

WASHINGTON SITE
INSTALLATION CONTRACTOR
QA DATA

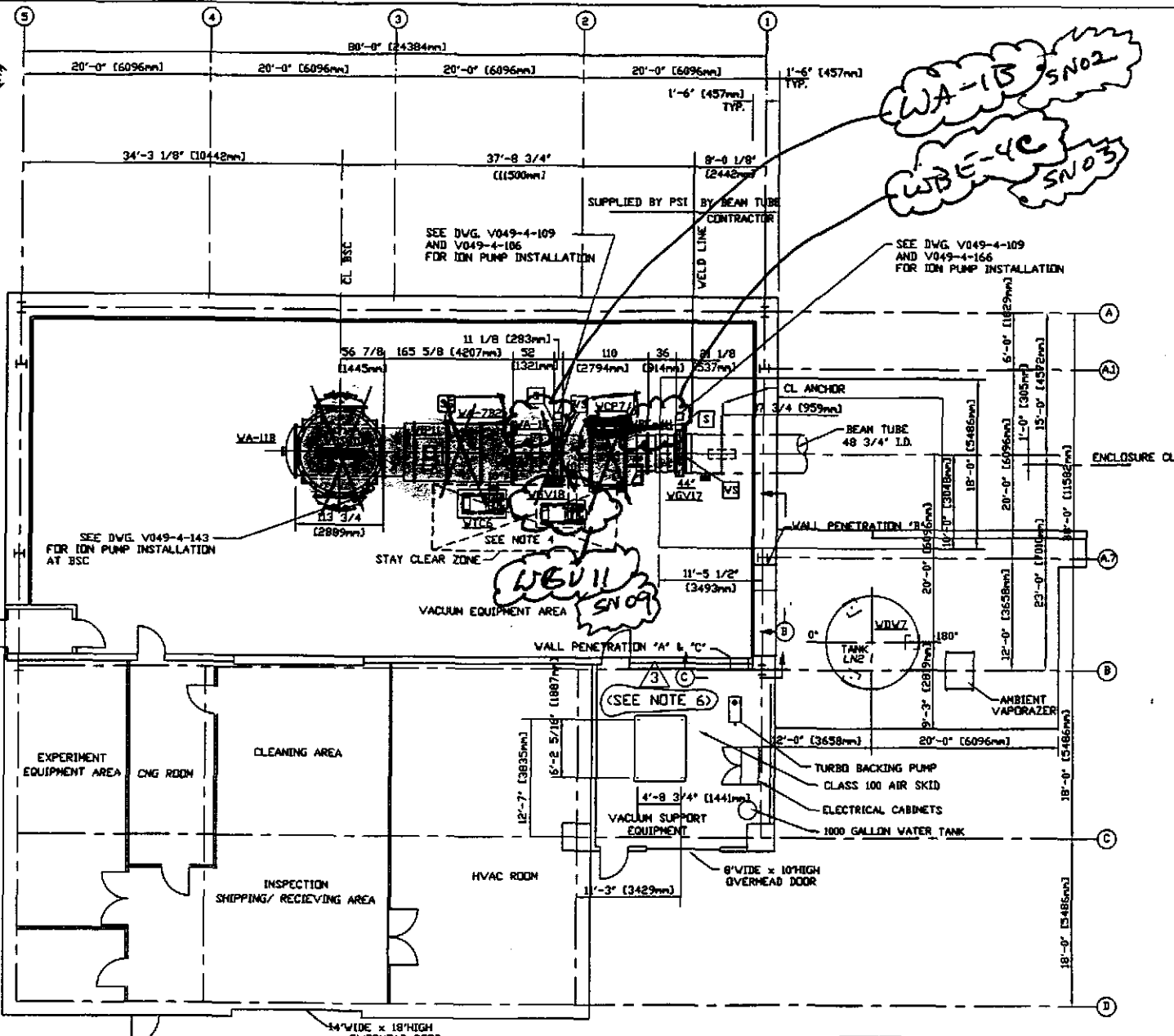
CONTRACT NO.: PC 175730
PROGRAM I.D.: LIGO VACUUM EQUIPMENT
PSI DOCUMENT NO.: V049-8-863
V049-8-864
V049-8-865
V049-8-866
V049-8-867

SUBMITTED TO:

California Institute of Technology
391 South Holliston Avenue
Pasadena, CA 91125

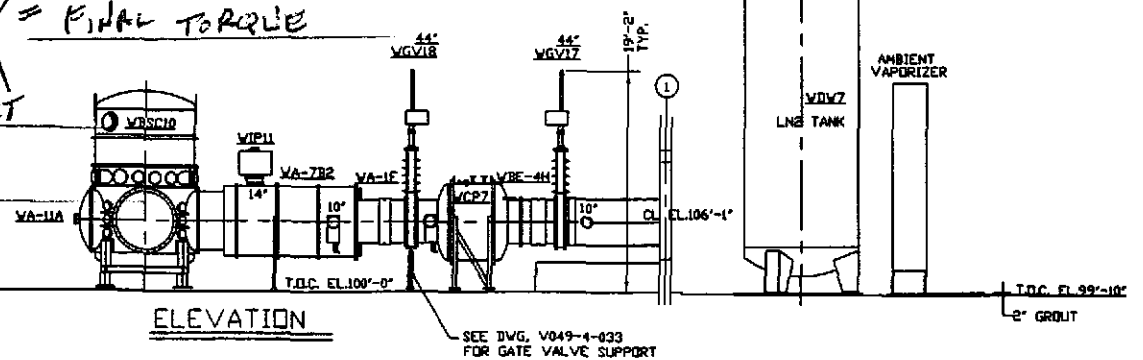
SUBMITTED BY:

Process Systems International, Inc.
20 Walkup Drive
Westborough, MA 01581



PLAN = GROUTED

X = FINAL TORQUE
 INITIAL SET
 FINAL SET

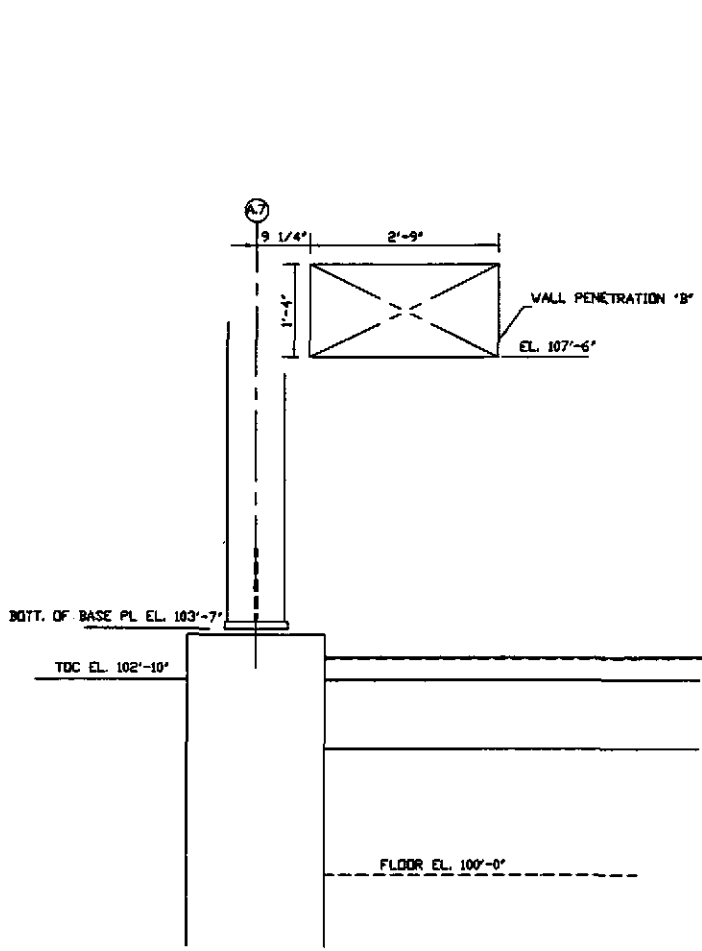


ELEVATION

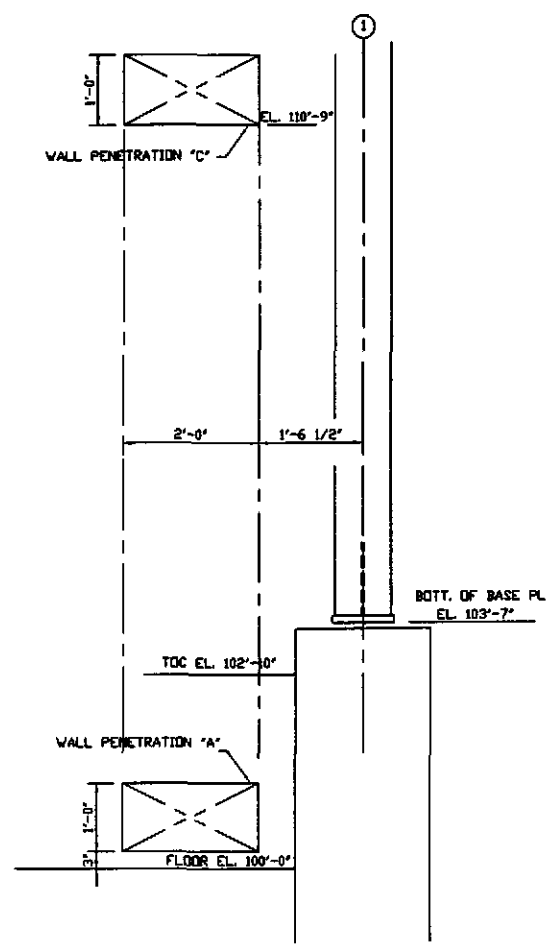
PROPRIETARY AND CONFIDENTIAL
 THIS DOCUMENT CONTAINS PROPRIETARY INFORMATION BELONGING TO PARSONS ARCHITECTURAL INTERNATIONAL, INC. OR ITS ASSOCIATED COMPANIES AND SHALL BE USED ONLY FOR THE PURPOSES FOR WHICH IT WAS SUPPLIED. IT SHALL NOT BE COPIED, REPRODUCED OR OTHERWISE USED, NOR SHALL SUCH INFORMATION BE FURNISHED IN WHOLE OR IN PART TO OTHERS EXCEPT IN ACCORDANCE WITH THE TERMS OF ANY AGREEMENT UNDER WHICH IT WAS SUPPLIED OR WITH THE PRIOR WRITTEN CONSENT OF PARSONS ARCHITECTURAL INTERNATIONAL, INC. AND SHALL BE RETURNED UPON REQUEST.

DWG. NO.	DESCRIPTION	DWG. NO.	DESCRIPTION
V049-0-100	DRAWING TREE/BOM STRUCTURE		
V049-2-021	SPEC FOR INSTALLATION/ COMMISSIONING		
V0490-0-001	P @ ID LIGO VACUUM EQUIPMENT		
WA-A-202	PARSONS ARCHITECTURAL END STATIONS FLOOR PLAN		
1101102	LIGO VACUUM EQUIPMENT END STATION		

UNLESS OTHER DIMENSIONS & TOLERANCES ANNOTATED, THIS PLACE FINISHED SURF. BREAK CORNERS. REMOVE ALL BURR.
 DO NOT SCALE
 USED ON:
 NEXT ASSY:



SECTION B
SCALE 3/4"=1'-0"
(HOLES BY OTHERS)



SECTION C
SCALE 3/4"=1'-0"
(HOLE BY OTHERS)

NOTES:

1. ALL GATE VALVES ARE SUPPLIED BY PSI.

NOTE: SPECIAL BOLTS AND WASHERS ARE REQUIRED TO CONNECT SPOOL FLANGES TO 44" AND 48" GATE VALVES. USE PSI P/N 203567 FOR BOLTS AND PSI P/N 203568 FOR WASHERS. SEE BUILDING BOM V049100WA FOR MATERIALS.

2. FOR ORIENTATION OF LARGE GATE VALVES SEE SIDE OF VALVE NOTED BY SYMBOL 'VS' IN PLAN BELOW. ALL 6", 10" & 14" GATE VALVES ARE TO HAVE SEAL SIDE MOUNTED TOWARD VESSEL.

3. FOR TUBING/ PIPE SUPPORT REQUIREMENTS, SEE SPEC. V049-2-021, SECTION 10.

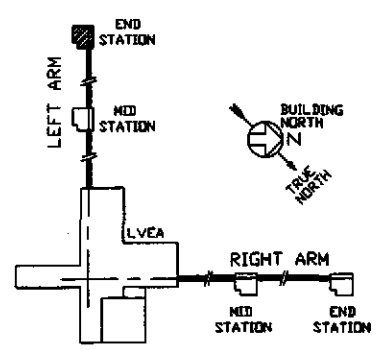
4. SEE DWG. D V049-4-010 FOR TURBO PUMP CART INSTALLATION.

5. LN2 TANK ANCHOR BOLTS BY OTHERS.

6. FOR ANCHOR BOLTS AND VIBRATION ISOLATION PAD REQUIREMENTS FOR VACUUM SUPPORT ROOM EQUIPMENT AND ELECTRICAL CABINETS, SEE DWG. V049-5-032, DETAIL 2.

SUPPORTS LEGEND

- A 3 WAY ANCHOR
- SG SUPPORT/GUIDE (AXIALLY FLEXIBLE)
- S VALVE SUPPORT
- GATE VALVE ION PUMP LOCATION
- VS VALVE SEAL SIDE



KEY PLAN

REV	DESCRIPTION	CHKD	DRWN	DATE	DECID
4	REISSUED FOR CONSTRUCTION AS NOTED			DA 6/26/97	0507
3	REISSUED FOR CONSTRUCTION AS NOTED			SPIDER 6/9/97	0497
2	ISSUED FOR CONSTRUCTION	DNW	RDC	PV 4/14/97	0465
1	ISSUED FOR FDR UPDATE & BID	DNW	RDC	REC PV 2/4/97	0356
0	ISSUED FOR FDR	DNW	RDC	REC PV 5/6/96	0147

PROCESS SYSTEMS INTERNATIONAL INC.
20 WALDEP DR. WESTBOROUGH, MASSACHUSETTS 01581 USA

EQUIPMENT ARRANGEMENT
LEFT END STATION
WASHINGTON
LIGO VACUUM EQUIPMENT

CAD FILE: V0495007
SIZE: D
DWG. NO.: V049-5-007
REV: 4

SCALE: 1/8"=1'-0"
SHEET: 1 OF 1

JUN 18, 1997 - 144702

COMPONENT CLOSE-OUT DATA SHEET

Component Tag Number:

WCP-7 / WBE-4C

Component Name:

CR40 Pump / 6000 FC

Component S/N:

S/N 02 S/N

Vacuum Sealing Surfaces Inspection

By:

[Signature] 12/17/97

Buyer:

[Signature] 17 DEC 97

Cleanliness Inspection

By:

[Signature] For former Rockwell 12/17/97

Buyer:

[Signature] 17 DEC 97

Wings Installed

By:

[Signature] For former Rockwell 12/17/97

Buyer:

[Signature] 17 DEC 97

Comments:

Rework Required:

Title

COMPONENT ALIGNMENT PROCEDURE

ATTACHMENT B

COMPONENT INSTALLATION DATA SHEET

Component Tag Number

WCP-7

Component Name

CRYO Pump

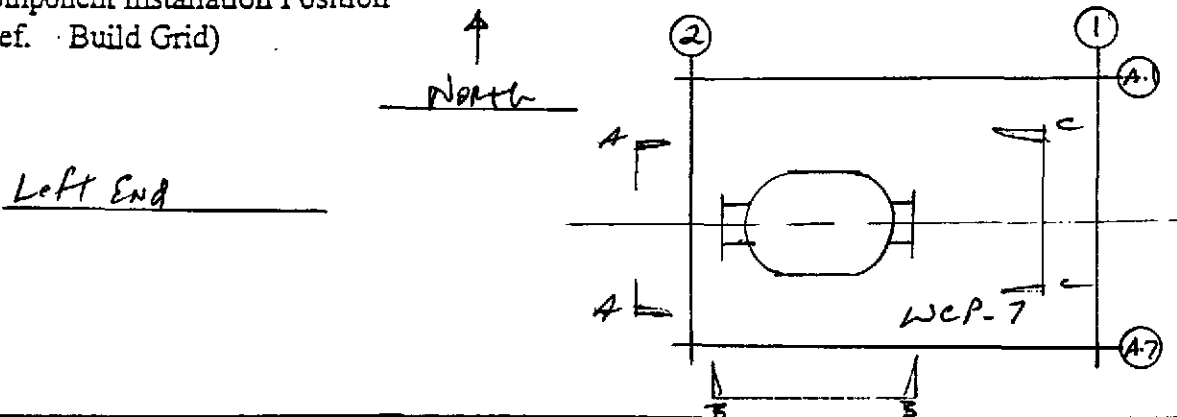
Component S/N

S/N 02

Component Installation Weight (lb.)

9,000 Lb

Component Installation Position
(Ref. Build Grid)



Signoffs (Contractor Unless Otherwise Noted)	By	Date
1. Shipping Cover Cross Hairs Verified	<i>[Signature]</i>	12/10/97
2. Component Located For Anchor Bolt Marking	<i>[Signature]</i>	12/11/97
	Buyer	11 DEC 97
3. Final Component Location Complete	<i>[Signature]</i>	12/17/97
	Buyer	17 DEC 97

Number
Rev.

SPECIFICATION

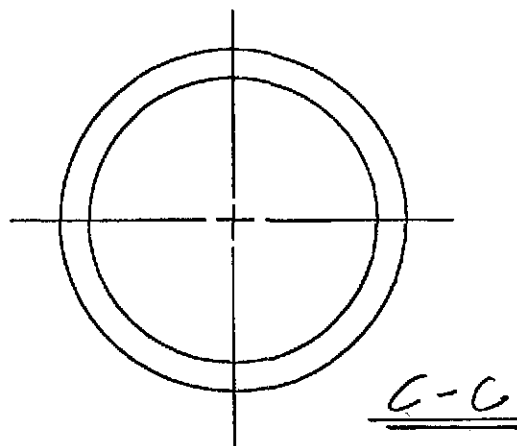
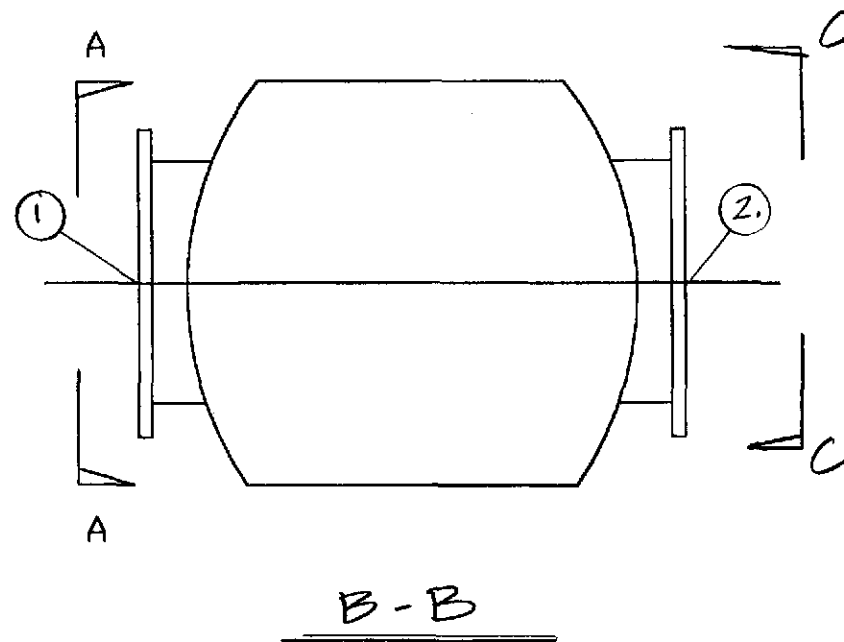
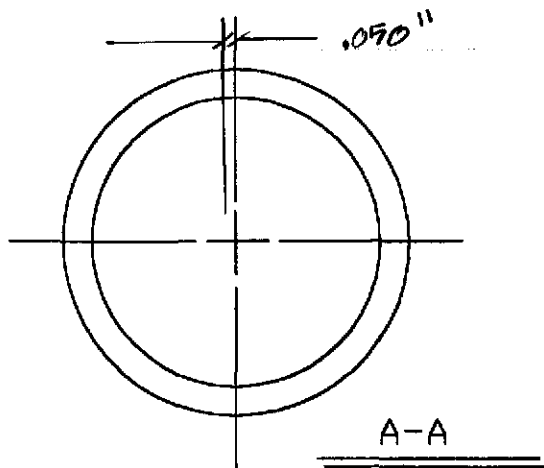
Number

A

V040-2-174

Rev.

1



Component ID:

WCP-7

Serial No.:

S/N-02

	①	②	△
Calc	.090	.022	.068
Shot	.093	.019	.074

Apollo

1207 W. Columbia Dr. Kennewick, Wa 99336

Title: CRYO PUMP
INSTALLED POSITION

Job No.: M-126

Project: LIGO Equipment Set

Scale:
None

Dwn By:

Apollo Concrete Anchor Installation Report

Project: LIGO Vacuum Equipment Installation & Commissioning		Job No.: M-126	
Drawing: V049-5-007	Rev. 4	Date: 12-12-97	
Item Anchored: WCP. 7	No. of Anchors 16	Size: 1"	Type: HVA

Attribute	a. Installer	b. Accepted	c. N/A	d. Date
Anchor Type (HAS Std or Super)		BW		12/12/97
Spacing & Location		BW		12/12/97
Anchor Size & Length		BW		12/12/97
Hole Size		BW		12/12/97
Hole & Core Condition (no voids, etc.)		BW		12/12/97
Embedment (minus 0 plus 1/8")		BW		12/12/97
Angle (90 deg. ± 1deg.)		BW		12/12/97
Floor Scarified		BW		12/12/97
Proper Nut Engagement		BW		1/20/98 - 2/13/97
Tightening		BW		1/20/98 - 2/23/97

Torque Device Identification: Model Williams Gauge UNSI # 10 1/20/98

Open Items

Item No.	Description	Corrective Action	Accept	Date

Comments:

Inspection by:

Date

COMPONENT CLOSE-OUT DATA SHEET

Component Tag Number: WVG 11

Component Name: 44" Gate Valve

Component S/N: 7200 S/N 09

Vacuum Sealing Surfaces Inspection

By:  12/18/97
FOR FREEMAN ROCKWELL

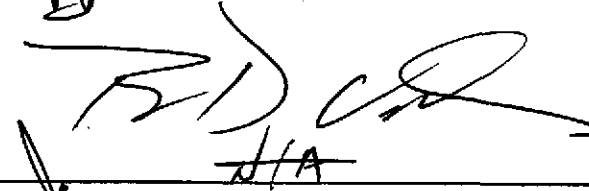
Buyer:  18 FEB 98

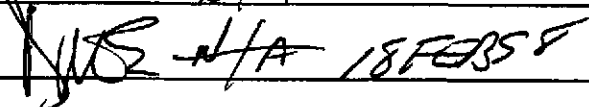
Cleanliness Inspection

By:  12/18/97
FOR FREEMAN ROCKWELL

Buyer:  18 FEB 98

Wings Installed

By:  12/18/97
N/A

Buyer:  N/A 18 FEB 98

Comments:

Rework Required:

Title

COMPONENT ALIGNMENT PROCEDURE

ATTACHMENT B

COMPONENT INSTALLATION DATA SHEET

Component Tag Number

WVG 11

Component Name

Gate Valve

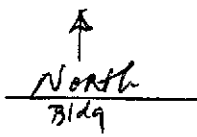
Component S/N

S/N 09

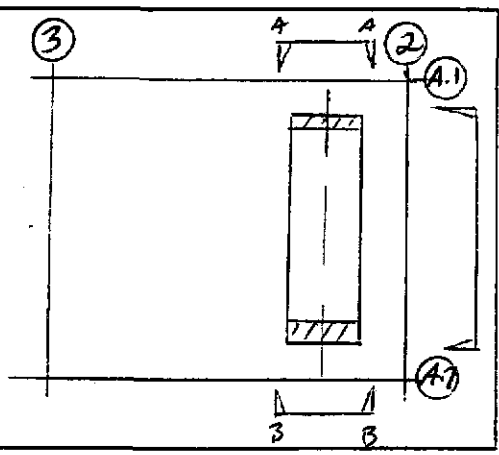
Component Installation Weight (lb.)

7200 Lbs

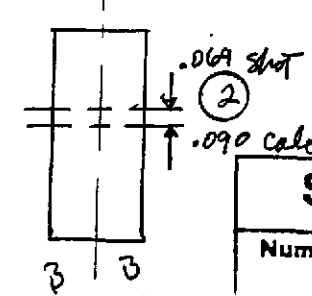
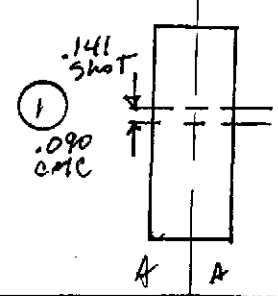
Component Installation Position
(Ref. Build Grid)



Left END station



Signoffs (Contractor Unless Otherwise Noted)	By	Date
1. Shipping Cover Cross Hairs Verified	<i>[Signature]</i>	12/11/97
2. Component Located For Anchor Bolt Marking	<i>[Signature]</i>	12/12/97
	Buyer	12 DEC 97
3. Final Component Location Complete	<i>[Signature]</i>	12/19/97
	Buyer	12 DEC 97



WVG 11	①	②	△
cmc	.090	.090	Ø
shot	.141	.069	.072

SPECIFICATION

Number	Rev.
A	1

V049-2-173

Number

Rev.

Apollo Concrete Anchor Installation Report

Project: LIGO Vacuum Equipment Installation & Commissioning			Job No.: M-126	
Drawing: <i>V04A-5-007</i>		Rev. <i>4</i>		Date: <i>12-12-97</i>
Item Anchored: <i>WGV-11</i>		No. of Anchors		Size: Type: HVA
Attribute	a. Installer	b. Accepted	c. N/A	d. Date
Anchor Type (HAS Std or Super)		<i>BW</i>		<i>12/12/97</i>
Spacing & Location		<i>BW</i>		<i>12/12/97</i>
Anchor Size & Length		<i>BW</i>		<i>12/12/97</i>
Hole Size		<i>BW</i>		<i>12/12/97</i>
Hole & Core Condition (no voids, etc.)		<i>BW</i>		<i>12/12/97</i>
Embedment (minus 0 plus 1/8")		<i>BW</i>		<i>12/12/97</i>
Angle (90 deg. ± 1deg.)		<i>BW</i>		<i>12/12/97</i>
Floor Scarified		<i>BW</i>		<i>12/12/97</i>
Proper Nut Engagement		<i>BW</i>		<i>12/12/97</i>
Tightening		<i>BW</i>		<i>12/23/97</i>
Torque Device Identification: <i>UNSF # 10</i>				

Open Items				
Item No.	Description	Corrective Action	Accept	Date

Comments:

Inspection by:	Date
----------------	------

COMPONENT CLOSE-OUT DATA SHEET

Component Tag Number:

WA7B2 / WA1B

Component Name:

Spool

Component S/N:

SN 02 / SN 02

Vacuum Sealing Surfaces Inspection

By:

BD ✓ 12/19/97
FOR FOREMAN ROCKWELL (CIRCA 12/8/97)

Buyer:

MSE 8 DEC 97

Cleanliness Inspection

By:

BD ✓ 12/19/97
FOR FOREMAN ROCKWELL (CIRCA 12/19/97)

Buyer:

MSE 9 DEC 97

Wings Installed

By:

BD ✓ 12/19/97
FOR FOREMAN ROCKWELL (CIRCA 12/8/97)

Buyer:

MSE 8 DEC 97

Comments:

found indent + raised divots on WA1B flange face (OK'd by PSI for install) MSE

Rework Required:

Title

COMPONENT ALIGNMENT PROCEDURE

ATTACHMENT B

COMPONENT INSTALLATION DATA SHEET

Component Tag Number

WA 7 B2 / WA 1 B

Component Name

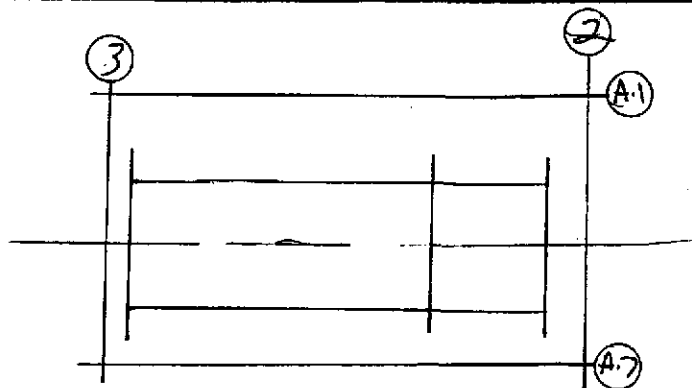
spool

Component S/N

S/N 02 / S/N 02

Component Installation Weight (lb.)

Component Installation Position
(Ref. Build Grid)



Signoffs (Contractor Unless Otherwise Noted)		By	Date
1.	Shipping Cover Cross Hairs Verified	[Signature]	12-12-97
2.	Component Located For Anchor Bolt Marking	[Signature]	12-12-97
	Buyer	MOS	12 DEC 97
3.	Final Component Location Complete	[Signature]	12-15-97
	Buyer	MOS	15 DEC 97

Number
Rev.

SPECIFICATION

Number

A

V049-2-174

Rev.

1

Apollo Concrete Anchor Installation Report

Project: LIGO Vacuum Equipment Installation & Commissioning		Job No.: M-126
Drawing: V049-5-007	Rev. 4	Date: 12-12-97
Item Anchored: WATB2/NA1B	No. of Anchors	Size: Type: HVA

Attribute	a. Installer	b. Accepted	c. N/A	d. Date
Anchor Type (HAS Std or Super)		BW		12-12-97
Spacing & Location		BW		12-12-97
Anchor Size & Length		BW		12-12-97
Hole Size		BW		12-12-97
Hole & Core Condition (no voids, etc.)		BW		12-12-97
Embedment (minus 0 plus 1/8")		BW		12-12-97
Angle (90 deg. ± 1deg.)		BW		12-12-97
Floor Scarified		BW		12-12-97
Proper Nut Engagement		BW		1/20/98
Tightening		BW		1/20/98

Torque Device Identification: ~~WAS-10~~ #009 also 1/20/98

Open Items				
Item No.	Description	Corrective Action	Accept	Date

Comments:

Inspection by:	Date
----------------	------

Title

COMPONENT ALIGNMENT PROCEDURE

ATTACHMENT B

COMPONENT INSTALLATION DATA SHEET

Component Tag Number

WB9C 10

Component Name

BEAM SPLITTER CHAMBER

Component S/N

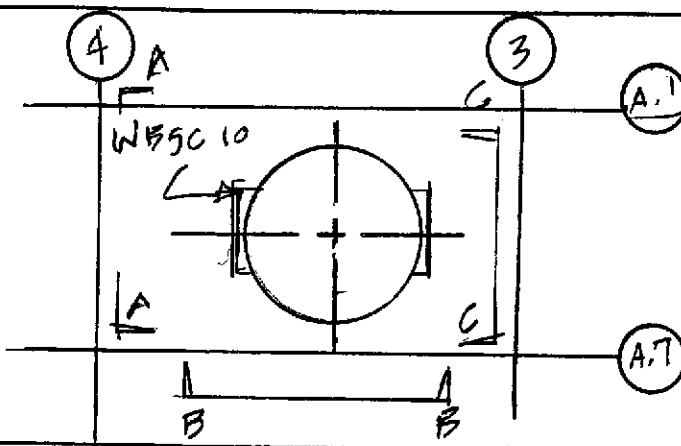
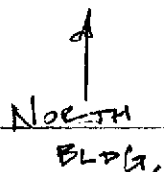
S/N 01

Component Installation Weight (lb.)

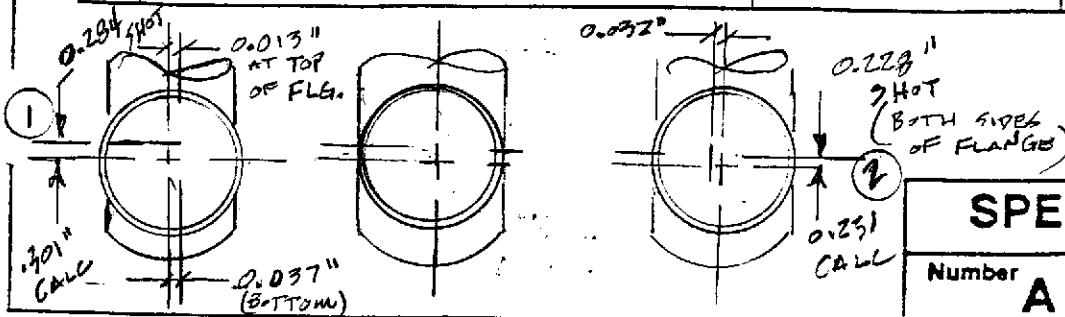
15,000 lb.

Component Installation Position
(Ref. Build Grid)

LEFT END. STA.



Signoffs (Contractor Unless Otherwise Noted)	By	Date
1. Shipping Cover Cross Hairs Verified (Quantifying marks on flange)	[Signature]	11-7-97
2. Component Located For Anchor Bolt Marking	[Signature]	11-7-97
	Yuan Chang	11-2-97
	SD [Signature]	12/16/97
	Dean Johnson	11-7-97
	Buyer [Signature]	16 DEC 97
3. Final Component Location Complete	[Signature]	12/16/97
	Buyer [Signature]	16 DEC 97



WB9C 10	①	②	Δ
CALL	.301	.231	.070
SHOT	.284	.228	.056

SPECIFICATION

Number	A	Rev.	1
		V049-2-174	

Number
Rev.

Held Exist Scribe

WGV 17

10°00'

31'-2 1/8"

4 Beam Tube

31'-2 1/8"

1 1/4"

1 1/4"

WBSC 10

15.0020 South



90°00'00"

WBSC 10

top 15.0010 South

Bottom 15.0012 South

Held scribe Floor

scribe line
15.0060 North
of R.S.I.
monuments

Base line

Held scribe Floor

Bldg North

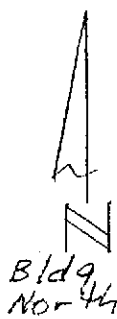
#97834160 Left End station 11-7-97

Before Floor Anchor

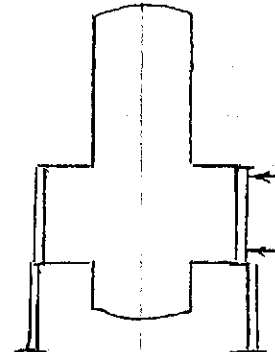
Bolts installed

V. Coyn

D. Johnson



WBSC 10

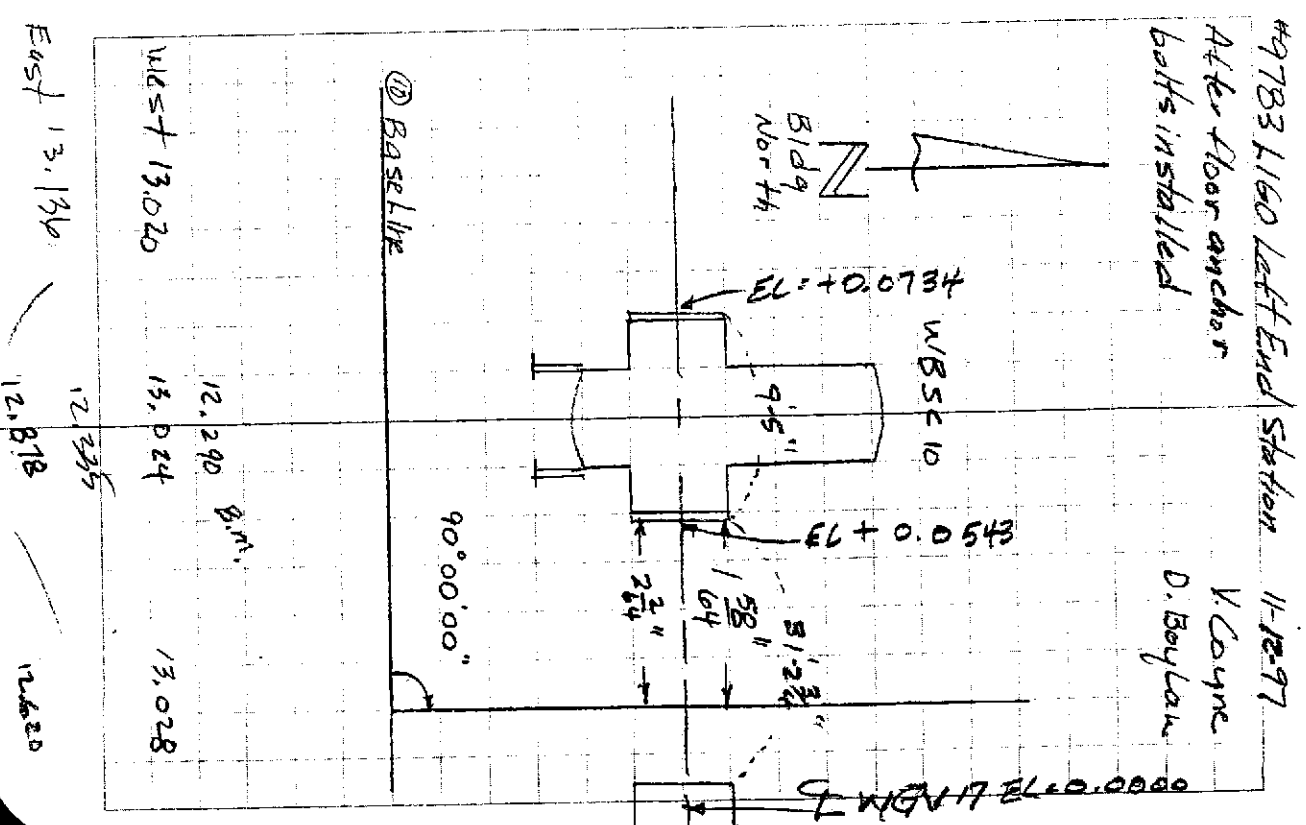
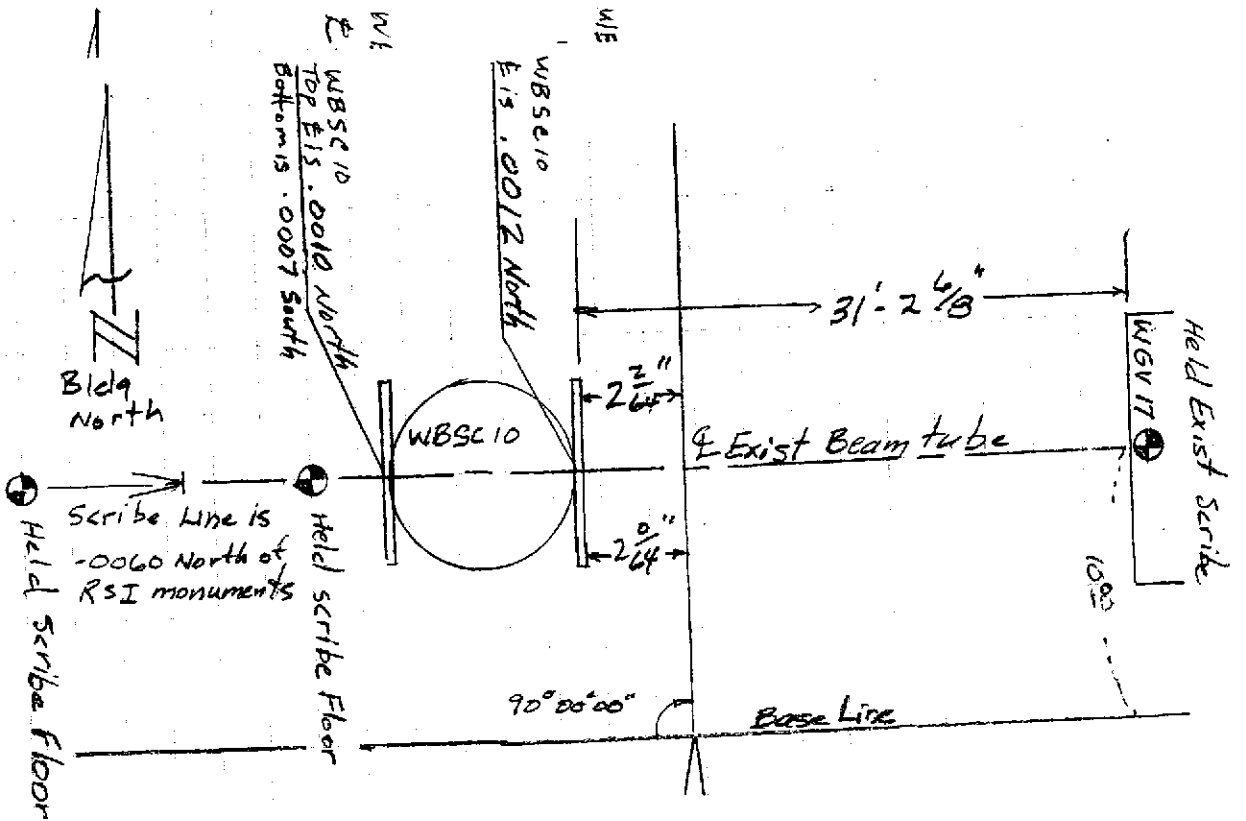


Base Line

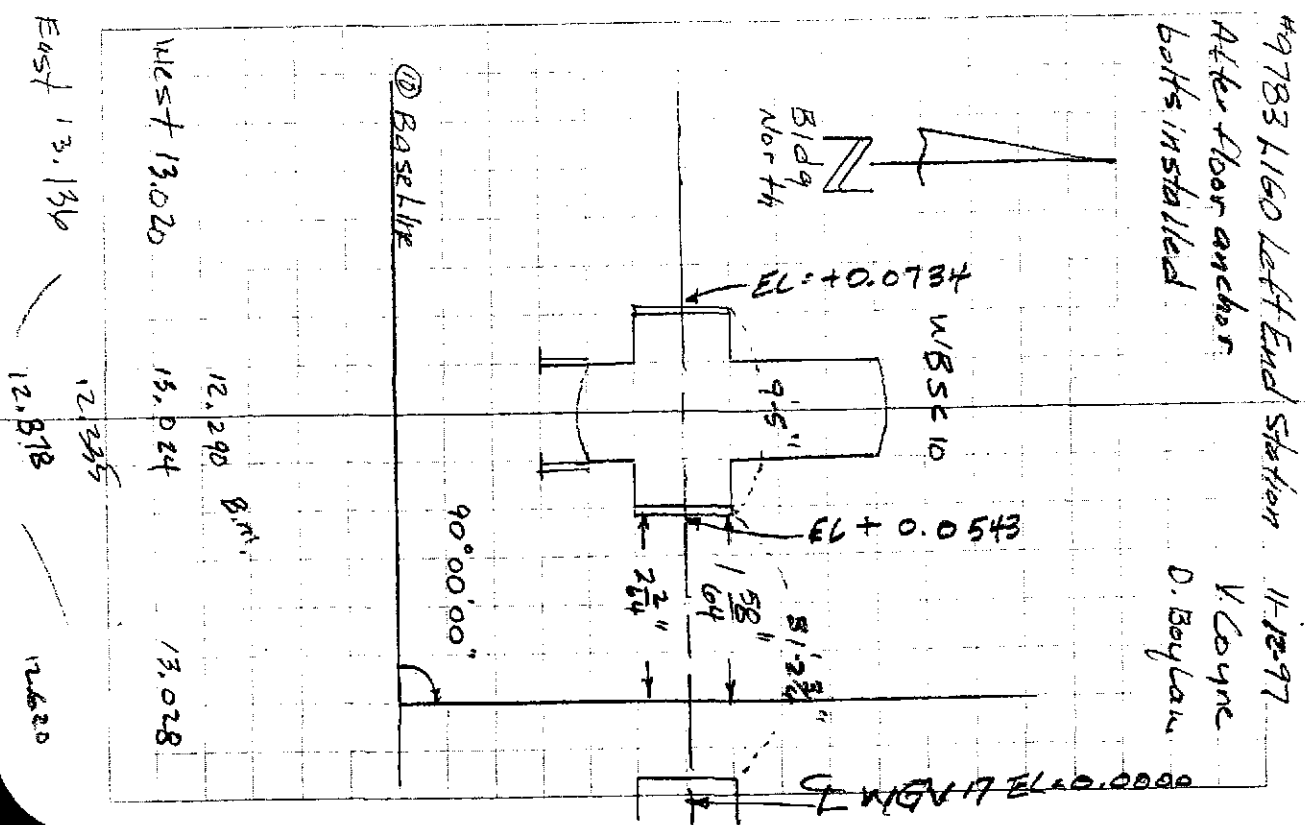
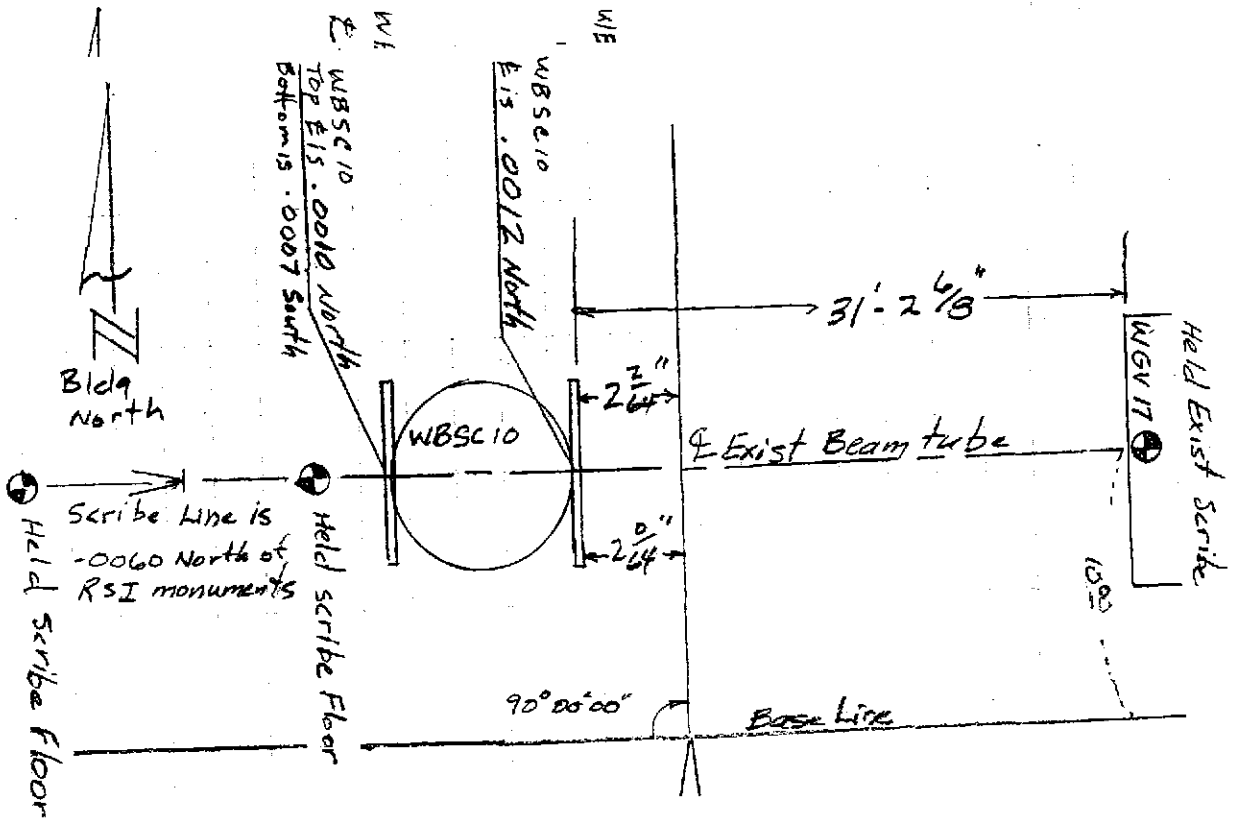
90°00'00"

Permit Surveying

RECEIVED
 NOV 12 1997
 APOLLO SHEET METAL INC.



5/90



49783 1160 Left End Station 11-10-97
 After floor anchors
 bolts installed
 V Coyne
 D. Baylan

Apollo Concrete Anchor Installation Report

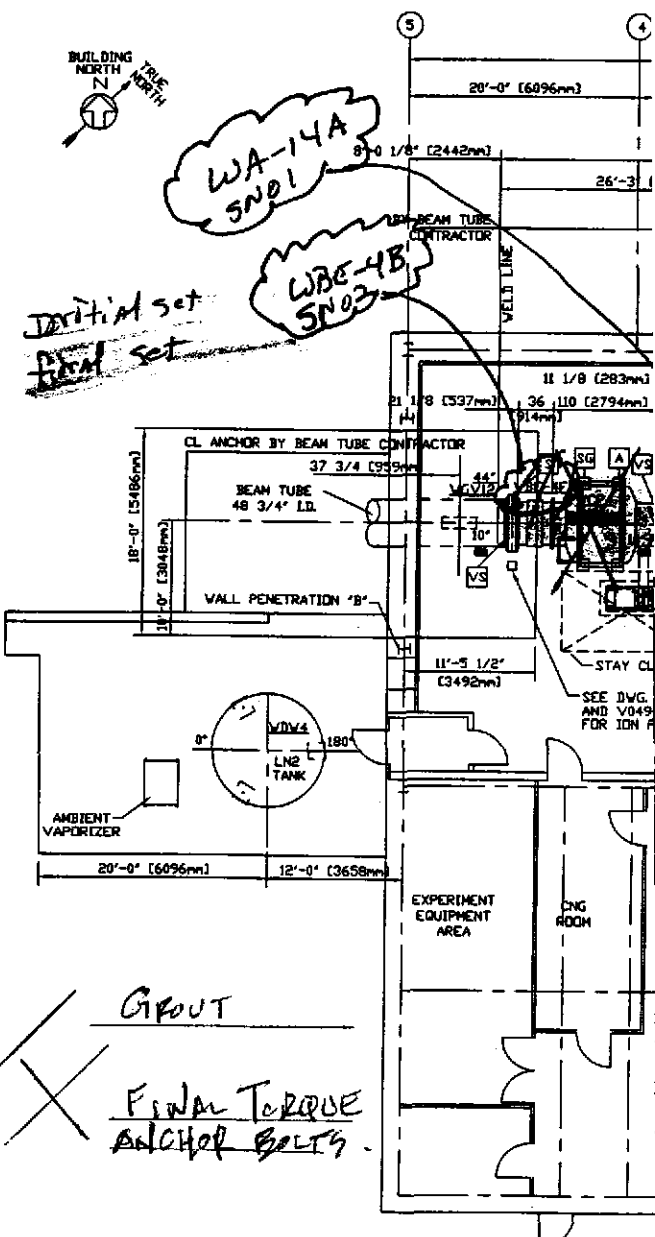
Project: LIGO Vacuum Equipment Installation & Commissioning		Job No.: M-126	
Drawing: V045-5-007	Rev. 4	Date: 11/7/97	
Item Anchored: WB5C 10	No. of Anchors 16	Size: 1 in.	Type: HVA

Attribute	a. Installer	b. Accepted	c. N/A	d. Date
Anchor Type (HAS Std or Super)		ok	---	11/10/97
Spacing & Location		ok	---	11/10/97
Anchor Size & Length		ok	---	11/10/97
Hole Size		ok	---	11/10/97
Hole & Core Condition (no voids, etc.)		ok	---	11/10/97
Embedment (minus 0 plus 1/8")		ok	---	11/10/97
Angle (90 deg. ± 1deg.)		ok	---	11/10/97
Floor Scarified		ok	---	11/13/97
Proper Nut Engagement		ok	---	11/13/97
Tightening		ok	---	1/20/98
Torque Device Identification:	KNSI # 10 Nov 1/20/98			

Open Items				
Item No.	Description	Corrective Action	Accept	Date
1	ONE ANCHOR DID NOT ACHIEVE FULL EMBED	USE A5-15 PER DEFICIENCY RPT #M126-03		

Comments:

Inspection by:	Date
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NOTES:

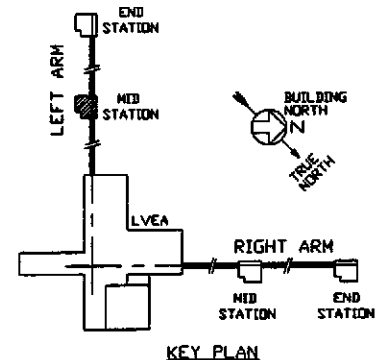
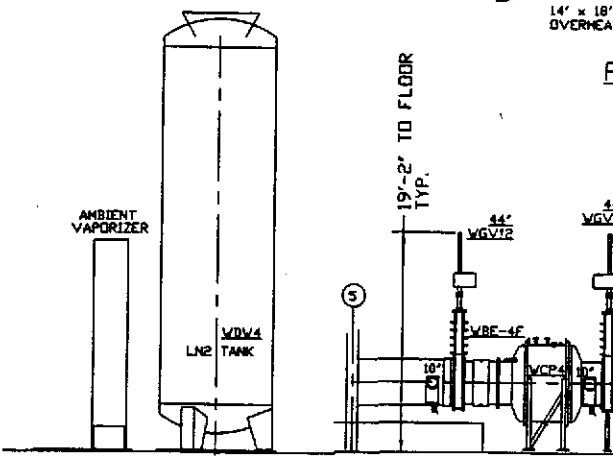
- △ ALL GATE VALVES ARE SUPPLIED BY PSI.
- NOTE: SPECIAL BOLTS AND WASHERS ARE REQUIRED TO CONNECT SPOOL FLANGES TO 44" AND 48" GATE VALVES. USE PSI P/N 203567 FOR BOLTS AND PSI P/N 203568 FOR WASHERS. SEE BUILDING BOM V049100WA FOR MATERIALS.
- △ FOR ORIENTATION OF LARGE GATE VALVES SEE SIDE OF VALVE NOTED BY SYMBOL 'VS' IN PLAN BELOW. ALL 6", 10" & 14" GATE VALVES ARE TO HAVE SEAL SIDE MOUNTED TOWARD VESSEL.
- 2. SEE SPEC. V049-2-021 FOR INSTALLATION/ COMMISSIONING INFORMATION.
- 3. FOR TUBING/ PIPE SUPPORT REQUIREMENTS, SEE SPEC. V049-2-021, SECTION 10.
- 4. SEE DWG. D V049-4-011 FOR TURBO PUMP CART INSTALLATION.
- 5. LN2 TANK ANCHOR BOLTS BY OTHERS.
- 6. FOR ANCHOR BOLTS AND VIBRATION ISOLATION PAD REQUIREMENTS FOR VACUUM SUPPORT ROOM EQUIPMENT AND ELECTRICAL CABINETS, SEE DWG. V049-5-028, DETAIL 2.

SUPPORTS LEGEND

- A 3 WAY ANCHOR
- SG SUPPORT/GUIDE (AXIALLY FLEXIBLE)
- S VALVE SUPPORT
- GATE VALVE IDN PUMP LOCATION
- VS VALVE SEAL SIDE

GIPOUT

FINAL TORQUE ANCHOR BOLTS



KEY PLAN

TARY AND CONFIDENTIAL

THIS DOCUMENT CONTAINS PROPRIETARY INFORMATION BELONGING TO PROCESS SYSTEMS INTERNATIONAL, INC. OR ITS AFFILIATED COMPANIES AND SHALL BE USED ONLY FOR THE PURPOSE FOR WHICH IT WAS SUPPLIED. IT SHALL NOT BE COPIED, REPRODUCED OR OTHERWISE USED, NOR SHALL SUCH INFORMATION BE FURNISHED IN WHOLE OR IN PART TO OTHERS EXCEPT IN ACCORDANCE WITH THE TERMS OF ANY AGREEMENT UNDER WHICH IT WAS SUPPLIED OR WITH THE PRIOR WRITTEN CONSENT OF PROCESS SYSTEMS INTERNATIONAL, INC. AND SHALL BE RETURNED UPON REQUEST.

DWG. NO.	DESCRIPTION	REFERENCE DRA
V049-5-006	EQUIPMENT ARRANGEMENT	
V049-5-007	LEFT MID STATION	
V049-5-008	WASHINGTON	
V049-5-009	LIGO VACUUM EQUIPMENT	
V049-5-010		
V049-5-011		
V049-5-012		
V049-5-013		
V049-5-014		
V049-5-015		
V049-5-016		
V049-5-017		
V049-5-018		
V049-5-019		
V049-5-020		
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V049-5-023		
V049-5-024		
V049-5-025		
V049-5-026		
V049-5-027		
V049-5-028		
V049-5-029		
V049-5-030		
V049-5-031		
V049-5-032		
V049-5-033		
V049-5-034		
V049-5-035		
V049-5-036		
V049-5-037		
V049-5-038		
V049-5-039		
V049-5-040		
V049-5-041		
V049-5-042		
V049-5-043		
V049-5-044		
V049-5-045		
V049-5-046		
V049-5-047		
V049-5-048		
V049-5-049		
V049-5-050		
V049-5-051		
V049-5-052		
V049-5-053		
V049-5-054		
V049-5-055		
V049-5-056		
V049-5-057		
V049-5-058		
V049-5-059		
V049-5-060		
V049-5-061		
V049-5-062		
V049-5-063		
V049-5-064		
V049-5-065		
V049-5-066		
V049-5-067		
V049-5-068		
V049-5-069		
V049-5-070		
V049-5-071		
V049-5-072		
V049-5-073		
V049-5-074		
V049-5-075		
V049-5-076		
V049-5-077		
V049-5-078		
V049-5-079		
V049-5-080		
V049-5-081		
V049-5-082		
V049-5-083		
V049-5-084		
V049-5-085		
V049-5-086		
V049-5-087		
V049-5-088		
V049-5-089		
V049-5-090		
V049-5-091		
V049-5-092		
V049-5-093		
V049-5-094		
V049-5-095		
V049-5-096		
V049-5-097		
V049-5-098		
V049-5-099		
V049-5-100		

PROCESS SYSTEMS INTERNATIONAL, INC.
20 WALKUP DR. WESTBOROUGH, MASSACHUSETTS 01581 USA

EQUIPMENT ARRANGEMENT
LEFT MID STATION
WASHINGTON
LIGO VACUUM EQUIPMENT

CAR FILE	SIZE	DWG. NO.	REV.
V0495006	D	V049-5-006	4

SCALE: 1/8"=1'-0"

SHEET: 1 OF 1

Jan 18, 1997 - 144257

COMPONENT CLOSE-OUT DATA SHEET

Component Tag Number: WCP03 / WBE-4A

Component Name: CRYO PUMP

Component S/N: S/N-01 S/N-01

Vacuum Sealing Surfaces Inspection

By:  12/1/97

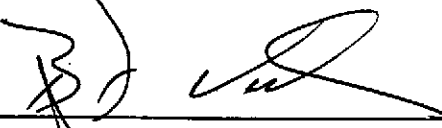
Buyer: JMS 1 DEC 97

Cleanliness Inspection

By:  12/1/97

Buyer: JMS 1 DEC 97

Workings Installed

By:  12/1/97

Buyer: JMS 1 DEC 97

Comments:

Rework Required:

Title

COMPONENT ALIGNMENT PROCEDURE

ATTACHMENT B

COMPONENT INSTALLATION DATA SHEET

Component Tag Number

WCP-03 W/WBE-4A

Component Name

CRYOPUMP

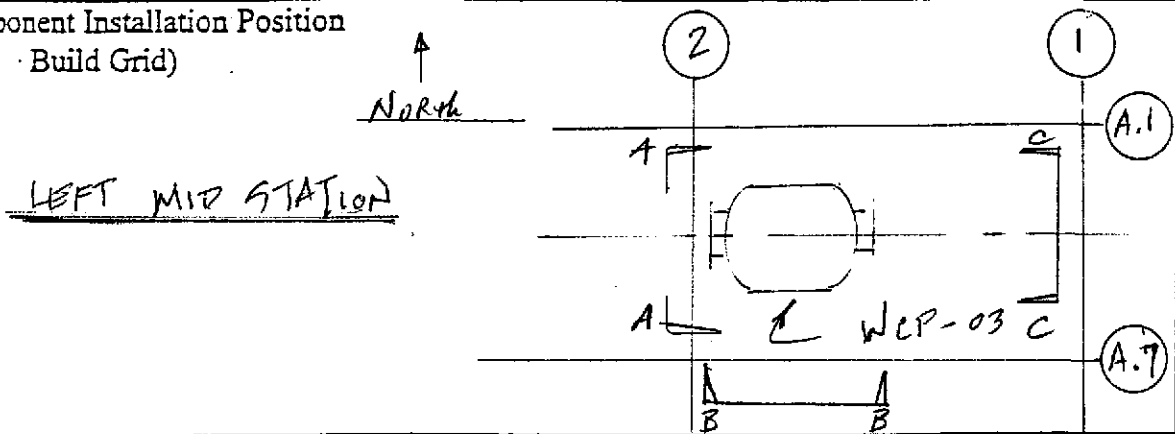
Component S/N

SIN 01

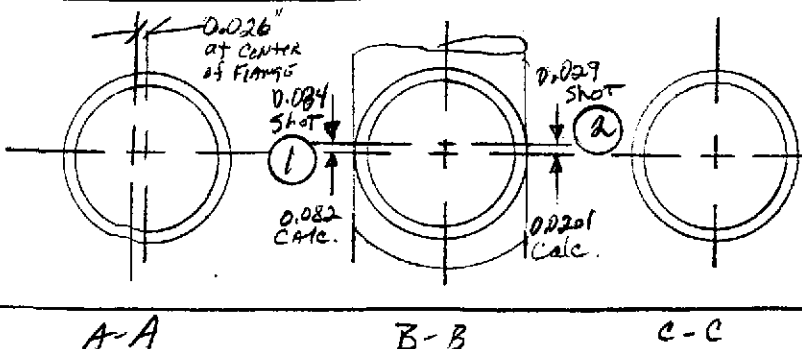
Component Installation Weight (lb.)

9,000 lb.

Component Installation Position
(Ref. Build Grid)



Signoffs (Contractor Unless Otherwise Noted)	By	Date
1. Shipping Cover Cross Hairs Verified	<i>[Signature]</i>	11-13-97
2. Component Located For Anchor Bolt Marking	<i>[Signature]</i>	11-14-97
3. Final Component Location Complete	Buyer <i>[Signature]</i>	14 NOV 97
	Buyer <i>[Signature]</i>	12-1-97
	Buyer <i>[Signature]</i>	1 DEC 97



WCP 3	①	②	△
Calc	.082	.0201	.0619
Shot	.084	.029	.055

SPECIFICATION

Number **A** V040.2-174 Rev. **1**

Number

Rev.

Apollo Concrete Anchor Installation Report

Project: LIGO Vacuum Equipment Installation & Commissioning		Job No.: M-126	
Drawing: V049-5-026	Rev. 3	Date: 11-14-97	
Item Anchored: WCP-03	No. of Anchors 16	Size: 1 in.	Type: HVA

Attribute	a. Installer	b. Accepted	c. N/A	d. Date
Anchor Type (HAS Std or Super)		<i>BNW</i>		11/18/97
Spacing & Location		<i>BNW</i>		11-14-97
Anchor Size & Length		<i>BNW</i>		11/18/97
Hole Size		<i>BNW</i>		11/18/97
Hole & Core Condition (no voids, etc.)		<i>BNW</i>		11/18/97
Embedment (minus 0 plus 1/8")		<i>BNW</i>		11/18/97
Angle (90 deg. ± 1deg.)		<i>BNW</i>		11/18/97
Floor Scarified		<i>BNW</i>		11/18/97
Proper Nut Engagement		<i>BNW why</i>		11/18/97
Tightening		<i>BNW why</i>		12/1/97

Torque Device Identification: *Model Williams Gauge UNST # 10 BNW 1/20/98*

Open Items				
Item No.	Description	Corrective Action	Accept	Date
	<i>over Embedment 1 anchor bolt</i>	<i>2 10/1/97</i>		
	<i>under Embedment 2 anchor bolts</i>	<i>discrepancy report</i>		

Comments:

Inspection by:	Date
----------------	------

COMPONENT CLOSE-OUT DATA SHEET

Component Tag Number:

WGN-10

Component Name:


GATE VALVE

Component S/N:

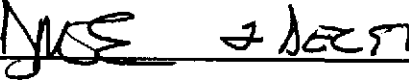
S/N-10

Vacuum Sealing Surfaces Inspection

By:

 12/2/97

Buyer:


 2 DEC 97

Cleanliness Inspection

By:


 12/2/97

Buyer:


 2 DEC 97

Wings Installed

By:

 12/2/97

Buyer:

 2 DEC 97

Comments:

Rework Required:

Title

COMPONENT ALIGNMENT PROCEDURE

ATTACHMENT B

COMPONENT INSTALLATION DATA SHEET

Component Tag Number

WGV 10

Component Name

Gate Valve

Component S/N

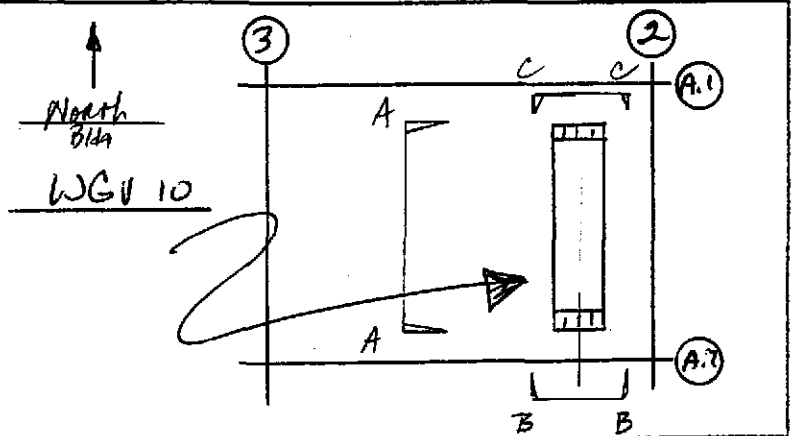
S/N 10

Component Installation Weight (lb.)

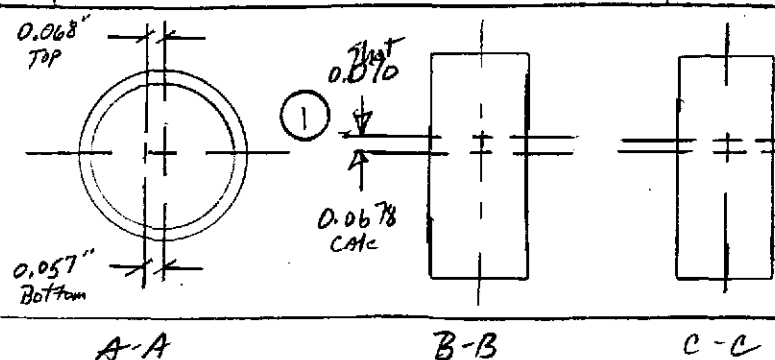
~~3500 LBS~~ 7200 LBS

Component Installation Position
(Ref. Build Grid)

Left Mid Station
East End



Signoffs (Contractor Unless Otherwise Noted)	By	Date
1. Shipping Cover Cross Hairs Verified	<i>[Signature]</i>	12-2-97
2. Component Located For Anchor Bolt Marking (gate valve support)	<i>[Signature]</i>	12-2-97
	Buyer <i>[Signature]</i>	2/12/97
3. Final Component Location Complete	<i>[Signature]</i>	12-2-97
	Buyer <i>[Signature]</i>	2/12/97



WGV10	①	②	△
Gate	.0678	.078	Ø
Shot	.070	.0878	.0178

SPECIFICATION		
Number	Rev.	
A	1	
V040-2-174		

Number

Flow

Apollo Concrete Anchor Installation Report

Project: LIGO Vacuum Equipment Installation & Commissioning		Job No.: M-126	
Drawing: V049-5-026	Rev. 3	Date: 12/1/97	
Item Anchored: WGV-10	No. of Anchors 8	Size: 3/4" ¹⁷	Type: HVA

Attribute	a. Installer	b. Accepted	c. N/A	d. Date
Anchor Type (HAS Std or Super)		EW		12/1/97
Spacing & Location		EW		12/1/97
Anchor Size & Length		EW		12/1/97
Hole Size		EW		12/1/97
Hole & Core Condition (no voids, etc.)		EW		12/1/97
Embedment (minus 0 plus 1/8")		EW		12/1/97
Angle (90 deg. ± 1deg.)		EW		12/1/97
Floor Scarified		EW		12/1/97
Proper Nut Engagement		EW ^{12/2/97}		12/1/97
Tightening		EW ^{12/2/97}		12/1/97

Torque Device Identification: ~~WNSF #70~~ #1009 ^{12/2/97}

Open Items				
Item No.	Description	Corrective Action	Accept	Date

Comments:

Inspection by:	Date
----------------	------

COMPONENT CLOSE-OUT DATA SHEET

Component Tag Number: WA-7B1/WA1A

Component Name: SPOOL

Component S/N: S/N 01 S/N 01

Vacuum Sealing Surfaces Inspection

By: W. T. Melny 12/3/97

Buyer: JWE 3 DEC 97

Cleanliness Inspection

By: W. T. Melny 12/3/97

Buyer: JWE 3 DEC 97

O-Rings Installed

By: W. T. Melny 12/3/97

Buyer: JWE 3 DEC 97

Comments:

- SEE APOLLO QUALITY NOTICES DATED 3 DEC 97 & 8 DEC 97.
- also note upon opening spool piece covers found aluminum foil pieces which was cleaned out JWE

Rework Required:

- NONE -

APOLLO QUALITY NOTICE

PAGE

1 OF 1

PROJECT NO.:

M-126

LOCATION (BLDG AREA):

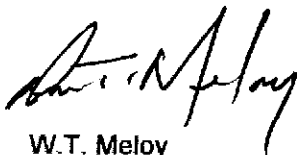
Left Mid Station

DATE:

3 DEC 97

Description:

In conjunction with installation efforts at the Left Mid Station, damage was noted on one flange of spool piece WA1A S/N 01. Damage consists of two small deformations at the extreme OD of the flange mating surface. Damaged area is located at the (Bldg) west end of the spool piece. PSI was notified and subsequently released Apollo to proceed with component installation.



W.T. Meloy
QAM



APOLLO QUALITY NOTICE

PAGE

1 OF 1

PROJECT NO.:

M-126

LOCATION (BLDG AREA):

Left Mid Station

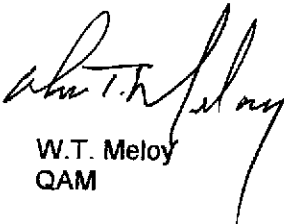
DATE:

8 DEC 97

Description:

In conjunction with installation efforts at the Left Mid Station, damage was noted on one flange of spool piece WA7B1. Damage consists of what appear to be arc strikes on the sealing surface. PSI was notified and subsequently released Apollo to proceed with component installation.

Damage has also been noted on gate valve GV-11. At removal of the shipping cover a small indentation was noted on a sealing surface. PSI was notified and subsequently directed Apollo to remove the component for return to the vendor.


W.T. Meloy
QAM


PSI

Title

COMPONENT ALIGNMENT PROCEDURE

ATTACHMENT B

COMPONENT INSTALLATION DATA SHEET

Component Tag Number

WA-7B1 / WA1A

Component Name

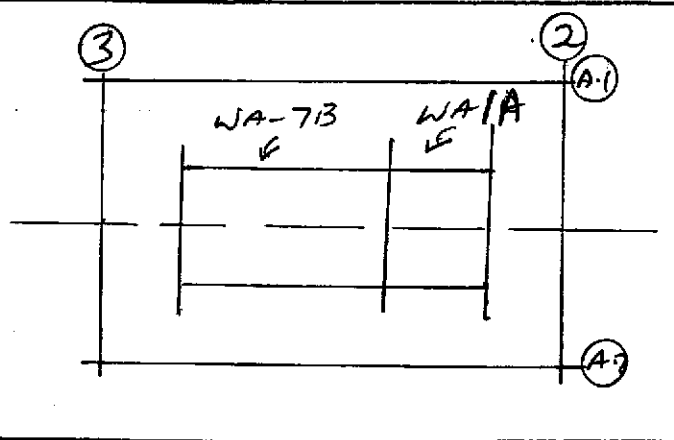
SPOOL

Component S/N

S/N 01 / S/N 01

Component Installation Weight (lb.)

Component Installation Position
(Ref. Build Grid)



Signoffs (Contractor Unless Otherwise Noted)	By	Date
1. Shipping Cover Cross Hairs Verified	<i>[Signature]</i>	12-12-97
2. Component Located For Anchor Bolt Marking	<i>[Signature]</i>	12-12-97
	Buyer	<i>[Signature]</i> 12 DEC 97
3. Final Component Location Complete	<i>[Signature]</i>	12-15-97
	Buyer	<i>[Signature]</i> 12 DEC 97

SPECIFICATION

Number

A

V049-2-174

Rev.

1

Number

Rev.

COMPONENT CLOSE-OUT DATA SHEET

Component Tag Number: WB96-6

Component Name: BEAM SPLITTER CHAMBER

Component S/N: S/N-07

Vacuum Sealing Surfaces Inspection

By: [Signature] FOR FOREMAN ROCKWELL 12/10/97

Buyer: [Signature] 10 DEC 97

Cleanliness Inspection

By: [Signature] FOR FOREMAN ROCKWELL 12/10/97

Buyer: [Signature] 10 DEC 97

O-rings Installed

By: [Signature] FOR FOREMAN ROCKWELL 12/10/97

Buyer: [Signature] 10 DEC 97

Comments:

Rework Required:

12.0

Title

COMPONENT ALIGNMENT PROCEDURE

ATTACHMENT B

COMPONENT INSTALLATION DATA SHEET

Component Tag Number

WB566

Component Name

BEAM SPLITTER CHAMBER

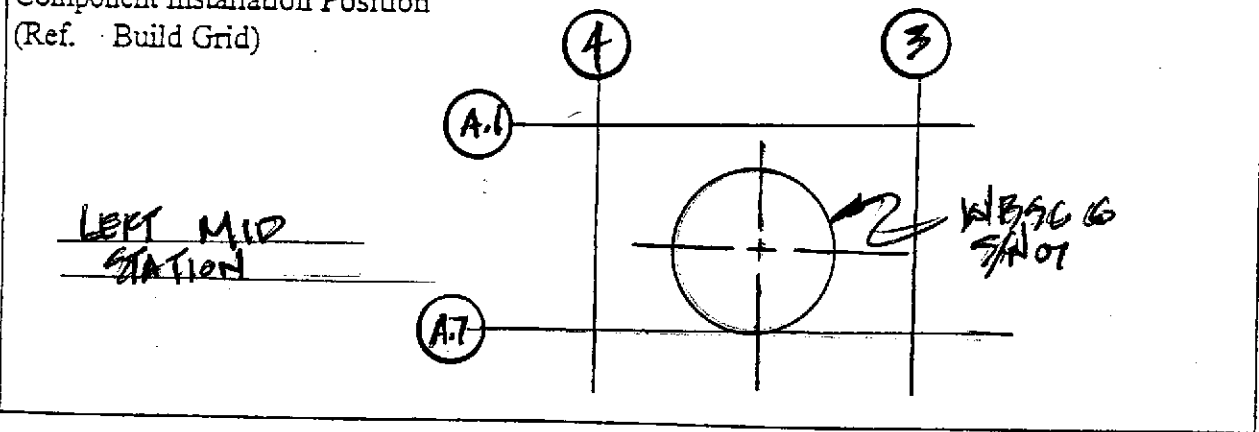
Component S/N

5/N 07

Component Installation Weight (lb.)

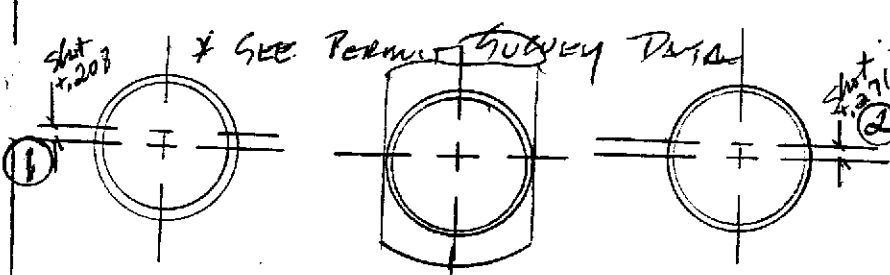
15,000 lb.

Component Installation Position
(Ref. Build Grid)



Signoffs (Contractor Unless Otherwise Noted)	By	Date
1. Snapping Cover Cross hairs verified	<i>[Signature]</i>	10-30-97
2. Component Located For Anchor Bolt Marking	Vern Coyne Bill Polster V.C.	10-30-97
	Buyer <i>[Signature]</i>	300597
3. Final Component Location Complete	<i>[Signature]</i>	11-4-97 *
	Buyer	

Number
Rev.



WB566	①	②	△
calc	+ .21	+ .275	+ .065
shot	+ .208	+ .271	.063

SPECIFICATION

Number

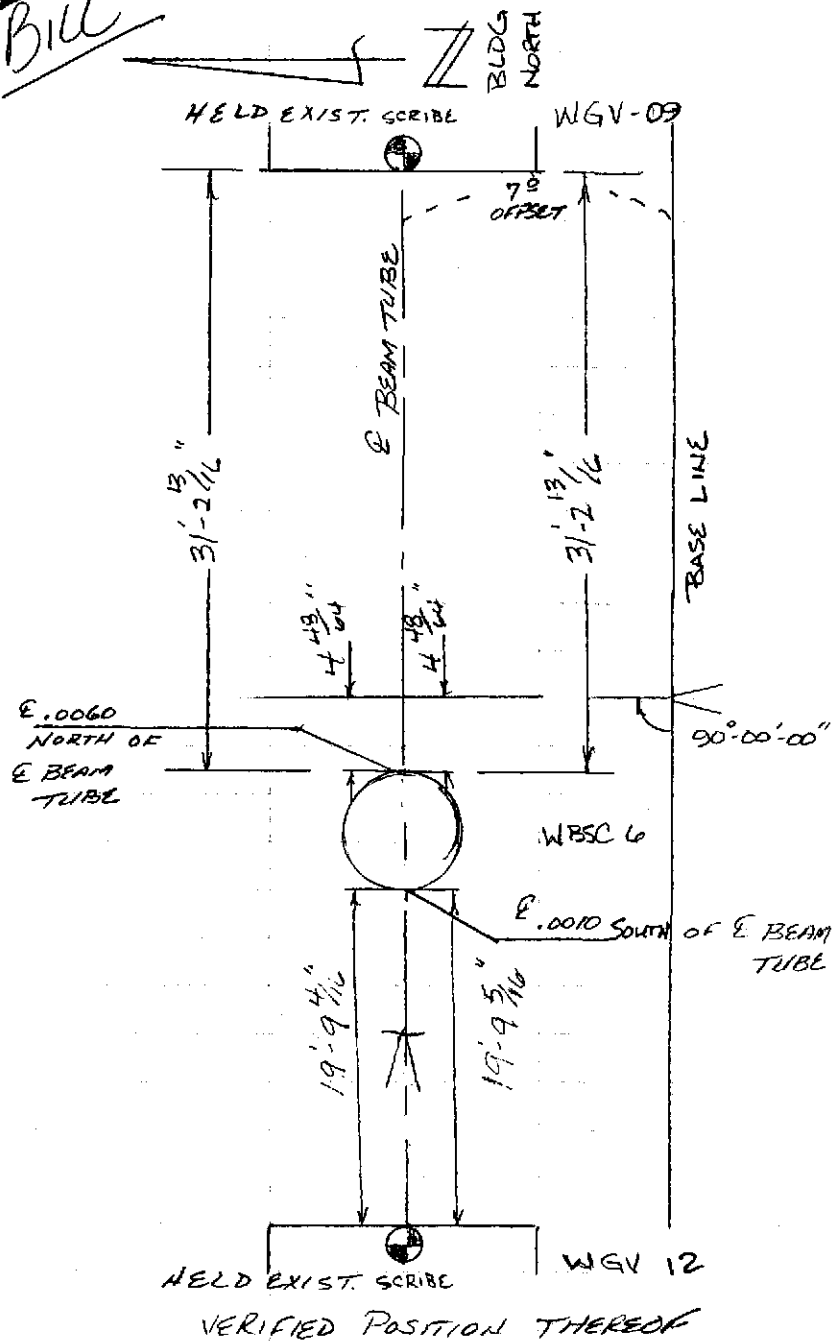
A

V049-2-174

Rev.

1

Bill

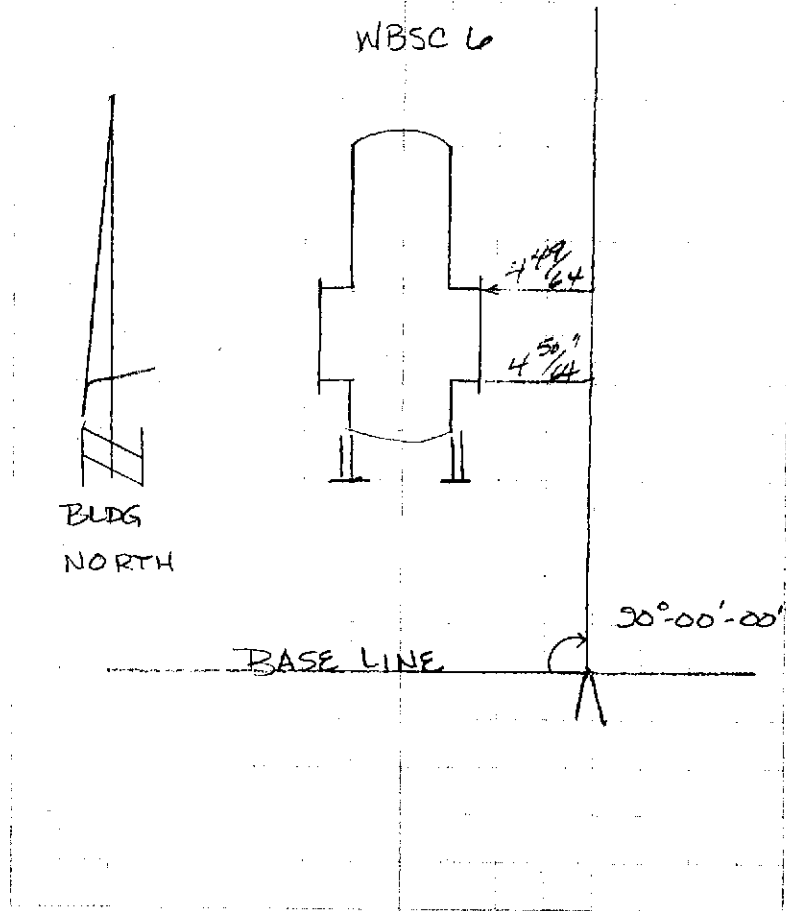


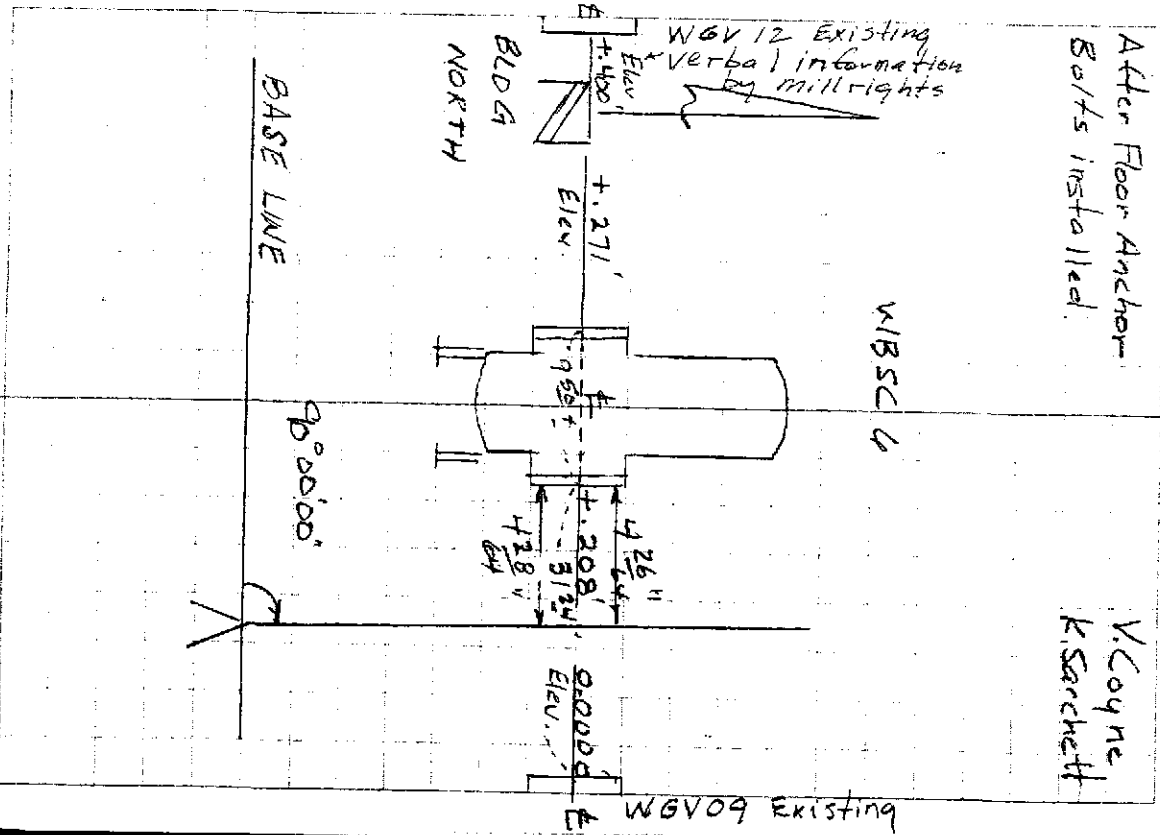
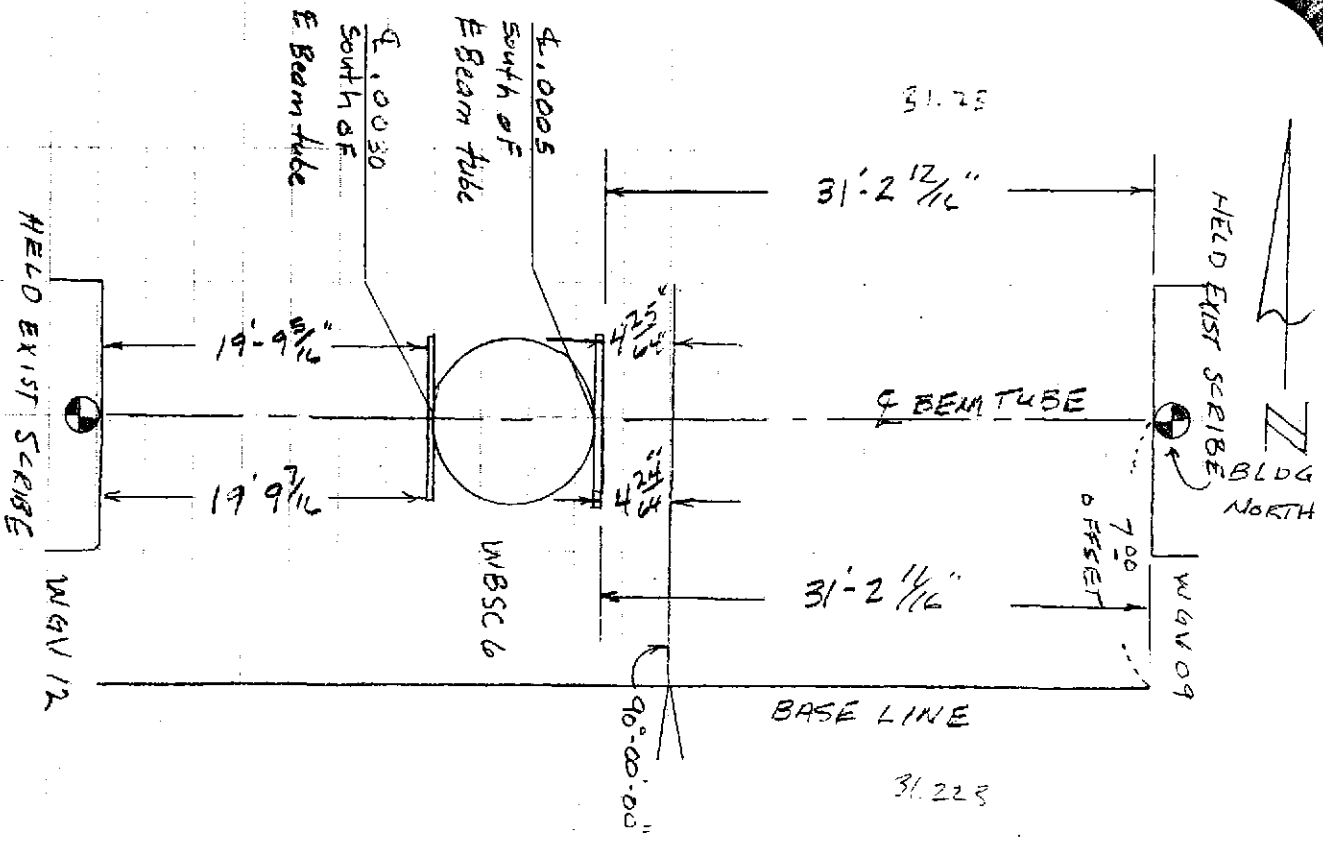
FILCOM VERN

L160 LEFT MID STATION

10-30-97

V. COYNE
B. POLSTER





#9783 LIGO LEFT MID STATION 11-4-97
 After Floor Anchor
 Bolts installed.
 V. Coyne
 K. Saracheth

3/90

+	H.I	-	Rod Elev.
			0-0000
	-11.637		11-637

11.845			+ .208"
--------	--	--	---------

11.908			+ .271'
--------	--	--	---------

9783 LI40 LEFT MID STATION 11-4-97

£ W 9709 Gate valve
 V. Coyne
 K. Serchett

£ WBSL6 East side

£ WBSG6 West side

11.80
66

208
63

9.5

Apollo Concrete Anchor Installation Report

Project: LIGO Vacuum Equipment Installation & Commissioning		Job No.: M-126	
Drawing: V049-5-006	Rev. 4	Date: 11/3/97	
Item Anchored: WBSC 6	No. of Anchors: 16	Size: 1 in.	Type: HVA

Attribute	a. Installer	b. Accepted	c. N/A	d. Date
Anchor Type (HAS Std or Super)		ahp 11/3/97		
Spacing & Location		ahp 11/3/97		
Anchor Size & Length		ahp 11/3/97		
Hole Size		ahp 11/3/97		
Hole & Core Condition (no voids, etc.)		ahp 11/3/97		
Embedment (minus 0 plus 1/8")		ahp 11/3/97		
Angle (90 deg. + 1deg.)		ahp 11/3/97		
Floor Scarified		ahp 11/3/97		
Proper Nut Engagement		ahp 11/3/97		
Tightening		ahp 11/3/97		
Torque Device Identification:	UNSE #10 ahp 11/20/97			11/20/97

Open Items				
Item No.	Description	Corrective Action	Accept	Date

Comments:

Inspection by:	Date
----------------	------

COMPONENT CLOSE-OUT DATA SHEET

Component Tag Number:

WA 14A

Component Name:

SPOOL PIECE

Component S/N:

9/N 01

Vacuum Sealing Surfaces Inspection

By:

John FOR FOREMAN ROCKWELL 12/10/97

Buyer:

JSE 10 DEC 97

Cleanliness Inspection

By:

John FOR FOREMAN ROCKWELL 12/10/97

Buyer:

JSE 10 DEC 97

Welds Installed

By:

John FOR FOREMAN ROCKWELL 12/10/97

Buyer:

JSE 10 DEC 97

Comments:

Rework Required:

(None)

Title

COMPONENT ALIGNMENT PROCEDURE

ATTACHMENT B

COMPONENT INSTALLATION DATA SHEET

Component Tag Number

WA14A

Component Name

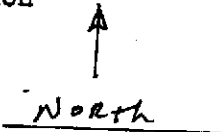
Spool

Component S/N

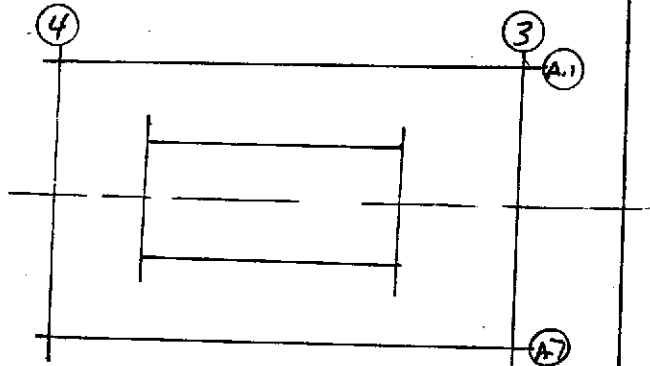
S/N 01

Component Installation Weight (lb.)

Component Installation Position
(Ref. Build Grid)



Left Mid



Signoffs (Contractor Unless Otherwise Noted)		By	Date
1.	Shipping Cover Cross Hairs Verified	<i>[Signature]</i>	12-4-97
2.	Component Located For Anchor Bolt Marking	<i>[Signature]</i>	12-4-97
		Buyer	4 DEC 97
3.	Final Component Location Complete	<i>[Signature]</i>	12-5-97
		Buyer	5 DEC 97

Number

Rev.

SPECIFICATION

Number

A

Rev.

1

V030-2-174

COMPONENT CLOSE-OUT DATA SHEET

Component Tag Number:

WGV-18

Component Name:

GATE VALVE

Component S/N:

S/N - 16

Vacuum Sealing Surfaces Inspection

BD ✓ 12/8/97

By:

FOR FOREMAN ROCKWELL

Buyer:

WSE 8 DEC 97

Cleanliness Inspection

BD ✓ 12/8/97

By:

FOR FOREMAN ROCKWELL

Buyer:

WSE 8 DEC 97

O-Rings Installed

BD ✓ 12/8/97

By:

H/A

Buyer:

WSE 8 DEC 97

Comments:

Rework Required:

NONE -

Title

COMPONENT ALIGNMENT PROCEDURE

ATTACHMENT B

COMPONENT INSTALLATION DATA SHEET

Component Tag Number

WGV-2018

Component Name

Gate Valve

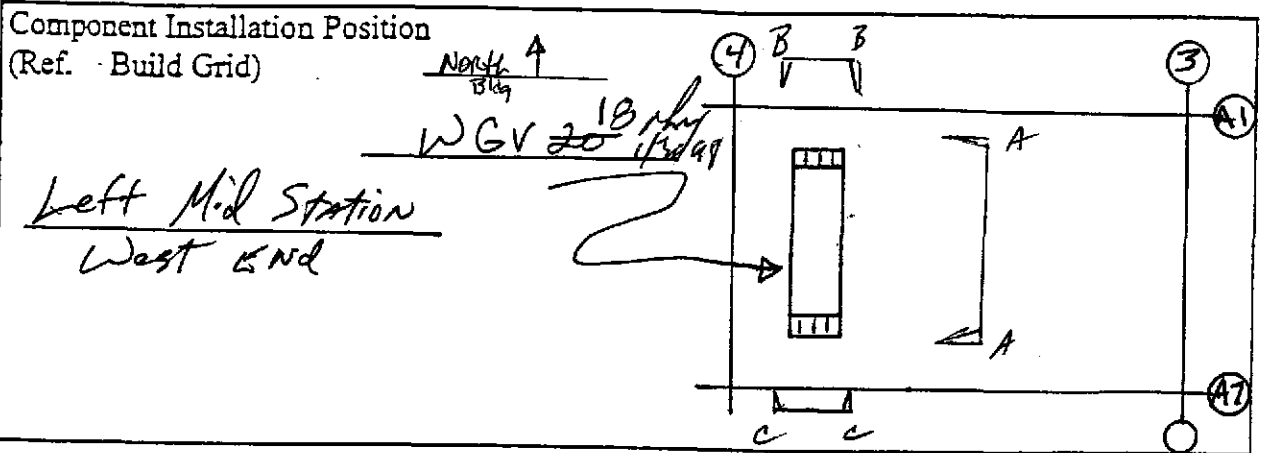
Component S/N

9/N 16

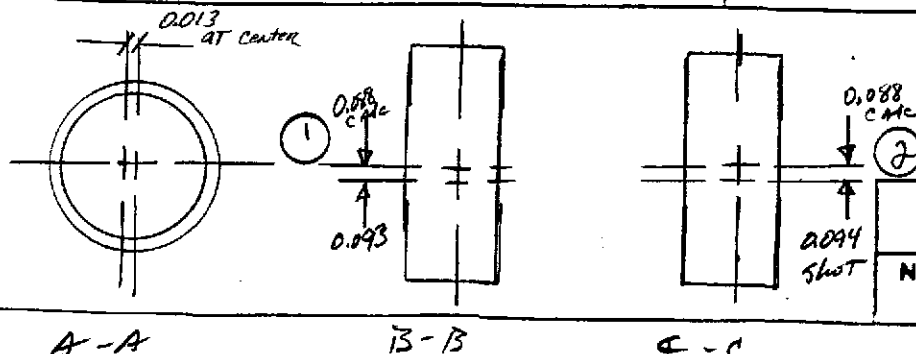
Component Installation Weight (lb.)

7200 LBS

Component Installation Position
(Ref. Build Grid)



Signoffs (Contractor Unless Otherwise Noted)	By	Date
1. Shipping Cover Cross Hairs Verified	[Signature]	12/4/97
2. Component Located For Anchor Bolt Marking (Gate Valve Support)	[Signature]	12/4/97
3. Final Component Location Complete	Buyer [Signature]	4 DEC 97
	Buyer [Signature]	12/8/97
	Buyer [Signature]	8 DEC 97



WGV 20	(1)	(2)	△
CMC	.088	.088	∅
SHOT	.093	.094	.001

SPECIFICATION

Number	A	Rev.	1
--------	---	------	---

COMPONENT CLOSE-OUT DATA SHEET

Component Tag Number:

WCP-4 / WBE4B

Component Name:

CRYO Pump / SPOOL PC.

Component S/N:

S/N 01 S/N 02

Vacuum Sealing Surfaces Inspection

By:

 12/4/97
John Folt Foreman Rockwell

Buyer:

JMS 4 DEC 97

Cleanliness Inspection

By:

 12/4/97
John Folt Foreman Rockwell

Buyer:

JMS 4 DEC 97

O-Rings Installed

By:

 12/4/97
John Folt Foreman Rockwell

Buyer:

JMS 4 DEC 97

Comments:

Rework Required:

— None —

Title

COMPONENT ALIGNMENT PROCEDURE

ATTACHMENT B

COMPONENT INSTALLATION DATA SHEET

Component Tag Number

WCP 4

Component Name

CRYOPUMP

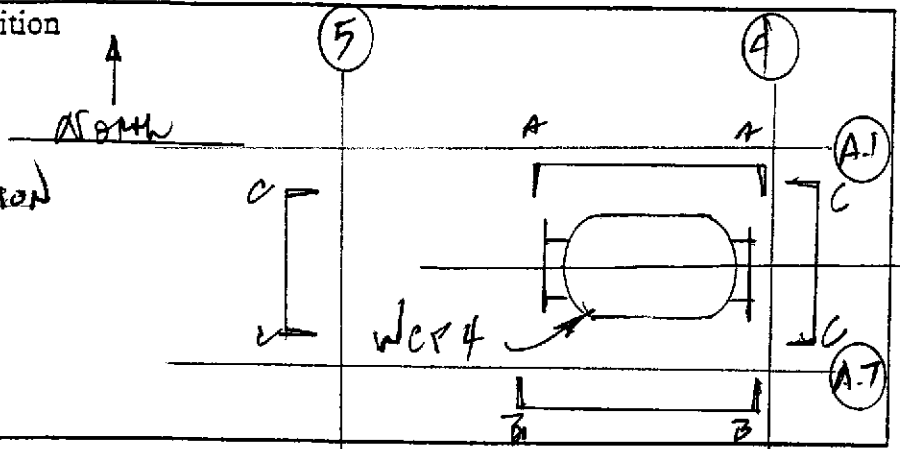
Component S/N

S/N 01

Component Installation Weight (lb.)

Component Installation Position
(Ref. Build Grid)

LEFT MID STATION



Signoffs (Contractor Unless Otherwise Noted)		By	Date
1.	Shipping Cover Cross Hairs Verified	<i>[Signature]</i>	11/16/97
2.	Component Located For Anchor Bolt Marking	<i>[Signature]</i>	11/17/97
		Buyer <i>[Signature]</i>	12/20/97
3.	Final Component Location Complete	<i>[Signature]</i>	12/4/97
		Buyer <i>[Signature]</i>	4 DEC 97

SPECIFICATION

Number

A

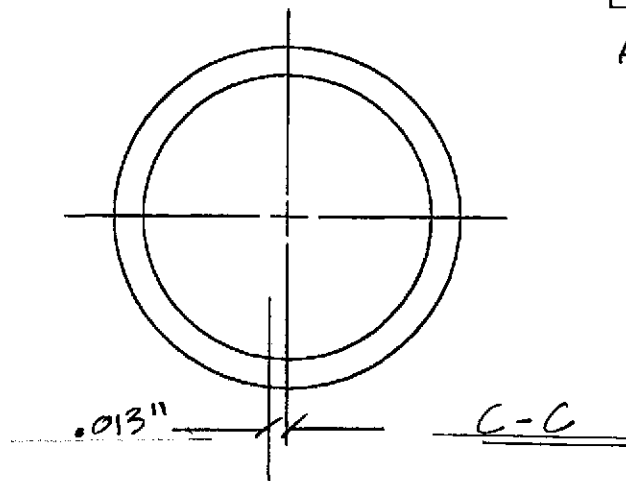
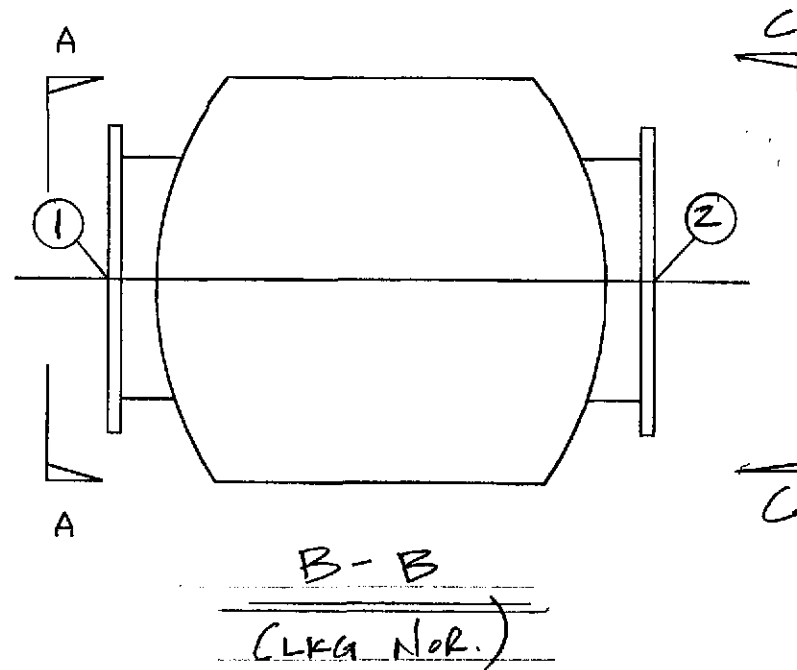
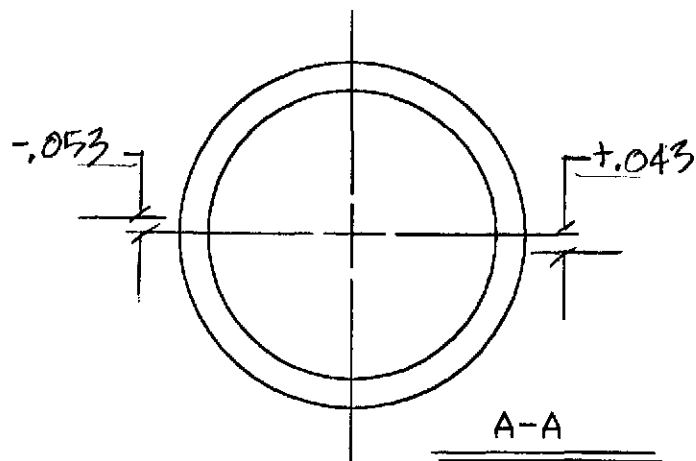
V049-2-174

Rev.

1

Number

Rev.



WCP-4	①	②	Δ
Calc	.082	-.020	.102
Shot	.085	+0.030	.055

Component ID: WCP-4
 Serial No.: S/N-01

Apollo

1207 W. Columbia Dr. Kennewick, Wa 99336

Title: CRYO PUMP
 INSTALLED POSITION

Job No.: M-126

Project: LIGO Equipment Set

Scale:
 None

Dwn By:
MELoy

Apollo Concrete Anchor Installation Report

Project: LIGO Vacuum Equipment Installation & Commissioning		Job No.: M-126	
Drawing: V049-5-026	Rev. 3	Date: 12/4/97	
Item Anchored: WCPH	No. of Anchors 16	Size: 1"	Type: HVA

Attribute	a. Installer	b. Accepted	c. N/A	d. Date
Anchor Type (HAS Std or Super)		FW		12/4/97
Spacing & Location		FW		12/4/97
Anchor Size & Length		FW		12/4/97
Hole Size		FW		12/4/97
Hole & Core Condition (no voids, etc.)		FW		12/4/97
Embedment (minus 0 plus 1/8")		FW		12/4/97
Angle (90 deg. ± 1deg.)		FW		12/4/97
Floor Scarified		FW		12/4/97
Proper Nut Engagement		FW <i>FW</i>		12/23/97 12/20/97
Tightening (400 Ft Lb)		FW <i>FW</i>		12/23/97 12/20/97

Torque Device Identification: UNSI #10 r/n 1/60/98

Open Items

Item No.	Description	Corrective Action	Accept	Date
01	overembedment	OS defeney report	FW	12/4/97
02	underembedment	OS defeney report	FW	12/4/97

Comments:

Inspection by:	Date
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