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YANKEE ATOMIC ELECTRIC COMPANY

20 Turnpike Road Westborough, Massachusetts 01581

March 5, 1976

United States Nuclear Regulatory Commission
Washington, D. C. 20555

Attention: Office of Nuclear Reactor Regulation

Reference: (1) License No. DPR-3 (Docket No. 50-29)
(2) Final Safety Analysis Report submitted, January 3, 1974.
(3) Yankee Rowe Final Hazards Summary Report.
(4) Change No. 113, Amendment 7, July 10, 1974.

Dear Sir:

Pursuant to Section 50.59 of the Commission's Rules and Regulations Yankee Atomic Electric Company hereby proposes the following modification to Appendix A to the Technical Specifications.

PROPOSED CHANGE: We propose to modify the Reactor Permissive Circuitry as described in Section 7.2.1.4 of Reference (2) and Page 214:5 of Reference 3, by substituting millivolt bistables operated by thermal converters for the existing pressure switches, and by altering the wiring arrangement for the permissive circuit indicating lights.

REASON FOR CHANGE: The pressure switches presently installed and described in the aforementioned references, monitor the Turbine No. 1 Nozzle Pressure to initiate the permissive circuit action at 15 MWe. The correlation between generated MWe and No. 1 Nozzle Pressure is not consistent enough to provide accurate automatic operation of the system.

The permissive circuitry indicating lights as connected and shown on Page 214:6 of Reference (3), do not truly represent the conditions of the circuit, in that the High SUR Scram may be operable without the operator's knowledge.

DESCRIPTION OF CHANGE:

1. Disconnect the No. 1 Nozzle Pressure Switches PS-420, PS-423 and PS-421.
2. Install three thermal converters to monitor gross generation from the same signal source as the installed gross MWe recorded.

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3. Install three millivolt bistable units to sense the new thermal converter outputs and to actuate the permissive circuit at a signal representing 15 MWe. These bistable units will electrically replace the No. 1 Nozzle pressure switches.

4. Connect the SUR TRIP (available) indicating light as shown on Enclosure 2.

5. Replace Page 214:5 of the Final Hazards Summary Report with Enclosure 1.

6. Replace Page 214:6 of the Final Hazards Summary Report with Enclosure 2.

7. Replace Stone and Webster Drawing No. 9699-FE-2G following Page 214:2 of the Final Hazards Summary Report with Enclosure 3.

8. Replace Page 7.2-6 of the Final Safety Analysis Report with Enclosure 4.

9. Replace Page 7.2-7 of the Final Safety Analysis Report with Enclosure 5.

10. Replace Page 7.2-8 of the Final Safety Analysis Report with Enclosure 6.

11. Replace Figure 7.2-3 of the Final Safety Analysis with Enclosure 7.

12. Replace Figure 7.2-2 of the Final Safety Analysis with Enclosure 8.

SAFETY CONSIDERATIONS: The proposed change does not present significant hazard considerations not described in the reference license as amended. This proposed change has been reviewed by the Nuclear Safety Audit and Review Committee.

SCHEDULE OF CHANGE: The changes will be effected prior to the completion of our Spring 1977 refueling period.

Very truly yours,

YANKEE ATOMIC ELECTRIC COMPANY

D.E. Vandenburgh

D. E. Vandenburgh
Vice President

COMMONWEALTH OF MASSACHUSETTS)
)ss.
COUNTY OF WORCESTER)

Then personally appeared before me, D. E. Vandenburgh, who being duly sworn, did state that he is a Vice President of Yankee Atomic Electric Company, that he is duly authorized to execute and file the foregoing request in the name and on behalf of Yankee Atomic Electric Company, and that the statements therein are true to the best of his knowledge and belief.

Armand R Soucy

Armand R. Soucy Notary Public
My Commission Expires September 9, 1977

main control board. The source range and intermediate range signals actuate the 1.1 decade per minute circuit, but only the intermediate range signals operate the 1.5 decades per minute circuit.

The startup rate scram is normally set to trip at 5.2 decades per minute and is adjustable from 3 to 10 decades per minute. The source range and intermediate range signals can actuate individual channel bistable magnetic amplifiers to initiate the scram.

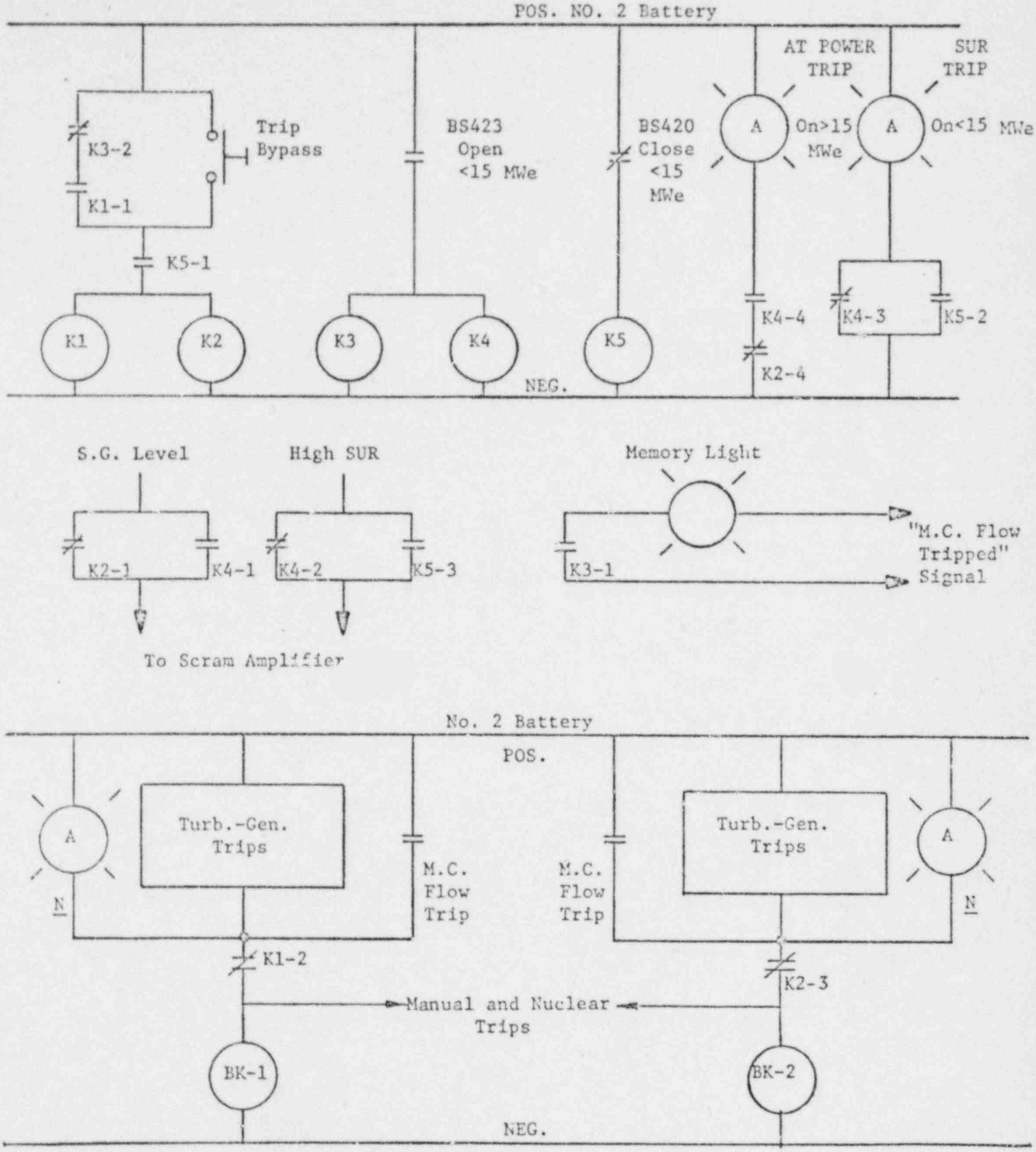
In addition to these signals, there exists from each one of the log microammeter units in the intermediate range channels an automatic signal, which disconnects the high voltage from the BF_3 proportional counters when the reactor neutron flux is increasing between 5×10^4 and 10^5 nv and reconnects the high voltage on decreasing flux at approximately the same level. The information that this signal is initiated is obtained by the source range high voltage light mounted on the nuclear section of the main control board. The light is off when the high voltage is off. A manual switch disconnecting the BF_3 source range high voltage is also available at the nuclear instrumentation cabinets.

The coincidence feature makes it necessary for two out of six power range channels to initiate high neutron flux level signals in order to cause the scram amplifiers to trip. The high neutron flux level trip set point is adjustable for various reactor operation conditions. For reactor 100% full power operation, (i.e., 600 MWt), with four loops in service, the level trip set point is set at 108%. For reactor operation between 0 and 15% of full power, the level trip set point is manually adjusted to 35% of full power. A power range coincidence single switch is provided to allow for coincidence scram or any single channel scram. The low power scram set switch is located on the nuclear section of the main control board.

Signals not fed through the coincidence circuit but operating on the scram amplifiers through the alarm and scram panel are those initiated from low main coolant pressure, low pressurizer pressure, low steam generator level, high pressurizer level, and high startup rate. Provision is made in the alarm and scram panel to accommodate additional signals for memory light indication only.

A permissive relay circuit, shown on page 214:6, is provided which is operated by two millivolt bistables activated from two MWe thermal converters. Operation of the circuit occurs at a generator output of 15 MWe. This circuitry provides for an optional manual by-pass for the low steam generator level scram, low flow scram and turbine-generator scram signals when the power is below 15 MWe. At 15 MWe and above, the scram bypass is automatically removed. The high startup rate scram signal is automatically connected at 15 MWe and below, and automatically bypassed above 15 MWe.

A second permissive relay circuit is actuated, by a third millivolt bistable and thermal converter, at the 130 MWe power level, which provides for automatic cut-in of a manual rods out reset circuit. At power levels of 130 MWe and above, the reset circuit requires the control switch to be returned to the neutral or reset position before making each additional rods out step. Below 130 MWe output, the reset circuit becomes



PERMISSIVE RELAY CIRCUIT

vital bus motor-generator set via the vital bus distribution cabinet.

7.2.1.3 Secondary Plant Instrumentation

7.2.1.3.1 Steam Generator Low Level Trip

A reactor trip signal is provided for protection against loss of feedwater. Four water level channels, one for each steam generator, each initiate a trip signal on low steam generator level. Each channel consists of a differential pressure sensor, a power supply, an indicator, and a bistable trip unit. The trip signals are connected in a two-out-of-four arrangement and the scram output signal is fed to the alarm and scram panel. In the event that one steam generator is out of service, the reactor will scram on a one-out-of-three basis.

7.2.1.3.2 Power Supply

The power supply for the steam generator level channels is 120 volts ± 3% and 60 hertz ± 1%, normally supplied by the vital bus motor-generator set via the vital bus distribution cabinet.

7.2.1.4 Other Reactor Trips

As shown on Figure 7.2-2, the reactor will trip above 15 MWe in the event of a generator trip or a turbine trip. Two millivolt bistables, connected to two gross MWe thermal converters, operate relays which connect the turbine-generator protective devices (and low flow scram) to the reactor scram circuit at power levels above 15 MWe. An amber light on the nuclear section of the main control board monitors each of the permissive circuit contacts and is lighted when the protective devices are connected. Each of these lights also monitors the integrity of a scram breaker trip coil.

The reactor may be manually scrammed with any one of three pushbuttons located on the main control board; two on the nuclear panel and the other on the turbine control panel. These scram signals go directly to the scram breaker trip circuits.

7.2.1.5 Reactor Trip Auxiliary Panels

The scram signals which are initiated in the nuclear, primary plant, and secondary plant instrumentation channels are fed to auxiliary panels located in the nuclear instrumentation cabinets. These panels contain the relays, switches, and magnetic amplifiers required to perform the necessary coincidence, permissive, memory, and scram breaker trip functions.

Enclosure 4

7.2.1.5.1 Intermediate Range Auxiliary Panel

The intermediate range auxiliary panel contains a coincidence-single scram switch for the three intermediate range power level scram signals, and a calibrating signal which is used to check the three intermediate power range panel units for normal operation.

7.2.1.5.2 Startup and Power Range Auxiliary Panel

The startup and power range auxiliary panel receives signals from the nuclear instrumentation and the process instrumentation channels and develops the necessary signals for annunciator circuits and the rods stop circuit. This panel also contains the power range coincidence-single scram switch, and the BF_3 high voltage disconnect relays. The high startup rate annunciator circuit is normally set to trip when the reactor startup rate reaches 1.1 decades per minute (adjustable between 0.5 and 5 decades per minute). These circuits are of the manual reset type and must be reset by operating the manual reset switch which is located on the nuclear section of the main control board. The source range and intermediate range signals actuate the 1.1 decade per minute annunciator circuits, but only the intermediate range signals operate the 1.5 decades per minute rods stop circuit. Each of the log microammeter units in the intermediate range channels initiates an automatic signal to a relay on the startup and power range auxiliary panel which disconnects the high voltage from a BF_3 proportional counter when the reactor neutron flux is increasing between 5×10^4 and 10^5 nv (approximately 10^{-9} amperes) and reconnects the high voltage on decreasing flux at approximately the same level. When this signal is initiated, a source range high voltage light operates on the nuclear section of the main control board. The light is off when the high voltage is off. A manual switch to disconnect the BF_3 source range high voltage is also available at the proportional counter power supply section of the nuclear instrumentation cabinets. The power range level scram signal coincidence feature makes it necessary for two of the six power range channels to initiate high neutron flux level trip. For reactor full power operation with four loops in service, the level trip set point is set at 108%. For reactor operation between 0 and 15% of full power, the level trip set point is set at 35% of full power for channels 6, 7, and 8 only. The low power scram set switch is located on the nuclear section of the main control board. A power range coincidence-single switch is provided to allow for coincidence scram or scram on any single channel. Permissive relay circuits, connected as shown in Figure 7.2-3 are operated by two millivolt bistables activated from two MWe thermal converters. Operation of the circuit occurs at an electrical generator output of 15 MWe. This circuitry provides for an optional by-pass for the low steam generator level scram, low flow scram and turbine-generator scram signals when the power is below 15 MWe. At 15 MWe and above, the scram bypass is automatically removed. The high startup rate scram signal is automatically connected at 15 MWe and below and automatically bypassed above 15 MWe. An amber light on the nuclear section of the main control board monitors the permissive relay and is lighted above 15 MWe.

Enclosure 5

7.2.1.5.3 Alarm and Scram Panel

Six scram signals (low pressurizer pressure, low main coolant pressure, high pressurizer level, high startup rate, steam generator low water level, and high neutron flux level are connected to the magnetic amplifier alarm and scram panel which acts as the memory center for indicating the individual signals that have been initiated. (See Technical Specification Section 2 for initiation set points.) Located above the alarm and scram panel is an alarm sequence panel which indicates the first scram signal received by the scram amplifiers. Although the low main coolant flow and turbine trip signals do not initiate a scram through this panel, they do initiate memory light and alarm sequence indication.

7.2.1.5.4 Scram Amplifiers

The two magnetic scram amplifiers operate individual scram relays whose contacts are connected to the trip coil circuits of the two rod scram circuit breakers. The scram relays are energized at all times except when a scram signal is sent to the scram amplifiers. When the scram amplifier outputs are zero, the scram relays are de-energized and the contacts close causing both scram breakers to trip. Either scram relay trips both scram breakers. Loss of vital bus voltage will also de-energize both scram relays.

7.2.2 Analysis

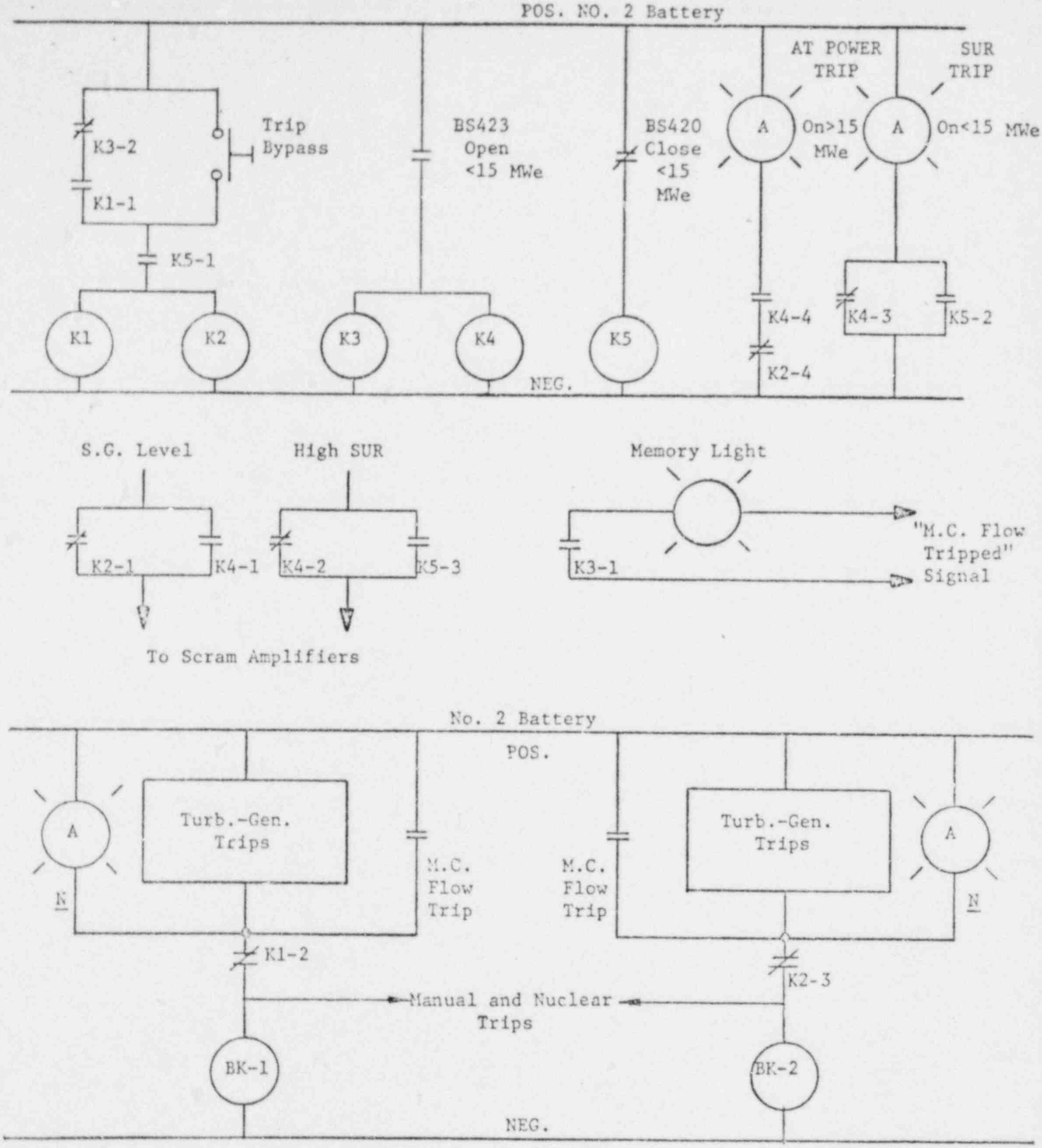
The reactor trip system was designed to the criteria which were applicable at the time of original system design. When backfit additions or changes are made, the criteria which are applicable at the time of the backfit are used in the design.

Two of the trip circuits in the reactor trip system were added to the system in 1972 as part of a backfit design charge, and therefore these new installations can be analyzed with respect to applicable backfit criteria.

7.2.2.1 Main Coolant Flow Trip

Main coolant pump currents are monitored with current transformers in the individual phases of the main coolant pumps. Main coolant flow in each loop and pump current for each main coolant pump are continuously indicated on the main control board. To provide protection against a single failure in the low flow scram protection circuitry, two redundant and independent pump current monitoring systems are used. All of the instrumentation is located outside of the containment. The four current transformers for each pump are located in the pump circuit breaker cubicles in the switch-

Enclosure 6.



PERMISSIVE RELAY CIRCUIT

Figure 7.2-3

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