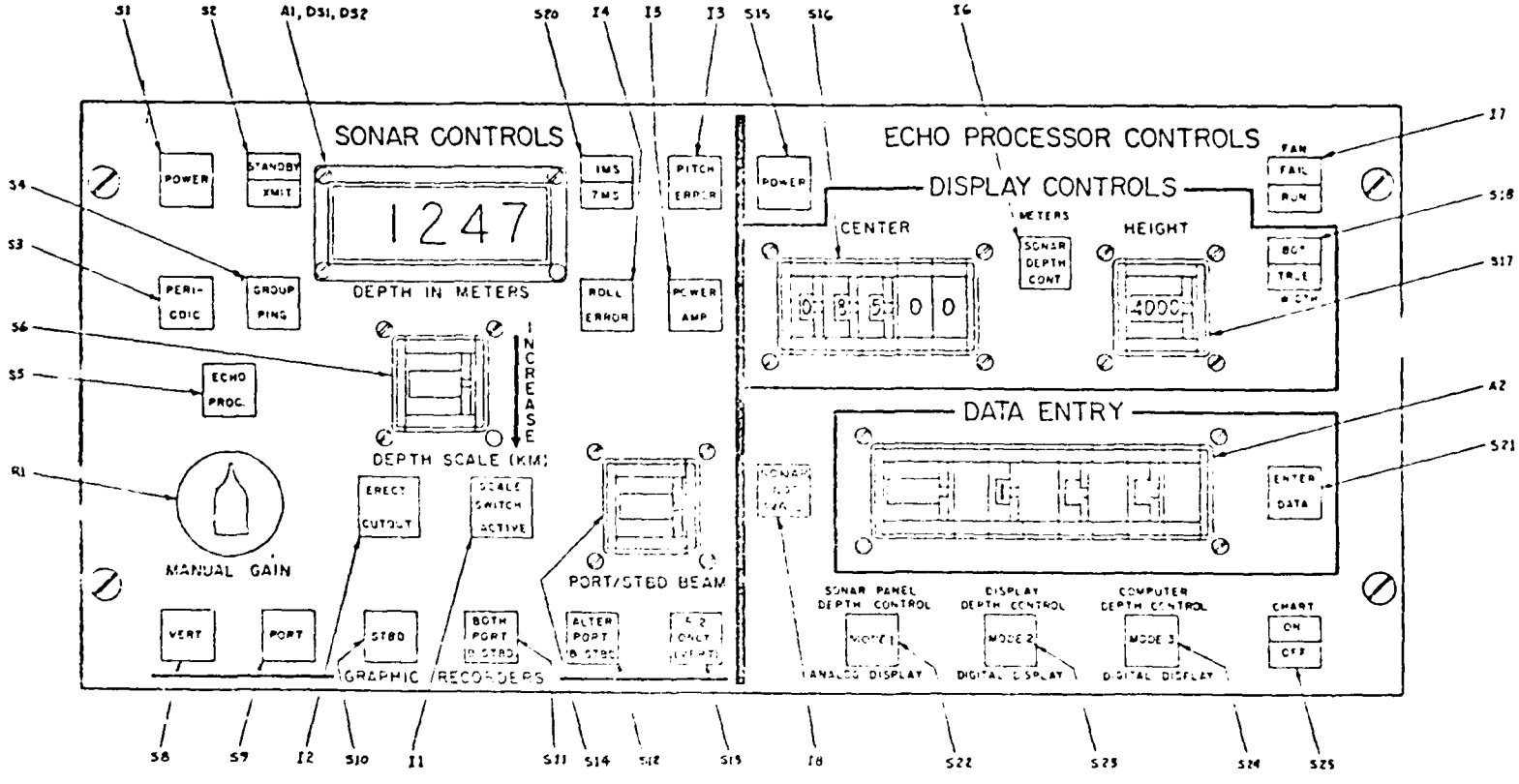

SONAR CONTROLS
POWER
STANDBY
XMIT
1247
DEPTH IN METERS
IMS
TMS
PITCH
ERROR
ROLL
ERROR
POWER
AMP
PERI-
SCOPE
GROUP
PING
ECHO
PROC.
INCREASE
DEPTH SCALE (KM)
MANUAL GAIN
ERECT
CUTOUT
SCALE
SWITCH
ACTIVE
PORT/STBD BEAM
VERT
PORT
STBD
BOTH
PORT
& STBD
ALTER
PORT
& STBD
GRAPHIC RECORDERS
ECHO PROCESSOR CONTROLS
POWER
FAN
FAIL
RUN
DISPLAY CONTROLS
CENTER
METERS
SONAR
DEPTH
CONT
HEIGHT
4000
80°
TRUE
DATA ENTRY
ENTER
DATA
SONAR PANEL
DEPTH CONTROL
DISPLAY
DEPTH CONTROL
COMPUTER
DEPTH CONTROL
MODE 1
MODE 2
MODE 3
ANALOG DISPLAY
DIGITAL DISPLAY
DIGITAL DISPLAY
CHART
ON
OFF
S1
S2
A1, DS1, DS2
S20
I4
I5
I3
S15
S16
I6
I7
S18
S17
S4
S3
S6
S5
R1
A2
S21
S8
S9
I2
S10
I1
S11
S14
S12
S13
I8
S22
S23
S24
S25

Fig. 2-2

S 2) STANDBY/XMIT Indicator/switch. Alternate-action switch which puts Sonar in STANDBY mode, Sonar transmission is stopped and transmission is inhibited until the STANDBY/XMIT switch is depressed and the XMIT light comes on. When power is turned on, the system is in STANDBY.

S 3) PERIODIC Mode Indicator/switch. When operating in PERIODIC Mode, the ping cycle is controlled by the setting of DEPTH SCALE (KM) thumbwheel switch. The interval is 1 second for each 750 meters of depth selected. For example, if the Depth Scale is set to 6.75-7.5 kilometers, one ping will occur each 10 seconds. When power is turned on, the system is in PERIODIC Mode.

S 4) GROUP PING Mode Indicator/switch. In the GROUP PING Mode, ping timing is controlled by the Universal Graphic Recorder. The digital depth display indicates OFF, and no data is available for data logging.

S 5) ECHO PROC Mode Indicator/switch. In ECHO PROC Mode, the ping timing is controlled by the ECHO PROCESSOR CONTROLS portion of the System Control Panel, for the Echo Processor Modes 2 and 3.

S 6) DEPTH SCALE (KM) Indicator/switch. This thumbwheel switch controls the sounding depth range of the Sonar in PERIODIC Mode or ECHO PROC/MODE 1.

I 1) SCALE SWITCH ACTIVE indicator. This is illuminated in PERIODIC Mode or ECHO/PROC/MODE 1. When this indicator is off, the system timing is under control of the Echo Processor.

NOTE

NOTE THAT THE SHALLOWEST RANGE ON THE DEPTH SCALE SWITCH IS MARKED "MIN-.75KM". THE MINIMUM DEPTH WILL VARY FROM INSTALLATION TO INSTALLATION. IT IS DETERMINED DURING INITIAL SEA TRIALS. IT WILL BE LESS THAN 45 METERS.

S 8) to S 13 GRAPHIC RECORDERS selection switches. The operation of these indicator/switches is detailed in Table 2-1. The switches control the operation of the UGR Sea Beam Monitor in conjunction with the PORT/STBD BEAM thumbwheel switch.

S 14) The PORT/STBD BEAM switch selects any one or all of the received side beams, which are then displayed on the Graphic Recorder.

A 1) DEPTH IN METERS Indicator. The DEPTH IN METERS Indicator is a 5-digit 7-segment gas-discharge readout which indicates OFF when the STANDBY/XMIT indicator/switch is in STANDBY or Group Ping Mode is selected.

TABLE 2-1

GRAPHIC RECORDER INDICATOR/SWITCHES

Indicator/Switch	UGR Monitor Recorder*
VERT	Displays Vertical Depth only
PORT	Displays Port Beam Selected by PORT/STBD Beam Switch
STBD	Displays Starboard Beam Selected by PORT/STBD Beam Switch
BOTH PORT & STBD	Displays Summation of Selected Port and Starboard Beams
ALTER PORT & STBD	Alternately displays 16 Port and 16 Starboard Echoes of the Selected Beam

* If no recorder is connected, or it is turned off, keying automatically comes from within the Sonar System.
#

I 3) PITCH Indicator. The PITCH indicator is illuminated whenever the error signal from the pitch Servo System unit exceeds a preset value. When on, it indicates excessive pitch rate or a faulty pitch compensator.

I 4) ROLL Indicator. The ROLL ERROR indicator is illuminated whenever the error signal from the roll servo system exceeds a preset value. When on, it indicates excessive roll rate or a faulty Roll Compensator.

I 5) POWER AMP Indicator. The POWER AMP indicator illuminates when one or more of the twenty power amplifiers in the Sonar is not operating properly.

R 1) MANUAL GAIN Potentiometer. The MANUAL GAIN Control is used during the Group Ping Mode to adjust the gain of the Sonar receivers. The Control is adjusted for a suitable presentation on the Graphic Recorder, and the setting is approximately proportional to water depth (full scale = 11,000; half scale = 5,000 meters; etc.)

I 2) ERECT CUTOUT Indicator. Illuminates to indicate that the gyro is in a fast erection mode due to turning of the ship.

S 20) 1MS/7MS Indicator/switch. Allows for keying the Sonar with either a 1 millisecond or 7 millisecond pulse. The 1 millisecond pulse allows better resolution of the vertical graphic record, but the Echo Processor cannot be used.

2.2.2 ECHO PROCESSOR CONTROLS. The Echo Processor portion of the System Control Panel contains the following controls and indicators.

S 15) POWER Indicator/switch. The POWER Indicator/switch controls application of ship's prime power to the EP system. Power is routed through a relay interlocked to a vane switch in the airflow of the blower to prevent system operation in the event of a blower failure.

I 7) FAN FAIL/RUN Indicator. In normal operation, the RUN portion of the indicator is illuminated. In the event of blower failure, the lower half of the indicator goes out and the upper half indicates FAIL.

I 8) Sonar Not Available Indicator. The Sonar not Available illuminates to indicate loss of Sonar Control by the Echo Processor when any of the following indicators show an inoperable state:

Sonar POWER Switch is not lit
STANDBY/XMIT indicates STANDBY
PERIODIC Lamp is lit
GROUP PING is lit

S 22) MODE 1 Indicator/switch. When depressed, places the Echo Processor in Mode 1, provided the Sonar is in ECHO PROC mode. The Sonar operates exactly as in Periodic. Depth control is by the DEPTH SCALE (KM) thumbwheel switch on the Sonar Controls panel.

The depth indication is on the DEPTH IN METERS display and unprocessed echoes are displayed on the CRT. Normally, this mode is used only in startup to determine the optimum control settings and to allow Console Terminal entry of parameters. The Echo Processor is in Mode 1 at Power turn-on.

S 23) Display Depth Control MODE 2. In mode 2, the receiver gate width is determined by the settings of the HEIGHT thumbwheel switch and the gate center time is determined by the CENTER thumbwheel switch on the DISPLAY CONTROLS portion of the panel. The CRT displays processed data with the data points connected, so that the bottom is seen as a continous profile.

S 24) Computer Depth Control MODE 3. In Mode 3, the computer controls the Sonar timing and receiver gate width, and the DISPLAY CONTROLS thumbwheel switches affect only the CRT display. In this mode, operation is completely automatic. In the event of loss of the gate, an error message is printed on the terminal.

S 25) Chart ON/OFF Indicator/switch. Enables and disables the Digital Plotter when in MODE 2 or MODE 3. The switch is disabled and its indicator will read OFF in MODE 1.

I 6) Display Controls SONAR DEPTH CONTROL Indicator. Is lit only when in EP Mode 2, to indicate that the Sonar Keying is being controlled by the HEIGHT and CENTER thumbwheel switches.

S 17) HEIGHT Thumbwheel switch. Controls the Depth Range observed vertically on the CRT display, and in Mode 2, the receiver gate width. The range of the HEIGHT control is from 250 meters to 16,000 meters, with each increment double that of the next lower setting. This allows expansion of the vertical scale so that relatively flat areas may by expanded in relief.

S 16) CENTER Thumbwheel switch. Sets the center line on the CRT Display to the depth value, in meters, on the thumbwheel switch. This control is used to bring the bottom profile onto the CRT Display. The range of the CENTER switch is from 100 meters to 19,900 meters, in 100-meter increments.

S 18) WIDTH 80DEG./TRUE Indicator/switch. The 80DEG./TRUE Indicator/switch controls the relative scale between the horizontal and vertical axes of the CRT Display.

In the TRUE mode, the vertical and horizontal scales of the CRT display are equal and controlled by the setting of the Height thumbwheel switch. The computer generates a grid overlay on the CRT Display. The grid line spacing in meters is automatically printed on the Terminal. The bottom profile may then be read directly off the grid in meters per grid line.

The 80DEG. mode provides the capability for expanding the horizontal scale to include the full width of the beam without regard for water depth or the setting of the HEIGHT thumbwheel switch. The HEIGHT switch continues to control the vertical scale of the CRT display, but the horizontal scale is controlled by the setting of the CENTER switch.

The display is roll compensated, so that vertical in always straight down on the display. In the 80DEG. mode, the full 80 DEG width (40 DEG Beam width plus or minus 20 DEG of roll) is displayed. During roll conditions beams may be dropped off on either side of the display below the horizontal center line. The 80 DEG mode requires less operator attention than the TRUE mode, and is preferred during normal operation.

A 2) DATA ENTRY Thumbwheel switch. The DATA ENTRY switch is a BCD encoded 4-digit switch which is used for setting the values of data to be input to the computer. Values may be entered through the thumbwheel switches in Mode 1, 2, or 3. The leftmost digit of the switch is used for setting 1 of the available parameters. These are:

CHART SC M/CM - sets the scale of the Swath Plotter in meters per centimeter.

CONTOUR INT. M - sets the contour interval of the Swath Plotter, in meters.

SPEED KNOTS - sets manual speed entry or changes between auto and manual modes.

DISP. THR. VOLTS - sets the threshold of the CRT display relative to the EP receiver outputs in Mode 1 only. It is normally set above the noise level, so that only signals above the noise are displayed.

PARAM, T, R SET 0-4 - allows selection of up to 5 complete sets of parameters for EP operation. Set 0 is the set currently in use.

A more complete explanation of these settings and the remaining digits on the switch (5,6,7,8,9), is given in the section on Thumbwheel Entries (Sect. 3.5).

S 21) ENTER DATA Indicator/switch. When depressed, illuminates to indicate that desired parameter, as currently set in the Data Entry thumbwheels, is ready to be sent to the computer When the computer accepts the data, the indicator light goes out.

2.3 POWER SUPPLY DRAWER. The Power supply drawer front panel contains two Elapsed Time indicators. The SONAR indicator monitors the power input to the SONAR system. The ECHO PROCESSOR indicator monitors the power input to the Echo Processor.

#

3.0 DESCRIPTION OF GENERAL FUNCTIONS AND THUMBWHEEL ENTRIES

This section provides an overview of the start up procedures which begin in the Sonar Periodic Mode and then progress through the Echo Processor Mode 1 (with Terminal Entry) and Modes 2 and 3. This progression is diagrammed in Figure 3-1. A description of the parameters entered through the Thumbwheel Data Entry switches is included at the end of this section. Detailed instructions for each step of the start up procedure will be found in Section 4.

3.1 PERIODIC MODE. In the Periodic Mode, the Sonar is operated independently of the Echo Processor, and the depth indication is on the DEPTH IN METERS indicator and the Universal Graphic Recorder. Keying of the Sonar is derived from an internal one per second pulse. The internal 1 per second pulse is synchronized to the UGR's key pulse.

The setting of the DEPTH SCALE (KM) switch determines the ping rate, the gain of the preamplifiers, and the receiver gain and blanking relative to time. The maximum ping rate is 1 per second, in water depths from minimum (minimum depth is variable and may be adjusted by maintenance personnel) to 750 meters. For greater depths, the ping interval is increased in 1 second increments, and the range is increased in 750 meter increments.

3.2 ECHO PROCESSOR MODE. The Echo Processor operates in 1 of 3 available modes. In EP Mode 1, the Sonar ping cycle timing is controlled by the setting of the DEPTH SCALE (KM) switch on the SONAR CONTROLS panel exactly as in Periodic Mode. In EP Mode 2 the ping cycle timing is controlled by the setting of the CENTER and HEIGHT thumbwheel switches on the DISPLAY CONTROLS portion of the ECHO PROCESSOR CONTROLS panel. In EP Mode 3, ping cycle timing is determined by the computer program and is completely automatic.

3.2.1 Echo Processor Mode 1. In EP Mode 1, the Sonar data is displayed on the DEPTH IN METERS indicator and the CRT Display (after Terminal Entry is complete). The Swath Plotter and Data Logger outputs are not available. The system is controlled by the computer program.

3.2.2 Terminal Entry Mode and Parameter Sets

When the program is started, the program enters the Terminal Entry Mode (which may be thought of as a sub-mode of Mode 1). All parameters which change infrequently during a cruise are entered from the Terminal in this mode. Other parameters which change more often can be entered through the Data Entry Thumbwheels while the program is running in Mode 1 (except in Terminal Entry Mode), and in Mode 2 or in Mode 3.

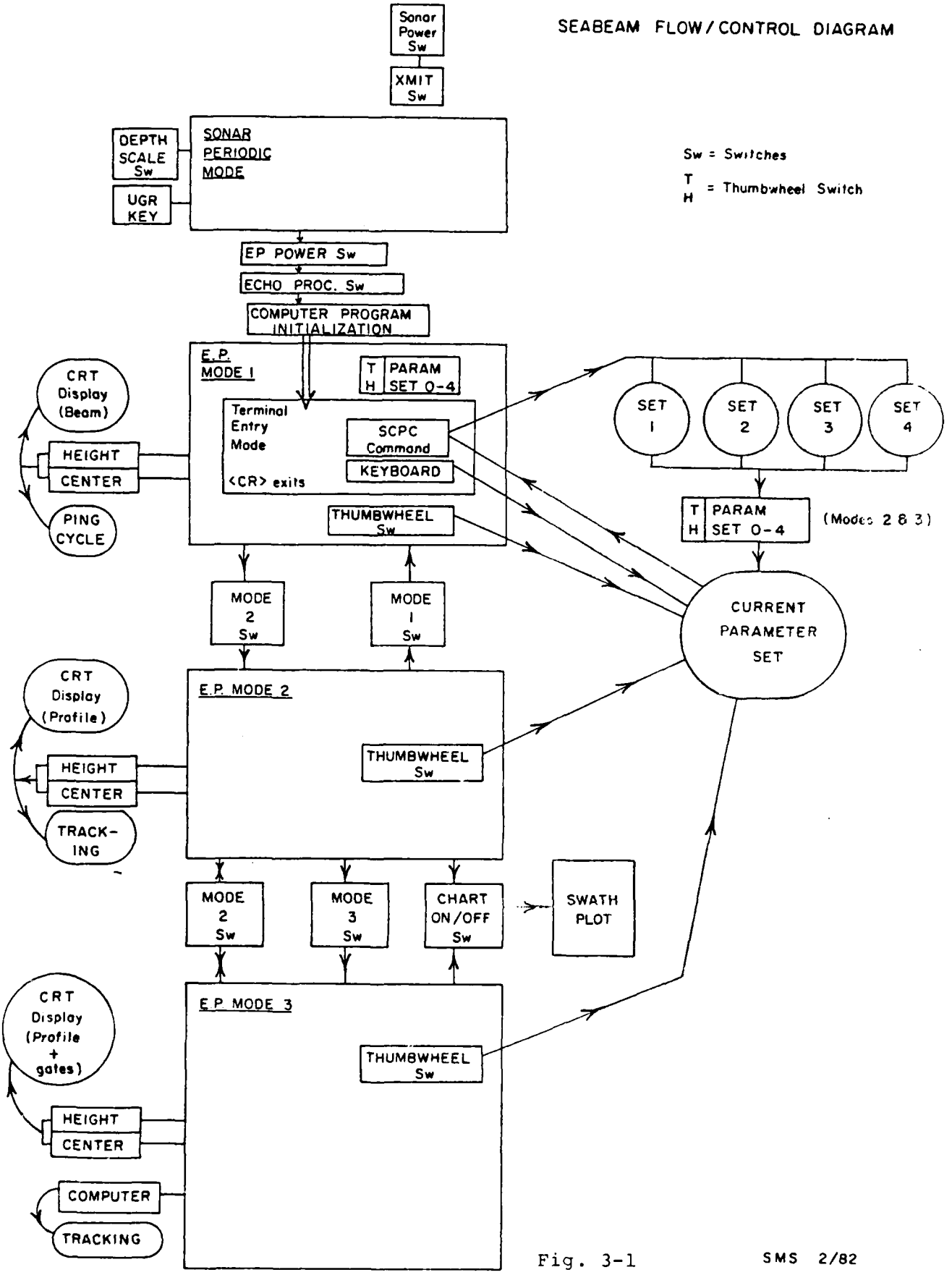


Fig. 3-1

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Table 3-1 shows the parameter mnemonics and command codes entered through the terminal. The table also shows what additional parameters and commands are entered through the thumbwheel switches.

Parameters, when entered, are loaded to the Current Parameter Set (Set Ø) which contains the active parameters currently being used by the system. While in Terminal Entry Mode, this current parameter set may be saved as Parameter Set 1,2,3 and/or 4. Subsequently, when out of Terminal Entry Mode, and operating in Modes 1,2, or 3, one may retrieve any previously saved parameter set by use of the PARAM. T R, SET Ø-4 Thumbwheel command. Use of this command in Mode 1 will, in addition, cause the system to re-enter the Terminal Entry Mode. The saved parameter sets are stored in memory, not on disk. Therefore they must be re-entered each time the computer program is re-started.

When the program is initialized, all 5 parameter sets contain default values as listed in Table 3-2, which are typical values that the computer reverts to in the event of non-entry of data. The default values are normally written over by the operating parameter sets.

3.2.3 Echo Processor Mode 2. In EP Mode 2, the system is under control of the computer program. The computer keys the Sonar at a rate determined by the setting of the CENTER and HEIGHT thumbwheel switches. Digital signal processing programs are enabled, which digitize and store the outputs of the 16 EP receivers. On the CRT display, the plot points of the ocean bottom are connected so that the display shows a continous cross track profile which is updated each ping cycle. The display threshold is now determined by the computer. Mode 2 is normally entered only briefly before passing on to automatic operation in Mode 3.

3.2.4 Echo Processor Mode 3. In EP Mode 3, operation of the system is completely automatic. The computer monitors all points of the cross track profile and adjusts the gating times so that the received signals are always within the gates. The upper and lower limits of the gates are displayed on the CRT Display as two dashed lines. The bottom profile is displayed as in EP Mode 2.

3.3 Swath Contour PLot

The near-real time contour swath plot (max. width, 24 cm) can be generated while the system is in Modes 2 or 3. The scale and contour interval are determined by the parameters entered through the thumbwheel switches. The along-track distance is calculated from the ship speed and therefore is only as accurate as speed over the ground is known.

At chart initialization, a header containing mission (leg) number, date, and chart scale is written on the plot. Ship time, heading and contour interval of the contour crossing the center line is annotated as often as every inch along the bottom. Ticks on the center line provide reference marks to these annotations and to even two minute intervals of ship's time (see Figure 3-2).

TABLE 3-1

Summary of Terminal and Thumbwheel entered Parameters and Commands

TERMINAL ENTRY		EXPLANATIONS
Commands:		
PCPS		Print Current Parameter Set
SCPS		Save Current Parameter Set
CSVP		Change Sound Velocity Profile
PSVP		Print Sound Velocity Profile
Parameters:		
MN		Mission (Leg) Number
DATE		Date, at initialization
TOD		Time of Day (GMT), at initialization
DRFT		Draft of ship (T. Washington = 5 meters)
SVP		Sound Velocity Profile
THUMBWHEEL ENTRY		
Parameters:		
CHART SC. M/CM		Chart Scale in meters/cm
CONTOUR INT. M		Contour Interval in Meters
SHIP SPEED		Manual Ship speed is included in Parameter set, auto logged speed is not. Ø to 29.9 = manual speed, in knots 90.0 = change to manual speed mode 90.1 = change to auto log speed mode 90.2 = print speed and time
Commands:		
PARAM,T,R SET Ø-4	ØØØ to ØØ4	Replace Current Parameter Set by Set Ø to 4 (and, in Mode 1 only, enter Terminal Entry Mode).
6ØØX		In Modes 2 and 3, display on CRT one Mode 1 (Beam) display after every "X" number of Mode 2 or 3 (Profile) displays.
DISP. THR. VOLTS		In Mode 1, set threshold of Mode 1 (Beam) In Mode 2 & 3, set processing threshold(?).

COMPUTER DATA SWITCH 6 up = Print depths and cross-track distance of 16 beams in a ping cycle.

#

TABLE 3-2

DEFAULT VALUES OF PARAMETERS

Parameter	Mnemonic	Default Value	Units
Draft	DRFT	0	meters
Ship's Speed	---	10	knots
Chart Scale	---	250	meters/cm
Contour Interval	---	50	meters
CRT Threshold	---	.1	volts
Sound Velocity Profile	SVP	1500	meters/sec (surface)
		1472	meters/sec (1000 meters)

#

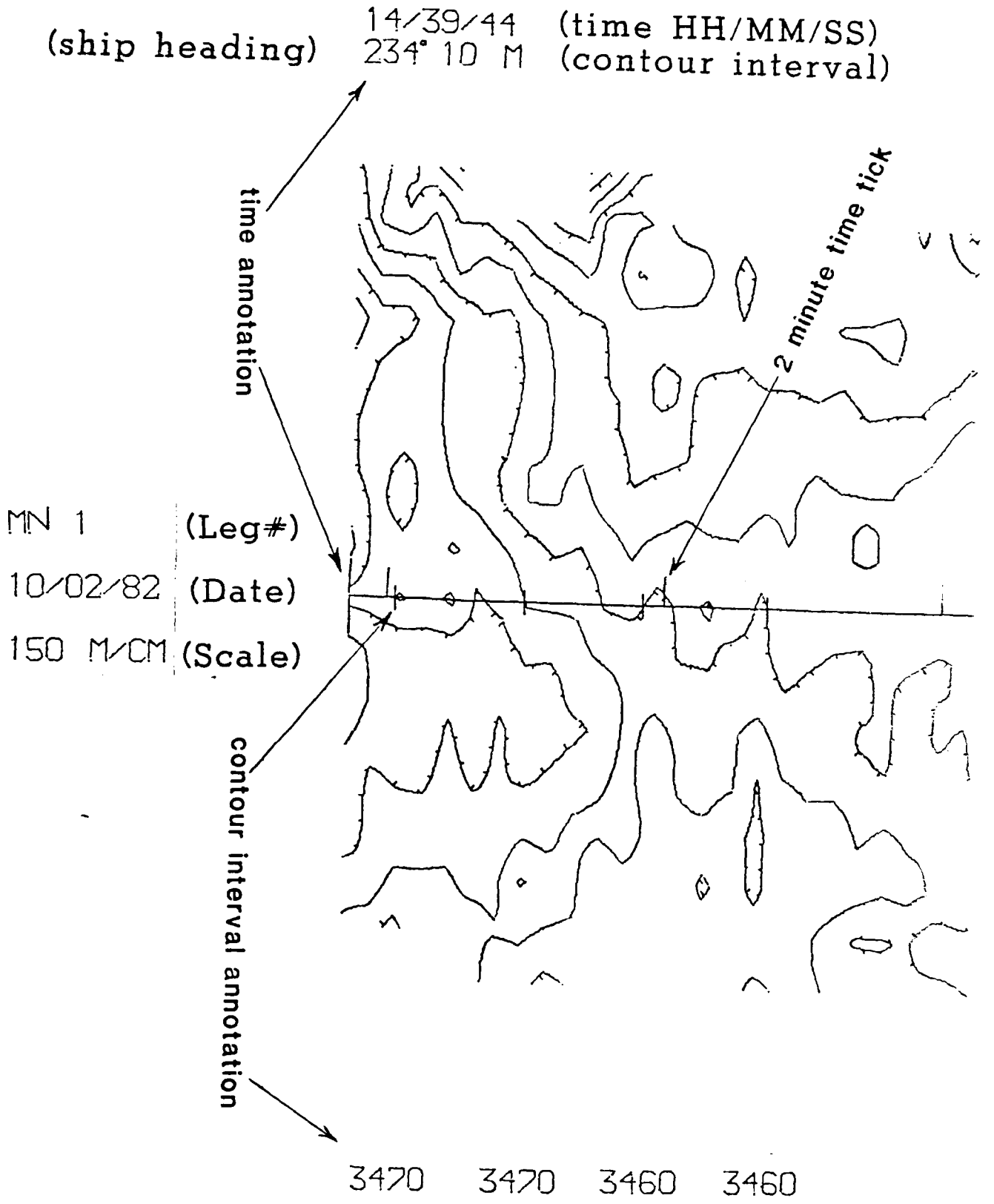

14/39/44 (time HH/MM/SS)
(ship heading) 234° 10 M (contour interval)
time annotation
2 minute time tick
MN 1 (Leg#)
10/02/82 (Date)
150 M/CM (Scale)
contour interval annotation
3470 3470 3460 3460

Fig. 3-2

3.4 Logged Data on Magnetic Tape

Data consisting of time, ship heading and 16 pairs of depth and cross-track distance are sent to the IBM 1800 Computer for every ping cycle while the system is in Mode 2 or Mode 3. The 1800 computer adds its time reference, the last computed DR position, course and speed, time, and writes the combined record onto magnetic tape. Depending on ocean depth, which affects ping cycle rate, approximately six 1200 foot reels of tape at 800 bpi are generated for a cruise leg of 30 days duration.

3.5 THUMBWHEEL SWITCHES - Echo Processor Panel

3.5.1 CHART SCALE (m/cm)

Sets the scale of the contour chart. The new scale becomes effective almost immediately (at the beginning of the next available block of data to be plotted). The time of the scale change and the new chart scale are printed on the terminal. The scale of the contour plot and the current date at the start of the chart operation are plotted on the chart header. (Note: It is good practice to make the plotter not ready by depressing the CHART ON/OFF switch before making a plot scale change. Otherwise the scale is changed but the scale written on the plot header applies only to the section of the plot prior to the change.)

Scales are expressed in meters per centimeter, i.e.,"200 M/CM". That means 200 meters of seafloor are represented by 1 cm on the swath plot. The conversion from these units to the conventional true scale (plot cm : seafloor cm) is:

$$1: \text{Scale} = \frac{1}{(\text{value})\text{M/CM} * 100} \qquad \text{e.g., } 1:25{,}000 = 250 \text{ M/CM}$$

Because swath width is 80% of ocean depth, a scale should be selected so that the plotted swath width will not exceed the 24 cm available on the plotter for the maximum depths expected to be encountered. Figure 3-3 summarizes the relationships between depth, swath width (in km and naut. miles), and plotted swath width at various scales.

3.5.2 CONTOUR INTERVAL (m)

Sets the contour interval of the contour plot. Upon change, the new interval and time of change is printed on the terminal. As with the scale, the new interval becomes effective on the plot with the next data block to be plotted. The most current interval is written on the time mark (upper label) on the contour plot. The only limit on entries are: not 0 and not 1. If either of these values are entered, the chart will continue to use the previous value for contour interval.

The appropriate contour interval depends on topographic relief and plot scale. In practice, if contours are consistently closer than 0.05 inches (0.2 cm) it is difficult to identify intervals, the downslope ticks blend with the next contour, and the plotter may not be able to keep up with the incoming data.

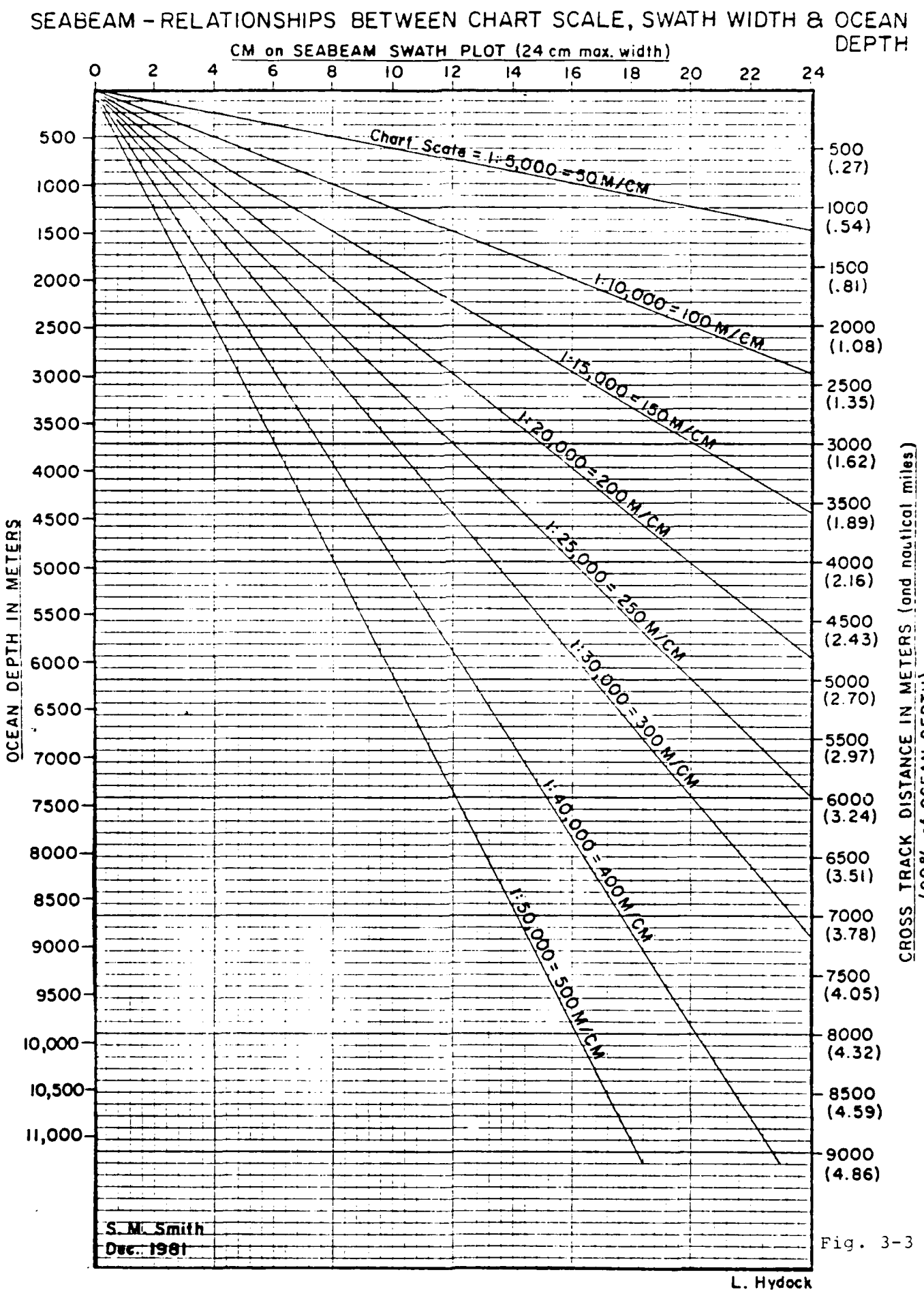

SEABEAM - RELATIONSHIPS BETWEEN CHART SCALE, SWATH WIDTH & OCEAN DEPTH
CM on SEABEAM SWATH PLOT (24 cm max. width)
0 2 4 6 8 10 12 14 16 18 20 22 24
OCEAN DEPTH IN METERS
500 1000 1500 2000 2500 3000 3500 4000 4500 5000 5500 6000 6500 7000 7500 8000 8500 9000 9500 10,000 10,500 11,000
Chart Scale = 1:5,000 = 50 M/CM
1:10,000 = 100 M/CM
1:15,000 = 150 M/CM
1:20,000 = 200 M/CM
1:25,000 = 250 M/CM
1:30,000 = 300 M/CM
1:40,000 = 400 M/CM
1:50,000 = 500 M/CM
CROSS TRACK DISTANCE IN METERS (and nautical miles)
(80% of OCEAN DEPTH)
500 (.27)
1000 (.54)
1500 (.81)
2000 (1.08)
2500 (1.35)
3000 (1.62)
3500 (1.89)
4000 (2.16)
4500 (2.43)
5000 (2.70)
5500 (2.97)
6000 (3.24)
6500 (3.51)
7000 (3.78)
7500 (4.05)
8000 (4.32)
8500 (4.59)
9000 (4.86)
S. M. Smith
Dec. 1981
L. Hydock

Fig. 3-3

3.5.3 SHIP SPEED (knots)

Used to enter ship speed manually, change between manual and automatic speed log modes, or to print out present speed and time.

Enter "90.0" Change to manual speed mode.
Follow this entry with a second entry of speed in knots.

"90.1" Change to auto log speed mode.

"90.2" Print present time and speed, and logging mode on terminal.

In normal operations on the T. Washington, speed is provided by the doppler speed log via the IBM 1800 computer. Because Sea Beam defaults to manual speed mode at initialization, one must enter "90.1" each time the computer is re-started in order to switch to the auto log mode.

A change to manual logging may be desirable if:

1) The IBM 1800 computer goes down or the doppler speed log malfunctions.

2) Swath plots are desired while stopped on station to monitor topography on different ship headings. Normally, the swath plotter will update after the ship has covered a certain plot distance which is dependent on speed and plot scale. It does not update if the ship is stopped. Set in a reasonable (5 to 10 kts) speed while the ship is on station and be sure to reset to auto log before departing.

There is also a provision for entering a current (drift) to be added to the manually entered ship speed. Normally it is not to be used on the Washington because the speed provided by the IBM 1800 computer already has estimated drift included. However, if a prolonged period of manual speed entry makes it desirable, proceed as follows:

If the current is positive, enter 30.0 + current speed in knots.

If the current is negative, enter 60.0 + current speed in knots. The current will stay active until reset by entering 30.0 + 0.0 or 60.0 + 0.0 (even if auto log mode is entered in the meantime?).

3.5.4 DISPLAY THRESHOLD (volts)

Controls the threshold value for signal processing. For use in Mode 1 only! Enter display threshold (start with 2.0) and increase or decrease value to extinguish noise from the CRT raw data display and exhibit on returned signal. This switch is useful for finding the bottom. In Modes 2 and 3 the computer computes the threshold automatically. Automatic thresholding begins when Mode 1 ends and Mode 2 begins.

The Display Threshold setting should not be used by the operator in Modes 2 or 3. If a threshold display value is inadvertently entered, the present automatically set threshold value is replaced by the manually entered one with unpredictable, and probably negative, results. To recover from this error, first try entering a display threshold value of "000" which may allow the system to again reset the threshold automatically. If this is not successful, a return to Mode 1 may be necessary to re-acquire the bottom.

3.5.5 PARAMETER SET (0-4)

Used in Mode 1 to enter the Terminal entry mode. In Mode 1, entering "PARAMETER SET 000" initiates program that inspects or modifies current parameter set by input through the terminal.

In Modes 2 and 3, entering "PARAMETER SET 001" to "004" loads that previously set parameter set into parameter set 0 (the current set). Selection of any number outside the range of 1 through 4 defaults to the current parameter set. See Section 4.5.3 for instructions on entering parameters in Mode 0.

REMEMBER: A parameter set can be modified or saved only while the system is in Mode 1. A parameter set previously saved as set 1-4 while in Mode 1 can be retrieved as the current set while in Mode 2 or 3 but any modification to a parameter needing terminal entry requires returning the system to Mode 1.

3.5.6 OTHER THUMBWHEEL ENTRIES

5XXX

Manual setting of lower gate stop, where XXX equals depth in meters of lower gate. For use in area where depth is 125 m or less and acquiring bottom is difficult due to strong second echo. The setting over-rides the depth tracker's calculation of the lower gate time. The value entered is used for all 16 beams. Make sure the value entered is greater than the upper gates and the bottom depth. To clear this function, enter a value of zero for thumbwheel switch 5, i.e. "5000". Note: the computed (depth tracker) gates will continue to be displayed on the CRT - not the manual over-ride value.

6XXX

Automatic Mode 1 CRT display of returns above threshold while running in Modes 2 or 3. Enter the frequency of Mode 1 displays, i.e. "6005" produces five Mode 2/3 type displays then one Mode 1 display, then five Mode 2/3 displays, etc. To clear this function enter "6000".

NOTE and CAUTION: No data is sent to the logging system for those ping cycles having Mode 1 display. This could cause inadvertent loss of data or could be used on purpose in shallow depths to log data at less frequent intervals.

7XXX - Not used.

8XXX - Not used.

9XXX

Here XXX equals beam number - receiver wave form display - not used in normal operating modes. See Vol. 2; write-up on program RXFRM for details.
#

4.0 SYSTEM POWER UP AND INITIALIZATION

SEVEN MAJOR PROCEDURES ARE REQUIRED:

4.1) System Power Up
4.2) UGR Monitor Set-Up
4.3) Swath Plotter Set-up
4.4) Sonar (narrow beam echosounder) Initialization
4.5) Echo Processor Mode 1 - Initialization
  4.5.1 Echo Processor Turn-on Procedure
  4.5.2 Computer Program Loading
  4.5.3 Terminal Entry of Parameters
  4.5.4 Thumbwheel entry of Additional Parameters
  4.5.5 Establishing Bottom Tracking
4.6) Echo Processor Mode 2 - setting gates
4.7) Echo Processor Mode 3 - automatic (normal) operation with swath plotter

The following sections provide step-by-step instructions from initial power up through putting the system in automatic mode with the swath plotter in operation. The operator should be familiar with the information contained in the section on Controls and Indicators and with the section on General Functional Description. Another section following this one, on Operating Procedures, describes how to modify parameters and deal with other situations encountered in normal operations.

Before beginning, it is helpful for the operator to know what contour interval and chart scale will be needed and to have a sound velocity profile ready to enter (check the Sea Beam Operations Log for the last one used on the previous leg for a start).

WARNING WARNING WARNING

The sonar transmitter will be turned on during the following procedures. Make sure, before proceeding that there are no swimmers or divers under the ship or within ____ feet of the transducers.

****

NOTE: THE FOLLOWING SYSTEM POWER UP IS TO BE DONE ONLY

BY THE SEA BEAM ENGINEER !

****

4.1.0 SYSTEM POWER-UP

4.1.05 Find out status of Computer MG (motor generator).

4.1.1 Check that the 400 Hz and system power switches are OFF on Sonar Cabinet (3 switches).

4.1.2 Check with Shipboard Computer Tech that ship's MG(motor generator) is operating and then turn on "Computer Power" master breaker on board located in passage behind flat bed plotter.

4.1.3 Turn on "Gyro Heater" circuit at Panel - wait 10 minutes.

4.1.4 Check that gyro located in rack on deck under computer tape drive is warm.

4.1.5 Turn on "Seabeam NBES" and "Seabeam EPR" circuits at panel.

4.1.6 Turn on 400 Hz Power and 400 Hz converter switches on Sonar Cabinet (upper and middle left of cabinet).

4.1.7 WAIT 10 MINUTES. This is important to prevent roll and pitch servos jamming against the stops and possibly requiring extensive re-alignment.

4.1.8 Turn on System Power switch on Sonar Cabinet, and

4.1.9 Turn on Power indicator/switch on Sonar Controls portion of System Controls panel (The indicator light on the System Power switch comes on only after the sonar control power switch is pressed.)

This completes the power up phase.

4.2.0 UGR MONITOR RECORDER SET-UP

4.2.1 Check with resident technician that the UGR has adequate paper and that the stylii are properly adjusted.

4.2.2 Set the UGR Controls as shown in the diagram in Figure 4-1.

4.2.3 Turn on UGR power switch.

NOTE: Do not operate the UGR at sweep speeds faster than 1 second (i.e. 1/4 or 1/2 sec.). Damage to the NBES (sonar) system may result.

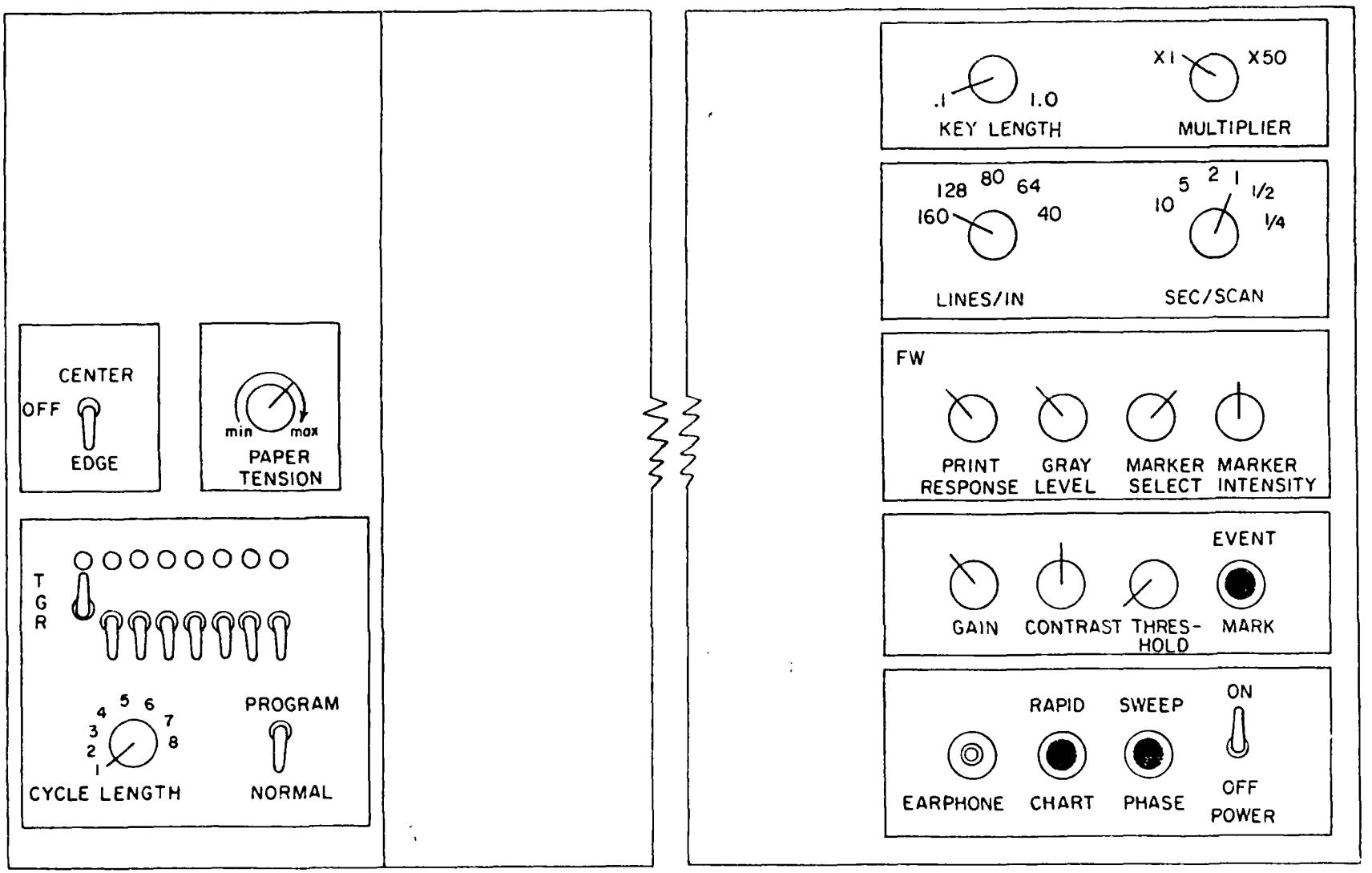


Fig. 4-1

INITIAL UGR MONITOR RECORDER SETTINGS

SMS 2/82

L. Hydock

4.3.0 SWATH CHART PLOTTER SET-UP

4.3.1 Check that the red power/indicator switch is OFF.

4.3.2 Open cover by depressing cover latch button, lifting hinged lid, and snapping lid latch (located in back left corner) to hold lid open.

4.3.3 Pull out trays, if stored under plotter, and insert bolts through trays into plywood to hold trays in position.

4.3.4 Place paper in rear tray, oriented so that round holes are to your left and alignment lines on sides of paper are facing up.

4.3.5 Bring paper over chart bed and engage sprockets on all four corners, making sure that the paper is in square alignment.

4.3.6 Release lid catch and press lid firmly against plotter bed (you should hear and feel a definite click).

4.3.7 Install pen in holder and screw holder into pen mount. Use black liquid ball pens for the Archive swath plotter because this color is best for subsequent microfilming.

4.3.8 Set PEN AXIS and CHART AXIS controls to "plot".

4.3.9 Set Pen Control to "Remote".

4.3.10 Turn on power by depressing red indicator/switch.

Refer to the Operations portion of the DP-1 Plotter Instruction Manual, reproduced in part as Appendix A, for further information.

4.4.0 SONAR (NARROW BEAM ECHOSOUNDER) TURN-ON PROCEDURE

4.4.1 Perform the system power up procedure (section 4.1.0).

4.4.2 The following indicators are illuminated to show the initial conditions when power is applied: STANDBY/XMIT is in STANDBY, PERIODIC and SCALE SWITCH ACTIVE are illuminated, the DEPTH IN METERS indicator displays OFF and the GRAPHIC RECORDERS indicator/switches indicate VERT.

4.4.3 Determine water depth and set DEPTH SCALE (KM) switch to next higher (deeper) range. The setting encompassing the actual depth provides the maximum rate of returns.

4.4.4 Depress the STANDBY/XMIT indicator/switch and note that XMIT lights up. Constant monitoring is required to ensure that the depth remains within the range of the setting of the DEPTH SCALE (KM) thumbwheel switch. The switch must never be set to a range less than required. It may be usually set 1 step higher than required.

4.4.5 Verify that none of the error indicators is lit (PITCH, ROLL, ERECT CO, and POWER AMP). If any of these indicators are lit, maintenance personnel should be notified and the malfunction corrected. Occasional blinking of the PITCH, ROLL, and ERECT CO indicators is normal. If air is being trapped under the bow, occasional power amp failure indication will be observed.

This completes the Sonar Turn-on procedure.

Go to the Echo Processor Mode 1 Initialization (sect 4.5.0).

#

4.5.0 ECHO PROCESSOR INITIALIZATION

Mode 1 Initialization requires 5 sub-steps:

Echo Processor Turn-on
Computer Program Loading
Terminal Entry of Parameters
Thumbwheel Entry of Parameters
Establish Bottom Tracking

4.5.1 ECHO PROCESSOR TURN-ON PROCEDURE

4.5.1.1 Perform Sonar Turn-on procedure as described in Sect. 4.4.

4.5.1.2 Depress the EP Power indicator/switch. The following indicators show the initial conditions:

The POWER indicator illuminates, the FAN FAIL/RUN indicator shows FAIL for a few seconds, then displays RUN. The MODE 1 indicator is lit. The WIDTH 80 deg/TRUE indicators will display the condition to which they have been set. The SONAR NOT AVAIL indicator is lit. The CHART ON/OFF indicator displays OFF.

4.5.1.3 Check that the CRT Display in ON (Power Switch OUT) and in Store Mode (Store Switch on CRT Display is depressed).

CAUTION ! !

When first receiving the CRT Display (Scope) or when it has been turned off for two weeks of more, proceed as follows:

Turn STORED BRIGHTNESS control full CW. Place the STORE switch in the STORE position. Set the POWER switch on the CRT Display Scope to OFF (in position). After turning on the Echo Processor (Section 4.5.1), pull the CRT Display switch to the ON position and note that after a short delay, the screen will become fully illuminated. Leave the CRT Display in the mode for 5 minutes before erasing, selecting the non-store mode, or before lifting the START Switch on the computer. This procedure reduces the ion content in the CRT and maximizes the CRT life.
Check that the Terminal is ON (power switch is located on the lower left corner of vertical support panel), the CAPS LOCK key is depressed and the terminal is in ON LINE, not LOCAL mode. Refer to the LA120 Users Guide (GI/Seabeam Manual Vol. 10, Appendix F) for additional information and troubleshooting.

4.5.1.4 Depress the ECHO PROC indicator/switch on the SONAR CONTROLS panel. The SONAR NOT AVAIL indicator should go out. If it does not, check that the STANDBY/XMIT switch is in XMIT.

4.5.2 COMPUTER PROGRAM LOADING PROCEDURE

4.5.2.1 Turn on computer by turning key in lock at right end of panel to "power on" position. Turn the ADDRESS COMPARE switch to OFF if it is not already at that position. All other switches should be down. Push STOP/RESET switch down (STOP) then up (RESET).

4.5.2.2 Turn on diskette drive power switch (upper right corner) Set one unit of the diskettes to "Ø" and the other unit to "1", using the thumbwheel over each unit.

4.5.2.3 Open the door of the unit designated "Ø" by depressing the lever below the door panel. Insert diskette containing program HOMS (stored in envelope on right side of rack) label side up and top of label out toward you. Close door. The READY and TRACK Ø lights for that unit should come on.

4.5.2.4 Set data switches to "1ØØØ33" (octal) or, using 1 = up and Ø = down,

Ø	1	2	3	4	5	6	7	8	9	1Ø	11	12	13	14	15	SWITCH
1	Ø	Ø	Ø	Ø	Ø	Ø	Ø	Ø	Ø	Ø	1	1	Ø	1	1	UP/DOWN SETTING
1		Ø		Ø		Ø		Ø		3			3			OCTAL VALUE

4.5.2.5 Lift "RESET" switch then lift "PR LOAD" switch.

4.5.2.6 When terminal prints FILENAME?, type in "HOMS<cr>", (where <cr> represents pressing the carriage return key).

4.5.2.7 Terminal prints RTOS REV. 6-2Ø. Wait until the computer stops as indicated by a stationary pattern of indicator lights. Lower all the data switches and then depress "CONTINUE" switch.

4.5.2.8 The computer will run for a few moments and then the terminal will print "COMPLETE SET?" This prompt indicates that the program is correctly loaded and in the Terminal Entry Mode. Before proceeding to the Terminal Entry Procedure it is good practice, but not essential, to do the two following steps.

4.5.2.9 Depress the lever on diskette unit "Ø", remove the diskette and return it to the holder on the side of the rack.

4.5.2.1Ø Turn off the diskette unit (no longer needed now that the program is loaded). Turn computer key to "LOCK" and remove key.

This completes the Program Loading Procedure.

4.5.3 TERMINAL ENTRY MODE PROCEDURE

In the following instructions, the text between quotes is entered but not the quotes themselves. Each line of input is terminated by typing a carriage return (<cr>) after the last character within quotes.

The last character typed may be deleted by use of the "DELETE" key (the backspace key does not perform that function). If more than the last character must be retyped, use the backward slash (\) to delete the whole line and then re-enter the complete line.

Terminal Entry Mode is entered automatically at the beginning of program execution (or by the operator entering a Parameter Set in the thumbwheel data entry switches while in Mode 1). Parameter Set Ø retains current set.

4.5.3.1 The opening prompt is:

```
COMPLETE SET?
```

Type "N"

The prompt in reply is:

```
OK
 ENTER
  ID
   VALUE
```

4.5.3.2 Mission (leg) Number

Type "MN"

Type "LLLL" where LLLL = a leg number (1 to 4 digits)

After the e, and subsequently entered pairs, the terminal will prompt:

```
ENTER
 ID
  VALUE
```

4.5.3.3 Date (G.M.T.)

Type "DATE"

Type "DD,MM,YY" where D = day, M = month, Y = year (with leading zeroes)

(prompt)

4.5.3.4 Time of Day (G.M.T.)

Type "TOD"

Type "HH,MM,SS" where H = hour, M = minutes, S = seconds with leading zeroes. Time starts when <cr> is pressed.

(prompt)

4.5.3.5 Ship Draft

Type "DRFT"

Type "5" the draft of the T. Washington in meters = 5.

(prompt)

4.5.3.6 Sound Velocity Profile

Type "SVP"

Type "nn" where nn = number of points in profile (normally 10).

Type "DDDD,VVVV" where D = depth in meters, V = sound velocity in m/sec. Integers (no decimal points). No leading zeroes required.

The first depth entered must have a value between 0 and 10 meters. If not, the following error message is printed:

SND VEL PROFILE MUST BEGIN WITH SURFACE - TRY AGAIN

Repeat entering depth, velocity pairs (one pair per line, followed by <cr>, until "nn" pairs have been entered. After the correct number of pairs have been entered, the machine returns the usual prompt:

ENTER
ID
VALUE

4.5.3.7 Print Current Parameter Set

Type "PCPS"

The following items are printed on the terminal:

Sound Velocity Profile

Chart Scale

Contour Interval

Ship Speed

Parameter Set No.

Ship Draft

(prompt)

4.5.3.8 Checking and Modifying Parameters

Check that the sound velocity profile and ship draft are correct. The other parameters may be ignored for the moment as they are default values which will be changed after exiting from the Terminal Entry Mode.

If the Ship draft needs correction, re-enter the DRFT mnemonic and value as shown above in sect. 4.5.3.5.

If only one or two sould velocity points need correction,

Type "CSVP" (Change Sound Velocity Profile)

Type "pn" where "pn" = number of the point to be corrected

Type "DDDD,VVVV" (The new depth, velocity pair)

(prompt)

Repeat the above sequence, beginning with "CSVP", for each point to be changed.

4.5.3.9 Save Current Parameter Set

The following sequence is not required but is recommended to avoid accidental use of parameters, especially sound velocity profile, other than the ones intended.

Type "SCPS" (Save Current Patameter Set)

Type "1" (stores current set as Set No. 1)

(prompt)

Type "SCPS"

Type "2"

(prompt)

Type "SCPS"

Type "3"

(prompt)

Type "SCPS"

Type "4"

(prompt)

4.5.3.10 Exit Terminal Mode

To exit Terminal Mode

Type "<cr>"

The Terminal Entry Mode Procedure is now complete.

4.5.4 THUMBWHEEL DATA ENTRY PROCEDURE

The following items are entered through the Thumbwheel Data Entry switches:

Ship Speed
Contour Interval
Chart Scale
Display Threshold Volts

Other items are entered through the thumbwheels during normal operation (see Section 5.0 on Operating Procedures).

4.5.4.1 Speed

See Section 3.5.3 for additional notes on speed logging.

NOTE: The Sea Beam Computer defaults to manual speed mode on initialization so that it is necessary to enter the auto speed mode each time the Sea Beam program is started up.

Change to Auto Speed Logging Mode

Set | SPEED KNOTS | 9 | 0 | 1 | Press | ENTER DATA | (wait for light to go out before changing Thumbwheel switches)

Check Speed and Time

Set | SPEED KNOTS | 9 | 0 | 2 | Press | ENTER DATA |

Terminal will print:

```
LOG SPEED
9.3 KNOTS        (present speed including smoothed drift)
CURRENT
Ø.Ø KNOTS
TOTAL
2:34: 5          (time in hours, minutes & seconds)
```

4.5.4.2 Contour Interval

Set | CONTOUR INT. M | I | I | I | Press | ENTER DATA | (III = contour interval in meters)

4.5.4.3 Chart Scale

Set | CHART SC. M/CM | C | C | C | Press | ENTER DATA | (CCC = Scale in m/cm, e.g. enter "250" for scale of 1:25,000)

4.5.4.4 Display Threshold Volts

Set [DISP.THR. VOLTS] [T T T] Press [ENTER DATA] (TTT = Threshold in Volts)

See Section 5.10.2 for notes on Threshold Voltage.

4.5.4.5 This completes the Thumbwheel entry procedure. Additional adjustment of the Display Threshold will be necessary in the next procedure to Establish Bottom Tracking in Mode 1. Note that Chart Scale and Contour Interval may have been modified from values present in previously stored parameter sets.

4.5.5 ESTABLISH BOTTOM TRACKING MODE 1 PROCEDURE

Echo Processor cycling will begin immediately after exiting from the Terminal Entry Mode*. The cycling rate is determined, while in Mode 1 only, by the Depth Scale Thumbwheel on the Sonar Control panel (it is equal to the 2-way travel time plus a small amount for processing). The CRT will show the individual beams which are above the Threshold voltage for each cycle. Hereafter this will be referred to as the "Beam Display" or "Mode 1 Display", in contrast to the cross-track Profile Display seen on the CRT in Modes 2 and 3.

* (If the 1 millisecond pulse width has been selected, an error message will be printed on the console terminal. The 7 millisecond pulse width must be selected before continuing.)

To adjust the CRT Display:

(1) Observe the depth reading on the DEPTH IN METERS indicator on the SONAR CONTROLS panel.

(2) Set the CENTER thumbwheel Switches on the DISPLAY CONTROLS portion of the EP panel to the nearest 100 meters of the DEPTH IN METERS indicator.

(3) See Section 5.10.2 for notes on Threshold Voltage. Select 2.00, 0.20 or 0.06 volts to determine the correct display threshold, and enter that value. One of three conditions will be observed on the display:

(a) Lines will appear on the display, indicating that the threshold is too low. If this occurs, double the threshold value until the lines disappear.

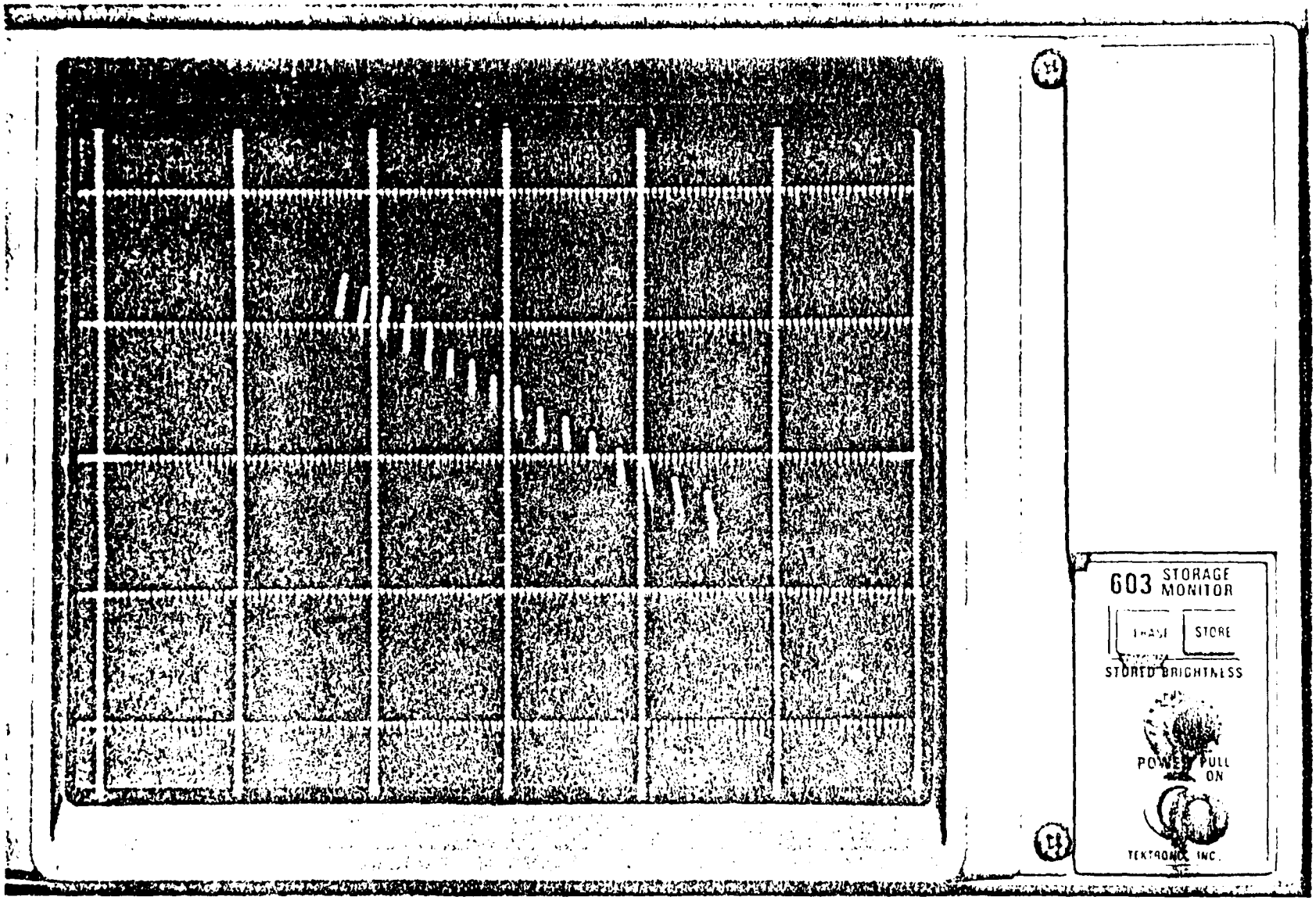
(b) Nothing will be observed on the display, indicating that threshold is too high. If this occurs, halve the threshold value until the bottom appears.

(c) Echoes will be seen as illustrated in Figure 4-2. This is the normal operating condition. If noise or second echoes are seen, increase the threshold. If some of the 16 echoes are missing, all or part of the time, decrease the threshold. The amount of change to make will be determined by operator experience.

All or most of the beams should now be on the CRT display.

(4) Adjust the HEIGHT Thumbwheel switch for the desired vertical scale (try 500), being careful to allow enough range on the display so that the changing bottom profile remains on the display.

(5) Set the WIDTH 80 deg/TRUE switch to 80 degrees. The 80 deg position displays the full width of the 16 beams of the Sonar with up to 20 deg of roll on the full width of the CRT display (at the center). In this mode, the relative scale between the horizontal and vertical axes on the CRT display will change as a function of CENTER and HEIGHT switch settings. In the TRUE mode, the relative scale of the vertical and horizontal axes is equal, and is controlled by the setting of the HEIGHT thumbwheel switch. The TRUE mode provides an undistorted view of the bottom profile. The display is normally operated in the 80 deg mode, as the maximum amount of information is available at all times, and less operator attention is required. It may be necessary to increase the Depth Control on the Sonar Panel to observe the outer beams.



CRT BEAM (MODE 1) DISPLAY

Fig. 4-2

4.6.0 ECHO PROCESSOR MODE 2 PROCEDURE

This procedure is performed after bottom tracking has been established in Mode 1 (sect. 4.5.5).

4.6.1 Depress the Display Depth Control MODE 2 Digital display indicator/switch on the Echo Processor panel. The MODE 1 indicator goes out and the MODE 2 indicator illuminates. The Terminal prints out the number of defective power amplifiers. (Notify the Sea Beam Engineer if any power amplifiers are defective.)

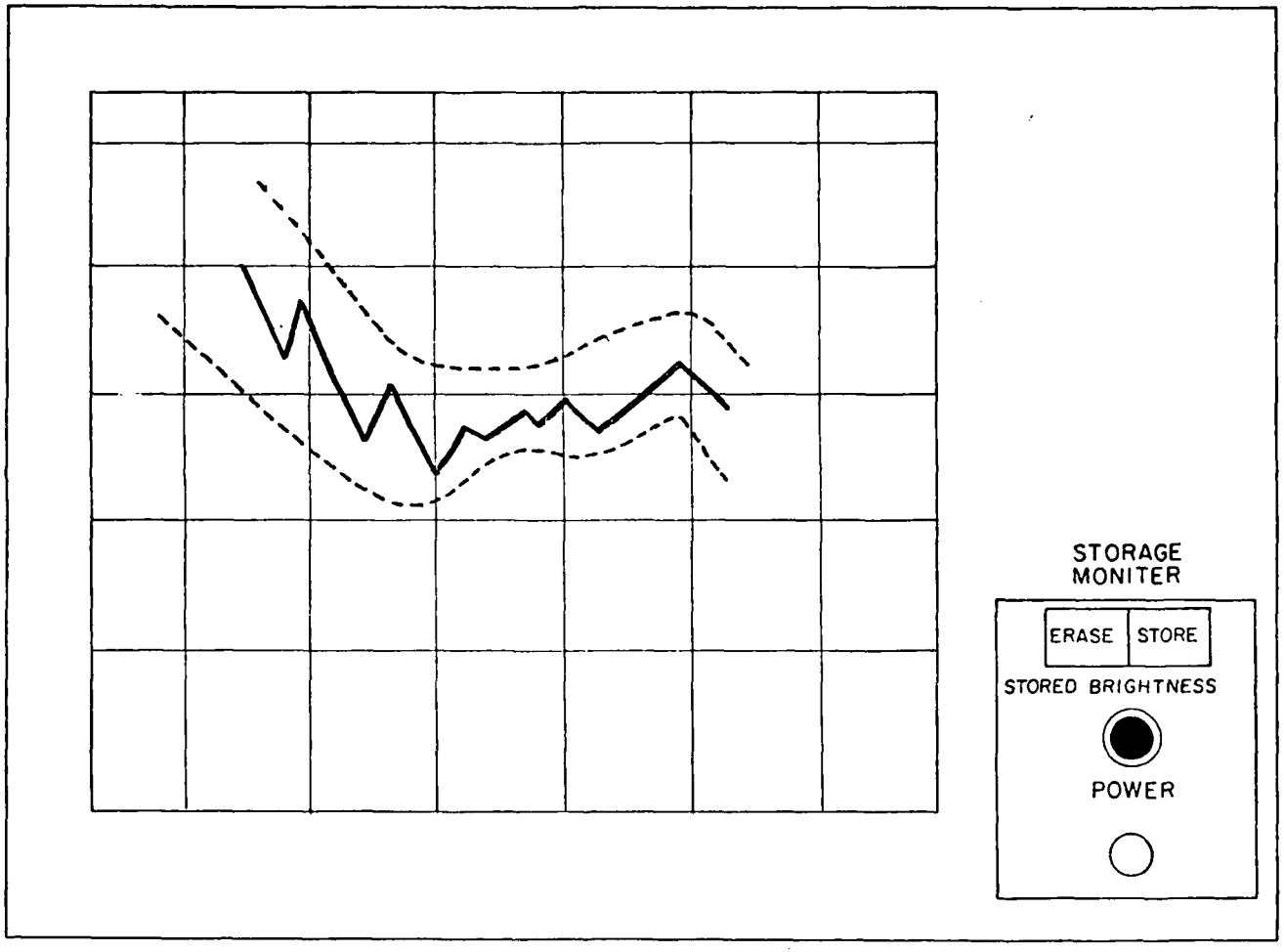
The SONAR DEPTH CONT indicator on the Display Control panel illuminates to indicate that the CENTER and HEIGHT thumbwheel switches now control the Sonar ping rate. The chart ON/OFF indicator/switch is enabled and indicates OFF, and the SCALE SWITCH ACTIVE indicator on the Sonar Control panel goes out, indicating that the Sonar ping rate is no longer being controlled by the DEPTH SCALE (KM) thumbwheel switch. The bottom depth should be monitored constantly and the CENTER thumbwheel switch should be adjusted to maintain the cross track profile on the CRT Display.

4.6.2 The system now commences operation in EP Mode 2. The Beam Display is now replaced by the cross-track Profile Display on the CRT (Figure 4-3). Normally the operator keeps the system in Mode 2 for only a few ping cycles before advancing to Mode 3.

4.6.3 After tracking is established, as evidenced by consistent profile displays, reduce the HEIGHT setting to 250 meters (this reduces the amount of time required for gate adjustment in Mode 3.

4.6.4 Depress the Mode 3 indicator/switch on the EP panel.

You are now in Mode 3 and have completed the Mode 2 procedure.



CRT PROFILE (MODE 2 & 3) DISPLAY

Fig. 4-3

4.7.0 ECHO PROCESSOR MODE 3 PROCEDURE

4.7.1 Depress the EP Control panel Mode 3 indicator/switch. The Mode 3 indicator illuminates and the Mode 2 indicator goes out, indicating that the CENTER and HEIGHT thumbwheel switches no longer control the gate times. They do however, continue to control the CRT Display in Mode 3.

4.7.2 The CRT will continue to show the Profile Display as in Mode 2 but the dashed lines representing the upper and lower gates will begin to move in from the top and bottom of the screen toward the profile. It usually requires a dozen or so ping cycles for them to reach a stable position.

4.7.3 Swath Plotter. Check that the Swath plotter Set-up Procedure (sect. 4.3.0) has been done. Depress the CHART ON/OFF switch on the EP Control Panel. The plotter will skip several feet of paper, then write a header consisting of Leg number (MN), date (DD/MM/YY), and chart scale (M/CM). The plotter will then pause until it has sufficient data to contour, usually a minute or two depending on scale and ship speed.

This completes the Echo Processor Mode 3 procedure as well as the complete group of start-up procedures.

Further information on operating methods and tactics will be found in the section on Operating Procedures (section 5.0).
#

5.0 OPERATING PROCEDURES

This section provides instructions for what to do after Sea Beam (SB) has been initialized and brought up to normal Mode 3 operation. The operator should be familiar with the information contained in the previous sections on Controls and Indicators, General Functional Description and Initialization Procedures before continuing.

5.05 PUTTING SEA BEAM IN STANDBY MODE

When doing station work or other temporary stops of the ship, the Sea Beam need not be completely shut down. Enter Mode 1 and press the "STDBY/XMIT" switch to put sonar controls in standby. To return to underway operations, press the "STDBY/XMIT" (XMIT will light) and return to Mode 3 after establishing bottom contact.

5.1 CHANGING CONTOUR INTERVAL

The new contour interval can be entered through the Data Entry (D.E.) switch in Modes 2 and 3. The new interval becomes effective on the next plot cycle and the changed interval written on the next plot annotation.

5.2 CHANGING SWATH SCALE

The new chart scale can also be entered through the D.E. switch while in Mode 2 or 3, and takes effect on the next plot cycle. Because the chart scale is not included in the annotation at the top of the plot, it is good practice, but not essential, to: (1) press the CHART ON/OFF switch to OFF, (2) Enter new scale through D.E., (3) press CHART ON/OFF switch to ON. A new chart header will be written including the new scale.

Doing above steps (1) through (3) causes some loss of data so you may choose to do only step (2) but be sure to hand annotate the swath plot with the scale change.

5.3 CHANGING SOUND VELOCITY PROFILE

Check for the need to enter a new SVP if you:

1) enter a new Carter Table area.

2) the surface temperature changes by more than 1 or 2 degrees.

Follow the procedures listed in the appendix on "Sound Velocity Profiles". Then put the system in Mode 1; enter Terminal Entry Mode by entering "PARAM. SET 000" in the D.E. switch; and then enter the new SVP as shown in section 4.5.3.6.

5.4 TIME/SPEED CHECK

Every hour the watch stander should enter "SPEED KNOTS 00.2" through the D.E. This is the best setting to leave in the D.E. switch because it only causes inquiry rather than erroneous action.

The terminal printout should read "LOG SPEED" not "MANUAL SPEED". Check with the computer tech if the speed differs from the Doppler speed log read-out by more than a few tenths of a knot. If the time differs from the GMT clock by more than 15 to 20 seconds, re-set the time by going to Mode 1, entering terminal Entry Mode by entering "PARAM. SET 000" in the D.E. switch, and changing time of day (TOD) (see section 4.5.3.4).

The watch stander should be instructed to make an entry in the U/W log in the Comments Section in the form of:

"1507Z SB CK/ SPD OK/ TIME 9 SEC FAST".

5.5 DEPTH-HORIZONTAL DISTANCE PRINTOUT (COMPUTER SWITCH 6 UP)

Raise computer data switch 6 to have depths and horizontal distances printed out for each ping cycle on the terminal. The format of the depths, followed by distances, is taped to the terminal. The depth corresponding to the 0 distance is the vertical beam and is a more accurate depth reading than the one shown on the sonar display.

5.6 BEAM (MODE 1) DISPLAY IN MODES 2 AND 3

To check beam display or interactions with other signals getting in the SB gates (see below), enter "6001" in the D.E. switch. This will cause the Beam Display to alternate with the normal Profile Display on the CRT. Enter "6000" to return to continuous profile display. (Remember that no data sets are logged to the IBM 1800 computer for those cycles having Beam Display, so this feature should not be used except for testing).

5.7 CHANGING PENS

Pens can be changed without stopping the plotter if done carefully and quickly between plot cycles. Use the black liquid ball point pens in the archive swath plotter (required for later microfilming). A pen lasts about 2 days at a scale of 250M/CM, using a 10 M contour interval in low relief. In areas of high relief topography and fairly deep water, pens will last only 10 to 12 hours at the same scale and contour interval.

5.8 CHANGING PAPER

Depress the CHART ON/OFF switch to OFF. Remove old swath book and install new one. For the archive swath book, follow the annotation formats given in the appendix titled "Swath Book Annotation Instructions". One swath book lasts slightly over two days using a chart scale of 250M/CM(1:25,000) at a speed of 9 knots.

A swath book change can also be accomplished by temporarily taping the 1st page of the new book to the last page of the old book and then advancing the paper through the plotter (Put pen in "up" position, paper knob in "slew", and push the "forward advance" button on the plotter between plot cycles. Return respective knobs to "remote" and "plot"). Be sure paper tension is not lost across the plotter bed. If it is, open the plotter and re-tension it during a break in plotting. Also be sure to annotate the new swath book with the proper header information unless it will remain permanently spliced to the old book.

5.9 UGR MONITOR RECORDER SETTINGS

1) Except for very shallow depths (less than 1500 M), it is better to set the UGR monitor to a ten second sweep. This keeps the pings cycling at a ten second rate regardless of depth, provides a good display of the overall topography, and allows monitoring of other sound sources that may interfere with Sea Beam.

2) Display all port and starboard beams instead of only the vertical by (a) setting "ALL" in the PORT/STB thumbwheel switch and (b) depressing the "BOTH PORT & STBD" indicator switch on the Sonar Panel. This will provide some indication of the roughness of the bottom, as well as a better idea of the range from which to exclude other sound sources and returns.

5.10 PROBLEMS

5.10.1 INTERACTIONS WITH 3.5KHZ & SEISMICS

Watergun seismics and 3.5kHz have enough energy at 12 kHz to cause problems for Sea Beam. The airgun seismics - at lower frequencies - cause no observable problems. At present the 3.5 kHz can not be operated at sweep speeds of less than 2 seconds and still leave an adequate window for SB returns. Use of the UGR monitor at a 10 second sweep helps sort out these outgoing and incoming returns (although the 3.5 kHz return is not as yet displayed). Use the Phase Delay button on the UGR or momentarily change the sweep rate of the 3.5 kHz recorder to offset the various signals.

Two symptoms of 3.5 kHz interactions are:

1) on flat bottom - noisy "hilly" features appear on the outer beams, especially on the port side.

2) going from flat to steep slopes - SB will pick up the 3.5 kHz outgoing or return signal part way up the slope follow it "through the hill" instead of tracking up over the top.

5.10.2 THRESHOLD

Thresholding is probably the least understood and documented part of the SB system. The following observations have been made:

As of December 1982, general experience has shown that it is best to leave the threshold voltage alone so that it is set automatically in Mode 3 operation. Entering a value of 0.0 volts forces automatic setting of the threshold.

If, after attempting operation for a significant amount of time (i.e. half hour), you still have problems, check if any of the following comments are applicable.

1) Entering a Display Threshold value in through the D.E. switch while in Mode 1 does, in fact, set a CRT display threshold which remains in effect also in Modes 2 and 3, if the alternating Beam Display is selected in these modes.

2) While in Mode 2 or 3, entering a new threshold value does change the displayed threshold of the CRT display, and does affect the "processing display" (an inferred but undocumented entity) by causing gain or loss of side beams.

3) If the system is put from Mode 3 to Mode 1 and back again, there is an apparent change (rise?) of threshold such that the outer beams are lost. Entering a threshold value while in Mode 3 appears to cure this problem. (0.06 is the magic number in current fashion for deep water).

4) In Mode 3 over a flat bottom, there is a tendency at times for the "tunnel effect" - a concave upward CRT profile display, and at other times a "hump effect" - convex upward. Both conditions can be temporarily cured by going to Mode 2 (be sure the CENTER and HEIGHT switches are set correctly) for several ping cycles then returning to Mode 3.

5.10.3 LOSS OF AUTO TRACKING

Loss of tracking is indicated by the terminal printing "AUTO GATES LOST". To regain tracking, determine correct depth from slow sweep seismic or UGR monitor recorder, then set CENTER and HEIGHT switches on the SB panel and go to Mode 2. The bottom profile display should appear after several ping cycles and the system may again be put into Mode 3. If not, a return to Mode 1 may be necessary.

NOTE: After returning to Mode 2 or 3 from Mode 1, the Sea Beam will often do 2 or 3 cycles of questionable contouring. Small steep circular seamount type features are the most easily recognized aberrations (possibly 3.5kHz interference?).

5.11 EMERGENCIES

5.11.1 POWER OUTAGE

The SB system runs on the same MG power supply as the shipboard computer and is more stable than the general lighting circuits. If the lights go out or dim, DO NOT PANIC and start turning off switches! Wait until the MG is dead as evidenced by no lights on the 1800 computer panel, then go through the SB system shut down procedures (sect 6.0). Consult with the Computer Tech before bringing the system up again. You will need to go through the complete power up and initialization procedures.

5.11.2 DOPPLER SPEED LOG MALFUNCTION

In auto speed log mode, the SB system uses the speeds sensed from the doppler speed log and smoothed by the IBM computer to calculate the along-track distance on the swath plot. If the Doppler log malfunctions, it is necessary to change to Manual Speed Mode and enter a new value each time the speed changes (see Section 4.5.3).

Remember to reset to the auto speed log mode when the problem is repaired.

5.11.3 IBM 1800 COMPUTER MALFUNCTION

The 1800 computer handles all navigation, logs SB digital values, and provides SB with estimated auto logged speeds. If the 1800 goes down:

1) Change SB to Manual Speed Mode.

2) Make sure swath plot is optimal (paper, pens, contour interval and chart scale) because that will be the only SB data produced until digital logging restored.

3) Make sure the watchstander logs all course and speed changes on the U/W log form so navigation can be re-constructed later.

5.12 SEABEAM OPERATION LOG

The two part (non-automatic carbon) log is to be maintained by the Principal Sea Beam Operator and the carbon copy returned to SIO at the end of each leg. (There is also a SB Hardware Log maintained by the SB Electronic Tech.) Use the log to record the following:

1) At the beginning of the leg, enter the names of the SB operator and ET, the computer and resident techs, and the chief scientist. Also the cruise leg and ports.

2) Any time a parameter set is changed, especially sound velocity profiles.

3) System malfunctions, giving cause, symtoms and cures.

4) Pen and other supply usage.

5) Observations on how system is functioning under various conditions. Include info on bottom depth, relief, other instrument operations, weather, etc.

6) Beginning/end times and dates of:

   Swath Books
   Raw Log Magnetic tapes
   UGR Monitor records

7) At the end of the leg, log time SB shut down, note elasped time on counters for sonar and echo processor and log in. Add any general comments about SB operations on the past leg.

#

6.0 SEA BEAM SYSTEM SHUT DOWN PROCEDURE

****

NOTE: THE FOLLOWING SYSTEM POWER DOWN IS TO BE DONE ONLY

BY THE SEA BEAM ENGINEER !

****

Perform the following procedures to turn off the system:

6.1 Depress the POWER push button switch on the Echo Processsor Control Panel. The Echo Processor shuts off immediately.

6.2 Insert key in Eclipse computer and turn to "OFF" position.

6.3 Depress POWER switch on the Sonar Control panel. The Sonar begins a timed sequence shut down.

6.4 Turn off the "400 Hz Power", "400 Hz converter", and "System Power" switches off on the Sonar Cabinet. Wait several minutes, then

6.5 Turn off circuit breakers for "NBES", "EPR", and "Gyro Master" at circuit board behind flat bed plotter.

If the shutdown is at the end of a cruise leg, the Principal Sea Beam Operator should also:

6.6 Remove pens and paper from swath plotters.

6.7 Record the elapsed time for the Sonar and Echo Processor from the counters located at the base of the System Control Panel and enter readings in the Seabeam Operations log.

6.8 Put covers on the UGR recorder and swath plotters. Cover front panel of system control panel if considered necessary for protection.

#

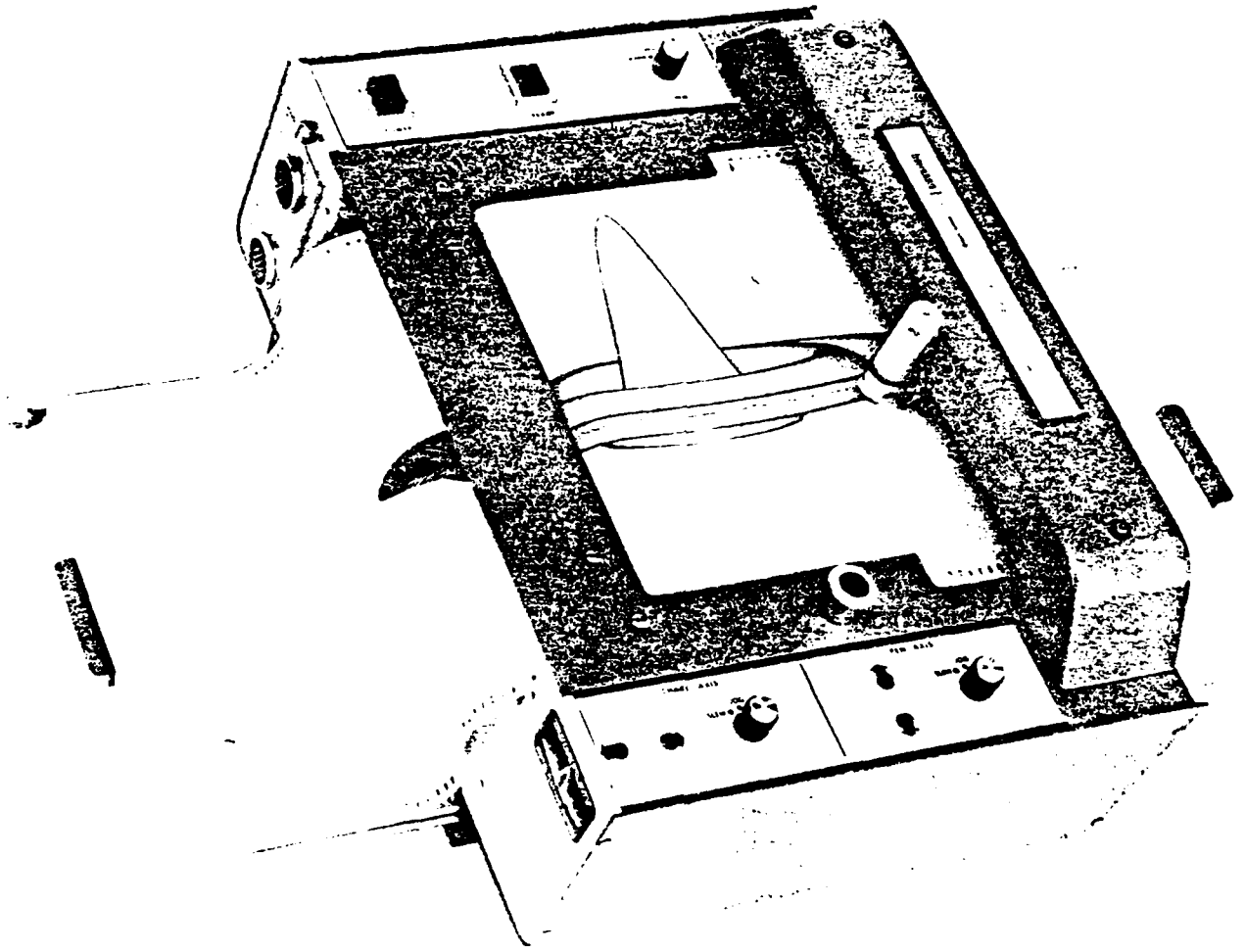
SEA BEAM OPERATOR MANUAL – Appendix A

CØMPLØT®

DP-1 PLOTTER

(EXERPTS FROM)

Instruction Manual



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"the recorder company"

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1–12 878

SECTION 3
OPERATION

3.1 INTRODUCTION

Before use, it is best to become familiar with the controls. Then the plotter can be loaded with paper, and marking elements for a checkout run. Thereafter, the only operations required are changing of paper and pens to accomplish the desired records. The plotter is permanently lubricated and requires only occasional cleaning for perfect performance.

3.2 CONTROL FUNCTIONS (See Figure 3–1)

3.2.1 Power

A push button control – lighted when power is applied to the plotter.

3.2.2 Ready

An indicator that is lit when plotter is ready to accept remotely applied inputs. If any one of the manual control switches is incorrectly positioned for remote inputs the light will not appear.

3.2.3 Pen

A rotary three position switch allowing manual control of the pen action. In DOWN the pen will be dropped. In UP the pen will be held aloft; regardless of the input signal. The REMOTE position directly couples the pen position to the input signals. This is the normal operating position.

3.2.4 Chart Axis

The rotary three position switch is coupled to the two adjacent direction switches. In SLEW, actuation of either pushbutton will move the paper at 200–300 increments per second in the appropriate direction. In JOG actuation of either pushbutton will move the paper one increment per actuation in the appropriate direction. In PLOT, chart direction is under control of the remote inputs. Normally SLEW and JOG are used for positioning only. Operating position is PLOT.

3.2.5 Pen Axis

Identical in function to the CHART AXIS controls except applying to the PEN AXIS.

3.3 CHARTS

In designing the new line of CØMPLØT plotters, it was decided to break with tradition and abandon the roll chart or individual flat sheet concept in favor of folded charts. The CØMPLØT folded charts are further improved in that they offer the best advantages of Z–fold book readability, have unlimited length and conform to standard drawing sizes.

Folded packets of chart paper are used which store on a tray in the plotter base, and pay into a second tray on the opposite side. The charts are both folded and perforated. The sprocket hole strips are also perforated for removal. By tearing off the sprocket strips and tearing at the perforated fold points, a standard drawing size of paper remains. These are immediately ready for storage, reproduction, or reprint use.

The packets may be installed or removed by simply raising the plotter lid. A partially completed packet may be removed, and the used and unused sections simply folded together and stored, if it is necessary to temporarily interrupt a series of tests. The section of chart just plotted and all earlier and later sections are accessible for annotation.

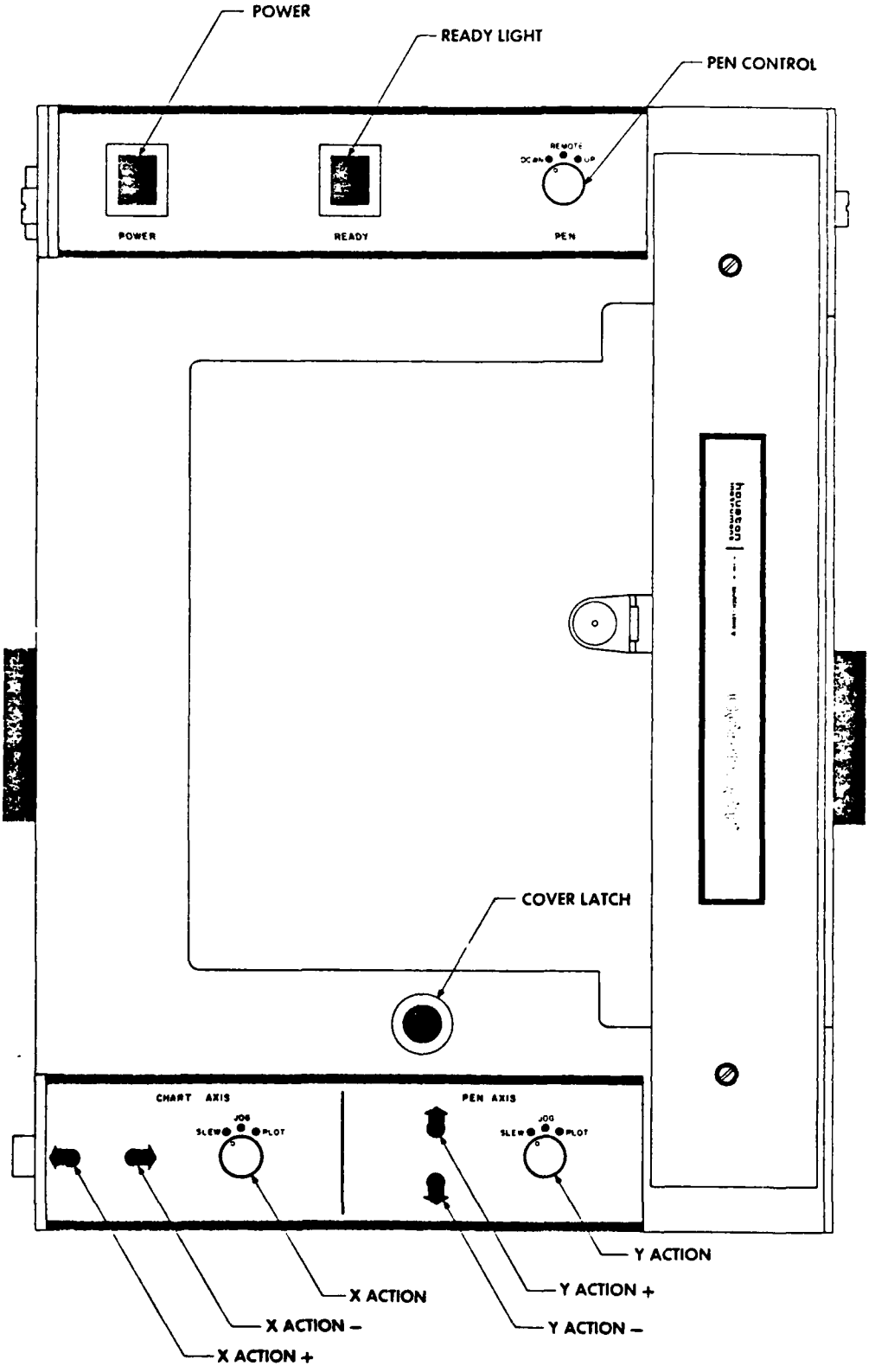
The folded chart packets may be loaded or removed at the beginning of the chart or anywhere along the chart in a few seconds. The major inconveniences of storing, loading, and removing roll charts or individual sheets, are eliminated.

With a folded chart, any portion of the record may be quickly viewed. The recorded portion is readily accessible and may be opened and visually scanned like the pages of a book. "After–thought" notations may be made on any portion of the plot with the recorder running or switched off. The problem of lack of accessibility of the previously recorded portion of a roll chart record, is eliminated.

Records of any length may be made and stored in standard size file folders or notebooks. Cementing or taping the packets end–to–end makes a record of unlimited length possible. Single records or roll charts are limited in length by recorder design.

3.4 CHART LOADING

Two trays can be pulled out of the plotter housing on opposite sides to act as paper feed and paper take–up receptacles. These trays are not necessary for proper operation as long as the paper is properly



DP–1 CONTROLS
FIGURE 3–1

positioned. It is not necessary to remove the pen if already installed. Load charts as follows:

a) Press the center of the lid knob with a thumb and concurrently lift using two fingers. See Figure 3–2

b) Raise lid and snap lid catch in place so lid is self supporting. See Figure 3–3

c) Pull out trays (if desired)

d) Place chart paper on right–hand tray with marking up from the plotter as the paper is unfolded over the main recorder body. See Figure 3–4. As a check this will place the round paper sprocket holes at the top of the chart.

e) Pull the chart over the chart bed until at least one full sheet of paper extends over the plotter bed. Check that sprocket holes are engaging in all four corners. See Figure 3–5

f) Release the lid catch and lower the lid.

g) Press the lid firmly against the plotter bed. This should engage the lid lock.

3.5 PENS

As standard equipment the plotter is supplied with two entirely different types of marking devices – ballpoint and fibre tipped. Each element has specific advantages for certain applications. The ballpoint, with a very fine trace of 0.008 inches (0.2 mm), is ideal for graphs or charts that must be read with maximum accuracy.

The fibre pen excels where graphics or dimensional drawings are created. Its trace width is 0.02 inches (0.5 mm). Dimensional drawings become vivid using the broader and denser line width: also they are easier to reproduce.

The ballpoint pen uses replaceable elements available in red, blue, green and black. The fibre pen elements are available in red, blue, green, and black. Substitution from one color to another can be made quickly by interchanging the marking elements in the pen holders.

3.6 PEN INSTALLATION

Two pen holders are supplied. One is for the ballpoint elements; the other for fibre tips (as will be noted there is a large difference in element diameters). Procedures are identical.

Slip the proper colored element into the pen sleeve until it dead ends. It is not necessary to remove the sleeve from the holder. See Figure 3–6.

Now screw the pen holder into the pen mount until hand tight. See Figure 3–6.

A knurled nut just below the pen mount regulates the amount of pen pressure on the chart. Pressure should be sufficient to insure a trace over all portions of the chart. If too much pressure is applied there is the danger of backlash in the trace and possible tearing of the chart especially at the perforations.

Increase pressure by turning the nut clockwise, see Figure 3–6. The ideal adjustment is slight pressure, above which the pen will skip when making a trace.

3.7 OPERATIONAL CHECK

Before remote plotting, the plotter should be checked for correct performance in all modes. Also should the plotter have been stored or if any indication of malfunction is apparent, the following procedure should be followed:

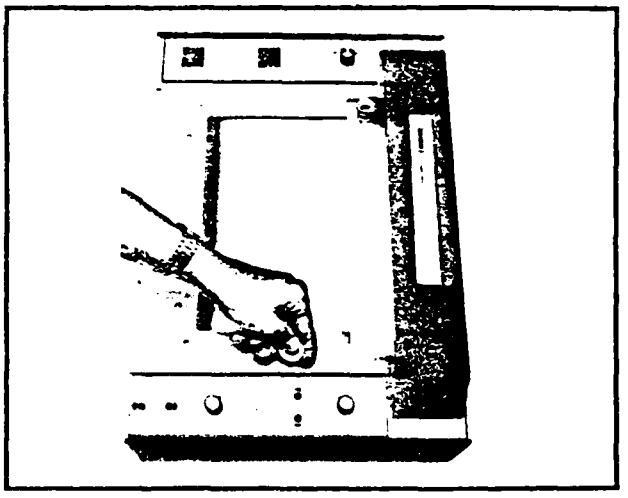
a) Install chart and pens per Section 3.4 and 3.6

b) Set the Power ON, PEN UP, CHART AXIS – SLEW, PEN AXIS SLEW.

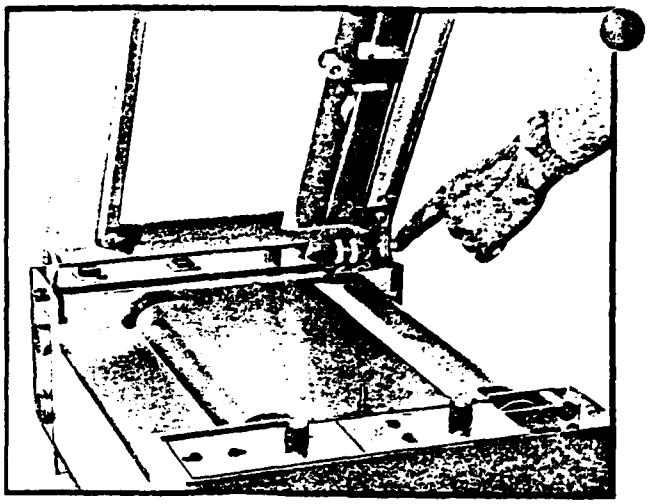
c) Set PEN DOWN and press either CHART AXIS direction push button. A horizontal trace should be drawn. If there is any skipping increase pen pressure. Retrace line by reversing direction.

d) Raise the Pen and index using the direction switches to a clean area of chart. Set both CHART AXIS and PEN AXIS switches to JOG. Drop the pen and press the CHART AXIS switch 10 times. Now actuate either PEN AXIS direction switch 10 times. Repeat on the CHART AXIS using the opposite direction switch from that first used. Lastly repeat using the opposite PEN AXIS switch. The pen should have returned to the initial starting point having drawn a perfect square.

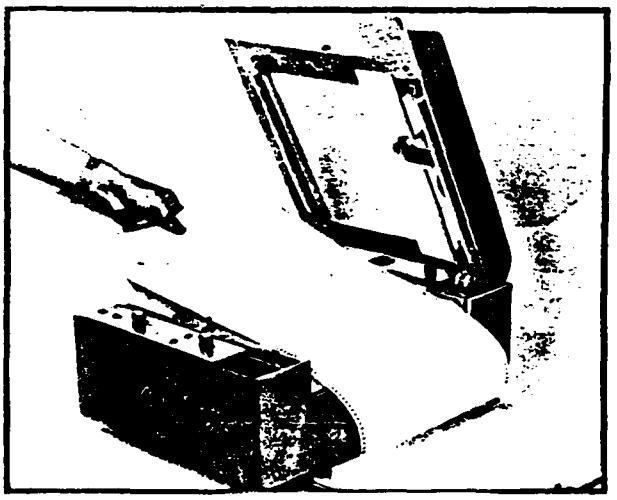
e) Raise the pen and again index to a clean section of the chart with the pen at the bottom of the chart. Lower the pen and put both CHART and PEN AXIS switchs in SLEW. Concurrently press carriage up and chart left direction switches for both axes. Release at approximately the top of the chart. Now press the two opposite buttons causing the pen to draw a trace parallel to but of opposite direction. Check for parallelism between traces.



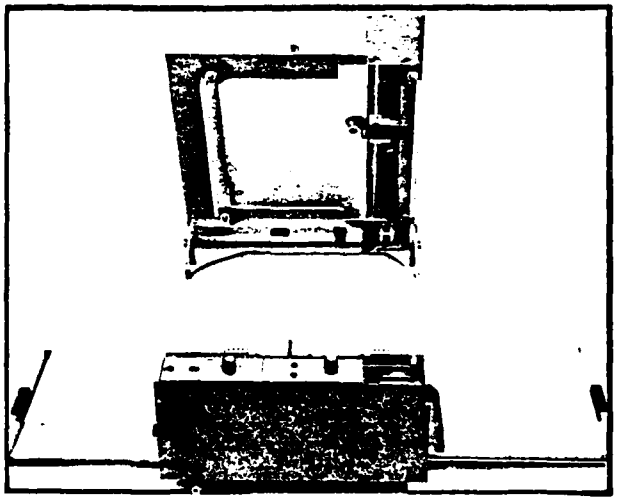
LID KNOB RELEASE
FIGURE 3–2



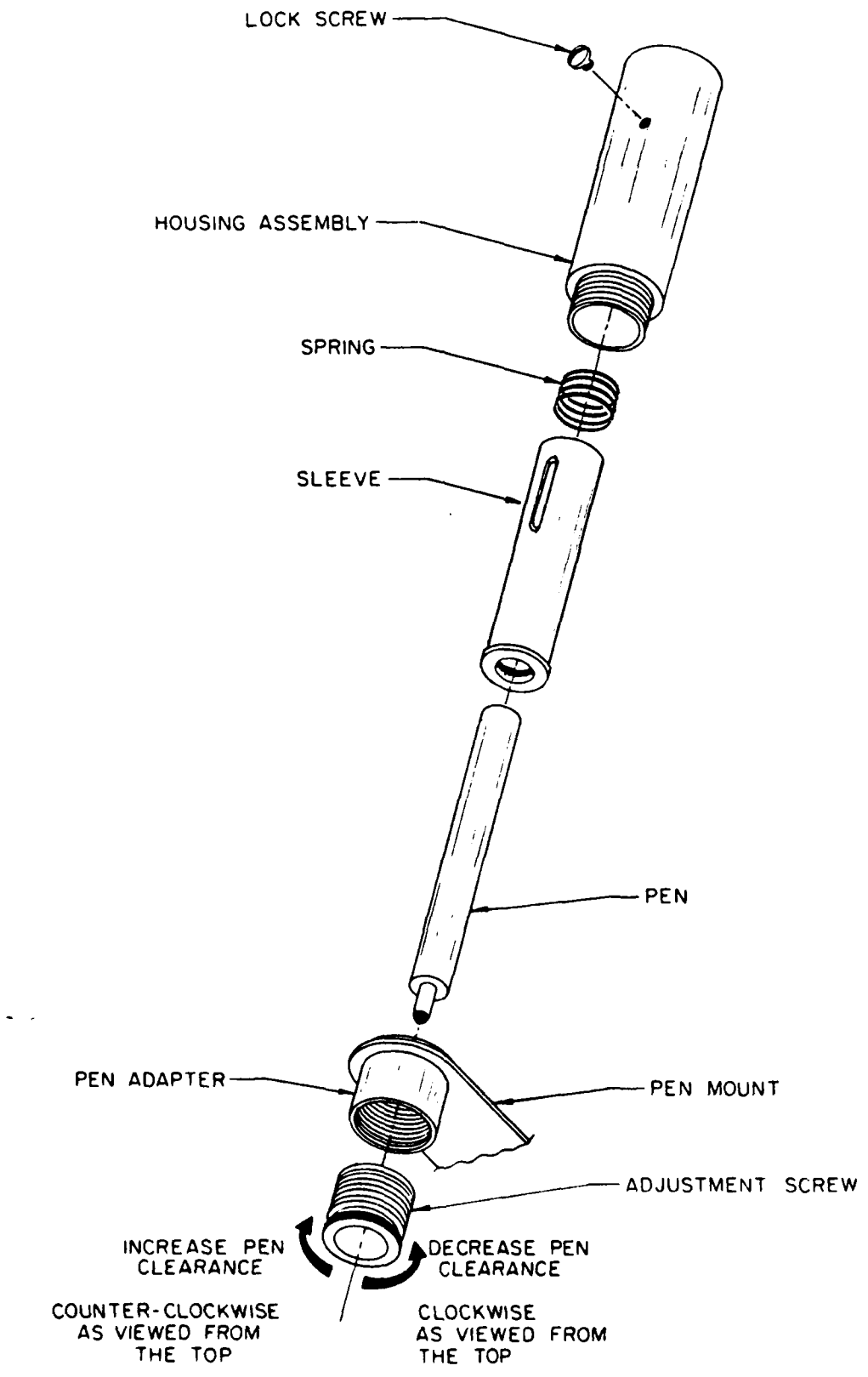
LID CATCH SUPPORT
FIGURE 3–3



PROPER PAPER ORIENTATION
FIGURE 3–4



PAPER LOADED
FIGURE 3–5



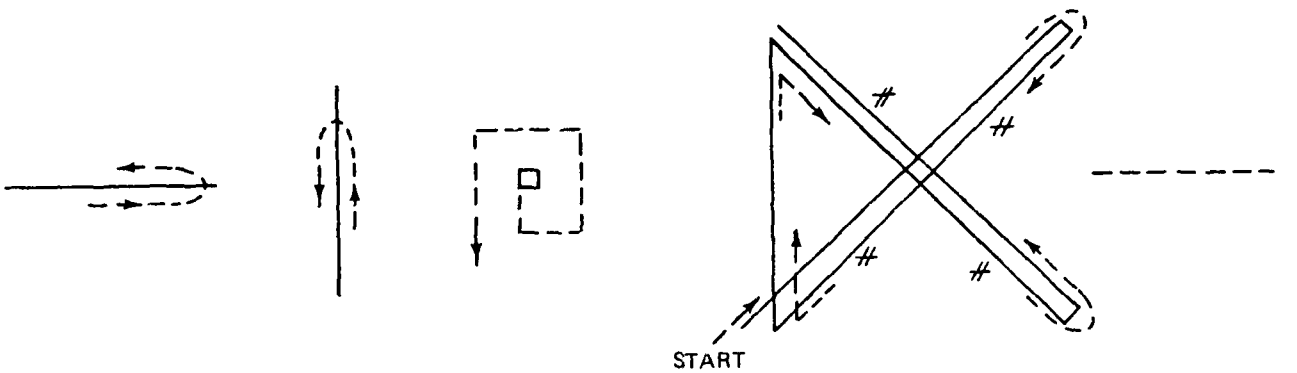
PEN ASSEMBLY
FIGURE 3-6

f) Concurrently press the PEN AXIS up and CHART AXIS right direction switches until the pen approaches top of the chart. Reverse directions and check for parallelism.

3.8 CONTROLLED OPERATION

If the input connector has not been previously installed, connect. Set the Pen Switch to REMOTE, CHART AXIS to PLOT and PEN AXIS to PLOT. The green ready light should then be lit and the plotter ready to operate automatically under source control.

Depending upon the program, it may be necessary to set the pen location at some zero point. This should be done using the manual controls. Normally, the chart is set such that the pen is located 0.5 inches (1.27 cm) to the right of any chart perforation.



TYPICAL SEQUENCE OF TRACE
FIGURE 3–7

APPENDIX B

PRINCIPAL SEABEAM OPERATOR DUTIES

BEGINNING OF CRUISE

1) Check supplies of pens, paper for plotters.

2) Confirm chart scales, contour intervals and sound velocity profile with chief scientist.
   Try, for shallow water: scale= 100M/CM; INT= 10M.
   deep water (5000M) Scale= 250 M/CM.; INT=10M (low relief)
   INT=20M (moderate to high)

3) Instruct u/w watchstanders in Sea Beam Mode 3 operation.

4) S.B. operations log - initial entries.

DAILY

1) Check pens in plotters for darkness; use black rolling ball in Archive Plotter (#1). (Microfilming needs darker pen than human eye, so change often.)

2) Check swath book paper in plotter. Set up next books with "END-END-FINISH". See "Swath Book Annotation" (Appendix C).

3) Check for need for new Sound Velocity profile and see "Sound Velocity Profile" (Appendix D).

EVENTS AS THEY OCCUR

1) Begin/end of Swath Book
   UGR Monitor Record
   SB Raw Data Mag Tape
   log above in (a) Sample Index
   b) S.B. Operations Log
   c) U/W Log Form

2) Sound Velocity Profile (SVP) - log SVP and source of data in S.B. Operations Log. Save profile calculations in SVP folder.

END OF LEG

1) Log elapsed operation time of Sonar and Echo Processor in log and add general comments.

2) Note need of new supplies in S.B. Operations Log.

3) Send following items back to SIO (Geological Data Center):

   S.B. Operations Log (yellow sheets)
   Sound Velocity Profile sheets
   Swath Books (Archive)
   S.B. UGR Monitor record
   S.B. Raw Log Mag tape (copy)

#

APPENDIX C

SEA BEAM SWATH BOOK ANNOTATION - ARCHIVE COPY

Please follow the instructions closely because consistant labeling is required for proper long term archiving at the Geological Data Center. Use black Pentil "bamboo" pens for all marking because the ink is long lasting and shows up well on microfilmed records. It is better for the Sea Beam Operator to do these annotations after the swath book is completed rather than trusting to a number of different watchstanders doing them uniformly and neatly.

SWATH BOOKS

A) Before loading swath book into the plotter, write in large (1 inch) letters with a Red Marks-A-Lot marking pen on the last three pages of the book:

" END END FINISH"

The purpose is to alert the watchstander to the end of paper. These pages can be discarded after the book is finished but leave at least one page after the last label and before the first label as leader/trailer required for microfilming.

B) BEGIN and END Labels - Right side up as you view the profile. make letters 1/4" high.

ARIAØ1WT
BEGIN (or END)
SWATH BOOK
#3
17Ø7Z
13FEB82

C) Every TWO Hours (even GMT):

Write date under computer generated time/cse/contour label:

"27FEB82"

D) Every FOUR Hours:

Write:	Scale	25ØM/CM
	Cruise ID	ARIAØ1WT
	Date	25FEB82

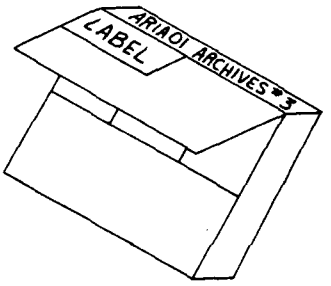
E) Put a box around date at date change (makes it easy to see on fast moving microfilm).

F) Write following label on face of paper exposed when book put in box (makes it easy to see if right book is in right box).

BEGIN
ARIAØ1WT #3
ARCHIVE

SWATH BOOK CONTAINER (BOX)

A) Cut halfway down sides so box opens like an envelope.



b) After swath book is completed, mark upper left corner of flap:

Cruise ID	ARIA01WT
"Archive" and number	ARCHIVE #3
Begin time/date	1707Z/13FEB82
End time/date	0329Z/14FEB82

C) Before storing, mark carton edge (above label) with:

"ARIA01WT ARCHIVE #3"

SEE EXAMPLE OF ANNOTATED SWATH BOOK

AND BOX ON BOARD R/V WASHINGTON

APPENDIX D

CALCULATING SEA BEAM SOUND VELOCITY PROFILES

1) A new sound velocity profile (SVP) should be entered:

   A) At the beginning of a cruise leg (to get underway use last SVP from previous leg - check Sea Beam (S.B.) Operations Log).

   B) When surface water termperature changes by more than 1 or 2 degrees C. (check thermograph maintained by Resident Tech in Aft lab). Note: thermograph may have systematic errors of 1-2 degrees from bucket temperature.

   C) When you enter a new Carter Table Area. (see step 8 below). Adjacent Carter Areas may have similar SVP in their lower portions.

2) Take a bucket temp. and XBT in the usual fashion (ask Res. tech for assistance if you don't know how). Note time (GMT) and get DR position from IBM 1800.

3) Pick about 5 to 8 points from the XBT trace. (To 1/10 degree and 1 meter). Include the surface, bottom of mixed layer and major inflection points. (Include also values at 100 M and 400 M to compare to the Carter Table derived velocities centered on these depths). See Figure Appendix D-1.

4) Check that the bucket temperature and XBT surface temperature agree within 1 or 2 tenths degree C. If not, check why not, and correct problem.

5) Keypunch the following cards:

   A) one title card (format not critical but follow this example)

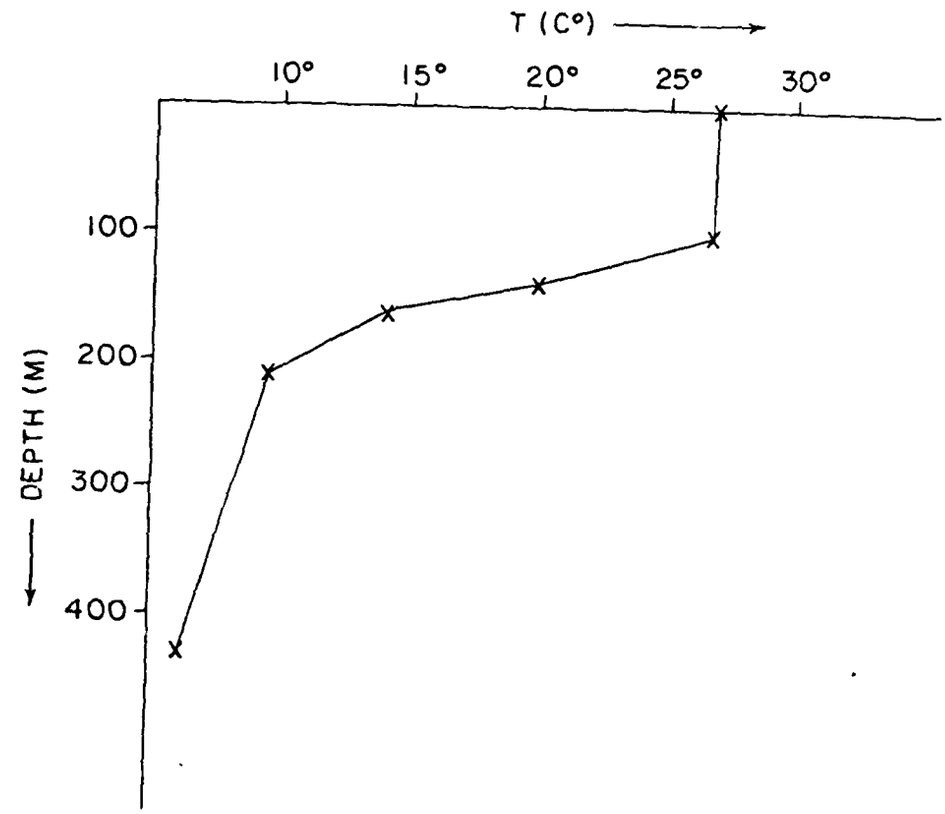
   column

   1
   SEABEAM XBT 1854Z/6FEB82 ARIA01WT 4-31S,149-37W

   B) Data Cards (one per point)

   All values are floating point (real), left justified, with decimal points explicitly punched (use SVELX drum card)

column	Mode	Value
1	F	Salinity depth 0-200-use "33.5" 201-600-use "34.0" 600+ -use "34.5"
7	F	Temperature(C) to 1/10 deg.
21	F	Depth (Meters)



EXAMPLE OF XBT TRACE

Figure Appendix D-1

6) Run program SVELX on IBM 1800 computer. (Determines sound velocity at each point after Wilson 1960).

Deck Set Up
// JOB
// EJECT
// SVELX FX
Title Card
[data cards]
2 blank cards
// End
1 blank card

7) Pick 5 points that best represent the SVP from the resulting output (see example). It may be instructive to plot the profile on graph paper to pick the best points. Round the velocities to the nearest 1 meter/sec. and write down as shown on the example SVELX output.

8) For the lower part of the SVP, do the following:

A) Determine what Carter Area you are in from the diagrams in the Carter Tables (stored in Sea Beam supplies drawer).

B) If representative points have been picked for the area, use these for the lower part (800 M & below) of the SVP.

C) If points for area have not been determined: Make a graph from the table titled "Mid-Interval Sound Velocities (M/sec) calculated from Carter (3rd ed.) Echosounding correction Tables (1980)". [Source of this Table is Program CARTV written by S.M. Smith 22 Jan 82 on IBM 1800 computer].

Pick points and add them to the collection listed with these instructions.

9) On the Program SVELX output, write down:

1. "SVP #<cruise ID>#(consecutive number beginning with 1 for each leg)" e.g. " SVP ARIA01WT - 3"
2. Bucket Temperature
3. Contents of XBT Title card
4. Depths for which XBT is source (XBT ident.)
5. Depths for which Carter Area is source (Carter Area #)

10) Enter the SVP into the Sea Beam Computer. (see Sea Beam Operating Manual, section 4.5.3.6).

11) Enter all information from step 9 above in Sea Beam operations Log, including time SVP became effective.

12) File SVELX output in folder in Sea Beam supplies drawer. (These should be returned to SIO with other Sea Beam data at the end of the leg).

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SIO SEA BEAM OPERATOR MANUAL - USER NOTES AND COMMENTS

Please return to: Geological Data Center, Code A-023
Scripps Institution of Oceanography
La Jolla, CA 92093


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