SMD Operations Procedures Manual

8.1.1.30 OPERATION OF DUAL ACME POWER SUPPLIES

Text Pages 1 through 11
Attachments 1, 2

Hand Processed Changes

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8.1.1.30 Operation of Dual Acme Power Supplies

1.0 Purpose and Scope

1.1 To provide instruction in operating the Dual Acme Power Supply System. The System is located in the Calibration Magnet area on the floor of Building 902. The individual Supplies are labeled "326" and "327".

1.2 Instruction in performing the following tasks is included:

Changing the configuration of the step-down transformer;

Connecting the load to the output of the System;

Activating power to the System;

Shutting down the System.

1.3 This procedure does not provide instructions for testing the safety interlocks. That information is contained in SMD OPM 8.1.1.31.

2.0 Responsibilities

2.1 The main actions in this procedure will be performed by an Authorized Operator of the Dual Acme Power Supplies, except as follows:

2.1.1 Section 5.3, "Changing the links on the step-down transformer" may be performed only by those who are qualified by having been instructed by the Cognizant Engineer. A list of qualified operators is maintained in the Electrical Systems Section group office.

2.1.2 A list of authorized operators of the Dual Acme Power Supplies shall be maintained by the Electrical Systems Support Section Supervisor.

2.2 The Operator will maintain a log book. Entries will include notes of any irregularities encountered during operation of the Supplies.

3.0 Prerequisites

Training:

3.1 The Operator shall be an "authorized employee" as defined by the SBMS Subject Area, "Lockout/Tagout (LOTO)".

3.2 The Operator shall be instructed by the following people:

3.2.1 Cognizant Engineer for the Dual Acme Supply, or the CE's designee.

3.3 An Operator who will perform the steps in section 5.3, "Changing the links on the step-down transformer", shall be specifically trained for this work. (Course No. AM-LOTO_OJTCALIBRATE)

Minimum Personnel:

3.4 Two operators are required to perform this procedure. One will perform the steps; the other will act as a safety person.

3.5 Operator must be trained in Qualified Electrical Worker 2, Personal Protective Equipment Requirements, and Arc Flash Hazards.

3.6 Operator LOTO OJT Training on Power Supply System must be current.

3.7 Operator must follow SBMS LOTO Procedure.

Special Tools and Equipment:

None

4.0 Precautions

Personal Protective Equipment per SBMS Subject Area *Electrical Safety* must be worn for verifying LOTO per arc placard.

5.0 Procedure

5.1 Verify that the safety interlocks have been tested within the past six months.

IF the test approval has expired,

THEN stop work and immediately notify the Cognizant Engineer. Do not continue performing this procedure.

NOTE ***A "Safety Interlock Test Approval" form is posted on the front panels of both Supplies. The form indicates the last test date, and the expiration date.***

WARNING

The steps in sections 5.2, 5.3, 5.4, and 5.5 must be performed by two operators. One operator will perform the actual steps. The other operator will act as a safety person.

NOTE

Section 5.2 is done in preparation for changing the links on the step-down transformer (Section 5.3)

5.2 Shutting Off Main A.C. Power to the Supplies

5.2.1 Operator must follow SBMS LOTO Procedure.

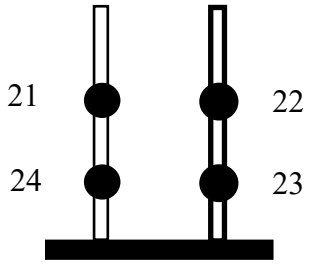
5.2.2 Place Input Disconnect Switch J-13 in the OPEN position.

5.2.3 Insert control keys #21 and #22 into the Kirk locks on the Switch. Access keys #23 and #24 should already be in their locks because they are captive. With all four keys in place, turn the keys clockwise until the lock plunger engages the capture plate on the switch handle.

5.2.4 Remove keys #23 and #24 from the Kirk locks on the Switch.

WARNING

You must have been instructed by the Cognizant Engineer in changing the links inside the step-down transformer Link Box before performing the steps in section 5.3



5.2.5 Complete the LOTO of main AC power to the supplies

5.3 Changing the Links on the Step-Down Transformer

NOTE ***The steps in this section are performed when a change in the operating voltage of the System is required.***

WARNING

To avoid a severe shock hazard, all of the steps in section 5.2 must be completed before continuing with this section.

5.3.1 Perform all of the steps in section 5.2.

5.3.2 Open the AC Link Box using Key #23 for Kirk lock RE10306.

5.3.3 Make sure that the system is de-energized by using a CAT IV/III DVM.

5.3.4 Using the DVM, verify that the input voltage, line to line and line to ground, is zero.

5.3.5 Verify that the Links and the bus material are free of debris at the mating points.

5.3.6 Connect the Input Transformer Links for the appropriate operating voltage condition. Refer to Attachment 1, "Input Transformer Link Box Diagram". Tighten the nuts securely.

5.3.7 Close the Link Box and remove Key #23. Keep the key on your person.

5.4 Accessing the D.C. Output of the Supplies to Connect a Magnet Load

WARNING

To avoid a severe shock hazard, all of the steps in section 5.2 must be completed before continuing with this section.

5.4.1 Perform all of the steps in section 5.2.

5.4.2 Insert control keys #38 and #40 into the Kirk locks on the contactors on the back of each Acme power supply. Access keys #39 and #41 should already be in their locks because they are captive. With all four keys in place, turn the keys clockwise until the lock plunger extends to block the contactor blade.

5.4.3 Remove keys #39 and #41 from the contactors and insert them into the Kirk locks on the cover panel of the D.C. Output Link Box.

5.4.4 Operate the locks and remove the cover panel.

5.4.5 Verify that the Links and the bus material are free of debris at the connection points.

5.4.6 Connect the D.C Output Links to the magnet load. Refer to Attachment 2, "D.C Output Link Box Diagram".

5.4.7 Tighten the nuts securely.

5.4.8 Replace the cover panel on the Link Box. Tighten the wing nuts. Lock the Kirk locks and remove keys #39 and #41. Keep the keys on your person.

5.4.9 Install connection jumpers for the magnet load.
NOTE ***This is not needed for the two calibration magnets.***

5.4.10 Install thermal interlocks on the magnet.

5.4.11 Connect water hoses to the magnet.

5.4.12 Open the return valves for the water-cooling system. After opening the return valves, open the supply valves. Check for water leaks and repair if necessary.

5.4.13 Connect the P.S. Interlock Cable from J7 of the Output Filter Assembly to the appropriate connector: either J8 (Dipole Magnet), J9 (Quad magnet), or J10 (All other types of magnets).

5.5 Preparing the Supplies for Operation

5.5.1 Turn on the blowers for both Supplies.

5.5.3 Insert keys #39 and #41 into the Kirk locks for the contactors and unlock the locks.

NOTE ***This will enable the contactors so that they may be energized under computer command.***

5.5.2 Clear faults on the PLC assembly on the window of each Supply & reset button in computer remote control rack. Ensure "Ready" light is illuminated on both supplies.

5.5.4 Remove keys #38 and #40 and keep them in Key Box in Calibration Control Room.

5.5.5 Verify that power is applied to the Output Filter Assembly and the Remote Control Rack.

5.6 Operating Remotely

CAUTION

Attempting to turn on the Supplies if the voltage levels described in step 5.6.1 are exceeded could cause the Supplies to ramp up.

5.6.1 Verify voltage out from Agilent E3631A power supply is 0.

5.6.2 Reset faults by pressing PS System Reset.

5.6.3 Hold PS System On button for 5 seconds.

5.6.4 Drive PS with Agilent benchtop power supply at 1960A output per Volt of input (the DCCT has a +24mV offset)

5.7 Shutting Down the Supplies

5.7.1 Verify power supply is at zero current

5.7.2 Press PS OFF to turn off the D.C section of the Supplies.

5.7.3 Insert keys #38 and #40 into the Kirk locks for the contactors and lock the locks.

5.7.4 Remove keys #39 and #41 from the Kirk locks and keep them in a controlled location.

5.7.5 Turn off the blowers for both Supplies.

5.7.6 Insert keys #21 and #22 into the Kirk locks on I-13 and turn the keys until the lock plunger is fully engaged.

5.7.7 Remove keys #23 and #24 from Switch I-13 and keep them in a controlled location.

5.7.8 Verify that the voltmeters on the step-down transformer Link Box indicate 0 Vac input.

6.0 Documentation

6.8 Logbook for testing using the Dual Acme Power Supplies.

7.0 References

7.1 SBMS Subject Area, "Lockout/Tagout (LOTO) for Installation, Demolition, or Service and Maintenance"

7.2 SBMS Subject Area "Electrical Safety"

7.3 System Specific SMD LOTO OJT Training.

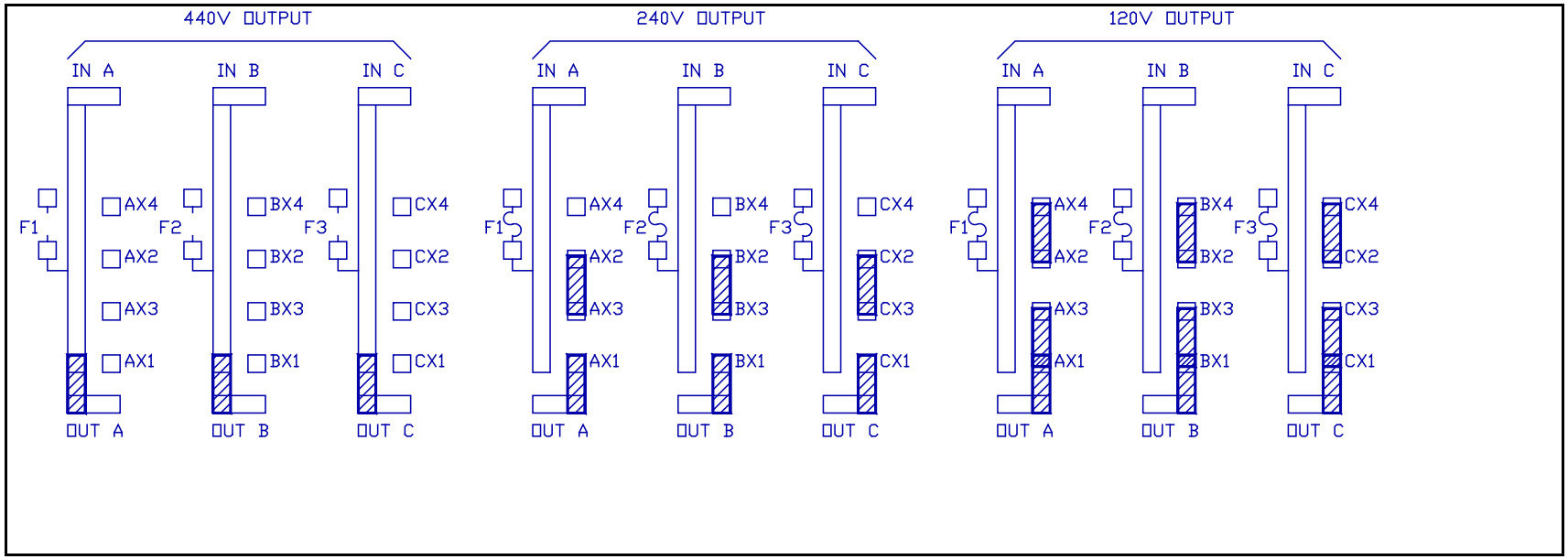
7.5 SMD OPM 8.1.1.31. Safety Interlock Test Dual Acme PS.

8.0 Attachments

1. Input Transformer Link Box Diagram
2. D.C. Output Link Box Diagram

Attachment 1

Input Transformer Link Box (AC Link Box) Diagram



1. For 440V Output: Short IN to OUT using heavy links, remove fuses.

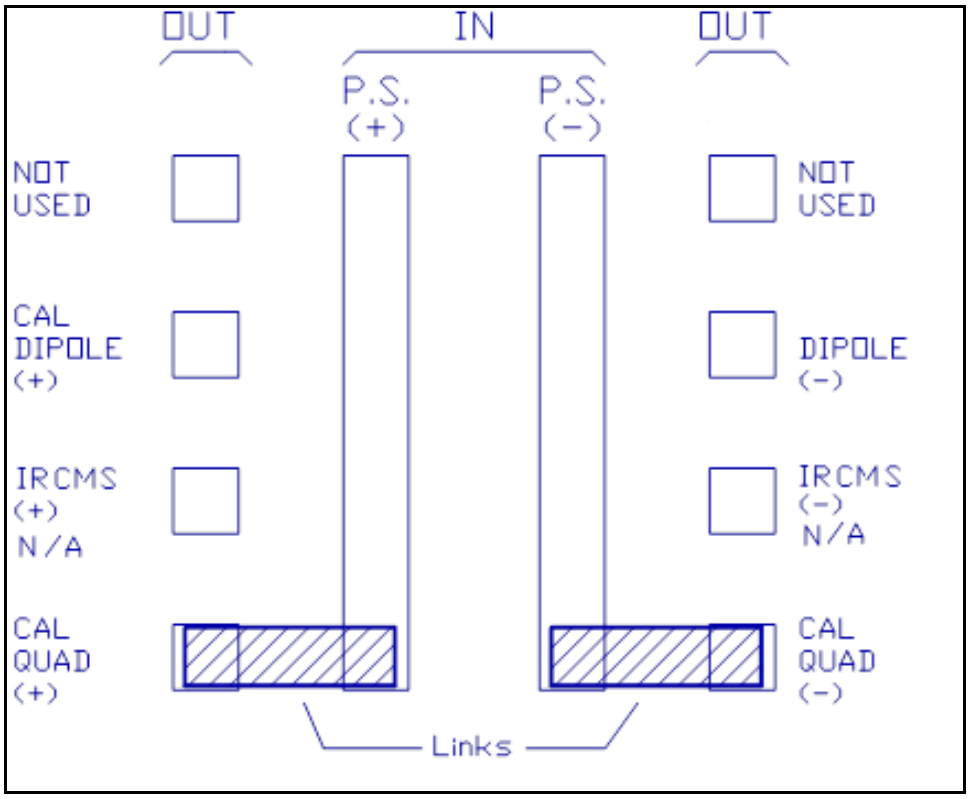
2. For 240V Output: Short X2 to X3, short X1 to OUT using heavy links, install fuses.

3. For 120V Output: Short X4 to X2, short X3 to X1, short X1 to OUT using heavy links, install fuses.

Attachment 2

D.C. Output Link Box Diagram

Shown configured for Calibration Quadrupole magnet.



9.0 Version History Log

Revision	Description of Changes	Reviewers	Effective Date
04	• Implemented Version History Log • Removed cognizant engineer or cognizant scientist for horizontal magnet testing as training sources • Updated training mentioned in 3.5 to Qualified Electrical Worker 2 instead of Electrical Safety 1 • Updated section 5.6. Operating Remotely to reflect the hardware change from pc drive to external voltage drive	P. Doutney P. Joshi H. Hocker M. Anerella M. Samms A. Volk	6/28/2024