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Subject: **Memorandum of Understanding E-815**

Transmitted herewith is an executed copy of the Memorandum of Understanding for E-815, which is now ready for implementation.

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Enclosure

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Directorate

MEMORANDUM OF UNDERSTANDING

E815

Precision Measurement of $\sin^2\theta_W$ and ρ in Neutrino Neutral Current Scattering

June 24b, 1994

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INTRODUCTION

This is a memorandum of understanding between the Fermi National Accelerator Laboratory and the E815 experimenters to perform E815 in the Fermilab Neutrino Center (NC) beam line.

The experiment will measure the electroweak parameters $\sin^2\theta_W$ and ρ using a new Sign-Selected Quadrupole Train (SSQT) beam. The experiment will use the existing CCFR calorimeter and spectrometer, which must be restored to the 1987 Quadrupole Triplet configuration (with some modest upgrades). Test beam requirements include low-intensity muon and hadron beams entering Lab E/F along with appropriate instrumentation.

The memorandum is intended solely for the purpose of providing a budget estimate and a work allocation for Fermilab, the funding agencies and the participating institutions. It reflects an arrangement that currently is satisfactory to the parties; however, it is recognized and anticipated that changing circumstances of the evolving research program will necessitate revisions. The parties agree to negotiate amendments to this memorandum which will reflect such required adjustments.

I. PERSONNEL AND INSTITUTIONS

Co-Spokespersons:	Robert Bernstein, Fermilab Michael Shaevitz, Columbia University
Physicist in Charge:	Robert Bernstein, Fermilab
E815 Project Manager:	Robert Bernstein, Fermilab
E815 Computing Off-line liaison:	Robert Steiner, Adelphi University
E815 Computing On-line liaison:	Eric Stern, Columbia University

Experimenters presently committed to this experiment and proposed additions are:

1.1 Adelphi University: W. Lefmann (Research Associate), R. Steiner (faculty).

1.2 University of California, Irvine: Wojciech Gajewski (Senior Research Associate).

1.3 University of Cincinnati: R. Johnson (faculty), M. Nussbaum (faculty), 1 Research Associate, L. Perera (student), M. Vakili (student).

1.4 Columbia University: J. Conrad (Research Associate), E. Stern (Research Associate), M. Shaevitz (faculty,spokesperson), P.C. Rowson (faculty), J. Kim, C. McNulty, A. Romosan (students).

1.5 Fermilab: R. Bernstein (spokesperson), K. McFarland (Research Associate), M. Lamm (40%), W. Marsh (30%), D. Naples (Research Associate).

1.6 Kansas State University: T. Bolton, N.W. Reay, R. Sidwell, N. Stanton (faculty), C. Zhang(Research Associate), 2 students.

1.7 University of Oregon: J. Brau (faculty) R. Frey (faculty), R. Drucker (Research Associate), 2 students

1.8 University of Rochester: A. Bodek (faculty), P. Auchincloss (Senior Lecturer), H. Budd (Senior Research Associate), P. DeBarbaro (Research Associate), D. Harris, (Research Associate), W. Sakumoto (Senior Research Associate), U.K. Yang (student), 1 student.

1.9 Other obligations:
(*) Graduate Students expected to obtain a thesis from this experiment.

	Title	Before Run	During Run	After Run
Adelphi Univ.				
R. Steiner	Asst. Prof.	SLD		
W. Lefmann	Post Doc			
U.C., Irvine				
Wojciech Gajewski	SRA	Kamioka	Kamioka	Kamioka
U. of Cincinnati				
R. Johnson	Prof.			
M. Nussbaum	Prof.	SLD		
	Research Associate			
L. Perera	Student*	E791		
M. Vakili	Student*			
Columbia Univ.				
P. Rowson	Asst. Prof.	SLD		
M. Shaevitz	Prof.	CCFR SLD	E803	E803
J. Conrad	Research Associate.			
E. Stern	Research Associate.			
J. Kim	Student*			
C. McNulty	Student*			
A. Romosan	Student*			
Fermilab				
R. Bernstein	Asst. Sci.	CCFR NUMI	NUMI	NUMI
K. McFarland	Lederman Fellow			
M. Lamm	Sci.	CCFR		
W. Marsh	Appl. Phys.	E835	E835	
D. Naples	Res. Assoc.			
Kansas State				
N.W. Reay	Prof.	E791/E803	E791/E803	E803
N. Stanton	Prof.	E803	E803	E803
T. Bolton	Prof.	CCFR	E803	E803
R. Sidwell	Assc. Prof.	E791	E791	E803
C. Zhang	Research Associate	E791	E791	
U. of Oregon				
Jim Brau	Prof.	SLD	SLD	SLD
Ray Frey	Asst. Prof.	SLD	SLD	SLD
Robert Drucker	Research Associate.			
U. of Rochester				
A. Bodek	Prof.	CDF/CCFR	CDF	CDF
P. Auchincloss	Senior Lecturer	CDF	CDF	CDF
H. Budd	SRA	CDF/CCFR	CDF	CDF
P. de Barbaro	SRA	CDF/CCFR	CDF	CDF

W. Sakumoto	SRA	CDF/CCFR	CDF	CDF
D. Harris	Research Associate	CCFR		
U.K. Yang	Student*			
	Student*			

II. EXPERIMENTAL AREA, BEAMS, AND SPECIAL CONSIDERATIONS

2.1 Location

2.1.1 The experiment is to take place in the Lab E experimental area using the Neutrino Center (NC) Beam.

2.2 Beam and Intensity

2.2.1 The beam for primary data-taking will be a sign-selected quadrupole train. The incident proton beam is planned to be 800 GeV. The experiment will receive at least 1E18 protons on target, at an intensity between 1 and 3 E13 protons/pulse. The target and ground water shielding will suffice up to 3E18/calendar year at 1 TeV.

2.2.2 It will be necessary for the beam to be spread over several fast spills. There will be at least three and up to five fast spills separated by at least 1 second. Each fast spill will contain from 3–5E12 protons.

2.2.3 The beam will be as described in the SSQT Technical Memorandum and Beam Design Report. Fermilab will supply monitoring devices capable of withstanding the intensity of the beam for the life of the experiment and which will provide measurements capable of measuring the position, spot size, and targeting angle to the required accuracy.

2.2.4 Overall monitoring of the primary proton beam intensity for the NC beam to 10% is required.

2.3 Test Beam Considerations

2.3.1 The Test Beam is described in the Beam Design Report. The experiment requires a hadron beam with an energy range of 25–110 GeV, electrons from 15–100 GeV with primary beam intensities of up to 1E12/spill. A low-intensity muon beam is required as well. Both the hadron and muon beams will operate in the slow spill mode and should be available throughout the run. Running in this mode will be coordinated by Fermilab's Program Planning Office.

2.3.2 During scheduled SDF (Silicon Detector Facility) shifts the NTest primary intensity will be limited to 2.5 E11 ppp. SDF scheduled shifts may run between 6AM and 10PM from Monday though Saturday. SDF will communicate its shift schedule to E815 in a timely way.

2.3.3 In any calendar month, the total monthly integrated NTest primary intensity during scheduled SDF shifts will not exceed 4E13 protons per hour.

2.3.4 The NK test beam will be used for hadrons, electrons, and muons. The NE beam will be dismantled and its components re-used.

2.4 Schedule

2.4.1 The experiment is to take place in the 1995–1997 fixed-target run.

III. RESPONSIBILITIES BY INSTITUTION - NON FERMILAB
([ ] denotes replacement cost of existing hardware.)

3.1 Adelphi University
(NSF funded)

3.1.1	Two 19" X terminals with extended software licenses to be used for E815 purposes (ownership to remain with Adelphi University)	$3.65K
	Total existing items	**[$.0K]**
	Total new items	**$3.65K**

3.2 University of California, Irvine
(DOE funded)

	Total existing items	**[$.0K]**
	Total new items	**$.0K**

3.3 University of Cincinnati
(NSF funded)

3.3.1	Engineering design of Drift Chamber Repair Room.	6 person-months
3.3.2	NCD X-Windows	$2.0K
3.3.3	PC/Camac Controller	$10.0K
3.3.3	Scintillator Oil Test Stand	$1.0K
3.3.4	486PC/Software/hardware	$10.0K
	Total existing items	**[$.0K]**
	Total new items	**$23.0K**

3.4 Columbia University
(NSF funded)

3.4.1	Chamber mount system.	$10.0K
3.4.2	TDC checkout and refurbishment	$25.0K
3.4.3	"Transport" interface replacement	$10.0K
3.4.4	New TDC and Readout Modules	$25.0K
3.4.5	SGI workstation for Lab E (not for DAQ)	$25.0K
3.4.6	Liquid Scintillation Counter PMT Mounts	$5.0K
	Total existing items	**[$.0K]**
	Total new items	**$100.0K**

3.5 Kansas State University
(DOE funded)

3.5.1	Photomultiplier tubes	$125.0K
3.5.2	2 DEC workstations	$25.0K
	Total existing items	**[$0.0K]**
	Total new items	**$150.0K**

3.6 University of Oregon
(DOE funded

3.6.1	X-Windows Terminals (7) and 3 GByte Drives (4)	$25.0K

	Total existing items	**[$0.0K]**
	Total new items	**$25.0K**

3.7 University of Rochester
(DOE funded)

3.7.1	Trigger Counter System	[$50.0K]
3.7.2	Electronics and delay boxes	[$50.0K]
3.7.3	Photomultiplier tubes	$125.0K
3.7.4	Veto wall counters/tubes and design	$50.0K
	Total existing items	**[$100.0K]**
	Total new items	**$175.0K**

3.S Summary of Non-Fermilab Costs:

Type of Funds	**Equipment**	**Operating**	**Personnel (person-years)**
Total existing items	**[$100.0K]**		
Total new items	**$476.7K**		
Totals with contingency	**$576.7K**		**0.5**

IV. RESPONSIBILITIES BY INSTITUTION - FERMILAB
([ ] denotes replacement cost of existing hardware.)

4.1 Fermilab Computing Division

4.1.1 The currently assigned Computing Division On-line Liaison is David Berg.
The currently assigned Computing Division Off-line Liaison is Dave Ritchie.

4.1.2 The attached off-line analysis plan contains the experiment's present understanding of its analysis model from code development, through production, stripping, final data analysis and Monte Carlo. A more detailed quantitative description is given in an Appendix. The Computing Division cannot guarantee, at this time, that these resources can be made available. The Computing Division, guided by priorities set by management, will attempt to allocate on a quarterly basis, the available resources. The present request and amendments will be used in attempting to plan the laboratory's computing acquisition strategies.

4.1.3 Support from the On-line Support Department (OLS) in developing and implementing the DAQ/On-line system. E815 will use components of the new DART DAQ system being developed as a joint collaborative project between the Computing Division and Fixed Target experiments. E815 will identify one person who is knowledgeable about the E815 data acquisition and on-line system and can speak with authority on he experiment's requirements. The E815 collaboration will at minimum provide the equivalent of 0.5 FTE of personnel to the DART project. The OLS department will provide project management for the DART collaborative effort and will be responsible for ongoing support of the DART core components. The OLS will provide and support a cross platform for development.

	Type of Funds	Equipment	Operating
4.1.4	Access to local and wide area networks with appropriate bridge/router to access and insulate from rest of Network.		
4.1.5	Software support for the on-line, data acquisition and other software products designated as supported by the Computing Division.		
4.1.6	Maintenance and update services for operating systems and packages at versions levels supported by the Computing Division.		$ 6.0K
4.1.7	PREP/DAQ and local computing request, see Appendix I, II and III.		
	Total of new equipment	$193.4K	
	Total new existing equipment	[$788.3K]	
	Total of existing equipment transfered from E770/E790	[$802.8K]	
4.1.8	Maintenance and repair of PREP and DAQ equipment.		$268.0K
4.1.9	Nevis Laboratories will be responsible for maintenance and repair of the FADC system along with the Control and Data Links in the TDC system		

4.1.S Summary of Computing Division Costs:

Type of Funds	Equipment	Operating	Plant	Personnel (person-years)
Total existing items	**[$1591.1K]**			
Total				
Total new items	**$193.4K**	**$274.0K**		
Contingency	**$100.0K**			
Totals with contingency	**$1884.5K**	**$274.0K**		

4.2 Fermilab Research Division

4.2.1 Liaison Physicist: Robert Bernstein.
Beamline Physicist: Gordon Koizumi.
Project Engineer: E. Villegas
Building Manager: Robert Morrison.

The amount of Plant funds are subject to change pending completion of the AIP Conceptual Design Report

		Equipment	Operating	Plant
4.2.2	**NC Construc. TOTAL**	**$98.5K**	**$40.0K**	**$2279.2**
4.2.2.1	Pre–Target Magnet Stands			113.4K
4.2.2.2	Pre–Target Instrumentation			126.7K
4.2.2.3	Target Cooling			7.2K
4.2.2.4	Target Pile			117.0K
4.2.2.5	Dumps			247.5K
4.2.2.6	Photon Veto			7.6K
4.2.2.7	Magnet Stands (SSQT)			219.9K
4.2.2.8	Shielding Cave			726.0K
4.2.2.9	Vacuum			36.8K
4.2.2.10	Downstream Instrumenta.			18.0K
4.2.2.11	LCW/RAW	5.0K		
4.2.2.12	Interlocks	50.0K		

4.2.2.13	NC1D3 Inserts	7.0K		
4.2.2.14	Power Supplies in N01			442.7K
4.2.2.15	Secondary Beam Monitoring			18.0K
4.2.2.16	Portakamp for NW2			50.0K
4.2.2.17	N01 Berm Modifications		40.0K	
4.2.2.18	N01 Improvements			138.4K
4.2.2.19	6–6–120 Modification	36.5K		
4.2.2.20	Alignment Modifications			10.0K
4.2.3	**Lab E TOTAL**	**$341.0K**	**$165.0K**	**$428.8K**
4.2.3.1	Portakamps			359.8K
4.2.3.2	Lab E Air Conditioning			69.0K
4.2.3.3	Lab F Crane Repair		5.0K	
4.2.3.4	Gas System(Lab E/NKC)	65.5K		
4.2.3.5	Walking/Working Surface	85.5K		
4.2.3.6	Cart Moving System	50.0K		
4.2.3.7	DC Repair Room	88.0K		
4.2.3.8	General Operating($20K/yr)		40.0K	
4.2.3.9	Electrical Upgrade	12.0K		
4.2.3.10	Rollup Door Fix	10.0K		
4.2.3.11	Veto Wall Construction	30.0K		
4.2.3.12	Ar/Ethane gas for Drift Ch.		120.0K	
4.2.4	**NKC Test Beam TOTAL**	**$237.9**	**$0.0K**	**$150.0K**
4.2.4.1	Magnet Stands	15.0K		
4.2.4.2	Rotating Dipole	10.2K		
4.2.4.3	Civil Construction			150.0K
4.2.4.4	Power	115.5K		
4.2.4.5	Vacuum	6.0K		
4.2.4.6	Interlocks	42.8K		
4.2.4.7	Instrumentation	32.4K		
4.2.4.8	Gaussmeters for Field	12.0K		
4.2.4.9	PC/AT for Monitoring	4.0K		
4.2.5	**Miscellany TOTAL**	**$25.0K**	**9.5 prs-yrs**	**$0.0K**
4.2.5.1	Epicure Interface Hardware	25.0K		
4.2.5.2	FTE Technician		3 person-yrs	
4.2.5.3	FTE Electrical Engineer		1 person-yr	
4.2.5.4	General Mech Support		1 person-yr	
4.2.5.5	FTE Mech Engineer		1.5 pers-yr	
4.2.5.6	FTE Drafters		1.5 pers-yr	
4.2.5.7	Gas Design (Mech Support)		1.5 pers-yr	

4.2.S Summary of Research Division Costs:

Type of Funds	**Equipment**	**Operating**	**Plant**	**Personnel (person-years)**
Total new items	**$702.4K**	**$205.0K**	**$2858.0K**	**9.5**
Contingency		**$15.0K**		
Totals with contingency	**$702.4K**	**$220.0K**	**$2858.0K**	**9.5**

4.3 Physics Section

	Type of Funds	Equipment	Operating
4.3.1	TRD System Xenon gas.		$7.5K
4.3.2	Drift Chamber Maintenance and Repair.		$10.0K
4.3.3	New scintillator oil and fittings	$68.0K	
4.3.4	Replacement PMT's for liquid counters.	$6.0K	
4.3.5	Cables, connectors and hardware for the logic.	$50.0K	
4.3.6	8 mm tapes		$3.0K
4.3.7	Travel for Fermilab Physicists		$30.5K
4.3.8	General operating expenses.		$49.0K
4.3.9	Technician Assignment Technicians for the installation and maintenance of the experiment including maintenance and repair of the drift chambers, pre-amplifiers, and scintillation counters, gas system, and the installation and cabling of equipment.	4 person-years	
4.3.10	The Physics Section will repair the TDC modules. A test stand and training will be provided by the experimenters (3 years).	2 days per month	
4.3.11	ES7137 Assembly (costs borne by Computing Div.)	2 person-months	
4.3.12	Drift Chamber System	[$2000.0K]	
4.3.13	Existing TRD's	[$20.0K]	
4.3.14	Single Wire Drift Chambers (SWDC)	$20.0K	
4.3.15	Technician effort for SWDC chambers	3 person-month	
4.3.S	Summary of Physics Section costs:		

Type of Funds	Equipment	Operating	Plant	Personnel (person-years)
Total existing items	**[$2020.0K]**			
Total new items	**$144.0K**	**$100.0K**		
Contingency				
Totals with contingency	**$2164.0K**	**$100.0K**	**$0.0K**	**4.6**

V. SUMMARY OF COSTS

Type of Funds, [] existing (with contingency) Fermilab Division/Section:	Equipment	Operating	Plant	Personnel (person-years)
Physics Section	$144.0K [$2020.0K]	$100.0K		4.6
Research Division	$702.4K	$220.0K	$2858.0K	9.5
Computing Division	$293.4K [$1591.1K]	$274.0K		
Totals Fermilab	**$1139.8K** **[$3611.1K]**	**$594.0K**	**$2858.0K**	**13.9**
Totals Non-Fermilab	**$476.7K** **[$100.0K]**			**0.5**
Overall Totals	**$5327.6K**	**$594.0K**	**$2858.0K**	**14.4**

VI. SPECIAL CONSIDERATIONS

6.1 The responsibilities of the Scientific Spokesperson and procedures to be followed by experimenters are found in the Fermilab publication "Procedures for Experimenters" (PFX). The Scientific Spokesperson agrees to those responsibilities and to follow the described procedures.

6.2 To carry out the experiment a number of Environment, Safety and Health (ES&H) reviews are necessary. The procedures to carry out these various reviews are found in the Fermilab publication "Review Procedures for Experiments" (RPX). The spokesperson undertakes to follow those procedures in a timely manner.

6.3 For the purpose of estimating budgets, specific products and vendors may be mentioned within this memorandum. At the time of purchasing, the Fermilab procurement policies shall apply. This may result in the purchase of different products and/or from different vendors.

6.4 The experiment spokesperson will undertake to ensure that no PREP and computing equipment be transferred from the experiment to another use except with the approval of and through the mechanism provided by the Computing Division management. They also undertake to ensure that no modifications of PREP equipment take place without the knowledge and consent of the Computing Division management.

6.5 Each institution will be responsible for maintaining and repairing both the electronics and the computing hardware supplied by them for the experiment. Any items for which the experiment requests that Fermilab performs maintenance and repair should appear explicitly in this agreement.

6.6 If the experiment brings to Fermilab on-line data acquisition or data communications equipment to be integrated with Fermilab owned equipment, early consultation with the Computing Division is advised.

6.7 At the completion of the experiment:

6.7.1 The spokesperson is responsible for the return of all PREP, equipment, Computing equipment and non-PREP data acquisition electronics. If the return is not completed after a period of one year after the end of running the Spokesperson will be required to furnish, in writing, an explanation for any non-return.

6.7.2 The experimenters agree to remove their experimental equipment as the Laboratory requests them to. They agree to remove it expeditiously and in compliance with all ES&H requirements, including those related to transportation. All the expenses and personnel for the removal will be borne by the experimenters.

6.7.3 The experimenters will assist the Fermilab Divisions and Sections with the disposition of any articles left in the offices they occupied, including computer printout and magnetic tapes. Disposition of magnetic tapes will be in compliance with Fermilab's tape retirement policies. Costs for shipment of printout and/or tapes will be borne by the receiving university.

VI. SIGNATURES

R. Bernstein, E815 Co-Spokesperson

M. Shaevitz, E815 Co-Spokesperson

J. Peoples, Director, Fermilab.

APPENDIX I - E815 PREP EQUIPMENT REQUEST

LIST C
** REQDB3 **

FERMI NATIONAL ACCELERATOR LABORATORY

PREP REQUEST DATA BASE

PREP EQUIPMENT TOTALS SORTED BY AFFILIATION

** REQDB3 **
05/09/1994

TYPE CODE	MFGR	MODEL	DESCRIPTION	QTY	ITEM	AFFIL	REQ. DATE	STATUS	UNIT COST	TOTAL COST $	QTY DELIV	QTY OWED	NEW QTY-PO#
AA	MECHTRON	3034	NIM BIN	18	EKZ/01	E815	12/92	W	550	9900	11	7	
AA	MECHTRON	3034	NIM BIN	1	FEW/01	E815	02/94	W	550	550	0	1	
AB	POW DES	AEC-320-9	NIM PS 6@10;12@4;24	18	EKZ/02	E815	12/92	WC	885	15930	18	0	
AB	POW DES	AEC-320-9	NIM PS 6@10;12@4;24	15	FEW/02	E815	02/94	W	885	13275	0	15	
AC	ORTEC	EX-100/N	NIM EXTENDER MODULE	1	EUA/01	E815	07/93	QC	375	375	1	0	
AD	LECROY	621AL	QUAD DISCRIMINATOR	4	EUC/16	E815	07/93	WC	1040	4160	4	0	
AD	LECROY	621AL	QUAD DISCRIMINATOR	6	FEW/03	E815	02/94	W	1040	6240	0	6	
AD	LECROY	621L	QUAD DISCRIMINATOR	4	EUC/01	E815	07/93	WC	1040	4160	4	0	
AD	LECROY	623	OCTAL DISCRIMINATOR	3	EUC/02	E815	07/93	WC	1180	3540	3	0	
AD	LECROY	623	OCTAL DISCRIMINATOR	1	FBW/01	E815	12/93	WC	1095	1095	1	0	
AD	LECROY	623B	OCTAL DISCRIMINATOR	14	EUC/17	E815	07/93	WC	1180	16520	14	0	
AD	PHILLIPS	710	OCTAL DISCRIMINATOR	6	EYZ/01	E815	10/93	WC	1295	7770	6	0	
AE	LECROY	364	DUAL 4-FOLD LOGIC	31	ELA/43	E815	12/92	W	1130	35030	17	14	
AE	LECROY	364AL	DUAL 4-FOLD LOGIC	1	EUC/10	E815	07/93	WC	595	595	1	0	
AE	LECROY	370	STROBED COINCIDENCE	3	EUC/03	E815	07/93	WC	612	1836	3	0	
AE	LECROY	370	STROBED COINCIDENCE	3	FBW/02	E815	12/93	WC	612	1836	3	0	
AE	LECROY	380A	MULTIPLICITY LOGIC	3	EUC/04	E815	07/93	WC	850	2550	3	0	
AE	LECROY	465	TRIPLE 4-FOLD COINC	1	FJA/01	E815	04/94	QC	1180	1180	1	0	
AE	LECROY	622	QUAD 2-FOLD LOG	1	EUC/05	E815	07/93	WC	1080	1080	1	0	
AE	LECROY	622	QUAD 2-FOLD LOG UNIT	1	EUC/11	E815	07/93	WC	1080	1080	1	0	
AF	ORTEC	F344/NLS	4-FOLD LOGIC FAN-OUT	2	EUC/12	E815	07/93	WC	435	870	2	0	
AF	LECROY	429	LOGIC FAN-IN/OUT	8	EUC/13	E815	07/93	WC	545	4360	8	0	
AF	LECROY	429	LOGIC FAN-IN/OUT	4	FBW/03	E815	12/93	WC	545	2180	4	0	
AF	LECROY	429A	LOGIC FAN-IN/OUT	4	EUC/06	E815	07/93	WC	890	3560	4	0	
AG	FERMILAB	ES-7137	OCTAL LINEAR FANOUT	31	ELA/44	E815	12/92	W	365	11315	31	0	
AG	FERMILAB	ES-7137	OCTAL LINEAR FAN-OUT	27	FDT/01	E815	01/94	W	365	9855	0	27	NEW 27-FABRI
AG	FERMILAB	ES-7138	QUAD LINEAR FAN-IN	19	ELA/45	E815	12/92	W	300	5700	13	6	
AG	FERMILAB	ES-7139	OCTAL LIN FAN-IN/OUT	27	ELA/46	E815	12/92	W	365	9855	26	1	
AG	LECROY	127FL	DUAL LIN OCT FAN-IN	21	EUC/09	E815	07/93	WC	450	9450	21	0	
AG	LECROY	428	QUAD LIN FAN-IN/OUT	8	EUC/15	E815	07/93	WC	860	6880	8	0	
AG	LECROY	428	QUAD LIN FAN-IN/OUT	1	FBW/04	E815	12/93	WC	506	506	1	0	
AG	LECROY	428S	QUAD LIN FAN-IN/OUT	3	EUC/07	E815	07/93	WC	860	2580	3	0	
AG	LECROY	428S	QUAD LIN FAN-IN/OUT	1	FEW/04	E815	02/94	W	860	860	0	1	
AH	LECROY	612	12CH X10 DC PMT AMP	5	FEW/08	E815	02/94	W	1125	5625	0	5	
AN	ORTEC	GG200/N	GATE GENERATOR	1	EUC/08	E815	07/93	WC	695	695	1	0	
AN	LECROY	222	DUAL GATE GENERATOR	3	EUC/14	E815	07/93	WC	1330	3990	3	0	
AN	LECROY	222	DUAL GATE GENERATOR	5	FBW/07	E815	12/93	WC	1460	7300	5	0	
AN	LECROY	222	DUAL GATE GENERATOR	7	FEW/05	E815	02/94	W	1460	10220	0	7	
AO	JOERGER	VS	DUAL VISUAL SCALER	3	FBW/05	E815	12/93	WC	629	1887	3	0	
AP	JORWAY	1883	PRESET SCALER	4	FBW/06	E815	12/93	WC	629	2516	4	0	
AY	LECROY	QVT3001	QVT MULT-CH ANALYZER	1	ETL/01	E815	06/93	QC	4170	4170	1	0	
CA	STD ENG	850C	CAMAC CRATE	9	ELA/01	E815	12/92	W	895	8055	1	8	
CA	DSP TECH	850C	CAMAC CRATE	1	FJH/01	E815	05/94	W	895	895	0	1	
CA	STD ENG	850F	CRATE FAN ASSEMBLY	9	ELA/02	E815	12/92	W	292	2628	1	8	
CA	DSP TECH	850F	CRATE FAN ASSEMBLY	1	FJH/02	E815	05/94	W	291	291	0	1	
CB	STD ENG	PCS850	CAM PS6@50;12@3;24@6	9	ELA/03	E815	12/92	W	1408	12672	1	8	
CB	DSP TECH	850P	CAM PS6@50;12@3;25@6	1	FJH/03	E815	05/94	W	1000	1000	0	1	
CC	JORWAY	50C	BRANCH TERMINATOR	2	ELA/05	E815	12/92	W	500	1000	0	2	
CC	LECROY	5211	CAM OPT UPORT ADAPT	1	FDW/01	E815	01/94	WC	2047	2047	1	0	
CC	CES	8210	CAMAC VME BRNCH DRVR	2	ELA/04	E815	12/92	WC	3474	6948	2	0	NEW 3>2-N0518;1-P
CD	JORWAY	BH-.5M	.5M BR HWY CABLE	7	ELA/32	E815	12/92	W	331	2317	1	6	
CD	JORWAY	BH-1M	1M BR HWY CABLE	1	EMF/01	E815	01/93	QC	331	331	1	0	
CD	ORTEC	BH-10FT	10FT BR HWY CABLE	1	ELX/01	E815	01/93	QC	586	586	1	0	
CD	JORWAY	BH-3FT	3FT BR HWY CABLE	1	EWQ/02	E815	09/93	QC	546	546	1	0	
CD	JORWAY	BH-30FT	30FT BR HWY CABLE	2	ELA/33	E815	12/92	W	825	1650	1	1	
CD	JORWAY	BH-30FT	30FT BR HWY CABLE	1	FEW/06	E815	02/94	W	825	825	0	1	
CD	LECROY	SPECTRO	SPECTRO STRIP	1	E2D/02	E815	10/93	WC	60	60	0	1	
CF	LECROY	2341	16CH COINCIDENCE REG	2	EUP/01	E815	07/93	WC	1100	2200	2	0	
CF	LECROY	2341A	16CH COINCIDENCE REG	1	EYZ/02	E815	10/93	WC	798	798	1	0	
CF	LECROY	4448	48-BIT COINC REG,ECL	10	EYZ/03	E815	10/93	WC	2620	26200	10	0	
CF	LECROY	4448	48-BIT COINC REG,ECL	4	FJH/04	E815	05/94	W	2620	10480	0	4	
CG	LECROY	2249A	12CH CHARGE ADC	1	EXU/01	E815	10/93	WC	3402	3402	1	0	
CG	LECROY	2249A	12CH CHARGE ADC	6	FJG/01	E815	05/94	WC	4150	24900	6	0	
CG	LECROY	2249A	12CH CHARGE ADC	10	FJH/05	E815	05/94	W	2450	24500	0	10	
CG	LECROY	4300B/610	ADC, 16-CHAN, FERA	58	ELA/06	E815	12/92	W	2457	142506	12	46	
CG	LECROY	4301	FERA DRIVER	7	ELA/07	E815	12/92	W	1728	12096	2	5	
CG	LECROY	4302	FAST MEMORY UNIT	27	ELA/08	E815	12/92	W	2862	77274	7	20	
CH	LECROY	4299	TDC BUFFER, ECL	1	EZD/03	E815	10/93	WC	4018	4018	1	0	
CI	KINETIC	3952	SER CRATE CONTROLLER	1	FDH/01	E815	01/94	QC	1660	1660	1	0	
CI	DSP TECH	6002	CAMAC CC/ACC	1	FHC/01	E815	03/94	WC	1650	1650	1	0	
CI	JORWAY	70B	PAR CRATE CONTROLLER	8	ELA/30	E815	12/92	W	1500	12000	1	7	
CI	JORWAY	71B-X	AUX CRATE CONTROLLER	1	ELX/02	E815	01/93	QC	1512	1512	1	0	
CI	JORWAY	74B	SER CRATE CONTROLLER	1	FJH/06	E815	05/94	W	1500	1500	0	1	NEW
CO	LECROY	4616	16X ECL/NIM CONVRTR	6	EYZ/04	E815	10/93	WC	1200	7200	6	0	
CP	JORWAY	201	MANUAL I/O REG	3	ELA/09	E815	12/92	WC	750	2250	3	0	NEW 3-P0429
EA	TEKTRONI	2465	OSCOPE, 350MHZ, 4CH	2	ESL/01	E815	06/93	WC	7755	15510	2	0	
EA	TEKTRONI	2465	OSCOPE, 350MHZ, 4CH	2	FEW/07	E815	02/94	W	7755	15510	0	2	
EA	LECROY	9310	OSCOPE,DIG,1M MEM	2	ELA/34	E815	12/92	W	9990	19980	1	1	NEW 1-P0432
EG	TEKTRONI	P6011	PROBE X1	4	ESL/02	E815	06/93	W	100	400	2	2	

EG	TEKTRONI	P6137	PROBE X10	4	ESL/03	E815	06/93	WC	196	784	4	0		
FA	LAMBDA	LLS-7008	LVPS 0-8V @ 100A	6	ETW/03	E815	07/93	5C	1813	10878	6	0	NEW	6-P0463
FA	LAMBDA	LLS-9008	LVPS 0-8V @ 100A	6	ETW/02	E815	07/93	5C	1353	8118	6	0	NEW	6-P0463
FA	UNKNOWN	UNKNOWN	LVPS>5A@-5.2V	2	FJH/07	E815	05/94	W	700	1400	0	2	NEW	
FA	UNKNOWN	UNKNOWN	LVPS>5A@+11V	2	FJH/08	E815	05/94	W	800	1600	0	2	NEW	
FA	UNKNOWN	UNKNOWN	LVPS>5A@-5.5V	2	FJH/09	E815	05/94	W	700	1400	0	2	NEW	
FA	LECROY	1441	LVPS, SYS PLUG-IN	6	ELA/10	E815	12/92	W	0	0	3	3		
FA	LECROY	1442.	LVPS, SYS PLUG-IN	12	ELA/11	E815	12/92	W	0	0	6	6		
FB	LECROY	1443NF	16-CHAN HV CARD	32	ELA/12	E815	12/92	W	2000	64000	12	20		
FB	LECROY	1449	HV MAINFRAME	6	ELA/13	E815	12/92	W	7010	42060	3	3		
FB	BERTAN	210-05R	POWER SUPPLY, STRIP	2	EKZ/04	E815	12/92	W	1000	2000	0	2	NEW	
FB	FLUKE	408B	HV PS 6KV@20MA	2	EKZ/03	E815	12/92	W	1013	2026	0	2		
FC	BERTAN	320N	HVPS 10KV@1MA	3	FJH/10	E815	05/94	W	900	2700	0	3	NEW	
FD	FERMILAB	ES-7092	HV DISTR BOX	1	FHA/01	E815	03/94	QC	1711	1711	1	0		
FI	LECROY	1445	HV CONTROLLER	6	ELA/14	E815	12/92	W	2090	12540	3	3		
KJ	DEC	VR201	VT240 MONITOR	3	ELA/35	E815	12/92	W	250	750	1	2		
KJ	DEC	VS240	VT240 LOGIC BOX	3	ELA/36	E815	12/92	W	250	750	1	2		
LC	ORTEC	M127/N	NIM COOLING FAN	10	FEW/09	E815	02/94	W	435	4350	0	10		
LC	FERMILAB	2107-F	NIM COOLING FAN	3	FGT/01	E815	03/94	WC	300	900	3	0		
PH	NANOMET	N-277CD	16-CH AMPL CARD DIFF	16	EZD/01	E815	10/93	WC	199	3184	16	0		
PI	LECROY	2738	PCOS CONTROLLER	1	EZD/05	E815	10/93	WC	3568	3568	0	1		
PL	LECROY	2731A	PCOS LATCHING CARD	8	EZD/04	E815	10/93	WC	1220	9760	0	8		

TOTAL IS 663 ITEMS - TOTAL COST $856,952
NEW COST $68,629
UNFILLED IS 297 ITEMS - TOTAL COST $444,788

APPENDIX II - E815 PREP ITEMS TRANSFERRED FROM E770/E790

E815 LIST B 5/03/94
List of items from E770/E790 transfered to E815

1 LIST D
** REQDB3 **

FERMI NATIONAL ACCELERATOR LABORATORY

PREP REQUEST DATA BASE

PREP EQUIPMENT TOTALS SORTED BY AFFILIATION

** REQDB3 **
05/03/1994

TYPE CODE	MFGR	MODEL	DESCRIPTION	QTY	ITEM	AFFIL	REQ. DATE	STATUS	UNIT COST	TOTAL COST $	QTY DELIV	QTY OWED	NEW QTY-PO#
AA	MECHTRON	3034	NIM BIN	22	EJL/01	E815TR	10/92	WC	770	16940	22	0	
AA	MECHTRON	3034	NIM BIN	6	EYM/01	E815TR	10/93	TC	550	3300	6	0	
AA	MECHTRON	3034	NIM BIN	30	EYX/01	E815TR	10/93	TC	550	16500	30	0	
AA	ORTEC	401A	NIM BIN	2	EWG/01	E815TR	07/93	WC	508	1016	2	0	
AB	POW DES	AEC-320-5	NIM PS 12@2;24@1	5	EJL/02	E815TR	10/92	WC	350	1750	5	0	
AB	POW DES	AEC-320-5	NIM PS 12@2;24@1	19	EYX/02	E815TR	10/93	T	495	9405	9	10	
AB	POW DES	AEC-320-9	NIM PS 6@10;12@4;24@	8	EJL/03	E815TR	10/92	WC	810	6480	8	0	
AB	POW DES	AEC-320-9	NIM PS 6@10;12@4;24@	1	EWG/04	E815TR	07/93	WC	885	885	1	0	
AB	BLP	1011	NIM PS 6@5;12@2;24@1	3	EJL/04	E815TR	10/92	WC	357	1071	3	0	
AB	BLP	1011	NIM PS 6@5;12@2;24@1	1	EWG/02	E815TR	07/93	WC	495	495	1	0	
AB	BLP	1011	NIM PS 6@5;12@2;24@1	16	EYX/03	E815TR	10/93	TC	595	9520	16	0	
AB	BLP	1012	NIM PS 6@5;12@2;24@1	3	EJL/05	E815TR	10/92	WC	393	1179	3	0	
AB	BLP	1012	NIM PS 6@5;12@2;24@1	1	EWG/03	E815TR	07/93	WC	495	495	1	0	
AB	BLP	1012	NIM PS 6@5;12@2;24@1	1	EYM/02	E815TR	10/93	TC	885	885	1	0	
AB	BLP	1012	NIM PS 6@5;12@2;24@1	3	EYX/04	E815TR	10/93	TC	885	2655	3	0	
AB	BLP	1012H	NIM PS 6@10;12@2;24@	4	EJL/06	E815TR	10/92	WC	457	1828	4	0	
AD	EGG	T140/N	QUAD ZERO-X DISCR	2	EYX/06	E815TR	10/93	T	760	1520	0	2	
AD	LECROY	321B	QUAD DISCRIMINATOR	1	EYX/07	E815TR	10/93	T	850	850	0	1	
AD	LECROY	620BL	OCTAL DISCRIMINATOR	1	EJL/07	E815TR	10/92	WC	880	880	1	0	
AD	LECROY	620BL	OCTAL DISCRIMINATOR	1	EYM/03	E815TR	10/93	TC	1045	1045	1	0	
AD	LECROY	620BL	OCTAL DISCRIMINATOR	5	EYX/08	E815TR	10/93	T	1045	5225	0	5	
AD	LECROY	621AL	QUAD DISCRIMINATOR	24	EYX/09	E815TR	10/93	T	1040	24960	18	6	
AD	LECROY	621BL	QUAD DISCRIMINATOR	1	EMD/01	E815TR	01/93	WC	795	795	1	0	
AD	LECROY	621BL	QUAD DISCRIMINATOR	6	EYM/04	E815TR	10/93	TC	1040	6240	6	0	
AD	LECROY	621BLP	QUAD DISCRIMINATOR	14	EJL/08	E815TR	10/92	WC	795	11130	14	0	
AD	LECROY	623	OCTAL DISCRIMINATOR	12	EJL/09	E815TR	10/92	WC	1095	13140	12	0	
AD	LECROY	623	OCTAL DISCRIMINATOR	23	EYX/10	E815TR	10/93	TC	1180	27140	23	0	
AE	LECROY	364	DUAL 4-FOLD LOGIC	2	EMD/02	E815TR	01/93	WC	695	1390	2	0	
AE	LECROY	364	DUAL 4-FOLD LOGIC	9	EYX/15	E815TR	10/93	TC	1130	10170	9	0	
AE	LECROY	364AL	DUAL 4-FOLD LOGIC	14	EJL/10	E815TR	10/92	WC	595	8330	14	0	
AE	LECROY	364ALP	DUAL 4-FOLD LOGIC	6	EYM/05	E815TR	10/93	TC	1130	6780	6	0	
AE	LECROY	365	DUAL 4-FOLD MAJ LOGI	2	EWG/06	E815TR	07/93	WC	1130	2260	2	0	
AE	LECROY	365	DUAL 4-FOLD MAJ LOGI	46	EYX/16	E815TR	10/93	T	1130	51980	13	33	
AE	LECROY	365ALP	DUAL 4-FOLD MAJ LOGI	5	EJL/11	E815TR	10/92	WC	812	4060	5	0	
AE	LECROY	365ALP	DUAL 4-FOLD MAJ LOGI	5	EYM/06	E815TR	10/93	TC	1130	5650	5	0	
AE	LECROY	370	STROBED COINCIDENCE	3	EJL/12	E815TR	10/92	WC	612	1836	3	0	
AE	LECROY	370	STROBED COINCIDENCE	1	EYM/07	E815TR	10/93	TC	612	612	1	0	
AE	LECROY	370	STROBED COINCIDENCE	3	EYX/17	E815TR	10/93	TC	612	1836	3	0	
AE	LECROY	375L	8-FOLD COINCIDENCE	5	EJL/13	E815TR	10/92	WC	545	2725	5	0	
AE	LECROY	375L	8-FOLD COINCIDENCE	3	EYX/18	E815TR	10/93	TC	545	1635	3	0	
AE	LECROY	380A	MULTIPLICITY LOGIC	2	EJL/14	E815TR	10/92	WC	850	1700	2	0	
AE	LECROY	380A	MULTIPLICITY LOGIC	1	EWG/07	E815TR	07/93	WC	850	850	1	0	
AE	LECROY	380A	MULTIPLICITY LOGIC	2	EYX/19	E815TR	10/93	T	850	1700	0	2	
AE	LECROY	622	QUAD 2-FOLD LOG UNIT	1	EJL/15	E815TR	10/92	WC	1095	1095	1	0	
AE	LECROY	622	QUAD 2-FOLD LOG UNIT	6	EYX/20	E815TR	10/93	TC	1080	6480	6	0	
AF	ORTEC	F344/NL	4-FOLD LOGIC FAN-OUT	22	EYX/22	E815TR	10/93	T	295	6490	12	10	
AF	ORTEC	F344/NLS	4-FOLD LOGIC FAN-OUT	4	EJL/16	E815TR	10/92	WC	295	1180	4	0	
AF	ORTEC	OR102/N	DUAL OR/NOR	1	EJL/17	E815TR	10/92	WC	340	340	1	0	
AF	LECROY	429	LOGIC FAN-IN/OUT	4	EJL/18	E815TR	10/92	WC	436	1744	3	1	
AF	LECROY	429	LOGIC FAN-IN/OUT	2	EWG/08	E815TR	07/93	WC	890	1780	2	0	
AF	LECROY	429A	LOGIC FAN-IN/OUT	16	EYX/24	E815TR	10/93	TC	890	14240	16	0	
AG	FERMILAB	ES-7137	OCT LINEAR FANOUT	23	EJL/19	E815TR	10/92	WC	365	8395	23	0	
AG	FERMILAB	ES-7138	QUAD LINEAR FAN-IN	17	EJL/20	E815TR	10/92	WC	300	5100	17	0	
AG	FERMILAB	ES-7139	OCT LIN FAN-IN/OUT	6	EJL/21	E815TR	10/92	WC	365	2190	6	0	
AG	FERMILAB	ES-7139	OCT LIN FAN-IN/OUT	1	EMD/03	E815TR	01/93	WC	365	365	1	0	
AG	LECROY	127FL	DUAL LIN OCT FAN-IN	1	EJL/22	E815TR	10/92	WC	360	360	1	0	
AG	LECROY	127FL	DUAL LIN OCT FAN-IN	8	EYX/27	E815TR	10/93	T	450	3600	4	4	
AG	LECROY	128	DUAL LIN OCT FAN-OUT	15	EYX/28	E815TR	10/93	T	450	6750	0	15	
AG	LECROY	128L	DUAL LIN OCT FAN-OUT	2	EJL/23	E815TR	10/92	WC	450	900	2	0	
AG	LECROY	128L	DUAL LIN OCT FAN-OUT	1	EWG/09	E815TR	07/93	WC	450	450	1	0	
AG	LECROY	428F	QUAD LIN FAN-IN/OUT	1	EJL/24	E815TR	10/92	WC	506	506	1	0	
AG	LECROY	428F	QUAD LIN FAN-IN/OUT	2	EWG/10	E815TR	07/93	WC	860	1720	2	0	
AG	LECROY	428F	QUAD LIN FAN-IN/OUT	10	EYX/29	E815TR	10/93	TC	860	8600	10	0	
AH	LECROY	333	DUAL X1-10 LIN AMPL	2	EYX/31	E815TR	10/93	T	550	1100	0	2	
AH	LECROY	612	12CH X10 DC PMT AMP	19	EJL/25	E815TR	10/92	WC	1125	21375	19	0	
AH	LECROY	612	12CH X10 DC PMT AMPL	20	EYX/32	E815TR	10/93	TC	1080	21600	20	0	
AH	LECROY	612A	12CH X10 DC PMT AMPL	2	EWG/11	E815TR	07/93	WC	1080	2160	2	0	
AH	PHILLIPS	776	16CH X10DC PMT AMP	2	EJL/26	E815TR	10/92	WC	1060	2120	2	0	
AH	PHILLIPS	776	16CH X10DC PMT AMPL	5	EYX/33	E815TR	10/93	T	1295	6475	2	3	NEW 6-P7329
AM	FERMILAB	ES-7130	MEAN TIMER	1	EYX/34	E815TR	10/93	T	290	290	0	1	
AN	ORTEC	GG202/N	DUAL GATE GENERATOR	1	EJL/28	E815TR	10/92	WC	945	945	1	0	
AN	ORTEC	GG202/N	DUAL GATE GENERATOR	2	EWG/12	E815TR	07/93	WC	945	1890	2	0	
AN	LECROY	222	DUAL GATE GENERATOR	3	EJL/27	E815TR	10/92	WC	1195	3585	3	0	
AN	LECROY	222	DUAL GATE GENERATOR	1	EMD/04	E815TR	01/93	WC	1460	1460	1	0	

AN	LECROY	222	DUAL GATE GENERATOR	3	EYX/36	E815TR 10/93	TC	1330	3990	3	0
AO	JOERGER	VS	DUAL VISUAL SCALER	4	EJL/29	E815TR 10/92	WC	950	3800	4	0
AO	JOERGER	VS	DUAL VISUAL SCALER	3	EWG/13	E815TR 07/93	WC	975	2925	3	0
AO	JOERGER	VS	DUAL VISUAL SCALER	1	EYX/37	E815TR 10/93	TC	975	975	1	0
AO	JORWAY	1880	DUAL VISUAL SCALER	12	EYX/38	E815TR 10/93	TC	975	11700	12	0
AO	JORWAY	1880A	DUAL VISUAL SCALER	2	EJL/30	E815TR 10/92	WC	700	1400	2	0
AP	JORWAY	1883	PRESET SCALER	2	EJL/31	E815TR 10/92	WC	629	1258	2	0
AQ	FERMILAB	ES-7103	NIM PREDET BOX	3	EYX/39	E815TR 10/93	T	605	1815	0	3
AR	LECROY	688	NIM/TTL CONVERTER	11	EYX/40	E815TR 10/93	T	1150	12650	2	9
AR	LECROY	688AL	NIM/TTL CONVERTER	2	EJL/32	E815TR 10/92	WC	842	1684	2	0
AR	LECROY	688AL	NIM/TTL CONVERTER	1	EMD/05	E815TR 01/93	WC	1040	1040	1	0
AU	BERK NUC	8010	50MZ PULSE GENERATOR	4	EJL/33	E815TR 10/92	WC	985	3940	4	0
AY	LECROY	QVT3001	QVT MULT-CH ANALYZER	1	EYX/41	E815TR 10/93	T	4170	4170	0	1
CA	STD ENG	WCS	CAMAC CRATE	2	EJL/34	E815TR 10/92	WC	587	1174	2	0
CA	STD ENG	WCS	CAMAC CRATE	8	EYX/42	E815TR 10/93	T	900	7200	0	8
CA	STD ENG	850C	CAMAC CRATE	4	EYX/43	E815TR 10/93	T	895	3580	3	1
CA	STD ENG	850F	CRATE FAN ASSEMBLY	4	EYX/45	E815TR 10/93	T	292	1168	3	1
CA	STD ENG	860F	CRATE FAN ASSEMBLY	1	EYX/46	E815TR 10/93	T	871	871	0	1
CB	POW DES	AEC-432	CAM PS 6@25;24@6	2	EYX/47	E815TR 10/93	T	1500	3000	0	2
CB	STD ENG	PCS850	CAM PS6@50;12@3;24@6	4	EYX/50	E815TR 10/93	T	1250	5000	3	1
CB	BLP	1031	CAM PS 6@25;24@6	2	EJL/35	E815TR 10/92	WC	705	1410	2	0
CB	BLP	1031	CAM PS 6@25;24@6	3	EYX/48	E815TR 10/93	T	1175	3525	0	3
CB	STD ENG	1410A	CAM PS 6@25;24@6	7	EYX/49	E815TR 10/93	T	1524	10668	0	7
CB	STD ENG	860P	CAM PS6@60;12@3;24@6	1	EYX/51	E815TR 10/93	T	1638	1638	0	1
CC	INTERSTD	DTM-299	DATAWAY TEST MODULE	1	EJL/36	E815TR 10/92	WC	299	299	1	0
CC	INTERSTD	DTM-299	DATAWAY TEST MODULE	9	EYX/52	E815TR 10/93	T	450	4050	0	9
CC	INTERSTD	DTM-399	DATAWAY DISPLAY	4	EYX/53	E815TR 10/93	T	695	2780	0	4
CC	JORWAY	J001	CAMAC TEST MODULE	1	EYX/54	E815TR 10/93	T	371	371	0	1
CC	JOERGER	MBD	MANUAL BRANCH DRIVER	1	EYX/55	E815TR 10/93	T	850	850	0	1
CC	JOERGER	VBT	VISUAL BRANCH TERMIN	1	EJL/38	E815TR 10/92	WC	750	750	1	0
CC	JOERGER	VBT	VISUAL BRANCH TERMIN.	1	EYM/11	E815TR 10/93	TC	750	750	1	0
CC	KINETIC	1150	CAMAC EXTENDER	2	EYX/56	E815TR 10/93	T	340	680	0	2
CC	JORWAY	50	BRANCH TERMINATOR	1	EYX/57	E815TR 10/93	T	700	700	0	1
CD	JORWAY	BH-.5M	.5M BR HWY CABLE	4	EYX/58	E815TR 10/93	T	331	1324	0	4
CD	JORWAY	BH-1M	1M BR HWY CABLE	5	EYX/59	E815TR 10/93	T	590	2950	0	5
CD	JORWAY	BH-15FT	15FT BR HWY CABLE	1	EYX/60	E815TR 10/93	TC	615	615	1	0
CD	JORWAY	BH-30FT	30FT BR HWY CABLE	1	EYX/61	E815TR 10/93	T	825	825	0	1
CD	JORWAY	BH-35FT	35FT BR HWY CABLE	1	EYX/62	E815TR 10/93	T	755	755	0	1
CD	JORWAY	BH-5FT	5FT BR HWY CABLE	1	EYX/63	E815TR 10/93	T	495	495	0	1
CD	JORWAY	BH-55FT	55FT BR HWY CABLE	1	EYX/64	E815TR 10/93	T	900	900	0	1
CE	LECROY	2551	12CH 100MHZ SCALER	4	EJL/37	E815TR 10/92	WC	1501	6004	4	0
CE	LECROY	2551	12CH 100MHZ SCALER	18	EYX/69	E815TR 10/93	T	2430	43740	0	18
CE	JORWAY	84-1	QUAD 100MHZ SCALER	2	EMD/07	E815TR 01/93	WC	990	1980	2	0
CE	JORWAY	84-1	QUAD 100MHZ SCALER	6	EYM/12	E815TR 10/93	TC	990	5940	6	0
CE	JORWAY	85	QUAD 100MHZ SCALER	4	EMD/06	E815TR 01/93	WC	895	3580	4	0
CE	JORWAY	85A	QUAD 100MHZ SCALER	4	EJL/39	E815TR 10/92	WC	650	2600	4	0
CE	JORWAY	85A	QUAD 100MHZ SCALER	2	EYM/13	E815TR 10/93	TC	1395	2790	2	0
CE	JORWAY	85A	QUAD 100MHZ SCALER	14	EYX/70	E815TR 10/93	T	1395	19530	0	14
CF	ORTEC	C124	COINCIDENCE REGISTER	2	EYM/14	E815TR 10/93	TC	865	1730	2	0
CF	EGG	C124	COINCIDENCE REGISTER	1	EYX/71	E815TR 10/93	T	865	865	0	1
CF	LECROY	2340B	16-CHANNEL COINC REG	1	EYX/72	E815TR 10/93	T	1950	1950	0	1
CG	LECROY	2249A	12CH CHARGE ADC	1	EYM/16	E815TR 10/93	TC	3405	3405	1	0
CG	LECROY	2249A	12CH CHARGE ADC	4	EYX/73	E815TR 10/93	T	3405	13620	0	4
CG	LECROY	2249W	12CH WIDE GATE ADC	3	EYX/74	E815TR 10/93	T	3575	10725	0	3
CG	LECROY	2259A	12CH PK SENSING ADC	1	EYX/75	E815TR 10/93	T	3675	3675	0	1
CH	LECROY	2228A	8CH, 10 BIT TDC	1	EJL/40	E815TR 10/92	WC	840	840	1	0
CH	LECROY	4291B	32CH DRFT CH TDC,ECL	1	EYM/17	E815TR 10/93	TC	1095	1095	1	0
CI	JOERGER	CCA-1	PAR CRATE CONTROLLER	4	EYX/79	E815TR 10/93	T	1600	6400	0	4
CI	JORWAY	70AX	PAR CRATE CONTROLLER	1	EJL/41	E815TR 10/92	WC	855	855	1	0
CI	JORWAY	70AX	PAR CRATE CONTROLLER	1	EYM/18	E815TR 10/93	TC	1575	1575	1	0
CI	JORWAY	70AX	CRATE CONTROLLER	8	EYX/80	E815TR 10/93	T	1575	12600	0	8
CL	FERMILAB	LLCBL	LAM LATCH CABLE	1	EYX/81	E815TR 10/93	T	50	50	0	1
CO	KINETIC	2000	NIM/TTL CONVERTER	1	EYX/82	E815TR 10/93	T	200	200	0	1
CP	EGG	ND027	OUTPUT REGISTER	2	EYX/83	E815TR 10/93	T	450	900	0	2
CP	STD ENG	PR-612/D	2X-24B PAR OUT REG	1	EYX/84	E815TR 10/93	T	576	576	0	1
CP	JORWAY	40	2X-24B OUTPUT REG	2	EYX/85	E815TR 10/93	T	395	790	0	2
CP	JORWAY	41	12B NIM/LEM OUT REG	2	EJL/42	E815TR 10/92	WC	395	790	2	0
CP	JORWAY	41	12B NIM/LEM OUT REG	2	EYX/86	E815TR 10/93	T	435	870	0	2
CR	FERMILAB	ES-7126	CAMAC PREDET BOX	1	EYX/87	E815TR 10/93	T	350	350	0	1
CR	FERMILAB	ES-7126/N	CAMAC PREDET BOX	1	EJL/43	E815TR 10/92	WC	350	350	1	0
CS	FERMILAB	ES-7123	CAMAC PWR SPLY ALARM	5	EYX/88	E815TR 10/93	T	240	1200	0	5
CW	LECROY	4416A	16CH PROG DISCR, ECL	3	EJL/44	E815TR 10/92	WC	1800	5400	3	0
EA	TEKTRONI	R454A	OSCOPE, 150MHZ 2CH	1	EYX/90	E815TR 10/93	T	2989	2989	0	1
EA	TEKTRONI	454A	OSCOPE, 150MHZ 2CH	2	EJL/45	E815TR 10/92	WC	3385	6770	2	0
EA	TEKTRONI	475	OSCOPE, 200MHZ, 2CH	1	EJL/46	E815TR 10/92	WC	2500	2500	1	0
EA	TEKTRONI	475	OSCOPE, 200MHZ 2CH	1	EYM/19	E815TR 10/93	TC	4630	4630	1	0
EA	TEKTRONI	475	OSCOPE, 200MHZ, 2CH	1	EYX/91	E815TR 10/93	T	4630	4630	0	1
ED	TEKTRONI	R5103/D13	OSCOPE, 2MHZ, STORE	1	EJL/47	E815TR 10/92	WC	1095	1095	1	0
ED	TEKTRONI	R5103/D13	OSCOPE, 2MHZ, STORE	1	EYX/92	E815TR 10/93	T	1395	1395	0	1
ED	TEKTRONI	R5115	OSCOPE, 2MHZ, STORE	1	EJL/48	E815TR 10/92	WC	1505	1505	1	0
ED	TEKTRONI	R564B	OSCOPE, 10MHZ, STORE	1	EYX/93	E815TR 10/93	T	3200	3200	0	1
EE	TEKTRONI	200-1	SCOPE CART	1	EMD/08	E815TR 01/93	WC	155	155	1	0
EE	TEKTRONI	200-1	SCOPE CART	1	EYX/94	E815TR 10/93	T	155	155	0	1
EF	TEKTRONI	C-30A-P	SCOPE CAMERA	1	EYX/95	E815TR 10/93	T	665	665	0	1
EF	TEKTRONI	C-31R	SCOPE CAMERA	1	EJL/49	E815TR 10/92	WC	675	675	1	0
EG	TEKTRONI	P6054	PROBE X10	1	EYX/96	E815TR 10/93	T	92	92	0	1
EG	TEKTRONI	P6065	PROBE X10	1	EYX/97	E815TR 10/93	T	92	92	0	1
EH	BALL RES	TE12M	MONITOR TV 14IN RACK	1	EYX/99	E815TR 10/93	T	531	531	0	1
EH	BALL RES	TU14R	MONITOR TV 14IN RACK	1	EYY/01	E815TR 10/93	T	531	531	0	1
EI	TEKTRONI	3A74	AMP 4T 20MV 2MHZ PI	1	EYY/02	E815TR 10/93	T	900	900	0	1
EI	TEKTRONI	3B3	TIME BASE, DEL SWEEP	2	EYY/03	E815TR 10/93	T	680	1360	0	2
EI	TEKTRONI	5A14N	AMP 4T 1MV 2MHZ PI	1	EJL/50	E815TR 10/92	WC	575	575	1	0

EI	TEKTRONI	5A18N	AMP 2T 1MV 2MHZ PI	2	EJL/51	E815TR	10/92	WC	295	590	2	0
EI	TEKTRONI	5B12N	TIME BASE, DBL SWEEP	1	EJL/52	E815TR	10/92	WC	450	450	1	0
FA	LAMBDA	LXS-C-6-R	LVPS 6V @ 8.8A	1	EJL/53	E815TR	10/92	WC	505	505	1	0
FA	SORENSON	QSB6-15	LVPS, 5-9V 16.5A	1	EYM/20	E815TR	10/93	TC	315	315	1	0
FA	POWERTEC	2EE15-21A	LVPS, 15V @ 21A	1	EYM/21	E815TR	10/93	TC	457	457	1	0
FB	LECROY	HV4032ASP	COMP CONT HV SUPPLY	1	EJL/54	E815TR	10/92	WC	5030	5030	1	0
FB	POW DES	1556B	HV POWER SUPPLY	1	EYM/22	E815TR	10/93	TC	675	675	1	0
FB	POW DES	1570	HV PS 3KV@40MA	4	EJL/55	E815TR	10/92	WC	525	2100	4	0
FB	POW DES	1570	HV PS 3KV @ 40MA	2	EYM/23	E815TR	10/93	TC	620	1240	2	0
FB	BERTAN	210-05R	HV POWER SPLY	6	EYY/17	E815TR	10/93	TC	1775	10650	6	0
FB	FLUKE	415B	HV PS 3KV @ 30MA	3	EMD/09	E815TR	01/93	WC	609	1827	3	0
FB	FLUKE	415B	HV PS 3KV @ 30MA	3	EYM/24	E815TR	10/93	TC	609	1827	3	0
FC	FERMILAB	ES-7125	POS MWPC POWER SPLY	63	EYY/21	E815TR	10/93	T	425	26775	0	63
FC	KIEBLER	5900	NEG MWPC POWER SPLY	8	EJL/56	E815TR	10/92	WC	725	5800	8	0
FC	KIEBLER	6900	POS MWPC POWER SPLY	12	EJL/57	E815TR	10/92	WC	725	8700	12	0
FD	FERMILAB	ES-7092	HV DISTR BOX	3	EYM/26	E815TR	10/93	TC	1600	4800	3	0
FD	FERMILAB	ES-7092V	H V DISTR BOX W/VAR	4	EJL/58	E815TR	10/92	WC	1250	5000	4	0
FD	FERMILAB	ES-7092V	H V DISTR BOX W/VAR	3	EMD/10	E815TR	01/93	WC	1600	4800	3	0
FD	FERMILAB	ES-7092V	HV DISTR BOX Q/VAR	1	EYM/27	E815TR	10/93	TC	1711	1711	1	0
GA	GEN RADI	1340	PULSE GENERATOR	1	EJL/59	E815TR	10/92	WC	495	495	1	0
GA	GEN RADI	1340	PULSE GENERATOR	1	EYY/23	E815TR	10/93	T	600	600	0	1
JA	FLUKE	8000A	DIGITAL MULTIMETER	1	EYY/24	E815TR	10/93	T	595	595	0	1
JA	FLUKE	8100A	DIGITAL VOLTMETER	1	EYY/25	E815TR	10/93	T	715	715	0	1
JA	FLUKE	8120A	DIGITAL VOLTMETER	1	EYY/26	E815TR	10/93	TC	695	695	1	0
JA	FLUKE	8600A	DIGITAL VOLTMETER	3	EYY/27	E815TR	10/93	T	649	1947	0	3
KJ	LSI	ADM-36	VIDEO TERMINAL	1	EJL/60	E815TR	10/92	WC	937	937	1	0
KJ	DEC	VR201	VT240 MONITOR	1	EYM/29	E815TR	10/93	TC	250	250	1	0
LA	ORTEC	DB263	DELAY BOX	1	EYY/33	E815TR	10/93	T	225	225	0	1
LA	ORTEC	DB463	DELAY BOX	2	EYM/31	E815TR	10/93	TC	600	1200	2	0
LA	CHRONETI	M21	DUAL DELAY BOX	1	EYY/34	E815TR	10/93	T	275	275	0	1
LC	FERMILAB	029029	NIM COOLING FAN	3	EWG/14	E815TR	07/93	WC	250	750	3	0
LC	FERMILAB	2107-F	NIM COOLING FAN	29	EJL/61	E815TR	10/92	WC	200	5800	29	0
LC	ORTEC M1	27/N	NIM COOLING FAN	10	EYY/35	E815TR	10/93	T	435	4350	0	10

TOTAL IS 949 ITEMS - TOTAL COST $809,309
NEW COST $6,475
UNFILLED IS 327 ITEMS - TOTAL COST $307,403

APPENDIX III - E815 COMPUTER EQUIPMENT REQUEST

1 LIST E DATA ACQUISITION EQUIPMENT
** REQDB9 ** FERMI NATIONAL ACCELERATOR LABORATORY ** REQDB9 **
REP REQUEST DATA BASE *05/03/1994*

COMPUTING EQUIPMENT TOTALS SORTED BY AFFILIATION

TYPE CODE	MFGR	MODEL	DESCRIPTION	QTY	ITEM	AFFIL	REQ. DATE	STATUS	UNIT COST	TOTAL COST $	QTY DELIV	QTY OWED	QTY-PO#
A5	VMETRO	VBT-321B	BUS ANALYZER	1	ELA/37	E815	12/92	9	6000	6000	0	1	
C2	SIGMA	SA-H173	BOX,EXP,EXABYTE	2	ELA/16	E815	12/92	9C	1200	2400	2	0	
C2	FERMIACP	VME CRATE	CRATE VME, ACP	1	ELA/15	E815	12/92	9C	2500	2500	1	0	
C2	SCHROFF	VMECRATE	CRATE,VME	1	ESN/01	E815	06/93	9C	1200	1200	1	0	
D3	MICROPOL	1924	DSK DRV,SCSI,2.1GB	2	ELA/17	E815	12/92	9C	2200	4400	2	0	
D4	SGI	HL7965KW	DISPLAY,19IN,COLOR	1	FAM/01	E815	11/93	9C	2000	2000	1	0	
D4	NCD	17C	MONITOR,X 17" COLOR	2	ELA/38	E815	12/92	9C	426	852	2	0	
D4	NCD	19	MONITOR,X 19", MONO	2	ELA/39	E815	12/92	9C	495	990	2	0	
D4	NCD	19	MONITOR,X 19", MONO	2	FEW/10	E815	02/94	9	495	990	0	2	
F2	ASTRO	5106	FAN,6 UNIT,COOLING	1	ELA/20	E815	12/92	9	500	500	0	1	
I7	MOTOROLA	MVME712M	TRANSITION MODULE	2	ELA/23	E815	12/92	9C	315	630	2	0	
P6	ACDC	REV103B	PS,VME	1	ESN/02	E815	06/93	9C	400	400	1	0	
P6	ACDC	UNKNOWN	POWER SUPPLY VME	1	ELA/25	E815	12/92	9C	1000	1000	1	0	
P7	HEW PACK	4SIMX	PRINTER,LASER	1	ELA/26	E815	12/92	9C	6995	6995	1	0	
P8	MOTOROLA	MVME16734	PRCSR,VME,1BOARD CPU	2	EZX/01	E815	07/93	9C	8300	16600	2	0	
T4	EXABYTE	EXB-8500	TAPE DRV,2.3GB	4	ELA/24	E815	12/92	9C	2500	10000	4	0	
U1	SGI	KSG32/R40	32MB MEMORY UPGRADE	1	ELA/29	E815	12/92	9	3000	3000	0	1	
W6	NCD	17CP	WRKSTN,BASE,X 17"CLR	2	ELA/40	E815	12/92	9C	2400	4800	2	0	
W6	NCD	19CP	WRKSTN,BASE,X19"MONO	2	ELA/41	E815	12/92	9C	1800	3600	2	0	
W6	NCD	19CP	WRKSTN,BASE,X19"MONO	2	FEW/11	E815	02/94	9	1800	3600	0	2	
W6	NCD	19P3KVT	TERMINAL,X 19",MONO	1	ELA/31	E815	12/92	9C	3450	3450	1	0	
W7	SGI	R4000	WRKSTN,INDIGO,8B COL	1	ELA/27	E815	12/92	9C	17400	17400	1	0	
X9	UNKNOWN	UNKNOWN	COMP/PREP CONTINGNCY	1	ELA/42	E815	12/92	9	25000	25000	0	1	

TOTAL 36 ITEMS - TOTAL COST $118,307
UNFILLED IS 8 ITEMS - TOTAL COST $39,090

E815 RUN PLAN

A run plan for the actual run is forthcoming from the experimenters.

Proposed Plan for Readying E815 for the 1995 - 1997 Fixed Target Run

Winter 1992	Start Engineering Design of Sign-Selected Quad Train Begin Off-line Software Development
Summer 1993--Fall 1993	Establish Computer System Test/Repair Detector Chambers and Counters Test/Repair TDC/FADC Systems Install/Check ADC System Re-Establish Lab E Electronics Install New PMT HV System
Winter 1993–Spring 1994	Replace Scintillator Oil in Counters Establish Computer Readout of Detector Reconstruct Test/Veto Wall
Summer 1994	Complete CDR Level Design of SSQT and Test Beam Secure AIP Funds
Summer 1994–Fall 1994	Perform Repairs to N01 and Modifications to Berm Replace Photomultiplier Tubes in Counters Build Chamber Repair Room/Begin Chamber Repairs Checkout On-line Readout/Monitoring Establish Cosmic Ray Running Develop On-line Monitoring System
Summer 1994–Winter 1995	Finish SSQT/Test Beam Engineering Design Purchase Steel
Winter/Spring 1995	Complete/Test SSQT Install Test Beam/Monitoring
October 1995	E815 Data Run

E815 HAZARD IDENTIFICATION CHECKLIST

Check any item for which there is anticipated need.

Cryogenics		Electrical Equipment		Hazardous Materials	
	beamline magnets		Cryo/Electrical devices		List hazardous/toxic materials
	analysis magnets		capacitor banks		planned for use in a beamline or
	target	X	high voltage (> 5 kV)		experimental enclosure:
	bubble chamber		exposed equipment over 50 V	1)	RTV
Pressure Vessels		**Flammable Gas or Liquids**		2)	Conformal Coating
	inside diameter	type:	Ethane	3)	Lead
	operating pressure	flow rate:	24 SCFH		
	window material	capacity:	670 cu ft		
	window thickness	**Radioactive Sources**			
Vacuum Vessels			permanent installation	**Target Materials**	
3 ft	inside diameter	X	temporary use	X	Beryllium (Be)
	operating pressure	type:	206 Ru		Lithium (Li)
stainless	window material	strength:	2 mCi		Mercury (Hg)
1/16 in	window thickness	**Hazardous Chemicals**			Lead (Pb)
Lasers			Cyanide plating materials		Tungsten (W)
	permanent installation	X	Scintillation Oil		Uranium (U)
	temporary installation		PCBs		other
	calibration		Methane	**Mechanical Structures**	
	alignment		TMAE	X	lifting devices
type:			TEA	X	motion controllers
wattage:			photographic developers	X	scaffolding/elevated platforms
class:			other	X	others

SUMMARY OF RUN PARAMETERS AND OFFLINE COMPUTING NEEDS

Data Sample:
Beam Studies ==> 50 neutrino events / 1.0E13 protons
10 antineutrino events / 1.0E13 protons
50 test beam events / 1.0E13 protons

Assume a run of 2.0E18 POT, evenly split between neutrino and anti-neutrino running:

Assume 1.0E18 protons on target for neutrino running:

===> 5.0E6 neutrino events

Assume 1.0E18 protons on target for antineutrino running:

===> 1.0E6 antineutrino events

Assume 50 events/spill @ 1.0E7 seconds for test beam running:

===> 1.0E7 test beam events

Total physics + test beam = 1.6E7 events

Offline Computing Needs:
Goal: Strip/Crunch a large fraction of the data during the run.

Note that 5 passes of strip/crunch is assumed below. This is a conservative estimate of the number of cycles of process/examine/fix & rerun that we can expect given the past experiences with E744/E770.

Offline Monitoring/Calibration:
2 workstations in Lab E for offline (from universities)

Offline Stripping/Crunching
10 mip-sec/event * 1.6E7 events = 1.6E8 mip-secs for 1 pass
= 4.6E4 mip-hours
= 5.3 mip-years

5 passes * 1.6 E8 mip-secs = 8 E8 mip-secs total

10 50-mip machines at 50% efficiency = 250 mips available
8E8 mip-sec/2.5E2 mip = 3.2E6 sec = 950 hours

Access to the 50% of the above computing is needed by 3600 hours into the run.

Tape parameters:
12E3 bytes/event * 1.6E7 events = 1.9 E11 bytes
= 190 Gbytes raw data

190 Gbytes/ 5Gbytes/tape = 40 tapes

x2 for inefficiency = 80 raw tapes

COMPUTING DIVISION ANALYSIS MODEL

E815 OFF-LINE ANALYSIS PLAN FOR THE 1995 - 1997 RUN

FACTS
Event Size: 12 Kb Event rate to tape: 1 Hz (DC)

5 M neutrino events / 7200 hour run
1 M antineutrino events / 7200 hour run
10 M test beam events / 7200 hour run

PRIMARY PROCESSING:
Assume 10 MIPS-sec/event for primary processing
Full pass 1 takes 1.6E8 MIPS-sec = 5.3 MIP-years

WE REQUEST THAT 50% OF THIS CAPABILITY BE AVAILABLE DURING DATA-TAKING.

PHYSICS ANALYSIS

In our model for offline computing, Fermilab would provide 500 mips of processing for the strip and crunch, along with tape copying facilities and tapes. This processing power will not be a dedicated purchase for E815; rather, it would be CLUBS or its 1995 equivalent. The universities would provide the processing for making DSTs, software development platforms, analysis platforms and processing power for Monte Carlos.

We are expecting to have offline computing capability in Lab E so that data integrity can be checked quickly during the run. We are planning for two 50 mips workstations, 18 GBytes of hard disk and 4 tape drives. One workstation would be dedicated to stripping and crunching, while the other would be used for general purpose offline computing, X-window driving, quick looks at pieces of the data using rough estimates of calibration, etc. These workstations would not be intended for crunching the main body of the data. (Crunching the main body of the data is to be provided by the 500 MIPS mentioned in the previous paragraph.)

An estimate of the costs is as follows:

	FNAL	Universities
2 50 mip workstations *		50.K
6 * 3 GByte hard disk	5.K	10.K
7*XWindows Terminals		15.K
4 * 8 mm tape drives	3.K	5.K
2560 8mm tapes		10.K
Miscellaneous	15.K	
Total	23.K	90.K **

* Note: An additional workstation is expected to be provided by FNAL as part of the online agreement, as discussed in the online portion of this MOU.

** FNAL will provide maintenance for these workstations and their peripherals from the time of their arrival onsite until one year after the data-taking provided the equipment is of the kind supported by the Fermilab Computing Division.

Computing Division Analysis Model - CPU and I/O resources

Stage	Analysis Stage/Activity	Description	Number of Input Events N 10**m	Input Event type (Raw or Monte Carlo)	Input Event size in KB	Number of Output Events N 10**m	Output Event size in KB	Avg. VUPS per event (VAX 780 units)	VUPS/MB/Sec
1	Monte Carlo	Generation of Monte Carlo data	N/A	N/A	N/A	5 10**7	0.2 KB	1	50
2	Code Development	Pre-data taking, using Monte Carlo data	5 10**5	Prior Expt. Data	12 KB	5 10**5	15 KB	1	50
3	Investigations	Program development using raw data	5 10**5	Raw Data	12 KB	5 10**5	15 KB	15	50
4	Primary Event Reconstruction	Main production effort	6 10**6 physics 1 10**7 test = 1.6 10**7 evts x 5 passes = 8 10**7	Raw Data	12 KB	1.6 10**7 x 5 passes = 8 10**7	12 KB (strip) 15 KB (crunch)	10	50
5 a	Compaction Stages	Compaction of data and/or some selection	N/A	N/A	N/A	N/A	N/A	N/A	N/A
5 b	Compaction Stages	Compaction of data and/or some selection	N/A	N/A	N/A	N/A	N/A	N/A	N/A
6 a	Stripping Stages (DST Creation)	Selection of data and/or some compaction	1.6 10**7	Crunched Data	15 KB	1.6 10**7	0.2 KB	1	50
6 b	Stripping Stages	Selection of data and/or some compaction	N/A	N/A	N/A	N/A	N/A	N/A	N/A
7	DST Analysis		1.6 10**7	DST	0.2 KB	N/A	N/A	1	50
8	Spin cycle	Express line, rapid turnaround diagnostics	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Computing Division E815 Analysis Model - Resources Characteristics

Stage	Analysis Stage/Activity	Preferred Machine/ Operating system	Input Media	No. Input tapes	Output Media	No. Output tapes	Memory size required in MB	Staging disk In GB or MB	Project disk in GB or MB	Time-span in years	No. Output streams	Location e.g. Fermilab, Columbia, etc.	Local on % effort
1	Monte Carlo	UNIX	8 mm, Disk	50	8 mm	50	16 MB	5 GB	3 GB	5	<5	Collab. Inst. and FNAL	20
2	Code Development	UNIX	8 mm, Disk	5	8 mm	50	16 MB	5 GB	3 GB	3	<5	Collab. Inst. and FNAL	20
3	Investigations	UNIX	8 mm, Disk	5	8 mm	50	16 MB	5 GB	3 GB	2	<5	Collab. Inst. and FNAL	100
4	Primary Event Reconstruction	UNIX	8 mm, Disk	80	8 mm	160 x 5 passes = 800	16 MB	5 GB	3 GB	1	<5	Collab. Inst. and FNAL	100
5 a	Compaction Stages	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
5 b	Compaction Stages	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
6 a	Stripping Stages (DST Creation)	UNIX	8 mm, Disk	160	8 mm	20	16 MB	5 GB	3 GB	1	<5	Collab. Inst. and FNAL	20
6 b	Stripping Stages	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
7	DST Analysis	UNIX	8 mm, Disk	20	8 mm	0	16 MB	5 GB	3 GB	5	<5	Collab. Inst. and FNAL	20
8	Spin cycle	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
9	Media conversion	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
10	Media replication	UNIX	8 mm	160	8 mm	1600	16 MB	5 GB	3 GB	1	<5	Collab. Inst. and FNAL	100

ITEM		FY 1992	FY 1993	FY 1994	FY 1995	FY 1996	TOTALS
Fermilab New Equipment Funds ($K, no contingency)							
Physics Sect.							
4.3.3	Scintillator Oil	9	59	0	0	0	68
4.3.4	Replac. PMT's	6	0	0	0	0	6
4.3.5	Hardware Misc.	0	20	27	3	0	50
4.3.14	Single Wire Chs.	0	0	10	10	0	20
	Physics Totals	15	79	37	13	0	144
Research Div.							
4.2.2	NC Construction	0	0	50	48.5	0	98.5
4.2.3	Lab E	11	32.9	50	247.1	0	341
4.2.4	NKC Test Beam	0	0	0	237.9	0	237.9
4.2.5	Miscellaneous	0	0	0	25	0	25
	R. D. Totals	11	32.9	100	558.5	0	702.4
Computing Div.							
4.1.8	PREP/DAQ	0	74	60	59.4	0	193.4
	C. D. Totals	0	74	60	59.4	0	193.4
TOTALS		**26**	**185.9**	**197**	**630.9**	**0**	**1039.8**
Fermilab Plant Funds							
Research							
4.2.2	NC Construction	0	0	2279.2	0	0	2279.2
4.2.3	Lab E	0	0	428.8	0	0	428.8
4.2.4	NKC Test Beam	0	0	0	150	0	150
TOTALS		**0**	**0**	**2708**	**150**	**0**	**2858**
Fermilab Operating Funds ($K, no contingency)							
Physics Sect.							
4.3.1	Xenon	0	0	0	3.5	4	7.5
4.3.2	Drift Chambers	0	2	7	1	0	10
4.3.6	8mm Tapes	0	0	0	1	2	3
4.3.7	Travel	4	4	6	7.5	9	30.5
4.3.8	General Operating	5	7	10	12	15	49
	Physics Totals	9	13	23	25	30	100
Research Div.							
4.2.2	NC Construction	0	0	40	0	0	40
4.2.3	Lab E	0	0	15	50	100	165
	R. D. Totals	0	0	55	50	100	205
Computing Div.							
4.1.7	Soft. Maintenance	0	0	2	2	2	6
4.1.9	Hard. Maintenance	0	0	89	89	90	268
	C. D. Totals	0	0	91	91	92	274
TOTALS		**9**	**13**	**169**	**166**	**222**	**579**

Computing Division E815 Analysis Model - Resources Characteristics

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2	Code Development	UNIX	8 mm, Disk	5	8 mm	50	16 MB	5 GB	3 GB	3	<5	Collab. Inst. and FNAL	20
3	Investigations	UNIX	8 mm, Disk	5	8 mm	50	16 MB	5 GB	3 GB	2	<5	Collab. Inst. and FNAL	100
4	Primary Event Reconstruction	UNIX	8 mm, Disk	80	8 mm	160 x 5 passes = 800	16 MB	5 GB	3 GB	1	<5	Collab. Inst. and FNAL	100
5 a	Compaction Stages	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
5 b	Compaction Stages	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
6 a	Stripping Stages (DST Creation)	UNIX	8 mm, Disk	160	8 mm	20	16 MB	5 GB	3 GB	1	<5	Collab. Inst. and FNAL	20
6 b	Stripping Stages	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
7	DST Analysis	UNIX	8 mm, Disk	20	8 mm	0	16 MB	5 GB	3 GB	5	<5	Collab. Inst. and FNAL	20
8	Spin cycle	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
9	Media conversion	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
10	Media replication	UNIX	8 mm	160	8 mm	1600	16 MB	5 GB	3 GB	1	<5	Collab. Inst. and FNAL	100

x2 for duplicates = 80 duplicate tapes

Strip/Crunch data volume = x2 raw volume ==> 160 tapes/pass
x 5 passes
==> 800 tapes for strip/crunch

1 set of final pass tapes to each of 10 institutions = 1600 tapes

Total tapes needed = 80 raw + 80 duplicate + 800 s/c + 1600 final
= 2560 tapes

Note:

E815 assumes that 8mm magnetic tape will be used for data recording and subsequent analysis. The Computing Division is exploring other serial media for these purposes on the time scale of the E815 data-taking. E815 should participate in these investigations.

E815 can expect an 8mm tape copying facility with a peak capability of 20 tapes/day in the best of cases and should take that into account in its planning.