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RECIP.NAME RECIPIENT AFFILIATION
DENTON,H.R. Office of Nuclear Reactor Regulation, Director

SUBJECT: Forwards responses to draft SER open items re instrument air sys,NSSS startup testing & load testing of diesel generators.

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CP&L
Carolina Power & Light Company

SERIAL: LAP-83-532

NOV 15 1983

Mr. Harold R. Denton, Director
Office of Nuclear Reactor Regulation
United States Nuclear Regulatory Commission
Washington, DC 20555

SHEARON HARRIS NUCLEAR POWER PLANT
UNIT NOS. 1 AND 2
DOCKET NOS. 50-400 AND 50-401
DRAFT SAFETY EVALUATION REPORT RESPONSES

Dear Mr. Denton:

Carolina Power & Light Company (CP&L) hereby transmits one original and forty copies of responses to Shearon Harris Nuclear Power Plant Draft Safety Evaluation Report Open Items. The response numbers are listed on the cover page of the attachment along with the corresponding review branch and reviewer for each response.

We will be providing responses to other Open Items in the Draft Safety Evaluation Report shortly.

Yours very truly,

M. A. McDuffie
Senior Vice President
Nuclear Generation

CT/cfr (8499NLU)
Enclosures

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LIST OF OPEN ITEMS, REVIEW BRANCH, AND REVIEWER

Procedures & Systems Review Branch/W. Long
Open Item 202

Reactor Systems Branch/E. Marinos
Open Item 235

Power Systems Branch/O. Chopra
Open Item 389

Shearon Harris Nuclear Power Plant
Safety Review Questions: 640.21, 640.7, 640.36,
640.9, and Open Item 202
Revised Response

Safety review questions 640.21, 640.7, 640.36, 640.9, and 640.5 (OI-202) were submitted to CP&L on June 22, 1982. The initial responses were submitted to the NRC via Amendment 4 to the FSAR. Based on additional discussion with the NRC staff, CP&L understands that additional clarification to these responses is required. This clarification is provided below.

Response:

1. Question 640.21

The response to this item was an amendment to FSAR Section 14.2.12.4.25. This revision included an error which will be corrected in a future amendment; the revision to be made is shown on the attached mark-up of FSAR page 14.2.12-29.

2. Question 640.7

The description of the test summary for the instrument air system is found in FSAR Section 14.2.12.1.79. This section will be amended to indicate that the sudden loss of pressure test will be conducted by isolating the instrument air system and bleeding off the air in the segment. The FSAR will be revised in a future amendment as shown on the attached FSAR page 14.2.12-7.

With regard to the Regulatory Guide 1.68.3 (Rev. 0), Position C.10, the instrument air system does not contain any single large loads which would cause a significant perturbation on the normal instrument air pressure. Therefore, a test to verify the instrument air system's response to the conditions postulated in C.10 will not be conducted. A revision to FSAR Section 1.8, Reg. Guide 1.68.3, will be made in a future amendment to address this issue.

3. Question 640.36

The response to this item was an amendment to FSAR Section 14.2.12.2.17. This section will be revised in a future amendment to clearly state that NSSS startup testing will be performed using step-load increases and decreases. The FSAR will be amended as shown on the attached FSAR page 14.2.12-89.

4. Question 640.9

The response to this item was an amendment to FSAR Section 14.2.12.1.16. This section of the FSAR will be revised in a future amendment to clearly state that load testing of each diesel generator will be in accordance with positions c.2.a (3) and (5) of Regulatory Guide 1.108, Revision 1. The FSAR will be amended as shown on the attached FSAR page 14.2.12-19.

5. Open Item 202

The response to this open item was submitted to the NRC in a letter dated July 22, 1983. The response addressed the participation of licensed operators in the special low-power testing program. The testing program to be used is the revised test sequence proposed by Westinghouse in a letter dated July 8, 1981; this sequence was approved for use at facilities employing a Westinghouse NSSS in a letter dated October 23, 1981 from the NRC to Westinghouse.

FSAR Sections 14.2.12.2.26 and 14.2.12.2.81 will be amended in a future amendment to include test methods for the special low-power testing program. The FSAR will be revised as shown on the attached pages. The revisions address items 1, 2, 3, and 5 in the test series. Item 4 is currently addressed by FSAR Section 14.2.12.2.21.

2) The response times of the pump and valves are in accordance with FSAR Section 6.3.

3) The residual heat removal pumps can supply adequate suction head to the Charging/Safety Injection pumps.

4) Critical valves are ~~unable~~ able to open against the maximum expected differential pressure conditions as specified by the NSSS supplier.

5) Safety Injection components actuate to the state specified in FSAR Section 6.3.2.1 on receipt of a safety injection signal. 4

6) The measured charging/safety injection pump NPSH meets or exceeds that required by the vendor technical manual for the CSIP.

14.2.12.1.26 High-Head Safety Injection System Check Valve Test Summary

a) Test Objective

1) To demonstrate that emergency core cooling water can be delivered into the reactor coolant system at approximately no-load operating temperature and pressure.

b) Prerequisites

1) Hot Functional Testing in progress with the RCS at approximately no-load pressure and temperature.

2) The water level in the pressurizer is as low as practical.

3) The applicable general prerequisites are met.

c) Test Method

1) Injection shall be verified by flow noise and/or increase in pressurizer level for each cold leg injection path.

d) Acceptance Criteria

1) The Safety Injection System injects emergency core cooling water into the reactor coolant system at approximately no-load operating temperature and pressure. 4

14.2.12.1.27 Safety Injection Accumulator Test Summary

a) Test Objective

1) To verify the discharge characteristics of each Safety Injection Accumulator.

2) To demonstrate that the SI Accumulator discharge isolation valves will open under the maximum differential pressure conditions.

d) Acceptance Criteria

1) The automatic temperature control of the sampled fluids is regulated per Ebasco specification.

2) The Secondary Sample Cabinets instrumentation and alarms function per FSAR Section 9.3.2.5 and Ebasco Specification.

3) Sample points have been verified per FSAR Table 9.3.2.1.

4) Operation of the "Hotwell Sample" pumps are in accordance with system design wiring diagrams and Ebasco Specification.

14.2.12.1.79 Loss of Instrument Air Test Summary

a) Test Objectives

1) To demonstrate that a reduction and loss of instrument air pressure causes fail-safe operation of pneumatically-operated valves and dampers both safety and nonsafety related located in the reactor building, auxiliary building and fuel handling building.

b) Prerequisites

1) The general prerequisites are met.

2) Specific prerequisites will be delineated in the system preoperational test procedure.

c) Test Method

1) Where safe to personnel and equipment, a slow reduction in pressure and a loss of pressure test will be performed. Testing will be done in small segments/individually and response noted for both safety and nonsafety-related valves and dampers. The loss of pressure test will be conducted by isolating segments/individual items and venting the air from the isolated segment.

d) Acceptance Criteria

1) Proper fail-safe operation of valves and dampers subject to a reduction and loss of instrument air is verified.

14.2.12.1.80 Containment Building Hot Penetration Testing

a) Test Objective

1) To demonstrate that containment concrete temperatures in the vicinity of hot containment penetrations do not exceed 200F. 7

b) Prerequisites

1) The general prerequisites are met.

2) For hot containment penetrations, the designer has provided the anticipated locations of maximum concrete temperatures.

4) Perform a 24 hour load reliability test of each diesel generator unit in accordance with Reg 1.108 (Rev. 1) C.2.a(3) & (5)

5) Perform a Combined Mode Diesel Generator Unit test to demonstrate independence of the two units.

d) Acceptance Criteria

1) Each diesel generator starts (automatic start or local/remote manual start) and accelerates to rated speed and voltage within 10 seconds after receiving a signal to start.

2) Each diesel generator shall start and accelerate emergency bus loads to rated speed in the required sequence (FSAR Table 8.3.1-2) without exceeding five percent speed drop, 20 percent voltage drop at the load terminals, and recover to within 10 percent of nominal voltage and two percent of nominal frequency within 40 percent of each load-sequence time interval. 4

3) The diesel generator speed shall not exceed 107.5 percent of nominal (450 rpm) upon disconnecting of the single largest load and shall not trip on overspeed (110 percent of nominal) upon disconnecting of all load.

4) The diesel generator and auxiliaries operate to maintain 100% load for a 22 hour period and 110% load for an additional two hours.

5) Each diesel generator satisfactorily performs during thirty-five consecutive starts per Regulatory Guide 1.108, Section c.2.e.

6) Both diesel generators start and operate satisfactorily upon receiving simultaneous start signals.

14.2.12.1.17 Incore Nuclear Instrumentation Test Summary

a) Test Objective

1) To demonstrate that the incore monitoring system functions to remotely position the incore neutron detectors for the purpose of flux mapping. 4

b) Prerequisites

1) Cleaning operations and tubing connection verifications are complete.

2) The drive unit has been loaded with a dummy detector.

3) The general precautions are met.

2) Using data results, and assumed calorimeter information, calculate the average steam generator moisture carryover.

d) Acceptance Criteria

Verify with a radioactive tracer injection method that steam generator moisture carryover is no more than 0.25% at the per FSAR Table 10.2.1-1 steam generator output.

14.2.12.2.17 Load Swing Test Summary

a) Test Objective

1) To verify proper nuclear plant and secondary plant transient response, including automatic control system performance when load changes are introduced at the turbine generator.

b) Prerequisites

1) Plant conditions are established as required by the test instruction.

2) The general prerequisites are met.

c) Test Method

Note: Step load changes will be initiated from steady state conditions at approximately 30, 75, and 100 percent power in accordance with Westinghouse NSSS Start-up Manual Section SU-3.4.7. 4

1) Manually initiate a load change in the turbine generator output as rapidly as possible to achieve an approximate 10 percent load step change.

2) Plant variables will be recorded, along with values observed on normal plant instrumentation, during the load transient for those parameters required.

d) Acceptance Criteria

1) The following acceptance criteria are to be used to determine successful test completion. Failure to meet those criteria does not constitute a need for stopping the test program, but correction of any deficiencies should be accomplished as required consistent with the current plant schedule.

(a) 1.1 Reactor and turbine do not trip.

(b) 1.2 Safety injection is not initiated.

(c) 1.3 Neither steam generator relief valves nor safety valves lift.

14.2.12.2.26 Natural Circulation Test Summary

a) Test Objective

1) To confirm that design heat removal capability exists under natural circulation conditions.

2) To verify that flow (without pumps) and temperature data are comparable to prototype designs for which equivalent tests have been successfully completed.

3) To obtain a data base for simulator training in natural circulation operation.

4) To demonstrate the effects of loss of pressurizer heaters, and varying charging flow and steam flow on margin to saturation temperature.

b) Prerequisites

Plant is stable at approximately 3% and parameters (are) at no-load values.

1) ~~Plant conditions are established as required by the test instructions.~~

Three reactor coolant pumps are running.

2) ~~The general prerequisites are met.~~

3) The general prerequisites are met.

c) Test Method

Trip the reactor coolant pumps.

1) At ~~about~~ 5% rate thermal power, ~~place~~ the plant in natural circulation mode recording the length of time for the plant to stabilize, the ~~flow distribution~~, and the ~~ability to~~ maintain cooling mode.

Verify adequate natural circulation flow to maintain cooling.

2) Perform ~~Loss-of-Offsite Power/Station~~ Blackout Test with plant trip from 10-20% Rated Thermal Power. Operate plant establishing stable conditions in natural circulation using batteries and emergency diesels. Record the length of time for the plant to stabilize, the ~~flow~~ distribution, ~~and~~ the ability to maintain cooling mode.

d) Acceptance Criteria

1) The heat removal capability, flow, (data,) power distribution, and temperature data, ~~and time for the plant to stabilize~~ are comparable to those of the prototypes ~~design~~ (North Anna) for which equivalent tests have been completed.

2) Pressurizer pressure remains above 1800 psig.

14.2.12.2.27 Main Steam and Feedwater Systems Test Summary

a) Test Objective

1) To verify the operating characteristics of the main steam and feedwater systems during power escalation.

b) Prerequisites

1) Power level is established as necessary to meet the test requirements.

2) The general prerequisites are met.

See attachment

3. Observe core power distribution.

4. Demonstrate the effects of loss of pressurizer heaters by de-energizing [illegible]

14.2.12.2.26

Test Methods cont.

5. Demonstrate the effects of varying charging flow and monitor pressurizer pressure and temperature.

6. Demonstrate the effects of varying steam flow and monitor pressurizer pressure and temperature.

14.2.12:1.8 1 Simulated Loss of On-site Power Test Summary

a) Test Objective

1) To verify the capability to maintain the plant using manual control of the atmospheric steam dump valves and the steam-driven auxiliary feed pump under adverse lighting and communication conditions.

b) Prerequisites

1) Hot Functional testing is in progress and the plant is stable at no-load values.

2) The general prerequisites are met.

c) Test Method

1) ~~Electrical~~ Power sources to plant equipment are de-energized except power to reactor coolant pumps, charging pumps, component cooling water, service water, essential equipment such as and lube oil systems.

2) Plant cooldown is controlled by manual control of the atmospheric steam dump valves and manual control of the steam-driven auxiliary feed pumps.

d) Acceptance Criteria

1) The ability to maintain the plant in hot shutdown, remotely, is demonstrated.

Shearon Harris Nuclear Power Plant
Draft SER Open Item 235
TMI Appendix, page TMI-53

Provide a response to NUREG 0737 item II.K.3.17, "Report on Outages of Emergency Core Cooling Systems Licensee Report and Proposed Technical Specification Changes."

Response:

In the first five years following issuance of an operating license for SHNPP, Unit 1, CP&L will collect the following data on ECC systems and components:

1. Outage dates and duration of outages
2. Cause of each outage
3. ECC systems or components involved in the outage
4. If applicable, corrective actions required

Test and maintenance outages will be included in the data collection. A report of the data collected will be submitted to the NRC within one year of the end of the five-year period.

The FSAR will be revised in a future amendment to reflect this response.

(8506COM/ccc)

Shearon Harris Nuclear Power Plant
Draft SER Open Item 389
Supplemental Information

The NRC (O. Chopra, Power Systems Branch) has requested that CP&L provide additional information on short circuit protective devices for circuits that pass through containment penetrations.

RESPONSE

Figure 1 depicts the typical system arrangement for the Auxiliary System at Shearon Harris Nuclear Power Plant.

Under normal conditions if there was a fault to ground (see Figure 1) on the secondary side of the control power transformer located in the Motor Control Center, the fuse located in the secondary side would blow and protect the electrical penetration. Under the most unlikely event where the fuse fails to clear the fault the transformer impedance is great enough to limit the short circuit current to a level which the containment penetration can carry without damage. The scenario requested to be considered by the reviewer is one in which there is a ground fault in containment on the control cable connected to the control power transformer, the fuse fails to interrupt and finally the control power transformer fails due to over-heating caused by it carrying a higher than normal current. The way the NRC postulates this failure the 480V side of the transformer being directly connected to the secondary side of the transformer thus applying 480 volts to the control circuit. The 6.9 kV - 480V transformer which is the source of 480V power has its 480V secondary neutral connected to ground through a resistor. This grounding resistor is sized to limit ground fault current to 15 amps. Therefore, in the above scenario where 480 volts is directly applied to the control circuit, the short circuit current would be limited to 15 amps which is within the capability of the penetration. See Figure (2). Therefore, we can conclude that damage to the penetration does not occur.

EBASCO SERVICES INCORPORATED

BY _____ DATE _____ SHEET _____ OF _____

CHKD. BY _____ DATE _____ OFS NO. _____ DEPT. NO. _____

CLIENT CAROLINA Power & LIGHT CO

PROJECT SHEARON HARRIS NPP

SUBJECT Failure of MCC Control Transformer

Fig 1

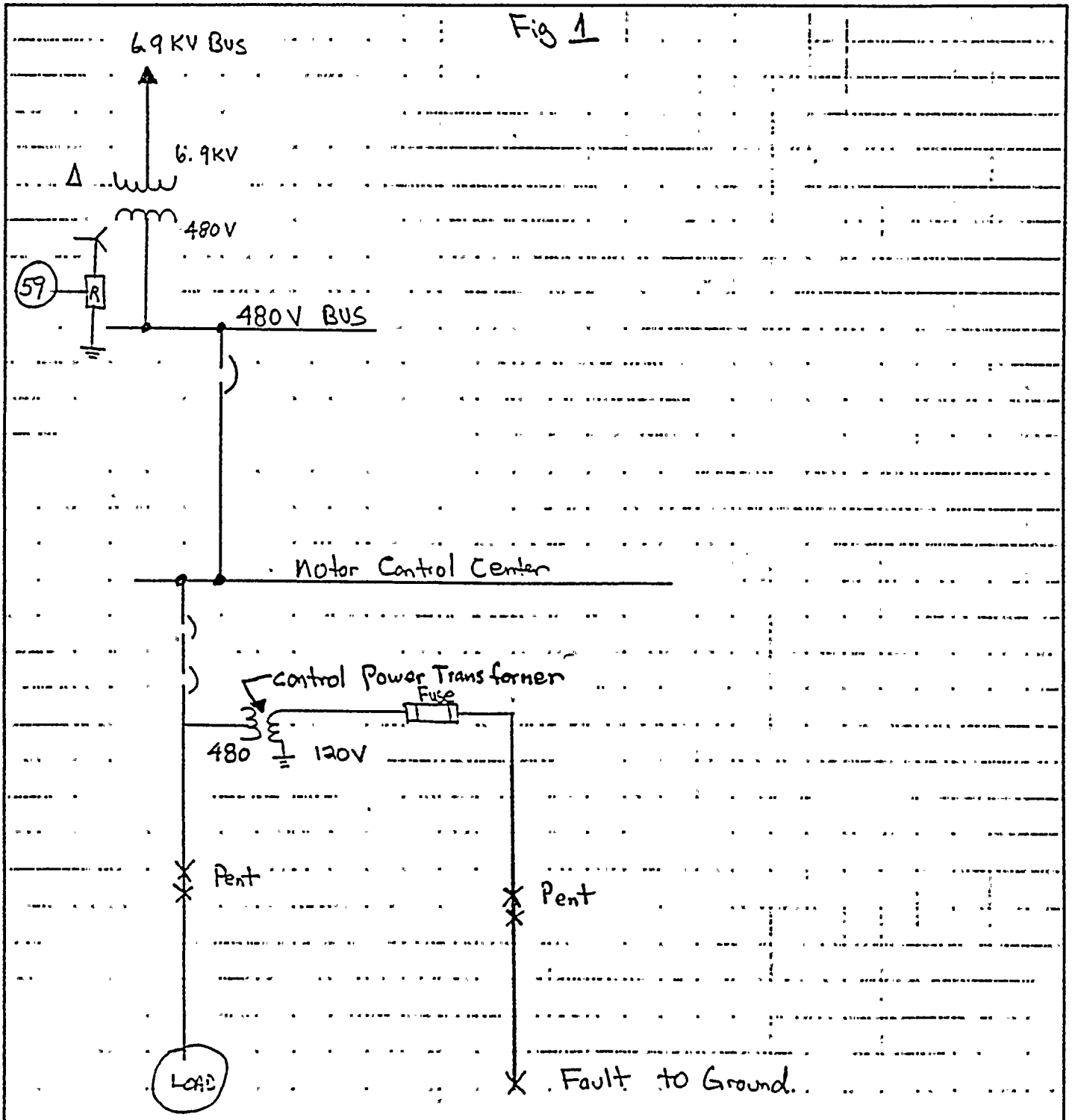
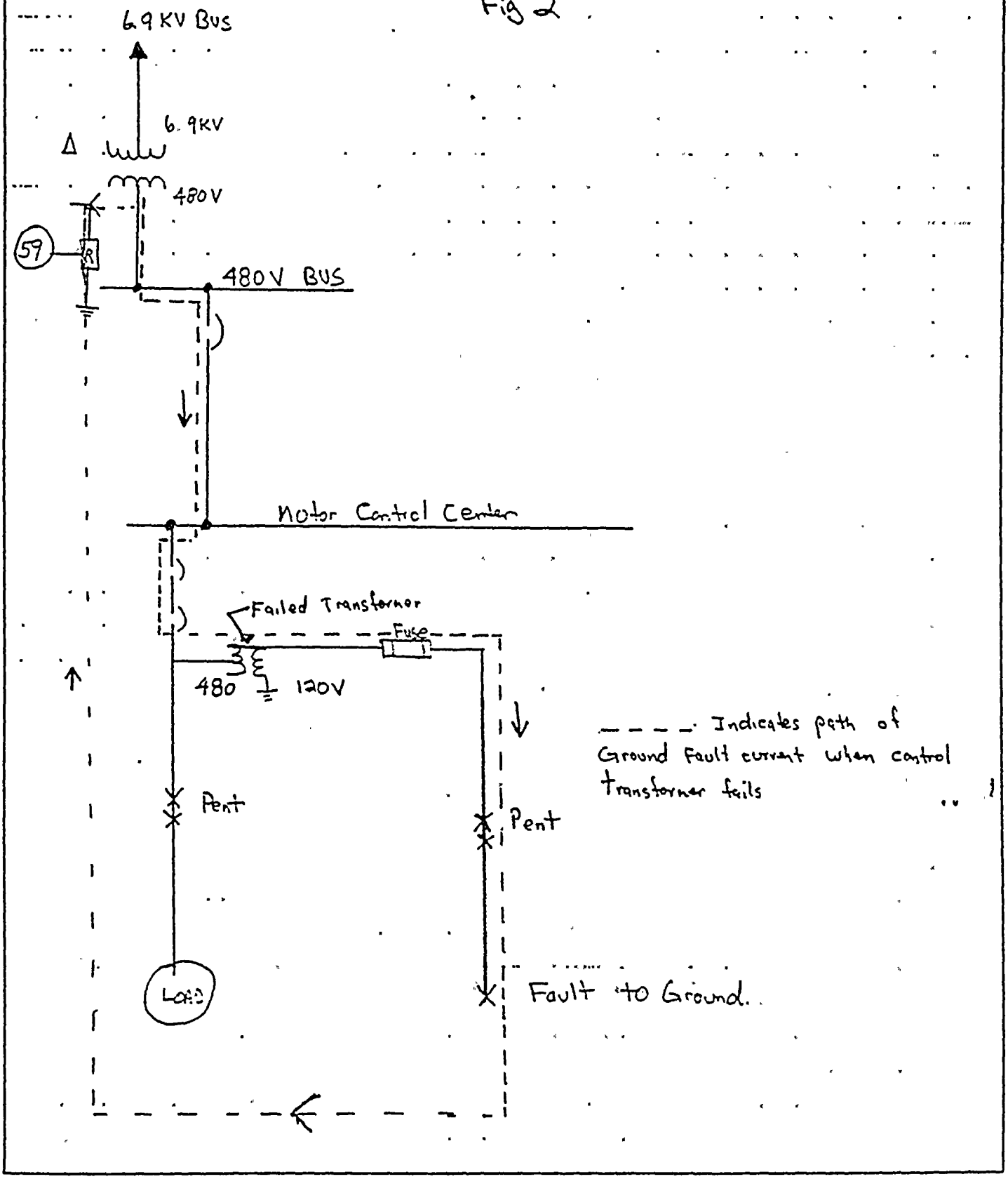


Fig 2


6.9 KV Bus
6.9KV
Δ
480V
59
480V BUS
Motor Control Center
Failed Transformer
Fuse
480
120V
Pent
Pent
Load
Fault to Ground.
---- Indicates path of Ground Fault current when control transformer fails