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C-A OPERATIONS PROCEDURES MANUAL

4.16 Access Control System (ACS) Testing

Text Pages 2 through 5

Attachments

Hand Processed Changes

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Approved: _____ *Signature on File* _____
Collider-Accelerator Department Chairman Date

V. Castillo

4.16 Access Control System (ACS) Testing

1. Introduction

1.1 Purpose

This procedure describes how the periodic tests of the relay based C-A Access Control System (ACS) are accomplished. This includes the following parts of the ACS:

- Linac
- Booster
- AGS Ring
- SEB primary Beams
- SEB Secondary Beams

1.2 Definitions

1.2.1 Logic is the combination or sequential configuration of input signals which generate output conditions. Relay contacts connected in series represent a logical AND function. A parallel combination of contacts represents a logical OR function.

2. Responsibilities

Only trained members of the C-A ACS Group will perform this procedure. They may be assisted by other C-A technical staff. All documentation of testing will be initialed and dated at the time of the test.

3. Prerequisites

- 3.1 Sources of radiation upstream of the area being tested must be locked out and tagged according to Radiation Safety Lockout Tagout procedures.
- 3.2 Current logic and schematic drawings.
- 3.3 Test lamp.
- 3.4 Several pocket type screwdrivers.
- 3.5 Multimeter (VOM).
- 3.6 Two way radios (2).
- 3.7 Working Hot Permit.

4. **Precautions**

Testing involves working in close contact with 115 VAC circuits, which must be kept energized. Comply with the requirements of the Working Hot Permit.

5. **Procedure**

Note:

Items on the test checklist may remain untested if approval is on the checklist by the RSC Chairperson and the C-A Chief Electrical Engineer.

Warning:

Partial or complete loss of protection from the interlock system may result if temporary jumper wires are NOT removed. Some tests require the use of jumper wires to reduce testing to manageable steps. Document the installation and removal of all jumper wires. VERIFY that all temporary jumper wires used for testing are promptly removed when testing is completed.

- 5.1 Lock out and tag out upstream sources of radiation (see [C-A-OPM 9.1.16](#)).
- 5.2 Access Gate Testing
 - 5.2.1 Perform a physical inspection of gate, switches, electric bolt or strike, gate box, and door closer, to insure no damage.
 - 5.2.2 Check the operation of the emergency crash switch, door magnet, door closed limit switches, door-latched switch, strike position switch, and electric strike release.
 - 5.2.3 Reset the gate using the correct key and verify that the reset relay is energized.
 - 5.2.4 Verify that each device listed in 5.2.2 drops out the reset relay.
 - 5.2.5 Verify that any redundant sensor correctly operates its relay.
- 5.3 Crash Button Testing
 - 5.3.1 Test by walking through the area where the buttons are located and verifying that each button actuation drops out the appropriate crash relay. Verification is by a second person conveniently stationed to observe relay operation. Use two-way radios for good coordination.

5.4 Checking Inputs

5.4.1 Inputs are defined as signals or indications from outside the system, which are used in the system logic. Inputs might be signals from other ACS areas, ON/OFF status of equipment, physical position of devices, magnitude or polarity of voltage, or currents or other signals.

5.4.2 To test inputs, the equipment is cycled while observing the operation of the corresponding input relay. When the statement describing the input is True, the input relay is energized. Examples of inputs and relay responses are:

- A power supply is turned on/off and the input relay is observed to change state. In general, the relay should energize when the power supply is off.
- A magnet's current is raised and the input relay operates at the threshold specified by the logic diagram or schematic.
- The beam-off status of an upstream area is simulated by energizing or de-energizing a remotely located relay, and the input relay is verified for correct operation.

5.5 Checking logic

5.5.1 Testing is accomplished by changing the state (forcing), of every relay contact making up the logic while observing the output point, either by watching the movement of the relay armature or by use of a test lamp or meter when the output point is a terminal. For example:

- Three normally open (NO) contacts connected in series (AND) define the logic to an output relay. This logic is tested by forcing each input relay On or Off while observing that only when all three relays are in the energized state (On) does the output relay armature move to the On position.

5.6 Checking Outputs

Note:

Outputs are the points in the system where the result of logic functions are transferred to equipment outside the ACS or to other ACS systems. A de-energized (Off) output relay or low voltage generally interlocks the external device into the safe condition.

Warning:

In order to avoid the potential for creating a radiation hazard, ensure that all upstream sources are locked out and tagged out by an RS LOTO BEFORE any ACS output relays are manipulated.

- 5.6.1 Testing is accomplished by making the output point high or relay On, observing that the device is not interlocked, turning on the device, then returning the output low or relay Off and observing the device shuts off.

6. Documentation

The forms which document compliance with the testing are found in Volumes I and IV of the C-A-OPM. [C-A-OPM-ATT 4.16.a](#) is a guide to the specific form associated with a specific module of the ACS. All forms are to be dated and initialed at the time the test is performed by the qualified ACS personnel. The completed form will be filed in the Security Group Office, where it will be available for audit.

7. References

BNL Radiation Control Manual, BNL ES&H Standards, Chapter 3.0.

8. Attachments

- 8.1 [C-A-OPM-ATT 4.16.a, "Access Control Test Directory"](#).