

**ORDER**

**DEPARTMENT OF TRANSPORTATION  
FEDERAL AVIATION ADMINISTRATION  
GREAT LAKES REGION**

GL 6910.15

8/15/73

**SUBJ:** METHOD OF KEEPING THE GENERAL ELECTRIC, HOLLINGSWORTH, AND WESTINGHOUSE ELECTRIC ALS SYSTEMS IN OPERATION WITH ONE REGULATOR REMOVED

1. PURPOSE. The attached instruction will enable maintenance personnel to provide continuity of service to the Approach Lighting System in case of one regulator failure.
2. DISTRIBUTION. This Order is distributed to the Airway Facilities Division, Branch level and above, and to all Airway Facilities field offices.
3. CANCELLATION. Order CE 6910.5 is cancelled.
4. APPLICATION.
  - a. Appendix 1 contains instructions applicable to the General Electric Approach Lighting System Substation, 175 KVA, 2400/4160 volt, Contract CCA-33958, CAA Specifications 1146 and 1147, G. E. Requisition Number 322-73550, GEI-6276. The Hollingsworth substation, Model FA-67WA-1612 is similar to the G. E. Substation.
  - b. Appendix 2 contains instructions applicable to the Westinghouse Approach Lighting System Substations, 175 KVA, 2400/4160 volt, Contract FA-1772 (1-3153), FAA Specifications 1146A and 1147A.

*Alan H. Glass*

ALAN H. GLASS  
Chief, Airway Facilities Division

Distribution: RAF-3; FAF-0 (Normal)

Initiated By: AGL-445

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Appendix 1

**APPENDIX 1. EMERGENCY OPERATION OF G.E. SUBSTATION**

1. **EMERGENCY OPERATION OF GENERAL ELECTRIC ALS SUBSTATION WITH ONE REGULATOR FAILURE.** This method of providing continuity of service is applicable to the General Electric 175 KVA Substation, Contract CCA-33958, CAA Specifications 1146 and 1147, G. E. Requisition Number 322-72550, GEI-62786.

When one is familiar with this procedure, this temporary method of operation can be set up in 30 minutes.

2. **PRECAUTION.**

- a. Do not attempt any repair on the defective regulator while this temporary method is in operation. De-energize the commercial feeder at the terminal pole when any work becomes necessary.
- b. Remove the fuse to the appropriate 50 KVAR capacitor whenever its associated regulator is disconnected.

3. **SUPPLIES AND TOOLS.** The following supplies and tools are required:

- a. Hand tools - Adjustable wrench, pliers, screwdriver.
- b. Supplies - Split-bolts for #6 wire, electrical tape, #6 5KV insulated wire (2 pieces about 2 feet long).

4. **PROCEDURE.**

- a. Turn Brightness Control switch to "OFF" position.
- b. Turn Breaker Control switch to "OFF" position.
- c. De-energize the incoming commercial service at the terminal pole.
- d. Ground bus bars with shorting bars to assure capacitors are discharged.
- e. Disconnect the series loop on the defective regulator and SERIES this with a loop on a good regulator at the series cutouts in Compartment 1D.
- f. Disconnect the defective regulator by removing the cover panel from the high voltage connection compartment located behind the load monitor panel in the upper compartment in Unit 2 and disconnecting the wire from the incoming power bushing (L1, L2, L3) on the defective regulator. Insulate this wire as necessary. (Reference: Drawing P31D856 in Instruction Manual for Unit 2.)

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- g. Remove the lower cover in the top section of the load monitor compartment. Block open the contacts of the Open Circuit Protector Relay on the defective regulator. See Figure 5 of GEI-64020 Instruction Book, relays 6, 10 or 17.
- h. Remove glass cover of appropriate relay 30, 34 or 39, and energize dual indicating lights on load monitor door panel by blocking appropriate contact. Relays 30, 34 and 39 can be seen in photograph Figure 6 of Instruction Booklet GEI-64020 for Unit #2. This removes defective regulator alarm.
- i. Energize incoming commercial service at the terminal pole.
- j. Energize the ALS System.
- k. Readings obtained on System:

- (1) Output Voltages - Regulator voltage supplying the two loops will register high. It will normally read the sum of the two loops at the appropriate brightness step.
- (2) Output Amperes - Normal on the operating regulators. No reading will be obtained from the defective regulator.
- (3) Micro Ammeter reading on load monitor panel - The readings obtained from the operating regulators will be normal. There will be a high reading from the defective regulator, but this can be ignored.

- 1. Effect of modification on Monitor System - With the two loops combined, the monitor will alarm with the failure of six lamps; i.e., if the monitor was originally set to alarm with six lamps out in each loop, it will still alarm with six lamps out on the combined loop.

The monitor alarm limits are thereby reduced from a total alarm condition of 11 lamp failures on the individual loops to an alarm condition of 6 lamp failures on the combined loop. This reduced alarm limit is not considered objectionable for short periods.

- 5. LIMITATIONS. This method was field tested for two hours on Brightness Step 4 and no overheating occurred. While the system operated normally on Brightness Step 5 for short periods during this test, prolonged periods of operation at this step should be avoided for fear of overloading the regulator. While the transformers are rated at 50 KVA and it has been calculated that two average loops will draw 48 KW on step five, the number of lights in the loops at each site could differ which will vary the KW.

**APPENDIX 2. EMERGENCY OPERATION OF WESTINGHOUSE SUBSTATION**

1. **EMERGENCY OPERATION OF WESTINGHOUSE ALS SUBSTATION WITH ONE REGULATOR FAILURE.** This method of providing continuity of service is applicable to the Westinghouse Electric Corporation 175 KVA Substation, Contract FA-1772 (1-3153), FAA Specifications 1146A and 1147A.

When one is familiar with this procedure, this temporary method of operation can be set up in 30 minutes.

2. **PRECAUTION.**

- a. Do not attempt any repair on the defective regulator while this temporary method is in operation. De-energize the commercial feeder at the terminal pole when any work becomes necessary.
- b. Remove the fuse to the appropriate 50 KVAR capacitor whenever its associated regulator is disconnected.

3. **SUPPLIES AND TOOLS.** The following supplies and tools are required:

- a. Hand tools - Adjustable wrench, pliers, screwdriver.
- b. Supplies - Split-bolts for #6 wire, electrical tape, #6, 5KV insulated wire (2 pieces about 2 ft. long).

4. **PROCEDURE.**

- a. Turn Brightness Control switch to "OFF" position.
- b. Turn Breaker Control switch to "OFF" position.
- c. De-energize the incoming commercial service at the terminal pole.
- d. Ground bus bars with shorting bars to assure capacitors are discharged.
- e. Disconnect the series loop on the defective regulator and SERIES this with a loop on a good regulator at the series cutouts in Compartment 1D.
- f. Disconnect the defective regulator by removing the bolted panel marked "DANGER, HIGH VOLTAGE", on the regulator tank wall and disconnecting wire from line bushing marked "N3". Insulate this wire if necessary.

For the location of the above mentioned panel, see the Instruction Book, Tab 12, Page 2 - Panel Marked "DANGER, HIGH VOLTAGE" on extreme right wall. See Drawing AT-52A-325, It. 6, Line Bushings at top of drawing.

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- g. Remove the trip feature of the short circuit (SC) Protective Relay on the defective regulator, by removing the two wires marked "AC" from socket pin #3 on the SC relay. The two removed wires must be connected together so that the remaining SC relays will continue to function normally.

Remove the trip feature of the Open Circuit (OC) Protective Relay on the defective regulator, by removing the two wires marked "AC" from socket pin #3 on the OC relay. The two removed wires must be connected together so that the remaining OC relays will continue to function normally.

See Drawing AT-52-D-514 and photograph in Instruction Book, Tab 12, Page 5 for location of the SC and OC relays.

- h. Re-energize the substation from terminal pole.

- i. Readings obtained on system:

(1) Output Amps - Normal on two loops. No reading will be obtained from disconnected loop.

(2) Output Voltage - Regulator voltage supplying the two loops will register high. It will normally read the sum of the two loops at the appropriate brightness step.

- j. Effect of modification on Monitor System - With the two loops combined, the monitor will alarm with the failure of six lamps; i.e., if the monitor was originally set to alarm with six lamps out in each loop, it will still alarm with six lamps out on the combined loop.

The monitor alarm limits are thereby reduced from a total alarm condition of 11 lamp failures on the individual loops to an alarm condition of 6 lamp failures on the combined loop. This reduced alarm limit is not considered objectionable for short periods.

5. LIMITATIONS. This method was field tested for two hours on Brightness Step 4 and no overheating occurred. While the system operated normally on brightness step 5 for short periods during this test, prolonged periods of operation at this step should be avoided for fear of overloading the regulator.