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ACCESSION NBR: 8812230153 DOC. DATE: 88/08/17 NOTARIZED: NO DOCKET #
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 RECIP. NAME RECIPIENT AFFILIATION

SUBJECT: LER 88-007-00: on 880706, Barton switch non-repeatability due to misassembly.

W/8 ltr.

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 TITLE: 50.73 Licensee Event Report (LER), Incident Rpt, etc.

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LICENSEE EVENT REPORT (LER) TEXT CONTINUATION

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TEXT (If more space is required, use additional NRC Form 386A's) (17)

I. DESCRIPTION OF EVENT:

On June 24, 1988, the plant was operating at 100% power. Instrument Technicians were performing scheduled maintenance on the Standby Emergency Diesel Generator (SBDG) System (EIS System DE), specifically with the Diesel Fuel Oil Day Tank Level Control instrumentation. The scheduled corrective maintenance involved recalibration of the two level indicating switch's (LIS) High Switches to a new, higher setpoint value. While working on LIS3210, SBDG 'B' Diesel Fuel Oil Day Tank Level Control Indicating Switch, the instrument technicians experienced much difficulty when trying to recalibrate the High Switch to the new setpoint. After several attempts, it was apparent that the High Switch would not calibrate to the new setpoint. Steps were taken to remove LIS3210 from its local mount to perform a bench calibration. However, once removed, bench calibration of the instrument also proved to be unsuccessful.

II. CAUSE OF EVENT:

Investigation into the inability to calibrate LIS3210 to the new setpoint revealed a problem associated with the instrument's internal assembly. Two ITT Barton Model 288A Differential Pressure Indicating Switches are utilized in the level control instrumentation as LIS's. Each LIS monitors the level of fuel oil in its respective Day Tank to control the operation of the Diesel Fuel Oil Transfer Pumps which provide make-up fuel oil to either Day Tank. Each Day Tank holds 1000 gallons (60") of fuel oil to provide a sufficient inventory for approximately four hours of diesel operation. Each LIS has two individual switches: the Low Switch starts the respective make-up pump to add fuel oil; the High Switch stops the make-up pump when the Day Tank approaches full. LIS3210 monitors fuel oil level in the SBDG 'B' Diesel Fuel Oil Day Tank. When fuel level falls to approximately 8" of fuel oil, equivalent to 128 gallons, the LIS3210 Low Switch trips, provides an alarm to indicate the low level condition, and starts the respective make-up pump to transfer fuel oil from the Diesel Fuel Oil Storage Tanks to the SBDG 'B' Day Tank. When fuel level has risen to approximately 55" of fuel oil, equivalent to 882 gallons, the LIS3210 High Switch trips and secures the make-up pump to stop the make-up of fuel oil.

Once the internal assembly problem was identified, the instrument technicians referenced the manufacturer's literature for the ITT Barton Model 288A Differential Pressure Indicating Switch. Utilizing this information, they were able to identify that the High Switch Assembly and Low Switch Assembly had been improperly assembled into the instrument in reverse order. Referring to Figure 1, the two Snap Action switches and their associated Switch Assembly Plates are mounted behind the Switch Linkages, the instrument face plate (not shown in Figure 1), and the Dial Indicator. The differential pressure unit senses the changes in the monitored parameter (in this case Day Tank level) and

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transfers the signal to the instrument's Drive Arm Assembly. The Drive Arm Assembly provides the mechanical linkage to the Movement Assembly (to provide rotational output to the Dial Indicator) and to the Actuating Cam (to apply the sensed change in parameter to the High and Low Switch Assemblies). If the sensed change exceeds either the Low or High Switch setpoint, the respective Switch trips to either start or stop the make-up of fuel oil to the Day Tank. Referring to Figure 2, the High and Low Switch Assemblies are configured such that the Low Switch Assembly is mounted behind or in back of the High Switch Assembly. The instrument technicians identified they were assembled just the opposite, with the High Switch Assembly mounted behind (or in back of) the Low Switch Assembly. This improper assembly caused misalignment and binding of the Switch Linkages which resulted in unreliable operation of the instrument High and Low Switches. Subsequent investigation and extensive research of the maintenance history associated with this instrument revealed that the misassembly occurred prior to installation of the instrument. No maintenance had been performed to the degree required where disassembly of the High and Low Switch Assemblies could have occurred.

III. ANALYSIS OF EVENT:

The improper assembly of this instrument had no effect on the safe operation of the 'B' SBDG or the overall plant. Technical Specification 3.5.G delineates the operability requirements for Emergency Diesel Generator availability. The SBDG system, including the 'B' SBDG, would have operated as designed upon receipt of an initiation signal. LIS3210 would have functioned to maintain the 'B' SBDG Day Tank fuel level.

The 'B' SBDG is verified operable per Technical Specifications via Surveillance Testing on a monthly basis. The calibration of LIS3210 has been verified quarterly via Surveillance Testing since its replacement in May of 1986 following a failure of the previously installed instrument. However, it has exhibited a severe history of instrument setpoint drifts and an unusually high number of recalibrations since its installation. The instrument was initially calibrated with the High Switch setpoint at 34.1 "H2O and the Low Switch setpoint at 5.25 "H2O. The necessary adjustments to the instrument to set these values would have placed a certain bind on the Switch Linkages caused by misalignment due to the misassembly of the instrument. When the attempt was made to recalibrate the instrument High Switch to the new setpoint value of 35.87 "H2O", the bind on the Switch Linkages disallowed repeatable High and Low Switch operation required by the calibration which eventually led to the discovery of the improper assembly of LIS3210.

If a situation would have occurred where the make-up of fuel to the SBDG 'B' Day Tank did not automatically initiate because of improper operation of LIS3210, continued operation of the 'B' SBDG could have been sustained by manual means, and the 'B' SBDG remain operable. Level in each Day Tank is monitored by separate, redundant instrumentation

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that provides both local and remote alarms in the event of either high, low or low-low level conditions. If the low level alarm did not clear, indicating make-up was not initiating, make-up could be manually started from the Control Room by Operations personnel to support reliable 'B' SBDG operation. If LIS3210 failed to shut off the Fuel Oil Transfer Pump after making-up fuel, indicating make-up was not securing, make-up could be manually secured from the Control Room by Operations personnel; also, an overflow line would direct any excess fuel oil back to the Diesel Fuel Oil Storage Tank. Also, the 'A' SBDG was fully operable and available for use if required.

IV. CORRECTIVE ACTIONS:

Immediate corrective action upon the discovery of LIS3210 being misassembled was revision of the maintenance instructions to allow repair of the instrument. LIS3210 was disassembled, reassembled per the manufacturer's literature, bench calibrated, reinstalled, the calibration verified, then returned to service at 2300 hours on June 24.

Under the same initial scheduled maintenance, the calibration of LIS3208, SBDG 'A' Diesel Fuel Oil Tank Control Indicating Switch, was performed on June 25. The Instrument Technicians visually verified proper assembly of LIS3208, satisfactorily calibrated the instrument, then returned it to service.

Due to the failure of LIS3210, a review of instrument performance for the remaining safety-related applications of this make and model of instrument was performed. Based on a comparison between these and LIS3210, it appears that no other instruments are exhibiting similar performance characteristics which would indicate a similar concern. Also, a review of problems associated with ITT Barton instruments reported to the NPRDS revealed no reports of similar problems.

V. ADDITIONAL INFORMATION:

The incident associated with LIS3210 was discussed with Instrument Shop personnel to disseminate information concerning the failure of the instrument. Personnel were informed of the cause of the failure, how it was identified and corrected, and how to inspect an ITT Barton Model 288A or 289A for misassembly. Personnel were also instructed on the proper actions to take if a similar incident occurs with these or any other type instrument.

This apparent manufacturing defect was reviewed for reportability under 10CFR21. The review concluded that while a substantial safety hazard did not exist, the event should be submitted for information to provide feedback to the industry.

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TEXT (If more space is required, use additional NRC Form 305A's) (17)

Affected Equipment: Differential Pressure Indicating Switch
Manufacturer: ITT Barton
Model: 288A
Serial Number: 22220

This event is being reported as "Information Only" to identify a deficiency associated with an instrument widely used throughout the industry.

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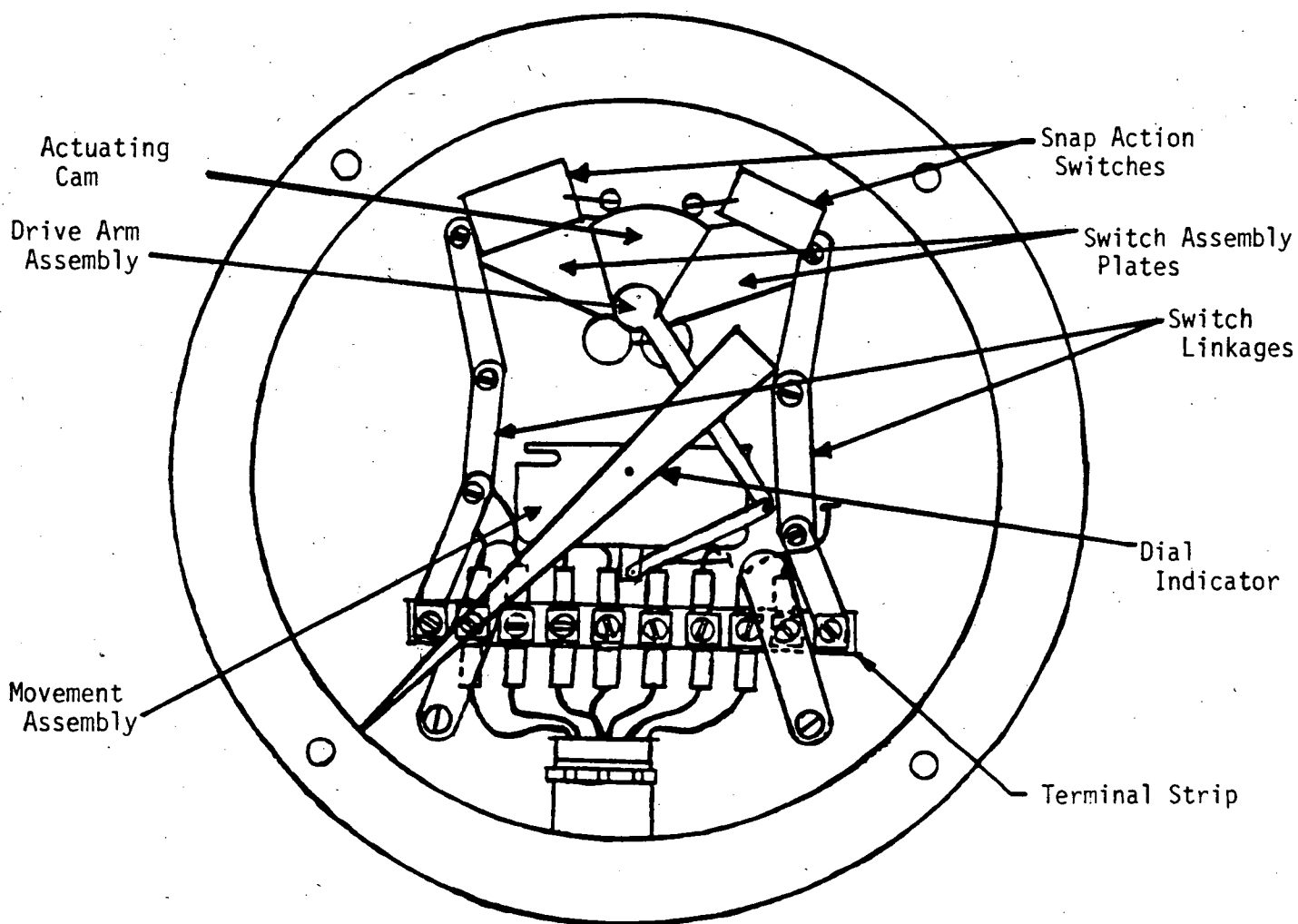


FIGURE 1. General Representation of Barton 280A Switch

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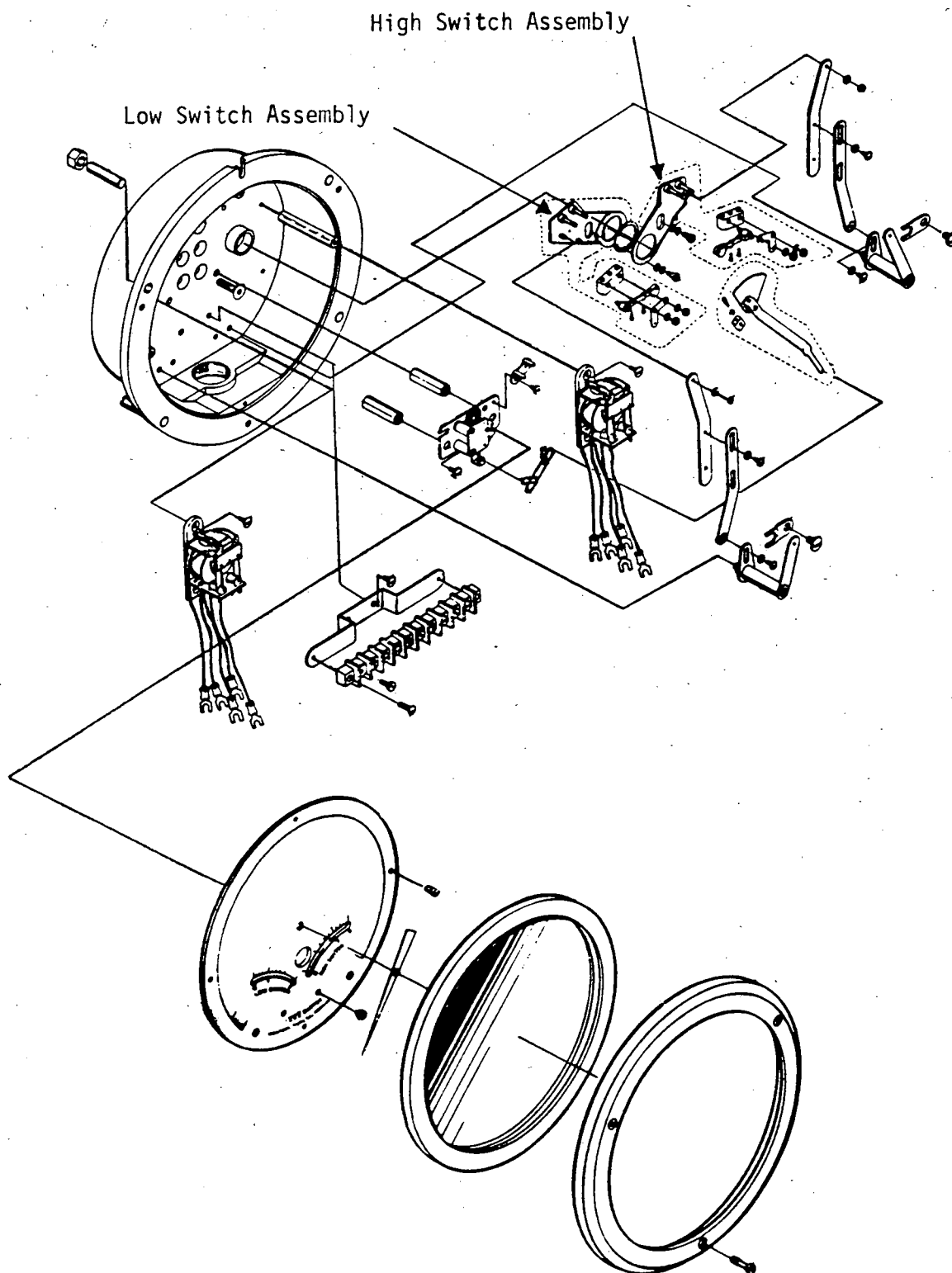


FIGURE 2. Barton 288A Indicating Switch - Exploded View

Iowa Electric Light and Power Company

August 17, 1988
DAEC-88-0632


Mr. A. Bert Davis
Regional Administrator
Region III
U. S. Nuclear Regulatory Commission
799 Glen Ellyn, IL 60137

Subject: Duane Arnold Energy Center
Docket No: 50-331
Op. License DPR-49
Licensee Event Report #88-007

Gentlemen:

Please find attached a copy of the subject Licensee Event Report submitted as "Information Only". This report is not required under 10 CFR 50.73.

Very truly yours,


 8-17-88
Rick L. Hannen
Plant Superintendent - Nuclear

RLH/BKS/go

cc: U. S. Nuclear Regulatory Commission
ATTN: Document Control Desk
Washington, D. C. 20555

NRC Resident Inspector - DAEC

File A-118a


AUG 22 1988