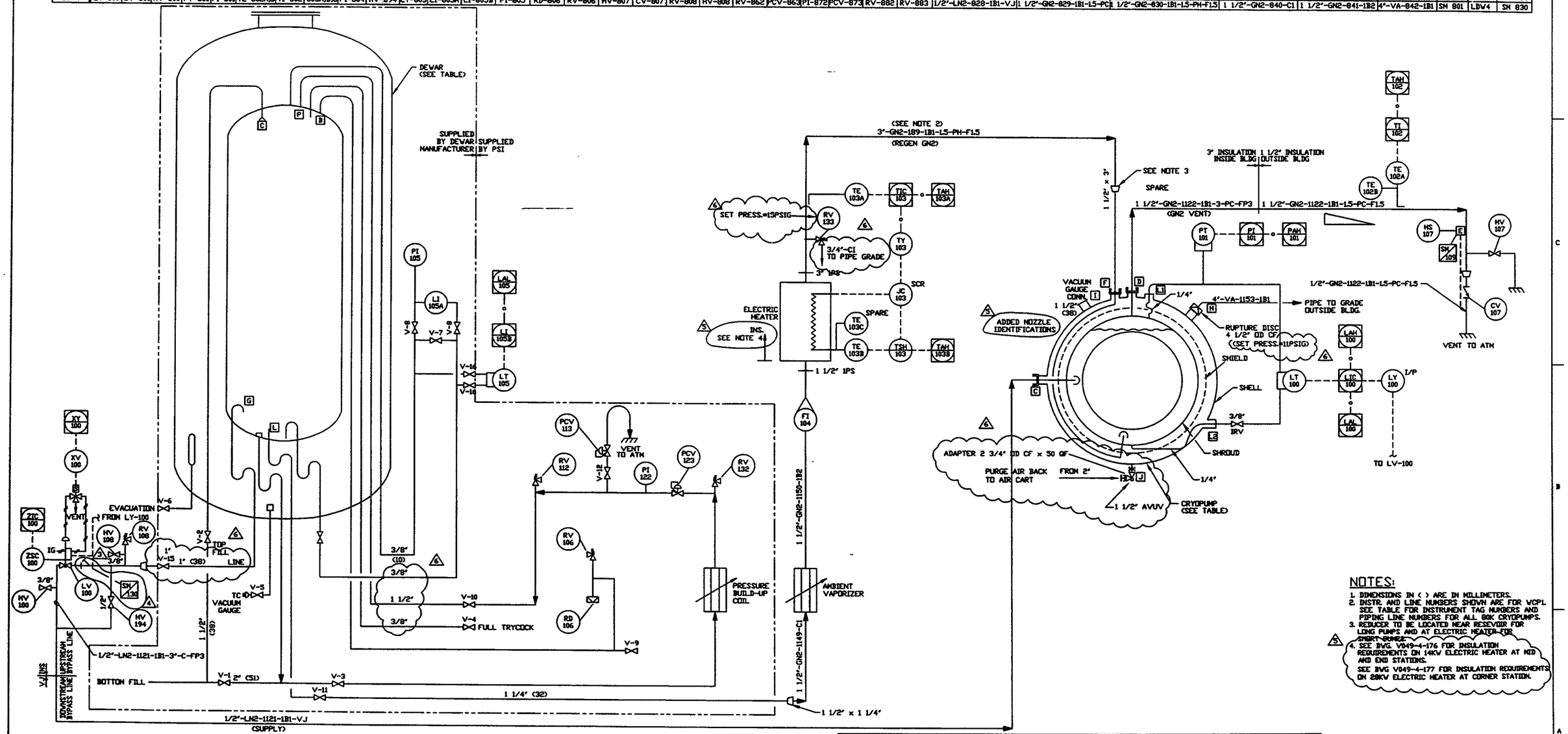
CRYOPUMP								TEMP CONTROL																		LINE NO. LN2	LINE NO. GN2 VENT	LINE NO. REGEN GN2	LINE NO.	LINE NO.	LINE NO.	VENT HEATER	DEWAR	STRAINER
VCP1	LT-100	LV-100	HV-100	PT-101	PI-101	TE-102A,B	TI-102	103A,B,C	FI-104	HV-194	LT-105	LI-105A	LI-105B	PI-105	RD-106	RV-106	HV-107	CV-107	RV-108	HV-108	RV-112	PCV-113	PI-122	PCV-123	RV-132	RV-133	1/2"-LN2-1121-1B1-VJ	1 1/2"-GN2-1122-1B1-L5-PC	3"-GN2-189-1B1-L5-PH-F1.5	1 1/2"-GN2-1149-C1	1 1/2"-GN2-1150-1B2	4"-VA-1153-1B1	SM 109	VDV1	SM 130
VCP2	LT-150	LV-150	HV-150	PT-151	PI-151	TE-152A,B	TI-152	153A,B,C	FI-154	HV-196	LT-155	LI-155A	LI-155B	PI-155	RD-156	RV-156	HV-157	CV-157	RV-158	HV-158	RV-142	PCV-143	PI-172	PCV-173	RV-182	RV-183	1/2"-LN2-1123-1B1-VJ	1 1/2"-GN2-1124-1B1-L5-PC	3"-GN2-191-1B1-L5-PH-F1.5	1 1/2"-GN2-1151-C1	1 1/2"-GN2-1152-1B2	4"-VA-1154-1B1	SM 110	VDV2	SM 131
VCP3	LT-200	LV-200	HV-200	PT-201	PI-201	TE-202A,B	TI-202	203A,B,C	FI-204	HV-294	LT-205	LI-205A	LI-205B	PI-205	RD-206	RV-206	HV-207	CV-207	RV-208	HV-208	RV-212	PCV-213	PI-222	PCV-223	RV-232	RV-233	1/2"-LN2-234-1B1-VJ	1 1/2"-GN2-235-1B1-L5-PC	1/2"-GN2-238-1B1-L5-PH-F1.5	1 1/2"-GN2-252-C1	1 1/2"-GN2-253-1B2	4"-VA-256-1B1	SM 202	VDV3	SM 230
VCP4	LT-250	LV-250	HV-250	PT-251	PI-251	TE-252A,B	TI-252	253A,B,C	FI-254	HV-296	LT-255	LI-255A	LI-255B	PI-255	RD-256	RV-256	HV-257	CV-257	RV-258	HV-258	RV-262	PCV-263	PI-272	PCV-273	RV-282	RV-283	1/2"-LN2-236-1B1-VJ	1 1/2"-GN2-237-1B1-L5-PC	1/2"-GN2-239-1B1-L5-PH-F1.5	1 1/2"-GN2-254-C1	1 1/2"-GN2-255-1B2	4"-VA-257-1B1	SM 203	VDV4	SM 231
VCP5	LT-300	LV-300	HV-300	PT-301	PI-301	TE-302A,B	TI-302	303A,B,C	FI-304	HV-394	LT-305	LI-305A	LI-305B	PI-305	RD-306	RV-306	HV-307	CV-307	RV-308	HV-308	RV-312	PCV-313	PI-322	PCV-323	RV-332	RV-333	1/2"-LN2-334-1B1-VJ	1 1/2"-GN2-335-1B1-L5-PC	1/2"-GN2-338-1B1-L5-PH-F1.5	1 1/2"-GN2-352-C1	1 1/2"-GN2-353-1B2	4"-VA-356-1B1	SM 302	VDV5	SM 330
VCP6	LT-350	LV-350	HV-350	PT-351	PI-351	TE-352A,B	TI-352	353A,B,C	FI-354	HV-396	LT-355	LI-355A	LI-355B	PI-355	RD-356	RV-356	HV-357	CV-357	RV-358	HV-358	RV-362	PCV-363	PI-372	PCV-373	RV-382	RV-383	1/2"-LN2-336-1B1-VJ	1 1/2"-GN2-337-1B1-L5-PC	1/2"-GN2-339-1B1-L5-PH-F1.5	1 1/2"-GN2-354-C1	1 1/2"-GN2-355-1B2	4"-VA-372-1B1	SM 303	VDV6	SM 331
VCP7	LT-400	LV-400	HV-400	PT-401	PI-401	TE-402A,B	TI-402	403A,B,C	FI-404	HV-494	LT-405	LI-405A	LI-405B	PI-405	RD-406	RV-406	HV-407	CV-407	RV-408	HV-408	RV-462	PCV-463	PI-472	PCV-473	RV-482	RV-483	1/2"-LN2-427-1B1-VJ	1 1/2"-GN2-428-1B1-L5-PC	1/2"-GN2-429-1B1-L5-PH-F1.5	1 1/2"-GN2-436-C1	1 1/2"-GN2-437-1B2	4"-VA-438-1B1	SM 402	VDV7	SM 430
VCP8	LT-500	LV-500	HV-500	PT-501	PI-501	TE-502A,B	TI-502	503A,B,C	FI-504	HV-594	LT-505	LI-505A	LI-505B	PI-505	RD-506	RV-506	HV-507	CV-507	RV-508	HV-508	RV-562	PCV-563	PI-572	PCV-573	RV-582	RV-583	1/2"-LN2-527-1B1-VJ	1 1/2"-GN2-528-1B1-L5-PC	1/2"-GN2-529-1B1-L5-PH-F1.5	1 1/2"-GN2-536-C1	1 1/2"-GN2-537-1B2	4"-VA-538-1B1	SM 502	VDV8	SM 530
LCP1	LT-600	LV-600	HV-600	PT-601	PI-601	TE-602A,B	TI-602	603A,B,C	FI-604	HV-694	LT-605	LI-605A	LI-605B	PI-605	RD-606	RV-606	HV-607	CV-607	RV-608	HV-608	RV-612	PCV-613	PI-622	PCV-623	RV-632	RV-633	1/2"-LN2-684-1B1-VJ	1 1/2"-GN2-685-1B1-L5-PC	3"-GN2-688-1B1-L5-PH-F1.5	1 1/2"-GN2-1619-C1	1 1/2"-GN2-1620-1B2	4"-VA-1623-1B1	SM 604	LDV1	SM 630
LCP2	LT-650	LV-650	HV-650	PT-651	PI-651	TE-652A,B	TI-652	653A,B,C	FI-654	HV-696	LT-655	LI-655A	LI-655B	PI-655	RD-656	RV-656	HV-657	CV-657	RV-658	HV-658	RV-642	PCV-643	PI-672	PCV-673	RV-682	RV-683	1/2"-LN2-686-1B1-VJ	1 1/2"-GN2-687-1B1-L5-PC	3"-GN2-689-1B1-L5-PH-F1.5	1 1/2"-GN2-1621-C1	1 1/2"-GN2-1622-1B2	4"-VA-1624-1B1	SM 605	LDV2	SM 631
LCP3	LT-700	LV-700	HV-700	PT-701	PI-701	TE-702A,B	TI-702	703A,B,C	FI-704	HV-794	LT-705	LI-705A	LI-705B	PI-705	RD-706	RV-706	HV-707	CV-707	RV-708	HV-708	RV-762	PCV-763	PI-772	PCV-773	RV-782	RV-783	1/2"-LN2-728-1B1-VJ	1 1/2"-GN2-729-1B1-L5-PC	1/2"-GN2-730-1B1-L5-PH-F1.5	1 1/2"-GN2-740-C1	1 1/2"-GN2-741-1B2	4"-VA-742-1B1	SM 701	LDV3	SM 730
LCP4	LT-800	LV-800	HV-800	PT-801	PI-801	TE-802A,B	TI-802	803A,B,C	FI-804	HV-894	LT-805	LI-805A	LI-805B	PI-805	RD-806	RV-806	HV-807	CV-807	RV-808	HV-808	RV-862	PCV-863	PI-872	PCV-873	RV-882	RV-883	1/2"-LN2-828-1B1-VJ	1 1/2"-GN2-829-1B1-L5-PC	1/2"-GN2-830-1B1-L5-PH-F1.5	1 1/2"-GN2-840-C1	1 1/2"-GN2-841-1B2	4"-VA-842-1B1	SM 801	LDV4	SM 830



NOTES:

1. DIMENSIONS IN ( ) ARE IN MILLIMETERS.
2. INSTR. AND LINE NUMBERS SHOWN ARE FOR VCP1. SEE TABLE FOR INSTRUMENT TAG NUMBERS AND PIPING LINE NUMBERS FOR ALL 80K CRYOPUMPS.
3. REDUCER TO BE LOCATED NEAR RESEVOIR FOR LONG PUMPS AND AT ELECTRIC HEATER FOR SHORT PUMPS.
4. SEE BVG. V049-4-176 FOR INSULATION REQUIREMENTS ON 14KV ELECTRIC HEATER AT MID AND END STATIONS.
   SEE BVG V049-4-177 FOR INSULATION REQUIREMENTS ON 28KV ELECTRIC HEATER AT CORNER STATION.

BVG. NO.	DESCRIPTION	BVG. NO.	DESCRIPTION
V049-0-384	PCI LIGO LN2 TANKS		
V049-0-001	P & ID LEGEND		

REFERENCE DRAWINGS

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES
FRACTIONAL ±
ANGULARITY 45°-30' BEND 45°
TWO PLACE DECIMAL ±
THREE PLACE DECIMAL ±
FINISHED SURFACE RMS
BREAK CORNERS ON
REMOVE ALL BURRS

DO NOT SCALE THIS DRAWING
USED ON
NEXT ASS'Y

REV	DESCRIPTION					CHKD	DRWN	DATE	DESIG
6	REVISED FOR FBR UPDATE					BA	BA	6/9/97	0499
5	REVISED				SM	BMcV	RJV	02.14.97	0435
4	REVISED				SM	BMcV	RJV	01.03.97	0394
3	ISSUE FOR FBR UPDATE			BM			RJV	10.25.96	0309
2	REVISED FOR DEWAR PURCHASE	RCB		BM			RJV	05.29.96	0180
1	ISSUE FOR FBR	RCB	RT	BM	TS	BMcV	RJV	04.26.96	0134
0	ISSUE FOR DESIGN				BM	BMcV	RJV	03.07.96	0083

ISSUE DESCRIPTION

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

PIPING & INSTRUMENTATION DIAGRAM LIGO VACUUM EQUIPMENT 80K CRYOPUMP

CAD FILE	SIZE	DWG. NO.	REV.
V0490006	D	V049-0-006	6
SCALE NONE		SHEET 1 OF 1	

LIGO-D961074-06-V