

INTERNATIONAL PHASE OF OCEAN DRILLING (IPOD)  
DEEP SEA DRILLING PROJECT  
DEVELOPMENT ENGINEERING  
TECHNICAL NOTE NO. 3

**FILE COPY**

# **RE-ENTRY CONE / TRIPLE CASING HANGER DESIGN**

SCRIPPS INSTITUTION OF OCEANOGRAPHY  
UNIVERSITY OF CALIFORNIA AT SAN DIEGO  
CONTRACT NSF C-482  
PRIME CONTRACTOR: THE REGENTS UNIVERSITY OF CALIFORNIA

DISCLAIMER

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TECHNICAL NOTE NO. 3

RE-ENTRY CONE/TRIPLE CASING HANGER DESIGN

Prepared for the  
NATIONAL SCIENCE FOUNDATION  
National Ocean Sediment Coring Program  
Under Contract C-482

by the

UNIVERSITY OF CALIFORNIA  
Scripps Institution of Oceanography  
Prime Contractor for the Project

June 1984

W. A. Nierenberg, Director  
Scripps Institution of Oceanography

M. N. A. Peterson  
Principal Investigator and  
Project Manager  
Deep Sea Drilling Project  
Scripps Institution of Oceanography

## INTRODUCTION

Concept development and design of the "Triple Casing Hanger" system began in October 1976. William Fischer, a consultant with many years of experience in the oil industry was contracted to develop the original concept based on the successful "dual casing hanger" system already in use aboard the GLOMAR CHALLENGER drill ship.

The triple casing hanger design allowed for deployment of two distinct casing strings (16" and 11-3/4"), in addition to the 20" conductor pipe washed in with the re-entry cone itself.

Machine drawings and hardware requirements for the system were developed at Deep Oil Technology (now part of Fluor Drilling Services).

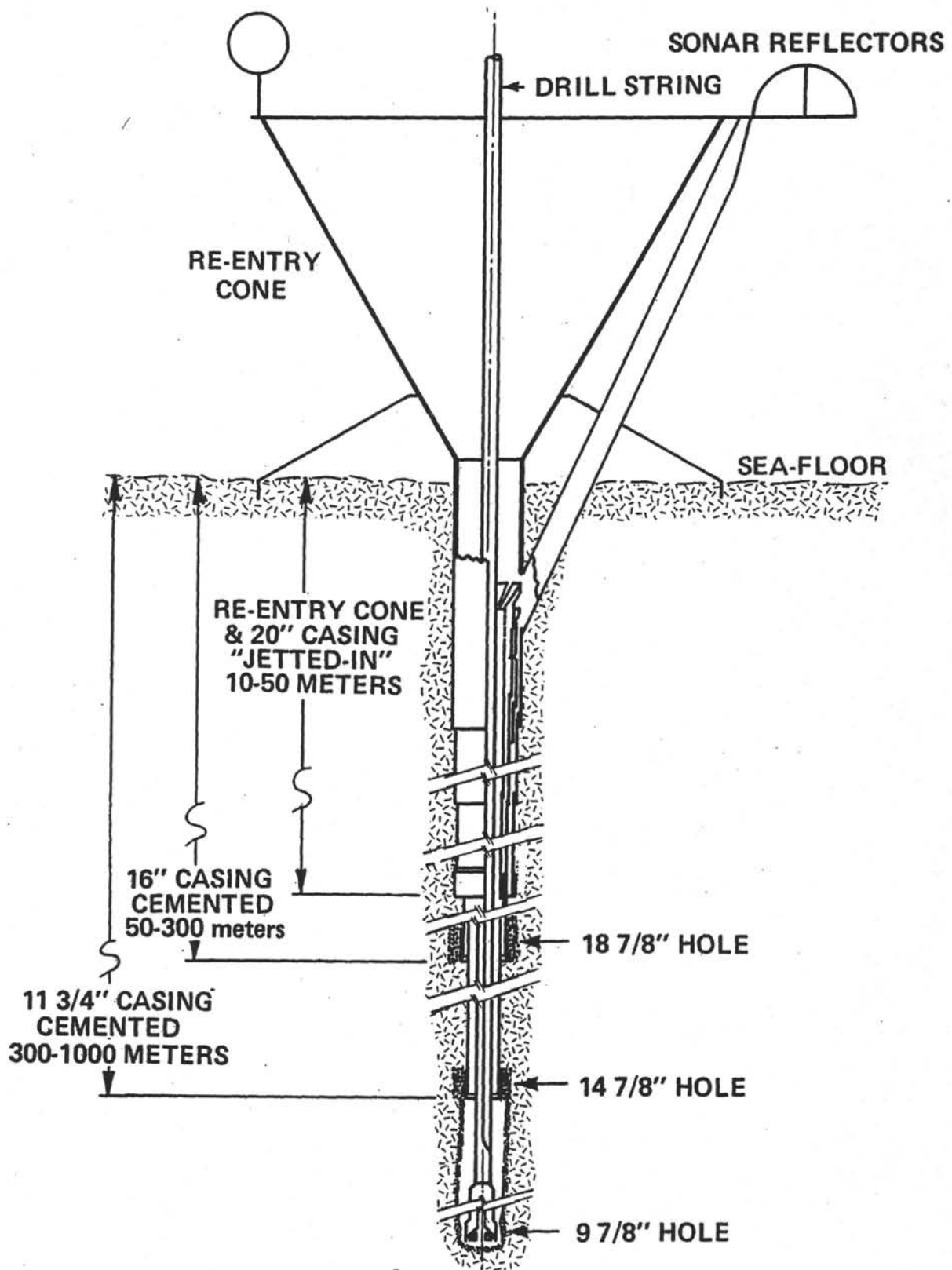
A Prototype assembly was fabricated in the fall of 1978. Latch-in and acuation testing of the system was begun but not completed. Additional testing should be performed prior to actual sea trials of the system.

## INDEX

### RE-ENTRY CONE/TRIPLE CASING HANGER SYSTEM

- I. OPERATIONAL SEQUENCE DRAWINGS
- II. PARTS LIST & MACHINE DRAWINGS

# TRIPLE CASING STRING SYSTEM



TRIPLE CASING STRING  
OPERATIONAL SEQUENCE  
DRAWINGS 1 THROUGH 4

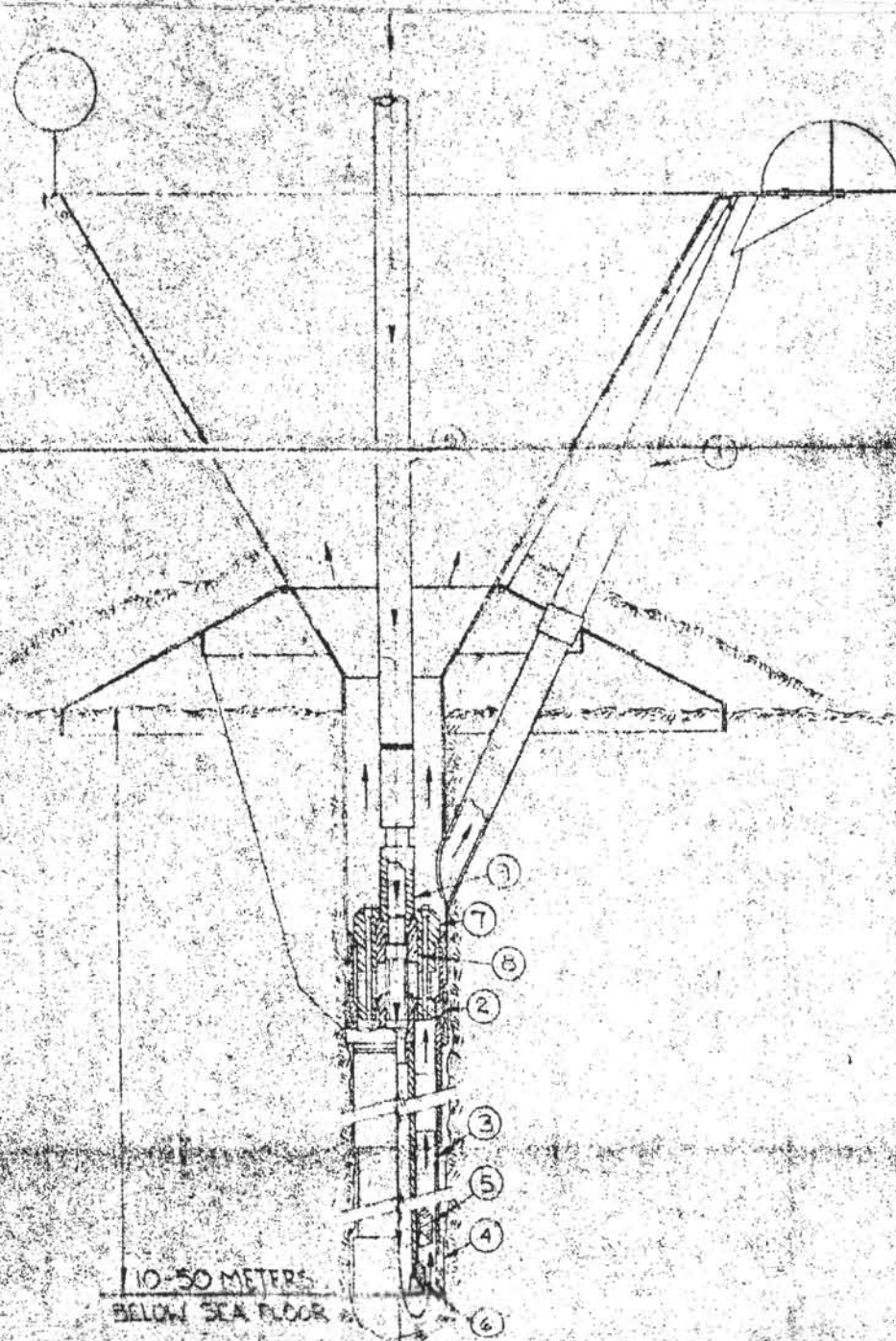
R-1071-00

R-1072-00

R-1073-00

R-1074-00

DEEP SEA DRILLING PROJECT  
 TRIPLE CASING STRING SYSTEM  
 SEQUENCE DRAWING No. ONE  
 SETTING IN 20" CASING



10-50 METERS  
 BELOW SEA FLOOR

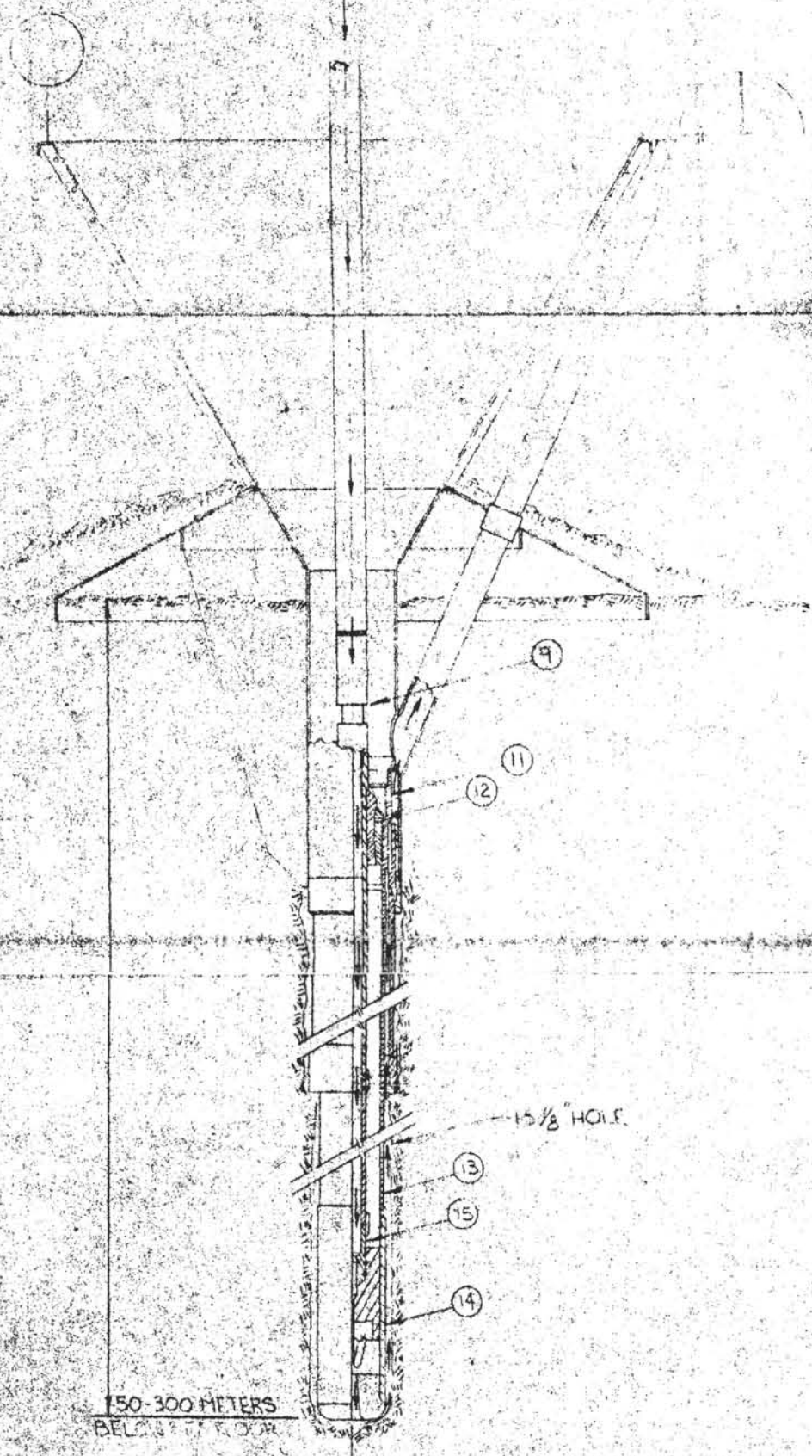
- ① RR ENTRY CONE - COMPLETE ASSY - AS USED WITH DUAL STRING SYSTEM.
- ② 20" CASING HEAD ASSEMBLY DRAWING No. D-0806-00
- ③ 20" K-55 9 7/8" BUTTRESS CASING
- ④ 20" TEXAS PATTERN OPEN GUIDE SHOE
- ⑤ 18 7/8" HOLE OPENER DRAWING No. D-1002-00
- ⑥ 14 1/2" CORE BIT SMITH TOOL CO.
- ⑦ 20" CASING HANDLING TOOL DRAWING No. D-0817-00
- ⑧ CASING LOWERING TOOL DRAWING No. RE-010-00
- ⑨ BUMPER SLIP RAASH-ROSS 2SI
- ⑩ BOTTOM HOLE ASSEMBLY

RR ENTRY/TRIPLE CASING STRING SYSTEM  
 SEQUENCE DRAWING No. ONE OF FOUR  
 SETTING IN 20" CASING

ALLIANCE	REVISIONS		NO. SHEETS/TOTAL NO. SHEETS
	NO.	DATE	
REVISED			1/1
APPROVED			1/1
DATE			
BY			
FOR			
SCALE			
PROJECT			
DRAWING NO.			
TITLE			



DEEP SEA DRILLING PROJECT  
 TRIPLE CASING STRING SYSTEM  
 SEQUENCE DRAWING No. TWO  
 LANDING 16" CASING



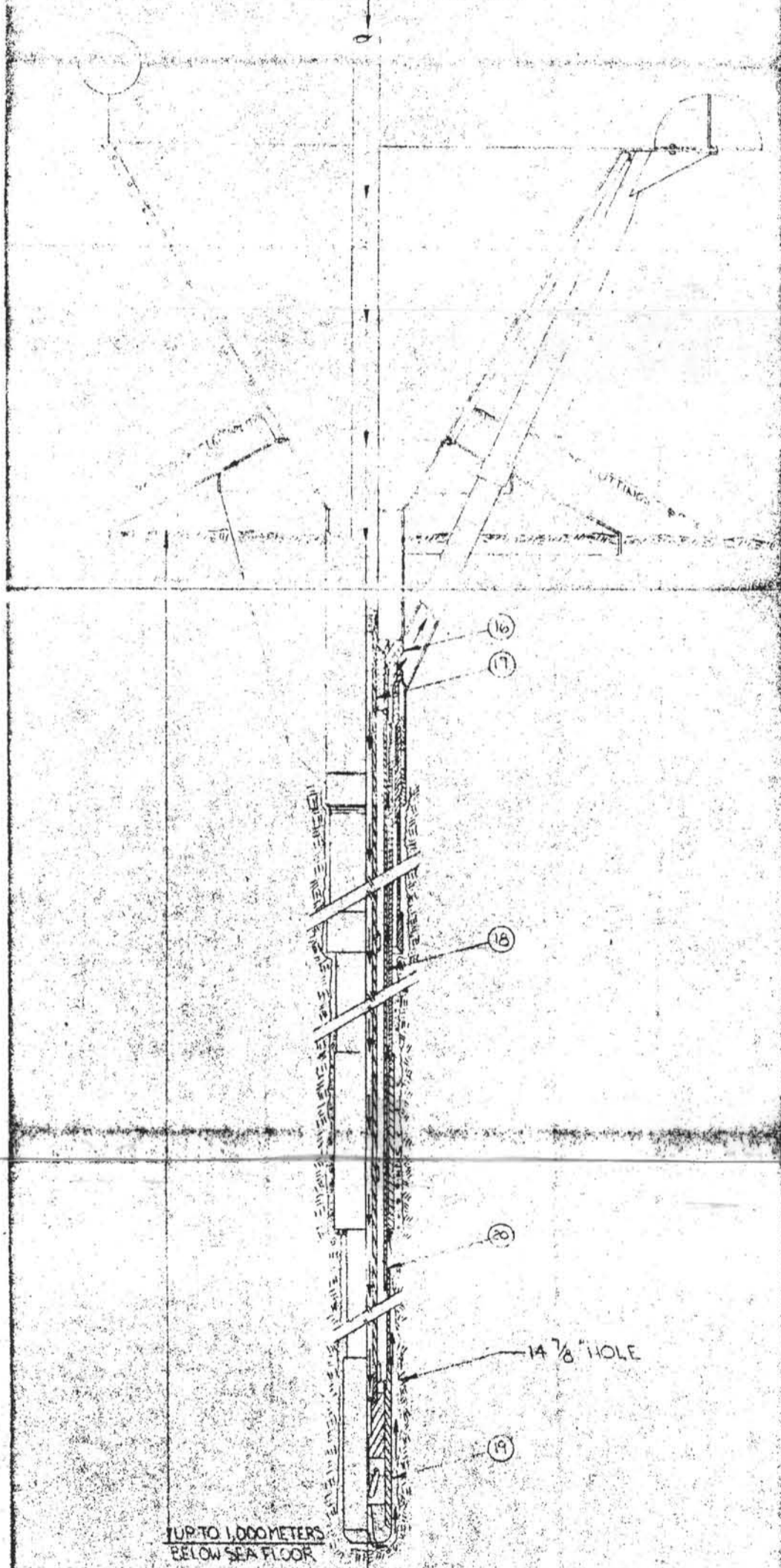
150-300 METERS  
 BELOW FLOOR

- ⑪ 16" CASING HANGER ASSEMBLY  
DRAWING NO. D-0811-00
- ⑫ 12" HEX. F.L.  
DRAWING NO. D-0816-00
- ⑬ 16" K-55 73' FT BUTTRESS CASING
- ⑭ 16" BUTTRESS "STAB-IN" FLOAT SHO  
HALLIBURTON
- ⑮ SEAL RING SUP. "STAB-IN" SHOE

RE-ENTRY/TRIPLE CASING STRING SYSTEM  
 SEQUENCE DRAWING No. TWO OF FOUR  
 LANDING 16" CASING

UNIV. OF CALIF. DEEP SEA DRILLING PROJ.		
SCALE	APPROVED BY [Signature]	DRAWN BY
DATE		REVISED
LANDING 16" CASING		
		DRAWING NUMBER 102-03

DEEP SEA DRILLING PROJECT  
 TRIPLE CASING STRING SYSTEM  
 SEQUENCE DRAWING No. THREE  
 LANDING 11 3/4" CASING

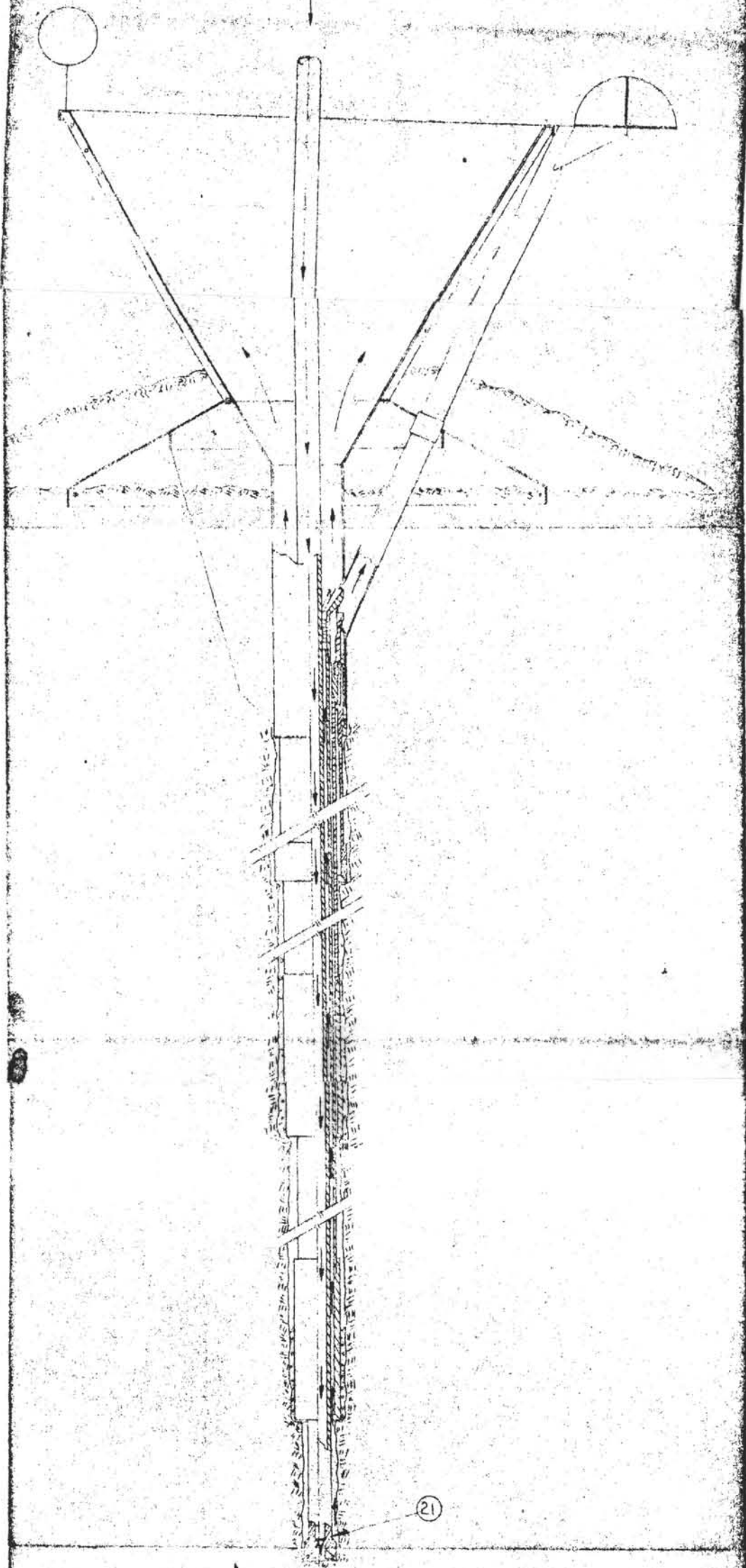


- ① 11 3/4" CASING HANGER ASSEMBLY, AS USED IN DUAL STRING SYSTEM
- ② 11 3/4" HEX FELLOE-TYPE LANDING TOOL DWG No D-0852-01
- ③ 11 3/4" K-55, 5.45" I.T. BUTTRESS CASING
- ④ 11 3/4" STAB-IN BUTTRESS FLOAT SHOE
- ⑤ 11 3/4" EXPANSION JOINT.

RE-ENTRY/TRIPLE CASING STRING SYSTEM  
 SEQUENCE DRAWING No. THREE OF FOUR  
 LANDING 11 3/4" CASING

UNIV. OF CALIF DEEP SEA DRILLING PROJ.		
DATE 2-26-79	DESIGNED BY KCB	DRAWN BY KIC
LANDING 11 3/4" CASING		
		PROJECT NUMBER R-1073.02

DEEP SEA DRILLING PROJECT  
 TRIPLE CASING STRING SYSTEM  
 SEQUENCE DRAWING NO. FOUR  
 DRILLING AHEAD 9 7/8" HOLE

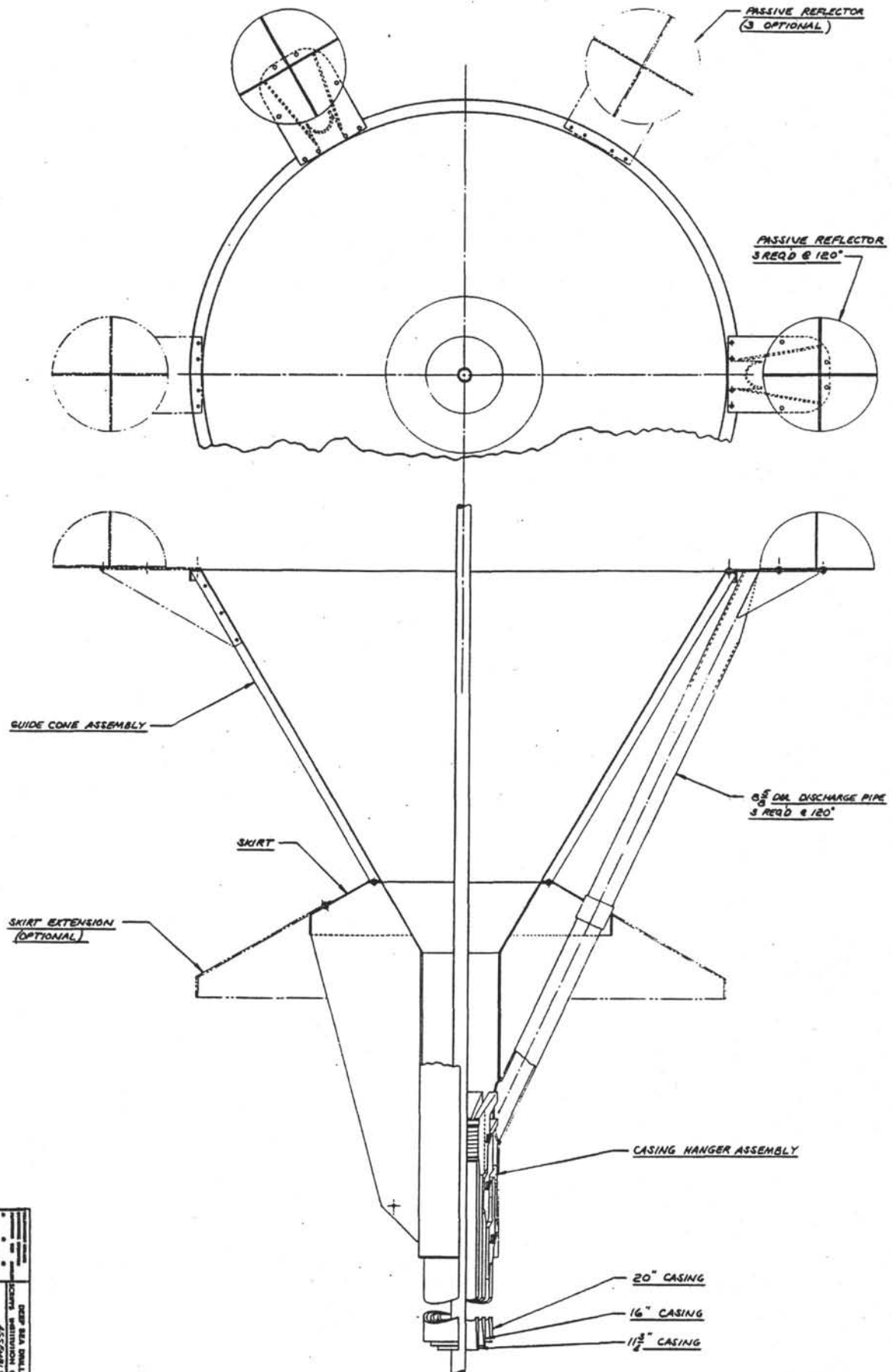


(21) 2 7/16 x 19 7/8" CORE BIT.

RE-ENTRY/ TRIPLE CASING STRING SYSTEM  
 SEQUENCE DRAWING NO. FOUR OF FOUR  
 DRILLING AHEAD 9 7/8" HOLE

UNIV. OF CALIF. DEEP SEA DRILLING PROJ.		
DATE 2-22-77	APPROVED BY: <i>[Signature]</i>	DRAWN BY P.
DRILLING AHEAD 9 7/8" HOLE		
		DRAWING NUMBER R-574-00





DATE	BY	CHKD	APP'D	DESCRIPTION
				DEEP SEA DRILLING PROJECT
				WELLHEAD ASSEMBLY
				ASSEMBLY
				DRILLER'S COPY AND 001.4.1117
				CONTRACT NUMBER
				1/5
				D-0-01700
				DR. 001.4.1117

11

11 3/4" LATCH RING  
DWG. # C-0H4320

SHOULDER RING  
DWG. # C-0H4722

16" LATCH RETAINING RING  
DWG. # C-0H4711

LATCH GROOVE RING  
DWG. # C-0H4706

16" CSG. HANGER ASS'Y  
DWG. # D-0H4708

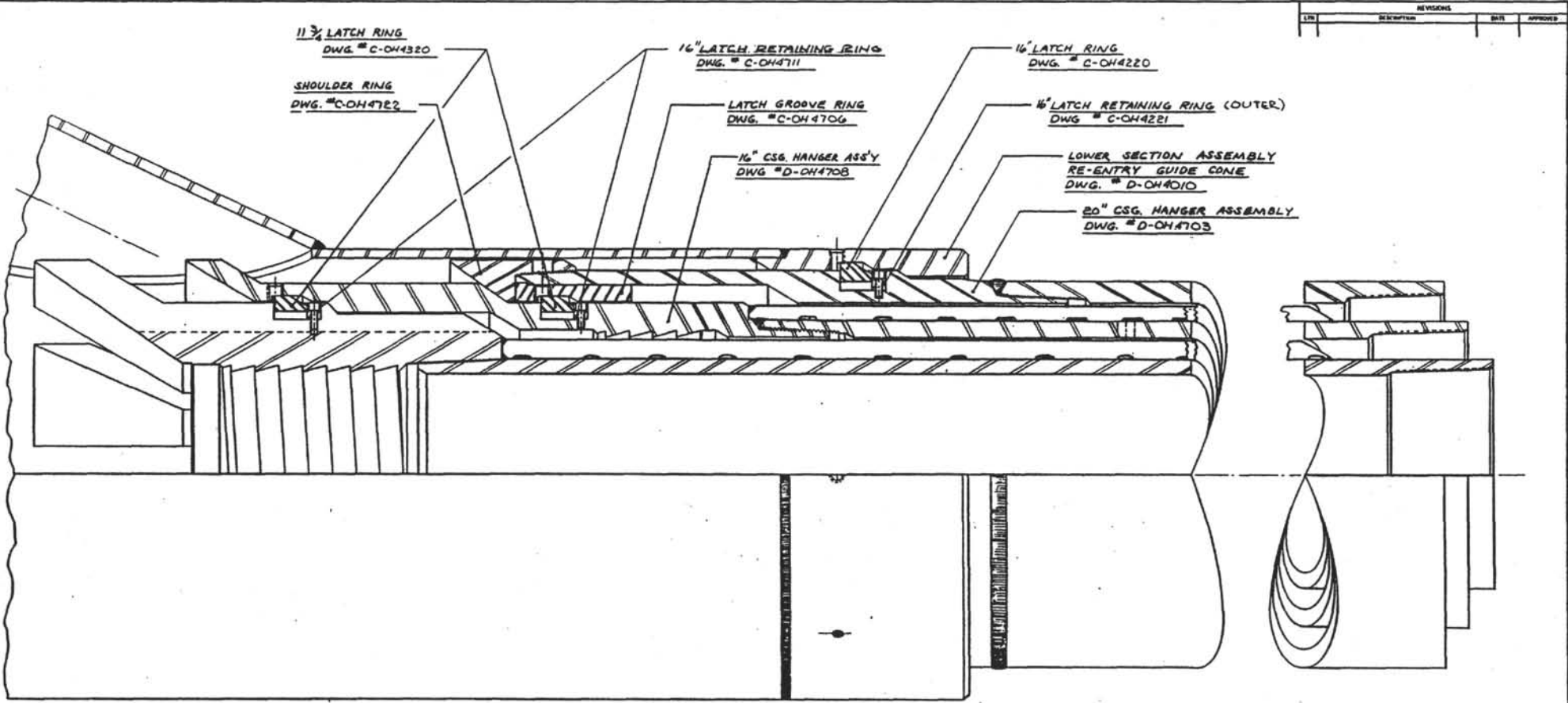
16" LATCH RING  
DWG. # C-0H4220

16" LATCH RETAINING RING (OUTER)  
DWG. # C-0H4221

LOWER SECTION ASSEMBLY  
RE-ENTRY GUIDE CONE  
DWG. # D-0H4010

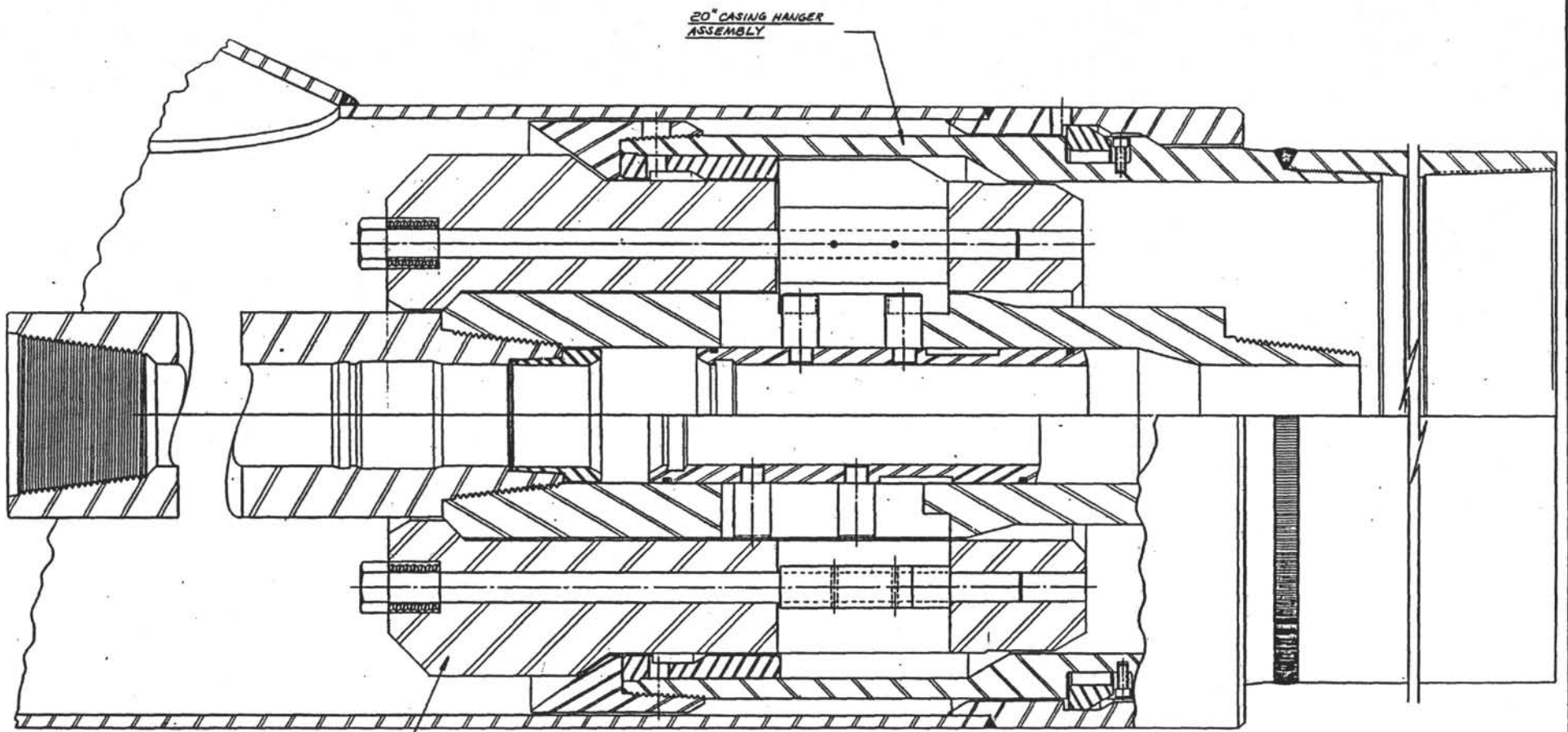
20" CSG. HANGER ASSEMBLY  
DWG. # D-0H4703

REVISIONS			
LN	DESCRIPTION	DATE	APPROVED



DESIGNED BY	DATE	DEEP SEA DRILLING PROJECT	
DRAWN BY	DATE	SCORPS INSTITUTION OF OCEANOGRAPHY	
CHECKED BY	DATE	ASSEMBLY	
APPROVED BY	DATE	20" X 16" X 11" CASING HANGER	
PROJECT NO.	SCALE	DWG. NO.	SHEET
	3/8	D-0H4701	
DO NOT SCALE DRAWING			

REVISIONS			
NO.	DESCRIPTION	DATE	APPROVED

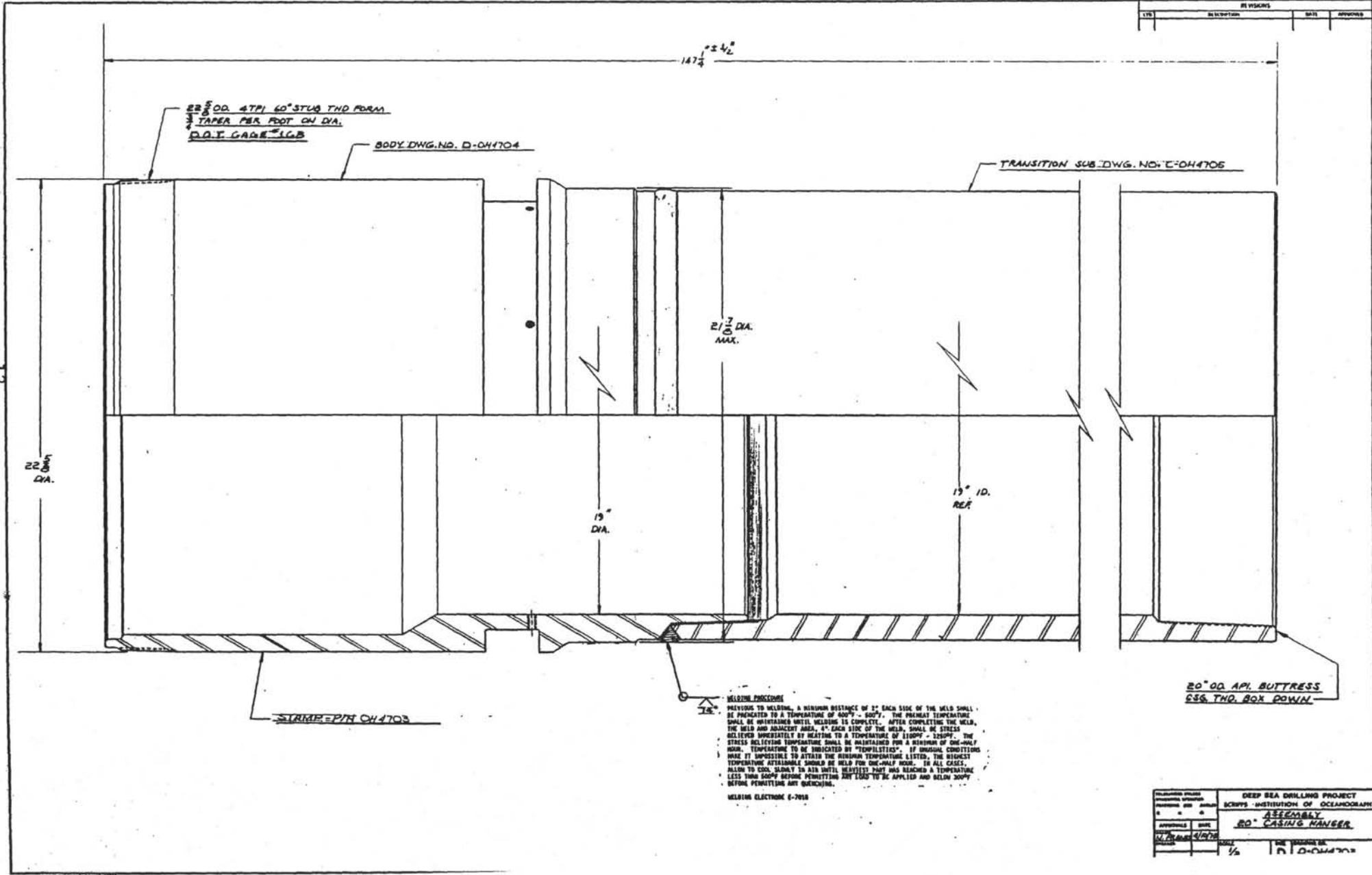


20" CASING HANGER  
ASSEMBLY

20" PADDLE TYPE  
LANDING TOOL ASSEMBLY

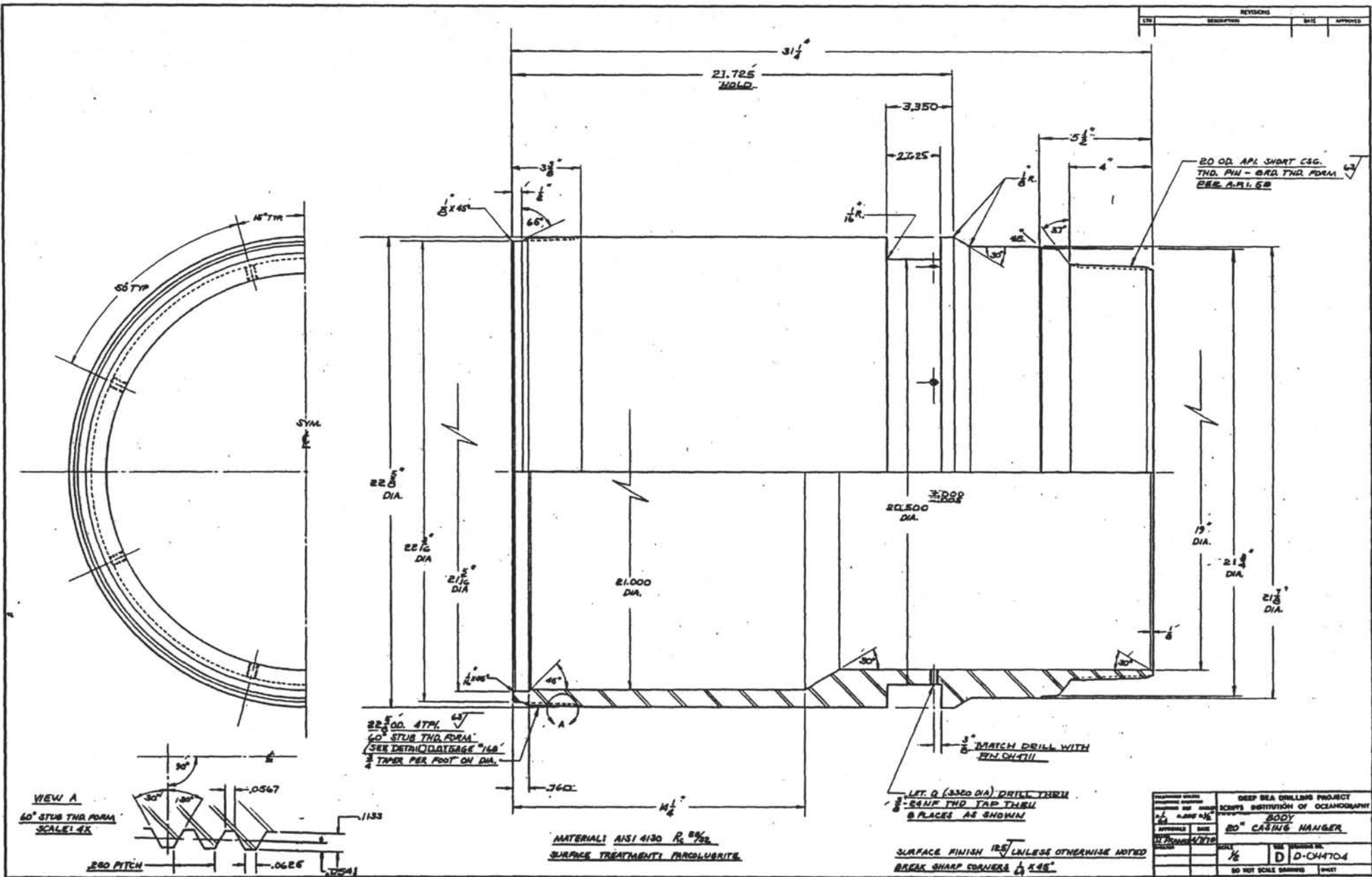
APPROVED BY	DATE	SCALE	REV	DESCRIPTION
DEEP SEA DRILLING PROJECT		SCOTT INSTITUTION OF OCEANOGRAPHY		
-LANDING ASSEMBLY-		REENTRY COLLAR AND 20" CASING		
APPROVED BY	DATE	SCALE	REV	DESCRIPTION

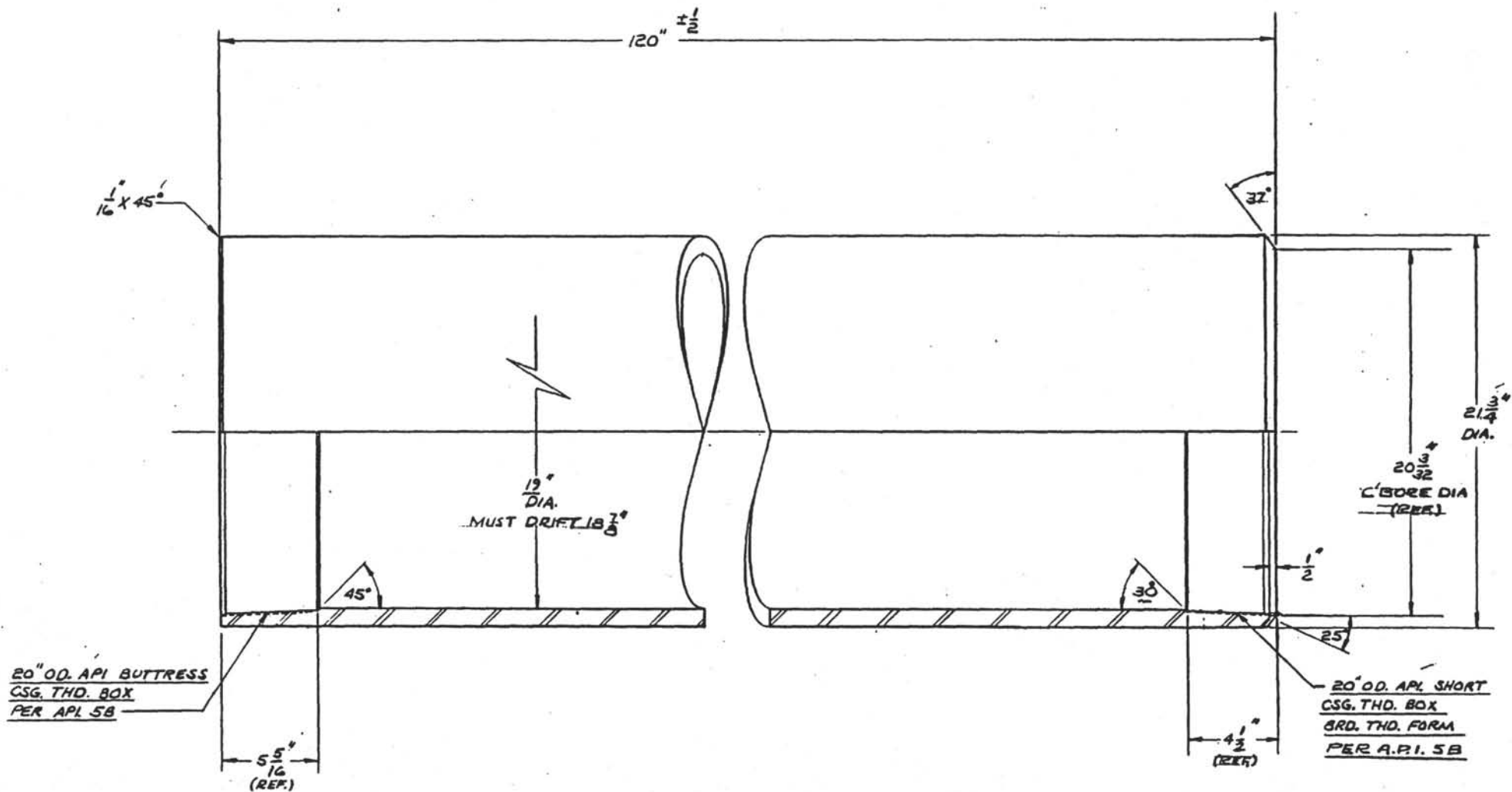
REVISIONS			
NO.	DESCRIPTION	DATE	APPROVED



DEEP SEA DRILLING PROJECT	
SCRS - INSTITUTION OF OCEANOGRAPHY	
ASSEMBLY	
20" CASING NANSER	
APPROVED	DATE
DATE	DATE
DATE	DATE
DATE	DATE





MATERIAL22" O.D.  $\times$  1/2" WALL PIPE

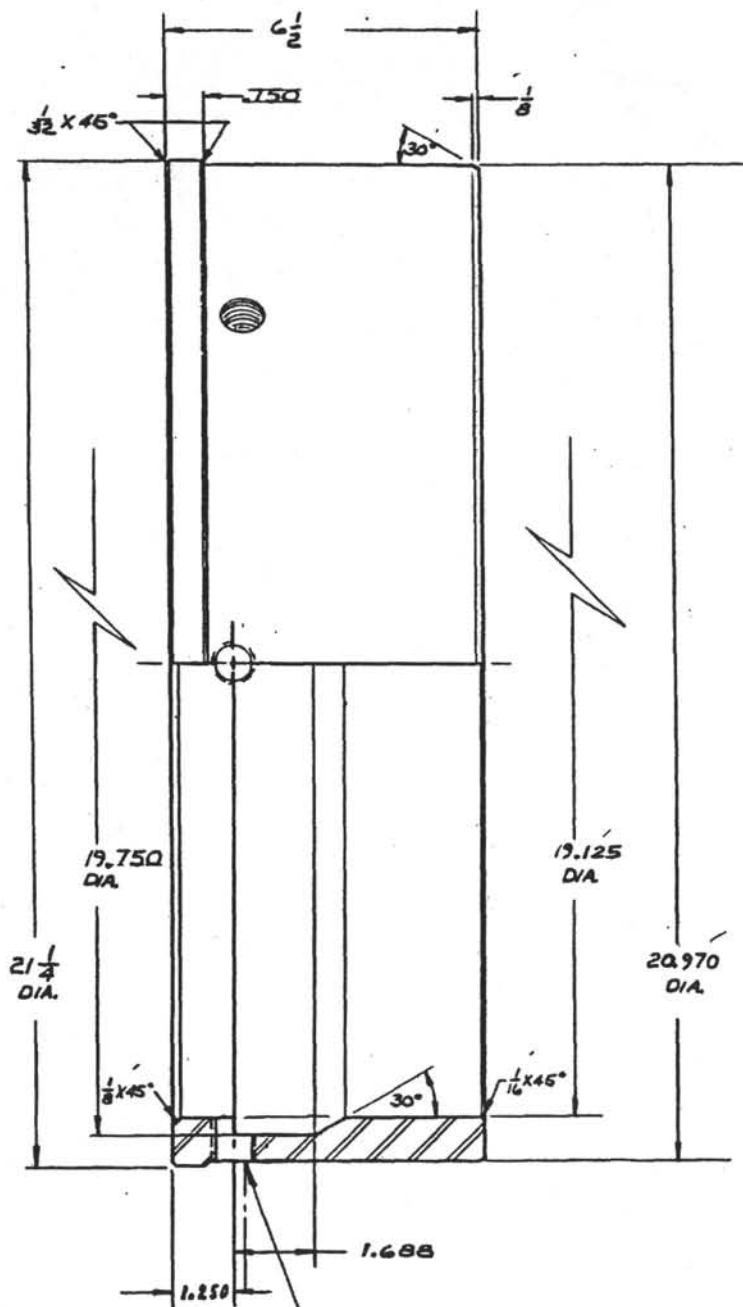
GRADE A-106B

MUST DRIFT 1/8"

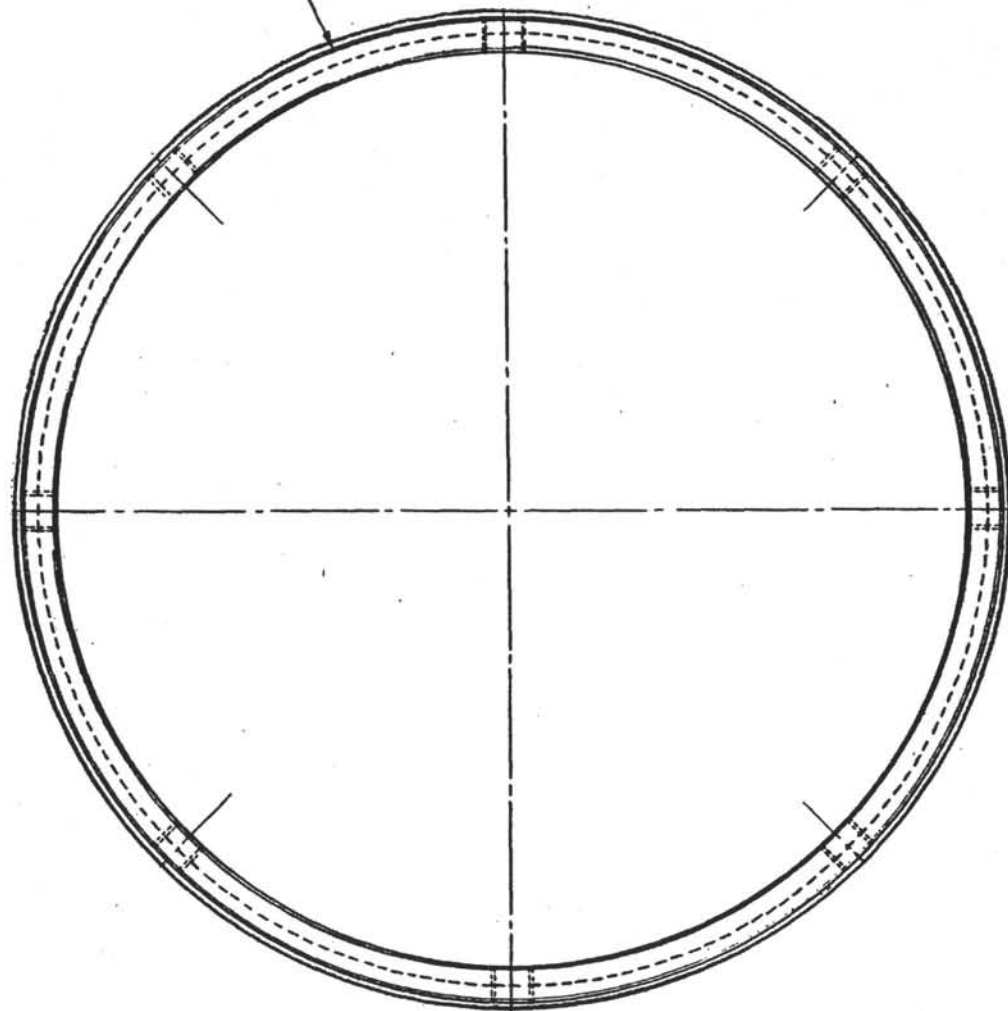
TOLERANCES UNLESS OTHERWISE NOTED

FRACTIONS  $\pm$  1/4 DECIMALS  $\pm$  .005ANGLES  $\pm$  1/2° CONCENTRICITY .005 TIRO.D. SURFACE FINISH 125  $\sqrt$  L.D. PER SPECA-106BBREAK SHARP CORNERS 1/4"  $\times$  45°DEEP SEA DRILLING PROJECT  
SCRIPPS INSTITUTION OF OCEANOGRAPHY

SCALE: 1/4"	APPROVED BY:	DRAWN BY: A. F. FRANKS
DATE: 4/10/78		REVISED:
TRANSITION SUB 20" CASING HANGER		
		DRAWING NUMBER C-04705



STAMP  
PIN-OH4706



1.688  
1.250

$\frac{43}{64}$  DIA. DRILL THRU  
 $\frac{7}{8}$  - 20 NC THD. THRU  
8 PLACES 45° APART

MATERIAL

AISI 4142  $R_c^{29/32}$  PARCOLUBRITE AFTER FINISH MACHINE

TOLERANCES UNLESS OTHERWISE NOTED

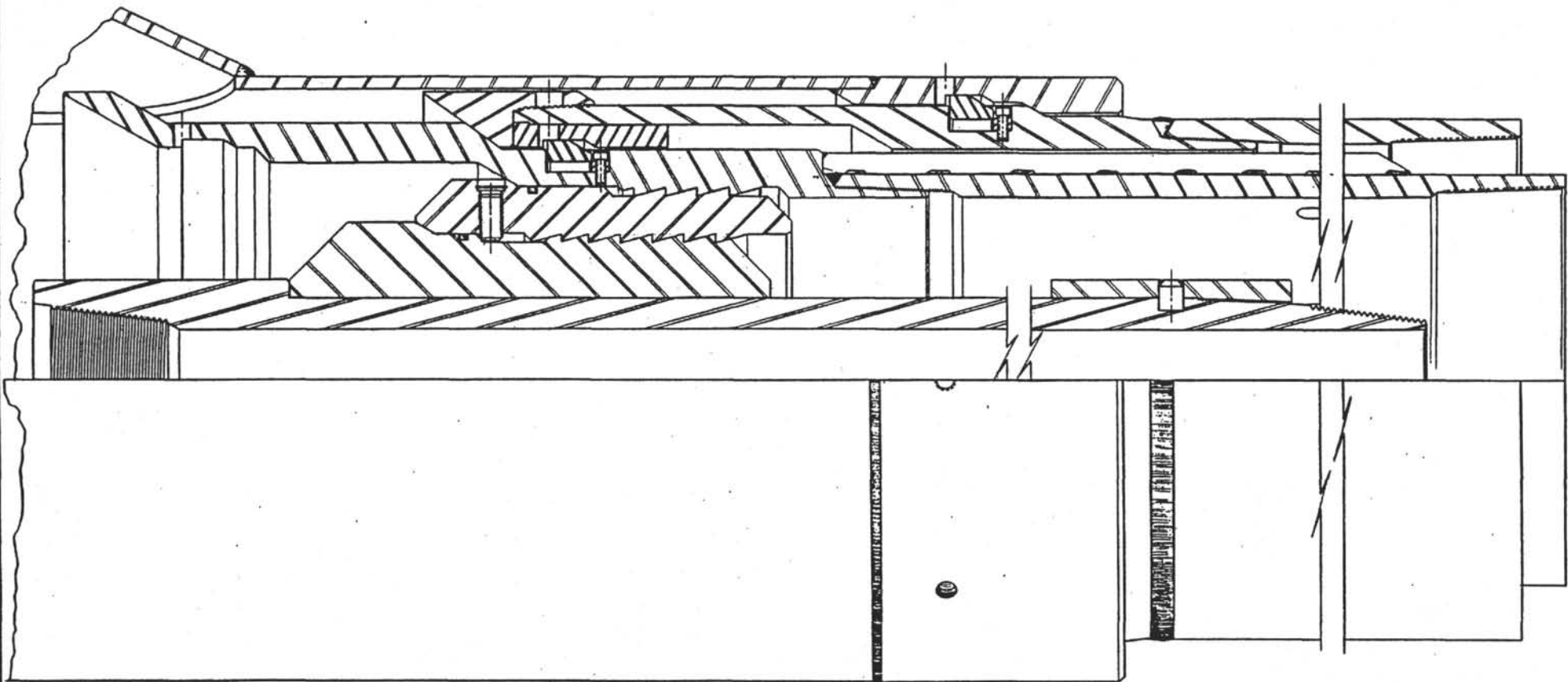
FRACTIONS  $\pm \frac{1}{64}$  DECIMALS  $\pm .005$   
ANGLES  $\pm \frac{1}{2}^\circ$  CONCENTRICITY .005 TIR.

SURFACE FINISH  $125 \sqrt{\text{IN}}$  UNLESS OTHERWISE NOTED  
BREAK SHARP CORNERS  $\frac{1}{64} \times 45^\circ$

DEEP SEA DRILLING PROJECT  
SCRIPPS INSTITUTION OF OCEANOGRAPHY

SCALE: $\frac{1}{2}$	APPROVED BY:	DRAWN BY: AL FRANKS
DATE: 4/13/78	REVISION:	
- LATCH GROOVE RING - 20" CASING HANGER		
DRAWING NUMBER: PIN-OH4706		604706

REVISIONS			
NO.	DESCRIPTION	DATE	APP'D.



PROJECT NO.	D-041707
DATE	10/1/70
SCALE	1/2"
BY	D
CHECKED	D
APPROVED	D
DATE	10/1/70
DO NOT SCALE DIMENSIONS	

DEEP SEA DRILLING PROJECT  
SCIENTIFIC INSTITUTION OF OCEANOGRAPHY

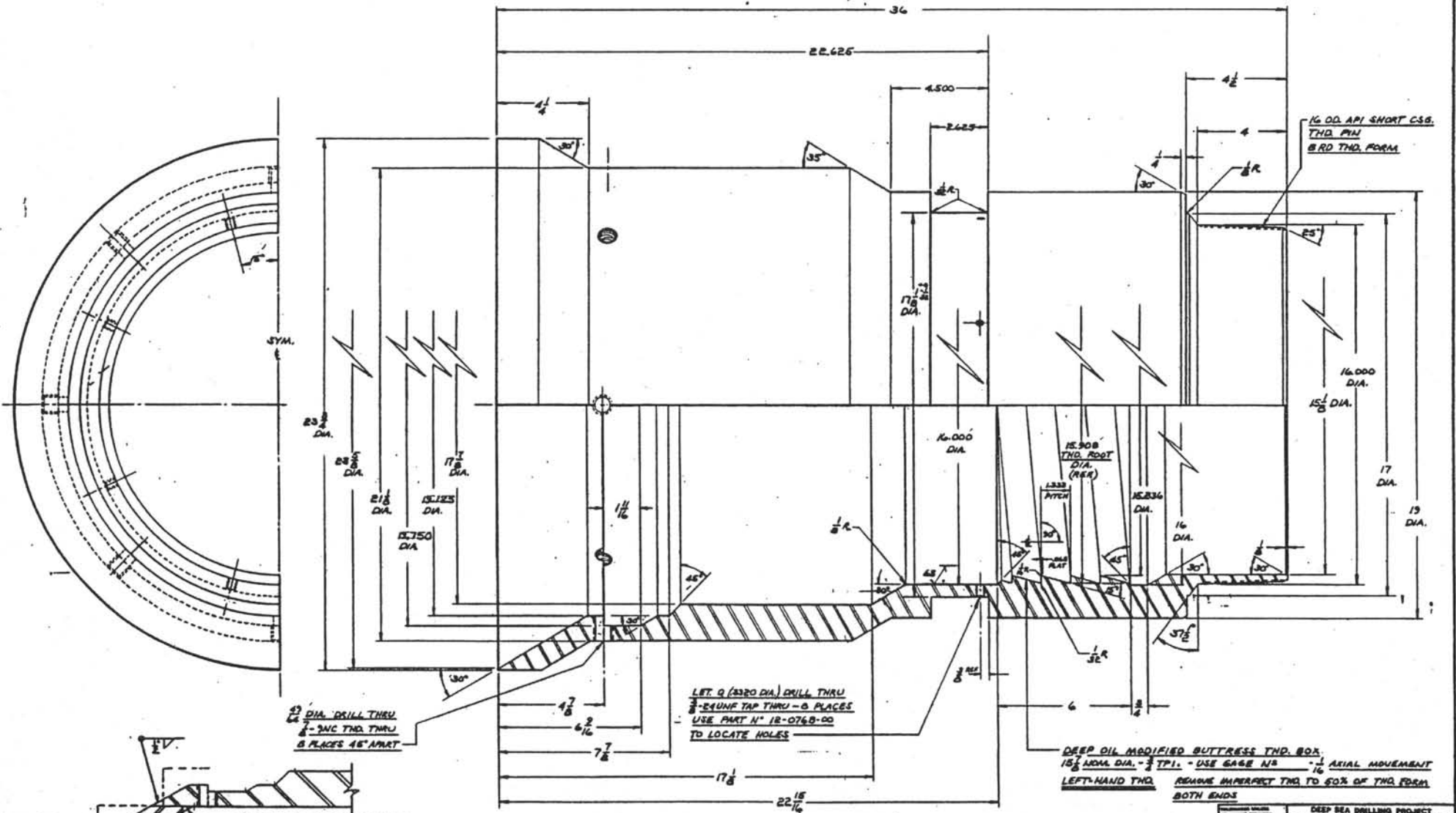
LANDING ASSEMBLY -  
16" CASING

D-041707

DO NOT SCALE DIMENSIONS



REV	DESCRIPTION	DATE	APPROVED



16 OD API SHORT C.S.G.  
THD. PIN  
8 RD THD. FORM

SYM.

22 DIA. DRILL THRU  
7-2NC THD THRU  
6 PLACES 45° APART

LET Ø (Ø320 DIA) DRILL THRU  
3/8-24UNC TAP THRU - 6 PLACES  
USE PART N° 12-0769-00  
TO LOCATE HOLES

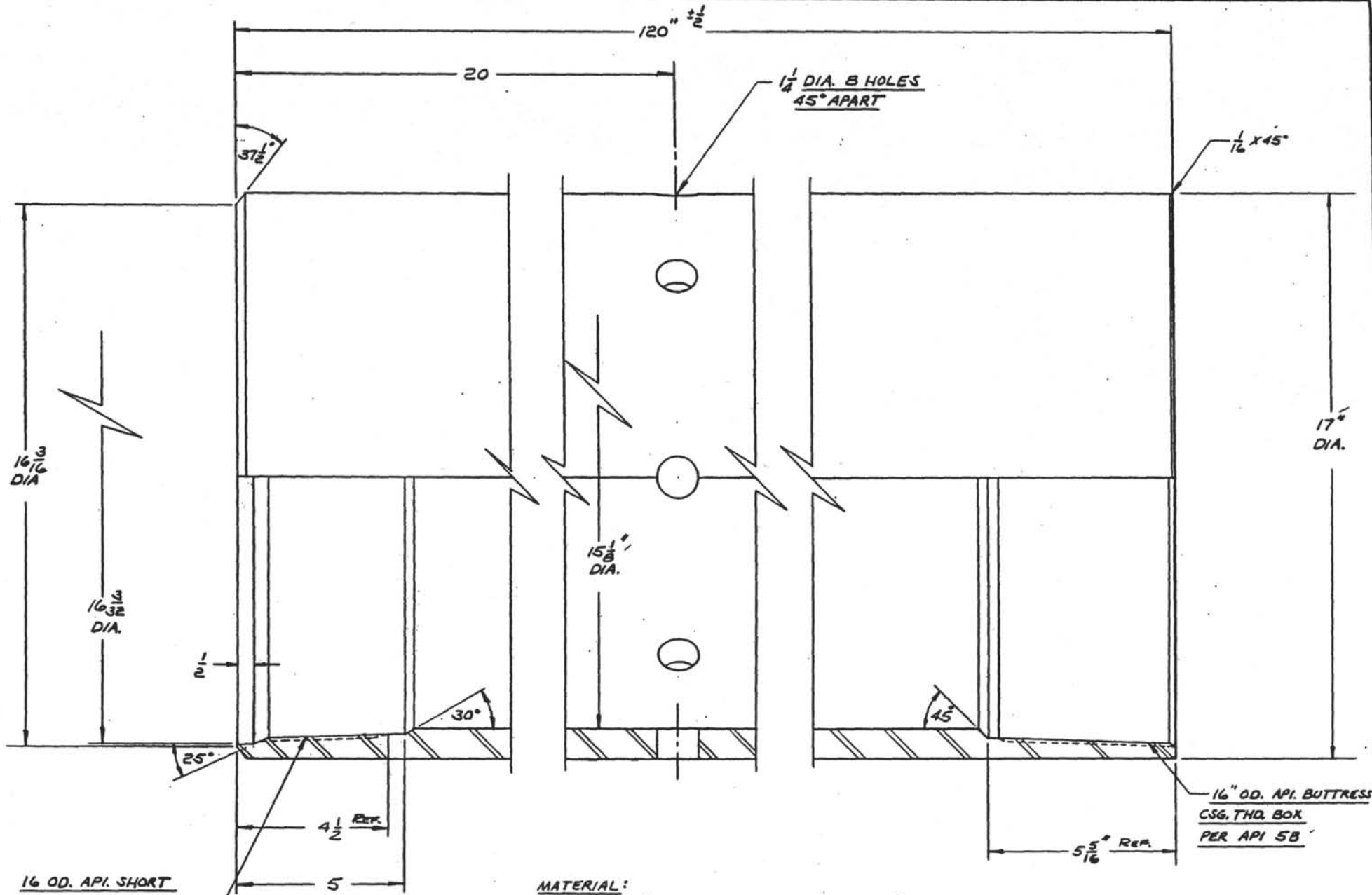
DEEP OIL MODIFIED BUTTRESS THD. BOX  
15 1/8 NOM. DIA. - 3/4 TPI. - USE GAGE N° 16 - 1/16 AXIAL MOVEMENT  
LEFT-HAND THD. REMOVE IMPERFECT THD. TO 60% OF THD. FORM  
BOTH ENDS

SEE SPEC. ON DWG. D-0411-00  
WELDING FABRICATION  
STEP FINISH PREFERRED, IF UNAVAILABLE,  
SATISFACTORY TO WELD BOND-BILL AS SHOWN  
BEFORE HEAT-TREATING.

MATERIAL: ANSI 4330 P<sub>6</sub> 88/792  
SURFACE TREATMENT: PARCOLUBRITE

DIAMETERS CONCENTRIC .005 TH.  
BREAK SHARP CORNERS 1/4" X 45°  
SURFACE FINISH 125/10 UNLESS OTHERWISE NOTED

DEEP SEA DRILLING PROJECT		SCIENTIFIC INSTITUTION OF OCEANOGRAPHY	
BODY		16" CASING MANAGER	
DATE	1/2	REV	D
APPROVED		DATE	0-04709
DO NOT SCALE DRAWING		SHEET	

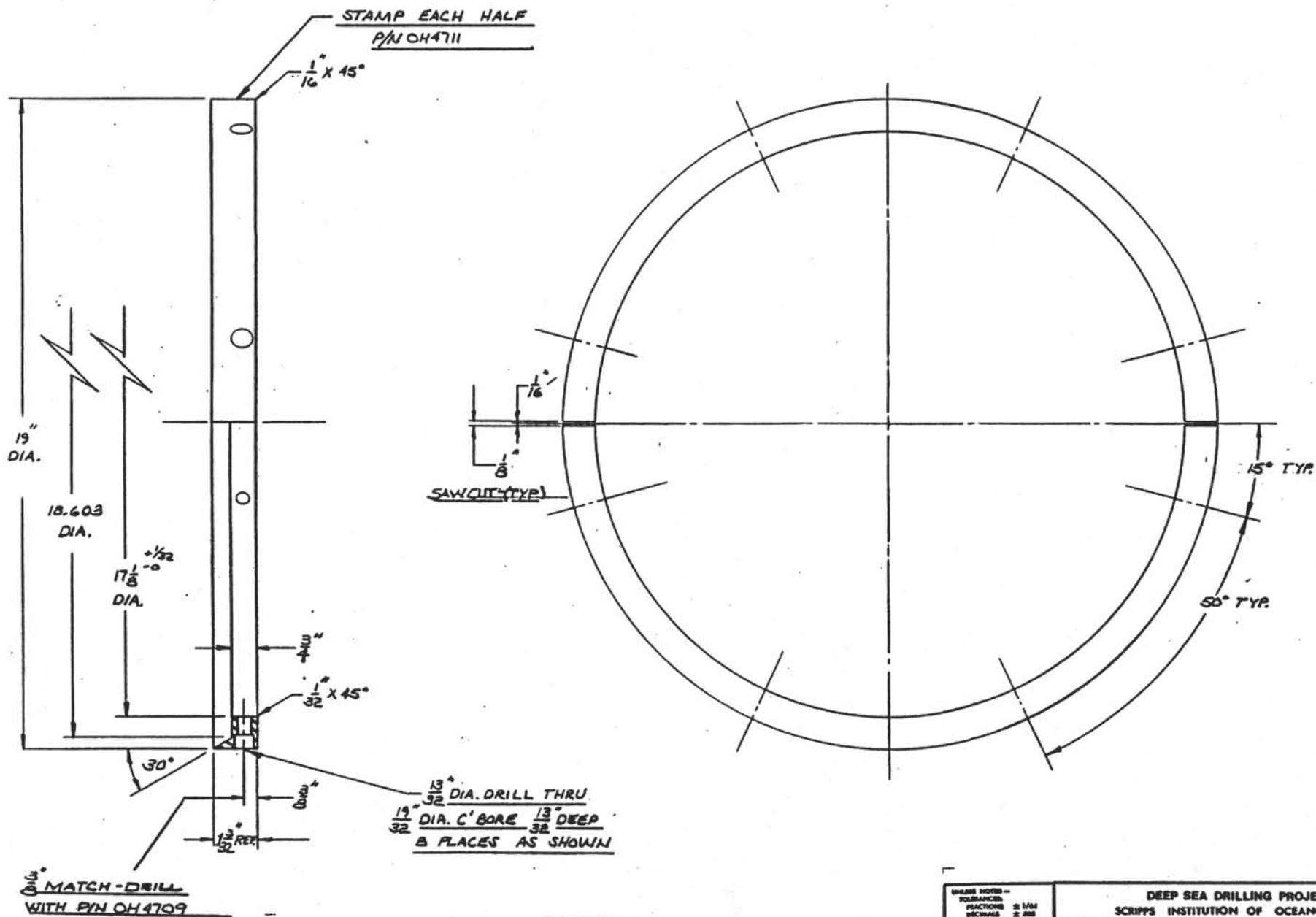


16 OD. API. SHORT  
CSG. THD. BOX.  
PER API 5B

MATERIAL:  
17" OD. 1" WALL PIPE MUST DRIFT 15"  
GRADE A106B

O.D. SURFACE FINISH PER A106B

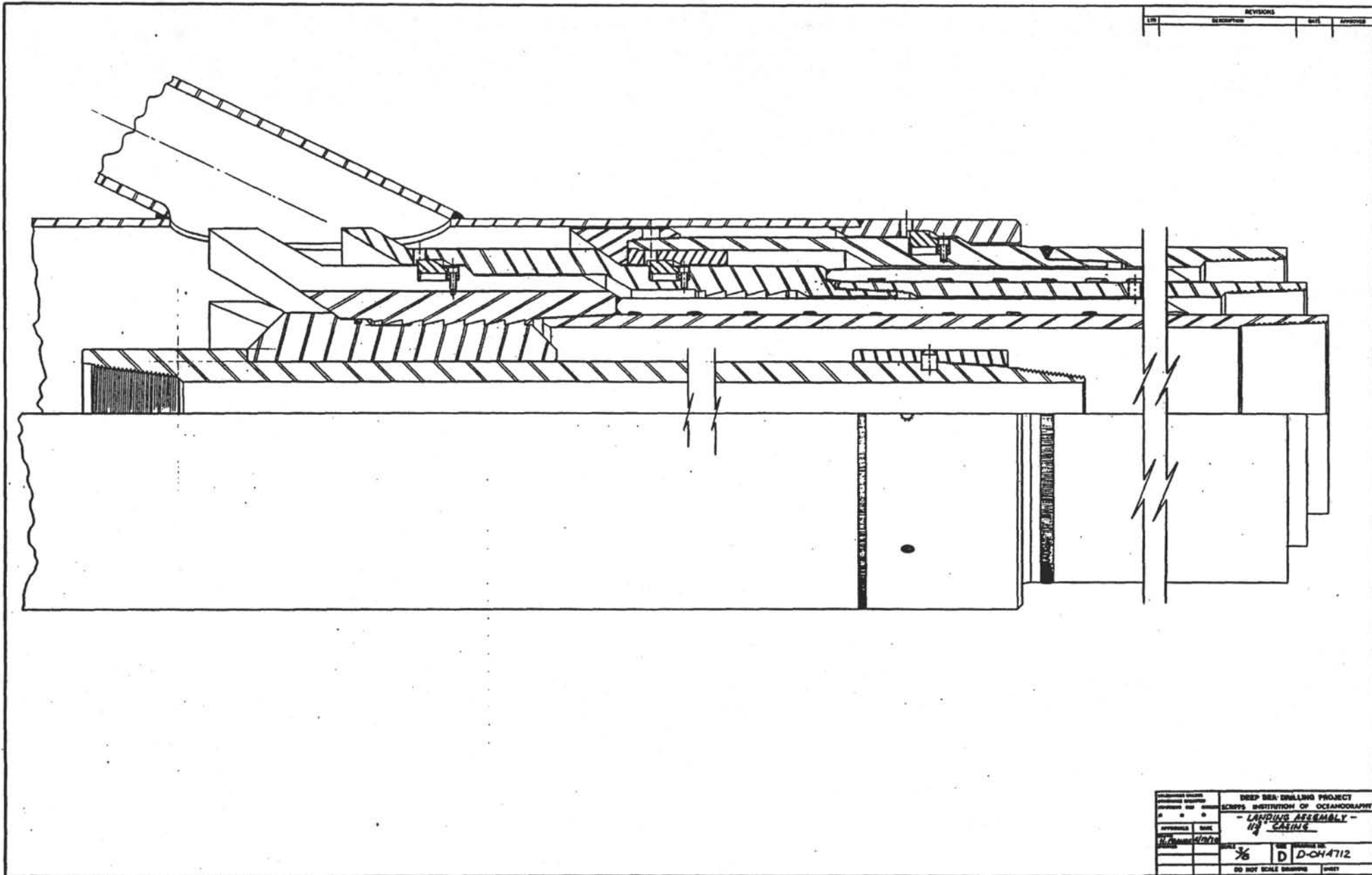
DEEP SEA DRILLING PROJECT SCRIPPS INSTITUTION OF OCEANOGRAPHY		
TOLERANCES - FRACTIONS ± 1/32 DECIMALS ± .005 ANGLES ± 15" FINISH - 125 RMS CORROSION - 1/64 ± .01" W LUGS	SCALE: 1/2 DATE: 4/11/78	APPROVED BY: DRAWN BY AL FRANKS REVISED
SURFACE TREATMENT HEAT TREATMENT		TRANSITION SUB 16" CASING HANGER
		DRAWING NUMBER



MATERIAL  
AISI 1018

UNLESS NOTED— TOLERANCES: FRACTIONS ± 1/32 DECIMALS ± .005 ANGLES ± 1'		DEEP SEA DRILLING PROJECT SCRIPPS INSTITUTION OF OCEANOGRAPHY	
FINISH: 125 RMS CORROS: 1/32 ± .005 ± LMS	SCALE: $\frac{1}{2}$	APPROVED BY:	DRAWN BY AL FRANK
SURFACE TREATMENT: PARALUBATE	DATE: 4/17/78	REVISOR:	
HEAT TREATING:	16" LATCH RETAINING RING 20" X 16" ASSY		DRAWING NUMBER: COH4711
	P/N OH4711		



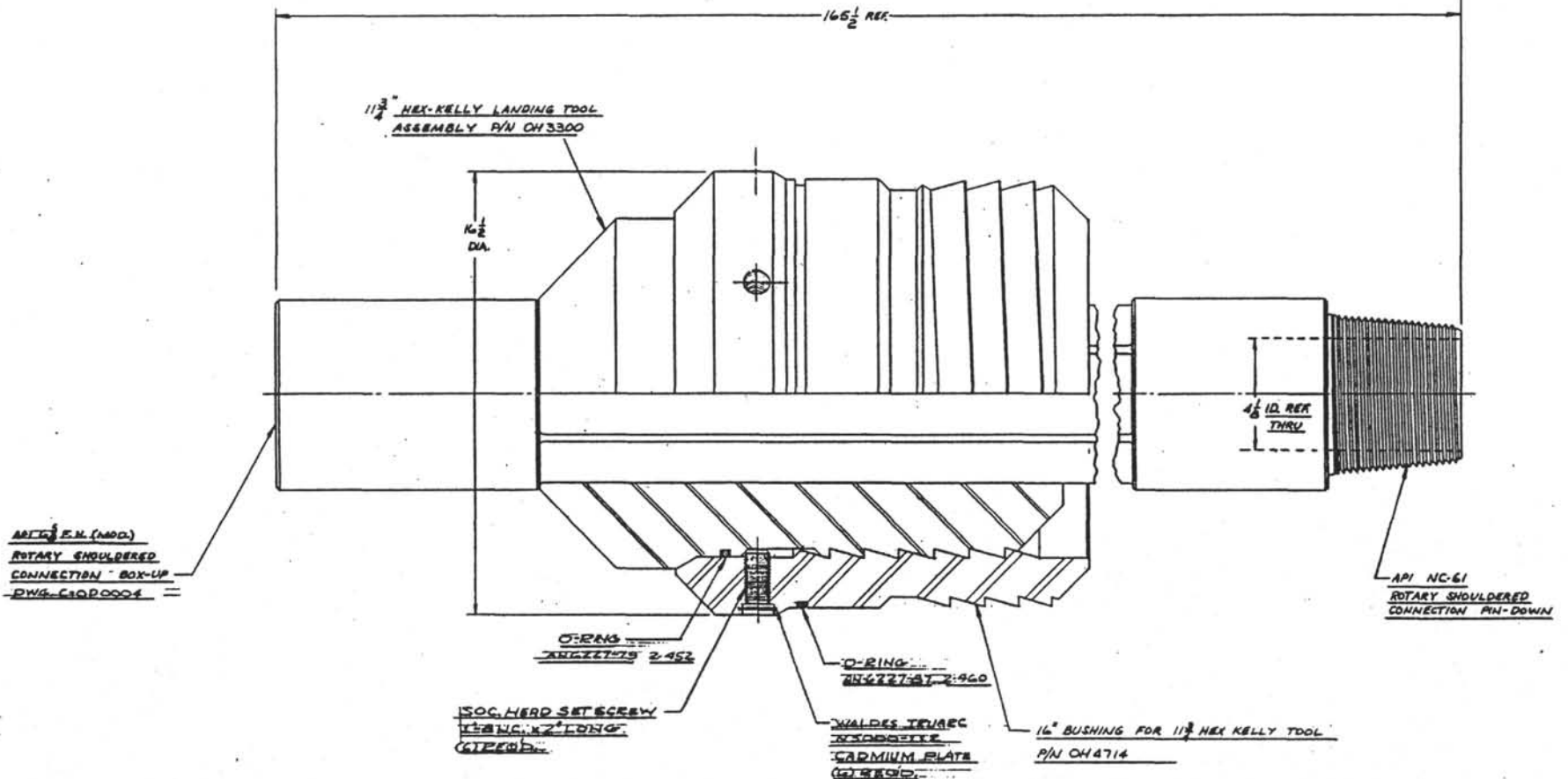


REVISIONS			
NO.	DESCRIPTION	DATE	APPROVED

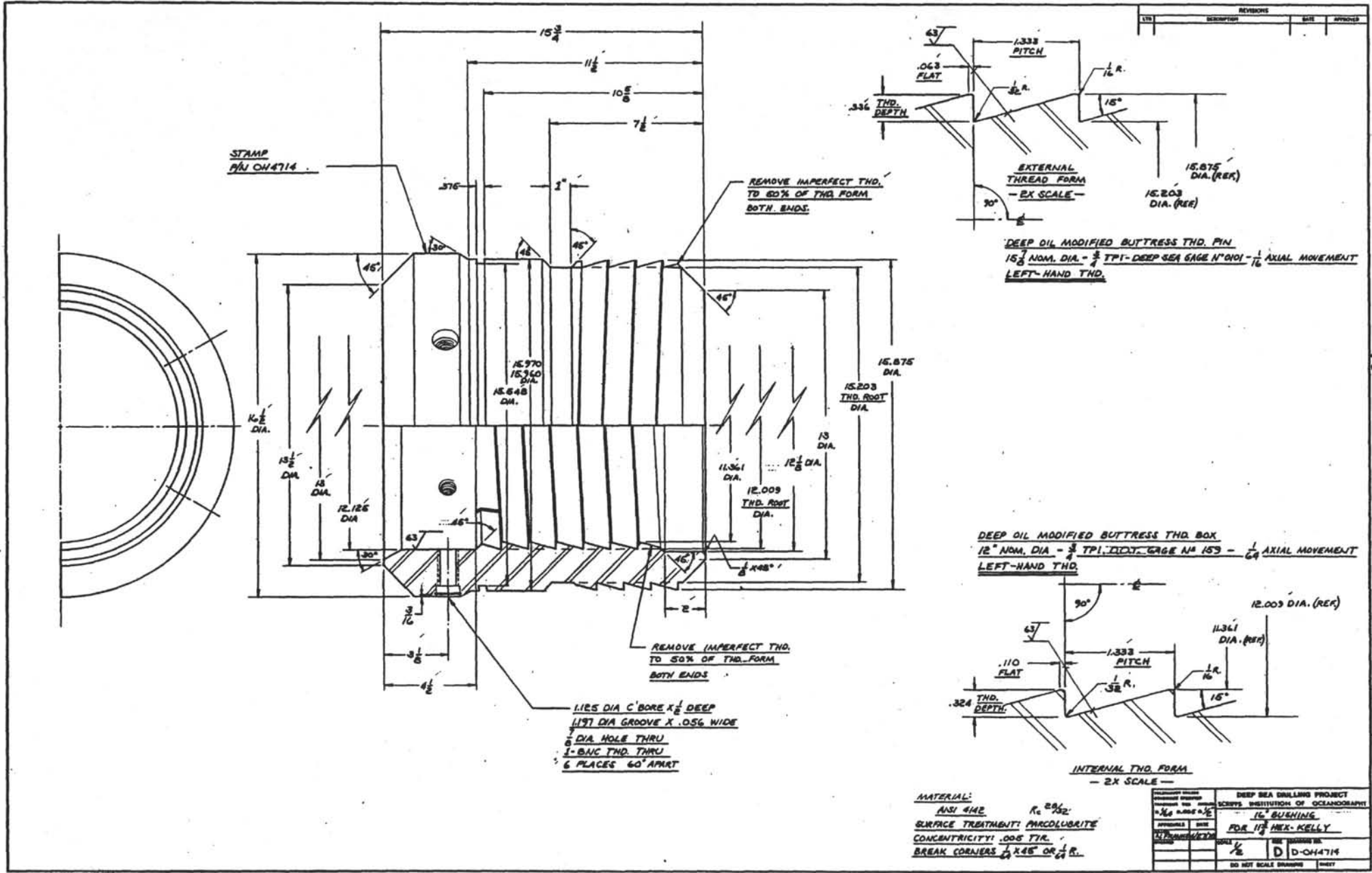
22

PROJECT	DEEP SEA DRILLING PROJECT
INSTITUTION	SCIENTIFIC INSTITUTION OF OCEANOGRAPHY
TITLE	LANDING ASSEMBLY - 1 1/2" CASING
DATE	1/2/68
SCALE	3/8" = 1"
DR	D
NO.	D-CH4712
DO NOT SCALE DRAWING	

REVISIONS			
LN	DESCRIPTION	DATE	APPROVED



DEEP SEA DRILLING PROJECT	
SCOTT INSTITUTION OF OCEANOGRAPHY	
1 1/4" HEX-KELLY LANDING TOOL ASSEMBLY	
DATE	DATE
1/2	D
DO NOT SCALE DRAWING	



STAMP  
PIN ON 4714

REMOVE IMPERFECT THD.  
TO 50% OF THD FORM  
BOTH ENDS.

REMOVE IMPERFECT THD.  
TO 50% OF THD FORM  
BOTH ENDS.

1.125 DIA C'BORE X 1/2 DEEP  
1.197 DIA GROOVE X .056 WIDE  
1/8 DIA HOLE THRU  
1/8 BNC THD THRU  
6 PLACES 60° APART

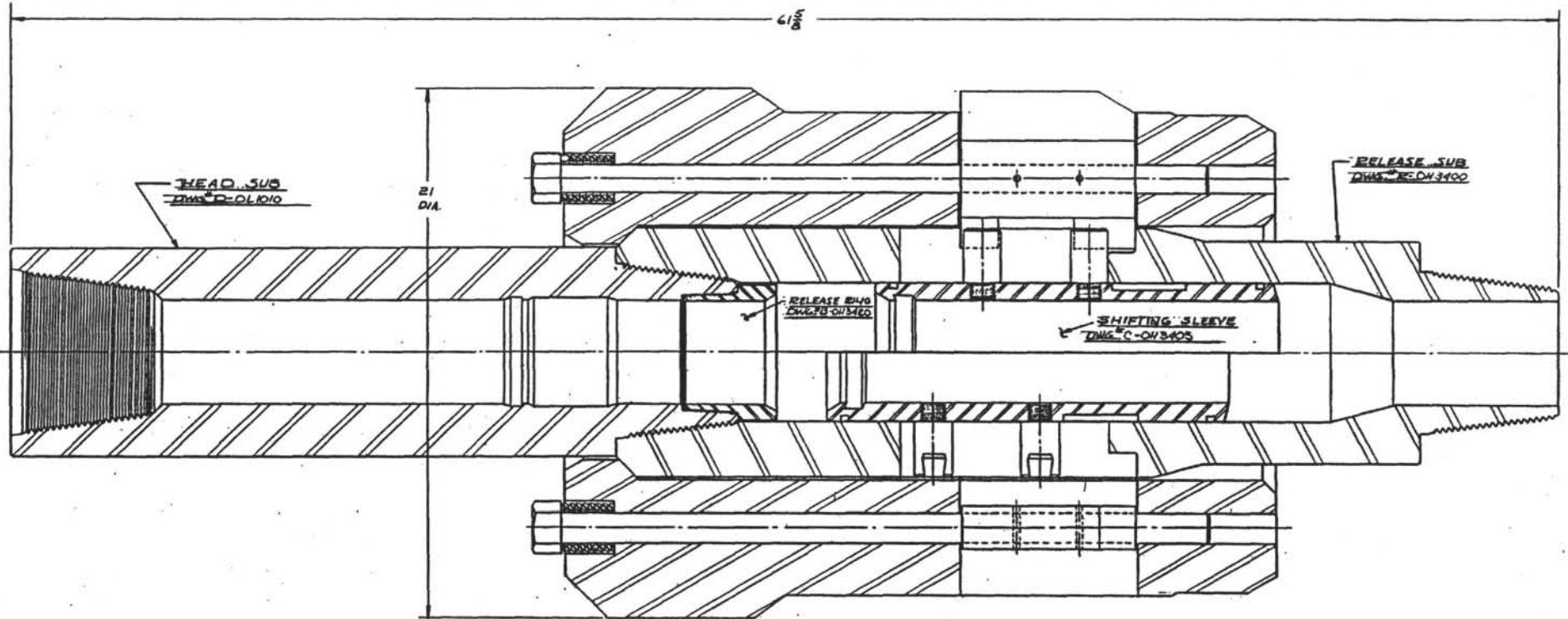
DEEP OIL MODIFIED BUTTRESS THD. PIN  
15 3/8 NOM. DIA. - 3/4 TPI - DEEP SEA GAGE N° 001 - 1/16 AXIAL MOVEMENT  
LEFT-HAND THD.

DEEP OIL MODIFIED BUTTRESS THD. BOX  
12" NOM. DIA. - 3/4 TPI - DEEP SEA GAGE N° 159 - 1/64 AXIAL MOVEMENT  
LEFT-HAND THD.

MATERIAL:  
ANSI 4142 R<sub>c</sub> 28 1/2  
SURFACE TREATMENT: PARCOLLUBRITE  
CONCENTRICITY: .005 TIR  
BREAK CORNERS: 1/8 R45 OR 1/8 R.

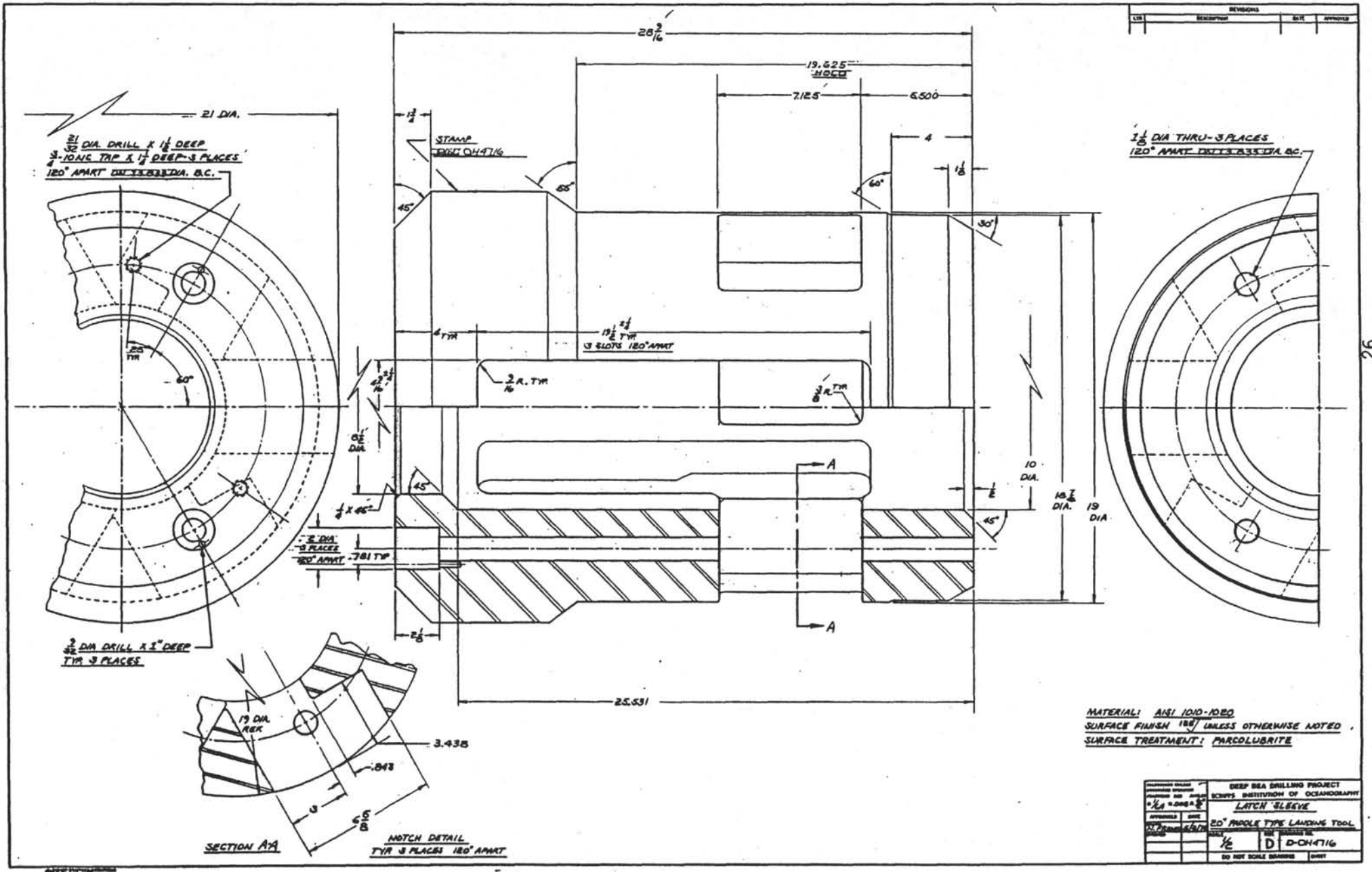
REV	DESCRIPTION	DATE	APPROVED

DEEP SEA DRILLING PROJECT		SCREWS INSTITUTION OF OCEANOGRAPHY	
PROJECT NO. 16		16" BUSHING	
FOR 1 1/2" HMK-KELLY		D D-04714	
SCALE: 1/2	DATE: 1/2	DO NOT SCALE DRAWING	



REVISIONS			
NO.	DESCRIPTION	DATE	APPROVED

DESIGNED BY	DEEP SEA DRILLING PROJECT
DRAWN BY	SCRIPS INSTITUTION OF OCEANOGRAPHY
CHECKED BY	ASSEMBLY
DATE	20" PADDLE-TYPE LANDING TOOL
SCALE	1/2" = 1'-0"
NO.	D-04715
DO NOT SCALE DRAWING	

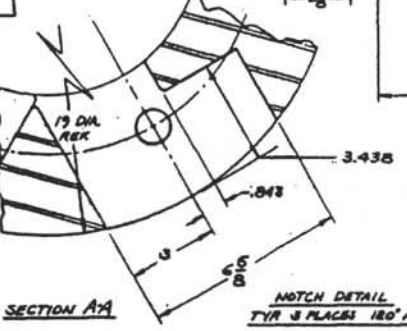


REV	DESCRIPTION	DATE	APPROVED

21 DIA.  
 21 DIA. DRILL X 1/8" DEEP  
 3- JONGE TAP X 1/8" DEEP-3 PLACES  
 120° APART ON 13.833 DIA. B.C.

1 1/8" DIA THRU-3 PLACES  
 120° APART ON 13.833 DIA. B.C.

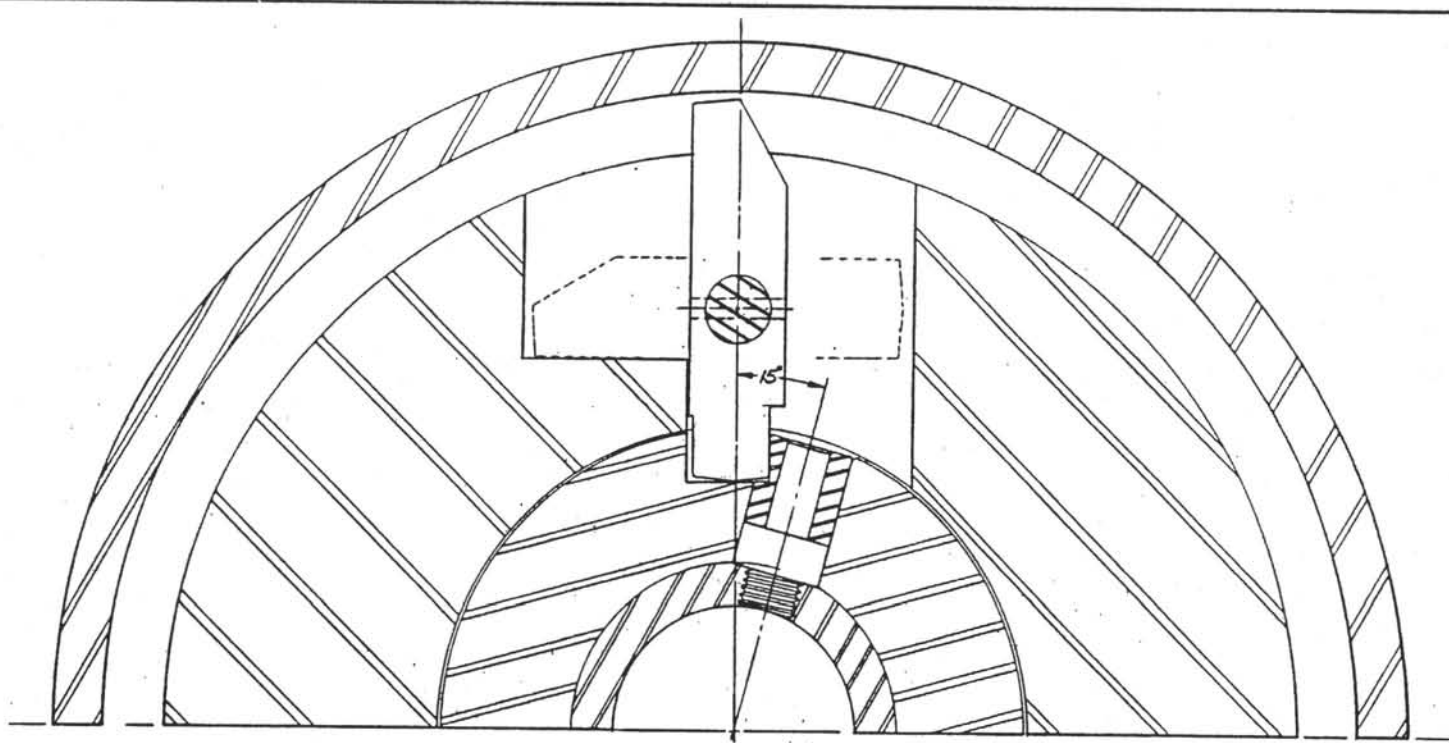
3/8" DIA DRILL X 1/2" DEEP  
 7/16" 3 PLACES



MATERIAL: AISI 1010-1020  
 SURFACE FINISH: 125 UNLESS OTHERWISE NOTED  
 SURFACE TREATMENT: PARCOLUBRITE

PROJECT NAME	DEEP SEA DRILLING PROJECT
PROJECT NUMBER	SCIENTIFIC INSTITUTION OF OCEANOGRAPHY
PROJECT TITLE	LATCH SLEEVE
APPROVAL	DATE
DESIGNED BY	20" PIVOT TYPE LANDING TOOL
CHECKED BY	DATE
	1/2" D D-CH-716
	DO NOT SCALE DRAWING

27

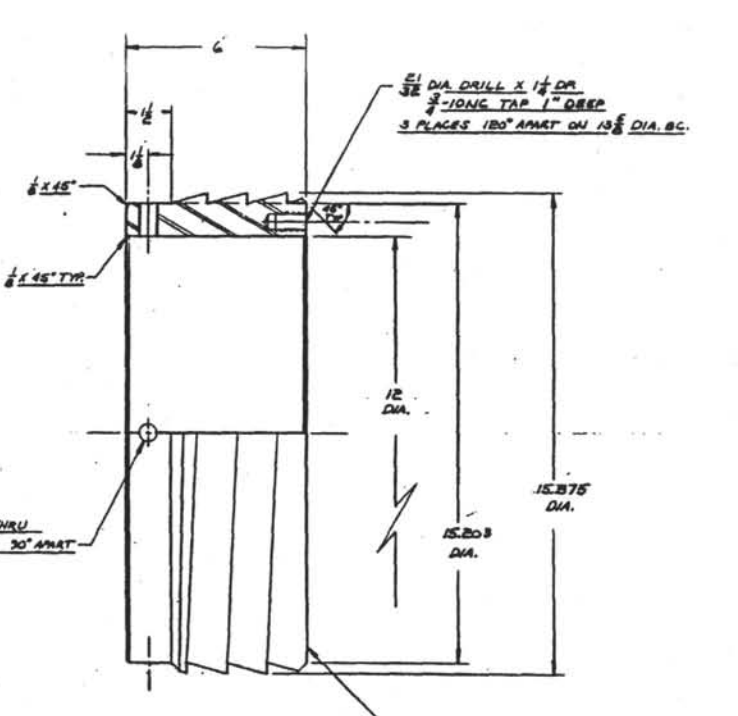
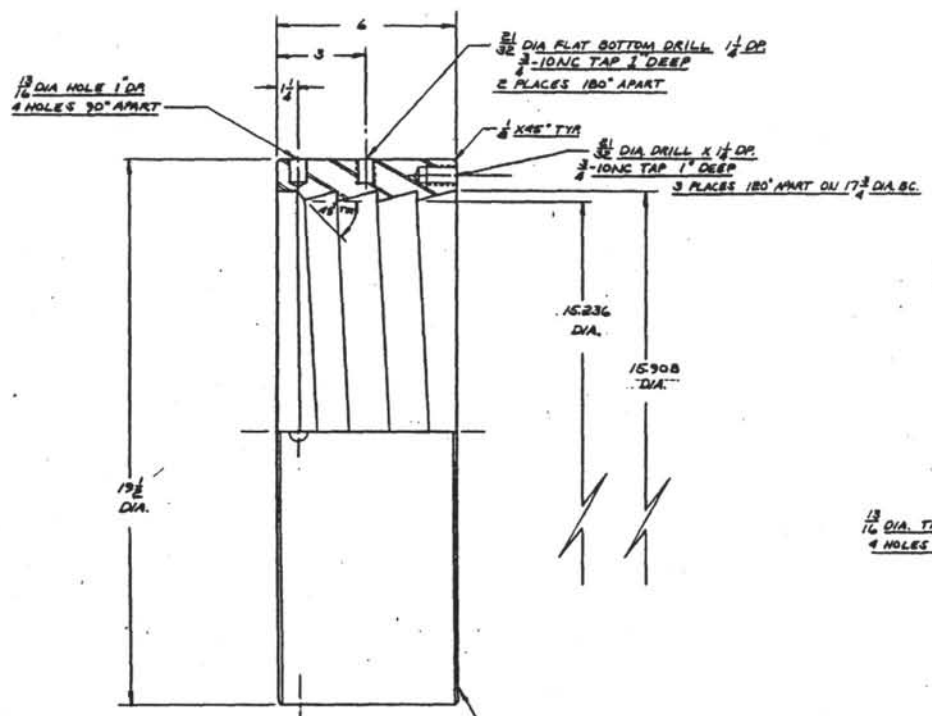


REVISIONS			
NO.	DESCRIPTION	DATE	APPROVED

PROJECT	DEEP SEA DRILLING PROJECT
INSTITUTION	SCALPS INSTITUTION OF OCEANOGRAPHY
TITLE	20 PADDLE ACTUATION
DATE	
SCALE	FULL
NO.	D-044717
DO NOT SCALE DRAWING	



REVISIONS			
NO.	DESCRIPTION	DATE	APPROVED

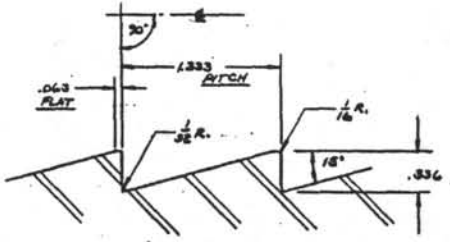


STAMP  
 DEEP SEA GAGE NO. 0101  
 15 1/2 OD LEFT HAND 3/4 TPI 1.333 PITCH  
 15 MOD. BUTT. STRT.

STAMP  
 15 7/8 OD LEFT HAND 3/4 TPI 1.333 PITCH  
 15 MOD. BUTT. STRT.

PIN GAGE

BOX GAGE

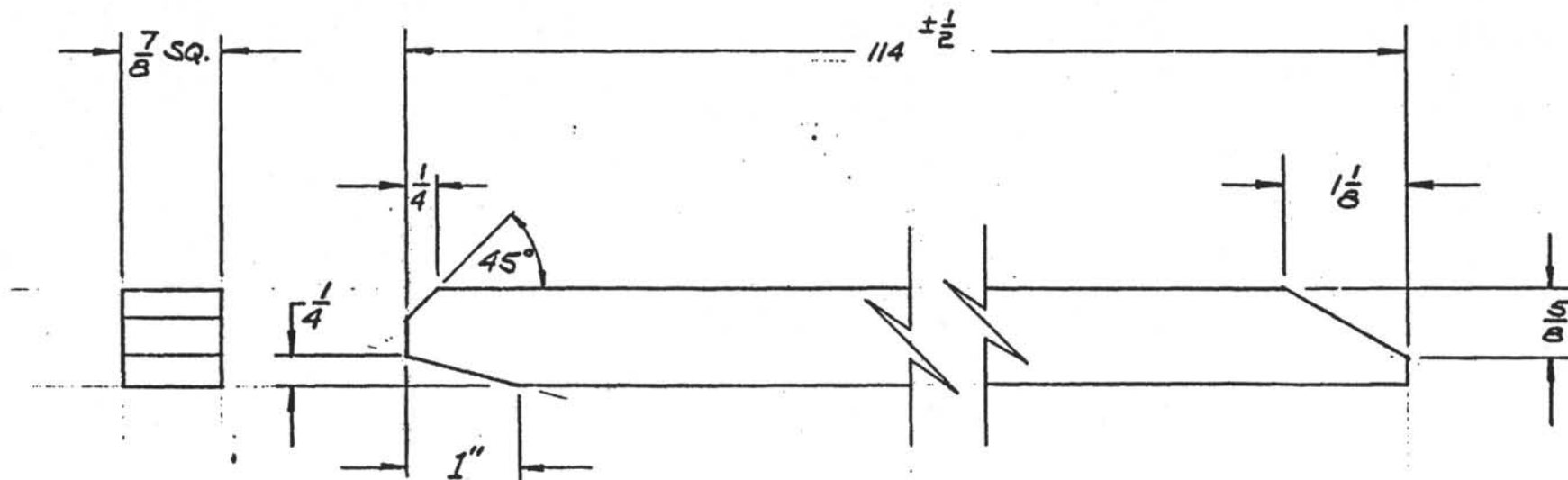


SURFACE TREAT: PARCOLUBRITE  
 CONCENTRICITY: .005 TIR  
 FIT: RING GAGE TO FIT PLUG WITH 1/16 ARIAL MOVE  
 MATERIAL: AISI 4140-4H2  
 HEAT TREAT: NORMALIZE

DESIGNED BY	DATE	DEPT.	PROJECT
APPROVED BY	DATE	DEPT.	PROJECT

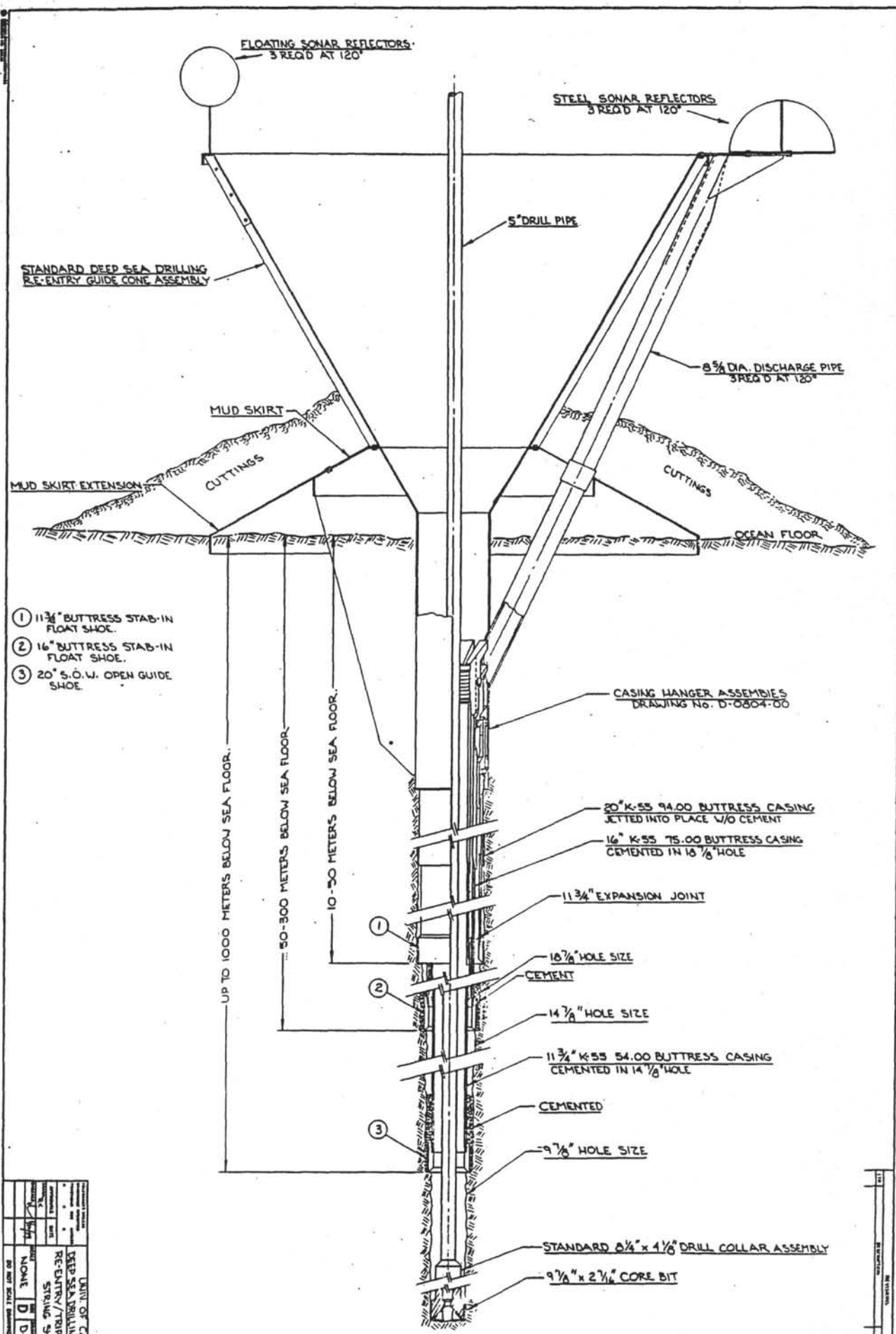
DEEP SEA DRILLING PROJECT  
 SCIENTIFIC INSTITUTION OF OCEANOGRAPHY  
 15 1/2 OD MODIFIED BUTT GAGE.  
 DATE: 1/2  
 D 0-04719  
 DO NOT SCALE DRAWING





MATERIAL  
AISI 1010-1020

UNLESS NOTED - TOLERANCES: FRACTIONS ± 1/64 DECIMALS ± .005 ANGLES ± 1/2° FINISH: ES & BS CORNERS: 1/64" = 45° or 1/64"	<b>DEEP SEA DRILLING PROJECT</b> SCRIPPS INSTITUTION OF OCEANOGRAPHY	
	SCALE: <i>FULL</i>	APPROVED BY:
SURFACE TREATMENT	DATE: <i>8/2/78</i>	DRAWN BY <i>NSF</i>
HEAT TREATMENT	<i>RIBS-16" CASING HANGER ASSEMBLY RE-ENTRY CONE / TRIPLE CASING SYSTEM</i>	
		REVISED
		DRAWING NUMBER <i>B-044720</i>



- ① 11 3/4" BUTTRESS STAB-IN FLOAT SHOE.
- ② 16" BUTTRESS STAB-IN FLOAT SHOE.
- ③ 20" S.O.W. OPEN GUIDE SHOE.

RE-ENTRY/TRIPLE CASING STRING SYSTEM ~ DRAWING NO. D-0H4721

PROJECT	DEEP SEA DRILLING PROJECT
REVISION	RE-ENTRY/TRIPLE CASING STRING SYSTEM
DATE	NOV 81
DRAWN BY	D
CHECKED BY	D
APPROVED BY	D
SCALE	AS SHOWN