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SUBJECT: Provides addl response to NRC 860924 ltr requesting schedules for addressing plant-specific design features of ATWS mitigation sys actuation circuitry. Requests preliminary indication of acceptabilty of util program by 870801.

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INDIANA & MICHIGAN ELECTRIC COMPANY

P.O. BOX 16631
COLUMBUS, OHIO 43216

June 25, 1987
AEP:NRC:0838Z
10 CFR 50.62

Donald C. Cook Nuclear Plant Unit Nos. 1 and 2
Docket Nos. 50-315 and 50-316
License Nos. DPR-58 and DPR-74
GENERIC LETTER 83-28, 10 CFR 50.62, AMSAC

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

Attn: T. E. Murley

Dear Dr. Murley:

This letter provides additional responses to your September 24, 1986 letter requesting the D. C. Cook schedules for addressing the plant-specific design features of the Anticipated Transients Without Scram (ATWS) Mitigation Systems Actuation Circuitry (AMSAC). In Attachment 2 to our November 7, 1986 letter (AEP:NRC:0838V, copy enclosed in Attachment 3) we were unable to provide a complete response to several items (4, 5, 6, 8, 12, 14 and Appendix A, [a] through [d], [f] and [g]) because the responses were related to information which would be required in Technical Specifications (T/Ss). We deferred completing these responses until the Westinghouse Owners Group (WOG) was able to resolve the issue, and if necessary, distribute to us an NRC-approved or recommended AMSAC Technical Specification.

In their letter OG-171 (dated February 10, 1986, copy enclosed in Attachment 3) the WOG indicated that T/Ss for AMSAC are unnecessary and that plant administrative procedures would be sufficient to control AMSAC. We concur with these statements. Therefore, we are proceeding with our plant-specific design on the basis that no Technical Specifications are required. In this light, we request that you disregard references to T/Ss for Items 4, 5, 6, 8, 12, and 14 in Attachment 2 to our November 7, 1986 letter.

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Items 5, 6, 8, and 12 of your September 24, 1986 letter expressed concern for the control room operator human factors engineering aspect. Our Detailed Control Room Design Review (DCRDR) program was reviewed and approved by your staff during the week of February 23, 1987. It is our intent that future control room changes or modifications, such as in this case the installation of new devices, will receive the close scrutiny of the DCRDR assessment process. This should ensure that the human engineering properties of the control panels attained by the DCRDR Program will be maintained in the future.

With regard to Appendix A of your September 24, 1986 letter, responses to all items, a through g, are contained in Attachment 1 to this letter.

Attachment 2 to this letter is the plant-specific design we committed to provide in our November 7, 1986 letter. Please be advised that in the attached D. C. Cook Plant-specific AMSAC design some Westinghouse design information is not yet available. The original Westinghouse date for delivering the "design for the variable times to initiate AMSAC" has been delayed from the original date of April 30, 1987. We will submit this information to you as soon as possible after we receive it from Westinghouse and have had an opportunity to review it.

We look forward to receiving preliminary indication of acceptability of the D. C. Cook Plant-specific AMSAC from the NRC by August 1, 1987 if possible. This will enable us to finalize the design work and meet our scheduled implementation dates established by 10 CFR 50.62.

This document has been prepared following Corporate procedures which incorporate a reasonable set of controls to insure its accuracy and completeness prior to signature by the undersigned.

Very truly yours,

M. P. Alexich
Vice President

cm

Attachments

cc: John E. Dolan (w/o attachments)
W. G. Smith, Jr. - Bridgman (w/o attachments)
R. C. Callen
G. Bruchmann
G. Charnoff
NRC Resident Inspector - Bridgman
A. B. Davis - Region III

ATTACHMENT 1 TO AEP:NRC:0838Z

RESPONSES TO NRC SAFETY EVALUATION

APPENDIX A

AMSAC ISOLATION DEVICE--REQUEST FOR ADDITIONAL INFORMATION

NRC Safety Evaluation Appendix A Responses
AMSAC Isolation Device -
Request for Additional Information

NRC Request: Please provide the following:

a. For the type of device used to accomplish electrical isolation, describe the specific testing performed to demonstrate that the device is acceptable for its application(s). This description should include elementary diagrams when necessary to indicate the test configuration and how the maximum credible faults were applied to the devices.

Response: We are presently making arrangements to have suppliers perform tests on their analog isolation devices (I/I's) prior to our purchase of equipment. We plan to require the suppliers to provide results for the test configurations listed below. Testing will be to impose the configuration on the output side of the I/I and monitor the input circuit.

Anticipated testing circuits configurations are as follows:

1). a nominal 100 ohm normal resistive load.
2). an output circuit open.
3). an output circuit short.
4). a nominal 110v AC, but not greater than a nominal 220v AC, voltage applied to both between the output leads and between both leads and ground.
5). a nominal 128v DC, but not greater than a nominal 250v DC, voltage applied to both between the output leads and between both leads and ground.

For items 4 & 5 above see b. below for a discussion on applied voltage.

NRC Request: Please provide the following:

b. Data to verify that the maximum credible faults applied during the test were the maximum voltage/current to which the device could be exposed, and define how the maximum voltage/current was determined.

Response: Normal design practice for D. C. Cook Plant categorizes cables into instrument, control or power cables. These practices route each category of cable separate from the other category. Therefore, instrument category cable would be exposed only to instrument power supply faults. The most probable fault being a nominal no-load voltage of 84v DC. However, during installation prior to circuit acceptance it is possible to impose 128v DC on the circuit through wiring errors. Therefore the selection of the 128v DC as the

maximum credible DC fault. Additionally, the instrument power supply source voltage is 110v AC. Although power supply source voltage feedthru is not a normally anticipated fault, this voltage is being selected as the maximum credible AC fault.

The maximum credible fault voltages were selected based on the above plus a review of the proposed design cable routings. In performing this review for the proposed routing such items as signal acquisition cabinet locations, AMSAC cabinet locations and the general area for the proposed cable routings were investigated.

Due to our normal design practices the imposing of control cable voltages on instrument cables is unlikely. However to take into account the remote possibility that the AMSAC instrument cables might be exposed to these higher voltages a survivability test is being proposed. These voltages of nominal 220v AC and nominal 250v DC will be imposed as part of the vendor testing. These voltages will not be termed maximum credible faults but rather survival faults.

NRC Request: Please provide the following:

c. Data to verify that the maximum credible fault was applied to the output of the device in the transverse mode (between signal and return) and other faults were considered (i.e., open and short circuits).

Response: Figure 1 indicates that the maximum credible faults will be applied to the output of the I/I in the transverse mode. Other possible faults (open and short circuits) are also depicted.

NRC Request: Please provide the following:

d. Define the pass/fail acceptance criteria for each type of device.

Response: The pass/fail acceptance criteria for the proposed tests are that the I/I must prevent the fault voltages applied in each test from damaging its input circuit or affecting its power supply circuit. It is recognized that one or more of the proposed tests may damage the output circuit of the I/I.

NRC Request: Please provide the following:

e. Provide a commitment that the isolation devices comply with the environment qualifications (10 CFR 50.49) and with the seismic qualifications which were the basis for plant licensing.

Response: The proposed location for the AMSAC I/I's is the controlled environment of the main control room for each Unit. As such the I/I's have no environment qualification (10 CFR 50.49) requirements. The I/I's will be purchased to comply with the seismic

qualifications which were the basis for the plant license. The I/I's that will be installed in existing control room cabinets will be installed in a manner which will maintain the existing cabinet rating. Although equipment is to be purchased to our existing seismic license basis if the supplier provides certification to IEEE 344-1975 this certification will be used.

NRC Request: Please provide the following:

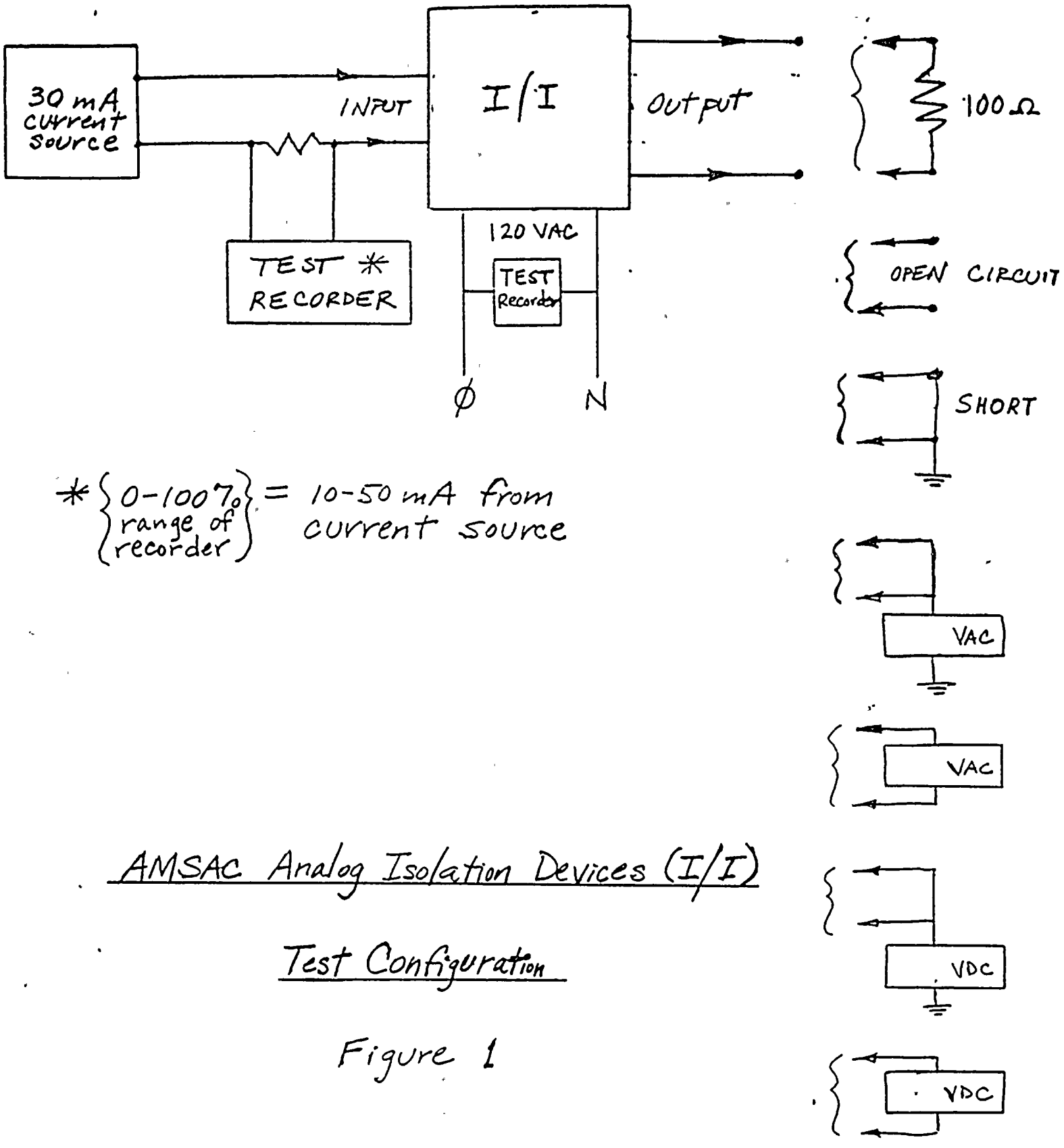
f. Provide a description of the measures taken to protect the safety systems from electrical interference (i.e., Electrostatic Coupling, EMI, Common Mode and Crosstalk) that may be generated by the ATWS circuits.

Response: The I/I's are to be enclosed in their own metal housings. In addition, the circuit connecting each feedwater flow signal and turbine impulse chamber pressure signal to the AMSAC System will have an isolation device at each end. The metal housings and connecting circuits design will protect the existing safety systems from electrical interference that may be generated by the ATWS circuits.

NRC Request: Please provide the following:

g. Provide information to verify that the Class 1E isolator is powered from a Class 1E source.

Response: The AMSAC I/I's are to be installed in existing Reactor Protection System and their own control room cabinets. These cabinets either are or are planned to be powered from one of the plant electric sources which are Class 1E power sources.



* {0-100% range of recorder} = 10-50 mA from current source

AMSAC Analog Isolation Devices (I/I)

Test Configuration

Figure 1

ATTACHMENT 2 TO AEP:NRC:0838Z

PRELIMINARY AMSAC DESIGN FOR D. C. COOK PLANT

This preliminary AMSAC design package is being submitted to give the NRC an opportunity to comment on the concept and circuitry to the extent that it has been finalized. A final design package will be submitted in the final quarter of 1987 which will provide the following additional information:

(1) More detailed location of the components.

(2) Engineering drawings - including relevant vendor information.

(3) Exact location and human factor attributes of the AMSAC control switches and annunciators in the Control Room.

(4) Recommended test/surveillance.

The design bases for the design have already been submitted to the NRC by Westinghouse.

The issue of isolators and their qualification is described in attachment 1 (Response to Appendix A of the Safety Evaluation Report).

Our AMSAC design is the low feedwater flow option. We will trip the turbine and initiate auxiliary feed water flow when we have less than 25% feed flow to 3 out of 4 steam generators and we are above 40% power. These setpoints have been given to us by Westinghouse.

Figure #1 shows the signal sensing block diagrams. We will sense feedwater flow from the existing flow transmitters (FFC-211, 221, 231, 241). The AMSAC power permissive signal will be sensed from the existing turbine 1st stage pressure transmitters (MPC-253, 254). We are adding new current repeaters (I/I) to each sensing loop. For the feed flow sensing loops, we will be placing the I/I's in the RPS cabinets and powering them from the existing power supplies: The Control Room Instrumentation Distribution System (CRIDS). These 120V ac supplies are powered from the existing station batteries via Class 1E inverters. Test points are available to inject signals for testing, trouble shooting, and maintenance. The logic equipment is the Foxboro Spec. 200. It will be powered from the AMSAC inverter and will be housed in the AMSAC cabinet which will be located in the control room.

Figure #2 contains the elementary logic diagram. The dc source is our Class 1E N-Train battery which powers the aux. feedwater valves. The N Train battery is independent of the station batteries. The 250V N-Train Battery will be isolated from AMSAC through qualified 1E fuses. The AMSAC inverter will provide all of the logic power (120 VAC). The undervoltage relay (27AMUV) will annunciate in the control room when AMSAC control bus voltage is unavailable. The contacts from the flow output relay

cards are arranged to start the initiate timer (62 AMIN) if we get low feedwater to any 3 out of 4 loops. The initiate timer is shown to have the time delay setting of 25 seconds. We will address the variable timer issue (which is being developed by Westinghouse) when we have received all of the technical data from the Westinghouse Owner's Group. The output relay contacts from the turbine 1st stage pressure are in an "and" configuration. We can test the power permissive by placing control switch 101CS-1 in bypass/test. Please note that AMSAC will "go to completion" once we receive an initial signal even though the reactor power drops below 40% power subsequently. Once AMSAC has gone to completion, the circuit will seal itself in (IR-2 (SI)) and must be acknowledged through a manual reset (control switch 101CS-3). Provisions have been made to manually initiate AMSAC through two spring return control switches (101CS-3, 101CS-4). When AMSAC is placed in bypass/test, the initiating relays (IR-1, 2, 3) will be disabled and a test relay (ATR) will be enabled. This will allow us to test the AMSAC logic without testing the AMSAC output relays. (ie. without initiating turbine trip and aux. feedwater flow). If the test relay is picked up, it will indicate a successful test and seal itself in (ATR(SI)). The signal can be cleared through control switch 101CS-2 (manual test reset). Once AMSAC has been restored to its normal state (101CS-1 in "normal"), the test indication will verify that the contacts have closed. AMSAC will be declared inoperable during testing.

Figure #3 shows the contact developments for the AMSAC logic and output relays. Relays IR1, IR2, IR3 will, when energized, initiate the auxiliary feedwater system and trip the main turbine.

Figure #4 contains the switches, indicating lights, and annunciator drops which will be placed in the control room. The exact panel locations will be finalized after the Detail Control Room Design Review.

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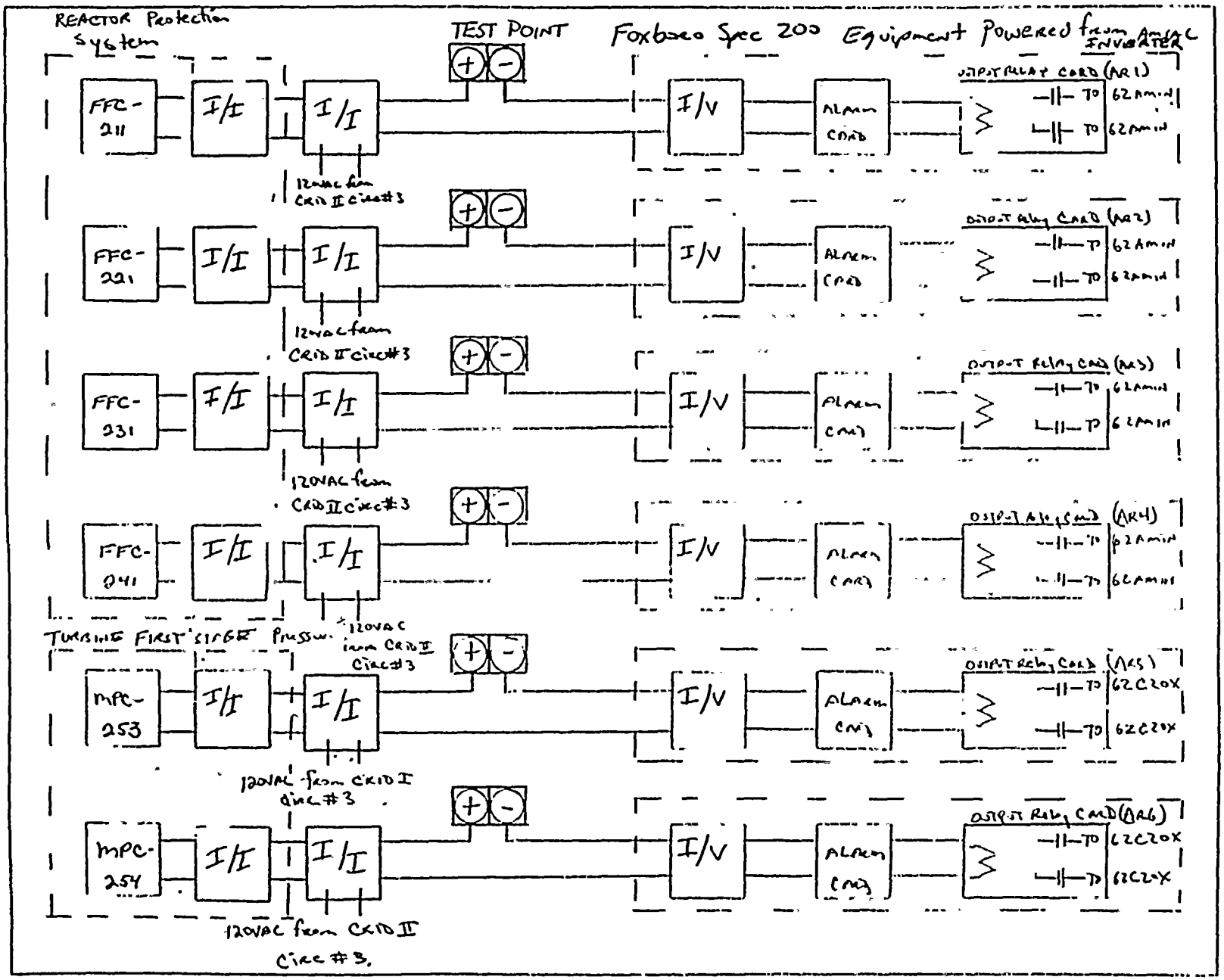
COLUMBUS, OHIO

DATE 5/27/87 BY MJF CK
COMPANY Q.O.
PLANT

SUBJECT AMSAC - Figure #1

INITIATING SIGNAL : BLOCK DIAGRAM



Attachment 2 to AEP:N 08382

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SUBJECT Amsac - Figure #2 Rev #1 6/11/82

DATE 5/22/82 BY ____ CK. ____
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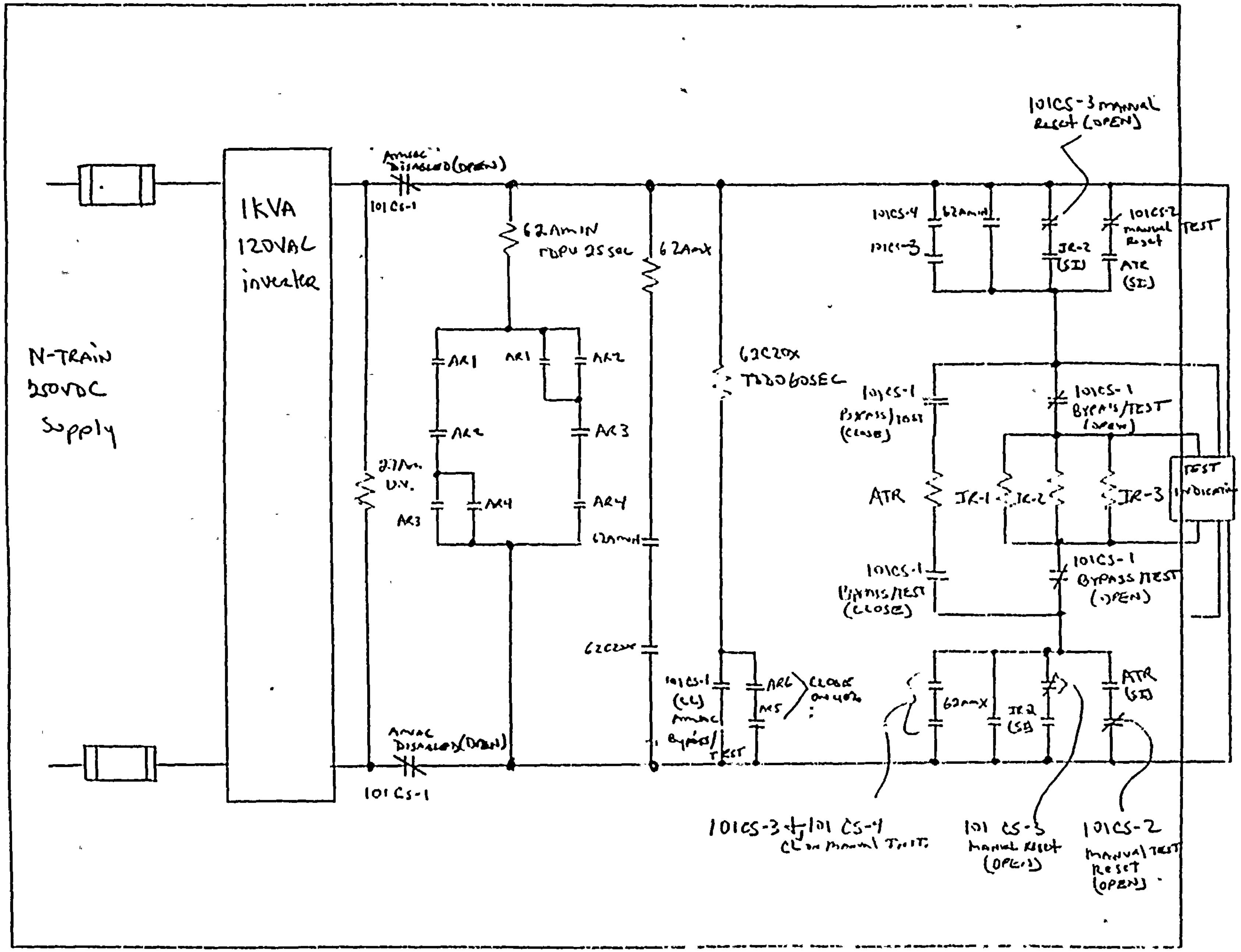
PLANT ____

LOGIC DIAGRAM



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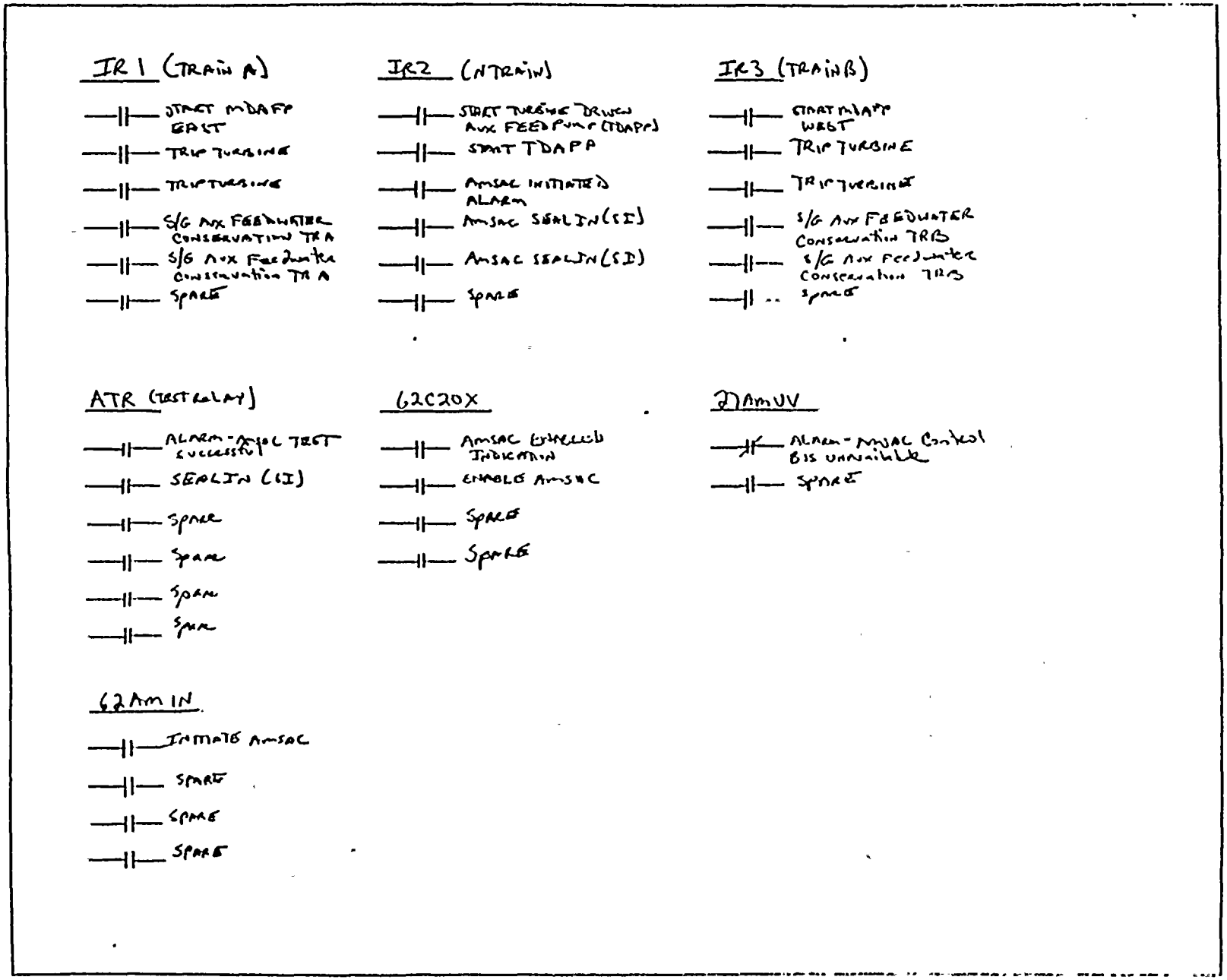
SUBJECT Amsac - Figure #3

RELAY CONTACTS AND THEIR FUNCTIONS



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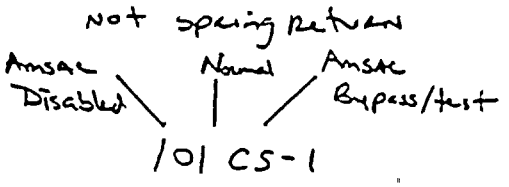
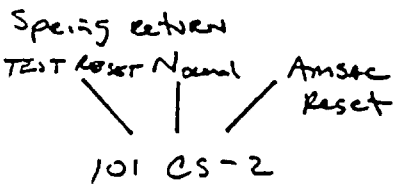
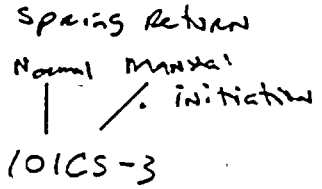
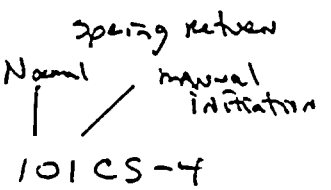
SUBJECT Amsac - Figure #4 Rev #1 6/11/87

CONTROL SWITCHES AND ANNUNCIATORS LOCATED IN THE CONTROL ROOM









Annunciator Drop: – Amsac initiated
– Amsac control bus unavailable

Indicating lights – Amsac ENABLED
– Amsac in Bypass/test
– Amsac Disabled
– Amsac TEST Successful

Panel locations to be finalized after Detailed Control Room Design Review.

ATTACHMENT 3 TO AEP:NRC:0838Z

LETTER, L. D. BUTTERFIELD TO H. R. DENTON, FEBRUARY 10, 1986

LETTER, M. P. ALEXICH TO H. R. DENTON, NOVEMBER 7, 1986