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TECHNICAL PROGRESS REPORT
OF THE
INDIANA UNIVERSITY HIGH ENERGY PHYSICS GROUP, Task E

January 1, 1991 - December 31, 1991
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I. Overview

This progress report for Task E of the Indiana University High Energy Physics Group covers the period June 1, 1990 to April 15, 1991. All my research effort was devoted to the Large Volume Detector (LVD) at the Gran Sasso Laboratory in Italy. The first of five "towers" of LVD is currently under construction. My primary effort during this time has been to bring to fruition the cabling plans developed by me the previous year. Other activities have included consultations on the design of the tracking trigger electronics, work on several hardware systems for the direct mount tracking modules, and coordination of various projects at the Gran Sasso Lab.

II. Personnel

Ethan D. Alyea. Jr.

III. The Large Volume Detector at Gran Sasso

The LVD collaboration includes institutions in Brazil, Italy, Japan, PRC, Switzerland, USA and the USSR. The spokesperson is A. Zichichi (CERN). The institutions in the US (and principal investigators) are Brown University (M. Widgoff), University of Houston (R. Weinstein), Indiana University (E. Alyea), Massachusetts Institute of Technology (I.A. Pless), and Northeastern University (E. vonGoeler).

The 3600 ton detector consists of 1800 tons of scintillator and 1800 tons of steel. The scintillator is housed in modules surrounded by tracking chambers. The tracking chambers are attached to the modules in one of two ways: by "hoods" which are independent structures holding the tracking chambers, or by "direct mount" (gluing) of the chambers to the modules. Each module, called portatank, containing 8 tanks of scintillator is approximately 6 meters long by 2 meters wide by 1 meter high. The whole of LVD (40m x 13m x 12m) is divided into five towers with an access corridor between each pair of towers. The data electronics is located in these corridors. Each tower contains 38 portatanks arranged as shown on the next page. Narrow access walkways are provided between each portatank for servicing the vertical pair of portatanks on each level. The height between levels is about 3 meters.

The US groups are working on the tracking system, overall detector cabling, the DAQ, and data analysis.

Tracking Layer Schematic for One Tower

View from ROAD

IV. Details of Progress

A. Equipment

Each tower of LVD has 38 portatank modules containing a total of 304 scintillator counters (or tanks). In June of 1990 there were 3 portatanks (test models), 2 tracking hood systems for the first tower, and 4 scintillator tanks at the Gran Sasso Lab. In April 1991 all the scintillator counters for the first tower are at Gran Sasso; four portatanks with scintillator and hoods are installed in the tower; additional portatanks are being loaded and installed in the tower at the rate of two per week; the cabling contractor is installing the cable trays in the tower; the initial survey of the structure of this tower has been finished; the central microVAX for data readout has been installed in a temporary building in the LVD hall and the readout programs are being tested. Commissioning of the full tower should begin in early fall 1991 with a target date of running by the beginning of 1992.

The most recent reports I have (dates shown) give the following details of hardware status:

Scintillation Counters (19 March):

255 scintillator counters are at Gran Sasso.

150 of these are tested and in the tunnel waiting to be installed in the tower.

105 are being tested.

20 more tanks were in transit and the remaining 29 tanks for the first tower will arrive before the end of April.

The current counter production rate is 60 per month.

Tracking System Hoods (19 March):

12 complete hoods are in the tunnel at Gran Sasso.

19 hoods have streamer tubes installed and are being equipped with electronic and gas systems at Frascati.

5 hoods exist but need streamer tubes.

A contract has been signed with Bindi to manufacture hoods and to assemble the electronics and gas systems on them. The 14 hoods needed to complete the first tower will be delivered at the rate of 2 per week.

Portatanks: (On 23 April there were 20 portatanks in the tunnel.)

3 in Tower 1 with hoods and tanks

3 in Tower 1 with hoods, tanks and photomultipliers

2 in Tower 2 with direct mount and tanks

2 not in tower with hoods

1 not in tower with direct mount

5 not in tower for hoods, painted, bare

1 not in tower for hoods, unpainted, bare

3 not in tower for direct mount, bare

The 24 portatanks needed to complete the first tower will be delivered by SAEM at the rate of 2 per week.

Cables (March):

The design of the cabling system is nearly complete.

(Pin to pin wiring tables for the junction boxes need to be made.) Most of the materials (cables and connectors) for the first tower have been delivered to Gran Sasso.

The cabling contractor is beginning work on the cable trays and assembly of connectors on cables is underway.

Counting House (19 March):

A firm has been chosen to construct the LVD counting house. Currently the space where the counting house will be located is being used for attaching the hoods to the portatanks. Therefore, the counting house will be constructed after the first tower is filled with portatanks/ hoods. (In the future the space will not be needed for this purpose since in the direct mount procedure the streamer tubes are mounted directly on the portatanks.)

Survey (19 March):

A contract has been signed with AZETA for surveying the LVD structure and portatanks within the structure. Work has started.

Electronics (March):

The streamer tube readout electronics (STROC) for the first tower has been constructed and tested by Brown University.

The scintillation signal electronics has been designed and manufactured by CAEN. It has been tested at Torino and is ready for the first tower.

The tracking trigger electronics has been designed by the World Lab engineers working at Gran Sasso. It is at the prototype stage.

DAQ (March) :

The microVAX computer and related hardware are undergoing tests in a temporary trailer in the tunnel at Gran Sasso. Brown, MIT and Torino are working on the fourth version of the software.

Gas System (19 March) :

CERN has designed and will install the gas system for the first tower. It should be installed this summer and early fall.

B. Neutrino Oscillation Experiment

The MIT group has done a detailed analysis of the sensitivity to which LVD can study neutrino oscillations. An important aspect of the study was to introduce the idea of comparing the neutrino interactions from neutrinos traveling upwards to those traveling horizontally. By considering these two regions rather than the usual up/down comparison the problem with the latitude effect is eliminated. The figure below shows the excluded region in the ΔM^2 vs $\sin^2(2\theta)$ plot for a run of 5 years in LVD.

LVD CALCULATIONS

5 Year Running Period

C. Indiana Participation

I have had primary responsibility for execution of the cabling plans which I developed over the previous year. The work included supervising the cabling engineer, F. Saggese. Executive drawings for the project were made; detailed specifications were developed for the bidding process on materials and installation; requests for bids were written and sent out; analyses of the bids were done; purchase orders were written for the materials; a computer inventory system was set up to keep track of parts; and the inventory records have been updated as parts have arrived. As the installation of the cables begins I continue my supervisory roll. The appendix to this report contains examples of the cabling documentation.

I have reviewed the work on the tracking trigger electronics carried out by B. Zhuang of the World Lab. Several times I have made suggestions which have been accepted and incorporated into the design.

I have also been consulted about the tracking gas system which CERN is constructing. I provided them with the earlier design done at Indiana and MIT and made suggestion on improvement in the proposed CERN design. I figured the best layout for the gas delivery piping in the structure and presented this plan to them.

Gas manifolds for the direct mount style portatank are made in the Indiana University Physics Department machine shop. Manifolds for twelve portatanks have been made during the year of this report. Mounting brackets for the SGS cards of the tracking system electronics are also made in the Indiana University shop. Brackets for twelve portatanks have also been made this year. The design for both of these parts have been simplified and improved by me during this year. The cost of this work has been paid by the Istituto Nazionale di Fisica Nucleare.

As with any large detector the various components of LVD are being made by different groups. I spend considerable time and effort looking at potential problems in interfacing the components and fostering communication between groups. This facilitates correction before installation begins. The kinds of problems range from electronic rack space to trigger signals. I also often place purchase orders for groups not present at the Gran Sasso Lab.

V. Travel (May 1990 through March 1991)

I made seven trips to Gran Sasso to work on LVD. The total time I spent there was over five months (152 days). The (approximate) total cost was \$24,708. The DOE paid \$7,800 and the INFN paid \$16,908.

APPENDIX

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ID-DEFS
10 Nov 1989

LVD Identification Scheme
for
Design Elements and Actual Objects

DESIGN ELEMENTS: These are components of LVD which enter into design considerations and are convenient to identify by means of a short name or ID. For example: the photomultiplier located at a certain position in a certain tank in a certain portatank on a certain level in a certain tower.

ACTUAL OBJECTS: These are the actual components which are installed in LVD.

DESIGN ELEMENTS

The ID for these is 10 characters long and consists of three parts:

1. The TYPE of element: 3 characters:

1st: General nature	(Example: H for Hardware)
2nd: Subgroup	(" S for Scintillator)
3rd: Subdivision	(" P for PM)

2. The LOCATION of element: 3 characters:

1st: Tower
2nd: Level
3rd: usually Portatank

3. The DETAIL for element: 4 characters:

Chosen to fit circumstances. Degree of detail increasing with character number.
For example -- PM
1st: Tank number in portatank
2nd: PM number in tank
3rd: Anode/dynode code
4th: not relevant, set to X

ACTUAL OBJECTS

The ID for these consists of 10 characters and has two parts:

1. The TYPE of object: Same three characters as defined for Design Elements.
2. The SERIAL NUMBER of object: 7 characters. Some of these may continue the TYPE code. For example, the PM cables inside the portatank could be distinguished from the external bundles.

The DATABASE would utilize the ACTUAL OBJECT ID and perhaps the DESIGN ELEMENT ID. This will depend on the database chosen and the format for its use.

Design Elements

ID Code for Junction Boxes

ID-J

Nov 10, 1989

(10 Characters)

Character Number	Code	Meaning
1	J	Junction Box
2	S	Scintillator
	T	Tracking
	B	Both Scintillator and Tracking
	G	Gas
3	D	Data
	T	Trigger
	H	High Voltage
	L	Low Voltage DC Power
	M	Monitor
	V	Various
	A	220 VAC
4	1-5	Tower Number (t for generic tower; u=t+1) The corridor is associated with the tower north of the corridor. Exception: Boxes mounted on portatank.
	C	Counting House
5	0-3	Corridor Level (Floor)
6	2-B	Portatank Number (Use even number for double module.)
	E	East
	W	West
	X	Not relevant.
7	P	On Portatank, electronics end
	G	On portatank, Gas end
	N	On structure (near portatank when Char 6 is 2-B), North side of corridor (electronics side of cor.)
	S	On structure (near portatank when Char 6 is 2-B), South side of corridor (gas side of corridor)
	R	On structure, near electronics Rack
	E	In Electronics rack
	C	In Counting house
8	0-F	Connector number in Hex
	X	Not relevant.
9	0-F	Connector or Pin Number in Hex
	X	Not relevant.
10	0-F	Connector or Pin Number in Hex
	X	Not relevant.

Design Elements ID Code for External Cables ID-C-EXT
10 Nov 1989

(External means outside the portatank and electronics racks.)
(10 Characters)

Character #	Code	Meaning
1	C	Cable
2	S	Scintillator
	T	Tracking
	B	Both Scintillator and Tracking
3	D	Data
	T	Trigger
	H	High Voltage
	I	High Voltage CAENET
	L	Low Voltage Power
	A	220 V AC Power
	M	Monitor
	N	CAENET Monitor
	C	CAMAC Branch Driver
	V	MicroVAX
	E	Ethernet
	F	Fiber Optics

4	1-5	Tower Number (t for generic tower; u=t+1) (Source tower for cables to other tower or counting house.)
	E	East
5	0-3	Corridor Level (Floor) at associated portatank or associated electronics rack.
6	2-B	Portatank associated with cable.
	E	East electronics rack associated with cable.
	W	West " " " "
	X	Not relevant.

7 Cable type as indicated below:

A	AC Power	R	Flat Ribbon (16 pair)
B	CAMAC Branch Driver	W	Flat Ribbon (43 pair)
E	Ethernet	Y	Belden 8107 (7 twisted pair)
F	Fiber Optic	Z	Belden 8112 (12.5 twisted pair)
H	Hi Voltage, RG59	I	Belden 83702 (2 cnd 16 AWG dbl shld)
C	Hi Voltage, CERN 04.31.51.555	J	Belden 83604 (4 cnd 20 AWG dbl shld)
L	LEMO Coax	K	Belden 83709 (9 cnd 16 AWG dbl shld)
M	Multiple Coax, RG58U, bundle of 12		

8	J	Jumper between portatank and junction box on structure (not in cable tray).
	R	Jumper between junction box on structure and electronics rack.
	P	Travels in cable tray(s) (Passerella).
	X	Not relevant.
9	0-F	Pair number in cable or sequence number in Hex.
	X	Not relevant.
10	1,2,3...	Sequence Number in Hex. (Start at 1.)

ID-P

Design Elements ID Code for Cable Trays (Passerella) 10 Nov 1989
(10 Characters)

Character Number	Code	Meaning
1	P	Passerella (Cable Tray)
2	C	Cable
3	Character 3 specifies the direction of the tray:	
	C	Corridor (across the tunnel axis)
	V	Vertical
	P	Peripheral (parallel to tunnel axis)
4	1-5 X	Tower Number (t for generic tower) Not relevant.
5	0-3 X	Corridor Level (Floor) Not relevant.
6	E C W X	East (Used with Corridor & Peripheral Trays.) Center (Used with Corridor Trays.) West (Used with Corridor & Peripheral Trays.) Not relevant.
7	Characters 7,8 & 9 specify columns supporting vertical trays:	
	2-A X	Even numbered portatank of double module. Not relevant.
8	N S X	North South Not relevant.
9	E W X	East West Not relevant.
10	1,2,3...	Sequence number

Assignment Of Vertical Cable Trays

(Figures are plan views of Corridors as in Fig. 5.3.2)

Symbols Used

B CAMAC Branch
D Scintillator Signal
G Gas Pipe
H Tracking High Voltage
L Tracking Low Voltage
T Tracking Data and Trigger
V Scintillator High Voltage

Major Vertical Trunks

Level 3 Cables to Level 2

Map from Fig. 5.3.2

Plan View

JB-LOC-N
02/03/90

Junction Box Locations

North (or "Electronics") Side of Corridor

(See Figs. 5.3.2 and 5.3.5 of Cables Progress Report for Map)

Vertical Column of Structure									
2NW	2NE	4NW	4NE	6NW	6NE	8NW	8NE	ANW	ANE
Level 3									
			JSht34N		JSht36N		JSht38N		
		JTVt34N		JTVt36N		JTVt38N			
Level 2									
	JSht2WN JSht32N JSht22N		JSht24N		JSht26N		JSht28N	JSht2EN	JSht3AN JSht2AN
JTVt32N JTVt22N		JTVt24N		JTVt26N		JTVt28N		JTVt3AN JTVt2AN	
Level 1									
	JSht1WN JSht12N		JSht14N		JSht16N		JSht18N	JSht1EN	JSht1AN
JTVt12N		JTVt14N		JTVt16N		JTVt18N		JTVt1AN	
Level 0									
	JSht0WN JSht02N		JSht04N		JSht06N		JSht08N	JSht0EN	JSht0AN
JTVt02N		JTVt04N		JTVt06N		JTVt08N		JTVt0AN	
		JBMt0WR					JBMt0ER		

Map from Fig. 5.3.2

NW	NE	NW	NE	NW	NE	NW	NE	NW	NE
2		4		6		8		A	
SW	SE	SW	SE	SW	SE	SW	SE	SW	SE

Plan View

JB-LOC-S
02/03/90

Junction Box Locations

South (or "Gas") Side of Corridor

(See Figs. 5.3.2 and 5.3.5 of Cables Progress Report for Map)

Vertical Column of Structure									
2SW	2SE	4SW	4SE	6SW	6SE	8SW	8SE	ASW	ASE
Level 3									
		JTVt34S	JSVt3WR		JTVt36S	JSVt3ER	JTVt38S		
			JSDt3WR			JSDt3ER			
Level 2									
	JTVt22S	JTVt2WR			JTVt26S	JTVt28S	JTVt2ER	JTVt3AS	JTVt2AS
JTVt32S			JTVt24S						
Level 1									
JTVt12S	JTVt14S		JSVt1WR	JTVt16S		JSVt1ER	JTVt18S	JTVt1AS	
			JSDt1WR			JSDt1ER			
Level 0									
JTHt0WS				JTVt06S			JTHt0ES		
JTVt02S	JTVt04S					JTVt08S	JTVt0AS		

Map from Fig. 5.3.2

NW	NE	NW	NE	NW	NE	NW	NE	NW	NE
2		4		6		8		A	
SW	SE	SW	SE	SW	SE	SW	SE	SW	SE

Plan View

JB-LOC-LIST
12/03/90

Junction Box Location List

(See Figs. 5.3.2 and 5.3.5 of Cables Progress Report for Map)

JB ID	Location		
	Level	Column	
JBM-t0E-R	0	8NE	Jumper to ER crosses corridor.
JBM-t0W-R	0	4NW	Jumper to ER crosses corridor.
JSD-t1E-R	1	8SW	
JSD-t1W-R	1	4SE	
JSD-t3E-R	3	8SW	
JSD-t3W-R	3	4SE	
JSH-t02-N	0	2NE	
JSH-t04-N	0	4NE	
JSH-t06-N	0	6NE	
JSH-t08-N	0	8NE	
JSH-t0A-N	0	ANE	
JSH-t0E-N	0	ANW	Jumper to ER crosses corridor.
JSH-t1E-N	1	ANW	
JSH-t2E-N	2	ANW	
JSH-t0W-N	0	2NE	Jumper to ER crosses corridor.
JSH-t1W-N	1	2NE	
JSH-t2W-N	2	2NE	
JSH-t12-N	1	2NE	
JSH-t14-N	1	4NE	
JSH-t16-N	1	6NE	
JSH-t18-N	1	8NE	
JSH-t1A-N	1	ANE	
JHS-t22-N	2	2NE	
JSH-t24-N	2	4NE	
JSH-t26-N	2	6NE	
JSH-t28-N	2	8NE	
JSH-t2A-N	2	ANE	
JSH-t32-N	2	2NE	
JSH-t34-N	3	4NE	
JSH-t36-N	3	6NE	
JSH-t38-N	3	8NE	
JSH-t3A-N	2	ANE	
JSV-t1E-R	1	8SW	
JSV-t1W-R	1	4SE	
JSV-t3E-R	3	8SW	
JSV-t3W-R	3	4SE	
JTH-t0E-S	0	ASW	
JTH-t0W-S	0	2SE	

JTV-t02-N	0	2NW
JTV-t02-S	0	2SE
JTV-t04-N	0	4NW
JTV-t04-S	0	4SW
JTV-t06-N	0	6NW
JTV-t06-S	0	6SW
JTV-t08-N	0	8NW
JTV-t08-S	0	8SE
JTV-t0A-N	0	ANW
JTV-t0A-S	0	ASW
JTV-t12-N	1	2NW
JTV-t12-S	1	2SE
JTV-t14-N	1	4NW
JTV-t14-S	1	4SW
JTV-t16-N	1	6NW
JTV-t16-S	1	6SW
JTV-t18-N	1	8NW
JTV-t18-S	1	8SE
JTV-t1A-N	1	ANW
JTV-t1A-S	1	ASW
JTV-t22-N	2	2NW
JTV-t22-S	2	2SE
JTV-t24-N	2	4NW
JTV-t24-S	2	4SE
JTV-t26-N	2	6NW
JTV-t26-S	2	6SE
JTV-t28-N	2	8NW
JTV-t28-S	2	8SW
JTV-t2A-N	2	ANW
JTV-t2A-S	2	ASW
JTV-t2E-R	2	8SE
JTV-t2W-R	2	4SW
JTV-t32-N	2	2NW
JTV-t32-S	2	2SE
JTV-t34-N	3	4NW
JTV-t34-S	3	4SW
JTV-t36-N	3	6NW
JTV-t36-S	3	6SE
JTV-t38-N	3	8NW
JTV-t38-S	3	8SE
JTV-t3A-N	2	ANW
JTV-t3A-S	2	ASW

JBM-t0E-R
31/08/90
14/03/91

Junction Box JBM-t0E-R-XXX
Near East High Voltage Electronics Rack
(All Junction Box names below end in XXX, not shown here)

The south end of the portatank is the electronics end of the portatank and is at the north side of the corridor.

The north end of the portatank is the gas end of the portatank and is at the south side of the corridor.

JSD-t1E-R
03/03/90

Junction Box JSD-t1E-R-XXX
Adjacent to East Electronics Rack, Level 1
Scintillator Signal

(All Junction Box names below end in XXX, not shown here)

JSD-t1E-R has 40 AMP 12 pin connectors and 320 LEMO connectors.

JSH-t04-N
09/11/89

Junction Box JSH-t04-N-XXX
Portatank t04/5
Scintillator High Voltage, South End of Portatank
(All Junction Box names below end in XXX, not shown here.)

JSH-t0W-N
29/06/90

JSH-t0W-N-XXX
Junction Boxes JSH-t1W-N-XXX
JSH-t2W-N-XXX
Scintillator High Voltage Tree / West Side
(All Junction Box names below end in XXX, not shown here)

JSV-t02-P
12/12/89

Junction Box JSV-t02-P-XXX
on Portatank t02/3, South End of Portatank
Scintillator Box

The south end of the portatank is the electronics end of the portatank and is at the north side of the corridor.

The north end of the portatank is the gas end of the portatank and is at the south side of the corridor.

JSV-t1E-R
09/11/89

Junction Box JSV-t1E-R-XXX
Near East Scintillator Rack, Level 1
Monitor/ Scintillator Trigger
(All Junction Box names below end in XXX, not shown here.)

The south end of the portatank is the electronics end of the portatank and is the north side of the corridor.

The north end of the portatank is the gas end of the portatank and is the south side of the corridor.

JSV-XYX-P-XSS
12 Dec. 1990
12 March 1991

Cable Layout on
Scintillator Signal Junction Box
of Portatank, Serial N. yy

JSV-Xyy-P-XSS <-- Junction Box ID

Cable ID's -> CIDyytenXX										yy= PT serial N. t= tank N. e= (A)node, (D)ynode, (S)pare n= A N. or X(not relevant)	
	1	3	t	5	7	2	4	t	6	8	
A3	o	o		o	o	o	o		o	o	A3
A2	o	o		o	o	o	o		o	o	A2
A1	o	o		o	o	o	o		o	o	A1
DX	o	o		o	o	o	o		o	o	DX
SX	o	o		o	o	o	o		o	o	SX

JTH-t0E-S
31/07/90

Junction Box JTH-t0E-S-XXX
Tracking High Voltage
Near East High Voltage Electronics Rack on corridor level 0
(All Junction Box names below end in XXX, not shown here)

THIS "BOX" IS A PANEL WITH FEED THROUGH CONNECTORS

JTV-t02-N
12/11/89

Junction Box JTV-t02-N-XXX
Tracking
Portatank t02/3, South End of Portatank
(All Junction Box names below end in XXX, not shown here)

JTV-t03-P Upper Portatank	CTD-t03-Y-JX1	JTV-t02-N local Junction Box on Structure	CTD-t02-Z-PX1	JTV-t2W-R near West Tracking Electronics Rack
	<-----> Data		<-----> Data	
	CTT-t03-Y-JX1		CTD-t02-Z-PX2	
	----->		----->	
	Trigger		Spare	
	CBM-t03-Z-JX1		CTT-t02-Z-PX1	
	----->		----->	
	Monitor		Trigger	
	CTL-t03-I-JX1			
	<----->		CBM-t02-Z-PX1	
	LVDC		----->	JBM-t0W-R
	CTL-t03-J-JX1		Monitor	
	<----->			
	LVDC			
JTV-t02-P Lower Portatank	CTD-t02-Y-JX1		CBM-t03-Z-PX1	near West HV Electronics Rack
	<-----> Data		----->	
	CTT-t02-Y-JX1		Monitor	
	----->		CTL-t02-K-PX1	
	Trigger		<----->	
	CBM-t02-Z-JX1		LVDC	
	----->			
	Monitor			
	CTL-t02-I-JX1			
	<----->			
	LVDC			
	CTL-t02-J-JX1			
	<----->			
	LVDC			
JSV-t02-P Scintillator Box on Portatank	CSN-t02-L-JX1		CSN-t04-L-PX1	JTV-T04-N
	<----->		<----->	
	CSN-t02-L-JX2		CSN-t04-L-PX2	
	<----->		<----->	
	CSN-t02-L-JX3		CSN-t02-L-PX1	
	----->		----->	
	CSN-t02-L-JX4		CSN-t02-L-PX2	
	----->		----->	
	Scintillator		Scintillator	
	CAENET		CAENET	

The south end of a portatank is the electronics end of the portatank and is at the north side of the corridor.

JTV-t02-S
09/09/90

Junction Box JTV-t02-S-XXX
Portatank u02/3
Tracking High Voltage, North End of Portatanks
(All Junction Box names below end in XXX, not shown here)

THIS "BOX" IS A PANEL WITH FEED THROUGH CONNECTORS

The north end of a portatank is the gas end of the portatank and is at the south side of the corridor.

JTV-t2E-R
06/08/90

Tracking Junction Box JTV-t2E-R-XXX
Near East Tracking Electronics Rack

JB's Levels 0,1,3		Electronics Rack	
-----+ CSN-t2E-L-PX1/2 2 +-----+ 2 CSN-t2E-L-RX1/2 +-----+			
JTV-t0A-N <-----/--->		<---/----->	(Scint. CAENET)
-----+ (Scint. CAENET)			
-----+ CBV-t0E-Y-PX1 1		1 CTN-t2E-L-RX1	
JBM-t0E-R <-----/--->		<---/----->	(Trac. HV CAENET)
-----+ CBV-t1E-Y-PX1 1			
JSV-t1E-R <-----/--->		3 CBV-t0E-Y-RX1	(MicroVAX
-----+ CBV-t3E-Y-PX1 1		<---/----->	Terminals)
JSV-t3E-R <-----/--->		CBV-t1E-Y-RX1	
-----+ (MicroVAX Terminal)		CBV-t3E-Y-RX1	
-----+ CBM-t2E-Z-PX1 1		1 CBM-t2E-Z-RX7	
JBM-C2X-C <-----/--->		<---/----->	(Monitor)
Counting House	(Monitor)		
-----+ Various Portatanks (South Ends)			
-----+ CBM-t28-Z-PX1 4		4 CBM-t2E-Z-RX1/4	
(4 Tanks) <-----/--->		<---/----->	(Monitor)
(Monitor)			
thru			
CBM-t2B-Z-PX1			
CTL-t26-K-PX1 5		5 CTL-t2E-K-RX1/5	(Low
(9 Tanks) <-----/--->		<---/----->	Voltage
(Low V DC)			DC)
thru			
CTL-t3A-K-PX1			
CTD-t08-Z-PX1 8		2 CTD-t2E-W-RX1/2	
(15 Tanks) <-----/--->		<---/----->	(STROC)
(Data)			
thru			
CTD-t3A-Z-PX1		2 CTD-t2E-L-RX1/2	
CTD-t08-Z-PX2 8		<---/----->	(STROC)
(15 Tanks) <-----/--->			
(Spare)			
thru			
CTD-t3A-Z-PX2			
CTT-t08-Z-PX1 8		7 CTT-t2E-R-RX1/7	
(15 Tanks) <-----/--->		<---/----->	(Trigger)
(Trigger)			
thru			
CTT-t3A-Z-PX1			
-----+ Near Rack in Tower s		2 CTT-t2W-L-PX1/2	
-----+ CTN-t2E-L-PX1 1		<---/----->	JTV-t2W-R
JBM-s0E-R <-----/--->		4 CTT-t2E-Z-PX1/4	
-----+ (Trac. HV CAENET)		<---/----->	

The south end of a portatank is the electronics end of the portatank and is at the north side of the corridor.

GRUPPI
JTV102
JTV104
JTV106
JTV108
JTV10A
JTV112
JTV114
JTV116
JTV118
JTV11A
JTV122
JTV124
JTV126
JTV128
JTV12A
JTV134
JTV136
JTV138

GRUPPO S JTV132S
JTV134S

GRUPPO S JTV132S JTV134S		GRUPPO S JTV132S JTV134S	
GRUPPO S JTV132S JTV134S		GRUPPO S JTV132S JTV134S	
GRUPPO S JTV132S JTV134S		GRUPPO S JTV132S JTV134S	
GRUPPO S JTV132S JTV134S		GRUPPO S JTV132S JTV134S

90x132

LVD Cable Routing Drawings
and
Related Drawings

Title	(Description)	Drawing Number(s)		Appendix page #
Connettori	(Junction Box Layout)	1C		22
CAENET Scintillator Cables		1E		24
CAMAC Branch, Microvax & Ethernet Cables			3G	37
HV Scintillator Cables		2E		25
HV Tracking Cables			2G	36
Tracking Data and Trigger Cables		3E	5G	26,27
Tracking DC Power Cables, Low Voltage		4E	6G	28,29
Scintillator Trigger to Tower 3			7G	38
Scintillator Signal Cables (called Signal Cables)			8G	39
Scintillator Signal Cables Layout	(Rack ID)			
Layout Signal Cables to Rack 1	(ERSt1WXXXX)	8/1		40
Layout Signal Cables to Rack 2	(ERSt1EXXXXX)	8/2		41
Layout Signal Cables to Rack 3	(ERSt3WXXXX)	8/3		42
Layout Signal Cables to Rack 4	(ERSt3EXXXXX)	8/4		43
Sezioni Verticali - Particolari (includes design of cable tray)		8/5		44
System Monitor Cables, Line to Counting House		5E	4G	30,31
Impianto Prese (220 VAC Power)		9E		35
Impianto Illuminazione (Lighting)		6E		32
Layout Electronic Cables (Plan View of Paths)		7E		33
Impianti di Terra (Grounding Bars)		8E		34

PROGETTORE DOTT. ING. F. SACCHETTI via S. Maria - 10121 Roma	CONTRATTORE UNIF. N. - LABORATORIO ISTITUTO FISICA NUCLEARE ASSEGNO - L'AQUILA
DATA 20 OT 1960	LAVORO IMPIANTI TRASMISSIONE DATI ED ELETTRICI
CALENDAIO	PROIEZIONE
ING. PROIEZIONE DOTT. ING. F. SACCHETTI	CAENET SCINTILLATOR CABLES TAV. 1E

1. NOME E COGNOME 2. DATA NASCITA 3. DOSSIER N° 4. DATA INGRESSO 5. DATA USCITA 6. DATA DIMISSIONE	7. DATA 8. DATA 9. DATA 10. DATA 11. DATA 12. DATA	13. DATA 14. DATA 15. DATA 16. DATA 17. DATA 18. DATA 19. DATA 20. DATA 21. DATA 22. DATA 23. DATA 24. DATA 25. DATA 26. DATA 27. DATA 28. DATA 29. DATA 30. DATA 31. DATA 32. DATA 33. DATA 34. DATA 35. DATA 36. DATA 37. DATA 38. DATA 39. DATA 40. DATA 41. DATA 42. DATA 43. DATA 44. DATA 45. DATA 46. DATA 47. DATA 48. DATA 49. DATA 50. DATA 51. DATA 52. DATA 53. DATA 54. DATA 55. DATA 56. DATA 57. DATA 58. DATA 59. DATA 60. DATA 61. DATA 62. DATA 63. DATA 64. DATA 65. DATA 66. DATA 67. DATA 68. DATA 69. DATA 70. DATA 71. DATA 72. DATA 73. DATA 74. DATA 75. DATA 76. DATA 77. DATA 78. DATA 79. DATA 80. DATA 81. DATA 82. DATA 83. DATA 84. DATA 85. DATA 86. DATA 87. DATA 88. DATA 89. DATA 90. DATA 91. DATA 92. DATA 93. DATA 94. DATA 95. DATA 96. DATA 97. DATA 98. DATA 99. DATA 100. DATA	101. DATA 102. DATA 103. DATA 104. DATA 105. DATA 106. DATA 107. DATA 108. DATA 109. DATA 110. DATA 111. DATA 112. DATA 113. DATA 114. DATA 115. DATA 116. DATA 117. DATA 118. DATA 119. DATA 120. DATA 121. DATA 122. DATA 123. DATA 124. DATA 125. DATA 126. DATA 127. DATA 128. DATA 129. DATA 130. DATA 131. DATA 132. DATA 133. DATA 134. DATA 135. DATA 136. DATA 137. DATA 138. DATA 139. DATA 140. DATA 141. DATA 142. DATA 143. DATA 144. DATA 145. DATA 146. DATA 147. DATA 148. DATA 149. DATA 150. DATA 151. DATA 152. DATA 153. DATA 154. DATA 155. DATA 156. DATA 157. DATA 158. DATA 159. DATA 160. DATA 161. DATA 162. DATA 163. DATA 164. DATA 165. DATA 166. DATA 167. DATA 168. DATA 169. DATA 170. DATA 171. DATA 172. DATA 173. DATA 174. DATA 175. DATA 176. DATA 177. DATA 178. DATA 179. DATA 180. DATA 181. DATA 182. DATA 183. DATA 184. DATA 185. DATA 186. DATA 187. DATA 188. DATA 189. DATA 190. DATA 191. DATA 192. DATA 193. DATA 194. DATA 195. DATA 196. DATA 197. DATA 198. DATA 199. DATA 200. DATA	201. DATA 202. DATA 203. DATA 204. DATA 205. DATA 206. DATA 207. DATA 208. DATA 209. DATA 210. DATA 211. DATA 212. DATA 213. DATA 214. DATA 215. DATA 216. DATA 217. DATA 218. DATA 219. DATA 220. DATA 221. DATA 222. DATA 223. DATA 224. DATA 225. DATA 226. DATA 227. DATA 228. DATA 229. DATA 230. DATA 231. DATA 232. DATA 233. DATA 234. DATA 235. DATA 236. DATA 237. DATA 238. DATA 239. DATA 240. DATA 241. DATA 242. DATA 243. DATA 244. DATA 245. DATA 246. DATA 247. DATA 248. DATA 249. DATA 250. DATA 251. DATA 252. DATA 253. DATA 254. DATA 255. DATA 256. DATA 257. DATA 258. DATA 259. DATA 260. DATA 261. DATA 262. DATA 263. DATA 264. DATA 265. DATA 266. DATA 267. DATA 268. DATA 269. DATA 270. DATA 271. DATA 272. DATA 273. DATA 274. DATA 275. DATA 276. DATA 277. DATA 278. DATA 279. DATA 280. DATA 281. DATA 282. DATA 283. DATA 284. DATA 285. DATA 286. DATA 287. DATA 288. DATA 289. DATA 290. DATA 291. DATA 292. DATA 293. DATA 294. DATA 295. DATA 296. DATA 297. DATA 298. DATA 299. DATA 300. DATA	301. DATA 302. DATA 303. DATA 304. DATA 305. DATA 306. DATA 307. DATA 308. DATA 309. DATA 310. DATA 311. DATA 312. DATA 313. DATA 314. DATA 315. DATA 316. DATA 317. DATA 318. DATA 319. DATA 320. DATA 321. DATA 322. DATA 323. DATA 324. DATA 325. DATA 326. DATA 327. DATA 328. DATA 329. DATA 330. DATA 331. DATA 332. DATA 333. DATA 334. DATA 335. DATA 336. DATA 337. DATA 338. DATA 339. DATA 340. DATA 341. DATA 342. DATA 343. DATA 344. DATA 345. DATA 346. DATA 347. DATA 348. DATA 349. DATA 350. DATA 351. DATA 352. DATA 353. DATA 354. DATA 355. DATA 356. DATA 357. DATA 358. DATA 359. DATA 360. DATA 361. DATA 362. DATA 363. DATA 364. DATA 365. DATA 366. DATA 367. DATA 368. DATA 369. DATA 370. DATA 371. DATA 372. DATA 373. DATA 374. DATA 375. DATA 376. DATA 377. DATA 378. DATA 379. DATA 380. DATA 381. DATA 382. DATA 383. DATA 384. DATA 385. DATA 386. DATA 387. DATA 388. DATA 389. DATA 390. DATA 391. DATA 392. DATA 393. DATA 394. DATA 395. DATA 396. DATA 397. DATA 398. DATA 399. DATA 400. DATA	401. DATA 402. DATA 403. DATA 404. DATA 405. DATA 406. DATA 407. DATA 408. DATA 409. DATA 410. DATA 411. DATA 412. DATA 413. DATA 41
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LABORATORIO ISTITUTO FISICA NUCLEARE INFN - LABORATORIO ISTITUTO FISICA NUCLEARE ASSERO - L'ADRIA		IMPIANTI TRASMISSIONE DATI ED ELETTRICI TRACKING DATA & TRIGGER CABLES	51
DOTT. ING. F. SACCHETTI 10.10.1930 10.10.1930	DOTT. ING. F. SACCHETTI 10.10.1930 10.10.1930	DOTT. ING. F. SACCHETTI 10.10.1930 10.10.1930	DOTT. ING. F. SACCHETTI 10.10.1930 10.10.1930

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1.0000 11.0000 DOTT ING F SAGGIO 00 0 00 - 0000000000 L'00000 - 00 0000000000			TRACKING DATA & TRIGGER CABLES

LABORATORIO ISTITUTE FISICA NUCLEARE INFN - LABORATORIO ISTITUTE FISICA NUCLEARE ASSERO - L'AQUILA		IMPIANTI TRASMISSIONE DATI ED ELETTRICI	
DOT. ING. F. SACCHI 21 07 80		6G	
TRACKING DC POWER		TAV

LABORATORIUM DOT. ING. F. SACCHI VIA S. M. - 00187 ROMA TEL. 06/47801		LABORATORIUM DOT. ING. F. SACCHI VIA S. M. - 00187 ROMA TEL. 06/47801	
COMMITTEE UN.F.N. - LABORATORIO ISTITUTO FISICA NUCLEARE ASSEGNO - L'ADOLE		COMMITTEE UN.F.N. - LABORATORIO ISTITUTO FISICA NUCLEARE ASSEGNO - L'ADOLE	
DATA 21.07.80		DATA 21.07.80	
IMPIANTI TRASMISSIONE DATI ED ELETTRICI		IMPIANTI TRASMISSIONE DATI ED ELETTRICI	
SYSTEM MONITOR CABLES LINE TO COUNTING HOUSE CABLES		SYSTEM MONITOR CABLES LINE TO COUNTING HOUSE CABLES	
SCALE 1:50		SCALE 1:50	
5E		5E

UNITED TECHNICAL	COMPONENTE
DOTI INC. F. 540252	UNIT N. - LABORATORIO ISTITUTO FISICA NUCLEARE
NO. 5. 001 - 000.000.000	ASSERIO - L'ADOLLA
DATA 21.01.80	IMPIANTI TRASMISSIONE DATI ED ELETTRICI
PROGETTISTA	PROGETTISTA
DOTI INC. F. 540252	SYSTEM MONITOR CABLES
	LINE TO COUNTING HOUSE CABLES
	IAV
	4C

- QUOTAZIONE ELETTRICA
- SCALATA ELETTRICA
- △ PIANO ELETTRICO PER LA STRUTTURA
- PIANO ELETTRICO PER LA STRUTTURA
- PIANO ELETTRICO PER LA STRUTTURA

TUTTI I CUBI DI LAVORAZIONE SONO IN FASE DI VERIFICA

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61

SEZIONE VERTICALE

ROAD

LABORATORIO ISTITUTO PER LA RICERCA NUCLEARE ASSESSORATO REGIONALE AREA 1 AREA 2 AREA 3 AREA 4 AREA 5 AREA 6 AREA 7 AREA 8 AREA 9 AREA 10 AREA 11 AREA 12 AREA 13 AREA 14 AREA 15 AREA 16 AREA 17 AREA 18 AREA 19 AREA 20 AREA 21 AREA 22 AREA 23 AREA 24 AREA 25 AREA 26 AREA 27 AREA 28 AREA 29 AREA 30 AREA 31 AREA 32 AREA 33 AREA 34 AREA 35 AREA 36 AREA 37 AREA 38 AREA 39 AREA 40 AREA 41 AREA 42 AREA 43 AREA 44 AREA 45 AREA 46 AREA 47 AREA 48 AREA 49 AREA 50 AREA 51 AREA 52 AREA 53 AREA 54 AREA 55 AREA 56 AREA 57 AREA 58 AREA 59 AREA 60 AREA 61 AREA 62 AREA 63 AREA 64 AREA 65 AREA 66 AREA 67 AREA 68 AREA 69 AREA 70 AREA 71 AREA 72 AREA 73 AREA 74 AREA 75 AREA 76 AREA 77 AREA 78 AREA 79 AREA 80 AREA 81 AREA 82 AREA 83 AREA 84 AREA 85 AREA 86 AREA 87 AREA 88 AREA 89 AREA 90 AREA 91 AREA 92 AREA 93 AREA 94 AREA 95 AREA 96 AREA 97 AREA 98 AREA 99 AREA 100	IMPIANTI TRASMISSIONE DALLI EDIFICI LAYOUT ELECTRONIC CABLES INV
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HOVER 1	HOVER 2	HOVER 3	HOVER 4	HOVER 5

[illegible][illegible]

[illegible]

LABORATORIO ISTITUTO FISICA NUCLEARE INFN - LABORATORIO ISTITUTO FISICA NUCLEARE ASSISI - L'ADRIA	
DATA: 20.07.80 AUTORE:	IMPIANTI TRASMISSIONE DATI ED ELETTRICI INVI 20
DATA: 20.07.80 AUTORE:	IMPIANTI TRASMISSIONE DATI ED ELETTRICI INVI 20

LABORATORIO ISTITUTO FISICA NUCLEARE ASSINO - L'AQUILA		IMPIANTI TRASMISSIONE DATI ED ELETTRICI	
DOTT. ING. F. SACCIS IN F. ING. - ING. ELETTRICI L. 10/10/68 - 10/10/68		DOTT. ING. F. SACCIS IN F. ING. - ING. ELETTRICI L. 10/10/68 - 10/10/68	
SCINTILLATOR TRIGGER TO TOWER 3		76

[illegible]

CONDIZIONE 1 LIVELLO

CONDIZIONE 1 LIVELLO

CONDIZIONE 0 LIVELLO

CONDIZIONE 0 LIVELLO

CONDIZIONE 0 LIVELLO

ALL 4 CABLES

<p>CONDIZIONE 1</p> <p>UNITA' TECNICHE</p> <p>UNITA' INC. F. SAGGESE</p> <p>IN 8 ANNI - 1980/1981</p> <p>1. CAVI - 2. CAVI - 3. CAVI</p> <p>DATA</p> <p>21.07.80</p> <p>ALLEGATO 10</p> <p>8. PRELAVORAZIONE</p> <p>UNITA' INC. F. SAGGESE</p>	<p>CONDIZIONE 1</p> <p>UNITA' N. - LABORATORIO ISTITUTO FISICA NUCLEARE</p> <p>ASSEGNO - L'ACQUA</p> <p>IMPANTI TRASMISSIONE DATI ED ELETTRICI</p> <p>DATA</p> <p>1. 80</p> <p>2. 80</p> <p>3. 80</p>	<p>LAYOUT SIGNAL CABLES TO RACK 1</p> <p>IAV</p> <p>8/1</p>
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SEZIONE VERTICALE

PASSERELLA PORTACAVI

STUDIO TECNICO		CONNETTENTE	
DOTT. ING. F. SAGGESE		I.N.F.N. - LABORATORIO ISTITUTO FISICA NUCLEARE	
L'AGENZIA - TEL. 06/5770000		ASSEGGIO - L'AGENZIA	
DATA	21 07 90	LAVORI	IMPIANTI TRASMISSIONE DATI ED ELETTRICI
PROGETTATO		PROTEZIONE	
S. PROGETTISTA		SALA	
DOTT. ING. F. SAGGESE		50	
		TAV	
		8/5	
		SIGNAL CABLES	
		SEZIONI VERTICALI - PARTICOLARI	

END

**DATE
FILMED**

12/11/191