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|  | Mu2e Project Office **BASIS of ESTIMATE FORM (BoE)** | **Document Number:** Mu2e-doc-1573-v16 (DCCT) |
| **Date of Estimate:**  |
| 1/27/2012 |
| **Prepared by:**Brian Drendel |
| **WBS Section: 2.04.12.01****Activity ID:**  | **Task Name:** Debuncher DCCT (Updated 1/27/2012 to removed Accumulator DCCT out of this BoE) |
| **Cost Type:** **\_ x \_ M&S** **\_ x \_Labor** | **Costing Method:**\_x\_Engineering Estimate\_\_\_Prior purchase or experience. Source: \_\_\_Catalog Price. Source:\_\_\_Vendor Quote (attached)**\_\_\_** Other- Description: |
| **Attach Relevant Documents (including but not limited to):**RFP, Responses to RFP, Technical Evaluation of RFP, Vendor Quotes, Technical Specifications, drawing numbers |
| **Task Duration** (calendar days)Minimum:  **1**20Most Likely: 140Maximum: 180 |
| **Task M&S Cost** (FY11$)**:** Minimum: $0.25KMost Likely: $2.19K ($1.75K) Maximum: $38.81K ($31.05K) **Task M&S Contingency (%) for most likely cost:** 25%. *The minimum cost is derived from the base cost minus some cost savings opportunity and does not include contingency. The most likely cost lists two numbers. The number inside of parenthesis is the base cost without contingency. The number not in parenthesis is the most likely cost, which is the base cost plus contingency. The maximum cost also has two numbers. The number inside of parenthesis is the base cost plus risks without contingency. The number outside of the parenthesis is the maximum cost, which is the base cost plus risks with contingency added.* | **Task Labor** (Functional Role & work hours, 85% efficiency assumed)**:** **Task Labor Contingency for most likely duration** (25%)**:** *The minimum hours are derived from the base hours minus some cost savings opportunity and does not include contingency. The most likely hours lists two numbers. The number inside of parenthesis is the base hours without contingency. The number not in parenthesis is the most likely hours, which is the base hours plus contingency. The maximum numbers column also has two numbers. The number inside of parenthesis is the base hours plus risks without contingency. The number outside of the parenthesis is the maximum hours, which is base hours plus risks with contingency added.* |
| **Functional Role** **(from docdb # XXXX)** | **Minimum Hours** | **Most Likely Hours** | **Maximum Hours** |
| Engineering Physicist (FN.AD.TE.OT.EP) | 20 | 50 (40) | 75 (60) |
| Electrical Engineer(FN.AD.EN.EE) | 56 | 220 (176) | 303 (242) |
| Electrical Technician(FN.AD.TE.ET) | 36 | 203 (162) | 268 (214) |
| Front End Programmer (FN.AD.EN.EE.CS) | 10 | 63 (50) | 106 (85) |
| Mechanical Engineer(FN.AD.TE.MT) | 6 | 15 (12) | 78 (62) |
| Mechanical Technician (FN.AD.TE.MT) | 0 | 38 (30) | 250 (200) |
| Survey/Alignment Technicians(FN.PD.TE.AL) | 0 | 38 (30) | 50 (40) |
| EE Support Designer (FN.AD.TE.DE.ED) | 0 | 0 | 50 (40) |
| EE Support Drafter (FN.AD.TE.DE.DR) | 0 | 0 | 50 (40) |

Details of Estimate: (Updated 1/27/2012 to removed Accumulator DCCT out of this BoE)

This Basis of Estimate covers the Post-CD0 design, post-CD1 preliminary and finals designs, and post CD-3 implementation & close-out tasks associated with upgrading the Debuncher DCCTs for Mu2e operation. Below is a breakdown of the most likely manpower needed to complete the project. The first tasks listed are those involving the engineering planning and oversight.

**Engineering Oversight (management) Labor:**

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|  Engineering Physicist (hours) |
|  | Minimum/Likely/Maximum |
| 475.02.04.12.01.01.012010 Post CD-0 Conceptual Design | 5 | 10 | 15 |
| 475.02.04.12.01.02.013010 Post CD-1 Preliminary Design | 5 | 10 | 15 |
| 475.02.04.12.01.02.013020 Post CD-1 Final Design | 5 | 10 | 15 |
| 475.02.04.12.01.03.014010 Post CD-3 Implementation & Close-out | 5  | 10 | 15 |
| Total | 20 | 40 | 60 |

**Debuncher DCCT (EDIA and Implementation):**

Labor and M&S numbers are taken from our DCCT costing spreadsheet1, and include both materials as well as contract electricians for cable pulls. M&S for the Debuncher DCCT is divided into minimum, most likely and maximum scenarios defined as follows:

* Minimum: Existing system is sufficient; No Maintenance/repairs needed other than modification to detector's windings.
* Most Likely: Keep current VME environment (crate, digitizer, etc.); Current VME conditioning board and DCCT electronics need board-level kludges; Detector/cables need repair/maintenance.
* Maximum: New VME crate, digitizer, input conditioning board; DCCT electronics and detector need repair/maintenance in addition to modification to windings

A summary of the labor costing for the Debuncher DCCT is provided below1:

**Debuncher DCCT Labor** **(EDIA and Implementation):**

|  |
| --- |
| Labor475.02.04.12.01.01.012010 Post CD-0 Conceptual Design475.02.04.12.01.02.013010 Post CD-1 Preliminary Design475.02.04.12.01.02.013020 Post CD-1 Final Design475.02.04.12.01.03.014010 Post CD-3 Implementation & Close-out |
|  | Minimum/Likely/Maximum |
| Electrical Engineer | 56 | 176 | 242 |
| Electrical Technician | 36 | 162 | 214 |
| Front End Programmer | 10 | 50 | 85 |
| Mechanical Engineer | 6 | 12 | 62 |
| Mechanical Technician | 0 | 30 | 200 |
| Alignment/Survey | 0 | 30 | 40 |
| EE Support Drafter | 0 | 0 | 40 |
| EE Support Designer | 0 | 0 | 40 |
| Total | 108 | 460 | 923 |

A summary of the M&S costing for the Debuncher DCCT is provided below1:

**Debuncher DCCT M&S (EDIA and Implementation):**

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| --- |
| M&S 475.02.04.12.01 Debuncher DCCT |
|  | Minimum/Likely/Maximum |
| DCCT Detector Construction | $0K | $0K | $10.6K |
| Remove DCCT Detector | $0K | $0K | $0K |
| Signal and Calibration Cables | $0K | $0K | $0K |
| DCCT Electronics (Webber Units) | $0K | $0.75K | $0K |
| NIM board (Webber Units) | $0K | $0.25K | $0K |
| DCCT Power Amp chassis | $0K | $0K | $7.7K |
| VME Digitizer & Transition Boards | $0K | $0K | $3.5K |
| VME Infrastructure Hardware | $0K | $0K | $8.5K |
| Front End Programming | $0K | $0K | $0K |
| Cable Pulls (contract electricians) | $0K | $0K | $0K |
| Installation and Commissioning | $0.25K | $0.75K | $0.75K |
| Totals | $0.25K | $1.75K | $31.05K |

References:

1. B. Drendel, A. Ibrahim, “Toroid and DCCT upgrade for Mu2e Storage Rings and Beam Lines,” Mu2e Documents Database #1180, January 2012.