



Fermi National Accelerator Laboratory  
Mechanical Department  
P. O. Box 500, MS 219  
Batavia, IL 60510

**JOB NAME:** E-907 JHA/Work Permit/Assembly Procedure for Rosie Magnet

**LOCATION:** Meson Experimental Area – MC7 Building

**E-907 SPOKESMAN:** Rajendran Raja

**E-907 INSTALLATION PROJECT MANAGERS:** Peter Barnes, Leon Beverly

**E-907 MAGNET INSTALLATION TASK MANAGERS:** Mike Mascione,  
Jim Ellermeier

**PERSONNEL PERFORMING WORK:** Mike Mascione and a Contract Rigging Crew

**Description of Work:** One of the experimental apparatuses required for running E-907 in the Meson center line at MC-7 will be the analysis magnet known as the Rosie. Since being disassembled and removed from PW8 last summer, this magnet has been stored in the outdoors just to the west of the area between MW9 and MP9. In its disassembled state, the magnet consist of the following components:

- 1.) Three top and three bottom steel pieces. The top three pieces weigh 18.8 tons, 21.5 tons and 21.75 tons. The three bottom pieces weigh the same as the three top pieces. The top three pieces each have a 2” lifting lug for lifting/rigging. The bottom three pieces will need to be rigged with slings, as they have no lifting lugs or drilled/tapped holes. These six pieces of steel are actually layers of 14 gauge steel sheets sandwiched between 2” steel plates with top, bottom and side pieces of 1/2” steel plate. Therefore, these six pieces can not be drilled and tapped.
- 2.) Two side pole steel pieces, each weighing 11.5 tons. Each is rigged with 4 each 1/2”-13 d/t holes for lifting /rigging.
- 3.) One 8” thick upstream mirror plate weighing 8.5 tons and one 9” thick downstream mirror plate weighing 9.5 tons. Each mirror plate is in two pieces after being modified for the last magnet configuration. The two top halves have two 1-1/2”-6 drilled and tapped holes for rigging. The two bottom halves will need to be drilled and tapped for rigging holes.

Each of these magnet components will be staged from their present storage area to the hardstand area just east of the MC-7 area where Rosie will be assembled. Staging will be done by Fermi personnel and contract rigging crews. Rigging equipment will consist of

properly rated cranes, forklifts and flat bed trucks. The magnet components will be staged and assembled in the order given by the assembly procedure described later in this document.

**Setup:** All magnet components for magnet assembly will be rigged into MC-7 with a 90 ton crane operated by a contract rigging crew and will be task managed by Mike Mascione. Backup task manager will be Jim Ellermeier

**Safety:** The following safety issues will be addresses and will be mitigated:

*Familiarity with the project:* All personnel involved with any phase of the magnet assembly will have been briefed on the scope of the task and the possible safety issues involved. All personnel involved with the task will have read and signed this document prior to the start of work.

*Possible injuries from pinching/crushing:* Because of the nature of this task with its very large pieces of steel, special care will be taken to prevent injuries from pinching and crushing. All personnel involved with rigging and assembly will wear work boots and hard hats. Gloves will be worn when necessary.

*Eye protection:* Safety eyewear will be worn when operating hand tools.

*Two-man rule:* Whenever a piece of the magnet is being moved, at least 2 people, in addition to the crane operator, will be monitoring and helping with this move.

*Working at heights:* Personnel will be working at heights up to 8 feet and in an open roof situation. Appropriate caution will be taken when working at these heights, and tie-offs with safety harnesses will be used when possible. The appropriate and safe use of ladders will be exercised.

*Securing work area:* All areas within 100 feet of the rigging /assembly area will be roped off and marked as a “stay clear” area in order to avoid unauthorized personnel from entering the work area.

**Procedure For Assembly of Rosie:** Rosie will be assembled with the use of drawing 9200.001-ME-397569.

- 1.) Build a dam for the epoxy grout of 1” or 1 1/2” aluminum angle. The dam should be 2”-3” wider on all sides than the footprint of the steel which will be marked on top of the 13” concrete pad, which is on top of the 12” concrete pad. Caulk all seams.
- 2.) The assembly of the magnet starts by rigging into position the bottom three pieces of steel onto the 13” concrete pad. They are marked upstream, middle and downstream. The pad will be pre-marked by the alignment group for the proper location of these three pieces in the x and z directions. The height of beam center will determine the height of the tops of these three pieces. The tops should be straight and level in all directions, and the tops should be at exactly the same height. At present, beam center is set at 80.5” above the floor elevation, thus the height of the top of these pieces of steel is to be 62.5” above the floor elevation. The downstream face of the downstream piece should be perpendicular to the beam. These three pieces will be shimmed to their proper position by use of a transit that

will be supplied and operated by experienced PPD personnel. Once they are shimmed to the proper position, draw the three pieces tightly together and apply stick welded two-inch skip welds every 12 inches along the mating surfaces. Once the skip welding is complete, fully stick weld all mating surfaces with a \_\_\_" fillet weld. Make sure that all welds are below the flat surfaces. Once this is done, the alignment group will verify the correct position of this three-piece assembly to 1/8". The correct position of these three bottom pieces of magnet steel is very crucial, as the rest of the magnet will stack off of their position and result in magnet center being on beam center.

- 3.) After this bottom three-piece assembly has been set, pour the epoxy grout. Depending on the temperature of the concrete at the time that the grout is poured, either Unisorb standard V-100 epoxy grout or Unisorb low-temp V-100 epoxy grout will be used to grout this three-piece assembly in place. Low-temp grout should be used for temperatures between 25 F and 60 F. Magnet assembly can continue the following morning after the epoxy has been poured, as the compressive strength of the epoxy will be 9,000 psi six hours after the pour. The floor loading for the fully assembled Rosie will be 40 psi.
- 4.) As the assembly proceeds, buff all steel mating surfaces with a wire wheel to remove rust and other debris. Use a bay-flex grinder to remove any slag that may interfere with the assembly of the magnet. The slag is a result of removing welding during the latest disassembly of the magnet
- 5.) The eight coils for Rosie will be marked #1-#8. They vary in weight, with the lightest weighing 5500 lbs. and the heaviest weighing 7100 lbs. Coil rigging will be done with slings, picking at four points. Pads should be used in conjunction with the slings to protect the insulating material. The coils will be stacked with the power and water connections facing upstream and on the east side. Shimming materials will be 1/16" and 1/8" G-10, 1/4" plywood (painted with fire retardant paint), and 1/16" and 1/8" firm rubber. All shimming should cover the full area of the mating surfaces and not create any high contact areas. Place coil #1 in its proper position over the three-piece lower assembly with even shimming both upstream and downstream. Use rubber between the coil and steel at the chamfered corners. Shim for a 0.750" spacing between the steel and the horizontal run of coil #1. Install coils #2, #3 and #4 and shim according to drawing 9200.001\_ME\_397569. Pay particular attention to the 0.250" coil-to coil shimming on the downstream side and the 0.125" coil-to-coil shimming on the horizontal runs of the coils. The upstream shimming will be to shim whatever space is created by the downstream 0.250" coil-to-coil shimming. After placing a 0.450" shim on top of coil #4, install coil #5 on top of coil #4, with coil #5's position being a mirror of the position of coil #4. Install and shim coils #6, #7 and #8, using the above-mentioned print for proper shimming. Shimming for coils #5 through #8 is the same as for coils #1 through #4. Shim the areas between the coils and the top and bottom mirror plate extension pieces on both sides of the magnet. Walt Jaskierny should be present whenever the coils are handled. Walt will inspect all surfaces that come in contact with the coils,

clean if necessary and hi-pot coils to steel. After coils are inspected, cleaned and hi-potted, cover them with a tarp while the balance of steel is stacked.

- 6.) Stack the two side pole pieces of steel. They have been marked as being an east and a west pole piece.
- 7.) Stack the three top pieces of steel. They have been marked upstream, center and downstream. Draw these three pieces tightly together and apply a two inch skip weld every 12 inches.
- 8.) Full weld the magnet, applying a \_\_\_\_” fillet weld to all mating surfaces.
- 9.) Rig and bolt in place the bottom halves of the 8” thick upstream mirror plate and the 9” thick downstream mirror plate. They have been marked to indicate which surface should face out when installed. Support these assemblies in three evenly spaced places with either bottle jacks or stacked steel. Rig and bolt in place the top halves of the two mirror plates. Make sure the two mating pieces make intimate contact while being installed. Using a \_\_\_\_” fillet weld, weld the mating surfaces.
- 10.) Shim between the mirror plates and the coils.

**Prepared by:** Jim Ellermeier 3/28/02

**Approved by:** John Cooper (PPD Division Office) \_\_\_\_\_

**Approved by:** Martha Heflin (PPD Sr. Safety Officer) \_\_\_\_\_

**Approved by:** Rajandrn Raja (E-907 Spokesman) \_\_\_\_\_

**Approved by:** Peter Barnes/Leon Beverly  
(Installation Project Managers) \_\_\_\_\_  
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**Approved by:** Mike Mascione/Jim Ellermeier  
(Installation Task Managers) \_\_\_\_\_  
\_\_\_\_\_

**Approved by:** \_\_\_\_\_

**Approved by:** \_\_\_\_\_

**Signature List of Workers Involved With This Task:**

My supervisor has reviewed this JHA and Work Permit with me. I understand the hazards and safety issues involved with this task. I will follow the requirements and instructions of this plan and will notify my supervisor if I an unable to do so.

<u>Name (print)</u>	<u>ID#</u>	<u>Signature</u>	<u>Date</u>
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