

Title I Design Report

# **Fermilab Main Injector**

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Volume 3

Technical Cost Estimate

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Revision 0

Fermi National Accelerator Laboratory

Batavia, Illinois



Operated By Universities Research Association Inc.

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THE ESTIMATE IS ZERO FOR THE FOLLOWING LINES:

18 1.1.1.1.4.9	CHESTER	MIR MAGNETS/P ABORT TRIMS, XBUMP (REWORK)
45 1.1.1.5.1.14	CHESTER	120GEV MAGNETS/BDM 240"B1/B2 LEFT IN PLACE
46 1.1.1.5.2.10	CHESTER	120GEV MAGS/84" BQB (REWORK)
S-075 1.1.1.5.2	CHESTER	120GEV MAGS/84" MR QUAD BQB
49 1.1.1.6.1.10	CHESTER	120GEV MAGNETS/2XB2 240" DIPOLES BDM (IN PLA
52 1.1.1.6.1.14	CHESTER	SLOW SPILL MAGS/B1 & B2 LEFT IN PLACE
54 1.1.1.6.2.10	CHESTER	SLOW SPILL MAGS/84" BQB LEFT IN PLACE
69 1.1.1.10.2.3	CHESTER	MI QUAD TOOLING (NEW)
73 1.1.1.10.3.1	CHESTER	MR TOOLING/SEXTUPOLE (NEW)
95 1.1.2.10.2.3	SAUER	BML VACUUM SYS/SPILL PUMPS
98 1.1.2.10.3.3	SAUER	BML VACUUM SYS/SPILL GAUGES
114 1.1.3.3.4	KRAFCZYK	150 GEV PROT LINE/LAMBERTSON POWER SUPPLY
115 1.1.3.4.1	KRAFCZYK	150 GEV PBAR LINE/DIPOLE SUPPLIES
116 1.1.3.4.2	KRAFCZYK	150GEV PBAR LINE/QUADRUPOLE SUPPLIES
118 1.1.3.4.4	KRAFCZYK	150 GEV PBAR LINE/EXT LAMBERTSON SUPPLIES
119 1.1.3.5.1	KRAFCZYK	PBAR PROD LINE(F11 TO F17)/DIPOLE SUPPLIES
124 1.1.3.6.3	KRAFCZYK	SLOW SPILL LINE/CORR ELEMENT SUPPLIES
139 1.1.6.1.3.1	DINKEL	150 GEV PROT EXTRACTION/KICKER MAGNET
140 1.1.6.1.3.2	DINKEL	150 GEV PROT EXT/KICKER POWER SUPPLIES
S-097 1.1.6.1.3	DINKEL	150 GEV PROT EXT/ KICKER
160 1.1.8.3.9	JACKSON	MIR INST/150 GEV PROT LINE PROFILE MONITORS
S-041 1.1.8.3	JACKSON	MIR INST/150 GEV PROT LINE
161 1.1.8.4.9	JACKSON	MIR INST/150 GEV PBAR LINE PROFILE MONITOR
S-042 1.1.8.4	JACKSON	MIR INST/150 GEV PBAR LINE
162 1.1.8.5.9	JACKSON	MIR INST/PBAR LINE PROFILE MONITOR
S-043 1.1.8.5	JACKSON	MIR INST/PBAR PRODUCTION LINE
163 1.1.8.6.9	JACKSON	SLOW SPILL INST/PROFILE MONIOTR
S-044 1.1.8.6	JACKSON	MIR INST/SLOW SPILL LANE
175 1.1.9.10.3	LUCAS	BLM CONTROLS/CATV SYSTEM
176 1.1.9.10.4	LUCAS	BLM CONTROLS/FIRUS SYSTEM
179 1.1.12.1.1.1	SATTI	MIR WATER SYS/POND PUMP SYSTEM



190	1.1.12.1.2.1	KRAFCZYK/SORENSE	MIR/INSTALL CABLE TRAYS
194	1.1.12.10.1.1	SATTI	BML WATER SYS/POND PUMP SYSTEM
199	1.1.12.10.2.1	KRAFCZYK/SORENSE	BML/INSTALL CABLE TRAYS
208	1.1.13.1.2.4	LANGE	MIR CORRECTION SYSTEM INSTALLATION
229	1.1.13.4.1.1	LANGE	150 GEV PBAR LINE/MAGNETS STANDS INSTALL
230	1.1.13.4.1.2	LANGE	150 GEV PBAR LINE/MAGNET INSTALL
232	1.1.13.4.2	LANGE	MIR CORRECTION ELEMENT INSTALLATION
233	1.1.13.4.3	SAUER	MIR VACUUM INSTALLATION
234	1.1.13.4.4	LANGE	MIR INSTRUMENTATION INSTALLATION
235	1.1.13.5.1.1	LANGE	PBAR PROD LINE/INSTALL MAGNET STANDS
236	1.1.13.5.1.2	LANGE	PBAR PROD LINE/INSTALL MAGNETS
238	1.1.13.5.2	LANGE	PBAR PROD LINE/CORR ELEMENT INSTALL
239	1.1.13.5.3	SAUER	PBAR PROD LINE/VACUUM INSTALLATION
240	1.1.13.5.4	LANGE	PBAR PROD LINE/INST INSTALLATION
258	1.2.1.4	PAWLAK	INDUSTRIAL BUILDING NUMBER 5, PHASE 1



WBS NUMBER	TITLE	NAME	PAGE #
1.1.1.1.1.1	MIR MAGNETS/240" DIPOLES IDA	CHESTER	1
1.1.1.1.1.2	MIR MAGNETS/240" DIPOLES IDB	CHESTER	2
1.1.1.1.1.3	MIR MAGNETS/160" DIPOLES IDC	CHESTER	3
1.1.1.1.1.4	MIR MAGNETS/160" DIPOLES IDD	CHESTER	4
1.1.1.1.1	MIR MAGNETS/DIPOLES	CHESTER	S-058
1.1.1.1.2.3	MIR MAGNETS/100" QUADS IQC (NEW)	CHESTER	5
1.1.1.1.2.4	MIR MAGNETS/116" QUAD IQD (NEW)	CHESTER	6
1.1.1.1.2.5	MIR MAGNETS/84" QUADS BQB (REWORK)	CHESTER	7
1.1.1.1.2.9	MIR MAGNETS/84" QUADS BQB ROLLED (REWORK)	CHESTER	8
1.1.1.1.2	MIR MAGNETS/QUADS	CHESTER	S-059
1.1.1.1.3.1	MIR MAGNETS/SEXTUPOLES 18" ISA (NEW)	CHESTER	9
1.1.1.1.3.2	MIR MAGNETS/TRIM QUAD (REWORK)	CHESTER	10
1.1.1.1.3.3	MIR MAGNETS/SKEW QUAD (REWORK)	CHESTER	11
1.1.1.1.3.4	MIR MAGNETS/SKEW SEXTUPOLE (REWORK)	CHESTER	12
1.1.1.1.3.5	MIR MAGNETS/TRIM SEXTUPOLE (REWORK)	CHESTER	13
1.1.1.1.3.6	MIR MAGNETS/OCTUPOLES (REWORK)	CHESTER	14
1.1.1.1.3.7	MIR MAGNETS/CR SKEW QUADS	CHESTER	15
1.1.1.1.3	MIR MAGNETS/CORRECTORS	CHESTER	S-060
1.1.1.1.4.2	MIR MAGNETS/HORIZ TRIM - IDH (NEW)	CHESTER	16
1.1.1.1.4.4	MIR MAGNETS/VERT TRIM DIP IDV (NEW)	CHESTER	17
1.1.1.1.4.9	MIR MAGNETS/P ABORT TRIMS, XBUMP (REWORK)	CHESTER	18
1.1.1.1.4	MIR MAGNETS/TRIM DIPOLES	CHESTER	S-061
1.1.1.1	MAIN INJECTOR RING MAGNETS	CHESTER	S-020
1.1.1.2.1.5	8GEV MAGNETS/SDB 120" DIPOLES (MORE)	CHESTER	19
1.1.1.2.1.7	8GEV MAGNETS/B2 DIPOLE BDM (REWORK)	CHESTER	20
1.1.1.2.1.12	8GEV MAGNETS/EPB DIPOLE 5-1.5-120 (REWORK)	CHESTER	21
1.1.1.2.1.13	8GEV MAGNETS/B3 DIPOLE ODM (REWORK)	CHESTER	22
1.1.1.2.1	8GEV MAGNETS/DIPOLES	CHESTER	S-062
1.1.1.2.2.7	8GEV MAGNETS/SQA(17") QUADS (REWORK)	CHESTER	23
1.1.1.2.2.8	8GEV MAGNETS/SQA(17") QUADS (MORE)	CHESTER	24
1.1.1.2.2	8GEV MAGNETS/QUADS	CHESTER	S-063
1.1.1.2.4.1	8GEV MAGNETS/H TRIM DIPOLE HDC (REWORK)	CHESTER	25
1.1.1.2.4.3	8GEV MAGNETS/V TRIM DIPOLE (REWORK)	CHESTER	26
1.1.1.2.4	8GEV MAGNETS/TRIM DIPOLES	CHESTER	S-064
1.1.1.2.5.1	8GEV MAGNETS/INJ LAMB ELA A0 106" (REWORK)	CHESTER	27
1.1.1.2.5	8GEV MAGNETS/LAMBERTSONS	CHESTER	S-065
1.1.1.2	8 GEV LINE MAGNETS	CHESTER	S-021
1.1.1.3.1.7	150GEV P MAGNETS/B2(240") DIP BDM (REWORK)	CHESTER	28
1.1.1.3.1	150GEV P MAGNETS/DIPOLES	CHESTER	S-066
1.1.1.3.2.5	150GEV P MAGNETS/3Q84 QUADS BQB (REWORK)	CHESTER	29
1.1.1.3.2.6	150GEV P MAGNETS/3Q52 QUADS BQA (REWORK)	CHESTER	30
1.1.1.3.2	150GEV P MAGNETS/QUADS	CHESTER	S-067
1.1.1.3.4.1	150GEV P MAGNETS/H TRIM DIPOLE (REWORK)	CHESTER	31
1.1.1.3.4.3	150GEV P MAGNETS/V TRIM DIPOLE (REWORK)	CHESTER	32
1.1.1.3.4	150GEV P MAGNETS/DIPOLE TRIMS	CHESTER	S-068
1.1.1.3.5.2	150GEV P/MI LAMBERTSON 94" (2.4M) (NEW)	CHESTER	33
1.1.1.3.5.3	150GEV P/MI LAMBERTSON 189" (4.8M) (NEW)	CHESTER	34
1.1.1.3.5.5	150GEV P/MI C-MAGNET 118" (NEW)	CHESTER	35
1.1.1.3.5	150GEV P MAGNETS/LAMBERTSONS	CHESTER	S-069
1.1.1.3	150 GEV PROTON (MI52-F0) MAGNETS	CHESTER	S-022
1.1.1.4.1.7	150GEV PBAR/B2 240" DIPOLES BDM (REWORK)	CHESTER	36
1.1.1.4.1	150GEV PBAR MAGNETS/DIPOLES	CHESTER	S-070
1.1.1.4.2.5	150GEV PBAR MAGNETS/84" QUADS BQB (REWORK)	CHESTER	37
1.1.1.4.2.6	150GEV PBAR MAGNETS/3Q52 QUADS BQA (REWORK)	CHESTER	38
1.1.1.4.2	150GEV PBAR MAGNETS/QUADS	CHESTER	S-071
1.1.1.4.4.1	150GEV PBAR MAGNETS/H TRIM DIPOLE (REWORK)	CHESTER	39
1.1.1.4.4.3	150GEV PBAR MAGNETS/V TRIM DIPOLE (REWORK)	CHESTER	40
1.1.1.4.4	150GEV PBAR MAGNETS/TRIM DIPOLES	CHESTER	S-072
1.1.1.4.5.2	150GEV PBAR/MI LAMBERTSON 94" (NEW)	CHESTER	41
1.1.1.4.5.3	150GEV PBAR/MI LAMBERTSON 189" (NEW)	CHESTER	42
1.1.1.4.5.5	150GEV PBAR/MI C-MAGNET 118" (NEW)	CHESTER	43
1.1.1.4.5	150GEV PBAR MAGNETS/LAMBERTSONS	CHESTER	S-073
1.1.1.4	150 GEV PBAR (MI62-F0) MAGNETS	CHESTER	S-023





1.1.1.5.1.13	120GEV MAGNETS/B3 DIPOLE ODM (REWORK)	CHESTER	44
1.1.1.5.1.14	120GEV MAGNETS/BDM 240"B1/B2 LEFT IN PLACE	CHESTER	45
1.1.1.5.1	120GEV MAGNETS/DIPOLES	CHESTER	S-074
1.1.1.5.2.10	120GEV MAGS/84" BQB (REWORK)	CHESTER	46
1.1.1.5.2	120GEV MAGS/84" MR QUAD BQB	CHESTER	S-075
1.1.1.5.4.1	120GEV MAGNETS/HDC TRIM DIPOLE (REWORK)	CHESTER	47
1.1.1.5.4.3	120GEV MAGNETS/VDC MR TRIM DIPOLE (REWORK)	CHESTER	48
1.1.1.5.4	120GEV MAGNETS/TRIM DIPOLES	CHESTER	S-076
1.1.1.5	120 GEV (F0-F17) MAGNETS	CHESTER	S-024
1.1.1.8.1.10	120GEV MAGNETS/2XB2 240" DIPOLES BDM (IN PLACE)	CHESTER	49
1.1.1.8.1.12	SLOW SPILL MAGNETS/EPB 1-1.5-120 (REWORK)	CHESTER	50
1.1.1.8.1.13	SLOW SPILL MAGS/B3 DIPOLE ODM (REWORK)	CHESTER	51
1.1.1.8.1.14	SLOW SPILL MAGS/B1 & B2 LEFT IN PLACE	CHESTER	52
1.1.1.8.1	SLOW SPILL MAGNETS/DIPOLES	CHESTER	S-077
1.1.1.8.2.5	SLOW SPILL MAGS/84" QUADS BQB (REWORK)	CHESTER	53
1.1.1.8.2.10	SLOW SPILL MAGS/84" BQB LEFT IN PLACE	CHESTER	54
1.1.1.8.2	SLOW SPILL MAGS/BQB	CHESTER	S-078
1.1.1.8.4.1	SLOW SPILL MAGS/H TRIM DIPOLE (REWORK)	CHESTER	55
1.1.1.8.4.3	SLOW SPILL MAGS/V TRIM DIPOLE (REWORK)	CHESTER	56
1.1.1.8.4	SLOW SPILL MAGNETS/BUMPS	CHESTER	S-079
1.1.1.8	SLOW SPILL (F18-SY) MAGNETS	CHESTER	S-025
1.1.1.8.1.7	ABORT LINE MAGNETS/B2 BDM DIPOLE (REWORK)	CHESTER	57
1.1.1.8.1	ABORT LINE MAGNETS/DIPOLES	CHESTER	S-080
1.1.1.8.2.6	ABORT LINE MAGNETS/3Q52 QUADS BQA (REWORK)	CHESTER	58
1.1.1.8.2	ABORT LINE MAGNETS/QUADS	CHESTER	S-081
1.1.1.8.4.1	ABORT LINE MAGNETS/H TRIM DIPOLE (REWORK)	CHESTER	59
1.1.1.8.4.3	ABORT LINE MAGNETS/V TRIM DIPOLE (REWORK)	CHESTER	60
1.1.1.8.4	ABORT LINE MAGNETS/TRIM DIPOLES	CHESTER	S-082
1.1.1.8.5.2	ABORT LINE MAGNETS/MI LAMBERTSON 94" (NEW)	CHESTER	61
1.1.1.8.5.3	ABORT LINE MAGNETS/MI LAMBERTSON 189" (NEW)	CHESTER	62
1.1.1.8.5.5	ABORT LINE MAGNETS/F-17 C-MAGNET 118" (NEW)	CHESTER	63
1.1.1.8.5	ABORT LINE MAGNETS/LAMBERTSONS	CHESTER	S-083
1.1.1.8	ABORT LINE MAGNETS	CHESTER	S-026
1.1.1.10.1.1	DIPOLE TOOLING/MIR DIPOLE	CHESTER	64
1.1.1.10.1.5	DIPOLE TOOLING/SDB-120"	CHESTER	65
1.1.1.10.1.7	DIPOLE TOOLING/B2 240" DIPOLE (REWORK)	CHESTER	66
1.1.1.10.1.12	DIPOLE TOOLING/EPB DIPOLE 5-1.5-120 (MORE)	CHESTER	67
1.1.1.10.1.13	DIPOLE TOOLING/B3 DIPOLE (REWORK)	CHESTER	68
1.1.1.10.1	DIPOLE TOOLING	CHESTER	S-084
1.1.1.10.2.3	MI QUAD TOOLING (NEW)	CHESTER	69
1.1.1.10.2.5	QUAD TOOLING/OLD MR 84"	CHESTER	70
1.1.1.10.2.6	QUAD TOOLING/BQA 52" (REWORK)	CHESTER	71
1.1.1.10.2.8	QUAD TOOLING/SQA	CHESTER	72
1.1.1.10.2	QUADRUPOLE TOOLING	CHESTER	S-085
1.1.1.10.3.1	MR TOOLING/SEXTUPOLE (NEW)	CHESTER	73
1.1.1.10.3.2	MR TOOLING/TRIM QUAD (REWORK)	CHESTER	74
1.1.1.10.3.3	MR TOOLING/SKEW QUAD (REWORK)	CHESTER	75
1.1.1.10.3.4	MR TOOLING/SKEW SEXTUPOLE (REWORK)	CHESTER	76
1.1.1.10.3.5	MR TOOLING/TRIM SEXTUPOLE (REWORK)	CHESTER	77
1.1.1.10.3.6	MR TOOLING/OCTUPOLE (REWORK)	CHESTER	78
1.1.1.10.3	SPECIAL MAGNET TOOLING	CHESTER	S-086
1.1.1.10.4.1	MR TOOLING/HORZ TRIM DIPOLE (REWORK)	CHESTER	79
1.1.1.10.4.2	MR TOOLING/HORZ TRIM DIPOLE (NEW)	CHESTER	80
1.1.1.10.4.3	MR TOOLING/VERT TRIM DIPOLE (REWORK)	CHESTER	81
1.1.1.10.4.4	MR TOOLING/VERT TRIM DIPOLE (NEW)	CHESTER	82
1.1.1.10.4	SPECIAL MAGNET TOOLING	CHESTER	S-087
1.1.1.10.5.1	LAMBERTSON TOOLING/INJ A0 TYPE(REW)	CHESTER	83
1.1.1.10.5.2	LAMBERTSON TOOLING/MI 94",189"(NEW)	CHESTER	84
1.1.1.10.5.5	LAMBERTSON TOOLING/F-17 C MAGNET(MORE)	CHESTER	85
1.1.1.10.5	LAMBERTSON MAGNET TOOLING	CHESTER	S-088
1.1.1.10	MAGNET TOOLING	CHESTER	S-027
1.1.1.14	MAGNET ED&I	CHESTER	86
1.1.1	MAIN INJECTOR MAGNETS	CHESTER	S-005
1.1.2.1.1	MIR VACUUM SYS/VACUUM CHAMBER,BELLOWS	SAUER	87
1.1.2.1.2	MIR VACUUM SYS/ROUGH PUMPS,TURBO CARTS	SAUER	88
1.1.2.1.3	MIR VACUUM SYS/GAUGES & CABLES	SAUER	89



1.1.2.1	MIR VACUUM SYSTEM	SAUER	S-028
1.1.2.10.1.1	BML VACUUM SYS/8GEV CHAMBER, BELLOWS	SAUER	90
1.1.2.10.1.2	BML VACUUM SYS/150GEV BELLOWS, CHAMBERS	SAUER	91
1.1.2.10.1.3	BML VACUUM SYS/SPILL BELLOWS, CHAMBERS	SAUER	92
1.1.2.10.1	BML VACUUM/CHAMBERS & BELLOWS	SAUER	S-089
1.1.2.10.2.1	BML VACUUM SYS/8GEV PUMPS	SAUER	93
1.1.2.10.2.2	BML VACUUM SYS/150GEV PUMPS	SAUER	94
1.1.2.10.2.3	BML VACUUM SYS/SPILL PUMPS	SAUER	95
1.1.2.10.2	BML VACUUM/ROUGH PUMPS/TURBO CARTS	SAUER	S-090
1.1.2.10.3.1	BML VACUUM SYS/8GEV GAUGES	SAUER	96
1.1.2.10.3.2	BML VACUUM SYS/150GEV GAUGES	SAUER	97
1.1.2.10.3.3	BML VACUUM SYS/SPILL GAUGES	SAUER	98
1.1.2.10.3	BML VACUUM/GAUGES & CABLES	SAUER	S-091
1.1.2.10	BML VACUUM SYSTEM	SAUER	S-029
1.1.2	MAIN INJECTOR VACUUM	SAUER	S-006
1.1.3.1.1.1	MIR PWR SUP/DIPOLE SUPPLY	HAYS	99
1.1.3.1.1.2	MIR PWR SUP/DIPOLE SUPPLY	HAYS	100
1.1.3.1.1	MIR PWR SUP/DIPOLE SUPPLY	HAYS	S-092
1.1.3.1.2	MIR PWR SUP/QUADRUPOLE SUPPLIES	HAYS	101
1.1.3.1.3	MIR PWR SUP/SEXTUPOLE SUPPLIES	HAYS	102
1.1.3.1.4	MIR PWR SUP/CORRECTION ELEMENT SUPPLIES	HAYS	103
1.1.3.1.6	MIR INJECTOR REGULATION SYSTEM	HAYS	104
1.1.3.1.7	MIR REGULATION SUPPLIES	HAYS	105
1.1.3.1.8	MIR ABORT SUPPLY	KRAFCZYK	106
1.1.3.1	MIR POWER SUPPLIES	KRAFCZYK	S-030
1.1.3.2.1	8GEV LINE/DIPOLE POWER SUPPLIES	KRAFCZYK	107
1.1.3.2.2	8GEV LINE/ QUADRUPOLE POWER SUPPLIES	KRAFCZYK	108
1.1.3.2.3	8GEV LINE/CORR ELEMENT POWER SUPPLIES	KRAFCZYK	109
1.1.3.2.4	8GEV LINE/INJ LAMBERTSON POWER SUPPLY	KRAFCZYK	110
1.1.3.2	8GEV LINE/POWER SUPPLY	KRAFCZYK	S-031
1.1.3.3.1	150GEV PROT LINE/DIPOLE SUPPLIES	KRAFCZYK	111
1.1.3.3.2	150GEV PROT LINE/QUADRUPOLE SUPPLIES	KRAFCZYK	112
1.1.3.3.3	150GEV PROT LINE/CORR ELE SUPPLIES	KRAFCZYK	113
1.1.3.3.4	150 GEV PROT LINE/LAMBERTSON POWER SUPPLY	KRAFCZYK	114
1.1.3.3	150 GEV PROT LINE/POWER SUPPLIES	KRAFCZYK	S-032
1.1.3.4.1	150 GEV PBAR LINE/DIPOLE SUPPLIES	KRAFCZYK	115
1.1.3.4.2	150GEV PBAR LINE/QUADRUPOLE SUPPLIES	KRAFCZYK	116
1.1.3.4.3	150GEV PBAR LINE/CORR ELEMENT SUPPLIES	KRAFCZYK	117
1.1.3.4.4	150 GEV PBAR LINE/EXT LAMBERTSON SUPPLIES	KRAFCZYK	118
1.1.3.4	150GEV PBAR LINE/POWER SUPPLIES	KRAFCZYK	S-033
1.1.3.5.1	PBAR PROD LINE(F11 TO F17)/DIPOLE SUPPLIES	KRAFCZYK	119
1.1.3.5.2	PBAR PROD LINE(F11 TO F17)/QUADRUPOLE SUPPLIES	KRAFCZYK	120
1.1.3.5.3	PBAR PROD LINE(F11 TO F17)/CORR ELEMENT SUPPLIES	KRAFCZYK	121
1.1.3.5	PBAR PROD LINE(F11 TO F17)/POWER SUPPLIES	KRAFCZYK	S-034
1.1.3.6.1	SLOW SPILL LINE/DIPOLE SUPPLIES	KRAFCZYK	122
1.1.3.6.2	SLOW SPILL LINE/QUADRUPOLE SUPPLIES	KRAFCZYK	123
1.1.3.6.3	SLOW SPILL LINE/CORR ELEMENT SUPPLIES	KRAFCZYK	124
1.1.3.6	SLOW SPILL LINE/POWER SUPPLIES	KRAFCZYK	S-035
1.1.3.7	BML PS CONTROLLERS	KRAFCZYK	125
1.1.3	POWER SUPPLIES	KRAFCZYK	S-007
1.1.4.1.1.1.1	MIR RF 53MHZ/200KW POWER AMPLIFIERS	MILLER/REID	126
1.1.4.1.1.1.2	MIR RF 53MHZ/4KWATT SOLID STATE AMP	MILLER/REID	127
1.1.4.1.1.1	MIR RF 53MHZ/POWER AMPLIFIERS	MILLER/REID	S-118
1.1.4.1.1.2.1	MIR RF 53MHZ/ANODE SUPPLIES	MILLER/REID	128
1.1.4.1.1.2.2	MIR RF 53MHZ/MODULATORS	MILLER/REID	129
1.1.4.1.1.2	MIR RF 53MHZ/ANODE SUPPLIES/MODULATORS	MILLER/REID	S-119
1.1.4.1.1.3	MIR RF 53MHZ/LOW LEVEL	MILLER/TAWZER	130
1.1.4.1.1.4	MIR RF 53MHZ/TRANSMISSION LINE	MILLER/ZIOBER	131
1.1.4.1.1.6	MIR RF 53MHZ/H=588 CAVITIES	MILLER/WILDMAN	132
1.1.4.1.1	MIR RF 53 MHZ	MARTIN	S-093
1.1.4.1.2.1	COAL/RF CAVITIES	MILLER/WILDMAN	133
1.1.4.1.2.4	COAL/TRANSMISSION LINE RF	MILLER/WILDMAN	134
1.1.4.1.2	COALESCING SYSTEM	MARTIN	S-094
1.1.4.1	RF SYSTEMS/RING	MARTIN	S-036
1.1.4	RF SYSTEMS	MARTIN	S-008
1.1.6.1.1.1	MIR 8 GEV PROT INJ/KICKER MAGNET	DINKEL	135



1.1.6.1.1.2	MIR 8 GEV PROT INJ/POWER SUPPLY	DINKEL	136
1.1.6.1.1	8 GEV PROT INJ KICKER	KRAFCZYK	S-095
1.1.6.1.2.1	8 GEV PBAR INJ/KICKER MAGNET	DINKEL	137
1.1.6.1.2.2	8 GEV PBAR INJ/KICKER POWER SUPPLY	DINKEL	138
1.1.6.1.2	8 GEV PBAR INJECTION KICKER	KRAFCZYK	S-096
1.1.6.1.3.1	150 GEV PROT EXTRACTION/KICKER MAGNET	DINKEL	139
1.1.6.1.3.2	150 GEV PROT EXT/KICKER POWER SUPPLIES	DINKEL	140
1.1.6.1.3	150 GEV PROT EXT/ KICKER	DINKEL	S-097
1.1.6.1.4.1	150 GEV PBAR EXT/KICKER MAGNET	DINKEL	141
1.1.6.1.4.2	150 GEV PBAR EXT/KICKER POWER SUPPLY	DINKEL	142
1.1.6.1.4	MIR 150 GEV PBAR EXT KICKER	KRAFCZYK	S-098
1.1.6.1.5.1	PROT ABORT KICKER MAGNET	DINKEL	143
1.1.6.1.5.2	PROT ABORT KICKER POWER SUPPLY	DINKEL	144
1.1.6.1.5	MIR EXT PROTON ABORT KICKER	KRAFCZYK	S-099
1.1.6.1	MIR EXTRACTION	KRAFCZYK	S-037
1.1.6.2.1	MIR SLOW EXT/ELECTROSTATIC SEPTUM	KRAFCZYK	145
1.1.6.2.2	MIR SLOW EXT/SPECIAL MAGNETIC ELEMENTS	KRAFCZYK	146
1.1.6.2.3	MIR SLOW EXT/QXR SYSTEM	KRAFCZYK	147
1.1.6.2	SLOW EXTRACTION	KRAFCZYK	S-038
1.1.6.3.1.1	TEV 150 GEV PROT INJ KICKER	DINKEL	148
1.1.6.3.1.2	TEV 150 GEV PROT INJ KICKER POWER SUPPLY	DINKEL	149
1.1.6.3.1	TEV 150 GEV PROT INJ KICKER	KRAFCZYK	S-100
1.1.6.3.2.1	TEV 150 GEV PBAR INJ KICKER MAGNET	DINKEL	150
1.1.6.3.2.2	TEV 150 GEV PBAR INJ KICKER POWER SUPPLY	DINKEL	151
1.1.6.3.2	TEV 150 GEV PBAR INJ KICKER	KRAFCZYK	S-101
1.1.6.3	TEV 150 GEV PBAR INJECTION	KRAFCZYK	S-039
1.1.6	KICKERS & SLOW EXTRACTION	KRAFCZYK	S-009
1.1.8.1.1	MIR INST/BPM SYSTEM	JACKSON	152
1.1.8.1.2	MIR INST/BLM SYSTEM	JACKSON	153
1.1.8.1.3	MIR INST/LONGITUDINAL PICKUP	JACKSON	154
1.1.8.1.4	MIR INST/TRANSVERSE PICKUP	JACKSON	155
1.1.8.1.5	MIR INST/DAMPERS	JACKSON	156
1.1.8.1.6	MIR INST/FLYING WIRES	JACKSON	157
1.1.8.1.7	MIR INST/D.C.C.T.	JACKSON	158
1.1.8.1.8	MIR INST/SCRAPERS	JACKSON	159
1.1.8.1	MIR INSTRUMENTATION	JACKSON	S-040
1.1.8.3.9	MIR INST/150 GEV PROT LINE PROFILE MONITORS	JACKSON	160
1.1.8.3	MIR INST/150 GEV PROT LINE	JACKSON	S-041
1.1.8.4.9	MIR INST/150 GEV PBAR LINE PROFILE MONITOR	JACKSON	161
1.1.8.4	MIR INST/150 GEV PBAR LINE	JACKSON	S-042
1.1.8.5.9	MIR INST/PBAR LINE PROFILE MONITOR	JACKSON	162
1.1.8.5	MIR INST/PBAR PRODUCTION LINE	JACKSON	S-043
1.1.8.6.9	SLOW SPILL INST/PROFILE MONIOTR	JACKSON	163
1.1.8.6	MIR INST/SLOW SPILL LANE	JACKSON	S-044
1.1.8.10.1	MIR INST/BEAMLINE AGGREGATE BPM SYSTEM	JACKSON	164
1.1.8.10.2	MIR INST/BEAMLINE	JACKSON	165
1.1.8.10.7	MIR INST/AGGREGATE TORROIDS	JACKSON	166
1.1.8.10.9	MIR INST/BEAMLINE SEMS	JACKSON	167
1.1.8.10	MIR INSTRUMENTATION	JACKSON	S-045
1.1.8	MIR INSTRUMENTATION	JACKSON	S-010
1.1.9.1.1	MIR CONTROLS/COMPUTERS, LINKS	LUCAS	168
1.1.9.1.2	MIR CONTROLS/CRATES, CARDS, RELAY RACKS, CABLING	LUCAS	169
1.1.9.1.3	MIR CONTROLS/CATV SYSTEM	LUCAS	170
1.1.9.1.4	MIR CONTROLS/FIRUS SYSTEM	LUCAS	171
1.1.9.1.5	MIR CONTROLS/ETHERNET	LUCAS	172
1.1.9.1	MIR CONTROLS	LUCAS	S-046
1.1.9.10.1	BLM CONTROLS/COMPUTERS, LINKS	LUCAS	173
1.1.9.10.2	BLM CONTROLS/CRATES, RELAY RACKS, CABLING	LUCAS	174
1.1.9.10.3	BLM CONTROLS/CATV SYSTEM	LUCAS	175
1.1.9.10.4	BLM CONTROLS/FIRUS SYSTEM	LUCAS	176
1.1.9.10	BEAMLINE AGGREGATE	LUCAS	S-047
1.1.9	CONTROLS	LUCAS	S-011
1.1.10.1	MIR SAFETY SYSTEM	CASEBOLT	177
1.1.10.2	BLM SAFETY SYSTEM	CASEBOLT	178
1.1.10	SAFETY	CASEBOLT	S-012
1.1.12.1.1.1	MIR WATER SYS/POND PUMP SYSTEM	SATTI	179



1.1.12.1.1.2	MIR WATER SYS/HEAT EXCHANGE	SATTI	180
1.1.12.1.1.3	MIR WATER SYS/LCW PROCESSING	SATTI	181
1.1.12.1.1.4	MIR WATER SYS/LCW PUMP SYSTEM	SATTI	182
1.1.12.1.1.5	MIR WATER SYS/LCW PIPING	SATTI	183
1.1.12.1.1.6	RF-95 DEG LCW/HEAT EX & PUMP SYS	SATTI	184
1.1.12.1.1.7	RF-95 DEG LCW/PROCESSING	SATTI	185
1.1.12.1.1.8	RF-95 DEG LCW/PIPING	SATTI	186
1.1.12.1.1.9	RF-55 DEG LCW/PROCESSING	SATTI	187
1.1.12.1.1.10	RF-55 DEG LCW/HEAT EX & PUMP SYS	SATTI	188
1.1.12.1.1.11	RF-55 DEG LCW/CHILLED LCW PIPING	SATTI	189
1.1.12.1.1	MIR INSTALL WATER SYSTEM	SATTI	S-102
1.1.12.1.2.1	MIR/INSTALL CABLE TRAYS	KRAFCZYK/SORENSEN	190
1.1.12.1.2.2	MIR/INSTALL CABLES	KRAFCZYK/SORENSEN	191
1.1.12.1.2	MIR CABLES	KRAFCZYK/SORENSEN	S-103
1.1.12.1.3.1	MIR ABORT/BEAM DUMP SYSTEM	LANGE	192
1.1.12.1.3.2	MIR ABORT/VACUUM SYSTEM	SAUER	193
1.1.12.1.3	MIR ABORT SYSTEMS	LANGE	S-104
1.1.12.1	MIR MECHANICAL UTILITIES	SATTI	S-048
1.1.12.10.1.1	BML WATER SYS/POND PUMP SYSTEM	SATTI	194
1.1.12.10.1.2	BML WATER SYS/HEAT EXCHANGER	SATTI	195
1.1.12.10.1.3	BML WATER SYS/LCW PROCESSING	SATTI	196
1.1.12.10.1.4	BML WATER SYS/LCW PUMP SYSTEMS	SATTI	197
1.1.12.10.1.5	BML WATER SYS/LCW PIPING	SATTI	198
1.1.12.10.1	BML WATER SYSTEMS	SATTI	S-105
1.1.12.10.2.1	BML/INSTALL CABLE TRAYS	KRAFCZYK/SORENSEN	199
1.1.12.10.2.2	BML/INSTALL CABLES	KRAFCZYK/SORENSEN	200
1.1.12.10.2	BEAMLINE CABLES	KRAFCZYK/SORENSEN	S-106
1.1.12.10	BEAMLINE AGGREGATE	SATTI	S-049
1.1.12	MIR UTILITIES & ABORT	LANGE	S-013
1.1.13.1.1.1	MIR/INSTALL MAGNET STANDS	LANGE	201
1.1.13.1.1.2	MIR/INSTALL MAGNETS	LANGE	202
1.1.13.1.1.3	MIR/SURVEY & ALIGN MAGNETS	MOORE	203
1.1.13.1.1.4	OLD MR MAGNET REMOVAL	LANGE	204
1.1.13.1.1	MIR MAGNET INSTALLATION	LANGE	S-107
1.1.13.1.2.1	MIR POWER SUPPLY INSTALLATION	KRAFCZYK/HAYS	205
1.1.13.1.2.2	MIR PWR DIST/MAGNET BUS, INSTALLATION	SATTI	206
1.1.13.1.2.3	MIR PWR DIST/NEW HARMONIC FILTER	KRAFCZYK/HAYS	207
1.1.13.1.2.4	MIR CORRECTION SYSTEM INSTALLATION	LANGE	208
1.1.13.1.2	MIR PULSED POWER DISTRIBUTION	KRAFCZYK	S-108
1.1.13.1.3	MIR VACUUM INSTALLATION	SAUER	209
1.1.13.1.4	MIR INSTRUMENTATION INSTALLATION	HAHN	210
1.1.13.1.5	MIR CONTROLS INSTALLATION	LUCAS	211
1.1.13.1.6.1	MIR ABORT STAND INSTALLATION	LANGE	212
1.1.13.1.6.2	MIR ABORT MAGNETS INSTALLATION	LANGE	213
1.1.13.1.6	MIR ABORT INSTALLATION	LANGE	S-109
1.1.13.1.7.1	MIR SLOW EXTRACTION STANDS INSTALLATION	LANGE	214
1.1.13.1.7.2	MIR SLOW EXTRACTION COMPONENT INSTALLATION	LANGE	215
1.1.13.1.7	MIR SLOW EXTRACTION INSTALLATION	MOORE	S-110
1.1.13.1.8	MIR SAFETY SYSTEM INSTALLATION	CASEBOLT	216
1.1.13.1	MIR INSTALLATION	LANGE	S-050
1.1.13.2.1.1	8 GEV LINE/INSTALL MAGNET STANDS	LANGE	217
1.1.13.2.1.2	8 GEV LINE/INSTALL MAGNETS	LANGE	218
1.1.13.2.1.3	8 GEV LINE/SURVEY & ALIGN MAGNETS	MOORE	219
1.1.13.2.1	8 GEV LINE/SURVEY & ALIGN MAGNETS	MOORE	S-111
1.1.13.2.2	8 GEV LINE CORR MAGNET INSTALLATION	LANGE	220
1.1.13.2.3	8 GEV LINE VACUUM INSTALLATION	SAUER	221
1.1.13.2.4	8 GEV LINE INSTRUMENTATION INSTALLATION	HAHN	222
1.1.13.2	8 GEV LINE	JACKSON	S-051
1.1.13.3.1.1	150 GEV PROT LINE/INSTALL MAGNET STANDS	LANGE	223
1.1.13.3.1.2	150 GEV PROT LINE/INSTALL MAGNETS	LANGE	224
1.1.13.3.1.3	150 GEV PROT LINE/SURVEY & ALIGNMENT MAGNETS	MOORE	225
1.1.13.3.1	150 GEV PROT LINE MAGNET INSTALLATION	LANGE	S-112
1.1.13.3.2	150 GEV PROT LINE/CORRECTION ELE INSTALL	LANGE	226
1.1.13.3.3	150 GEV PROT LINE/VACUUM INSTALLATION	SAUER	227
1.1.13.3.4	150 GEV PROT LINE/INST INSTALLATION	LANGE	228
1.1.13.3	150 GEV PROT LINE	LANGE	S-052





1.1.13.4.1.1	150 GEV PBAR LINE/MAGNETS STANDS INSTALL	LANGE	229
1.1.13.4.1.2	150 GEV PBAR LINE/MAGNET INSTALL	LANGE	230
1.1.13.4.1.3	150 GEV PBAR LINE/SURVEY & ALIGNMENT	MOORE	231
1.1.13.4.1	150 GEV PBAR LINE/MAGNET INSTALLATION	LANGE	S-113
1.1.13.4.2	MIR CORRECTION ELEMENT INSTALLATION	LANGE	232
1.1.13.4.3	MIR VACUUM INSTALLATION	SAUER	233
1.1.13.4.4	MIR INSTRUMENTATION INSTALLATION	LANGE	234
1.1.13.4	150 GEV PBAR LINE	LANGE	S-053
1.1.13.5.1.1	PBAR PROD LINE/INSTALL MAGNET STANDS	LANGE	235
1.1.13.5.1.2	PBAR PROD LINE/INSTALL MAGNETS	LANGE	236
1.1.13.5.1.3	PBAR PROD LINE/SURVEY & ALIGNMENT	MOORE	237
1.1.13.5.1	PBAR PROD LINE/MAGNET INSTALLATION	LANGE	S-114
1.1.13.5.2	PBAR PROD LINE/CORR ELEMENT INSTALL	LANGE	238
1.1.13.5.3	PBAR PROD LINE/VACUUM INSTALLATION	SAUER	239
1.1.13.5.4	PBAR PROD LINE/INST INSTALLATION	LANGE	240
1.1.13.5	PBAR PRODUCTION LINE	LANGE	S-054
1.1.13.6.1.1	SLOW SPILL/INSTALL MAGNET STANDS	LANGE	241
1.1.13.6.1.2	SLOW SPILL/INSTALL MAGNETS	LANGE	242
1.1.13.6.1.3	SLOW SPILL/SURVEY & ALIGNMENT	MOORE	243
1.1.13.6.1	SLOW SPILL/MAGNET INSTALLATION	LANGE	S-115
1.1.13.6.2	SLOW SPILL/CORRECTION ELEMENT INSTALL	LANGE	244
1.1.13.6.3	SLOW SPILL/VACUUM INSTALLATION	SAUER	245
1.1.13.6.4	SLOW SPILL/INST INSTALLATION	HAHN	246
1.1.13.6	SLOW SPILL INSTALLATION	LANGE	S-055
1.1.13.7.1	MIR/NEW TEV E0 VACUUM	MAY	247
1.1.13.7.2.1	MIR/TEV F0 REMOVAL	MAY	248
1.1.13.7.2.2	MIR/NEW TEV F0 VACUUM	MAY	249
1.1.13.7.2.3	TEV RF REDISTRIBUTION	WILDMAN	250
1.1.13.7.2	MIR/NEW TEV F0 VACUUM	MAY	S-116
1.1.13.7	MIR/NEW TEV VACUUM	MAY	S-056
1.1.13.10.2.1	BML PPWR SYS/PWR SUP INSTALLATION	HAYS	251
1.1.13.10.2.2	BML PWR DIST/MAGNET BUS, INSTALLATION	SATTI	252
1.1.13.10.2	BML PPS INSTALLATION	KRAFCZYK	S-117
1.1.13.10.5	BML CONTROLS INSTALLATION	LUCAS	253
1.1.13.10.8	BML SAFETY SYSTEM INSTALLATION	CASEBOLT	254
1.1.13.10	BEAMLINE AGGREGATE	LANGE	S-057
1.1.13	INSTALLATION	LANGE	S-014
1.1	FERMILAB MAIN INJECTOR TECHNICAL COMPONENTS	HOLMES	S-002
1.2.1.1	WETLAND MITIGATION, PHASE 1	PAWLAK	255
1.2.1.2	SITE PREPARATION, PHASE 1	PAWLAK	256
1.2.1.3	ROADS & UTILITIES, PHASE 1	PAWLAK	257
1.2.1.4	INDUSTRIAL BUILDING NUMBER 5, PHASE 1	PAWLAK	258
1.2.1	CIVIL CONSTRUCTION/PHASE 1	PAWLAK	S-015
1.2.2.1	INJECTOR ENCLOSURE AT MI60, PHASE 2	PAWLAK	259
1.2.2.2	INJECTOR ENCLOSURE AT MI62-MI52, PHASE 2	PAWLAK	260
1.2.2.3	SERVICE BLDGS 10,20,30,40,50, PHASE 2	PAWLAK	261
1.2.2.4	MI52 & 62 SERVICE BUILDING, PHASE 2	PAWLAK	262
1.2.2.5	MI60 SERVICE BUILDING, PHASE 2	PAWLAK	263
1.2.2.6	SERVICE BLDG. F0 N. ADDITION, PHASE 2	PAWLAK	264
1.2.2.7	8 GEV BEAM ENCLOSURE, PHASE 2	PAWLAK	265
1.2.2.8	NORTH HATCH BUILDING, PHASE 2	PAWLAK	266
1.2.2.9	345 KV TRANSMISSION LINE, PHASE 2	PAWLAK	267
1.2.2.10	KAUTZ ROAD SUBSTATION, PHASE 2	PAWLAK	268
1.2.2.11	COOLING WATER SYSTEM, PHASE 2	PAWLAK	269
1.2.2	CIVIL CONSTRUCTION/PHASE 2	PAWLAK	S-016
1.2.3.1	F0 ENCL. & BUILDING F0 MODS, PHASE 3	PAWLAK	270
1.2.3.2	8 GEV BOOSTER ENCL. CONNECTION, PHASE 3	PAWLAK	271
1.2.3.3	8 GEV ENCLOSURE AT ANTIPROTON, PHASE 3	PAWLAK	272
1.2.3	CIVIL CONSTRUCTION/PHASE 3	PAWLAK	S-017
1.2.4.1	LANDSCAPING & PAVING, PHASE 4	PAWLAK	273
1.2.4	CIVIL CONSTRUCTION/PHASE 4	PAWLAK	S-018
1.2.14.1	CIVIL CONSTRUCTION/Phase 1 ED&I	PAWLAK	274
1.2.14.2	CIVIL CONSTRUCTION/Phase 2 ED&I	PAWLAK	275
1.2.14.3	CIVIL CONSTRUCTION/Phase 3 ED&I	PAWLAK	276
1.2.14.4	CIVIL CONSTRUCTION/Phase 4 ED&I	PAWLAK	277
1.2.14	CIVIL CONSTRUCTION ED&I	PAWLAK	S-019



1.2	MAIN INJECTOR CONVENTIONAL CONSTRUCTION	PAWLAK	S-003
1.3.1	MAIN INJECTOR PROJECT MANAGEMENT	HOLMES	278
1.3.2	MAIN INJECTOR ACCELERATOR PHYSICS	HOLMES	279
1.3.3	MAIN INJECTOR G&A	HOLMES	280
1.3	PROJECT MANAGEMENT	HOLMES	S-004
1.4	MAIN INJECTOR CONTINGENCY	HOLMES	281
1.5	MAIN INJECTOR ESCALATION	HOLMES	282
1	FERMILAB MAIN INJECTOR	HOLMES	S-001
TOTAL	FERMILAB MAIN INJECTOR PROJECT	HOLMES	
CASEBOLT			
CHESTER			
DINKEL			
HAHN			
HAYS			
HOLMES			
JACKSON			
KRAFCZYK			
KRAFCZYK/HAYS			
KRAFCZYK/SORENSEN			
LANGE			
LUCAS			
MARTIN			
MAY			
MILLER/REID			
MILLER/TAWZER			
MILLER/WILDMAN			
MILLER/ZIOBER			
MOORE			
PAWLAK			
SATTI			
SAUER			
WILDMAN			



## MAIN INJECTOR FABRICATION, CONSTRUCTION, INSTALLATION COST ESTIMATE SUMMARY - A

LEVEL PRINTED 7-AUG-92 12:47:15

PAGE #	WBS	RESPONSIBLE	SYSTEM	MULT BY	7	8	5	4	3	2	1
1	1.1.1.1.1.1	CHESTER	MIR MAGNETS/240" DIPOLES IDA	105	10364						
2	1.1.1.1.1.2	CHESTER	MIR MAGNETS/240" DIPOLES IDB	105	10364						
3	1.1.1.1.1.3	CHESTER	MIR MAGNETS/160" DIPOLES IDC	61	4751						
4	1.1.1.1.1.4	CHESTER	MIR MAGNETS/160" DIPOLES IDD	61	4751						
S-058	1.1.1.1.1	CHESTER	MIR MAGNETS/DIPOLES	1	30230						
5	1.1.1.1.2.3	CHESTER	MIR MAGNETS/100" QUADS IQC (NEW)	31	1095						
6	1.1.1.1.2.4	CHESTER	MIR MAGNETS/116" QUAD IQD (NEW)	47	1843						
7	1.1.1.1.2.5	CHESTER	MIR MAGNETS/84" QUADS BQB (REWORK)	127	267						
8	1.1.1.1.2.9	CHESTER	MIR MAGNETS/84" QUADS BQB ROLLED (REWORK)	1	2						
S-059	1.1.1.1.2	CHESTER	MIR MAGNETS/QUADS	1	3208						
9	1.1.1.1.3.1	CHESTER	MIR MAGNETS/SEXTUPOLES 18" ISA (NEW)	108	1365						
10	1.1.1.1.3.2	CHESTER	MIR MAGNETS/TRIM QUAD (REWORK)	24	24						
11	1.1.1.1.3.3	CHESTER	MIR MAGNETS/SKEW QUAD (REWORK)	18	18						
12	1.1.1.1.3.4	CHESTER	MIR MAGNETS/SKEW SEXTUPOLE (REWORK)	12	12						
13	1.1.1.1.3.5	CHESTER	MIR MAGNETS/TRIM SEXTUPOLE (REWORK)	28	11						
14	1.1.1.1.3.6	CHESTER	MIR MAGNETS/OCTUPOLES (REWORK)	20	8						
15	1.1.1.1.3.7	CHESTER	MIR MAGNETS/CR SKEW QUADS	4	7						
S-060	1.1.1.1.3	CHESTER	MIR MAGNETS/CORRECTORS	1	1444						
16	1.1.1.1.4.2	CHESTER	MIR MAGNETS/HORIZ TRIM - IDH (NEW)	104	202						
17	1.1.1.1.4.4	CHESTER	MIR MAGNETS/VERT TRIM DIP IDV (NEW)	104	221						
S-061	1.1.1.1.4	CHESTER	MIR MAGNETS/TRIM DIPOLES	1	424						
S-020	1.1.1.1	CHESTER	MAIN INJECTOR RING MAGNETS	1	35305						
19	1.1.1.2.1.5	CHESTER	8GEV MAGNETS/SDB 120" DIPOLES (MORE)	2	208						
20	1.1.1.2.1.7	CHESTER	8GEV MAGNETS/B2 DIPOLE BDM (REWORK)	51	63						
21	1.1.1.2.1.12	CHESTER	8GEV MAGNETS/EPB DIPOLE 5-1.5-120 (REWORK)	3	19						

## MAIN INJECTOR FABRICATION, CONSTRUCTION, INSTALLATION COST ESTIMATE SUMMARY - A

LEVEL PRINTED 7-AUG-92 12:47:15

PAGE #	WBS	RESPONSIBLE	SYSTEM	MULT BY	7	6	5	4	3	2	1
	22 1.1.1.2.1.13	CHESTER	8GEV MAGNETS/B3 DIPOLE ODM (REWORK)	2		2					
S-082	1.1.1.2.1	CHESTER	8GEV MAGNETS/DIPOLES	1			293				
	23 1.1.1.2.2.7	CHESTER	8GEV MAGNETS/SQA(17") QUADS (REWORK)	17		32					
	24 1.1.1.2.2.8	CHESTER	8GEV MAGNETS/SQA(17") QUADS (MORE)	34		1018					
S-083	1.1.1.2.2	CHESTER	8GEV MAGNETS/QUADS	1			1050				
	25 1.1.1.2.4.1	CHESTER	8GEV MAGNETS/H TRIM DIPOLE HDC (REWORK)	25		12					
	26 1.1.1.2.4.3	CHESTER	8GEV MAGNETS/V TRIM DIPOLE (REWORK)	25		12					
S-084	1.1.1.2.4	CHESTER	8GEV MAGNETS/TRIM DIPOLES	1			25				
	27 1.1.1.2.5.1	CHESTER	8GEV MAGNETS/INJ LAMB ELA A0 106" (REWORK)	1		6					
S-085	1.1.1.2.5	CHESTER	8GEV MAGNETS/LAMBERTSONS	1			6				
S-021	1.1.1.2	CHESTER	8 GEV LINE MAGNETS	1				1373			
	28 1.1.1.3.1.7	CHESTER	150GEV P MAGNETS/B2(240") DIP BDM (REWORK)	15		19					
S-086	1.1.1.3.1	CHESTER	150GEV P MAGNETS/DIPOLES	1			19				
	29 1.1.1.3.2.5	CHESTER	150GEV P MAGNETS/3Q84 QUADS BQB (REWORK)	13		27					
	30 1.1.1.3.2.6	CHESTER	150GEV P MAGNETS/3Q52 QUADS BQA (REWORK)	4		11					
S-087	1.1.1.3.2	CHESTER	150GEV P MAGNETS/QUADS	1			38				
	31 1.1.1.3.4.1	CHESTER	150GEV P MAGNETS/H TRIM DIPOLE (REWORK)	6		3					
	32 1.1.1.3.4.3	CHESTER	150GEV P MAGNETS/V TRIM DIPOLE (REWORK)	6		3					
S-088	1.1.1.3.4	CHESTER	150GEV P MAGNETS/DIPOLE TRIMS	1			6				
	33 1.1.1.3.5.2	CHESTER	150GEV P/MI LAMBERTSON 94" (2.4M) (NEW)	1		48					
	34 1.1.1.3.5.3	CHESTER	150GEV P/MI LAMBERTSON 189" (4.8M) (NEW)	2		179					
	35 1.1.1.3.5.5	CHESTER	150GEV P/MI C-MAGNET 118" (NEW)	5		231					
S-089	1.1.1.3.5	CHESTER	150GEV P MAGNETS/LAMBERTSONS	1			458				
S-022	1.1.1.3	CHESTER	150 GEV PROTON (MI52-F0) MAGNETS	1				521			
	36 1.1.1.4.1.7	CHESTER	150GEV PBAR/B2 240" DIPOLES BDM (REWORK)	15		19					

MAIN INJECTOR FABRICATION, CONSTRUCTION, INSTALLATION COST ESTIMATE SUMMARY - A

LEVEL PRINTED 7-AUG-92 12:47:15

PAGE #	WBS -	RESPONSIBLE	SYSTEM	MULT BY	7	6	5	4	3	2	1
S-070	1.1.1.4.1	CHESTER	150GEV PBAR MAGNETS/DIPOLES	1			19				
37	1.1.1.4.2.5	CHESTER	150GEV PBAR MAGNETS/84" QUADS BQB (REWORK)	13		27					
38	1.1.1.4.2.6	CHESTER	150GEV PBAR MAGNETS/3Q52 QUADS BQA (REWORK)	4		11					
S-071	1.1.1.4.2	CHESTER	150GEV PBAR MAGNETS/QUADS	1			38				
39	1.1.1.4.4.1	CHESTER	150GEV PBAR MAGNETS/H TRIM DIPOLE (REWORK)	6		3					
40	1.1.1.4.4.3	CHESTER	150GEV PBAR MAGNETS/V TRIM DIPOLE (REWORK)	6		3					
S-072	1.1.1.4.4	CHESTER	150GEV PBAR MAGNETS/TRIM DIPOLES	1			6				
41	1.1.1.4.5.2	CHESTER	150GEV PBAR/MI LAMBERTSON 94" (NEW)	1		48					
42	1.1.1.4.5.3	CHESTER	150GEV PBAR/MI LAMBERTSON 189" (NEW)	2		179					
43	1.1.1.4.5.5	CHESTER	150GEV PBAR/MI C-MAGNET 118" (NEW)	5		231					
S-073	1.1.1.4.5	CHESTER	150GEV PBAR MAGNETS/LAMBERTSONS	1			458				
S-023	1.1.1.4	CHESTER	150 GEV PBAR (MI62-F0) MAGNETS	1				521			
44	1.1.1.5.1.13	CHESTER	120GEV MAGNETS/B3 DIPOLE ODM (REWORK)	8		10					
S-074	1.1.1.5.1	CHESTER	120GEV MAGNETS/DIPOLES	1			10				
47	1.1.1.5.4.1	CHESTER	120GEV MAGNETS/HDC TRIM DIPOLE (REWORK)	4		2					
48	1.1.1.5.4.3	CHESTER	120GEV MAGNETS/VDC MR TRIM DIPOLE (REWORK)	4		2					
S-076	1.1.1.5.4	CHESTER	120GEV MAGNETS/TRIM DIPOLES	1			4				
S-024	1.1.1.5	CHESTER	120 GEV (F0-F17) MAGNETS	1				14			
50	1.1.1.6.1.12	CHESTER	SLOW SPILL MAGNETS/EPB 1-1.5-120 (REWORK)	1		6					
51	1.1.1.6.1.13	CHESTER	SLOW SPILL MAGS/B3 DIPOLE ODM (REWORK)	4		5					
S-077	1.1.1.6.1	CHESTER	SLOW SPILL MAGNETS/DIPOLES	1			11				
53	1.1.1.6.2.5	CHESTER	SLOW SPILL MAGS/84" QUADS BQB (REWORK)	1		2					
S-078	1.1.1.6.2	CHESTER	SLOW SPILL MAGS/BQB	1			2				
55	1.1.1.6.4.1	CHESTER	SLOW SPILL MAGS/H TRIM DIPOLE (REWORK)	14		7					
56	1.1.1.6.4.3	CHESTER	SLOW SPILL MAGS/V TRIM DIPOLE (REWORK)	14		7					

## MAIN INJECTOR FABRICATION, CONSTRUCTION, INSTALLATION COST ESTIMATE SUMMARY - A

LEVEL PRINTED 7-AUG-92 12:47:15

PAGE #	WBS	RESPONSIBLE	SYSTEM	MULT BY	7	6	5	4	3	2	1
S-079	1.1.1.6.4	CHESTER	SLOW SPILL MAGNETS/BUMPS	1			14				
S-025	1.1.1.6	CHESTER	SLOW SPILL (F18-SY) MAGNETS	1				27			
57	1.1.1.8.1.7	CHESTER	ABORT LINE MAGNETS/B2 BDM DIPOLE (REWORK)	2		2					
S-080	1.1.1.8.1	CHESTER	ABORT LINE MAGNETS/DIPOLES	1			2				
58	1.1.1.8.2.6	CHESTER	ABORT LINE MAGNETS/3Q52 QUADS BQA (REWORK)	3		8					
S-081	1.1.1.8.2	CHESTER	ABORT LINE MAGNETS/QUADS	1			8				
59	1.1.1.8.4.1	CHESTER	ABORT LINE MAGNETS/H TRIM DIPOLE (REWORK)	2		1					
60	1.1.1.8.4.3	CHESTER	ABORT LINE MAGNETS/V TRIM DIPOLE (REWORK)	2		1					
S-082	1.1.1.8.4	CHESTER	ABORT LINE MAGNETS/TRIM DIPOLES	1			2				
61	1.1.1.8.5.2	CHESTER	ABORT LINE MAGNETS/MI LAMBERTSON 94" (NEW)	1		48					
62	1.1.1.8.5.3	CHESTER	ABORT LINE MAGNETS/MI LAMBERTSON 189" (NEW)	1		90					
63	1.1.1.8.5.5	CHESTER	ABORT LINE MAGNETS/F-17 C-MAGNET 118" (NEW)	1		46					
S-083	1.1.1.8.5	CHESTER	ABORT LINE MAGNETS/LAMBERTSONS	1			184				
S-028	1.1.1.8	CHESTER	ABORT LINE MAGNETS	1				196			
64	1.1.1.10.1.1	CHESTER	DIPOLE TOOLING/MIR DIPOLE	1		921					
65	1.1.1.10.1.5	CHESTER	DIPOLE TOOLING/SDB-120"	1		65					
66	1.1.1.10.1.7	CHESTER	DIPOLE TOOLING/B2 240" DIPOLE (REWORK)	1		2					
67	1.1.1.10.1.12	CHESTER	DIPOLE TOOLING/EPB DIPOLE 5-1.5-120 (MORE)	1		22					
68	1.1.1.10.1.13	CHESTER	DIPOLE TOOLING/B3 DIPOLE (REWORK)	1		2					
S-084	1.1.1.10.1	CHESTER	DIPOLE TOOLING	1			1011				
70	1.1.1.10.2.5	CHESTER	QUAD TOOLING/OLD MR 84"	1		4					
71	1.1.1.10.2.6	CHESTER	QUAD TOOLING/BQA 52" (REWORK)	1		2					
72	1.1.1.10.2.8	CHESTER	QUAD TOOLING/SQA	1		12					
S-085	1.1.1.10.2	CHESTER	QUADRUPOLE TOOLING	1			19				
74	1.1.1.10.3.2	CHESTER	MR TOOLING/TRIM QUAD (REWORK)	1		2					



## MAIN INJECTOR FABRICATION, CONSTRUCTION, INSTALLATION COST ESTIMATE SUMMARY - A

LEVEL PRINTED 7-AUG-92 12:47:15

PAGE #	WBS	RESPONSIBLE	SYSTEM	MULT BY	7	6	5	4	3	2	1
75	1.1.1.10.3.3	CHESTER	MR TOOLING/SKEW QUAD (REWORK)	1		2					
76	1.1.1.10.3.4	CHESTER	MR TOOLING/SKEW SEXTUPOLE (REWORK)	1		2					
77	1.1.1.10.3.5	CHESTER	MR TOOLING/TRIM SEXTUPOLE (REWORK)	1		2					
78	1.1.1.10.3.6	CHESTER	MR TOOLING/OCTUPOLE (REWORK)	1		2					
S-086	1.1.1.10.3	CHESTER	SPECIAL MAGNET TOOLING	1			11				
79	1.1.1.10.4.1	CHESTER	MR TOOLING/HORZ TRIM DIPOLE (REWORK)	1		2					
80	1.1.1.10.4.2	CHESTER	MR TOOLING/HORZ TRIM DIPOLE (NEW)	1		11					
81	1.1.1.10.4.3	CHESTER	MR TOOLING/VERT TRIM DIPOLE (REWORK)	1		2					
82	1.1.1.10.4.4	CHESTER	MR TOOLING/VERT TRIM DIPOLE (NEW)	1		11					
S-087	1.1.1.10.4	CHESTER	SPECIAL MAGNET TOOLING	1			27				
83	1.1.1.10.5.1	CHESTER	LAMBERTSON TOOLING/INJ A0 TYPE(REW)	1		2					
84	1.1.1.10.5.2	CHESTER	LAMBERTSON TOOLING/MI 94",189" (NEW)	1		115					
85	1.1.1.10.5.5	CHESTER	LAMBERTSON TOOLING/F-17 C MAGNET(MORE)	1		69					
S-088	1.1.1.10.5	CHESTER	LAMBERTSON MAGNET TOOLING	1			185				
S-027	1.1.1.10	CHESTER	MAGNET TOOLING	1				1253			
86	1.1.1.14	CHESTER	MAGNET ED&I	1				2249			
S-005	1.1.1	CHESTER	MAIN INJECTOR MAGNETS	1					41458		
87	1.1.2.1.1	SAUER	MIR VACUUM SYS/VACUUM CHAMBER,BELLOWS	1			1501				
88	1.1.2.1.2	SAUER	MIR VACUUM SYS/ROUGH PUMPS,TURBO CARTS	1			558				
89	1.1.2.1.3	SAUER	MIR VACUUM SYS/GAUGES & CABLES	1			231				
S-028	1.1.2.1	SAUER	MIR VACUUM SYSTEM	1				2290			
90	1.1.2.10.1.1	SAUER	BML VACUUM SYS/8GEV CHAMBER,BELLOWS	1		335					
91	1.1.2.10.1.2	SAUER	BML VACUUM SYS/150GEV BELLOWS, CHAMBERS	1		142					
92	1.1.2.10.1.3	SAUER	BML VACUUM SYS/SPILL BELLOWS, CHAMBERS	1		19					
S-089	1.1.2.10.1	SAUER	BML VACUUM/CHAMBERS & BELLOWS	1			496				

MAIN INJECTOR FABRICATION, CONSTRUCTION, INSTALLATION COST ESTIMATE SUMMARY - A

LEVEL PRINTED 7-AUG-92 12:47:15

PAGE #	WBS	RESPONSIBLE	SYSTEM	MULT BY	7	6	5	4	3	2	1
93	1.1.2.10.2.1	SAUER	BML VACUUM SYS/8GEV PUMPS	1		196					
94	1.1.2.10.2.2	SAUER	BML VACUUM SYS/150GEV PUMPS	1		34					
S-090	1.1.2.10.2	SAUER	BML VACUUM/ROUGH PUMPS/TURBO CARTS	1			230				
96	1.1.2.10.3.1	SAUER	BML VACUUM SYS/8GEV GAUGES	1		44					
97	1.1.2.10.3.2	SAUER	BML VACUUM SYS/150GEV GAUGES	1		23					
S-091	1.1.2.10.3	SAUER	BML VACUUM/GAUGES & CABLES	1			67				
S-029	1.1.2.10	SAUER	BML VACUUM SYSTEM	1				793			
S-006	1.1.2	SAUER	MAIN INJECTOR VACUUM	1					3083		
99	1.1.3.1.1.1	HAYS	MIR PWR SUP/DIPOLE SUPPLY	11		4181					
100	1.1.3.1.1.2	HAYS	MIR PWR SUP/DIPOLE SUPPLY	11		1131					
S-092	1.1.3.1.1	HAYS	MIR PWR SUP/DIPOLE SUPPLY	1			5312				
101	1.1.3.1.2	HAYS	MIR PWR SUP/QUADRUPOLE SUPPLIES	1			385				
102	1.1.3.1.3	HAYS	MIR PWR SUP/SEXTUPOLE SUPPLIES	1			332				
103	1.1.3.1.4	HAYS	MIR PWR SUP/CORRECTION ELEMENT SUPPLIES	1			40				
104	1.1.3.1.6	HAYS	MIR INJECTOR REGULATION SYSTEM	1			246				
105	1.1.3.1.7	HAYS	MIR REGULATION SUPPLIES	1			133				
106	1.1.3.1.8	KRAFCZYK	MIR ABORT SUPPLY	1			19				
S-030	1.1.3.1	KRAFCZYK	MIR POWER SUPPLIES	1				6468			
107	1.1.3.2.1	KRAFCZYK	8GEV LINE/DIPOLE POWER SUPPLIES	1			147				
108	1.1.3.2.2	KRAFCZYK	8GEV LINE/ QUADRUPOLE POWER SUPPLIES	1			134				
109	1.1.3.2.3	KRAFCZYK	8GEV LINE/CORR ELEMENT POWER SUPPLIES	1			169				
110	1.1.3.2.4	KRAFCZYK	8GEV LINE/INJ LAMBERTSON POWER SUPPLY	1			6				
S-031	1.1.3.2	KRAFCZYK	8GEV LINE/POWER SUPPLY	1				455			
111	1.1.3.3.1	KRAFCZYK	150GEV PROT LINE/DIPOLE SUPPLIES	1			524				
112	1.1.3.3.2	KRAFCZYK	150GEV PROT LINE/QUADRUPOLE SUPPLIES	1			990				

MAIN INJECTOR FABRICATION, CONSTRUCTION, INSTALLATION COST ESTIMATE SUMMARY - A

LEVEL PRINTED 7-AUG-92 12:47:15

PAGE #	WBS	RESPONSIBLE	SYSTEM	MULT BY	7	6	5	4	3	2	1
	113 1.1.3.3.3	KRAFCZYK	150GEV PROT LINE/CORR ELE SUPPLIES	1			78				
	S-032 1.1.3.3	KRAFCZYK	150 GEV PROT LINE/POWER SUPPLIES	1			1592				
	117 1.1.3.4.3	KRAFCZYK	150GEV PBAR LINE/CORR ELEMENT SUPPLIES	1			94				
	S-033 1.1.3.4	KRAFCZYK	150GEV PBAR LINE/POWER SUPPLIES	1			94				
	120 1.1.3.5.2	KRAFCZYK	PBAR PROD LINE(F11 TO F17)/QUADRUPOLE SUPPLI	1			313				
	121 1.1.3.5.3	KRAFCZYK	PBAR PROD LINE(F11 TO F17)/CORR ELEMENT SUPP	1			25				
	S-034 1.1.3.5	KRAFCZYK	PBAR PROD LINE(F11 TO F17)/POWER SUPPLIES	1			338				
	122 1.1.3.6.1	KRAFCZYK	SLOW SPILL LINE/DIPOLE SUPPLIES	1			623				
	123 1.1.3.6.2	KRAFCZYK	SLOW SPILL LINE/QUADRUPOLE SUPPLIES	1			436				
	S-035 1.1.3.6	KRAFCZYK	SLOW SPILL LINE/POWER SUPPLIES	1			1059				
	125 1.1.3.7	KRAFCZYK	BML PS CONTROLLERS	1			100				
	S-007 1.1.3	KRAFCZYK	POWER SUPPLIES	1			10107				
	126 1.1.4.1.1.1.1	MILLER/REID	MIR RF 53MHZ/200KW POWER AMPLIFIERS	15	851						
	127 1.1.4.1.1.1.2	MILLER/REID	MIR RF 53MHZ/4KWATT SOLID STATE AMP	15	1048						
	S-118 1.1.4.1.1.1	MILLER/REID	MIR RF 53MHZ/POWER AMPLIFIERS	1	1897						
	128 1.1.4.1.1.2.1	MILLER/REID	MIR RF 53MHZ/ANODE SUPPLIES	1	942						
	129 1.1.4.1.1.2.2	MILLER/REID	MIR RF 53MHZ/MODULATORS	1	1080						
	S-119 1.1.4.1.1.2	MILLER/REID	MIR RF 53MHZ/ANODE SUPPLIES/MODULATORS	1	2022						
	130 1.1.4.1.1.3	MILLER/TAWZER	MIR RF 53MHZ/LOW LEVEL	1	48						
	131 1.1.4.1.1.4	MILLER/ZIOBER	MIR RF 53MHZ/TRANSMISSION LINE	1	255						
	132 1.1.4.1.1.6	MILLER/WILDMAN	MIR RF 53MHZ/H=588 CAVITIES	1	126						
	S-093 1.1.4.1.1	MARTIN	MIR RF 53 MHZ	1	4347						
	133 1.1.4.1.2.1	MILLER/WILDMAN	COAL/RF CAVITIES	1	25						
	134 1.1.4.1.2.4	MILLER/WILDMAN	COAL/TRANSMISSION LINE RF	1	27						
	S-094 1.1.4.1.2	MARTIN	COALESCING SYSTEM	1	52						

## MAIN INJECTOR FABRICATION, CONSTRUCTION, INSTALLATION COST ESTIMATE SUMMARY - A

LEVEL PRINTED 7-AUG-92 12:47:15

PAGE #	WBS	RESPONSIBLE	SYSTEM	MULT BY	7	6	5	4	3	2	1
S-036	1.1.4.1	MARTIN	RF SYSTEMS/RING	1				4399			
S-008	1.1.4	MARTIN	RF SYSTEMS	1					4399		
135	1.1.6.1.1.1	DINKEL	MIR 8 GEV PROT INJ/KICKER MAGNET	1	119						
136	1.1.6.1.1.2	DINKEL	MIR 8 GEV PROT INJ/POWER SUPPLY	1	347						
S-095	1.1.6.1.1	KRAFCZYK	8 GEV PROT INJ KICKER	1			467				
137	1.1.6.1.2.1	DINKEL	8 GEV PBAR INJ/KICKER MAGNET	1	214						
138	1.1.6.1.2.2	DINKEL	8 GEV PBAR INJ/KICKER POWER SUPPLY	1	472						
S-096	1.1.6.1.2	KRAFCZYK	8 GEV PBAR INJECTION KICKER	1			686				
141	1.1.6.1.4.1	DINKEL	150 GEV PBAR EXT/KICKER MAGNET	1	35						
142	1.1.6.1.4.2	DINKEL	150 GEV PBAR EXT/KICKER POWER SUPPLY	1	123						
S-098	1.1.6.1.4	KRAFCZYK	MIR 150 GEV PBAR EXT KICKER	1			157				
143	1.1.6.1.5.1	DINKEL	PROT ABORT KICKER MAGNET	1	28						
144	1.1.6.1.5.2	DINKEL	PROT ABORT KICKER POWER SUPPLY	1	273						
S-099	1.1.6.1.5	KRAFCZYK	MIR EXT PROTON ABORT KICKER	1			300				
S-037	1.1.6.1	KRAFCZYK	MIR EXTRACTION	1				1610			
145	1.1.6.2.1	KRAFCZYK	MIR SLOW EXT/ELECTROSTATIC SEPTUM	1			23				
146	1.1.6.2.2	KRAFCZYK	MIR SLOW EXT/SPECIAL MAGNETIC ELEMENTS	1			163				
147	1.1.6.2.3	KRAFCZYK	MIR SLOW EXT/QXR SYSTEM	1			163				
S-038	1.1.6.2	KRAFCZYK	SLOW EXTRACTION	1				349			
148	1.1.6.3.1.1	DINKEL	TEV 150 GEV PROT INJ KICKER	1	127						
149	1.1.6.3.1.2	DINKEL	TEV 150 GEV PROT INJ KICKER POWER SUPPLY	1	61						
S-100	1.1.6.3.1	KRAFCZYK	TEV 150 GEV PROT INJ KICKER	1			188				
150	1.1.6.3.2.1	DINKEL	TEV 150 GEV PBAR INJ KICKER MAGNET	1	4						
151	1.1.6.3.2.2	DINKEL	TEV 150 GEV PBAR INJ KICKER POWER SUPPLY	1	61						
S-101	1.1.6.3.2	KRAFCZYK	TEV 150 GEV PBAR INJ KICKER	1			65				

## MAIN INJECTOR FABRICATION, CONSTRUCTION, INSTALLATION COST ESTIMATE SUMMARY - A

LEVEL PRINTED 7-AUG-92 12:47:15

PAGE #	WBS	RESPONSIBLE	SYSTEM	MULT BY	7	6	5	4	3	2	1
S-039	1.1.8.3	KRAFCZYK	TEV 150 GEV PBAR INJECTION	1				253			
S-009	1.1.8	KRAFCZYK	KICKERS & SLOW EXTRACTION	1					2212		
152	1.1.8.1.1	JACKSON	MIR INST/BPM SYSTEM	1			240				
153	1.1.8.1.2	JACKSON	MIR INST/BLM SYSTEM	1			78				
154	1.1.8.1.3	JACKSON	MIR INST/LONGITUDINAL PICKUP	1			7				
155	1.1.8.1.4	JACKSON	MIR INST/TRANSVERSE PICKUP	2			26				
156	1.1.8.1.5	JACKSON	MIR INST/DAMPERS	2			455				
157	1.1.8.1.6	JACKSON	MIR INST/FLYING WIRES	3			145				
158	1.1.8.1.7	JACKSON	MIR INST/D.C.C.T.	1			8				
159	1.1.8.1.8	JACKSON	MIR INST/SCRAPERS	1			64				
S-040	1.1.8.1	JACKSON	MIR INSTRUMENTATION	1				1023			
164	1.1.8.10.1	JACKSON	MIR INST/BEAMLINE AGGREGATE BPM SYSTEM	1			206				
165	1.1.8.10.2	JACKSON	MIR INST/BEAMLINE	1			44				
166	1.1.8.10.7	JACKSON	MIR INST/AGGREGATE TORROIDS	10			50				
167	1.1.8.10.9	JACKSON	MIR INST/BEAMLINE SEMS	1			325				
S-045	1.1.8.10	JACKSON	MIR INSTRUMENTATION	1				626			
S-010	1.1.8	JACKSON	MIR INSTRUMENTATION	1					1648		
168	1.1.9.1.1	LUCAS	MIR CONTROLS/COMPUTERS, LINKS	1			190				
169	1.1.9.1.2	LUCAS	MIR CONTROLS/CRATES, CARDS, RELAY RACKS, CABLIN	1			198				
170	1.1.9.1.3	LUCAS	MIR CONTROLS/CATV SYSTEM	1			176				
171	1.1.9.1.4	LUCAS	MIR CONTROLS/FIRUS SYSTEM	1			51				
172	1.1.9.1.5	LUCAS	MIR CONTROLS/ETHERNET	1			53				
S-046	1.1.9.1	LUCAS	MIR CONTROLS	1				669			
173	1.1.9.10.1	LUCAS	BML CONTROLS/COMPUTERS, LINKS	1			34				
174	1.1.9.10.2	LUCAS	BML CONTROLS/CRATES, RELAY RACKS, CABLING	1			345				

MAIN INJECTOR FABRICATION, CONSTRUCTION, INSTALLATION COST ESTIMATE SUMMARY - A

LEVEL PRINTED 7-AUG-92 12:47:15

PAGE #	WBS	RESPONSIBLE	SYSTEM	MULT BY	7	6	5	4	3	2	1
S-047	1.1.9.10	LUCAS	BEAMLINE AGGREGATE	1				380			
S-011	1.1.9	LUCAS	CONTROLS	1					1049		
177	1.1.10.1	CASEBOLT	MIR SAFETY SYSTEM	1				345			
178	1.1.10.2	CASEBOLT	BML SAFETY SYSTEM	1				238			
S-012	1.1.10	CASEBOLT	SAFETY	1					583		
180	1.1.12.1.1.2	SATTI	MIR WATER SYS/HEAT EXCHANGE	1		698					
181	1.1.12.1.1.3	SATTI	MIR WATER SYS/LCW PROCESSING	1		424					
182	1.1.12.1.1.4	SATTI	MIR WATER SYS/LCW PUMP SYSTEM	1		441					
183	1.1.12.1.1.5	SATTI	MIR WATER SYS/LCW PIPING	1		2050					
184	1.1.12.1.1.6	SATTI	RF-95 DEG LCW/HEAT EX & PUMP SYS	1		251					
185	1.1.12.1.1.7	SATTI	RF-95 DEG LCW/PROCESSING	1		160					
186	1.1.12.1.1.8	SATTI	RF-95 DEG LCW/PIPING	1		256					
187	1.1.12.1.1.9	SATTI	RF-55 DEG LCW/PROCESSING	1		137					
188	1.1.12.1.1.10	SATTI	RF-55 DEG LCW/HEAT EX & PUMP SYS	1		143					
189	1.1.12.1.1.11	SATTI	RF-55 DEG LCW/CHILLED LCW PIPING	1		198					
S-102	1.1.12.1.1	SATTI	MIR INSTALL WATER SYSTEM	1			4759				
191	1.1.12.1.2.2	KRAFCZYK/SORENSE	MIR/INSTALL CABLES	1		775					
S-103	1.1.12.1.2	KRAFCZYK/SORENSE	MIR CABLES	1			775				
192	1.1.12.1.3.1	LANGE	MIR ABORT/BEAM DUMP SYSTEM	1		223					
193	1.1.12.1.3.2	SAUER	MIR ABORT/VACUUM SYSTEM	1		71					
S-104	1.1.12.1.3	LANGE	MIR ABORT SYSTEMS	1			294				
S-048	1.1.12.1	SATTI	MIR MECHANICAL UTILITIES	1			5828				
195	1.1.12.10.1.2	SATTI	BML WATER SYS/HEAT EXCHANGER	1		56					
196	1.1.12.10.1.3	SATTI	BML WATER SYS/LCW PROCESSING	1		165					
197	1.1.12.10.1.4	SATTI	BML WATER SYS/LCW PUMP SYSTEMS	1		140					

## MAIN INJECTOR FABRICATION, CONSTRUCTION, INSTALLATION COST ESTIMATE SUMMARY - A

LEVEL PRINTED 7-AUG-92 12:47:15

PAGE #	WBS	RESPONSIBLE	SYSTEM	MULT BY	7	6	5	4	3	2	1
198	1.1.12.10.1.5	SATTI	BML WATER SYS/LCW PIPING	1		642					
S-105	1.1.12.10.1	SATTI	BML WATER SYSTEMS	1			1003				
200	1.1.12.10.2.2	KRAFCZYK/SORENSE	BML/INSTALL CABLES	1		1165					
S-106	1.1.12.10.2	KRAFCZYK/SORENSE	BEAMLINE CABLES	1			1165				
S-049	1.1.12.10	SATTI	BEAMLINE AGGREGATE	1				2168			
S-013	1.1.12	LANGE	MIR UTILITIES & ABORT	1					7995		
201	1.1.13.1.1.1	LANGE	MIR/INSTALL MAGNET STANDS	1		1396					
202	1.1.13.1.1.2	LANGE	MIR/INSTALL MAGNETS	1		705					
203	1.1.13.1.1.3	MOORE	MIR/SURVEY & ALIGN MAGNETS	1		340					
204	1.1.13.1.1.4	LANGE	OLD MR MAGNET REMOVAL	1		279					
S-107	1.1.13.1.1	LANGE	MIR MAGNET INSTALLATION	1			2719				
205	1.1.13.1.2.1	KRAFCZYK/HAYS	MIR POWER SUPPLY INSTALLATION	6		225					
206	1.1.13.1.2.2	SATTI	MIR PWR DIST/MAGNET BUS, INSTALLATION	1		2029					
207	1.1.13.1.2.3	KRAFCZYK/HAYS	MIR PWR DIST/NEW HARMONIC FILTER	1		577					
S-108	1.1.13.1.2	KRAFCZYK	MIR PULSED POWER DISTRIBUTION	1			2831				
209	1.1.13.1.3	SAUER	MIR VACUUM INSTALLATION	1			171				
210	1.1.13.1.4	HAHN	MIR INSTRUMENTATION INSTALLATION	1			106				
211	1.1.13.1.5	LUCAS	MIR CONTROLS INSTALLATION	1			93				
212	1.1.13.1.6.1	LANGE	MIR ABORT STAND INSTALLATION	1		53					
213	1.1.13.1.6.2	LANGE	MIR ABORT MAGNETS INSTALLATION	1		81					
S-109	1.1.13.1.6	LANGE	MIR ABORT INSTALLATION	1			134				
214	1.1.13.1.7.1	LANGE	MIR SLOW EXTRACTION STANDS INSTALLATION	1		60					
215	1.1.13.1.7.2	LANGE	MIR SLOW EXTRACTION COMPONENT INSTALLATION	1		16					
S-110	1.1.13.1.7	MOORE	MIR SLOW EXTRACTION INSTALLATION	1			76				
216	1.1.13.1.8	CASEBOLT	MIR SAFETY SYSTEM INSTALLATION	1			98				

## MAIN INJECTOR FABRICATION, CONSTRUCTION, INSTALLATION COST ESTIMATE SUMMARY - A

LEVEL PRINTED 7-AUG-92 12:47:15

PAGE #	WBS	RESPONSIBLE	SYSTEM	MULT BY	7	6	5	4	3	2	1
S-050	1.1.13.1	LANGE	MIR INSTALLATION	1			6227				
217	1.1.13.2.1.1	LANGE	8 GEV LINE/INSTALL MAGNET STANDS	1	392						
218	1.1.13.2.1.2	LANGE	8 GEV LINE/INSTALL MAGNETS	1	138						
219	1.1.13.2.1.3	MOORE	8 GEV LINE/SURVEY & ALIGN MAGNETS	1	119						
S-111	1.1.13.2.1	MOORE	8 GEV LINE/SURVEY & ALIGN MAGNETS	1		649					
220	1.1.13.2.2	LANGE	8 GEV LINE CORR MAGNET INSTALLATION	1		18					
221	1.1.13.2.3	SAUER	8 GEV LINE VACUUM INSTALLATION	1		23					
222	1.1.13.2.4	HAHN	8 GEV LINE INSTRUMENTATION INSTALLATION	1		86					
S-051	1.1.13.2	JACKSON	8 GEV LINE	1			775				
223	1.1.13.3.1.1	LANGE	150 GEV PROT LINE/INSTALL MAGNET STANDS	1	247						
224	1.1.13.3.1.2	LANGE	150 GEV PROT LINE/INSTALL MAGNETS	1	109						
225	1.1.13.3.1.3	MOORE	150 GEV PROT LINE/SURVEY & ALIGNMENT MAGNET	1	3						
S-112	1.1.13.3.1	LANGE	150 GEV PROT LINE MAGNET INSTALLATION	1		359					
226	1.1.13.3.2	LANGE	150 GEV PROT LINE/CORRECTION ELE INSTALL	1		18					
227	1.1.13.3.3	SAUER	150 GEV PROT LINE/VACUUM INSTALLATION	1		16					
228	1.1.13.3.4	LANGE	150 GEV PROT LINE/INST INSTALLATION	1		3					
S-052	1.1.13.3	LANGE	150 GEV PROT LINE	1			396				
231	1.1.13.4.1.3	MOORE	150 GEV PBAR LINE/SURVEY & ALIGNMENT	1	3						
S-113	1.1.13.4.1	LANGE	150 GEV PBAR LINE/MAGNET INSTALLATION	1		3					
S-053	1.1.13.4	LANGE	150 GEV PBAR LINE	1			3				
237	1.1.13.5.1.3	MOORE	PBAR PROD LINE/SURVEY & ALIGNMENT	1	3						
S-114	1.1.13.5.1	LANGE	PBAR PROD LINE/MAGNET INSTALLATION	1		3					
S-054	1.1.13.5	LANGE	PBAR PRODUCTION LINE	1			3				
241	1.1.13.6.1.1	LANGE	SLOW SPILL/INSTALL MAGNET STANDS	1	80						
242	1.1.13.6.1.2	LANGE	SLOW SPILL/INSTALL MAGNETS	1	83						



## MAIN INJECTOR FABRICATION, CONSTRUCTION, INSTALLATION COST ESTIMATE SUMMARY - A

LEVEL PRINTED 7-AUG-92 12:47:15

PAGE #	WBS	RESPONSIBLE	SYSTEM	MULT BY	7	6	5	4	3	2	1
243	1.1.13.6.1.3	MOORE	SLOW SPILL/SURVEY & ALGINMENT	1		3					
S-115	1.1.13.6.1	LANGE	SLOW SPILL/MAGNET INSTALLATION	1			166				
244	1.1.13.6.2	LANGE	SLOW SPILL/CORRECTION ELEMENT INSTALL	1			18				
245	1.1.13.6.3	SAUER	SLOW SPILL/VACUUM INSTALLATION	1			16				
246	1.1.13.6.4	HAHN	SLOW SPILL/INST INSTALLATION	1			3				
S-055	1.1.13.6	LANGE	SLOW SPILL INSTALLATION	1				203			
247	1.1.13.7.1	MAY	MIR/NEW TEV E0 VACUUM	1			32				
248	1.1.13.7.2.1	MAY	MIR/TEV F0 REMOVAL	1		14					
249	1.1.13.7.2.2	MAY	MIR/NEW TEV F0 VACUUM	1		45					
250	1.1.13.7.2.3	WILDMAN	TEV RF REDISTRIBUTION	1		612					
S-116	1.1.13.7.2	MAY	MIR/NEW TEV F0 VACUUM	1			671				
S-056	1.1.13.7	MAY	MIR/NEW TEV VACUUM	1				703			
251	1.1.13.10.2.1	HAYS	BML PPWR SYS/PPWR SUP INSTALLATION	1		229					
252	1.1.13.10.2.2	SATTI	BML PWR DIST/MAGNET BUS, INSTALLATION	1		330					
S-117	1.1.13.10.2	KRAFCZYK	BML PPS INSTALLATION	1			559				
253	1.1.13.10.5	LUCAS	BML CONTROLS INSTALLATION	1			48				
254	1.1.13.10.8	CASEBOLT	BML SAFETY SYSTEM INSTALLATION	1			87				
S-057	1.1.13.10	LANGE	BEAMLINE AGGREGATE	1				694			
S-014	1.1.13	LANGE	INSTALLATION	1					9008		
S-002	1.1	HOLMES	FERMILAB MAIN INJECTOR TECHNICAL COMPONENTS	1						81541	
255	1.2.1.1	PAWLAK	WETLAND MITIGATION, PHASE 1	1			591				
256	1.2.1.2	PAWLAK	SITE PREPARATION, PHASE 1	1			3449				
257	1.2.1.3	PAWLAK	ROADS & UTILITIES, PHASE 1	1			5826				
S-015	1.2.1	PAWLAK	CIVIL CONSTRUCTION/PHASE 1	1				9866			
259	1.2.2.1	PAWLAK	INJECTOR ENCLOSURE AT MI00, PHASE 2	1			7863				

## MAIN INJECTOR FABRICATION, CONSTRUCTION, INSTALLATION COST ESTIMATE SUMMARY - A

LEVEL PRINTED 7-AUG-92 12:47:15

PAGE #	WBS	RESPONSIBLE	SYSTEM	MULT BY	7	6	5	4	3	2	1
	260 1.2.2.2	PAWLAK	INJECTOR ENCLOSURE AT MI62-MI52, PHASE 2	1				17931			
	261 1.2.2.3	PAWLAK	SERVICE BLDGS 10,20,30,40,50, PHASE 2	1				2291			
	262 1.2.2.4	PAWLAK	MI52 & 62 SERVICE BUILDING, PHASE 2	1				511			
	263 1.2.2.5	PAWLAK	MI60 SERVICE BUILDING, PHASE 2	1				3265			
	264 1.2.2.6	PAWLAK	SERVICE BLDG. F0 N. ADDITION, PHASE 2	1				766			
	265 1.2.2.7	PAWLAK	8 GEV BEAM ENCLOSURE, PHASE 2	1				4407			
	266 1.2.2.8	PAWLAK	NORTH HATCH BUILDING, PHASE 2	1				846			
	267 1.2.2.9	PAWLAK	345 KV TRANSMISSION LINE, PHASE 2	1				1628			
	268 1.2.2.10	PAWLAK	KAUTZ ROAD SUBSTATION, PHASE 2	1				4212			
	269 1.2.2.11	PAWLAK	COOLING WATER SYSTEM, PHASE 2	1				1529			
S-016	1.2.2	PAWLAK	CIVIL CONSTRUCTION/PHASE 2	1				45249			
	270 1.2.3.1	PAWLAK	F0 ENCL. & BUILDING F0 MODS, PHASE 3	1				5924			
	271 1.2.3.2	PAWLAK	8 GEV BOOSTER ENCL. CONNECTION, PHASE 3	1				4697			
	272 1.2.3.3	PAWLAK	8 GEV ENCLOSURE AT ANTIPROTON, PHASE 3	1				264			
S-017	1.2.3	PAWLAK	CIVIL CONSTRUCTION/PHASE 3	1				10885			
	273 1.2.4.1	PAWLAK	LANDSCAPING & PAVING, PHASE 4	1				538			
S-018	1.2.4	PAWLAK	CIVIL CONSTRUCTION/PHASE 4	1				538			
	274 1.2.14.1	PAWLAK	CIVIL CONSTRUCTION/Phase 1 ED&I	1				964			
	275 1.2.14.2	PAWLAK	CIVIL CONSTRUCTION/Phase 2 ED&I	1				4423			
	276 1.2.14.3	PAWLAK	CIVIL CONSTRUCTION/Phase 3 ED&I	1				1064			
	277 1.2.14.4	PAWLAK	CIVIL CONSTRUCTION/Phase 4 ED&I	1				53			
S-019	1.2.14	PAWLAK	CIVIL CONSTRUCTION ED&I	1				6504			
S-003	1.2	PAWLAK	MAIN INJECTOR CONVENTIONAL CONSTRUCTION	1				73042			
	278 1.3.1	HOLMES	MAIN INJECTOR PROJECT MANAGEMENT	1				3561			
	279 1.3.2	HOLMES	MAIN INJECTOR ACCELERATOR PHYSICS	1				1260			

## MAIN INJECTOR FABRICATION, CONSTRUCTION, INSTALLATION COST ESTIMATE SUMMARY - A

LEVEL PRINTED 7-AUG-92 12:47:15

PAGE #	WBS	RESPONSIBLE	SYSTEM	MULT BY	7	6	5	4	3	2	1
	280 1.3.3	HOLMES	MAIN INJECTOR G&A	1					1116		
	S-004 1.3	HOLMES	PROJECT MANAGEMENT	1						5937	
	281 1.4	HOLMES	MAIN INJECTOR CONTINGENCY	1						29467	
	282 1.5	HOLMES	MAIN INJECTOR ESCALATION	1						27459	
	S-001 1	HOLMES	FERMILAB MAIN INJECTOR	1							217446
	TOTAL	HOLMES	FERMILAB MAIN INJECTOR PROJECT	1							217446

MAIN INJECTOR FABRICATION, CONSTRUCTION, INSTALLATION COST ESTIMATE SUMMARY - B

PRINTED 7-AUG-92 12:47:15

LEVEL 1 SUMMARY - DIRECT COST

DETAIL PAGE #	WBS	DESCRIPTION	MATERIAL K\$	LABOR K\$	TOTAL K\$	QUANT REQ'D	MAT'L K\$	LABOR K\$	GRAND TOT K\$
S-001	1	FERMILAB MAIN INJECTOR	181,837.1	35,609.0	217,446.1	1	181,837.1	35,609.0	217,446.1
	TOTAL	FERMILAB MAIN INJECTOR PROJECT				1	181,837.1	35,609.0	217,446.1

## MAIN INJECTOR FABRICATION, CONSTRUCTION, INSTALLATION COST ESTIMATE SUMMARY - B

PRINTED 7-AUG-92 12:47:15

## LEVEL 2 SUMMARY - DIRECT COST

DETAIL PAGE #	WBS	DESCRIPTION	MATERIAL K\$	LABOR K\$	TOTAL K\$	QUANT REQ'D	MAT'L K\$	LABOR K\$	GRAND TOT K\$
S-002	1.1	FERMILAB MAIN INJECTOR TECHNICAL COMPONENT	56,757.1	24,783.5	81,540.6	1	56,757.1	24,783.5	81,540.6
S-003	1.2	MAIN INJECTOR CONVENTIONAL CONSTRUCTION	66,537.9	6,504.1	73,042.0	1	66,537.9	6,504.1	73,042.0
S-004	1.3	PROJECT MANAGEMENT	1,615.8	4,321.3	5,937.1	1	1,615.8	4,321.3	5,937.1
281	1.4	MAIN INJECTOR CONTINGENCY	29,466.9	0.0	29,466.9	1	29,466.9	0.0	29,466.9
282	1.5	MAIN INJECTOR ESCALATION	27,459.4	0.0	27,459.4	1	27,459.4	0.0	27,459.4
S-001	1	FERMILAB MAIN INJECTOR				1	181,837.1	35,609.0	217,446.1

## MAIN INJECTOR FABRICATION, CONSTRUCTION, INSTALLATION COST ESTIMATE SUMMARY - B

PRINTED 7-AUG-92 12:47:15

## LEVEL 3 SUMMARY - DIRECT COST

DETAIL PAGE #	WBS #	DESCRIPTION	MATERIAL K\$	LABOR K\$	TOTAL K\$	QUANT REQ'D	MAT'L K\$	LABOR K\$	GRAND TOT K\$
S-005	1.1.1	MAIN INJECTOR MAGNETS	32,590.7	8,867.0	41,457.7	1	32,590.7	8,867.0	41,457.7
S-006	1.1.2	MAIN INJECTOR VACUUM	2,175.0	907.7	3,082.7	1	2,175.0	907.7	3,082.7
S-007	1.1.3	POWER SUPPLIES	6,795.0	3,311.9	10,106.8	1	6,795.0	3,311.9	10,106.8
S-008	1.1.4	RF SYSTEMS	3,769.0	630.3	4,399.4	1	3,769.0	630.3	4,399.4
S-009	1.1.6	KICKERS & SLOW EXTRACTION	1,055.0	1,157.0	2,212.1	1	1,055.0	1,157.0	2,212.1
S-010	1.1.8	MIR INSTRUMENTATION	1,030.9	617.5	1,648.5	1	1,030.9	617.5	1,648.5
S-011	1.1.9	CONTROLS	794.0	255.0	1,049.0	1	794.0	255.0	1,049.0
S-012	1.1.10	SAFETY	349.2	233.8	583.0	1	349.2	233.8	583.0
S-013	1.1.12	MIR UTILITIES & ABORT	4,445.7	3,549.4	7,995.1	1	4,445.7	3,549.4	7,995.1
S-014	1.1.13	INSTALLATION	3,752.5	5,254.0	9,006.5	1	3,752.5	5,254.0	9,006.5
S-002	1.1	FERMILAB MAIN INJECTOR TECHNICAL COMPONENTS				1	58,757.1	24,783.5	81,540.6
S-015	1.2.1	CIVIL CONSTRUCTION/PHASE 1	9,865.8	0.0	9,865.8	1	9,865.8	0.0	9,865.8
S-016	1.2.2	CIVIL CONSTRUCTION/PHASE 2	45,249.4	0.0	45,249.4	1	45,249.4	0.0	45,249.4
S-017	1.2.3	CIVIL CONSTRUCTION/PHASE 3	10,884.7	0.0	10,884.7	1	10,884.7	0.0	10,884.7
S-018	1.2.4	CIVIL CONSTRUCTION/PHASE 4	538.1	0.0	538.1	1	538.1	0.0	538.1
S-019	1.2.14	CIVIL CONSTRUCTION ED&I	0.0	6,504.1	6,504.1	1	0.0	6,504.1	6,504.1
S-003	1.2	MAIN INJECTOR CONVENTIONAL CONSTRUCTION				1	66,537.9	6,504.1	73,042.0
278	1.3.1	MAIN INJECTOR PROJECT MANAGEMENT	500.0	3,061.3	3,561.3	1	500.0	3,061.3	3,561.3
279	1.3.2	MAIN INJECTOR ACCELERATOR PHYSICS	0.0	1,260.0	1,260.0	1	0.0	1,260.0	1,260.0
280	1.3.3	MAIN INJECTOR G&A	1,115.8	0.0	1,115.8	1	1,115.8	0.0	1,115.8
S-004	1.3	PROJECT MANAGEMENT				1	1,615.8	4,321.3	5,937.1

## MAIN INJECTOR FABRICATION, CONSTRUCTION, INSTALLATION COST ESTIMATE SUMMARY - B

PRINTED 7-AUG-92 12:47:15

## LEVEL 4 SUMMARY - DIRECT COST

DETAIL PAGE #	WBS	DESCRIPTION	MATERIAL K\$	LABOR K\$	TOTAL K\$	QUANT REQ'D	MAT'L K\$	LABOR K\$	GRAND TOT K\$
S-020	1.1.1.1	MAIN INJECTOR RING MAGNETS	30,551.1	4,753.6	35,304.7	1	30,551.1	4,753.6	35,304.7
S-021	1.1.1.2	8 GEV LINE MAGNETS	494.3	878.9	1,373.3	1	494.3	878.9	1,373.3
S-022	1.1.1.3	150 GEV PROTON (MI52-F0) MAGNETS	224.9	295.7	520.6	1	224.9	295.7	520.6
S-023	1.1.1.4	150 GEV PBAR (MI62-F0) MAGNETS	224.9	295.7	520.6	1	224.9	295.7	520.6
S-024	1.1.1.5	120 GEV (F0-F17) MAGNETS	6.0	7.9	13.9	1	6.0	7.9	13.9
S-025	1.1.1.6	SLOW SPILL (F18-SY) MAGNETS	8.7	18.4	27.2	1	8.7	18.4	27.2
S-026	1.1.1.8	ABORT LINE MAGNETS	77.0	119.4	196.4	1	77.0	119.4	196.4
S-027	1.1.1.10	MAGNET TOOLING	1,003.8	248.9	1,252.7	1	1,003.8	248.9	1,252.7
86	1.1.1.14	MAGNET ED&I	0.0	2,248.5	2,248.5	1	0.0	2,248.5	2,248.5
S-005	1.1.1	MAIN INJECTOR MAGNETS				1	32,590.7	8,867.0	41,457.7
S-028	1.1.2.1	MIR VACUUM SYSTEM	1,621.6	668.4	2,290.1	1	1,621.6	668.4	2,290.1
S-029	1.1.2.10	BML VACUUM SYSTEM	553.4	239.3	792.7	1	553.4	239.3	792.7
S-006	1.1.2	MAIN INJECTOR VACUUM				1	2,175.0	907.7	3,082.7
S-030	1.1.3.1	MIR POWER SUPPLIES	4,059.4	2,409.0	6,468.5	1	4,059.4	2,409.0	6,468.5
S-031	1.1.3.2	8GEV LINE/POWER SUPPLY	235.3	220.1	455.4	1	235.3	220.1	455.4
S-032	1.1.3.3	150 GEV PROT LINE/POWER SUPPLIES	1,299.7	292.0	1,591.7	1	1,299.7	292.0	1,591.7
S-033	1.1.3.4	150GEV PBAR LINE/POWER SUPPLIES	36.7	57.3	94.0	1	36.7	57.3	94.0
S-034	1.1.3.5	PBAR PROD LINE(F11 TO F17)/POWER SUPPLIES	247.1	91.2	338.3	1	247.1	91.2	338.3
S-035	1.1.3.6	SLOW SPILL LINE/POWER SUPPLIES	911.0	148.5	1,059.4	1	911.0	148.5	1,059.4
125	1.1.3.7	BML PS CONTROLLERS	5.8	93.8	99.6	1	5.8	93.8	99.6
S-007	1.1.3	POWER SUPPLIES				1	6,795.0	3,311.9	10,106.8

## MAIN INJECTOR FABRICATION, CONSTRUCTION, INSTALLATION COST ESTIMATE SUMMARY - B

PRINTED 7-AUG-92 12:47:15

## LEVEL 4 SUMMARY - DIRECT COST

DETAIL PAGE #	WBS	DESCRIPTION	MATERIAL K\$	LABOR K\$	TOTAL K\$	QUANT REQ'D	MAT'L K\$	LABOR K\$	GRAND TOT K\$
S-036	1.1.4.1	RF SYSTEMS/RING	3,769.0	630.3	4,399.4	1	3,769.0	630.3	4,399.4
S-008	1.1.4	RF SYSTEMS				1	3,769.0	630.3	4,399.4
S-037	1.1.6.1	MIR EXTRACTION	788.8	821.4	1,610.2	1	788.8	821.4	1,610.2
S-038	1.1.6.2	SLOW EXTRACTION	204.2	144.6	348.9	1	204.2	144.6	348.9
S-039	1.1.6.3	TEV 150 GEV PBAR INJECTION	62.0	191.0	253.0	1	62.0	191.0	253.0
S-009	1.1.6	KICKERS & SLOW EXTRACTION				1	1,055.0	1,157.0	2,212.1
S-040	1.1.8.1	MIR INSTRUMENTATION	557.9	465.1	1,023.0	1	557.9	465.1	1,023.0
S-045	1.1.8.10	MIR INSTRUMENTATION	473.1	152.4	625.5	1	473.1	152.4	625.5
S-010	1.1.8	MIR INSTRUMENTATION				1	1,030.9	617.5	1,648.5
S-046	1.1.9.1	MIR CONTROLS	497.0	172.1	669.1	1	497.0	172.1	669.1
S-047	1.1.9.10	BEAMLINE AGGREGATE	296.9	82.9	379.9	1	296.9	82.9	379.9
S-011	1.1.9	CONTROLS				1	794.0	255.0	1,049.0
177	1.1.10.1	MIR SAFETY SYSTEM	197.0	147.8	344.8	1	197.0	147.8	344.8
178	1.1.10.2	BML SAFETY SYSTEM	152.2	86.0	238.2	1	152.2	86.0	238.2
S-012	1.1.10	SAFETY				1	349.2	233.8	583.0
S-048	1.1.12.1	MIR MECHANICAL UTILITIES	3,387.0	2,440.5	5,827.5	1	3,387.0	2,440.5	5,827.5
S-049	1.1.12.10	BEAMLINE AGGREGATE	1,058.7	1,108.9	2,167.6	1	1,058.7	1,108.9	2,167.6



## MAIN INJECTOR FABRICATION, CONSTRUCTION, INSTALLATION COST ESTIMATE SUMMARY - B

PRINTED 7-AUG-92 12:47:15

## LEVEL 4 SUMMARY - DIRECT COST

DETAIL PAGE #	WBS	DESCRIPTION	MATERIAL K\$	LABOR K\$	TOTAL K\$	QUANT REQ'D	MAT'L K\$	LABOR K\$	GRAND TOT K\$
S-013	1.1.12	MIR UTILITIES & ABORT				1	4,445.7	3,549.4	7,995.1
S-050	1.1.13.1	MIR INSTALLATION	3,024.5	3,202.7	6,227.2	1	3,024.5	3,202.7	6,227.2
S-051	1.1.13.2	8 GEV LINE	161.6	613.8	775.4	1	161.6	613.8	775.4
S-052	1.1.13.3	150 GEV PROT LINE	144.7	251.7	396.4	1	144.7	251.7	396.4
S-053	1.1.13.4	150 GEV PBAR LINE	0.0	3.2	3.2	1	0.0	3.2	3.2
S-054	1.1.13.5	PBAR PRODUCTION LINE	0.0	3.2	3.2	1	0.0	3.2	3.2
S-055	1.1.13.6	SLOW SPILL INSTALLATION	28.0	175.3	203.3	1	28.0	175.3	203.3
S-056	1.1.13.7	MIR/NEW TEV VACUUM	265.7	437.6	703.4	1	265.7	437.6	703.4
S-057	1.1.13.10	BEAMLINE AGGREGATE	128.0	566.4	694.4	1	128.0	566.4	694.4
S-014	1.1.13	INSTALLATION				1	3,752.5	5,254.0	9,006.5
255	1.2.1.1	WETLAND MITIGATION, PHASE 1	590.6	0.0	590.6	1	590.6	0.0	590.6
256	1.2.1.2	SITE PREPARATION, PHASE 1	3,448.9	0.0	3,448.9	1	3,448.9	0.0	3,448.9
257	1.2.1.3	ROADS & UTILITIES, PHASE 1	5,826.3	0.0	5,826.3	1	5,826.3	0.0	5,826.3
259	1.2.2.1	INJECTOR ENCLOSURE AT MI60, PHASE 2	7,863.2	0.0	7,863.2	1	7,863.2	0.0	7,863.2
260	1.2.2.2	INJECTOR ENCLOSURE AT MI62-MI52, PHASE 2	17,930.7	0.0	17,930.7	1	17,930.7	0.0	17,930.7
261	1.2.2.3	SERVICE BLDGS 10,20,30,40,50, PHASE 2	2,290.5	0.0	2,290.5	1	2,290.5	0.0	2,290.5
262	1.2.2.4	MI52 & 62 SERVICE BUILDING, PHASE 2	511.5	0.0	511.5	1	511.5	0.0	511.5
263	1.2.2.5	MI60 SERVICE BUILDING, PHASE 2	3,265.3	0.0	3,265.3	1	3,265.3	0.0	3,265.3
264	1.2.2.6	SERVICE BLDG. F0 N. ADDITION, PHASE 2	765.5	0.0	765.5	1	765.5	0.0	765.5
265	1.2.2.7	8 GEV BEAM ENCLOSURE, PHASE 2	4,406.9	0.0	4,406.9	1	4,406.9	0.0	4,406.9
266	1.2.2.8	NORTH HATCH BUILDING, PHASE 2	846.4	0.0	846.4	1	846.4	0.0	846.4

## MAIN INJECTOR FABRICATION, CONSTRUCTION, INSTALLATION COST ESTIMATE SUMMARY - B

PRINTED 7-AUG-92 12:47:15

## LEVEL 4 SUMMARY - DIRECT COST

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267	1.2.2.9	345 KV TRANSMISSION LINE, PHASE 2	1,628.0	0.0	1,628.0	1	1,628.0	0.0	1,628.0
268	1.2.2.10	KAUTZ ROAD SUBSTATION, PHASE 2	4,212.5	0.0	4,212.5	1	4,212.5	0.0	4,212.5
269	1.2.2.11	COOLING WATER SYSTEM, PHASE 2	1,529.0	0.0	1,529.0	1	1,529.0	0.0	1,529.0
S-016	1.2.2	CIVIL CONSTRUCTION/PHASE 2				1	45,249.4	0.0	45,249.4
270	1.2.3.1	F0 ENCL. & BUILDING F0 MODS, PHASE 3	5,924.0	0.0	5,924.0	1	5,924.0	0.0	5,924.0
271	1.2.3.2	8 GEV BOOSTER ENCL. CONNECTION, PHASE 3	4,697.1	0.0	4,697.1	1	4,697.1	0.0	4,697.1
272	1.2.3.3	8 GEV ENCLOSURE AT ANTIPROTON, PHASE 3	263.5	0.0	263.5	1	263.5	0.0	263.5
S-017	1.2.3	CIVIL CONSTRUCTION/PHASE 3				1	10,884.7	0.0	10,884.7
273	1.2.4.1	LANDSCAPING & PAVING, PHASE 4	538.1	0.0	538.1	1	538.1	0.0	538.1
S-018	1.2.4	CIVIL CONSTRUCTION/PHASE 4				1	538.1	0.0	538.1
274	1.2.14.1	CIVIL CONSTRUCTION/Phase 1 ED&I	0.0	964.4	964.4	1	0.0	964.4	964.4
275	1.2.14.2	CIVIL CONSTRUCTION/Phase 2 ED&I	0.0	4,423.2	4,423.2	1	0.0	4,423.2	4,423.2
276	1.2.14.3	CIVIL CONSTRUCTION/Phase 3 ED&I	0.0	1,064.0	1,064.0	1	0.0	1,064.0	1,064.0
277	1.2.14.4	CIVIL CONSTRUCTION/Phase 4 ED&I	0.0	52.6	52.6	1	0.0	52.6	52.6
S-019	1.2.14	CIVIL CONSTRUCTION ED&I				1	0.0	6,504.1	6,504.1

## MAIN INJECTOR FABRICATION, CONSTRUCTION, INSTALLATION COST ESTIMATE SUMMARY - B

PRINTED 7-AUG-92 12:47:15

## LEVEL 5 SUMMARY - DIRECT COST

DETAIL PAGE #	WBS	DESCRIPTION	MATERIAL K\$	LABOR K\$	TOTAL K\$	QUANT REQ'D	MAT'L K\$	LABOR K\$	GRAND TOT K\$
S-058	1.1.1.1.1	MIR MAGNETS/DIPOLES	28,803.6	1,626.1	30,229.8	1	28,803.6	1,626.1	30,229.8
S-059	1.1.1.1.2	MIR MAGNETS/QUADS	1,360.9	1,846.8	3,207.6	1	1,360.9	1,846.8	3,207.6
S-060	1.1.1.1.3	MIR MAGNETS/CORRECTORS	374.1	1,069.5	1,443.6	1	374.1	1,069.5	1,443.6
S-061	1.1.1.1.4	MIR MAGNETS/TRIM DIPOLES	212.5	211.1	423.7	1	212.5	211.1	423.7
S-020	1.1.1.1	MAIN INJECTOR RING MAGNETS				1	30,551.1	4,753.6	35,304.7
S-062	1.1.1.2.1	8GEV MAGNETS/DIPOLES	138.0	155.3	293.3	1	138.0	155.3	293.3
S-063	1.1.1.2.2	8GEV MAGNETS/QUADS	345.3	704.5	1,049.8	1	345.3	704.5	1,049.8
S-064	1.1.1.2.4	8GEV MAGNETS/TRIM DIPOLES	10.0	14.5	24.5	1	10.0	14.5	24.5
S-065	1.1.1.2.5	8GEV MAGNETS/LAMBERTSONS	1.0	4.6	5.6	1	1.0	4.6	5.6
S-021	1.1.1.2	8 GEV LINE MAGNETS				1	494.3	878.9	1,373.3
S-066	1.1.1.3.1	150GEV P MAGNETS/DIPOLES	8.2	10.4	18.6	1	8.2	10.4	18.6
S-067	1.1.1.3.2	150GEV P MAGNETS/QUADS	6.6	31.4	38.0	1	6.6	31.4	38.0
S-068	1.1.1.3.4	150GEV P MAGNETS/DIPOLE TRIMS	2.4	3.5	5.9	1	2.4	3.5	5.9
S-069	1.1.1.3.5	150GEV P MAGNETS/LAMBERTSONS	207.7	250.3	458.0	1	207.7	250.3	458.0
S-022	1.1.1.3	150 GEV PROTON (MI52-F0) MAGNETS				1	224.9	295.7	520.6
S-070	1.1.1.4.1	150GEV PBAR MAGNETS/DIPOLES	8.2	10.4	18.6	1	8.2	10.4	18.6
S-071	1.1.1.4.2	150GEV PBAR MAGNETS/QUADS	6.6	31.4	38.0	1	6.6	31.4	38.0
S-072	1.1.1.4.4	150GEV PBAR MAGNETS/TRIM DIPOLES	2.4	3.5	5.9	1	2.4	3.5	5.9
S-073	1.1.1.4.5	150GEV PBAR MAGNETS/LAMBERTSONS	207.7	250.3	458.0	1	207.7	250.3	458.0
S-023	1.1.1.4	150 GEV PBAR (MI62-F0) MAGNETS				1	224.9	295.7	520.6

## MAIN INJECTOR FABRICATION, CONSTRUCTION, INSTALLATION COST ESTIMATE SUMMARY - B

PRINTED 7-AUG-92 12:47:15

## LEVEL 5 SUMMARY - DIRECT COST

DETAIL PAGE #	WBS	DESCRIPTION	MATERIAL K\$	LABOR K\$	TOTAL K\$	QUANT REQ'D	MAT'L K\$	LABOR K\$	GRAND TOT K\$
S-074	1.1.1.5.1	120GEV MAGNETS/DIPOLES	4.4	5.6	9.9	1	4.4	5.6	9.9
S-076	1.1.1.5.4	120GEV MAGNETS/TRIM DIPOLES	1.6	2.3	3.9	1	1.6	2.3	3.9
S-024	1.1.1.5	120 GEV (F0-F17) MAGNETS				1	6.0	7.9	13.9
S-077	1.1.1.6.1	SLOW SPILL MAGNETS/DIPOLES	2.8	8.6	11.4	1	2.8	8.6	11.4
S-078	1.1.1.6.2	SLOW SPILL MAGS/BQB	0.4	1.7	2.1	1	0.4	1.7	2.1
S-079	1.1.1.6.4	SLOW SPILL MAGNETS/BUMPS	5.6	8.1	13.7	1	5.6	8.1	13.7
S-025	1.1.1.6	SLOW SPILL (F18-SY) MAGNETS				1	8.7	18.4	27.2
S-080	1.1.1.8.1	ABORT LINE MAGNETS/DIPOLES	1.1	1.4	2.5	1	1.1	1.4	2.5
S-081	1.1.1.8.2	ABORT LINE MAGNETS/QUADS	1.4	6.6	8.0	1	1.4	6.6	8.0
S-082	1.1.1.8.4	ABORT LINE MAGNETS/TRIM DIPOLES	0.8	1.2	2.0	1	0.8	1.2	2.0
S-083	1.1.1.8.5	ABORT LINE MAGNETS/LAMBERTSONS	73.7	110.3	183.9	1	73.7	110.3	183.9
S-026	1.1.1.8	ABORT LINE MAGNETS				1	77.0	119.4	196.4
S-084	1.1.1.10.1	DIPOLE TOOLING	821.5	189.6	1,011.1	1	821.5	189.6	1,011.1
S-085	1.1.1.10.2	QUADRUPOLE TOOLING	6.0	12.8	18.8	1	6.0	12.8	18.8
S-086	1.1.1.10.3	SPECIAL MAGNET TOOLING	5.0	5.8	10.8	1	5.0	5.8	10.8
S-087	1.1.1.10.4	SPECIAL MAGNET TOOLING	22.0	4.6	26.6	1	22.0	4.6	26.6
S-088	1.1.1.10.5	LAMBERTSON MAGNET TOOLING	149.4	36.1	185.5	1	149.4	36.1	185.5
S-027	1.1.1.10	MAGNET TOOLING				1	1,003.8	248.9	1,252.7

## MAIN INJECTOR FABRICATION, CONSTRUCTION, INSTALLATION COST ESTIMATE SUMMARY - B

PRINTED 7-AUG-92 12:47:15

## LEVEL 5 SUMMARY - DIRECT COST

DETAIL PAGE #	WBS	DESCRIPTION	MATERIAL K\$	LABOR K\$	TOTAL K\$	QUANT REQ'D	MAT'L K\$	LABOR K\$	GRAND TOT K\$
87	1.1.2.1.1	MIR VACUUM SYS/VACUUM CHAMBER,BELLOWS	857.9	642.7	1,500.6	1	857.9	642.7	1,500.6
88	1.1.2.1.2	MIR VACUUM SYS/ROUGH PUMPS,TURBO CARTS	553.7	4.2	558.0	1	553.7	4.2	558.0
89	1.1.2.1.3	MIR VACUUM SYS/GAUGES & CABLES	210.0	21.5	231.5	1	210.0	21.5	231.5
S-028	1.1.2.1	MIR VACUUM SYSTEM				1	1,821.6	668.4	2,290.1
S-089	1.1.2.10.1	BML VACUUM/CHAMBERS & BELLOWS	260.0	235.6	495.7	1	260.0	235.6	495.7
S-090	1.1.2.10.2	BML VACUUM/ROUGH PUMPS/TURBO CARTS	228.3	2.0	230.3	1	228.3	2.0	230.3
S-091	1.1.2.10.3	BML VACUUM/GAUGES & CABLES	65.0	1.7	66.7	1	65.0	1.7	66.7
S-029	1.1.2.10	BML VACUUM SYSTEM				1	553.4	239.3	792.7
S-092	1.1.3.1.1	MIR PWR SUP/DIPOLE SUPPLY	3,689.0	1,623.0	5,311.9	1	3,689.0	1,623.0	5,311.9
101	1.1.3.1.2	MIR PWR SUP/QUADRUPOLE SUPPLIES	3.3	382.2	385.5	1	3.3	382.2	385.5
102	1.1.3.1.3	MIR PWR SUP/SEXTUPOLE SUPPLIES	272.1	60.4	332.5	1	272.1	60.4	332.5
103	1.1.3.1.4	MIR PWR SUP/CORRECTION ELEMENT SUPPLIES	0.0	40.1	40.1	1	0.0	40.1	40.1
104	1.1.3.1.6	MIR INJECTOR REGULATION SYSTEM	60.7	185.6	246.3	1	60.7	185.6	246.3
105	1.1.3.1.7	MIR REGULATION SUPPLIES	22.4	110.5	132.8	1	22.4	110.5	132.8
106	1.1.3.1.8	MIR ABORT SUPPLY	12.0	7.4	19.4	1	12.0	7.4	19.4
S-030	1.1.3.1	MIR POWER SUPPLIES				1	4,059.4	2,409.0	6,468.5
107	1.1.3.2.1	8GEV LINE/DIPOLE POWER SUPPLIES	68.3	78.2	146.5	1	68.3	78.2	146.5
108	1.1.3.2.2	8GEV LINE/ QUADRUPOLE POWER SUPPLIES	62.3	71.3	133.6	1	62.3	71.3	133.6
109	1.1.3.2.3	8GEV LINE/CORR ELEMENT POWER SUPPLIES	104.5	64.7	169.2	1	104.5	64.7	169.2
110	1.1.3.2.4	8GEV LINE/INJ LAMBERTSON POWER SUPPLY	0.2	6.0	6.2	1	0.2	6.0	6.2

## MAIN INJECTOR FABRICATION, CONSTRUCTION, INSTALLATION COST ESTIMATE SUMMARY - B

PRINTED 7-AUG-92 12:47:15

## LEVEL 5 SUMMARY - DIRECT COST

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S-031	1.1.3.2	8GEV LINE/POWER SUPPLY				1	235.3	220.1	455.4
111	1.1.3.3.1	150GEV PROT LINE/DIPOLE SUPPLIES	412.0	111.8	523.8	1	412.0	111.8	523.8
112	1.1.3.3.2	150GEV PROT LINE/QUADRUPOLE SUPPLIES	851.0	139.1	990.1	1	851.0	139.1	990.1
113	1.1.3.3.3	150GEV PROT LINE/CORR ELE SUPPLIES	36.7	41.1	77.8	1	36.7	41.1	77.8
117	1.1.3.4.3	150GEV PBAR LINE/CORR ELEMENT SUPPLIES	36.7	57.3	94.0	1	36.7	57.3	94.0
120	1.1.3.5.2	PBAR PROD LINE(F11 TO F17)/QUADRUPOLE SUP	241.0	72.4	313.4	1	241.0	72.4	313.4
121	1.1.3.5.3	PBAR PROD LINE(F11 TO F17)/CORR ELEMENT S	6.1	18.8	24.9	1	6.1	18.8	24.9
S-034	1.1.3.5	PBAR PROD LINE(F11 TO F17)/POWER SUPPLIES				1	247.1	91.2	338.3
122	1.1.3.6.1	SLOW SPILL LINE/DIPOLE SUPPLIES	551.0	72.3	623.3	1	551.0	72.3	623.3
123	1.1.3.6.2	SLOW SPILL LINE/QUADRUPOLE SUPPLIES	360.0	76.1	436.1	1	360.0	76.1	436.1
S-093	1.1.4.1.1	MIR RF 53 MHZ	3,748.8	598.6	4,347.4	1	3,748.8	598.6	4,347.4
S-094	1.1.4.1.2	COALESCING SYSTEM	20.2	31.7	52.0	1	20.2	31.7	52.0
S-036	1.1.4.1	RF SYSTEMS/RING				1	3,769.0	630.3	4,399.4
S-095	1.1.6.1.1	8 GEV PROT INJ KICKER	233.9	232.6	466.5	1	233.9	232.6	466.5
S-096	1.1.6.1.2	8 GEV PBAR INJECTION KICKER	318.0	367.8	685.8	1	318.0	367.8	685.8
S-098	1.1.6.1.4	MIR 150 GEV PBAR EXT KICKER	28.0	129.4	157.4	1	28.0	129.4	157.4
S-099	1.1.6.1.5	MIR EXT PROTON ABORT KICKER	208.9	91.6	300.5	1	208.9	91.6	300.5
S-037	1.1.6.1	MIR EXTRACTION				1	788.8	821.4	1,610.2

## MAIN INJECTOR FABRICATION, CONSTRUCTION, INSTALLATION COST ESTIMATE SUMMARY - B

PRINTED 7-AUG-92 12:47:15

## LEVEL 5 SUMMARY - DIRECT COST

DETAIL PAGE #	WBS	DESCRIPTION	MATERIAL K\$	LABOR K\$	TOTAL K\$	QUANT REQ'D	MAT'L K\$	LABOR K\$	GRAND TOT K\$
145	1.1.6.2.1	MIR SLOW EXT/ELECTROSTATIC SEPTUM	0.0	23.0	23.0	1	0.0	23.0	23.0
146	1.1.6.2.2	MIR SLOW EXT/SPECIAL MAGNETIC ELEMENTS	142.0	21.2	163.2	1	142.0	21.2	163.2
147	1.1.6.2.3	MIR SLOW EXT/QXR SYSTEM	62.3	100.4	162.6	1	62.3	100.4	162.6
S-038	1.1.6.2	SLOW EXTRACTION				1	204.2	144.6	348.9
S-100	1.1.6.3.1	TEV 150 GEV PROT INJ KICKER	49.0	139.1	188.1	1	49.0	139.1	188.1
S-101	1.1.6.3.2	TEV 150 GEV PBAR INJ KICKER	13.0	51.9	64.9	1	13.0	51.9	64.9
S-039	1.1.6.3	TEV 150 GEV PBAR INJECTION				1	62.0	191.0	253.0
152	1.1.8.1.1	MIR INST/BPM SYSTEM	88.8	151.2	240.0	1	88.8	151.2	240.0
153	1.1.8.1.2	MIR INST/BLM SYSTEM	28.4	49.6	78.0	1	28.4	49.6	78.0
154	1.1.8.1.3	MIR INST/LONGITUDINAL PICKUP	6.3	1.0	7.3	1	6.3	1.0	7.3
155	1.1.8.1.4	MIR INST/TRANSVERSE PICKUP	11.5	1.7	13.1	2	22.9	3.4	26.3
156	1.1.8.1.5	MIR INST/DAMPERS	193.3	34.0	227.3	2	386.7	68.0	454.7
157	1.1.8.1.6	MIR INST/FLYING WIRES	3.3	44.9	48.2	3	9.8	134.7	144.6
158	1.1.8.1.7	MIR INST/D.C.C.T.	5.4	2.9	8.3	1	5.4	2.9	8.3
159	1.1.8.1.8	MIR INST/SCRAPERS	9.5	54.3	63.8	1	9.5	54.3	63.8
S-040	1.1.8.1	MIR INSTRUMENTATION				1	557.9	465.1	1,023.0
164	1.1.8.10.1	MIR INST/BEAMLINE AGGREGATE BPM SYSTEM	132.8	73.5	206.3	1	132.8	73.5	206.3
165	1.1.8.10.2	MIR INST/BEAMLINE	29.7	14.6	44.3	1	29.7	14.6	44.3
166	1.1.8.10.7	MIR INST/AGGREGATE TORROIDS	3.9	1.1	5.0	10	39.3	10.6	49.9
167	1.1.8.10.9	MIR INST/BEAMLINE SEMS	271.3	53.8	325.0	1	271.3	53.8	325.0

## MAIN INJECTOR FABRICATION, CONSTRUCTION, INSTALLATION COST ESTIMATE SUMMARY - B

PRINTED 7-AUG-92 12:47:15

## LEVEL 5 SUMMARY - DIRECT COST

DETAIL PAGE #	WBS	DESCRIPTION	MATERIAL K\$	LABOR K\$	TOTAL K\$	QUANT REQ'D	MAT'L K\$	LABOR K\$	GRAND TOT K\$
145	1.1.6.2.1	MIR SLOW EXT/ELECTROSTATIC SEPTUM	0.0	23.0	23.0	1	0.0	23.0	23.0
146	1.1.6.2.2	MIR SLOW EXT/SPECIAL MAGNETIC ELEMENTS	142.0	21.2	163.2	1	142.0	21.2	163.2
147	1.1.6.2.3	MIR SLOW EXT/QXR SYSTEM	62.3	100.4	162.6	1	62.3	100.4	162.6
S-038	1.1.6.2	SLOW EXTRACTION				1	204.2	144.6	348.9
S-100	1.1.6.3.1	TEV 150 GEV PROT INJ KICKER	49.0	139.1	188.1	1	49.0	139.1	188.1
S-101	1.1.6.3.2	TEV 150 GEV PBAR INJ KICKER	13.0	51.9	64.9	1	13.0	51.9	64.9
S-039	1.1.6.3	TEV 150 GEV PBAR INJECTION				1	62.0	191.0	253.0
152	1.1.8.1.1	MIR INST/BPM SYSTEM	88.8	151.2	240.0	1	88.8	151.2	240.0
153	1.1.8.1.2	MIR INST/BLM SYSTEM	28.4	49.6	78.0	1	28.4	49.6	78.0
154	1.1.8.1.3	MIR INST/LONGITUDINAL PICKUP	6.3	1.0	7.3	1	6.3	1.0	7.3
155	1.1.8.1.4	MIR INST/TRANSVERSE PICKUP	11.5	1.7	13.1	2	22.9	3.4	26.3
156	1.1.8.1.5	MIR INST/DAMPERS	193.3	34.0	227.3	2	386.7	68.0	454.7
157	1.1.8.1.6	MIR INST/FLYING WIRES	3.3	44.9	48.2	3	9.8	134.7	144.6
158	1.1.8.1.7	MIR INST/D.C.C.T.	5.4	2.9	8.3	1	5.4	2.9	8.3
159	1.1.8.1.8	MIR INST/SCRAPERS	9.5	54.3	63.8	1	9.5	54.3	63.8
S-040	1.1.8.1	MIR INSTRUMENTATION				1	557.9	465.1	1,023.0
164	1.1.8.10.1	MIR INST/BEAMLINE AGGREGATE BPM SYSTEM	132.8	73.5	206.3	1	132.8	73.5	206.3
165	1.1.8.10.2	MIR INST/BEAMLINE	29.7	14.6	44.3	1	29.7	14.6	44.3
166	1.1.8.10.7	MIR INST/AGGREGATE TORROIDS	3.9	1.1	5.0	10	39.3	10.6	49.9
167	1.1.8.10.9	MIR INST/BEAMLINE SEMS	271.3	53.8	325.0	1	271.3	53.8	325.0



## MAIN INJECTOR FABRICATION, CONSTRUCTION, INSTALLATION COST ESTIMATE SUMMARY - B

PRINTED 7-AUG-92 12:47:15

## LEVEL 5 SUMMARY - DIRECT COST

DETAIL PAGE #	WBS	DESCRIPTION	MATERIAL K\$	LABOR K\$	TOTAL K\$	QUANT REQ'D	MAT'L K\$	LABOR K\$	GRAND TOT K\$
S-045	1.1.8.10	MIR INSTRUMENTATION				1	473.1	152.4	625.5
188	1.1.9.1.1	MIR CONTROLS/COMPUTERS, LINKS	180.1	29.8	189.9	1	180.1	29.8	189.9
189	1.1.9.1.2	MIR CONTROLS/CRATES, CARDS, RELAY RACKS, CAB	180.2	37.8	198.0	1	180.2	37.8	198.0
170	1.1.9.1.3	MIR CONTROLS/CATV SYSTEM	111.9	64.5	176.4	1	111.9	64.5	176.4
171	1.1.9.1.4	MIR CONTROLS/FIRUS SYSTEM	11.4	39.9	51.3	1	11.4	39.9	51.3
172	1.1.9.1.5	MIR CONTROLS/ETHERNET	53.4	0.0	53.4	1	53.4	0.0	53.4
S-046	1.1.9.1	MIR CONTROLS				1	497.0	172.1	669.1
173	1.1.9.10.1	BML CONTROLS/COMPUTERS, LINKS	6.1	28.3	34.4	1	6.1	28.3	34.4
174	1.1.9.10.2	BML CONTROLS/CRATES, RELAY RACKS, CABLING	290.8	54.6	345.4	1	290.8	54.6	345.4
S-102	1.1.12.1.1	MIR INSTALL WATER SYSTEM	2,881.4	1,877.2	4,758.6	1	2,881.4	1,877.2	4,758.6
S-103	1.1.12.1.2	MIR CABLES	353.7	421.4	775.1	1	353.7	421.4	775.1
S-104	1.1.12.1.3	MIR ABORT SYSTEMS	151.9	141.9	293.8	1	151.9	141.9	293.8
S-048	1.1.12.1	MIR MECHANICAL UTILITIES				1	3,387.0	2,440.5	5,827.5
S-105	1.1.12.10.1	BML WATER SYSTEMS	486.1	517.0	1,003.0	1	486.1	517.0	1,003.0
S-106	1.1.12.10.2	BEAMLINE CABLES	572.6	591.9	1,164.5	1	572.6	591.9	1,164.5
S-049	1.1.12.10	BEAMLINE AGGREGATE				1	1,058.7	1,108.9	2,167.6
S-107	1.1.13.1.1	MIR MAGNET INSTALLATION	1,253.0	1,466.4	2,719.4	1	1,253.0	1,466.4	2,719.4
S-108	1.1.13.1.2	MIR PULSED POWER DISTRIBUTION	1,737.3	1,093.5	2,830.7	1	1,737.3	1,093.5	2,830.7

## MAIN INJECTOR FABRICATION, CONSTRUCTION, INSTALLATION COST ESTIMATE SUMMARY - B

PRINTED 7-AUG-92 12:47:15

## LEVEL 5 SUMMARY - DIRECT COST

DETAIL PAGE #	WBS	DESCRIPTION	MATERIAL K\$	LABOR K\$	TOTAL K\$	QUANT REQ'D	MAT'L K\$	LABOR K\$	GRAND TOT K\$
209	1.1.13.1.3	MIR VACUUM INSTALLATION	0.0	171.0	171.0	1	0.0	171.0	171.0
210	1.1.13.1.4	MIR INSTRUMENTATION INSTALLATION	0.0	106.0	106.0	1	0.0	106.0	106.0
211	1.1.13.1.5	MIR CONTROLS INSTALLATION	5.2	87.4	92.5	1	5.2	87.4	92.5
S-109	1.1.13.1.6	MIR ABORT INSTALLATION	14.9	119.0	133.9	1	14.9	119.0	133.9
S-110	1.1.13.1.7	MIR SLOW EXTRACTION INSTALLATION	0.0	75.6	75.6	1	0.0	75.6	75.6
218	1.1.13.1.8	MIR SAFETY SYSTEM INSTALLATION	14.2	83.7	97.9	1	14.2	83.7	97.9
S-050	1.1.13.1	MIR INSTALLATION				1	3,024.5	3,202.7	6,227.2
S-111	1.1.13.2.1	8 GEV LINE/SURVEY & ALIGN MAGNETS	161.6	487.2	648.7	1	161.6	487.2	648.7
220	1.1.13.2.2	8 GEV LINE CORR MAGNET INSTALLATION	0.0	17.7	17.7	1	0.0	17.7	17.7
221	1.1.13.2.3	8 GEV LINE VACUUM INSTALLATION	0.0	22.5	22.5	1	0.0	22.5	22.5
222	1.1.13.2.4	8 GEV LINE INSTRUMENTATION INSTALLATION	0.0	86.4	86.4	1	0.0	86.4	86.4
S-051	1.1.13.2	8 GEV LINE				1	161.6	613.8	775.4
S-112	1.1.13.3.1	150 GEV PROT LINE MAGNET INSTALLATION	144.7	214.7	359.4	1	144.7	214.7	359.4
226	1.1.13.3.2	150 GEV PROT LINE/CORRECTION ELE INSTALL	0.0	17.7	17.7	1	0.0	17.7	17.7
227	1.1.13.3.3	150 GEV PROT LINE/VACUUM INSTALLATION	0.0	16.1	16.1	1	0.0	16.1	16.1
228	1.1.13.3.4	150 GEV PROT LINE/INST INSTALLATION	0.0	3.2	3.2	1	0.0	3.2	3.2
S-052	1.1.13.3	150 GEV PROT LINE				1	144.7	251.7	396.4
S-113	1.1.13.4.1	150 GEV PBAR LINE/MAGNET INSTALLATION	0.0	3.2	3.2	1	0.0	3.2	3.2
S-114	1.1.13.5.1	PBAR PROD LINE/MAGNET INSTALLATION	0.0	3.2	3.2	1	0.0	3.2	3.2
S-115	1.1.13.6.1	SLOW SPILL/MAGNET INSTALLATION	28.0	138.0	166.0	1	28.0	138.0	166.0

## MAIN INJECTOR FABRICATION, CONSTRUCTION, INSTALLATION COST ESTIMATE SUMMARY - B

PRINTED 7-AUG-92 12:47:15

## LEVEL 5 SUMMARY - DIRECT COST

DETAIL PAGE #	WBS	DESCRIPTION	MATERIAL K\$	LABOR K\$	TOTAL K\$	QUANT REQ	MAT'L K\$	LABOR K\$	GRAND TOT K\$
244	1.1.13.6.2	SLOW SPILL/CORRECTION ELEMENT INSTALL	0.0	17.7	17.7	1	0.0	17.7	17.7
245	1.1.13.6.3	SLOW SPILL/VACUUM INSTALLATION	0.0	16.3	16.3	1	0.0	16.3	16.3
246	1.1.13.6.4	SLOW SPILL/INST INSTALLATION	0.0	3.2	3.2	1	0.0	3.2	3.2
S-055	1.1.13.6	SLOW SPILL INSTALLATION				1	28.0	175.3	203.3
247	1.1.13.7.1	MIR/NEW TEV E0 VACUUM	28.7	3.6	32.3	1	28.7	3.6	32.3
S-116	1.1.13.7.2	MIR/NEW TEV F0 VACUUM	237.0	434.0	671.1	1	237.0	434.0	671.1
S-056	1.1.13.7	MIR/NEW TEV VACUUM				1	265.7	437.6	703.4
S-117	1.1.13.10.2	BML PPS INSTALLATION	105.0	454.1	559.1	1	105.0	454.1	559.1
253	1.1.13.10.5	BML CONTROLS INSTALLATION	11.9	36.0	47.9	1	11.9	36.0	47.9
254	1.1.13.10.8	BML SAFETY SYSTEM INSTALLATION	11.1	76.3	87.5	1	11.1	76.3	87.5
S-057	1.1.13.10	BEAMLINE AGGREGATE				1	128.0	566.4	694.4

## MAIN INJECTOR FABRICATION, CONSTRUCTION, INSTALLATION COST ESTIMATE SUMMARY - B

PRINTED 7-AUG-92 12:47:15

## LEVEL 6 SUMMARY - DIRECT COST

DETAIL PAGE #	WBS	DESCRIPTION	MATERIAL K\$	LABOR K\$	TOTAL K\$	QUANT REQ'D	MAT'L K\$	LABOR K\$	GRAND TOT K\$
1	1.1.1.1.1.1	MIR MAGNETS/240" DIPOLES IDA	93.8	4.9	98.7	105	9,846.0	517.6	10,363.6
2	1.1.1.1.1.2	MIR MAGNETS/240" DIPOLES IDB	93.8	4.9	98.7	105	9,846.0	517.6	10,363.6
3	1.1.1.1.1.3	MIR MAGNETS/160" DIPOLES IDC	73.0	4.8	77.9	61	4,455.8	295.4	4,751.3
4	1.1.1.1.1.4	MIR MAGNETS/160" DIPOLES IDD	73.0	4.8	77.9	61	4,455.8	295.4	4,751.3
S-058	1.1.1.1.1	MIR MAGNETS/DIPOLES				1	28,603.6	1,626.1	30,229.8
5	1.1.1.1.2.3	MIR MAGNETS/100" QUADS IQC (NEW)	15.7	19.6	35.3	31	486.6	608.6	1,095.2
6	1.1.1.1.2.4	MIR MAGNETS/116" QUAD IQD (NEW)	17.6	21.6	39.2	47	827.9	1,015.4	1,843.3
7	1.1.1.1.2.5	MIR MAGNETS/84" QUADS BQB (REWORK)	0.4	1.7	2.1	127	46.0	221.0	267.0
8	1.1.1.1.2.9	MIR MAGNETS/84" QUADS BQB ROLLED (REWORK)	0.4	1.7	2.1	1	0.4	1.7	2.1
S-059	1.1.1.1.2	MIR MAGNETS/QUADS				1	1,360.9	1,846.8	3,207.6
9	1.1.1.1.3.1	MIR MAGNETS/SEXTUPOLES 18" ISA (NEW)	3.1	9.6	12.6	108	331.3	1,033.6	1,364.8
10	1.1.1.1.3.2	MIR MAGNETS/TRIM QUAD (REWORK)	0.4	0.6	1.0	24	9.6	13.9	23.5
11	1.1.1.1.3.3	MIR MAGNETS/SKEW QUAD (REWORK)	0.4	0.6	1.0	18	7.2	10.4	17.6
12	1.1.1.1.3.4	MIR MAGNETS/SKEW SEXTUPOLE (REWORK)	0.4	0.6	1.0	12	4.8	7.0	11.8
13	1.1.1.1.3.5	MIR MAGNETS/TRIM SEXTUPOLE (REWORK)	0.4	0.0	0.4	28	11.2	0.0	11.2
14	1.1.1.1.3.6	MIR MAGNETS/OCTUPOLES (REWORK)	0.4	0.0	0.4	20	8.0	0.0	8.0
15	1.1.1.1.3.7	MIR MAGNETS/CR SKEW QUADS	0.5	1.2	1.7	4	2.0	4.6	6.6
S-060	1.1.1.1.3	MIR MAGNETS/CORRECTORS				1	374.1	1,069.5	1,443.6
16	1.1.1.1.4.2	MIR MAGNETS/HORIZ TRIM - IDH (NEW)	1.1	0.9	1.9	104	111.8	90.5	202.3
17	1.1.1.1.4.4	MIR MAGNETS/VERT TRIM DIP IDV (NEW)	1.0	1.2	2.1	104	100.7	120.6	221.4

## MAIN INJECTOR FABRICATION, CONSTRUCTION, INSTALLATION COST ESTIMATE SUMMARY - B

PRINTED 7-AUG-92 12:47:15

## LEVEL 6 SUMMARY - DIRECT COST

DETAIL PAGE #	WBS	DESCRIPTION	MATERIAL K\$	LABOR K\$	TOTAL K\$	QUANT REQ'D	MAT'L K\$	LABOR K\$	GRAND TOT K\$
19	1.1.1.2.1.5	8GEV MAGNETS/SDB 120" DIPOLES (MORE)	53.6	50.5	104.1	2	107.3	101.0	208.2
20	1.1.1.2.1.7	8GEV MAGNETS/B2 DIPOLE BDM (REWORK)	0.5	0.7	1.2	51	27.8	35.5	63.3
21	1.1.1.2.1.12	8GEV MAGNETS/EPB DIPOLE 5-1.5-120 (REWORK)	0.6	5.8	6.4	3	1.8	17.4	19.2
22	1.1.1.2.1.13	8GEV MAGNETS/B3 DIPOLE ODM (REWORK)	0.5	0.7	1.2	2	1.1	1.4	2.5
S-062	1.1.1.2.1	8GEV MAGNETS/DIPOLES				1	138.0	155.3	293.3
23	1.1.1.2.2.7	8GEV MAGNETS/SQA(17") QUADS (REWORK)	0.4	1.5	1.9	17	6.6	25.1	31.7
24	1.1.1.2.2.8	8GEV MAGNETS/SQA(17") QUADS (MORE)	10.0	20.0	29.9	34	338.8	679.4	1,018.1
S-063	1.1.1.2.2	8GEV MAGNETS/QUADS				1	345.3	704.5	1,049.8
25	1.1.1.2.4.1	8GEV MAGNETS/H TRIM DIPOLE HDC (REWORK)	0.2	0.3	0.5	25	5.0	7.3	12.3
26	1.1.1.2.4.3	8GEV MAGNETS/V TRIM DIPOLE (REWORK)	0.2	0.3	0.5	25	5.0	7.3	12.3
S-064	1.1.1.2.4	8GEV MAGNETS/TRIM DIPOLES				1	10.0	14.5	24.5
27	1.1.1.2.5.1	8GEV MAGNETS/INJ LAMB ELA A0 106" (REWORK)	1.0	4.6	5.6	1	1.0	4.6	5.6
S-065	1.1.1.2.5	8GEV MAGNETS/LAMBERTSONS				1	1.0	4.6	5.6
28	1.1.1.3.1.7	150GEV P MAGNETS/B2(240") DIP BDM (REWORK)	0.5	0.7	1.2	15	8.2	10.4	18.6
S-066	1.1.1.3.1	150GEV P MAGNETS/DIPOLES				1	8.2	10.4	18.6
29	1.1.1.3.2.5	150GEV P MAGNETS/3Q84 QUADS BQB (REWORK)	0.4	1.7	2.1	13	4.7	22.6	27.3
30	1.1.1.3.2.6	150GEV P MAGNETS/3Q52 QUADS BQA (REWORK)	0.5	2.2	2.7	4	1.9	8.8	10.7

## MAIN INJECTOR FABRICATION, CONSTRUCTION, INSTALLATION COST ESTIMATE SUMMARY - B

PRINTED 7-AUG-92 12:47:15

## LEVEL 6 SUMMARY - DIRECT COST

DETAIL PAGE #	WBS	DESCRIPTION	MATERIAL K\$	LABOR K\$	TOTAL K\$	QUANT REQ'D	MAT'L K\$	LABOR K\$	GRAND TOT K\$
S-067	1.1.1.3.2	150GEV P MAGNETS/QUADS				1	6.6	31.4	38.0
31	1.1.1.3.4.1	150GEV P MAGNETS/H TRIM DIPOLE (REWORK)	0.2	0.3	0.5	6	1.2	1.7	2.9
32	1.1.1.3.4.3	150GEV P MAGNETS/V TRIM DIPOLE (REWORK)	0.2	0.3	0.5	6	1.2	1.7	2.9
S-068	1.1.1.3.4	150GEV P MAGNETS/DIPOLE TRIMS				1	2.4	3.5	5.9
33	1.1.1.3.5.2	150GEV P/MI LAMBERTSON 94" (2.4M) (NEW)	14.6	33.6	48.2	1	14.6	33.6	48.2
34	1.1.1.3.5.3	150GEV P/MI LAMBERTSON 189" (4.8M) (NEW)	34.0	55.5	89.5	2	68.1	111.0	179.1
35	1.1.1.3.5.5	150GEV P/MI C-MAGNET 118" (NEW)	25.0	21.1	46.1	5	125.0	105.7	230.7
S-069	1.1.1.3.5	150GEV P MAGNETS/LAMBERTSONS				1	207.7	250.3	458.0
36	1.1.1.4.1.7	150GEV PBAR/B2 240" DIPOLES BDM (REWORK)	0.5	0.7	1.2	15	8.2	10.4	18.6
S-070	1.1.1.4.1	150GEV PBAR MAGNETS/DIPOLES				1	8.2	10.4	18.6
37	1.1.1.4.2.5	150GEV PBAR MAGNETS/84" QUADS BQB (REWORK)	0.4	1.7	2.1	13	4.7	22.6	27.3
38	1.1.1.4.2.6	150GEV PBAR MAGNETS/3Q52 QUADS BQA (REWORK)	0.5	2.2	2.7	4	1.9	8.8	10.7
S-071	1.1.1.4.2	150GEV PBAR MAGNETS/QUADS				1	6.6	31.4	38.0
39	1.1.1.4.4.1	150GEV PBAR MAGNETS/H TRIM DIPOLE (REWORK)	0.2	0.3	0.5	6	1.2	1.7	2.9
40	1.1.1.4.4.3	150GEV PBAR MAGNETS/V TRIM DIPOLE (REWORK)	0.2	0.3	0.5	6	1.2	1.7	2.9
S-072	1.1.1.4.4	150GEV PBAR MAGNETS/TRIM DIPOLES				1	2.4	3.5	5.9

## MAIN INJECTOR FABRICATION, CONSTRUCTION, INSTALLATION COST ESTIMATE SUMMARY - B

PRINTED 7-AUG-92 12:47:15

## LEVEL 6 SUMMARY - DIRECT COST

DETAIL PAGE #	WBS	DESCRIPTION	MATERIAL K\$	LABOR K\$	TOTAL K\$	QUANT REQ'D	MAT'L K\$	LABOR K\$	GRAND TOT K\$
41	1.1.1.4.5.2	150GEV PBAR/MI LAMBERTSON 94" (NEW)	14.6	33.6	48.2	1	14.6	33.6	48.2
42	1.1.1.4.5.3	150GEV PBAR/MI LAMBERTSON 189" (NEW)	34.0	55.5	89.5	2	68.1	111.0	179.1
43	1.1.1.4.5.5	150GEV PBAR/MI C-MAGNET 118" (NEW)	25.0	21.1	46.1	5	125.0	105.7	230.7
S-073	1.1.1.4.5	150GEV PBAR MAGNETS/LAMBERTSONS				1	207.7	250.3	458.0
44	1.1.1.5.1.13	120GEV MAGNETS/B3 DIPOLE ODM (REWORK)	0.5	0.7	1.2	8	4.4	5.6	9.9
47	1.1.1.5.4.1	120GEV MAGNETS/HDC TRIM DIPOLE (REWORK)	0.2	0.3	0.5	4	0.8	1.2	2.0
48	1.1.1.5.4.3	120GEV MAGNETS/VDC MR TRIM DIPOLE (REWORK)	0.2	0.3	0.5	4	0.8	1.2	2.0
S-076	1.1.1.5.4	120GEV MAGNETS/TRIM DIPOLES				1	1.6	2.3	3.9
50	1.1.1.6.1.12	SLOW SPILL MAGNETS/EPB 1-1.5-120 (REWORK)	0.6	5.8	6.4	1	0.6	5.8	6.4
51	1.1.1.6.1.13	SLOW SPILL MAGS/B3 DIPOLE ODM (REWORK)	0.5	0.7	1.2	4	2.2	2.8	5.0
53	1.1.1.6.2.5	SLOW SPILL MAGS/84" QUADS BQB (REWORK)	0.4	1.7	2.1	1	0.4	1.7	2.1
55	1.1.1.6.4.1	SLOW SPILL MAGS/H TRIM DIPOLE (REWORK)	0.2	0.3	0.5	14	2.8	4.1	6.9
56	1.1.1.6.4.3	SLOW SPILL MAGS/V TRIM DIPOLE (REWORK)	0.2	0.3	0.5	14	2.8	4.1	6.9
S-079	1.1.1.6.4	SLOW SPILL MAGNETS/BUMPS				1	5.6	8.1	13.7
57	1.1.1.8.1.7	ABORT LINE MAGNETS/B2 BDM DIPOLE (REWORK)	0.5	0.7	1.2	2	1.1	1.4	2.5
S-080	1.1.1.8.1	ABORT LINE MAGNETS/DIPOLES				1	1.1	1.4	2.5
58	1.1.1.8.2.6	ABORT LINE MAGNETS/3Q62 QUADS BQA (REWORK)	0.5	2.2	2.7	3	1.4	6.6	8.0
S-081	1.1.1.8.2	ABORT LINE MAGNETS/QUADS				1	1.4	6.6	8.0

## MAIN INJECTOR FABRICATION, CONSTRUCTION, INSTALLATION COST ESTIMATE SUMMARY - B

PRINTED 7-AUG-92 12:47:15

## LEVEL 8 SUMMARY - DIRECT COST

DETAIL PAGE #	WBS	DESCRIPTION	MATERIAL K\$	LABOR K\$	TOTAL K\$	QUANT REQ'D	MAT'L K\$	LABOR K\$	GRAND TOT K\$
59	1.1.1.8.4.1	ABORT LINE MAGNETS/H TRIM DIPOLE (REWORK)	0.2	0.3	0.5	2	0.4	0.6	1.0
60	1.1.1.8.4.3	ABORT LINE MAGNETS/V TRIM DIPOLE (REWORK)	0.2	0.3	0.5	2	0.4	0.6	1.0
S-082	1.1.1.8.4	ABORT LINE MAGNETS/TRIM DIPOLES				1	0.8	1.2	2.0
61	1.1.1.8.5.2	ABORT LINE MAGNETS/MI LAMBERTSON 94" (NEW	14.6	33.6	48.2	1	14.6	33.6	48.2
62	1.1.1.8.5.3	ABORT LINE MAGNETS/MI LAMBERTSON 189" (NE	34.0	55.5	89.5	1	34.0	55.5	89.5
63	1.1.1.8.5.5	ABORT LINE MAGNETS/F-17 C-MAGNET 118" (NE	25.0	21.1	46.1	1	25.0	21.1	46.1
S-083	1.1.1.8.5	ABORT LINE MAGNETS/LAMBERTSONS				1	73.7	110.3	183.9
64	1.1.1.10.1.1	DIPOLE TOOLING/MIR DIPOLE	766.8	153.8	920.5	1	766.8	153.8	920.5
65	1.1.1.10.1.5	DIPOLE TOOLING/SDB-120"	42.7	21.9	64.6	1	42.7	21.9	64.6
66	1.1.1.10.1.7	DIPOLE TOOLING/B2 240" DIPOLE (REWORK)	1.0	1.2	2.2	1	1.0	1.2	2.2
67	1.1.1.10.1.12	DIPOLE TOOLING/EPB DIPOLE 5-1.5-120 (MORE	10.0	11.6	21.6	1	10.0	11.6	21.6
68	1.1.1.10.1.13	DIPOLE TOOLING/B3 DIPOLE (REWORK)	1.0	1.2	2.2	1	1.0	1.2	2.2
S-084	1.1.1.10.1	DIPOLE TOOLING				1	821.5	189.6	1,011.1
70	1.1.1.10.2.5	QUAD TOOLING/OLD MR 84"	2.0	2.3	4.3	1	2.0	2.3	4.3
71	1.1.1.10.2.6	QUAD TOOLING/BQA 52" (REWORK)	1.0	1.2	2.2	1	1.0	1.2	2.2
72	1.1.1.10.2.8	QUAD TOOLING/SQA	3.0	9.3	12.3	1	3.0	9.3	12.3
S-085	1.1.1.10.2	QUADRUPOLE TOOLING				1	6.0	12.8	18.8
74	1.1.1.10.3.2	MR TOOLING/TRIM QUAD (REWORK)	1.0	1.2	2.2	1	1.0	1.2	2.2



## MAIN INJECTOR FABRICATION, CONSTRUCTION, INSTALLATION COST ESTIMATE SUMMARY - B

PRINTED 7-AUG-92 12:47:15

## LEVEL 8 SUMMARY - DIRECT COST

DETAIL PAGE #	WBS	DESCRIPTION	MATERIAL K\$	LABOR K\$	TOTAL K\$	QUANT REQ'D	MAT'L K\$	LABOR K\$	GRAND TOT K\$
75	1.1.1.10.3.3	MR TOOLING/SKEW QUAD (REWORK)	1.0	1.2	2.2	1	1.0	1.2	2.2
76	1.1.1.10.3.4	MR TOOLING/SKEW SEXTUPOLE (REWORK)	1.0	1.2	2.2	1	1.0	1.2	2.2
77	1.1.1.10.3.5	MR TOOLING/TRIM SEXTUPOLE (REWORK)	1.0	1.2	2.2	1	1.0	1.2	2.2
78	1.1.1.10.3.6	MR TOOLING/OCTUPOLE (REWORK)	1.0	1.2	2.2	1	1.0	1.2	2.2
S-086	1.1.1.10.3	SPECIAL MAGNET TOOLING				1	5.0	5.8	10.8
79	1.1.1.10.4.1	MR TOOLING/HORZ TRIM DIPOLE (REWORK)	1.0	1.2	2.2	1	1.0	1.2	2.2
80	1.1.1.10.4.2	MR TOOLING/HORZ TRIM DIPOLE (NEW)	10.0	1.2	11.2	1	10.0	1.2	11.2
81	1.1.1.10.4.3	MR TOOLING/VERT TRIM DIPOLE (REWORK)	1.0	1.2	2.2	1	1.0	1.2	2.2
82	1.1.1.10.4.4	MR TOOLING/VERT TRIM DIPOLE (NEW)	10.0	1.2	11.2	1	10.0	1.2	11.2
S-087	1.1.1.10.4	SPECIAL MAGNET TOOLING				1	22.0	4.6	26.6
83	1.1.1.10.5.1	LAMBERTSON TOOLING/INJ A0 TYPE (REW)	1.0	1.2	2.2	1	1.0	1.2	2.2
84	1.1.1.10.5.2	LAMBERTSON TOOLING/MI 94", 189" (NEW)	100.0	14.5	114.5	1	100.0	14.5	114.5
85	1.1.1.10.5.5	LAMBERTSON TOOLING/F-17 C MAGNET (MORE)	48.4	20.4	68.8	1	48.4	20.4	68.8
S-088	1.1.1.10.5	LAMBERTSON MAGNET TOOLING				1	149.4	36.1	185.5
90	1.1.2.10.1.1	BML VACUUM SYS/8GEV CHAMBER, BELLOWS	173.5	161.2	334.7	1	173.5	161.2	334.7
91	1.1.2.10.1.2	BML VACUUM SYS/150GEV BELLOWS, CHAMBERS	83.9	58.0	141.8	1	83.9	58.0	141.8
92	1.1.2.10.1.3	BML VACUUM SYS/SPILL BELLOWS, CHAMBERS	2.7	16.4	19.1	1	2.7	16.4	19.1
S-089	1.1.2.10.1	BML VACUUM/CHAMBERS & BELLOWS				1	260.0	235.6	495.7

## MAIN INJECTOR FABRICATION, CONSTRUCTION, INSTALLATION COST ESTIMATE SUMMARY - B

PRINTED 7-AUG-92 12:47:15

## LEVEL 6 SUMMARY - DIRECT COST

DETAIL PAGE #	WBS	DESCRIPTION	MATERIAL K\$	LABOR K\$	TOTAL K\$	QUANT REQ'D	MAT'L K\$	LABOR K\$	GRAND TOT K\$
93	1.1.2.10.2.1	BML VACUUM SYS/8GEV PUMPS	194.8	1.7	196.5	1	194.8	1.7	196.5
94	1.1.2.10.2.2	BML VACUUM SYS/150GEV PUMPS	33.5	0.3	33.8	1	33.5	0.3	33.8
96	1.1.2.10.3.1	BML VACUUM SYS/8GEV GAUGES	42.8	1.0	43.8	1	42.8	1.0	43.8
97	1.1.2.10.3.2	BML VACUUM SYS/150GEV GAUGES	22.2	0.7	22.9	1	22.2	0.7	22.9
99	1.1.3.1.1.1	MIR PWR SUP/DIPOLE SUPPLY	299.5	80.6	380.1	11	3,294.1	887.0	4,181.1
100	1.1.3.1.1.2	MIR PWR SUP/DIPOLE SUPPLY	35.9	66.9	102.8	11	394.9	735.9	1,130.8
S-092	1.1.3.1.1	MIR PWR SUP/DIPOLE SUPPLY				1	3,689.0	1,623.0	5,311.9
S-118	1.1.4.1.1.1	MIR RF 53MHZ/POWER AMPLIFIERS	1,700.9	196.3	1,897.2	1	1,700.9	196.3	1,897.2
S-119	1.1.4.1.1.2	MIR RF 53MHZ/ANODE SUPPLIES/MODULATORS	1,809.1	212.8	2,021.8	1	1,809.1	212.8	2,021.8
130	1.1.4.1.1.3	MIR RF 53MHZ/LOW LEVEL	11.3	36.5	47.9	1	11.3	36.5	47.9
131	1.1.4.1.1.4	MIR RF 53MHZ/TRANSMISSION LINE	200.5	54.2	254.7	1	200.5	54.2	254.7
132	1.1.4.1.1.6	MIR RF 53MHZ/H=588 CAVITIES	27.0	98.8	125.8	1	27.0	98.8	125.8
S-093	1.1.4.1.1	MIR RF 53 MHZ				1	3,748.8	598.6	4,347.4
133	1.1.4.1.2.1	COAL/RF CAVITIES	0.0	25.3	25.3	1	0.0	25.3	25.3
134	1.1.4.1.2.4	COAL/TRANSMISSION LINE RF	20.2	6.4	26.6	1	20.2	6.4	26.6
S-094	1.1.4.1.2	COALESCING SYSTEM				1	20.2	31.7	52.0
135	1.1.6.1.1.1	MIR 8 GEV PROT INJ/KICKER MAGNET	42.0	77.0	119.0	1	42.0	77.0	119.0
136	1.1.6.1.1.2	MIR 8 GEV PROT INJ/POWER SUPPLY	191.9	155.6	347.5	1	191.9	155.6	347.5
S-095	1.1.6.1.1	8 GEV PROT INJ KICKER				1	233.9	232.6	466.5

## MAIN INJECTOR FABRICATION, CONSTRUCTION, INSTALLATION COST ESTIMATE SUMMARY - B

PRINTED 7-AUG-92 12:47:15

## LEVEL 6 SUMMARY - DIRECT COST

DETAIL PAGE #	WBS	DESCRIPTION	MATERIAL K\$	LABOR K\$	TOTAL QUANT K\$ REQ'D	MAT'L K\$	LABOR K\$	GRAND TOT K\$	
137	1.1.6.1.2.1	8 GEV PBAR INJ/KICKER MAGNET	120.0	93.8	213.8	1	120.0	93.8	213.8
138	1.1.6.1.2.2	8 GEV PBAR INJ/KICKER POWER SUPPLY	198.0	274.1	472.1	1	198.0	274.1	472.1
S-098	1.1.6.1.2	8 GEV PBAR INJECTION KICKER				1	318.0	367.8	685.8
141	1.1.6.1.4.1	150 GEV PBAR EXT/KICKER MAGNET	0.0	34.7	34.7	1	0.0	34.7	34.7
142	1.1.6.1.4.2	150 GEV PBAR EXT/KICKER POWER SUPPLY	28.0	94.6	122.6	1	28.0	94.6	122.6
S-098	1.1.6.1.4	MIR 150 GEV PBAR EXT KICKER				1	28.0	129.4	157.4
143	1.1.6.1.5.1	PROT ABORT KICKER MAGNET	10.0	17.5	27.5	1	10.0	17.5	27.5
144	1.1.6.1.5.2	PROT ABORT KICKER POWER SUPPLY	198.9	74.0	272.9	1	198.9	74.0	272.9
S-099	1.1.6.1.5	MIR EXT PROTON ABORT KICKER				1	208.9	91.6	300.5
148	1.1.6.3.1.1	TEV 150 GEV PROT INJ KICKER	36.0	90.8	126.8	1	36.0	90.8	126.8
149	1.1.6.3.1.2	TEV 150 GEV PROT INJ KICKER POWER SUPPLY	13.0	48.3	61.3	1	13.0	48.3	61.3
S-100	1.1.6.3.1	TEV 150 GEV PROT INJ KICKER				1	49.0	139.1	188.1
150	1.1.6.3.2.1	TEV 150 GEV PBAR INJ KICKER MAGNET	0.0	3.6	3.6	1	0.0	3.6	3.6
151	1.1.6.3.2.2	TEV 150 GEV PBAR INJ KICKER POWER SUPPLY	13.0	48.3	61.3	1	13.0	48.3	61.3
S-101	1.1.6.3.2	TEV 150 GEV PBAR INJ KICKER				1	13.0	51.9	64.9
180	1.1.12.1.1.2	MIR WATER SYS/HEAT EXCHANGE	660.0	38.5	698.5	1	660.0	38.5	698.5
181	1.1.12.1.1.3	MIR WATER SYS/LCW PROCESSING	256.3	167.3	423.6	1	256.3	167.3	423.6

## MAIN INJECTOR FABRICATION, CONSTRUCTION, INSTALLATION COST ESTIMATE SUMMARY - B

PRINTED 7-AUG-92 12:47:15

## LEVEL 6 SUMMARY - DIRECT COST

DETAIL PAGE #	WBS	DESCRIPTION	MATERIAL K\$	LABOR K\$	TOTAL K\$	QUANT REQ'D	MAT'L K\$	LABOR K\$	GRAND TOT K\$
182	1.1.12.1.1.4	MIR WATER SYS/LCW PUMP SYSTEM	292.7	148.6	441.3	1	292.7	148.6	441.3
183	1.1.12.1.1.5	MIR WATER SYS/LCW PIPING	1,142.4	907.8	2,050.2	1	1,142.4	907.8	2,050.2
184	1.1.12.1.1.6	RF-95 DEG LCW/HEAT EX & PUMP SYS	147.2	104.2	251.4	1	147.2	104.2	251.4
185	1.1.12.1.1.7	RF-95 DEG LCW/PROCESSING	92.8	67.6	160.5	1	92.8	67.6	160.5
186	1.1.12.1.1.8	RF-95 DEG LCW/PIPING	91.9	163.7	255.6	1	91.9	163.7	255.6
187	1.1.12.1.1.9	RF-55 DEG LCW/PROCESSING	73.0	64.3	137.3	1	73.0	64.3	137.3
188	1.1.12.1.1.10	RF-55 DEG LCW/HEAT EX & PUMP SYS	50.9	91.7	142.6	1	50.9	91.7	142.6
189	1.1.12.1.1.11	RF-55 DEG LCW/CHILLED LCW PIPING	74.2	123.4	197.7	1	74.2	123.4	197.7
S-102	1.1.12.1.1	MIR INSTALL WATER SYSTEM				1	2,881.4	1,877.2	4,758.6
191	1.1.12.1.2.2	MIR/INSTALL CABLES	353.7	421.4	775.1	1	353.7	421.4	775.1
S-103	1.1.12.1.2	MIR CABLES				1	353.7	421.4	775.1
192	1.1.12.1.3.1	MIR ABORT/BEAM DUMP SYSTEM	107.0	115.9	222.9	1	107.0	115.9	222.9
193	1.1.12.1.3.2	MIR ABORT/VACUUM SYSTEM	44.9	26.0	70.9	1	44.9	26.0	70.9
S-104	1.1.12.1.3	MIR ABORT SYSTEMS				1	151.9	141.9	293.8
195	1.1.12.10.1.2	BML WATER SYS/HEAT EXCHANGER	12.0	44.2	56.2	1	12.0	44.2	56.2
196	1.1.12.10.1.3	BML WATER SYS/LCW PROCESSING	87.0	77.7	164.7	1	87.0	77.7	164.7
197	1.1.12.10.1.4	BML WATER SYS/LCW PUMP SYSTEMS	74.8	65.5	140.3	1	74.8	65.5	140.3
198	1.1.12.10.1.5	BML WATER SYS/LCW PIPING	312.2	329.6	641.8	1	312.2	329.6	641.8
S-105	1.1.12.10.1	BML WATER SYSTEMS				1	486.1	517.0	1,003.0

## MAIN INJECTOR FABRICATION, CONSTRUCTION, INSTALLATION COST ESTIMATE SUMMARY - B

PRINTED 7-AUG-92 12:47:15

## LEVEL 6 SUMMARY - DIRECT COST

DETAIL PAGE #	WBS	DESCRIPTION	MATERIAL K\$	LABOR K\$	TOTAL K\$	QUANT REQ'D	MAT'L K\$	LABOR K\$	GRAND TOT K\$
200	1.1.12.10.2.2	BML/INSTALL CABLES	572.6	591.9	1,164.5	1	572.6	591.9	1,164.5
S-106	1.1.12.10.2	BEAMLINE CABLES				1	572.6	591.9	1,164.5
201	1.1.13.1.1.1	MIR/INSTALL MAGNET STANDS	1,055.8	340.0	1,395.8	1	1,055.8	340.0	1,395.8
202	1.1.13.1.1.2	MIR/INSTALL MAGNETS	195.0	509.8	704.8	1	195.0	509.8	704.8
203	1.1.13.1.1.3	MIR/SURVEY & ALIGN MAGNETS	0.0	340.1	340.1	1	0.0	340.1	340.1
204	1.1.13.1.1.4	OLD MR MAGNET REMOVAL	2.2	276.4	278.6	1	2.2	276.4	278.6
S-107	1.1.13.1.1	MIR MAGNET INSTALLATION				1	1,253.0	1,466.4	2,719.4
205	1.1.13.1.2.1	MIR POWER SUPPLY INSTALLATION	12.2	25.2	37.5	6	73.4	151.4	224.8
206	1.1.13.1.2.2	MIR PWR DIST/MAGNET BUS, INSTALLATION	1,309.0	720.4	2,029.4	1	1,309.0	720.4	2,029.4
207	1.1.13.1.2.3	MIR PWR DIST/NEW HARMONIC FILTER	354.9	221.7	576.6	1	354.9	221.7	576.6
212	1.1.13.1.6.1	MIR ABORT STAND INSTALLATION	14.9	38.1	53.0	1	14.9	38.1	53.0
213	1.1.13.1.6.2	MIR ABORT MAGNETS INSTALLATION	0.0	80.9	80.9	1	0.0	80.9	80.9
S-109	1.1.13.1.6	MIR ABORT INSTALLATION				1	14.9	119.0	133.9
214	1.1.13.1.7.1	MIR SLOW EXTRACTION STANDS INSTALLATION	0.0	59.6	59.6	1	0.0	59.6	59.6
215	1.1.13.1.7.2	MIR SLOW EXTRACTION COMPONENT INSTALLATIO	0.0	16.1	16.1	1	0.0	16.1	16.1
S-110	1.1.13.1.7	MIR SLOW EXTRACTION INSTALLATION				1	0.0	75.6	75.6
217	1.1.13.2.1.1	8 GEV LINE/INSTALL MAGNET STANDS	161.6	230.6	392.2	1	161.6	230.6	392.2
218	1.1.13.2.1.2	8 GEV LINE/INSTALL MAGNETS	0.0	137.9	137.9	1	0.0	137.9	137.9

## MAIN INJECTOR FABRICATION, CONSTRUCTION, INSTALLATION COST ESTIMATE SUMMARY - B

PRINTED 7-AUG-92 12:47:15

## LEVEL 8 SUMMARY - DIRECT COST

DETAIL PAGE #	WBS	DESCRIPTION	MATERIAL K\$	LABOR K\$	TOTAL K\$	QUANT REQ'D	MAT'L K\$	LABOR K\$	GRAND TOT K\$
219	1.1.13.2.1.3	8 GEV LINE/SURVEY & ALIGN MAGNETS	0.0	118.7	118.7	1	0.0	118.7	118.7
S-111	1.1.13.2.1	8 GEV LINE/SURVEY & ALIGN MAGNETS				1	161.6	487.2	648.7
223	1.1.13.3.1.1	150 GEV PROT LINE/INSTALL MAGNET STANDS	144.7	102.2	246.9	1	144.7	102.2	246.9
224	1.1.13.3.1.2	150 GEV PROT LINE/INSTALL MAGNETS	0.0	109.3	109.3	1	0.0	109.3	109.3
225	1.1.13.3.1.3	150 GEV PROT LINE/SURVEY & ALLIGNMENT MAG	0.0	3.2	3.2	1	0.0	3.2	3.2
S-112	1.1.13.3.1	150 GEV PROT LINE MAGNET INSTALLATION				1	144.7	214.7	359.4
231	1.1.13.4.1.3	150 GEV PBAR LINE/SURVEY & ALIGNMENT	0.0	3.2	3.2	1	0.0	3.2	3.2
S-113	1.1.13.4.1	150 GEV PBAR LINE/MAGNET INSTALLATION				1	0.0	3.2	3.2
237	1.1.13.5.1.3	PBAR PROD LINE/SURVEY & ALIGNMENT	0.0	3.2	3.2	1	0.0	3.2	3.2
S-114	1.1.13.5.1	PBAR PROD LINE/MAGNET INSTALLATION				1	0.0	3.2	3.2
241	1.1.13.6.1.1	SLOW SPILL/INSTALL MAGNET STANDS	28.0	52.1	80.1	1	28.0	52.1	80.1
242	1.1.13.6.1.2	SLOW SPILL/INSTALL MAGNETS	0.0	82.7	82.7	1	0.0	82.7	82.7
243	1.1.13.6.1.3	SLOW SPILL/SURVEY & ALGINMENT	0.0	3.2	3.2	1	0.0	3.2	3.2
S-115	1.1.13.6.1	SLOW SPILL/MAGNET INSTALLATION				1	28.0	138.0	166.0
248	1.1.13.7.2.1	MIR/TEV F0 REMOVAL	0.0	13.6	13.6	1	0.0	13.6	13.6
249	1.1.13.7.2.2	MIR/NEW TEV F0 VACUUM	35.3	9.7	45.0	1	35.3	9.7	45.0
250	1.1.13.7.2.3	TEV RF REDISTRIBUTION	201.7	410.8	612.5	1	201.7	410.8	612.5

## MAIN INJECTOR FABRICATION, CONSTRUCTION, INSTALLATION COST ESTIMATE SUMMARY - B

PRINTED 7-AUG-92 12:47:15

## LEVEL 6 SUMMARY - DIRECT COST

DETAIL PAGE #	WBS	DESCRIPTION	MATERIAL K\$	LABOR K\$	TOTAL K\$	QUANT REQ'D	MAT'L K\$	LABOR K\$	GRAND TOT K\$
S-116	1.1.13.7.2	MIR/NEW TEV F0 VACUUM				1	237.0	434.0	671.1
251	1.1.13.10.2.1	BML PPWR SYS/PWR SUP INSTALLATION	49.5	179.2	228.7	1	49.5	179.2	228.7
252	1.1.13.10.2.2	BML PWR DIST/MAGNET BUS, INSTALLATION	55.5	275.0	330.4	1	55.5	275.0	330.4
S-117	1.1.13.10.2	BML PPS INSTALLATION				1	105.0	454.1	559.1

## MAIN INJECTOR FABRICATION, CONSTRUCTION, INSTALLATION COST ESTIMATE SUMMARY - B

PRINTED 7-AUG-92 12:47:15

## LEVEL 7 SUMMARY - DIRECT COST

DETAIL PAGE #	WBS	DESCRIPTION	MATERIAL K\$	LABOR K\$	TOTAL K\$	QUANT REQ'D	MAT'L K\$	LABOR K\$	GRAND TOT K\$
126	1.1.4.1.1.1.1	MIR RF 53MHZ/200KW POWER AMPLIFIERS	48.9	7.8	56.7	15	733.4	117.3	850.7
127	1.1.4.1.1.1.2	MIR RF 53MHZ/4KWATT SOLID STATE AMP	64.5	5.3	69.8	15	967.5	79.0	1,046.5
S-118	1.1.4.1.1.1	MIR RF 53MHZ/POWER AMPLIFIERS				1	1,700.9	196.3	1,897.2
128	1.1.4.1.1.2.1	MIR RF 53MHZ/ANODE SUPPLIES	888.5	53.1	941.6	1	888.5	53.1	941.6
129	1.1.4.1.1.2.2	MIR RF 53MHZ/MODULATORS	920.6	159.6	1,080.2	1	920.6	159.6	1,080.2
S-119	1.1.4.1.1.2	MIR RF 53MHZ/ANODE SUPPLIES/MODULATORS				1	1,809.1	212.8	2,021.8



## MAIN INJECTOR RING MAGNETS

ESTIMATE --- COST ESTIMATE DETAILS

PAGE NUMBER 1

SUB-SYSTEM: MIR MAGNETS/DIPOLES

DATE PRINTED: 7-AUG-92

WBS CODE: 1.1.1.1.1.1 MULT BY 105 COMPONENT : MIR MAGNETS/240" DIPOLES IDA

DATE ESTIMATED: 7/ 9/92

RESPONSIBLE: CHESTER

&lt;----- MATERIAL -----&gt; &lt;----- LABOR -----&gt;

ITEM NUM.	ITEM TITLE	UNIT MEAS.	NO. UNITS	FY91 \$ /UNIT	COST BASIS	TOTAL MT K\$	NO. UNITS	HOURS /UNIT	TOTAL CRAFT HOURS CODE	\$/HR	TOTAL LABOR K\$
1	LAMINATIONS (MATERIAL)	LB	47700	0.58	VQ	27.666					
2	LAMINATIONS (STAMPING)	EA	8415	0.49	VQ	4.123					
3	COMPLETE HALF-CORES	EA	2	9213.	A91	18.426					
4	FORMED COILS	EA	2	13140.	VQ	26.280					
5	INSULATION CONTRACT	EA	2	6388.	A91	12.776					
6	BEAMTUBE	EA	1	4000.	VQ	4.000					
7	ASSEMBLY PARTS	LOT	1	500.	A91	0.500					
8	FINAL ASSEMBLY						1	98.0	98.0 T3	29.00	2.842
9	HANDLING & INSPECTION						1	72.0	72.0 T3	29.00	2.088
						93.771	<----- SUBTOTALS THIS PAGE ----->				4.930

TECHNICAL DESCRIPTION OF THIS WORK PACKAGE:

93.771 + 4.930 = 98.701

105 DIPOLES ASSEMBLED BY TSS, 3 BUILT WITH R&amp;D FUNDS (2.1.1.1.1.1).

SAME AS 1.1.1.1.1.2 BUT WITH OPPOSITE CURVATURE.

TOTAL = 10363.642 MULTIPLY BY 105 9845.992 &lt;----- SUBTOTALS THIS PAGE -----&gt; 517.650

## MAIN INJECTOR RING MAGNETS

ESTIMATE --- COST ESTIMATE DETAILS

PAGE NUMBER 2

SUB-SYSTEM: MIR MAGNETS/DIPOLES

DATE PRINTED: 7-AUG-92

WBS CODE: 1.1.1.1.1.2 MULT BY 105 COMPONENT : MIR MAGNETS/240" DIPOLES IDB

DATE ESTIMATED: 7/ 9/92

RESPONSIBLE: CHESTER

&lt;----- MATERIAL -----&gt; &lt;----- LABOR -----&gt;

ITEM NUM.	ITEM TITLE	UNIT MEAS.	NO. UNITS	FY91 \$ /UNIT	COST BASIS	TOTAL MT K\$	NO. UNITS	HOURS /UNIT	TOTAL CRAFT HOURS CODE	\$/HR	TOTAL LABOR K\$
1	LAMINATIONS (MATERIAL)	LB	47700	0.58	VQ	27.666					
2	LAMINATIONS (STAMPING)	EA	8415	0.49	VQ	4.123					
3	COMPLETE HALF-CORES	EA	2	9213.	A91	18.426					
4	FORMED COILS	EA	2	13140.	VQ	26.280					
5	INSULATION CONTRACT	EA	2	6388.	A91	12.776					
6	BEAMTUBE	EA	1	4000.	VQ	4.000					
7	ASSEMBLY PARTS	LOT	1	500.	A91	0.500					
8	FINAL ASSEMBLY						1	98.0	98.0 T3	29.00	2.842
9	HANDLING & INSPECTION						1	72.0	72.0 T3	29.00	2.088
						93.771	<----- SUBTOTALS THIS PAGE ----->				4.930

TECHNICAL DESCRIPTION OF THIS WORK PACKAGE:

93.771 + 4.930 = 98.701

105 DIPOLES ASSEMBLED BY TSS, 3 BUILT WITH R&amp;D FUNDS (2.1.1.1.1.2).

SAME AS 1.1.1.1.1.1 BUT WITH OPPOSITE CURVATURE.

TOTAL = 10363.642 MULTIPLY BY 105 9845.992 &lt;----- SUBTOTALS THIS PAGE -----&gt; 517.650

## MAIN INJECTOR RING MAGNETS

ESTIMATE --- COST ESTIMATE DETAILS

PAGE NUMBER 3

SUB-SYSTEM: MIR MAGNETS/DIPOLES

DATE PRINTED: 7-AUG-92

WBS CODE: 1.1.1.1.1.3 MULT BY 61 COMPONENT : MIR MAGNETS/160" DIPOLE

DATE ESTIMATED: 7/ 9/92

RESPONSIBLE: CHESTER

&lt;----- MATERIAL -----&gt; &lt;----- LABOR -----&gt;

ITEM NUM.	ITEM TITLE	UNIT MEAS.	NO. UNITS	FY91 \$ /UNIT	COST BASIS	TOTAL MT K\$	NO. UNITS	HOURS /UNIT	TOTAL CRAFT HOURS CODE	\$/HR	TOTAL LABOR K\$
1	LAMINATIONS (MATERIAL)	LB	31800	0.58	VQ	18.444					
2	LAMINATIONS (STAMPING)	EA	5609	0.49	VQ	2.748					
3	COMPLETE HALF-CORES	EA	2	6661.	A91	13.322					
4	FORMED COILS	EA	2	12100.	VQ	24.200					
5	INSULATION CONTRACT	EA	2	5116.	A91	10.232					
6	BEAMTUBE	EA	1	3600.	VQ	3.600					
7	ASSEMBLY PARTS	LOT	1	500.	A91	0.500					
8	FINAL ASSEMBLY						1	95.0	95.0 T3	29.00	2.755
9	HANDLING & INSPECTION						1	72.0	72.0 T3	29.00	2.088
						73.046	<----- SUBTOTALS THIS PAGE ----->				4.843

TECHNICAL DESCRIPTION OF THIS WORK PACKAGE:

73.046 + 4.843 = 77.889

61 DIPOLES ASSEMBLED BY TSS, 3 BUILT WITH R&amp;D FUNDS (2.1.1.11.3).

TOTAL = 4751.254 MULTIPLY BY 61 4455.831 &lt;----- SUBTOTALS THIS PAGE -----&gt; 295.423

## MAIN INJECTOR RING MAGNETS

## ESTIMATE --- COST ESTIMATE DETAILS

PAGE NUMBER 4

## SUB-SYSTEM: MIR MAGNETS/DIPOLES

DATE PRINTED: 7-AUG-92

WBS CODE: 1.1.1.1.1.4 MULT BY 61 COMPONENT : MIR MAGNETS/160" DIPOLES IDD

DATE ESTIMATED: 7/10/92

RESPONSIBLE: CHESTER

&lt;----- MATERIAL -----&gt;

&lt;----- LABOR -----&gt;

ITEM NUM.	ITEM TITLE	UNIT MEAS.	NO. UNITS	FY91 \$ /UNIT	COST BASIS	TOTAL MT K\$	NO. UNITS	HOURS /UNIT	TOTAL CRAFT HOURS CODE \$/HR	TOTAL LABOR K\$
1	LAMINATIONS (MATERIAL)	LB	31800	0.58	VQ	18.444				
2	LAMINATIONS (STAMPING)	EA	5609	0.49	VQ	2.748				
3	COMPLETE HALF-CORES	EA	2	6661.	A91	13.322				
4	FORMED COILS	EA	2	12100.	VQ	24.200				
5	INSULATION CONTRACT	EA	2	5116.	A91	10.232				
6	BEAMTUBE	EA	1	3600.	VQ	3.600				
7	ASSEMBLY PARTS	LOT	1	500.	A91	0.500				
8	FINAL ASSEMBLY						1	95.0	95.0 T3 29.00	2.755
9	HANDLING & INSPECTION						1	72.0	72.0 T3 29.00	2.088
						73.046			<----- SUBTOTALS THIS PAGE ----->	4.843
TECHNICAL DESCRIPTION OF THIS WORK PACKAGE:						73.046 +	4.843 =	77.889		

61 DIPOLES ASSEMBLED BY TSS, 3 BUILT WITH R&amp;D FUNDS (2.1.1.11.4).

TOTAL = 4751.254 MULTIPLY BY 61 4455.831 &lt;----- SUBTOTALS THIS PAGE -----&gt; 295.423

## MAIN INJECTOR RING MAGNETS

ESTIMATE --- COST ESTIMATE DETAILS

PAGE NUMBER 5

SUB-SYSTEM: MIR MAGNETS/QUADS

DATE PRINTED: 7-AUG-92

WBS CODE: 1.1.1.1.2.3 MULT BY 31 COMPONENT : MIR MAGNETS/100" QUADS IQC (NEW)

DATE ESTIMATED: 2/18/92

RESPONSIBLE: CHESTER

&lt;----- MATERIAL -----&gt; &lt;----- LABOR -----&gt;

ITEM NUM.	ITEM TITLE	UNIT MEAS.	NO. UNITS	FY91 \$ /UNIT	COST BASIS	TOTAL MT K\$	NO. UNITS	HOURS /UNIT	TOTAL CRAFT HOURS CODE	\$/HR	TOTAL LABOR K\$
1	LAMINATIONS (MATERIAL)	LB	14490	0.40	A88	5.796					
2	LAMINATIONS (STAMPING)	EACH	3734	0.49	EE	1.830					
3	CONDUCTOR	LBS	660	2.55	EE	1.683					
4	COIL INSULATION	SET	1	2200.38	A88	2.200					
5	CORE PARTS	SET	1	893.26	A82	0.893					
6	MANIFOLDING & BUSWORK	SET	1	658.48	A82	0.658					
7	BEAMTUBE & ACCESS.	SET	1	1430.52	A86	1.431					
8	MAGNET FEET/BRACES	SET	1	222.77	A82	0.223					
9	MACHINE SHOP	EA	1	982.80	A84	0.983					
10	PREPARE COILS						1	336.0	336.0	T1 29.00	9.744
11	ASSEMBLE CORE						1	135.0	135.0	T1 29.00	3.915
12	FINAL ASSEMBLY						1	206.0	206.0	T1 29.00	5.974
						15.697	<----- SUBTOTALS THIS PAGE ----->				19.633
TECHNICAL DESCRIPTION OF THIS WORK PACKAGE:						15.697 +	19.633 =				35.330

ONE UNIT BUILT ON R &amp; D (2.1.1.1.2.3)

TOTAL = 1095.226 MULTIPLY BY 31 486.603 &lt;----- SUBTOTALS THIS PAGE -----&gt; 608.623

PAGE NUMBER 6

DATE PRINTED: 7-AUG-92

DATE ESTIMATED: 2/18/92

<----- MATERIAL -----> <----- LABOR ----->

TOTAL = 1843.293    MULTIPLY BY    47    827.858    <----- SUBTOTALS THIS PAGE -----> 1015.435

827.858 <----- SUBTOTALS THIS PAGE -----> 1015.435

## MAIN INJECTOR RING MAGNETS

## ESTIMATE --- COST ESTIMATE DETAILS

PAGE NUMBER 7

SUB-SYSTEM: MIR MAGNETS/QUADS

DATE PRINTED: 7-AUG-92

WBS CODE: 1.1.1.1.2.5 MULT BY 127 COMPONENT : MIR MAGNETS/84" QUADS BQB (REWORK)

DATE ESTIMATED: 2/18/92

RESPONSIBLE: CHESTER

&lt;----- MATERIAL -----&gt;

&lt;----- LABOR -----&gt;

ITEM NUM.	ITEM TITLE	UNIT MEAS.	NO. UNITS	FY91 \$ /UNIT	COST BASIS	TOTAL MT K\$	NO. UNITS	HOURS /UNIT	TOTAL HOURS	CRAFT CODE	\$/HR	TOTAL LABOR K\$
1	REMOVE BELLOWS ASS'Y						1	6.0	6.0	T1	29.00	0.174
2	INSTALL ADPT END FLANGES (1)						1	1.0	1.0	T1	29.00	0.029
3	INSTALL NEW BELLOWS						1	1.0	1.0	T1	29.00	0.029
4	INSTALL NEW FLANGES						1	1.0	1.0	T1	29.00	0.029
5	WELD FLANGES						1	10.0	10.0	T1	29.00	0.290
6	REPLACE INSULATORS						1	8.0	8.0	T1	29.00	0.232
7	PAINT MAGNET						1	2.0	2.0	T1	29.00	0.058
8	INSPECTION						1	5.0	5.0	T1	29.00	0.145
9	SUPERVISION						1	9.0	9.0	T1	29.00	0.261
10	REWORK STANDS						1	17.0	17.0	T1	29.00	0.493
11	INSULATOR	SET	1	81.90	A89	0.082						
12	ADPT PLATES	SET	1	76.44	A89	0.076						
13	BELLOWS	SET	1	171.44	E89	0.171						
14	FLANGES	SET	1	28.39	E89	0.028						
15	PAINT	SET	1	4.37	E89	0.004						

0.363 &lt;----- SUBTOTALS THIS PAGE -----&gt; 1.740

TECHNICAL DESCRIPTION OF THIS WORK PACKAGE:

0.363 + 1.740 = 2.103

TOTAL = 267.023 MULTIPLY BY 127 46.043 &lt;----- SUBTOTALS THIS PAGE -----&gt; 220.980

## MAIN INJECTOR RING MAGNETS

## ESTIMATE --- COST ESTIMATE DETAILS

PAGE NUMBER 8

SUB-SYSTEM: MIR MAGNETS/QUADS

DATE PRINTED: 7-AUG-92

WBS CODE: 1.1.1.1.2.9 MULT BY 1 COMPONENT : MIR MAGNETS/84" QUADS BQB ROLLED (REWORK)

DATE ESTIMATED: 2/20/92

RESPONSIBLE: CHESTER

&lt;----- MATERIAL -----&gt; &lt;----- LABOR -----&gt;

ITEM NUM.	ITEM TITLE	UNIT MEAS.	NO. UNITS	FY91 \$ /UNIT	COST BASIS	TOTAL MT K\$	NO. UNITS	HOURS /UNIT	TOTAL HOURS	CRAFT CODE	\$/HR	TOTAL LABOR K\$
1	REMOVE BELLOWS ASS'Y						1	6.0	6.0	T1	29.00	0.174
2	INSTALL ADPT END FLANGES (1)						1	1.0	1.0	T1	29.00	0.029
3	INSTALL NEW BELLOWS						1	1.0	1.0	T1	29.00	0.029
4	INSTALL NEW FLANGES						1	1.0	1.0	T1	29.00	0.029
5	WELD FLANGES						1	10.0	10.0	T1	29.00	0.290
6	REPLACE INSULATORS						1	8.0	8.0	T1	29.00	0.232
7	PAINT MAGNET						1	2.0	2.0	T1	29.00	0.058
8	INSPECTION						1	5.0	5.0	T1	29.00	0.145
9	SUPERVISION						1	9.0	9.0	T1	29.00	0.261
10	REWORK STANDS						1	17.0	17.0	T1	29.00	0.493
11	INSULATOR	SET	1	81.90	A89	0.082						
12	ADPT PLATES	SET	1	76.44	A89	0.076						
13	BELLOWS	SET	1	171.44	E89	0.171						
14	FLANGES	SET	1	28.39	E89	0.028						
15	PAINT	SET	1	4.37	E89	0.004						

0.383 &lt;----- SUBTOTALS THIS PAGE -----&gt; 1.740

TECHNICAL DESCRIPTION OF THIS WORK PACKAGE:

0.383 + 1.740 = 2.103



## MAIN INJECTOR RING MAGNETS

## ESTIMATE --- COST ESTIMATE DETAILS

PAGE NUMBER 9

SUB-SYSTEM: MIR MAGNETS/CORRECTORS

DATE PRINTED: 7-AUG-92

WBS CODE: 1.1.1.1.3.1 MULT BY 108 COMPONENT : MIR MAGNETS/SEXTUPOLES 18" ISA (NEW)

DATE ESTIMATED: 7/ 9/92

RESPONSIBLE: CHESTER

&lt;----- MATERIAL -----&gt; &lt;----- LABOR -----&gt;

ITEM NUM.	ITEM TITLE	UNIT MEAS.	NO. UNITS	FY91 \$ /UNIT	COST BASIS	TOTAL MT K\$	NO. UNITS	HOURS /UNIT	TOTAL CRAFT HOURS CODE \$/HR	TOTAL LABOR K\$
1	LAMINATIONS (MATERIAL)	LB	1256	0.48	A88	0.578				
2	LAMINATIONS (STAMPING)	EACH	611	0.50	A84	0.306				
3	CONDUCTOR	LBS	75	2.88	VQ	0.216				
4	COIL INSULATION	SET	1	521.	A89	0.521				
5	CORE PARTS	SET	1	352.	EE	0.352				
6	MANIFOLDING & BUSWORK	SET	1	760.	EE	0.760				
7	MACHINE SHOP	EA	1	335.	EE	0.335				
8	PREPARE COILS						1	170.0	170.0 T1 29.00	4.930
9	ASSEMBLE CORE						1	54.0	54.0 T1 29.00	1.566
10	FINAL ASSEMBLY						1	106.0	106.0 T1 29.00	3.074

3.067 <----- SUBTOTALS THIS PAGE -----> 9.570

TECHNICAL DESCRIPTION OF THIS WORK PACKAGE:

3.067 + 9.570 = 12.637

TOTAL = 1364.824 MULTIPLY BY 108 331.264 <----- SUBTOTALS THIS PAGE -----> 1033.560

## MAIN INJECTOR RING MAGNETS

## ESTIMATE --- COST ESTIMATE DETAILS

PAGE NUMBER 10

SUB-SYSTEM: MIR MAGNETS/CORRECTORS

DATE PRINTED: 7-AUG-92

WBS CODE: 1.1.1.1.3.2 MULT BY 24 COMPONENT : MIR MAGNETS/TRIM QUAD (REWORK)

DATE ESTIMATED: 2/15/91

RESPONSIBLE: CHESTER

&lt;----- MATERIAL -----&gt;

&lt;----- LABOR -----&gt;

ITEM NUM.	ITEM TITLE	UNIT MEAS.	NO. UNITS	FY91 \$ /UNIT	COST BASIS	TOTAL MT K\$	NO. UNITS	HOURS /UNIT	TOTAL CRAFT HOURS CODE	\$/HR	TOTAL LABOR K\$
1	MATERIALS & LABOR	LOT	1	400.	EE	0.400	1	20.0	20.0 T1	29.00	0.580
						0.400	SUBTOTALS THIS PAGE				0.580
TECHNICAL DESCRIPTION OF THIS WORK PACKAGE:						0.400 +	0.580 =	0.980			
TOTAL = 23.520 MULTIPLY BY 24						9.600	SUBTOTALS THIS PAGE				13.920

## MAIN INJECTOR RING MAGNETS

## ESTIMATE --- COST ESTIMATE DETAILS

PAGE NUMBER 11

SUB-SYSTEM: MIR MAGNETS/CORRECTORS

DATE PRINTED: 7-AUG-92

WBS CODE: 1.1.1.1.3.3 MULT BY 18 COMPONENT : MIR MAGNETS/SKEW QUAD (REWORK)

DATE ESTIMATED: 2/15/91

RESPONSIBLE: CHESTER

&lt;----- MATERIAL -----&gt; &lt;----- LABOR -----&gt;

ITEM NUM.	ITEM TITLE	UNIT MEAS.	NO. UNITS	FY91 \$ /UNIT	COST BASIS	TOTAL MT K\$	NO. UNITS	HOURS /UNIT	TOTAL CRAFT HOURS CODE	\$/HR	TOTAL LABOR K\$
1	MATERIALS & LABOR	LOT	1	400.	EE	0.400	1	20.0	20.0 T1	29.00	0.580
						0.400	----- SUBTOTALS THIS PAGE -----				0.580
TECHNICAL DESCRIPTION OF THIS WORK PACKAGE:						0.400 +	0.580 =	0.980			
TOTAL = 17.640 MULTIPLY BY 18						7.200	----- SUBTOTALS THIS PAGE -----				10.440

## MAIN INJECTOR RING MAGNETS

## ESTIMATE --- COST ESTIMATE DETAILS

PAGE NUMBER 12

SUB-SYSTEM: MIR MAGNETS/CORRECTORS

DATE PRINTED: 7-AUG-92

WBS CODE: 1.1.1.1.3.4 MULT BY 12 COMPONENT : MIR MAGNETS/SKEW SEXTUPOLE (REWORK)

DATE ESTIMATED: 2/15/91

RESPONSIBLE: CHESTER

&lt;----- MATERIAL -----&gt; &lt;----- LABOR -----&gt;

ITEM NUM.	ITEM TITLE	UNIT MEAS.	NO. UNITS	FY91 \$ /UNIT	COST BASIS	TOTAL MT K\$	NO. UNITS	HOURS /UNIT	TOTAL CRAFT HOURS CODE	\$/HR	TOTAL LABOR K\$
1	MATERIALS & LABOR	LOT	1	400.	EE	0.400	1	20.0	20.0 T1	29.00	0.580
						0.400	<----- SUBTOTALS THIS PAGE ----->				0.580
TECHNICAL DESCRIPTION OF THIS WORK PACKAGE:						0.400 +	0.580 =	0.980			
TOTAL = 11.760 MULTIPLY BY 12						4.800	<----- SUBTOTALS THIS PAGE ----->				6.960

## MAIN INJECTOR RING MAGNETS

## ESTIMATE --- COST ESTIMATE DETAILS

PAGE NUMBER 13

SUB-SYSTEM: MIR MAGNETS/CORRECTORS

DATE PRINTED: 7-AUG-92

WBS CODE: 1.1.1.1.3.5

MULT BY 28 COMPONENT : MIR MAGNETS/TRIM SEXTUPOLE (REWORK)

DATE ESTIMATED: 2/20/92

RESPONSIBLE: CHESTER

&lt;----- MATERIAL -----&gt; &lt;----- LABOR -----&gt;

ITEM NUM.	ITEM TITLE	UNIT MEAS.	NO. UNITS	FY91 \$ /UNIT	COST BASIS	TOTAL MT K\$	NO. UNITS	HOURS /UNIT	TOTAL CRAFT HOURS CODE \$/HR	TOTAL LABOR K\$	
1	MATERIALS & LABOR	LOT	1	400.	EE	0.400					
						0.400	----- SUBTOTALS THIS PAGE -----			0.000	
TECHNICAL DESCRIPTION OF THIS WORK PACKAGE:						0.400 +	0.000 =	0.400			
TOTAL = 11.200 MULTIPLY BY 28						11.200	----- SUBTOTALS THIS PAGE -----			0.000	

MAIN INJECTOR RING MAGNETS

ESTIMATE --- COST ESTIMATE DETAILS

PAGE NUMBER 14

SUB-SYSTEM: MIR MAGNETS/CORRECTORS

DATE PRINTED: 7-AUG-92

WBS CODE: 1.1.1.1.3.6 MULT BY 20 COMPONENT : MIR MAGNETS/OCTUPOLES (REWORK)

DATE ESTIMATED: 2/20/92

RESPONSIBLE: CHESTER

<----- MATERIAL -----> <----- LABOR ----->

ITEM NUM.	ITEM TITLE	UNIT MEAS.	NO. UNITS	FY91 \$ /UNIT	COST BASIS	TOTAL MT K\$	NO. UNITS	HOURS /UNIT	TOTAL CRAFT HOURS CODE	\$/HR	TOTAL LABOR K\$
--------------	------------	---------------	--------------	------------------	---------------	-----------------	--------------	----------------	---------------------------	-------	--------------------

1	MATERIALS & LABOR	LOT	1	400.	EE	0.400					
---	-------------------	-----	---	------	----	-------	--	--	--	--	--

0.400 <----- SUBTOTALS THIS PAGE -----> 0.000

TECHNICAL DESCRIPTION OF THIS WORK PACKAGE:

0.400 + 0.000 = 0.400

TOTAL = 8.000 MULTIPLY BY 20 8.000 <----- SUBTOTALS THIS PAGE -----> 0.000

## MAIN INJECTOR RING MAGNETS

## ESTIMATE --- COST ESTIMATE DETAILS

PAGE NUMBER 15

SUB-SYSTEM: MIR MAGNETS/CORRECTORS

DATE PRINTED: 7-AUG-92

WBS CODE: 1.1.1.1.3.7 MULT BY 4 COMPONENT : MIR MAGNETS/CR SKEW QUADS

DATE ESTIMATED: 7/10/92

RESPONSIBLE: CHESTER

&lt;----- MATERIAL -----&gt; &lt;----- LABOR -----&gt;

ITEM NUM.	ITEM TITLE	UNIT MEAS.	NO. UNITS	FY91 \$ /UNIT	COST BASIS	TOTAL MT K\$	NO. UNITS	HOURS /UNIT	TOTAL CRAFT HOURS CODE	\$/HR	TOTAL LABOR K\$
1	MATERIALS & LABOR	LOT	1	500.	EE	0.500	1	40.0	40.0 T3	29.00	1.160

0.500 &lt;----- SUBTOTALS THIS PAGE -----&gt; 1.160

TECHNICAL DESCRIPTION OF THIS WORK PACKAGE:

0.500 + 1.160 = 1.660

TOTAL = 8.640 MULTIPLY BY 4 2.000 &lt;----- SUBTOTALS THIS PAGE -----&gt; 4.640

## MAIN INJECTOR RING MAGNETS

## ESTIMATE --- COST ESTIMATE DETAILS

PAGE NUMBER 18

SUB-SYSTEM: MIR MAGNETS/TRIM DIPOLES

DATE PRINTED: 7-AUG-92

WBS CODE: 1.1.1.1.4.2 MULT BY 104 COMPONENT : MIR MAGNETS/HORIZ TRIM - IDH (NEW)

DATE ESTIMATED: 2/19/92

RESPONSIBLE: CHESTER

&lt;----- MATERIAL -----&gt;

&lt;----- LABOR -----&gt;

ITEM NUM.	ITEM TITLE	UNIT MEAS.	NO. UNITS	FY91 \$ /UNIT	COST BASIS	TOTAL MT K\$	NO. UNITS	HOURS /UNIT	TOTAL CRAFT HOURS CODE	\$/HR	TOTAL LABOR K\$
1	LAMINATIONS (MATERIAL)	LBS	204	0.58	EE	0.118					
2	LAMINATIONS (STAMPING)	EA	434	0.35	EE	0.152					
3	CONDUCTOR	LBS	162	2.50	EE	0.405					
4	INSULATION & PARTS	LOT	1	400.	EE	0.400					
5	COIL FABRICATION						1	10.0	10.0 T1	29.00	0.290
6	CORE FABRICATION						1	10.0	10.0 T1	29.00	0.290
7	ASSEMBLY						1	10.0	10.0 T1	29.00	0.290
						1.075	<----- SUBTOTALS THIS PAGE ----->				0.870
TECHNICAL DESCRIPTION OF THIS WORK PACKAGE:						1.075 +	0.870 =				1.945
TOTAL = 202.303 MULTIPLY BY 104						111.823	<----- SUBTOTALS THIS PAGE ----->				90.480



## MAIN INJECTOR RING MAGNETS

## ESTIMATE --- COST ESTIMATE DETAILS

PAGE NUMBER 17

SUB-SYSTEM: MIR MAGNETS/TRIM DIPOLES

DATE PRINTED: 7-AUG-92

WBS CODE: 1.1.1.1.4.4 MULT BY 104 COMPONENT : MIR MAGNETS/VERT TRIM DIP IDV (NEW)

DATE ESTIMATED: 2/19/92

RESPONSIBLE: CHESTER

&lt;----- MATERIAL -----&gt; &lt;----- LABOR -----&gt;

ITEM NUM.	ITEM TITLE	UNIT MEAS.	NO. UNITS	FY91 \$ /UNIT	COST BASIS	TOTAL MT K\$	NO. UNITS	HOURS /UNIT	TOTAL CRAFT HOURS CODE	\$/HR	TOTAL LABOR K\$
1	LAMINATIONS (MATERIAL)	LBS	270	0.58	EE	0.157					
2	LAMINATIONS (STAMPING)	EA	434	0.35	EE	0.152					
3	CONDUCTOR	LBS	104	2.50	EE	0.260					
4	INSULATION & PARTS	LOT	1	400.	EE	0.400					
5	COIL FABRICATION						1	20.0	20.0 T1	29.00	0.580
6	CORE FABRICATION						1	10.0	10.0 T1	29.00	0.290
7	ASSEMBLY						1	10.0	10.0 T1	29.00	0.290
						0.968	<----- SUBTOTALS THIS PAGE ----->				1.160

TECHNICAL DESCRIPTION OF THIS WORK PACKAGE:

0.968 + 1.160 = 2.129

TOTAL = 221.364 MULTIPLY BY 104 100.724 &lt;----- SUBTOTALS THIS PAGE -----&gt; 120.640

MAIN INJECTOR RING MAGNETS

ESTIMATE --- COST ESTIMATE DETAILS

PAGE NUMBER 18

SUB-SYSTEM: MIR MAGNETS/TRIM DIPOLES

DATE PRINTED: 7-AUG-92

WBS CODE: 1.1.1.1.4.9 MULT BY 1 COMPONENT : MIR MAGNETS/P ABORT TRIMS, XBUMP (REWORK)

DATE ESTIMATED: 2/19/92

RESPONSIBLE: CHESTER

<----- MATERIAL -----> <----- LABOR ----->

ITEM NUM.	ITEM TITLE	UNIT MEAS.	NO. UNITS	FY91 \$ /UNIT	COST BASIS	TOTAL MT K\$	NO. UNITS	HOURS /UNIT	TOTAL CRAFT HOURS CODE	\$/HR	TOTAL LABOR K\$
1			0	0.		0.000					
						0.000	<----- SUBTOTALS THIS PAGE ----->				0.000

TECHNICAL DESCRIPTION OF THIS WORK PACKAGE:

0.000 + 0.000 = 0.000

## 8 GEV LINE MAGNETS

## ESTIMATE --- COST ESTIMATE DETAILS

PAGE NUMBER 19

SUB-SYSTEM: 8GEV MAGNETS/DIPOLES

DATE PRINTED: 7-AUG-92

WBS CODE: 1.1.1.2.1.6 MULT BY 2 COMPONENT : 8GEV MAGNETS/SDB 120" DIPOLES (MORE)

DATE ESTIMATED: 2/28/92

RESPONSIBLE: CHESTER

&lt;----- MATERIAL -----&gt; &lt;----- LABOR -----&gt;

ITEM NUM.	ITEM TITLE	UNIT MEAS.	NO. UNITS	FY91 \$ /UNIT	COST BASIS	TOTAL MT K\$	NO. UNITS	HOURS /UNIT	TOTAL CRAFT HOURS CODE \$/HR	TOTAL LABOR K\$	
1	LAMINATIONS (MATERIAL)	LB	40000	0.40	A88	16.000					
2	LAMINATIONS (STAMPING)	EA	4518	0.49	A85	2.214					
3	CONDUCTOR	LBS	8775	2.55	EE	22.376					
4	COIL INSULATION	EACH	1	2058.42	A89	2.058					
5	CORE PARTS	EACH	1	2667.76	A84	2.668					
6	MANIFOLDING & BUSWORK	EACH	1	370.19	A88	0.370					
7	BEAMTUBE & FLANGES	EACH	1	2185.44	EE	2.185					
8	DEGASSING BEAMTUBES	EACH	1	2450.45	EE	2.450					
9	MACHINE SHOP	EA	1	3330.60	A84	3.331					
10	ASSEMBLE COILS						1	1295.0	1295.0 T1 29.00	37.555	
11	PREPARE/STACK CORE						1	171.0	171.0 T1 29.00	4.959	
12	FINAL ASSEMBLY						1	275.0	275.0 T1 29.00	7.975	
						53.633	<----- SUBTOTALS THIS PAGE ----->				50.489
TECHNICAL DESCRIPTION OF THIS WORK PACKAGE:						53.633 +	50.489 =				104.122
TOTAL = 208.244 MULTIPLY BY 2						107.266	<----- SUBTOTALS THIS PAGE ----->				100.978

8 GEV LINE MAGNETS

ESTIMATE --- COST ESTIMATE DETAILS

PAGE NUMBER 20

SUB-SYSTEM: 8GEV MAGNETS/DIPOLES

DATE PRINTED: 7-AUG-92

WBS CODE: 1.1.1.2.1.7 MULT BY 51 COMPONENT : 8GEV MAGNETS/B2 DIPOLE BDM (REWORK)

DATE ESTIMATED: 2/20/92

RESPONSIBLE: CHESTER

<----- MATERIAL -----> <----- LABOR ----->

ITEM NUM.	ITEM TITLE	UNIT MEAS.	NO. UNITS	FY91 \$ /UNIT	COST BASIS	TOTAL MT K\$	NO. UNITS	HOURS /UNIT	TOTAL CRAFT HOURS CODE	\$/HR	TOTAL LABOR K\$
1	MATERIALS	LOT	1	548.	EE	0.548	1	24.0	24.0 T1	29.00	0.696
						0.548	<----- SUBTOTALS THIS PAGE ----->				0.696
TECHNICAL DESCRIPTION OF THIS WORK PACKAGE:						0.548 +	0.696 =	1.242			
TOTAL = 63.342 MULTIPLY BY 51						27.846	<----- SUBTOTALS THIS PAGE ----->				35.496

## 8 GEV LINE MAGNETS

## ESTIMATE --- COST ESTIMATE DETAILS

PAGE NUMBER 21

SUB-SYSTEM: 8GEV MAGNETS/DIPOLES

DATE PRINTED: 7-AUG-92

WBS CODE: 1.1.1.2.1.12 MULT BY 3 COMPONENT : 8GEV MAGNETS/EPB DIPOLE 5-1.5-120 (REWORK)

DATE ESTIMATED: 7/31/92

RESPONSIBLE: CHESTER

&lt;----- MATERIAL -----&gt; &lt;----- LABOR -----&gt;

ITEM NUM.	ITEM TITLE	UNIT MEAS.	NO. UNITS	FY91 \$ /UNIT	COST BASIS	TOTAL MT K\$	NO. UNITS	HOURS /UNIT	TOTAL CRAFT HOURS CODE	\$/HR	TOTAL LABOR K\$
1	MATERIALS	LOT	1	600.	EE	0.600	1	200.0	200.0 T3	29.00	5.800
						0.600	<----- SUBTOTALS THIS PAGE ----->				5.800

TECHNICAL DESCRIPTION OF THIS WORK PACKAGE:

0.600 + 5.800 = 6.400

THESE ARE REWORKED MAGNETS PER ECR-13.

TOTAL = 19.200 MULTIPLY BY 3 1.800 &lt;----- SUBTOTALS THIS PAGE -----&gt; 17.400

8 GEV LINE MAGNETS

ESTIMATE --- COST ESTIMATE DETAILS

PAGE NUMBER 22

SUB-SYSTEM: 8GEV MAGNETS/DIPOLES

DATE PRINTED: 7-AUG-92

WBS CODE: 1.1.1.2.1.13 MULT BY 2 COMPONENT : 8GEV MAGNETS/B3 DIPOLE ODM (REWORK)

DATE ESTIMATED: 2/20/92

RESPONSIBLE: CHESTER

&lt;----- MATERIAL -----&gt; &lt;----- LABOR -----&gt;

ITEM NUM.	ITEM TITLE	UNIT MEAS.	NO. UNITS	FY91 \$ /UNIT	COST BASIS	TOTAL MT K\$	NO. UNITS	HOURS /UNIT	TOTAL CRAFT HOURS CODE	\$/HR	TOTAL LABOR K\$
1	MATERIALS	LOT	1	548.	EE	0.548	1	24.0	24.0 T1	29.00	0.696
						0.548	SUBTOTALS THIS PAGE				0.696

TECHNICAL DESCRIPTION OF THIS WORK PACKAGE:

0.548 + 0.696 = 1.242

TOTAL = 2.484 MULTIPLY BY 2 1.092 &lt;----- SUBTOTALS THIS PAGE -----&gt; 1.392

## 8 GEV LINE MAGNETS

## ESTIMATE --- COST ESTIMATE DETAILS

PAGE NUMBER 23

SUB-SYSTEM: 8GEV MAGNETS/QUADS

DATE PRINTED: 7-AUG-92

WBS CODE: 1.1.1.2.2.7 MULT BY 17 COMPONENT : 8GEV MAGNETS/SQA(17") QUADS (REWORK)

DATE ESTIMATED: 2/19/92

RESPONSIBLE: CHESTER

&lt;----- MATERIAL -----&gt; &lt;----- LABOR -----&gt;

ITEM NUM.	ITEM TITLE	UNIT MEAS.	NO. UNITS	FY91 \$ /UNIT	COST BASIS	TOTAL MT K\$	NO. UNITS	HOURS /UNIT	TOTAL CRAFT HOURS CODE \$/HR	TOTAL LABOR K\$
1	REMOVE BELLOWS ASS'Y						1	8.0	8.0 T1 29.00	0.174
2	REMOVE END FLANGES (2)						1	8.0	8.0 T1 29.00	0.174
3	INSTALL ADPT END FLANGES (2)						1	2.0	2.0 T1 29.00	0.058
4	INSTALL NEW BELLOWS						1	1.0	1.0 T1 29.00	0.029
5	INSTALL NEW FLANGES						1	2.0	2.0 T1 29.00	0.058
6	WELD FLANGES						1	14.0	14.0 T1 29.00	0.408
7	PAINT MAGNET						1	2.0	2.0 T1 29.00	0.058
8	INSPECTION						1	8.0	8.0 T1 29.00	0.174
9	SUPERVISION						1	12.0	12.0 T1 29.00	0.348
10	ADPT PLATES	SET	1	152.88	A89	0.153				
11	BELLOWS	SET	1	171.44	E89	0.171				
12	FLANGES	SET	1	56.78	E89	0.057				
13	PAINT	SET	1	4.37	E89	0.004				
						0.385	<----- SUBTOTALS THIS PAGE ----->			1.479
TECHNICAL DESCRIPTION OF THIS WORK PACKAGE:						0.385 +	1.479 =			1.864
TOTAL = 31.698 MULTIPLY BY 17						6.553	<----- SUBTOTALS THIS PAGE ----->			25.143

8 GEV LINE MAGNETS

ESTIMATE --- COST ESTIMATE DETAILS

PAGE NUMBER 24

SUB-SYSTEM: 8GEV MAGNETS/QUADS

DATE PRINTED: 7-AUG-92

WBS CODE: 1.1.1.2.2.8 MULT BY 34 COMPONENT : 8GEV MAGNETS/SQA(17") QUADS (MORE)

DATE ESTIMATED: 2/19/92

RESPONSIBLE: CHESTER

&lt;----- MATERIAL -----&gt; &lt;----- LABOR -----&gt;

ITEM NUM.	ITEM TITLE	UNIT MEAS.	NO. UNITS	FY91 \$ /UNIT	COST BASIS	TOTAL MT K\$	NO. UNITS	HOURS /UNIT	TOTAL CRAFT HOURS CODE \$/HR	TOTAL LABOR K\$	
1	LAMINATIONS (MATERIAL)	LB	5023	0.40	A88	2.009					
2	LAMINATIONS (STAMPING)	EACH	675	0.49	EE	0.331					
3	CONDUCTOR	LBS	674	3.67	A88	2.474					
4	COIL INSULATION	SET	1	960.96	A89	0.961					
5	CORE PARTS	SET	1	1113.84	A83	1.114					
6	MANIFOLDING & BUSWORK	SET	1	1260.17	A85	1.260					
7	BEAMTUBE & ACCESS.	SET	1	1079.99	A84	1.080					
8	MAGNET FEET/BRACES	SET	1	222.77	A82	0.223					
9	MACHINE SHOP	EA	1	513.24	A84	0.513					
10	PREPARE COILS						1	461.0	461.0 T1 29.00	13.369	
11	ASSEMBLE CORE						1	88.0	88.0 T1 29.00	2.552	
12	FINAL ASSEMBLY						1	140.0	140.0 T1 29.00	4.060	
						9.984	<----- SUBTOTALS THIS PAGE ----->				19.981
TECHNICAL DESCRIPTION OF THIS WORK PACKAGE:						9.984 +	19.981 =				29.946
TOTAL = 1018.147 MULTIPLY BY 34						338.793	<----- SUBTOTALS THIS PAGE ----->				679.354



## 8 GEV LINE MAGNETS

## ESTIMATE --- COST ESTIMATE DETAILS

PAGE NUMBER 25

SUB-SYSTEM: 8GEV MAGNETS/TRIM DIPOLES

DATE PRINTED: 7-AUG-92

WBS CODE: 1.1.1.2.4.1

MULT BY 25

COMPONENT : 8GEV MAGNETS/H TRIM DIPOLE HDC (REWORK)

DATE ESTIMATED: 2/26/92

RESPONSIBLE: CHESTER

&lt;----- MATERIAL -----&gt;

&lt;----- LABOR -----&gt;

ITEM NUM.	ITEM TITLE	UNIT MEAS.	NO. UNITS	FY91 \$ /UNIT	COST BASIS	TOTAL MT K\$	NO. UNITS	HOURS /UNIT	TOTAL CRAFT HOURS CODE	\$/HR	TOTAL LABOR K\$
1	MATERIALS & LABOR	LOT	1	200.	EE	0.200	1	10.0	10.0 T1	29.00	0.290
						0.200	----- SUBTOTALS THIS PAGE -----				0.290
TECHNICAL DESCRIPTION OF THIS WORK PACKAGE:						0.200 +	0.290 =	0.490			
TOTAL = 12.250 MULTIPLY BY 25						5.000	----- SUBTOTALS THIS PAGE -----				7.250

8 GEV LINE MAGNETS

ESTIMATE --- COST ESTIMATE DETAILS

PAGE NUMBER 26

SUB-SYSTEM: 8GEV MAGNETS/TRIM DIPOLES

DATE PRINTED: 7-AUG-92

WBS CODE: 1.1.1.2.4.3 MULT BY 25 COMPONENT : 8GEV MAGNETS/V TRIM DIPOLE (REWORK)

DATE ESTIMATED: 2/20/92

RESPONSIBLE: CHESTER

<----- MATERIAL -----> <----- LABOR ----->

ITEM NUM.	ITEM TITLE	UNIT MEAS.	NO. UNITS	FY91 \$ /UNIT	COST BASIS	TOTAL MT K\$	NO. UNITS	HOURS /UNIT	TOTAL CRAFT HOURS CODE	\$/HR	TOTAL LABOR K\$
1	MATERIALS & LABOR	LOT	1	200.	EE	0.200	1	10.0	10.0 T1	29.00	0.290
						0.200	<----- SUBTOTALS THIS PAGE ----->				0.290
TECHNICAL DESCRIPTION OF THIS WORK PACKAGE:						0.200 +	0.290 =	0.490			
TOTAL = 12.250 MULTIPLY BY 25						5.000	<----- SUBTOTALS THIS PAGE ----->				7.250

## 8 GEV LINE MAGNETS

### ESTIMATE --- COST ESTIMATE DETAILS

PAGE NUMBER 27

SUB-SYSTEM: 8GEV MAGNETS/LAMBERTSONS

DATE PRINTED: 7-AUG-92

WBS CODE: 1.1.1.2.5.1      MULT BY    1    COMPONENT : 8GEV MAGNETS/INJ LAMB ELA AØ 108" (REWORK)

DATE ESTIMATED: 4/25/91

RESPONSIBLE: CHESTER

<----- MATERIAL ----->

<----- LABOR ----->

ITEM NUM.	ITEM TITLE	UNIT MEAS.	NO. UNITS	FY91 \$ /UNIT	COST BASIS	TOTAL MT K\$	NO. UNITS	HOURS /UNIT	TOTAL CRAFT HOURS CODE	\$/HR	TOTAL LABOR K\$
1	MATERIAL & LABOR	LOT	1	1000.	EE	1.000					
2							1	160.0	160.0 T1	29.00	4.640
						1.000	SUBTOTALS THIS PAGE				4.640
TECHNICAL DESCRIPTION OF THIS WORK PACKAGE:						1.000 +	4.640 =	5.640			

TECHNICAL DESCRIPTION OF THIS WORK PACKAGE:

150 GEV PROTON (MI52-F0) MAGNETS

## ESTIMATE --- COST ESTIMATE DETAILS

PAGE NUMBER 28

SUB-SYSTEM: 150GEV P MAGNETS/DIPOLES

DATE PRINTED: 7-AUG-92

WBS CODE: 1.1.1.3.1.7 MULT BY 15 COMPONENT : 150GEV P MAGNETS/B2(240") DIP BDM (REWORK)

DATE ESTIMATED: 2/19/92

RESPONSIBLE: CHESTER

&lt;----- MATERIAL -----&gt; &lt;----- LABOR -----&gt;

ITEM NUM.	ITEM TITLE	UNIT MEAS.	NO. UNITS	FY91 \$ /UNIT	COST BASIS	TOTAL MT K\$	NO. UNITS	HOURS /UNIT	TOTAL CRAFT HOURS CODE	\$/HR	TOTAL LABOR K\$
1	MATERIALS	LOT	1	548.	EE	0.548	1	24.0	24.0 T1	29.00	0.696
						0.548	<----- SUBTOTALS THIS PAGE ----->				0.696

TECHNICAL DESCRIPTION OF THIS WORK PACKAGE:

0.548 + 0.696 = 1.242

157 MR B2(240") DIPOLES WILL BE RECYCLED FOR USE IN BEAM LINES. ONLY 28 WILL BE PHYSICALLY MOVED.

TOTAL =	18.630	MULTIPLY BY	15	8.190	<----- SUBTOTALS THIS PAGE ----->	10.440
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## 150 GEV PROTON (MI52-F0) MAGNETS

## ESTIMATE --- COST ESTIMATE DETAILS

PAGE NUMBER 29

SUB-SYSTEM: 150GEV P MAGNETS/QUADS

DATE PRINTED: 7-AUG 92

WBS CODE: 1.1.1.3.2.5 MULT BY 13 COMPONENT : 150GEV P MAGNETS/3Q84 QUADS BQB (REWORK)

DATE ESTIMATED: 2/19/92

RESPONSIBLE: CHESTER

&lt;----- MATERIAL -----&gt; &lt;----- LABOR -----&gt;

ITEM NUM.	ITEM TITLE	UNIT MEAS.	NO. UNITS	FY91 \$ /UNIT	COST BASIS	TOTAL MT K\$	NO. UNITS	HOURS /UNIT	TOTAL HOURS	CRAFT CODE	\$/HR	TOTAL LABOR K\$
1	REMOVE BELLOWS ASS'Y						1	6.0	6.0	T1	29.00	0.174
2	INSTALL ADPT END FLANGES (1)						1	1.0	1.0	T1	29.00	0.029
3	INSTALL NEW BELLOWS						1	1.0	1.0	T1	29.00	0.029
4	INSTALL NEW FLANGES						1	1.0	1.0	T1	29.00	0.029
5	WELD FLANGES						1	10.0	10.0	T1	29.00	0.290
6	REPLACE INSULATORS						1	8.0	8.0	T1	29.00	0.232
7	PAINT MAGNET						1	2.0	2.0	T1	29.00	0.058
8	INSPECTION						1	5.0	5.0	T1	29.00	0.145
9	SUPERVISION						1	9.0	9.0	T1	29.00	0.261
10	REWORK STANDS						1	17.0	17.0	T1	29.00	0.493
11	INSULATOR	SET	1	81.90	A89	0.082						
12	ADPT PLATES	SET	1	76.44	A89	0.076						
13	BELLOWS	SET	1	171.44	E89	0.171						
14	FLANGES	SET	1	28.39	E89	0.028						
15	PAINT	SET	1	4.37	E89	0.004						

0.363 &lt;----- SUBTOTALS THIS PAGE -----&gt; 1.740

TECHNICAL DESCRIPTION OF THIS WORK PACKAGE:

0.363 + 1.740 = 2.103

PLEASE NOTE: ABOUT 15% OF THE 3Q84'S WILL NEED REWORK AT BOTH ENDS. THIS MEANS THAT \$1.77K FOR LABOR AND \$.428 FOR PARTS

TOTAL = 27.333 MULTIPLY BY 13 4.713 &lt;----- SUBTOTALS THIS PAGE -----&gt; 22.620

SUB-SYSTEM: 150GEV P MAGNETS/QUADS

DATE PRINTED: 7-AUG-92

WBS CODE: 1.1.1.3.2.6 MULT BY 4 COMPONENT : 150GEV P MAGNETS/3Q52 QUADS BQA (REWORK)

DATE ESTIMATED: 2/19/92

RESPONSIBLE: CHESTER

&lt;----- MATERIAL -----&gt; &lt;----- LABOR -----&gt;

ITEM NUM.	ITEM TITLE	UNIT MEAS.	NO. UNITS	FY91 \$ /UNIT	COST BASIS	TOTAL MT K\$	NO. UNITS	HOURS /UNIT	TOTAL CRAFT HOURS CODE	\$/HR	TOTAL LABOR K\$
1	REMOVE BELLOWS ASS'Y						1	6.0	6.0 T1	29.00	0.174
2	REMOVE END FLANGES (2)						1	6.0	6.0 T1	29.00	0.174
3	INSTALL ADPT END FLANGES (2)						1	2.0	2.0 T1	29.00	0.058
4	INSTALL NEW BELLOWS						1	1.0	1.0 T1	29.00	0.029
5	INSTALL NEW FLANGES						1	2.0	2.0 T1	29.00	0.058
6	WELD FLANGES						1	14.0	14.0 T1	29.00	0.408
7	REPLACE INSULATORS						1	8.0	8.0 T1	29.00	0.232
8	PAINT MAGNET						1	2.0	2.0 T1	29.00	0.058
9	INSPECTION						1	6.0	6.0 T1	29.00	0.174
10	SUPERVISION						1	12.0	12.0 T1	29.00	0.348
11	REWORK STANDS						1	17.0	17.0 T1	29.00	0.493
12	INSULATOR	SET	1	81.90	A89	0.082					
13	ADPT PLATES	SET	1	152.88	A89	0.153					
14	BELLOWS	SET	1	171.44	E89	0.171					
15	FLANGES	SET	1	56.78	E89	0.057					
16	PAINT	SET	1	4.37	E89	0.004					

0.467 &lt;----- SUBTOTALS THIS PAGE -----&gt; 2.204

TECHNICAL DESCRIPTION OF THIS WORK PACKAGE:

0.467 + 2.204 = 2.671

TOTAL = 10.685 MULTIPLY BY 4 1.869 &lt;----- SUBTOTALS THIS PAGE -----&gt; 8.816

150 GEV PROTON (MI52-F0) MAGNETS

## ESTIMATE --- COST ESTIMATE DETAILS

PAGE NUMBER 31

SUB-SYSTEM: 150GEV P MAGNETS/DIPOLE TRIMS

DATE PRINTED: 7-AUG-92

WBS CODE: 1.1.1.3.4.1 MULT BY 6 COMPONENT : 150GEV P MAGNETS/H TRIM DIPOLE (REWORK)

DATE ESTIMATED: 2/20/92

RESPONSIBLE: CHESTER

&lt;----- MATERIAL -----&gt; &lt;----- LABOR -----&gt;

ITEM NUM.	ITEM TITLE	UNIT MEAS.	NO. UNITS	FY91 \$ /UNIT	COST BASIS	TOTAL MT K\$	NO. UNITS	HOURS /UNIT	TOTAL CRAFT HOURS CODE	\$/HR	TOTAL LABOR K\$
1	MATERIALS & LABOR	LOT	1	200.	EE	0.200	1	10.0	10.0 T1	29.00	0.290

0.200 &lt;----- SUBTOTALS THIS PAGE -----&gt; 0.290

TECHNICAL DESCRIPTION OF THIS WORK PACKAGE:

0.200 + 0.290 = 0.490

TOTAL = 2.940 MULTIPLY BY 6 1.200 &lt;----- SUBTOTALS THIS PAGE -----&gt; 1.740

150 GEV PROTON (MI52-F0) MAGNETS

## ESTIMATE --- COST ESTIMATE DETAILS

PAGE NUMBER 32

SUB-SYSTEM: 150GEV P MAGNETS/DIPOLE TRIMS

DATE PRINTED: 7-AUG-92

WBS CODE: 1.1.1.3.4.3 MULT BY 6 COMPONENT : 150GEV P MAGNETS/V TRIM DIPOLE (REWORK)

DATE ESTIMATED: 2/20/92

RESPONSIBLE: CHESTER

&lt;----- MATERIAL -----&gt; &lt;----- LABOR -----&gt;

ITEM NUM.	ITEM TITLE	UNIT MEAS.	NO. UNITS	FY91 \$ /UNIT	COST BASIS	TOTAL MT K\$	NO. UNITS	HOURS /UNIT	TOTAL CRAFT HOURS CODE	\$/HR	TOTAL LABOR K\$
1	MATERIALS & LABOR	LOT	1	200.	EE	0.200	1	10.0	10.0 T1	29.00	0.290

0.200 &lt;----- SUBTOTALS THIS PAGE -----&gt; 0.290

TECHNICAL DESCRIPTION OF THIS WORK PACKAGE:

0.200 + 0.290 = 0.490

TOTAL = 2.940 MULTIPLY BY 6 1.200 &lt;----- SUBTOTALS THIS PAGE -----&gt; 1.740



150 GEV PROTON (MI52-F0) MAGNETS

ESTIMATE --- COST ESTIMATE DETAILS

PAGE NUMBER 33

SUB-SYSTEM: 150GEV P MAGNETS/LAMBERTSONS

DATE PRINTED: 7-AUG-92

WBS CODE: 1.1.1.3.5.2 MULT BY 1 COMPONENT : 150GEV P/MI LAMBERTSON 94" (2.4M) (NEW)

DATE ESTIMATED: 2/19/92

RESPONSIBLE: CHESTER

&lt;----- MATERIAL -----&gt; &lt;----- LABOR -----&gt;

ITEM NUM.	ITEM TITLE	UNIT MEAS.	NO. UNITS	FY91 \$ /UNIT	COST BASIS	TOTAL MT K\$	NO. UNITS	HOURS /UNIT	TOTAL CRAFT HOURS CODE \$/HR	TOTAL LABOR K\$	
1	COPPER CONDUCTOR	LB	120	2.60	A87	0.312					
2	LAMINATION (MATERIAL)	LB	5130	0.60	VQ	3.078					
3	LAMINATION STAMPING	EA	5530	0.44	A90	2.433					
4	CORE PARTS	EA	1	6384.	A87	6.384					
5	MANIFOLD & BUSS WORK	EA	1	1942.	A87	1.942					
6	COIL INSULATION	EA	1	495.	A86	0.495					
7	COIL FABRICATION						1	200.0	200.0 T1 29.00	5.800	
8	YOKE FABRICATION						1	600.0	600.0 T1 29.00	17.400	
9	FINAL ASSEMBLY						1	359.0	359.0 T1 29.00	10.411	
						14.624	<----- SUBTOTALS THIS PAGE ----->				33.611
TECHNICAL DESCRIPTION OF THIS WORK PACKAGE:						14.624 +	33.611 =		48.235		

SUB-SYSTEM: 150GEV P MAGNETS/LAMBERTSONS

DATE PRINTED: 7-AUG-92

WBS CODE: 1.1.1.3.5.3 MULT BY 2 COMPONENT : 150GEV P/MI LAMBERTSON 189" (4.8M) (NEW)

DATE ESTIMATED: 2/28/92

RESPONSIBLE: CHESTER

&lt;----- MATERIAL -----&gt; &lt;----- LABOR -----&gt;

ITEM NUM.	ITEM TITLE	UNIT MEAS.	NO. UNITS	FY91 \$ /UNIT	COST BASIS	TOTAL MT K\$	NO. UNITS	HOURS /UNIT	TOTAL CRAFT HOURS CODE \$/HR	TOTAL LABOR K\$	
1	COPPER CONDUCTOR	LB	270	2.60	A87	0.702					
2	LAMINATION (MATERIAL)	LB	10200	0.60	VQ	6.120					
3	LAMINATION STAMPING	EA	11000	0.44	A90	4.840					
4	CORE PARTS	EA	1	18962.	A87	18.962					
5	MANIFOLD & BUSS WORK	EA	1	1942.	A87	1.942					
6	COIL INSULATION	EA	1	1476.	A88	1.476					
7	COIL FABRICATION						1	400.0	400.0 T1 29.00	11.600	
8	YOKE FABRICATION						1	1000.0	1000.0 T1 29.00	29.000	
9	FINAL ASSEMBLY						1	514.0	514.0 T1 29.00	14.906	
						34.042	<----- SUBTOTALS THIS PAGE ----->				55.506
TECHNICAL DESCRIPTION OF THIS WORK PACKAGE:						34.042 +	55.506 =				89.548
TOTAL = 179.096 MULTIPLY BY 2						68.084	<----- SUBTOTALS THIS PAGE ----->				111.012

150 GEV PROTON (MI52-F0) MAGNETS

## ESTIMATE --- COST ESTIMATE DETAILS

PAGE NUMBER 35

SUB-SYSTEM: 150GEV P MAGNETS/LAMBERTSONS

DATE PRINTED: 7-AUG-92

WBS CODE: 1.1.1.3.5.5 MULT BY 5 COMPONENT : 150GEV P/MI C-MAGNET 118" (NEW)

DATE ESTIMATED: 2/19/92

RESPONSIBLE: CHESTER

&lt;----- MATERIAL -----&gt; &lt;----- LABOR -----&gt;

ITEM NUM.	ITEM TITLE	UNIT MEAS.	NO. UNITS	FY91 \$ /UNIT	COST BASIS	TOTAL MT K\$	NO. UNITS	HOURS /UNIT	TOTAL CRAFT HOURS CODE	\$/HR	TOTAL LABOR K\$
1	COMPONENTS	LOT	1	25000.	EE	25.000					
2	COIL FABRICATION						1	196.0	196.0 T1	29.00	5.684
3	YOKE FABRICATION						1	175.0	175.0 T1	29.00	5.075
4	FINAL ASSEMBLY						1	358.0	358.0 T1	29.00	10.382

25.000 &lt;----- SUBTOTALS THIS PAGE -----&gt; 21.141

TECHNICAL DESCRIPTION OF THIS WORK PACKAGE:

25.000 + 21.141 = 46.141

TOTAL = 230.705 MULTIPLY BY 5 125.000 &lt;----- SUBTOTALS THIS PAGE -----&gt; 105.705

150 GEV PBAR (MI62-F0) MAGNETS

## ESTIMATE --- COST ESTIMATE DETAILS

PAGE NUMBER 36

SUB-SYSTEM: 150GEV PBAR MAGNETS/DIPOLES

DATE PRINTED: 7-AUG-92

WBS CODE: 1.1.1.4.1.7 MULT BY 15 COMPONENT : 150GEV PBAR/B2 240" DIPOLES BDM (REWORK)

DATE ESTIMATED: 2/19/92

RESPONSIBLE: CHESTER

&lt;----- MATERIAL -----&gt; &lt;----- LABOR -----&gt;

ITEM NUM.	ITEM TITLE	UNIT MEAS.	NO. UNITS	FY91 \$ /UNIT	COST BASIS	TOTAL MT K\$	NO. UNITS	HOURS /UNIT	TOTAL CRAFT HOURS CODE	\$/HR	TOTAL LABOR K\$
1	MATERIALS & LABOR	LOT	1	546.	EE	0.546	1	24.0	24.0 T1	29.00	0.696
						0.546	SUBTOTALS THIS PAGE				0.696
TECHNICAL DESCRIPTION OF THIS WORK PACKAGE:						0.546 +	0.696 =	1.242			
TOTAL = 18.630 MULTIPLY BY 15						8.190	SUBTOTALS THIS PAGE				10.440

150 GEV PBAR (MI02-F0) MAGNETS

ESTIMATE --- COST ESTIMATE DETAILS

PAGE NUMBER 37

SUB-SYSTEM: 150GEV PBAR MAGNETS/QUADS

DATE PRINTED: 7-AUG-92

WBS CODE: 1.1.1.4.2.5 MULT BY 13 COMPONENT : 150GEV PBAR MAGNETS/84" QUADS BQB (REWORK)

DATE ESTIMATED: 2/19/92

RESPONSIBLE: CHESTER

&lt;----- MATERIAL -----&gt; &lt;----- LABOR -----&gt;

ITEM NUM.	ITEM TITLE	UNIT MEAS.	NO. UNITS	FY91 \$ /UNIT	COST BASIS	TOTAL MT K\$	NO. UNITS	HOURS /UNIT	TOTAL CRAFT HOURS CODE	\$/HR	TOTAL LABOR K\$
1	REMOVE BELLOWS ASS'Y						1	6.0	6.0 T1	29.00	0.174
2	INSTALL ADPT END FLANGES (1)						1	1.0	1.0 T1	29.00	0.029
3	INSTALL NEW BELLOWS						1	1.0	1.0 T1	29.00	0.029
4	INSTALL NEW FLANGES						1	1.0	1.0 T1	29.00	0.029
5	WELD FLANGES						1	10.0	10.0 T1	29.00	0.290
6	REPLACE INSULATORS						1	8.0	8.0 T1	29.00	0.232
7	PAINT MAGNET						1	2.0	2.0 T1	29.00	0.058
8	INSPECTION						1	5.0	5.0 T1	29.00	0.145
9	SUPERVISION						1	9.0	9.0 T1	29.00	0.261
10	REWORK STANDS						1	17.0	17.0 T1	29.00	0.493
11	INSULATOR	SET	1	81.90	A89	0.082					
12	ADPT PLATES	SET	1	76.44	A89	0.076					
13	BELLOWS	SET	1	171.44	E89	0.171					
14	FLANGES	SET	1	28.39	E89	0.028					
15	PAINT	SET	1	4.37	E89	0.004					

0.363 &lt;----- SUBTOTALS THIS PAGE -----&gt; 1.740

TECHNICAL DESCRIPTION OF THIS WORK PACKAGE:

0.363 + 1.740 = 2.103

TOTAL = 27.333 MULTIPLY BY 13 4.713 &lt;----- SUBTOTALS THIS PAGE -----&gt; 22.620

150 GEV PBAR (MI62-F0) MAGNETS

## ESTIMATE --- COST ESTIMATE DETAILS

PAGE NUMBER 38

SUB-SYSTEM: 150GEV PBAR MAGNETS/QUADS

DATE PRINTED: 7-AUG-92

WBS CODE: 1.1.1.4.2.6 MULT BY 4 COMPONENT : 150GEV PBAR MAGNETS/3Q52 QUADS BQA (REWORK)

DATE ESTIMATED: 2/19/92

RESPONSIBLE: CHESTER

&lt;----- MATERIAL -----&gt; &lt;----- LABOR -----&gt;

ITEM NUM.	ITEM TITLE	UNIT MEAS.	NO. UNITS	FY91 \$ /UNIT	COST BASIS	TOTAL MT K\$	NO. UNITS	HOURS /UNIT	TOTAL CRAFT HOURS CODE \$/HR	TOTAL LABOR K\$
1	REMOVE BELLOWS ASS'Y						1	6.0	6.0 T1 29.00	0.174
2	REMOVE END FLANGES (2)						1	6.0	6.0 T1 29.00	0.174
3	INSTALL ADPT END FLANGES (2)						1	2.0	2.0 T1 29.00	0.058
4	INSTALL NEW BELLOWS						1	1.0	1.0 T1 29.00	0.029
5	INSTALL NEW FLANGES						1	2.0	2.0 T1 29.00	0.058
6	WELD FLANGES						1	14.0	14.0 T1 29.00	0.406
7	REPLACE INSULATORS						1	8.0	8.0 T1 29.00	0.232
8	PAINT MAGNET						1	2.0	2.0 T1 29.00	0.058
9	INSPECTION						1	6.0	6.0 T1 29.00	0.174
10	SUPERVISION						1	12.0	12.0 T1 29.00	0.348
11	REWORK STANDS						1	17.0	17.0 T1 29.00	0.493
12	INSULATOR	SET	1	81.90	A89	0.082				
13	ADPT PLATES	SET	1	152.88	A89	0.153				
14	BELLOWS	SET	1	171.44	E89	0.171				
15	FLANGES	SET	1	56.78	E89	0.057				
16	PAINT	SET	1	4.37	E89	0.004				

0.467 &lt;----- SUBTOTALS THIS PAGE -----&gt; 2.204

TECHNICAL DESCRIPTION OF THIS WORK PACKAGE:

0.467 + 2.204 = 2.671

TOTAL = 10.685 MULTIPLY BY 4 1.869 &lt;----- SUBTOTALS THIS PAGE -----&gt; 8.816

150 GEV PBAR (MI82-F0) MAGNETS

## ESTIMATE --- COST ESTIMATE DETAILS

PAGE NUMBER 39

SUB-SYSTEM: 150GEV PBAR MAGNETS/TRIM DIPOLES

DATE PRINTED: 7-AUG-92

WBS CODE: 1.1.1.4.4.1 MULT BY 6 COMPONENT : 150GEV PBAR MAGNETS/H TRIM DIPOLE (REWORK)

DATE ESTIMATED: 2/20/92

RESPONSIBLE: CHESTER

&lt;----- MATERIAL -----&gt; &lt;----- LABOR -----&gt;

ITEM NUM.	ITEM TITLE	UNIT MEAS.	NO. UNITS	FY91 \$ /UNIT	COST BASIS	TOTAL MT K\$	NO. UNITS	HOURS /UNIT	TOTAL CRAFT HOURS CODE	\$/HR	TOTAL LABOR K\$
1	MATERIALS & LABOR	LOT	1	200.	EE	0.200	1	10.0	10.0 T1	29.00	0.290
						0.200	SUBTOTALS THIS PAGE				0.290
TECHNICAL DESCRIPTION OF THIS WORK PACKAGE:						0.200 +	0.290 =	0.490			
TOTAL = 2.940 MULTIPLY BY 6						1.200	SUBTOTALS THIS PAGE				1.740

150 GEV PBAR (MI82-F0) MAGNETS

ESTIMATE --- COST ESTIMATE DETAILS

PAGE NUMBER 40

SUB-SYSTEM: 150GEV PBAR MAGNETS/TRIM DIPOLES

DATE PRINTED: 7-AUG-92

WBS CODE: 1.1.1.4.4.3 MULT BY 8 COMPONENT : 150GEV PBAR MAGNETS/V TRIM DIPOLE (REWORK)

DATE ESTIMATED: 2/20/92

RESPONSIBLE: CHESTER

<----- MATERIAL -----> <----- LABOR ----->

ITEM NUM.	ITEM TITLE	UNIT MEAS.	NO. UNITS	FY91 \$ /UNIT	COST BASIS	TOTAL MT K\$	NO. UNITS	HOURS /UNIT	TOTAL CRAFT HOURS CODE	\$/HR	TOTAL LABOR K\$
1	MATERIALS & LABOR	LOT	1	200.	EE	0.200	1	10.0	10.0 T1	29.00	0.290
						0.200	<----- SUBTOTALS THIS PAGE ----->				0.290
TECHNICAL DESCRIPTION OF THIS WORK PACKAGE:						0.200 +	0.290 =	0.490			
TOTAL = 2.940 MULTIPLY BY 8						1.200	<----- SUBTOTALS THIS PAGE ----->				1.740



150 GEV PBAR (MI82-F0) MAGNETS

## ESTIMATE --- COST ESTIMATE DETAILS

PAGE NUMBER 41

SUB-SYSTEM: 150GEV PBAR MAGNETS/LAMBERTSONS

DATE PRINTED: 7-AUG-92

WBS CODE: 1.1.1.4.5.2 MULT BY 1 COMPONENT : 150GEV PBAR/MI LAMBERTSON 94" (NEW)

DATE ESTIMATED: 2/19/92

RESPONSIBLE: CHESTER

&lt;----- MATERIAL -----&gt; &lt;----- LABOR -----&gt;

ITEM NUM.	ITEM TITLE	UNIT MEAS.	NO. UNITS	FY91 \$ /UNIT	COST BASIS	TOTAL MT K\$	NO. UNITS	HOURS /UNIT	TOTAL CRAFT HOURS CODE	\$/HR	TOTAL LABOR K\$
1	COPPER CONDUCTOR	LB	120	2.60	A87	0.312					
2	LAMINATION (MATERIAL)	LB	5130	0.60	VQ	3.078					
3	LAMINATION STAMPING	EA	5530	0.44	A90	2.433					
4	CORE PARTS	EA	1	6364.	A87	6.364					
5	MANIFOLD & BUSS WORK	EA	1	1942.	A87	1.942					
6	COIL INSULATION	EA	1	495.	A88	0.495					
7	COIL FABRICATION						1	200.0	200.0	T1 29.00	5.800
8	YOKE FABRICATION						1	600.0	600.0	T1 29.00	17.400
9	FINAL ASSEMBLY						1	359.0	359.0	T1 29.00	10.411
						14.624	<----- SUBTOTALS THIS PAGE ----->				33.611

TECHNICAL DESCRIPTION OF THIS WORK PACKAGE:

14.624 + 33.611 = 48.235

150 GEV PBAR (MI82-F0) MAGNETS

ESTIMATE --- COST ESTIMATE DETAILS

PAGE NUMBER 42

SUB-SYSTEM: 150GEV PBAR MAGNETS/LAMBERTSONS

DATE PRINTED: 7-AUG-92

WBS CODE: 1.1.1.4.5.3 MULT BY 2 COMPONENT : 150GEV PBAR/MI LAMBERTSON 189" (NEW)

DATE ESTIMATED: 2/28/92

RESPONSIBLE: CHESTER

&lt;----- MATERIAL -----&gt; &lt;----- LABOR -----&gt;

ITEM NUM.	ITEM TITLE	UNIT MEAS.	NO. UNITS	FY91 \$ /UNIT	COST BASIS	TOTAL MT K\$	NO. UNITS	HOURS /UNIT	TOTAL CRAFT HOURS CODE	\$/HR	TOTAL LABOR K\$
1	COPPER CONDUCTOR	LB	270	2.60	A87	0.702					
2	LAMINATION (MATERIAL)	LB	10200	0.60	VQ	6.120					
3	LAMINATION STAMPING	EA	11000	0.44	A90	4.840					
4	CORE PARTS	EA	1	18962.	A87	18.962					
5	MANIFOLD & BUSS WORK	EA	1	1942.	A87	1.942					
6	COIL INSULATION	EA	1	1476.	A86	1.476					
7	COIL FABRICATION						1	400.0	400.0 T1	29.00	11.600
8	YOKE FABRICATION						1	1000.0	1000.0 T1	29.00	29.000
9	FINAL ASSEMBLY						1	514.0	514.0 T1	29.00	14.906
						34.042	SUBTOTALS THIS PAGE				55.506
TECHNICAL DESCRIPTION OF THIS WORK PACKAGE:						34.042 +	55.506 =				89.548
TOTAL = 179.096 MULTIPLY BY 2						68.084	SUBTOTALS THIS PAGE				111.012

150 GEV PBAR (MI62-F0) MAGNETS

## ESTIMATE --- COST ESTIMATE DETAILS

PAGE NUMBER 43

SUB-SYSTEM: 150GEV PBAR MAGNETS/LAMBERTSONS

DATE PRINTED: 7-AUG-92

WBS CODE: 1.1.1.4.5.6 MULT BY 5 COMPONENT : 150GEV PBAR/MI C-MAGNET 118" (NEW)

DATE ESTIMATED: 2/19/92

RESPONSIBLE: CHESTER

&lt;----- MATERIAL -----&gt; &lt;----- LABOR -----&gt;

ITEM NUM.	ITEM TITLE	UNIT MEAS.	NO. UNITS	FY91 \$ /UNIT	COST BASIS	TOTAL MT K\$	NO. UNITS	HOURS /UNIT	TOTAL CRAFT HOURS CODE	\$/HR	TOTAL LABOR K\$
1	COMPONENTS	LOT	1	25000.	EE	25.000					
2	COIL FABRICATION						1	198.0	198.0 T1	29.00	5.884
3	YOKE FABRICATION						1	175.0	175.0 T1	29.00	5.075
4	FINAL ASSEMBLY						1	358.0	358.0 T1	29.00	10.382

25.000 &lt;----- SUBTOTALS THIS PAGE -----&gt; 21.141

TECHNICAL DESCRIPTION OF THIS WORK PACKAGE:

25.000 + 21.141 = 46.141

TOTAL = 230.705 MULTIPLY BY 5 125.000 &lt;----- SUBTOTALS THIS PAGE -----&gt; 105.705

120 GEV (F0-F17) MAGNETS

ESTIMATE --- COST ESTIMATE DETAILS

PAGE NUMBER 44

SUB-SYSTEM: 120GEV MAGNETS/DIPOLES

DATE PRINTED: 7-AUG-92

WBS CODE: 1.1.1.5.1.13 MULT BY 8 COMPONENT : 120GEV MAGNETS/B3 DIPOLE ODM (REWORK)

DATE ESTIMATED: 2/28/92

RESPONSIBLE: CHESTER

<----- MATERIAL -----> <----- LABOR ----->

ITEM NUM.	ITEM TITLE	UNIT MEAS.	NO. UNITS	FY91 \$ /UNIT	COST BASIS	TOTAL MT K\$	NO. UNITS	HOURS /UNIT	TOTAL CRAFT HOURS CODE	\$/HR	TOTAL LABOR K\$
1	MATERIALS	LOT	1	546.	EE	0.546	1	24.0	24.0 T1	29.00	0.696
						0.546	<----- SUBTOTALS THIS PAGE ----->				0.696
TECHNICAL DESCRIPTION OF THIS WORK PACKAGE:						0.546 +	0.696 =	1.242			
TOTAL = 9.936 MULTIPLY BY 8						4.368	<----- SUBTOTALS THIS PAGE ----->				5.588

120 GEV (F0-F17) MAGNETS

ESTIMATE --- COST ESTIMATE DETAILS

PAGE NUMBER 45

SUB-SYSTEM: 120GEV MAGNETS/DIPOLES

DATE PRINTED: 7-AUG-92

WBS CODE: 1.1.1.5.1.14 MULT BY 15 COMPONENT : 120GEV MAGNETS/BDM 240\*B1/B2 LEFT IN PLACE

DATE ESTIMATED: 2/26/92

RESPONSIBLE: CHESTER

<----- MATERIAL -----> <----- LABOR ----->

ITEM NUM.	ITEM TITLE	UNIT MEAS.	NO. UNITS	FY91 \$ /UNIT	COST BASIS	TOTAL MT K\$	NO. UNITS	HOURS /UNIT	TOTAL CRAFT HOURS CODE \$/HR	TOTAL LABOR K\$
1			0	0.		0.000				
						0.000	<----- SUBTOTALS THIS PAGE ----->			0.000

TECHNICAL DESCRIPTION OF THIS WORK PACKAGE:

0.000 + 0.000 = 0.000

120 GEV (F0-F17) MAGNETS

ESTIMATE --- COST ESTIMATE DETAILS

PAGE NUMBER 46

SUB-SYSTEM: 120GEV MAGS/84" MR QUAD BQB

DATE PRINTED: 7-AUG-92

WBS CODE: 1.1.1.5.2.10 MULT BY 1 COMPONENT : 120GEV MAGS/84" BQB (REWORK)

DATE ESTIMATED: 2/26/92

RESPONSIBLE: CHESTER

<----- MATERIAL -----> <----- LABOR ----->

ITEM NUM.	ITEM TITLE	UNIT MEAS.	NO. UNITS	FY91 \$ /UNIT	COST BASIS	TOTAL MT K\$	NO. UNITS	HOURS /UNIT	TOTAL CRAFT HOURS CODE	\$/HR	TOTAL LABOR K\$
1			0	0.		0.000					
						0.000	<----- SUBTOTALS THIS PAGE ----->				0.000

TECHNICAL DESCRIPTION OF THIS WORK PACKAGE:

0.000 + 0.000 = 0.000

120 GEV (F0-F17) MAGNETS

ESTIMATE --- COST ESTIMATE DETAILS

PAGE NUMBER 47

SUB-SYSTEM: 120GEV MAGNETS/TRIM DIPOLES

DATE PRINTED: 7-AUG-92

WBS CODE: 1.1.1.5.4.1 MULT BY 4 COMPONENT : 120GEV MAGNETS/HDC TRIM DIPOLE (REWORK)

DATE ESTIMATED: 2/26/92

RESPONSIBLE: CHESTER

<----- MATERIAL -----> <----- LABOR ----->

ITEM NUM.	ITEM TITLE	UNIT MEAS.	NO. UNITS	FY91 \$ /UNIT	COST BASIS	TOTAL MT K\$	NO. UNITS	HOURS /UNIT	TOTAL CRAFT HOURS CODE	\$/HR	TOTAL LABOR K\$
1	MATERIALS & LABOR	LOT	1	200.	EE	0.200	1	10.0	10.0 T1	29.00	0.290
						0.200	<----- SUBTOTALS THIS PAGE ----->				0.290
TECHNICAL DESCRIPTION OF THIS WORK PACKAGE:						0.200 +	0.290 =	0.490			
TOTAL = 1.960 MULTIPLY BY 4						0.800	<----- SUBTOTALS THIS PAGE ----->				1.160

120 GEV (F0-F17) MAGNETS

## ESTIMATE --- COST ESTIMATE DETAILS

PAGE NUMBER 48

SUB-SYSTEM: 120GEV MAGNETS/TRIM DIPOLES

DATE PRINTED: 7-AUG-92

WBS CODE: 1.1.1.5.4.3 MULT BY 4 COMPONENT : 120GEV MAGNETS/VDC MR TRIM DIPOLE (REWORK)

DATE ESTIMATED: 2/26/92

RESPONSIBLE: CHESTER

&lt;----- MATERIAL -----&gt; &lt;----- LABOR -----&gt;

ITEM NUM.	ITEM TITLE	UNIT MEAS.	NO. UNITS	FY91 \$ /UNIT	COST BASIS	TOTAL MT K\$	NO. UNITS	HOURS /UNIT	TOTAL CRAFT HOURS CODE	\$/HR	TOTAL LABOR K\$
1	MATERIALS & LABOR	LOT	1	200.	EE	0.200	1	10.0	10.0 T1	29.00	0.290

0.200 &lt;----- SUBTOTALS THIS PAGE -----&gt; 0.290

TECHNICAL DESCRIPTION OF THIS WORK PACKAGE:

0.200 + 0.290 = 0.490

TOTAL = 1.960 MULTIPLY BY 4 0.800 &lt;----- SUBTOTALS THIS PAGE -----&gt; 1.160



SLOW SPILL (F18-SY) MAGNETS

ESTIMATE --- COST ESTIMATE DETAILS

PAGE NUMBER 49

SUB-SYSTEM: SLOW SPILL MAGNETS/DIPOLES

DATE PRINTED: 7-AUG-92

WBS CODE: 1.1.1.6.1.10 MULT BY 1 COMPONENT : 120GEV MAGNETS/2XB2 240" DIPOLES BDM (IN PLACE)

DATE ESTIMATED: 2/28/92

RESPONSIBLE: CHESTER

&lt;----- MATERIAL -----&gt; &lt;----- LABOR -----&gt;

ITEM NUM.	ITEM TITLE	UNIT MEAS.	NO. UNITS	FY91 \$ /UNIT	COST BASIS	TOTAL MT K\$	NO. UNITS	HOURS /UNIT	TOTAL CRAFT HOURS CODE \$/HR	TOTAL LABOR K\$
1			0	0.		0.000				
						0.000	<----- SUBTOTALS THIS PAGE ----->			0.000

TECHNICAL DESCRIPTION OF THIS WORK PACKAGE:

0.000 + 0.000 = 0.000

ZERO COST (LEFT IN PLACE)

SLOW SPILL (F18-SY) MAGNETS

ESTIMATE --- COST ESTIMATE DETAILS

PAGE NUMBER 50

SUB-SYSTEM: SLOW SPILL MAGNETS/DIPOLES

DATE PRINTED: 7-AUG-92

WBS CODE: 1.1.1.0.1.12 MULT BY 1 COMPONENT : SLOW SPILL MAGNETS/EPB 1-1.5-120 (REWORK)

DATE ESTIMATED: 7/31/92

RESPONSIBLE: CHESTER

<----- MATERIAL -----> <----- LABOR ----->

ITEM NUM.	ITEM TITLE	UNIT MEAS.	NO. UNITS	FY91 \$ /UNIT	COST BASIS	TOTAL MT K\$	NO. UNITS	HOURS /UNIT	TOTAL CRAFT HOURS CODE	\$/HR	TOTAL LABOR K\$
1	MATERIALS	LOT	1	600.	EE	0.600	1	200.0	200.0 T1	29.00	5.800
						0.600	<----- SUBTOTALS THIS PAGE ----->				5.800

TECHNICAL DESCRIPTION OF THIS WORK PACKAGE:

0.600 + 5.800 = 6.400

THESE ARE NOW REWORKED MAGNETS PER ECR-14.

SLOW SPILL (F18-SY) MAGNETS

ESTIMATE --- COST ESTIMATE DETAILS

PAGE NUMBER 51

SUB-SYSTEM: SLOW SPILL MAGNETS/DIPOLES

DATE PRINTED: 7-AUG-92

WBS CODE: 1.1.1.6.1.13 MULT BY 4 COMPONENT : SLOW SPILL MAGS/B3 DIPOLE ODM (REWORK)

DATE ESTIMATED: 2/26/92

RESPONSIBLE: CHESTER

&lt;----- MATERIAL -----&gt; &lt;----- LABOR -----&gt;

ITEM NUM.	ITEM TITLE	UNIT MEAS.	NO. UNITS	FY91 \$ /UNIT	COST BASIS	TOTAL MT K\$	NO. UNITS	HOURS /UNIT	TOTAL CRAFT HOURS CODE \$/HR	TOTAL LABOR K\$
1	MATERIALS	LOT	1	548.	EE	0.548	1	24.0	24.0 T1 29.00	0.696

0.548 &lt;----- SUBTOTALS THIS PAGE -----&gt; 0.696

TECHNICAL DESCRIPTION OF THIS WORK PACKAGE:

0.548 + 0.696 = 1.242

TOTAL = 4.968 MULTIPLY BY 4 2.184 &lt;----- SUBTOTALS THIS PAGE -----&gt; 2.784

SLOW SPILL (F18-SY) MAGNETS

ESTIMATE --- COST ESTIMATE DETAILS

PAGE NUMBER 52

SUB-SYSTEM: SLOW SPILL MAGNETS/DIPOLES

DATE PRINTED: 7-AUG-92

WBS CODE: 1.1.1.8.1.14 MULT BY 103 COMPONENT : SLOW SPILL MAGS/B1 & B2 LEFT IN PLACE

DATE ESTIMATED: 2/28/92

RESPONSIBLE: CHESTER

<----- MATERIAL -----> <----- LABOR ----->

ITEM NUM.	ITEM TITLE	UNIT MEAS.	NO. UNITS	FY91 \$ /UNIT	COST BASIS	TOTAL MT K\$	NO. UNITS	HOURS /UNIT	TOTAL CRAFT HOURS CODE \$/HR	TOTAL LABOR K\$
--------------	------------	---------------	--------------	------------------	---------------	-----------------	--------------	----------------	---------------------------------	--------------------

1			0	0.		0.000				
---	--	--	---	----	--	-------	--	--	--	--

0.000 <----- SUBTOTALS THIS PAGE -----> 0.000

TECHNICAL DESCRIPTION OF THIS WORK PACKAGE:

0.000 + 0.000 = 0.000

DIPOLES IN MAIN RING REMNANT LEFT IN PLACE.

## SLOW SPILL (F18-SY) MAGNETS

## ESTIMATE --- COST ESTIMATE DETAILS

PAGE NUMBER 53

SUB-SYSTEM: SLOW SPILL MAGS/BQB

DATE PRINTED: 7-AUG-92

WBS CODE: 1.1.1.8.2.5 MULT BY 1 COMPONENT : SLOW SPILL MAGS/84" QUADS BQB (REWORK)

DATE ESTIMATED: 2/26/92

RESPONSIBLE: CHESTER

&lt;----- MATERIAL -----&gt; &lt;----- LABOR -----&gt;

ITEM NUM.	ITEM TITLE	UNIT MEAS.	NO. UNITS	FY91 \$ /UNIT	COST BASIS	TOTAL MT K\$	NO. UNITS	HOURS /UNIT	TOTAL CRAFT HOURS	CODE	\$/HR	TOTAL LABOR K\$
1	REMOVE BELLOWS ASS'Y						1	6.0	6.0	T1	29.00	0.174
2	INSTALL ADPT END FLANGES (1)						1	1.0	1.0	T1	29.00	0.029
3	INSTALL NEW BELLOWS						1	1.0	1.0	T1	29.00	0.029
4	INSTALL NEW FLANGES						1	1.0	1.0	T1	29.00	0.029
5	WELD FLANGES						1	10.0	10.0	T1	29.00	0.290
6	REPLACE INSULATORS						1	8.0	8.0	T1	29.00	0.232
7	PAINT MAGNET						1	2.0	2.0	T1	29.00	0.058
8	INSPECTION						1	5.0	5.0	T1	29.00	0.145
9	SUPERVISION						1	9.0	9.0	T1	29.00	0.261
10	REWORK STANDS						1	17.0	17.0	T1	29.00	0.493
11	INSULATOR	SET	1	81.90	A89	0.082						
12	ADPT PLATES	SET	1	76.44	A89	0.076						
13	BELLOWS	SET	1	171.44	E89	0.171						
14	FLANGES	SET	1	28.39	E89	0.028						
15	PAINT	SET	1	4.37	E89	0.004						

0.363 &lt;----- SUBTOTALS THIS PAGE -----&gt; 1.740

TECHNICAL DESCRIPTION OF THIS WORK PACKAGE:

0.363 + 1.740 = 2.103

SLOW SPILL (F18-SY) MAGNETS

ESTIMATE --- COST ESTIMATE DETAILS

PAGE NUMBER 54

SUB-SYSTEM: SLOW SPILL MAGS/BQB

DATE PRINTED: 7-AUG-92

WBS CODE: 1.1.1.6.2.10 MULT BY 30 COMPONENT : SLOW SPILL MAGS/84" BQB LEFT IN PLACE

DATE ESTIMATED: 2/28/92

RESPONSIBLE: CHESTER

<----- MATERIAL -----> <----- LABOR ----->

ITEM NUM.	ITEM TITLE	UNIT MEAS.	NO. UNITS	FY91 \$ /UNIT	COST BASIS	TOTAL MT K\$	NO. UNITS	HOURS /UNIT	TOTAL CRAFT HOURS CODE \$/HR	TOTAL LABOR K\$
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1			0	0.		0.000				
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0.000 <----- SUBTOTALS THIS PAGE -----> 0.000

TECHNICAL DESCRIPTION OF THIS WORK PACKAGE:

0.000 + 0.000 = 0.000

QUADRUPOLES IN MAIN RING REMNANT LEFT IN PLACE.

SLOW SPILL (F18-SY) MAGNETS

ESTIMATE --- COST ESTIMATE DETAILS

PAGE NUMBER 55

SUB-SYSTEM: SLOW SPILL MAGNETS/BUMPS

DATE PRINTED: 7-AUG-92

WBS CODE: 1.1.1.6.4.1 MULT BY 14 COMPONENT : SLOW SPILL MAGS/H TRIM DIPOLE (REWORK)

DATE ESTIMATED: 2/28/92

RESPONSIBLE: CHESTER

&lt;----- MATERIAL -----&gt; &lt;----- LABOR -----&gt;

ITEM NUM.	ITEM TITLE	UNIT MEAS.	NO. UNITS	FY91 \$ /UNIT	COST BASIS	TOTAL MT K\$	NO. UNITS	HOURS /UNIT	TOTAL CRAFT HOURS CODE	\$/HR	TOTAL LABOR K\$
1	MATERIALS & LABOR	LOT	1	200.	EE	0.200	1	10.0	10.0 T1	29.00	0.290
						0.200	<----- SUBTOTALS THIS PAGE ----->				0.290

TECHNICAL DESCRIPTION OF THIS WORK PACKAGE:

0.200 + 0.290 = 0.490

TOTAL =	6.860	MULTIPLY BY	14	2.800	<----- SUBTOTALS THIS PAGE ----->	4.060
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SLOW SPILL (F18-SY) MAGNETS

## ESTIMATE --- COST ESTIMATE DETAILS

PAGE NUMBER 56

SUB-SYSTEM: SLOW SPILL MAGNETS/BUMPS

DATE PRINTED: 7-AUG-92

WBS CODE: 1.1.1.6.4.3 MULT BY 14 COMPONENT : SLOW SPILL MAGS/V TRIM DIPOLE (REWORK)

DATE ESTIMATED: 2/26/92

RESPONSIBLE: CHESTER

&lt;----- MATERIAL -----&gt;

&lt;----- LABOR -----&gt;

ITEM NUM.	ITEM TITLE	UNIT MEAS.	NO. UNITS	FY91 \$ /UNIT	COST BASIS	TOTAL MT K\$	NO. UNITS	HOURS /UNIT	TOTAL CRAFT HOURS CODE	\$/HR	TOTAL LABOR K\$
1	MATERIALS & LABOR	LOT	1	200.	EE	0.200	1	10.0	10.0 T1	29.00	0.290
						0.200	SUBTOTALS THIS PAGE				0.290
TECHNICAL DESCRIPTION OF THIS WORK PACKAGE:						0.200 +	0.290 =	0.490			
TOTAL = 0.860 MULTIPLY BY 14						2.800	SUBTOTALS THIS PAGE				4.060



## ABORT LINE MAGNETS

## ESTIMATE --- COST ESTIMATE DETAILS

PAGE NUMBER 57

SUB-SYSTEM: ABORT LINE MAGNETS/DIPOLES

DATE PRINTED: 7-AUG-92

WBS CODE: 1.1.1.8.1.7 MULT BY 2 COMPONENT : ABORT LINE MAGNETS/B2 BDM DIPOLE (REWORK)

DATE ESTIMATED: 2/20/92

RESPONSIBLE: CHESTER

&lt;----- MATERIAL -----&gt; &lt;----- LABOR -----&gt;

ITEM NUM.	ITEM TITLE	UNIT MEAS.	NO. UNITS	FY91 \$ /UNIT	COST BASIS	TOTAL MT K\$	NO. UNITS	HOURS /UNIT	TOTAL CRAFT HOURS CODE	\$/HR	TOTAL LABOR K\$
1	MATERIALS	LOT	1	546.	EE	0.546	1	24.0	24.0 T1	29.00	0.696

0.546 &lt;----- SUBTOTALS THIS PAGE -----&gt; 0.696

TECHNICAL DESCRIPTION OF THIS WORK PACKAGE:

0.546 + 0.696 = 1.242

TOTAL = 2.484 MULTIPLY BY 2 1.092 &lt;----- SUBTOTALS THIS PAGE -----&gt; 1.392

## ABORT LINE MAGNETS

## ESTIMATE --- COST ESTIMATE DETAILS

PAGE NUMBER 58

SUB-SYSTEM: ABORT LINE MAGNETS/QUADS

DATE PRINTED: 7-AUG-92

WBS CODE: 1.1.1.8.2.8 MULT BY 3 COMPONENT : ABORT LINE MAGNETS/3Q52 QUADS BQA (REWORK)

DATE ESTIMATED: 2/19/92

RESPONSIBLE: CHESTER

&lt;----- MATERIAL -----&gt; &lt;----- LABOR -----&gt;

ITEM NUM.	ITEM TITLE	UNIT MEAS.	NO. UNITS	FY91 \$ /UNIT	COST BASIS	TOTAL MT K\$	NO. UNITS	HOURS /UNIT	TOTAL CRAFT HOURS	CODE	\$/HR	TOTAL LABOR K\$
1	REMOVE BELLOWS ASS'Y						1	6.0	6.0	T1	29.00	0.174
2	REMOVE END FLANGES (2)						1	6.0	6.0	T1	29.00	0.174
3	INSTALL ADPT END FLANGES (2)						1	2.0	2.0	T1	29.00	0.058
4	INSTALL NEW BELLOWS						1	1.0	1.0	T1	29.00	0.029
5	INSTALL NEW FLANGES						1	2.0	2.0	T1	29.00	0.058
6	WELD FLANGES						1	14.0	14.0	T1	29.00	0.408
7	REPLACE INSULATORS						1	8.0	8.0	T1	29.00	0.232
8	PAINT MAGNET						1	2.0	2.0	T1	29.00	0.058
9	INSPECTION						1	6.0	6.0	T1	29.00	0.174
10	SUPERVISION						1	12.0	12.0	T1	29.00	0.348
11	REWORK STANDS						1	17.0	17.0	T1	29.00	0.493
12	INSULATOR	SET	1	81.90	A89	0.082						
13	ADPT PLATES	SET	1	152.88	A89	0.153						
14	BELLOWS	SET	1	171.44	E89	0.171						
15	FLANGES	SET	1	56.78	E89	0.057						
16	PAINT	SET	1	4.37	E89	0.004						

0.467 &lt;----- SUBTOTALS THIS PAGE -----&gt; 2.204

TECHNICAL DESCRIPTION OF THIS WORK PACKAGE:

0.467 + 2.204 = 2.671

TOTAL = 8.014 MULTIPLY BY 3

1.402 &lt;----- SUBTOTALS THIS PAGE -----&gt; 6.612

## ABORT LINE MAGNETS

## ESTIMATE --- COST ESTIMATE DETAILS

PAGE NUMBER 59

SUB-SYSTEM: ABORT LINE MAGNETS/TRIM DIPOLES

DATE PRINTED: 7-AUG-92

WBS CODE: 1.1.1.8.4.1 MULT BY 2 COMPONENT : ABORT LINE MAGNETS/H TRIM DIPOLE (REWORK)

DATE ESTIMATED: 2/28/92

RESPONSIBLE: CHESTER

&lt;----- MATERIAL -----&gt;

&lt;----- LABOR -----&gt;

ITEM NUM.	ITEM TITLE	UNIT MEAS.	NO. UNITS	FY91 \$ /UNIT	COST BASIS	TOTAL MT K\$	NO. UNITS	HOURS /UNIT	TOTAL CRAFT HOURS CODE	\$/HR	TOTAL LABOR K\$
1	MATERIALS & LABOR	LOT	1	200.	EE	0.200	1	10.0	10.0 T1	29.00	0.290
						0.200	<----- SUBTOTALS THIS PAGE ----->				0.290

TECHNICAL DESCRIPTION OF THIS WORK PACKAGE:

0.200 + 0.290 = 0.490

TOTAL = 0.980 MULTIPLY BY 2

0.400 &lt;----- SUBTOTALS THIS PAGE -----&gt; 0.580

## ABORT LINE MAGNETS

## ESTIMATE --- COST ESTIMATE DETAILS

PAGE NUMBER 60

SUB-SYSTEM: ABORT LINE MAGNETS/TRIM DIPOLES

DATE PRINTED: 7-AUG-92

WBS CODE: 1.1.1.8.4.3 MULT BY 2 COMPONENT : ABORT LINE MAGNETS/V TRIM DIPOLE (REWORK)

DATE ESTIMATED: 2/28/92

RESPONSIBLE: CHESTER

&lt;----- MATERIAL -----&gt; &lt;----- LABOR -----&gt;

ITEM NUM.	ITEM TITLE	UNIT MEAS.	NO. UNITS	FY91 \$ /UNIT	COST BASIS	TOTAL MT K\$	NO. UNITS	HOURS /UNIT	TOTAL CRAFT HOURS CODE	\$/HR	TOTAL LABOR K\$
1	MATERIALS & LABOR	LOT	1	200.	EE	0.200	1	10.0	10.0 T1	29.00	0.290
						0.200	SUBTOTALS THIS PAGE				0.290

TECHNICAL DESCRIPTION OF THIS WORK PACKAGE:

0.200 + 0.290 = 0.490

TOTAL =	0.980	MULTIPLY BY	2	0.400	SUBTOTALS THIS PAGE		0.580
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## ABORT LINE MAGNETS

## ESTIMATE --- COST ESTIMATE DETAILS

PAGE NUMBER 61

SUB-SYSTEM: ABORT LINE MAGNETS/LAMBERTSONS

DATE PRINTED: 7-AUG-92

WBS CODE: 1.1.1.8.6.2 MULT BY 1 COMPONENT : ABORT LINE MAGNETS/MI LAMBERTSON 94" (NEW)

DATE ESTIMATED: 2/19/92

RESPONSIBLE: CHESTER

&lt;----- MATERIAL -----&gt;

&lt;----- LABOR -----&gt;

ITEM NUM.	ITEM TITLE	UNIT MEAS.	NO. UNITS	FY91 \$ /UNIT	COST BASIS	TOTAL MT K\$	NO. UNITS	HOURS /UNIT	TOTAL CRAFT HOURS CODE \$/HR	TOTAL LABOR K\$
1	COPPER CONDUCTOR	LB	120	2.60	A87	0.312				
2	LAMINATION (MATERIAL)	LB	5130	0.60	VQ	3.078				
3	LAMINATION STAMPING	EA	5530	0.44	A90	2.433				
4	CORE PARTS	EA	1	6364.	A87	6.364				
5	MANIFOLD & BUSS WORK	EA	1	1942.	A87	1.942				
6	COIL INSULATION	EA	1	495.	A86	0.495				
7	COIL FABRICATION						1	200.0	200.0 T1 29.00	5.800
8	YOKE FABRICATION						1	600.0	600.0 T1 29.00	17.400
9	FINAL ASSEMBLY						1	359.0	359.0 T1 29.00	10.411
						14.624	<----- SUBTOTALS THIS PAGE ----->			33.611

TECHNICAL DESCRIPTION OF THIS WORK PACKAGE:

14.624 + 33.611 = 48.235

## ABORT LINE MAGNETS

## ESTIMATE --- COST ESTIMATE DETAILS

PAGE NUMBER 62

SUB-SYSTEM: ABORT LINE MAGNETS/LAMBERTSONS

DATE PRINTED: 7-AUG-92

WBS CODE: 1.1.1.8.5.3 MULT BY 1 COMPONENT : ABORT LINE MAGNETS/MI LAMBERTSON 189" (NEW)

DATE ESTIMATED: 2/19/92

RESPONSIBLE: CHESTER

&lt;----- MATERIAL -----&gt; &lt;----- LABOR -----&gt;

ITEM NUM.	ITEM TITLE	UNIT MEAS.	NO. UNITS	FY91 \$ /UNIT	COST BASIS	TOTAL MT K\$	NO. UNITS	HOURS /UNIT	TOTAL CRAFT HOURS CODE	\$/HR	TOTAL LABOR K\$
1	COPPER CONDUCTOR	LB	270	2.60	A87	0.702					
2	LAMINATION (MATERIAL)	LB	10200	0.60	VQ	6.120					
3	LAMINATION STAMPING	EA	11000	0.44	A90	4.840					
4	CORE PARTS	EA	1	18982.	A87	18.982					
5	MANIFOLD & BUSS WORK	EA	1	1942.	A87	1.942					
6	COIL INSULATION	EA	1	1476.	A86	1.476					
7	COIL FABRICATION						1	400.0	400.0	T1 29.00	11.600
8	YOKE FABRICATION						1	1000.0	1000.0	T1 29.00	29.000
9	FINAL ASSEMBLY						1	514.0	514.0	T1 29.00	14.906
						34.042	<----- SUBTOTALS THIS PAGE ----->				55.506

TECHNICAL DESCRIPTION OF THIS WORK PACKAGE:

34.042 + 55.506 = 89.548

## ABORT LINE MAGNETS

## ESTIMATE --- COST ESTIMATE DETAILS

PAGE NUMBER 63

SUB-SYSTEM: ABORT LINE MAGNETS/LAMBERTSONS

DATE PRINTED: 7-AUG-92

WBS CODE: 1.1.1.8.5.5 MULT BY 1 COMPONENT : ABORT LINE MAGNETS/F-17 C-MAGNET 118" (NEW)

DATE ESTIMATED: 4/26/91

RESPONSIBLE: CHESTER

&lt;----- MATERIAL -----&gt; &lt;----- LABOR -----&gt;

ITEM NUM.	ITEM TITLE	UNIT MEAS.	NO. UNITS	FY91 \$ /UNIT	COST BASIS	TOTAL MT K\$	NO. UNITS	HOURS /UNIT	TOTAL CRAFT HOURS CODE \$/HR	TOTAL LABOR K\$
1	COMPONENTS	LOT	1	25000.	EE	25.000				
2	COIL FABRICATION						1	196.0	196.0 T1 29.00	5.684
3	YOKE FABRICATION						1	175.0	175.0 T1 29.00	5.075
4	FINAL ASSEMBLY						1	358.0	358.0 T1 29.00	10.382
						25.000			<----- SUBTOTALS THIS PAGE ----->	21.141

TECHNICAL DESCRIPTION OF THIS WORK PACKAGE:

25.000 + 21.141 = 46.141

## SUB-SYSTEM: DIPOLE TOOLING

DATE PRINTED: 7-AUG-92

WBS CODE: 1.1.1.10.1.1 MULT BY 1 COMPONENT : DIPOLE TOOLING/MIR DIPOLE

DATE ESTIMATED: 2/19/92

RESPONSIBLE: CHESTER

&lt;----- MATERIAL -----&gt; &lt;----- LABOR -----&gt;

ITEM NUM.	ITEM TITLE	UNIT MEAS.	NO. UNITS	FY91 \$ /UNIT	COST BASIS	TOTAL MT K\$	NO. UNITS	HOURS /UNIT	TOTAL HOURS	CRAFT CODE	\$/HR	TOTAL LABOR K\$
1	INSULATING CARTS	EA	3	4950.	A90	14.850	3	4.0	12.0	T3	29.00	0.348
2	GRIT BLASTING CARTS	EA	3	20000.	EE	60.000	3	4.0	12.0	T3	29.00	0.348
3	CURING CRADLE (HOLD 2 FIXTURES)	EA	1	4500.	EE	4.500	1	20.0	20.0	T3	29.00	0.580
4	STAMPING DIE (20' DIPOLE)	EA	1	35000.	A91	35.000	1	12.0	12.0	T3	29.00	0.348
5	STACKING PLATE (FOR 2ND STACKER)	EA	1	26900.	A89	26.900	1	24.0	24.0	T3	29.00	0.696
6	STACKING HYDRAULIC HOLD DOWN	EA	1	22000.	A89	22.000	1	48.0	48.0	T3	29.00	1.392
7	END PACK STACKING FIXTURE	EA	2	6500.	A89	13.000	2	60.0	120.0	T3	29.00	3.480
8	ASSEMBLY STANDS (STORAGE)	EA	3	10000.	EE	30.000	3	4.0	12.0	T3	29.00	0.348
9	COIL POTTING CURING FIXTURE	EA	2	75000.	A89	150.000	2	40.0	80.0	T3	29.00	2.320
10	POTTING TANK UPGRADE	EA	1	25000.	EE	25.000	1	120.0	120.0	T3	29.00	3.480
11	FOOT LOCATING FIXTURE	EA	2	5000.	EE	10.000	2	12.0	24.0	T3	29.00	0.696
12	ASSEMBLY STANDS (PEDASTALS)	EA	10	10000.	EE	100.000	10	4.0	40.0	T3	29.00	1.160
13	LIFTING FIXTURE/CORES	EA	2	10000.	A90	20.000	2	8.0	16.0	T3	29.00	0.464
14	LIFTING FIXTURE/COILS	EA	3	5000.	A89	15.000	3	8.0	24.0	T3	29.00	0.696
15	NEW VACUUM TANK RACK W/WHEELS	EA	1	13104.	EE	13.104	1	120.0	120.0	T3	29.00	3.480
16	NEW DOWTHERM SYS/POTTING COILS	EA	1	87360.	EE	87.360	1	250.0	250.0	T3	29.00	7.250
17	MAINT/NEW & EXIST/VACUUM SYSTEM	LOT	1	15000.	EE	15.000	1	1248.0	1248.0	T3	29.00	36.192
18	MAINTENANCE OF DOWTHERM SYSTEMS	LOT	1	7862.40	EE	7.862	1	1248.0	1248.0	T3	29.00	36.192
19	MAINTENANCE OF GRITBLAST SYSTEM	LOT	1	10000.	EE	10.000	1	1872.0	1872.0	T3	29.00	54.288
20	EXPECTED REWORK/FAB TOOLING	LOT	1	107179.	EE	107.179						

766.755 &lt;----- SUBTOTALS THIS PAGE -----&gt; 153.758

TECHNICAL DESCRIPTION OF THIS WORK PACKAGE:

766.755 + 153.758 = 920.513

PRODUCTION TOOLING. A SECOND SET WILL BE BUILT ON PRE-CONSTRUCTION R&amp;D.



## MAGNET TOOLING

## ESTIMATE --- COST ESTIMATE DETAILS

PAGE NUMBER 85

## SUB-SYSTEM: DIPOLE TOOLING

DATE PRINTED: 7-AUG-92

WBS CODE: 1.1.1.10.1.5 MULT BY 1 COMPONENT : DIPOLE TOOLING/SDB-120"

DATE ESTIMATED: 6/26/90

RESPONSIBLE: CHESTER

&lt;----- MATERIAL -----&gt;

&lt;----- LABOR -----&gt;

ITEM NUM.	ITEM TITLE	UNIT MEAS.	NO. UNITS	FY91 \$ /UNIT	COST BASIS	TOTAL MT K\$	NO. UNITS	HOURS /UNIT	TOTAL CRAFT HOURS CODE	\$/HR	TOTAL LABOR K\$
1	WINDING FIXTURE	EA	1	273.	EE	0.273	1	60.0	60.0 T1	29.00	1.740
2	CURING FIXTURE	EA	1	273.	EE	0.273	1	60.0	60.0 T1	29.00	1.740
3	STACKING SET-UP (HOLD DOWNS)	EA	6	273.	EE	1.638	6	20.0	120.0 T1	29.00	3.480
4	END PACK STACKING LH & RH	EA	2	8736.	A87	17.472	2	48.0	96.0 T1	29.00	2.784
5	STACKING PLATE	EA	1	17035.20	A83	17.035	1	48.0	48.0 T1	29.00	1.392
6	WINDING STAND	EA	1	273.	EE	0.273	1	48.0	48.0 T1	29.00	1.392
7	ASSEMBLY STANDS	EA	9	273.	EE	2.457	9	36.0	324.0 T1	29.00	9.396
8	EXPECTED REWORK TO EXISTING TOOL	LOT	1	3276.	EE	3.276					

-----  
 42.697 <----- SUBTOTALS THIS PAGE -----> 21.924  
 -----

TECHNICAL DESCRIPTION OF THIS WORK PACKAGE:

42.697 + 21.924 = 64.621

MAGNET TOOLING

## ESTIMATE --- COST ESTIMATE DETAILS

PAGE NUMBER 66

SUB-SYSTEM: DIPOLE TOOLING

DATE PRINTED: 7-AUG-92

WBS CODE: 1.1.1.10.1.7 MULT BY 1 COMPONENT : DIPOLE TOOLING/B2 240" DIPOLE (REWORK)

DATE ESTIMATED: 2/20/92

RESPONSIBLE: CHESTER

&lt;----- MATERIAL -----&gt; &lt;----- LABOR -----&gt;

ITEM NUM.	ITEM TITLE	UNIT MEAS.	NO. UNITS	FY91 \$ /UNIT	COST BASIS	TOTAL MT K\$	NO. UNITS	HOURS /UNIT	TOTAL CRAFT HOURS CODE	\$/HR	TOTAL LABOR K\$
1	MATERIAL	LOT	1	1000.	EE	1.000	1	40.0	40.0 T1	29.00	1.160
						1.000	SUBTOTALS THIS PAGE				1.160

TECHNICAL DESCRIPTION OF THIS WORK PACKAGE:

1.000 + 1.160 = 2.160

MAGNET TOOLING

ESTIMATE --- COST ESTIMATE DETAILS

PAGE NUMBER 67

SUB-SYSTEM: DIPOLE TOOLING

DATE PRINTED: 7-AUG-92

WBS CODE: 1.1.1.10.1.12 MULT BY 1 COMPONENT : DIPOLE TOOLING/EPB DIPOLE 5-1.5-120 (MORE)

DATE ESTIMATED: 2/28/92

RESPONSIBLE: CHESTER

<----- MATERIAL ----->

<----- LABOR ----->

ITEM NUM.	ITEM TITLE	UNIT MEAS.	NO. UNITS	FY91 \$ /UNIT	COST BASIS	TOTAL MT K\$	NO. UNITS	HOURS /UNIT	TOTAL CRAFT HOURS CODE \$/HR	TOTAL LABOR K\$
1	MATERIAL	LOT	1	10000.	EE	10.000	1	400.0	400.0 T1 29.00	11.600
						10.000	<----- SUBTOTALS THIS PAGE ----->			11.600

TECHNICAL DESCRIPTION OF THIS WORK PACKAGE:

10.000 + 11.600 = 21.600

MAGNET TOOLING

ESTIMATE --- COST ESTIMATE DETAILS

PAGE NUMBER 68

SUB-SYSTEM: DIPOLE TOOLING

DATE PRINTED: 7-AUG-92

WBS CODE: 1.1.1.10.1.13 MULT BY 1 COMPONENT : DIPOLE TOOLING/B3 DIPOLE (REWORK)

DATE ESTIMATED: 2/20/92

RESPONSIBLE: CHESTER

<----- MATERIAL -----> <----- LABOR ----->

ITEM NUM.	ITEM TITLE	UNIT MEAS.	NO. UNITS	FY91 \$ /UNIT	COST BASIS	TOTAL MT K\$	NO. UNITS	HOURS /UNIT	TOTAL CRAFT HOURS CODE	\$/HR	TOTAL LABOR K\$
1	MATERIAL	LOT	1	1000.	EE	1.000	1	40.0	40.0 T1	29.00	1.160
						1.000	<----- SUBTOTALS THIS PAGE ----->				1.160

TECHNICAL DESCRIPTION OF THIS WORK PACKAGE:

1.000 + 1.160 = 2.160

MAGNET TOOLING

## ESTIMATE --- COST ESTIMATE DETAILS

PAGE NUMBER 89

SUB-SYSTEM: QUADRUPOLE TOOLING

DATE PRINTED: 7-AUG-92

WBS CODE: 1.1.1.10.2.3 MULT BY 1 COMPONENT : MI QUAD TOOLING (NEW)

DATE ESTIMATED: 1/28/92

RESPONSIBLE: CHESTER

&lt;----- MATERIAL -----&gt; &lt;----- LABOR -----&gt;

ITEM NUM.	ITEM TITLE	UNIT MEAS.	NO. UNITS	FY91 \$ /UNIT	COST BASIS	TOTAL MT K\$	NO. UNITS	HOURS /UNIT	TOTAL CRAFT HOURS CODE	\$/HR	TOTAL LABOR K\$
1	MATERIALS	EA	0	500000.	EE	0.000	0	2000.0	0.0 T2	18.70	0.000
						0.000	<----- SUBTOTALS THIS PAGE ----->				0.000

TECHNICAL DESCRIPTION OF THIS WORK PACKAGE:

0.000 + 0.000 = 0.000

TOOLING PURCHASED WITH R&amp;D FUNDS.

MAGNET TOOLING

## ESTIMATE --- COST ESTIMATE DETAILS

PAGE NUMBER 70

SUB-SYSTEM: QUADRUPOLE TOOLING

DATE PRINTED: 7-AUG-92

WBS CODE: 1.1.1.10.2.5 MULT BY 1 COMPONENT : QUAD TOOLING/OLD MR 84"

DATE ESTIMATED: 2/19/92

RESPONSIBLE: CHESTER

&lt;----- MATERIAL -----&gt; &lt;----- LABOR -----&gt;

ITEM NUM.	ITEM TITLE	UNIT MEAS.	NO. UNITS	FY91 \$ /UNIT	COST BASIS	TOTAL MT K\$	NO. UNITS	HOURS /UNIT	TOTAL CRAFT HOURS CODE	\$/HR	TOTAL LABOR K\$
1	MATERIALS	EA	1	2000.	EE	2.000	1	80.0	80.0 T1	29.00	2.320
						2.000	<----- SUBTOTALS THIS PAGE ----->				2.320

TECHNICAL DESCRIPTION OF THIS WORK PACKAGE:

2.000 + 2.320 = 4.320

MAGNET TOOLING

ESTIMATE --- COST ESTIMATE DETAILS

PAGE NUMBER 71

SUB-SYSTEM: QUADRUPOLE TOOLING

DATE PRINTED: 7-AUG-92

WBS CODE: 1.1.1.10.2.6 MULT BY 1 COMPONENT : QUAD TOOLING/BQA 52" (REWORK)

DATE ESTIMATED: 5/ 3/91

RESPONSIBLE: CHESTER

<----- MATERIAL -----> <----- LABOR ----->

ITEM NUM.	ITEM TITLE	UNIT MEAS.	NO. UNITS	FY91 \$ /UNIT	COST BASIS	TOTAL MT K\$	NO. UNITS	HOURS /UNIT	TOTAL CRAFT HOURS CODE	\$/HR	TOTAL LABOR K\$
1	MATERIALS	EA	1	1000.	EE	1.000	1	40.0	40.0 T1	29.00	1.160
						1.000	<----- SUBTOTALS THIS PAGE ----->				1.160

TECHNICAL DESCRIPTION OF THIS WORK PACKAGE:

1.000 + 1.160 = 2.160

## MAGNET TOOLING

## ESTIMATE --- COST ESTIMATE DETAILS

PAGE NUMBER 72

## SUB-SYSTEM: QUADRUPOLE TOOLING

DATE PRINTED: 7-AUG-92

WBS CODE: 1.1.1.10.2.8 MULT BY 1 COMPONENT : QUAD TOOLING/SQA

DATE ESTIMATED: 5/ 3/91

RESPONSIBLE: CHESTER

&lt;----- MATERIAL -----&gt; &lt;----- LABOR -----&gt;

ITEM NUM.	ITEM TITLE	UNIT MEAS.	NO. UNITS	FY91 \$ /UNIT	COST BASIS	TOTAL MT K\$	NO. UNITS	HOURS /UNIT	TOTAL CRAFT HOURS CODE \$/HR	TOTAL LABOR K\$
1	STACKING PLATE	EA	1	273.	EE	0.273	1	48.0	48.0 T1 29.00	1.392
2	WINDING FIXTURE	EA	2	273.	EE	0.546	2	24.0	48.0 T1 29.00	1.392
3	CURING FIXTURE	EA	4	273.	EE	1.092	4	12.0	48.0 T1 29.00	1.392
4	STACKING SET-UP	EA	1	546.	EE	0.546	1	48.0	48.0 T1 29.00	1.392
5	FLIP-FLOP MACHINE						2	24.0	48.0 T1 29.00	1.392
6	SET UP SCREW STACKER	EA	1	546.	EE	0.546	1	80.0	80.0 T1 29.00	2.320
						3.003	<----- SUBTOTALS THIS PAGE ----->			9.280

TECHNICAL DESCRIPTION OF THIS WORK PACKAGE:

3.003 + 9.280 = 12.283



## MAGNET TOOLING

## ESTIMATE --- COST ESTIMATE DETAILS

PAGE NUMBER 73

SUB-SYSTEM: SPECIAL MAGNET TOOLING

DATE PRINTED: 7-AUG-92

WBS CODE: 1.1.1.10.3.1 MULT BY 1 COMPONENT : MR TOOLING/SEXTUPOLE (NEW)

DATE ESTIMATED: 2/28/92

RESPONSIBLE: CHESTER

&lt;----- MATERIAL -----&gt; &lt;----- LABOR -----&gt;

ITEM NUM.	ITEM TITLE	UNIT MEAS.	NO. UNITS	FY91 \$ /UNIT	COST BASIS	TOTAL MT K\$	NO. UNITS	HOURS /UNIT	TOTAL CRAFT HOURS CODE	\$/HR	TOTAL LABOR K\$
1	MATERIALS	EA	0	75000.	EE	0.000	0	160.0	0.0 T1	29.00	0.000
						0.000	<----- SUBTOTALS THIS PAGE ----->				0.000

TECHNICAL DESCRIPTION OF THIS WORK PACKAGE:

0.000 + 0.000 = 0.000

SEXTUPOLE TOOLING PURCHASED WITH R&amp;D FUNDS.

## MAGNET TOOLING

## ESTIMATE --- COST ESTIMATE DETAILS

PAGE NUMBER 74

SUB-SYSTEM: SPECIAL MAGNET TOOLING

DATE PRINTED: 7-AUG-92

WBS CODE: 1.1.1.10.3.2 MULT BY 1 COMPONENT : MR TOOLING/TRIM QUAD (REWORK)

DATE ESTIMATED: 2/19/92

RESPONSIBLE: CHESTER

&lt;----- MATERIAL -----&gt; &lt;----- LABOR -----&gt;

ITEM NUM.	ITEM TITLE	UNIT MEAS.	NO. UNITS	FY91 \$ /UNIT	COST BASIS	TOTAL MT K\$	NO. UNITS	HOURS /UNIT	TOTAL CRAFT HOURS CODE	\$/HR	TOTAL LABOR K\$
1	MATERIALS	EA	1	1000.	EE	1.000	1	40.0	40.0 T1	29.00	1.160
						1.000	<----- SUBTOTALS THIS PAGE ----->				1.160

TECHNICAL DESCRIPTION OF THIS WORK PACKAGE:

1.000 + 1.160 = 2.160

## MAGNET TOOLING

## ESTIMATE --- COST ESTIMATE DETAILS

PAGE NUMBER 75

SUB-SYSTEM: SPECIAL MAGNET TOOLING

DATE PRINTED: 7-AUG-92

WBS CODE: 1.1.1.10.3.3 MULT BY 1 COMPONENT : MR TOOLING/SKEW QUAD (REWORK)

DATE ESTIMATED: 2/19/92

RESPONSIBLE: CHESTER

&lt;----- MATERIAL -----&gt; &lt;----- LABOR -----&gt;

ITEM NUM.	ITEM TITLE	UNIT MEAS.	NO. UNITS	FY91 \$ /UNIT	COST BASIS	TOTAL MT K\$	NO. UNITS	HOURS /UNIT	TOTAL CRAFT HOURS CODE	\$/HR	TOTAL LABOR K\$
1	MATERIALS	EA	1	1000.	EE	1.000	1	40.0	40.0 T1	29.00	1.160
						1.000	<----- SUBTOTALS THIS PAGE ----->				1.160

TECHNICAL DESCRIPTION OF THIS WORK PACKAGE:

1.000 + 1.160 = 2.160

MAGNET TOOLING

## ESTIMATE --- COST ESTIMATE DETAILS

PAGE NUMBER 78

SUB-SYSTEM: SPECIAL MAGNET TOOLING

DATE PRINTED: 7-AUG-92

WBS CODE: 1.1.1.10.3.4 MULT BY 1 COMPONENT : MR TOOLING/SKEW SEXTUPOLE (REWORK)

DATE ESTIMATED: 2/19/92

RESPONSIBLE: CHESTER

&lt;----- MATERIAL -----&gt; &lt;----- LABOR -----&gt;

ITEM NUM.	ITEM TITLE	UNIT MEAS.	NO. UNITS	FY91 \$ /UNIT	COST BASIS	TOTAL MT K\$	NO. UNITS	HOURS /UNIT	TOTAL CRAFT HOURS CODE	\$/HR	TOTAL LABOR K\$
1	MATERIALS	EA	1	1000.	EE	1.000	1	40.0	40.0 T1	29.00	1.160
						1.000	----- SUBTOTALS THIS PAGE ----->				1.160

TECHNICAL DESCRIPTION OF THIS WORK PACKAGE:

1.000 + 1.160 = 2.160

## MAGNET TOOLING

## ESTIMATE --- COST ESTIMATE DETAILS

PAGE NUMBER 77

SUB-SYSTEM: SPECIAL MAGNET TOOLING

DATE PRINTED: 7-AUG-92

WBS CODE: 1.1.1.10.3.5 MULT BY 1 COMPONENT : MR TOOLING/TRIM SEXTUPOLE (REWORK)

DATE ESTIMATED: 2/20/92

RESPONSIBLE: CHESTER

&lt;----- MATERIAL -----&gt; &lt;----- LABOR -----&gt;

ITEM NUM.	ITEM TITLE	UNIT MEAS.	NO. UNITS	FY91 \$ /UNIT	COST BASIS	TOTAL MT K\$	NO. UNITS	HOURS /UNIT	TOTAL CRAFT HOURS CODE	\$/HR	TOTAL LABOR K\$
1	MATERIALS	EA	1	1000.	EE	1.000	1	40.0	40.0 T1	29.00	1.160
						1.000	----- SUBTOTALS THIS PAGE ----->				1.160

TECHNICAL DESCRIPTION OF THIS WORK PACKAGE:

1.000 + 1.160 = 2.160

MAGNET TOOLING

## ESTIMATE --- COST ESTIMATE DETAILS

PAGE NUMBER 78

SUB-SYSTEM: SPECIAL MAGNET TOOLING

DATE PRINTED: 7-AUG-92

WBS CODE: 1.1.1.10.3.6 MULT BY 1 COMPONENT : MR TOOLING/OCTUPOLE (REWORK)

DATE ESTIMATED: 2/20/92

RESPONSIBLE: CHESTER

&lt;----- MATERIAL -----&gt; &lt;----- LABOR -----&gt;

ITEM NUM.	ITEM TITLE	UNIT MEAS.	NO. UNITS	FY91 \$ /UNIT	COST BASIS	TOTAL MT K\$	NO. UNITS	HOURS /UNIT	TOTAL CRAFT HOURS CODE	\$/HR	TOTAL LABOR K\$
1	MATERIALS	EA	1	1000.	EE	1.000	1	40.0	40.0 T1	29.00	1.160
						1.000	SUBTOTALS THIS PAGE				1.160

TECHNICAL DESCRIPTION OF THIS WORK PACKAGE:

1.000 + 1.160 = 2.160

MAGNET TOOLING

ESTIMATE --- COST ESTIMATE DETAILS

PAGE NUMBER 79

SUB-SYSTEM: SPECIAL MAGNET TOOLING

DATE PRINTED: 7-AUG-92

WBS CODE: 1.1.1.10.4.1 MULT BY 1 COMPONENT : MR TOOLING/HORZ TRIM DIPOLE (REWORK)

DATE ESTIMATED: 2/19/92

RESPONSIBLE: CHESTER

<----- MATERIAL -----> <----- LABOR ----->

ITEM NUM.	ITEM TITLE	UNIT MEAS.	NO. UNITS	FY91 \$ /UNIT	COST BASIS	TOTAL MT K\$	NO. UNITS	HOURS /UNIT	TOTAL CRAFT HOURS CODE	\$/HR	TOTAL LABOR K\$
1	MATERIALS	EA	1	1000.	EE	1.000	1	40.0	40.0 T1	29.00	1.160
						1.000	<----- SUBTOTALS THIS PAGE ----->				1.160
TECHNICAL DESCRIPTION OF THIS WORK PACKAGE:						1.000 +	1.160 =	2.160			

MAGNET TOOLING

## ESTIMATE --- COST ESTIMATE DETAILS

PAGE NUMBER 80

SUB-SYSTEM: SPECIAL MAGNET TOOLING

DATE PRINTED: 7-AUG-92

WBS CODE: 1.1.1.10.4.2 MULT BY 1 COMPONENT : MR TOOLING/HORZ TRIM DIPOLE (NEW)

DATE ESTIMATED: 2/20/92

RESPONSIBLE: CHESTER

&lt;----- MATERIAL -----&gt; &lt;----- LABOR -----&gt;

ITEM NUM.	ITEM TITLE	UNIT MEAS.	NO. UNITS	FY91 \$ /UNIT	COST BASIS	TOTAL MT K\$	NO. UNITS	HOURS /UNIT	TOTAL CRAFT HOURS CODE	\$/HR	TOTAL LABOR K\$
1	MATERIALS	EA	1	10000.	EE	10.000	1	40.0	40.0 T1	29.00	1.160
						10.000	----- SUBTOTALS THIS PAGE -----				1.160

TECHNICAL DESCRIPTION OF THIS WORK PACKAGE:

10.000 + 1.160 = 11.160



MAGNET TOOLING

ESTIMATE --- COST ESTIMATE DETAILS

PAGE NUMBER 81

SUB-SYSTEM: SPECIAL MAGNET TOOLING

DATE PRINTED: 7-AUG-92

WBS CODE: 1.1.1.10.4.3 MULT BY 1 COMPONENT : MR TOOLING/VERT TRIM DIPOLE (REWORK)

DATE ESTIMATED: 2/19/92

RESPONSIBLE: CHESTER

<----- MATERIAL -----> <----- LABOR ----->

ITEM NUM.	ITEM TITLE	UNIT MEAS.	NO. UNITS	FY91 \$ /UNIT	COST BASIS	TOTAL MT K\$	NO. UNITS	HOURS /UNIT	TOTAL CRAFT HOURS CODE	\$/HR	TOTAL LABOR K\$
1	MATERIALS	EA	1	1000.	EE	1.000	1	40.0	40.0 T1	29.00	1.160
						1.000	SUBTOTALS THIS PAGE				1.160

TECHNICAL DESCRIPTION OF THIS WORK PACKAGE:

1.000 + 1.160 = 2.160

MAGNET TOOLING

ESTIMATE --- COST ESTIMATE DETAILS

PAGE NUMBER 82

SUB-SYSTEM: SPECIAL MAGNET TOOLING

DATE PRINTED: 7-AUG-92

WBS CODE: 1.1.1.10.4.4 MULT BY 1 COMPONENT : MR TOOLING/VERT TRIM DIPOLE (NEW)

DATE ESTIMATED: 2/20/92

RESPONSIBLE: CHESTER

<----- MATERIAL -----> <----- LABOR ----->

ITEM NUM.	ITEM TITLE	UNIT MEAS.	NO. UNITS	FY91 \$ /UNIT	COST BASIS	TOTAL MT K\$	NO. UNITS	HOURS /UNIT	TOTAL CRAFT HOURS CODE	\$/HR	TOTAL LABOR K\$
1	MATERIALS	EA	1	10000.	EE	10.000	1	40.0	40.0 T1	29.00	1.160
						10.000	<----- SUBTOTALS THIS PAGE ----->				1.160

TECHNICAL DESCRIPTION OF THIS WORK PACKAGE:

10.000 + 1.160 = 11.160

## MAGNET TOOLING

## ESTIMATE --- COST ESTIMATE DETAILS

PAGE NUMBER 83

SUB-SYSTEM: LAMBERTSON MAGNET TOOLING

DATE PRINTED: 7-AUG-92

WBS CODE: 1.1.1.10.5.1 MULT BY 1 COMPONENT : LAMBERTSON TOOLING/INJ A0 TYPE(REW)

DATE ESTIMATED: 5/ 3/91

RESPONSIBLE: CHESTER

&lt;----- MATERIAL -----&gt; &lt;----- LABOR -----&gt;

ITEM NUM.	ITEM TITLE	UNIT MEAS.	NO. UNITS	FY91 \$ /UNIT	COST BASIS	TOTAL MT K\$	NO. UNITS	HOURS /UNIT	TOTAL CRAFT HOURS CODE	\$/HR	TOTAL LABOR K\$
1	WINDING FIXTURE	EA	1	1000.	EE	1.000	1	40.0	40.0 T1	29.00	1.160
						1.000	<----- SUBTOTALS THIS PAGE ----->				1.160

TECHNICAL DESCRIPTION OF THIS WORK PACKAGE:

1.000 + 1.160 = 2.160

MAGNET TOOLING

## ESTIMATE --- COST ESTIMATE DETAILS

PAGE NUMBER 84

SUB-SYSTEM: LAMBERTSON MAGNET TOOLING

DATE PRINTED: 7-AUG-92

WBS CODE: 1.1.1.10.5.2 MULT BY 1 COMPONENT : LAMBERTSON TOOLING/MI 94",189"(NEW)

DATE ESTIMATED: 2/19/92

RESPONSIBLE: CHESTER

&lt;----- MATERIAL -----&gt; &lt;----- LABOR -----&gt;

ITEM NUM.	ITEM TITLE	UNIT MEAS.	NO. UNITS	FY91 \$ /UNIT	COST BASIS	TOTAL MT K\$	NO. UNITS	HOURS /UNIT	TOTAL CRAFT HOURS CODE	\$/HR	TOTAL LABOR K\$
1	LAMBERTSON TOOLING	EA	1	100000.	EE	100.000	1	500.0	500.0 T1	29.00	14.500
						100.000	<----- SUBTOTALS THIS PAGE ----->				14.500

TECHNICAL DESCRIPTION OF THIS WORK PACKAGE:

100.000 + 14.500 = 114.500

## MAGNET TOOLING

## ESTIMATE --- COST ESTIMATE DETAILS

PAGE NUMBER 85

SUB-SYSTEM: LAMBERTSON MAGNET TOOLING

DATE PRINTED: 7-AUG-92

WBS CODE: 1.1.1.10.5.5 MULT BY 1 COMPONENT : LAMBERTSON TOOLING/F-17 C MAGNET(MORE)

DATE ESTIMATED: 5/ 4/91

RESPONSIBLE: CHESTER

&lt;----- MATERIAL -----&gt; &lt;----- LABOR -----&gt;

ITEM NUM.	ITEM TITLE	UNIT MEAS.	NO. UNITS	FY91 \$ /UNIT	COST BASIS	TOTAL MT K\$	NO. UNITS	HOURS /UNIT	TOTAL CRAFT HOURS CODE	\$/HR	TOTAL LABOR K\$
1	WINDING TOOLING	EA	1	10374.	A84	10.374	1	48.0	48.0 T1	29.00	1.392
2	CURING TOOLING	EA	1	13888.	A84	13.888	1	48.0	48.0 T1	29.00	1.392
3	STACKING PLATE	EA	1	13104.	A83	13.104	1	48.0	48.0 T1	29.00	1.392
4	STACKING HOLD DOWNS	EA	1	1092.	EE	1.092	1	80.0	80.0 T1	29.00	2.320
5	ASSEMBLY SETUP	EA	6	273.	EE	1.638	6	24.0	144.0 T1	29.00	4.176
6	PUSHER PLATES	EA	2	328.	EE	0.656	2	24.0	48.0 T1	29.00	1.392
7	ASSEMBLY POSTS/BARS	EA	12	273.	EE	3.276	12	24.0	288.0 T1	29.00	8.352
8	EXPECTED REWORK OF FAB TOOLING	LOT	1	4368.	EE	4.368					

48.376 <----- SUBTOTALS THIS PAGE -----> 20.416

TECHNICAL DESCRIPTION OF THIS WORK PACKAGE:

48.376 + 20.416 = 68.792

SUB-SYSTEM: MAIN INJECTOR MAGNETS

DATE PRINTED: 7-AUG-92

WBS CODE: 1.1.1.14 MULT BY 1 COMPONENT : MAGNET ED&amp;I

DATE ESTIMATED: 3/ 2/92

RESPONSIBLE: CHESTER

&lt;----- MATERIAL -----&gt; &lt;----- LABOR -----&gt;

ITEM NUM.	ITEM TITLE	UNIT MEAS.	NO. UNITS	FY91 \$ /UNIT	COST BASIS	TOTAL MT K\$	NO. UNITS	HOURS /UNIT	TOTAL CRAFT HOURS CODE	\$/HR	TOTAL LABOR K\$
1	EDI						1	60000.0	60000.0 T3	29.00	1740.000
2							1	15000.0	15000.0 PH	33.90	508.500
						0.000	SUBTOTALS THIS PAGE				2248.500

TECHNICAL DESCRIPTION OF THIS WORK PACKAGE:

0.000 + 2248.500 = 2248.500

## MAIN INJECTOR VACUUM

## ESTIMATE --- COST ESTIMATE DETAILS

PAGE NUMBER 87

## SUB-SYSTEM: MIR VACUUM SYSTEM

DATE PRINTED: 7-AUG-92

WBS CODE: 1.1.2.1.1

MULT BY 1 COMPONENT : MIR VACUUM SYS/VACUUM CHAMBER,BELLOWS

DATE ESTIMATED: 3/24/92

RESPONSIBLE: SAUER

&lt;----- MATERIAL -----&gt; &lt;----- LABOR -----&gt;

ITEM NUM.	ITEM TITLE	UNIT MEAS.	NO. UNITS	FY91 \$ /UNIT	COST BASIS	TOTAL MT K\$	NO. UNITS	HOURS /UNIT	TOTAL HOURS	CRAFT CODE	\$/HR	TOTAL LABOR K\$
1	6" UHV PNEUMATIC GATE VALVE	EA	32	2680.	CP	85.760	32	4.0	128.0	T2	18.70	2.394
2	2.5" ALL METAL HAND VALVE	EA	52	1820.	CP	94.640	52	4.0	208.0	T2	18.70	3.890
3	2.5" O-RING HAND VALVE	EA	10	1065.	CP	10.650	10	4.0	40.0	T2	18.70	0.748
4	1.5" ALL METAL HAND VALVE	EA	52	840.	CP	43.680	52	4.0	208.0	T2	18.70	3.890
5	6" SS BEAM TUBE (DRIFTS)	FT	1280	50.	CP	64.000						
6	6" TO OVAL SS ADAPTERS	EA	16	150.	EE	2.400	16	1.5	24.0	T2	18.70	0.449
7	QUAD OVAL BEAM TUBE	EA	182	1400.	EE	254.800						
8	QUAD 6" FLANGES (OVAL ADAPTERS)	EA	416	100.	EE	41.600						
9	6" SEGMENTED CLAMPS	EA	600	200.	EE	120.000						
10	OVAL ALUM. RIDGED SEAL	EA	800	30.	EE	24.000						
11	COMPRESSED AIR SYSTEM	EA	11000	5.	EE	55.000	32	2.0	64.0	T2	18.70	1.197
12	MAGNETIC SHIELDING	EA	520	60.	EE	31.200						
13	MISC MACHINING						1	1500.0	1500.0	S1	33.00	49.500
14	THERMAL BLANKETS, HEATERS, ETC.	LOT	1	5000.	EE	5.000						
15	BELLOWS FOR STRAIGHTS	EA	24	250.	EE	6.000	24	1.0	24.0	S2	38.00	0.912
16							24	1.0	24.0	T2	18.70	0.449
17	BEAM TUBE STANDS FOR STRAIGHTS	EA	128	150.	EE	19.200						
18	EDI						1	7500.0	7500.0	EN	32.40	243.000
19							1	6600.0	6600.0	DC	32.00	211.200
20							1	3650.0	3650.0	DR	22.20	81.030
21							1	2200.0	2200.0	AD	20.00	44.000

857.930 &lt;----- SUBTOTALS THIS PAGE -----&gt; 642.657

TECHNICAL DESCRIPTION OF THIS WORK PACKAGE:

857.930 + 642.657 = 1500.587

## MAIN INJECTOR VACUUM

## ESTIMATE --- COST ESTIMATE DETAILS

PAGE NUMBER 88

SUB-SYSTEM: MIR VACUUM SYSTEM

DATE PRINTED: 7-AUG-92

WBS CODE: 1.1.2.1.2 MULT BY 1 COMPONENT : MIR VACUUM SYS/ROUGH PUMPS,TURBO CARTS

DATE ESTIMATED: 3/24/92

RESPONSIBLE: SAUER

&lt;----- MATERIAL -----&gt; &lt;----- LABOR -----&gt;

ITEM NUM.	ITEM TITLE	UNIT MEAS.	NO. UNITS	FY91 \$ /UNIT	COST BASIS	TOTAL MT K\$	NO. UNITS	HOURS /UNIT	TOTAL CRAFT HOURS CODE	\$/HR	TOTAL LABOR K\$
1	ROUGHING CART & COLD TRAP	EA	10	19000.	EE	190.000	10	7.0	70.0 T2	18.70	1.309
2	LEAK DETECTOR & COLD TRAP	EA	8	24500.	CP	196.000	8	6.0	48.0 T2	18.70	0.898
3	MISC EQUIP (PROBES,DEWARS,ETC)	LOT	1	20000.	EE	20.000					
4	VACUUM HOSE & FLANGE	EA	18	319.	CP	5.742	18	0.5	9.0 T2	18.70	0.168
5	30 L/S ION PUMPS, FLANGED	EA	100	1420.	CP	142.000	100	1.0	100.0 T2	18.70	1.870

553.742 &lt;----- SUBTOTALS THIS PAGE -----&gt; 4.245

TECHNICAL DESCRIPTION OF THIS WORK PACKAGE:

553.742 + 4.245 = 557.987



## MAIN INJECTOR VACUUM

## ESTIMATE --- COST ESTIMATE DETAILS

PAGE NUMBER 89

## SUB-SYSTEM: MIR VACUUM SYSTEM

DATE PRINTED: 7-AUG-92

WBS CODE: 1.1.2.1.3

MULT BY 1 COMPONENT : MIR VACUUM SYS/GAUGES &amp; CABLES

DATE ESTIMATED: 3/24/92

RESPONSIBLE: SAUER

&lt;----- MATERIAL -----&gt; &lt;----- LABOR -----&gt;

ITEM NUM.	ITEM TITLE	UNIT MEAS.	NO. UNITS	FY91 \$ /UNIT	COST BASIS	TOTAL MT K\$	NO. UNITS	HOURS /UNIT	TOTAL HOURS	CRAFT CODE	\$/HR	TOTAL LABOR K\$
1	COLD CATHODE GAUGE	EA	35	100.	EE	3.500	35	1.0	35.0	S2	38.00	1.330
2							35	1.0	35.0	T2	18.70	0.654
3	PIRANI GAUGE	EA	102	85.	CP	8.670	17	1.0	17.0	S2	38.00	0.646
4							17	1.0	17.0	T2	18.70	0.318
5	FLANGE, TUBE, ETC FOR GAUGE TREE	EA	35	100.	EE	3.500	35	2.0	70.0	S1	33.00	2.310
6	ION PUMP & GAUGE CONTROLS	EA	8	19900.	EE	159.200						
7	ION PUMP CONNECTORS	EA	850	31.92	A90	27.132	850	1.0	850.0	T2	18.70	15.895
8	RESIDUAL GAS ANALYZER	EA	1	7950.	A89	7.950	1	20.0	20.0	T2	18.70	0.374

209.952 <----- SUBTOTALS THIS PAGE -----> 21.527

TECHNICAL DESCRIPTION OF THIS WORK PACKAGE:

209.952 + 21.527 = 231.479

BML VACUUM SYSTEM

## ESTIMATE --- COST ESTIMATE DETAILS

PAGE NUMBER 90

SUB-SYSTEM: BML VACUUM/CHAMBERS &amp; BELLOWS

DATE PRINTED: 7-AUG-92

WBS CODE: 1.1.2.10.1.1 MULT BY 1 COMPONENT : BML VACUUM SYS/8GEV CHAMBER,BELLOWS

DATE ESTIMATED: 3/24/92

RESPONSIBLE: SAUER

&lt;----- MATERIAL -----&gt; &lt;----- LABOR -----&gt;

ITEM NUM.	ITEM TITLE	UNIT MEAS.	NO. UNITS	FY91 \$ /UNIT	COST BASIS	TOTAL MT K\$	NO. UNITS	HOURS /UNIT	TOTAL CRAFT HOURS CODE \$/HR	TOTAL LABOR K\$	
1	8" PNEUMATIC GATE VALVE	EA	5	2880.	CP	13.400	5	4.0	20.0 T2 18.70	0.374	
2	TITANIUM WINDOW	EA	1	750.	EE	0.750	1	3.0	3.0 T2 18.70	0.056	
3	6" TO 2.5" PUMP OUT TEE	EA	8	400.	EE	3.200	8	1.0	8.0 T2 18.70	0.150	
4	2.5" O-RING HAND VALVE	EA	8	580.	CP	4.640					
5	BEAM TUBE	FT	1000	50.	EE	50.000					
6	BELLOWS FOR BEAM TUBE	EA	20	250.	EE	5.000	20	1.0	20.0 S2 38.00	0.760	
7							20	1.0	20.0 T2 18.70	0.374	
8	STANDS FOR BEAM TUBE	EA	100	150.	EE	15.000					
9	COMPRESSED AIR SYSTEM	FT	2400	8.	EE	19.200	5	2.0	10.0 T2 18.70	0.187	
10	MISC MACHINING						1	600.0	600.0 S1 33.00	19.800	
11	FLANGES, SEALS, ETC	SET	109	480.	EE	52.320					
12	LAMBERTSON BLANKET, CONTROLS	LOT	2	5000.	EE	10.000					
13	EDI						1	1800.0	1800.0 EN 32.40	58.320	
14							1	1600.0	1600.0 DC 32.00	51.200	
15							1	900.0	900.0 DR 22.20	19.980	
16							1	500.0	500.0 AD 20.00	10.000	
						173.510	<----- SUBTOTALS THIS PAGE ----->				161.201
TECHNICAL DESCRIPTION OF THIS WORK PACKAGE:						173.510 +	161.201 =	334.711			

BML VACUUM SYSTEM

## ESTIMATE --- COST ESTIMATE DETAILS

PAGE NUMBER 91

SUB-SYSTEM: BML VACUUM/CHAMBERS &amp; BELLWS

DATE PRINTED: 7-AUG-92

WBS CODE: 1.1.2.10.1.2 MULT BY 1 COMPONENT : BML VACUUM SYS/150GEV BELLWS, CHAMBERS

DATE ESTIMATED: 3/24/92

RESPONSIBLE: SAUER

&lt;----- MATERIAL -----&gt; &lt;----- LABOR -----&gt;

ITEM NUM.	ITEM TITLE	UNIT MEAS.	NO. UNITS	FY91 \$ /UNIT	COST BASIS	TOTAL MT K\$	NO. UNITS	HOURS /UNIT	TOTAL CRAFT HOURS	CODE	\$/HR	TOTAL LABOR K\$
1	8" PNEUMATIC GATE VALVE	EA	4	2680.	CP	10.720	4	4.0	16.0	T2	18.70	0.299
2	COMPRESSED AIR SYSTEM	FT	700	8.	EE	5.600	4	2.0	8.0	T2	18.70	0.150
3	SS BEAM TUBE	FT	260	50.	EE	13.000						
4	2.5" ALL METAL HAND VALVE	EA	6	840.	CP	5.040	6	4.0	24.0	T2	18.70	0.449
5	1.5" ALL METAL HAND VALVE	EA	4	1820.	CP	7.280	4	4.0	16.0	T2	18.70	0.299
6	PUMP OUT TEE	EA	10	400.	EE	4.000	10	1.0	10.0	T2	18.70	0.187
7	TITANIUM WINDOW	EA	2	750.	EE	1.500						
8	FLANGES, SEALS, ETC	SET	64	480.	EE	30.720						
9	MISC MACHINING						1	300.0	300.0	S1	33.00	9.900
10	BELLWS FOR BEAM TUBE	EA	10	600.	EE	6.000	10	1.0	10.0	S2	38.00	0.380
11							10	1.0	10.0	T2	18.70	0.187
12	EDI						1	600.0	600.0	EN	32.40	19.440
13							1	500.0	500.0	DC	32.00	16.000
14							1	300.0	300.0	DR	22.20	6.660
15							1	200.0	200.0	AD	20.00	4.000

83.860 &lt;----- SUBTOTALS THIS PAGE -----&gt; 57.951

TECHNICAL DESCRIPTION OF THIS WORK PACKAGE:

83.860 + 57.951 = 141.811

BML VACUUM SYSTEM

## ESTIMATE --- COST ESTIMATE DETAILS

PAGE NUMBER 92

SUB-SYSTEM: BML VACUUM/CHAMBERS &amp; BELLOWS

DATE PRINTED: 7-AUG-92

WBS CODE: 1.1.2.10.1.3 MULT BY 1 COMPONENT : BML VACUUM SYS/SPILL BELLOWS, CHAMBERS

DATE ESTIMATED: 3/24/92

RESPONSIBLE: SAUER

&lt;----- MATERIAL -----&gt; &lt;----- LABOR -----&gt;

ITEM NUM.	ITEM TITLE	UNIT MEAS.	NO. UNITS	FY91 \$ /UNIT	COST BASIS	TOTAL MT K\$	NO. UNITS	HOURS /UNIT	TOTAL CRAFT HOURS CODE \$/HR	TOTAL LABOR K\$
1	8" PNEUMATIC GATE VALVE	EA	1	2680.	CP	2.680	1	4.0	4.0 T2 18.70	0.075
2	MISC MACHINING						1	200.0	200.0 S1 33.00	6.600
3	EDI						1	160.0	160.0 EN 32.40	5.184
4							1	90.0	90.0 DC 32.00	2.880
5							1	50.0	50.0 DR 22.20	1.110
6							1	30.0	30.0 AD 20.00	0.600
						2.680	<----- SUBTOTALS THIS PAGE ----->			16.449
TECHNICAL DESCRIPTION OF THIS WORK PACKAGE:						2.680 +	16.449 =	19.129		

## BML VACUUM SYSTEM

## ESTIMATE --- COST ESTIMATE DETAILS

PAGE NUMBER 93

SUB-SYSTEM: BML VACUUM/ROUGH PUMPS/TURBO CARTS

DATE PRINTED: 7-AUG-92

WBS CODE: 1.1.2.10.2.1 MULT BY 1 COMPONENT : BML VACUUM SYS/8GEV PUMPS

DATE ESTIMATED: 3/24/92

RESPONSIBLE: SAUER

&lt;----- MATERIAL -----&gt; &lt;----- LABOR -----&gt;

ITEM NUM.	ITEM TITLE	UNIT MEAS.	NO. UNITS	FY91 \$ /UNIT	COST BASIS	TOTAL MT K\$	NO. UNITS	HOURS /UNIT	TOTAL CRAFT HOURS CODE \$/HR	TOTAL LABOR K\$
1	30 L/S FLANGED ION PUMP	EA	47	1420.	CP	66.740	47	1.0	47.0 T2 18.70	0.879
2	TURBO CART & COLD TRAP	EA	4	19000.	EE	76.000	4	7.0	28.0 T2 18.70	0.524
3	LEAK DETECTOR	EA	2	24500.	CP	49.000	2	6.0	12.0 T2 18.70	0.224
4	ION PUMP CONNECTOR	EA	49	31.92	A90	1.564				
5	6" TEE	EA	2	760.	CP	1.520	2	1.0	2.0 T2 18.70	0.037

194.824 &lt;----- SUBTOTALS THIS PAGE -----&gt; 1.664

TECHNICAL DESCRIPTION OF THIS WORK PACKAGE:

194.824 + 1.664 = 196.488

BML VACUUM SYSTEM

## ESTIMATE --- COST ESTIMATE DETAILS

PAGE NUMBER 94

SUB-SYSTEM: BML VACUUM/ROUGH PUMPS/TURBO CARTS

DATE PRINTED: 7-AUG-92

WBS CODE: 1.1.2.10.2.2 MULT BY 1 COMPONENT : BML VACUUM SYS/150GEV PUMPS

DATE ESTIMATED: 3/24/92

RESPONSIBLE: SAUER

&lt;----- MATERIAL -----&gt; &lt;----- LABOR -----&gt;

ITEM NUM.	ITEM TITLE	UNIT MEAS.	NO. UNITS	FY91 \$ /UNIT	COST BASIS	TOTAL MT K\$	NO. UNITS	HOURS /UNIT	TOTAL CRAFT HOURS CODE	\$/HR	TOTAL LABOR K\$
1	8" TEE	EA	4	783.	CP	3.052	4	1.0	4.0 T2	18.70	0.075
2	30 L/S FLANGED ION PUMP	EA	14	1420.	CP	19.880	14	1.0	14.0 T2	18.70	0.262
3	THERMAL BLANKET, CONTROLS ETC	LOT	2	5000.	EE	10.000					
4	ION PUMP CONNECTOR	EA	18	31.92	A90	0.575					

-----  
 33.507 <----- SUBTOTALS THIS PAGE -----> 0.337  
 -----

TECHNICAL DESCRIPTION OF THIS WORK PACKAGE:

33.507 + 0.337 = 33.843

BML VACUUM SYSTEM

ESTIMATE --- COST ESTIMATE DETAILS

PAGE NUMBER 95

SUB-SYSTEM: BML VACUUM/ROUGH PUMPS/TURBO CARTS

DATE PRINTED: 7-AUG-92

WBS CODE: 1.1.2.10.2.3 MULT BY 1 COMPONENT : BML VACUUM SYS/SPILL PUMPS

DATE ESTIMATED: 2/27/92

RESPONSIBLE: SAUER

<----- MATERIAL -----> <----- LABOR ----->

ITEM NUM.	ITEM TITLE	UNIT MEAS.	NO. UNITS	FY91 \$ /UNIT	COST BASIS	TOTAL MT K\$	NO. UNITS	HOURS /UNIT	TOTAL CRAFT HOURS CODE \$/HR	TOTAL LABOR K\$
1			0	0.		0.000				

0.000 <----- SUBTOTALS THIS PAGE -----> 0.000

TECHNICAL DESCRIPTION OF THIS WORK PACKAGE:

0.000 + 0.000 = 0.000

BML VACUUM SYSTEM

## ESTIMATE --- COST ESTIMATE DETAILS

PAGE NUMBER 98

SUB-SYSTEM: BML VACUUM/GAUGES &amp; CABLES

DATE PRINTED: 7-AUG-92

WBS CODE: 1.1.2.10.3.1 MULT BY 1 COMPONENT : BML VACUUM SYS/8GEV GAUGES

DATE ESTIMATED: 3/24/92

RESPONSIBLE: SAUER

&lt;----- MATERIAL -----&gt; &lt;----- LABOR -----&gt;

ITEM NUM.	ITEM TITLE	UNIT MEAS.	NO. UNITS	FY91 \$ /UNIT	COST BASIS	TOTAL MT K\$	NO. UNITS	HOURS /UNIT	TOTAL CRAFT HOURS CODE	\$/HR	TOTAL LABOR K\$
1	COLD CATHODE GAUGE	EA	8	100.	EE	0.800	8	1.0	8.0 S2	38.00	0.304
2							8	1.0	8.0 T2	18.70	0.150
3	THERMOCOUPLE GAUGE	EA	16	85.	CP	1.360					
4	GAUGE & ION PUMP CONTROLS	EA	2	19900.	EE	39.800					
5	GAUGE TEE & FLANGE	EA	8	104.	CP	0.832	8	2.0	16.0 S1	33.00	0.528
						42.792	<----- SUBTOTALS THIS PAGE ----->				0.982

TECHNICAL DESCRIPTION OF THIS WORK PACKAGE:

42.792 + 0.982 = 43.774



BML VACUUM SYSTEM

## ESTIMATE --- COST ESTIMATE DETAILS

PAGE NUMBER 97

SUB-SYSTEM: BML VACUUM/GAUGES &amp; CABLES

DATE PRINTED: 7-AUG-92

WBS CODE: 1.1.2.10.3.2 MULT BY 1 COMPONENT : BML VACUUM SYS/150GEV GAUGES

DATE ESTIMATED: 3/24/92

RESPONSIBLE: SAUER

&lt;----- MATERIAL -----&gt; &lt;----- LABOR -----&gt;

ITEM NUM.	ITEM TITLE	UNIT MEAS.	NO. UNITS	FY91 \$ /UNIT	COST BASIS	TOTAL MT K\$	NO. UNITS	HOURS /UNIT	TOTAL CRAFT HOURS CODE	\$/HR	TOTAL LABOR K\$
1	COLD CATHODE GAUGE	EA	4	100.	EE	0.400					
2	THERMOCOUPLE GAUGE	EA	8	85.	CP	0.680					
3	GAUGE TEE & FLANGE	EA	12	104.	CP	1.248					
4							12	1.0	12.0 S2	38.00	0.456
5							12	1.0	12.0 T2	18.70	0.224
6	GAUGE & ION PUMP CONTROLS	EA	1	19900.	EE	19.900					
						22.228	<----- SUBTOTALS THIS PAGE ----->				0.680
TECHNICAL DESCRIPTION OF THIS WORK PACKAGE:						22.228 +	0.680 =		22.908		

BML VACUUM SYSTEM

ESTIMATE --- COST ESTIMATE DETAILS

PAGE NUMBER 98

SUB-SYSTEM: BML VACUUM/GAUGES & CABLES

DATE PRINTED: 7-AUG-92

WBS CODE: 1.1.2.10.3.3 MULT BY 1 COMPONENT : BML VACUUM SYS/SPILL GAUGES

DATE ESTIMATED: 2/27/92

RESPONSIBLE: SAUER

<----- MATERIAL -----> <----- LABOR ----->

ITEM NUM.	ITEM TITLE	UNIT MEAS.	NO. UNITS	FY91 \$ /UNIT	COST BASIS	TOTAL MT K\$	NO. UNITS	HOURS /UNIT	TOTAL CRAFT HOURS CODE \$/HR	TOTAL LABOR K\$
1			0	0.		0.000				

0.000 <----- SUBTOTALS THIS PAGE -----> 0.000

TECHNICAL DESCRIPTION OF THIS WORK PACKAGE:

0.000 + 0.000 = 0.000

MIR POWER SUPPLIES

ESTIMATE --- COST ESTIMATE DETAILS

PAGE NUMBER 99

SUB-SYSTEM: MIR PWR SUP/DIPOLE SUPPLY

DATE PRINTED: 7-AUG-92

WBS CODE: 1.1.3.1.1.1 MULT BY 11 COMPONENT : MIR PWR SUP/DIPOLE SUPPLY

DATE ESTIMATED: 3/ 2/92

RESPONSIBLE: HAYS

&lt;----- MATERIAL -----&gt; &lt;----- LABOR -----&gt;

ITEM NUM.	ITEM TITLE	UNIT MEAS.	NO. UNITS	FY91 \$ /UNIT	COST BASIS	TOTAL MT K\$	NO. UNITS	HOURS /UNIT	TOTAL CRAFT HOURS CODE	\$/HR	TOTAL LABOR K\$
1	TRANSFORMER	EA	1	139000.	A91	139.000					
2	V.C.B.	EA	1	18500.	CP	18.500					
3	SWITCH GEAR	EA	1	10920.	CP	10.920					
4	ELECTRICAL WORK						1	278.0	278.0	IE 38.20	10.620
5	POWER CABLE	EA	1	21840.	CP	21.840	1	120.0	120.0	IE 38.20	4.584
6	POWER FILTER	EA	1	98280.	A88	98.280					
7	ASSEMBLY						1	582.0	582.0	T2 18.70	10.883
8	MISCELLANEOUS PARTS	EA	1	10920.	EE	10.920					
9	E.D.I.						1	420.0	420.0	EN 32.40	13.608
10							1	91.0	91.0	PH 33.90	3.085
11							1	864.0	864.0	DC 32.00	27.648
12							1	460.0	460.0	DR 22.20	10.212

-----  
 299.480 <----- SUBTOTALS THIS PAGE -----> 80.640  
 -----

TECHNICAL DESCRIPTION OF THIS WORK PACKAGE:

299.480 + 80.640 = 380.100

TWO UNITS BUILT ON R&amp;D

-----  
 TOTAL = 4181.099 MULTIPLY BY 11 3294.060 <----- SUBTOTALS THIS PAGE -----> 887.039  
 -----

MIR POWER SUPPLIES

## ESTIMATE --- COST ESTIMATE DETAILS

PAGE NUMBER 100

SUB-SYSTEM: MIR PWR SUP/DIPOLE SUPPLY

DATE PRINTED: 7-AUG-92

WBS CODE: 1.1.3.1.1.2

MULT BY 11

COMPONENT : MIR PWR SUP/DIPOLE SUPPLY

DATE ESTIMATED: 3/ 2/92

RESPONSIBLE: HAYS

&lt;----- MATERIAL -----&gt;

&lt;----- LABOR -----&gt;

ITEM NUM.	ITEM TITLE	UNIT MEAS.	NO. UNITS	FY91 \$ /UNIT	COST BASIS	TOTAL MT K\$	NO. UNITS	HOURS /UNIT	TOTAL CRAFT HOURS CODE \$/HR	TOTAL LABOR K\$	
1	A.C. CONTROLLER	EA	1	1092.	CP	1.092	1	11.0	11.0 T2 18.70	0.208	
2	COPPER	EA	1	6552.	EE	6.552	1	40.0	40.0 S1 33.00	1.320	
3	FIRING CIRCUIT	EA	1	5460.	A86	5.460					
4	S.C.R'S	EA	25	387.66	VQ	9.691					
5	CONTROL EQUIPMENT	EA	1	5460.	A84	5.460	1	85.0	85.0 EN 32.40	2.754	
6	SUPPLY CABINET	EA	1	5460.	EE	5.460	1	290.0	290.0 T2 18.70	5.423	
7	KNIFE SWITCH	EA	1	2184.	CP	2.184	1	59.0	59.0 T2 18.70	1.103	
8	ASSEMBLY COST						1	200.0	200.0 EN 32.40	6.480	
9	ASSEMBLY COST						1	2100.0	2100.0 T2 18.70	39.270	
10	E.D.I						1	257.0	257.0 EN 32.40	8.327	
11							1	91.0	91.0 DR 22.20	2.020	
						35.899	<----- SUBTOTALS THIS PAGE ----->				66.903

TECHNICAL DESCRIPTION OF THIS WORK PACKAGE:

35.899 + 66.903 = 102.803

TWO UNITS ON R&amp;D FUNDS

TOTAL = 1130.828 MULTIPLY BY 11 394.895 &lt;----- SUBTOTALS THIS PAGE -----&gt; 735.933

## POWER SUPPLIES

## ESTIMATE --- COST ESTIMATE DETAILS

PAGE NUMBER 101

## SUB-SYSTEM: MIR POWER SUPPLIES

DATE PRINTED: 7-AUG-92

WBS CODE: 1.1.3.1.2

MULT BY

1

COMPONENT : MIR PWR SUP/QUADRUPOLE SUPPLIES

DATE ESTIMATED: 3/ 2/92

RESPONSIBLE: HAYS

&lt;----- MATERIAL -----&gt;

&lt;----- LABOR -----&gt;

ITEM NUM.	ITEM TITLE	UNIT MEAS.	NO. UNITS	FY91 \$ /UNIT	COST BASIS	TOTAL MT K\$	NO. UNITS	HOURS /UNIT	TOTAL CRAFT HOURS CODE \$/HR	TOTAL LABOR K\$
1	LOCATION AND CONNECTION						6	200.0	1200.0 T2 18.70	22.440
2	LAYOUT						6	75.0	450.0 EN 32.40	14.580
3	CONTROL CONNECTION	EA	6	546.	CP	3.276	6	80.0	480.0 IE 38.20	18.336
4	E.D.I.						1	1500.0	1500.0 EN 32.40	48.600
5							1	1000.0	1000.0 PH 33.90	33.900
6							1	5000.0	5000.0 DC 32.00	160.000
7							1	3800.0	3800.0 DR 22.20	84.360
						3.276	<----- SUBTOTALS THIS PAGE ----->			382.216

TECHNICAL DESCRIPTION OF THIS WORK PACKAGE:

3.276 + 382.216 = 385.492

## POWER SUPPLIES

## ESTIMATE --- COST ESTIMATE DETAILS

PAGE NUMBER 102

SUB-SYSTEM: MIR POWER SUPPLIES

DATE PRINTED: 7-AUG-92

WBS CODE: 1.1.3.1.3

MULT BY 1 COMPONENT : MIR PWR SUP/SEXTUPOLE SUPPLIES

DATE ESTIMATED: 4/17/91

RESPONSIBLE: HAYS

&lt;----- MATERIAL -----&gt; &lt;----- LABOR -----&gt;

ITEM NUM.	ITEM TITLE	UNIT MEAS.	NO. UNITS	FY91 \$ /UNIT	COST BASIS	TOTAL MT K\$	NO. UNITS	HOURS /UNIT	TOTAL CRAFT HOURS	CODE	\$/HR	TOTAL LABOR K\$	
1	SEXH SEXH-2 P.S	EA	4	19656.	CP	78.624							
2	SEXV P.S.	EA	2	19656.	CP	39.312							
3	BULK P.S. FOR SEXTS LOOPS	EA	6	15910.44	CP	95.463							
4	INDIVIDUAL SEXT. P.S.	EA	8	2506.14	CP	20.049							
5	CONTROLLER FOR SEXH, SEXV	EA	3	2184.	EE	6.552	3	40.0	120.0	EN	32.40	3.888	
6							3	240.0	720.0	T2	18.70	13.464	
7	CONTROLLER FOR INDIV. SEXTS	EA	8	1092.	EE	8.736	8	60.0	480.0	T2	18.70	8.976	
8	TRANSDUCTORS	EA	14	1668.58	A85	23.360							
9	INSTALLATION FOR SEXH						2	24.0	48.0	T2	18.70	0.898	
10	INSTALLATION FOR SEXV						2	24.0	48.0	T2	18.70	0.898	
11	INSTALLATION FOR INDIVIDUAL SEXT						8	24.0	192.0	T2	18.70	3.590	
12	E.D.I						1	200.0	200.0	EN	32.40	6.480	
13							1	80.0	80.0	PH	33.90	2.712	
14							1	400.0	400.0	DC	32.00	12.800	
15							1	300.0	300.0	DR	22.20	6.660	
						272.096	<----- SUBTOTALS THIS PAGE ----->						60.368

TECHNICAL DESCRIPTION OF THIS WORK PACKAGE:

272.096 + 60.368 = 332.461

## POWER SUPPLIES

## ESTIMATE --- COST ESTIMATE DETAILS

PAGE NUMBER 103

SUB-SYSTEM: MIR POWER SUPPLIES

DATE PRINTED: 7-AUG-92

WBS CODE: 1.1.3.1.4

MULT BY 1

COMPONENT : MIR PWR SUP/CORRECTION ELEMENT SUPPLIES

DATE ESTIMATED: 2/12/92

RESPONSIBLE: HAYS

&lt;----- MATERIAL -----&gt; &lt;----- LABOR -----&gt;

ITEM NUM.	ITEM TITLE	UNIT MEAS.	NO. UNITS	FY91 \$ /UNIT	COST BASIS	TOTAL MT K\$	NO. UNITS	HOURS /UNIT	TOTAL CRAFT HOURS CODE \$/HR	TOTAL LABOR K\$
1	REMOVE OLD EQUIPMENT						24	10.0	240.0 T2 18.70	4.488
2	REINSTALL CHASSIS						24	16.0	384.0 T2 18.70	7.181
3	NEW POWER						24	28.0	672.0 IE 38.20	25.670
4	E.D.I						1	50.0	50.0 EN 32.40	1.620
5							1	50.0	50.0 DR 22.20	1.110

0.000 &lt;----- SUBTOTALS THIS PAGE -----&gt; 40.069

TECHNICAL DESCRIPTION OF THIS WORK PACKAGE:

0.000 + 40.069 = 40.069

## POWER SUPPLIES

## ESTIMATE --- COST ESTIMATE DETAILS

PAGE NUMBER 104

SUB-SYSTEM: MIR POWER SUPPLIES

DATE PRINTED: 7-AUG-92

WBS CODE: 1.1.3.1.6 MULT BY 1 COMPONENT : MIR INJECTOR REGULATION SYSTEM

DATE ESTIMATED: 3/ 2/92

RESPONSIBLE: HAYS

&lt;----- MATERIAL -----&gt; &lt;----- LABOR -----&gt;

ITEM NUM.	ITEM TITLE	UNIT MEAS.	NO. UNITS	FY91 \$ /UNIT	COST BASIS	TOTAL MT K\$	NO. UNITS	HOURS /UNIT	TOTAL CRAFT HOURS CODE \$/HR	TOTAL LABOR K\$	
1	NEW TRANSDUCTORS MAIN BUS	EA	2	9400.	CP	18.800	4	20.0	80.0 EN 32.40	2.592	
2	NEW TRANDUCTORS QUADRUPOLE	EA	2	6770.40	A87	13.541	4	20.0	80.0 EN 32.40	2.592	
3	NEW TRANDUCTORS PWR HEAD INSTALL	EA	4	4368.	CP	17.472	8	40.0	320.0 T2 18.70	5.984	
4	COMPUTER INTERFACE SYSTEM	EA	4	2730.	A87	10.920	4	160.0	640.0 EN 32.40	20.736	
5	COMPUTER INTERFACE ASSEMBLY						4	160.0	640.0 T2 18.70	11.968	
6	INSTALL NEW SYSTEM						8	40.0	320.0 T2 18.70	5.984	
7	E.D.I						1	1470.0	1470.0 EN 32.40	47.628	
8							1	1000.0	1000.0 PH 33.90	33.900	
9							1	1000.0	1000.0 DR 22.20	22.200	
10							1	1000.0	1000.0 DC 32.00	32.000	
						60.733	<----- SUBTOTALS THIS PAGE ----->				185.584
TECHNICAL DESCRIPTION OF THIS WORK PACKAGE:						60.733 + 185.584 = 246.317					



## POWER SUPPLIES

## ESTIMATE --- COST ESTIMATE DETAILS

PAGE NUMBER 105

SUB-SYSTEM: MIR POWER SUPPLIES

DATE PRINTED: 7-AUG-92

WBS CODE: 1.1.3.1.7

MULT BY 1 COMPONENT : MIR REGULATION SUPPLIES

DATE ESTIMATED: 3/ 2/92

RESPONSIBLE: HAYS

&lt;----- MATERIAL -----&gt;

&lt;----- LABOR -----&gt;

ITEM NUM.	ITEM TITLE	UNIT MEAS.	NO. UNITS	FY91 \$ /UNIT	COST BASIS	TOTAL MT K\$	NO. UNITS	HOURS /UNIT	TOTAL CRAFT HOURS CODE	\$/HR	TOTAL LABOR K\$
1	50 KVA TRANSFORMER	EA	2	2072.82	CP	4.145	2	40.0	80.0	IE 38.20	3.056
2	RELAY RACK	EA	3	873.60	CP	2.621	3	40.0	120.0	T2 18.70	2.244
3	DEVELOPMENT	EA	2	2730.	A86	5.460	2	165.0	330.0	EN 32.40	10.692
4	PHASE CONTROLLER	EA	2	1207.75	VQ	2.415	2	40.0	80.0	IE 38.20	3.056
5	ASSEMBLY						2	320.0	640.0	T2 18.70	11.968
6	SHOP BUS CONST	EA	20	163.80	CP	3.276	2	80.0	160.0	S1 33.00	5.280
7	PLATTING/COPPER	EA	20	12.01	A86	0.240					
8	TRANSISTORS	EA	10	420.42	CP	4.204	10	50.0	500.0	T2 18.70	9.350
9	E.D.I						1	850.0	850.0	EN 32.40	27.540
10							1	300.0	300.0	PH 33.90	10.170
11							1	500.0	500.0	DC 32.00	16.000
12							1	500.0	500.0	DR 22.20	11.100
						22.362	<----- SUBTOTALS THIS PAGE ----->				110.456
TECHNICAL DESCRIPTION OF THIS WORK PACKAGE:						22.362 + 110.456 = 132.818					

## POWER SUPPLIES

## ESTIMATE --- COST ESTIMATE DETAILS

PAGE NUMBER 106

SUB-SYSTEM: MIR POWER SUPPLIES

DATE PRINTED: 7-AUG-92

WBS CODE: 1.1.3.1.8

MULT BY 1 COMPONENT : MIR ABORT SUPPLY

DATE ESTIMATED: 2/17/92

RESPONSIBLE: KRAFCZYK

&lt;----- MATERIAL -----&gt; &lt;----- LABOR -----&gt;

ITEM NUM.	ITEM TITLE	UNIT MEAS.	NO. UNITS	FY91 \$ /UNIT	COST BASIS	TOTAL MT K\$	NO. UNITS	HOURS /UNIT	TOTAL CRAFT HOURS CODE \$/HR	TOTAL LABOR K\$
1	MOVE B3 TRIM PS						1	16.0	16.0 IG 42.80	0.685
2	5KW 50V/100A PS	EA	4	3000.	CP	12.000	5	8.0	40.0 T2 18.70	0.748
3	E.D.I						1	100.0	100.0 EN 32.40	3.240
4							1	50.0	50.0 DR 22.20	1.110
5							1	50.0	50.0 DC 32.00	1.600

12.000 &lt;----- SUBTOTALS THIS PAGE -----&gt; 7.383

TECHNICAL DESCRIPTION OF THIS WORK PACKAGE:

12.000 + 7.383 = 19.383

ABORT LAMBERTSONS(2), C MAGNET(1), 52\*QUADS(3) AND ROLLED B2S(2) WILL BE ON THE MIQUAD BUS.

## POWER SUPPLIES

## ESTIMATE --- COST ESTIMATE DETAILS

PAGE NUMBER 107

SUB-SYSTEM: 8GEV LINE/POWER SUPPLY

DATE PRINTED: 7-AUG-92

WBS CODE: 1.1.3.2.1

MULT BY 1 COMPONENT : 8GEV LINE/DIPOLE POWER SUPPLIES

DATE ESTIMATED: 2/27/92

RESPONSIBLE: KRAFCZYK

&lt;----- MATERIAL -----&gt; &lt;----- LABOR -----&gt;

ITEM NUM.	ITEM TITLE	UNIT MEAS.	NO. UNITS	FY91 \$ /UNIT	COST BASIS	TOTAL MT K\$	NO. UNITS	HOURS /UNIT	TOTAL CRAFT HOURS	CRAFT CODE	\$/HR	TOTAL LABOR K\$
1	77KW 55V/1400A	EA	1	50000.	A85	50.000	1	40.0	40.0	IE	38.20	1.528
2	22.5KW 30V/750A	EA	1	12900.	CP	12.900	1	40.0	40.0	IE	38.20	1.528
3	1KW 20V/50A SHUT	EA	1	1000.	EE	1.000	1	120.0	120.0	T2	18.70	2.244
4	MOVE 4 EXISTING SUPPLIES						4	24.0	96.0	IG	42.80	4.109
5	AC POWER HOOKUP						4	40.0	160.0	IE	38.20	6.112
6	CONTROLS INTERFACE	EA	3	1000.	EE	3.000	3	100.0	300.0	T2	18.70	5.610
7	INSTALLATION & CHECKOUT						7	80.0	560.0	T2	18.70	10.472
8	MISCELLANEOUS PARTS	EA	1	1400.	EE	1.400						
9	E.D.I.						1	1000.0	1000.0	EN	32.40	32.400
10							1	100.0	100.0	PH	33.90	3.390
11							1	200.0	200.0	DC	32.00	6.400
12							1	200.0	200.0	DR	22.20	4.440
						68.300	<----- SUBTOTALS THIS PAGE ----->			78.233		

TECHNICAL DESCRIPTION OF THIS WORK PACKAGE:

68.300 + 78.233 = 146.533

1)MOVE, 2-ISR2220 (1-200V/1200A,1-400V/600A)

2)MOVE, 2-HP8475C (110V/100A)

## POWER SUPPLIES

## ESTIMATE --- COST ESTIMATE DETAILS

PAGE NUMBER 108

SUB-SYSTEM: 8GEV LINE/POWER SUPPLY

DATE PRINTED: 7-AUG-92

WBS CODE: 1.1.3.2.2 MULT BY 1 COMPONENT : 8GEV LINE/ QUADRUPOLE POWER SUPPLIES

DATE ESTIMATED: 2/27/92

RESPONSIBLE: KRAFCZYK

&lt;----- MATERIAL -----&gt; &lt;----- LABOR -----&gt;

ITEM NUM.	ITEM TITLE	UNIT MEAS.	NO. UNITS	FY91 \$ /UNIT	COST BASIS	TOTAL MT K\$	NO. UNITS	HOURS /UNIT	TOTAL CRAFT HOURS CODE \$/HR	TOTAL LABOR K\$
1	52.5KW 300V/175A	EA	1	18000.	CP	18.000	3	30.0	90.0 IE 38.20	3.438
2	MOVE 3 EXISTING POWER SUPPLIES						3	20.0	60.0 IG 42.80	2.588
3	250W 10V/25A TRIM SUPPLIES/SHUT	EA	17	2500.	EE	42.500	17	20.0	340.0 T2 18.70	6.358
4	AC POWER HOOK UP						3	40.0	120.0 IE 38.20	4.584
5	CONTROLS INTERFACE	EA	1	1000.	EE	1.000	1	100.0	100.0 T2 18.70	1.870
6	INSTALLATION & CHECKOUT						4	20.0	80.0 T2 18.70	1.496
7	MISCELLANEOUS PARTS	EA	1	800.	EE	0.800				
8	E.D.I						1	1000.0	1000.0 EN 32.40	32.400
9							1	100.0	100.0 PH 33.90	3.390
10							1	300.0	300.0 DC 32.00	9.600
11							1	250.0	250.0 DR 22.20	5.550

-----  
62.300 <----- SUBTOTALS THIS PAGE -----> 71.254  
-----

TECHNICAL DESCRIPTION OF THIS WORK PACKAGE:

62.300 + 71.254 = 133.554

1)MOVE 2-HP8486C(18V/500A),1-DYNA POWER(80V/375A)

## POWER SUPPLIES

## ESTIMATE --- COST ESTIMATE DETAILS

PAGE NUMBER 109

SUB-SYSTEM: 8GEV LINE/POWER SUPPLY

DATE PRINTED: 7-AUG-92

WBS CODE: 1.1.3.2.3 MULT BY 1 COMPONENT : 8GEV LINE/CORR ELEMENT POWER SUPPLIES

DATE ESTIMATED: 2/27/92

RESPONSIBLE: KRAFCZYK

&lt;----- MATERIAL -----&gt; &lt;----- LABOR -----&gt;

ITEM NUM.	ITEM TITLE	UNIT MEAS.	NO. UNITS	FY91 \$ /UNIT	COST BASIS	TOTAL MT K\$	NO. UNITS	HOURS /UNIT	TOTAL HOURS	CRAFT CODE	\$/HR	TOTAL LABOR K\$
1	360W 60V/6A	EA	51	2000.	CP	102.000	51	12.0	612.0	T2	18.70	11.444
2	AC POWER HOOKUP						51	14.0	714.0	IE	38.20	27.275
3	INSTALLATION & CHECKOUT						51	2.0	102.0	T2	18.70	1.907
4	MISCELLANEOUS PARTS	EA	1	2500.	EE	2.500						
5	E.D.I.						1	500.0	500.0	EN	32.40	16.200
6							1	100.0	100.0	PH	33.90	3.390
7							1	200.0	200.0	DR	22.20	4.440

104.500 &lt;----- SUBTOTALS THIS PAGE -----&gt; 64.657

TECHNICAL DESCRIPTION OF THIS WORK PACKAGE:

104.500 + 64.657 = 169.157

## POWER SUPPLIES

## ESTIMATE --- COST ESTIMATE DETAILS

PAGE NUMBER 110

SUB-SYSTEM: 8GEV LINE/POWER SUPPLY

DATE PRINTED: 7-AUG-92

WBS CODE: 1.1.3.2.4 MULT BY 1 COMPONENT : 8GEV LINE/INJ LAMBERTSON POWER SUPPLY

DATE ESTIMATED: 2/17/92

RESPONSIBLE: KRAFCZYK

&lt;----- MATERIAL -----&gt; &lt;----- LABOR -----&gt;

ITEM NUM.	ITEM TITLE	UNIT MEAS.	NO. UNITS	FY91 \$ /UNIT	COST BASIS	TOTAL MT K\$	NO. UNITS	HOURS /UNIT	TOTAL CRAFT HOURS CODE \$/HR	TOTAL LABOR K\$
1	MOVE EXISTING P.S.						1	24.0	24.0 IG 42.80	1.027
2	AC POWER HOOK UP						1	32.0	32.0 IE 38.20	1.222
3	INSTALLATION & CHECKOUT						1	100.0	100.0 T2 18.70	1.870
4	MISCELLANEOUS PARTS	EA	1	200.	EE	0.200				
5	E.D.I						1	40.0	40.0 EN 32.40	1.296
6							1	25.0	25.0 DR 22.20	0.555
						0.200	<----- SUBTOTALS THIS PAGE ----->			5.971

TECHNICAL DESCRIPTION OF THIS WORK PACKAGE:

0.200 + 5.971 = 6.171

MOVE OLD HB 83 P.S. TO NEW LOCATION

## POWER SUPPLIES

## ESTIMATE --- COST ESTIMATE DETAILS

PAGE NUMBER 111

SUB-SYSTEM: 150 GEV PROT LINE/POWER SUPPLIES

DATE PRINTED: 7-AUG-92

WBS CODE: 1.1.3.3.1 MULT BY 1 COMPONENT : 150GEV PROT LINE/DIPOLE SUPPLIES

DATE ESTIMATED: 3/ 2/92

RESPONSIBLE: KRAFCZYK

&lt;----- MATERIAL -----&gt; &lt;----- LABOR -----&gt;

ITEM NUM.	ITEM TITLE	UNIT MEAS.	NO. UNITS	FY91 \$ /UNIT	COST BASIS	TOTAL MT K\$	NO. UNITS	HOURS /UNIT	TOTAL HOURS	CRAFT CODE	\$/HR	TOTAL LABOR K\$
1	MOVE B1, B6 PS(NOTE 2)						2	20.0	40.0	IG	42.80	1.712
2	B2 525KW-150V/3500A	EA	1	167000.	A84	167.000	1	40.0	40.0	IE	38.20	1.528
3	B5 180KW-40V/4000A PS	EA	1	87000.	A84	87.000	1	40.0	40.0	IE	38.20	1.528
4	B4 75KW-50V/1500A PS	EA	1	60000.	A84	60.000	1	40.0	40.0	IE	38.20	1.528
5	4 POLE LOAD TRANSFER SWITCH	EA	2	28000.	A90	56.000	2	200.0	400.0	T2	18.70	7.480
6	2 POLE LOAD TRANSFER SWITCH	EA	3	14000.	A90	42.000	3	100.0	300.0	T2	18.70	5.610
7	CHECKOUT						6	40.0	240.0	T2	18.70	4.488
8	E.D.I.						1	1500.0	1500.0	EN	32.40	48.600
9							1	200.0	200.0	PH	33.90	6.780
10							1	600.0	600.0	DR	22.20	13.320
11							1	600.0	600.0	DC	32.00	19.200

412.000 <----- SUBTOTALS THIS PAGE -----> 111.774

## TECHNICAL DESCRIPTION OF THIS WORK PACKAGE:

412.000 + 111.774 = 523.774

1) ITEM 1, MOVE EXISTING TRANSREX 500-5 POWER SUPPLIES FOR EXTRACTION.

2) ITEM 2-4 ARE COST WITH POSSIBLE FILTERS

3) ITEM 5,6 ARE USED TO POWER EITHER THE PROTON OR PBAR LINE FOR TRANSFER TO THE TEVATRON.

4) 2 MR POWER SUPPLIES HOOKED IN SERIES WILL BE USED TO POWER THE MAIN BENDS (14 B25).

RELOCATION OF THESE POWER SUPPLIES IS COVERED IN WBS #1.1.13.10.2.1. LOAD TRANSFER SWITCHES FOR THIS BEND IS COVERED UNDER ITEM 6.

## POWER SUPPLIES

## ESTIMATE --- COST ESTIMATE DETAILS

PAGE NUMBER 112

SUB-SYSTEM: 150 GEV PROT LINE/POWER SUPPLIES

DATE PRINTED: 7-AUG-92

WBS CODE: 1.1.3.3.2

MULT BY

1

COMPONENT : 150GEV PROT LINE/QUADRUPOLE SUPPLIES

DATE ESTIMATED: 3/ 2/92

RESPONSIBLE: KRAFCZYK

&lt;----- MATERIAL -----&gt;

&lt;----- LABOR -----&gt;

ITEM NUM.	ITEM TITLE	UNIT MEAS.	NO. UNITS	FY91 \$ /UNIT	COST BASIS	TOTAL MT K\$	NO. UNITS	HOURS /UNIT	TOTAL CRAFT HOURS	CODE	\$/HR	TOTAL LABOR K\$
1	Q1,Q2 300KW-75V/4000A PS	EA	2	122000.	A84	244.000	2	40.0	80.0	IE	38.20	3.056
2	Q4,Q6,Q7 200KW-50V/4000A PS	EA	3	107000.	A84	321.000	3	40.0	120.0	IE	38.20	4.584
3	Q5,Q8 160KW-40V/4000A PS	EA	2	87000.	A84	174.000	2	40.0	80.0	IE	38.20	3.056
4	2 POLE LOAD TRANSFER SWITCH	EA	8	14000.	A84	112.000	8	100.0	800.0	T2	18.70	14.960
5	CHECKOUT						8	40.0	320.0	T2	18.70	5.984
6	E.D.I.						1	2000.0	2000.0	EN	32.40	64.800
7							1	300.0	300.0	PH	33.90	10.170
8							1	600.0	600.0	DR	22.20	13.320
9							1	600.0	600.0	DC	32.00	19.200
						851.000	SUBTOTALS THIS PAGE			139.130		

## TECHNICAL DESCRIPTION OF THIS WORK PACKAGE:

851.000 + 139.130 = 990.130

ITEMS 1-3 ARE COST WITH PASSIVE FILTERS.

ITEM 4 IS USED TO POWER EITHER PROTON OR PBAR LINES FOR TRANSFER TO THE TEVATRON.

1 MR POWER SUPPLIES WILL BE USED TO POWER 7-3Q84 QUADRUPOLES IN THE CENTER OF THE LINE. RELOCATION OF THIS SUPPLY IS COVERED IN WBS # 1.1.13.10.2.1. THE LOAD TRANSFER SWITCH FOR THESE QUADRUPOLES IS COVERED IN ITEM 4



## POWER SUPPLIES

## ESTIMATE --- COST ESTIMATE DETAILS

PAGE NUMBER 113

SUB-SYSTEM: 150 GEV PROT LINE/POWER SUPPLIES

DATE PRINTED: 7-AUG-92

WBS CODE: 1.1.3.3.3

MULT BY 1 COMPONENT : 150GEV PROT LINE/CORR ELE SUPPLIES

DATE ESTIMATED: 3/ 2/92

RESPONSIBLE: KRAFCZYK

&lt;----- MATERIAL -----&gt; &lt;----- LABOR -----&gt;

ITEM NUM.	ITEM TITLE	UNIT MEAS.	NO. UNITS	FY91 \$ /UNIT	COST BASIS	TOTAL MT K\$	NO. UNITS	HOURS /UNIT	TOTAL CRAFT HOURS CODE \$/HR	TOTAL LABOR K\$
1	5KW 50V/100 AMP P.S.	EA	12	3057.08	.CP	36.685	8	12.0	96.0 T2 18.70	1.795
2	AC POWER						8	8.0	64.0 IE 38.20	2.445
3	E.D.I.						1	500.0	500.0 EN 32.40	16.200
4							1	100.0	100.0 PH 33.90	3.390
5							1	400.0	400.0 DC 32.00	12.800
6							1	200.0	200.0 DR 22.20	4.440

36.685 &lt;----- SUBTOTALS THIS PAGE -----&gt; 41.070

TECHNICAL DESCRIPTION OF THIS WORK PACKAGE:

36.685 + 41.070 = 77.755

## POWER SUPPLIES

## ESTIMATE --- COST ESTIMATE DETAILS

PAGE NUMBER 114

SUB-SYSTEM: 150 GEV PROT LINE/POWER SUPPLIES

DATE PRINTED: 7-AUG-92

WBS CODE: 1.1.3.3.4

MULT BY 1

COMPONENT : 150 GEV PROT LINE/LAMBERTSON POWER SUPPLY

DATE ESTIMATED: 2/17/92

RESPONSIBLE: KRAFCZYK

&lt;----- MATERIAL -----&gt;

&lt;----- LABOR -----&gt;

ITEM NUM.	ITEM TITLE	UNIT MEAS.	NO. UNITS	FY91 \$ /UNIT	COST BASIS	TOTAL MT K\$	NO. UNITS	HOURS /UNIT	TOTAL CRAFT HOURS CODE \$/HR	TOTAL LABOR K\$
1			0	0.		0.000				
						0.000	<----- SUBTOTALS THIS PAGE ----->			0.000

TECHNICAL DESCRIPTION OF THIS WORK PACKAGE:

0.000 + 0.000 = 0.000

150 GEV PROT LINE/LAMBERTSON POWER SUPPLY IS COST UNDER WBS #1.1.3.3.1 AS ITEM #1 (B1 WITH A LOAD TRANSFER SWITCH)

POWER SUPPLIES

ESTIMATE --- COST ESTIMATE DETAILS

PAGE NUMBER 115

SUB-SYSTEM: 150GEV PBAR LINE/POWER SUPPLIES

DATE PRINTED: 7-AUG-92

WBS CODE: 1.1.3.4.1

MULT BY 1 COMPONENT : 150 GEV PBAR LINE/DIPOLE SUPPLIES

DATE ESTIMATED: 2/13/92

RESPONSIBLE: KRAFCZYK

<----- MATERIAL -----> <----- LABOR ----->

ITEM NUM.	ITEM TITLE	UNIT MEAS.	NO. UNITS	FY91 \$ /UNIT	COST BASIS	TOTAL MT K\$	NO. UNITS	HOURS /UNIT	TOTAL CRAFT HOURS CODE \$/HR	TOTAL LABOR K\$
--------------	------------	---------------	--------------	------------------	---------------	-----------------	--------------	----------------	---------------------------------	--------------------

1			0	0.		0.000				
---	--	--	---	----	--	-------	--	--	--	--

0.000 <----- SUBTOTALS THIS PAGE -----> 0.000

TECHNICAL DESCRIPTION OF THIS WORK PACKAGE:

0.000 + 0.000 = 0.000

150 GEV PBAR LINE DIPOLE SUPPLIES ARE COST IN WBS #1.1.3.3.1

POWER SUPPLIES

## ESTIMATE --- COST ESTIMATE DETAILS

PAGE NUMBER 118

SUB-SYSTEM: 150GEV PBAR LINE/POWER SUPPLIES

DATE PRINTED: 7-AUG-92

WBS CODE: 1.1.3.4.2 MULT BY 1 COMPONENT : 150GEV PBAR LINE/QUADRUPOLE SUPPLIES

DATE ESTIMATED: 2/13/92

RESPONSIBLE: KRAFCZYK

&lt;----- MATERIAL -----&gt; &lt;----- LABOR -----&gt;

ITEM NUM.	ITEM TITLE	UNIT MEAS.	NO. UNITS	FY91 \$ /UNIT	COST BASIS	TOTAL MT K\$	NO. UNITS	HOURS /UNIT	TOTAL CRAFT HOURS CODE	\$/HR	TOTAL LABOR K\$
1			0	0.		0.000					
						0.000	<----- SUBTOTALS THIS PAGE ----->				0.000

TECHNICAL DESCRIPTION OF THIS WORK PACKAGE:

0.000 + 0.000 = 0.000

150 GEV PBAR LINE QUADRUPOLE SUPPLIES ARE COST IN WBS #1.1.3.3.2

## POWER SUPPLIES

## ESTIMATE --- COST ESTIMATE DETAILS

PAGE NUMBER 117

SUB-SYSTEM: 150GEV PBAR LINE/POWER SUPPLIES

DATE PRINTED: 7-AUG-92

WBS CODE: 1.1.3.4.3

MULT BY 1 COMPONENT : 150GEV PBAR LINE/CORR ELEMENT SUPPLIES

DATE ESTIMATED: 2/27/92

RESPONSIBLE: KRAFCZYK

&lt;----- MATERIAL -----&gt; &lt;----- LABOR -----&gt;

ITEM NUM.	ITEM TITLE	UNIT MEAS.	NO. UNITS	FY91 \$ /UNIT	COST BASIS	TOTAL MT K\$	NO. UNITS	HOURS /UNIT	TOTAL CRAFT HOURS CODE \$/HR	TOTAL LABOR K\$
1	6KW,50 VOLT/100 AMP P.S.	EA	12	3057.70	CP	36.692	8	12.0	96.0 T2 18.70	1.795
2	AC POWER						8	8.0	64.0 IE 38.20	2.445
3	E.D.I						1	1000.0	1000.0 EN 32.40	32.400
4							1	100.0	100.0 PH 33.90	3.390
5							1	400.0	400.0 DC 32.00	12.800
6							1	200.0	200.0 DR 22.20	4.440

36.692 &lt;----- SUBTOTALS THIS PAGE -----&gt; 57.270

TECHNICAL DESCRIPTION OF THIS WORK PACKAGE:

36.692 + 57.270 = 93.962

## POWER SUPPLIES

## ESTIMATE --- COST ESTIMATE DETAILS

PAGE NUMBER 118

SUB-SYSTEM: 150GEV PBAR LINE/POWER SUPPLIES

DATE PRINTED: 7-AUG-92

WBS CODE: 1.1.3.4.4 MULT BY 1 COMPONENT : 150 GEV PBAR LINE/EXT LAMBERTSON SUPPLIES

DATE ESTIMATED: 2/17/92

RESPONSIBLE: KRAFCZYK

&lt;----- MATERIAL -----&gt; &lt;----- LABOR -----&gt;

ITEM NUM.	ITEM TITLE	UNIT MEAS.	NO. UNITS	FY91 \$ /UNIT	COST BASIS	TOTAL MT K\$	NO. UNITS	HOURS /UNIT	TOTAL CRAFT HOURS CODE	\$/HR	TOTAL LABOR K\$
1			0	0.		0.000					
						0.000	----- SUBTOTALS THIS PAGE -----				0.000

TECHNICAL DESCRIPTION OF THIS WORK PACKAGE:

0.000 + 0.000 = 0.000

150 GEV PBAR LINE/EXT LAMBERTSON SUPPLIES ARE COST UNDER WBS1.1.3.3.1 AS ITEM #1 (B1 WITH A LOAD TRANSFER SWITCH).

## POWER SUPPLIES

## ESTIMATE --- COST ESTIMATE DETAILS

PAGE NUMBER 119

SUB-SYSTEM: PBAR PROD LINE(F11 TO F17)/POWER SUPPLIES

DATE PRINTED: 7-AUG-92

WBS CODE: 1.1.3.5.1

MULT BY 1

COMPONENT : PBAR PROD LINE(F11 TO F17)/DIPOLE SUPPLIES

DATE ESTIMATED: 2/17/92

RESPONSIBLE: KRAFCZYK

&lt;----- MATERIAL -----&gt;

&lt;----- LABOR -----&gt;

ITEM NUM.	ITEM TITLE	UNIT MEAS.	NO. UNITS	FY91 \$ /UNIT	COST BASIS	TOTAL MT K\$	NO. UNITS	HOURS /UNIT	TOTAL CRAFT HOURS CODE	\$/HR	TOTAL LABOR K\$
1			0	0.		0.000					
						0.000	----- SUBTOTALS THIS PAGE -----				0.000

TECHNICAL DESCRIPTION OF THIS WORK PACKAGE:

0.000 + 0.000 = 0.000

(NOTE 1) USE EXISTING MR POWER SUPPLY TO POWER A CONBINATION OF B2 AND B3 MAGNETS F11-A TO F16-D.

(NOTE 2) F17 LAMB WILL BE REMOVED AND A B3 INSTALLED. THE PRESENT MR POWER SUPPLY WILL POWER THIS F17-A, F17-B AND F17  
-C COMBINATION.

## POWER SUPPLIES

## ESTIMATE --- COST ESTIMATE DETAILS

PAGE NUMBER 120

SUB-SYSTEM: PBAR PROD LINE(F11 TO F17)/POWER SUPPLIES

DATE PRINTED: 7-AUG-92

WBS CODE: 1.1.3.5.2

MULT BY

1

COMPONENT : PBAR PROD LINE(F11 TO F17)/QUADRUPOLE SUPPLIES

DATE ESTIMATED: 3/ 2/92

RESPONSIBLE: KRAFCZYK

&lt;----- MATERIAL -----&gt;

&lt;----- LABOR -----&gt;

ITEM NUM.	ITEM TITLE	UNIT MEAS.	NO. UNITS	FY91 \$ /UNIT	COST BASIS	TOTAL MT K\$	NO. UNITS	HOURS /UNIT	TOTAL HOURS	CRAFT CODE	\$/HR	TOTAL LABOR K\$
1	QF11A 40KW-20V/2000A	EA	1	38000.	A84	38.000	1	40.0	40.0	IE	38.20	1.528
2	QF11B,QF12 75KW-25V/3000A	EA	2	60000.	A84	120.000	2	40.0	80.0	IE	38.20	3.056
3	QF13-F17 125KW-50V/2500A	EA	1	83000.	A84	83.000	1	40.0	40.0	IE	38.20	1.528
4	CHECKOUT						4	240.0	960.0	T2	18.70	17.952
5	E.D.I						1	750.0	750.0	EN	32.40	24.300
6							1	200.0	200.0	PH	33.90	6.780
7							1	400.0	400.0	DC	32.00	12.800
8							1	200.0	200.0	DR	22.20	4.440

241.000	<-----	SUBTOTALS THIS PAGE	----->	72.384
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TECHNICAL DESCRIPTION OF THIS WORK PACKAGE:

241.000 + 72.384 = 313.384



## POWER SUPPLIES

## ESTIMATE --- COST ESTIMATE DETAILS

PAGE NUMBER 121

SUB-SYSTEM: PBAR PROD LINE(F11 TO F17)/POWER SUPPLIES

DATE PRINTED: 7-AUG-92

WBS CODE: 1.1.3.5.3

MULT BY 1

COMPONENT : PBAR PROD LINE(F11 TO F17)/CORR ELEMENT SUPPLIES

DATE ESTIMATED: 3/ 2/92

RESPONSIBLE: KRAFCZYK

&lt;----- MATERIAL -----&gt; &lt;----- LABOR -----&gt;

ITEM NUM.	ITEM TITLE	UNIT MEAS.	NO. UNITS	FY91 \$ /UNIT	COST BASIS	TOTAL MT K\$	NO. UNITS	HOURS /UNIT	TOTAL CRAFT HOURS CODE \$/HR	TOTAL LABOR K\$
1	5KW 50 VOLT,100 AMP P.S.	EA	2	3057.60	CP	6.115	2	40.0	80.0 T2 18.70	1.496
2	AC POWER						2	8.0	16.0 IE 38.20	0.611
3	E.D.I.						1	250.0	250.0 EN 32.40	8.100
4							1	200.0	200.0 DC 32.00	6.400
5							1	100.0	100.0 DR 22.20	2.220

6.115 &lt;----- SUBTOTALS THIS PAGE -----&gt; 18.827

TECHNICAL DESCRIPTION OF THIS WORK PACKAGE:

6.115 + 18.827 = 24.942

POWER SUPPLIES

## ESTIMATE --- COST ESTIMATE DETAILS

PAGE NUMBER 122

SUB-SYSTEM: SLOW SPILL LINE/POWER SUPPLIES

DATE PRINTED: 7-AUG-92

WBS CODE: 1.1.3.6.1 MULT BY 1 COMPONENT : SLOW SPILL LINE/DIPOLE SUPPLIES

DATE ESTIMATED: 3/ 2/92

RESPONSIBLE: KRAFCZYK

&lt;----- MATERIAL -----&gt; &lt;----- LABOR -----&gt;

ITEM NUM.	ITEM TITLE	UNIT MEAS.	NO. UNITS	FY91 \$ /UNIT	COST BASIS	TOTAL MT K\$	NO. UNITS	HOURS /UNIT	TOTAL CRAFT HOURS CODE \$/HR	TOTAL LABOR K\$
1	HB1 - 500 KW	EA	2	168000.	A84	336.000	2	100.0	200.0 T2 18.70	3.740
2	VB1 - 500 KW	EA	1	168000.	A84	168.000	1	100.0	100.0 T2 18.70	1.870
3	VB2 - 90 KW	EA	1	48956.	A85	48.956	1	30.0	30.0 IE 38.20	1.146
4	AC POWER						3	80.0	240.0 IE 38.20	9.168
5	E.D.I						1	1000.0	1000.0 EN 32.40	32.400
6							1	200.0	200.0 PH 33.90	6.780
7							1	400.0	400.0 DC 32.00	12.800
8							1	200.0	200.0 DR 22.20	4.440

550.956 &lt;----- SUBTOTALS THIS PAGE -----&gt; 72.344

TECHNICAL DESCRIPTION OF THIS WORK PACKAGE:

550.956 + 72.344 = 623.300

ITEM 1-4 FOR F49 - SY SEGMENT

## POWER SUPPLIES

## ESTIMATE --- COST ESTIMATE DETAILS

PAGE NUMBER 123

## SUB-SYSTEM: SLOW SPILL LINE/POWER SUPPLIES

DATE PRINTED: 7-AUG-92

WBS CODE: 1.1.3.6.2

MULT BY 1 COMPONENT : SLOW SPILL LINE/QUADRUPOLE SUPPLIES

DATE ESTIMATED: 3/ 2/92

RESPONSIBLE: KRAFCZYK

&lt;----- MATERIAL -----&gt; &lt;----- LABOR -----&gt;

ITEM NUM.	ITEM TITLE	UNIT MEAS.	NO. UNITS	FY91 \$ /UNIT	COST BASIS	TOTAL MT K\$	NO. UNITS	HOURS /UNIT	TOTAL CRAFT HOURS CODE \$/HR	TOTAL LABOR K\$	
1	Q1-Q4 - 200 KW	EA	4	90000.	A84	360.000	4	100.0	400.0 T2 18.70	7.480	
2	AC POWER						4	80.0	320.0 IE 38.20	12.224	
3	E.D.I.						1	1000.0	1000.0 EN 32.40	32.400	
4							1	200.0	200.0 PH 33.90	6.780	
5							1	400.0	400.0 DC 32.00	12.800	
6							1	200.0	200.0 DR 22.20	4.440	
						360.000	<----- SUBTOTALS THIS PAGE ----->				76.124

TECHNICAL DESCRIPTION OF THIS WORK PACKAGE:

360.000 + 76.124 = 436.124

ITEM 1 &amp; 2 FOR F49 - SY SEGMENT

POWER SUPPLIES

## ESTIMATE --- COST ESTIMATE DETAILS

PAGE NUMBER 124

SUB-SYSTEM: SLOW SPILL LINE/POWER SUPPLIES

DATE PRINTED: 7-AUG-92

WBS CODE: 1.1.3.6.3

MULT BY 1

COMPONENT : SLOW SPILL LINE/CORR ELEMENT SUPPLIES

DATE ESTIMATED: 11/09/90

RESPONSIBLE: KRAFCZYK

&lt;----- MATERIAL -----&gt;

&lt;----- LABOR -----&gt;

ITEM NUM.	ITEM TITLE	UNIT MEAS.	NO. UNITS	FY91 \$ /UNIT	COST BASIS	TOTAL MT K\$	NO. UNITS	HOURS /UNIT	TOTAL CRAFT HOURS CODE \$/HR	TOTAL LABOR K\$
1	SUPPLIES	EA	0	0.		0.000				
						0.000	----- SUBTOTALS THIS PAGE -----			0.000

TECHNICAL DESCRIPTION OF THIS WORK PACKAGE:

0.000 + 0.000 = 0.000

## FERMILAB MAIN INJECTOR TECHNICAL COMPONENTS

ESTIMATE --- COST ESTIMATE DETAILS

PAGE NUMBER 125

## SUB-SYSTEM: POWER SUPPLIES

DATE PRINTED: 7-AUG-92

WBS CODE: 1.1.3.7

MULT BY 1 COMPONENT : BML PS CONTROLLERS

DATE ESTIMATED: 3/ 2/91

RESPONSIBLE: KRAFCZYK

&lt;----- MATERIAL -----&gt; &lt;----- LABOR -----&gt;

ITEM NUM.	ITEM TITLE	UNIT MEAS.	NO. UNITS	FY91 \$ /UNIT	COST BASIS	TOTAL MT K\$	NO. UNITS	HOURS /UNIT	TOTAL CRAFT HOURS CODE \$/HR	TOTAL LABOR K\$
1	POWER SUPPLY CONTROLLERS	EACH	44	131.97	A86	5.807	32	20.0	640.0 T2 18.70	11.968
2	RE-USE OVERPASS REGULATORS						3	200.0	600.0 T2 18.70	11.220
3	E.D.I						1	1000.0	1000.0 EN 32.40	32.400
4							1	500.0	500.0 DC 32.00	16.000
5							1	1000.0	1000.0 DR 22.20	22.200
						5.807	<----- SUBTOTALS THIS PAGE ----->			93.788

TECHNICAL DESCRIPTION OF THIS WORK PACKAGE:

5.807 + 93.788 = 99.595

THE CONTROLLERS ABOVE ARE FOR COMMERCIAL OFF THE SHELF POWER SUPPLIES ONLY. ALL CUSTUM SUPPLIES HAVE CONTROLLERS BUILT IN.

MIR RF 53 MHZ

## ESTIMATE --- COST ESTIMATE DETAILS

PAGE NUMBER 128

SUB-SYSTEM: MIR RF 53MHZ/POWER AMPLIFIERS

DATE PRINTED: 7-AUG-92

WBS CODE: 1.1.4.1.1.1.1 MULT BY 15 COMPONENT : MIR RF 53MHZ/200KW POWER AMPLIFIERS

DATE ESTIMATED: 2/18/92

RESPONSIBLE: MILLER/REID

&lt;----- MATERIAL -----&gt; &lt;----- LABOR -----&gt;

ITEM NUM.	ITEM TITLE	UNIT MEAS.	NO. UNITS	FY91 \$ /UNIT	COST BASIS	TOTAL MT K\$	NO. UNITS	HOURS /UNIT	TOTAL CRAFT HOURS CODE	\$/HR	TOTAL LABOR K\$
1	FINAL POWER TUBE	EA	1	9282.	A89	9.282					
2	SCREEN BY-PASS CAP	EA	1	1638.	EE	1.638					
3	GRID BY-PASS CAPACITOR	EA	1	2730.	EE	2.730					
4	PA FILAMENT TRANSFORMER	EA	1	6552.	A89	6.552					
5	P A TOP PLATE SOCKET MTG	EA	1	1858.	EE	1.858					
6	OUTER SHELL	EA	1	3684.	EE	3.684					
7	TUBE SOCKET	EA	1	7098.	EE	7.098					
8	WATER INSULATORS	EA	1	500.	EE	0.500					
9	ANODE SHROUD	EA	1	1000.	EE	1.000					
10	CATHODE CKT PARTS	EA	1	1500.	EE	1.500					
11	CONNECTORS & CABLES	EA	1	1000.	EE	1.000					
12	MISCELLANEOUS	EA	1	1000.	EE	1.000					
13	ASSEMBLY						1	100.0	100.0	T2 18.70	1.870
14							1	10.0	10.0	EN 32.40	0.324
15							1	12.0	12.0	DR 22.20	0.266
16	PA SCREEN SUPPLY	EA	1	4500.	EE	4.500					
17	ASSEMBLY						1	120.0	120.0	T2 18.70	2.244
18							1	8.0	8.0	EN 32.40	0.259
19							1	8.0	8.0	DR 22.20	0.178
20	PA GRID SUPPLY	EA	1	6552.	EE	6.552					
21	ASSEMBLY						1	120.0	120.0	T2 18.70	2.244
22							1	8.0	8.0	EN 32.40	0.259
23							1	8.0	8.0	DR 22.20	0.178
						48.892	SUBTOTALS THIS PAGE				7.822

MIR RF 53 MHZ

ESTIMATE --- COST ESTIMATE DETAILS

PAGE NUMBER 126

SUB-SYSTEM: MIR RF 53MHZ/POWER AMPLIFIERS

DATE PRINTED: 7-AUG-92

WBS CODE: 1.1.4.1.1.1.1 MULT BY 15 COMPONENT : MIR RF 53MHZ/200KW POWER AMPLIFIERS

DATE ESTIMATED: 2/18/92

RESPONSIBLE: MILLER/REID

<----- MATERIAL -----> <----- LABOR ----->

ITEM NUM.	ITEM TITLE	UNIT MEAS.	NO. UNITS	FY91 \$ /UNIT	COST BASIS	TOTAL MT K\$	NO. UNITS	HOURS /UNIT	TOTAL CRAFT HOURS CODE	\$/HR	TOTAL LABOR K\$
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TECHNICAL DESCRIPTION OF THIS WORK PACKAGE:

48.892 + 7.822 = 56.714

TOTAL = 850.710 MULTIPLY BY 15 733.380 <----- SUBTOTALS THIS PAGE -----> 117.330

MIR RF 53 MHZ

## ESTIMATE --- COST ESTIMATE DETAILS

PAGE NUMBER 127

SUB-SYSTEM: MIR RF 53MHZ/POWER AMPLIFIERS

DATE PRINTED: 7-AUG-92

WBS CODE: 1.1.4.1.1.1.2 MULT BY 15 COMPONENT : MIR RF 53MHZ/4KWATT SOLID STATE AMP

DATE ESTIMATED: 2/18/92

RESPONSIBLE: MILLER/REID

&lt;----- MATERIAL -----&gt;

&lt;----- LABOR -----&gt;

ITEM NUM.	ITEM TITLE	UNIT MEAS.	NO. UNITS	FY91 \$ /UNIT	COST BASIS	TOTAL MT K\$	NO. UNITS	HOURS /UNIT	TOTAL CRAFT HOURS CODE \$/HR	TOTAL LABOR K\$
1	250 WATT MODULE	EA	17	1200.	EE	20.400				
2	4 WAY SPLITTER - 150W	EA	1	850.	A91	0.850				
3	4 WAY SPLITTER - 40W	EA	4	525.	A91	2.100				
4	4 WAY COMBINER - 1000W	EA	4	3800.	A91	15.200				
5	OUTPUT COMBINER	EA	1	7500.	EE	7.500				
6	OUTPUT DIRECTIONAL COUPLER	EA	4	975.	A91	3.900				
7	MOUNTING CHASSIS	EA	2	1500.	EE	3.000				
8	MOUNTING CHASSIS - PRE DRIVER	EA	1	750.	EE	0.750				
9	CONTROLS/PROTECTION	EA	1	1000.	EE	1.000				
10	RELAY RACK	EA	1	1000.	A91	1.000				
11	POWER SUPPLY 500/200A	EA	1	7500.	EE	7.500				
12	MISCELLANEOUS	EA	1	1500.	EE	1.500				
13	ASSEMBLY						1	240.0	240.0 T2 18.70	4.488
14							1	24.0	24.0 EN 32.40	0.778
						64.500	<----- SUBTOTALS THIS PAGE ----->			5.266
TECHNICAL DESCRIPTION OF THIS WORK PACKAGE:						64.500 +	5.266 =			69.766
TOTAL = 1046.484 MULTIPLY BY 15						967.500	<----- SUBTOTALS THIS PAGE ----->			78.984



MIR RF 53 MHZ

## ESTIMATE --- COST ESTIMATE DETAILS

PAGE NUMBER 128

SUB-SYSTEM: MIR RF 53MHZ/ANODE SUPPLIES/MODULATORS

DATE PRINTED: 7-AUG-92

WBS CODE: 1.1.4.1.1.2.1 MULT BY 1 COMPONENT : MIR RF 53MHZ/ANODE SUPPLIES

DATE ESTIMATED: 2/18/92

RESPONSIBLE: MILLER/REID

&lt;----- MATERIAL -----&gt; &lt;----- LABOR -----&gt;

ITEM NUM.	ITEM TITLE	UNIT MEAS.	NO. UNITS	FY91 \$ /UNIT	COST BASIS	TOTAL MT K\$	NO. UNITS	HOURS /UNIT	TOTAL CRAFT HOURS CODE	\$/HR	TOTAL LABOR K\$
1	MAIN TRANSFORMER, 30KV, 48A	EA	1	350000.	A92	350.000					
2	RECTIFIER STACK	EA	1	23000.	A92	23.000					
3	FILTER CAPACITORS	EA	16	750.	A92	12.000					
4	INTERPHASE REACTOR	EA	1	10000.	A92	10.000					
5	WATER RESISTOR	EA	2	7500.	A92	15.000					
6	CROWBAR	EA	3	8500.	A92	25.500					
7	HV BLEEDER	EA	3	2500.	A92	7.500					
8	HV DIVIDER	EA	3	1500.	A92	4.500					
9	DC CURRENT MONITOR	EA	3	1000.	A92	3.000					
10	BRASS BOX - ELECTRONICS	EA	3	1000.	A92	3.000					
11	CONTROLS	EA	3	10000.	A92	30.000					
12	MISC PARTS - CONNECTORS, PLUMBING	EA	3	10000.	A92	30.000					
13	13.8KV VACUUM CONTACTOR	EA	3	125000.	A92	375.000					
14							1	1440.0	1440.0	T2 18.70	26.928
15							1	480.0	480.0	EN 32.40	15.552
16							1	480.0	480.0	DR 22.20	10.656
						888.500	<----- SUBTOTALS THIS PAGE ----->				53.136
TECHNICAL DESCRIPTION OF THIS WORK PACKAGE:						888.500 +	53.136 =				941.636

MIR RF 53 MHZ

## ESTIMATE --- COST ESTIMATE DETAILS

PAGE NUMBER 129

SUB-SYSTEM: MIR RF 53MHZ/ANODE SUPPLIES/MODULATORS

DATE PRINTED: 7-AUG-92

WBS CODE: 1.1.4.1.1.2.2 MULT BY 1 COMPONENT : MIR RF 53MHZ/MODULATORS

DATE ESTIMATED: 2/28/92

RESPONSIBLE: MILLER/REID

&lt;----- MATERIAL -----&gt; &lt;----- LABOR -----&gt;

ITEM NUM.	ITEM TITLE	UNIT MEAS.	NO. UNITS	FY91 \$ /UNIT	COST BASIS	TOTAL MT K\$	NO. UNITS	HOURS /UNIT	TOTAL CRAFT HOURS CODE \$/HR	TOTAL LABOR K\$	
1	30KV MODULATOR	EA	15	27300.	A80	409.500					
2	Y687B SERIES TUBE	EA	15	9282.	A89	139.230					
3	MODULATOR CONTROLS	EA	15	8190.	EE	122.850					
4	SERIES TUBE SOCKET	EA	15	4040.40	A89	60.608					
5	800F TETRODES	EA	15	739.28	A89	11.089					
6	TRANSFORMER	EA	15	819.	EE	12.285					
7	HV DECK	EA	15	11000.	EE	165.000					
8	ASSEMBLY						15	150.0	2250.0 T2 18.70	42.075	
9							1	2000.0	2000.0 EN 32.40	64.800	
10							1	2300.0	2300.0 DR 22.20	51.060	
11							1	50.0	50.0 PH 33.90	1.695	
						920.560	<----- SUBTOTALS THIS PAGE ----->				159.630

TECHNICAL DESCRIPTION OF THIS WORK PACKAGE:

920.560 + 159.630 = 1080.190

RF SYSTEMS/RING

## ESTIMATE --- COST ESTIMATE DETAILS

PAGE NUMBER 130

SUB-SYSTEM: MIR RF 53 MHZ

DATE PRINTED: 7-AUG-92

WBS CODE: 1.1.4.1.1.3 MULT BY 1 COMPONENT : MIR RF 53MHZ/LOW LEVEL

DATE ESTIMATED: 2/24/92

RESPONSIBLE: MILLER/TAWZER

&lt;----- MATERIAL -----&gt; &lt;----- LABOR -----&gt;

ITEM NUM.	ITEM TITLE	UNIT MEAS.	NO. UNITS	FY91 \$ /UNIT	COST BASIS	TOTAL MT K\$	NO. UNITS	HOURS /UNIT	TOTAL CRAFT HOURS CODE \$/HR	TOTAL LABOR K\$	
1	DIVIDE BY 588 COUNTDOWN	EA	2	1092.	EE	2.184	2	120.0	240.0 T2 18.70	4.488	
2	DIVIDE BY 21 PHASELOCK	EA	2	2000.	EE	4.000	2	120.0	240.0 T2 18.70	4.488	
3	DELAY LINES						5	24.0	120.0 T2 18.70	2.244	
4	FAN-OUT/FAN-BACK	EA	1	5132.	EE	5.132					
5							1	160.0	160.0 T2 18.70	2.992	
6	E.D.I.						1	50.0	50.0 PH 33.90	1.695	
7							1	500.0	500.0 EN 32.40	16.200	
8							1	200.0	200.0 DR 22.20	4.440	
						11.316	<----- SUBTOTALS THIS PAGE ----->				36.547

TECHNICAL DESCRIPTION OF THIS WORK PACKAGE:

11.316 + 36.547 = 47.863

RF SYSTEMS/RING

## ESTIMATE --- COST ESTIMATE DETAILS

PAGE NUMBER 131

SUB-SYSTEM: MIR RF 53 MHZ

DATE PRINTED: 7-AUG-92

WBS CODE: 1.1.4.1.1.4 MULT BY 1 COMPONENT : MIR RF 53MHZ/TRANSMISSION LINE

DATE ESTIMATED: 2/28/92

RESPONSIBLE: MILLER/ZIOBER

&lt;----- MATERIAL -----&gt; &lt;----- LABOR -----&gt;

ITEM NUM.	ITEM TITLE	UNIT MEAS.	NO. UNITS	FY91 \$ /UNIT	COST BASIS	TOTAL MT K\$	NO. UNITS	HOURS /UNIT	TOTAL CRAFT HOURS CODE \$/HR	TOTAL LABOR K\$
1	1/2" COAXIAL TRANSMISSION LINE	FT	20000	3.06	CP	61.200				
2	1/2" LINE CONNECTORS	EA	800	29.27	CP	23.416	800	1.0	800.0 T2 18.70	14.960
3	B+ CABLE (RG-220)	FT	6300	3.99	A87	25.137	18	20.0	360.0 IE 38.20	13.752
4	-750 V CABLE	FT	4500	2.18	CP	9.810	18	10.0	180.0 IE 38.20	6.876
5	E.D.I.						1	300.0	300.0 EN 32.40	9.720
6							1	400.0	400.0 DR 22.20	8.880
7	BIAS SUPPLY BARS	EA	18	4499.	EE	80.982				

200.545 <----- SUBTOTALS THIS PAGE -----> 54.188

TECHNICAL DESCRIPTION OF THIS WORK PACKAGE:

200.545 + 54.188 = 254.733

RF SYSTEMS/RING

## ESTIMATE --- COST ESTIMATE DETAILS

PAGE NUMBER 132

SUB-SYSTEM: MIR RF 53 MHZ

DATE PRINTED: 7-AUG-92

WBS CODE: 1.1.4.1.1.6 MULT BY 1 COMPONENT : MIR RF 53MHZ/H=588 CAVITIES

DATE ESTIMATED: 2/18/92

RESPONSIBLE: MILLER/WILDMAN

&lt;----- MATERIAL -----&gt; &lt;----- LABOR -----&gt;

ITEM NUM.	ITEM TITLE	UNIT MEAS.	NO. UNITS	FY91 \$ /UNIT	COST BASIS	TOTAL MT K\$	NO. UNITS	HOURS /UNIT	TOTAL CRAFT HOURS CODE \$/HR	TOTAL LABOR K\$
1	MODIFY STANDS	EA	18	1500.	EE	27.000				
2	REMOVE - INSTALL						18	16.0	288.0 IG 42.80	12.328
3	E.D.I.						1	200.0	200.0 PH 33.90	6.780
4							1	1500.0	1500.0 EN 32.40	48.600
5							1	1400.0	1400.0 DR 22.20	31.080

27.000 &lt;----- SUBTOTALS THIS PAGE -----&gt; 98.786

TECHNICAL DESCRIPTION OF THIS WORK PACKAGE:

27.000 + 98.786 = 125.786

ENG DESIGN AND INSPECTION TO REMOVE MAIN RING CAVITIES, MODIFY STANDS, INSPECT REINSTALL IN MI60.

## SUB-SYSTEM: COALESCING SYSTEM

DATE PRINTED: 7-AUG-92

WBS CODE: 1.1.4.1.2.1 MULT BY 1 COMPONENT : COAL/RF CAVITIES

DATE ESTIMATED: 2/18/92

RESPONSIBLE: MILLER/WILDMAN

&lt;----- MATERIAL -----&gt;

&lt;----- LABOR -----&gt;

ITEM NUM.	ITEM TITLE	UNIT MEAS.	NO. UNITS	FY91 \$ /UNIT	COST BASIS	TOTAL MT K\$	NO. UNITS	HOURS /UNIT	TOTAL CRAFT HOURS	CODE	\$/HR	TOTAL LABOR K\$	
1	MOVE ANODE SUPPLY						1	16.0	16.0	IG	42.80	0.685	
2							1	32.0	32.0	IE	38.20	1.222	
3							1	32.0	32.0	T2	18.70	0.598	
4							1	60.0	60.0	EN	32.40	1.944	
5							1	80.0	80.0	DR	22.20	1.776	
6	CONTROL RACKS						5	16.0	80.0	T2	18.70	1.496	
7							5	16.0	80.0	IE	38.20	3.056	
8							1	60.0	60.0	EN	32.40	1.944	
9							1	80.0	80.0	DR	22.20	1.776	
10	CAVITIES						1	100.0	100.0	PH	33.90	3.390	
11							1	60.0	60.0	EN	32.40	1.944	
12							1	80.0	80.0	DR	22.20	1.776	
13	E.D.I.						1	60.0	60.0	EN	32.40	1.944	
14							1	80.0	80.0	DR	22.20	1.776	
						0.000	SUBTOTALS THIS PAGE						25.328
TECHNICAL DESCRIPTION OF THIS WORK PACKAGE:						0.000 +	25.328 =						25.328

RF SYSTEMS/RING

## ESTIMATE --- COST ESTIMATE DETAILS

PAGE NUMBER 134

SUB-SYSTEM: COALESCING SYSTEM

DATE PRINTED: 7-AUG-92

WBS CODE: 1.1.4.1.2.4 MULT BY 1 COMPONENT : COAL/TRANSMISSION LINE RF

DATE ESTIMATED: 2/05/91

RESPONSIBLE: MILLER/WILDMAN

&lt;----- MATERIAL -----&gt; &lt;----- LABOR -----&gt;

ITEM NUM.	ITEM TITLE	UNIT MEAS.	NO. UNITS	FY91 \$ /UNIT	COST BASIS	TOTAL MT K\$	NO. UNITS	HOURS /UNIT	TOTAL CRAFT HOURS CODE \$/HR	TOTAL LABOR K\$
1	RG213/U	FT	1000	0.22	CP	0.220				
2	3/8" COAXIAL LINE	FT	6300	2.40	CP	15.120				
3	3/8" COAXIAL CONNECTORS	EA	126	32.21	CP	4.058	126	1.0	126.0 T2 18.70	2.356
4	20 KV HV CONNECTORS	EA	18	45.19	CP	0.813	18	1.0	18.0 T2 18.70	0.337
5	E.D.I						1	60.0	60.0 EN 32.40	1.944
6							1	80.0	80.0 DR 22.20	1.776
						20.212	<----- SUBTOTALS THIS PAGE ----->			6.413
TECHNICAL DESCRIPTION OF THIS WORK PACKAGE:						20.212 +	6.413 =	26.625		

MIR EXTRACTION

## ESTIMATE --- COST ESTIMATE DETAILS

PAGE NUMBER 135

SUB-SYSTEM: 8 GEV PROT INJ KICKER

DATE PRINTED: 7-AUG-92

WBS CODE: 1.1.6.1.1.1 MULT BY 1 COMPONENT : MIR 8 GEV PROT INJ/KICKER MAGNET

DATE ESTIMATED: 7/ 9/92

RESPONSIBLE: DINKEL

&lt;----- MATERIAL -----&gt; &lt;----- LABOR -----&gt;

ITEM NUM.	ITEM TITLE	UNIT MEAS.	NO. UNITS	FY91 \$ /UNIT	COST BASIS	TOTAL MT K\$	NO. UNITS	HOURS /UNIT	TOTAL CRAFT HOURS CODE	\$/HR	TOTAL LABOR K\$
1	FERRITE (1)	EA	1	3600.	EE	3.600					
2	MECHANICAL & ASSEMBLY	EA	3	10800.	EE	32.400	3	320.0	960.0	T2 18.70	17.952
3	BEAM PIPE MODIFICATION	EA	3	2000.	EE	6.000					
4	E.D.I.						1	550.0	550.0	EN 32.40	17.820
5							1	200.0	200.0	PH 33.90	6.780
6							1	800.0	800.0	DC 32.00	25.600
7							1	400.0	400.0	DR 22.20	8.880
						42.000	<----- SUBTOTALS THIS PAGE ----->				77.032

TECHNICAL DESCRIPTION OF THIS WORK PACKAGE:

42.000 + 77.032 = 119.032

(1) WE WILL RECLAIM FERRITE FOR 2 MAGNETS FROM EXISTING MAGNETS. WE WILL REWORK (SHORTEN) EXISTING BEAM PIPES FOR USE WITH NEW MAGNETS. NEW MAGNETS WILL ESSENTIALLY BE A SHORTER VERSION OF THE PRESENT MK90 DESIGN.



MIR EXTRACTION

## ESTIMATE --- COST ESTIMATE DETAILS

PAGE NUMBER 136

SUB-SYSTEM: 8 GEV PROT INJ KICKER

DATE PRINTED: 7-AUG-92

WBS CODE: 1.1.8.1.1.2 MULT BY 1 COMPONENT : MIR 8 GEV PROT INJ/POWER SUPPLY

DATE ESTIMATED: 7/ 9/92

RESPONSIBLE: DINKEL

&lt;----- MATERIAL -----&gt; &lt;----- LABOR -----&gt;

ITEM NUM.	ITEM TITLE	UNIT MEAS.	NO. UNITS	FY91 \$ /UNIT	COST BASIS	TOTAL MT K\$	NO. UNITS	HOURS /UNIT	TOTAL HOURS	CRAFT CODE	\$/HR	TOTAL LABOR K\$	
1	THYRATRON PULSER	EA	3	33500.	EE	100.500	3	280.0	840.0	T2	18.70	15.708	
2	RESONANT CHARGING SUPPLY	EA	3	16000.	EE	48.000	3	240.0	720.0	T2	18.70	13.464	
3	PFL	EA	3	8800.	EE	26.400	3	120.0	360.0	T2	18.70	6.732	
4	LOAD RESISTOR	EA	1	11000.	EE	11.000	1	120.0	120.0	T2	18.70	2.244	
5	INSTALLATION	EA	1	6000.	EE	6.000	1	60.0	60.0	IE	38.20	2.292	
6	E.D.I.						1	1700.0	1700.0	EN	32.40	55.080	
7							1	500.0	500.0	PH	33.90	16.950	
8							1	1000.0	1000.0	DC	32.00	32.000	
9							1	500.0	500.0	DR	22.20	11.100	
						191.900	<----- SUBTOTALS THIS PAGE ----->						155.570

TECHNICAL DESCRIPTION OF THIS WORK PACKAGE:

191.900 + 155.570 = 347.470

MIR EXTRACTION

## ESTIMATE --- COST ESTIMATE DETAILS

PAGE NUMBER 137

SUB-SYSTEM: 8 GEV PBAR INJECTION KICKER

DATE PRINTED: 7-AUG-92

WBS CODE: 1.1.8.1.2.1 MULT BY 1 COMPONENT : 8 GEV PBAR INJ/KICKER MAGNET

DATE ESTIMATED: 3/ 2/92

RESPONSIBLE: DINKEL

&lt;----- MATERIAL -----&gt; &lt;----- LABOR -----&gt;

ITEM NUM.	ITEM TITLE	UNIT MEAS.	NO. UNITS	FY91 \$ /UNIT	COST BASIS	TOTAL MT K\$	NO. UNITS	HOURS /UNIT	TOTAL CRAFT HOURS CODE \$/HR	TOTAL LABOR K\$
1	FERRITE	EA	2	25000.	EE	50.000				
2	CAPACITORS	EA	2	25000.	EE	50.000				
3	MECHANICAL & ASSEMBLY	EA	2	10000.	EE	20.000	2	480.0	960.0 T2 18.70	17.952
4	E.D.I.						1	800.0	800.0 EN 32.40	25.920
5							1	200.0	200.0 PH 33.90	6.780
6							1	1000.0	1000.0 DC 32.00	32.000
7							1	500.0	500.0 DR 22.20	11.100

-----  
120.000 <----- SUBTOTALS THIS PAGE -----> 93.752  
-----

TECHNICAL DESCRIPTION OF THIS WORK PACKAGE:

120.000 + 93.752 = 213.752

THESE MAGNETS WILL ALSO BE USED FOR PROTON EXTRACTION

MIR EXTRACTION

## ESTIMATE --- COST ESTIMATE DETAILS

PAGE NUMBER 138

SUB-SYSTEM: 8 GEV PBAR INJECTION KICKER

DATE PRINTED: 7-AUG-92

WBS CODE: 1.1.6.1.2.2 MULT BY 1 COMPONENT : 8 GEV PBAR INJ/KICKER POWER SUPPLY

DATE ESTIMATED: 3/ 2/92

RESPONSIBLE: DINKEL

&lt;----- MATERIAL -----&gt; &lt;----- LABOR -----&gt;

ITEM NUM.	ITEM TITLE	UNIT MEAS.	NO. UNITS	FY91 \$ /UNIT	COST BASIS	TOTAL MT K\$	NO. UNITS	HOURS /UNIT	TOTAL HOURS	CRAFT CODE	\$/HR	TOTAL LABOR K\$
1	THYRATRON PULSER	EA	1	120000.	EE	120.000	1	2000.0	2000.0	T2	18.70	37.400
2	PFN	EA	1	71000.	EE	71.000	1	2000.0	2000.0	T2	18.70	37.400
3	LOAD RESISTOR	EA	1	5000.	EE	5.000	1	1000.0	1000.0	T2	18.70	18.700
4	CABLING	EA	1	2000.	EE	2.000	1	240.0	240.0	IE	38.20	9.168
5	E.D.I.						1	2600.0	2600.0	EN	32.40	84.240
6							1	500.0	500.0	PH	33.90	16.950
7							1	1500.0	1500.0	DC	32.00	48.000
8							1	1000.0	1000.0	DR	22.20	22.200

198.000 &lt;----- SUBTOTALS THIS PAGE -----&gt; 274.058

TECHNICAL DESCRIPTION OF THIS WORK PACKAGE:

198.000 + 274.058 = 472.058

THIS POWER SUPPLY WILL ALSO BE USED FOR PROTON EXTRACTION

MIR EXTRACTION

ESTIMATE --- COST ESTIMATE DETAILS

PAGE NUMBER 139

SUB-SYSTEM: 150 GEV PROT EXT/ KICKER

DATE PRINTED: 7-AUG-92

WBS CODE: 1.1.6.1.3.1 MULT BY 1 COMPONENT : 150 GEV PROT EXTRACTION/KICKER MAGNET

DATE ESTIMATED: 2/27/92

RESPONSIBLE: DINKEL

<----- MATERIAL -----> <----- LABOR ----->

ITEM NUM.	ITEM TITLE	UNIT MEAS.	NO. UNITS	FY91 \$ /UNIT	COST BASIS	TOTAL MT K\$	NO. UNITS	HOURS /UNIT	TOTAL CRAFT HOURS CODE \$/HR	TOTAL LABOR K\$
1			0	0.		0.000				

0.000 <----- SUBTOTALS THIS PAGE -----> 0.000

TECHNICAL DESCRIPTION OF THIS WORK PACKAGE:

0.000 + 0.000 = 0.000

SAME DEVICE AS 1.1.6.1.2.1

MIR EXTRACTION

ESTIMATE --- COST ESTIMATE DETAILS

PAGE NUMBER 140

SUB-SYSTEM: 150 GEV PROT EXT/ KICKER

DATE PRINTED: 7-AUG-92

WBS CODE: 1.1.6.1.3.2 MULT BY 1 COMPONENT : 150 GEV PROT EXT/KICKER POWER SUPPLIES

DATE ESTIMATED: 2/27/92

RESPONSIBLE: DINKEL

<----- MATERIAL ----->

<----- LABOR ----->

ITEM NUM.	ITEM TITLE	UNIT MEAS.	NO. UNITS	FY91 \$ /UNIT	COST BASIS	TOTAL MT K\$	NO. UNITS	HOURS /UNIT	TOTAL CRAFT HOURS CODE \$/HR	TOTAL LABOR K\$
1			0	0.		0.000				
						0.000	<----- SUBTOTALS THIS PAGE ----->			0.000

TECHNICAL DESCRIPTION OF THIS WORK PACKAGE:

0.000 + 0.000 = 0.000

SAME DEVICE AS 1.1.6.1.2.2

MIR EXTRACTION

ESTIMATE --- COST ESTIMATE DETAILS

PAGE NUMBER 141

SUB-SYSTEM: MIR 150 GEV PBAR EXT KICKER

DATE PRINTED: 7-AUG-92

WBS CODE: 1.1.6.1.4.1 MULT BY 1 COMPONENT : 150 GEV PBAR EXT/KICKER MAGNET

DATE ESTIMATED: 7/ 9/92

RESPONSIBLE: DINKEL

<----- MATERIAL -----> <----- LABOR ----->

ITEM NUM.	ITEM TITLE	UNIT MEAS.	NO. UNITS	FY91 \$ /UNIT	COST BASIS	TOTAL MT K\$	NO. UNITS	HOURS /UNIT	TOTAL CRAFT HOURS CODE	\$/HR	TOTAL LABOR K\$
1							2	480.0	960.0 T2	18.70	17.952
2	E.D.I.						1	200.0	200.0 EN	32.40	6.480
3							1	50.0	50.0 PH	33.90	1.695
4							1	200.0	200.0 DC	32.00	6.400
5							1	100.0	100.0 DR	22.20	2.220
						0.000	SUBTOTALS THIS PAGE				34.747

TECHNICAL DESCRIPTION OF THIS WORK PACKAGE:

0.000 + 34.747 = 34.747

USE EXISTING MAIN RING ABORT STYLE MAGNET AS IS.

MIR EXTRACTION

## ESTIMATE --- COST ESTIMATE DETAILS

PAGE NUMBER 142

SUB-SYSTEM: MIR 150 GEV PBAR EXT KICKER

DATE PRINTED: 7-AUG-92

WBS CODE: 1.1.8.1.4.2 MULT BY 1 COMPONENT : 150 GEV PBAR EXT/KICKER POWER SUPPLY

DATE ESTIMATED: 3/ 2/92

RESPONSIBLE: DINKEL

&lt;----- MATERIAL -----&gt;

&lt;----- LABOR -----&gt;

ITEM NUM.	ITEM TITLE	UNIT MEAS.	NO. UNITS	FY91 \$ /UNIT	COST BASIS	TOTAL MT K\$	NO. UNITS	HOURS /UNIT	TOTAL CRAFT HOURS CODE \$/HR	TOTAL LABOR K\$	
1	PULSER	EA	1	28000.	EE	28.000	1	1800.0	1800.0 T2 18.70	33.660	
2	INSTALLATION (CABLE)	EA	1	2000.	EE	2.000	1	80.0	80.0 IE 38.20	3.058	
3	E.D.I.						1	600.0	600.0 EN 32.40	19.440	
4							1	100.0	100.0 PH 33.90	3.390	
5							1	750.0	750.0 DC 32.00	24.000	
6							1	500.0	500.0 DR 22.20	11.100	
						28.000	<----- SUBTOTALS THIS PAGE ----->				94.648
TECHNICAL DESCRIPTION OF THIS WORK PACKAGE:						28.000 +	94.648 =				122.648

MIR EXTRACTION

## ESTIMATE --- COST ESTIMATE DETAILS

PAGE NUMBER 143

SUB-SYSTEM: MIR EXT PROTON ABORT KICKER

DATE PRINTED: 7-AUG-92

WBS CODE: 1.1.6.1.5.1 MULT BY 1 COMPONENT : PROT ABORT KICKER MAGNET

DATE ESTIMATED: 7/ 9/92

RESPONSIBLE: DINKEL

&lt;----- MATERIAL -----&gt; &lt;----- LABOR -----&gt;

ITEM NUM.	ITEM TITLE	UNIT MEAS.	NO. UNITS	FY91 \$ /UNIT	COST BASIS	TOTAL MT K\$	NO. UNITS	HOURS /UNIT	TOTAL CRAFT HOURS CODE \$/HR	TOTAL LABOR K\$
1	MAGNET REWORK	EA	2	5000.	EE	10.000	2	20.0	40.0 T2 18.70	0.748
2	E.D.I.						1	200.0	200.0 EN 32.40	6.480
3							1	50.0	50.0 PH 33.90	1.695
4							1	200.0	200.0 DC 32.00	6.400
5							1	100.0	100.0 DR 22.20	2.220

10.000 <----- SUBTOTALS THIS PAGE -----> 17.543

TECHNICAL DESCRIPTION OF THIS WORK PACKAGE:

10.000 + 17.543 = 27.543

MODIFY INPUT CONNECTION OF EXISTING ABORT STYLE MAGNET.



MIR EXTRACTION

## ESTIMATE --- COST ESTIMATE DETAILS

PAGE NUMBER 144

SUB-SYSTEM: MIR EXT PROTON ABORT KICKER

DATE PRINTED: 7-AUG-92

WBS CODE: 1.1.8.1.5.2 MULT BY 1 COMPONENT : PROT ABORT KICKER POWER SUPPLY

DATE ESTIMATED: 7/ 9/92

RESPONSIBLE: DINKEL

&lt;----- MATERIAL -----&gt;

&lt;----- LABOR -----&gt;

ITEM NUM.	ITEM TITLE	UNIT MEAS.	NO. UNITS	FY91 \$ /UNIT	COST BASIS	TOTAL MT. K\$	NO. UNITS	HOURS /UNIT	TOTAL CRAFT HOURS CODE \$/HR	TOTAL LABOR K\$	
1	CHARGING SUPPLY	EA	1	6300.	EE	6.300					
2	PULSER	EA	2	89700.	EE	179.400	2	1000.0	2000.0 T2 18.70	37.400	
3	INSTALLATION	EA	1	13200.	EE	13.200	1	80.0	80.0 IE 38.20	3.056	
4	E.D.I.						1	400.0	400.0 EN 32.40	12.960	
5							1	100.0	100.0 PH 33.90	3.390	
6							1	400.0	400.0 DC 32.00	12.800	
7							1	200.0	200.0 DR 22.20	4.440	
						198.900	<----- SUBTOTALS THIS PAGE ----->				74.046
TECHNICAL DESCRIPTION OF THIS WORK PACKAGE:						198.900 +	74.046 = 272.946				

KICKERS &amp; SLOW EXTRACTION

ESTIMATE --- COST ESTIMATE DETAILS

PAGE NUMBER 145

SUB-SYSTEM: SLOW EXTRACTION

DATE PRINTED: 7-AUG-92

WBS CODE: 1.1.6.2.1 MULT BY 1 COMPONENT : MIR SLOW EXT/ELECTROSTATIC SEPTUM

DATE ESTIMATED: 2/27/92

RESPONSIBLE: KRAFCZYK

&lt;----- MATERIAL -----&gt; &lt;----- LABOR -----&gt;

ITEM NUM.	ITEM TITLE	UNIT MEAS.	NO. UNITS	FY91 \$ /UNIT	COST BASIS	TOTAL MT K\$	NO. UNITS	HOURS /UNIT	TOTAL CRAFT HOURS CODE \$/HR	TOTAL LABOR K\$
1	ELECTROSTATIC EXTRACTION						1	303.0	303.0 S2 38.00	11.514
2	ES SEPTUM VACUUM SYS						1	40.0	40.0 S1 33.00	1.320
3	ES SEPTUM STANDS						2	10.0	20.0 S1 33.00	0.660
4	ES SEPTUM POSITION CONTROL						2	10.0	20.0 T2 18.70	0.374
5	ES SEPTUM POWER SUPPLY						1	40.0	40.0 T2 18.70	0.748
6	ES SEPTUM HV CABLES						300	0.042	12.6 IE 38.20	0.481
7	ES SEPTUM VAC/CONTROL CABLES						300	0.014	4.2 IE 38.20	0.160
8	E.D.I.						1	80.0	80.0 EN 32.40	2.592
9							1	100.0	100.0 PH 33.90	3.390
10							1	80.0	80.0 DR 22.20	1.776

0.000 &lt;----- SUBTOTALS THIS PAGE -----&gt; 23.016

TECHNICAL DESCRIPTION OF THIS WORK PACKAGE:

0.000 + 23.016 = 23.016

MATERIALS EXIST; ASSEMBLE ONLY

## KICKERS &amp; SLOW EXTRACTION

## ESTIMATE --- COST ESTIMATE DETAILS

PAGE NUMBER 146

## SUB-SYSTEM: SLOW EXTRACTION

DATE PRINTED: 7-AUG-92

WBS CODE: 1.1.6.2.2 MULT BY 1 COMPONENT : MIR SLOW EXT/SPECIAL MAGNETIC ELEMENTS

DATE ESTIMATED: 2/27/92

RESPONSIBLE: KRAFCZYK

&lt;----- MATERIAL -----&gt; &lt;----- LABOR -----&gt;

ITEM NUM.	ITEM TITLE	UNIT MEAS.	NO. UNITS	FY91 \$ /UNIT	COST BASIS	TOTAL MT K\$	NO. UNITS	HOURS /UNIT	TOTAL CRAFT HOURS CODE \$/HR	TOTAL LABOR K\$
1	QUAD	EACH	4	21840.	EE	87.360				
2	OCTUPOLE	EACH	1	54600.	EE	54.600				
3	E.D.I.						1	400.0	400.0 PH 33.90	13.560
4							1	100.0	100.0 EN 32.40	3.240
5							1	200.0	200.0 DR 22.20	4.440
						141.960	<----- SUBTOTALS THIS PAGE ----->			21.240

TECHNICAL DESCRIPTION OF THIS WORK PACKAGE:

141.960 + 21.240 = 163.200

## KICKERS &amp; SLOW EXTRACTION

## ESTIMATE --- COST ESTIMATE DETAILS

PAGE NUMBER 147

## SUB-SYSTEM: SLOW EXTRACTION

DATE PRINTED: 7-AUG-92

WBS CODE: 1.1.6.2.3 MULT BY 1 COMPONENT : MIR SLOW EXT/QXR SYSTEM

DATE ESTIMATED: 3/ 2/92

RESPONSIBLE: KRAFCZYK

&lt;----- MATERIAL -----&gt; &lt;----- LABOR -----&gt;

ITEM NUM.	ITEM TITLE	UNIT MEAS.	NO. UNITS	FY91 \$ /UNIT	COST BASIS	TOTAL MT K\$	NO. UNITS	HOURS /UNIT	TOTAL CRAFT HOURS CODE \$/HR	TOTAL LABOR K\$
1	MICROPROCESSOR	EACH	1	15440.88	EE	15.441	1	830.0	830.0 T2 18.70	15.521
2	CONTROLS	LOT	1	40404.	EE	40.404	1	200.0	200.0 EN 32.40	6.480
3	POWER SUPPLIES (8)	EACH	1	2184.	EE	2.184	1	200.0	200.0 PR 30.90	6.180
4	RELAY RACK	EACH	1	982.80	EE	0.983				
5	SIGNAL LINE DRIVER	EACH	1	1092.	EE	1.092				
6	OCTUPOLE POWER SUPPLY (2)	EACH	1	2184.	EE	2.184				
7	E.D.I.						1	800.0	800.0 EN 32.40	19.440
8							1	500.0	500.0 PH 33.90	16.950
9							1	220.0	220.0 DR 22.20	4.884
10							1	1000.0	1000.0 PR 30.90	30.900

62.288 &lt;----- SUBTOTALS THIS PAGE -----&gt; 100.355

TECHNICAL DESCRIPTION OF THIS WORK PACKAGE:

62.288 + 100.355 = 162.643

THESE EXIST.

TEV 150 GEV PBAR INJECTION

## ESTIMATE --- COST ESTIMATE DETAILS

PAGE NUMBER 148

SUB-SYSTEM: TEV 150 GEV PROT INJ KICKER

DATE PRINTED: 7-AUG-92

WBS CODE: 1.1.6.3.1.1 MULT BY 1 COMPONENT : TEV 150 GEV PROT INJ KICKER

DATE ESTIMATED: 7/10/92

RESPONSIBLE: DINKEL

&lt;----- MATERIAL -----&gt; &lt;----- LABOR -----&gt;

ITEM NUM.	ITEM TITLE	UNIT MEAS.	NO. UNITS	FY91 \$ /UNIT	COST BASIS	TOTAL MT K\$	NO. UNITS	HOURS /UNIT	TOTAL HOURS	CRAFT CODE	\$/HR	TOTAL LABOR K\$
1	MECHANICAL AND ASSEMBLY	EA	2	12500.	EE	25.000	2	320.0	640.0	T2	18.70	11.968
2	CAPACITORS	EA	2	5500.	EE	11.000						
3	FERRITE						2	80.0	160.0	T2	18.70	2.992
4	ED&I						1	800.0	800.0	EN	32.40	25.920
5							1	200.0	200.0	PH	33.90	6.780
6							1	1000.0	1000.0	DC	32.00	32.000
7							1	500.0	500.0	DR	22.20	11.100
						36.000	<----- SUBTOTALS THIS PAGE ----->					90.760

TECHNICAL DESCRIPTION OF THIS WORK PACKAGE:

36.000 + 90.760 = 126.760

RECLAIM FERRITE AND BEAM TUBE FROM PRESENT E17 MAGNET.

TEV 150 GEV PBAR INJECTION

## ESTIMATE --- COST ESTIMATE DETAILS

PAGE NUMBER 149

SUB-SYSTEM: TEV 150 GEV PROT INJ KICKER

DATE PRINTED: 7-AUG-92

WBS CODE: 1.1.0.3.1.2 MULT BY 1 COMPONENT : TEV 150 GEV PROT INJ KICKER POWER SUPPLY

DATE ESTIMATED: 3/ 2/92

RESPONSIBLE: DINKEL

&lt;----- MATERIAL -----&gt; &lt;----- LABOR -----&gt;

ITEM NUM.	ITEM TITLE	UNIT MEAS.	NO. UNITS	FY91 \$ /UNIT	COST BASIS	TOTAL MT K\$	NO. UNITS	HOURS /UNIT	TOTAL CRAFT HOURS	CODE	\$/HR	TOTAL LABOR K\$
1	MOVE P.S.						1	80.0	80.0	IG	42.80	3.424
2	CONTROLS REWORK	LOT	1	10000.	EE	10.000	1	750.0	750.0	T2	18.70	14.025
3	CABLE INSTALLATION	LOT	1	3000.	EE	3.000	1	240.0	240.0	IE	38.20	9.168
4	E.D.I.						1	300.0	300.0	EN	32.40	9.720
5							1	100.0	100.0	PH	33.90	3.390
6							1	200.0	200.0	DC	32.00	6.400
7							1	100.0	100.0	DR	22.20	2.220

-----  
 13.000 <----- SUBTOTALS THIS PAGE -----> 48.347  
 -----

TECHNICAL DESCRIPTION OF THIS WORK PACKAGE:

13.000 + 48.347 = 61.347

TEV 150 GEV PBAR INJECTION

ESTIMATE --- COST ESTIMATE DETAILS

PAGE NUMBER 150

SUB-SYSTEM: TEV 150 GEV PBAR INJ KICKER

DATE PRINTED: 7-AUG-92

WBS CODE: 1.1.6.3.2.1 MULT BY 1 COMPONENT : TEV 150 GEV PBAR INJ KICKER MAGNET

DATE ESTIMATED: 2/27/92

RESPONSIBLE: DINKEL

<----- MATERIAL -----> <----- LABOR ----->

ITEM NUM.	ITEM TITLE	UNIT MEAS.	NO. UNITS	FY91 \$ /UNIT	COST BASIS	TOTAL MT K\$	NO. UNITS	HOURS /UNIT	TOTAL CRAFT HOURS CODE	\$/HR	TOTAL LABOR K\$
1	MOVE KICKER MODULES						2	80.0	160.0	DR 22.20	3.552
						0.000	SUBTOTALS THIS PAGE				3.552

TECHNICAL DESCRIPTION OF THIS WORK PACKAGE:

0.000 + 3.552 = 3.552

TEV 150 GEV PBAR INJECTION

## ESTIMATE --- COST ESTIMATE DETAILS

PAGE NUMBER 151

SUB-SYSTEM: TEV 150 GEV PBAR INJ KICKER

DATE PRINTED: 7-AUG-92

WBS CODE: 1.1.6.3.2.2 MULT BY 1 COMPONENT : TEV 150 GEV PBAR INJ KICKER POWER SUPPLY

DATE ESTIMATED: 3/ 2/92

RESPONSIBLE: DINKEL

&lt;----- MATERIAL -----&gt; &lt;----- LABOR -----&gt;

ITEM NUM.	ITEM TITLE	UNIT MEAS.	NO. UNITS	FY91 \$ /UNIT	COST BASIS	TOTAL MT K\$	NO. UNITS	HOURS /UNIT	TOTAL CRAFT HOURS CODE \$/HR	TOTAL LABOR K\$	
1	MOVE P.S.						1	80.0	80.0 IG 42.80	3.424	
2	CONTROLS REWORK	LOT	1	10000.	EE	10.000	1	750.0	750.0 T2 18.70	14.025	
3	CABLE INSTALLATION	LOT	1	3000.	EE	3.000	1	240.0	240.0 IE 38.20	9.168	
4	E.D.I.						1	300.0	300.0 EN 32.40	9.720	
5							1	100.0	100.0 PH 33.90	3.390	
6							1	200.0	200.0 DC 32.00	6.400	
7							1	100.0	100.0 DR 22.20	2.220	
						13.000	<----- SUBTOTALS THIS PAGE ----->				48.347

TECHNICAL DESCRIPTION OF THIS WORK PACKAGE:

13.000 + 48.347 = 61.347

MOVE E17 POWER SUPPLY



## MIR INSTRUMENTATION

## ESTIMATE --- COST ESTIMATE DETAILS

PAGE NUMBER 152

SUB-SYSTEM: MIR INSTRUMENTATION

DATE PRINTED: 7-AUG-92

WBS CODE: 1.1.8.1.1

MULT BY 1 COMPONENT : MIR INST/BPM SYSTEM

DATE ESTIMATED: 4/02/91

RESPONSIBLE: JACKSON

&lt;----- MATERIAL -----&gt; &lt;----- LABOR -----&gt;

ITEM NUM.	ITEM TITLE	UNIT MEAS.	NO. UNITS	FY91 \$ /UNIT	COST BASIS	TOTAL MT K\$	NO. UNITS	HOURS /UNIT	TOTAL CRAFT HOURS	CODE	\$/HR	TOTAL LABOR K\$	
1	FEED THRU	EA	214	283.92	A88	60.759	214	0.5	107.0	T2	18.70	2.001	
2	STAINLESS STEEL	EA	214	43.68	A88	9.348							
3	CERAMIC	EA	214	87.36	A88	18.695							
4	CERMAIC MACHINING						214	4.0	856.0	T2	18.70	16.007	
5	METAL WORKING						214	4.0	856.0	T2	18.70	16.007	
6	QUALITY CONTROL						1	200.0	200.0	EN	32.40	6.480	
7	ASSEMBLY						214	4.0	856.0	T1	29.00	24.824	
8	TEST AND CALIBRATION						1	100.0	100.0	PH	33.90	3.390	
9							1	500.0	500.0	EN	32.40	16.200	
10	E.D.I						1	1000.0	1000.0	PH	33.90	33.900	
11							1	1000.0	1000.0	EN	32.40	32.400	
						88.801	<----- SUBTOTALS THIS PAGE ----->						151.209

TECHNICAL DESCRIPTION OF THIS WORK PACKAGE:

88.801 + 151.209 = 240.011

MAIN RING/OLD TEVATRON RF MODULES, PROCESSORS, AND INTERMODULE CABLING TO BE REUSED ASSUMING 2020 QUADS PLUS 2 PER STRAIGHT SECTION, A TOTAL OF 214 LOCATIONS ASSUMING SHORTED STRIPLINES, 4 STRIPLINES PER LOCATION.

## MIR INSTRUMENTATION

## ESTIMATE --- COST ESTIMATE DETAILS

PAGE NUMBER 153

SUB-SYSTEM: MIR INSTRUMENTATION

DATE PRINTED: 7-AUG-92

WBS CODE: 1.1.8.1.2 MULT BY 1 COMPONENT : MIR INST/BLM SYSTEM

DATE ESTIMATED: 4/02/91

RESPONSIBLE: JACKSON

&lt;----- MATERIAL -----&gt; &lt;----- LABOR -----&gt;

ITEM NUM.	ITEM TITLE	UNIT MEAS.	NO. UNITS	FY91 \$ /UNIT	COST BASIS	TOTAL MT K\$	NO. UNITS	HOURS /UNIT	TOTAL CRAFT HOURS CODE \$/HR	TOTAL LABOR K\$	
1	BLM ION CHAMBER ASSEMBLY	EA	50	131.04	A87	6.552	50	1.0	50.0 T1 29.00	1.450	
2	BLM ELECTRONICS	EA	20	1092.	EE	21.840	20	16.0	320.0 T1 29.00	9.280	
3	QUALITY CONTROL						1	200.0	200.0 EN 32.40	6.480	
4	TEST AND CALIBRATION						1	500.0	500.0 EN 32.40	16.200	
5	E.D.I.						1	500.0	500.0 EN 32.40	16.200	
						28.392	<----- SUBTOTALS THIS PAGE ----->				49.610

TECHNICAL DESCRIPTION OF THIS WORK PACKAGE:

28.392 + 49.610 = 78.002

REDUCED # OF UNITS DUE TO REUSING EXISTING MAIN RING EQUIPMENT.

## MIR INSTRUMENTATION

## ESTIMATE --- COST ESTIMATE DETAILS

PAGE NUMBER 154

SUB-SYSTEM: MIR INSTRUMENTATION

DATE PRINTED: 7-AUG-92

WBS CODE: 1.1.8.1.3

MULT BY 1 COMPONENT : MIR INST/LONGITUDINAL PICKUP

DATE ESTIMATED: 8/28/90

RESPONSIBLE: JACKSON

&lt;----- MATERIAL -----&gt; &lt;----- LABOR -----&gt;

ITEM NUM.	ITEM TITLE	UNIT MEAS.	NO. UNITS	FY91 \$ /UNIT	COST BASIS	TOTAL MT K\$	NO. UNITS	HOURS /UNIT	TOTAL CRAFT HOURS CODE	\$/HR	TOTAL LABOR K\$
1	FERRITES	EA	1	2184.	EE	2.184					
2	CERAMIC CAP	EA	1	1638.	EE	1.638					
3	CASE	EA	1	546.	EE	0.546	1	20.0	20.0 T1	29.00	0.580
4							1	20.0	20.0 T2	18.70	0.374
5	MICROWAVE ABSORBER	EA	1	1638.	EE	1.638					
6	200 FEET OF 1/2" HELIAX	LOT	1	327.60	EE	0.328					

6.334 &lt;----- SUBTOTALS THIS PAGE -----&gt; 0.954

TECHNICAL DESCRIPTION OF THIS WORK PACKAGE:

6.334 + 0.954 = 7.288

## MIR INSTRUMENTATION

ESTIMATE --- COST ESTIMATE DETAILS

PAGE NUMBER 155

SUB-SYSTEM: MIR INSTRUMENTATION

DATE PRINTED: 7-AUG-92

WBS CODE: 1.1.8.1.4

MULT BY 2 COMPONENT : MIR INST/TRANSVERSE PICKUP

DATE ESTIMATED: 6/26/90

RESPONSIBLE: JACKSON

&lt;----- MATERIAL -----&gt; &lt;----- LABOR -----&gt;

ITEM NUM.	ITEM TITLE	UNIT MEAS.	NO. UNITS	FY91 \$ /UNIT	COST BASIS	TOTAL MT K\$	NO. UNITS	HOURS /UNIT	TOTAL CRAFT HOURS CODE	\$/HR	TOTAL LABOR K\$
1	PRECISION PICKUP	EA	1	9282.	A88	9.282	1	40.0	40.0 T2	18.70	0.748
2	LOW NOISE AMPLIFIER/SPLITTER	EA	1	873.60	A88	0.874	1	16.0	16.0 T1	29.00	0.464
3	SWITCHING MATRIX	EA	1	764.40	A88	0.764	1	16.0	16.0 T1	29.00	0.464
4	200 FEET OF 1/2" HELIAX	LOT	1	327.60	A88	0.328					
5	HELIAX CONNECTORS	LOT	1	218.40	A88	0.218					

11.466	<-----	SUBTOTALS THIS PAGE	----->	1.676
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TECHNICAL DESCRIPTION OF THIS WORK PACKAGE:

11.466 + 1.676 = 13.142

ONE SYSTEM FOR EACH PLANE.

TOTAL =	26.284	MULTIPLY BY	2	22.932	<-----	SUBTOTALS THIS PAGE	----->	3.352
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## MIR INSTRUMENTATION

## ESTIMATE --- COST ESTIMATE DETAILS

PAGE NUMBER 158

SUB-SYSTEM: MIR INSTRUMENTATION

DATE PRINTED: 7-AUG-92

WBS CODE: 1.1.8.1.5

MULT BY 2 COMPONENT : MIR INST/DAMPERS

DATE ESTIMATED: 2/18/92

RESPONSIBLE: JACKSON

&lt;----- MATERIAL -----&gt; &lt;----- LABOR -----&gt;

ITEM NUM.	ITEM TITLE	UNIT MEAS.	NO. UNITS	FY91 \$ /UNIT	COST BASIS	TOTAL MT K\$	NO. UNITS	HOURS /UNIT	TOTAL CRAFT HOURS CODE	\$/HR	TOTAL LABOR K\$	
1	PRECISION BEAM DETECTORS	EA	1	9282.	EE	9.282	1	40.0	40.0 T1	29.00	1.160	
2	LOW LEVEL CABLES	EA	1	4368.	EE	4.368						
3	ANALOG ELECTRONICS	EA	1	13104.	EE	13.104	1	180.0	180.0 T1	29.00	4.640	
4	DIGITAL ELECTRONICS	EA	1	6552.	EE	6.552	1	180.0	180.0 T1	29.00	4.640	
5	RACKS,POWERSUPPLIES,CRATES,COOLG	EA	1	12012.	EE	12.012	1	40.0	40.0 T1	29.00	1.160	
6	POWER AMPS & DRIVER AMPS	EA	1	98280.	EE	98.280	1	640.0	640.0 T2	18.70	11.968	
7	POWER CABLES	EA	1	6552.	EE	6.552						
8	DEFLECTORS	EA	1	8190.	EE	8.190	1	40.0	40.0 T1	29.00	1.160	
9	H.V. ANODE POWER SUPPLY	EA	1	35000.	EE	35.000	2	160.0	320.0 T1	29.00	9.280	
						193.340	<----- SUBTOTALS THIS PAGE ----->					34.008
TECHNICAL DESCRIPTION OF THIS WORK PACKAGE:						193.340 +	34.008 =					227.348
TOTAL = 454.696 MULTIPLY BY 2						386.680	<----- SUBTOTALS THIS PAGE ----->					68.016

MIR INSTRUMENTATION

ESTIMATE --- COST ESTIMATE DETAILS

PAGE NUMBER 157

SUB-SYSTEM: MIR INSTRUMENTATION

DATE PRINTED: 7-AUG-92

WBS CODE: 1.1.8.1.6

MULT BY 3 COMPONENT : MIR INST/FLYING WIRES

DATE ESTIMATED: 2/24/92

RESPONSIBLE: JACKSON

&lt;----- MATERIAL -----&gt; &lt;----- LABOR -----&gt;

ITEM NUM.	ITEM TITLE	UNIT MEAS.	NO. UNITS	FY91 \$ /UNIT	COST BASIS	TOTAL MT K\$	NO. UNITS	HOURS /UNIT	TOTAL CRAFT HOURS CODE \$/HR	TOTAL LABOR K\$
1	MECHANICAL ASSEMBLY	EA	1	3276.	EE	3.276	1	160.0	160.0 S1 33.00	5.280
2	QUALITY CONTROL						1	100.0	100.0 EN 32.40	3.240
3	TEST AND CALIBRATION						1	100.0	100.0 EN 32.40	3.240
4	E.D.I.						1	500.0	500.0 PH 33.90	16.950
5							1	500.0	500.0 EN 32.40	16.200
						3.276	SUBTOTALS THIS PAGE			44.910

TECHNICAL DESCRIPTION OF THIS WORK PACKAGE:

3.276 + 44.910 = 48.186

2 HORIZONTAL AND 1 VERTICAL FLYING WIRE SYSTEM REBUILD OUTER VACUUM TANK TO FIT TO NEW MAIN INJECTOR BEAM PIPE  
DIMENSIONS.

TOTAL = 144.558 MULTIPLY BY 3 9.828 &lt;----- SUBTOTALS THIS PAGE -----&gt; 134.730

## MIR INSTRUMENTATION

## ESTIMATE --- COST ESTIMATE DETAILS

PAGE NUMBER 158

SUB-SYSTEM: MIR INSTRUMENTATION

DATE PRINTED: 7-AUG-92

WBS CODE: 1.1.8.1.7 MULT BY 1 COMPONENT : MIR INST/D.C.C.T.

DATE ESTIMATED: 8/28/90

RESPONSIBLE: JACKSON

&lt;----- MATERIAL -----&gt; &lt;----- LABOR -----&gt;

ITEM NUM.	ITEM TITLE	UNIT MEAS.	NO. UNITS	FY91 \$ /UNIT	COST BASIS	TOTAL MT K\$	NO. UNITS	HOURS /UNIT	TOTAL CRAFT HOURS CODE	\$/HR	TOTAL LABOR K\$
1	TAPE WOUND CORES	EA	6	273.	EE	1.638					
2	MAGNETIC SHIELDS	EA	3	163.80	EE	0.491					
3	MECHANICAL FABRICATION	LOT	1	218.40	EE	0.218	1	63.5	63.5 T1	29.00	1.841
4	CERAMIC BREAK	EA	1	873.60	EE	0.874					
5	ELECTRONICS & CABLING	LOT	1	2184.	EE	2.184	1	56.5	56.5 T2	18.70	1.057
						5.405	<----- SUBTOTALS THIS PAGE ----->				2.898

TECHNICAL DESCRIPTION OF THIS WORK PACKAGE:

5.405 + 2.898 = 8.303

TAPE WOUND CORES ARE 5.5" ID, 7" OD, 1" HIGH.

## MIR INSTRUMENTATION

## ESTIMATE --- COST ESTIMATE DETAILS

PAGE NUMBER 159

SUB-SYSTEM: MIR INSTRUMENTATION

DATE PRINTED: 7-AUG-92

WBS CODE: 1.1.8.1.8

MULT BY 1 COMPONENT : MIR INST/SCRAPERS

DATE ESTIMATED: 4/02/91

RESPONSIBLE: JACKSON

&lt;----- MATERIAL -----&gt; &lt;----- LABOR -----&gt;

ITEM NUM.	ITEM TITLE	UNIT MEAS.	NO. UNITS	FY91 \$ /UNIT	COST BASIS	TOTAL MT K\$	NO. UNITS	HOURS /UNIT	TOTAL CRAFT HOURS	CODE	\$/HR	TOTAL LABOR K\$
1	MOMENTUM SCRAPER BELLOWS	EA	2	1092.	EE	2.184						
2	MOMENTUM SCRAPER FLANGES	EA	4	109.20	EE	0.437						
3	MOMENTUM SCRAPER MOTORS	EA	2	109.20	EE	0.218						
4	MOMENTUM SCRAPER STAND						1	30.0	30.0	S1	33.00	0.990
5	MOMENTUM SCRAPER BODY						1	120.0	120.0	S1	33.00	3.960
6	MOMENTUM SCRAPER LVDT READOUTS	EA	2	873.60	EE	1.747						
7	MOMENTUM SCRAPER BEARINGS	EA	4	38.22	EE	0.153						
8	TRANSVERSE SCRAPER BELLOWS	EA	2	1092.	EE	2.184						
9	TRANSVERSE SCRAPER FLANGES	EA	4	109.20	EE	0.437						
10	TRANSVERSE SCRAPER MOTORS	EA	2	109.20	EE	0.218						
11	TRANSVERSE SCRAPER STAND						2	30.0	60.0	S1	33.00	1.980
12	TRANSVERSE SCRAPER BODY						2	80.0	160.0	S1	33.00	5.280
13	TRANSVERSE SCRAPER LVDT READOUT	EA	2	873.60	EE	1.747						
14	TRANSVERSE SCRAPER BEARING	EA	4	38.22	EE	0.153						
15	QUALITY CONTROL						1	200.0	200.0	EN	32.40	6.480
16	TEST AND CALIBRATION						1	100.0	100.0	EN	32.40	3.240
17	E.D.I.						1	1000.0	1000.0	EN	32.40	32.400

9.479 <----- SUBTOTALS THIS PAGE -----> 54.330

TECHNICAL DESCRIPTION OF THIS WORK PACKAGE:

9.479 + 54.330 = 63.809

ONE MOMENTUM SCRAPER AND TWO TRANSVERSE SCRAPERS ASSUMED.



MIR INSTRUMENTATION

ESTIMATE --- COST ESTIMATE DETAILS

PAGE NUMBER 160

SUB-SYSTEM: MIR INST/150 GEV PROT LINE

DATE PRINTED: 7-AUG-92

WBS CODE: 1.1.8.3.9

MULT BY 1 COMPONENT : MIR INST/150 GEV PROT LINE PROFILE MONITORS

DATE ESTIMATED: 7/ 4/90

RESPONSIBLE: JACKSON

<----- MATERIAL -----> <----- LABOR ----->

ITEM NUM.	ITEM TITLE	UNIT MEAS.	NO. UNITS	FY91 \$ /UNIT	COST BASIS	TOTAL MT K\$	NO. UNITS	HOURS /UNIT	TOTAL CRAFT HOURS CODE \$/HR	TOTAL LABOR K\$
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1			0	0.		0.000				
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0.000 <----- SUBTOTALS THIS PAGE -----> 0.000

TECHNICAL DESCRIPTION OF THIS WORK PACKAGE:

0.000 + 0.000 = 0.000

MIR INSTRUMENTATION

ESTIMATE --- COST ESTIMATE DETAILS

PAGE NUMBER 181

SUB-SYSTEM: MIR INST/150 GEV PBAR LINE

DATE PRINTED: 7-AUG-92

WBS CODE: 1.1.8.4.9 MULT BY 1 COMPONENT : MIR INST/150 GEV PBAR LINE PROFILE MONITOR

DATE ESTIMATED: 7/ 4/90

RESPONSIBLE: JACKSON

<----- MATERIAL -----> <----- LABOR ----->

ITEM NUM.	ITEM TITLE	UNIT MEAS.	NO. UNITS	FY91 \$ /UNIT	COST BASIS	TOTAL MT K\$	NO. UNITS	HOURS /UNIT	TOTAL CRAFT HOURS CODE	\$/HR	TOTAL LABOR K\$
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1			0	0.		0.000					
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0.000 <----- SUBTOTALS THIS PAGE -----> 0.000

TECHNICAL DESCRIPTION OF THIS WORK PACKAGE:

0.000 + 0.000 = 0.000

## MIR INSTRUMENTATION

ESTIMATE --- COST ESTIMATE DETAILS

PAGE NUMBER 162

SUB-SYSTEM: MIR INST/PBAR PRODUCTION LINE

DATE PRINTED: 7-AUG-92

WBS CODE: 1.1.8.5.9

MULT BY 1 COMPONENT : MIR INST/PBAR LINE PROFILE MONITOR

DATE ESTIMATED: 7/ 4/90

RESPONSIBLE: JACKSON

&lt;----- MATERIAL -----&gt; &lt;----- LABOR -----&gt;

ITEM NUM.	ITEM TITLE	UNIT MEAS.	NO. UNITS	FY91 \$ /UNIT	COST BASIS	TOTAL MT K\$	NO. UNITS	HOURS /UNIT	TOTAL CRAFT HOURS CODE \$/HR	TOTAL LABOR K\$
--------------	------------	---------------	--------------	------------------	---------------	-----------------	--------------	----------------	---------------------------------	--------------------

1

0

0.

0.000

0.000

&lt;----- SUBTOTALS THIS PAGE -----&gt;

0.000

TECHNICAL DESCRIPTION OF THIS WORK PACKAGE:

0.000 + 0.000 = 0.000

MIR INSTRUMENTATION

ESTIMATE --- COST ESTIMATE DETAILS

PAGE NUMBER 163

SUB-SYSTEM: MIR INST/SLOW SPILL LANE

DATE PRINTED: 7-AUG-92

WBS CODE: 1.1.8.8.9

MULT BY 1

COMPONENT : SLOW SPILL INST/PROFILE MONIOTR

DATE ESTIMATED: 7/ 4/90

RESPONSIBLE: JACKSON

<----- MATERIAL ----->

<----- LABOR ----->

ITEM NUM.	ITEM TITLE	UNIT MEAS.	NO. UNITS	FY91 \$ /UNIT	COST BASIS	TOTAL MT K\$	NO. UNITS	HOURS /UNIT	TOTAL CRAFT HOURS CODE	\$/HR	TOTAL LABOR K\$
1			0	0.		0.000					
						0.000	----- SUBTOTALS THIS PAGE ----->				0.000

TECHNICAL DESCRIPTION OF THIS WORK PACKAGE:

0.000 + 0.000 = 0.000

## MIR INSTRUMENTATION

## ESTIMATE --- COST ESTIMATE DETAILS

PAGE NUMBER 164

## SUB-SYSTEM: MIR INSTRUMENTATION

DATE PRINTED: 7-AUG-92

WBS CODE: 1.1.8.10.1

MULT BY 1

COMPONENT : MIR INST/BEAMLINE AGGREGATE BPM SYSTEM

DATE ESTIMATED: 4/02/91

RESPONSIBLE: JACKSON

&lt;----- MATERIAL -----&gt;

&lt;----- LABOR -----&gt;

ITEM NUM.	ITEM TITLE	UNIT MEAS.	NO. UNITS	FY91 \$ /UNIT	COST BASIS	TOTAL MT K\$	NO. UNITS	HOURS /UNIT	TOTAL CRAFT HOURS	CODE	\$/HR	TOTAL LABOR K\$
1	PUE (BEAM POSITION)	EA	26	1405.40	A85	36.540	26	25.0	650.0	T2	18.70	12.155
2	PUE (BEAM POSITION	EA	12	349.44	A85	4.193	12	6.0	72.0	T2	18.70	1.346
3	PUE (BEAM POSITION)	EA	39	207.48	EE	8.092	39	6.25	243.8	T1	29.00	7.069
4	BPM ANALOG BOC, TIM, ETC	EA	8	1092.	EE	8.736	8	30.0	240.0	T1	29.00	6.960
5	TUNNEL CABLE CONNECTORS	EA	200	8.74	EE	1.748	200	0.2	40.0	T1	29.00	1.160
6	SWITCHYARD BPM ELETRONICS	EA	26	2511.60	EE	65.302	26	30.0	780.0	T1	29.00	22.620
7	MISC CABLE ASSEMBLIES	EA	375	21.84	EE	8.190	375	0.25	93.8	T1	29.00	2.719
8	QUALITY CONTROL						1	200.0	200.0	EN	32.40	6.480
9	TEST AND CALIBRATION						1	200.0	200.0	EN	32.40	6.480
10	E.D.I.						1	200.0	200.0	EN	32.40	6.480

132.801 <----- SUBTOTALS THIS PAGE -----> 73.469

## TECHNICAL DESCRIPTION OF THIS WORK PACKAGE:

132.801 + 73.469 = 206.270

ITEM 1. TUNED CAVITIES FOR USE IN TEST BEAM LINE.

ITEM 2. FOR USE IN 8GEV LINE.

ITEM 3. 7 UNITS FOR USE IN TARGET LINE AND 32 FOR USE IN 150 GEV LINES.

SAME TYPE OF BEAM POSITION PICKUPS AS IN 1.1.1.7.1.1-6, MIR BPM SYSTEM.

## MIR INSTRUMENTATION

## ESTIMATE --- COST ESTIMATE DETAILS

PAGE NUMBER 185

SUB-SYSTEM: MIR INSTRUMENTATION

DATE PRINTED: 7-AUG-92

WBS CODE: 1.1.8.10.2 MULT BY 1 COMPONENT : MIR INST/BEAMLINE

DATE ESTIMATED: 4/02/91

RESPONSIBLE: JACKSON

&lt;----- MATERIAL -----&gt; &lt;----- LABOR -----&gt;

ITEM NUM.	ITEM TITLE	UNIT MEAS.	NO. UNITS	FY91 \$ /UNIT	COST BASIS	TOTAL MT K\$	NO. UNITS	HOURS /UNIT	TOTAL CRAFT HOURS CODE	\$/HR	TOTAL LABOR K\$
1	BLM ION CHAMBER ASSEMBLY	EA	80	131.04	A87	10.483	80	1.0	80.0 T1	29.00	2.320
2	BLM ELECTRONICS	EA	16	1092.	EE	17.472	16	16.0	256.0 T1	29.00	7.424
3	TUNNEL CABLE CONNECTORS	EA	200	8.74	EE	1.748	2	0.2	0.4 T1	29.00	0.012
4	QUALITY CONTROL						1	50.0	50.0 EN	32.40	1.620
5	TEST AND CALIBRATION						1	100.0	100.0 EN	32.40	3.240

29.703 <----- SUBTOTALS THIS PAGE -----> 14.618

TECHNICAL DESCRIPTION OF THIS WORK PACKAGE:

29.703 + 14.618 = 44.319

MIR INSTRUMENTATION

ESTIMATE --- COST ESTIMATE DETAILS

PAGE NUMBER 166

SUB-SYSTEM: MIR INSTRUMENTATION

DATE PRINTED: 7-AUG-92

WBS CODE: 1.1.8.10.7 MULT BY 10 COMPONENT : MIR INST/AGGREGATE TORROIDS

DATE ESTIMATED: 6/27/90

RESPONSIBLE: JACKSON

&lt;----- MATERIAL -----&gt; &lt;----- LABOR -----&gt;

ITEM NUM.	ITEM TITLE	UNIT MEAS.	NO. UNITS	FY91 \$ /UNIT	COST BASIS	TOTAL MT K\$	NO. UNITS	HOURS /UNIT	TOTAL CRAFT HOURS CODE	\$/HR	TOTAL LABOR K\$
1	STANDARD 3100 (ABOUT 3.25")	EA	1	1965.60	A88	1.966					
2	CERAMIC BREAKS	EA	1	873.60	EE	0.874					
3	ELECTRONICS(CABLING, INTERGRATOR) LOG		1	1092.	EE	1.092	1	56.5	56.5 T2	18.70	1.057
						3.931	<----- SUBTOTALS THIS PAGE ----->				1.057
TECHNICAL DESCRIPTION OF THIS WORK PACKAGE:						3.931 +	1.057 =	4.988			
TOTAL = 49.878 MULTIPLY BY 10						39.312	<----- SUBTOTALS THIS PAGE ----->				10.566

## MIR INSTRUMENTATION

## ESTIMATE --- COST ESTIMATE DETAILS

PAGE NUMBER 187

SUB-SYSTEM: MIR INSTRUMENTATION

DATE PRINTED: 7-AUG-92

WBS CODE: 1.1.8.10.9 MULT BY 1 COMPONENT : MIR INST/BEAMLINE SEMS

DATE ESTIMATED: 4/12/91

RESPONSIBLE: JACKSON

&lt;----- MATERIAL -----&gt; &lt;----- LABOR -----&gt;

ITEM NUM.	ITEM TITLE	UNIT MEAS.	NO. UNITS	FY91 \$ /UNIT	COST BASIS	TOTAL MT K\$	NO. UNITS	HOURS /UNIT	TOTAL CRAFT HOURS CODE	\$/HR	TOTAL LABOR K\$
1	VACUUM BOX & SEM	EA	24	5480.	EE	131.040	24	30.0	720.0 T1	29.00	20.880
2							24	30.0	720.0 T2	18.70	13.484
3	SCANNER	EA	24	1255.80	EE	30.139					
4	POWER SUPPLY	EA	24	327.60	EE	7.862					
5	PREAMPS	EA	24	982.80	EE	23.587					
6	CABLES (500 FEET)	LOT	24	3276.	EE	78.624					
7	QUALITY CONTROL						1	200.0	200.0 EN	32.40	6.480
8	TEST AND CALIBRATION						1	200.0	200.0 EN	32.40	6.480
9	E.D.I						1	200.0	200.0 EN	32.40	6.480
						271.253	SUBTOTALS THIS PAGE				53.784

TECHNICAL DESCRIPTION OF THIS WORK PACKAGE:

271.253 + 53.784 = 325.037



CONTROLS

## ESTIMATE --- COST ESTIMATE DETAILS

PAGE NUMBER 188

SUB-SYSTEM: MIR CONTROLS

DATE PRINTED: 7-AUG-92

WBS CODE: 1.1.9.1.1

MULT BY 1 COMPONENT : MIR CONTROLS/COMPUTERS, LINKS

DATE ESTIMATED: 7/ 9/92

RESPONSIBLE: LUCAS

&lt;----- MATERIAL -----&gt; &lt;----- LABOR -----&gt;

ITEM NUM.	ITEM TITLE	UNIT MEAS.	NO. UNITS	FY91 \$ /UNIT	COST BASIS	TOTAL MT K\$	NO. UNITS	HOURS /UNIT	TOTAL CRAFT HOURS	CODE	\$/HR	TOTAL LABOR K\$	
1	INNERDUCT	FT	15250	0.95	A92	14.487							
2	MULTIMODE 12 FIBER CABLE (1)	M	6000	8.32	A92	49.920							
3	SPLICE CABINET ASSEMBLY (2)	EA	12.5	979.	A92	12.238							
4	CONNECTION PIGTAILS	EA	274	35.24	A92	9.656							
5	REPEATER CHASSIS	EA	13	739.28	EE	9.611							
6	REPEATER MODULES	EA	150	218.40	EE	32.760							
7	TOKEN RING MSAU FIBER	EA	7	1400.	A91	9.800							
8	FRONT END COMPUTER (3)	EA	1	21621.60	A88	21.622							
9	INSTALL MIBS CLOCK						1	40.0	40.0	EN	32.40	1.296	
10	INSTALL MIBS CLOCK						1	40.0	40.0	T2	18.70	0.748	
11	EDI						1	500.0	500.0	PH	33.90	16.950	
12							1	335.0	335.0	EN	32.40	10.854	
						160.093	<----- SUBTOTALS THIS PAGE ----->						29.848

TECHNICAL DESCRIPTION OF THIS WORK PACKAGE:

160.093 + 29.848 = 189.941

- 1) FIBER COST IS AN APPROPRIATE FRACTION OF THE EXPENSE OF 36 CHANNEL CABLE. EXCESS CAPACITY WILL BE INSTALLED FOR FUTURE EXPANSION, BUT IS NOT INCLUDED IN THIS COST ESTIMATE.
- 2) SPLICE CABINET ASSEMBLY COST IS AN APPROPRIATE FRACTION OF THE EXPENSE OF THAT FOR A 36 CHANNEL UNIT. THE EXCESS CHANNELS ARE PROVIDED FOR FUTURE EXPANSION.
- 3) THE MAIN RING FRONT END COMPUTER WILL NOT BE MOVED TO MI, SINCE IT WILL REALISTICALLY BE CONTROLLING SOME TEVATRON EQUIPMENT.

CONTROLS

ESTIMATE --- COST ESTIMATE DETAILS

PAGE NUMBER 189

SUB-SYSTEM: MIR CONTROLS

DATE PRINTED: 7-AUG-92

WBS CODE: 1.1.9.1.2 MULT BY 1 COMPONENT : MIR CONTROLS/CRATES,CARDS,RELAY RACKS,CABLING

DATE ESTIMATED: 2/13/91

RESPONSIBLE: LUCAS

&lt;----- MATERIAL -----&gt; &lt;----- LABOR -----&gt;

ITEM NUM.	ITEM TITLE	UNIT MEAS.	NO. UNITS	FY91 \$ /UNIT	COST BASIS	TOTAL MT K\$	NO. UNITS	HOURS /UNIT	TOTAL CRAFT HOURS CODE	\$/HR	TOTAL LABOR K\$
1	RELAY RACKS W/AIR CIRCULATION (1)	EA	110	1201.20	A89	132.132					
2	CABLING REPEATERS TO RACKS (2)	EA	18	87.36	A89	1.572					
3	CAMAC CARDS (3)	EA	15	819.	A89	12.285					
4	MADC'S (4)	EA	5	2839.20	A88	14.198					
5	EDI						1	500.0	500.0	PH 33.90	18.950
6							1	845.0	845.0	EN 32.40	20.898
						160.185	SUBTOTALS THIS PAGE				37.848

TECHNICAL DESCRIPTION OF THIS WORK PACKAGE:

160.185 + 37.848 = 198.033

- 1) RELAY RACKS ARE FOR ALL USERS, NOT JUST CONTROLS.
- 2) INSTALLING NEW CABLING IS CHEAPER THAN REMOVING THE OLD FROM THE MAIN RING.
- 3) A REALISTIC ESTIMATE OF CARDS NOT REMOVABLE FROM MAIN RING DUE TO SHARING WITH THE TEVATRON.
- 4) A REALISTIC ESTIMATE OF MADC'S NOT REMOVABLE FROM MAIN RING.

CONTROLS

## ESTIMATE --- COST ESTIMATE DETAILS

PAGE NUMBER 170

SUB-SYSTEM: MIR CONTROLS

DATE PRINTED: 7-AUG-92

WBS CODE: 1.1.9.1.3

MULT BY 1 COMPONENT : MIR CONTROLS/CATV SYSTEM

DATE ESTIMATED: 7/ 9/92

RESPONSIBLE: LUCAS

&lt;----- MATERIAL -----&gt; &lt;----- LABOR -----&gt;

ITEM NUM.	ITEM TITLE	UNIT MEAS.	NO. UNITS	FY91 \$ /UNIT	COST BASIS	TOTAL MT K\$	NO. UNITS	HOURS /UNIT	TOTAL CRAFT HOURS CODE \$/HR	TOTAL LABOR K\$
1	AMPLIFIERS	EA	23	1932.84	A88	44.455				
2	MODULATORS	EA	17	682.50	A88	11.603				
3	RECEIVERS & CONVERTERS	EA	1	2271.36	A88	2.271				
4	HARDLINE CABLE (1) (2)	FT	116522	0.46	A88	53.600				
5	INSTALLATION						15	166.0	2490.0 T2 18.70	46.563
6	EDI						1	500.0	500.0 EN 32.40	16.200
7							1	50.0	50.0 PH 33.90	1.695
						111.929	<----- SUBTOTALS THIS PAGE ----->			64.458

TECHNICAL DESCRIPTION OF THIS WORK PACKAGE:

111.929 + 64.458 = 176.387

(1) SUFFICIENT HARDLINE CABLE WILL BE INSTALLED TO FILL THE DUCT.

(2) SPECIFIED IS 0.5" CABLE. THIS MAY BE INCREASED TO 0.54" FOR TV ONLY.

CONTROLS

## ESTIMATE --- COST ESTIMATE DETAILS

PAGE NUMBER 171

SUB-SYSTEM: MIR CONTROLS

DATE PRINTED: 7-AUG-92

WBS CODE: 1.1.9.1.4 MULT BY 1 COMPONENT : MIR CONTROLS/FIRUS SYSTEM

DATE ESTIMATED: 2/13/91

RESPONSIBLE: LUCAS

&lt;----- MATERIAL -----&gt; &lt;----- LABOR -----&gt;

ITEM NUM.	ITEM TITLE	UNIT MEAS.	NO. UNITS	FY91 \$ /UNIT	COST BASIS	TOTAL MT K\$	NO. UNITS	HOURS /UNIT	TOTAL CRAFT HOURS CODE \$/HR	TOTAL LABOR K\$
1	FIRUS DETECTORS,SYS CONNECTIONS	EA	10	1137.86	A88	11.379				
2	FIRUS INSTALLATION						10	40.0	400.0 IE 38.20	15.280
3	SOFTWARE MODIFICATIONS						1	40.0	40.0 PR 30.90	1.236
4	EDI						1	670.0	670.0 EN 32.40	21.708
5							1	50.0	50.0 PH 33.90	1.695

11.379	<-----	SUBTOTALS THIS PAGE	----->	39.919
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TECHNICAL DESCRIPTION OF THIS WORK PACKAGE:

11.379 + 39.919 = 51.298

HARDLINE CABLE IS FOR TV, FIRUS, AND 2 SPARE CHANNELS.

## CONTROLS

## ESTIMATE --- COST ESTIMATE DETAILS

PAGE NUMBER 172

## SUB-SYSTEM: MIR CONTROLS

DATE PRINTED: 7-AUG-92

WBS CODE: 1.1.9.1.5 MULT BY 1 COMPONENT : MIR CONTROLS/ETHERNET

DATE ESTIMATED: 7/10/92

RESPONSIBLE: LUCAS

&lt;----- MATERIAL -----&gt; &lt;----- LABOR -----&gt;

ITEM NUM.	ITEM TITLE	UNIT MEAS.	NO. UNITS	FY91 \$ /UNIT	COST BASIS	TOTAL MT K\$	NO. UNITS	HOURS /UNIT	TOTAL CRAFT HOURS CODE \$/HR	TOTAL LABOR K\$
1	LANBRIDGE	EA	2	9300.50	A92	18.601				
2	DROPCABLE	EA	10	19.58	A92	0.196				
3	STAR COUPLER	EA	1	5619.46	A92	5.619				
4	OPTIC TRASCIEVER	EA	8	582.50	A92	4.660				
5	DEMPR REPEATER	EA	8	1801.36	A92	14.411				
6	MX TRASCIEVER	EA	8	78.32	A92	0.627				
7	DECSERVER	EA	8	1165.01	A92	9.320				

53.434 &lt;----- SUBTOTALS THIS PAGE -----&gt; 0.000

TECHNICAL DESCRIPTION OF THIS WORK PACKAGE:

53.434 + 0.000 = 53.434

CONTROLS

## ESTIMATE --- COST ESTIMATE DETAILS

PAGE NUMBER 173

SUB-SYSTEM: BEAMLINE AGGREGATE

DATE PRINTED: 7-AUG-92

WBS CODE: 1.1.9.10.1 MULT BY 1 COMPONENT : BML CONTROLS/COMPUTERS, LINKS

DATE ESTIMATED: 7/ 9/92

RESPONSIBLE: LUCAS

&lt;----- MATERIAL -----&gt; &lt;----- LABOR -----&gt;

ITEM NUM.	ITEM TITLE	UNIT MEAS.	NO. UNITS	FY91 \$ /UNIT	COST BASIS	TOTAL MT K\$	NO. UNITS	HOURS /UNIT	TOTAL CRAFT HOURS CODE \$/HR	TOTAL LABOR K\$
1	CONNECTION PIGTAILS	EA	38	24.55	A89	0.884				
2	REPEATER MODULES	EA	24	218.40	EE	5.242				
3	EDI						1	500.0	500.0 PH 33.90	16.950
4							1	350.0	350.0 EN 32.40	11.340
						6.125	<----- SUBTOTALS THIS PAGE ----->			28.290

TECHNICAL DESCRIPTION OF THIS WORK PACKAGE:

6.125 + 28.290 = 34.415

INNERDUCT AND FIBER CABLE INCLUDED WITH MI LINKS.

## CONTROLS

## ESTIMATE --- COST ESTIMATE DETAILS

PAGE NUMBER 174

## SUB-SYSTEM: BEAMLINE AGGREGATE

DATE PRINTED: 7-AUG-92

WBS CODE: 1.1.9.10.2 MULT BY 1 COMPONENT : BML CONTROLS/CRATES,RELAY RACKS,CABLING

DATE ESTIMATED: 2/24/92

RESPONSIBLE: LUCAS

&lt;----- MATERIAL -----&gt; &lt;----- LABOR -----&gt;

ITEM NUM.	ITEM TITLE	UNIT MEAS.	NO. UNITS	FY91 \$ /UNIT	COST BASIS	TOTAL MT K\$	NO. UNITS	HOURS /UNIT	TOTAL CRAFT HOURS CODE \$/HR	TOTAL LABOR K\$
1	RELAY RACKS W/AIR CIRCULATION (1)	EA	45	1201.20	A89	54.054				
2	CABLING REPEATERS TO RACKS	EA	4	87.36	EE	0.349				
3	CAMAC CRATES WITH CONTROLLERS (2)	EA	8	3527.16	A88	28.217				
4	CAMAC CARDS (2)	EA	170	928.20	EE	157.794				
5	BEAM POSITION MONITORS	EA	14	3600.	A89	50.400	14	95.0	1330.0 T2 18.70	24.871
6	EDI						1	500.0	500.0 EN 32.40	16.200
7							1	400.0	400.0 PH 33.90	13.560
						290.815	<----- SUBTOTALS THIS PAGE ----->			54.631

## TECHNICAL DESCRIPTION OF THIS WORK PACKAGE:

290.815 + 54.631 = 345.446

1) RELAY RACKS ARE FOR ALL USERS, NOT JUST CONTROLS.

2) ASSUMES UTILIZATION OF SOME CAMAC CRATES AND CARDS FROM CURRENT 8 GEV, AP1 AND FORWARD AND REVERSE TEVATRON INJECTION LINES.

CONTROLS

ESTIMATE --- COST ESTIMATE DETAILS

PAGE NUMBER 175

SUB-SYSTEM: BEAMLINE AGGREGATE

DATE PRINTED: 7-AUG-92

WBS CODE: 1.1.9.10.3 MULT BY 1 COMPONENT : BLM CONTROLS/CATV SYSTEM

DATE ESTIMATED: 7/ 4/90

RESPONSIBLE: LUCAS

<----- MATERIAL -----> <----- LABOR ----->

ITEM NUM.	ITEM TITLE	UNIT MEAS.	NO. UNITS	FY91 \$ /UNIT	COST BASIS	TOTAL MT K\$	NO. UNITS	HOURS /UNIT	TOTAL CRAFT HOURS CODE	\$/HR	TOTAL LABOR K\$
1			0	0.		0.000					
						0.000	----- SUBTOTALS THIS PAGE -----				0.000

TECHNICAL DESCRIPTION OF THIS WORK PACKAGE:

0.000 + 0.000 = 0.000



CONTROLS

ESTIMATE --- COST ESTIMATE DETAILS

PAGE NUMBER 178

SUB-SYSTEM: BEAMLINE AGGREGATE

DATE PRINTED: 7-AUG-92

WBS CODE: 1.1.9.10.4 MULT BY 1 COMPONENT : BLM CONTROLS/FIRUS SYSTEM

DATE ESTIMATED: 7/ 4/90

RESPONSIBLE: LUCAS

<----- MATERIAL -----> <----- LABOR ----->

ITEM NUM.	ITEM TITLE	UNIT MEAS.	NO. UNITS	FY91 \$ /UNIT	COST BASIS	TOTAL MT K\$	NO. UNITS	HOURS /UNIT	TOTAL CRAFT HOURS CODE \$/HR	TOTAL LABOR K\$
1			0	0.		0.000				
						0.000	<----- SUBTOTALS THIS PAGE ----->			0.000
TECHNICAL DESCRIPTION OF THIS WORK PACKAGE:						0.000 +	0.000 =	0.000		

## SUB-SYSTEM: SAFETY

DATE PRINTED: 7-AUG-92

WBS CODE: 1.1.10.1 MULT BY 1 COMPONENT : MIR SAFETY SYSTEM

DATE ESTIMATED: 1/22/92

RESPONSIBLE: CASEBOLT

&lt;----- MATERIAL -----&gt; &lt;----- LABOR -----&gt;

ITEM NUM.	ITEM TITLE	UNIT MEAS.	NO. UNITS	FY91 \$ /UNIT	COST BASIS	TOTAL MT K\$	NO. UNITS	HOURS /UNIT	TOTAL CRAFT HOURS	CODE	\$/HR	TOTAL LABOR K\$
1	INTERLOCK HARDWARE	EA	7	4368.	A89	30.576	7	80.0	560.0	T2	18.70	10.472
2	CABLING	FT	35000	1.26	EE	44.100						
3	JUNCTION BOX/P.S.	EA	3	2184.	A89	6.552	3	20.0	60.0	T2	18.70	1.122
4	MASTER CONTROLLER	EA	1	6552.	A89	6.552	1	100.0	100.0	T2	18.70	1.870
5	CRITICAL DEVICE	EA	1	32760.	A89	32.760						
6	RADIATION MONITOR	EA	12	1638.	A89	19.656						
7	TECHNICIAN LABOR						1	1000.0	1000.0	T2	18.70	18.700
8	PROGRAMMING	EA	1	3276.	A89	3.276	1	1000.0	1000.0	EN	32.40	32.400
9	P.A. AUDIO SYSTEM	EA	1	4368.	A89	4.368	1	100.0	100.0	T2	18.70	1.870
10	CARD READER	EA	7	2184.	A89	15.288	1	100.0	100.0	T2	18.70	1.870
11	KEYS/CORES	EA	1	5460.	A89	5.460	1	100.0	100.0	T2	18.70	1.870
12	COMPUTER SYSTEM	EA	1	16380.	A89	16.380	1	400.0	400.0	T2	18.70	7.480
13	GATES/BARRIER	EA	6	2000.	EE	12.000	6	50.0	300.0	IP	41.10	12.330
14	E.D.I.						1	300.0	300.0	PH	33.90	10.170
15							1	300.0	300.0	EN	32.40	9.720
16							1	700.0	700.0	DC	32.00	22.400
17							1	700.0	700.0	DR	22.20	15.540

196.968 <----- SUBTOTALS THIS PAGE -----> 147.814

TECHNICAL DESCRIPTION OF THIS WORK PACKAGE:

196.968 + 147.814 = 344.782

## FERMILAB MAIN INJECTOR TECHNICAL COMPONENTS

ESTIMATE --- COST ESTIMATE DETAILS

PAGE NUMBER 178

SUB-SYSTEM: SAFETY

DATE PRINTED: 7-AUG-92

WBS CODE: 1.1.10.2

MULT BY 1 COMPONENT : BML SAFETY SYSTEM

DATE ESTIMATED: 1/22/92

RESPONSIBLE: CASEBOLT

&lt;----- MATERIAL -----&gt;

&lt;----- LABOR -----&gt;

ITEM NUM.	ITEM TITLE	UNIT MEAS.	NO. UNITS	FY91 \$ /UNIT	COST BASIS	TOTAL MT K\$	NO. UNITS	HOURS /UNIT	TOTAL CRAFT HOURS	CODE	\$/HR	TOTAL LABOR K\$	
1	INTERLOCK HARDWARE	EA	10	4368.	A89	43.680	10	80.0	800.0	T2	18.70	14.960	
2	CABLING	FT	7000	1.26	A89	8.820							
3	CRITICAL DEVICE	EA	2	32760.	A89	65.520							
4	MASTER CONTROLLER	EA	1	6552.	A89	6.552	1	100.0	100.0	IE	38.20	3.820	
5	JUNCTION BOX	EA	3	2184.	A89	6.552	3	20.0	60.0	T2	18.70	1.122	
6	GATES/BARRIEA	EA	4	2000.	EE	8.000	4	50.0	200.0	IP	41.10	8.220	
7	RADIATION MONITOR	EA	8	1638.	A89	13.104							
8	E.D.I.						1	300.0	300.0	PH	33.90	10.170	
9							1	300.0	300.0	EN	32.40	9.720	
10							1	700.0	700.0	DC	32.00	22.400	
11							1	700.0	700.0	DR	22.20	15.540	
						152.228	<----- SUBTOTALS THIS PAGE ----->						85.952

TECHNICAL DESCRIPTION OF THIS WORK PACKAGE:

152.228 + 85.952 = 238.180

MIR MECHANICAL UTILITIES

ESTIMATE --- COST ESTIMATE DETAILS

PAGE NUMBER 179

SUB-SYSTEM: MIR INSTALL WATER SYSTEM

DATE PRINTED: 7-AUG-92

WBS CODE: 1.1.12.1.1.1 MULT BY 1 COMPONENT : MIR WATER SYS/POND PUMP SYSTEM

DATE ESTIMATED: 2/14/92

RESPONSIBLE: SATTI

<----- MATERIAL -----> <----- LABOR ----->

ITEM NUM.	ITEM TITLE	UNIT MEAS.	NO. UNITS	FY91 \$ /UNIT	COST BASIS	TOTAL MT K\$	NO. UNITS	HOURS /UNIT	TOTAL CRAFT HOURS CODE \$/HR	TOTAL LABOR K\$
1			0	0.		0.000				

0.000 <----- SUBTOTALS THIS PAGE -----> 0.000

TECHNICAL DESCRIPTION OF THIS WORK PACKAGE:

0.000 + 0.000 = 0.000

ALL REASIGNED TO CIVIL CONSTRUCTION.

## MIR MECHANICAL UTILITIES

## ESTIMATE --- COST ESTIMATE DETAILS

PAGE NUMBER 180

SUB-SYSTEM: MIR INSTALL WATER SYSTEM

DATE PRINTED: 7-AUG-92

WBS CODE: 1.1.12.1.1.2 MULT BY 1 COMPONENT : MIR WATER SYS/HEAT EXCHANGE

DATE ESTIMATED: 8/02/92

RESPONSIBLE: SATTI

&lt;----- MATERIAL -----&gt; &lt;----- LABOR -----&gt;

ITEM NUM.	ITEM TITLE	UNIT MEAS.	NO. UNITS	FY91 \$ /UNIT	COST BASIS	TOTAL MT K\$	NO. UNITS	HOURS /UNIT	TOTAL CRAFT HOURS CODE	\$/HR	TOTAL LABOR K\$
1	NEW HEAT EXCHANGER	EA	6	110000.	VQ	660.000					
2	RIGGERS MOVE TO NEW LOCATION						6	36.0	216.0	IG 42.80	9.245
3	INSTALLATION						6	32.0	192.0	IP 41.10	7.891
4	EDI						1	160.0	160.0	DC 32.00	5.120
5							1	500.0	500.0	EN 32.40	16.200
6			0	0.		0.000					

660.000	<-----	SUBTOTALS THIS PAGE	----->	38.456
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TECHNICAL DESCRIPTION OF THIS WORK PACKAGE:

660.000 + 38.456 = 698.456

EACH SERVICE BUILDING WILL NEED ONE HEAT EXCHANGER.

## SUB-SYSTEM: MIR INSTALL WATER SYSTEM

DATE PRINTED: 7-AUG-92

WBS CODE: 1.1.12.1.1.3 MULT BY 1 COMPONENT : MIR WATER SYS/LCW PROCESSING

DATE ESTIMATED: 7/24/92

RESPONSIBLE: SATTI

&lt;----- MATERIAL -----&gt; &lt;----- LABOR -----&gt;

ITEM NUM.	ITEM TITLE	UNIT MEAS.	NO. UNITS	FY91 \$ /UNIT	COST BASIS	TOTAL MT K\$	NO. UNITS	HOURS /UNIT	TOTAL HOURS	CRAFT CODE	\$/HR	TOTAL LABOR K\$	
1	DEIONIZER BOTTLES	EA	60	712.	VQ	42.720							
2	LCW STORAGE TANK 3000 GAL	EA	1	60060.	EE	60.060	1	120.0	120.0	IP	41.10	4.932	
3	PIPING CUB TO 8 GEV LINE	EA	1	45000.	EE	45.000	1	1500.0	1500.0	IP	41.10	61.650	
4	RECIRCULATING PUMP	EA	1	3150.	EE	3.150							
5	SAND FILTER	EA	1	3276.	EE	3.276							
6	FINE FILTER	EA	7	4368.	EE	30.576							
7	MAKE-UP WATER PUMP	EA	1	3276.	EE	3.276							
8	PIPING - FITTING - VALVES	LOT	1	38220.	EE	38.220	7	120.0	840.0	IP	41.10	34.524	
9	CONDUCTIVITY PROBES & METERS CONT	EA	7	1638.	CP	11.466	7	32.0	224.0	IP	41.10	9.206	
10	NITROGEN GAS SYSTEM	LOT	1	5460.	EE	5.460							
11	PH METER CONTROLS	EA	1	2184.	EE	2.184	1	40.0	40.0	IE	38.20	1.528	
12	ELECTRICAL COMPONENTS	LOT	1	10920.	EE	10.920	1	480.0	480.0	IE	38.20	18.336	
13	EDI						1	750.0	750.0	EN	32.40	24.300	
14							1	400.0	400.0	DC	32.00	12.800	
						256.308	<----- SUBTOTALS THIS PAGE ----->						167.276

## TECHNICAL DESCRIPTION OF THIS WORK PACKAGE:

256.308 + 167.276 = 423.584

PORTABLE MIXED-BED DEIONIZER BOTTLES WILL BE USED FOR POLISHING ONLY IN EACH SERVICE BUILDING. THE BOTTLES WILL BE REGENERATED AT THE CUB WHERE EXISTING LARGE INDUSTRIAL DEIONIZER COLUMNS ARE OPERATING. LCW FILLS WILL BE MADE FROM THE CUB EXISTING LCW PROCESSING EQUIPMENT. IN THE MI-60 SERVICE BUILDING, A 3000 GAL. STORAGE AND EXPANSION TANK WILL PROVIDE EMERGENCY LCW MAKE-UP. WATER FILTERS WILL BE USED AT THE 6 SERVICE BUILDINGS AND AT THE CUB MAIN FILL STATION.

## MIR MECHANICAL UTILITIES

## ESTIMATE --- COST ESTIMATE DETAILS

PAGE NUMBER 182

SUB-SYSTEM: MIR INSTALL WATER SYSTEM

DATE PRINTED: 7-AUG-92

WBS CODE: 1.1.12.1.1.4 MULT BY 1 COMPONENT : MIR WATER SYS/LCW PUMP SYSTEM

DATE ESTIMATED: 7/24/92

RESPONSIBLE: SATTI

&lt;----- MATERIAL -----&gt; &lt;----- LABOR -----&gt;

ITEM NUM.	ITEM TITLE	UNIT MEAS.	NO. UNITS	FY91 \$ /UNIT	COST BASIS	TOTAL MT K\$	NO. UNITS	HOURS /UNIT	TOTAL CRAFT HOURS	CODE	\$/HR	TOTAL LABOR K\$
1	DISCONNECT 13 PUMPS FROM OLD M.R.						13	16.0	208.0	T2	18.70	3.890
2	REWORK PIPING FOR NEW M.R. TUNNEL						13	32.0	416.0	IP	41.10	17.098
3	MOVE PUMPS & MATERIAL TO NEW LOCA						17	5.0	85.0	IG	42.80	3.638
4	NEW PUMP 300 GPM, 375 TDH, 50HP	EA	18	5678.40	VG	102.211						
5	S.S. PIPING, FITTING FOR PUMPS	EA	30	2500.	EE	75.000						
6	NEW ELECTRICAL STARTER W/CABINET	EA	17	3549.	A87	60.333						
7	NEW REMOTE OPERATION	EA	17	2184.	EE	37.128						
8	PUMP INSTAL. INCLUDING VALVES						30	32.0	960.0	IP	41.10	39.456
9	ELECTRICAL INSTALL & MISC MATERI	EA	30	600.	EE	18.000	30	40.0	1200.0	IE	38.20	45.840
10	EDI						1	750.0	750.0	EN	32.40	24.300
11							1	450.0	450.0	DC	32.00	14.400
						292.672	<----- SUBTOTALS THIS PAGE ----->			148.621		

## TECHNICAL DESCRIPTION OF THIS WORK PACKAGE:

292.672 + 148.621 = 441.293

9000 GPM TOTAL LCW REQUIRED. (30) PUMPS TOTAL REQUIRED - EACH PUMP 300 GPM - 375 TDH (162PSI) - 50 HP. WE REUSE (13) PUMPS FROM OLD MAIN RING - WE HAVE (4) SPARE PUMPS - 18 NEW PUMPS REQUIRED (5 SPARE). WE WILL USE (13) OLD ELECTRICAL STARTERS & REMOTE CONTROLS. EACH SERVICE BUILDING WILL HAVE 5 PUMPS.

## SUB-SYSTEM: MIR INSTALL WATER SYSTEM

DATE PRINTED: 7-AUG-92

WBS CODE: 1.1.12.1.1.5 MULT BY 1 COMPONENT : MIR WATER SYS/LCW PIPING

DATE ESTIMATED: 7/17/92

RESPONSIBLE: SATTI

&lt;----- MATERIAL -----&gt; &lt;----- LABOR -----&gt;

ITEM NUM.	ITEM TITLE	UNIT MEAS.	NO. UNITS	FY91 \$ /UNIT	COST BASIS	TOTAL MT K\$	NO. UNITS	HOURS /UNIT	TOTAL HOURS	CRAFT CODE	\$/HR	TOTAL LABOR K\$
1	10" 304 S.S. SCH 10 PIPE	FT	582	56.	VQ	32.592	582	1.0	582.0	IP	41.10	23.920
2	8" 304 S.S. SCH 10 PIPE	FT	752	41.	VQ	30.832	752	0.73	549.0	IP	41.10	22.562
3	6" 304 S.S. SCH 10 PIPE	FT	15274	26.50	VQ	404.761	15274	0.6	9164.4	IP	41.10	376.657
4	5" 304 S.S. SCH 10 PIPE	FT	84	23.50	VQ	1.974	84	0.46	38.6	IP	41.10	1.588
5	4"-304 S.S. SCH 10-PIPE	FT	8510	16.60	VQ	141.266	8510	0.38	3233.8	IP	41.10	132.909
6	10" S.S. FITTINGS -90 DEG.	EA	48	410.	VQ	19.680	48	12.0	576.0	IP	41.10	23.674
7	8" S.S. FITTINGS - 90 DEG.	EA	42	180.	VQ	7.560	42	8.0	336.0	IP	41.10	13.810
8	6" S.S. FITTINGS - 90 DEG.	EA	132	110.	VQ	14.520	132	6.0	792.0	IP	41.10	32.551
9	4" S.S. FITTING - 90 DEG.	EA	120	37.	VQ	4.440	120	4.0	480.0	IP	41.10	19.728
10	10" S.S. TEES	EA	102	740.	VQ	75.480	102	13.3	1356.6	IP	41.10	55.756
11	10" - 3WAY VALVE	EA	6	5000.	EE	30.000	6	16.0	96.0	IP	41.10	3.946
12	MISC. FITTING & VALVES	EA	6	7110.	EE	42.660	6	80.0	480.0	IP	41.10	19.728
13	PIPE SUPPORT BRACKETS	EA	2750	34.14	A87	93.885	2750	0.25	687.5	IP	41.10	28.256
14	CERAMIC FLEX HOSE CONNECTORS	EA	665	365.	EE	242.725	665	1.0	665.0	IP	41.10	27.331
15	EDI						1	1400.0	1400.0	EN	32.40	45.360
16							1	2500.0	2500.0	DC	32.00	80.000
						1142.375	<----- SUBTOTALS THIS PAGE ----->				907.777	

## TECHNICAL DESCRIPTION OF THIS WORK PACKAGE:

1142.375 + 907.777 = 2050.152

THE TUNNEL CIRCUMFERENCE IS 10,891 FT WITH SIX (6) SERVICE BUILDINGS. THE LCW SYSTEM DESIGN IS SIMILAR TO THE OLD MAIN RING. THIRTY PUMPS (5 PER SERVICE BUILDING) ARE CONNECTED IN PARALLEL ACROSS THE STAINLESS STEEL RETURN AND SUPPLY HEADERS. EACH MAGNET, WITH PORTION OF THE BUS, IS ALSO CONNECTED IN PARALLEL ACROSS THE LCW HEADERS. CERAMIC FEEDTHROUGHS, WITH FLEXIBLE METAL BRAID HOSES, ELECTRICALLY INSULATE THE LCW PIPING FROM THE COPPER BUS SYSTEM.



## MIR MECHANICAL UTILITIES

## ESTIMATE --- COST ESTIMATE DETAILS

PAGE NUMBER 184

SUB-SYSTEM: MIR INSTALL WATER SYSTEM

DATE PRINTED: 7-AUG-92

WBS CODE: 1.1.12.1.1.6 MULT BY 1 COMPONENT : RF-95 DEG LCW/HEAT EX &amp; PUMP SYS

DATE ESTIMATED: 7/31/92

RESPONSIBLE: SATTI

&lt;----- MATERIAL -----&gt; &lt;----- LABOR -----&gt;

ITEM NUM.	ITEM TITLE	UNIT MEAS.	NO. UNITS	FY91 \$ /UNIT	COST BASIS	TOTAL MT K\$	NO. UNITS	HOURS /UNIT	TOTAL CRAFT HOURS CODE \$/HR	TOTAL LABOR K\$	
1	DISCONNECT OLD HEAT EXCH PIPE						2	16.0	32.0 IP 41.10	1.315	
2	M.R. PIPE & VALVE REWORK	EA	2	4000.	EE	8.000	2	48.0	96.0 IP 41.10	3.946	
3	VALVES & PIPING	EA	2	7500.	EE	15.000					
4	INSTALLATION HEAT EXCH.						2	160.0	320.0 IP 41.10	13.152	
5	NEW PUMPS 400 GPM, 375TDH,75HP	EA	6	7500.	VQ	45.000					
6	S.S.PIPING,VALVES,FIT. FOR PUMPS	EA	6	6000.	EE	36.000					
7	ELECTRICAL STARTER/CABINET	EA	6	5000.	A87	30.000					
8	REMOTE OPERATION	EA	6	2200.	EE	13.200					
9	PIPING INSTALLATION/PUMPS						1	700.0	700.0 IP 41.10	28.770	
10	ELECTRICAL INSTALLATION						1	480.0	480.0 IE 38.20	18.336	
11	EDI						1	750.0	750.0 EN 32.40	24.300	
12							1	450.0	450.0 DC 32.00	14.400	
						147.200	<----- SUBTOTALS THIS PAGE ----->				104.219

TECHNICAL DESCRIPTION OF THIS WORK PACKAGE:

147.200 + 104.219 = 251.419

THE R.F. TEST STATION AND POWER SUPPLY SYSTEM WILL NEED 3.3 M WATTS OF HEAT LOAD REMOVAL. AN INDEPENDENT LOW CONDUCTIVITY WATER SYSTEM (95F), INSTALLED IN MI-60, WILL DISSIPATE THE HEAT THROUGH TWO HEAT EXCHANGERS TO THE WATER PONDS. THIS ESTIMATE DOES NOT INCLUDE THE WORK AND MATERIAL ASSOCIATED WITH THE POND WATER.

SUB-SYSTEM: MIR INSTALL WATER SYSTEM

DATE PRINTED: 7-AUG-92

WBS CODE: 1.1.12.1.1.7 MULT BY 1 COMPONENT : RF-95 DEG LCW/PROCESSING

DATE ESTIMATED: 2/28/92

RESPONSIBLE: SATTI

&lt;----- MATERIAL -----&gt; &lt;----- LABOR -----&gt;

ITEM NUM.	ITEM TITLE	UNIT MEAS.	NO. UNITS	FY91 \$ /UNIT	COST BASIS	TOTAL MT K\$	NO. UNITS	HOURS /UNIT	TOTAL CRAFT HOURS CODE	\$/HR	TOTAL LABOR K\$
1	DEIONIZER BOTTLES	EA	14	712.	VQ	9.968					
2	LCW STORAGE TANK 500 GAL	EA	1	10000.	EE	10.000					
3	RECIRCULATING PUMP	EA	1	2184.	EE	2.184					
4	FINE FILTER	EA	1	4368.	EE	4.368					
5	PIPE, FITTINGS, VALVES	SET	1	35000.	EE	35.000					
6	CONDUCTIVITY PROBE & METER	SET	1	1638.	EE	1.638					
7	NITROGEN GAS SYSTEM	SET	1	7500.	EE	7.500					
8	PH METER CONTROLS	SET	1	2184.	EE	2.184					
9	INSTALLATION - PIPING						1	480.0	480.0	IP 41.10	19.728
10	ELECTRICAL COMPONENTS	SET	1	20000.	EE	20.000	1	400.0	400.0	IE 38.20	15.280
11	E.D.I.						1	640.0	640.0	DC 32.00	20.480
12							1	375.0	375.0	EN 32.40	12.150
						92.842	SUBTOTALS THIS PAGE				67.638

TECHNICAL DESCRIPTION OF THIS WORK PACKAGE:

92.842 + 67.638 = 160.480

THE MAKE UP WATER WILL COME FROM THE MIR LCW SYSTEM WHICH IN TERM GETS MAKE UP WATER FROM THE CUB. THE DEIONIZER BOTTLES WILL BE USED FOR POLISHING ONLY. THE STORAGE TANK, USED ALSO AS AN EXPANSION TANK, WILL PROVIDE EMERGENCY LCW.

## MIR MECHANICAL UTILITIES

## ESTIMATE --- COST ESTIMATE DETAILS

PAGE NUMBER 188

SUB-SYSTEM: MIR INSTALL WATER SYSTEM

DATE PRINTED: 7-AUG-92

WBS CODE: 1.1.12.1.1.8 MULT BY 1 COMPONENT : RF-95 DEG LCW/PIPING

DATE ESTIMATED: 2/28/92

RESPONSIBLE: SATTI

&lt;----- MATERIAL -----&gt; &lt;----- LABOR -----&gt;

ITEM NUM.	ITEM TITLE	UNIT MEAS.	NO. UNITS	FY91 \$ /UNIT	COST BASIS	TOTAL MT K\$	NO. UNITS	HOURS /UNIT	TOTAL CRAFT HOURS	CODE	\$/HR	TOTAL LABOR K\$	
1	4"-304SS- SCH10-PIPE	FT	1800	14.63	VQ	26.334	1800	0.43	774.0	IP	41.10	31.811	
2	1"-304SS- SCH10-PIPE	FT	1000	5.15	EE	5.150	1000	0.35	350.0	IP	41.10	14.385	
3	PIPE SUPPORT BRACKETS	EA	280	25.	EE	7.000							
4	VALVES-FLANGES-FITTINGS	SET	1	35000.	EE	35.000							
5	HARDWARE-UNISTRUT & MISC	LOT	1	14000.	EE	14.000							
6	FLOW CONTROLLER	LOT	100	44.	EE	4.400							
7	POWER SUP & COMPONENT LCW CONNECT						1	640.0	640.0	IP	41.10	26.304	
8	PIPING INSTALLATION						1	1280.0	1280.0	IP	41.10	52.608	
9	E.D.I.						1	400.0	400.0	EN	32.40	12.960	
10							1	800.0	800.0	DC	32.00	25.600	
						91.884	<----- SUBTOTALS THIS PAGE ----->						163.668

TECHNICAL DESCRIPTION OF THIS WORK PACKAGE:

91.884 + 163.668 = 255.552

THE 95 DEGREES LCW WILL COOL ELECTRICAL COMPONENTS AND POWER SUPPLIES. FOUR INCH STAINLESS STEEL MANIFOLDS WITH 1 INCH BRANCHES WILL DELIVER THE WATER TO THE STATIONS. FLOW CONTROLLERS WILL REGULATE THE WATER SYSTEM.

## MIR MECHANICAL UTILITIES

## ESTIMATE --- COST ESTIMATE DETAILS

PAGE NUMBER 187

SUB-SYSTEM: MIR INSTALL WATER SYSTEM

DATE PRINTED: 7-AUG-92

WBS CODE: 1.1.12.1.1.9 MULT BY 1 COMPONENT : RF-55 DEG LCW/PROCESSING

DATE ESTIMATED: 7/17/92

RESPONSIBLE: SATTI

&lt;----- MATERIAL -----&gt; &lt;----- LABOR -----&gt;

ITEM NUM.	ITEM TITLE	UNIT MEAS.	NO. UNITS	FY91 \$ /UNIT	COST BASIS	TOTAL MT K\$	NO. UNITS	HOURS /UNIT	TOTAL CRAFT HOURS CODE \$/HR	TOTAL LABOR K\$	
1	DEIONIZER BOTTLES	EA	10	712.	VQ	7.120					
2	LCW STORAGE TANK 300 GAL	EA	1	7000.	EE	7.000					
3	RECIRCULATING PUMP	EA	1	2184.	EE	2.184					
4	FINE FILTER	EA	1	4368.	EE	4.368					
5	PIPE, FITTINGS, VALVES	LOT	1	25000.	EE	25.000					
6	CONDUCTIVITY METER	EA	1	1638.	EE	1.638					
7	NITROGEN GAS SYSTEM	LOT	1	7500.	EE	7.500					
8	PH METER CONTROLS	SET	1	2184.	EE	2.184					
9	INSTALLATION-PIPING						1	400.0	400.0 IP 41.10	16.440	
10	ELECTRICAL COMPONENTS	SET	1	16000.	EE	16.000	1	400.0	400.0 IE 38.20	15.280	
11	E.D.I.						1	640.0	640.0 DC 32.00	20.480	
12							1	375.0	375.0 EN 32.40	12.150	
						72.994	<----- SUBTOTALS THIS PAGE ----->				64.350

TECHNICAL DESCRIPTION OF THIS WORK PACKAGE:

72.994 + 64.350 = 137.344

THE DEIONIZER BOTTLES WILL BE USED FOR POLISHING ONLY. MAKEUP WATER WILL COME FROM THE MIR LCW SYSTEM. THE STORAGE TANK-EXPANSION TANK COMBINATION WILL PROVIDE EMERGENCY CHILLED LCW.

## MIR MECHANICAL UTILITIES

## ESTIMATE --- COST ESTIMATE DETAILS

PAGE NUMBER 188

SUB-SYSTEM: MIR INSTALL WATER SYSTEM

DATE PRINTED: 7-AUG-92

WBS CODE: 1.1.12.1.1.10 MULT BY 1 COMPONENT : RF-55 DEG LCW/HEAT EX &amp; PUMP SYS

DATE ESTIMATED: 2/28/92

RESPONSIBLE: SATTI

&lt;----- MATERIAL -----&gt; &lt;----- LABOR -----&gt;

ITEM NUM.	ITEM TITLE	UNIT MEAS.	NO. UNITS	FY91 \$ /UNIT	COST BASIS	TOTAL MT K\$	NO. UNITS	HOURS /UNIT	TOTAL HOURS	CRAFT CODE	\$/HR	TOTAL LABOR K\$
1	TUBE & SHELL HEAT EXCHANGER						1	36.0	36.0	IG	42.80	1.541
2	PUMPS 350 GPM, 75HP	EA	1	6500.	VQ	6.500	1	16.0	16.0	IP	41.10	0.658
3	VALVES, FLANGES, FITTINGS	LOT	1	35000.	EE	35.000						
4	INSTALLATION - COMPONENTS						1	960.0	960.0	IP	41.10	39.456
5	ELECTRICAL STARTER/CABINET	EA	1	5000.	EE	5.000						
6	REMOTE OPERATION	EA	2	2200.	EE	4.400						
7	ELECTRICAL INSTALLATION						1	400.0	400.0	IE	38.20	15.280
8	E.D.I.						1	600.0	600.0	EN	32.40	19.440
9							1	480.0	480.0	DC	32.00	15.360
						50.900	----- SUBTOTALS THIS PAGE -----			91.734		

## TECHNICAL DESCRIPTION OF THIS WORK PACKAGE:

50.900 + 91.734 = 142.634

THE EXISTING HEAT EXCHANGER AT F0 WILL BE MOVED INTO THE NEW LOCATION IN MI-60. CHILLED LCW IS USED FOR COOLING THE CAVITIES IN THE ENCLOSURE AND AT THE TEST STATION. A TOTAL OF 700 GPM WILL BE REQUIRED. ONE NEW PUMP ADDED TO THE EXISTING PUMP WILL BE USED. THE LOW CONDUCTIVITY WATER (LCW) WILL DISSIPATE THE HEAT THROUGH THE HEAT EXCHANGER TO THE INDUSTRIAL CHILLED WATER (ICW). EXISTING INDUSTRIAL CHILLED WATER WILL BE DELIVERED FROM THE F0 LOCATION.

THIS ESTIMATE DOES NOT INCLUDE ANY ICW WORK.

MIR MECHANICAL UTILITIES

ESTIMATE --- COST ESTIMATE DETAILS

PAGE NUMBER 189

SUB-SYSTEM: MIR INSTALL WATER SYSTEM

DATE PRINTED: 7-AUG-92

WBS CODE: 1.1.12.1.1.11 MULT BY 1 COMPONENT : RF-55 DEG LCW/CHILLED LCW PIPING

DATE ESTIMATED: 2/28/92

RESPONSIBLE: SATTI

&lt;----- MATERIAL -----&gt; &lt;----- LABOR -----&gt;

ITEM NUM.	ITEM TITLE	UNIT MEAS.	NO. UNITS	FY91 \$ /UNIT	COST BASIS	TOTAL MT K\$	NO. UNITS	HOURS /UNIT	TOTAL CRAFT HOURS CODE \$/HR	TOTAL LABOR K\$	
1	6"-304SS SCH10-PIPE	FT	700	27.	EE	18.900					
2	2"-304SS SCH10-PIPE	FT	200	9.	EE	1.800					
3	PIPE SUPPORT BRACKETS	EA	80	25.	EE	2.000					
4	FLANGES-VALVES-FITTINGS	LOT	1	28000.	EE	28.000					
5	HARDWARE & MISC.	LOT	1	10000.	EE	10.000					
6	FLOW CONTROLLERS	LOT	80	44.	EE	3.520					
7	PIPE INSULATION	LOT	1	10000.	EE	10.000	1	240.0	240.0 IP 41.10	9.864	
8	CAVITIES & TEST STAT LCW CONNECT						1	560.0	560.0 IP 41.10	23.016	
9	PIPING INSTALLATION						1	1500.0	1500.0 IP 41.10	61.650	
10	E.D.I.						1	300.0	300.0 EN 32.40	9.720	
11							1	600.0	600.0 DC 32.00	19.200	
						74.220	<----- SUBTOTALS THIS PAGE ----->				123.450

TECHNICAL DESCRIPTION OF THIS WORK PACKAGE:

74.220 + 123.450 = 197.670

INSULATED STAINLESS STEEL PIPES WILL CARRY THE CHILLED LCW TO THE CAVITIES IN THE ENCLOSURE AND TO THE TEST STATION.

MIR MECHANICAL UTILITIES

ESTIMATE --- COST ESTIMATE DETAILS

PAGE NUMBER 190

SUB-SYSTEM: MIR CABLES

DATE PRINTED: 7-AUG-92

WBS CODE: 1.1.12.1.2.1 MULT BY 1 COMPONENT : MIR/INSTALL CABLE TRAYS

DATE ESTIMATED: 2/26/92

RESPONSIBLE: KRAFCZYK/SORENSEN

&lt;----- MATERIAL -----&gt; &lt;----- LABOR -----&gt;

ITEM NUM.	ITEM TITLE	UNIT MEAS.	NO. UNITS	FY91 \$ /UNIT	COST BASIS	TOTAL MT K\$	NO. UNITS	HOURS /UNIT	TOTAL CRAFT HOURS CODE \$/HR	TOTAL LABOR K\$	
1	CABLE TRAY 18 X 4 (TUNNEL)	FT	0	10.09	A83	0.000	0	0.167	0.0 IE 38.20	0.000	
2	CABLE TRAY 18 X 4 (SERVICE BLDG)	FT	0	10.09	A83	0.000	0	0.167	0.0 IE 38.20	0.000	
3	INSTALLATION						0	320.0	0.0 T2 18.70	0.000	
4	E.D.I.						0	200.0	0.0 EN 32.40	0.000	
5							0	320.0	0.0 DC 32.00	0.000	
6							0	200.0	0.0 DR 22.20	0.000	
						0.000	<----- SUBTOTALS THIS PAGE ----->				0.000

TECHNICAL DESCRIPTION OF THIS WORK PACKAGE:

0.000 + 0.000 = 0.000

COSTS ACCOUNTED UNDER CIVIL CONSTRUCTION.

TOTAL  
6 12 4 - 1/97  
125,300.00

MIR MECHANICAL UTILITIES

ESTIMATE --- COST ESTIMATE DETAILS

PAGE NUMBER 191

SUB-SYSTEM: MIR CABLES

DATE PRINTED: 7-AUG-92

WBS CODE: 1.1.12.1.2.2 MULT BY 1 COMPONENT : MIR/INSTALL CABLES

DATE ESTIMATED: 2/17/92

RESPONSIBLE: KRAFCZYK/SORENSEN

&lt;----- MATERIAL -----&gt; &lt;----- LABOR -----&gt;

ITEM NUM.	ITEM TITLE	UNIT MEAS.	NO. UNITS	FY91 \$ /UNIT	COST BASIS	TOTAL MT K\$	NO. UNITS	HOURS /UNIT	TOTAL CRAFT HOURS CODE \$/HR	TOTAL LABOR K\$	
1	VACUUM (RG58C/U RED)	KFT	400	100.	CP	40.000	400	7.35	2940.0 IE 38.20	112.308	
2	BPM (RG8/U BLK)	KFT	300	275.	CP	82.500	300	7.35	2205.0 IE 38.20	84.231	
3	BLM (RG58C/U GREEN)	KFT	150	100.	CP	15.000	150	7.35	1102.5 IE 38.20	42.115	
4	CORR ELEMENTS(#10GA-2 COND)	KFT	200	550.	VQ	110.000	200	7.35	1470.0 IE 38.20	56.154	
5	TERMINATION	EA	4000	4.55	EE	18.200	4000	0.176	704.0 IE 38.20	26.893	
6	SEXTAPOLE 500/MCM	KFT	25	2880.	CP	72.000	25	59.0	1475.0 IE 38.20	56.345	
7	MISC CALBES	LOT	1	16000.	EE	16.000	1	500.0	500.0 IE 38.20	19.100	
8	INSTALLATION						1	200.0	200.0 T2 18.70	3.740	
9	E.D.I.						1	300.0	300.0 EN 32.40	9.720	
10							1	200.0	200.0 DC 32.00	6.400	
11							1	200.0	200.0 DR 22.20	4.440	
						353.700	<----- SUBTOTALS THIS PAGE ----->				421.446

TECHNICAL DESCRIPTION OF THIS WORK PACKAGE:

353.700 + 421.446 = 775.146

ITEM 7 IS INTENDED TO INCLUDE ALL SMALL NUMBER CABLE RUNS NOT WELL KNOWN AT THIS TIME. THIS NUMBER IS 5% OF CABLE ORDER  
CABLES INCLUDED IN THIS GROUP ARE BEAM VALVE CONTROL, VACUUMPUMP CONTROL AND MONITORING, TEMPERATURE MONITORING, ETC

\$420K  
716K  
1136K

110-2 COND

830/100



## MIR MECHANICAL UTILITIES

## ESTIMATE --- COST ESTIMATE DETAILS

PAGE NUMBER 192

SUB-SYSTEM: MIR ABORT SYSTEMS

DATE PRINTED: 7-AUG-92

WBS CODE: 1.1.12.1.3.1 MULT BY 1 COMPONENT : MIR ABORT/BEAM DUMP SYSTEM

DATE ESTIMATED: 3/ 2/92

RESPONSIBLE: LANGE

&lt;----- MATERIAL -----&gt; &lt;----- LABOR -----&gt;

ITEM NUM.	ITEM TITLE	UNIT MEAS.	NO. UNITS	FY91 \$ /UNIT	COST BASIS	TOTAL MT K\$	NO. UNITS	HOURS /UNIT	TOTAL CRAFT HOURS CODE \$/HR	TOTAL LABOR K\$	
1	DUMP CORE BOX	EA	1	33000.	EE	33.000	1	320.0	320.0 S2 38.00	12.160	
2	DUMP COOLING SYSTEM	LOT	1	53000.	EE	53.000	1	520.0	520.0 IP 41.10	21.372	
3	DUMP INSTRUMENTATION	LOT	1	21000.	EE	21.000					
4	EDI						1	1500.0	1500.0 EN 32.40	48.600	
5							1	500.0	500.0 DC 32.00	16.000	
6							1	800.0	800.0 DR 22.20	17.760	
						107.000	<----- SUBTOTALS THIS PAGE ----->				115.892

TECHNICAL DESCRIPTION OF THIS WORK PACKAGE:

107.000 + 115.892 = 222.892

CIVIL CONSTRUCTION &amp; SHIELDING STEEL IS NOT INCLUDED IN THIS WBS.

## SUB-SYSTEM: MIR ABORT SYSTEMS

DATE PRINTED: 7-AUG-92

WBS CODE: 1.1.12.1.3.2 MULT BY 1 COMPONENT : MIR ABORT/VACUUM SYSTEM

DATE ESTIMATED: 3/24/92

RESPONSIBLE: SAUER

&lt;----- MATERIAL -----&gt; &lt;----- LABOR -----&gt;

ITEM NUM.	ITEM TITLE	UNIT MEAS.	NO. UNITS	FY91 \$ /UNIT	COST BASIS	TOTAL MT K\$	NO. UNITS	HOURS /UNIT	TOTAL CRAFT HOURS CODE \$/HR	TOTAL LABOR K\$
1	TURBOCART	EA	1	19000.	EE	19.000	1	9.0	9.0 T2 18.70	0.168
2	PNEUMATIC VALVE	EA	1	2680.	CP	2.680	1	5.0	5.0 T2 18.70	0.094
3	CC GAUGE	EA	1	100.	EE	0.100	1	1.0	1.0 T2 18.70	0.019
4	TC GAUGE	EA	4	85.	CP	0.340	4	1.0	4.0 T2 18.70	0.075
5	GAUGE TREE						5	1.0	5.0 S2 38.00	0.190
6							5	1.0	5.0 T2 18.70	0.094
7	BEAM TUBE	FT	100	50.	CP	5.000	8	2.0	16.0 S2 38.00	0.608
8	BEAM TUBE, LARGE DIA	FT	150	100.	EE	15.000	8	2.0	16.0 S2 38.00	0.608
9	MISC MACHINING						1	100.0	100.0 S1 33.00	3.300
10	TITANIUM WINDOW	EA	2	1000.	EE	2.000	2	4.0	8.0 T2 18.70	0.150
11	LEAK CHECK						1	40.0	40.0 T2 18.70	0.748
12	BELLOWS	EA	4	200.	EE	0.800	4	3.0	12.0 T2 18.70	0.224
13							4	1.0	4.0 S2 38.00	0.152
14	EDI						1	300.0	300.0 EN 32.40	9.720
15							1	200.0	200.0 DC 32.00	6.400
16							1	100.0	100.0 DR 22.20	2.220
17							1	60.0	60.0 AD 20.00	1.200

44.920 <----- SUBTOTALS THIS PAGE -----> 25.969

TECHNICAL DESCRIPTION OF THIS WORK PACKAGE:

44.920 + 25.969 = 70.889

BEAMLINE AGGREGATE

ESTIMATE --- COST ESTIMATE DETAILS

PAGE NUMBER 194

SUB-SYSTEM: BML WATER SYSTEMS

DATE PRINTED: 7-AUG-92

WBS CODE: 1.1.12.10.1.1 MULT BY 1 COMPONENT : BML WATER SYS/POND PUMP SYSTEM

DATE ESTIMATED: 2/14/92

RESPONSIBLE: SATTI

<----- MATERIAL -----> <----- LABOR ----->

ITEM NUM.	ITEM TITLE	UNIT MEAS.	NO. UNITS	FY91 \$ /UNIT	COST BASIS	TOTAL MT K\$	NO. UNITS	HOURS /UNIT	TOTAL CRAFT HOURS CODE \$/HR	TOTAL LABOR K\$
1			0	0.		0.000				
						0.000	<----- SUBTOTALS THIS PAGE ----->			0.000
TECHNICAL DESCRIPTION OF THIS WORK PACKAGE:						0.000 +	0.000 =	0.000		

ALL REASSIGNED TO CIVIL CONSTRUCTION.

BEAMLINE AGGREGATE

ESTIMATE --- COST ESTIMATE DETAILS

PAGE NUMBER 195

SUB-SYSTEM: BML WATER SYSTEMS

DATE PRINTED: 7-AUG-92

WBS CODE: 1.1.12.10.1.2 MULT BY 1 COMPONENT : BML WATER SYS/HEAT EXCHANGER

DATE ESTIMATED: 8/02/92

RESPONSIBLE: SATTI

<----- MATERIAL -----> <----- LABOR ----->

ITEM NUM.	ITEM TITLE	UNIT MEAS.	NO. UNITS	FY91 \$ /UNIT	COST BASIS	TOTAL MT K\$	NO. UNITS	HOURS /UNIT	TOTAL CRAFT HOURS CODE \$/HR	TOTAL LABOR K\$	
1	DISCONNECT OLD HEAT EXCH PIPE						3	16.0	48.0 IP 41.10	1.973	
2	M.R. PIPE & VALVE REWORK	EA	3	4000.	EE	12.000	3	48.0	144.0 IP 41.10	5.918	
3	INSTALL HEAT EXCHANGER						3	36.0	108.0 IG 42.80	4.622	
4	PIPING INSTALLATION						3	32.0	96.0 IP 41.10	3.946	
5	EDI						1	500.0	500.0 EN 32.40	16.200	
6							1	360.0	360.0 DC 32.00	11.520	
						12.000	<----- SUBTOTALS THIS PAGE ----->				44.179

TECHNICAL DESCRIPTION OF THIS WORK PACKAGE:

12.000 + 44.179 = 56.179

ONE HEAT EXCHANGERS WILL BE REQUIRED FOR THE 8 GEV LINE AND TWO WILL BE REQUIRED FOR 150 GEV PROTON LINE. THE 150 GEV P-BAR LINE, WITH LOW POWER, IS COOLED FROM THE MIR LCW SYSTEM

BEAMLINE AGGREGATE

ESTIMATE --- COST ESTIMATE DETAILS

PAGE NUMBER 198

SUB-SYSTEM: BML WATER SYSTEMS

DATE PRINTED: 7-AUG-92

WBS CODE: 1.1.12.10.1.3 MULT BY 1 COMPONENT : BML WATER SYS/LCW PROCESSING

DATE ESTIMATED: 2/28/92

RESPONSIBLE: SATTI

&lt;----- MATERIAL -----&gt; &lt;----- LABOR -----&gt;

ITEM NUM.	ITEM TITLE	UNIT MEAS.	NO. UNITS	FY91 \$ /UNIT	COST BASIS	TOTAL MT K\$	NO. UNITS	HOURS /UNIT	TOTAL CRAFT HOURS CODE \$/HR	TOTAL LABOR K\$	
1	DEIONIZER BOTTLES	EA	8	712.	VQ	5.698					
2	LCW STORAGE TANK 1500 GAL	EA	1	27300.	EE	27.300	1	100.0	100.0 IP 41.10	4.110	
3	RECIRCULATION PUMP	EA	1	2184.	EE	2.184					
4	FINE FILTER	EA	1	4368.	EE	4.368					
5	PIPING FITTING VALVES	SET	1	27300.	EE	27.300					
6	CONDUCTIVITY PROBE & METER	SET	1	1638.	EE	1.638					
7	NITROGEN GAS SYSTEM	LOT	1	5460.	EE	5.460					
8	PH METER CONTROLS	EA	1	2184.	EE	2.184					
9	INSTALLATION-PIPING						1	500.0	500.0 IP 41.10	20.550	
10	ELECTRICAL COMPONENTS	LOT	1	10920.	EE	10.920	1	400.0	400.0 IE 38.20	15.280	
11	EDI						1	800.0	800.0 DC 32.00	25.600	
12							1	375.0	375.0 EN 32.40	12.150	
						87.050	<----- SUBTOTALS THIS PAGE ----->				77.690

TECHNICAL DESCRIPTION OF THIS WORK PACKAGE:

87.050 + 77.690 = 164.740

THE 8 GEV LCW PIPING IS THE LINK JOINING THE MAIN INJECTOR RING TO THE CUB-LCW PROCESSING EQUIPMENT. PORTABLE DI BOTTLES ARE USED FOR POLISHING ONLY. THE 1500 GAL EXPANSION AND STORAGE TANK WILL PROVIDE EMERGENCY LCW MAKE-UP.

BEAMLINE AGGREGATE

ESTIMATE --- COST ESTIMATE DETAILS

PAGE NUMBER 197

SUB-SYSTEM: BML WATER SYSTEMS

DATE PRINTED: 7-AUG-92

WBS CODE: 1.1.12.10.1.4 MULT BY 1 COMPONENT : BML WATER SYS/LCW PUMP SYSTEMS

DATE ESTIMATED: 7/24/92

RESPONSIBLE: SATTI

&lt;----- MATERIAL -----&gt; &lt;----- LABOR -----&gt;

ITEM NUM.	ITEM TITLE	UNIT MEAS.	NO. UNITS	FY91 \$ /UNIT	COST BASIS	TOTAL MT K\$	NO. UNITS	HOURS /UNIT	TOTAL CRAFT HOURS CODE	\$/HR	TOTAL LABOR K\$
1	NEW PUMP 300GPM, 375TDH, 50HP	EA	5	5678.40	EE	28.392					
2	SS PIPING-FITTINGS-VALVES	SET	5	2948.40	A87	14.742					
3	ELECT. STARTER W/CABINET	EA	5	3549.	A87	17.745					
4	REMOTE OPERATION CONTROLS	EA	5	2184.	EE	10.920					
5	PIPING INSTALLATION						6	72.0	432.0	IP 41.10	17.755
6	ELECT. INSTAL & MISC. MATERIAL	EA	5	600.60	EE	3.003	6	40.0	240.0	IE 38.20	9.168
7	EDI						1	450.0	450.0	EN 32.40	14.580
8							1	750.0	750.0	DC 32.00	24.000
						74.802	SUBTOTALS THIS PAGE				65.503

TECHNICAL DESCRIPTION OF THIS WORK PACKAGE:

74.802 + 65.503 = 140.305

THE NORTH HATCH SERVICE BUILDING WILL SUPPLY COOLING FOR THE MAGNETS IN THE 8 GEV LINE FROM THE EXISTING AP4 LINE TO THE NEW INJECTOR RING.

## BEAMLINE AGGREGATE

## ESTIMATE --- COST ESTIMATE DETAILS

PAGE NUMBER 198

SUB-SYSTEM: BML WATER SYSTEMS

DATE PRINTED: 7-AUG-92

WBS CODE: 1.1.12.10.1.5 MULT BY 1 COMPONENT : BML WATER SYS/LCW PIPING

DATE ESTIMATED: 7/23/92

RESPONSIBLE: SATTI

&lt;----- MATERIAL -----&gt;

&lt;----- LABOR -----&gt;

ITEM NUM.	ITEM TITLE	UNIT MEAS.	NO. UNITS	FY91 \$ /UNIT	COST BASIS	TOTAL MT K\$	NO. UNITS	HOURS /UNIT	TOTAL CRAFT HOURS CODE	\$/HR	TOTAL LABOR K\$
1	4" - 304SS-SCH10-PIPE	FT	8660	16.60	VG	143.756	8660	0.43	3723.8	IP 41.10	153.048
2	PIPE SUPPORT BRACKETS	EA	870	34.79	A87	30.267	870	0.25	217.5	IP 41.10	8.939
3	4"-SSVALVES & FLANGES	SET	12	928.20	VQ	11.138	12	16.0	192.0	IP 41.10	7.891
4	BOLTS-NUTS-UNISTRUT % MISC	LOT	1	11684.40	EE	11.684	1	240.0	240.0	IP 41.10	9.864
5	4" S.S. FITTINGS	EA	40	335.24	A88	13.410	40	4.0	160.0	IP 41.10	6.576
6	CERAMIC FLEXIBLE HOSE CONNECTORS	EA	250	364.12	EE	91.030	93	2.0	186.0	IP 41.10	7.645
7	FLOW CONTROLLERS	EA	250	43.68	EE	10.920	250	1.0	250.0	IP 41.10	10.275
8	EDI						1	1400.0	1400.0	EN 32.40	45.360
9							1	2500.0	2500.0	DC 32.00	80.000
						312.206	SUBTOTALS THIS PAGE				329.598

## TECHNICAL DESCRIPTION OF THIS WORK PACKAGE:

312.206 + 329.598 = 641.804

4" STAINLESS STEEL - SUPPLY & RETURN HEADERS WILL BE INSTALLED IN THE 8 GEV AND THE 150 GEV PROTON LINE TUNNEL. EACH MAGNET WILL BE CONNECTED IN PARALLEL USING LCW FLOW CONTROLLERS. CERAMIC FEEDTHROUGHS, WITH FLEXIBLE METAL BRAID HOSES, ELECTRICALLY INSULATE THE LCW PIPING FROM THE MAGNET SYSTEM.

BEAMLINE AGGREGATE

ESTIMATE --- COST ESTIMATE DETAILS

PAGE NUMBER 199

SUB-SYSTEM: BEAMLINE CABLES

DATE PRINTED: 7-AUG-92

WBS CODE: 1.1.12.10.2.1 MULT BY 1 COMPONENT : BML/INSTALL CABLE TRAYS

DATE ESTIMATED: 2/26/92

RESPONSIBLE: KRAFCZYK/SORENSEN

<----- MATERIAL -----> <----- LABOR ----->

ITEM NUM.	ITEM TITLE	UNIT MEAS.	NO. UNITS	FY91 \$ /UNIT	COST BASIS	TOTAL MT K\$	NO. UNITS	HOURS /UNIT	TOTAL CRAFT HOURS CODE \$/HR	TOTAL LABOR K\$	
1 2	EA 4 X 12 TRAY	FT	0	6.72	A83	0.000	0	0.167	0.0 IE 38.20	0.000	
2	INSTALLATION						0	320.0	0.0 T2 18.70	0.000	
3	E.D.I.						0	200.0	0.0 EN 32.40	0.000	
4							0	320.0	0.0 DC 32.00	0.000	
5							0	200.0	0.0 DR 22.20	0.000	
						0.000	SUBTOTALS THIS PAGE				0.000

TECHNICAL DESCRIPTION OF THIS WORK PACKAGE:

0.000 + 0.000 = 0.000

COSTS ACCOUNTED UNDER CIVIL CONSTRUCTION.



## BEAMLINE AGGREGATE

## ESTIMATE --- COST ESTIMATE DETAILS

PAGE NUMBER 200

SUB-SYSTEM: BEAMLINE CABLES

DATE PRINTED: 7-AUG-92

WBS CODE: 1.1.12.10.2.2 MULT BY 1 COMPONENT : BML/INSTALL CABLES

DATE ESTIMATED: 2/17/92

RESPONSIBLE: KRAFCZYK/SORENSEN

&lt;----- MATERIAL -----&gt;

&lt;----- LABOR -----&gt;

ITEM NUM.	ITEM TITLE	UNIT MEAS.	NO. UNITS	FY91 \$ /UNIT	COST BASIS	TOTAL MT K\$	NO. UNITS	HOURS /UNIT	TOTAL HOURS	CRAFT CODE	\$/HR	TOTAL LABOR K\$
1	VACUUM (RG58C/U RED)	KFT	100	100.	CP	10.000	100	7.38	738.0	IE	38.20	28.192
2	BPM (RG8/U BLK)	KFT	170	275.	CP	48.750	170	7.38	1254.6	IE	38.20	47.926
3	BLM (RG58C/U GREEN)	KFT	67	100.	CP	6.700	67	7.38	494.5	IE	38.20	18.888
4	CORR ELEMENT (#10GA-2COND)	KFT	85	475.	VQ	40.375	85	29.5	2507.5	IE	38.20	95.787
5	TERMINATION	EA	1500	4.55	CP	6.825	1500	0.176	264.0	IE	38.20	10.085
6	500 MCM	KFT	150	2880.	CP	432.000	150	59.0	8850.0	IE	38.20	338.070
7	MISC CABLES	LOT	1	30000.	EE	30.000	1	750.0	750.0	IE	38.20	28.650
8	INSTALLATION						1	200.0	200.0	T2	18.70	3.740
9	E.D.I.						1	300.0	300.0	EN	32.40	9.720
10							1	200.0	200.0	DC	32.00	6.400
11							1	200.0	200.0	DR	22.20	4.440
						572.650	SUBTOTALS THIS PAGE			591.897		

TECHNICAL DESCRIPTION OF THIS WORK PACKAGE:

572.650 + 591.897 = 1164.547

ITEM 7 IS INTENDED TO INCLUDE ALL SMALL NUMBER CABLE RUNS NOT WELL KNOWN AT THIS TIME. THIS NUMBER IS 5% OF THE CABLE ORDER. CABLES INCLUDED IN THIS GROUP ARE BEAM VALVE CONTROL, VACUUM VALVE CONTROL AND MONITORING, TEMPERATURE MONITORING, ETC.

MIR INSTALLATION

ESTIMATE --- COST ESTIMATE DETAILS

PAGE NUMBER 201

SUB-SYSTEM: MIR MAGNET INSTALLATION

DATE PRINTED: 7-AUG-92

WBS CODE: 1.1.13.1.1.1 MULT BY 1 COMPONENT : MIR/INSTALL MAGNET STANDS

DATE ESTIMATED: 7/17/92

RESPONSIBLE: LANGE

&lt;----- MATERIAL -----&gt; &lt;----- LABOR -----&gt;

ITEM NUM.	ITEM TITLE	UNIT MEAS.	NO. UNITS	FY91 \$ /UNIT	COST BASIS	TOTAL MT K\$	NO. UNITS	HOURS /UNIT	TOTAL CRAFT HOURS CODE \$/HR	TOTAL LABOR K\$	
1	STAND BASE-DIPOLE	SET	344	1400.	EE	481.800	344	2.0	688.0 IL 27.20	18.714	
2	STAND BASE-QUADS	SET	208	1500.	EE	312.000	208	2.0	416.0 IL 27.20	11.315	
3	CORRECTION MAG SUPPTS	SET	310	500.	EE	155.000	310	0.5	155.0 IL 27.20	4.216	
4	SEXTUPOLE STANDS-75M	SET	108	900.	EE	97.200	108	0.1	10.8 IL 27.20	0.294	
5	INSTALLATION EQT.	SET	1	10000.	EE	10.000					
6	EDI						1	2000.0	2000.0 EN 32.40	64.800	
7							1	1900.0	1900.0 DC 32.00	60.800	
8							1	4500.0	4500.0 DR 22.20	99.900	
9							1	4000.0	4000.0 AD 20.00	80.000	
						1055.800	<----- SUBTOTALS THIS PAGE ----->				340.039
TECHNICAL DESCRIPTION OF THIS WORK PACKAGE:						1055.800 + 340.039 = 1395.839					

MIR INSTALLATION

## ESTIMATE --- COST ESTIMATE DETAILS

PAGE NUMBER 202

SUB-SYSTEM: MIR MAGNET INSTALLATION

DATE PRINTED: 7-AUG-92

WBS CODE: 1.1.13.1.1.2 MULT BY 1 COMPONENT : MIR/INSTALL MAGNETS

DATE ESTIMATED: 2/28/92

RESPONSIBLE: LANGE

&lt;----- MATERIAL -----&gt; &lt;----- LABOR -----&gt;

ITEM NUM.	ITEM TITLE	UNIT MEAS.	NO. UNITS	FY91 \$ /UNIT	COST BASIS	TOTAL MT K\$	NO. UNITS	HOURS /UNIT	TOTAL HOURS	CRAFT CODE	\$/HR	TOTAL LABOR K\$
1	MAGNETS-DIPOLES						344	16.0	5504.0	IG	42.80	235.571
2	MAGNETS-QUADS						208	12.0	2496.0	IG	42.80	106.829
3	CORRECTION MAGNETS						306	4.0	1224.0	IL	27.20	33.293
4	SEXTUPOLES-75M						108	4.0	432.0	IG	42.80	18.490
5	MAGNET INSTALLATION EQT.	SET	1	180000.	EE	180.000						
6	MAGNET MOVER MODIFIC.	SET	1	15000.	EE	15.000						
7	EDI						1	1800.0	1800.0	EN	32.40	51.840
8							1	1300.0	1300.0	DC	32.00	41.600
9							1	1000.0	1000.0	DR	22.20	22.200
						195.000	<----- SUBTOTALS THIS PAGE ----->					509.822

TECHNICAL DESCRIPTION OF THIS WORK PACKAGE:

195.000 + 509.822 = 704.822

MIR INSTALLATION

ESTIMATE --- COST ESTIMATE DETAILS

PAGE NUMBER 203

SUB-SYSTEM: MIR MAGNET INSTALLATION

DATE PRINTED: 7-AUG-92

WBS CODE: 1.1.13.1.1.3 MULT BY 1 COMPONENT : MIR/SURVEY &amp; ALIGN MAGNETS

DATE ESTIMATED: 2/28/92

RESPONSIBLE: MOORE

&lt;----- MATERIAL -----&gt; &lt;----- LABOR -----&gt;

ITEM NUM.	ITEM TITLE	UNIT MEAS.	NO. UNITS	FY91 \$ /UNIT	COST BASIS	TOTAL MT K\$	NO. UNITS	HOURS /UNIT	TOTAL CRAFT HOURS CODE	\$/HR	TOTAL LABOR K\$
1	CONSTRUCTION CONTROL						100	24.0	2400.0	IA 31.10	74.640
2	CONTRACT COMPLIANCE						60	8.0	480.0	IA 31.10	14.928
3	ALIGNMENT CONTROL BRASS INTERNAL						220	12.0	2640.0	IA 31.10	82.104
4	STAND ALIGNMENT						556	3.0	1668.0	IA 31.10	51.875
5	MAGNET ALIGNMENT						664	4.0	2656.0	IA 31.10	82.602
6	MINITUBE ALIGN TRIM/HERE(DIPOLE)						208	4.0	832.0	IA 31.10	25.875
7	EDI						1	250.0	250.0	EN 32.40	8.100

0.000 <----- SUBTOTALS THIS PAGE -----> 340.124

TECHNICAL DESCRIPTION OF THIS WORK PACKAGE:

0.000 + 340.124 = 340.124

THE NUMBERS FOR MAGNETS ASSUME CONTINUOUS INSTALLATION. FOR RANDOM INSTALLATION, ADD 30 %. 24 HOURS IS ONE CREW-DAY  
(8 HOURS X 3 PERSONS). NUMBER OF MAGNETS HAS INCREASED BY 10% 4-18-91.

MIR INSTALLATION

## ESTIMATE --- COST ESTIMATE DETAILS

PAGE NUMBER 204

SUB-SYSTEM: MIR MAGNET INSTALLATION

DATE PRINTED: 7-AUG-92

WBS CODE: 1.1.13.1.1.4 MULT BY 1 COMPONENT : OLD MR MAGNET REMOVAL

DATE ESTIMATED: 2/28/92

RESPONSIBLE: LANGE

&lt;----- MATERIAL -----&gt; &lt;----- LABOR -----&gt;

ITEM NUM.	ITEM TITLE	UNIT MEAS.	NO. UNITS	FY91 \$ /UNIT	COST BASIS	TOTAL MT K\$	NO. UNITS	HOURS /UNIT	TOTAL CRAFT HOURS	CODE	\$/HR	TOTAL LABOR K\$
1	REMOVE B2 MAGNETS						92	8.5	782.0	T2	18.70	14.623
2	REMOVE B3 MAGNETS						7	12.0	84.0	T2	18.70	1.571
3	REMOVE QUAD MAGNETS						196	7.0	1372.0	T2	18.70	25.656
4	REMOVE CORRECTION MAGNETS						310	2.0	620.0	T2	18.70	11.594
5	REMOVE E0 INJ SYSTEM						9	20.0	180.0	T2	18.70	3.366
6	REMOVE C0 ABORT SYSTEM						7	20.0	140.0	T2	18.70	2.618
7	REMOVE KICKERS						1	224.0	224.0	T2	18.70	4.189
8	SHIP TO STORAGE OR MAIN INJ						440	8.0	3520.0	IG	42.80	150.656
9	PURGE DEVICE AT STORAGE	EA	36	60.00	EE	2.162	3	22.0	66.0	T2	18.70	1.234
10	EDI						1	800.0	800.0	EN	32.40	25.920
11							1	400.0	400.0	DC	32.00	12.800
12							1	1000.0	1000.0	DR	22.20	22.200

2.162 <----- SUBTOTALS THIS PAGE -----> 276.428

TECHNICAL DESCRIPTION OF THIS WORK PACKAGE:

2.162 + 276.428 = 278.590

MIR INSTALLATION

ESTIMATE --- COST ESTIMATE DETAILS

PAGE NUMBER 205

SUB-SYSTEM: MIR PULSED POWER DISTRIBUTION

DATE PRINTED: 7-AUG-92

WBS CODE: 1.1.13.1.2.1 MULT BY 8 COMPONENT : MIR POWER SUPPLY INSTALLATION

DATE ESTIMATED: 3/20/91

RESPONSIBLE: KRAFCZYK/HAYS

&lt;----- MATERIAL -----&gt; &lt;----- LABOR -----&gt;

ITEM NUM.	ITEM TITLE	UNIT MEAS.	NO. UNITS	FY91 \$ /UNIT	COST BASIS	TOTAL MT K\$	NO. UNITS	HOURS /UNIT	TOTAL CRAFT HOURS	CODE	\$/HR	TOTAL LABOR K\$	
1	PPS SUBSTATION *	EA	1	0.	EE/A	0.000	1	88.0	88.0	IG	42.80	3.766	
2	DISASSEMBLY & ASSEMBLY	EA	1	568.93	EE	0.569	1	88.0	88.0	IE	38.20	3.362	
3	SECONDARY CABLES	SET	1	6827.18	CP	6.827	1	64.0	64.0	IE	38.20	2.445	
4	TERMINATION OF SEC. CABLES	SET	1	873.60	CP	0.874	1	48.0	48.0	IE	38.20	1.834	
5	CONTROLS	SET	1	340.81	A87	0.341	1	96.0	96.0	IE	38.20	3.667	
6	BUS CAGE	EA	1	340.81	EE	0.341	1	80.0	80.0	IP	41.10	3.288	
7	H.V. DUCT	EA	1	2184.	EE	2.184	1	16.0	16.0	IE	38.20	0.611	
8	NEW HIGH VOLTAGE CUBICLE	EA	1	1092.	EE	1.092	1	64.0	64.0	IE	38.20	2.445	
9	INSTALLATION						1	10.0	10.0	EN	32.40	0.324	
10							1	15.0	15.0	DC	32.00	0.480	
11							1	16.0	16.0	S1	33.00	0.528	
12							1	23.3	23.3	T2	18.70	0.436	
13	E.D.I.						1	17.0	17.0	EN	32.40	0.551	
14							1	7.0	7.0	DC	32.00	0.224	
15							1	13.0	13.0	T2	18.70	0.243	
16							1	27.0	27.0	IE	38.20	1.031	
						12.227	SUBTOTALS THIS PAGE						25.235

TECHNICAL DESCRIPTION OF THIS WORK PACKAGE:

12.227 + 25.235 = 37.462

SUBSTATION INCLUDES TERMINATION CUBICLE CIRCUIT BREAKER BUS DUCT &amp; TRANSFORMER &amp; DISCONNECT STEVE HAYS HAS OTHER 12 UNIT

TOTAL = 224.772 MULTIPLY BY 6 73.364 &lt;----- SUBTOTALS THIS PAGE -----&gt; 151.408







MIR INSTALLATION

## ESTIMATE --- COST ESTIMATE DETAILS

PAGE NUMBER 207

SUB-SYSTEM: MIR PULSED POWER DISTRIBUTION

DATE PRINTED: 7-AUG-92

WBS CODE: 1.1.13.1.2.3 MULT BY 1 COMPONENT : MIR PWR DIST/NEW HARMONIC FILTER

DATE ESTIMATED: 2/17/92

RESPONSIBLE: KRAFCZYK/HAYS

&lt;----- MATERIAL -----&gt; &lt;----- LABOR -----&gt;

ITEM NUM.	ITEM TITLE	UNIT MEAS.	NO. UNITS	FY91 \$ /UNIT	COST BASIS	TOTAL MT K\$	NO. UNITS	HOURS /UNIT	TOTAL CRAFT HOURS CODE	\$/HR	TOTAL LABOR K\$
1	HARMONIC FILTER	EA	1	354900.	A86	354.900					
2	INSTALLATION						1	2778.0	2778.0	IE 38.20	106.120
3							1	600.0	600.0	EN 32.40	19.440
4							1	600.0	600.0	DC 32.00	19.200
5							1	1200.0	1200.0	DR 22.20	26.640
6	E.D.I.						1	200.0	200.0	PH 33.90	6.780
7							1	400.0	400.0	EN 32.40	12.960
8							1	400.0	400.0	DC 32.00	12.800
9							1	800.0	800.0	DR 22.20	17.760
						354.900	<----- SUBTOTALS THIS PAGE ----->				221.700

TECHNICAL DESCRIPTION OF THIS WORK PACKAGE:

354.900 + 221.700 = 576.600

MIR INSTALLATION

ESTIMATE --- COST ESTIMATE DETAILS

PAGE NUMBER 208

SUB-SYSTEM: MIR PULSED POWER DISTRIBUTION

DATE PRINTED: 7-AUG-92

WBS CODE: 1.1.13.1.2.4 MULT BY 1 COMPONENT : MIR CORRECTION SYSTEM INSTALLATION

DATE ESTIMATED: 2/17/92

RESPONSIBLE: LANGE

<----- MATERIAL -----> <----- LABOR ----->

ITEM NUM.	ITEM TITLE	UNIT MEAS.	NO. UNITS	FY91 \$ /UNIT	COST BASIS	TOTAL MT K\$	NO. UNITS	HOURS /UNIT	TOTAL CRAFT HOURS CODE	\$/HR	TOTAL LABOR K\$
1			0	0.		0.000					
						0.000	----- SUBTOTALS THIS PAGE -----				0.000

TECHNICAL DESCRIPTION OF THIS WORK PACKAGE:

0.000 + 0.000 = 0.000

INSTALLATION OF THE MIR CORRECTION MAGNETS IS COVERED IN WBS 1.1.13.1.1.2 .

## INSTALLATION

## ESTIMATE --- COST ESTIMATE DETAILS

PAGE NUMBER 209

SUB-SYSTEM: MIR INSTALLATION

DATE PRINTED: 7-AUG-92

WBS CODE: 1.1.13.1.3 MULT BY 1 COMPONENT : MIR VACUUM INSTALLATION

DATE ESTIMATED: 2/27/92

RESPONSIBLE: SAUER

&lt;----- MATERIAL -----&gt; &lt;----- LABOR -----&gt;

ITEM NUM.	ITEM TITLE	UNIT MEAS.	NO. UNITS	FY91 \$ /UNIT	COST BASIS	TOTAL MT K\$	NO. UNITS	HOURS /UNIT	TOTAL CRAFT HOURS CODE \$/HR	TOTAL LABOR K\$	
1	INSTALL VALVES						148	1.5	219.0 T2 18.70	4.095	
2	WELD STRAIGHT SECTIONS						104	1.5	156.0 S1 33.00	5.148	
3	CONNECT MAGNETS						550	0.5	275.0 T2 18.70	5.143	
4	LEAK CHECK VACUUM SECTION						32	120.0	3840.0 T2 18.70	71.808	
5	CERTIFY MR ION PUMPS						770	2.0	1540.0 T2 18.70	28.798	
6	INSTALL ION PUMPS						518	1.0	518.0 T2 18.70	9.649	
7	INSTALL SHIELDING						520	1.0	520.0 T2 18.70	9.724	
8	INSTALL STANDS						128	2.0	256.0 IL 27.20	6.963	
9	INSTALL MISC						1	500.0	500.0 T2 18.70	9.350	
10	INSTALL GAUGING						35	1.0	35.0 T2 18.70	0.654	
11	ION PUMP CONNECTOR						518	1.0	518.0 IE 38.20	19.711	
						0.000	----- SUBTOTALS THIS PAGE -----				171.044

TECHNICAL DESCRIPTION OF THIS WORK PACKAGE:

0.000 + 171.044 = 171.044

## INSTALLATION

## ESTIMATE --- COST ESTIMATE DETAILS

PAGE NUMBER 210

SUB-SYSTEM: MIR INSTALLATION

DATE PRINTED: 7-AUG-92

WBS CODE: 1.1.13.1.4 MULT BY 1 COMPONENT : MIR INSTRUMENTATION INSTALLATION

DATE ESTIMATED: 2/13/91

RESPONSIBLE: HAHN

&lt;----- MATERIAL -----&gt; &lt;----- LABOR -----&gt;

ITEM NUM.	ITEM TITLE	UNIT MEAS.	NO. UNITS	FY91 \$ /UNIT	COST BASIS	TOTAL MT K\$	NO. UNITS	HOURS /UNIT	TOTAL HOURS	CRAFT CODE	\$/HR	TOTAL LABOR K\$
1	LONGIT. PICKUP	INSTALLATION					1	12.0	12.0	IE	38.20	0.458
2		TERMINATION					1	0.5	0.5	IE	38.20	0.019
3	TRANSFER PICKUPS	INSTALLATION					2	12.0	24.0	IE	38.20	0.917
4		TERMINATION					2	0.5	1.0	IE	38.20	0.038
5	DAMPER:	INSTALLATION					4	12.0	48.0	IE	38.20	1.834
6		TERMINATION					4	0.5	2.0	IE	38.20	0.076
7	FLYING WIRES:	INSTALLATION					3	12.0	36.0	IE	38.20	1.375
8		TERMINATION					3	1.0	3.0	IE	38.20	0.115
9	D.C.C.T.:	INSTALLATION					1	12.0	12.0	IE	38.20	0.458
10		TERMINATION					1	0.5	0.5	IE	38.20	0.019
11	SCRAPERS:	INSTALLATION					3	12.0	36.0	IE	38.20	1.375
12		TERMINATION					3	1.0	3.0	IE	38.20	0.115
13	BPM	INSTALLATION					202	6.0	1212.0	IE	38.20	46.298
14		TERMINATION					202	0.5	101.0	IE	38.20	3.858
15	BLM	INSTALLATION					202	4.0	808.0	IE	38.20	30.866
16		TERMINATION					202	0.5	101.0	IE	38.20	3.858
17	PROFILE MONITOR	INSTALLATION					8	12.0	96.0	IE	38.20	3.667
18		TERMINATION					8	2.0	16.0	IE	38.20	0.611
19	SCHOTTKY SIGNAL	INSTALLATION					2	12.0	24.0	IE	38.20	0.917
20		TERMINATION					2	0.5	1.0	IE	38.20	0.038
21	TRANSVERSE DIAG KICKER	INSTAL					2	12.0	24.0	IE	38.20	0.917
22		TERMINATION					2	0.5	1.0	IE	38.20	0.038
23	ALIGNMENT						1	264.0	264.0	T2	18.70	4.937
24	EDI						1	100.0	100.0	EN	32.40	3.240

INSTALLATION

ESTIMATE --- COST ESTIMATE DETAILS

PAGE NUMBER 210

SUB-SYSTEM: MIR INSTALLATION

DATE PRINTED: 7-AUG-92

WBS CODE: 1.1.13.1.4 MULT BY 1 COMPONENT : MIR INSTRUMENTATION INSTALLATION

DATE ESTIMATED: 2/13/91

RESPONSIBLE: HAHN

<----- MATERIAL -----> <----- LABOR ----->

ITEM NUM.	ITEM TITLE	UNIT MEAS.	NO. UNITS	FY91 \$ /UNIT	COST BASIS	TOTAL MT K\$	NO. UNITS	HOURS /UNIT	TOTAL CRAFT HOURS CODE \$/HR	TOTAL LABOR K\$
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0.000 <----- SUBTOTALS THIS PAGE -----> 106.045

TECHNICAL DESCRIPTION OF THIS WORK PACKAGE:

0.000 + 106.045 = 106.045

INSTALLATION

ESTIMATE --- COST ESTIMATE DETAILS

PAGE NUMBER 211

SUB-SYSTEM: MIR INSTALLATION

DATE PRINTED: 7-AUG-92

WBS CODE: 1.1.13.1.5 MULT BY 1 COMPONENT : MIR CONTROLS INSTALLATION

DATE ESTIMATED: 7/ 9/92

RESPONSIBLE: LUCAS

<----- MATERIAL -----> <----- LABOR ----->

ITEM NUM.	ITEM TITLE	UNIT MEAS.	NO. UNITS	FY91 \$ /UNIT	COST BASIS	TOTAL MT K\$	NO. UNITS	HOURS /UNIT	TOTAL CRAFT HOURS	CODE	\$/HR	TOTAL LABOR K\$	
1	OPTIC CABLE PULLING, TERM'G (1)						13	166.0	2158.0	T2	18.70	40.355	
2	INSTALL MADC SYSTEM	EA	5	851.76	A88	4.259	15	24.0	360.0	T2	18.70	6.732	
3	INSTALL RACKS (2)						110	4.0	440.0	IE	38.20	16.808	
4	INSTALL CAMAC CARDS	EA	15	60.06	EE	0.901	130	5.0	650.0	T2	18.70	12.155	
5	INSTALL ETHERNET LINK						2	40.0	80.0	T2	18.70	1.496	
6	CONNECT LINK TO RACK						7	3.0	21.0	T2	18.70	0.393	
7	MRRF INSTALLATION WORK (3)						2	166.0	332.0	T2	18.70	6.208	
8	EDI						1	100.0	100.0	EN	32.40	3.240	
						5.160	<----- SUBTOTALS THIS PAGE ----->						87.387

TECHNICAL DESCRIPTION OF THIS WORK PACKAGE:

5.160 + 87.387 = 92.546

- 1) COST SCALED FROM CONTRACT PRICE FOR SIMILAR WORK IN MAIN RING.
- 2) RACKS ARE FOR ALL ELECTRONICS IN BUILDING, NOT JUST CONTROLS.
- 3) RF CONTROLS WILL ACTUALLY BE REBUILT EITHER PRIOR TO, OR AS PART OF, MI CONSTRUCTION.

MIR INSTALLATION

## ESTIMATE --- COST ESTIMATE DETAILS

PAGE NUMBER 212

SUB-SYSTEM: MIR ABORT INSTALLATION

DATE PRINTED: 7-AUG-92

WBS CODE: 1.1.13.1.8.1 MULT BY 1 COMPONENT : MIR ABORT STAND INSTALLATION

DATE ESTIMATED: 2/28/92

RESPONSIBLE: LANGE

&lt;----- MATERIAL -----&gt; &lt;----- LABOR -----&gt;

ITEM NUM.	ITEM TITLE	UNIT MEAS.	NO. UNITS	FY91 \$ /UNIT	COST BASIS	TOTAL MT K\$	NO. UNITS	HOURS /UNIT	TOTAL CRAFT HOURS CODE \$/HR	TOTAL LABOR K\$
1	DIPOLE 240" B2	SET	2	1400.	EE	2.800	2	4.0	8.0 IL 27.20	0.218
2	LAMBERTSON MAGNET	SET	2	1400.	EE	2.800	2	4.0	8.0 IL 27.20	0.218
3	QUAD - 52" BQA	SET	3	1500.	EE	4.500	3	4.0	12.0 IL 27.20	0.328
4	TRIM MAGNETS	SET	4	500.	EE	2.000	4	0.5	2.0 IL 27.20	0.054
5	KICKER MAGNET	SET	1	1400.	EE	1.400	1	4.0	4.0 IL 27.20	0.109
6	C MAGNET	SET	1	1400.	EE	1.400	1	4.0	4.0 IL 27.20	0.109
7	EDI						1	300.0	300.0 EN 32.40	9.720
8							1	300.0	300.0 DC 32.00	9.600
9							1	800.0	800.0 DR 22.20	17.760

14.900 &lt;----- SUBTOTALS THIS PAGE -----&gt; 38.114

TECHNICAL DESCRIPTION OF THIS WORK PACKAGE:

14.900 + 38.114 = 53.014

MIR INSTALLATION

## ESTIMATE --- COST ESTIMATE DETAILS

PAGE NUMBER 213

SUB-SYSTEM: MIR ABORT INSTALLATION

DATE PRINTED: 7-AUG-92

WBS CODE: 1.1.13.1.6.2 MULT BY 1 COMPONENT : MIR ABORT MAGNETS INSTALLATION

DATE ESTIMATED: 2/28/92

RESPONSIBLE: LANGE

&lt;----- MATERIAL -----&gt; &lt;----- LABOR -----&gt;

ITEM NUM.	ITEM TITLE	UNIT MEAS.	NO. UNITS	FY91 \$ /UNIT	COST BASIS	TOTAL MT K\$	NO. UNITS	HOURS /UNIT	TOTAL CRAFT HOURS	CODE	\$/HR	TOTAL LABOR K\$
1	DIPOLE - 240" B2						2	24.0	48.0	IG	42.80	2.054
2	LAMBERTSON MAGNET						2	24.0	48.0	IG	42.80	2.054
3	QUAD - 52" BQA						3	16.0	48.0	IG	42.80	2.054
4	TRIM MAGNETS						4	8.0	32.0	IL	27.20	0.870
5	HORIZ KICKER MAGNET						2	16.0	32.0	IG	42.80	1.370
6	C MAGNET						1	16.0	16.0	IG	42.80	0.685
7	EDI						1	200.0	200.0	EN	32.40	6.480
8							1	1000.0	1000.0	DC	32.00	32.000
9							1	1500.0	1500.0	DR	22.20	33.300
						0.000	<----- SUBTOTALS THIS PAGE ----->					80.868

TECHNICAL DESCRIPTION OF THIS WORK PACKAGE:

0.000 + 80.868 = 80.868



MIR INSTALLATION

## ESTIMATE --- COST ESTIMATE DETAILS

PAGE NUMBER 214

SUB-SYSTEM: MIR SLOW EXTRACTION INSTALLATION

DATE PRINTED: 7-AUG-92

WBS CODE: 1.1.13.1.7.1 MULT BY 1 COMPONENT : MIR SLOW EXTRACTION STANDS INSTALLATION

DATE ESTIMATED: 2/17/92

RESPONSIBLE: LANGE

&lt;----- MATERIAL -----&gt; &lt;----- LABOR -----&gt;

ITEM NUM.	ITEM TITLE	UNIT MEAS.	NO. UNITS	FY91 \$ /UNIT	COST BASIS	TOTAL MT K\$	NO. UNITS	HOURS /UNIT	TOTAL CRAFT HOURS CODE \$/HR	TOTAL LABOR K\$
1			0	0.		0.000				
2	EDI						1	500.0	500.0 EN 32.40	16.200
3							1	800.0	800.0 DC 32.00	25.600
4							1	800.0	800.0 DR 22.20	17.760
						0.000	<----- SUBTOTALS THIS PAGE ----->			59.560

TECHNICAL DESCRIPTION OF THIS WORK PACKAGE:

0.000 + 59.560 = 59.560

MIR SLOW EXTRACTION STAND INSTALLATION IS COVERED IN WBS # 1.1.13.1.1.1

MIR INSTALLATION

ESTIMATE --- COST ESTIMATE DETAILS

PAGE NUMBER 215

SUB-SYSTEM: MIR SLOW EXTRACTION INSTALLATION

DATE PRINTED: 7-AUG-92

WBS CODE: 1.1.13.1.7.2 MULT BY 1 COMPONENT : MIR SLOW EXTRACTION COMPONENT INSTALLATION

DATE ESTIMATED: 2/24/92

RESPONSIBLE: LANGE

<----- MATERIAL -----> <----- LABOR ----->

ITEM NUM.	ITEM TITLE	UNIT MEAS.	NO. UNITS	FY91 \$ /UNIT	COST BASIS	TOTAL MT K\$	NO. UNITS	HOURS /UNIT	TOTAL CRAFT HOURS CODE \$/HR	TOTAL LABOR K\$
1	EDI						1	200.0	200.0 EN 32.40	6.480
2							1	300.0	300.0 DC 32.00	9.600
						0.000	SUBTOTALS THIS PAGE			16.080

TECHNICAL DESCRIPTION OF THIS WORK PACKAGE:

0.000 + 16.080 = 16.080

MIR SLOW EXTRACTION COMPONENT INSTALLATION IS COVERED IN WBS1.1.13.1.1.2

## INSTALLATION

## ESTIMATE --- COST ESTIMATE DETAILS

PAGE NUMBER 218

## SUB-SYSTEM: MIR INSTALLATION

DATE PRINTED: 7-AUG-92

WBS CODE: 1.1.13.1.8 MULT BY 1 COMPONENT : MIR SAFETY SYSTEM INSTALLATION

DATE ESTIMATED: 1/18/92

RESPONSIBLE: CASEBOLT

&lt;----- MATERIAL -----&gt; &lt;----- LABOR -----&gt;

ITEM NUM.	ITEM TITLE	UNIT MEAS.	NO. UNITS	FY91 \$ /UNIT	COST BASIS	TOTAL MT K\$	NO. UNITS	HOURS /UNIT	TOTAL CRAFT HOURS CODE \$/HR	TOTAL LABOR K\$
1	INTERLOCK HARDWARE/SB	EA	14	548.	A89	7.644	14	80.0	840.0 IE 38.20	32.088
2	CABLING						1	300.0	300.0 IE 38.20	11.460
3	JUNCTION BOX/P.S.						3	30.0	90.0 IE 38.20	3.438
4	CRITICAL DEVICE						1	150.0	150.0 IG 42.80	6.420
5	P.A. AUDIO SYSTEM						1	200.0	200.0 IE 38.20	7.640
6	SECTION GATES	EA	6	1092.	A89	6.552	6	20.0	120.0 IP 41.10	4.932
7	EDI						1	350.0	350.0 EN 32.40	11.340
8							1	200.0	200.0 DC 32.00	6.400

14.196 &lt;----- SUBTOTALS THIS PAGE -----&gt; 83.718

TECHNICAL DESCRIPTION OF THIS WORK PACKAGE:

14.196 + 83.718 = 97.914

8 GEV LINE

## ESTIMATE --- COST ESTIMATE DETAILS

PAGE NUMBER 217

SUB-SYSTEM: 8 GEV LINE/SURVEY &amp; ALIGN MAGNETS

DATE PRINTED: 7-AUG-92

WBS CODE: 1.1.13.2.1.1 MULT BY 1 COMPONENT : 8 GEV LINE/INSTALL MAGNET STANDS

DATE ESTIMATED: 2/28/92

RESPONSIBLE: LANGE

&lt;----- MATERIAL -----&gt; &lt;----- LABOR -----&gt;

ITEM NUM.	ITEM TITLE	UNIT MEAS.	NO. UNITS	FY91 \$ /UNIT	COST BASIS	TOTAL MT K\$	NO. UNITS	HOURS /UNIT	TOTAL CRAFT HOURS CODE \$/HR	TOTAL LABOR K\$
1	DIPOLES - 240" B3	SET	2	1400.	EE	2.800	2	2.0	4.0 IL 27.20	0.109
2	DIPOLES - 240" B2	SET	51	1400.	EE	71.400	51	2.0	102.0 IL 27.20	2.774
3	DIPOLES - EPB	SET	3	1400.	EE	4.200	3	2.0	6.0 IL 27.20	0.163
4	DIPOLES - SDB	SET	2	2730.	EE	5.460	2	6.0	12.0 IG 42.80	0.514
5	QUADS - SQA	SET	51	700.	EE	35.700	51	2.0	102.0 IL 27.20	2.774
6	LAMBERTSON	SET	1	1400.	EE	1.400	1	2.0	2.0 IL 27.20	0.054
7	INJ. KICKERS - MK90	SET	4	1400.	EE	5.600	4	2.0	8.0 IL 27.20	0.218
8	TRIM (H) VERNIER	SET	25	500.	EE	12.500	25	0.5	12.5 IL 27.20	0.340
9	TRIM (V) VERNIER	SET	25	500.	EE	12.500	25	0.5	12.5 IL 27.20	0.340
10	INSTALLATION EQT	SET	1	10000.	EE	10.000				
11	EDI						1	1800.0	1800.0 EN 32.40	58.320
12							1	1200.0	1200.0 DC 32.00	38.400
13							1	3000.0	3000.0 DR 22.20	66.600
14							1	3000.0	3000.0 AD 20.00	60.000
						161.560	<----- SUBTOTALS THIS PAGE ----->			230.608
TECHNICAL DESCRIPTION OF THIS WORK PACKAGE:						161.560 + 230.608 = 392.168				

8 GEV LINE

## ESTIMATE --- COST ESTIMATE DETAILS

PAGE NUMBER 218

SUB-SYSTEM: 8 GEV LINE/SURVEY &amp; ALIGN MAGNETS

DATE PRINTED: 7-AUG-92

WBS CODE: 1.1.13.2.1.2 MULT BY 1 COMPONENT : 8 GEV LINE/INSTALL MAGNETS

DATE ESTIMATED: 2/28/92

RESPONSIBLE: LANGE

&lt;----- MATERIAL -----&gt; &lt;----- LABOR -----&gt;

ITEM NUM.	ITEM TITLE	UNIT MEAS.	NO. UNITS	FY91 \$ /UNIT	COST BASIS	TOTAL MT K\$	NO. UNITS	HOURS /UNIT	TOTAL CRAFT HOURS	CODE	\$/HR	TOTAL LABOR K\$	
1	DIPOLES - 240" B3						2	16.0	32.0	IG	42.80	1.370	
2	DIPOLES - 240" B2						51	16.0	816.0	IG	42.80	34.925	
3	DIPOLES - EPB						3	16.0	48.0	IG	42.80	2.054	
4	DIPOLES - SDB						2	24.0	48.0	IG	42.80	2.054	
5	QUADS (SQA)						51	12.0	612.0	IG	42.80	26.194	
6	LAMBERTSON						1	24.0	24.0	IG	42.80	1.027	
7	INJ. KICKERS						4	16.0	64.0	IG	42.80	2.739	
8	TRIM (H) VERNIER						25	4.0	100.0	IL	27.20	2.720	
9	TRIM (V) VERNIER						25	4.0	100.0	IL	27.20	2.720	
10	EDI						1	600.0	600.0	EN	32.40	19.440	
11							1	500.0	500.0	DC	32.00	16.000	
12							1	1200.0	1200.0	DR	22.20	26.640	
						0.000	<----- SUBTOTALS THIS PAGE ----->						137.883

TECHNICAL DESCRIPTION OF THIS WORK PACKAGE:

0.000 + 137.883 = 137.883

8 GEV LINE

## ESTIMATE --- COST ESTIMATE DETAILS

PAGE NUMBER 219

SUB-SYSTEM: 8 GEV LINE/SURVEY &amp; ALIGN MAGNETS

DATE PRINTED: 7-AUG-92

WBS CODE: 1.1.13.2.1.3 MULT BY 1 COMPONENT : 8 GEV LINE/SURVEY &amp; ALIGN MAGNETS

DATE ESTIMATED: 2/17/92

RESPONSIBLE: MOORE

&lt;----- MATERIAL -----&gt; &lt;----- LABOR -----&gt;

ITEM NUM.	ITEM TITLE	UNIT MEAS.	NO. UNITS	FY91 \$ /UNIT	COST BASIS	TOTAL MT K\$	NO. UNITS	HOURS /UNIT	TOTAL CRAFT HOURS CODE	\$/HR	TOTAL LABOR K\$
1	8GEV TRANSPORT LINES(MAG&STAND)						160	8.0	1280.0	IA 31.10	39.808
2							54	12.0	648.0	IA 31.10	20.153
3	120GEV TRANSPORT LINE(MAG&STAND)						40	8.0	320.0	IA 31.10	9.952
4	MONUMENT						14	12.0	168.0	IA 31.10	5.225
5	150GEV MI TO TEV(P+PBAR) (M & S)						108	8.0	864.0	IA 31.10	26.870
6	MONUMENT						36	12.0	432.0	IA 31.10	13.435
7	EDI						1	100.0	100.0	EN 32.40	3.240

-----  
0.000 <----- SUBTOTALS THIS PAGE -----> 118.683  
-----

TECHNICAL DESCRIPTION OF THIS WORK PACKAGE:

0.000 + 118.683 = 118.683

120 GEV/PBAR PROD LINE MAGNETS INCREASED BY 173% - 4/18/91 150 GEV LINE MAGNETS INCREASED BY 25% - 4/18/91.

INSTALLATION

ESTIMATE --- COST ESTIMATE DETAILS

PAGE NUMBER 220

SUB-SYSTEM: 8 GEV LINE

DATE PRINTED: 7-AUG-92

WBS CODE: 1.1.13.2.2 MULT BY 1 COMPONENT : 8 GEV LINE CORR MAGNET INSTALLATION

DATE ESTIMATED: 2/17/92

RESPONSIBLE: LANGE

<----- MATERIAL -----> <----- LABOR ----->

ITEM NUM.	ITEM TITLE	UNIT MEAS.	NO. UNITS	FY91 \$ /UNIT	COST BASIS	TOTAL MT K\$	NO. UNITS	HOURS /UNIT	TOTAL CRAFT HOURS CODE	\$/HR	TOTAL LABOR K\$
1			0	0.		0.000					
2	EDI						1	250.0	250.0	EN 32.40	8.100
3							1	300.0	300.0	DC 32.00	9.600
						0.000	SUBTOTALS THIS PAGE				17.700

TECHNICAL DESCRIPTION OF THIS WORK PACKAGE:

0.000 + 17.700 = 17.700

8 GEV LINE CORR MAGNET INSTALLATION IS COVERED IN WBS # 1.1.13.2.1.2

INSTALLATION

ESTIMATE --- COST ESTIMATE DETAILS

PAGE NUMBER 221

SUB-SYSTEM: 8 GEV LINE

DATE PRINTED: 7-AUG-92

WBS CODE: 1.1.13.2.3 MULT BY 1 COMPONENT : 8 GEV LINE VACUUM INSTALLATION

DATE ESTIMATED: 2/27/92

RESPONSIBLE: SAUER

<----- MATERIAL -----> <----- LABOR ----->

ITEM NUM.	ITEM TITLE	UNIT MEAS.	NO. UNITS	FY91 \$ /UNIT	COST BASIS	TOTAL MT K\$	NO. UNITS	HOURS /UNIT	TOTAL CRAFT HOURS CODE \$/HR	TOTAL LABOR K\$
1	INSTALL VALVES						13	1.5	19.5 T2 18.70	0.365
2	WELD TUBE & BELLOWS						70	1.5	105.0 S1 33.00	3.465
3	INSTALL STANDS						100	2.0	200.0 IL 27.20	5.440
4	CONNECT MAGNETS						110	0.5	55.0 T2 18.70	1.028
5	LEAK CHECK VACUUM SECTION						4	120.0	480.0 T2 18.70	8.976
6	INSTALL ION PUMPS						47	1.0	47.0 T2 18.70	0.879
7	ION PUMP CONNECTOR						49	1.0	49.0 IE 38.20	1.872
8	WELD 6" TEE						2	2.0	4.0 S1 33.00	0.132
9	INSTALL GAUGE TREE						8	1.0	8.0 T2 18.70	0.150
10	INSTALL WINDOW						1	13.0	13.0 T2 18.70	0.243

0.000 <----- SUBTOTALS THIS PAGE -----> 22.550

TECHNICAL DESCRIPTION OF THIS WORK PACKAGE:

0.000 + 22.550 = 22.550



INSTALLATION

## ESTIMATE --- COST ESTIMATE DETAILS

PAGE NUMBER 222

SUB-SYSTEM: 8 GEV LINE

DATE PRINTED: 7-AUG-92

WBS CODE: 1.1.13.2.4

MULT BY 1

COMPONENT : 8 GEV LINE INSTRUMENTATION INSTALLATION

DATE ESTIMATED: 4/23/91

RESPONSIBLE: HAHN

&lt;----- MATERIAL -----&gt; &lt;----- LABOR -----&gt;

ITEM NUM.	ITEM TITLE	UNIT MEAS.	NO. UNITS	FY91 \$ /UNIT	COST BASIS	TOTAL MT K\$	NO. UNITS	HOURS /UNIT	TOTAL CRAFT HOURS	CODE	\$/HR	TOTAL LABOR K\$	
1	BEAM TORROIDS: INSTALLATION						10	12.0	120.0	IE	38.20	4.584	
2	TERMINATION						10	0.5	5.0	IE	38.20	0.191	
3	PROFILE MONITORS: INSTALLATION						36	12.0	432.0	IE	38.20	16.502	
4	TERMINATION						36	2.0	72.0	IE	38.20	2.750	
5	BPM SYSTEM INSTALLATION						93	6.0	558.0	IE	38.20	21.316	
6	TERMINATION						93	0.5	46.5	IE	38.20	1.776	
7	BLM SYSTEMS: INSTALLATION						80	6.0	480.0	IE	38.20	18.336	
8	TERMINATION						80	0.5	40.0	IE	38.20	1.528	
9	ALIGNMENT						1	864.0	864.0	T2	18.70	16.157	
10	EDI						1	100.0	100.0	EN	32.40	3.240	
						0.000	<----- SUBTOTALS THIS PAGE ----->						86.381

TECHNICAL DESCRIPTION OF THIS WORK PACKAGE:

0.000 + 86.381 = 86.381

NEED TO BE SURVEYED AND INSTALLED.

1/2 HR/UNIT) NO NEED FOR SURVEY.

UADS AND ARE ALREADY SURVEYED.

PHYSICAL PLACEMENT OF ION CHAMBER BY INSTRUMENTATION TECH (

26 OUT OF 93 WILL NEED TO BE SURVEYED IN. THE REST ARE IN Q

150 GEV PROT LINE

ESTIMATE --- COST ESTIMATE DETAILS

PAGE NUMBER 223

SUB-SYSTEM: 150 GEV PROT LINE MAGNET INSTALLATION

DATE PRINTED: 7-AUG-92

WBS CODE: 1.1.13.3.1.1 MULT BY 1 COMPONENT : 150 GEV PROT LINE/INSTALL MAGNET STANDS

DATE ESTIMATED: 2/28/92

RESPONSIBLE: LANGE

&lt;----- MATERIAL -----&gt; &lt;----- LABOR -----&gt;

ITEM NUM.	ITEM TITLE	UNIT MEAS.	NO. UNITS	FY91 \$ /UNIT	COST BASIS	TOTAL MT K\$	NO. UNITS	HOURS /UNIT	TOTAL HOURS	CRAFT CODE	\$/HR	TOTAL LABOR K\$	
1	LAMBERTSON	SET	6	1400.	EE	8.400	6	2.0	12.0	IL	27.20	0.328	
2	C-MAGNETS	SET	10	1400.	EE	14.000	10	2.0	20.0	IL	27.20	0.544	
3	DIPOLES - 240" B2	SET	30	1400.	EE	42.000	30	2.0	60.0	IL	27.20	1.632	
4	DIPOLES -240" 2XB2	SET	2	1400.	EE	2.800	2	2.0	4.0	IL	27.20	0.109	
5	QUADS - 84" BQB	SET	29	1500.	EE	43.500	29	2.0	58.0	IL	27.20	1.578	
6	QUADS - 52" BQA	SET	8	1500.	EE	12.000	8	2.0	16.0	IL	27.20	0.435	
7	TRIMS (H)	SET	12	500.	EE	6.000	12	0.5	6.0	IL	27.20	0.163	
8	TRIMS (V)	SET	12	500.	EE	6.000	12	0.5	6.0	IL	27.20	0.163	
9	INSTALLATION EQT	SET	1	10000.	EE	10.000							
10	EDI						1	800.0	800.0	EN	32.40	25.920	
11							1	1000.0	1000.0	DC	32.00	32.000	
12							1	1500.0	1500.0	DR	22.20	33.300	
13							1	300.0	300.0	AD	20.00	6.000	
						144.700	<----- SUBTOTALS THIS PAGE ----->						102.170
TECHNICAL DESCRIPTION OF THIS WORK PACKAGE:						144.700 + 102.170 = 246.870							

150 GEV PROT LINE

## ESTIMATE --- COST ESTIMATE DETAILS

PAGE NUMBER 224

SUB-SYSTEM: 150 GEV PROT LINE MAGNET INSTALLATION

DATE PRINTED: 7-AUG-92

WBS CODE: 1.1.13.3.1.2 MULT BY 1 COMPONENT : 150 GEV PROT LINE/INSTALL MAGNETS

DATE ESTIMATED: 2/28/92

RESPONSIBLE: LANGE

&lt;----- MATERIAL -----&gt; &lt;----- LABOR -----&gt;

ITEM NUM.	ITEM TITLE	UNIT MEAS.	NO. UNITS	FY91 \$ /UNIT	COST BASIS	TOTAL MT K\$	NO. UNITS	HOURS /UNIT	TOTAL CRAFT HOURS	CODE	\$/HR	TOTAL LABOR K\$	
1	LAMB						6	24.0	144.0	IG	42.80	6.163	
2	C-MAGNET						10	16.0	160.0	IG	42.80	6.848	
3	DIPOLES 240" B2						30	16.0	480.0	IG	42.80	20.544	
4	DIPOLES 240" 2XB2						2	16.0	32.0	IG	42.80	1.370	
5	QUADS 84" BQB						29	12.0	348.0	IG	42.80	14.894	
6	QUADS 52" BQA						8	12.0	96.0	IG	42.80	4.109	
7	TERMS (H)						12	4.0	48.0	IG	42.80	2.054	
8	TERMS (V)						12	4.0	48.0	IG	42.80	2.054	
9	EDI						1	600.0	600.0	EN	32.40	19.440	
10							1	300.0	300.0	DC	32.00	9.600	
11							1	1000.0	1000.0	DR	22.20	22.200	
						0.000	SUBTOTALS THIS PAGE						109.277

TECHNICAL DESCRIPTION OF THIS WORK PACKAGE:

0.000 + 109.277 = 109.277

150 GEV PROT LINE

ESTIMATE --- COST ESTIMATE DETAILS

PAGE NUMBER 225

SUB-SYSTEM: 150 GEV PROT LINE MAGNET INSTALLATION

DATE PRINTED: 7-AUG-92

WBS CODE: 1.1.13.3.1.3 MULT BY 1 COMPONENT : 150 GEV PROT LINE/SURVEY & ALLIGNMENT MAGNETS

DATE ESTIMATED: 4/23/91

RESPONSIBLE: MOORE

<----- MATERIAL -----> <----- LABOR ----->

ITEM NUM.	ITEM TITLE	UNIT MEAS.	NO. UNITS	FY91 \$ /UNIT	COST BASIS	TOTAL MT K\$	NO. UNITS	HOURS /UNIT	TOTAL CRAFT HOURS CODE	\$/HR	TOTAL LABOR K\$
1	EDI						1	100.0	100.0 EN	32.40	3.240
						0.000	----- SUBTOTALS THIS PAGE -----				3.240

TECHNICAL DESCRIPTION OF THIS WORK PACKAGE:

0.000 + 3.240 = 3.240

T2 LABOR IS COVERED IN 8 GEV LINE ESTIMATE.

INSTALLATION

ESTIMATE --- COST ESTIMATE DETAILS

PAGE NUMBER 226

SUB-SYSTEM: 150 GEV PROT LINE

DATE PRINTED: 7-AUG-92

WBS CODE: 1.1.13.3.2 MULT BY 1 COMPONENT : 150 GEV PROT LINE/CORRECTION ELE INSTALL

DATE ESTIMATED: 2/17/92

RESPONSIBLE: LANGE

<----- MATERIAL -----> <----- LABOR ----->

ITEM NUM.	ITEM TITLE	UNIT MEAS.	NO. UNITS	FY91 \$ /UNIT	COST BASIS	TOTAL MT K\$	NO. UNITS	HOURS /UNIT	TOTAL CRAFT HOURS CODE	\$/HR	TOTAL LABOR K\$
1	EDI						1	250.0	250.0 EN	32.40	8.100
2							1	300.0	300.0 DC	32.00	9.600
						0.000	SUBTOTALS THIS PAGE				17.700

TECHNICAL DESCRIPTION OF THIS WORK PACKAGE:

0.000 + 17.700 = 17.700

150 GEV PROT LINE CORR MAGNET INSTALLATION IS COVERED IN WBS#1.1.13.3.1.1

INSTALLATION

## ESTIMATE --- COST ESTIMATE DETAILS

PAGE NUMBER 227

SUB-SYSTEM: 150 GEV PROT LINE

DATE PRINTED: 7-AUG-92

WBS CODE: 1.1.13.3.3 MULT BY 1 COMPONENT : 150 GEV PROT LINE/VACUUM INSTALLATION

DATE ESTIMATED: 2/27/92

RESPONSIBLE: SAUER

&lt;----- MATERIAL -----&gt; &lt;----- LABOR -----&gt;

ITEM NUM.	ITEM TITLE	UNIT MEAS.	NO. UNITS	FY91 \$ /UNIT	COST BASIS	TOTAL MT K\$	NO. UNITS	HOURS /UNIT	TOTAL CRAFT HOURS CODE	\$/HR	TOTAL LABOR K\$
1	INSTALL VALVES						14	1.5	21.0 T2	18.70	0.393
2	WELD TUBE & BELLOWS						33	1.5	49.5 S1	33.00	1.633
3	INSTALL STANDS						26	2.0	52.0 IL	27.20	1.414
4	CONNECT MAGNETS						66	0.5	33.0 T2	18.70	0.617
5	LEAK CHECK VACUUM SECTION						4	120.0	480.0 T2	18.70	8.976
6	INSTALL ION PUMPS						44	1.0	44.0 T2	18.70	0.823
7	ION PUMP CONNECTOR						44	1.0	44.0 IE	38.20	1.681
8	WELD 6" TEE						4	2.0	8.0 S1	33.00	0.264
9	INSTALL GAUGE TREE						12	1.0	12.0 T2	18.70	0.224
10	INSTALL WINDOW						2	1.0	2.0 T2	18.70	0.037
						0.000	SUBTOTALS THIS PAGE				18.063
TECHNICAL DESCRIPTION OF THIS WORK PACKAGE:						0.000 + 18.063 = 18.063					

INSTALLATION

ESTIMATE --- COST ESTIMATE DETAILS

PAGE NUMBER 228

SUB-SYSTEM: 150 GEV PROT LINE

DATE PRINTED: 7-AUG-92

WBS CODE: 1.1.13.3.4 MULT BY 1 COMPONENT : 150 GEV PROT LINE/INST INSTALLATION

DATE ESTIMATED: 2/17/92

RESPONSIBLE: LANGE

<----- MATERIAL -----> <----- LABOR ----->

ITEM NUM.	ITEM TITLE	UNIT MEAS.	NO. UNITS	FY91 \$ /UNIT	COST BASIS	TOTAL MT K\$	NO. UNITS	HOURS /UNIT	TOTAL CRAFT HOURS CODE	\$/HR	TOTAL LABOR K\$
1	EDI						1	100.0	100.0	EN 32.40	3.240
						0.000	SUBTOTALS THIS PAGE				3.240

TECHNICAL DESCRIPTION OF THIS WORK PACKAGE:

0.000 + 3.240 = 3.240

150 GEV PBAR LINE

ESTIMATE --- COST ESTIMATE DETAILS

PAGE NUMBER 229

SUB-SYSTEM: 150 GEV PBAR LINE/MAGNET INSTALLATION

DATE PRINTED: 7-AUG-92

WBS CODE: 1.1.13.4.1.1 MULT BY 1 COMPONENT : 150 GEV PBAR LINE/MAGNETS STANDS INSTALL

DATE ESTIMATED: 2/17/92

RESPONSIBLE: LANGE

<----- MATERIAL -----> <----- LABOR ----->

ITEM NUM.	ITEM TITLE	UNIT MEAS.	NO. UNITS	FY91 \$ /UNIT	COST BASIS	TOTAL MT K\$	NO. UNITS	HOURS /UNIT	TOTAL CRAFT HOURS CODE \$/HR	TOTAL LABOR K\$
1			0	0.		0.000				
						0.000	----- SUBTOTALS THIS PAGE -----			0.000
TECHNICAL DESCRIPTION OF THIS WORK PACKAGE:						0.000 +	0.000 =	0.000		

150 GEV PBAR COMPONENTS ARE INCLUDED IN 150 GEV PROT LINE.



150 GEV PBAR LINE

ESTIMATE --- COST ESTIMATE DETAILS

PAGE NUMBER 230

SUB-SYSTEM: 150 GEV PBAR LINE/MAGNET INSTALLATION

DATE PRINTED: 7-AUG-92

WBS CODE: 1.1.13.4.1.2 MULT BY 1 COMPONENT : 150 GEV PBAR LINE/MAGNET INSTALL

DATE ESTIMATED: 2/17/92

RESPONSIBLE: LANGE

<----- MATERIAL -----> <----- LABOR ----->

ITEM NUM.	ITEM TITLE	UNIT MEAS.	NO. UNITS	FY91 \$ /UNIT	COST BASIS	TOTAL MT K\$	NO. UNITS	HOURS /UNIT	TOTAL CRAFT HOURS CODE \$/HR	TOTAL LABOR K\$
--------------	------------	---------------	--------------	------------------	---------------	-----------------	--------------	----------------	---------------------------------	--------------------

1			0	0.		0.000				
---	--	--	---	----	--	-------	--	--	--	--

0.000	<-----	SUBTOTALS THIS PAGE	----->	0.000
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TECHNICAL DESCRIPTION OF THIS WORK PACKAGE:

0.000 + 0.000 = 0.000

150 GEV PBAR COMPONENTS ARE INCLUDED IN 150 GEV PROT LINE.

150 GEV PBAR LINE

ESTIMATE --- COST ESTIMATE DETAILS

PAGE NUMBER 231

SUB-SYSTEM: 150 GEV PBAR LINE/MAGNET INSTALLATION

DATE PRINTED: 7-AUG-92

WBS CODE: 1.1.13.4.1.3 MULT BY 1 COMPONENT : 150 GEV PBAR LINE/SURVEY & ALIGNMENT

DATE ESTIMATED: 4/23/91

RESPONSIBLE: MOORE

<----- MATERIAL -----> <----- LABOR ----->

ITEM NUM.	ITEM TITLE	UNIT MEAS.	NO. UNITS	FY91 \$ /UNIT	COST BASIS	TOTAL MT K\$	NO. UNITS	HOURS /UNIT	TOTAL CRAFT HOURS CODE	\$/HR	TOTAL LABOR K\$
1	EDI						1	100.0	100.0	EN 32.40	3.240
						0.000	SUBTOTALS THIS PAGE				3.240

TECHNICAL DESCRIPTION OF THIS WORK PACKAGE:

0.000 + 3.240 = 3.240

T2 LABOR IS COVERED IN 8 GEV LINE ESTIMATE.

INSTALLATION

ESTIMATE --- COST ESTIMATE DETAILS

PAGE NUMBER 232

SUB-SYSTEM: 150 GEV PBAR LINE

DATE PRINTED: 7-AUG-92

WBS CODE: 1.1.13.4.2 MULT BY 1 COMPONENT : MIR CORRECTION ELEMENT INSTALLATION

DATE ESTIMATED: 2/17/92

RESPONSIBLE: LANGE

<----- MATERIAL -----> <----- LABOR ----->

ITEM NUM.	ITEM TITLE	UNIT MEAS.	NO. UNITS	FY91 \$ /UNIT	COST BASIS	TOTAL MT K\$	NO. UNITS	HOURS /UNIT	TOTAL CRAFT HOURS CODE \$/HR	TOTAL LABOR K\$
--------------	------------	---------------	--------------	------------------	---------------	-----------------	--------------	----------------	---------------------------------	--------------------

1			0	0.		0.000				
---	--	--	---	----	--	-------	--	--	--	--

0.000 <----- SUBTOTALS THIS PAGE -----> 0.000

TECHNICAL DESCRIPTION OF THIS WORK PACKAGE:

0.000 + 0.000 = 0.000

150 GEV PBAR COMPONENTS ARE INCLUDED IN 150 GEV PROT LINE.

INSTALLATION

ESTIMATE --- COST ESTIMATE DETAILS

PAGE NUMBER 233

SUB-SYSTEM: 150 GEV PBAR LINE

DATE PRINTED: 7-AUG-92

WBS CODE: 1.1.13.4.3 MULT BY 1 COMPONENT : MIR VACUUM INSTALLATION

DATE ESTIMATED: 2/27/92

RESPONSIBLE: SAUER

<----- MATERIAL -----> <----- LABOR ----->

ITEM NUM.	ITEM TITLE	UNIT MEAS.	NO. UNITS	FY91 \$ /UNIT	COST BASIS	TOTAL MT K\$	NO. UNITS	HOURS /UNIT	TOTAL CRAFT HOURS CODE	\$/HR	TOTAL LABOR K\$
1			0	0.		0.000					
						0.000	<----- SUBTOTALS THIS PAGE ----->				0.000
TECHNICAL DESCRIPTION OF THIS WORK PACKAGE:						0.000 +	0.000 =	0.000			

INSTALLATION

ESTIMATE --- COST ESTIMATE DETAILS

PAGE NUMBER 234

SUB-SYSTEM: 150 GEV PBAR LINE

DATE PRINTED: 7-AUG-92

WBS CODE: 1.1.13.4.4 MULT BY 1 COMPONENT : MIR INSTRUMENTATION INSTALLATION

DATE ESTIMATED: 2/17/92

RESPONSIBLE: LANGE

<----- MATERIAL -----> <----- LABOR ----->

ITEM NUM.	ITEM TITLE	UNIT MEAS.	NO. UNITS	FY91 \$ /UNIT	COST BASIS	TOTAL MT K\$	NO. UNITS	HOURS /UNIT	TOTAL CRAFT HOURS CODE	\$/HR	TOTAL LABOR K\$
1			0	0.		0.000					
						0.000	----- SUBTOTALS THIS PAGE -----				0.000
TECHNICAL DESCRIPTION OF THIS WORK PACKAGE:						0.000 +	0.000 =	0.000			

150 GEV PBAR COMPONENTS ARE INCLUDED IN 150 GEV PROT LINE.

PBAR PRODUCTION LINE

ESTIMATE --- COST ESTIMATE DETAILS

PAGE NUMBER 235

SUB-SYSTEM: PBAR PROD LINE/MAGNET INSTALLATION

DATE PRINTED: 7-AUG-92

WBS CODE: 1.1.13.5.1.1 MULT BY 1 COMPONENT : PBAR PROD LINE/INSTALL MAGNET STANDS

DATE ESTIMATED: 2/17/92

RESPONSIBLE: LANGE

<----- MATERIAL -----> <----- LABOR ----->

ITEM NUM.	ITEM TITLE	UNIT MEAS.	NO. UNITS	FY91 \$ /UNIT	COST BASIS	TOTAL MT K\$	NO. UNITS	HOURS /UNIT	TOTAL CRAFT HOURS CODE	\$/HR	TOTAL LABOR K\$
--------------	------------	---------------	--------------	------------------	---------------	-----------------	--------------	----------------	---------------------------	-------	--------------------

1			0	0.		0.000					
---	--	--	---	----	--	-------	--	--	--	--	--

0.000 <----- SUBTOTALS THIS PAGE -----> 0.000

TECHNICAL DESCRIPTION OF THIS WORK PACKAGE:

0.000 + 0.000 = 0.000

PBAR PROD LINE COMPONENTS ARE INCLUDED IN 150 GEV PROT. LINE

PBAR PRODUCTION LINE

ESTIMATE --- COST ESTIMATE DETAILS

PAGE NUMBER 236

SUB-SYSTEM: PBAR PROD LINE/MAGNET INSTALLATION

DATE PRINTED: 7-AUG-92

WBS CODE: 1.1.13.5.1.2 MULT BY 1 COMPONENT : PBAR PROD LINE/INSTALL MAGNETS

DATE ESTIMATED: 2/17/92

RESPONSIBLE: LANGE

<----- MATERIAL -----> <----- LABOR ----->

ITEM NUM.	ITEM TITLE	UNIT MEAS.	NO. UNITS	FY91 \$ /UNIT	COST BASIS	TOTAL MT K\$	NO. UNITS	HOURS /UNIT	TOTAL CRAFT HOURS CODE \$/HR	TOTAL LABOR K\$
--------------	------------	---------------	--------------	------------------	---------------	-----------------	--------------	----------------	---------------------------------	--------------------

1			0	0.		0.000				
---	--	--	---	----	--	-------	--	--	--	--

0.000 <----- SUBTOTALS THIS PAGE -----> 0.000

TECHNICAL DESCRIPTION OF THIS WORK PACKAGE:

0.000 + 0.000 = 0.000

PBAR PROD LINE COMPONENTS ARE INCLUDED IN 150 GEV PROT. LINE

PBAR PRODUCTION LINE

ESTIMATE --- COST ESTIMATE DETAILS

PAGE NUMBER 237

SUB-SYSTEM: PBAR PROD LINE/MAGNET INSTALLATION

DATE PRINTED: 7-AUG-92

WBS CODE: 1.1.13.5.1.3 MULT BY 1 COMPONENT : PBAR PROD LINE/SURVEY & ALSIGNMENT

DATE ESTIMATED: 4/23/91

RESPONSIBLE: MOORE

<----- MATERIAL -----> <----- LABOR ----->

ITEM NUM.	ITEM TITLE	UNIT MEAS.	NO. UNITS	FY91 \$ /UNIT	COST BASIS	TOTAL MT K\$	NO. UNITS	HOURS /UNIT	TOTAL CRAFT HOURS CODE	\$/HR	TOTAL LABOR K\$
1			0	0.		0.000					
2	EDI						1	100.0	100.0	EN 32.40	3.240
						0.000	<----- SUBTOTALS THIS PAGE ----->				3.240

TECHNICAL DESCRIPTION OF THIS WORK PACKAGE:

0.000 + 3.240 = 3.240

T2 LABOR IS COVERED IN 8 GEVS LINE ESTIMATE.



INSTALLATION

ESTIMATE --- COST ESTIMATE DETAILS

PAGE NUMBER 238

SUB-SYSTEM: PBAR PRODUCTION LINE

DATE PRINTED: 7-AUG-92

WBS CODE: 1.1.13.5.2 MULT BY 1 COMPONENT : PBAR PROD LINE/CORR ELEMENT INSTALL

DATE ESTIMATED: 2/17/92

RESPONSIBLE: LANGE

<----- MATERIAL -----> <----- LABOR ----->

ITEM NUM.	ITEM TITLE	UNIT MEAS.	NO. UNITS	FY91 \$ /UNIT	COST BASIS	TOTAL MT K\$	NO. UNITS	HOURS /UNIT	TOTAL CRAFT HOURS CODE \$/HR	TOTAL LABOR K\$
--------------	------------	---------------	--------------	------------------	---------------	-----------------	--------------	----------------	---------------------------------	--------------------

1			0	0.		0.000				
---	--	--	---	----	--	-------	--	--	--	--

0.000 <----- SUBTOTALS THIS PAGE -----> 0.000

TECHNICAL DESCRIPTION OF THIS WORK PACKAGE:

0.000 + 0.000 = 0.000

PBAR PROD LINE COMPONENTS ARE INCLUDED IN 150 GEV PROT. LINE

INSTALLATION

ESTIMATE --- COST ESTIMATE DETAILS

PAGE NUMBER 239

SUB-SYSTEM: PBAR PRODUCTION LINE

DATE PRINTED: 7-AUG-92

WBS CODE: 1.1.13.5.3 MULT BY 1 COMPONENT : PBAR PROD LINE/VACUUM INSTALLATION

DATE ESTIMATED: 2/27/92

RESPONSIBLE: SAUER

<----- MATERIAL -----> <----- LABOR ----->

ITEM NUM.	ITEM TITLE	UNIT MEAS.	NO. UNITS	FY91 \$ /UNIT	COST BASIS	TOTAL MT K\$	NO. UNITS	HOURS /UNIT	TOTAL CRAFT HOURS CODE \$/HR	TOTAL LABOR K\$
--------------	------------	---------------	--------------	------------------	---------------	-----------------	--------------	----------------	---------------------------------	--------------------

1			0	0.		0.000				
---	--	--	---	----	--	-------	--	--	--	--

0.000 <----- SUBTOTALS THIS PAGE -----> 0.000

TECHNICAL DESCRIPTION OF THIS WORK PACKAGE:

0.000 + 0.000 = 0.000

INSTALLATION

ESTIMATE --- COST ESTIMATE DETAILS

PAGE NUMBER 240

SUB-SYSTEM: PBAR PRODUCTION LINE

DATE PRINTED: 7-AUG-92

WBS CODE: 1.1.13.5.4 MULT BY 1 COMPONENT : PBAR PROD LINE/INST INSTALLATION

DATE ESTIMATED: 2/17/92

RESPONSIBLE: LANGE

<----- MATERIAL -----> <----- LABOR ----->

ITEM NUM.	ITEM TITLE	UNIT MEAS.	NO. UNITS	FY91 \$ /UNIT	COST BASIS	TOTAL MT K\$	NO. UNITS	HOURS /UNIT	TOTAL CRAFT HOURS CODE	\$/HR	TOTAL LABOR K\$
1			0	0.		0.000					
						0.000	----- SUBTOTALS THIS PAGE -----				0.000

TECHNICAL DESCRIPTION OF THIS WORK PACKAGE:

0.000 + 0.000 = 0.000

PBAR PROD LINE COMPONENTS ARE INCLUDED IN 150 GEV PROT. LINE

## SLOW SPILL INSTALLATION

## ESTIMATE --- COST ESTIMATE DETAILS

PAGE NUMBER 241

SUB-SYSTEM: SLOW SPILL/MAGNET INSTALLATION

DATE PRINTED: 7-AUG-92

WBS CODE: 1.1.13.6.1.1 MULT BY 1 COMPONENT : SLOW SPILL/INSTALL MAGNET STANDS

DATE ESTIMATED: 2/28/92

RESPONSIBLE: LANGE

&lt;----- MATERIAL -----&gt; &lt;----- LABOR -----&gt;

ITEM NUM.	ITEM TITLE	UNIT MEAS.	NO. UNITS	FY91 \$ /UNIT	COST BASIS	TOTAL MT K\$	NO. UNITS	HOURS /UNIT	TOTAL CRAFT HOURS CODE \$/HR	TOTAL LABOR K\$
1	DIPOLLES 240" B2	SET	4	1400.	EE	5.600	4	4.0	16.0 IL 27.20	0.435
2	DIPOLLES 240" B3	SET	1	1400.	EE	1.400	1	4.0	4.0 IL 27.20	0.109
3	TRIMS (H)	SET	32	500.	EE	16.000	32	2.0	64.0 IL 27.20	1.741
4	INSTALLATION EQT.	SET	1	5000.	EE	5.000				
5	EDI						1	500.0	500.0 EN 32.40	16.200
6							1	300.0	300.0 DC 32.00	9.600
7							1	900.0	900.0 DR 22.20	19.980
8							1	200.0	200.0 AD 20.00	4.000

28.000 <----- SUBTOTALS THIS PAGE -----> 52.065

TECHNICAL DESCRIPTION OF THIS WORK PACKAGE:

28.000 + 52.065 = 80.065

## SLOW SPILL INSTALLATION

## ESTIMATE --- COST ESTIMATE DETAILS

PAGE NUMBER 242

SUB-SYSTEM: SLOW SPILL/MAGNET INSTALLATION

DATE PRINTED: 7-AUG-92

WBS CODE: 1.1.13.6.1.2 MULT BY 1 COMPONENT : SLOW SPILL/INSTALL MAGNETS

DATE ESTIMATED: 2/17/92

RESPONSIBLE: LANGE

&lt;----- MATERIAL -----&gt; &lt;----- LABOR -----&gt;

ITEM NUM.	ITEM TITLE	UNIT MEAS.	NO. UNITS	FY91 \$ /UNIT	COST BASIS	TOTAL MT K\$	NO. UNITS	HOURS /UNIT	TOTAL CRAFT HOURS CODE \$/HR	TOTAL LABOR K\$
1	DIPOLAS - 240" B2						4	24.0	96.0 IG 42.80	4.109
2	DIPOLAS - 240" B3						1	24.0	24.0 IG 42.80	1.027
3	TRIM						32	8.0	256.0 IL 27.20	6.963
4	EDI						1	1000.0	1000.0 EN 32.40	32.400
5							1	500.0	500.0 DC 32.00	16.000
6							1	1000.0	1000.0 DR 22.20	22.200

0.000 &lt;----- SUBTOTALS THIS PAGE -----&gt; 82.699

TECHNICAL DESCRIPTION OF THIS WORK PACKAGE:

0.000 + 82.699 = 82.699

SLOW SPILL INSTALLATION

ESTIMATE --- COST ESTIMATE DETAILS

PAGE NUMBER 243

SUB-SYSTEM: SLOW SPILL/MAGNET INSTALLATION

DATE PRINTED: 7-AUG-92

WBS CODE: 1.1.13.6.1.3 MULT BY 1 COMPONENT : SLOW SPILL/SURVEY & ALGINMENT

DATE ESTIMATED: 4/23/91

RESPONSIBLE: MOORE

<----- MATERIAL -----> <----- LABOR ----->

ITEM NUM.	ITEM TITLE	UNIT MEAS.	NO. UNITS	FY91 \$ /UNIT	COST BASIS	TOTAL MT K\$	NO. UNITS	HOURS /UNIT	TOTAL CRAFT HOURS CODE \$/HR	TOTAL LABOR K\$
1			0	0.		0.000				
2	EDI						1	100.0	100.0 EN 32.40	3.240
						0.000	<----- SUBTOTALS THIS PAGE ----->			3.240
TECHNICAL DESCRIPTION OF THIS WORK PACKAGE:						0.000 +	3.240 =	3.240		

T2 LABOR IS COVERED IN 8GEV LINE ESTIMATE.

## INSTALLATION

## ESTIMATE --- COST ESTIMATE DETAILS

PAGE NUMBER 244

SUB-SYSTEM: SLOW SPILL INSTALLATION

DATE PRINTED: 7-AUG-92

WBS CODE: 1.1.13.6.2 MULT BY 1 COMPONENT : SLOW SPILL/CORRECTION ELEMENT INSTALL

DATE ESTIMATED: 2/17/92

RESPONSIBLE: LANGE

&lt;----- MATERIAL -----&gt; &lt;----- LABOR -----&gt;

ITEM NUM.	ITEM TITLE	UNIT MEAS.	NO. UNITS	FY91 \$ /UNIT	COST BASIS	TOTAL MT K\$	NO. UNITS	HOURS /UNIT	TOTAL CRAFT HOURS CODE \$/HR	TOTAL LABOR K\$
1			0	0.		0.000				
2	EDI						1	250.0	250.0 EN 32.40	8.100
3							1	300.0	300.0 DC 32.00	9.600
						0.000	----- SUBTOTALS THIS PAGE ----->			17.700

TECHNICAL DESCRIPTION OF THIS WORK PACKAGE:

0.000 + 17.700 = 17.700

SLOW SPILL CORR MAGNET INSTALLATION IS COVERED IN WBS # . 1.1.13.6.1.1

INSTALLATION

ESTIMATE --- COST ESTIMATE DETAILS

PAGE NUMBER 245

SUB-SYSTEM: SLOW SPILL INSTALLATION

DATE PRINTED: 7-AUG-92

WBS CODE: 1.1.13.6.3 MULT BY 1 COMPONENT : SLOW SPILL/VACUUM INSTALLATION

DATE ESTIMATED: 2/27/92

RESPONSIBLE: SAUER

<----- MATERIAL -----> <----- LABOR ----->

ITEM NUM.	ITEM TITLE	UNIT MEAS.	NO. UNITS	FY91 \$ /UNIT	COST BASIS	TOTAL MT K\$	NO. UNITS	HOURS /UNIT	TOTAL CRAFT HOURS CODE	\$/HR	TOTAL LABOR K\$
1	INSTALL VALVE						1	1.0	1.0 T2	18.70	0.019
2	LEAK CHECK VACUUM SECTION						4	120.0	480.0 T2	18.70	8.976
3	INSTALL ION PUMPS						129	1.0	129.0 T2	18.70	2.412
4	CONNECTORS						129	1.0	129.0 IE	38.20	4.928

0.000 <----- SUBTOTALS THIS PAGE -----> 16.335

TECHNICAL DESCRIPTION OF THIS WORK PACKAGE:

0.000 + 16.335 = 16.335



INSTALLATION

ESTIMATE --- COST ESTIMATE DETAILS

PAGE NUMBER 246

SUB-SYSTEM: SLOW SPILL INSTALLATION

DATE PRINTED: 7-AUG-92

WBS CODE: 1.1.13.6.4 MULT BY 1 COMPONENT : SLOW SPILL/INST INSTALLATION

DATE ESTIMATED: 4/23/91

RESPONSIBLE: HAHN

<----- MATERIAL -----> <----- LABOR ----->

ITEM NUM.	ITEM TITLE	UNIT MEAS.	NO. UNITS	FY91 \$ /UNIT	COST BASIS	TOTAL MT K\$	NO. UNITS	HOURS /UNIT	TOTAL CRAFT HOURS CODE	\$/HR	TOTAL LABOR K\$
1			0	0.		0.000					
2	EDI						1	100.0	100.0	EN 32.40	3.240
						0.000	<----- SUBTOTALS THIS PAGE ----->				3.240
TECHNICAL DESCRIPTION OF THIS WORK PACKAGE:						0.000 +	3.240 =		3.240		

INSTALLATION

ESTIMATE --- COST ESTIMATE DETAILS

PAGE NUMBER 247

SUB-SYSTEM: MIR/NEW TEV VACUUM

DATE PRINTED: 7-AUG-92

WBS CODE: 1.1.13.7.1 MULT BY 1 COMPONENT : MIR/NEW TEV E0 VACUUM

DATE ESTIMATED: 4/14/92

RESPONSIBLE: MAY

<----- MATERIAL -----> <----- LABOR ----->

ITEM NUM.	ITEM TITLE	UNIT MEAS.	NO. UNITS	FY91 \$ /UNIT	COST BASIS	TOTAL MT K\$	NO. UNITS	HOURS /UNIT	TOTAL CRAFT HOURS CODE	\$/HR	TOTAL LABOR K\$
1	4" O.D. PIPE	EA	200	6.	CP	1.200	10	2.0	20.0 T2	18.70	0.374
2	6" O.D. CONFLATS	EA	32	98.	CP	3.136	32	1.0	32.0 T2	18.70	0.598
3	ION PUMPS	EA	12	1747.	E0	20.964	12	2.0	24.0 T2	18.70	0.449
4	4-1/2 O.D. CONFLATS	EA	12	66.	CP	0.792	12	1.0	12.0 T2	18.70	0.224
5	TEES	EA	4	44.	EE	0.176	4	0.5	2.0 T2	18.70	0.037
6	2-1/2 PULL OUTS	EA	12	22.	EE	0.264	12	0.5	6.0 T2	18.70	0.112
7	BAKE OUT SYSTEM	EA	1	2184.	EE	2.184	1	32.0	32.0 T2	18.70	0.598
8	VAC PIP INSTALLATION						1	64.0	64.0 T2	18.70	1.197

28.716 <----- SUBTOTALS THIS PAGE -----> 3.590

TECHNICAL DESCRIPTION OF THIS WORK PACKAGE:

28.716 + 3.590 = 32.306

MIR/NEW TEV VACUUM

## ESTIMATE --- COST ESTIMATE DETAILS

PAGE NUMBER 248

SUB-SYSTEM: MIR/NEW TEV F0 VACUUM

DATE PRINTED: 7-AUG-92

WBS CODE: 1.1.13.7.2.1 MULT BY 1 COMPONENT : MIR/TEV F0 REMOVAL

DATE ESTIMATED: 4/14/92

RESPONSIBLE: MAY

&lt;----- MATERIAL -----&gt; &lt;----- LABOR -----&gt;

ITEM NUM.	ITEM TITLE	UNIT MEAS.	NO. UNITS	FY91 \$ /UNIT	COST BASIS	TOTAL MT K\$	NO. UNITS	HOURS /UNIT	TOTAL CRAFT HOURS CODE \$/HR	TOTAL LABOR K\$
1	REMOVE AMPLIFIERS						18	1.0	18.0 T2 18.70	0.337
2	REMOVE MR ION PUMPS & VAC EQUIP						24	1.0	24.0 T2 18.70	0.449
3	REMOVE TEV CAVS, ION PS, XLINES						8	9.0	72.0 T2 18.70	1.346
4	REMOVE TEV MISC DEVICES						10	2.0	20.0 T2 18.70	0.374
5	REMOVE MR MISC DEVICES						8	2.0	16.0 T2 18.70	0.299
6	REMOVE LCW SYSTEM						6	32.0	192.0 T2 18.70	3.590
7	SHIP TO STORAGE						10	32.0	320.0 T2 18.70	5.984
8	PURGE DEVICES AT STORAGE						4	16.0	64.0 T2 18.70	1.197

0.000 &lt;----- SUBTOTALS THIS PAGE -----&gt; 13.576

TECHNICAL DESCRIPTION OF THIS WORK PACKAGE:

0.000 + 13.576 = 13.576

MIR/NEW TEV VACUUM

## ESTIMATE --- COST ESTIMATE DETAILS

PAGE NUMBER 249

SUB-SYSTEM: MIR/NEW TEV F0 VACUUM

DATE PRINTED: 7-AUG-92

WBS CODE: 1.1.13.7.2.2 MULT BY 1 COMPONENT : MIR/NEW TEV F0 VACUUM

DATE ESTIMATED: 4/14/92

RESPONSIBLE: MAY

&lt;----- MATERIAL -----&gt; &lt;----- LABOR -----&gt;

ITEM NUM.	ITEM TITLE	UNIT MEAS.	NO. UNITS	FY91 \$ /UNIT	COST BASIS	TOTAL MT K\$	NO. UNITS	HOURS /UNIT	TOTAL HOURS	CRAFT CODE	\$/HR	TOTAL LABOR K\$	
1	4" BELLOWS	EA	10	49.	EE	0.490	10	1.0	10.0	T2	18.70	0.187	
2	4" WELDED BELLOWS	EA	4	328.	EE	1.312	4	1.0	4.0	T2	18.70	0.075	
3	6" WELDED BELLOWS	EA	6	655.	EE	3.930	6	1.0	6.0	T2	18.70	0.112	
4	6" O.D. CONFLATS	EA	10	98.	EE	0.980	10	1.0	10.0	T2	18.70	0.187	
5	8" O.D. CONFLATS	EA	4	109.	EE	0.436	4	1.0	4.0	T2	18.70	0.075	
6	4.1/2 O.D. CONFLATS	EA	10	66.	EE	0.660	10	0.5	5.0	T2	18.70	0.094	
7	THERMD COUPLER & COLD CATHODES	EA	8	382.	EE	3.056	8	2.0	16.0	T2	18.70	0.299	
8	TEE'S	EA	8	44.	EE	0.352	8	1.5	12.0	T2	18.70	0.224	
9	4" SS PIPE	EA	300	6.	CP	1.800	15	2.0	30.0	S1	33.00	0.990	
10	2 1/2" PULLOUTS	EA	20	22.	EE	0.440	40	0.5	20.0	S1	33.00	0.660	
11	PUMP-OUT VAC VALVES	EA	4	1092.	EE	4.368	4	1.0	4.0	T2	18.70	0.075	
12	BAKE-OUT SYSTEM	EA	1	17472.	EE	17.472	1	200.0	200.0	T2	18.70	3.740	
13	VAC-PIPE INSTALLATION						1	160.0	160.0	T2	18.70	2.992	
						35.296	<----- SUBTOTALS THIS PAGE ----->						9.710
TECHNICAL DESCRIPTION OF THIS WORK PACKAGE:						35.296 +	9.710 =	45.006					

MIR/NEW TEV VACUUM

ESTIMATE --- COST ESTIMATE DETAILS

PAGE NUMBER 250

SUB-SYSTEM: MIR/NEW TEV F0 VACUUM

DATE PRINTED: 7-AUG-92

WBS CODE: 1.1.13.7.2.3 MULT BY 1 COMPONENT : TEV RF REDISTRIBUTION

DATE ESTIMATED: 4/15/92

RESPONSIBLE: WILDMAN

&lt;----- MATERIAL -----&gt;

&lt;----- LABOR -----&gt;

ITEM NUM.	ITEM TITLE	UNIT MEAS.	NO. UNITS	FY91 \$ /UNIT	COST BASIS	TOTAL MT K\$	NO. UNITS	HOURS /UNIT	TOTAL HOURS	CRAFT CODE	\$/HR	TOTAL LABOR K\$
1	RF CAVITY	EA	8	682.	CP	5.456	8	42.0	336.0	T2	18.70	6.283
2	F0 BEAM PICK-UPS						3	40.0	120.0	T2	18.70	2.244
3	9" TRANSMISSION LINE						8	74.0	592.0	T2	18.70	11.070
4	9" TRANSMISSION LINE	EA	8	6006.	A88	48.048	8	40.0	320.0	S1	33.00	10.560
5	30 KV MODULATORS						8	30.0	240.0	T2	18.70	4.488
6	480 V SERVICE TO MODULATOR	EA	8	360.	CP	2.880	8	16.0	128.0	IE	38.20	4.890
7	B+ CABLE (RG220)	FT	1600	4.	A87	6.400	8	8.0	64.0	IE	38.20	2.445
8	H2O CARTS & HEATER						8	52.0	416.0	T2	18.70	7.779
9	480 V SERVICE TO H2O CARTS	EA	8	360.	CP	2.880	8	32.0	256.0	IE	38.20	9.779
10	MOVE 30 KV ANODE SUPPLY (DC)						1	240.0	240.0	T2	18.70	4.488
11	MOVE ANODE SUPPLY (AC)						1	64.0	64.0	IG	42.80	2.739
12	MOVE ANODE SUPPLY (AC)						1	80.0	80.0	IE	38.20	3.056
13	150 KW POWER AMPS						8	32.0	256.0	T2	18.70	4.787
14	-750 SUPPLY						1	40.0	40.0	T2	18.70	0.748
15	CONTROL RACK						48	32.0	1536.0	T2	18.70	28.723
16	CONTROL RACK						48	10.0	480.0	IE	38.20	18.336
17	SUPER DAMPER						2	160.0	320.0	T2	18.70	5.984
18	SUPER DAMPER CABLE PULL						16	16.0	256.0	IE	38.20	9.779
19	STATION CABLING						8	80.0	640.0	T2	18.70	11.968
20	CABLE TRAYS						1	160.0	160.0	IE	38.20	6.112
21	TUNNEL CABLES						96	1.0	96.0	IE	38.20	3.667
22	1/2" TRANSMISSION LINE	FT	20000	3.06	CP	61.200						
23	1/2" TRANSMISSION LINE CONNECTORS	EA	200	29.27	CP	5.854	200	1.0	200.0	T2	18.70	3.740
24	95 DEGREE LCW PIPING	EA	1	30685.	A82	30.685	1	2340.0	2340.0	IP	41.10	96.174

MIR/NEW TEV VACUUM

## ESTIMATE --- COST ESTIMATE DETAILS

PAGE NUMBER 250

SUB-SYSTEM: MIR/NEW TEV F0 VACUUM

DATE PRINTED: 7-AUG-92

WBS CODE: 1.1.13.7.2.3 MULT BY 1 COMPONENT : TEV RF REDISTRIBUTION

DATE ESTIMATED: 4/15/92

RESPONSIBLE: WILDMAN

&lt;----- MATERIAL -----&gt; &lt;----- LABOR -----&gt;

ITEM NUM.	ITEM TITLE	UNIT MEAS.	NO. UNITS	FY91 \$ /UNIT	COST BASIS	TOTAL MT K\$	NO. UNITS	HOURS /UNIT	TOTAL CRAFT HOURS CODE \$/HR	TOTAL LABOR K\$
25	CHILLED H2O PIPING	EA	1	14742.	A82	14.742	1	1050.0	1050.0 IP 41.10	43.155
26	ENGINEERING						2	1300.0	2600.0 EN 32.40	84.240
27	DESIGN						1	735.0	735.0 DC 32.00	23.520
28	9" TRANSMISSION LINE BELLOWS	EA	8	2948.	EE	23.584				

201.729 &lt;----- SUBTOTALS THIS PAGE -----&gt; 410.755

TECHNICAL DESCRIPTION OF THIS WORK PACKAGE:

201.729 + 410.755 = 612.484

## SUB-SYSTEM: BML PPS INSTALLATION

DATE PRINTED: 7-AUG-92

WBS CODE: 1.1.13.10.2.1 MULT BY 1 COMPONENT : BML PPWR SYS/PWR SUP INSTALLATION

DATE ESTIMATED: 2/17/92

RESPONSIBLE: HAYS

&lt;----- MATERIAL -----&gt; &lt;----- LABOR -----&gt;

ITEM NUM.	ITEM TITLE	UNIT MEAS.	NO. UNITS	FY91 \$ /UNIT	COST BASIS	TOTAL MT K\$	NO. UNITS	HOURS /UNIT	TOTAL HOURS	CRAFT CODE	\$/HR	TOTAL LABOR K\$
1	PPS TRANSFORMER						3	88.0	264.0	IG	42.80	11.299
2	DIS/ASSEMBLY	SYS	3	568.93	EE	1.707	3	88.0	264.0	IE	38.20	10.085
3	CONTROLS RELOCATION						3	20.0	60.0	IE	38.20	2.292
4	BUS CAGE	EACH	3	341.36	EE	1.024	3	80.0	240.0	IP	41.10	9.864
5	HIGH VOLTAGE DISTRIBUTION	EACH	3	2184.	EE	6.552	3	16.0	48.0	IE	38.20	1.834
6	INSTALLATION BUS WORK						5	80.0	400.0	IP	41.10	16.440
7	TRANSFORMER PLACEMENT						3	88.0	264.0	IG	42.80	11.299
8	SECONDARY CABLES	EA	5	6827.18	CP	34.136	5	312.0	1560.0	IE	38.20	59.592
9	SECONDARY TERMINATION	SYS	5	873.80	CP	4.368	5	48.0	240.0	IE	38.20	9.168
10	CONTROLS	SYS	5	341.36	A87	1.707	5	160.0	800.0	T2	18.70	14.960
11							5	120.0	600.0	S1	33.00	19.800
12							5	20.0	100.0	DC	32.00	3.200
13							5	10.0	50.0	EN	32.40	1.620
14	E.D.I.						1	80.0	80.0	EN	32.40	2.592
15							1	160.0	160.0	DC	32.00	5.120

49.494 <----- SUBTOTALS THIS PAGE -----> 179.165

## TECHNICAL DESCRIPTION OF THIS WORK PACKAGE:

49.494 + 179.165 = 228.658

- 1) TWO SUPPLIES ARE FOR THE 150 GEV BOND AND ONE FOR THE QUAD.
- 2) INSTALLATIONS ARE FOR THE 3 150GEV SUPPLIES, ONE F17 LAMB, LF2 TO THE REMNANT SECTION. TWO SUPPLIES ARE ALREADY IN THE REQUIRED LOCATION ONLY RECONNECT IS NEEDED.

## BEAMLINE AGGREGATE

## ESTIMATE --- COST ESTIMATE DETAILS

PAGE NUMBER 252

SUB-SYSTEM: BML PPS INSTALLATION

DATE PRINTED: 7-AUG-92

WBS CODE: 1.1.13.10.2.2 MULT BY 1 COMPONENT : BML PWR DIST/MAGNET BUS, INSTALLATION

DATE ESTIMATED: 8/07/92

RESPONSIBLE: SATTI

&lt;----- MATERIAL -----&gt; &lt;----- LABOR -----&gt;

ITEM NUM.	ITEM TITLE	UNIT MEAS.	NO. UNITS	FY91 \$ /UNIT	COST BASIS	TOTAL MT K\$	NO. UNITS	HOURS /UNIT	TOTAL CRAFT HOURS CODE	\$/HR	TOTAL LABOR K\$
1	OLD M.R. BUS REMOVED & CLEAN	FT	0	0.		0.000	8300	0.1	830.0	IE 38.20	31.700
2	RIGGERS MOVE TO NEW LOCATION	EA	0	0.		0.000	1	300.0	300.0	IG 42.80	12.840
3	COPPER BUS INSTALLATION	FT	0	0.		0.000	8300	0.3	2490.0	IE 38.20	95.118
4	COPPER FITTING PER MAGN	EA	191	32.76	EE	6.257					
5	PORCELAIN CLAMPS (1-7/8")	EA	830	10.22	EE	8.483					
6	BUS SUPPORT BRACKETS	EA	830	34.14	A87	28.336					
7	COPPER COUPLINGS (1-5/8" ID)	EA	600	4.	EE	2.400					
8	SPECIAL CURRENT VALVES (1")	EA	20	500.	EE	10.000					
9	LCW & ELE CONNECTION TO MAGN						191	4.0	764.0	IE 38.20	29.185
10	EDI						1	1300.0	1300.0	EN 32.40	42.120
11							1	2000.0	2000.0	DC 32.00	64.000
						55.476	SUBTOTALS THIS PAGE				274.969

TECHNICAL DESCRIPTION OF THIS WORK PACKAGE:

55.476 + 274.969 = 330.445

OLD 15/8" OD BUS FROM THE MAIN RING WILL BE USED FOR SOME OF THE BEAM LINES. THE CONNECTIONS TO THE MAGNETS WILL BE SIMILAR TO THE DESIGN OF THE MAIN RING.



INSTALLATION

ESTIMATE --- COST ESTIMATE DETAILS

PAGE NUMBER 253

SUB-SYSTEM: BEAMLINE AGGREGATE

DATE PRINTED: 7-AUG-92

WBS CODE: 1.1.13.10.5 MULT BY 1 COMPONENT : BML CONTROLS INSTALLATION

DATE ESTIMATED: 7/ 9/92

RESPONSIBLE: LUCAS

<----- MATERIAL -----> <----- LABOR ----->

ITEM NUM.	ITEM TITLE	UNIT MEAS.	NO. UNITS	FY91 \$ /UNIT	COST BASIS	TOTAL MT K\$	NO. UNITS	HOURS /UNIT	TOTAL HOURS	CRAFT CODE	\$/HR	TOTAL LABOR K\$	
1	INSTALL MADC SYSTEMS	EACH	2	851.78	A88	1.704	2	24.0	48.0	T2	18.70	0.898	
2	INSTALL RACKS (1)						45	4.0	180.0	IE	38.20	6.876	
3	INSTALL CAMAC CARDS	EACH	170	60.06	EE	10.210	300	3.0	900.0	T2	18.70	16.830	
4	CONNECT LINK TO RACK						5	3.0	15.0	T2	18.70	0.280	
5	OPTIC CABLE TERMINATING (2)						2	36.0	72.0	T2	18.70	1.346	
6	EDI						1	300.0	300.0	EN	32.40	9.720	
						11.914	<----- SUBTOTALS THIS PAGE ----->						35.950

TECHNICAL DESCRIPTION OF THIS WORK PACKAGE:

11.914 + 35.950 = 47.864

- 1) RACKS ARE FOR ALL ELECTRONICS IN BUILDING, NOT JUST CONTROLS.
- 2) COST SCALED FROM CONTRACT PRICE FOR SIMILAR WORK IN MAIN RING.

INSTALLATION

ESTIMATE --- COST ESTIMATE DETAILS

PAGE NUMBER 254

SUB-SYSTEM: BEAMLINE AGGREGATE

DATE PRINTED: 7-AUG-92

WBS CODE: 1.1.13.10.8 MULT BY 1 COMPONENT : BML SAFETY SYSTEM INSTALLATION

DATE ESTIMATED: 2/28/92

RESPONSIBLE: CASEBOLT

<----- MATERIAL -----> <----- LABOR ----->

ITEM NUM.	ITEM TITLE	UNIT MEAS.	NO. UNITS	FY91 \$ /UNIT	COST BASIS	TOTAL MT K\$	NO. UNITS	HOURS /UNIT	TOTAL CRAFT HOURS	CODE	\$/HR	TOTAL LABOR K\$	
1	INTERLOCK HARDWARE	EA	10	546.	A89	5.460	10	60.0	600.0	IE	38.20	22.920	
2	CABLING						1	200.0	200.0	IE	38.20	7.640	
3	JUNCTION BOX						3	50.0	150.0	IE	38.20	5.730	
4	CRITICAL DEVICE						2	150.0	300.0	IG	42.80	12.840	
5	SECTION GATES	EA	4	1092.	A89	4.368	4	20.0	80.0	IP	41.10	3.288	
6	P.A. COST ESTIMATE	EA	6	218.40	A89	1.310	6	20.0	120.0	IE	38.20	4.584	
7	EDI						1	300.0	300.0	EN	32.40	9.720	
8							1	300.0	300.0	DC	32.00	9.600	
						11.138	<----- SUBTOTALS THIS PAGE ----->						76.322

TECHNICAL DESCRIPTION OF THIS WORK PACKAGE:

11.138 + 76.322 = 87.460

## MAIN INJECTOR CONVENTIONAL CONSTRUCTION

## ESTIMATE --- COST ESTIMATE DETAILS

PAGE NUMBER 255

SUB-SYSTEM: CIVIL CONSTRUCTION/PHASE 1

DATE PRINTED: 7-AUG-92

WBS CODE: 1.2.1.1

MULT BY 1 COMPONENT : WETLAND MITIGATION, PHASE 1

DATE ESTIMATED: 8/ 7/92

RESPONSIBLE: PAWLAK

&lt;----- MATERIAL -----&gt;

&lt;----- LABOR -----&gt;

ITEM NUM.	ITEM TITLE	UNIT MEAS.	NO. UNITS	FY91 \$ /UNIT	COST BASIS	TOTAL MT K\$	NO. UNITS	HOURS /UNIT	TOTAL CRAFT HOURS CODE \$/HR	TOTAL LABOR K\$
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1 CONSTRUCTION SUB-CONTRACT

LOT

1

590595. EE

590.595

590.595

&lt;----- SUBTOTALS THIS PAGE -----&gt;

0.000

TECHNICAL DESCRIPTION OF THIS WORK PACKAGE:

590.595 + 0.000 = 590.595

MAIN INJECTOR CONVENTIONAL CONSTRUCTION

ESTIMATE --- COST ESTIMATE DETAILS

PAGE NUMBER 258

SUB-SYSTEM: CIVIL CONSTRUCTION/PHASE 1

DATE PRINTED: 7-AUG-92

WBS CODE: 1.2.1.2 MULT BY 1 COMPONENT : SITE PREPARATION, PHASE 1

DATE ESTIMATED: 8/ 7/92

RESPONSIBLE: PAWLAK

<----- MATERIAL -----> <----- LABOR ----->

ITEM NUM.	ITEM TITLE	UNIT MEAS.	NO. UNITS	FY91 \$ /UNIT	COST BASIS	TOTAL MT K\$	NO. UNITS	HOURS /UNIT	TOTAL CRAFT HOURS CODE	\$/HR	TOTAL LABOR K\$
1	CONSTRUCTION SUB-CONTRACT	LOT	1	3448887.	EE	3448.887					
						3448.887	<----- SUBTOTALS THIS PAGE ----->				0.000
TECHNICAL DESCRIPTION OF THIS WORK PACKAGE:						3448.887 +	0.000 =				3448.887

MAIN INJECTOR CONVENTIONAL CONSTRUCTION

ESTIMATE --- COST ESTIMATE DETAILS

PAGE NUMBER 257

SUB-SYSTEM: CIVIL CONSTRUCTION/PHASE 1

DATE PRINTED: 7-AUG-92

WBS CODE: 1.2.1.3

MULT BY 1 COMPONENT : ROADS & UTILITIES, PHASE 1

DATE ESTIMATED: 8/ 7/92

RESPONSIBLE: PAWLAK

<----- MATERIAL -----> <----- LABOR ----->

ITEM NUM.	ITEM TITLE	UNIT MEAS.	NO. UNITS	FY91 \$ /UNIT	COST BASIS	TOTAL MT K\$	NO. UNITS	HOURS /UNIT	TOTAL CRAFT HOURS CODE \$/HR	TOTAL LABOR K\$
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1	CONSTRUCTION SUB-CONTRACT	LOT	1	5826296.	EE	5826.296				
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5826.296	<-----	SUBTOTALS THIS PAGE	----->	0.000
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TECHNICAL DESCRIPTION OF THIS WORK PACKAGE:

5826.296 + 0.000 = 5826.296

MAIN INJECTOR CONVENTIONAL CONSTRUCTION

ESTIMATE --- COST ESTIMATE DETAILS

PAGE NUMBER 258

SUB-SYSTEM: CIVIL CONSTRUCTION/PHASE 1

DATE PRINTED: 7-AUG-92

WBS CODE: 1.2.1.4 MULT BY 1 COMPONENT : INDUSTRIAL BUILDING NUMBER 5, PHASE 1

DATE ESTIMATED: 3/ 2/92

RESPONSIBLE: PAWLAK

<----- MATERIAL -----> <----- LABOR ----->

ITEM NUM.	ITEM TITLE	UNIT MEAS.	NO. UNITS	FY91 \$ /UNIT	COST BASIS	TOTAL MT K\$	NO. UNITS	HOURS /UNIT	TOTAL CRAFT HOURS CODE	\$/HR	TOTAL LABOR K\$
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1	CONSTRUCTION SUB-CONTRACT	LOT	1	0.	EE	0.000					
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0.000	<-----	SUBTOTALS THIS PAGE	----->	0.000
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TECHNICAL DESCRIPTION OF THIS WORK PACKAGE:

0.000 + 0.000 = 0.000

## MAIN INJECTOR CONVENTIONAL CONSTRUCTION

ESTIMATE --- COST ESTIMATE DETAILS

PAGE NUMBER 259

SUB-SYSTEM: CIVIL CONSTRUCTION/PHASE 2

DATE PRINTED: 7-AUG-92

WBS CODE: 1.2.2.1

MULT BY 1 COMPONENT : INJECTOR ENCLOSURE AT MI60, PHASE 2

DATE ESTIMATED: 8/ 7/92

RESPONSIBLE: PAWLAK

&lt;----- MATERIAL -----&gt; &lt;----- LABOR -----&gt;

ITEM NUM.	ITEM TITLE	UNIT MEAS.	NO. UNITS	FY91 \$ /UNIT	COST BASIS	TOTAL MT K\$	NO. UNITS	HOURS /UNIT	TOTAL CRAFT HOURS CODE	\$/HR	TOTAL LABOR K\$
1	CONSTRUCTION SUB-CONTRACT	LOT	1	7863179.	EE	7863.179					
						7863.179	<----- SUBTOTALS THIS PAGE ----->				0.000

TECHNICAL DESCRIPTION OF THIS WORK PACKAGE:

7863.179 + 0.000 = 7863.179

## MAIN INJECTOR CONVENTIONAL CONSTRUCTION

ESTIMATE --- COST ESTIMATE DETAILS

PAGE NUMBER 260

SUB-SYSTEM: CIVIL CONSTRUCTION/PHASE 2

DATE PRINTED: 7-AUG-92

WBS CODE: 1.2.2.2

MULT BY 1 COMPONENT : INJECTOR ENCLOSURE AT MI62-MI62, PHASE 2

DATE ESTIMATED: 5/12/92

RESPONSIBLE: PAWLAK

&lt;----- MATERIAL -----&gt; &lt;----- LABOR -----&gt;

ITEM NUM.	ITEM TITLE	UNIT MEAS.	NO. UNITS	FY91 \$ /UNIT	COST BASIS	TOTAL MT K\$	NO. UNITS	HOURS /UNIT	TOTAL CRAFT HOURS CODE	\$/HR	TOTAL LABOR K\$
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1	CONSTRUCTION SUB-CONTRACT	LOT	1	17930717.	EE	17930.717					
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17930.717	<-----	SUBTOTALS THIS PAGE	----->	0.000
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TECHNICAL DESCRIPTION OF THIS WORK PACKAGE:

17930.717 + 0.000 = 17930.717



## MAIN INJECTOR CONVENTIONAL CONSTRUCTION

ESTIMATE --- COST ESTIMATE DETAILS

PAGE NUMBER 261

SUB-SYSTEM: CIVIL CONSTRUCTION/PHASE 2

DATE PRINTED: 7-AUG-92

WBS CODE: 1.2.2.3 MULT BY 1 COMPONENT : SERVICE BLDGS 10,20,30,40,50, PHASE 2

DATE ESTIMATED: 8/ 7/92

RESPONSIBLE: PAWLAK

&lt;----- MATERIAL -----&gt;

&lt;----- LABOR -----&gt;

ITEM NUM.	ITEM TITLE	UNIT MEAS.	NO. UNITS	FY91 \$ /UNIT	COST BASIS	TOTAL MT K\$	NO. UNITS	HOURS /UNIT	TOTAL CRAFT HOURS CODE \$/HR	TOTAL LABOR K\$
1	CONSTRUCTION SUB-CONTRACT	LOT	1	2290543.	EE	2290.543				
						2290.543	<----- SUBTOTALS THIS PAGE ----->			0.000
TECHNICAL DESCRIPTION OF THIS WORK PACKAGE:						2290.543 + 0.000 = 2290.543				

## MAIN INJECTOR CONVENTIONAL CONSTRUCTION

ESTIMATE --- COST ESTIMATE DETAILS

PAGE NUMBER 262

SUB-SYSTEM: CIVIL CONSTRUCTION/PHASE 2

DATE PRINTED: 7-AUG-92

WBS CODE: 1.2.2.4

MULT BY 1 COMPONENT : MI52 &amp; 62 SERVICE BUILDING, PHASE 2

DATE ESTIMATED: 8/ 7/92

RESPONSIBLE: PAWLAK

&lt;----- MATERIAL -----&gt; &lt;----- LABOR -----&gt;

ITEM NUM.	ITEM TITLE	UNIT MEAS.	NO. UNITS	FY91 \$ /UNIT	COST BASIS	TOTAL MT K\$	NO. UNITS	HOURS /UNIT	TOTAL CRAFT HOURS CODE	\$/HR	TOTAL LABOR K\$
1	CONSTRUCTION SUB-CONTRACT	LOT	1	511494.	EE	511.494					
						511.494	----- SUBTOTALS THIS PAGE -----				0.000
TECHNICAL DESCRIPTION OF THIS WORK PACKAGE:						511.494 +	0.000	=	511.494		

## MAIN INJECTOR CONVENTIONAL CONSTRUCTION

## ESTIMATE --- COST ESTIMATE DETAILS

PAGE NUMBER 263

SUB-SYSTEM: CIVIL CONSTRUCTION/PHASE 2

DATE PRINTED: 7-AUG-92

WBS CODE: 1.2.2.5 MULT BY 1 COMPONENT : MI60 SERVICE BUILDING, PHASE 2

DATE ESTIMATED: 8/ 7/92

RESPONSIBLE: PAWLAK

&lt;----- MATERIAL -----&gt; &lt;----- LABOR -----&gt;

ITEM NUM.	ITEM TITLE	UNIT MEAS.	NO. UNITS	FY91 \$ /UNIT	COST BASIS	TOTAL MT K\$	NO. UNITS	HOURS /UNIT	TOTAL CRAFT HOURS CODE	\$/HR	TOTAL LABOR K\$
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1	CONSTRUCTION SUB-CONTRACT	LOT	1	3265271.	EE	3265.271					
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3265.271	<-----	SUBTOTALS THIS PAGE	----->	0.000
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TECHNICAL DESCRIPTION OF THIS WORK PACKAGE:

3265.271 + 0.000 = 3265.271

## MAIN INJECTOR CONVENTIONAL CONSTRUCTION

ESTIMATE --- COST ESTIMATE DETAILS

PAGE NUMBER 264

SUB-SYSTEM: CIVIL CONSTRUCTION/PHASE 2

DATE PRINTED: 7-AUG-92

WBS CODE: 1.2.2.6

MULT BY 1 COMPONENT : SERVICE BLDG. F0 N. ADDITION, PHASE 2

DATE ESTIMATED: 8/ 7/92

RESPONSIBLE: PAWLAK

&lt;----- MATERIAL -----&gt; &lt;----- LABOR -----&gt;

ITEM NUM.	ITEM TITLE	UNIT MEAS.	NO. UNITS	FY91 \$ /UNIT	COST BASIS	TOTAL MT K\$	NO. UNITS	HOURS /UNIT	TOTAL CRAFT HOURS CODE \$/HR	TOTAL LABOR K\$
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1	CONSTRUCTION SUB-CONTRACT	LOT	1	765503.	EE	765.503				
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765.503	<-----	SUBTOTALS THIS PAGE	----->	0.000
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TECHNICAL DESCRIPTION OF THIS WORK PACKAGE:

765.503 + 0.000 = 765.503

MAIN INJECTOR CONVENTIONAL CONSTRUCTION

ESTIMATE --- COST ESTIMATE DETAILS

PAGE NUMBER 285

SUB-SYSTEM: CIVIL CONSTRUCTION/PHASE 2

DATE PRINTED: 7-AUG-92

WBS CODE: 1.2.2.7

MULT BY 1 COMPONENT : 8 GEV BEAM ENCLOSURE, PHASE 2

DATE ESTIMATED: 8/07/92

RESPONSIBLE: PAWLAK

<----- MATERIAL -----> <----- LABOR ----->

ITEM NUM.	ITEM TITLE	UNIT MEAS.	NO. UNITS	FY91 \$ /UNIT	COST BASIS	TOTAL MT K\$	NO. UNITS	HOURS /UNIT	TOTAL CRAFT HOURS CODE \$/HR	TOTAL LABOR K\$
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.1	CONSTRUCTION SUB-CONTRACT	LOT	1	4406868.	EE	4406.868				
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4406.868	<-----	SUBTOTALS THIS PAGE	----->	0.000
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TECHNICAL DESCRIPTION OF THIS WORK PACKAGE:

4406.868 + 0.000 = 4406.868

## MAIN INJECTOR CONVENTIONAL CONSTRUCTION

ESTIMATE --- COST ESTIMATE DETAILS

PAGE NUMBER 266

SUB-SYSTEM: CIVIL CONSTRUCTION/PHASE 2

DATE PRINTED: 7-AUG-92

WBS CODE: 1.2.2.8 MULT BY 1 COMPONENT : NORTH HATCH BUILDING, PHASE 2

DATE ESTIMATED: 8/ 7/92

RESPONSIBLE: PAWLAK

&lt;----- MATERIAL -----&gt; &lt;----- LABOR -----&gt;

ITEM NUM.	ITEM TITLE	UNIT MEAS.	NO. UNITS	FY91 \$ /UNIT	COST BASIS	TOTAL MT K\$	NO. UNITS	HOURS /UNIT	TOTAL CRAFT HOURS CODE \$/HR	TOTAL LABOR K\$
1	CONSTRUCTION SUB-CONTRACT	LOT	1	846384.	EE	846.384				
						846.384	<----- SUBTOTALS THIS PAGE ----->			0.000
TECHNICAL DESCRIPTION OF THIS WORK PACKAGE:						846.384 +	0.000 =	846.384		

MAIN INJECTOR CONVENTIONAL CONSTRUCTION

ESTIMATE --- COST ESTIMATE DETAILS

PAGE NUMBER 267

SUB-SYSTEM: CIVIL CONSTRUCTION/PHASE 2

DATE PRINTED: 7-AUG-92

WBS CODE: 1.2.2.9

MULT BY 1 COMPONENT : 345 KV TRANSMISSION LINE, PHASE 2

DATE ESTIMATED: 3/ 2/92

RESPONSIBLE: PAWLAK

<----- MATERIAL -----> <----- LABOR ----->

ITEM NUM.	ITEM TITLE	UNIT MEAS.	NO. UNITS	FY91 \$ /UNIT	COST BASIS	TOTAL MT K\$	NO. UNITS	HOURS /UNIT	TOTAL CRAFT HOURS CODE \$/HR	TOTAL LABOR K\$
1	CONSTRUCTION SUB-CONTRACT	LOT	1	1627984.	EE	1627.984				
						1627.984	<----- SUBTOTALS THIS PAGE ----->			0.000

TECHNICAL DESCRIPTION OF THIS WORK PACKAGE:

1627.984 + 0.000 = 1627.984

MAIN INJECTOR CONVENTIONAL CONSTRUCTION

ESTIMATE --- COST ESTIMATE DETAILS

PAGE NUMBER 268

SUB-SYSTEM: CIVIL CONSTRUCTION/PHASE 2

DATE PRINTED: 7-AUG-92

WBS CODE: 1.2.2.10 MULT BY 1 COMPONENT : KAUTZ ROAD SUBSTATION, PHASE 2

DATE ESTIMATED: 8/ 7/92

RESPONSIBLE: PAWLAK

<----- MATERIAL -----> <----- LABOR ----->

ITEM NUM.	ITEM TITLE	UNIT MEAS.	NO. UNITS	FY91 \$ /UNIT	COST BASIS	TOTAL MT K\$	NO. UNITS	HOURS /UNIT	TOTAL CRAFT HOURS CODE \$/HR	TOTAL LABOR K\$
1	CONSTRUCTION SUB-CONTRACT	LOT	1	4212457.	EE	4212.457				
						4212.457	<----- SUBTOTALS THIS PAGE ----->			0.000
TECHNICAL DESCRIPTION OF THIS WORK PACKAGE:						4212.457 +	0.000 =			4212.457



## MAIN INJECTOR CONVENTIONAL CONSTRUCTION

ESTIMATE --- COST ESTIMATE DETAILS

PAGE NUMBER 269

SUB-SYSTEM: CIVIL CONSTRUCTION/PHASE 2

DATE PRINTED: 7-AUG-92

WBS CODE: 1.2.2.11 MULT BY 1 COMPONENT : COOLING WATER SYSTEM, PHASE 2

DATE ESTIMATED: 8/ 7/92

RESPONSIBLE: PAWLAK

&lt;----- MATERIAL -----&gt; &lt;----- LABOR -----&gt;

ITEM NUM.	ITEM TITLE	UNIT MEAS.	NO. UNITS	FY91 \$ /UNIT	COST BASIS	TOTAL MT K\$	NO. UNITS	HOURS /UNIT	TOTAL CRAFT HOURS CODE \$/HR	TOTAL LABOR K\$
1	CONSTRUCTION SUB-CONTRACT	LOT	1	1528955.	EE	1528.955				
						1528.955	<----- SUBTOTALS THIS PAGE ----->			0.000
TECHNICAL DESCRIPTION OF THIS WORK PACKAGE:						1528.955 +	0.000 =			1528.955

## MAIN INJECTOR CONVENTIONAL CONSTRUCTION

ESTIMATE --- COST ESTIMATE DETAILS

PAGE NUMBER 270

SUB-SYSTEM: CIVIL CONSTRUCTION/PHASE 3

DATE PRINTED: 7-AUG-92

WBS CODE: 1.2.3.1 MULT BY 1 COMPONENT : F0 ENCL. &amp; BUILDING F0 MODS, PHASE 3

DATE ESTIMATED: 8/ 7/92

RESPONSIBLE: PAWLAK

&lt;----- MATERIAL -----&gt; &lt;----- LABOR -----&gt;

ITEM NUM.	ITEM TITLE	UNIT MEAS.	NO. UNITS	FY91 \$ /UNIT	COST BASIS	TOTAL MT K\$	NO. UNITS	HOURS /UNIT	TOTAL CRAFT HOURS CODE	\$/HR	TOTAL LABOR K\$
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1	CONSTRUCTION SUB-CONTRACT	LOT	1	5924013.	EE	5924.013					
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5924.013	<-----	SUBTOTALS THIS PAGE	----->	0.000
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TECHNICAL DESCRIPTION OF THIS WORK PACKAGE:

5924.013 + 0.000 = 5924.013

## MAIN INJECTOR CONVENTIONAL CONSTRUCTION

ESTIMATE --- COST ESTIMATE DETAILS

PAGE NUMBER 271

SUB-SYSTEM: CIVIL CONSTRUCTION/PHASE 3

DATE PRINTED: 7-AUG-92

WBS CODE: 1.2.3.2

MULT BY 1 COMPONENT : 8 GEV BOOSTER ENCL. CONNECTION, PHASE 3

DATE ESTIMATED: 8/ 7/92

RESPONSIBLE: PAWLAK

&lt;----- MATERIAL -----&gt; &lt;----- LABOR -----&gt;

ITEM NUM.	ITEM TITLE	UNIT MEAS.	NO. UNITS	FY91 \$ /UNIT	COST BASIS	TOTAL MT K\$	NO. UNITS	HOURS /UNIT	TOTAL CRAFT HOURS CODE \$/HR	TOTAL LABOR K\$
1	CONSTRUCTION SUB-CONTRACT	LOT	1	4697110.	EE	4697.110				
						4697.110	<----- SUBTOTALS THIS PAGE ----->			0.000
TECHNICAL DESCRIPTION OF THIS WORK PACKAGE:						4697.110 +	0.000 =			4697.110

MAIN INJECTOR CONVENTIONAL CONSTRUCTION

ESTIMATE --- COST ESTIMATE DETAILS

PAGE NUMBER 272

SUB-SYSTEM: CIVIL CONSTRUCTION/PHASE 3

DATE PRINTED: 7-AUG-92

WBS CODE: 1.2.3.3 MULT BY 1 COMPONENT : 8 GEV ENCLOSURE AT ANTIPROTON, PHASE 3

DATE ESTIMATED: 8/ 7/92

RESPONSIBLE: PAWLAK

<----- MATERIAL -----> <----- LABOR ----->

ITEM NUM.	ITEM TITLE	UNIT MEAS.	NO. UNITS	FY91 \$ /UNIT	COST BASIS	TOTAL MT K\$	NO. UNITS	HOURS /UNIT	TOTAL CRAFT HOURS CODE	\$/HR	TOTAL LABOR K\$
1	CONSTRUCTION SUB-CONTRACT	LOT	1	263538.	EE	263.538					
						263.538	<----- SUBTOTALS THIS PAGE ----->				0.000
TECHNICAL DESCRIPTION OF THIS WORK PACKAGE:						263.538 +	0.000 =		263.538		

## MAIN INJECTOR CONVENTIONAL CONSTRUCTION

## ESTIMATE --- COST ESTIMATE DETAILS

PAGE NUMBER 273

SUB-SYSTEM: CIVIL CONSTRUCTION/PHASE 4

DATE PRINTED: 7-AUG-92

WBS CODE: 1.2.4.1

MULT BY 1 COMPONENT : LANDSCAPING &amp; PAVING, PHASE 4

DATE ESTIMATED: 3/ 2/92

RESPONSIBLE: PAWLAK

&lt;----- MATERIAL -----&gt;

&lt;----- LABOR -----&gt;

ITEM NUM.	ITEM TITLE	UNIT MEAS.	NO. UNITS	FY91 \$ /UNIT	COST BASIS	TOTAL MT K\$	NO. UNITS	HOURS /UNIT	TOTAL CRAFT HOURS CODE \$/HR	TOTAL LABOR K\$
--------------	------------	---------------	--------------	------------------	---------------	-----------------	--------------	----------------	---------------------------------	--------------------

1	CONSTRUCTION SUB-CONTRACT	LOT	1	538085.	EE	538.085				
---	---------------------------	-----	---	---------	----	---------	--	--	--	--

538.085	<-----	SUBTOTALS THIS PAGE	----->	0.000
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TECHNICAL DESCRIPTION OF THIS WORK PACKAGE:

538.085 + 0.000 = 538.085

## MAIN INJECTOR CONVENTIONAL CONSTRUCTION

ESTIMATE --- COST ESTIMATE DETAILS

PAGE NUMBER 274

SUB-SYSTEM: CIVIL CONSTRUCTION ED&amp;I

DATE PRINTED: 7-AUG-92

WBS CODE: 1.2.14.1

MULT BY 1 COMPONENT : CIVIL CONSTRUCTION/Phase 1 ED&amp;I

DATE ESTIMATED: 8/07/92

RESPONSIBLE: PAWLAK

&lt;----- MATERIAL -----&gt; &lt;----- LABOR -----&gt;

ITEM NUM.	ITEM TITLE	UNIT MEAS.	NO. UNITS	FY91 \$ /UNIT	COST BASIS	TOTAL MT K\$	NO. UNITS	HOURS /UNIT	TOTAL CRAFT HOURS	CODE	\$/HR	TOTAL LABOR K\$
1	EDI						1	16073.0	16073.0	AE	50.00	803.650
2							1	4019.0	4019.0	CE	40.00	160.760
						0.000	SUBTOTALS THIS PAGE					964.410

TECHNICAL DESCRIPTION OF THIS WORK PACKAGE:

0.000 + 964.410 = 964.410

## MAIN INJECTOR CONVENTIONAL CONSTRUCTION

## ESTIMATE --- COST ESTIMATE DETAILS

PAGE NUMBER 275

SUB-SYSTEM: CIVIL CONSTRUCTION ED&amp;I

DATE PRINTED: 7-AUG-92

WBS CODE: 1.2.14.2

MULT BY 1 COMPONENT : CIVIL CONSTRUCTION/Phase 2 ED&amp;I

DATE ESTIMATED: 8/07/92

RESPONSIBLE: PAWLAK

&lt;----- MATERIAL -----&gt; &lt;----- LABOR -----&gt;

ITEM NUM.	ITEM TITLE	UNIT MEAS.	NO. UNITS	FY91 \$ /UNIT	COST BASIS	TOTAL MT K\$	NO. UNITS	HOURS /UNIT	TOTAL CRAFT HOURS CODE	\$/HR	TOTAL LABOR K\$
1	EDI						1	73717.0	73717.0 AE	50.00	3685.850
2							1	18433.0	18433.0 CE	40.00	737.320
						0.000	SUBTOTALS THIS PAGE				4423.170

TECHNICAL DESCRIPTION OF THIS WORK PACKAGE:

0.000 + 4423.170 = 4423.170

## MAIN INJECTOR CONVENTIONAL CONSTRUCTION

ESTIMATE --- COST ESTIMATE DETAILS

PAGE NUMBER 276

SUB-SYSTEM: CIVIL CONSTRUCTION ED&amp;I

DATE PRINTED: 7-AUG-92

WBS CODE: 1.2.14.3

MULT BY 1 COMPONENT : CIVIL CONSTRUCTION/Phase 3 ED&amp;I

DATE ESTIMATED: 8/07/92

RESPONSIBLE: PAWLAK

&lt;----- MATERIAL -----&gt; &lt;----- LABOR -----&gt;

ITEM NUM.	ITEM TITLE	UNIT MEAS.	NO. UNITS	FY91 \$ /UNIT	COST BASIS	TOTAL MT K\$	NO. UNITS	HOURS /UNIT	TOTAL CRAFT HOURS CODE	\$/HR	TOTAL LABOR K\$
1	EDI						1	17733.0	17733.0 AE	50.00	886.650
2							1	4434.0	4434.0 CE	40.00	177.360
						0.000	SUBTOTALS THIS PAGE				1064.010

TECHNICAL DESCRIPTION OF THIS WORK PACKAGE:

0.000 + 1064.010 = 1064.010



## MAIN INJECTOR CONVENTIONAL CONSTRUCTION

ESTIMATE --- COST ESTIMATE DETAILS

PAGE NUMBER 277

SUB-SYSTEM: CIVIL CONSTRUCTION ED&amp;I

DATE PRINTED: 7-AUG-92

WBS CODE: 1.2.14.4

MULT BY 1 COMPONENT : CIVIL CONSTRUCTION/Phase 4 ED&amp;I

DATE ESTIMATED: 8/07/92

RESPONSIBLE: PAWLAK

&lt;----- MATERIAL -----&gt; &lt;----- LABOR -----&gt;

ITEM NUM.	ITEM TITLE	UNIT MEAS.	NO. UNITS	FY91 \$ /UNIT	COST BASIS	TOTAL MT K\$	NO. UNITS	HOURS /UNIT	TOTAL CRAFT HOURS CODE	\$/HR	TOTAL LABOR K\$
1	EDI						1	876.0	876.0 AE	50.00	43.800
2							1	219.0	219.0 CE	40.00	8.760
						0.000	SUBTOTALS THIS PAGE				52.560

TECHNICAL DESCRIPTION OF THIS WORK PACKAGE:

0.000 + 52.560 = 52.560

FERMILAB MAIN INJECTOR

## ESTIMATE --- COST ESTIMATE DETAILS

PAGE NUMBER 278

SUB-SYSTEM: PROJECT MANAGEMENT

DATE PRINTED: 7-AUG-92

WBS CODE: 1.3.1

MULT BY 1 COMPONENT : MAIN INJECTOR PROJECT MANAGEMENT

DATE ESTIMATED: 3/24/92

RESPONSIBLE: HOLMES

&lt;----- MATERIAL -----&gt; &lt;----- LABOR -----&gt;

ITEM NUM.	ITEM TITLE	UNIT MEAS.	NO. UNITS	FY91 \$ /UNIT	COST BASIS	TOTAL MT K\$	NO. UNITS	HOURS /UNIT	TOTAL CRAFT HOURS CODE	\$/HR	TOTAL LABOR K\$
1	PROJECT MANAGER & DEPUTY						2	9000.0	18000.0	PM 40.00	720.000
2	CONSTRUCTION MANAGER						1	10000.0	10000.0	CE 40.00	400.000
3	BUDGET MANAGER						1	9000.0	9000.0	EN 32.40	291.600
4	SCHEDULE MANAGER						1	9000.0	9000.0	EN 32.40	291.600
5	PROGRAMMER						1	9000.0	9000.0	PR 30.90	278.100
6	ENVIRONMENTAL MANAGER						1	9000.0	9000.0	PM 40.00	360.000
7	ADMINISTRATIVE AIDE & SECRETARIES						4	9000.0	36000.0	AD 20.00	720.000
8	MISC. PROCUREMENTS	LOT	1	500000.	EE	500.000					

500.000 &lt;----- SUBTOTALS THIS PAGE -----&gt; 3061.300

TECHNICAL DESCRIPTION OF THIS WORK PACKAGE:

500.000 + 3061.300 = 3561.300

DOES NOT INCLUDE 8,000 HOURS LISTED UNDER R&amp;D.

FERMILAB MAIN INJECTOR

ESTIMATE --- COST ESTIMATE DETAILS

PAGE NUMBER 279

SUB-SYSTEM: PROJECT MANAGEMENT

DATE PRINTED: 7-AUG-92

WBS CODE: 1.3.2

MULT BY 1 COMPONENT : MAIN INJECTOR ACCELERATOR PHYSICS

DATE ESTIMATED: 3/24/92

RESPONSIBLE: HOLMES

<----- MATERIAL -----> <----- LABOR ----->

ITEM NUM.	ITEM TITLE	UNIT MEAS.	NO. UNITS	FY91 \$ /UNIT	COST BASIS	TOTAL MT K\$	NO. UNITS	HOURS /UNIT	TOTAL CRAFT HOURS CODE	\$/HR	TOTAL LABOR K\$
1	PHYSICISTS						4	7500.0	30000.0	PH 33.90	1017.000
2	ENGINEERS						1	7500.0	7500.0	EN 32.40	243.000
						0.000	SUBTOTALS THIS PAGE				1260.000

TECHNICAL DESCRIPTION OF THIS WORK PACKAGE:

0.000 + 1260.000 = 1260.000

90 % OF COSTS CARRIED ON PLANT, 10 % ON R&D. LAST SIX MONTHS ON PRE-OP.

## FERMILAB MAIN INJECTOR

## ESTIMATE --- COST ESTIMATE DETAILS

PAGE NUMBER 280

## SUB-SYSTEM: PROJECT MANAGEMENT

DATE PRINTED: 7-AUG-92

WBS CODE: 1.3.3

MULT BY 1 COMPONENT : MAIN INJECTOR G&amp;A

DATE ESTIMATED: 8/07/92

RESPONSIBLE: HOLMES

&lt;----- MATERIAL -----&gt; &lt;----- LABOR -----&gt;

ITEM NUM.	ITEM TITLE		UNIT MEAS.	NO. UNITS	FY91 \$ /UNIT	COST BASIS	TOTAL MT K\$	NO. UNITS	HOURS /UNIT	TOTAL CRAFT HOURS CODE \$/HR	TOTAL LABOR K\$
1	G & A ON 1.1	0 .7 %	K\$	81540	7.	EE	570.780				
2	G & A ON 1.2	0 .7 %	K\$	73043	7.	EE	511.301				
3	G & A ON 1.3.1-2	0 .7 %	K\$	4821	7.	EE	33.747				

1115.828 &lt;----- SUBTOTALS THIS PAGE -----&gt; 0.000

TECHNICAL DESCRIPTION OF THIS WORK PACKAGE:

1115.828 + 0.000 = 1115.828

## FERMILAB MAIN INJECTOR PROJECT

## ESTIMATE --- COST ESTIMATE DETAILS

PAGE NUMBER 281

SUB-SYSTEM: FERMILAB MAIN INJECTOR

DATE PRINTED: 7-AUG-92

WBS CODE: 1.4

MULT BY 1 COMPONENT : MAIN INJECTOR CONTINGENCY

DATE ESTIMATED: 8/07/92

RESPONSIBLE: HOLMES

&lt;----- MATERIAL -----&gt; &lt;----- LABOR -----&gt;

ITEM NUM.	ITEM TITLE	UNIT MEAS.	NO. UNITS	FY91 \$ /UNIT	COST BASIS	TOTAL MT K\$	NO. UNITS	HOURS /UNIT	TOTAL CRAFT HOURS CODE	\$/HR	TOTAL LABOR K\$
1	CONTINGENCY ON 1.1	0	19.0 %	K\$	81540	190.10	EE	15500.754			
2	CONTINGENCY ON 1.2	0	17.5 %	K\$	73043	175.20	EE	12797.134			
3	CONTINGENCY ON 1.3	0	19.7 %	K\$	5937	190.90	EE	1188.995			

29466.883 &lt;----- SUBTOTALS THIS PAGE -----&gt; 0.000

TECHNICAL DESCRIPTION OF THIS WORK PACKAGE:

29466.883 + 0.000 = 29466.883

## FERMILAB MAIN INJECTOR PROJECT

## ESTIMATE --- COST ESTIMATE DETAILS

PAGE NUMBER 282

SUB-SYSTEM: FERMILAB MAIN INJECTOR

DATE PRINTED: 7-AUG-92

WBS CODE: 1.5

MULT BY 1 COMPONENT : MAIN INJECTOR ESCALATION

DATE ESTIMATED: 8/07/92

RESPONSIBLE: HOLMES

&lt;----- MATERIAL -----&gt; &lt;----- LABOR -----&gt;

ITEM NUM.	ITEM TITLE	UNIT MEAS.	NO. UNITS	FY91 \$ /UNIT	COST BASIS	TOTAL MT K\$	NO. UNITS	HOURS /UNIT	TOTAL CRAFT HOURS CODE	\$/HR	TOTAL LABOR K\$
1	ESCALATION 1.1-1.4	0	14.5 %	K\$	189991	144.53	EE	27459.399			
						27459.399	<----- SUBTOTALS THIS PAGE ----->				0.000

TECHNICAL DESCRIPTION OF THIS WORK PACKAGE:

27459.399 + 0.000 = 27459.399

TOTALS FOR THIS RUN

217446.1 = 181837.1

+ 35609.0

## FERMILAB MAIN INJECTOR PROJECT

## ESTIMATE --- SUMMARY OF LABOR HOURS

PRINTED, 7-AUG-92 12:47:15

WBS	PM HOURS	PH HOURS	EN HOURS	AE HOURS	CE HOURS	DC HOURS	DR HOURS	AD HOURS	PR HOURS	IA HOURS	IP HOURS	IE HOURS	IG HOURS	IL HOURS	T1 HOURS	T2 HOURS	T3 HOURS
1.1.1.1.1.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	17850
1.1.1.1.1.2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	17850
1.1.1.1.1.3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10187
1.1.1.1.1.4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10187
1.1.1.1.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	56074
1.1.1.1.2.3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	20987	0	0
1.1.1.1.2.4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	35015	0	0
1.1.1.1.2.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	7620	0	0
1.1.1.1.2.9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	60	0	0
1.1.1.1.2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	63682	0	0
1.1.1.1.3.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	35640	0	0
1.1.1.1.3.2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	480	0	0
1.1.1.1.3.3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	360	0	0
1.1.1.1.3.4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	240	0	0
1.1.1.1.3.7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	160
1.1.1.1.3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	36720	0	160
1.1.1.1.4.2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3120	0	0
1.1.1.1.4.4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4160	0	0
1.1.1.1.4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	7280	0	0
1.1.1.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0107682	0	56234
1.1.1.2.1.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3482	0	0
1.1.1.2.1.7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1224	0	0
1.1.1.2.1.12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	600
1.1.1.2.1.13	0	0	0	0	0	0	0	0	0	0	0	0	0	0	48	0	0
1.1.1.2.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4754	0	600
1.1.1.2.2.7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	867	0	0
1.1.1.2.2.8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	23426	0	0

SUMMARY OF LABOR HOURS

	K HOURS	\$/HOUR	K\$
PM	27.000	40.00	1080.000
PH	58.881	33.90	1996.066
EN	122.969	32.40	3984.196
AE	108.399	50.00	5419.950
CE	37.105	40.00	1484.200
DC	68.651	32.00	2196.832
DR	53.796	22.20	1194.271
AD	46.490	20.00	929.800
PR	10.240	30.90	316.416
IA	14.388	31.10	447.467
IP	43.656	41.10	1794.270
IE	76.304	38.20	2914.827
IG	18.291	42.80	782.855
IL	4.043	27.20	109.964
T1	171.434	29.00	4971.598
T2	119.076	18.70	2226.717
T3	122.136	29.00	3541.944
S1	5.684	33.00	187.588
S2	0.790	38.00	30.020
TOT	1109.334		35608.980



## FERMILAB MAIN INJECTOR PROJECT

## ESTIMATE --- SUMMARY OF LABOR HOURS

PRINTED, 7-AUG-92 12:47:15

WBS	PM HOURS	PH HOURS	EN HOURS	AE HOURS	CE HOURS	DC HOURS	DR HOURS	AD HOURS	PR HOURS	IA HOURS	IP HOURS	IE HOURS	IG HOURS	IL HOURS	T1 HOURS	T2 HOURS	T3 HOURS
1.1.1.2.2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	24293	0	0
1.1.1.2.4.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	250	0	0
1.1.1.2.4.3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	250	0	0
1.1.1.2.4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	500	0	0
1.1.1.2.5.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	160	0	0
1.1.1.2.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	160	0	0
1.1.1.2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	29707	0	600
1.1.1.3.1.7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	360	0	0
1.1.1.3.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	360	0	0
1.1.1.3.2.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	780	0	0
1.1.1.3.2.6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	304	0	0
1.1.1.3.2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1084	0	0
1.1.1.3.4.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	60	0	0
1.1.1.3.4.3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	60	0	0
1.1.1.3.4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	120	0	0
1.1.1.3.5.2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1159	0	0
1.1.1.3.5.3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3828	0	0
1.1.1.3.5.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3645	0	0
1.1.1.3.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	8632	0	0
1.1.1.3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10196	0	0
1.1.1.4.1.7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	360	0	0
1.1.1.4.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	360	0	0
1.1.1.4.2.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	780	0	0
1.1.1.4.2.6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	304	0	0
1.1.1.4.2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1084	0	0
1.1.1.4.4.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	60	0	0
1.1.1.4.4.3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	60	0	0

## FERMILAB MAIN INJECTOR PROJECT

## ESTIMATE --- SUMMARY OF LABOR HOURS

PRINTED, 7-AUG-92 12:47:15

WBS	PM HOURS	PH HOURS	EN HOURS	AE HOURS	CE HOURS	DC HOURS	DR HOURS	AD HOURS	PR HOURS	IA HOURS	IP HOURS	IE HOURS	IG HOURS	IL HOURS	T1 HOURS	T2 HOURS	T3 HOURS
1.1.1.4.4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	120	0	0
1.1.1.4.5.2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1159	0	0
1.1.1.4.5.3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3828	0	0
1.1.1.4.5.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3845	0	0
1.1.1.4.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	8632	0	0
1.1.1.4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10196	0	0
1.1.1.5.1.13	0	0	0	0	0	0	0	0	0	0	0	0	0	0	192	0	0
1.1.1.5.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	192	0	0
1.1.1.5.4.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	40	0	0
1.1.1.5.4.3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	40	0	0
1.1.1.5.4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	80	0	0
1.1.1.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	272	0	0
1.1.1.6.1.12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	200	0	0
1.1.1.6.1.13	0	0	0	0	0	0	0	0	0	0	0	0	0	0	96	0	0
1.1.1.6.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	296	0	0
1.1.1.6.2.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	60	0	0
1.1.1.6.2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	60	0	0
1.1.1.6.4.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	140	0	0
1.1.1.6.4.3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	140	0	0
1.1.1.6.4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	280	0	0
1.1.1.6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	636	0	0
1.1.1.8.1.7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	48	0	0
1.1.1.8.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	48	0	0
1.1.1.8.2.6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	228	0	0
1.1.1.8.2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	228	0	0
1.1.1.8.4.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	20	0	0
1.1.1.8.4.3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	20	0	0

## FERMILAB MAIN INJECTOR PROJECT

## ESTIMATE --- SUMMARY OF LABOR HOURS

PRINTED, 7-AUG-92 12:47:15

WBS	PM HOURS	PH HOURS	EN HOURS	AE HOURS	CE HOURS	DC HOURS	DR HOURS	AD HOURS	PR HOURS	IA HOURS	IP HOURS	IE HOURS	IG HOURS	IL HOURS	T1 HOURS	T2 HOURS	T3 HOURS
1.1.1.8.4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	40	0	0
1.1.1.8.5.2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1159	0	0
1.1.1.8.5.3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1914	0	0
1.1.1.8.5.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	729	0	0
1.1.1.8.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3802	0	0
1.1.1.8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4118	0	0
1.1.1.10.1.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5302
1.1.1.10.1.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	756	0	0
1.1.1.10.1.7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	40	0	0
1.1.1.10.1.12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	400	0	0
1.1.1.10.1.13	0	0	0	0	0	0	0	0	0	0	0	0	0	0	40	0	0
1.1.1.10.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1238	0	5302
1.1.1.10.2.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	80	0	0
1.1.1.10.2.6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	40	0	0
1.1.1.10.2.8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	320	0	0
1.1.1.10.2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	440	0	0
1.1.1.10.3.2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	40	0	0
1.1.1.10.3.3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	40	0	0
1.1.1.10.3.4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	40	0	0
1.1.1.10.3.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	40	0	0
1.1.1.10.3.6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	40	0	0
1.1.1.10.3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	200	0	0
1.1.1.10.4.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	40	0	0
1.1.1.10.4.2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	40	0	0
1.1.1.10.4.3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	40	0	0
1.1.1.10.4.4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	40	0	0
1.1.1.10.4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	160	0	0

## FERMILAB MAIN INJECTOR PROJECT

## ESTIMATE --- SUMMARY OF LABOR HOURS

PRINTED, 7-AUG-92 12:47:15

WBS	PM HOURS	PH HOURS	EN HOURS	AE HOURS	CE HOURS	DC HOURS	DR HOURS	AD HOURS	PR HOURS	IA HOURS	IP HOURS	IE HOURS	IG HOURS	IL HOURS	T1 HOURS	T2 HOURS	T3 HOURS
1.1.1.10.5.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	40	0	0
1.1.1.10.5.2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	500	0	0
1.1.1.10.5.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	704	0	0
1.1.1.10.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1244	0	0
1.1.1.10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3280	0	5302
1.1.1.14	0	15000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	60000
1.1.1	0	15000	0	0	0	0	0	0	0	0	0	0	0	0	0166087	0	122136
1.1.2.1.1	0	0	7500	0	0	6600	3650	2200	0	0	0	0	0	0	0	696	0
1.1.2.1.2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	227	0
1.1.2.1.3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	922	0
1.1.2.1	0	0	7500	0	0	6600	3650	2200	0	0	0	0	0	0	0	1845	0
1.1.2.10.1.1	0	0	1800	0	0	1600	900	500	0	0	0	0	0	0	0	61	0
1.1.2.10.1.2	0	0	600	0	0	500	300	200	0	0	0	0	0	0	0	84	0
1.1.2.10.1.3	0	0	160	0	0	90	50	30	0	0	0	0	0	0	0	4	0
1.1.2.10.1	0	0	2560	0	0	2190	1250	730	0	0	0	0	0	0	0	149	0
1.1.2.10.2.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	89	0
1.1.2.10.2.2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	18	0
1.1.2.10.2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	107	0
1.1.2.10.3.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	8	0
1.1.2.10.3.2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	12	0
1.1.2.10.3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	20	0
1.1.2.10	0	0	2560	0	0	2190	1250	730	0	0	0	0	0	0	0	278	0
1.1.2	0	0	10080	0	0	8790	4900	2930	0	0	0	0	0	0	0	2121	0
1.1.3.1.1.1	0	1001	4620	0	0	9504	5080	0	0	0	0	4378	0	0	0	6402	0
1.1.3.1.1.2	0	0	5962	0	0	0	1001	0	0	0	0	0	0	0	0	27060	0
1.1.3.1.1	0	1001	10582	0	0	9504	6061	0	0	0	0	4378	0	0	0	33462	0
1.1.3.1.2	0	1000	1950	0	0	5000	3800	0	0	0	0	480	0	0	0	1200	0

## FERMILAB MAIN INJECTOR PROJECT

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PRINTED, 7-AUG-92 12:47:15

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1.1.3.1.3	0	80	320	0	0	400	300	0	0	0	0	0	0	0	0	1488	0
1.1.3.1.4	0	0	50	0	0	0	50	0	0	0	0	672	0	0	0	624	0
1.1.3.1.6	0	1000	2270	0	0	1000	1000	0	0	0	0	0	0	0	0	1280	0
1.1.3.1.7	0	300	1180	0	0	500	500	0	0	0	0	160	0	0	0	1260	0
1.1.3.1.8	0	0	100	0	0	50	50	0	0	0	0	0	16	0	0	40	0
1.1.3.1	0	3381	16452	0	0	16454	11761	0	0	0	0	5690	16	0	0	39354	0
1.1.3.2.1	0	100	1000	0	0	200	200	0	0	0	0	240	96	0	0	980	0
1.1.3.2.2	0	100	1000	0	0	300	250	0	0	0	0	210	60	0	0	520	0
1.1.3.2.3	0	100	500	0	0	0	200	0	0	0	0	714	0	0	0	714	0
1.1.3.2.4	0	0	40	0	0	0	25	0	0	0	0	32	24	0	0	100	0
1.1.3.2	0	300	2540	0	0	500	675	0	0	0	0	1196	180	0	0	2314	0
1.1.3.3.1	0	200	1500	0	0	600	600	0	0	0	0	120	40	0	0	940	0
1.1.3.3.2	0	300	2000	0	0	600	600	0	0	0	0	280	0	0	0	1120	0
1.1.3.3.3	0	100	500	0	0	400	200	0	0	0	0	64	0	0	0	96	0
1.1.3.3	0	600	4000	0	0	1600	1400	0	0	0	0	464	40	0	0	2156	0
1.1.3.4.3	0	100	1000	0	0	400	200	0	0	0	0	64	0	0	0	96	0
1.1.3.4	0	100	1000	0	0	400	200	0	0	0	0	64	0	0	0	96	0
1.1.3.5.2	0	200	750	0	0	400	200	0	0	0	0	160	0	0	0	960	0
1.1.3.5.3	0	0	250	0	0	200	100	0	0	0	0	16	0	0	0	80	0
1.1.3.5	0	200	1000	0	0	600	300	0	0	0	0	176	0	0	0	1040	0
1.1.3.6.1	0	200	1000	0	0	400	200	0	0	0	0	270	0	0	0	300	0
1.1.3.6.2	0	200	1000	0	0	400	200	0	0	0	0	320	0	0	0	400	0
1.1.3.6	0	400	2000	0	0	800	400	0	0	0	0	590	0	0	0	700	0
1.1.3.7	0	0	1000	0	0	500	1000	0	0	0	0	0	0	0	0	1240	0
1.1.3	0	4981	27992	0	0	20854	15736	0	0	0	0	8180	236	0	0	46900	0
1.1.4.1.1.1.1	0	0	390	0	0	0	420	0	0	0	0	0	0	0	0	5100	0
1.1.4.1.1.1.2	0	0	360	0	0	0	0	0	0	0	0	0	0	0	0	3600	0

## FERMILAB MAIN INJECTOR PROJECT

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PRINTED, 7-AUG-92 12:47:15

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1.1.4.1.1.1	0	0	750	0	0	0	420	0	0	0	0	0	0	0	0	8700	0
1.1.4.1.1.2.1	0	0	480	0	0	0	480	0	0	0	0	0	0	0	0	1440	0
1.1.4.1.1.2.2	0	50	2000	0	0	0	2300	0	0	0	0	0	0	0	0	2250	0
1.1.4.1.1.2	0	50	2480	0	0	0	2780	0	0	0	0	0	0	0	0	3890	0
1.1.4.1.1.3	0	50	500	0	0	0	200	0	0	0	0	0	0	0	0	760	0
1.1.4.1.1.4	0	0	300	0	0	0	400	0	0	0	0	540	0	0	0	800	0
1.1.4.1.1.6	0	200	1500	0	0	0	1400	0	0	0	0	0	288	0	0	0	0
1.1.4.1.1	0	300	5530	0	0	0	5200	0	0	0	0	540	288	0	0	13950	0
1.1.4.1.2.1	0	100	240	0	0	0	320	0	0	0	0	112	16	0	0	112	0
1.1.4.1.2.4	0	0	80	0	0	0	80	0	0	0	0	0	0	0	0	144	0
1.1.4.1.2	0	100	300	0	0	0	400	0	0	0	0	112	16	0	0	256	0
1.1.4.1	0	400	5830	0	0	0	5600	0	0	0	0	652	304	0	0	14206	0
1.1.4	0	400	5830	0	0	0	5600	0	0	0	0	652	304	0	0	14206	0
1.1.6.1.1.1	0	200	550	0	0	800	400	0	0	0	0	0	0	0	0	960	0
1.1.6.1.1.2	0	500	1700	0	0	1000	500	0	0	0	0	60	0	0	0	2040	0
1.1.6.1.1	0	700	2250	0	0	1800	900	0	0	0	0	60	0	0	0	3000	0
1.1.6.1.2.1	0	200	800	0	0	1000	500	0	0	0	0	0	0	0	0	960	0
1.1.6.1.2.2	0	500	2800	0	0	1500	1000	0	0	0	0	240	0	0	0	5000	0
1.1.6.1.2	0	700	3400	0	0	2500	1500	0	0	0	0	240	0	0	0	5960	0
1.1.6.1.4.1	0	50	200	0	0	200	100	0	0	0	0	0	0	0	0	960	0
1.1.6.1.4.2	0	100	600	0	0	750	500	0	0	0	0	80	0	0	0	1800	0
1.1.6.1.4	0	150	800	0	0	950	600	0	0	0	0	80	0	0	0	2760	0
1.1.6.1.5.1	0	50	200	0	0	200	100	0	0	0	0	0	0	0	0	40	0
1.1.6.1.5.2	0	100	400	0	0	400	200	0	0	0	0	80	0	0	0	2000	0
1.1.6.1.5	0	150	600	0	0	600	300	0	0	0	0	80	0	0	0	2040	0
1.1.6.1	0	1700	7050	0	0	5850	3300	0	0	0	0	460	0	0	0	13760	0
1.1.6.2.1	0	100	80	0	0	0	80	0	0	0	0	17	0	0	0	60	0

PRINTED, 7-AUG-92 12:47:15

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## FERMILAB MAIN INJECTOR PROJECT

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1.1.9.1.2	0	500	645	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1.1.9.1.3	0	50	500	0	0	0	0	0	0	0	0	0	0	0	0	2490	0
1.1.9.1.4	0	50	670	0	0	0	0	0	40	0	0	400	0	0	0	0	0
1.1.9.1	0	1100	2190	0	0	0	0	0	40	0	0	400	0	0	0	2530	0
1.1.9.10.1	0	500	350	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1.1.9.10.2	0	400	500	0	0	0	0	0	0	0	0	0	0	0	0	1330	0
1.1.9.10	0	900	850	0	0	0	0	0	0	0	0	0	0	0	0	1330	0
1.1.9	0	2000	3040	0	0	0	0	0	40	0	0	400	0	0	0	3860	0
1.1.10.1	0	300	1300	0	0	700	700	0	0	0	300	0	0	0	0	2420	0
1.1.10.2	0	300	300	0	0	700	700	0	0	0	200	100	0	0	0	860	0
1.1.10	0	600	1600	0	0	1400	1400	0	0	0	500	100	0	0	0	3280	0
1.1.12.1.1.2	0	0	500	0	0	160	0	0	0	0	192	0	216	0	0	0	0
1.1.12.1.1.3	0	0	750	0	0	400	0	0	0	0	2684	520	0	0	0	0	0
1.1.12.1.1.4	0	0	750	0	0	450	0	0	0	0	1376	1200	85	0	0	208	0
1.1.12.1.1.5	0	0	1400	0	0	2500	0	0	0	0	19037	0	0	0	0	0	0
1.1.12.1.1.6	0	0	750	0	0	450	0	0	0	0	1148	480	0	0	0	0	0
1.1.12.1.1.7	0	0	375	0	0	640	0	0	0	0	480	400	0	0	0	0	0
1.1.12.1.1.8	0	0	400	0	0	800	0	0	0	0	3044	0	0	0	0	0	0
1.1.12.1.1.9	0	0	375	0	0	640	0	0	0	0	400	400	0	0	0	0	0
1.1.12.1.1.10	0	0	600	0	0	480	0	0	0	0	976	400	36	0	0	0	0
1.1.12.1.1.11	0	0	300	0	0	600	0	0	0	0	2300	0	0	0	0	0	0
1.1.12.1.1	0	0	6200	0	0	7120	0	0	0	0	31637	3400	337	0	0	208	0
1.1.12.1.2.2	0	0	300	0	0	200	200	0	0	0	0	10397	0	0	0	200	0
1.1.12.1.2	0	0	300	0	0	200	200	0	0	0	0	10397	0	0	0	200	0
1.1.12.1.3.1	0	0	1500	0	0	500	800	0	0	0	520	0	0	0	0	0	0
1.1.12.1.3.2	0	0	300	0	0	200	100	60	0	0	0	0	0	0	0	84	0
1.1.12.1.3	0	0	1800	0	0	700	900	60	0	0	520	0	0	0	0	84	0



PRINTED, 7-AUG-92 12:47:15

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## FERMILAB MAIN INJECTOR PROJECT

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1.1.13.1.7	0	0	700	0	0	1100	800	0	0	0	0	0	0	0	0	0	0
1.1.13.1.8	0	0	350	0	0	200	0	0	0	0	120	1430	150	0	0	0	0
1.1.13.1	0	200	9062	0	0	9732	11600	4000	0	10676	600	25719	12822	2820	0	14996	0
1.1.13.2.1.1	0	0	1800	0	0	1200	3000	3000	0	0	0	0	12	249	0	0	0
1.1.13.2.1.2	0	0	600	0	0	500	1200	0	0	0	0	0	1644	200	0	0	0
1.1.13.2.1.3	0	0	100	0	0	0	0	0	0	3712	0	0	0	0	0	0	0
1.1.13.2.1	0	0	2500	0	0	1700	4200	3000	0	3712	0	0	1656	449	0	0	0
1.1.13.2.2	0	0	250	0	0	300	0	0	0	0	0	0	0	0	0	0	0
1.1.13.2.3	0	0	0	0	0	0	0	0	0	0	0	49	0	200	0	623	0
1.1.13.2.4	0	0	100	0	0	0	0	0	0	0	0	1754	0	0	0	864	0
1.1.13.2	0	0	2850	0	0	2000	4200	3000	0	3712	0	1803	1656	649	0	1487	0
1.1.13.3.1.1	0	0	800	0	0	1000	1500	300	0	0	0	0	0	182	0	0	0
1.1.13.3.1.2	0	0	600	0	0	300	1000	0	0	0	0	0	1356	0	0	0	0
1.1.13.3.1.3	0	0	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1.1.13.3.1	0	0	1500	0	0	1300	2500	300	0	0	0	0	1356	182	0	0	0
1.1.13.3.2	0	0	250	0	0	300	0	0	0	0	0	0	0	0	0	0	0
1.1.13.3.3	0	0	0	0	0	0	0	0	0	0	0	44	0	52	0	592	0
1.1.13.3.4	0	0	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1.1.13.3	0	0	1850	0	0	1600	2500	300	0	0	0	44	1356	234	0	592	0
1.1.13.4.1.3	0	0	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1.1.13.4.1	0	0	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1.1.13.4	0	0	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1.1.13.5.1.3	0	0	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1.1.13.5.1	0	0	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1.1.13.5	0	0	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1.1.13.6.1.1	0	0	500	0	0	300	900	200	0	0	0	0	0	84	0	0	0
1.1.13.6.1.2	0	0	1000	0	0	500	1000	0	0	0	0	0	120	256	0	0	0

PRINTED, 7-AUG-92 12:47:15

WBS	PM HOURS	PH HOURS	EN HOURS	AE HOURS	CE HOURS	DC HOURS	DR HOURS	AD HOURS	PR HOURS	IA HOURS	IP HOURS	IE HOURS	IG HOURS	IL HOURS	T1 HOURS	T2 HOURS	T3 HOURS
1.1.13.6.1.3	0	0	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1.1.13.6.1	0	0	1600	0	0	800	1900	200	0	0	0	0	120	340	0	0	0
1.1.13.6.2	0	0	250	0	0	300	0	0	0	0	0	0	0	0	0	0	0
1.1.13.6.3	0	0	0	0	0	0	0	0	0	0	0	129	0	0	0	610	0
1.1.13.6.4	0	0	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1.1.13.6	0	0	1950	0	0	1100	1900	200	0	0	0	129	120	340	0	610	0
1.1.13.7.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	192	0
1.1.13.7.2.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	726	0
1.1.13.7.2.2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	431	0
1.1.13.7.2.3	0	0	2600	0	0	735	0	0	0	0	3390	1520	64	0	0	4936	0
1.1.13.7.2	0	0	2600	0	0	735	0	0	0	0	3390	1520	64	0	0	6093	0
1.1.13.7	0	0	2600	0	0	735	0	0	0	0	3390	1520	64	0	0	6286	0
1.1.13.10.2.1	0	0	130	0	0	260	0	0	0	0	640	2172	528	0	0	800	0
1.1.13.10.2.2	0	0	1300	0	0	2000	0	0	0	0	0	4084	300	0	0	0	0
1.1.13.10.2	0	0	1430	0	0	2260	0	0	0	0	640	6256	828	0	0	800	0
1.1.13.10.5	0	0	300	0	0	0	0	0	0	0	0	180	0	0	0	1035	0
1.1.13.10.8	0	0	300	0	0	300	0	0	0	0	80	1070	300	0	0	0	0
1.1.13.10	0	0	2030	0	0	2560	0	0	0	0	720	7506	1128	0	0	1835	0
1.1.13	0	200	20542	0	0	17727	20200	7500	0	14388	4710	36721	17146	4043	0	25804	0
1.1	0	28881	97469	0	0	68651	53796	10490	1240	14388	43656	76304	18291	40431	71434	119076	122136
1.2.14.1	0	0	0	18073	4019	0	0	0	0	0	0	0	0	0	0	0	0
1.2.14.2	0	0	0	73717	18433	0	0	0	0	0	0	0	0	0	0	0	0
1.2.14.3	0	0	0	17733	4434	0	0	0	0	0	0	0	0	0	0	0	0
1.2.14.4	0	0	0	876	219	0	0	0	0	0	0	0	0	0	0	0	0
1.2.14	0	0	0	108399	27105	0	0	0	0	0	0	0	0	0	0	0	0
1.2	0	0	0	108399	27105	0	0	0	0	0	0	0	0	0	0	0	0
1.3.1	27000	0	18000	0	10000	0	0	36000	9000	0	0	0	0	0	0	0	0

## FERMILAB MAIN INJECTOR PROJECT

## ESTIMATE --- SUMMARY OF LABOR HOURS

PRINTED, 7-AUG-92 12:47:15

WBS	PM HOURS	PH HOURS	EN HOURS	AE HOURS	CE HOURS	DC HOURS	DR HOURS	AD HOURS	PR HOURS	IA HOURS	IP HOURS	IE HOURS	IG HOURS	IL HOURS	T1 HOURS	T2 HOURS	T3 HOURS
1.3.2	0	30000	7500	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1.3	27000	30000	25500	0	10000	0	0	38000	9000	0	0	0	0	0	0	0	0
1	27000	58881	122969	108399	37105	68651	53798	46490	10240	14388	43658	76304	18291	40431	71434	11907	61221
1 K\$	1080	1996	3984	5419	1484	2196	1194	929	316	447	1794	2914	782	109	4971	2226	3541
1 CUM K\$	1080	3076	7060	12480	13964	16161	17355	18285	18601	19049	20843	23758	24541	24651	29622	31849	35391
TOTAL	27000	58881	122969	108399	37105	68651	53798	46490	10240	14388	43658	76304	18291	40431	71434	11907	61221

## FERMILAB MAIN INJECTOR PROJECT

## ESTIMATE --- SUMMARY OF LABOR HOURS

PRINTED, 7-AUG-92 12:47:15

WBS	S1 HOURS	S2 HOURS	TOTAL HOURS	TOTAL K\$
1.1.1.1.1.1	0	0	17,850.000	517.650
1.1.1.1.1.2	0	0	17,850.000	517.650
1.1.1.1.1.3	0	0	10,187.000	295.423
1.1.1.1.1.4	0	0	10,187.000	295.423
1.1.1.1.1	0	0	58,074.000	1,626.146
1.1.1.1.2.3	0	0	20,987.000	608.623
1.1.1.1.2.4	0	0	35,015.000	1,015.435
1.1.1.1.2.5	0	0	7,620.000	220.980
1.1.1.1.2.9	0	0	60.000	1.740
1.1.1.1.2	0	0	63,682.000	1,846.778
1.1.1.1.3.1	0	0	35,640.000	1,033.560
1.1.1.1.3.2	0	0	480.000	13.920
1.1.1.1.3.3	0	0	360.000	10.440
1.1.1.1.3.4	0	0	240.000	6.960
1.1.1.1.3.7	0	0	160.000	4.640
1.1.1.1.3	0	0	36,880.000	1,069.520
1.1.1.1.4.2	0	0	3,120.000	90.480
1.1.1.1.4.4	0	0	4,160.000	120.640
1.1.1.1.4	0	0	7,280.000	211.120
1.1.1.1	0	0	163,916.000	4,753.564
1.1.1.2.1.5	0	0	3,482.000	100.978
1.1.1.2.1.7	0	0	1,224.000	35.496
1.1.1.2.1.12	0	0	600.000	17.400
1.1.1.2.1.13	0	0	48.000	1.392
1.1.1.2.1	0	0	5,354.000	155.266
1.1.1.2.2.7	0	0	867.000	25.143
1.1.1.2.2.8	0	0	23,426.000	679.354

## FERMILAB MAIN INJECTOR PROJECT

## ESTIMATE --- SUMMARY OF LABOR HOURS

PRINTED, 7-AUG-92 12:47:15

WBS	S1 HOURS	S2 HOURS	TOTAL HOURS	TOTAL K\$
1.1.1.2.2	0	0	24,293.000	704.497
1.1.1.2.4.1	0	0	250.000	7.250
1.1.1.2.4.3	0	0	250.000	7.250
1.1.1.2.4	0	0	500.000	14.500
1.1.1.2.5.1	0	0	160.000	4.640
1.1.1.2.5	0	0	160.000	4.640
1.1.1.2	0	0	30,307.000	878.903
1.1.1.3.1.7	0	0	360.000	10.440
1.1.1.3.1	0	0	360.000	10.440
1.1.1.3.2.5	0	0	780.000	22.620
1.1.1.3.2.6	0	0	304.000	8.816
1.1.1.3.2	0	0	1,084.000	31.436
1.1.1.3.4.1	0	0	60.000	1.740
1.1.1.3.4.3	0	0	60.000	1.740
1.1.1.3.4	0	0	120.000	3.480
1.1.1.3.5.2	0	0	1,159.000	33.611
1.1.1.3.5.3	0	0	3,828.000	111.012
1.1.1.3.5.5	0	0	3,645.000	105.705
1.1.1.3.5	0	0	8,632.000	250.328
1.1.1.3	0	0	10,196.000	295.684
1.1.1.4.1.7	0	0	360.000	10.440
1.1.1.4.1	0	0	360.000	10.440
1.1.1.4.2.5	0	0	780.000	22.620
1.1.1.4.2.6	0	0	304.000	8.816
1.1.1.4.2	0	0	1,084.000	31.436
1.1.1.4.4.1	0	0	60.000	1.740
1.1.1.4.4.3	0	0	60.000	1.740

## FERMILAB MAIN INJECTOR PROJECT

## ESTIMATE --- SUMMARY OF LABOR HOURS

PRINTED, 7-AUG-92 12:47:15

WBS	S1 HOURS	S2 HOURS	TOTAL HOURS	TOTAL K\$
1.1.1.4.4	0	0	120.000	3.480
1.1.1.4.5.2	0	0	1,159.000	33.611
1.1.1.4.5.3	0	0	3,828.000	111.012
1.1.1.4.5.5	0	0	3,645.000	105.705
1.1.1.4.5	0	0	8,632.000	250.328
1.1.1.4	0	0	10,196.000	295.684
1.1.1.5.1.13	0	0	192.000	5.568
1.1.1.5.1	0	0	192.000	5.568
1.1.1.5.4.1	0	0	40.000	1.160
1.1.1.5.4.3	0	0	40.000	1.160
1.1.1.5.4	0	0	80.000	2.320
1.1.1.5	0	0	272.000	7.888
1.1.1.6.1.12	0	0	200.000	5.800
1.1.1.6.1.13	0	0	96.000	2.784
1.1.1.6.1	0	0	296.000	8.584
1.1.1.6.2.5	0	0	60.000	1.740
1.1.1.6.2	0	0	60.000	1.740
1.1.1.6.4.1	0	0	140.000	4.060
1.1.1.6.4.3	0	0	140.000	4.060
1.1.1.6.4	0	0	280.000	8.120
1.1.1.6	0	0	636.000	18.444
1.1.1.8.1.7	0	0	48.000	1.392
1.1.1.8.1	0	0	48.000	1.392
1.1.1.8.2.6	0	0	228.000	6.612
1.1.1.8.2	0	0	228.000	6.612
1.1.1.8.4.1	0	0	20.000	0.580
1.1.1.8.4.3	0	0	20.000	0.580

## FERMILAB MAIN INJECTOR PROJECT

## ESTIMATE --- SUMMARY OF LABOR HOURS

PRINTED, 7-AUG-92 12:47:15

WBS	S1 HOURS	S2 HOURS	TOTAL HOURS	TOTAL K\$
1.1.1.8.4	0	0	40.000	1.160
1.1.1.8.5.2	0	0	1,159.000	33.611
1.1.1.8.5.3	0	0	1,914.000	55.506
1.1.1.8.5.5	0	0	729.000	21.141
1.1.1.8.5	0	0	3,802.000	110.258
1.1.1.8	0	0	4,118.000	119.422
1.1.1.10.1.1	0	0	5,302.000	153.758
1.1.1.10.1.5	0	0	756.000	21.924
1.1.1.10.1.7	0	0	40.000	1.160
1.1.1.10.1.12	0	0	400.000	11.600
1.1.1.10.1.13	0	0	40.000	1.160
1.1.1.10.1	0	0	6,538.000	189.602
1.1.1.10.2.5	0	0	80.000	2.320
1.1.1.10.2.6	0	0	40.000	1.160
1.1.1.10.2.8	0	0	320.000	9.280
1.1.1.10.2	0	0	440.000	12.760
1.1.1.10.3.2	0	0	40.000	1.160
1.1.1.10.3.3	0	0	40.000	1.160
1.1.1.10.3.4	0	0	40.000	1.160
1.1.1.10.3.5	0	0	40.000	1.160
1.1.1.10.3.6	0	0	40.000	1.160
1.1.1.10.3	0	0	200.000	5.800
1.1.1.10.4.1	0	0	40.000	1.160
1.1.1.10.4.2	0	0	40.000	1.160
1.1.1.10.4.3	0	0	40.000	1.160
1.1.1.10.4.4	0	0	40.000	1.160
1.1.1.10.4	0	0	160.000	4.640



## FERMILAB MAIN INJECTOR PROJECT

## ESTIMATE --- SUMMARY OF LABOR HOURS

PRINTED, 7-AUG-92 12:47:15

WBS	S1 HOURS	S2 HOURS	TOTAL HOURS	TOTAL K\$
1.1.1.10.5.1	0	0	40.000	1.160
1.1.1.10.5.2	0	0	500.000	14.500
1.1.1.10.5.5	0	0	704.000	20.416
1.1.1.10.5	0	0	1,244.000	36.076
1.1.1.10	0	0	8,582.000	248.878
1.1.1.14	0	0	75,000.000	2,248.500
1.1.1	0	0	303,223.000	8,866.967
1.1.2.1.1	1500	24	22,170.000	642.657
1.1.2.1.2	0	0	227.000	4.245
1.1.2.1.3	70	52	1,044.000	21.527
1.1.2.1	1570	76	23,441.000	668.429
1.1.2.10.1.1	600	20	5,481.000	161.201
1.1.2.10.1.2	300	10	1,994.000	57.951
1.1.2.10.1.3	200	0	534.000	16.449
1.1.2.10.1	1100	30	8,009.000	235.600
1.1.2.10.2.1	0	0	89.000	1.664
1.1.2.10.2.2	0	0	18.000	0.337
1.1.2.10.2	0	0	107.000	2.001
1.1.2.10.3.1	16	8	32.000	0.982
1.1.2.10.3.2	0	12	24.000	0.680
1.1.2.10.3	16	20	56.000	1.662
1.1.2.10	1116	50	8,172.000	239.263
1.1.2	2686	126	31,613.000	907.693
1.1.3.1.1.1	0	0	30,965.000	887.039
1.1.3.1.1.2	440	0	34,463.000	735.933
1.1.3.1.1	440	0	65,428.000	1,622.972
1.1.3.1.2	0	0	13,430.000	382.216

## FERMILAB MAIN INJECTOR PROJECT

## ESTIMATE --- SUMMARY OF LABOR HOURS

PRINTED, 7-AUG-92 12:47:15

WBS	S1 HOURS	S2 HOURS	TOTAL HOURS	TOTAL K\$
1.1.3.1.3	0	0	2,588.000	60.366
1.1.3.1.4	0	0	1,396.000	40.069
1.1.3.1.6	0	0	6,550.000	185.584
1.1.3.1.7	160	0	4,060.000	110.456
1.1.3.1.8	0	0	256.000	7.383
1.1.3.1	600	0	93,708.000	2,409.045
1.1.3.2.1	0	0	2,816.000	78.233
1.1.3.2.2	0	0	2,440.000	71.254
1.1.3.2.3	0	0	2,228.000	64.657
1.1.3.2.4	0	0	221.000	5.971
1.1.3.2	0	0	7,705.000	220.114
1.1.3.3.1	0	0	4,000.000	111.774
1.1.3.3.2	0	0	4,900.000	139.130
1.1.3.3.3	0	0	1,360.000	41.070
1.1.3.3	0	0	10,260.000	291.974
1.1.3.4.3	0	0	1,860.000	57.270
1.1.3.4	0	0	1,860.000	57.270
1.1.3.5.2	0	0	2,670.000	72.384
1.1.3.5.3	0	0	646.000	18.827
1.1.3.5	0	0	3,316.000	91.211
1.1.3.6.1	0	0	2,370.000	72.344
1.1.3.6.2	0	0	2,520.000	76.124
1.1.3.6	0	0	4,890.000	148.468
1.1.3.7	0	0	3,740.000	93.788
1.1.3	600	0	125,479.000	3,311.871
1.1.4.1.1.1.1	0	0	5,910.000	117.330
1.1.4.1.1.1.2	0	0	3,960.000	78.984

## FERMILAB MAIN INJECTOR PROJECT

## ESTIMATE --- SUMMARY OF LABOR HOURS

PRINTED, 7-AUG-92 12:47:15

WBS	S1 HOURS	S2 HOURS	TOTAL HOURS	TOTAL K\$
1.1.4.1.1.1	0	0	9,870.000	196.314
1.1.4.1.1.2.1	0	0	2,400.000	53.136
1.1.4.1.1.2.2	0	0	6,600.000	159.630
1.1.4.1.1.2	0	0	9,000.000	212.766
1.1.4.1.1.3	0	0	1,510.000	36.547
1.1.4.1.1.4	0	0	2,040.000	54.188
1.1.4.1.1.6	0	0	3,388.000	98.786
1.1.4.1.1	0	0	25,808.000	598.601
1.1.4.1.2.1	0	0	900.000	25.328
1.1.4.1.2.4	0	0	284.000	6.413
1.1.4.1.2	0	0	1,184.000	31.740
1.1.4.1	0	0	26,992.000	630.342
1.1.4	0	0	26,992.000	630.342
1.1.6.1.1.1	0	0	2,910.000	77.032
1.1.6.1.1.2	0	0	5,800.000	155.570
1.1.6.1.1	0	0	8,710.000	232.602
1.1.6.1.2.1	0	0	3,460.000	93.752
1.1.6.1.2.2	0	0	10,840.000	274.058
1.1.6.1.2	0	0	14,300.000	367.810
1.1.6.1.4.1	0	0	1,510.000	34.747
1.1.6.1.4.2	0	0	3,830.000	94.646
1.1.6.1.4	0	0	5,340.000	129.393
1.1.6.1.5.1	0	0	590.000	17.543
1.1.6.1.5.2	0	0	3,180.000	74.046
1.1.6.1.5	0	0	3,770.000	91.589
1.1.6.1	0	0	32,120.000	821.394
1.1.6.2.1	60	303	699.800	23.016

## FERMILAB MAIN INJECTOR PROJECT

## ESTIMATE --- SUMMARY OF LABOR HOURS

PRINTED, 7-AUG-92 12:47:15

WBS	S1 HOURS	S2 HOURS	TOTAL HOURS	TOTAL K\$
1.1.8.2.2	0	0	700.000	21.240
1.1.8.2.3	0	0	3,550.000	100.355
1.1.8.2	60	303	4,949.800	144.611
1.1.8.3.1.1	0	0	3,300.000	90.760
1.1.8.3.1.2	0	0	1,770.000	48.347
1.1.8.3.1	0	0	5,070.000	139.107
1.1.8.3.2.1	0	0	160.000	3.552
1.1.8.3.2.2	0	0	1,770.000	48.347
1.1.8.3.2	0	0	1,930.000	51.899
1.1.8.3	0	0	7,000.000	191.006
1.1.8	60	303	44,069.797	1,157.011
1.1.8.1.1	0	0	5,475.000	151.209
1.1.8.1.2	0	0	1,570.000	49.610
1.1.8.1.3	0	0	40.000	0.954
1.1.8.1.4	0	0	144.000	3.352
1.1.8.1.5	0	0	2,800.000	68.016
1.1.8.1.6	480	0	4,080.000	134.730
1.1.8.1.7	0	0	120.000	2.898
1.1.8.1.8	370	0	1,670.000	54.330
1.1.8.1	850	0	15,899.000	465.099
1.1.8.10.1	0	0	2,719.500	73.469
1.1.8.10.2	0	0	486.400	14.616
1.1.8.10.7	0	0	565.000	10.565
1.1.8.10.9	0	0	2,040.000	53.784
1.1.8.10	0	0	5,810.900	152.434
1.1.8	850	0	21,709.898	617.533
1.1.9.1.1	0	0	915.000	29.848

## FERMILAB MAIN INJECTOR PROJECT

## ESTIMATE --- SUMMARY OF LABOR HOURS

PRINTED, 7-AUG-92 12:47:15

WBS	S1 HOURS	S2 HOURS	TOTAL HOURS	TOTAL K\$
1.1.9.1.2	0	0	1,145.000	37.848
1.1.9.1.3	0	0	3,040.000	64.458
1.1.9.1.4	0	0	1,160.000	39.919
1.1.9.1	0	0	6,260.000	172.073
1.1.9.10.1	0	0	850.000	28.290
1.1.9.10.2	0	0	2,230.000	54.631
1.1.9.10	0	0	3,080.000	82.921
1.1.9	0	0	9,340.000	254.994
1.1.10.1	0	0	5,720.000	147.814
1.1.10.2	0	0	3,160.000	85.952
1.1.10	0	0	8,880.000	233.766
1.1.12.1.1.2	0	0	1,068.000	38.456
1.1.12.1.1.3	0	0	4,354.000	167.276
1.1.12.1.1.4	0	0	4,069.000	148.621
1.1.12.1.1.5	0	0	22,936.898	907.777
1.1.12.1.1.6	0	0	2,828.000	104.219
1.1.12.1.1.7	0	0	1,895.000	67.638
1.1.12.1.1.8	0	0	4,244.000	163.668
1.1.12.1.1.9	0	0	1,815.000	64.350
1.1.12.1.1.10	0	0	2,492.000	91.734
1.1.12.1.1.11	0	0	3,200.000	123.450
1.1.12.1.1	0	0	48,901.898	1,877.190
1.1.12.1.2.2	0	0	11,296.500	421.446
1.1.12.1.2	0	0	11,296.500	421.446
1.1.12.1.3.1	0	320	3,640.000	115.892
1.1.12.1.3.2	100	41	885.000	25.969
1.1.12.1.3	100	361	4,525.000	141.861

## FERMILAB MAIN INJECTOR PROJECT

## ESTIMATE --- SUMMARY OF LABOR HOURS

PRINTED, 7-AUG-92 12:47:15

WBS	S1 HOURS	S2 HOURS	TOTAL HOURS	TOTAL K\$
1.1.12.1	100	361	64,723.398	2,440.497
1.1.12.10.1.2	0	0	1,256.000	44.179
1.1.12.10.1.3	0	0	2,175.000	77.690
1.1.12.10.1.4	0	0	1,872.000	65.503
1.1.12.10.1.5	0	0	8,869.300	329.598
1.1.12.10.1	0	0	14,172.300	516.971
1.1.12.10.2.2	0	0	15,758.560	591.897
1.1.12.10.2	0	0	15,758.560	591.897
1.1.12.10	0	0	29,930.859	1,108.888
1.1.12	100	361	94,654.258	3,549.365
1.1.13.1.1.1	0	0	13,669.800	340.039
1.1.13.1.1.2	0	0	13,556.000	509.822
1.1.13.1.1.3	0	0	10,926.000	340.124
1.1.13.1.1.4	0	0	9,188.000	276.428
1.1.13.1.1	0	0	47,339.797	1,466.412
1.1.13.1.2.1	96	0	4,033.800	151.408
1.1.13.1.2.2	0	0	19,475.000	720.365
1.1.13.1.2.3	0	0	6,978.000	221.700
1.1.13.1.2	96	0	30,488.799	1,093.472
1.1.13.1.3	156	0	8,373.000	171.044
1.1.13.1.4	0	0	2,926.000	106.045
1.1.13.1.5	0	0	4,141.000	87.387
1.1.13.1.6.1	0	0	1,438.000	38.114
1.1.13.1.6.2	0	0	2,924.000	80.868
1.1.13.1.6	0	0	4,362.000	118.982
1.1.13.1.7.1	0	0	2,100.000	59.560
1.1.13.1.7.2	0	0	500.000	16.080

## FERMILAB MAIN INJECTOR PROJECT

## ESTIMATE --- SUMMARY OF LABOR HOURS

PRINTED, 7-AUG-92 12:47:15

WBS	S1 HOURS	S2 HOURS	TOTAL HOURS	TOTAL K\$
1.1.13.1.7	0	0	2,600.000	75.640
1.1.13.1.8	0	0	2,250.000	83.718
1.1.13.1	252	0	102,478.594	3,202.700
1.1.13.2.1.1	0	0	9,261.000	230.606
1.1.13.2.1.2	0	0	4,144.000	137.883
1.1.13.2.1.3	0	0	3,812.000	118.683
1.1.13.2.1	0	0	17,217.000	487.173
1.1.13.2.2	0	0	550.000	17.700
1.1.13.2.3	109	0	980.500	22.550
1.1.13.2.4	0	0	2,717.500	86.380
1.1.13.2	109	0	21,465.000	613.803
1.1.13.3.1.1	0	0	3,782.000	102.170
1.1.13.3.1.2	0	0	3,256.000	109.277
1.1.13.3.1.3	0	0	100.000	3.240
1.1.13.3.1	0	0	7,138.000	214.687
1.1.13.3.2	0	0	550.000	17.700
1.1.13.3.3	58	0	745.500	16.063
1.1.13.3.4	0	0	100.000	3.240
1.1.13.3	58	0	8,533.500	251.690
1.1.13.4.1.3	0	0	100.000	3.240
1.1.13.4.1	0	0	100.000	3.240
1.1.13.4	0	0	100.000	3.240
1.1.13.5.1.3	0	0	100.000	3.240
1.1.13.5.1	0	0	100.000	3.240
1.1.13.5	0	0	100.000	3.240
1.1.13.6.1.1	0	0	1,984.000	52.065
1.1.13.6.1.2	0	0	2,876.000	82.699

## FERMILAB MAIN INJECTOR PROJECT

## ESTIMATE --- SUMMARY OF LABOR HOURS

PRINTED, 7-AUG-92 12:47:15

WBS	S1 HOURS	S2 HOURS	TOTAL HOURS	TOTAL K\$
1.1.13.6.1.3	0	0	100.000	3.240
1.1.13.6.1	0	0	4,960.000	138.004
1.1.13.6.2	0	0	550.000	17.700
1.1.13.6.3	0	0	739.000	16.335
1.1.13.6.4	0	0	100.000	3.240
1.1.13.6	0	0	6,349.000	175.279
1.1.13.7.1	0	0	192.000	3.590
1.1.13.7.2.1	0	0	726.000	13.576
1.1.13.7.2.2	50	0	481.000	9.710
1.1.13.7.2.3	320	0	13,565.000	410.755
1.1.13.7.2	370	0	14,772.000	434.041
1.1.13.7	370	0	14,964.000	437.632
1.1.13.10.2.1	600	0	5,130.000	179.165
1.1.13.10.2.2	0	0	7,684.000	274.989
1.1.13.10.2	600	0	12,814.000	454.134
1.1.13.10.5	0	0	1,515.000	35.950
1.1.13.10.8	0	0	2,050.000	76.322
1.1.13.10	600	0	16,379.000	566.406
1.1.13	1389	0	170,369.094	5,253.989
1.1	5685	790	836,330.000	24,783.529
1.2.14.1	0	0	20,092.000	964.410
1.2.14.2	0	0	92,150.000	4,423.170
1.2.14.3	0	0	22,167.000	1,064.010
1.2.14.4	0	0	1,095.000	52.560
1.2.14	0	0	135,504.000	6,504.150
1.2	0	0	135,504.000	6,504.150
1.3.1	0	0	100,000.000	3,061.300



## FERMILAB MAIN INJECTOR PROJECT

## ESTIMATE --- SUMMARY OF LABOR HOURS

PRINTED, 7-AUG-92 12:47:15

WBS	S1 HOURS	S2 HOURS	TOTAL HOURS	TOTAL K\$
1.3.2	0	0	37,500.000	1,260.000
1.3	0	0	137,500.000	4,321.300
1	5885	790	1,109,334.000	35,608.977
1 CUM K\$	35578	35808	1,109,334.000	35,608.977
TOTAL	5885	790	1,109,334.000	35,608.977

