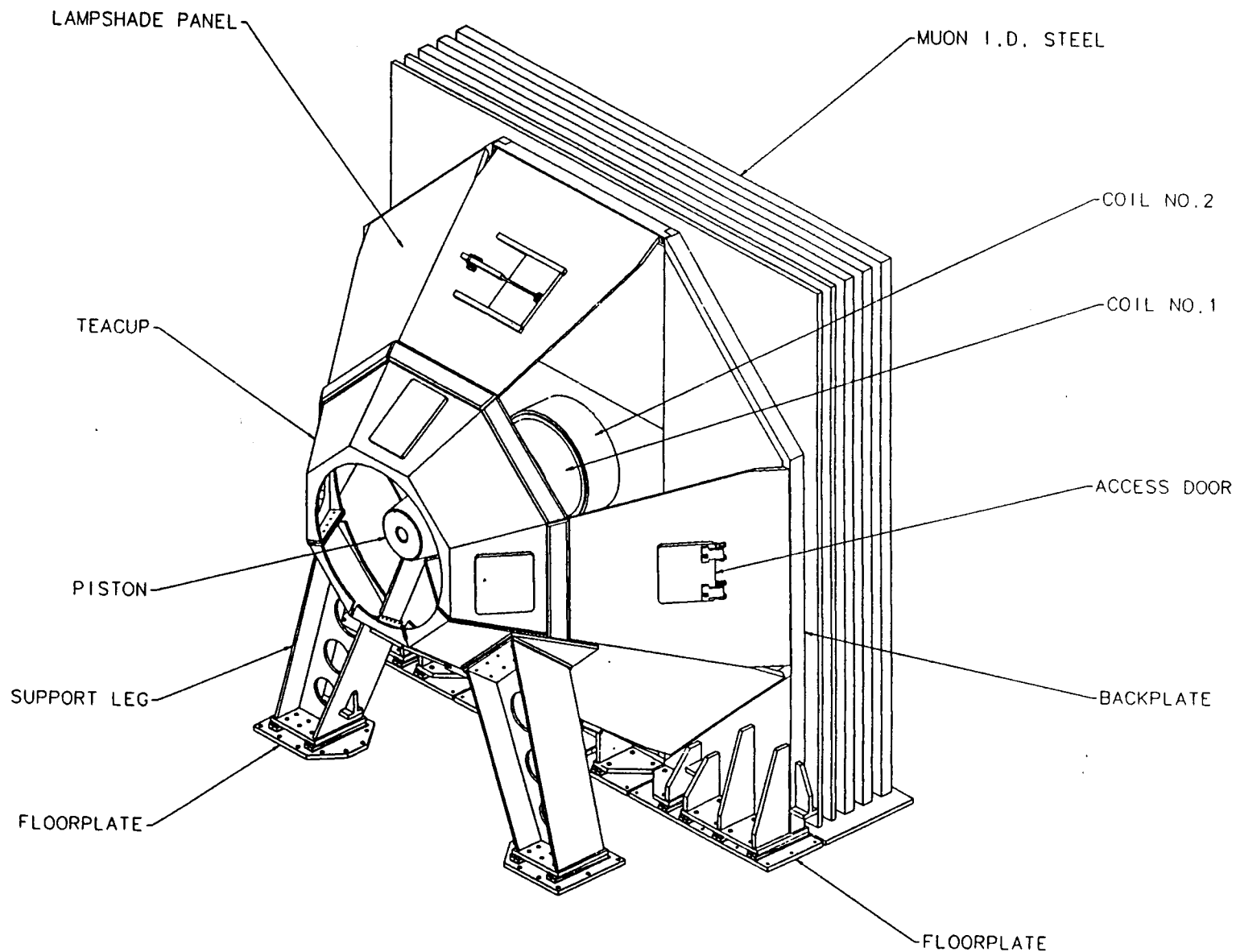


Muon Magnet North
Steel and Coils

PHENIX Muon Magnet Assembly - Isometric



PHENIX MM Coil - Design/1



- **Coil is made up of two individual solenoidal coils:**
 - a small (#1) coil and a large (#2) coil
- **Coils are identical except for:**
 - overall diameters
 - detail of bus flags
- **Coils are:**
 - made from square hollow copper conductor
 - bifilar wound (two in-hand)
 - 2 layer solenoids
 - cooled in parallel - 8 inlet & 8 outlet water fittings (each layer of coil cooled individually)

PHENIX MM Coil - Design/2



- **Coils run electrically in series**
 - **utilizes one power supply**
 - **uses a single pair of water cooled leads**
(actual coil conductor used - has its own independent cooling circuit)
 - **inlet and outlet power physically attached to coils between the end of coil #1 and the beginning of coil #2**
 - **power leads come from the bottom of the magnet at 22.5° from the vertical centerline (west side of magnet) and hides in the shadow of the muon chambers support structure**

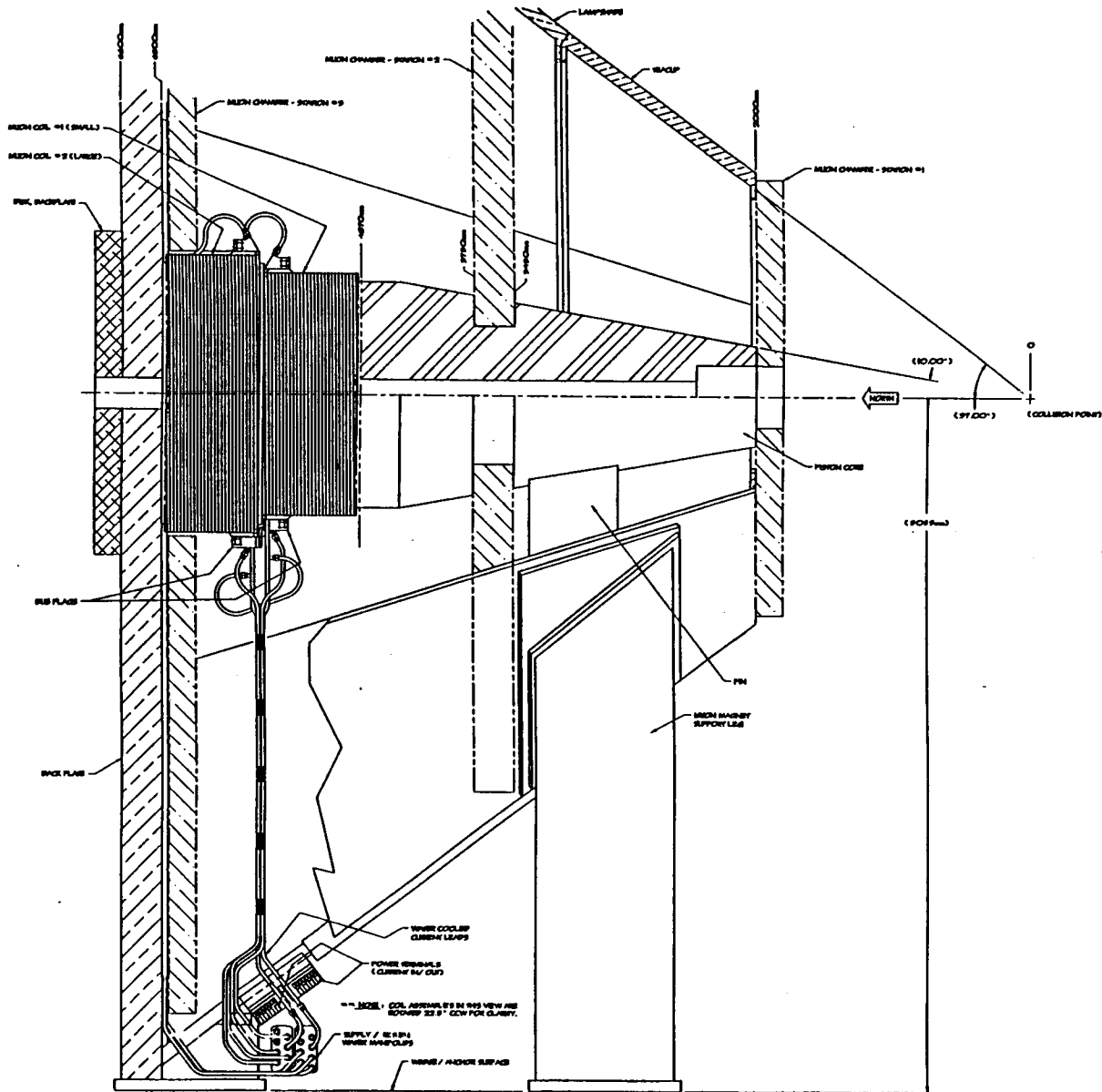
PHENIX MM Coil - Design/3



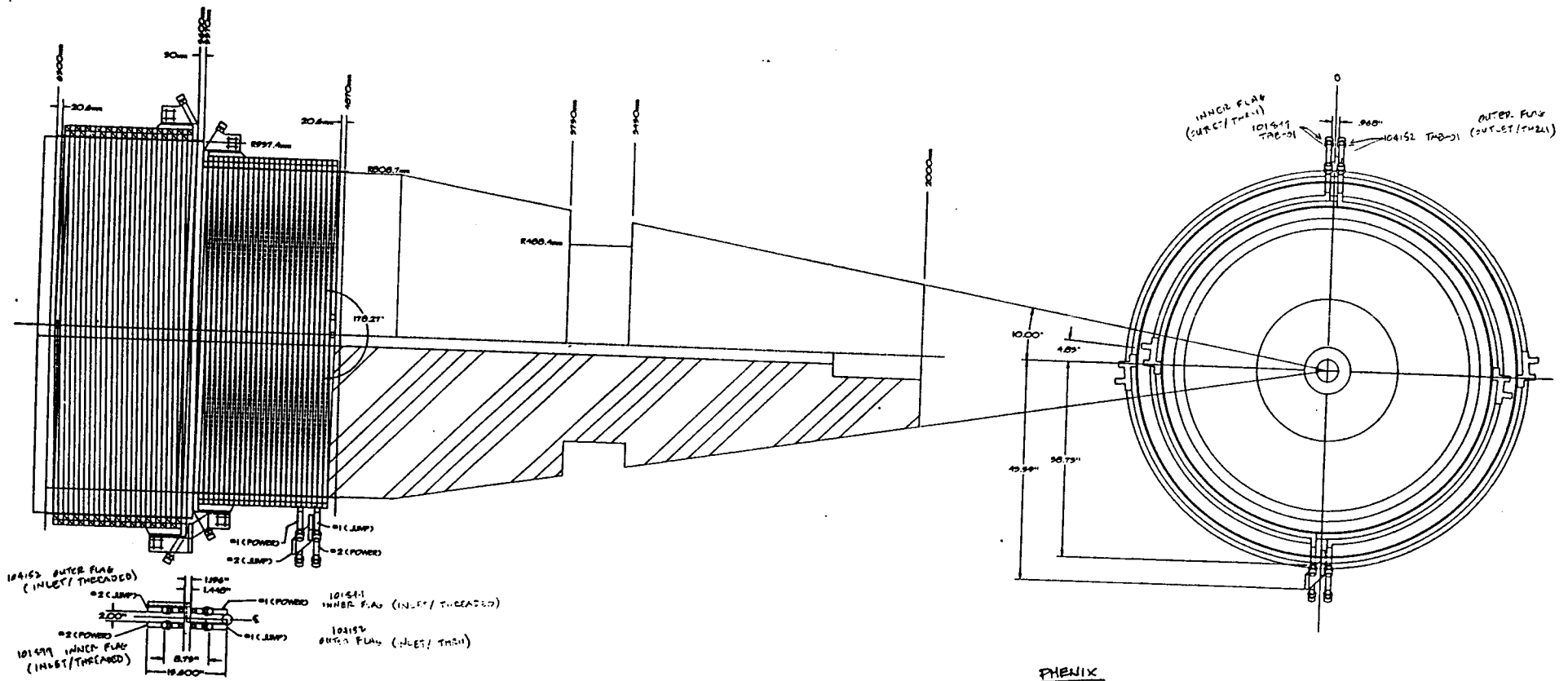
- Final "potted" coil dimensions consistent with Tom Shea's mid-July configuration control drawing
- Because of piston steel saturation concerns, all clearances required between the OD of the muon piston and the ID of the coil are taken up by enlarging the ID of the coil

	Tom Shea	Small #1 Coil	Large #2 Coil	Piston Steel
Radius	<i>808.70 mm</i>	811.15 mm 812.67 mm		808.20 mm <i>808.70 mm</i>
	<i>937.40 mm</i>		939.55 mm 941.07 mm	936.90 mm <i>937.40 mm</i>
Radial Clearance:		+2.45 mm	+2.15 mm	
Length:	<i>700.00 mm</i>	677.93 mm	677.93 mm	>695.00 mm

PHENIX Muon Magnet - Coil Installation

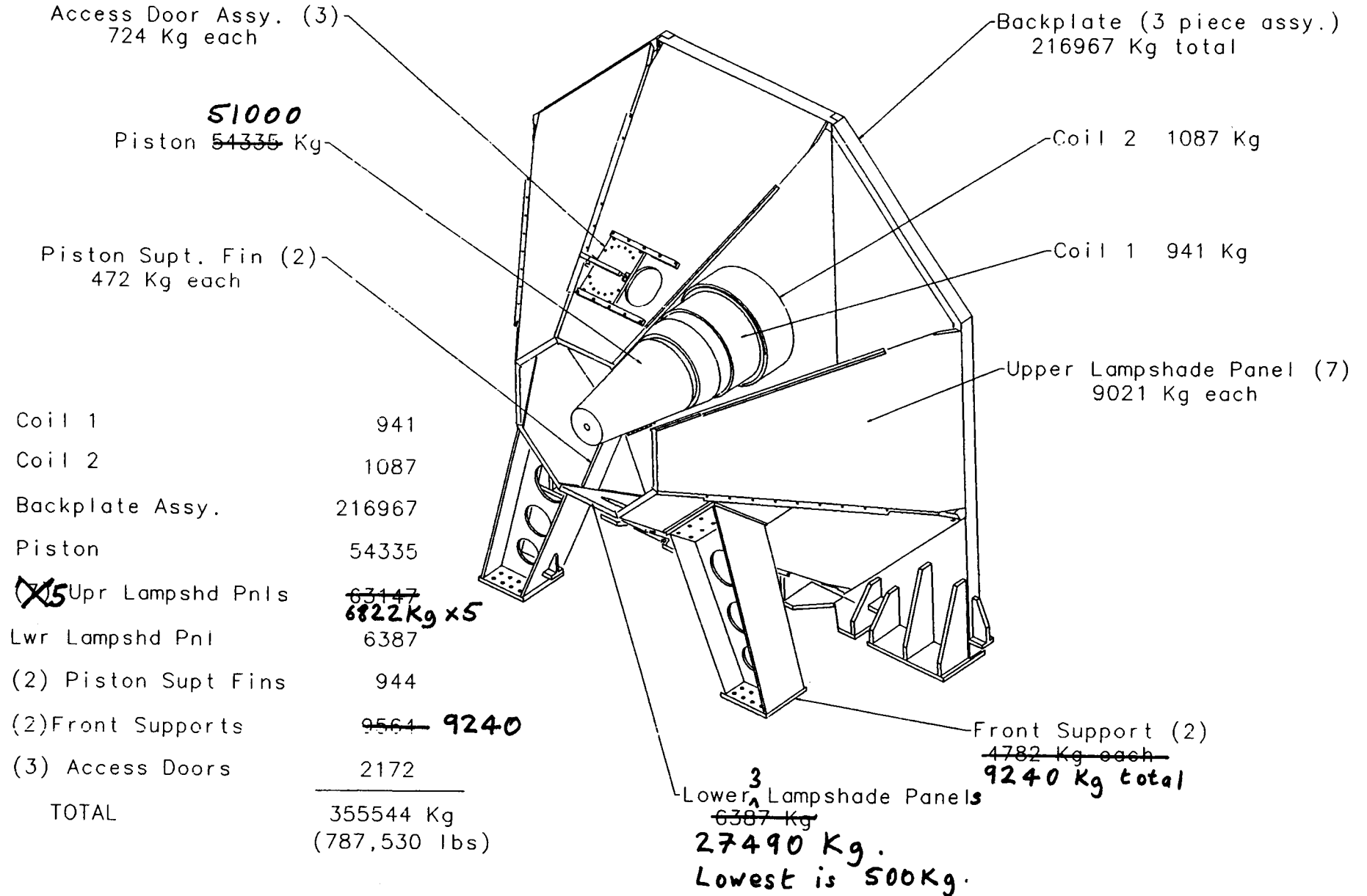


PHENIX Muon Magnet - Overall Layout



PHENIX
 MUON LAYOUT
 W² 7-20-93
 7-26-93

Muon Magnet Assy. — Approx. Weight



North Muon Magnet power supply

Output Power	456 kW	3800A dc @ 120v
Control Mode	Current control with voltage limit	
Input voltage	480 VAC, 60 hz, 3 phase	
Rectifier/transformer config	12 phase, extended delta	
Output voltage ripple	1 %	
Long term reproducibility	0.1% (1 year)	
Stability (all ambient variations considered)	0.1% (1 min to 1 year)	
Remote Control and status	RS 422 Serial Communications Link	

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PHENIX MM Coil - Appendix



- **Coil engineering analysis summary sheets (Art Harvey)**

- **Drawings (Winston Wong)**
 - **AAA93-101857-00** **Coil #2 Assembly** **(4 sheets)**
 - **AAA93-XXXXX-00** **MM Coil Layout** **(1 sheet)**
 - **AAA93-101856-00** **Coil Transition** **(1 sheet)**
 - **AAA93-101899-00** **Bus Flag - Inner Lead** **(2 sheets)**
 - **AAA93-104152-00** **Bus Flag - Outer Lead** **(2 sheets)**
 - **AAA93-104153-00** **Coil Jumper** **(1 sheet)**
 - **AAA93-101897-00** **Outlet Conductor Fitting** **(1 sheet)**
 - **AAA93-101898-00** **Inlet Conductor Fitting** **(1 sheet)**
 - **AAA93-104150-00** **Shorting Pad** **(1 sheet)**
 - **AAA93-104151-00** **Shorting Block** **(1 sheet)**

- **Tom Shea's configuration control drawings (2 sheets)**

PHENIX Coils - Power Supply Cable Summary



<u>Parameter</u>	<u>CM Outer Coils</u>	<u>CM Inner Coils</u>	<u>MM Coils</u>
Current (amps)	1719	2442	2941
Voltage (volts)	348	134	77
Power (kwatts)	600	328	225

PHENIX Muon Magnet - Coil Parameters



	Muon Magnet	
	<u>Small #1 Coil</u>	<u>Large #2 Coil</u>
Amp-Turns		300,000
Configuration	2 Layer Solenoid	2 Layer Solenoid
Cond Material	Copper	Copper
Inside Dia (mm)	1623.8	1880.6
Outside Dia (mm)	1740.4	1997.2
# of Turns	51	51
Cond Size (mm)	24.13 square	24.13 square
Cond Hole \varnothing (mm)	15.49	15.49
Cond Length (m)	270	311
Current (amps)		2941
Voltage (volts)	35.5	41.1
Power (kwatts)		225
Flow rate (gpm)	35.3	32.6
Weight (kg)	951	1096
Avg Coil Temp $^{\circ}$C	25.6	27.1