

UNITED STATES DEPARTMENT OF THE INTERIOR  
GEOLOGICAL SURVEY

A SURVEY OF PISTON CORING SYSTEMS  
USED BY OCEANOGRAPHIC  
INSTITUTIONS

By

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This report is preliminary and  
has not been reviewed for conformity with  
U.S. Geological Survey editorial standards.

## INTRODUCTION

I conducted a survey of oceanographic institutions in 1979 to determine the details of the piston coring systems then in use. The survey was conducted through the questionnaire shown in Table I. Eighteen questionnaires were sent out and 17 were returned. The results are presented in matrix form in Table II.

No conclusions have been drawn from the results of the questionnaire; the purpose was simply to document in one table some of the equipment in use. Note that since the questionnaire was compiled, several institutions have begun to use the "Driscoll piston corer." This system is the one described under the University of Rhode Island in Table II. Additional information about the "Driscoll piston corer" can be obtained directly from:

Alan H. Driscoll  
Graduate School of Oceanography  
University of Rhode Island  
Kingston, Rhode Island 02881.

The reasons for the adoption of the Driscoll piston corer range from a desire to standardize coring equipment to the use of a hoped-for second generation design that will circumvent previous problems. As of this writing, not enough use of the Driscoll piston corer has been reported to evaluate its performance over the other systems.

The contacts (when known) and addresses of the institutions, listed in the order they appear in Table II are:

UNIV. KIEL/FRG

Dr. Friedrich-Christian Kögler  
Geologisch-Paläontologisches  
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UNIV. RHODE ISLAND

Dr. James P. Kennett  
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WOODS HOLE OCEAN

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LAMONT-DOHERTY

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UT/GALVESTON

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NORDA

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NSTL Station, Mississippi 39529

UNIV. SOUTHERN CAL

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TEXAS A & M

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National Oceanic and Atmospheric Administration  
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Miami, Florida 33149

BEDFORD INSTITUTE OF OCEANOGRAPHY

Dr. Keith Manchester  
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**Hawaii**

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**UNIV. WASHINGTON**

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**UNIV. MIAMI**

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**USGS/PABMG**

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**SCRIPPS**

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University of California San Diego  
La Jolla, California 92093

**FLORIDA STATE**

Dennis Cassidy  
Department of Geology  
The Florida State University  
Tallahassee, Florida 32306

**OSU**

Peter A. Kalk  
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Corvallis, Oregon 97331

This survey was performed for the Coring Committee of the Pacific-Arctic Branch of Marine Geology, U.S. Geological Survey, Menlo Park, California in cooperation with the Steering Committee of the Long Core Facility, a program funded by the National Science Foundation to develop a new generation of large-scale piston corers that are capable of obtaining a 50-m core.

Table 1. Questionnaire sent out

PISTON CORER

size of wire you use \_\_\_\_\_

tapered wire    yes \_\_\_\_\_ no \_\_\_\_\_

weight of weight stand \_\_\_\_\_ kg

instrument ports in weight stand: yes \_\_\_\_\_ no \_\_\_\_\_

hydrodynamic tapered weight stand: yes \_\_\_\_\_ no \_\_\_\_\_

Do you think hydrodynamic tapering is effective: yes \_\_\_\_\_ no \_\_\_\_\_

weight stand fins for stability: yes \_\_\_\_\_ no \_\_\_\_\_

Do you think fins are effective: yes \_\_\_\_\_ no \_\_\_\_\_

length of each barrel \_\_\_\_\_ m

type of barrel material \_\_\_\_\_

type of barrel couplings: screwed \_\_\_\_\_ nailed \_\_\_\_\_ other \_\_\_\_\_

inside diameter of barrel: \_\_\_\_\_ cm

wall thickness of barrel: \_\_\_\_\_ cm

Do you use core liners: yes \_\_\_\_\_ no \_\_\_\_\_

if so, what is the composition: polycarbonate \_\_\_\_\_ polybuterate \_\_\_\_\_

other \_\_\_\_\_

inside diameter of liner \_\_\_\_\_ cm

wall thickness of liner \_\_\_\_\_ cm

Do you use break-away pistons: yes \_\_\_\_\_ no \_\_\_\_\_

if no, why not: \_\_\_\_\_

Do you use a trigger weight \_\_\_\_\_ or trigger corer \_\_\_\_\_

if trigger corer, what is weight \_\_\_\_\_ kg

length of trigger core barrel \_\_\_\_\_ m and diameter \_\_\_\_\_ cm

Do you use trigger core liner: yes \_\_\_\_\_ no \_\_\_\_\_

Do you use weight stand instrumentation: yes \_\_\_\_\_ no \_\_\_\_\_

camera \_\_\_\_\_

accelerometer \_\_\_\_\_

compass \_\_\_\_\_

heat flow \_\_\_\_\_

other (specify) \_\_\_\_\_

core catcher type

fingers \_\_\_\_\_

sphincter \_\_\_\_\_

trap door \_\_\_\_\_

other (specify) \_\_\_\_\_

Do you orient cores: yes \_\_\_\_\_ no \_\_\_\_\_

how do you orient cores \_\_\_\_\_

what length of scope (distance of trigger below cutter) do you use \_\_\_\_\_ m

estimated cost of your weight stand \_\_\_\_\_

estimated cost of one core barrel \_\_\_\_\_

length of your trigger arm \_\_\_\_\_ m

Do you routinely record:

number of barrels attempted \_\_\_\_\_

mud line on outside of barrel \_\_\_\_\_

scope \_\_\_\_\_

Do you use a valve on the weight stand: yes \_\_\_\_\_ no \_\_\_\_\_

Table II. Summary of piston coring systems used by the principal oceanographic institutions.

	SIZE OF WIRE	TAPERED WIRE?	WEIGHT (KG)	INSTRUMENT PORTS	HYDRODYNAMIC SHAPE	IS HYDRO TAPER EFFECTIVE	FINE	ARE FINE EFFECTIVE	LENGTH (M)	TYPE OF MATERIAL	TYPE OF COUPLINGS	BARREL I.D. (CM)	WALL THICK- NESS (CM)	USE LINERS	LINER COM- POSITION	LINERS	WALL THICK- NESS (CM)	BREAK-AWAY PISTON	TW WEIGHT (KG)	TW LENGTH (M)	TW DIAM- ETER (CM)	TRIGGER WEIGHT	WEIGHT STAND INSTRUMENTATION	OTHER	FINGERS	SPHINX FLAPPER	DIRECTION & ORIENT TO CORES	LENGTH OF SCOPE (M)	COST OF WEIGHT STAND	COST OF CORE BARREL	LENGTH OF TRIGGER ARM (H)	VALVE ON WEIGHT STAND	RECORD BARRELS ATTEMPTED	RECORD MUDLINE SCOPE				
UNIV. KIEL/FRG	1/2"	NO	1500	YES	NO	NO	NO	NO	6.0	2 INCO- PLATED STEEL	NAIL	13.2	0.4	YES	PVC	12.0	0.2	YES	80	1.5	6.0	YES	-	X	-	-	1-3	\$31,527	\$1970	1.2	NO	YES	YES	NO				
UNIV. RHODE ISLAND	1/2"	NO	1363	YES	NO	--	NO	--	5.0	STAIN- LESS STEEL	SET SCREWS	7.04	0.77	YES	TOP POLY- CARBONATE BOTTOM POLY- BUTERATE	6.33	0.58	YES	136	1.5	7.0	YES	YES	YES	X	-	6.0	\$5,000	\$600	1.0	NO	YES	YES	YES				
WOODS HOLE OCEAN	1/2"	NO	850	YES	NO	NO	NO	NO	3.2	STAIN- LESS STEEL	SET SCREWS	7.5	0.81	YES	POLYCAR- BONATE	6.72	0.61	NO	130	1.4	7.5	YES	YES	YES	X	-	4.5	\$5,500	\$525	1.2	NO	YES	YES	YES				
LAHOUT-OHERTY	1/2"	NO	670	YES	NO	YES	NO	YES	7.0	MILD STEEL "BOILER TUBE"	SET SCREWS	6.25	0.065	NO	-	-	-	NO	45	1.0	3.8	YES	YES	NO	YES	PINGER	X	NO	\$1,600	\$140	2.0	YES	YES	YES	YES			
UT/GALVESTON	1/2"	NO	636	YES	NO	YES	YES	YES	6.0	IRON RUST- PROOF COATING	SET SCREWS	6.35	0.635	YES	POLYCARB-6 CELLULOSE ACETATE BUTYRATE	5.715	0.32	NO	57	0.4	3.9	YES	NO	NO	-	X	SCRIBE ON LINEAR & BARRELS	3.0 TO 3.6	\$1,050	\$100	1.37	NO	YES	YES	YES			
NORDA	9/16"	NO	908	NO	NO	YES	YES	YES	6.0	CAST IRON	SET SCREWS	6.5	0.65	YES	POLYCAR- BONATE	6.2	0.16	YES	WEIGHT BUT NO COKER	-	-	-	-	-	X	NO	NO	\$2,500	\$95	2.0	NO	YES	NO	YES				
UNIV. SOUTHERN CAL.	1/2"	NO	590	NO	NO	NO	NO	NO	6.0	CARBON STEEL "BLACK PIPE"	SET SCREWS	6.4	0.5	YES	POLY- BUTERATE	5.0	0.4	NO	115	1.5	7.4	YES	NO	YES	NO	-	X	LOCKING COUPLERS	8.0	\$1,000	\$60	1.0	YES	YES	NO	NO		
TEXAS A & M	9/16"	-	227	NO	YES	-	YES	-	-	-	SET SCREWS	5.2	1.3	YES	-	-	-	NO	-	-	-	-	-	-	X	NO	-	-	-	-	-	-	-	-	-			
NOAA/MIAMI	9/16"	NO	1000	NO	YES	NO	YES	NO	6.0	WELOD STEEL STD. BLACK WATER PIPE	SET SCREWS	8.9	0.6	YES	PVC	8.2	0.3	NO	160	1.5	8.9	NO	-	-	YES	PINGER	X	NO	\$3,500	\$65	2.0	NO	YES	YES	NO			
BEDFORD INSTITUTE OF OCEANOGRAPHY	1/2"	NO	1000	NO	YES	-	YES	-	3.0	STEEL	SET SCREWS	7.0	-	YES	-	-	-	YES	80	1- 1.5	7.0	YES	-	-	-	X	NO	-	-	-	-	NO	NO	NO	NO			
DALHOUSIE	1/2"	NO	900	NO	YES	-	YES	-	6.0	STEEL	NAILS	6.3	-	YES	-	-	-	NO	VARIABLE	-	-	-	-	-	-	X	-	-	\$200	-	NO	YES	YES	YES				
HAWAII	9/16"	NO	800	YES	NO	NO	-	-	6.15	SHELBY 1015	SET SCREWS	7.6	0.6	YES	POLY- BUTERATE	6.6	0.3	NO	WEIGHT BUT NO COKER	-	-	-	YES	YES	-	X	ACCELEROMETER AND COMPASS RECORDED ON HIGH-SPEED GYRO IN WEIGHT STAND	6.0	-	\$140	1.5	NO	YES	YES	YES			
UNIV. WASHINGTON	1/2"	NO	1000	NO	NO	NO	NO	NO	1.5	C75 & HIGH CARBON STEEL TEFLON COAT	SET SCREWS	7.6	0.6	YES	POLY- BUTERATE	6.7	0.3	YES	18 TO 0.9 56	0.6	5.7	YES	-	-	-	X	NO	2-2.5	-	\$1000	0.9	NO	NO	YES	YES			
UNIV. MIAMI	1/2"	NO	90	NO	NO	NO	NO	NO	4.6	HYDRIL CS TUBING	SET SCREWS	7.4	1.5	YES	POLY- BUTERATE	7.1	0.3	YES	80	1.5	5.0	YES	-	-	YES	-	SCRIBE LINER	3.7	-	-	0.9	NO	YES	YES	YES			
USGS/PABMG	9/16"	NO	900	NO	NO	NO	NO	NO	3.0	SHELBY NAILS	NAILS	8.9	0.6	YES	POLY- CARBONATE & BUTERATE	8.26	0.32	NO	150	1.0	8.9	0.6	-	-	-	X	NO	6.0	-	\$200	1.5	NO	NO	NO	NO			
SCRIPPS	-	NO	900	NO	NO	NO	NO	NO	3.0	SHELBY NAILS	NAILS	8.9	0.6	YES	POLY- BUTERATE	-	-	YES	-	-	-	-	-	-	X	-	-	-	-	-	1.5	NO	-	-	-			
FLORIDA STATE	3/8"	NO	320	NO	NO	YES	YES	YES	3.65	STEEL TUBING	SET SCREW	6.35	0.6	YES	-	-	-	YES	-	1.5	4.5	YES	-	-	-	X	NO	-	-	-	1.2	NO	YES	YES	YES			
OSU	SAME AS SCRIPPS																																					