JANUARY 17 1979

MEMORANDUM FOR: Thomas A. Ippolito, Chief, Operating Reactors Branch #3, DOR

FROM: David M. Verrelli, Project Manager, Operating Reactors Branch #3, DOR

SUBJECT: SUMMARY OF MEETING HELD ON JANUARY 10, 1979 WITH GEORGIA POWER COMPANY REGARDING MODIFICATIONS TO THE HATCH UNITS NOS. 1 AND 2 RPS POWER SUPPLY

1. On January 10, 1979, members of the NRC Staff met with representatives of the Georgia Power Company in Bethesda, Maryland. The purpose of the meeting was to review the licensee's proposed conceptual design of a Class IE system capable of protecting the Reactor Protection System (RPS) from unacceptably poor electrical power.

2. The licensee presented a summary of the present trip system and the proposed modification. Enclosure 1 is a copy of material relevant to the licensee's presentation.

3. The Staff indicated that the proposed design appears to be acceptable on the conditions that the licensee provides information on the following items:

   a. Alternate RPS power supply - since the proposed design does not provide protection for failures of the alternate source, a Technical Specification limiting the duration and total length of time this alternate source is connected to either RPS bus would have to be defined and justified. An alternative would be to install Class IE protection against failure of this source.

   b. Proposed Setpoints - certain proposed setpoints (e.g., under voltage and under frequency trip settings) deviate from currently approved Technical Specification limits. These deviations would have to be justified.

   c. Time delay - the proposed time delay of 6 seconds would have to be justified considering the loads connected to the RPS bus.

M4
GD

4. The Staff suggested that the licensee proceed with final design and request formal Commission approval, with associated Technical Specification changes as necessary.

5. A list of Attendees is attached.

Original signed by

David M. Verrelli, Project Manager
Operating Reactors Branch #3
Division of Operating Reactors

Enclosures:
1. Licensee's Presentation
2. List of Attendees

DISTRIBUTION:
See attached sheet

OFFICE ➤	ORB#3	DSS	PSB	ORB#3		
SURNAME ➤	DVerrelli:acm	FRosa	GLainas	TIppolito		
DATE ➤	1/ /79	1/ /79	1/ /79	1/ /79		

EDWIN I. HATCH NUCLEAR PLANT

(Docket No. 50-321)

GEORGIA POWER COMPANY

PRESENTATION ON REACTOR PROTECTION SYSTEM POWER SUPPLY PROPOSED MODIFICATION

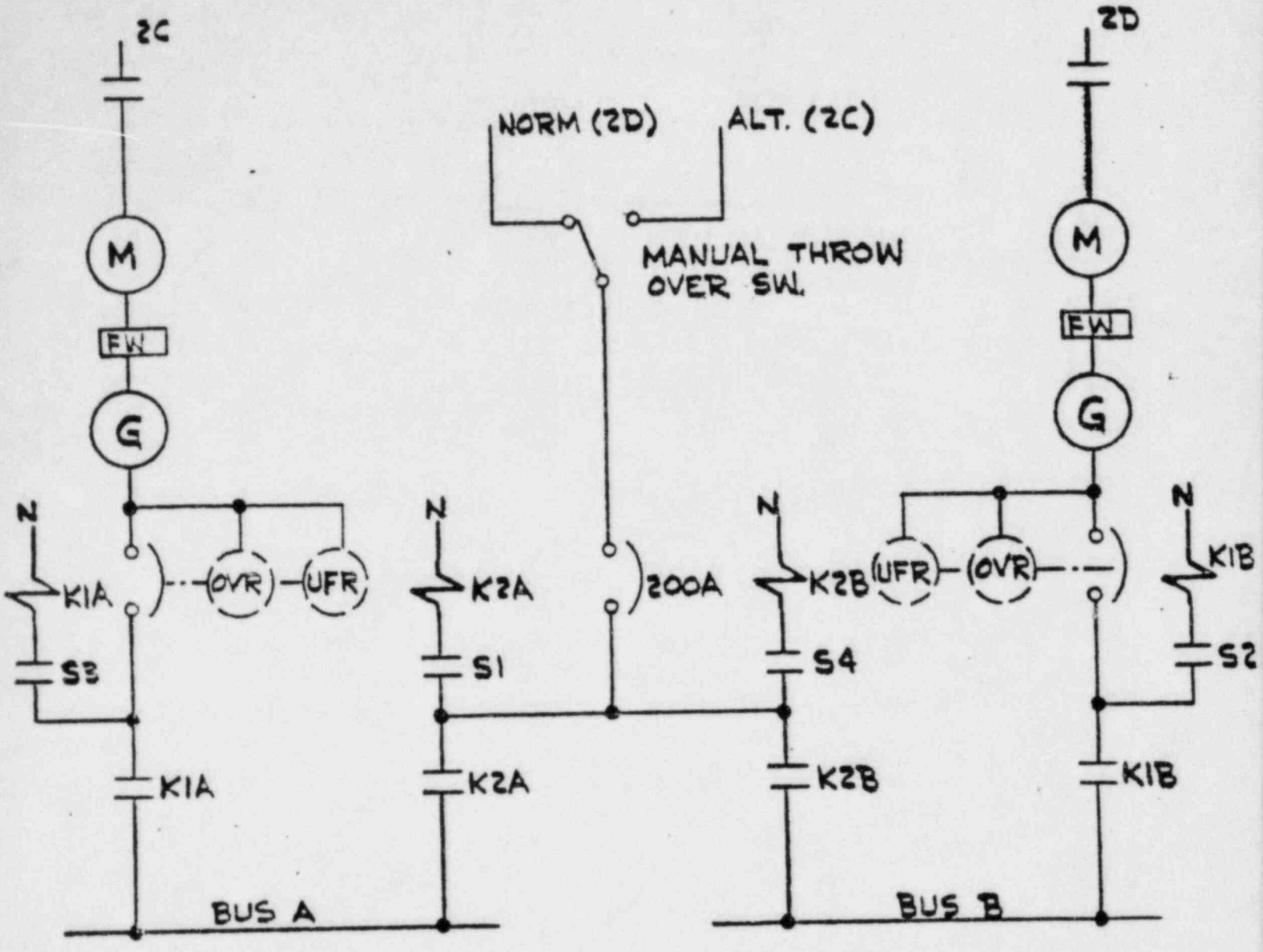
Attachment I -- Chronological History

Attachment II -- Proposed Design

CHRONOLOGICAL HISTORY
OF
PROPOSED RPS POWER SUPPLY MODIFICATION

June 13, 1978	Georgia Power Company receives full power operating license for Unit 2
	Item 5 of the staff open items requires that a class IE trip system be installed on the Unit 2 Reactor Protection System power supply prior to start-up following first scheduled refueling outtage.
	NRC review of plans prior to April 1979
August 7, 1978	NRC increases surveillance requirements on Unit 1 to similar requirements of Unit 2 for RPS power system.
August 7, 1978	NRC grants exemption to license from General Design Criteria 2 until next refueling outtage on Unit 1 for installation class IE trip system on the RPS power supply.
September 14, 1978	General Electric meets with the NRC with a presentation of its generic modification to the RPS power supply system.
	General Electric schedule for the first implementation is December 1979.
	Note: Schedule imposed on Hatch 1 is first subsequent refueling outtage (Spring 1979)
October 31, 1978	General Electric letter to NRC (R. S. Boyd)
	Request approval of conceptual design which includes RPS MG set feeder breaker arrangement plus addition of Class IE trips on the alternate feeder.

PRESENT M.G. (RPS) SYSTEM



SWITCH: NORM (2,3) — CLOSES K1A & K1B
ALT. A (1,2) — CLOSES K2A & K1B
ALT. B (3,4) — CLOSES K1A & K2B

CATALOG 214A262
UNDER FREQUENCY MONITOR

WITH ADJUSTABLE DIFFERENTIAL
AND ADJUSTABLE TIME DELAY ON DROPOUT

SOLID-STATE
ELECTRONIC
CONTROLS

8D4051

DATA SHEET

GENERAL:

ASCO Catalog 214A262 Under Frequency Monitor is designed for use on a single phase power source. When applied to polyphase power sources, this Monitor will sense an under frequency condition on one phase. These Monitors are available with input voltage ratings to accommodate phase to neutral or phase to phase sensing of the polyphase power source.

The Monitor combines under frequency sensing with an adjustable differential and time delay on trip into one unit utilizing a single output relay. Adjustable reset, trip and time delay settings are accessibly provided.

These Monitors provide high reliability, assured repetitive accuracy of response, and long maintenance-free life. Users can apply these Monitors in frequency critical applications with confidence that the product has been designed to industrial control standards.

These objectives have been achieved through the use of silicon semi-conductors in combination with an ASCO industrial control class output relay, assuring total adequacy of performance.

CONSTRUCTION AND INSTALLATION:

Catalog 214A262 Monitor consists of a compact chassis assembly containing the solid state elements (mounted on a printed circuited board and coated for protection against the industrial atmosphere), the output relay, and terminals for connections.

The chassis assembly measures 3½" wide x 6½" high x 5¼" deep. NEMA type enclosures measure 10" wide x 10" high x 6" deep.

The Monitor identified as Catalog 214A262 is the open type assembly. NEMA type enclosures are available. These are identified by the suffix C1, C12, etc., indicating the NEMA enclosure type.

Field installation simply requires connection of the Monitor to a source of voltage and connection to the output relay contacts.

The net weight of the open type Monitor is 3 pounds (Shipping weight: 4 pounds, 8 ounces).

ORDERING INFORMATION:

When placing an order for this Monitor, specify Catalog Number, nominal input voltage, nominal frequency, trip, reset, and time delay settings.

Automatic Switch Co. HANOVER ROAD,
FLORHAM PARK, NEW JERSEY 07932
Telephone: Area Code 201 • 966-2000

SOLID–STATE
ELECTRONIC
CONTROLS

8D4051

DATA SHEET

CATALOG 214 262
UNDER FREQUENCY MONITOR

WITH ADJUSTABLE DIFFERENTIAL
AND ADJUSTABLE TIME DELAY ON DROPOUT

OPERATION:

Catalog 214A262, Under Frequency Monitor, is designed to energize the chassis mounted output relay whenever the frequency level exceeds the reset point and to deenergize the output relay whenever the frequency level falls below the trip point and remains at this level until the time delay has expired. Should the frequency level raise to a point slightly above the trip setting before the time delay has expired, the Monitor will reset itself automatically and give no indication of failure. This results in a virtual zero differential about the trip setting. Should, however, the frequency level remain below the trip setting for the duration of the time delay, the output relay will deenergize and the frequency level must be raised to the reset point before the Monitor will automatically reset itself. The time delay is accurate and effective only over the Monitor's input voltage range (70 to 125% of nominal).

RATINGS: (continuous duty)

Nominal Input Voltage	120, 208, 240, 440 or 480 Volts 50/60 Hz. (As Specified)
Input Voltage Range	70 to 125% of Nominal
Under Frequency Trip Range of Adjustability	40 to 60 Hz.
Under Frequency Reset Range of Adjustability	approximately 0.2 to 10 Hz. above trip point
Time Delay (on Trip) Range of Adjustability	0.1 to 6 seconds
Environmental Temperature Range	0°C to 45°C
Repetitive Accuracy of Response	± 0.2 Hz.
Volt-Ampere Burden of Monitor	3.5 VA @60 Hz.
Transient Withstand	2000 volts for 200 micro-seconds
Output Relay:	
Contact Configuration	2 pole, double throw (6 terminals provided)
Continuous Current Rating	10 amperes
Voltage Rating for General Use	1 pole to load 10 amps @ 120 VAC
	6 amps @ 240 VAC
	3 amps @ 480 VAC
	2 amps @ 600 VAC
	2 pole to load 10 amps @ 480 VAC
	7.5 amps @ 600 VAC

Note: Double throw rating applies only when used with sources of same polarity.

ASCO Solid State Frequency Monitors are insensitive to voltage, over the range of 70 to 125% of nominal, and respond to frequency levels only.

CATA OG 214A262
UNDER FREQUENCY MONITOR
WITH ADJUSTABLE DIFFERENTIAL
AND ADJUSTABLE TIME DELAY ON DROPOUT

SOLID–STATE
ELECTRONIC
CONTROLS
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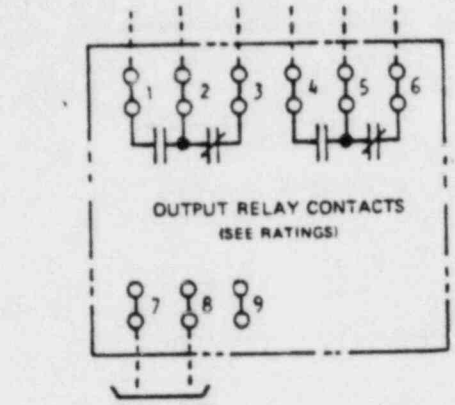
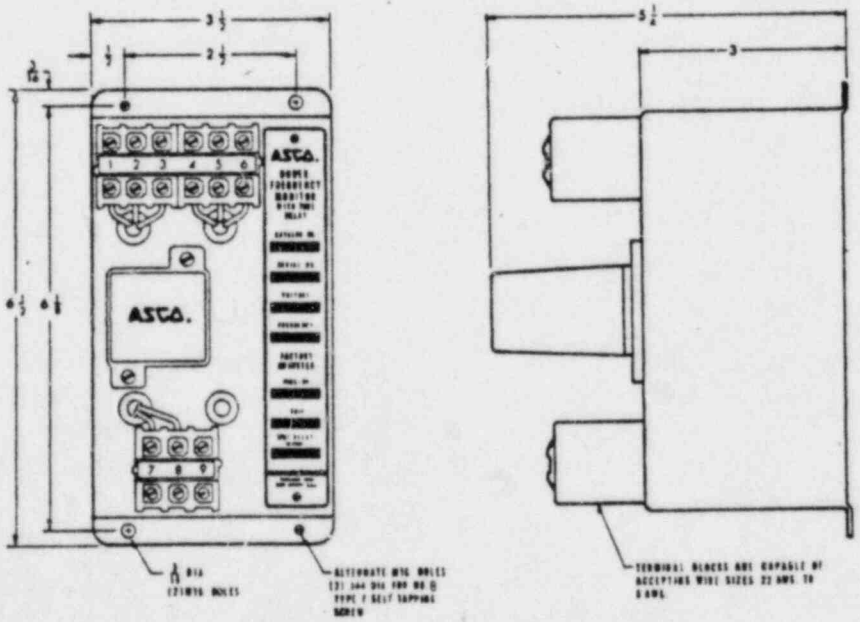
DATA SHEET



WIRING CONNECTIONS

CUSTOMER CONNECTIONS SHOWN DOTTED
MONITOR SHOWN DE-ENERGIZED



OUTLINE AND WIRING CONNECTIONS

(Dimensions in inches)

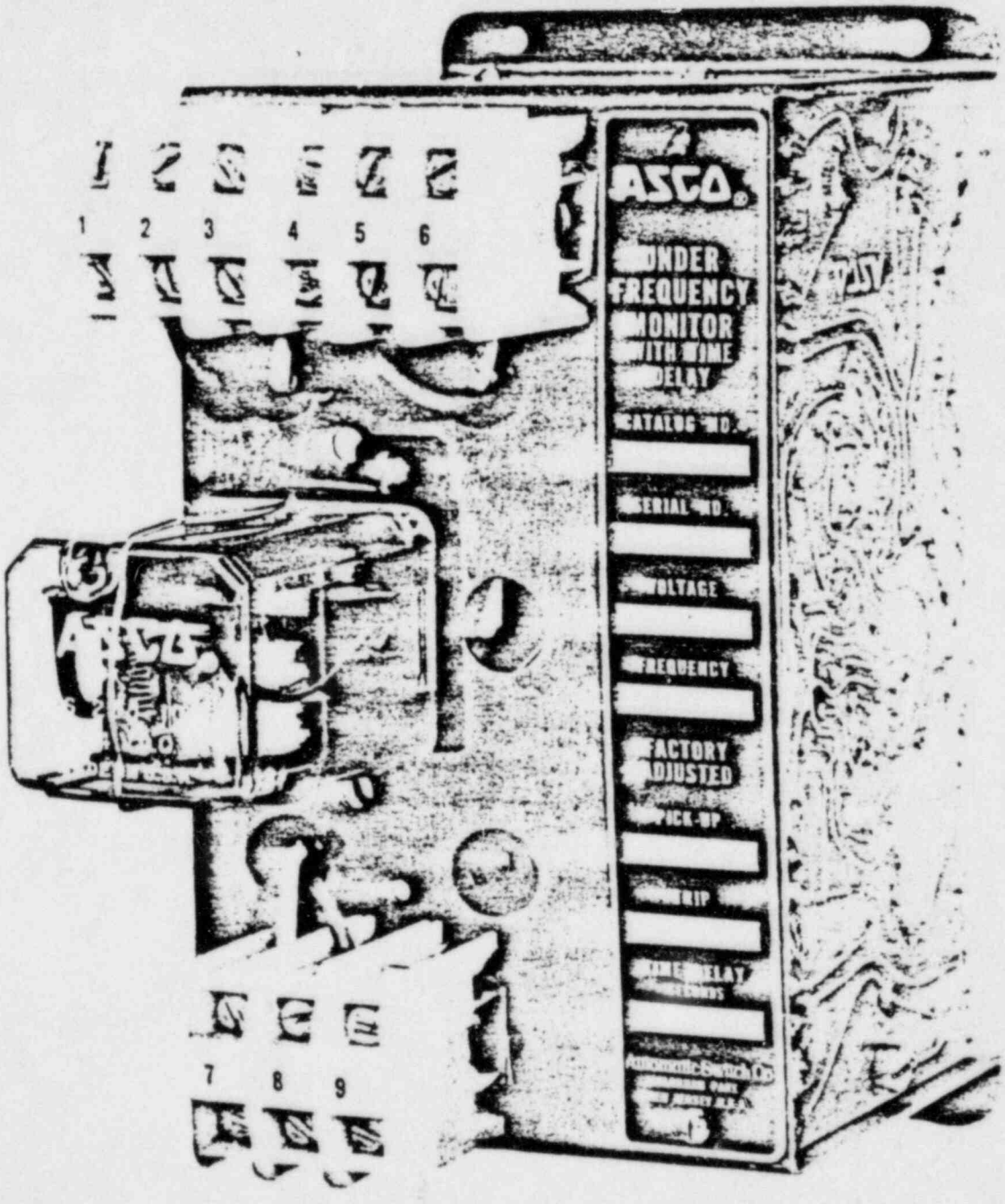
SOLID–STATE
ELECTRONIC
CONTROLS

8D4051

DATA SHEET

CATALOG 214^262
UNDER FREQUENCY MONITOR

WITH ADJUSTABLE DIFFERENTIAL
AND ADJUSTABLE TIME DELAY ON DROPOUT



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FLORHAM PARK, NEW JERSEY 07932
Telephone: Area Code 201 • 666-2900

CATA' OG 214A261 SINGLE PHASE RMS UNDER VOLTAGE MONITOR

WITH ADJUSTABLE TIME DELAY ON DROPOUT

SOLID–STATE ELECTRONIC CONTROLS

8D4052

DATA SHEET

GENERAL:

ASCO Catalog 214A261 RMS Under Voltage Monitor is designed for use on a single phase power source. It combines RMS under voltage sensing with time delay on dropout into one unit utilizing a single output relay. Adjustable pickup, dropout, and time delay settings are provided. The additional desirable feature of virtual zero differential about the dropout setting after initial energization has also been designed into this Monitor.

The Monitor uses the "operational" method of RMS (Root Mean Square) detection to insure accuracy of response. This technique permits the Monitor to accurately maintain its trip setting at the actual RMS value of the power source voltage irrespective of harmonics or other line distortions.

Catalog 214A261 Monitors provide high reliability, assured repetitive accuracy of response and long maintenance-free life. Users can apply these Monitors for voltage critical loads with the confidence that the product has been designed to industrial control standards.

These objectives have been achieved through the use of integrated circuits and discrete semiconductors in combination with an ASCO industrial control class output relay, assuring total adequacy of performance.

CONSTRUCTION AND INSTALLATION:

Catalog 214A261 Monitor consists of a compact chassis assembly containing the solid state elements (mounted on a printed circuit board and coated for protection against the industrial atmosphere), the output relay, and terminals for connections.

The chassis assembly measures 3½" wide x 6½" high x 5¼" deep. NEMA type enclosures measure 10" wide x 10" high x 6" deep.

The Monitor identified as Catalog 214A261 is the open type assembly. NEMA type enclosures are available. These are identified by the suffix C1, C12, etc., indicating the NEMA enclosure type.

Field installation simply requires connection of the Monitor to a source of voltage and connection to the output relay contacts.

The net weight of the open type Monitor is 3 pounds (Shipping weight: 4 pounds, 8 ounces).

ORDERING INFORMATION:

When placing an order for this Monitor, specify Catalog Number, nominal input voltage, nominal frequency, pickup, dropout, and time delay settings.

OPERATION:

The purpose of monitoring power line voltage is to determine the quality of the line and its ability to deliver power to the load. Since the RMS or effective voltage is related to line power, it is this value that most accurately reflects the line condition.

The definition of RMS voltage is that value of a voltage that corresponds to the effective D.C. heating value of the waveform. Mathematically it is defined by the equation:

$$E_{RMS} = \sqrt{\frac{1}{T} \int_0^T e^2(t)\, dt}$$

The Monitor must process or "operate" on the power line waveform defined as e(t) in terms of the previous equation. In effect, the Monitor squares, averages and then roots the input waveform e(t) to obtain the RMS value of voltage. This voltage is then compared with an internal reference which determines the status of the output relay.

CATALOG 214A261
SINGLE PHASE
RMS UNDER VOLTAGE MONITOR

WITH ADJUSTABLE TIME DELAY ON DROPOUT

Catalog 214A261 Single Phase RMS Under Voltage Monitor is designed to energize the chassis mounted output relay whenever the RMS voltage level exceeds the pre-set pickup point (adjustable from 85 to 100% of nominal voltage) and to de-energize the output relay whenever the RMS voltage level falls below the preset dropout point (adjustable from 80 to 95% of the pickup voltage setting) and remains at this level until the time delay (adjustable from 0.1 to 6 seconds) has expired. Should the RMS voltage level raise to a point slightly above the dropout setting before the time delay has expired, the Monitor will reset itself automatically and give no indication of failure (virtual zero differential about the dropout setting). Should the RMS voltage level remain below the dropout setting for the duration of the time delay, the output relay will de-energize and the RMS voltage level must be raised above the pickup setting before the Monitor will automatically reset itself.

The time delay is accurate and effective over the Monitor's entire range of adjustability (68 to 125% of nominal voltage).

RATINGS: (continuous duty)

Nominal Input Voltage	120, 208, 240, 440 or 480 Volts 50/60 Hz. (As Specified)
Maximum Input Voltage	125% of nominal
Undervoltage Pickup Range of Adjustability	85 to 100% of nominal
Undervoltage Dropout Range of Adjustability	80 to 95% of pickup voltage
Time Delay (on Dropout) Range of Adjustability	0.1 to 6 seconds
Environmental Temperature Range	0°C to 45°C
Repetitive Accuracy of Response	± 2%
Volt-Ampere Burden of Monitor	5.0 VA @ 60 Hz.
Transient Withstand	2000 volts for 200 micro-seconds
Output Relay:	
Contact Configuration	2 pole, double throw (6 terminals provided)
Continuous Current Rating	10 amperes
Voltage Rating for General Use	1 pole to load 10 amps @ 120 VAC
	6 amps @ 240 VAC
	3 amps @ 480 VAC
	2 amps @ 600 VAC
	2 poles to load 10 amps @ 480 VAC
	7.5 amps @ 600 VAC

Note: Double throw rating applies only when used with sources of same polarity.

ASCO Solid-State Voltage Monitors are unaffected, in the accuracy of voltage response, by frequency variations over the range of 50 to 70 hertz.

Automatic Switch Co. HANOVER ROAD,
FLORHAM PARK, NEW JERSEY 07932
Telephone: Area Code 201 • 966-2000

CATALOG 214A261
SINGLE PHASE
RMS UNDER VOLTAGE MONITOR
WITH ADJUSTABLE TIME DELAY ON DROPOUT

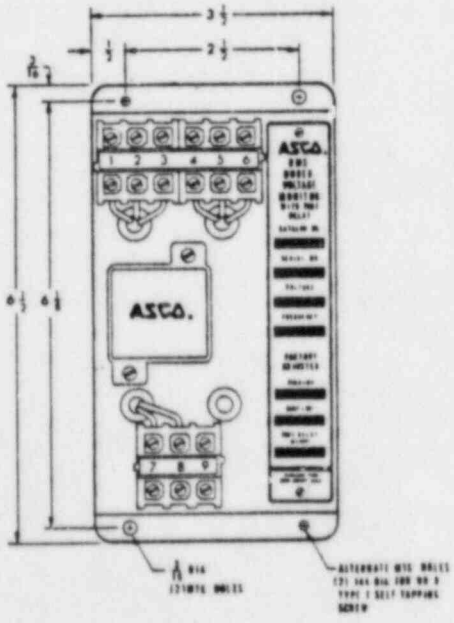
SOLID–STATE
ELECTRONIC
CONTROLS

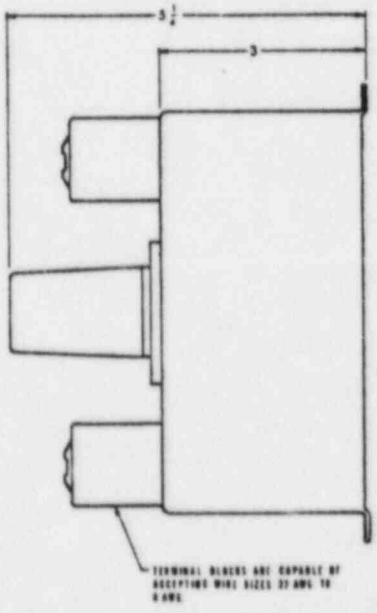
8D4052

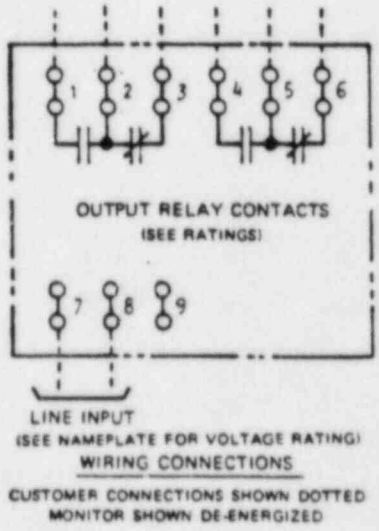
DATA SHEET

CALIBRATION PROCEDURE:

1. Remove the two screws holding the nameplate and remove the nameplate.
2. Rotate the pickup control (PU) to the maximum clockwise position (a faint click will be heard).
3. Rotate dropout control (DO) to maximum counter-clockwise position (a faint click will be heard).
4. Rotate time delay control (TD) to maximum counter-clockwise position (a faint click will be heard).
5. Apply nominal voltage to Monitor. Output relay should be de-energized.
6. Adjust input voltage until voltage is at the desired pickup point (adjustable 85 to 100% of nominal). Rotate pickup control slowly counter-clockwise until the output relay just picks up.
7. Adjust input voltage until voltage is at the desired dropout point (adjustable from 80 to 95% of pickup voltage). Rotate dropout control slowly clockwise until the output relay just drops out.
8. Rotate time delay control clockwise approximately 5 turns.
9. Lower the input voltage to the Monitor to a value slightly below the dropout point. The lowering of the voltage should be synchronized with the initiation of a timing device such as a stop watch. When the output relay de-energizes the elapsed time should be noted on the timing device. If the time delay is greater than the desired time, the time delay control should be rotated in the counter-clockwise direction. If the time delay is less than the desired time, the time delay control should be rotated in the clockwise direction. The time delay should be checked after each adjustment is made. The process should be repeated until the time delay is at the desired value. Replace nameplate.
10. The Under Voltage Monitor is now completely calibrated and ready for use.







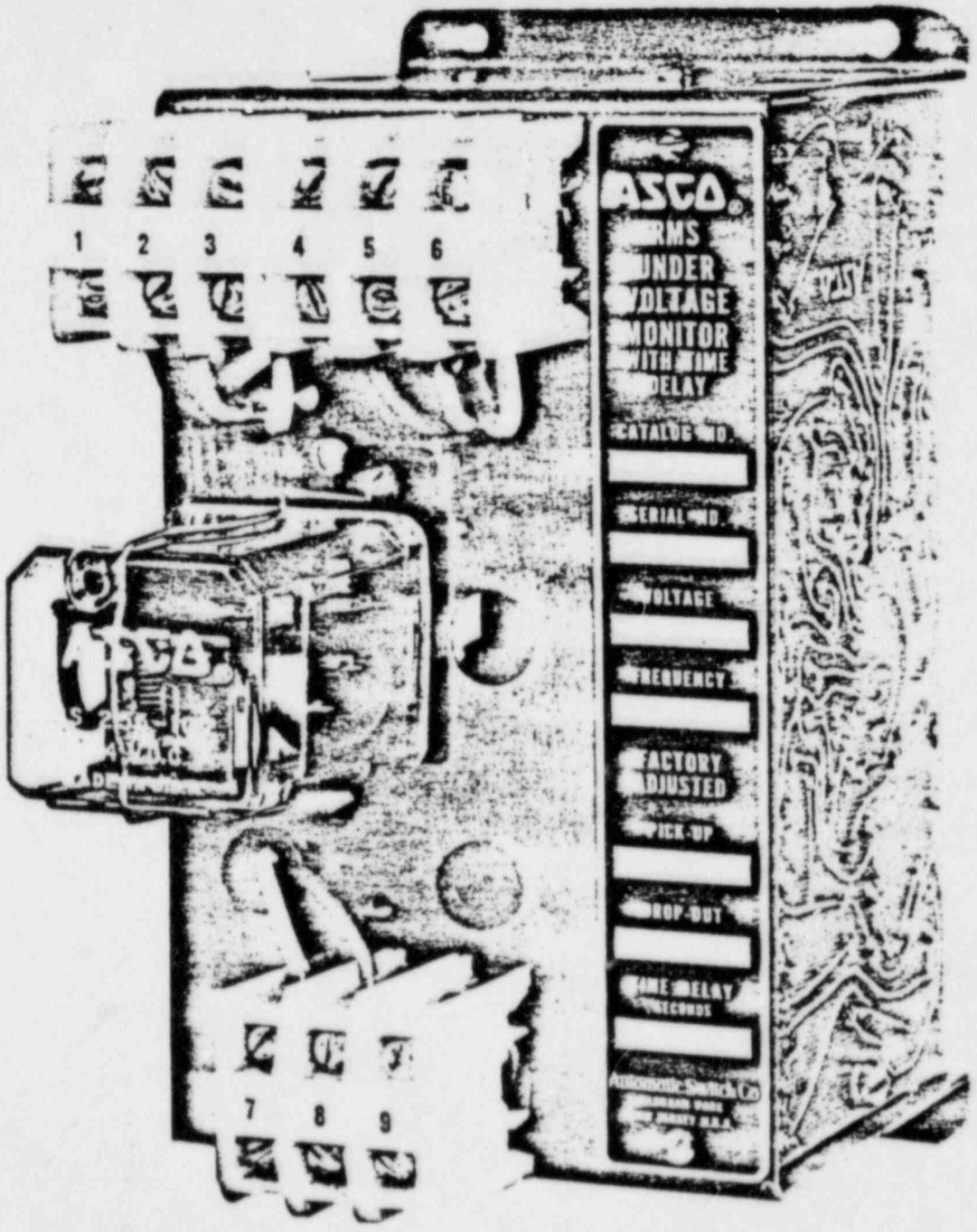
WIRING CONNECTIONS

CUSTOMER CONNECTIONS SHOWN DOTTED
MONITOR SHOWN DE-ENERGIZED

OUTLINE AND WIRING CONNECTIONS
(Dimensions in inches)

CATALOG 214^261
SINGLE PHASE
RMS UNDER VOLTAGE MONITOR

WITH ADJUSTABLE TIME DELAY ON DROPOUT



CATALOG 214B70
OVER VOLTAGE MONITOR

SOLID-STATE
ELECTRONIC
CONTROLS
8D4097
DATA SHEET

GENERAL:

ASCO Catalog 214B70 Monitor is a single phase over voltage monitor with readily adjustable trip setting and a fixed differential of approximately 3%.

These Monitors provide high reliability, assured repetitive accuracy of response, and long maintenance-free life. Users can apply these Monitors for voltage critical loads with confidence that the product has been designed to industrial control standards.

These objectives have been achieved through the use of silicon semi-conductors in combination with an ASCO industrial control class output relay, assuring total adequacy of performance.

CONSTRUCTION AND INSTALLATION:

Catalog 214B70 Monitor consists of a compact chassis assembly containing the solid state elements (mounted on a printed circuit board and coated for protection against the industrial atmosphere), the output relay, and terminals for connections.

The chassis assembly measures 2⅝" wide x 4½" high x 5⅜" deep. NEMA type enclosures measure 8" wide x 8" high x 6" deep.

The Monitor identified as Catalog 214B70 is the open type assembly. NEMA type enclosures are available. These are identified by the suffix C1, C12, etc., indicating the NEMA enclosure type.

The output relay provides one normally open, double break contact. Remove jumper between terminals 1 and 3 for a 2 pole, normally open contact arrangement. See page 2 for contact rating.

Field installation simply requires connection of the Monitor to a source of voltage and connection to the output relay contacts.

The net weight of the open type Monitor is 2 pounds, 2 ounces (Shipping weight: 4 pounds).

OPERATION:

Catalog 214B70 Over Voltage Monitor is designed to de-energize the chassis mounted output relay (opening its 10 ampere contacts) whenever the voltage level exceeds the pre-set trip point (adjustable from 100% to 115% of nominal voltage).

A fixed differential of approximately 3% has been designed into the Monitor. When an over voltage condition has been detected by the Monitor and the output relay has de-energized, the voltage level must be reduced approximately 3% below the pre-set trip setting before the output relay will energize (closing its 10 ampere contacts) and thus indicate a normal condition.

Upon energization of the Monitor from a zero (0) potential condition, the output relay will energize at approximately 50% of nominal. Energizing the Monitor at nominal voltage will energize the output relay immediately.

The response time of the Monitor on trip is approximately 50 milli-seconds. This is the total time measured from the instant the voltage attains the Monitor pre-set trip point to the opening of the contacts on the output relay.

Automatic Switch Co. HANOVER ROAD,
FLORHAM PARK, NEW JERSEY 07932
Telephone: Area Code 201 • 966-2000

CATALOG 214B70
OVER VOLTAGE MONITOR

RATINGS: (continuous duty)

Nominal Input Voltage	120, 208, 240, 440 or 480 Volts 50/60 Hz. (As Specified)
Maximum Input Voltage	125% of Nominal
Trip Voltage Range of Adjustability	100% to 115% of Nominal Voltage
Fixed Differential	3% of Trip Voltage
Environmental Temperature Range	0°C to 45°C
Repetitive Accuracy of Response	± 2%
Volt-Ampere Burden of Monitor	2.5 VA
Transient Withstand	2000 volts for 200 micro-seconds
Output Relay:	
Contact Configuration	1 pole, n/o, double break
Continuous Current Rating	10 amperes
Voltage Rating for General Use	1 pole to load 10 amps@120 VAC
	6 amps@240 VAC
	3 amps@480 VAC
	2 amps@600 VAC
	2 pole to load 10 amps@480 VAC
	7.5 amps@600 VAC

ASCO Solid State Voltage Monitors are insensitive to frequency and respond to voltage levels only.

ORDERING INFORMATION:

When placing an order for this Monitor, specify Catalog Number, nominal input voltage, nominal frequency, and trip voltage.

CALIBRATION PROCEDURE:

(All adjustments to be performed at nominal frequency as specified on nameplate.)

1. Remove nameplate from Monitor to expose the adjustment potentiometer.
2. Rotate trip potentiometer to the maximum clockwise position.
3. Apply nominal input voltage to Monitor as specified on nameplate. Relay should energize.
4. Adjust input voltage to trip voltage as specified on nameplate.
5. Rotate trip potentiometer counter-clockwise until relay just drops out.
6. Check trip setting by varying the input voltage.
7. Replace nameplate. The Monitor is now completely calibrated and ready for use.

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CATALOG 214B70
OVER VOLTAGE MONITOR

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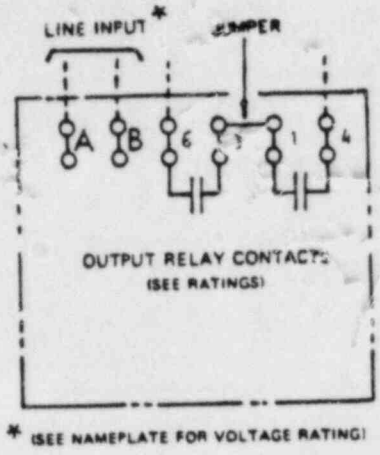
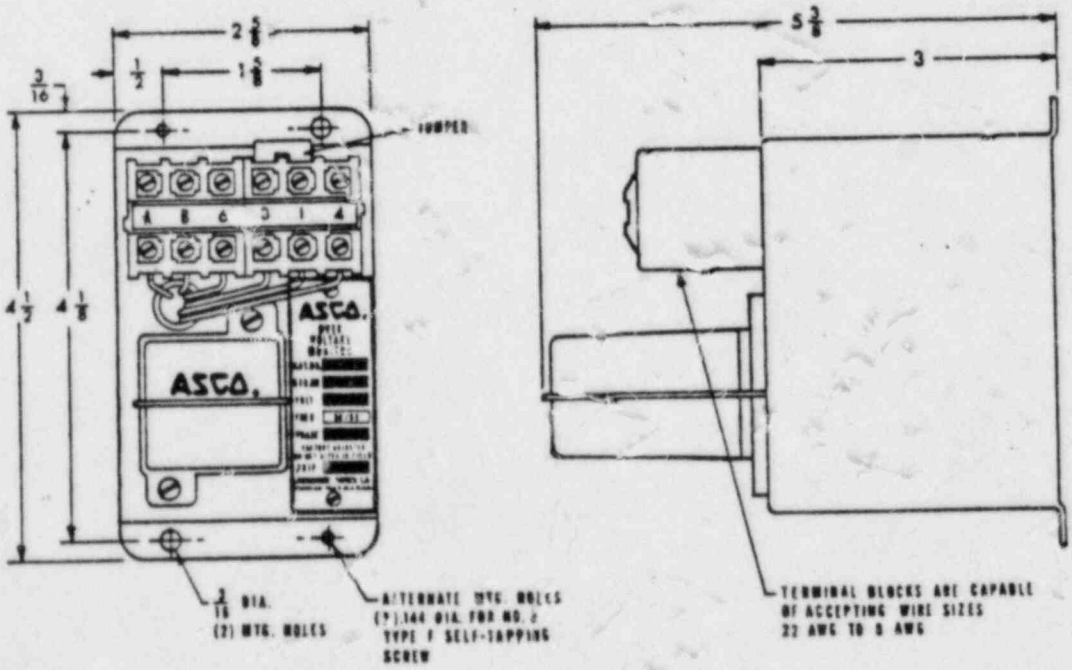
CONTROLS
8D4097
DATA SHEET



WIRING CONNECTIONS

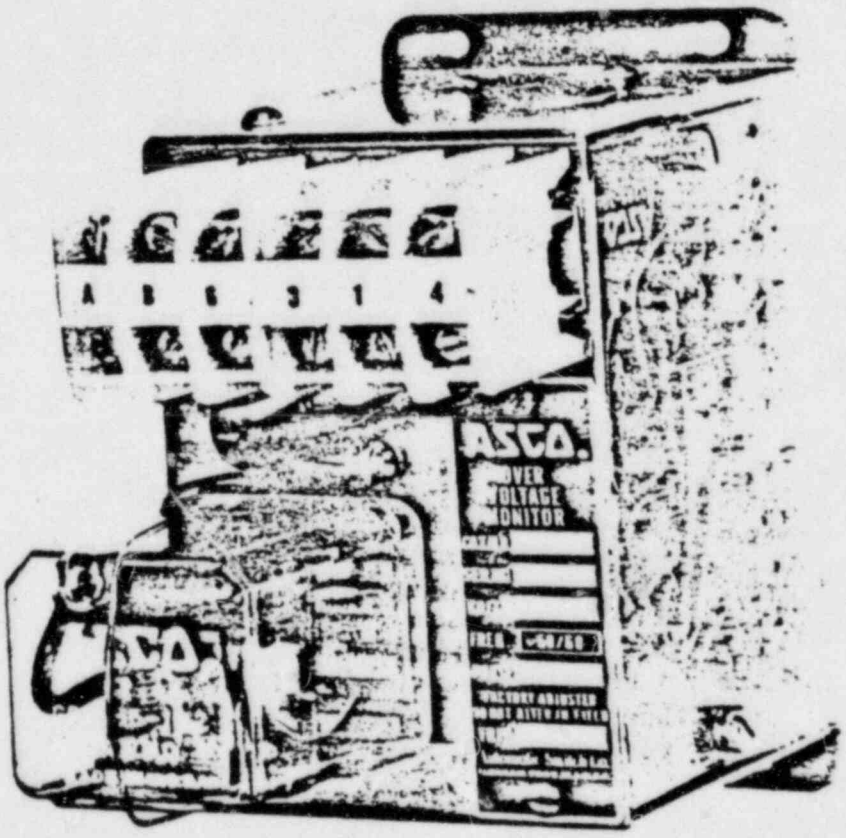
CUSTOMER CONNECTIONS SHOWN DOTTED
MONITOR SHOWN DE-ENERGIZED



OUTLINE AND WIRING CONNECTIONS

(Dimensions in inches)

CATALOG 214870
OVER VOLTAGE MONITOR



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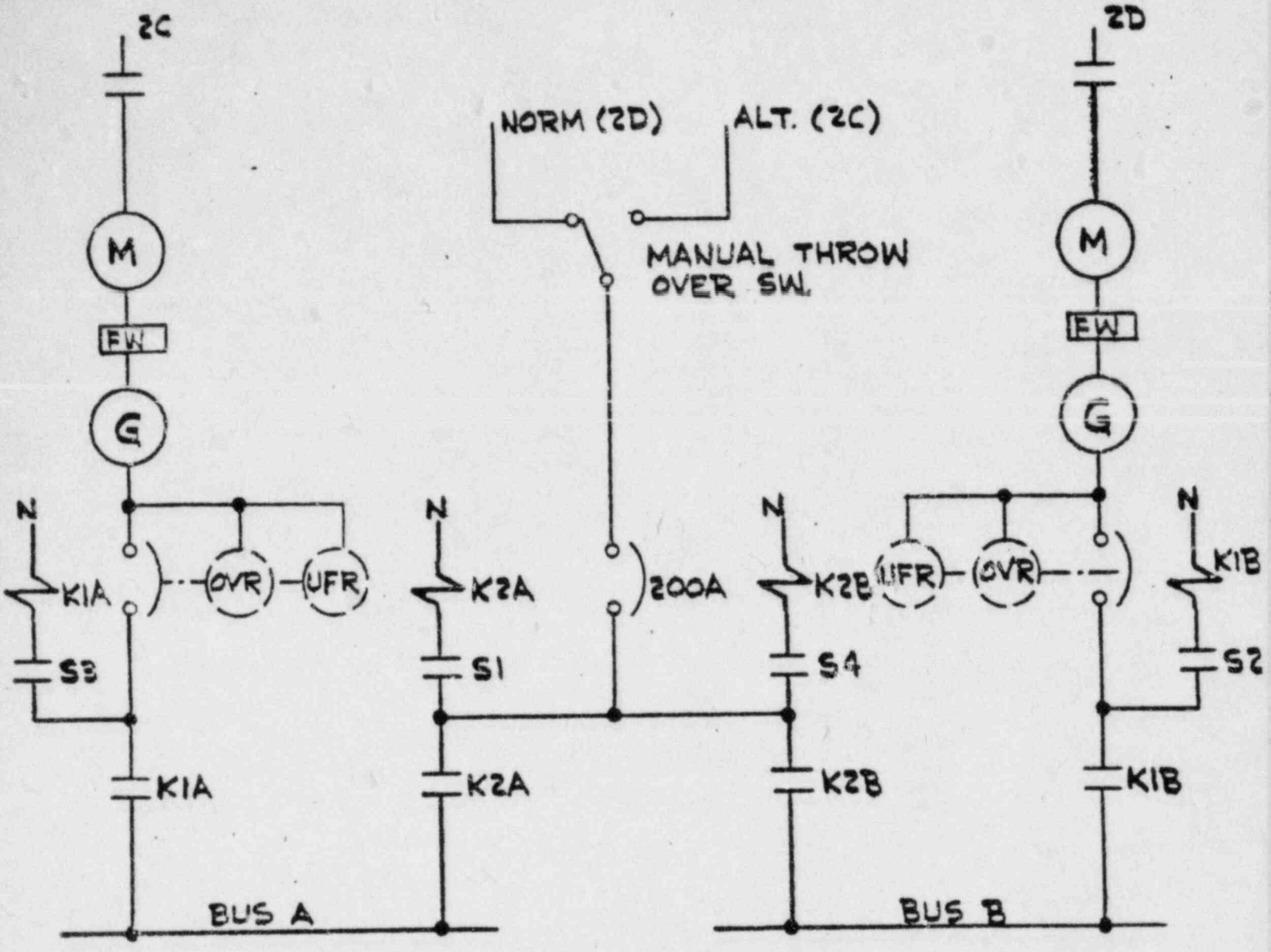
PRESENT M.G. (RPS) SYSTEM



SWITCH: NORM (2,3) CLOSES K1A & K1B
ALT. A (4,2) CLOSES K2A & K1B
ALT. B (3,4) CLOSES K1A & K2B

MEETING ATTENDANCE

JANUARY 10, 1979

"HATCH - RPS POWER SUPPLY MODIFICATION"

Name	Organization
David M. Verrelli	NRC
F. Rosa	NRC
D. Tondi	NRC
J. T. Beard	NRC
T. Ippolito	NRC
R. D. Baker	Georgia Power Company
J. A. Betaill	Georgia Power Company
J. R. Jordan	Georgia Power Company
C. T. Moore	Georgia Power Company
T. M. Milton	Southern Company Services
C. E. Feltman	Bechtel Power Corporation
L. L. Rowe	Bechtel Power Corporation
R. A. Glasby	Bechtel Power Corporation

UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D. C. 20555

Mr. Charles F. Whitmer
Vice President - Engineering
Georgia Power Company
P. O. Box 4545
Atlanta, Georgia 30302

G. F. Trowbridge, Esquire
Shaw, Pittman, Potts and Trowbridge
1800 M Street, N. W.
Washington, D. C. 20036

Ruble A. Thomas
Vice President
P. O. Box 2625
Southern Services, Inc.
Birmingham, Alabama 35202

Mr. Harry Majors
Southern Services, Inc.
300 Office Park
Birmingham, Alabama 35202

Mr. C. T. Moore
Georgia Power Company
Power Generation Department
P. O. Box 4545
Atlanta, Georgia 30302

Mr. L. T. Gucwa
Georgia Power Company
Engineering Department
P. O. Box 4545
Atlanta, Georgia 30302

Appling County Public Library
Parker Street
Baxley Georgia 31413

Mr. R. F. Rogers
U. S. Nuclear Regulatory Commission
P. O. Box 710
Baxley, Georgia 31513

Docket File 50-366
NRC PDR
Local PDR
NRR Rdg
ORB#3 Rdg
E. G. Case
V. Stello
H. Denton
D. Eisenhut
A. Schwencer
D. Ziemann
T. Ippolito
R. Reid
J. Miller
V. Noonan
P. Check
G. Lainas
B. Grimes
D. Davis
Project Manager
OELD
OI&E (3)
S. Sheppard
NRC Participants
ACRS (16)
TERA
J. R. Buchanan

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