

ROBINSON NUCLEAR PROJECT

UNIT NO. 2

PLANT MODIFICATION M-958

ADD AUTO START TO "B" SI PUMP

ATTACHMENT 1

CONTENTS AND DISTRIBUTION LIST

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Rev. 0 0

M-958-1, Revision 0

*Lay W. Williams*  
Cognizant Engineer

*11 JUNE '77*

Date

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## ROBINSON NUCLEAR PROJECT

UNIT NO. 2

PLANT MODIFICATION M - 958

ATTACHMENT 1

M958-1, REV.0

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\* The remaining attachments may be required on a case-by-case basis and shall be assigned by the Cognizant Engineer(s). Each modification package shall have an attachment for DCN's.

Cognizant Engineer:

Lay W. Molise

Date:

14 OCT. '88

## ROBINSON NUCLEAR PROJECT

UNIT NO. 2

PLANT MODIFICATION M-958

ADD AUTO START TO "B" SI PUMP

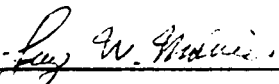
ATTACHMENT 2

SAFETY EVALUATION

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M-958-2, Revision 0



Cognizant Engineer

20 OCT '83

Date

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SAFETY EVALUATION FOR M-958  
"ADD AUTO START TO 'B' SI PUMP"

I. PURPOSE

The purpose of this safety evaluation is to evaluate the subject plant modification in accordance with RNP Plant Operating Manual Section MOD-005 to meet the requirements of 10CFR50.59. This will provide assurance that the proposed changes will not cause the plant to be operated outside the boundaries of analyses performed to ensure that plant systems, structures, and components important to safety can perform their design functions during normal operation and all analyzed accident conditions. This safety evaluation does not take the place of design verification and/or technical reviews of the subject plant modification.

This safety evaluation will address the impact of the reinstallation of the automatic start of the "B" safety injection pump without the installation of the automatic transfer feature. The intent is to use the "B" SI pump as an auto started maintenance pump which would replace either the "A" or "C" SI pump while they are out of service for maintenance.

It is intended that this safety analysis determine whether reinstallation of the automatic start features on the "B" SI pump would constitute an unreviewed safety question or a significant hazard.

## II.

DISCUSSIONA. History

The January 14, 1988 NRC Letter NRC-88-017 expressed a concern that the automatic transfer scheme that existed with the "B" SI pump may compromise the independence between redundant power sources and that a fault at the E1-E2 swing bus supplying the "B" SI pump could result in the loss of both buses.

In the process of reviewing plant documents for formulating a response to NRC Letter NRC-88-017, it was discovered that a single failure scenario related to the diesel generator could cause a failure of two of the three safety injection (SI) pumps. The Technical Specifications at the time required that after any single failure at least two SI pumps would automatically start and mitigate the effects of the spectrum of Loss of Coolant Accidents (LOCA). An analysis by the Nuclear Fuels group and Westinghouse showed that one SI pump could mitigate the effects of a LOCA.

Modification 951 was implemented to resolve the automatic transfer concern and the single failure scenario related to the diesel generator. This modification disconnected the auto start sequencer for the "B" SI pump which ensured that two SI pumps (A and C) would start automatically and the third SI pump (B) would be manually aligned and started by the operator if necessary. The Technical Specifications were changed to allow auto start of two safety injection pumps with a reactor power level limited to 60%. NRC approval was then granted to operate at 100% reactor power level with only two auto start SI pumps operational.

The "B" SI pump will only be used as a maintenance pump and will never be placed on the emergency bus when the "A" and "C" pumps are in service.

B. Description of Modification

This modification will reinstall the automatic start feature on the "B" SI pump that was deleted as part of Modification 951. In addition, this modification will make a minor wiring change to the safeguards logic which will ensure proper sequencing of the "B" SI pump and changes to the Plant Operating Manual will be initiated which will align the E1-E2 tie breakers so that the "B" SI pump will start only on one bus as a maintenance pump. Additionally, changes will be made to the RTGB and breaker trip settings to incorporate a human factors engineering review. Changes will also be made to the SI pump room cooling fan control logic to start these fans when the E1-E2 tie breakers close instead of the B SI pump feeder breaker.

1. Reinstallation of the "B" SI Pump Auto Start Feature

The auto start contact from the safeguards racks will be wired into the close circuits of the two E1-E2 tie breakers (see Figures 2 and 3). For Breaker 52/29B Cable C2896C will be terminated on Terminals 3 and 4 of Auxiliary Panel JA. For Breaker 52/22B Cable C2891C will be terminated on Terminals 3 and 4 of Auxiliary Panel FA. These cables are already in place and were determined at the auxiliary panels and tagged spare as part of Modification 951. With these cables reconnected, the "B" SI pump will start

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10 seconds after initiation of the safety injection signal, which is the same initiation sequence that was in effect prior to Modification 951.

2. Wiring Change to the Safeguards Logic

A jumper will be placed between Terminals 5M-11 and 5M-12 of Safeguards Rack 51 ("A" train) and a jumper will be placed between Terminals 5L-12 and 5L-11 of Safeguards Rack No. 63 ("B" train) (see Figure 4). These jumpers ensure that a close command is given to both Breakers 52/22B and 52/29B. These jumpers bypass contacts which would prevent both sequencing trains from timing out which would initiate a close command to Breakers 52/22B and 52/29B. These jumpers also bypass a contact which served to select the EI bus for SI Pump "B" first. Since the "B" SI pump will be manually prealigned to one bus by racking out the unwanted breaker, these contacts are no longer needed.

3. Changes to the Plant Operating Manual

Changes will be initiated through POM change requests which will align the EI-E2 Tie Breakers 52/22B and 52/29B (see Figure 1) so that both breakers will normally be racked out. Either 52/22B or 52/29B will be racked in when the "B" SI pump is used to replace the "A" or "C" SI pump when they are out of service.

4. Changes to Incorporate Human Factors Engineering

A human factors engineering review was performed on the "B" safety injection (SI) pump controls with the proposed changes and a deficiency was found. The proposed changes would align the "B" SI Pump Feeder Breaker 52-29C (see Figure 1) so that it remains closed all the time and the

"B" SI pump would be started by one of the E1/E2 tie breakers (52/22B or 52/29B). This can be misleading for the operator since the pump run indication on the RTGB is currently derived from breaker position of 52/29C which would falsely indicate that the pump is always running. The deficiency will be corrected by implementing the following changes:

- A. Breaker 52/29C - Removal of the breaker controls located in RTGB Module M35. Removal of the amptector trip unit on Breaker 52/29C and operate the breaker locally as a manual disconnect switch only.
- B. Breaker 52/29B - Move the breaker controls from RTGB Module M187 to M35. Lower the breaker trip setpoints to protect the "B" SI pump motor.
- C. Breaker 52/22B - Move the breaker controls from RTGB Module M185 to M35. Lower the breaker trip setpoints to protect the "B" SI pump motor.

The above changes will move the breaker controls for the E1/E2 tie breakers to the module that is used to control the "B" SI pump, which is between the "A" and "B" SI pump controls. Since these breakers will be used to start the "B" SI pump, it makes sense that these controls should be located on Module M35.

5. Changes in the SI Pump Room Cooling Fan Control Logic

The SI Pump Room Cooling Fans HVH-6A and HVH-6B are presently interlocked to start when the "B" SI pump feeder breaker (52/29C) closes. This modification will remove the trip coils from Breaker 52/29C and make it a normally closed manual disconnect. To prevent the cooling fans from running continuously, the fan interlocks will be

deleted from Breaker 52/29C and added to the E1/E2 bus tie breakers (52/22B and 52/29B). Since the E1/E2 tie breakers will be used to start the "B" SI pump, the cooling fans will still run whenever the "B" SI pump is running.

6. TRAIN SEPARATION

The control and power cables for these breakers have been verified to have independent routes through use of the cable and conduit list and hands-on tracing of cables.

III. SAFETY ANALYSIS

A. FSAR Review

In order to determine if changes in the facility or procedure as described in the Safety Analysis Report (SAR) or testing not described in the SAR would be made by implementation of the subject modification, the updated FSAR chapters/sections listed in the "Reference" section (VI.A.4) of this safety evaluation were reviewed in detail. The Table of Contents of the updated FSAR was reviewed for applicability.

This review has shown that the subject modification would require a change in the facility as described in FSAR. In particular, many of the changes submitted as a result of Modification 951 under Amendment No. 7 FSAR Change Request No. A7-001 would be revised. FSAR Chapters 6, 8, and 15 will need revising to show "B" SI pump as a maintenance pump. A statement in Chapter 8 will be added to address the new alignment of the E1-E2 tie breakers that feed the "B" SI pump.

This review has shown that the subject modification will require a change in procedures as described in the FSAR. In particular, the RNP Plant Operating Manual (POM) will require changing (such as SD-002).

The subject modification does not constitute a test or experiment not described in the FSAR.

Since implementation of the subject modification would involve a change to the facility and procedures as described in the FSAR, the proposed changes may be implemented without prior approval of the NRC only if there are no changes to the Technical Specifications and an unreviewed safety question (USQ) does not exist.

B. Technical Specification Review

In order to determine if the subject plant modification requires a change in the RNP operating license Technical Specifications, the Technical Specifications sections listed in the "References" section (VI.A.5) of this safety evaluation were reviewed in detail. The Table of Contents of the technical specification was reviewed for applicability.

The review indicates that changes to the RNP Technical Specifications will not be required as a result of implementing the subject modification.

C. Basis for Unreviewed Safety Question Determination

The following discussion will serve as the basis for determining if an unreviewed safety question (USQ) exists (i.e., it will provide the basis for answering "yes" or "no" to the safety evaluation question in Section IV.A).

1. The proposed changes were reviewed to determine if they alter the design, function, or method of performing the function of any component, system, or structure which could initiate or which is required to mitigate any accident previously evaluated in the FSAR. The review has concluded that systems associated with

accident mitigation would be altered since the design of the safeguards logic and tie breaker alignment and closing logic would be changed. The basic functioning and method of performing the function of the safeguards logic has not changed except both A and B trains of the safeguards logic will time out and give the E1-E2 tie breakers a close command. The safeguards logic will sequentially load the same equipment onto the same emergency buses with the same timing sequence as before Modification 951 except the "B" SI pump will only start on the E1 or E2 bus if the "A" or "C" SI pump has been taken out of service. The "B" SI pump would then be substituted for the out of service pump. The availability of a maintenance pump for automatic start will not provide additional SI flow above that contained in the analyses in Westinghouse's Letter CPL-88-510, which was submitted by a letter dated February 26, 1988 to the NRC, nor will this maintenance pump increase the loading on the E1 or E2 bus; therefore, the probability of occurrence of an accident has not been increased, nor have the margins associated with the mitigation of those accidents been reduced.

Operation of the facility with the addition of the automatic start of the "B" safety injection pump would not involve the increase in the consequences of an accident previously analyzed because a failure that would disable the bus providing power to the maintenance safety injection pump would disable only one pump, leaving one pump available for providing mitigating action. This is consistent with the assumptions of a previously analyzed accident in that

the analysis associated with the current technical specification amendment which assumed that only one safety injection pump was providing flow to the core. Therefore, the safety criteria are met and the consequences of any of these events are not increased.

2. Operation of the facility in accordance with the present Technical Specifications and after the implementation of this modification would not involve an increase in the probability of an accident that has not been previously analyzed because the safety injection system serves to mitigate the consequences of an accident only after an accident event has been initiated. This modification will add auto start of the "B" SI pump without introducing the potential of a fault on the E1-E2 tie bus transferring from E1 bus to E2 bus causing loss of both buses. The probability of initiating any Chapter 15 accidents is unaffected by the availability of the safety injection pumps. Therefore, the probability of a previously analyzed accident has not been increased.
3. Operation of the facility after the installation of this modification would not create the possibility of a new or different kind of accident from any accident previously evaluated because the operation of the safety injection pumps is solely a mitigating action in response to previously analyzed accident scenarios. The "B" SI pump will function as a true maintenance pump and will be used to replace the "A" or "C" SI pump when they are out of service for maintenance.

Operation of the facility would not involve a reduction in margin of safety in the currently approved accident analyses by reinstallation of the automatic start function to the "B" safety injection pump. Implementation of the subject modification would not change the margin of safety by changing the quantity of safety injection pumps that would be automatically available to mitigate an accident.

4. A functional test will be run that will test the proper operation of the safety injection system including all operational modes of the "B" SI pump.

#### IV. SAFETY EVALUATION

##### A. Unreviewed Safety Question Determination

In order to determine if the proposed changes involve an unreviewed safety question (USQ), the RNP interpretation of the three questions listed in 10CFR50.59 will be addressed. The RNP interpretation of 10CFR50.59 questions is outlined in RNP POM Section MOD-005 and consists of answering the following questions:

1. Is the probability of the occurrence or the consequences of an accident or malfunction of equipment important to safety previously evaluated in the safety analysis report increased?

No, based on Section III.C.1 of this safety evaluation. The probability of the occurrence of an accident has not increased in that safety injection serves to mitigate accidents after the accident initiating event. The ability to mitigate the consequences of a previously analyzed accident has not been reduced as the mitigation of LOCAs are based on the availability

of only one safety injection pump, and this is still a valid assumption. The malfunction of safety injection pumps and their ancillary equipment such that the number of available pumps is reduced to only one safety injection pump is the currently analyzed accident. Therefore, the probability of occurrence nor the consequences of previously analyzed accidents have not increased.

2. Is the possibility for an accident or malfunction of a different type than previously evaluated in the safety analysis report created?

No, based on Section III.C.2 of this safety evaluation. The mitigation of analyzed accidents based on the flow from only one safety injection pump has been previously analyzed and the analysis has been reviewed and accepted by the NRC. This modification does not create any situation that would invalidate that analysis. Implementation of the subject modification does not have the potential to create new, unanalyzed accidents. Therefore the possibility for an accident or malfunction of a different type than previously evaluated has not been created.

3. Is the margin of safety as defined in the basis for any Technical Specification reduced?

No, based on Section III.C.3 of this safety evaluation. The margin of safety that provides for operation at 100% as defined in the current amendment of the technical specification is not decreased by the reactivation of the automatic start feature for the "B" safety injection pump. After implementation of the subject modification, at least one safety injection pump will still be capable of operating following a

single failure, loss of off-site power, and initiation of the SI signal.

V. SUMMARY

The proposed changes are a change to the facility and procedures as described in the FSAR. However, the proposed changes do not require changes in the Technical Specifications, nor do they involve an unreviewed safety question. Therefore, in accordance with 10CFR50.59, the proposed changes may be implemented without prior approval from the NRC.

VI. MISCELLANEOUS

A. References

1. POM Sections

- a. MOD-005, Revision 10, "Modification/Package Development and Revision"
- b. OP-603, Revision 20, "Electrical Distribution"
- c. EPP-1, Revision 3, "Loss of All AC Power"
- d. EPP-3, Revision 3, "Loss of All AC Power with SI Required"
- e. SD-16, Revision 27, "Electrical System"

2. Letter NRC-88-017

3. 10CFR50.59, "Changes, Tests, and Experiments"

4. FSAR Chapters/Sections:
  - a. Chapter 1, Section 1.8, "Conformance to NRC Regulatory Guides"
  - b. Chapter 6, Section 6.3, "Emergency Core Cooling System"
  - c. Chapter 7, Section 7.3, "Engineered Safety Features Systems"
  - d. Chapter 8, "Electric Power"
  - e. Chapter 15, "Accident Analysis"
5. Technical Specification Sections (including bases)
  - a. 3.3, "Emergency Core Cooling Systems, etc."
  - b. 3.5, "Instrumentation Systems"
  - c. 3.7, "Auxiliary Electric Systems"
  - d. 4.5, "Emergency Core Cooling, etc., Systems Tests"
  - e. 4.6, "Emergency Power System Periodic Test"
6. Plant Modification M-951, "SI Pump 'B' Deletion of Auto Start"
7. Drawing B-190628 Sheets:
  - a. 891 (Revision 14)
  - b. 896 (Revision 14)

8. Drawing CP-380, 5379-3238 (Revision 13)

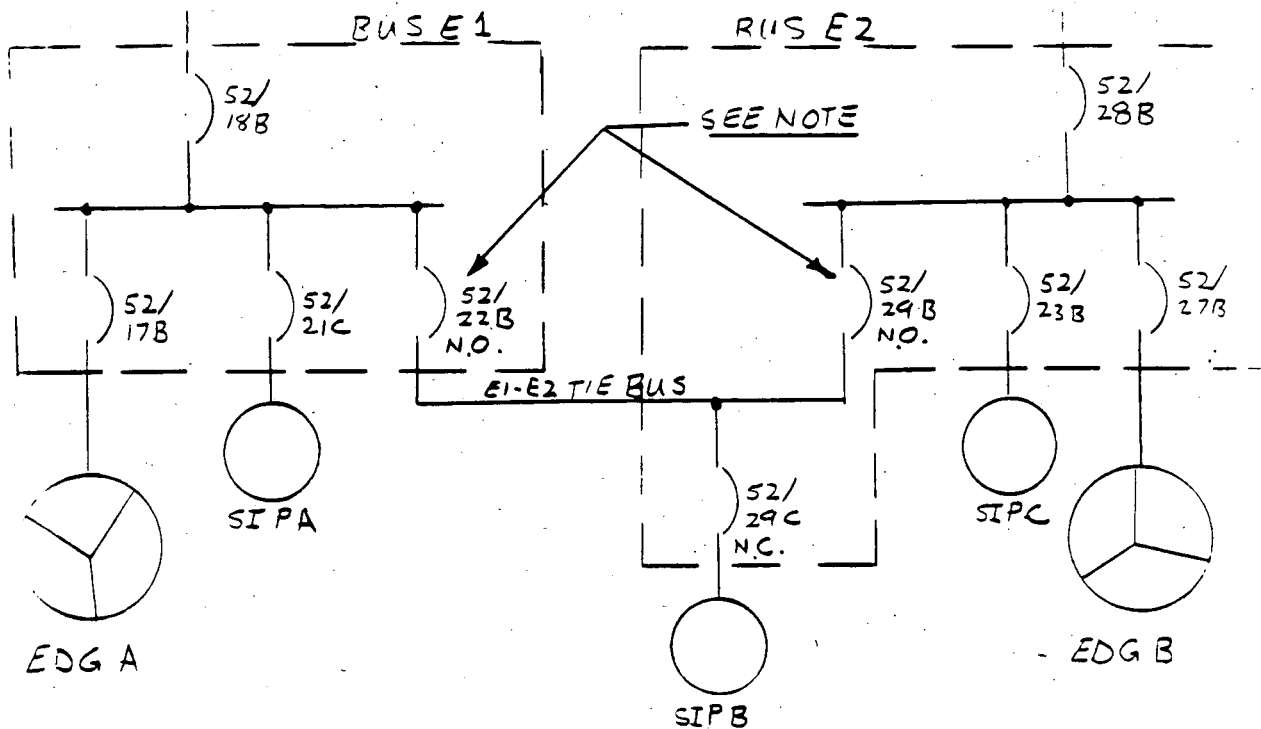


FIGURE 1

SIMPLIFIED 480V ONE LINE - SAFETY INJECTION PUMPS

NOTE: The "B" SI pump will be aligned to start on one of the emergency buses only to replace the "A" or "C" SI pump when they are out of service. Alignment to the E1 or E2 bus will be accomplished by racking out one E1-E2 bus tie breaker and racking in the other E1-E2 bus tie breaker. Under normal conditions, both breakers will be racked out and the "B" SI pump will stand by as a maintenance pump only.

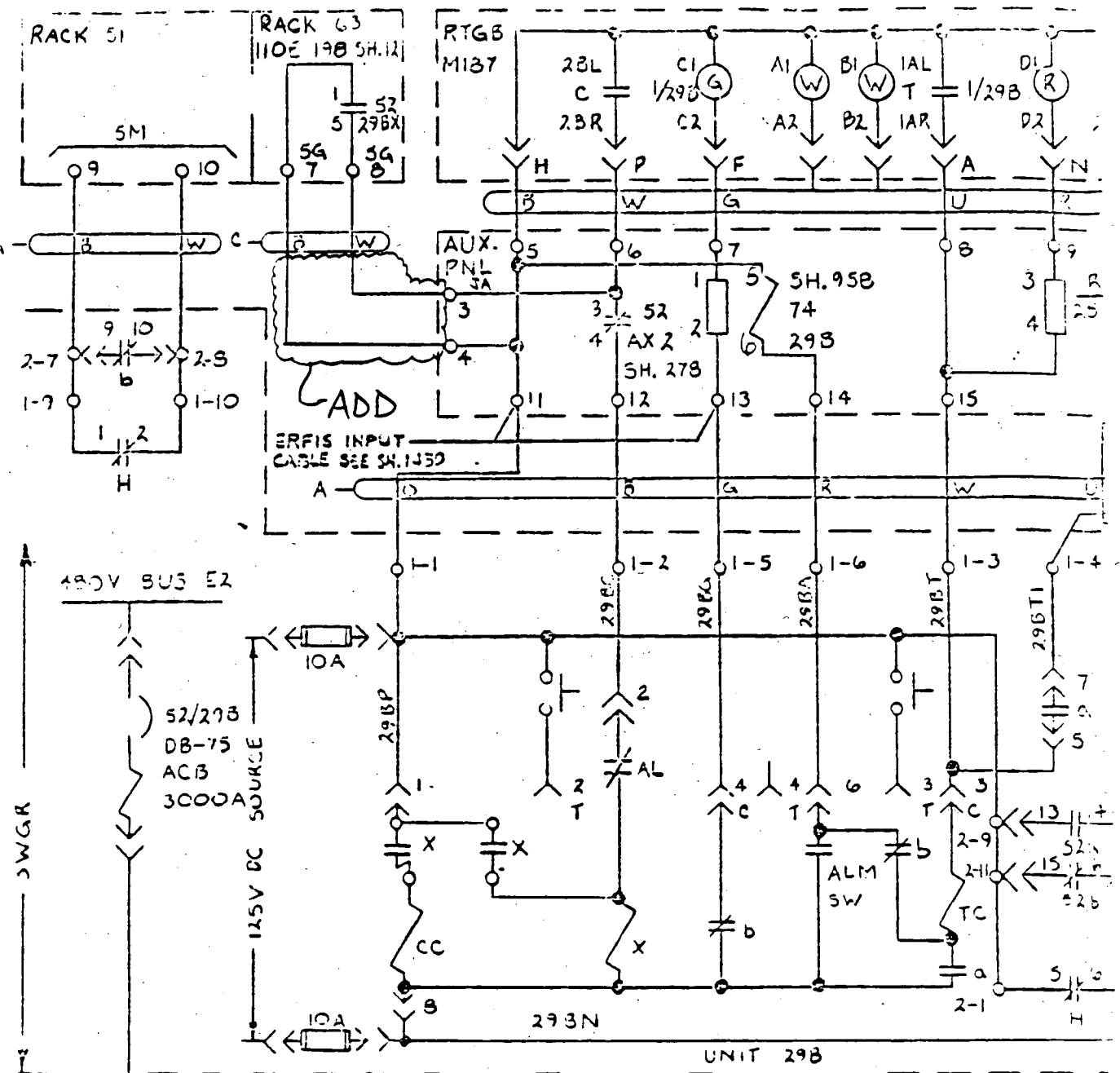


FIGURE 2

BREAKER 52/29B CONTROL CHANGES

Reference Drawing B-190628, Sheet 896, Revision 14

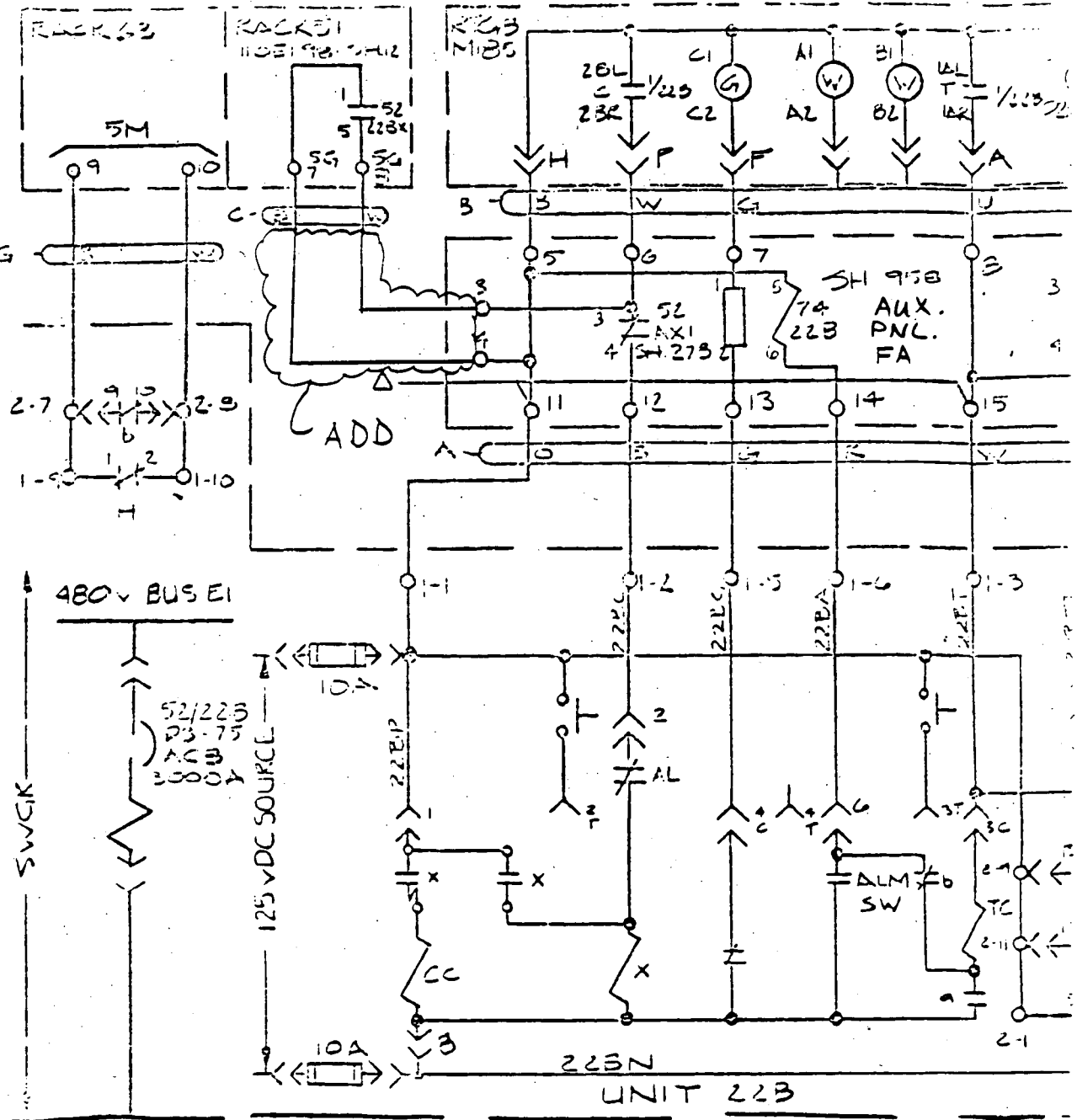


FIGURE 3

### BREAKER 52/22B CONTROL CHANGES

Reference Drawing B-190628, Sheet 891, Revision 14

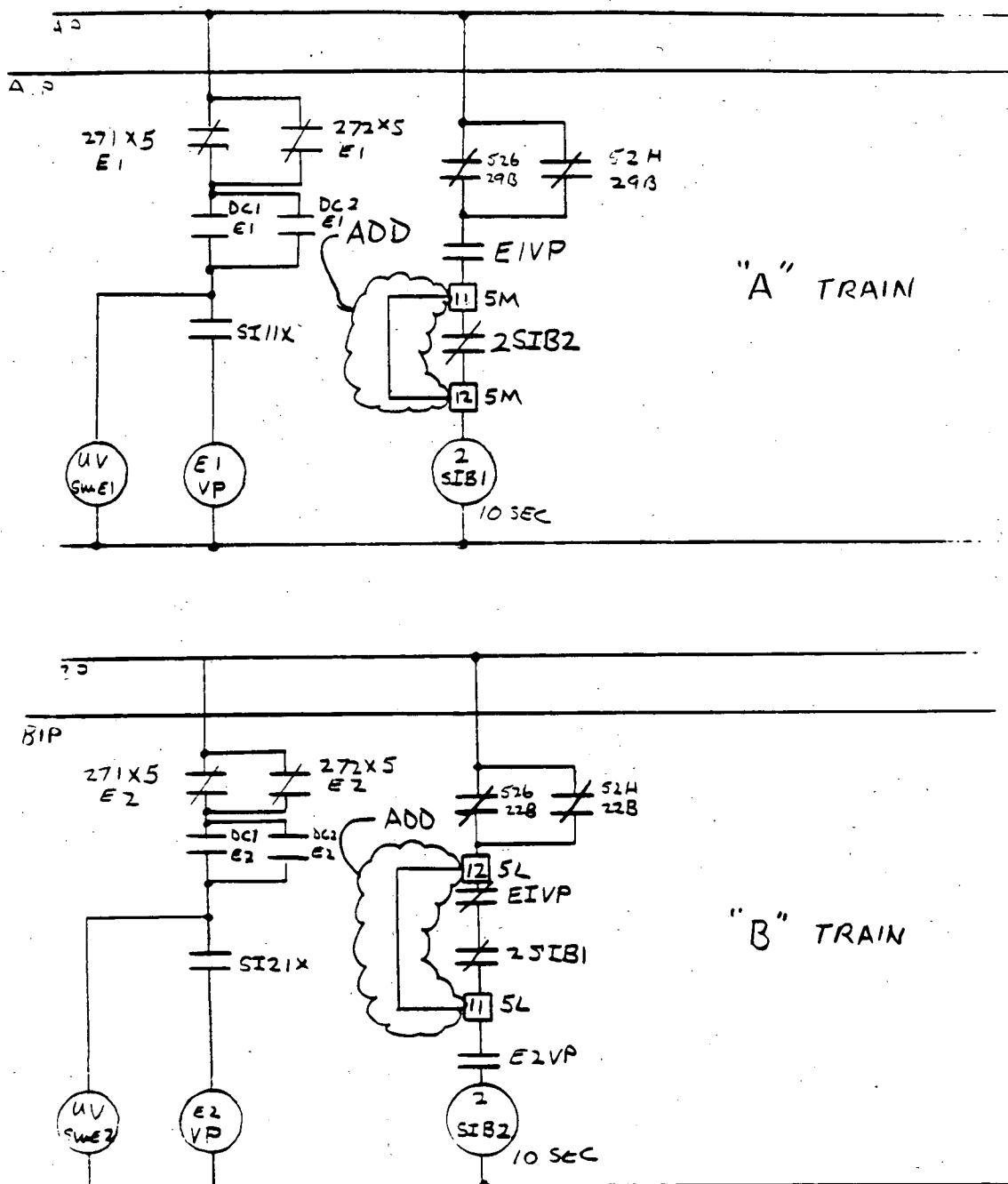


FIGURE 4

SAFEGUARDS LOGIC CHANGES

Reference Drawing CP380 5379-3238, Revision 13

ROBINSON NUCLEAR PROJECT

UNIT NO. 2

PLANT MODIFICATION M-958

ADD AUTO START TO "B" SI PUMP

ATTACHMENT 3

TRAINING SUMMARY

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M-958-3, Revision 0

Jay W. Marice  
Cognizant Engineer

20 OCT. 88  
Date

Training Review Complete:

RS Allen by RW  
Name for telecon

SR Spec. Training  
Title

11-19-88  
Date

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## TRAINING SUMMARY

1.0 TITLE: Add Auto Start to "B" SI Pump

2.0 SYSTEMS/COMPONENTS AFFECTED:

Safety Injection Pump "B", Safeguards Rack Nos. 51 and 63, E1-E2 Bus Tie Breakers 52/22B and 52/29B, and SI pump "B" Feeder Breaker 52/29C.

3.0 BACKGROUND

The January 14, 1988 NRC Letter NRC-88-017 expressed a concern that the automatic transfer scheme that existed with the "B" SI pump may compromise the independence between redundant power sources and that a fault at the E1-E2 swing bus supplying the "B" SI pump could result in the loss of both buses.

In the process of reviewing plant documents for formulating a response to NRC Letter NRC-88-017 it was discovered that a single failure scenario related to the diesel generator could cause a failure of two of the three safety injection (SI) pumps. The Technical Specifications at the time required that after any single failure at least two SI pumps would automatically start and mitigate the effects of the spectrum of Loss of Coolant Accidents (LOCA). An analysis by the Nuclear Fuels group and Westinghouse showed that one SI pump could mitigate the effects of a LOCA.

Modification 951 was implemented to resolve the automatic bus transfer concern and the single failure scenario related to the diesel generator. This modification disconnected the auto start sequencer for the "B" SI pump which ensured that two SI pumps (A and C) would start automatically with the third SI

pump (B) manually aligned and started by the operator if necessary. The Technical Specifications were changed to allow auto start of two safety injection pumps.

#### 4.0 DETAILS

##### 4.1 Purpose

The purpose of this modification is to add the automatic start feature of the "B" safety injection pump without installation of the automatic transfer feature that existed prior to Modification 951. This modification will not change the Technical Specification statement that only two SI pumps are required to start automatically. The intent of this modification is to provide more flexibility for maintenance and operations by making the "B" SI pump a true auto started maintenance pump that can substitute the "A" or "C" SI pumps when they are out of service for maintenance.

##### 4.2 General Description

This modification will reinstall the automatic start feature on the "B" SI pump that was deleted as part of Modification 951. In addition, this modification will make a minor wiring change to the safeguards logic which will ensure proper sequencing of the "B" SI pump and changes to the Plant Operating Manual will be initiated which will align the E1-E2 tie breakers so that the "B" SI pump will only start when the "A" or "C" SI pump is out of service. The controls for the "B" SI pump feeder breaker (52/29C) will be deleted from the RTGB, and the controls for the E1/E2 tie breakers (52/22B and 52/29B) will be moved on the RTGB to the module that now controls the "B" SI pump feeder breaker to incorporate human factors in the design.

### 4.3 Description of Major Components/Elements

#### 4.3.1 Reinstallation of the "B" SI Pump Auto Start Feature

The auto start contact from the safeguards racks will be wired into the close circuits of the two E1-E2 tie breakers (see Figures 2 and 3). For Breaker 52/29B, Cable C2896C will be terminated on Terminals 3 and 4 of Auxiliary Panel JA. For Breaker 52/22B, Cable C2891C will be terminated on Terminals 3 and 4 of Auxiliary Panel FA. These cables are already in place and were determined at the auxiliary panels and tagged spare as part of Modification 951. With these cables reconnected, the "B" SI pump will start 10 seconds after initiation of the safety injection signal, which is the same initiation sequence that was in effect prior to Modification 951.

#### 4.3.2 Wiring Change to the Safeguards Logic

A jumper will be placed between Terminals 5M-11 and 5M-12 of Safeguards Rack 51 ("A" train) and a jumper will be placed between Terminals 5L-12 and 5L-11 of Safeguards Rack No. 63 ("B" train) (see Figure 4). These jumpers ensure that a close command is given to both Breakers 52/22B and 52/29B. These jumpers bypass contacts which would prevent both sequencing trains from timing out which would initiate a close command to Breakers 52/22B and 52/29B.

These jumpers also bypass a contact which served to select the E1 bus for SI Pump "B" first. Since the "B" SI pump will be manually prealigned to one bus by racking out the unwanted breaker, these contacts are no longer needed.

4.3.3 Changes to the Plant Operating Manual

Changes will be initiated through POM change requests which will align the E1-E2 Tie Breakers 52/22B and 52/29B (see Figure 1) so that one breaker will be racked in and one breaker will be racked out when the "B" SI pump is used to replace "A" or "C" SI pump. Breakers 52/22B and 52/29B will normally be racked out with the control power fuses removed.

4.3.4 Changes to the "B" SI Pump Feeder Controls

The controls for the "B" SI pump feeder breaker (52/29C) will be removed from RTGB Module M35. This breaker will be operated locally as a manual disconnect. The controls for the E1/E2 tie breakers (52/22B and 52/29B) will be moved from Modules M185 and M187, respectively, to Module M35. The "B" safety injection pump will be started by one of these two tie breakers.

5.0 PROCEDURES AFFECTED

SD-006	OST-162
OP-603	OST-163
GP-2	OMM-8
OWP-016	OMM-10
OWP-023	PM-402
OST-151	EPP Foldouts

6.0 IMPACT ON OPERATIONS

This modification will have a minor impact on plant operations. The "B" SI pump will start automatically on an SI signal when it is aligned to replace the "A" or "C" SI pumps. Normally, the "B" SI pump breakers will be racked out and the "B" SI pump will not start. The "B" SI pump will be started by the E1/E2 bus tie breaker that is racked in (52/22B or 52/29B). The controls for the "B" SI pump feeder will be deleted and this

breaker will be used as a locally operated manual disconnect only.

The E1/E2 tie breaker controls will be moved to RTGB Module M35 which is in between the "A" SI pump and "C" SI pump start switches.

The SI pump room cooling fans (HVH-6A and HVH-6B) will be interlocked with the E1/E2 bus tie breakers (52/22B and 52/29B) to start when the "B" SI pump is running.

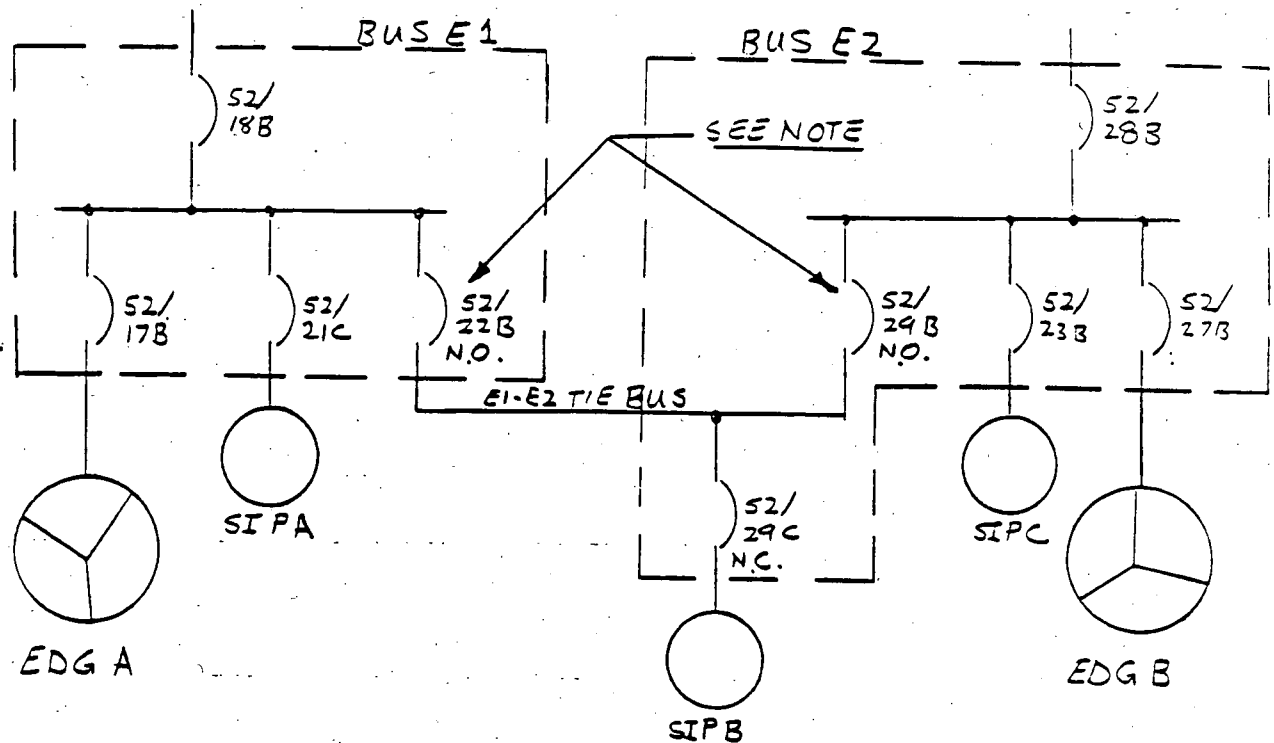


FIGURE 1

SIMPLIFIED 480V ONE LINE - SAFETY INJECTION PUMPS

NOTE: The "B" SI pump will align to start on one of the emergency buses only when it is replacing the "A" or "C" SI pumps. Alignment to E1 or E2 buses will be accomplished by racking out one E1-E2 breaker and racking in the other E1-E2 breaker. Under normal conditions, both breakers will be racked out and the "B" SI pump will stand by as a maintenance pump only.

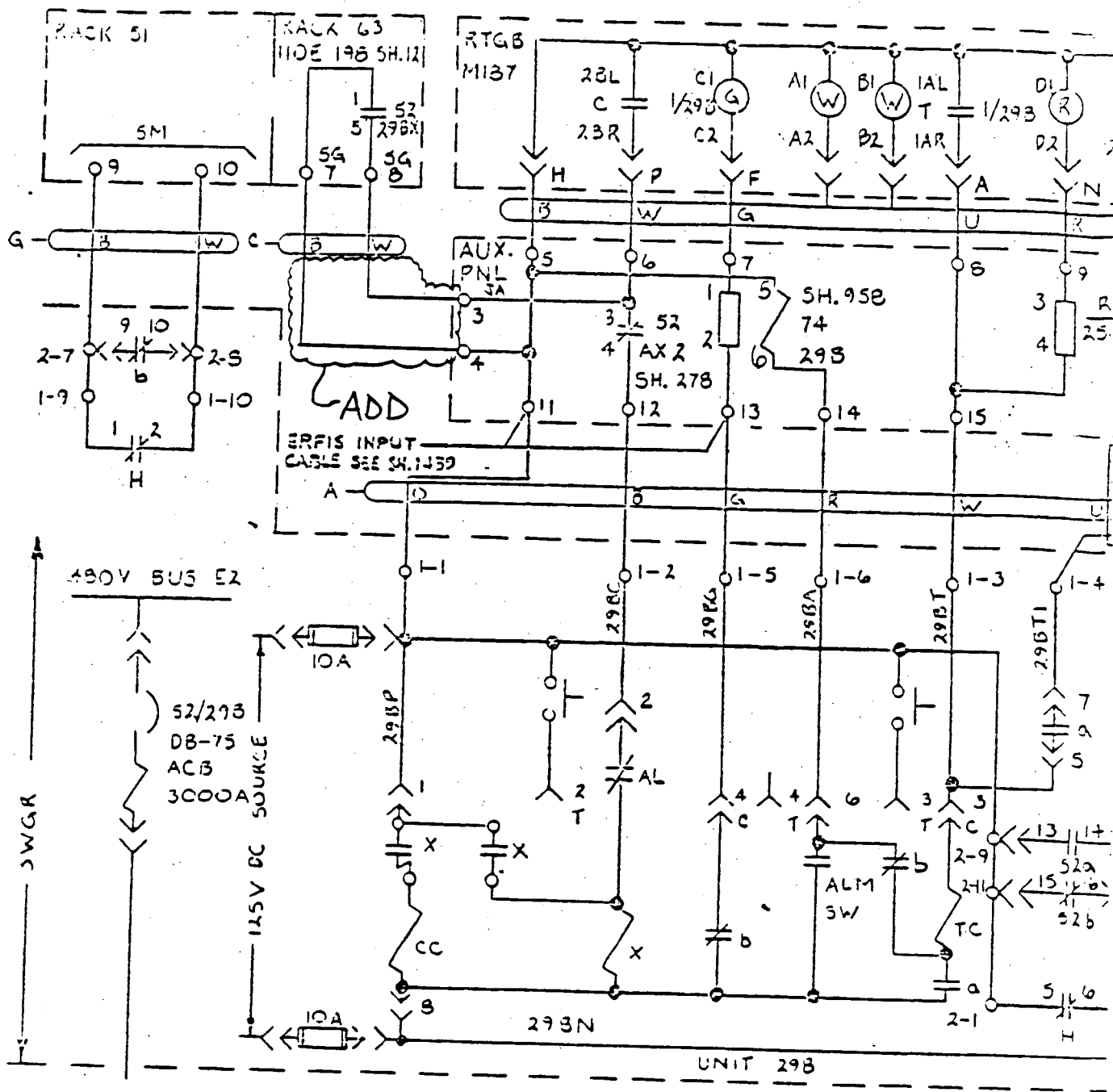


FIGURE 2

BREAKER 52/29B CONTROL CHANGES

Reference Drawing B-190628, Sheet 896, Revision 14

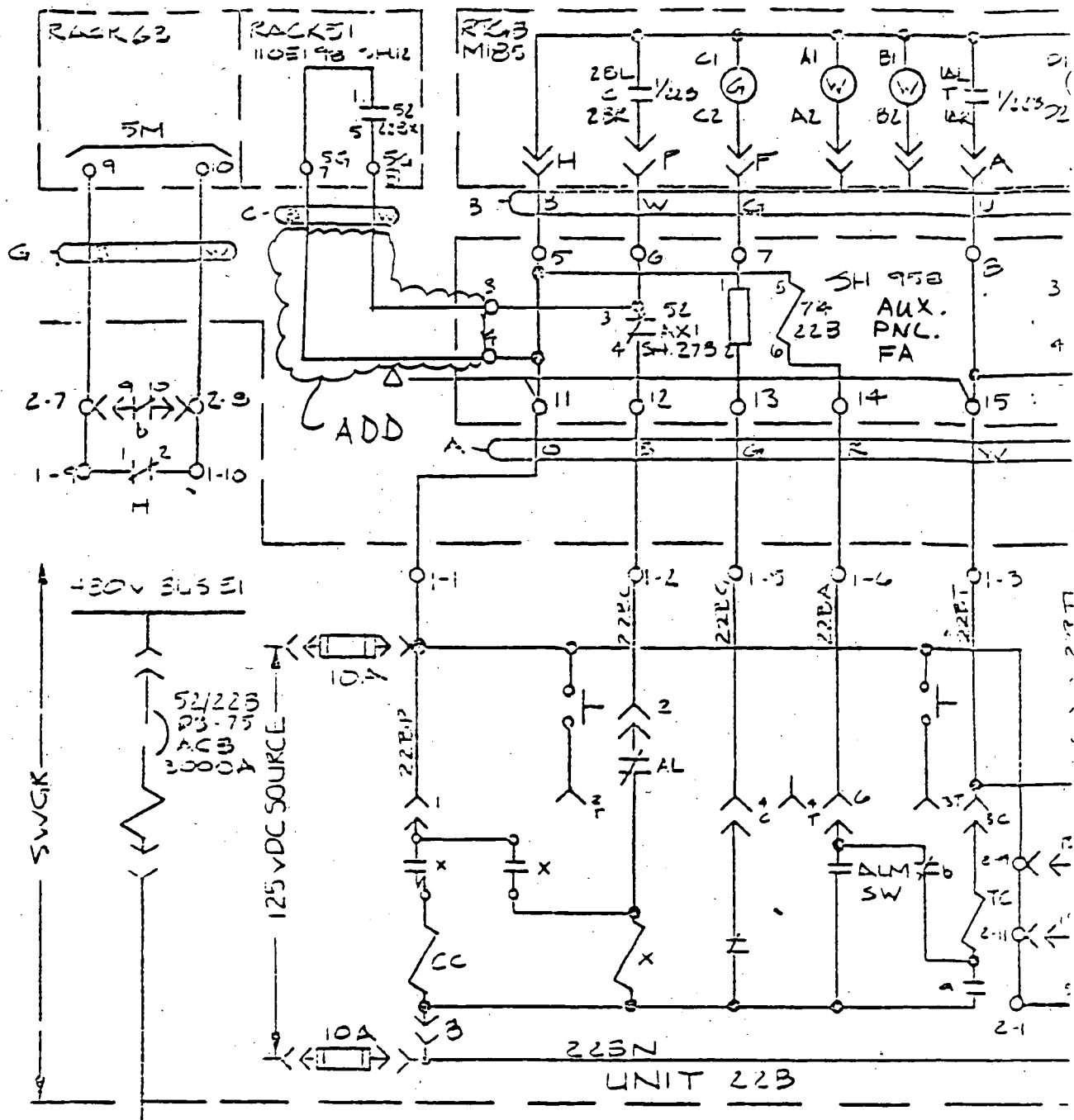


FIGURE 3

BREAKER 52/22B CONTROL CHANGES

Reference Drawing B-190628, Sheet 891, Revision 14

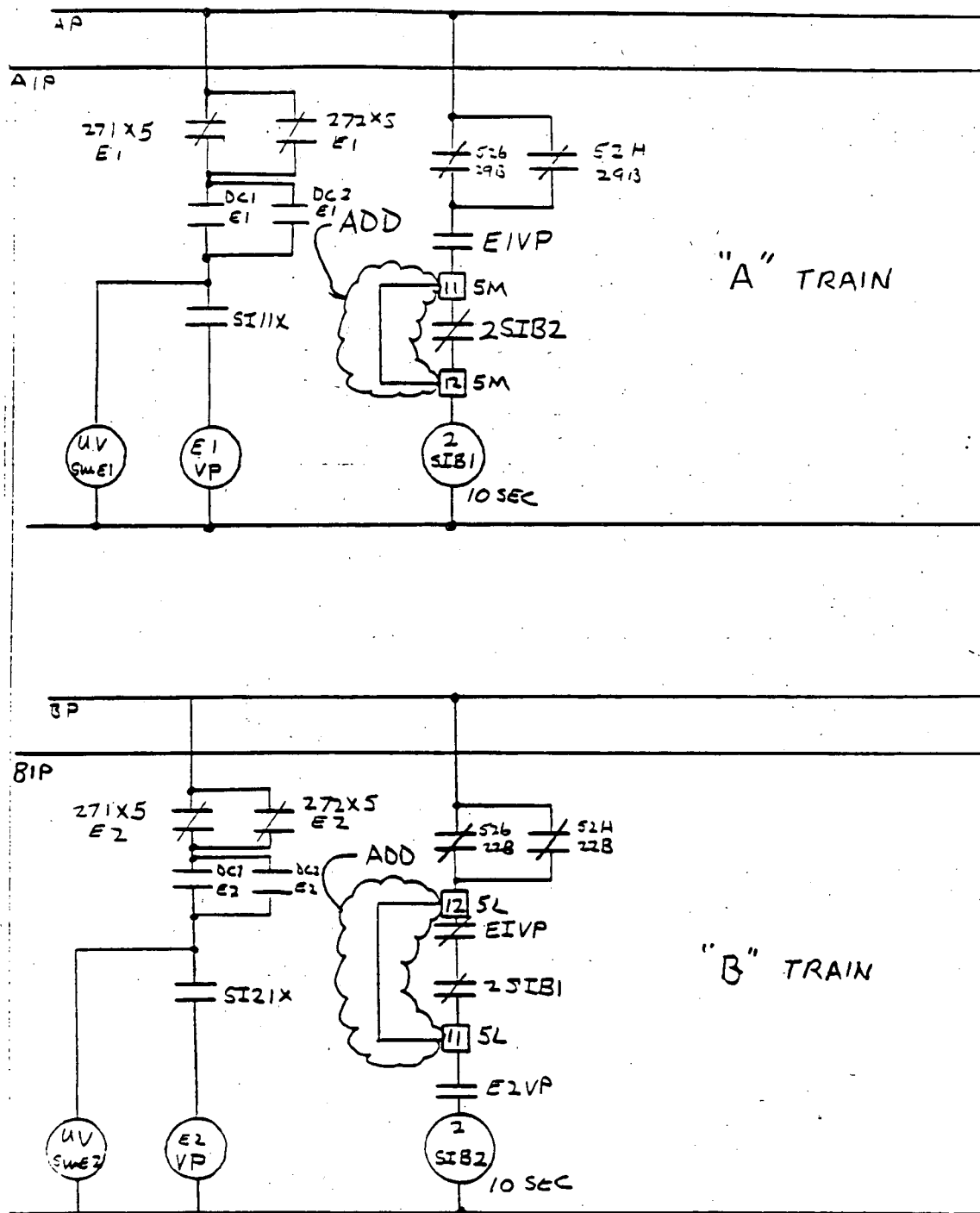


FIGURE 4

SAFEGUARDS LOGIC CHANGES

Reference Drawing CP380 5379-3238, Revision 13

ROBINSON NUCLEAR PROJECT

UNIT NO. 2

PLANT MODIFICATION M-958

ADD AUTO START TO "B" SI PUMP

ATTACHMENT 4

MODIFICATION DESIGN BASIS RECORD

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M-958-4, Revision 0

*Greg M. Wood*  
Cognizant Engineer

20 OCT. 73

Date

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(PM958/jap)

ROBINSON NUCLEAR PROJECT

UNIT NO. 2

PLANT MODIFICATION M-958

ATTACHMENT 4

MODIFICATION DESIGN BASIS RECORD

THE TWENTY-NINE (29) ITEMS LISTED HEREUNDER HAVE BEEN CONSIDERED, AND EACH HAS BEEN CONSIDERED TO BE EITHER:

APPLICABLE AS NOTED BY THE INDICATED REFERENCE, OR NOT APPLICABLE AS INDICATED "N/A". JUSTIFICATION TO BE PROVIDED FOR EACH "N/A". ATTACH ADDITIONAL SHEETS, AS NECESSARY.

REFERENCE LISTED IS THE APPROPRIATE PARAGRAPH OF THE DESIGN BASIS DOCUMENT.

REFERENCE

- |             |   |
|-------------|---|
| <u>1.0</u>  | 1. Basic functions of each structure, system and component.   |
| <u>2.0</u>  | 2. Performance requirements such as capacity, rating, system output.  |
| <u>3.0</u>  | 3. Codes, standards, and regulatory requirements including the applicable issue and/or addenda.   |
| <u>4.0</u>  | 4. Design conditions such as pressure, temperature, fluid chemistry and voltage.  |
| <u>5.0</u>  | 5. Loads such as seismic, wind, thermal and dynamic.  |
| <u>6.0</u>  | 6. Environmental conditions anticipated during storage, construction and operation such as pressure, temperature, humidity, corrosiveness, site elevation, wind direction, nuclear radiation, electromagnetic radiation and duration of exposure. |
| <u>7.0</u>  | 7. Interface requirements including definition of the functional and physical interfaces involving structures, systems, and components.   |
| <u>8.0</u>  | 8. Material requirements including such items as compatibility, electrical insulation properties, protective coating and corrosion resistance.  |
| <u>9.0</u>  | 9. Mechanical requirements such as vibrations, stress, shock, and reaction forces.  |
| <u>10.0</u> | 10. Structural requirements covering such items as equipment foundations and pipe supports.   |

ROBINSON NUCLEAR PROJECT

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UNIT NO. 2

PLANT MODIFICATION M-958

ATTACHMENT 4

MODIFICATION DESIGN BASIS RECORD

THE TWENTY-NINE (29) ITEMS LISTED HEREUNDER HAVE BEEN CONSIDERED, AND EACH HAS BEEN CONSIDERED TO BE EITHER:  
APPLICABLE AS NOTED BY THE INDICATED REFERENCE, OR NOT APPLICABLE AS INDICATED "N/A". JUSTIFICATION TO BE PROVIDED FOR EACH "N/A". ATTACH ADDITIONAL SHEETS, AS NECESSARY.

REFERENCE

- 11.0 11. Hydraulic requirements such as pump net positive suction heads (NPSH), allowable pressure drops and allowable fluid velocities.
- 12.0 12. Chemistry requirements such as provisions for sampling and limitations on water chemistry.
- 13.0 13. Electrical requirements such as source of power, voltage, raceway requirements, electrical insulation and motor requirements.
- 14.0 14. Layout and arrangement requirements.
- 15.0 15. Operation requirements under variation conditions, such as Plant startup, normal Plant operation, Plant shutdown, Plant emergency operation, special or infrequent operation and system abnormal or emergency operation.
- 16.0 16. Instrumentation and control requirements including indicating instruments, controls and alarms required for operation, testing, and maintenance. Other requirements such as the type of instrument, installed spares, range of measurement, and location of indication should also be included.
- 17.0 17. Access and administrative control requirements for Plant security.
- 18.0 18. Redundancy, diversity and separation requirements of structures, systems and components.
- 19.0 19. Failure effects requirements of structures systems and components, including a definition of those events and accidents which they must be designed to withstand.

ROBINSON NUCLEAR PROJECT

UNIT NO. 2

PLANT MODIFICATION M-958

ATTACHMENT 4

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MODIFICATION DESIGN BASIS RECORD

THE TWENTY-NINE (29) ITEMS LISTED HEREUNDER HAVE BEEN CONSIDERED, AND EACH HAS BEEN CONSIDERED TO BE EITHER:  
APPLICABLE AS NOTED BY THE INDICATED REFERENCE, OR NOT APPLICABLE AS INDICATED "N/A". JUSTIFICATION TO BE PROVIDED FOR EACH "N/A". ATTACH ADDITIONAL SHEETS, AS NECESSARY.

REFERENCE

- 20.0 20. Test requirements including implant tests and the conditions under which they will be performed.
- 21.0 21. Accessibility, maintenance, repair and inservice inspection requirements for the Plant including the conditions under which these will be performed.
- 22.0 22. Personnel requirements and limitations including the qualification and number of personnel available for Plant operation, maintenance, testing and inspection and permissible personnel radiation exposure for specified areas and conditions.
- 23.0 23. Transportability requirements such as size and shipping weight, limitations, ICC regulations.
- 24.0 24. Fire protection or resistance requirements.
- 25.0 25. Handling, storage and shipping requirements.
- 26.0 26. Other requirements to prevent undue risk to the health and safety of the public.
- 27.0 27. Materials, processes, parts and equipment suitable for application.
- 28.0 28. Safety requirements for preventing personnel injury including such items as radiation hazards (including ALARA requirements), restricting the use of dangerous materials, escape provisions from enclosures, and of grounding electrical systems.
- 29.0 29. Other.

## DESIGN BASIS DOCUMENT

### 1.0 BASIC FUNCTIONS

This modification will affect the H. B. Robinson safety injection pumps. It is the function of the safety injection pumps to provide emergency core cooling during a safety injection scenario, such as a Loss of Coolant Accident. The safety injection system consists of three pumps:

"A" SI pump fed from 480V E1 bus

"B" SI pump fed from 480V E1 or E2 bus (Note: This pump is manually started on either bus.)

"C" SI pump fed from 480V E2 bus

More specifically, this modification will add an automatic capability to the "B" SI pump, and the "B" SI pump will be designated as a maintenance replacement for the "A" or "C" SI pump.

### 2.0 PERFORMANCE REQUIREMENTS

Given the following conditions, one of the three safety injection pumps must operate:

Safety injection signal

Loss of off-site power

Any credible single failure

### 3.0 CODES, STANDARDS, AND APPLICABLE DOCUMENTS

3.1 H. B. Robinson Plant Operating Manual, SD-002, Safety Injection, Revision 6.

- 3.2 Updated Final Safety Analysis Report (UFSAR) for H. B. Robinson Unit 2
- 3.3 H. B. Robinson "Engineering Evaluation for Electrical Cables," E.E. No. 82-022 approved April 21, 1982.
- 3.4 ANSI N45.2.2-1972, "Packaging, Shipping, Receiving, Storage, and Handling of Items for Nuclear Power Plants."
- 3.5 Patel Engineers Report No. PEI-TR-831006-1 dated January 28, 1988, "Final Report on Zone Map Study for Carolina Power & Light Company's H. B. Robinson Unit 2 Electrical Generating Station."

4.0 DESIGN CONDITIONS

Safety injection pumps are 480 volts AC.

Safety injection pump tie breakers are Westinghouse DB-75.

Control voltage for safety injection logic and breakers is 125 volts DC.

E1 bus control logic DC power is Battery "A."

E2 bus control logic DC power is Battery "B."

5.0 DESIGN LOADS

This modification will terminate existing wires and wire jumpers and does not involve work that is affected by loads such as seismic, wind, thermal, and dynamic.

6.0 ENVIRONMENTAL CONDITIONS

Safety-related components installed by this modification will be stored and installed in a mild environment as defined by Patel Engineers Report No. PEI-TR-831006-1, Revision 0.

7.0 INTERFACE REQUIREMENTS

This modification does not involve any new interfaces between systems or components. Existing cables that were disconnected as part of Modification 951 will be reconnected.

8.0 MATERIAL REQUIREMENTS

Wire to be used for jumpers will be procured to meet the requirements of H. B. Robinson engineering evaluation for Cable E.E. No. 82-022.

9.0 MECHANICAL REQUIREMENTS

This is strictly an electrical modification which does not involve mechanical requirements such as vibrations, stress, shock, or reaction forces.

10.0 STRUCTURAL REQUIREMENTS

This modification does not involve structural requirements such as equipment foundations and pipe supports.

11.0 HYDRAULIC REQUIREMENTS

This modification does not involve hydraulic requirements such as pump net positive suction heads, allowable pressure drops, or allowable fluid velocities.

12.0 CHEMISTRY REQUIREMENTS

This modification does not involve chemistry requirements such as provisions for sampling or limitations on water chemistry.

13.0 ELECTRICAL REQUIREMENTS

This modification will terminate cables from safeguards logic racks to the E1/E2 Tie Breakers 52/22B and 52/29B. These cables were determined as part of Modification 951, were tagged "spare," and are associated with the "B" SI pump auto start logic. The modification will also install jumpers within the safeguards racks.

The amptector for the "B" SI Pump Feeder Breaker 52/29C will be disconnected and the trip setpoints for the E1/E2 Tie Breakers 52/22B and 52/29B will be reduced to protect the "B" safety injection pump.

The controls for Breakers 52/22B, 52/29B, and 52/29C and also the controls for the SI Pump Room Cooling Fans HVH-6A and HVH-6B shall have a human factors review and be changed as the review dictates.

New wire and cabling used in this modification shall meet the requirements of H. B. Robinson Engineering Evaluation No. E.E. 82-022.

14.0 LAYOUT AND ARRANGEMENT

The wiring in this modification shall be accomplished in a neat and orderly fashion. Wires shall be routed so as not to cover or interfere with electrical components within the safeguard racks or auxiliary panels.

15.0 OPERATIONAL REQUIREMENTS

This modification will add auto start to the "B" SI pump. The modification will revise the safeguards logic so that the E1 bus is no longer the preference bus for the "B" SI pump and will initiate POM changes to have both E1-E2 tie breakers (52/22B and 52/29B) racked out. If the "A" or "C" SI pump is to be taken out of service for maintenance, the appropriate E1-E2 tie breaker will be racked in so the "B" SI pump can replace the out of service SI pump.

Safeguards rack work could be performed in conditions other than cold shutdown with approval from operations. The remaining work associated with this modification may be accomplished during any plant operational condition.

16.0 INSTRUMENTATION AND CONTROLS

The modification makes minor wiring changes in the safeguards logic and adds auto start to the "B" SI pump. Refer to Sections 13.0 and 15.0 for details on this.

17.0 ACCESS AND ADMINISTRATIVE CONTROL REQUIREMENTS

This modification does not alter the access and administrative control requirements for plant security.

18.0 REDUNDANCY, DIVERSITY, AND SEPARATION REQUIREMENTS

This modification does not alter the redundancy, diversity, and separation requirements of structures, systems, and components.

19.0 FAILURE EFFECTS

This modification shall not affect the safety injection system's ability to automatically start at least one safety injection pump assuming loss of off-site power, a single failure of any component, and initiation of the safety injection signal.

20.0 TEST REQUIREMENTS

An acceptance test will be run following implementation of this modification which will verify proper operation of the "B" SI pump control logic including the auto start feature.

21.0 ACCESSIBILITY, MAINTENANCE, AND REPAIR

This modification will not affect the accessibility of equipment or systems modified and will not change the frequency of maintenance, testing, or repair.

22.0 PERSONNEL REQUIREMENTS

This modification will require I&C technicians for installation. No other unusual personnel requirements will be needed for implementation of this modification. This modification can be implemented with the existing plant personnel.

23.0 TRANSPORTABILITY REQUIREMENTS

No unusual transportability requirements are posed by shipment of wire used in this modification.

24.0 FIRE PROTECTION REQUIREMENTS

This modification must undergo a formal Appendix R review before installation. The modification does not affect any fire barriers. New wire used in this modification shall be certified to be type tested to IEEE-383-1974 and shall be procured manufacturing standard "Q Off-the-shelf" or "Fire Protection Q".

25.0 HANDLING, STORAGE, AND SHIPPING REQUIREMENTS

Wire installed by this modification shall be shipped, handled, and stored in accordance with ANSI N45.2.2, Level D.

26.0 OTHER REQUIREMENTS

This modification does not require special constraints to prevent risk to the health and safety of the public.

27.0 MATERIAL, PROCESSES, AND EQUIPMENT SUITABLE FOR APPLICATION

Material selected for this modification shall be suitable for its intended service and be qualified for the environment to which it is exposed.

All work associated with this modification will be accomplished in areas of the plant that are classified as a mild environment as defined in Patel Engineers Report No. PE1-TR-831006-1.

28.0 SAFETY REQUIREMENTS

Existing plant work procedures will provide adequate safety requirements for implementation of this modification. Examples will be referenced in Attachment 8.

29.0

OTHER

No other topics need be addressed for this design basis.

ROBINSON NUCLEAR PROJECT

UNIT NO. 2

PLANT MODIFICATION M-958

ADD AUTO START TO "B" SI PUMP

ATTACHMENT 5

QUALITY CLASSIFICATION

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Rev. 0 0

M-958-5, Revision 0

*Ray W. Harris*  
Cognizant Engineer

20 OCT '88  
Date

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QUALITY CLASSIFICATION

This modification is Q List, safety related.

ROBINSON NUCLEAR PROJECT

UNIT NO. 2

PLANT MODIFICATION M-958

ADD AUTO START TO "B" SI PUMP

ATTACHMENT 6

BILL OF MATERIAL

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M-958-6, Revision 0

*Ray W. Molvie*  
Cognizant Engineer

16 AUG. '88  
Date

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M958-6, REV. D  
PAGE 2

MOD TITLE: ADD AUTO START TO "B" SI PUMP  
Cognizant Engineer: JAY W. MOLPIE

Date: 14 OCT '88  
Proj. Coord.: RONNIE WILLIAMSON

NOTE 1 : WIRE MANUFACTURED TO PROVIDE CERTIFICATION THAT WIRE HAS BEEN TYPE TESTED TO IEEE-383-1974.  
 Cognizant Engineer: Joe W. Holsie Date: 14 OCT '88

M 958-G, REV. 0  
PAGE 3

MOD TITLE: ADD AUTO START To "SI" PUMP  
Cognizant Engineer: JAY MOLYIE

Date: 10/14/88

Proj. Coord.: R. WILLIAMSON

Cognizant Engineer: Ray W. Madore

Date: 14 OCT. '88

NOTE 1: CABLE PROVIDED 4-LIST PER SPEC. L2-E-017 REV. 3 MAY BE SUBSTITUTED FOR ITEM 3.

ROBINSON NUCLEAR PROJECT  
UNIT NO. 2  
PLANT MODIFICATION M-958  
ATTACHMENT 6

M958-6, REV. 0  
PAGE 4

BILL OF MATERIALS

MOD TITLE: ADD AUTO START TO "B" ST. PUMP  
Cognizant Engineer: JAY MOLVIE

Date: 10/14/88  
Proj. Coord.: R. WILLIAMSON

ITEM	QUAN.	P.O. NO.	DESCRIPTION	PROV'D BY	SPECIFICATION	NON-Q	Q	OTHER
6	50		BURNDY PINS CAT# RM 16M-23D28	RND				OFF THE SHELF "Q"
7	50		BURNDY SOCKET CAT# RC 16M-23D28	RND				OFF THE SHELF "Q"
8	1		ENGRAVED LEGEND MICRO-SWITCH CAT# 2A346-L	NED		X		
9	9		CURRENT SENSOR FOR WESTINGHOUSE DB-75 BREAKER 1000/600/5A CAT. NO. 2817C83G11	NED				OFF THE SHELF "Q"

Cognizant Engineer: Jay to Molvie Date: 14 OCT '88

ROBINSON NUCLEAR PROJECT  
UNIT NO. 2  
PLANT MODIFICATION M-958  
ATTACHMENT 6

M958-6 REV. 0  
PAGE 5

BILL OF MATERIALS

MOD TITLE: <u>ADD AUTO START TO 'B' SI PUMP</u>								
Cognizant Engineer: <u>JAY HOLVIE</u>				Date: <u>10/14/88</u>				
				Proj. Coord.: <u>R. WILLIAMSON</u>				
ITEM	QUAN.	P.O. NO.	DESCRIPTION	PROV'D BY	SPECIFICATION	NON-Q	Q	OTHER
10	100'		2/c #12 AWG 600 V CABLE	RNP	L2-E-014 REV. 4 (SEE NOTE 2)			FPQ
11	2		AMPTECTOR FOR DB BREAKERS WESTINGHOUSE TYPE LIG MODEL 1A	NED	MFG. STD.			OFF THE SHELF "Q"
12	4		BLANK PLASTIC PLATES FOR MODULES M185 AND M187	RNP	MFG. STD.	✓		
13	2		PLASTIC FACE PLATES FOR MODULES M35 ENGRAVED PER DRAWING	RNP	MFG. STD.	✓		

NOTE 2: CABLE PROVIDED Q-LIST PER SPEC. L2-E-017 REV. 3 MAY BE SUBSTITUTED FOR ITEM 10

Cognizant Engineer: Jay W. Holvie

Date: 14 OCT. 88

ROBINSON NUCLEAR PROJECT

UNIT NO. 2

PLANT MODIFICATION M-958

ADD AUTO START TO "B" SI PUMP

ATTACHMENT 7

SPARE PARTS LIST

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M-958-7, Revision 0

Loy W. Maier

Cognizant Engineer

20 OCT. 88

Date

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ROBINSON NUCLEAR PROJECT  
UNIT NO. 2  
PLANT MODIFICATION M-958

APPROVED SPARE PARTS LIST

M-958-7, REV. 0  
PAGE 2

MODIFICATION AFFECTED EQUIPMENT	MODIFICATION REQUIRED SPARE	CP&L PART NUMBER	STOCK LEVEL (*)	NIRF INITIATION DATE	NIRF APPROVAL DATE
	CURRENT SENSOR FOR DB-75 BREAKER 1000/600/5A DBL TAP		A		
	AMPTECTOR 1A TRIP UNIT FOR DB-75 BREAKER TYPE LIG		NC		

(\*) Enter "A" for items being added to Plant stock, "D" for items being deleted from Plant stock, "LC" for items currently stocked but require a stock level change and "NC" for items which are currently stocked but no changes are required.

M 958-7 REV. 0

Cognizant Engineer: John W. Smith

Date: 16 AUG. '83

## ROBINSON NUCLEAR PROJECT

UNIT NO. 2

## PLANT MODIFICATION M-958

ADD AUTO START TO "B" SI PUMP

## ATTACHMENT 8

## IMPLEMENTING PROCEDURE

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M-958-8, Revision 0

*L. W. Moore*

Cognizant Engineer

20 OCT. '33

Date

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IMPLEMENTING PROCEDURE1.0 INTRODUCTION

This implementing procedure provides instructions for adding auto start to the "B" SI pump.

2.0 PREREQUISITES

2.1 This modification may be implemented while the plant is in operation with proper Shift Foreman approval.

2.2 Prior to beginning this modification, notify the Shift Foreman of the scope, location, and duration of work to be performed. Permission granted to begin Modification 958.

---

Shift Foreman

---

Date

3.0 PRECAUTIONS AND LIMITATIONS

3.1 Obtain and remove clearances as required as the modification progresses in accordance with POM Volume 3, Part 1, OMM-005, "Clearance and Test Requests."

3.2 Only Plant Operations personnel are permitted to operate plant equipment or systems. Equipment or system operations by NED, RPC, or contract personnel is prohibited.

3.3 The Cognizant Engineer shall be made aware of any problems that arise. In the absence of the Cognizant Engineer, notify the Liaison Engineer.

#### 4.0 DIVISION OF RESPONSIBILITY

- 4.1 HBR Liaison Engineer is responsible for reviewing all prerequisites, precautions, and work instructions contained in this attachment and is also responsible for coordinating the acceptance testing as outlined in Attachment 9.
- 4.2 HBR Liaison Engineer is responsible for coordinating the review of the modification package for installation, monitoring, and for modification package closeout.
- 4.3 I&C is responsible for removal of existing wiring changes as outlined in Section 5 and procurement as outlined in Attachment 6 and will assign a responsible representative to verify that all wiring changes conform to design documents and drawings.
- 4.4 I&C is responsible for providing personnel and material as required herein to support plant modification acceptance testing.
- 4.5 NED is responsible for plant modification engineering, engineering support, and modification turnover reviews.
- 4.6 QA/QC is responsible for inspections and verifications as called for in this modification package.
- 4.7 Operations is responsible for all equipment and breaker operations.

#### 5.0 WORK INSTRUCTIONS

All work required by this modification shall be completed in a safe and qualified manner in accordance with the latest procedures and all applicable plant standards and procedures. Examples of standards and work procedures that shall be adhered to include but are not limited to:

OMM-005	Clearance and Test Requests
FP-010	Housekeeping Controls
OQA-302	Electrical and Instrumentation Equipment (QA/QC inspection procedure)

5.0.1 Equipment removed by this modification that is not immediately reused shall be scrapped or returned to stock per PMC-002.

5.1 E1-E2 BUS TIE BREAKER 52/22B WORK

5.1.1 Obtain clearance on E1-E2 Tie Breaker 52/22B and have operations remove control power and rack out Breaker 52/22B.

---

I & C

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Date

5.1.2 Terminate Cable C2891C on Auxiliary Panel FA as detailed in Sketches SK-958-Z-7000, SK-958-Z-7002, and SK-958-Z-7005.

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I & C

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Date

5.1.3 Have QC inspect the cable termination in Step 5.1.2 per OQA-302. Refer to SK-958-Z-7000, SK-958-Z-7002, and SK-958-Z-7005.

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QC

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Date

5.2      SAFEGUARDS RACK NO. 51 WORK

- 5.2.1      Obtain clearance on Safeguards Rack No. 51 and have Operations remove power as deemed necessary by I&C and Operations from Safeguards Rack No. 51.

\_\_\_\_\_  
I & C

\_\_\_\_\_  
Date

- 5.2.2      Wire a jumper using a portion of Bill of Material Item 1 from Terminal 5M-11 to 5M-12 in Safeguards Rack No. 51 as detailed in Sketch SK-958-Z-7006.

\_\_\_\_\_  
I&C

\_\_\_\_\_  
Date

- 5.2.3      Have QC inspect the jumper installation in Step 5.2.2 per OQA-302. Refer to SK-958-Z-7006.

\_\_\_\_\_  
QC

\_\_\_\_\_  
Date

- 5.2.4      Have      Operations      restore power and remove clearance from Safeguards Rack 51.

NOTE:      Breaker 52/22B will now remain racked out, with it's control power fuses removed, for normal plant operation.

\_\_\_\_\_  
Shift Foreman

\_\_\_\_\_  
Date

5.3 E1-E2 BUS TIE BREAKER 52/29B WORK

- 5.3.1 Obtain clearance on E1-E2 Tie Breaker 52/29B and have Operations remove control power and rack out Breaker 52/29B.

---

I & C

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Date

- 5.3.2 Terminate Cable C2896C on Auxiliary Panel JA as detailed in Sketches SK-958-Z-7001, SK-958-Z-7003, and SK-958-Z-7004.

---

I&C

---

Date

- 5.3.3 Have QC inspect the cable termination in Step 5.3.2 per OQA-302. Refer to SK-958-Z-7001, SK-958-Z-7003, and SK-958-Z-7004.

---

QC

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Date

5.4 SAFEGUARDS RACK NO. 63 WORK

- 5.4.1 Obtain clearance on Safeguards Rack No. 63 and have Operations remove power as deemed necessary by I&C and Operations from Safeguards Rack No. 63.

---

I & C

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Date

- 5.4.2 Wire a jumper using a portion of Bill of Material Item 1 from Terminal 5L-12 to 5L-11 in Safeguards Rack No. 63 as detailed in Sketch SK-958-Z-7006.

---

I&C

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Date

- 5.4.3 Have QC inspect the jumper installation in Step 5.4.2 per OQA-302. Refer to SK-958-Z-7006.

---

QC

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Date

- 5.4.4 Have Operations restore power and remove clearance from Safeguards Rack 63.

---

I & C

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Date

5.5 RTGB Modules M35, M185, and M187 Changes

- 5.5.1 Obtain clearance on and have operations rack out Breakers 52/29C and 52/22B.

---

I & C

---

Date

- 5.5.2 Remove wiring associated with Module M35 as detailed in Sketch SK-958-Z-7007.

---

I & C

---

Date

CAUTION: Use care when removing selector switches in Steps 5.5.3 and 5.5.4. They will be reused in Step 5.5.5.

- 5.5.3 Remove Module M185 and disconnect selector switch and pilot lights as detailed in Sketch SK-958-Z-7008. Install a blank faceplate on Module M-185 (B/M Item No. 12) and reinsert Module M-185 in RTGB.

---

I & C

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Date

(PM958/jap)

- 5.5.4 Remove Module M187 and disconnect selector switch and pilot lights as detailed in Sketch SK-958-Z-7009. Install a blank faceplate on Module M-185 (B/M Item No. 12) and reinsert Module M-187 in RTGB.

---

I&C

---

Date

- 5.5.5 Install new faceplate and rewire Module M35 as detailed in Sketches SK-958-Z-7012 and SK-958-Z-7013.

---

I&C

---

Date

- 5.5.6 Have QC inspect wiring of Module M35 in Step 5.5.5 per OQA-302. Refer to Sketches SK-958-Z-7013.

---

QC

---

Date

- 5.5.7 Splice the new cable extension on Cable C2891B and install existing connector as detailed in Sketch SK-958-Z-7014.

---

I&C

---

Date

- 5.5.8 Have QC inspect the cable splice and connector installation in Step 5.5.7 per OQA-302. Refer to Sketch SK-958-Z-7014.

---

QC

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Date

- 5.5.9 Splice the new cable extension on Cable C2896B and install existing connector as detailed in Sketch SK-958-Z-7015.

---

I&C

---

Date

(PM958/jap)

- 5.5.10 Have QC inspect the cable splice and connector installation in Step 5.5.9 per OQA-302. Refer to Sketch SK-958-Z-7015.

\_\_\_\_\_  
QC

\_\_\_\_\_  
Date

5.6 Breaker 52/22B and 52/29B Changes

- 5.6.1 *Remove the fuses for power to the TC-2 shunt trips on breakers 52/22B and 52/29B. These fuses are located in cubicles 52/17A and 52/27A. (Do not reinstall)*

\_\_\_\_\_  
I/C

\_\_\_\_\_  
Date

- 5.6.2 Remove wires from Breaker 52/29B as detailed in Sketches SK-958-Z-7016 and SK-958-Z-7017.

\_\_\_\_\_  
I&C

\_\_\_\_\_  
Date

- 5.6.3 Rewire the auxiliary contact in Breaker 52/29B as detailed in Sketch SK-958-Z-7018.

\_\_\_\_\_  
I&C

\_\_\_\_\_  
Date

- 5.6.4 Have QC inspect the wire installation in Step 5.6.2 per OQA-302. Refer to Sketch SK-958-Z-7018.

\_\_\_\_\_  
QC

\_\_\_\_\_  
Date

- 5.6.5 Remove wires from Breaker 52/22B as detailed in Sketches SK-958-Z-7019 and SK-958-Z-7017.

\_\_\_\_\_  
I&C

\_\_\_\_\_  
Date

- 5.6.6 Rewire the auxiliary contact in Breaker 52/22B as detailed in Sketch SK-958-Z-7020.

\_\_\_\_\_  
I&C

\_\_\_\_\_  
Date

- 5.6.7 Have QC inspect the wire revisions in Step 5.6.5 per OQA-302. Refer to Sketch SK-958-Z-7017, SK-958-Z-7019, and SK-958-Z-7020.

\_\_\_\_\_  
QC

\_\_\_\_\_  
Date

- 5.7 E1 Bus Compartment 17A and E2 Bus Compartment 27A Changes

- 5.7.1 <sup>and conduit</sup> Make the wiring changes in E1 Bus Compartment 17A as detailed in Sketches SK-958-Z-7021 and SK-958-Z-7024.

\_\_\_\_\_  
I&C

\_\_\_\_\_  
Date

- 5.7.2 Have QC inspect the wiring changes made in Step 5.7.1 per OQA-302. Refer to Sketches SK-958-Z-7021 and SK-958-Z-7024.

\_\_\_\_\_  
QC

\_\_\_\_\_  
Date

- 5.7.3 <sup>and conduit</sup> Make the wiring changes in E2 Bus Compartment 27A as detailed in Sketches SK-958-Z-7022 and SK-958-Z-7023.

\_\_\_\_\_  
I&C

\_\_\_\_\_  
Date

- 5.7.4 Have QC inspect the wiring changes made in Step 5.7.3 per OQA-302. Refer to Sketches SK-958-Z-7022 and SK-958-Z-7023.

\_\_\_\_\_  
QC

\_\_\_\_\_  
Date

5.8 SI Pump Room Fans HVH-6A and HVH-6B Interlock Change

5.8.1 Install Cables C2550D and C2550E as detailed in Sketch SK-958-Z-7025.  
(B/M Item No. 10)

\_\_\_\_\_  
I&C, C2550D

\_\_\_\_\_  
Date

5.8.2 ~~I&C, C2550E~~  
Have QC inspect the cable installation in Step 5.8.1 per Date  
OQA-302. Refer to Sketch SK-958-Z-7025.

\_\_\_\_\_  
QC, C2550D

\_\_\_\_\_  
Date

\_\_\_\_\_  
QC, C2550E

\_\_\_\_\_  
Date

5.8.3 Remove wires that run between E2 Bus Compartments 25C and 29C  
as detailed in Sketch SK-958-Z-7026.

\_\_\_\_\_  
I&C

\_\_\_\_\_  
Date

5.8.4 Have QC inspect wire removals in Step 5.8.3 per OQA-302. Refer  
to Sketch SK-958-Z-7026.

\_\_\_\_\_  
QC

\_\_\_\_\_  
Date

5.9      Replacement of Breakers 52/22B and 52/29B Current Sensors and  
          Amptector Units

- 5.9.1      Replace the current sensors on Breakers 52/22B and 52/29B as  
            detailed in Drawing SK-958-Z-7028.

I/C, 52/29B      Date

I&C, 52/22B      Date

- 5.9.2      Replace the amptectors on Breakers 52/22B and 52/29B as detailed  
            in Drawing SK-958-Z-7029.

I/C, 52/29B      Date

I&C, 52/22B      Date

- 5.9.3      Have QC inspect that the current sensor ratio is 600/5, and the  
            amptector wiring made in Step 5.9.2 is per Drawing SK-958-Z-7029  
            and OQA-302.

QC    52/29B      DATE

QC    52/22B      Date

5.10      Removal of Breaker 52/29C Amptector Trip Circuit

- 5.10.1      Remove the amptector wiring, amptector, current sensors, and  
            ACTR on Breaker 52/29C as detailed on Drawing SK-958-Z-7027.

I&C      Date

- 5.10.2      Have QC inspect the amptector wire removals made in Step 5.10.1  
            per OQA-302. Refer to Drawing SK-958-Z-7027.

QC      Date

5.11 Calibration of Breakers 52/22B and 52/29B Amptectors

- 5.11.1 Have I&C recalibrate the amptectors for Breakers 52/22B and 52/29B using PM-402 as a guide. Refer to the marked up circuit breaker data sheets included at the end of this attachment for the new breaker set points.

\_\_\_\_\_  
I&C, 52/22B

\_\_\_\_\_  
Date

\_\_\_\_\_  
I/C, 52/29B

\_\_\_\_\_  
Date

**LOCATION: E2-22B**

COIL OR SENSOR RATING:600/5

AMPS

	As Found		
	A	B	C
Primary Fingers			
ARC Chutes			
Main Contacts:			
Condition			
Pressure			
Alignment			
ARC Contacts			
Trip Bar			
Mechanism			
Movable Secondary			
Contacts			
Positioning Lever			
Retaining Rings			

[illegible]

Device	As Found	As Left
X Relay		
Alarm Sw.		
Clog. Coil		
Trip Coil		
Sec. Cont.		
Actuator		

C = Corrective action  
required, see notes

Long Delay Trip  
Test Amps (1800) 15

As Found				As Left		
A	B	C		A	B	C
			Test 1			
14 sec			Desired	14 sec		
10 - 17 sec			Tolerance	10 - 17 sec		
			P/U			
(540) 4.5A			Desired	(540) 4.5A		
10%			Tolerance	10%		

Short Delay Trip  
Test Amps N/A

As Found				As Left		
A	B	C		A	B	C
N/A	N/A	N/A	Test 1	N/A	N/A	N/A
N/A sec.			Desired	N/A sec.		
N/A sec.			Tolerance	N/A sec.		
N/A	N/A	N/A	P/U	N/A	N/A	N/A
N/A			Desired	N/A		
N/A			Tolerance	N/A		

Instantaneous Trip  
Test Amps (4500) 37.5

As Found				As Left		
A	B	C		A	B	C
			Test 1			
37.5 AMPS			Desired	37.5 AMPS		
±10%			Tolerance	±10%		

Tech. \_\_\_\_\_ Date \_\_\_\_\_

As Found				As Left		
A	B	C		A	B	C
			Breaker Ph. to Frame			
			Load Ph. to Grd.			
			CT Output Check			
A-B	B-C	C-A	Breaker Ph. to Ph.	A-B	B-C	C-A
			Load Bridge Reading			

**Notes:**

LOCATION: E1-29B

COIL OR SENSOR RATING: 600/5

AMPS

Device	As Found	As Left
X Relay		
Alarm Sw. .		
Closg. Coil		
Trip Coil		
Sec. Cont.		
Actuator		

C = Corrective action  
required, see notes

	As Found		
	A	B	C
Primary Fingers			
ARC Chutes			
Main Contacts:			
Condition			
Pressure			
Alignment			
ARC Contacts			
Trip Bar			
Mechanism			
Movable Secondary			
Contacts			
Positioning Lever			
Retaining Rings			

[illegible]

## Electrical

Long Delay Trip  
Test Amps (1800) 15

Short Delay Trip  
Test Amps N/A

As Found				As Left		
A	B	C		A	B	C
			Test 1			
14 sec			Desired	14 sec		
10 - 17 sec			Tolerance	10 - 17 sec		
			P/U			
(540) 4.5A			Desired	(540) 4.5A		
10%			Tolerance	10%		

As Found				As Left		
A	B	C		A	B	C
N/A	N/A	N/A	Test 1	N/A	N/A	N/A
N/A sec.			Desired	N/A sec.		
N/A sec.			Tolerance	N/A sec.		
N/A	N/A	N/A	P/U	N/A	N/A	N/A
N/A			Desired	N/A		
N/A			Tolerance	N/A		

Instantaneous Trip  
Test Amps (4500) 37.5

### Megger and Bridge Readings

As Found				As Left		
A	B	C		A	B	C
			Test 1			
37.5 AMPS			Desired	37.5 AMPS		
±10%			Tolerance	±10%		

As Found				As Left		
A	B	C		A	B	C
			Breaker			
			Ph. to Frame			
			Load			
			Ph. to Grd.			
			CT Output			
			Check			
A-B	B-C	C-A	Breaker	A-B	B-C	C-A
			Ph. to Ph.			
			Load			
			Bridge Reading			

Tech. \_\_\_\_\_ Date \_\_\_\_\_

**Notes:**

CIRCUIT BREAKER DATA SHEETNAME: "B" Safety Injection Pump  
LOCATION: E2-29C

TYPE: DB- 50

Mechanical

	As Found			As Left		
	A	B	C	A	B	C
Primary Fingers						
ARC Chutes						
Main Contacts:						
Condition						
Pressure						
Alignment						
ARC Contacts						
Trip Bar						
Mechanism						
Movable Secondary						
Contacts						
Positioning Lever						
Retaining Rings						

Tech. \_\_\_\_\_ Date \_\_\_\_\_

Notes: THIS BREAKER IS OPERATED AS A MANUAL DISCONNECT ONLY. IT HAS NO AMPECTOR TRIP UNIT.

ROBINSON NUCLEAR PROJECT

UNIT NO. 2

PLANT MODIFICATION M-958

ADD AUTO START TO "B" SI PUMP

ATTACHMENT 9

ACCEPTANCE TEST PROCEDURE

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M-958-9, Revision 0

Jay W. Fiala  
Cognizant Engineer

20 OCT '88  
Date

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ACCEPTANCE TEST

1.0 PREREQUISITES

- 1.1 The Unit No. 2 Operations Shift Foreman shall give permission to conduct this test prior to starting the test.

---

Shift Foreman

---

Date

2.0 PRECAUTIONS AND LIMITATIONS

- 2.1 Only Operations personnel or their designated representative can open closed breakers and operate equipment.
- 2.2 Only one of the E1-E2 bus breakers (52/22B and 52/29B) may be racked in at any time.

3.0 SPECIAL TOOLS AND EQUIPMENT

No special tools and equipment are required to execute the acceptance test.

4.0 ACCEPTANCE CRITERIA

- 4.1 This acceptance test is acceptable if the following conditions are met:
- 4.1.1 The "B" SI pump starts automatically on initiation of the safety injection signal. Operation on E1 bus and E2 bus shall be separately tested.
- 4.1.2 The SI Pump Room Fans HVH-6A and HVH-6B start properly when the "B" safety injection pump runs.

4.2 The Cognizant Engineer, Liaison Engineer, or a designated representative will make final assessment of acceptance test results.

5.0 PROCEDURE

5.1 Have "B" SI Pump aligned for operation in the recirculation mode (OP-202).

\_\_\_\_\_  
OPS

\_\_\_\_\_  
Date

5.2 Assure that breaker 52/29C is racked in and is closed. (This breaker must be manually closed with 52/22B and 52/29B racked out.)

\_\_\_\_\_  
I&C

\_\_\_\_\_  
Date

5.3 Have Operations rack in breaker 52/22B and install its control power fuses.

\_\_\_\_\_  
I&C

\_\_\_\_\_  
Date

5.4 Verify that the green light is illuminated for the EI feeder on Module M35 on the RTGB.

\_\_\_\_\_  
I&C

\_\_\_\_\_  
Date

5.5 Have Operations start "B" SI pump using control switch 1/22B in Module M35 on the RTGB.

\_\_\_\_\_  
I&C

\_\_\_\_\_  
Date

5.6 Verify that breaker 52/22B closes and "B" SI pump runs.

\_\_\_\_\_  
I&C

\_\_\_\_\_  
Date

- 5.7 Verify that red indication is received for the E1 feeder on the RTGB.

\_\_\_\_\_  
I&C

\_\_\_\_\_  
Date

- 5.8 Have Operations stop "B" SI pump using control switch 1/22B in Module M35 on the RTGB.

\_\_\_\_\_  
I&C

\_\_\_\_\_  
Date

- 5.9 Verify that breaker 52/22B opens and green indication is received on the RTGB.

\_\_\_\_\_  
I&C

\_\_\_\_\_  
Date

- 5.10 Have Operations turn control switch 1/29B for breaker 52/29B to the start position and then release it.

\_\_\_\_\_  
I&C

\_\_\_\_\_  
Date

- 5.11 Verify that breakers 52/22B and 52/29B remain open.

\_\_\_\_\_  
I&C

\_\_\_\_\_  
Date

- 5.12 Have Operations turn control switch 1/29B for breaker 52/29B to the stop position momentarily and then release it.

\_\_\_\_\_  
I&C

\_\_\_\_\_  
Date

- 5.13 Verify that breakers 52/22B and 52/29B remain open.

\_\_\_\_\_  
I&C

\_\_\_\_\_  
Date

- 5.14 Have Operations remove the control power fuses and rack out breaker 52/22B.

\_\_\_\_\_  
I&C

\_\_\_\_\_  
Date

- 5.15 Verify the indication for E1 feed on the RTGB is lost.

\_\_\_\_\_  
I&C

\_\_\_\_\_  
Date

- 5.16 Have Operations rack in breaker 52/29B and install its control power fuses.

\_\_\_\_\_  
I&C

\_\_\_\_\_  
Date

- 5.17 Verify that the green indication for the E2 feed is illuminated on Module M35 on the RTGB.

\_\_\_\_\_  
I&C

\_\_\_\_\_  
Date

- 5.18 Have Operations start "B" SI pump using control switch 1/29B in Module M35 on the RTGB.

\_\_\_\_\_  
I&C

\_\_\_\_\_  
Date

- 5.19 Verify that breaker 52/29B closes and "B" SI pump runs.

\_\_\_\_\_  
I&C

\_\_\_\_\_  
Date

- 5.20 Verify that red indication is received for the E2 feeder on the RTGB.

\_\_\_\_\_  
I&C

\_\_\_\_\_  
Date

- 5.21 Have Operations stop "B" SI pump using control switch 1/29B in Module M35 on the RTGB.

\_\_\_\_\_  
I&C

\_\_\_\_\_  
Date

- 5.22 Verify that breaker 52/29B opens and green indication is received on the RTGB.

\_\_\_\_\_  
I&C

\_\_\_\_\_  
Date

- 5.23 Have Operations turn control switch 1/22B for breaker 52/22B to the start position and then release it.

\_\_\_\_\_  
I&C

\_\_\_\_\_  
Date

- 5.24 Verify that breakers 52/22B and 52/29B remain open.

\_\_\_\_\_  
I&C

\_\_\_\_\_  
Date

- 5.25 Have Operations turn control switch 1/22B for breaker 52/22B to the stop position momentarily and then release it.

\_\_\_\_\_  
I&C

\_\_\_\_\_  
Date

- 5.26 Verify that breakers 52/22B and 52/29B remain open.

\_\_\_\_\_  
I&C

\_\_\_\_\_  
Date

- 5.27 Have Operations remove the control power fuses and rack out breaker 52/29B.

\_\_\_\_\_  
I&C

\_\_\_\_\_  
Date

- 5.28 Verify the procedure change for OST-163 to assure testing of "B" SI pump has been implemented.

\_\_\_\_\_  
Liaison

\_\_\_\_\_  
Date

- 5.29 Have Operations perform OST-163 and verify that the "B" safety injection pump start automatically from either E1 or E2 on initiation of safety injection and the Safety Injection Pump room Cooling Fans HVH-6A and HVH-6B start when the "B" safety injection pump runs.

\_\_\_\_\_  
I&C

\_\_\_\_\_  
Date

- 5.30 Obtain a clearance on breakers 52/22B and 52/29B. Have the breakers racked out and their control power fuses pulled. This clearance will not be cancelled until the appropriate administrative changes have been implemented for control of these breakers.

\_\_\_\_\_  
Liaison

\_\_\_\_\_  
Date

- 5.31 Clearance cancelled.

\_\_\_\_\_  
Liaison

\_\_\_\_\_  
Date

ROBINSON NUCLEAR PROJECT

UNIT NO. 2

PLANT MODIFICATION M-958

ADD AUTO START TO "B" SI PUMP

ATTACHMENT 10

POM CHANGE RECORD SHEET

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*Ray W. Proctor*  
Cognizant Engineer

20 OCT. '88  
Date

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ROBINSON NUCLEAR PROJECT  
UNIT NO. 2

PLANT MODIFICATION M-958  
ADD AUTO START TO "B" SI PUMP  
ATTACHMENT 10  
POM CHANGE RECORD SHEET

POM VOLUME	PART	PROCEDURE NO.	PROCEDURE TITLE	PCN	DATE DISTRIBUTED
6	2	SD-006	Reactor Safeguards		
3	2	OP-603	Electrical Distribution		
3	3	GP-2	Cold Solid To Hot Subcritical at No Load T-avg		
3	10	OWP-016	Safety Injection System		
3	10	OWP-023	AC Electrical Distribution (Electrical)		
3	9	OST-151	Safety Injection System Component Test (Monthly)		
3	9	OST-162	EDG Auto Start of Loss of Power and SI Emergency Diesel Trips Defeat		
3	9	OST-163	Safety Injection Test (Refueling)		
3	1	OMM-8	Minimum Equipment List		
3	1	OMM-10	Post Trip/Safeguards Review		
3	4	EPP	EPP FOLDOUTS		
4	3	PM-402	Circuit Breaker Inspection and Testing		

M-958-10, Revision 0

*L. W. Thomas*  
Cognizant Engineer

20 OCT '88

Date

(PM958/jap)

ROBINSON NUCLEAR PROJECT

UNIT NO. 2

PLANT MODIFICATION M-958

ADD AUTO START TO "B" SI PUMP

ATTACHMENT 11

PLANT DRAWING CHANGE RECORD SHEET

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*Ray W. Martin*  
Cognizant Engineer

20 OCT 88  
Date

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ROBINSON NUCLEAR PROJECT

UNIT NO. 2

PLANT MODIFICATION M-958

ADD AUTO START TO "B" SI PUMP

ATTACHMENT 11

PLANT DRAWING CHANGE RECORD SHEET

VENDOR DRAWING NO.	PLANT DRAWING NO.	DRAWING TITLE	DCR NO.	DATE DISTRIBUTED
	B-190628 Sht. 891	Control Wiring Diagram		
	B-190628 Sht. 896	Control Wiring Diagram		
	B-190634 Sht. C2896A	Cable and Conduit List		
	B-190634 Sht. C2891A	Cable and Conduit List		
	CP380 5379-3238	Safeguards System		
	B-190629 Sht. 32	LAYOUT AND WIRING AUXILIARY PANEL		
	B-190629 Sht. 50	LAYOUT AND WIRING AUXILIARY PANEL		
	B-190628 Sht. 238	CONTROL WIRING DIAGRAM		
	B-190628 Sht. 550	CONTROL WIRING DIAGRAM		

M-958-11, Revision 0

*Ray G. Gagne*  
Cognizant Engineer

20 OCT '88

Date

(PM958/jap)

ROBINSON NUCLEAR PROJECT

UNIT NO. 2

PLANT MODIFICATION M-958

ADD AUTO START TO "B" SI PUMP

ATTACHMENT 12

DESIGN DRAWINGS

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Rev.	0	0	0	0	0	0	0	0	0	0	0	0

M-958-12, Revision 0

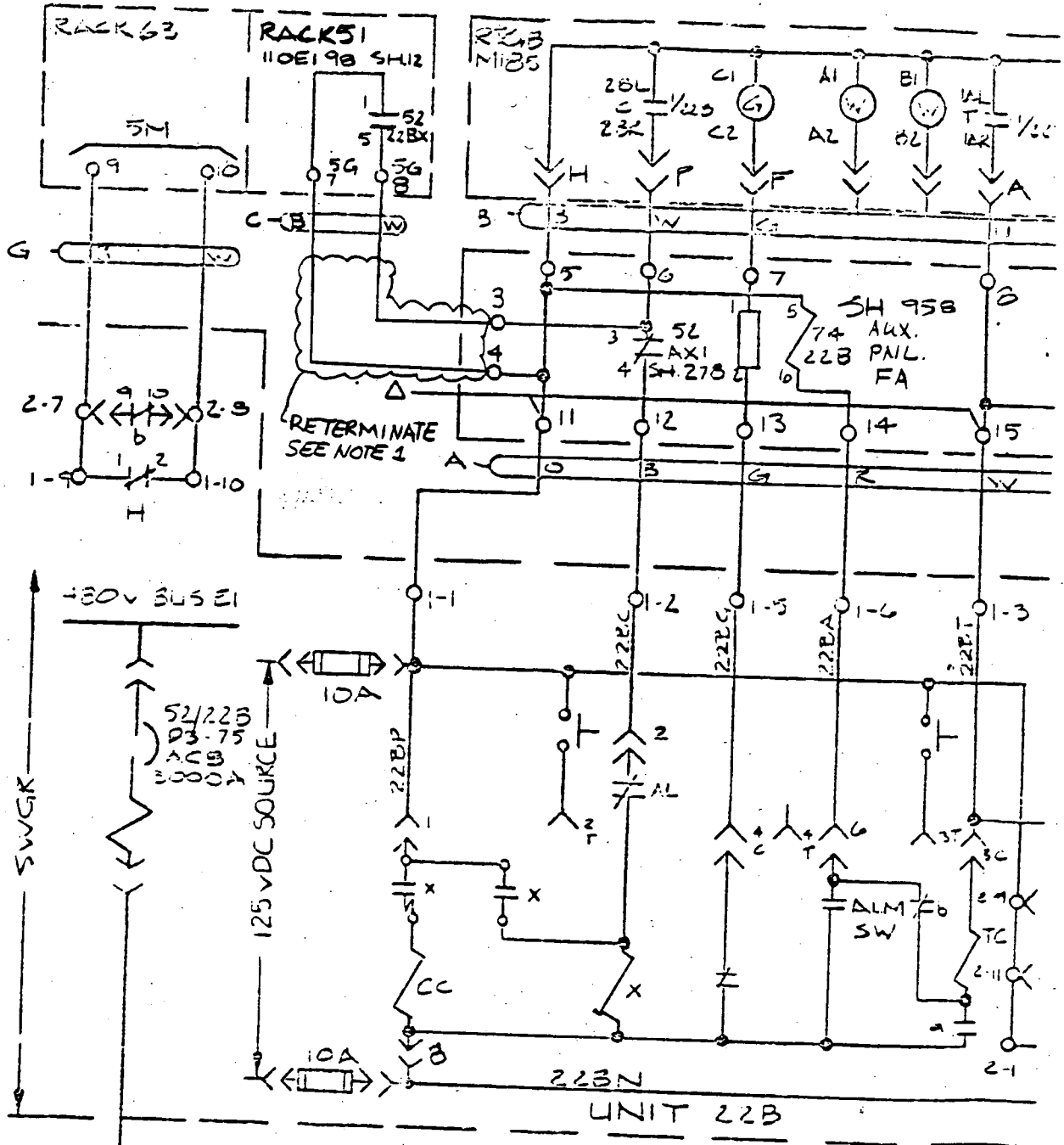
*Jay W. G. [Signature]*  
Cognizant Engineer

20 OCT-88

Date

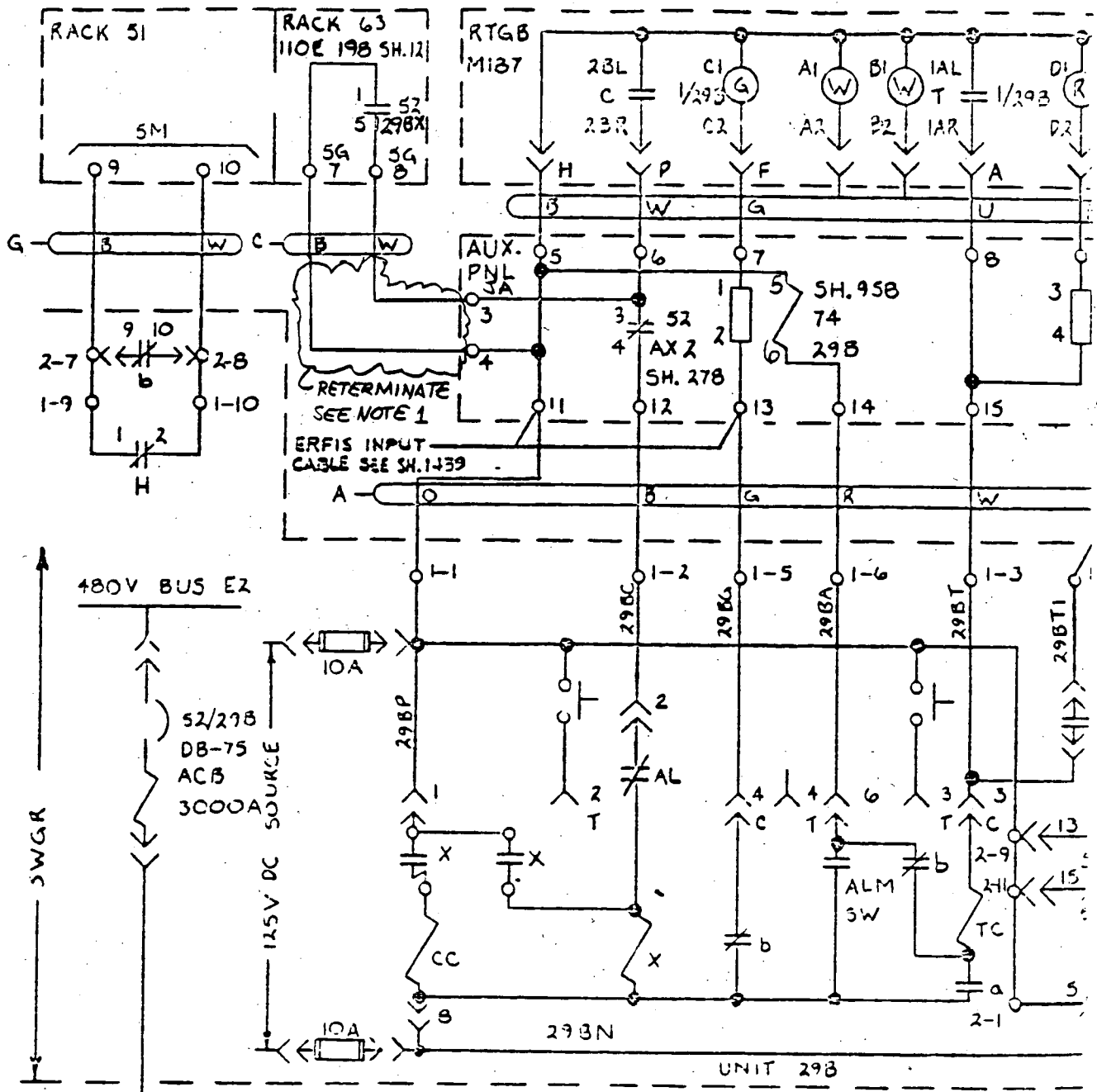
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For Information Only

(PM958/jap)



NOTE 1: CABLE C2891C WAS DETERMINATED AND LABELED SPARE PER MOD-951.  
RETERMINATE THIS CABLE ONI AUX PNL FA AS SHOWN.

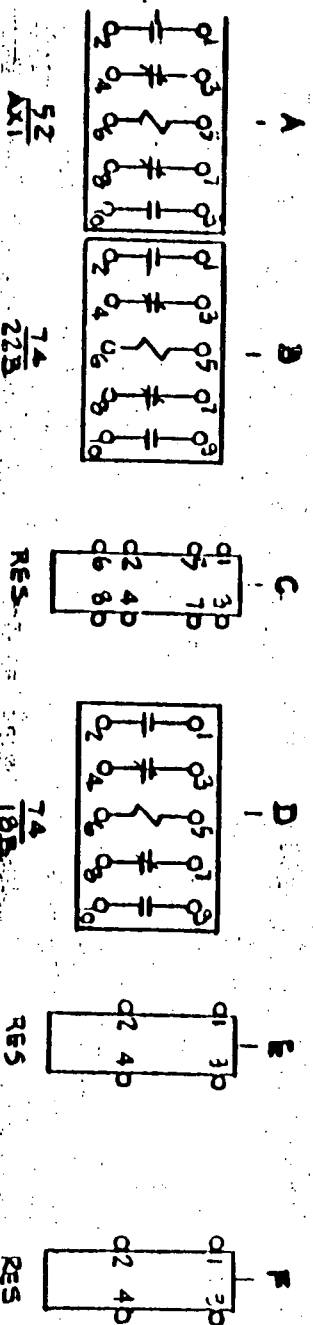
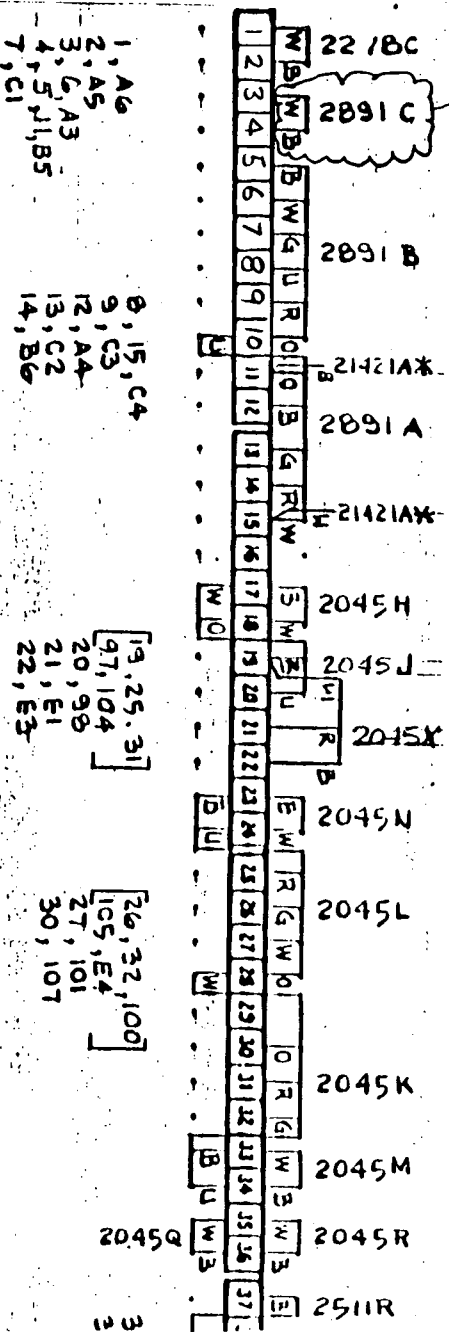
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					SAFETY RELATED
					CONTROL WIRING DIAGRAM
A	14 JUNE 35	ISSUED FOR MOD-958	JM <del>TRE</del>	AC	
REV NO.	DATE	DESCRIPTION	DRAWN BY J.M.D.	RV.WD	APPR.
					REF. DWG. B-190628 SHT. 891, REV. 14
					SKETCH NO. SK-958 - Z-7000



NOTE 1: CABLE C2896C WAS DETERMINED AND LABELED SPARE PER MOD-951.  
RETERMINATE THIS CABLE ON AUX PANEL JA AS SHOWN.

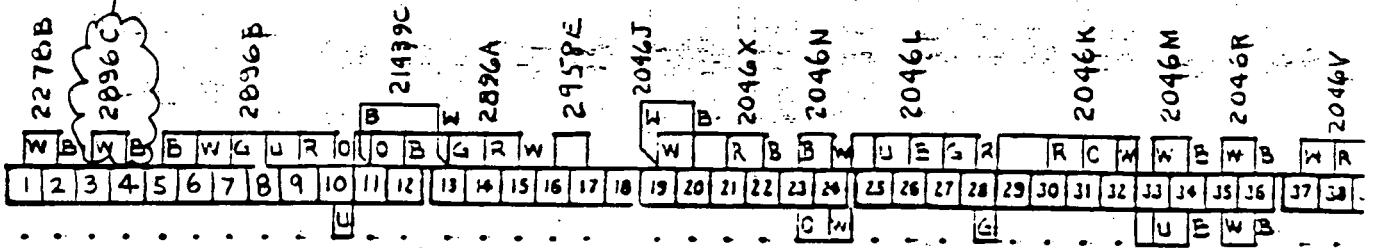
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				SAFETY RELATED			
				CONTROL WIRING DIAGRAM			
REV NO.	DATE	DESCRIPTION	DRAWN BY	CHK'D	RV'ND	APPRV.	REF. DWG. B-190628 SHT 896, REV. 14
A	14 JUNE 88	ISSUED FOR MOD 958	JM	RE	AC		SKETCH NO. SK-958-Z-7001

RETERMINATE CABLE AS SHOWN



CAROLINA POWER & LIGHT CO. H.B. ROBINSON STEAM ELECTRIC PLANT				
SAFETY RELATED				
LAYOUT AND WIRING AUXILIARY PANEL FA				
REV NO.	DATE	DESCRIPTION	DRAWN BY CHK. BY	APPRV.
A	14 JUNE 88	ISSUED FOR MOD 958	JM RC	RC
REF. DWG. B-190629 SHT. 32, REV. 7				
SKETCH NO. SK-958-27002				

RETERMINATE CABLE AS SHOWN



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2, A5  
3, C, A3  
4, 5, 11, B5  
7, C1

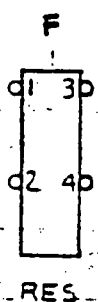
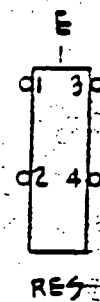
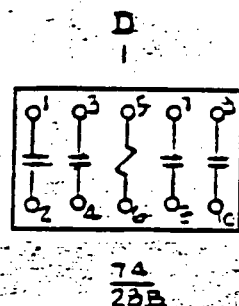
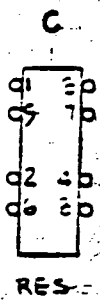
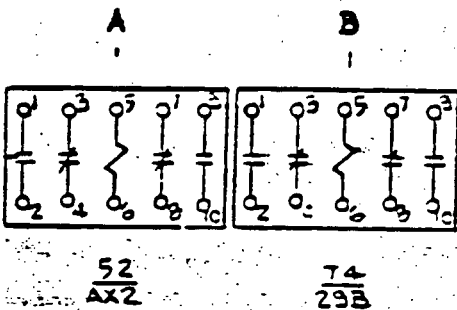
8, 15, C4  
9, C3  
12, A4  
13, C2  
14, B6

16, B1, D1  
17, B2, D2

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19, 104  
20, 38  
21, E1  
22, E3

23, 32, 100  
24, 105, E4  
27, 101  
30, 10T

2046Q  
37, 10  
38, F1  
39, F2



				CAROLINA POWER & LIGHT CO. H.B. ROBINSON STEAM ELECTRIC PLANT			
				SAFETY RELATED			
				LAYOUT AND WIRING			
				AUXILIARY PANEL JA			
REV NO.	DATE	DESCRIPTION	DRAWN BY	RV'NO	APPRV.	REF. DWG. B-M0629 SHT. 50, REV. 6	
A	14 JUNE 88	ISSUED FOR MOD-958	JM		AC	SKETCH NO. SK-958-Z-7003	

REV NO.	A
DATE	JUNE 88
DESCRIPTION	ISSUED FOR MOD-958
DRAWN BY	JM
CHECKED BY	RM
REV. NO.	8
APPRV.	RM
REF. DWG. B-190634 SHT C2896A, REV. 2	
SKETCH NO. SK-958-Z-7004	

NUMBER	CWD SHEET NUMBER	FROM	TO
C2896A		480V BUSE2, UNIT 29B	EMERG BUS E2 TIE BKR AUX PNL JA
C2896B		AUX PNL JA	KTGE M187
C2896C		<del>CABLE DISCONNECTED &amp; SPARE</del>	<del>RELAY RACK R63</del>
C2896D		480V BUS E2 COMP 27A	480V BUS E2 COMP 29B
C2896E		480V SWGR BUS E2	480V SWGR BUS E2
C2896F		COMPT 29B	COMPT 28A
C2896G		RELAY RACK 51	

CABLE AND CONDUIT LIST

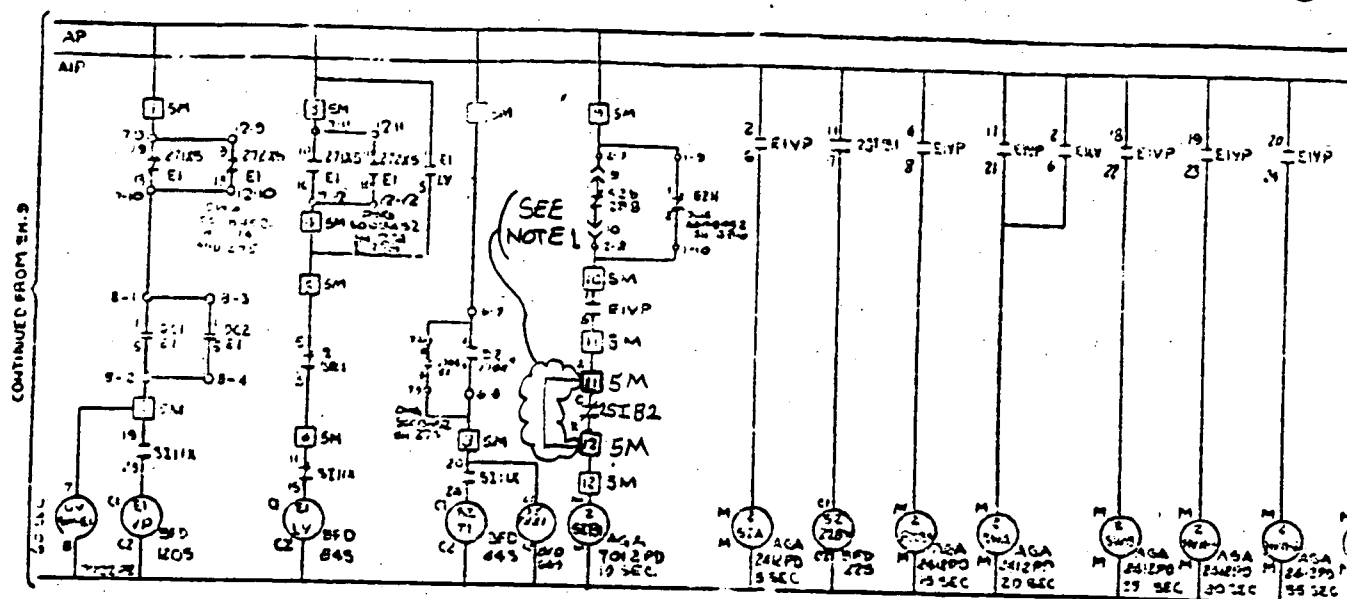
SAFETY RELATED

CAROLINA POWER & LIGHT CO.  
H.B. ROBINSON STEAM ELECTRIC PLANT

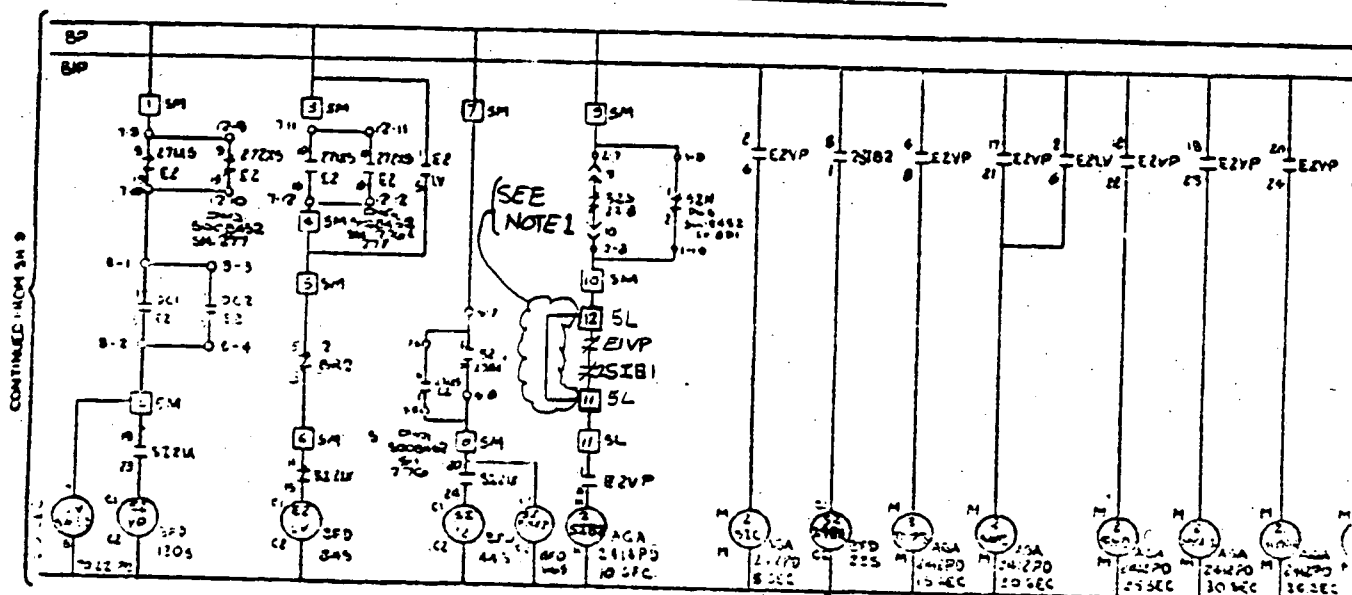
REV. NO.	DATE	DESCRIPTION	DRAWN BY	CHK'D	RV'D	APPRV.
A	14 JUNE 88	ISSUED FOR MOD. 958	JM	PL	AC	
<p>CAROLINA POWER &amp; LIGHT CO. H.B. ROBINSON STEAM ELECTRIC PLANT</p> <p>SAFETY RELATED</p> <p>CABLE AND CONDUIT LIST</p>						
REF. DWG. B-190634 SHT C2891A, REV. 3						
SKETCH NO. SK-958 - Z-7005						

NUMBER	CWD SHEET NUMBER	FROM	TO
C2891A		480V BUSEI UNIT 22B	EMERG BUS "EI" TIE BKR. CO AUX PNL FA
C2891B		AUX PNL FA	RTGB (M186)
C2891C		AUX PNL FA <i>REVISE TO USE</i> CABLE DISCONNECTED & SPARE	RELAY RACK R51
C2891F		480V SWGR BUSEI COMPT 22B	480V SWGR BUSEI COMPT 18B
C2891G		480V SWGR BUSEI COMPT 22B	RELAY RACK 63
C2891H		480V BUS EI COMP 17A	480V BUS EI COMP 22B



SAFEGUARD SEQUENCING



NOTE 1: INSTALL A JUMPER BETWEEN TERMINALS SM-11 AND SM-12 IN SAFEGUARDS RACK NO. 51 AND A JUMPER BETWEEN TERMINALS 5L-12 AND 5L-11 IN SAFEGUARDS RACK NO. 63 AS SHOWN.

CAROLINA POWER & LIGHT CO.  
H.B. ROBINSON STEAM ELECTRIC PLANT

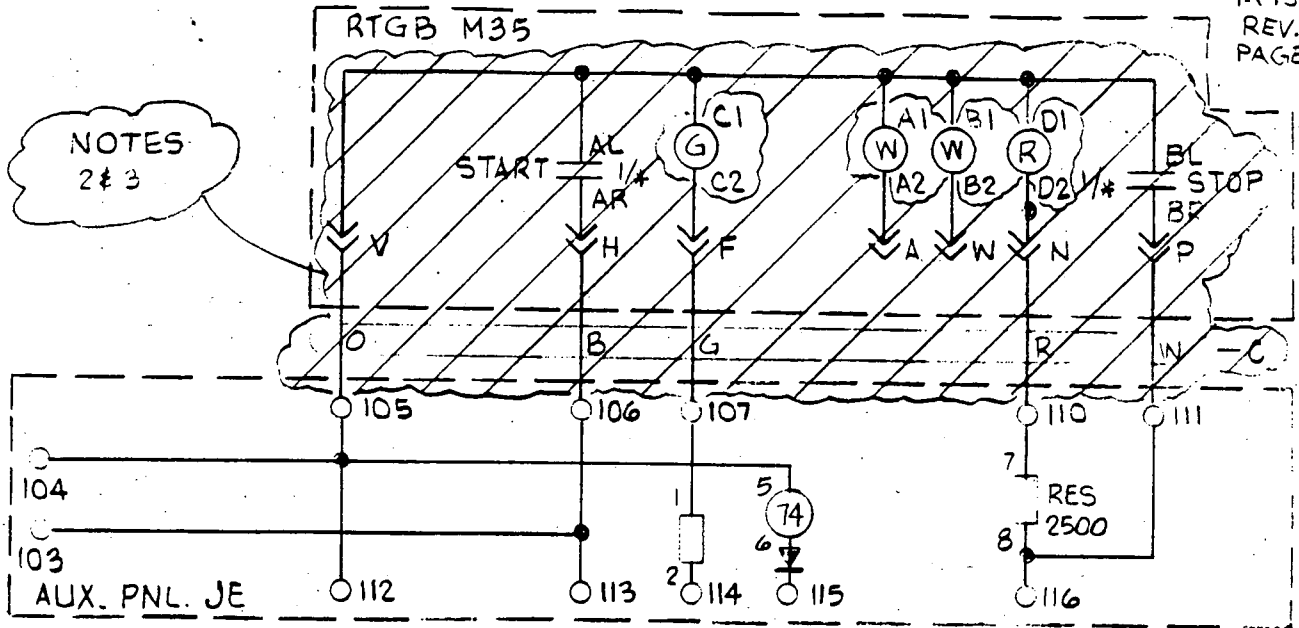
SAFETY RELATED

SAFEGUARDS SYSTEM

REF. DWG. CP380 5379-3238, REV. 13

SKETCH NO. SK-958-Z-7006

REV NO.	DATE	DESCRIPTION	DRAWN BY	CHK'D	RV'D	APPRV.
A	14 JUNE 88	ISSUED FOR MOD 958	JM	RV	AC	



### NOTES:

1. SEE SK-958-Z-7010 FOR LOCATION OF M35
2. DISCONNECT BOTH ENDS OF CABLE C2238C, TAPE ENDS AND RE-TAG CABLE C28500H AT BOTH ENDS.
3. DISCONNECT INTERNAL WIRING FROM SELECTOR SWITCH AND LIGHTS TO CONNECTOR. REMOVE INTERNAL WIRING AND SWITCH FROM MODULE. MODULE WILL BE REUSED LATER. REF. DWG. SK-958-Z-7013.

CONSTRUCTION ONLY

BASE DRAWING

190628 SH. 238. REV. 12

CAROLINA POWER & LIGHT CO.  
H.B. ROBINSON STEAM ELECTRIC PLANT

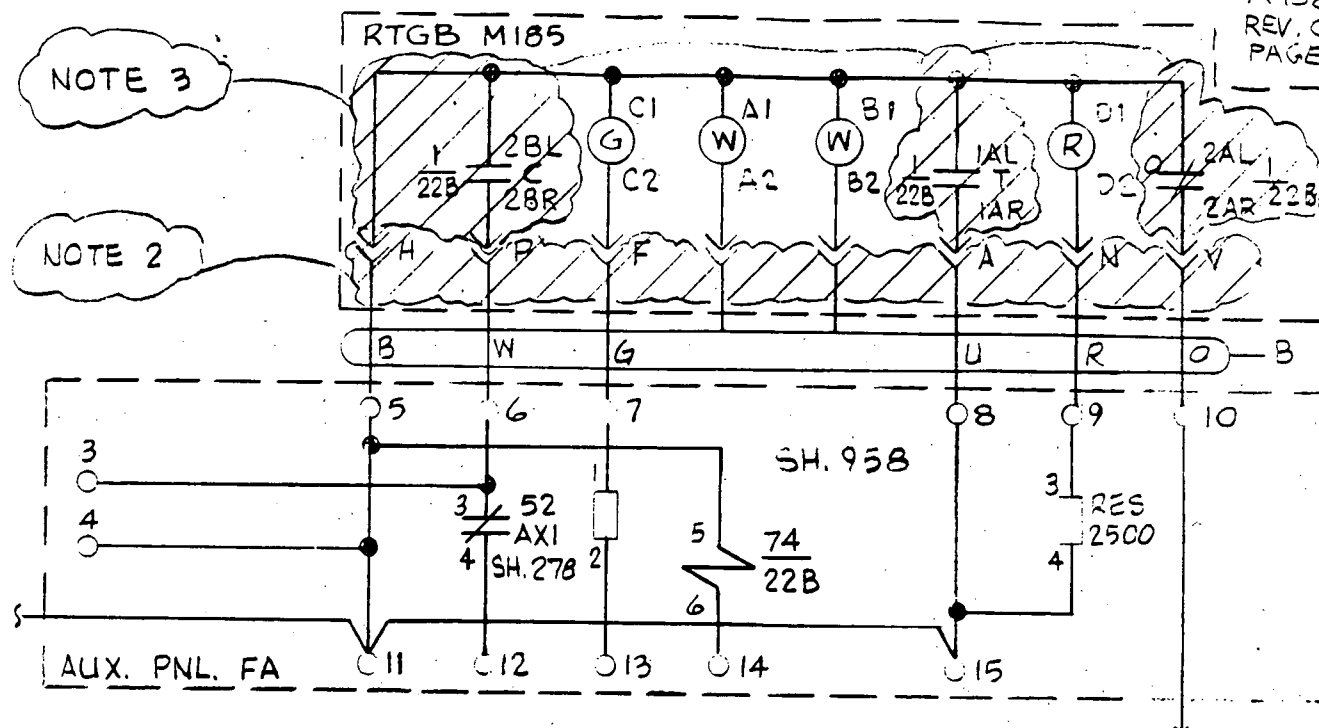
SAFETY-RELATED

CONTROL WIRING DIAGRAM  
SAFETY INJECTION PUMP "B"  
REMOVALS

REF. DWG. 190628 SH. 238

SKETCH NO. SK-958-Z-7007

REV. NO.	DATE	DESCRIPTION	DRAWN BY	CHECKED BY	REV. NO.	APPROVED BY
3	OCT 12 '88	REVISED PER PLANT COMMENT	W. T. F. P. H.	R. M. A. C.		
A	AUG. 25 '88	ISSUED FOR MOD-958	W. T. F. P. H.	R. M. A. C.		



# NOTES:

- SEE SK-958-Z-7011 FOR LOCATION OF M185.
- DISCONNECT CABLE C2891B FROM CONNECTOR OF M185. CABLE WILL BE SPLICED AND USED LATER.
- DISCONNECT INTERNAL WIRING FROM SELECTOR SWITCH. REMOVE SELECTOR SWITCH FROM M185. SELECTOR SWITCH WILL BE INSTALLED IN M35 LATER.
- REMOVE MODULE M185 FROM PANEL AND INSTALL PLATE OVER CUT-OUT.

CONSTRUCTION ONLY

BASE DRAWING:

190628 SH. 891, REV. 14

CAROLINA POWER & LIGHT CO.  
H.B. ROBINSON STEAM ELECTRIC PLANT

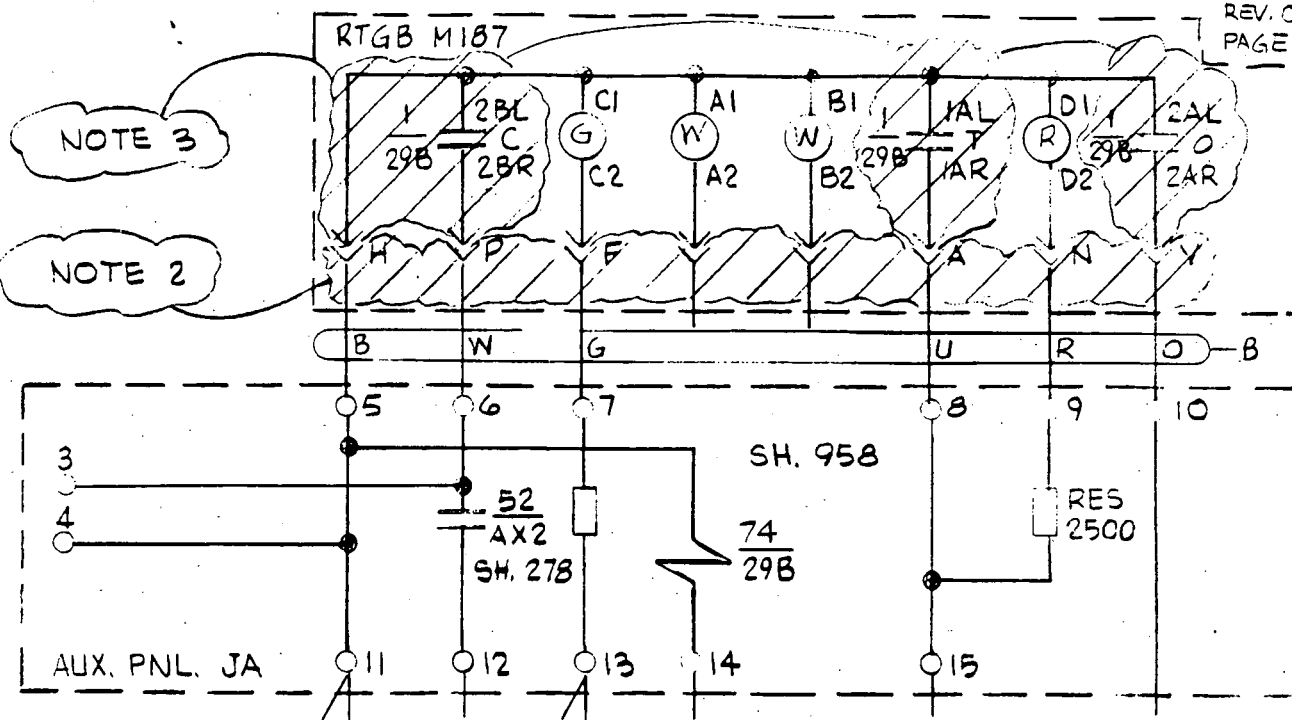
SAFETY-RELATED

CONTROL WIRING DIAGRAM  
480V BREAKER 52/228 BUS E1 TO E2  
REMOVALS

REF. DWG. 190628, SH. 891

SKETCH NO. SK-958-Z-7008

REV. NO.	DATE	DESCRIPTION	DESIGN	BY	CHK'D	REV'D	APPROV.
B	OCT. 12 '88	REVISED PER PLANT COMMENT	MSB	RAE	AL	AC	
A	AUG. 25 '88	ISSUED FOR MOD-958	MSB	RAE	AL	AC	



### NOTES:

1. SEE SK-958-Z-7011 FOR LOCATION OF M187.
2. DISCONNECT CABLE C2896B FROM CONNECTOR OF M187. CABLE WILL BE SPLICED AND USED LATER.
3. DISCONNECT INTERNAL WIRING FROM SELECTOR SWITCH. REMOVE SELECTOR SWITCH FROM M187. SELECTOR SWITCH WILL BE INSTALLED IN M35 LATER.
4. REMOVE MODULE M187 FROM PANEL AND INSTALL PLATE OVER CUT-OUT.

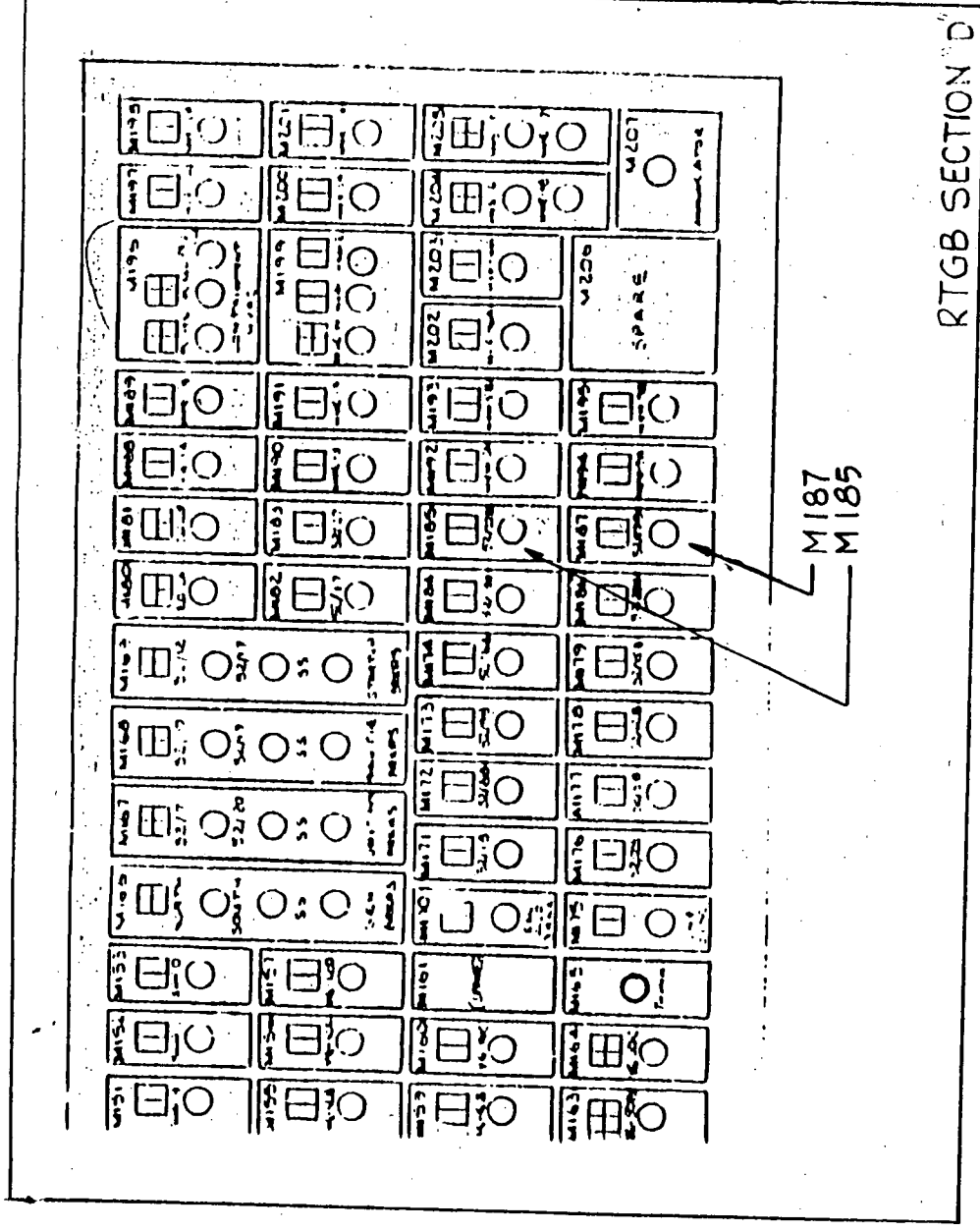
CONSTRUCTION

BASE DRAWING

190628 SHT. 896, REV. 14

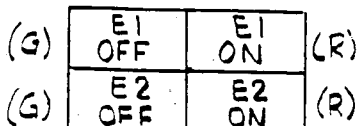
				CAROLINA POWER & LIGHT CO. H.B. ROBINSON STEAM ELECTRIC PLANT			
				SAFETY-RELATED			
B	1/2	88	REVISED PER PLANT COMMENT	MTG	RAE	PL	CONTROL WIRING DIAGRAM 480V BREAKER 52/29B BUS E1 TO E2 REMOVALS
A	25	88	ISSUED FOR MOD-958	MTG	RAE	PL	
REV. NO.	DATE	DESCRIPTION		DRAWN BY	CHECKED BY	REV. NO.	APPROV.
				REF. DWG. 190628 SH. 896			
				SKETCH NO. SK-958-Z-7009			





CONSTRUCTION ONLY

						CAROLINA POWER & LIGHT CO. H.B. ROBINSON STEAM ELECTRIC PLANT
		/				SAFETY - RELATED
		/				CONTROL BOARD "D" M185 & M187 LOCATIONS
		/				REF. DWG.
		/				SKETCH NO. SK-958-Z-7011



SI PUMP

B

480-EI

STOP      START

SI PUMP

8

480-E2

STOP      START

NOTE:

1. ENGRAVE AS SHOWN.

CONSTRUCTION ONLY

CAROLINA POWER & LIGHT CO.  
H.B. ROBINSON STEAM ELECTRIC PLANT

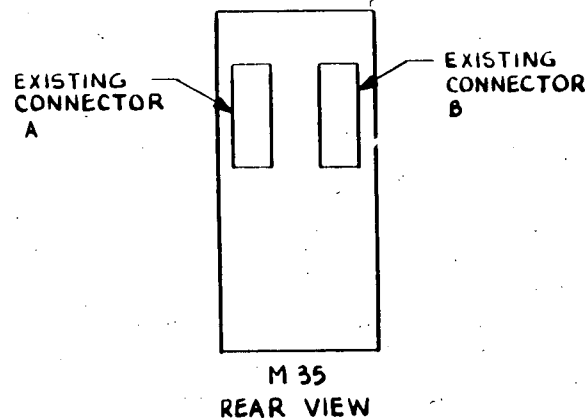
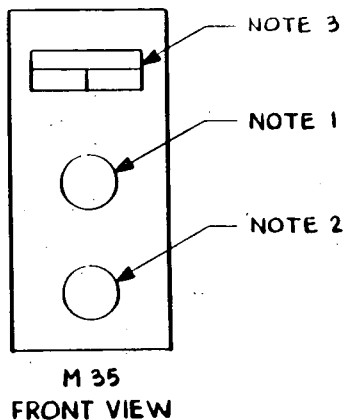
SAFETY - RELATED

M35 ENGRAVING

ISSUED FOR MOD-958

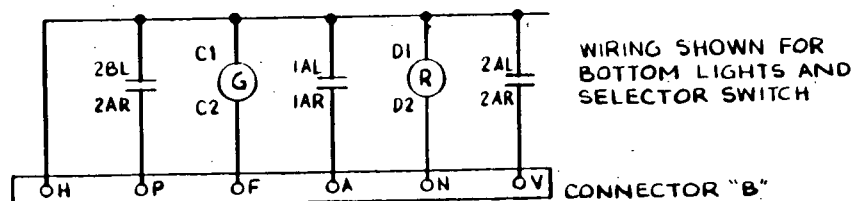
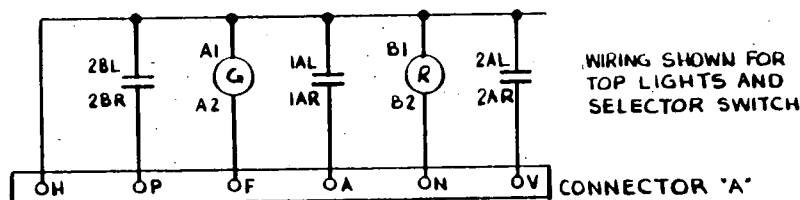
REF. CUG.

SKETCH NO. SK-958-Z-7012



#### NOTES:

1. INSTALL SELECTOR SWITCH REMOVED FROM M185.
2. INSTALL SELECTOR SWITCH REMOVED FROM M187.
3. REMOVE 3-POSITION LIGHT LENS AND REPLACE WITH 4-POSITION LIGHT LENS; B/M # 8
4. INSTALL CONNECTOR PINS & WIRE AS SHOWN IN WIRING DETAILS. USE 1/C STRANDED #16 AWG. B/M # 4, B/M # 5 AND B/M # 6



M 35 WIRING DETAILS

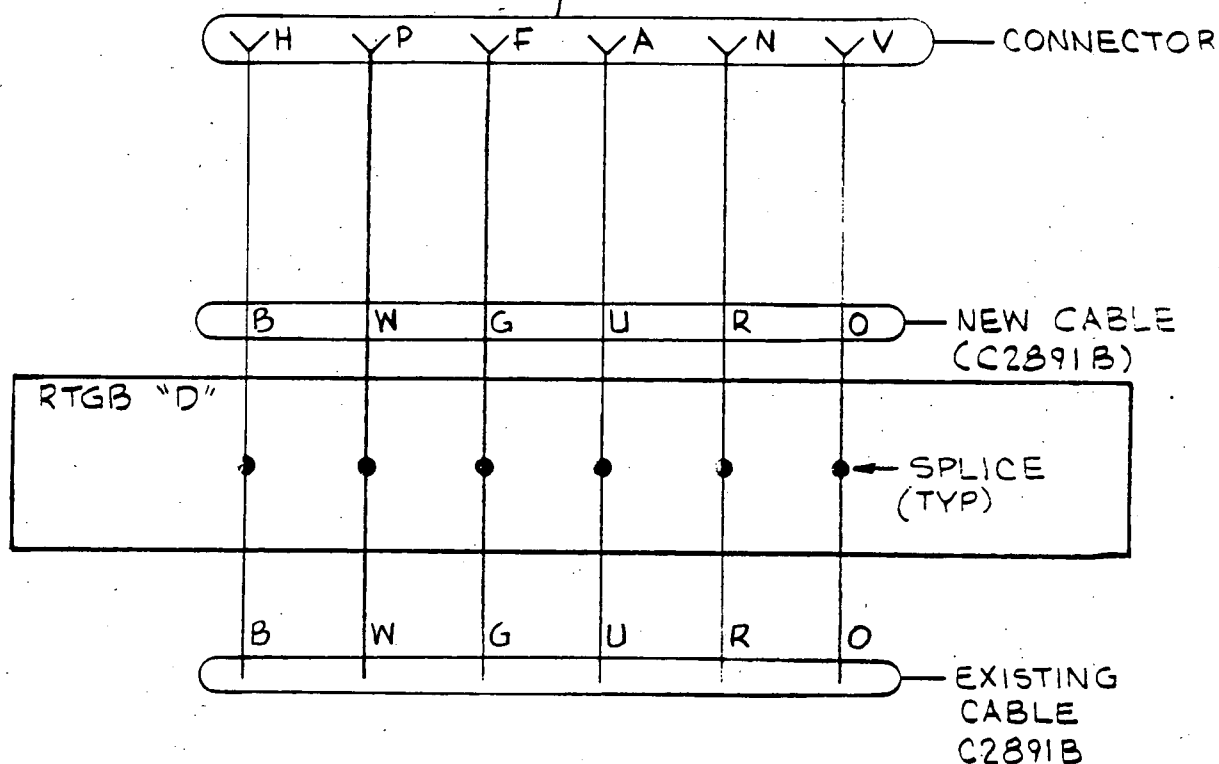
#### CONSTRUCTION ONLY

M458-12  
REV. 0  
PAGE 15

B	REV. PER PLNT COMMENT	DATE	BY	CHKD	APPD
A	ISSUED FOR MOD 958	10/1/88	AL	AL	AL
REV	DATE	DESCRIPTION	CHKD	APPD	DATE
1	10/1/88	MOD 958	AL	AL	10/1/88
PROFESSIONAL ENGINEER					
SAFETY-RELATED					
CAROLINA POWER & LIGHT COMPANY					
NUCLEAR ENGINEERING DEPARTMENT - FALCON, N.C.					
PLANT H. B. ROBINSON			UNIT NO. 2		
TITLE					
M35 MODIFICATIONS					
UNIT NO.	SK-950-2-7013	SHEET	1 OF 1	REV.	B

RTGB "A"

M 35  
CONNECTOR "A"

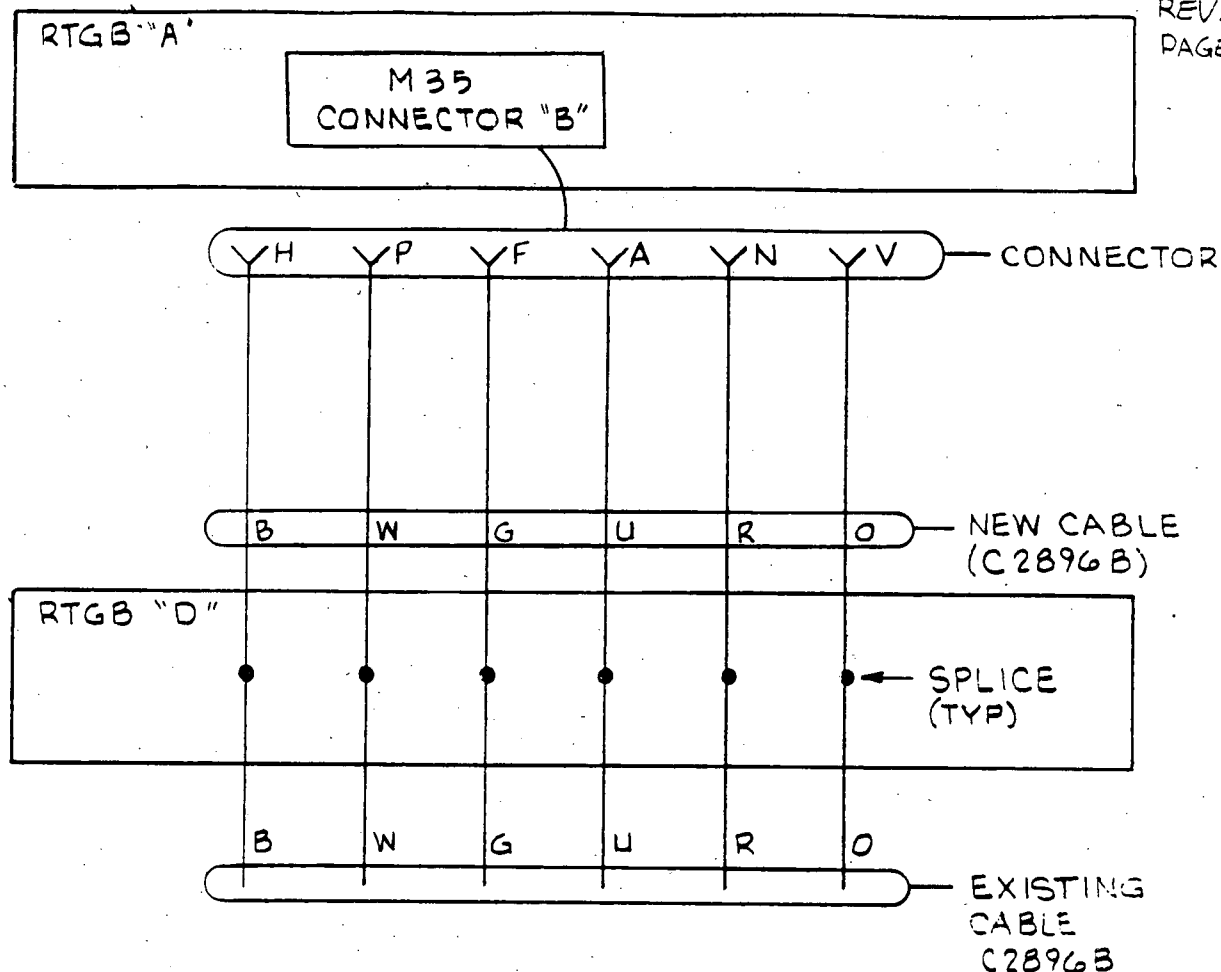


NOTES:

1. SPLICE EXISTING CABLE TO NEW CABLE IN RTGB "D", AND ROUTE NEW CABLE THRU RTGB SECTIONS "C" & "B" TO "A". NEW CABLE IS 7/C #16AWG. TAG CABLE C28918.
2. INSTALL CONNECTOR ON END OF CABLE IN RTGB "A", AND PLUG INTO CONNECTOR "A" ON M35.  
(USE B/M#7 FOR CONNECTOR SOCKET.)

CONSTRUCTION ONLY

				CAROLINA POWER & LIGHT CO. H.B. ROBINSON STEAM ELECTRIC PLANT			
				SAFETY-RELATED			
2	12	'88	REVISED PER PLANT COMMENT	MTG RFE	8/24/88	RA	AC
A	25	'88	ISSUED FOR MOD 958	MTG RFE	8/24/88	RA	AC
REV. NO.	DATE	DESCRIPTION		DRAWN BY CHK'D	BY V'D	APPRV.	
				REF. DWG.			
				SKETCH NO. SK-958-Z-7014			



NOTES:

1. SPLICE EXISTING CABLE TO NEW CABLE IN RTGB "D" AND ROUTE NEW CABLE THRU RTGB SECTIONS "C" & "B" TO "A". NEW CABLE IS 7/C #16AWG. TAG CABLE AS C2896B.
2. INSTALL CONNECTOR ON END OF CABLE IN RTGB "A" AND PLUG INTO CONNECTOR "B" ON M35.  
(USE B/M#7 FOR CONNECTOR SOCKET)

CONSTRUCTION ONLY

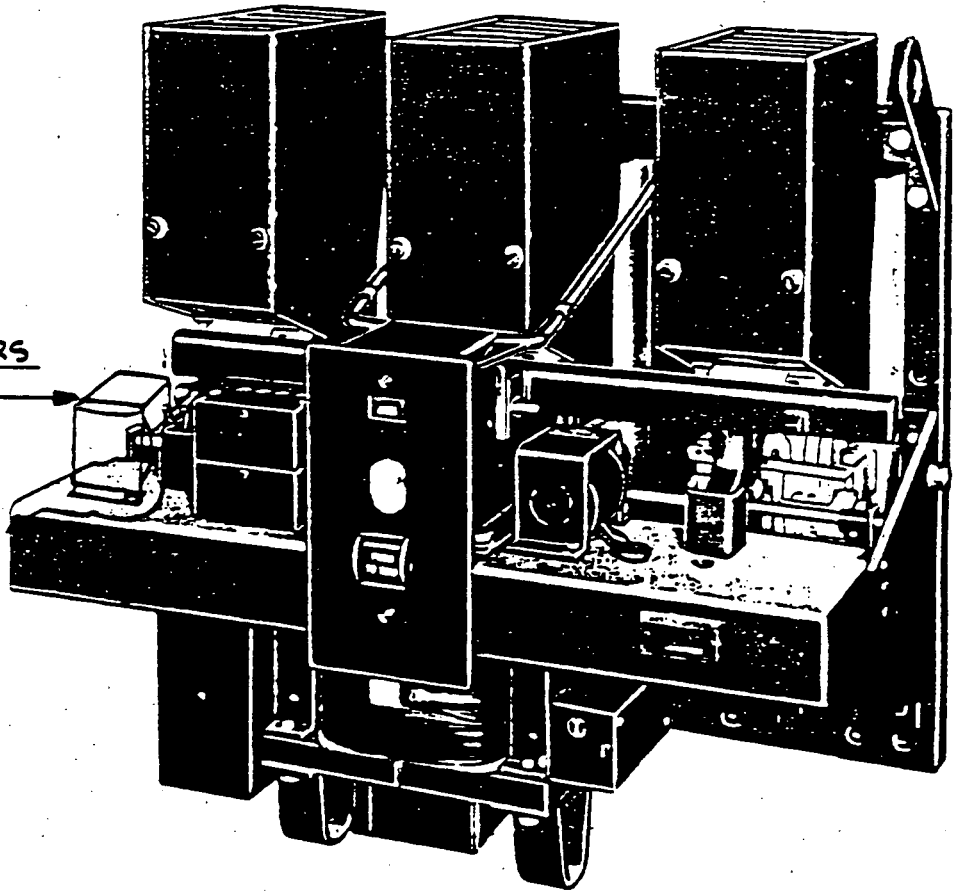
				CAROLINA POWER & LIGHT CO. H.B. ROBINSON STEAM ELECTRIC PLANT			
				SAFETY-RELATED			
R. 12 OCT. '88 25 AUG. '88 REV. NO. DATE DESCRIPTION				CABLE ROUTE FROM RTGB "D" TO RTGB "A" M187 TO M35			
REVISIONS 1. REVISED PER PLANT COMMENT 2. ISSUED FOR MOD 958				REF. DWG. SKETCH NO. SK-958-Z-7015			
DRAWN BY CHK'D REV'D APPR'D							



1. FOR LOCATION OF SHUNT RELAY (TC-2) SEE SK-958-Z-7017 DISCONNECT & REMOVE WIRING FROM TC-2 TO 52A CONTACT -5 AND MOVING CONTACT -11. REMOVE TC-2.
2. REMOVE WIRE/CABLE AND CONDUIT

REV. NO.	DATE	DESCRIPTION	DESIGNED BY	CHECKED BY	APPROVED	CAROLINA POWER & LIGHT CO. H.B. ROBINSON STEAM ELECTRIC PLANT
SAFETY - RELATED						SWGR. EMERG. BUS E2 CUB 29B WIRING REMOVALS
REF. CUG.						
SKETCH NO. SK-958-Z-7016						

TYP. FOR BOTH BREAKERS  
SHUNT RELAY



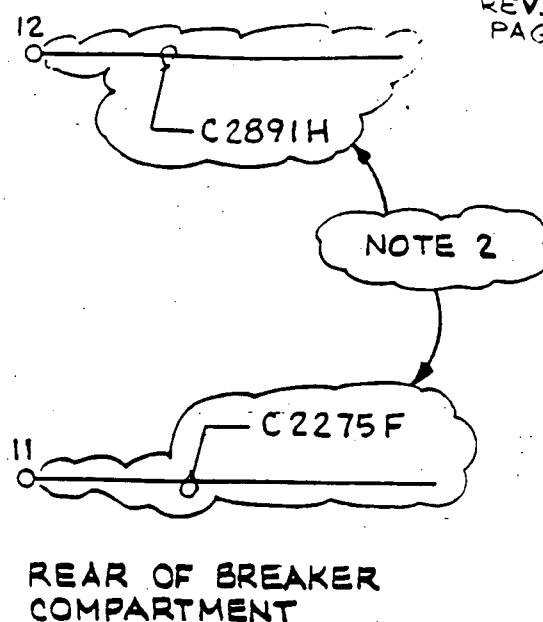
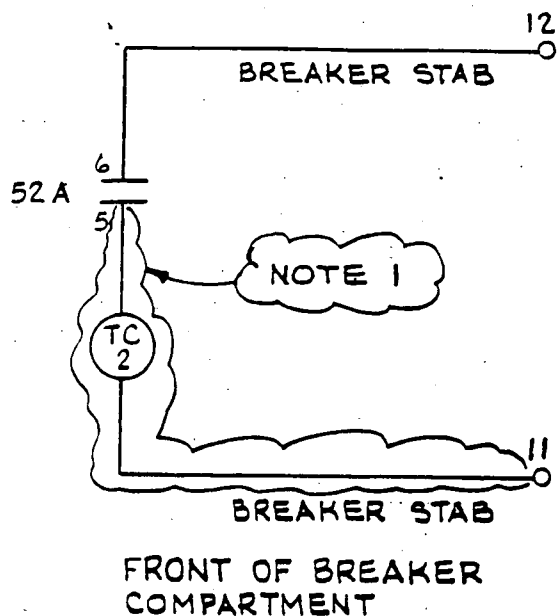
				CAROLINA POWER & LIGHT CO. H.B. ROBINSON STEAM ELECTRIC PLANT	
				SAFETY-RELATED	
				LOCATION OF SHUNT RELAYS ON BREAKERS 22B & 29B	
A	1988 AUG 25	PM 958	WJG RFB RFB	APPROV.	REF. DWG.
REV NO	DATE	DESCRIPTION	DESIGNED BY	REV'D	APPROV.
					SKETCH NO. SK-958-Z-7017

## ADDITIONS

7. INSTALL & CONNECT WIRING FROM 52A CONTACT 5 AND MOVING CONTACT - 11.

CONSTRUCTION ONLY

				CAROLINA POWER & LIGHT CO. H.B. ROBINSON STEAM ELECTRIC PLANT			
				SAFETY-RELATED			
				SWGR EMERG BUS E2 CUB. 29B WIRING ADDITIONS			
REV NO.	DATE	DESCRIPTION	DRAWN BY	CHK'D BY	APP'D BY	APP'D BY	REF. CNG.
1	8/25/88	PM 958	WTH	WTH	WTH	WTH	SKETCH NO. SK-958-Z-7018



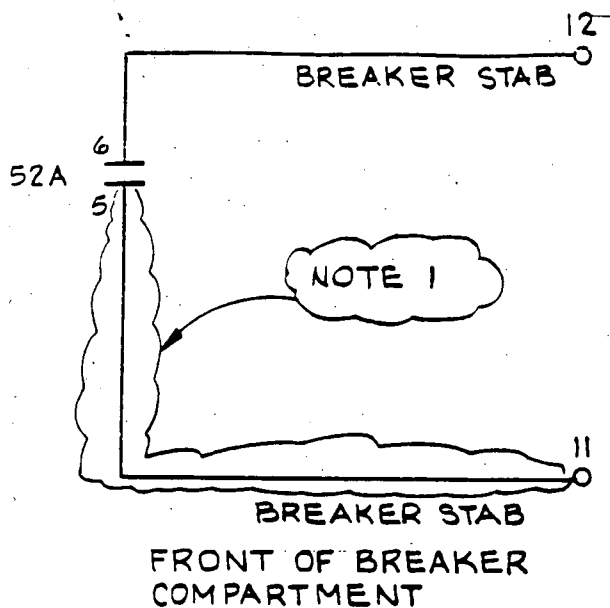
# REMOVALS

## NOTES:

1. FOR LOCATION OF SHUNT RELAY (TC-2) SEE SK-958-Z-7017. DISCONNECT & REMOVE WIRING FROM TC-2 TO 52A CONTACT 5 AND MOVING CONTACT - 11. REMOVE TC-2.
2. REMOVE WIRE/CABLE AND CONDUIT

## CONSTRUCTION ONLY

				CAROLINA POWER & LIGHT CO. H.B. ROBINSON STEAM ELECTRIC PLANT			
				SAFETY- RELATED			
				SWGR. EMERG. BUS E, CUB. 22B WIRING REMOVALS			
REV. NO.	DATE	DESCRIPTION	DATE	BY	CHK'D	REV'D	APPROV.
A	88 AUG. 25	PM 958					
				REF. DWG.			
				SKETCH NO. SK-958-Z-7019			



## ADDITIONS

### NOTES:

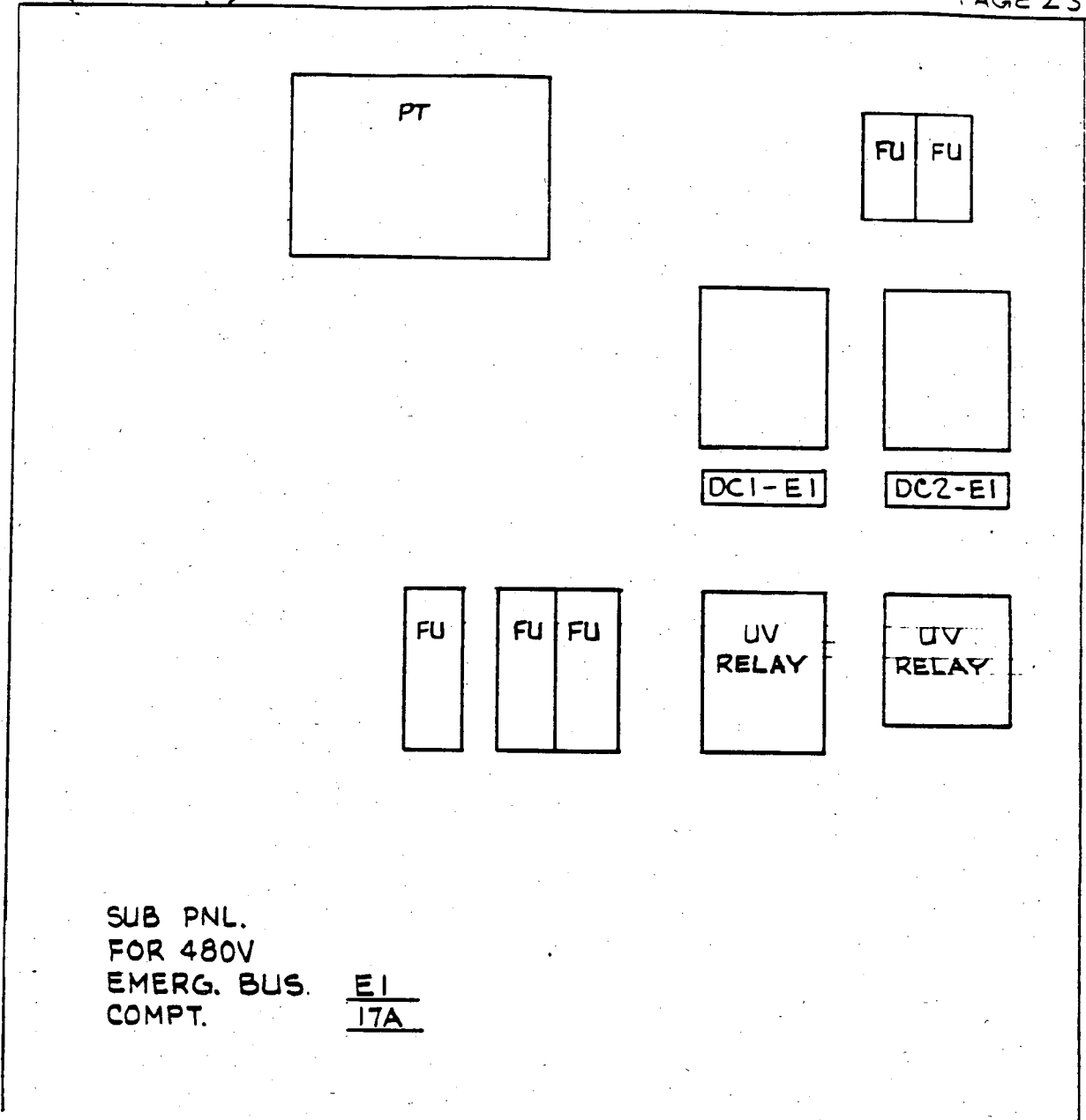
1. INSTALL & CONNECT WIRING FROM 52A CONTACT 5 AND MOVING CONTACT -11.

### CONSTRUCTION ONLY

				CAROLINA POWER & LIGHT CO. H.B. ROBINSON STEAM ELECTRIC PLANT			
				SAFETY-RELATED			
				SWGR. EMERG. BUS E, CUB. 22B WIRING ADDITIONS			
REV NO	DATE	DESCRIPTION	DRAWN BY	CHECKED BY	REV'D BY	APPROV. BY	REF. CNG.
A	'88 AUG. 25	PM 958	WLG RAC	WLG RAC	WLG RAC	WLG RAC	SKETCH NO. SK-958-Z-7020

SUB PANEL 7

M958-12  
REV. 0  
PAGE 23

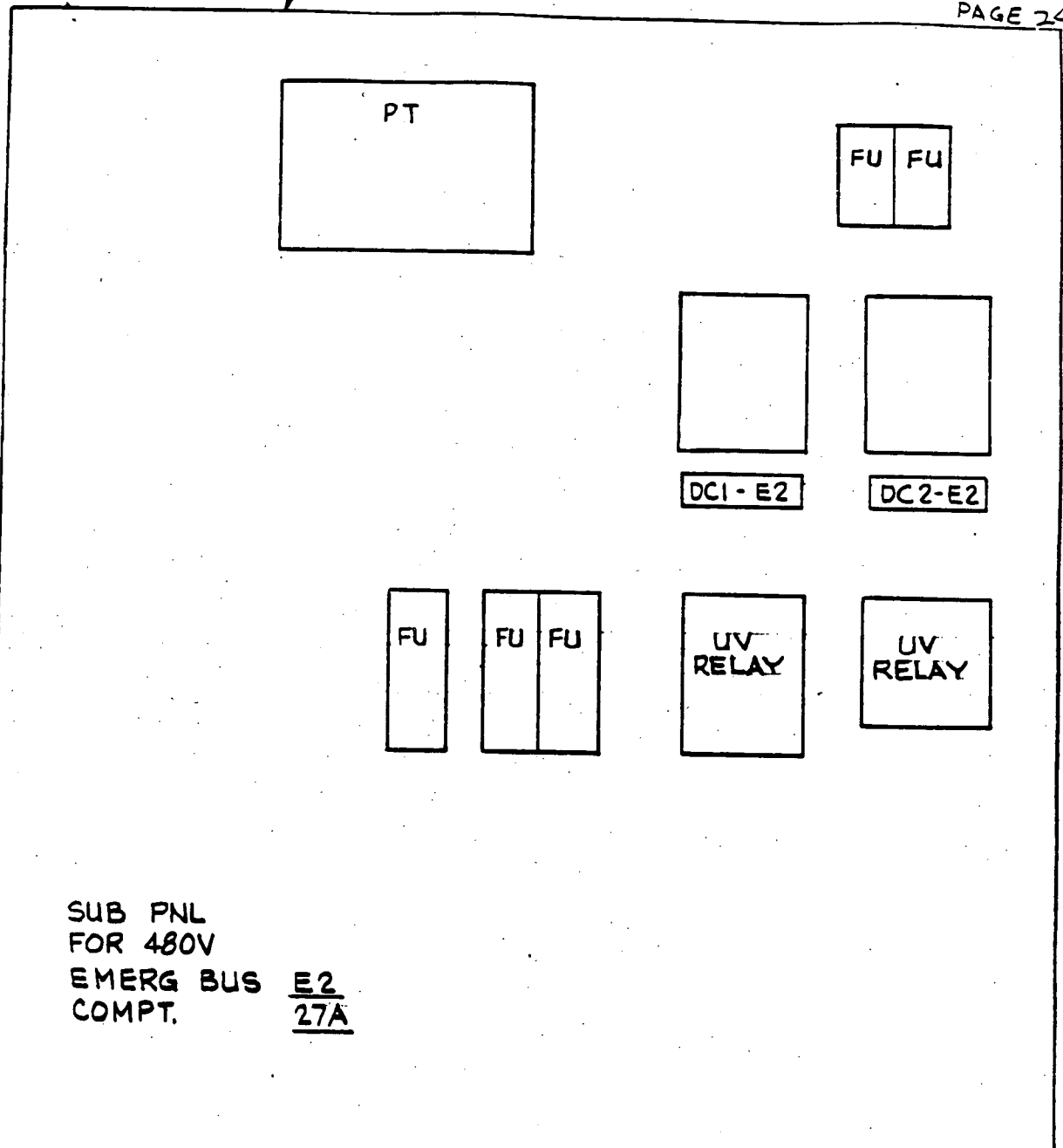


SUB PNL.  
FOR 480V  
EMERG. BUS.  
COMPT. EI  
17A

CONSTRUCTION ONLY

					CAROLINA POWER & LIGHT CO. H.B. ROBINSON STEAM ELECTRIC PLANT
					SAFETY-RELATED
					DC1-EI AND DC2-EI RELAY LOCATIONS COMPT. 17A
A	182 AUG 25	PM 958	WIG Roe	WIG Roe	REF. CNG.
REV NO	DATE	DESCRIPTION	DRAWN BY	CHK'D BY	APPROV.
					SKETCH NO. SK-958-Z-7021

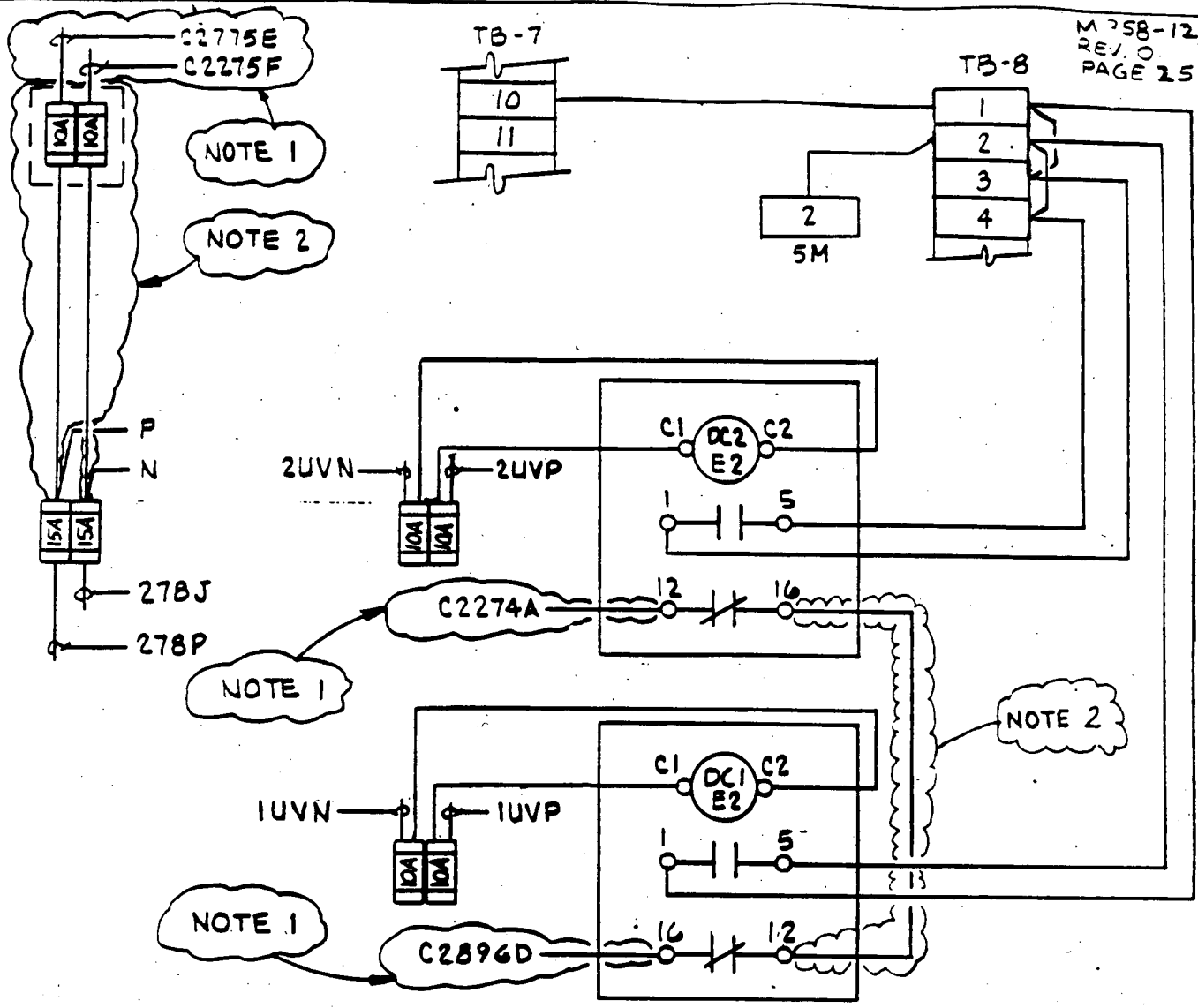
SUB PANEL

M958-12  
REV. 0  
PAGE 24

SUB PNL  
FOR 480V  
EMERG BUS E2  
COMPT. 27A

CONSTRUCTION ONLY

									CAROLINA POWER & LIGHT CO. H.B. ROBINSON STEAM ELECTRIC PLANT
									SAFETY-RELATED
									DC1-E2 AND DC2-E2 RELAY LOCATIONS COMPT. 27A
REV. NO.	DATE	DESCRIPTION	DRAWN BY	CHECKED BY	APPROVED BY	DATE	TIME	APPROV. NO.	REF. DWG.
1A	AUG 25 '88	PM 958	WJC	RAE	RAE				SKETCH NO. SK-958-Z-7022

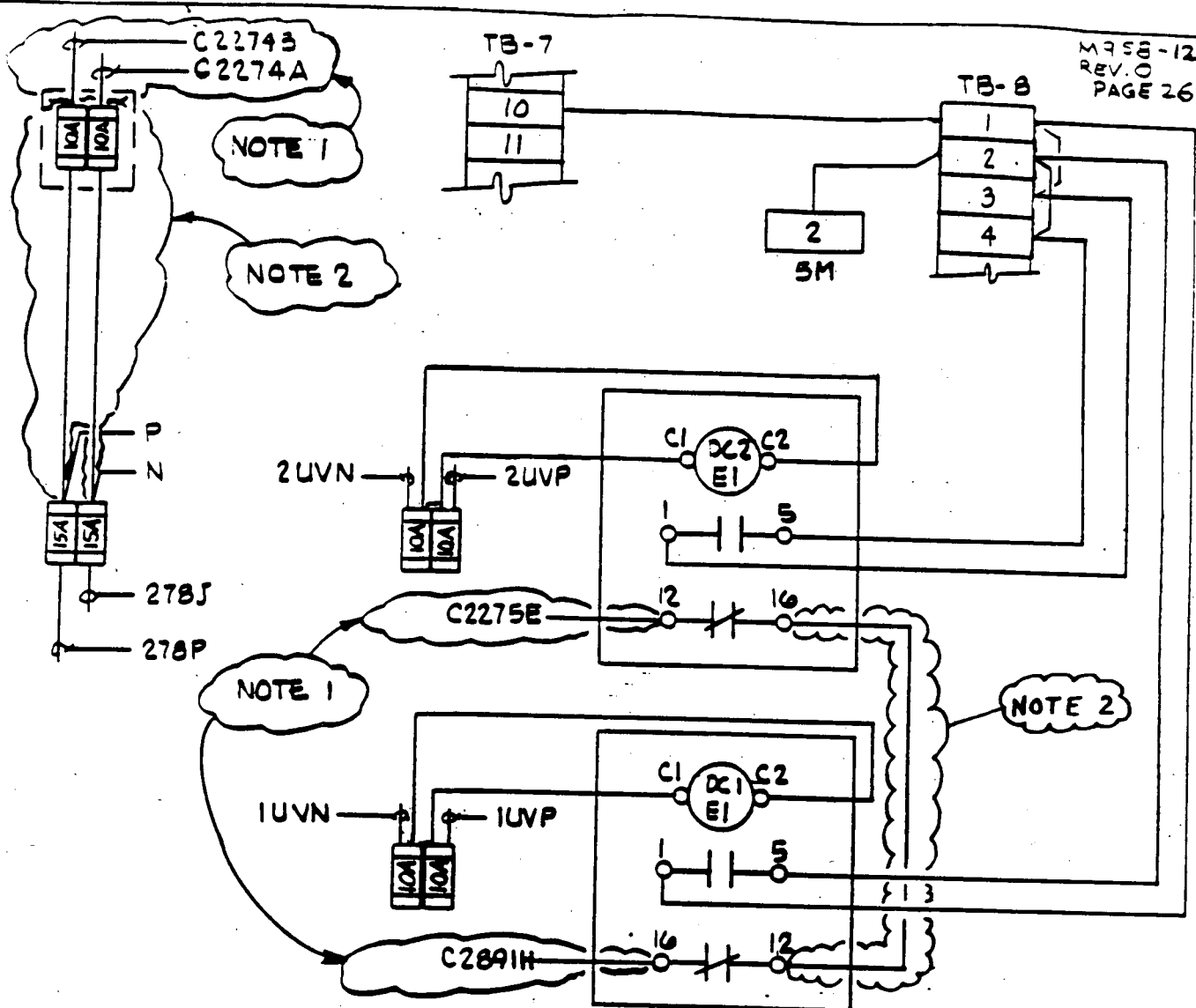


NOTES:

1. SEE DWG. SK-958-Z-7022 FOR DEVICE LOCATIONS. DISCONNECT, PULL BACK & REMOVE THESE CABLES AND THEIR CONDUITS.
2. DISCONNECT AND REMOVE WIRING, FUSES & JUMPER AS SHOWN WITHIN CLOUD. ENSURE THAT EXISTING WIRING WHICH IS TO REMAIN, IS SECURE.
3. JUNCTION Box # 206 MAY BE LEFT IN PLACE.

CONSTRUCTION ONLY

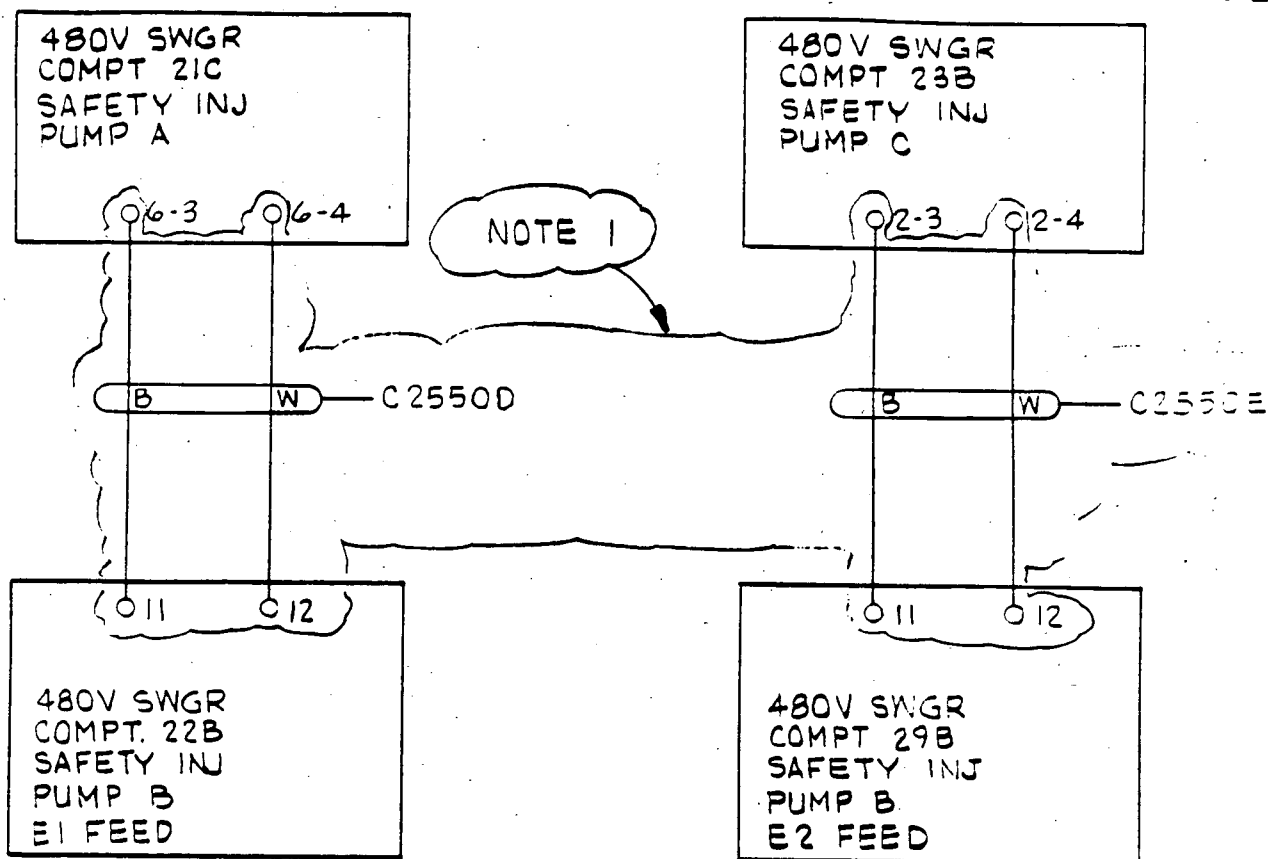
				CAROLINA POWER & LIGHT CO. H.B. ROBINSON STEAM ELECTRIC PLANT			
				SAFETY RELATED			
				SWGR EMERG BUS E2 CUB. 27A MODIFICATIONS			
REV. NO.	DATE	DESCRIPTION	THRU	BY	IN	APPROV.	REF. DWG.
A	89 AUG 28	PH 958	WJG	WJG	WJG	WJG	SKETCH NO. SK-958-Z-7023



- NOTES:**
1. SEE DWG. SK-958-Z-7021 FOR DEVICE LOCATIONS. DISCONNECT, PULL BACK & REMOVE THESE CABLES AND THEIR CONDUITS
  2. DISCONNECT AND REMOVE WIRING, FUSES & JUMPER AS SHOWN WITHIN CLOUD. ENSURE THAT EXISTING WIRING WHICH IS TO REMAIN, IS SECURE.
  3. JUNCTION BOX #207 MAY BE LEFT IN PLACE.

CONSTRUCTION ONLY

				CAROLINA POWER & LIGHT CO. H.B. ROBINSON STEAM ELECTRIC PLANT			
				SAFETY RELATED			
				SWGR. EMERG. BUS EI CUB. 17A MODIFICATIONS			
A <sup>98</sup> <sub>25</sub> PH 958				REF. DWG.			
REV. NO.	DATE	DESCRIPTION	INITIALS	BY	DATE	APPROVED	DATE
				SKETCH NO. SK-958-Z-7024			



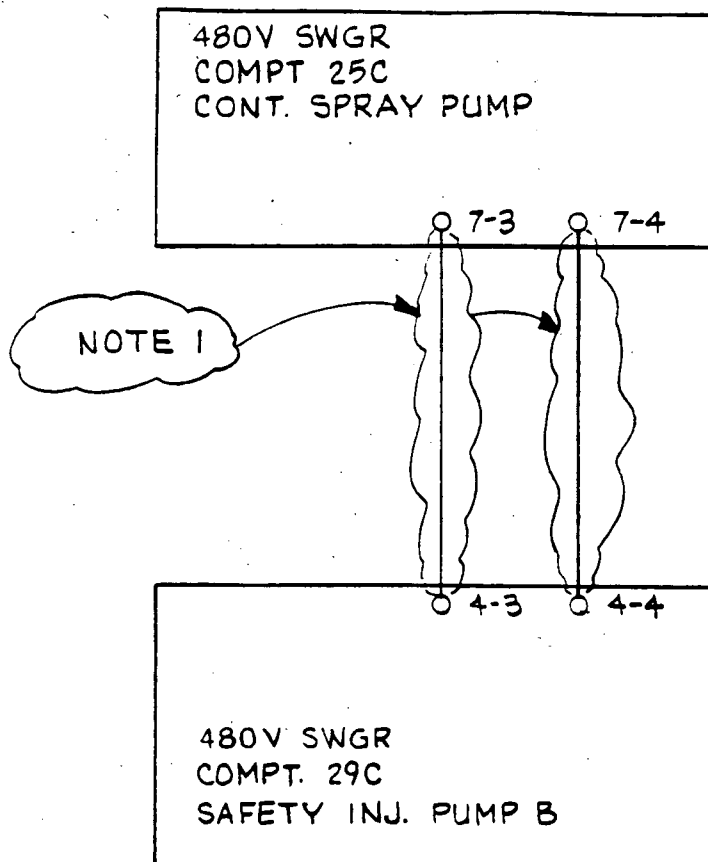
NOTES:

1. INSTALL CABLES BETWEEN COMPARTMENTS AS SHOWN, UTILIZING EXISTING TROUGHS & WIREWAYS. TAG CABLES AS SHOWN.

2. CABLE TO BE USED IS ITEM NO. 10 ON THE BOM.

CONSTRUCTION ONLY

				CAROLINA POWER & LIGHT CO. H.B. ROBINSON STEAM ELECTRIC PLANT			
				SAFETY-RELATED			
				+80V SWGR. CABLE INSTALLATION/TERMINATIONS			
A	88 AUG 25	PM 958		DESIGN BY	CHK'D	REV'D	APPROV.
REV'D	DATE	DESCRIPTION					
				REF. CNG.			
				SKETCH NO. SK-958-Z-7025			

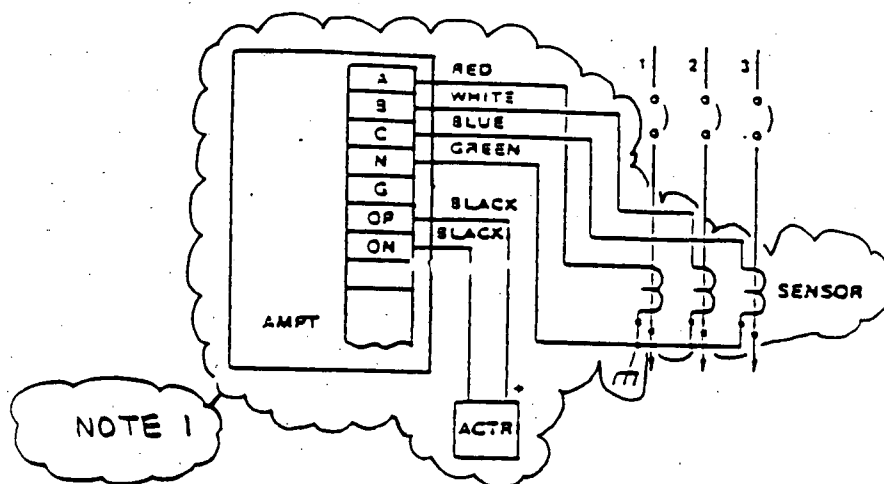


NOTES:

- I. DISCONNECT BOTH ENDS OF CABLE. TAPE BACK AND SPARE.

CONSTRUCTION ONLY

				CAROLINA POWER & LIGHT CO. H.B. ROBINSON STEAM ELECTRIC PLANT			
				SAFETY - RELATED			
				480V SWGR WIRE REMOVAL			
REV NO	DATE	DESCRIPTION	DRAWN BY	CHECKED BY	REV'D BY	APPROVED BY	REF. DWG.
A	25	PM 958	WLG	RAE	RAE	RAE	B-190628 SMT 550 REV. 2
							SKETCH NO. SK-958-Z-7026



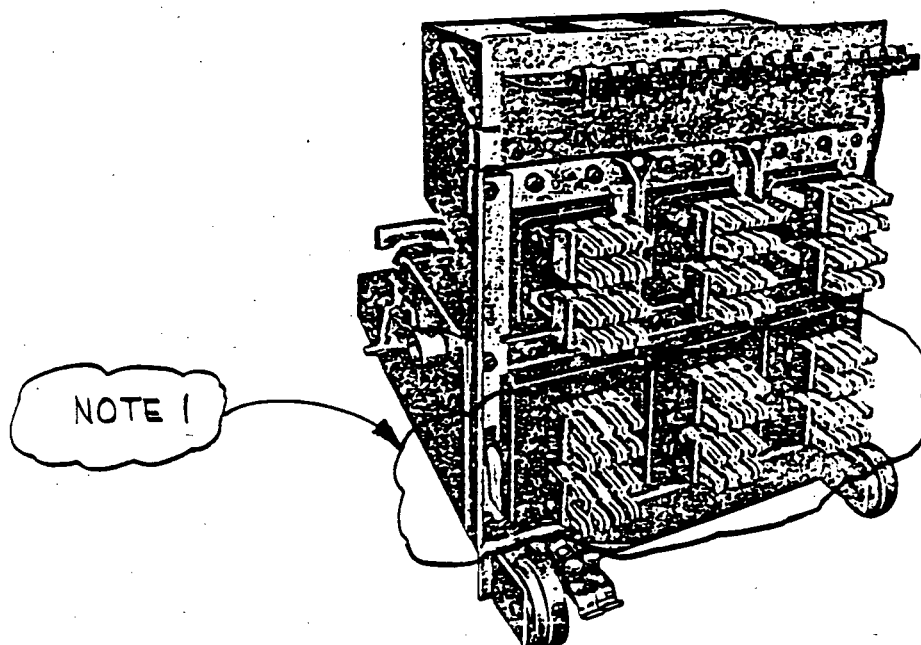
COMPT, 29C

NOTES:

1. REMOVE THE AMPTECTOR, CURRENT SENSORS, ACTR, AND THEIR ASSOCIATED WIRING

CONSTRUCTION ONLY

				CAROLINA POWER & LIGHT CO. H.B. ROBINSON STEAM ELECTRIC PLANT			
				SAFETY - RELATED			
				"B" SI FEEDER BREAKER 52/29C AMPTECTOR DISABLE			
REV. NO.	DATE	DESCRIPTION	CHANGED BY	CHANGED BY	REV. NO.	DATE	DESCRIPTION
A	AUG 88	PM-958	WLB	WLB			
							REF. CHG.
				SKETCH NO. SK-958-Z-7027			



NOTES:

- I. REPLACE EXISTING 3000/5 AMP CURRENT SENSORS WITH NEW 1000/600/5 AMP SENSORS.  
(ITEM 9 OF BILL OF MATERIAL)

CONSTRUCTION ONLY

				CAROLINA POWER & LIGHT CO. H.B. ROBINSON STEAM ELECTRIC PLANT			
				SAFETY-RELATED			
B	'88 OCT. 12	REVISED PER PLANT COMMENT	WJG RFE	WJG RFE	WJG RFE	AC	E1 & E2 TIE BREAKERS 52/22B & 52/29B CURRENT SENSOR CHANGEOUT
A	'88 AUG. 25	PM-958	WJG RFE	WJG RFE	WJG RFE	AC	
REV. NO.	DATE	DESCRIPTION	DESIGNED BY	CHECKED BY	APPROVED BY	REF. DWG.	SKETCH NO. SK-958-Z-7028

NOTES:

- CONSTRUCTION ONLY

			/		CAROLINA POWER & LIGHT CO. H.B. ROBINSON STEAM ELECTRIC PLANT
			/		SAFETY - RELATED
			/		E1 & E2 TIE BREAKERS 52/22B & 52/29B AMPTECTOR CHANGE-OUT
A <sup>88</sup> 25	APR 6	PM-958	HIG RE ALL AL		
REV NO.	DATE	DESCRIPTION	DRAWN BY	CHK'D BY	APPV.
					REF. CWS.
					SERIAL NO. SK-958-Z-7029

ROBINSON NUCLEAR PROJECT

UNIT NO. 2

PLANT MODIFICATION M-958

ADD AUTO START TO "B" SI PUMP

ATTACHMENT 13

DESIGN CHANGE NOTICES

List of Effective Pages

Page 1

Rev. 0

M-958-13, Revision 0

*Raymond J. M. [Signature]*  
Cognizant Engineer

14 JUNE 88

Date

Uncontrolled Copy  
For Information Only

(PM958/jap)