07-201-01

NIAGARA MOHAWK POWER CORPORATION

NINE MILE POINT NUCLEAR STATION UNIT 2

OPERATING PROCEDURE

N2-OP-95B

REVISION 02

ROD SEQUENCE CONTROL SYSTEM

Approved by:
R. B. Abbott for
Joseph F. Firlit, Vice President - Nuclear Generation

RBAbbott

8/16/90
Date

FOR INFORMATION ONLY

Effective Date: 8/22/90

NOT TO BE USED AFTER August 1992
SUBJECT TO PERIODIC REVIEW

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A. REFERENCES

1.0 Technical Specification

3.1.3.1, Control Rods
3.1.3.7, Control Rod Position Indication
3.1.4.2, Rod Sequence Control System

2.0 Licensee Documentation

Updated Safety Analysis Report, USAR
Section 7.7.1.1.5, Rod Sequence Control Subsystem to RMCS

3.0 Standards, Regulations, and Codes

None

4.0 Policies, Programs, and Procedures

None

5.0 Technical Information

5.1 Flow Diagrams

None

5.2 Electrical Diagrams

791E406TY, GE Elementary, Reactor Manual Control System

5.3 Vendor Manuals

None

5.4 System Instruction Manuals

GEK-83320A, Reactor Manual Control System

6.0 Supplemental References

None

7.0 Commitments

None

B. SYSTEM DESCRIPTION

The Rod Sequence Control System is a hardwired control rod position control system which provides insert, withdraw and continuous drive permissive signals to the Reactor Manual Control System (RMCS) during reactor startup and shutdown when reactor power is less than 20% sensed by Turbine first stage pressure. These restrictions are imposed upon control rod movement to mitigate the consequences of a postulated Control Rod Drop Accident. The RSCS logic determines if the selected rod may be moved by the following inputs: 1) Control rod positions from the Rod Position Information System (RPIS), 2) Which rod is selected from the Rod Select Matrix on Panel 603, 3) Various field inputs, and 4) The operator-selected sequence.

The RSCS will prevent the movement of out-of-sequence rods and limit the movement of in-sequence rods to predetermined positions. This will insure no rod will develop a worth high enough to cause fuel damage should that rod drop out of the core.

The RSCS has the ability to bypass the address and position of up to eight control rods that may become inoperative. This will allow a great deal of flexibility in maneuvering control rods. The RSCS also contains an elaborate Self-Test feature that will determine system operability. The Self-Test is performed prior to startup and shutdown of the Reactor.

The major components of the RSCS consists of the RSCS display on Panel 603 and the RSCS Cabinet in Panel 659.

The RSCS display consists of a core map which has an amber and red LED for each control rod address. The amber LEDs are controlled by the amber display switch which will indicate either ALL RODS that are assigned to the rod group of the rod selected or the FREE RODS in the group in the rod selected that are free to be moved.

The red LEDs are controlled by the red display control switch which will select indication of either the RODS F.I. (rods full in) or control rods which are BYPASS.

The RSCS display contains a select switch for selecting the desired rod withdraw or insert sequence, A or B, a select switch for direction of rod movement either INSERT or W/DRAW which will indicate which rods are free for movement as indicated by their associated amber LEDs.

B. SYSTEM DESCRIPTION (Cont)

The substitute position select switch SEL SUB, on the RSCS display, enables the operator to accept substitute control rod position data in the event of a RPIS data fault, (no rod position information on the selected rod). There is also an indicator on this select switch (ABOVE LPSP) that will illuminate when Reactor power is above 20% of full rated as sensed at the first stage pressure of the Turbine. The RSCS also receives input from; the Rod Select Matrix (request word), the RPIS Cabinet (rod position) and the RDCS Cabinet. The RSCS outputs to; the RDCS Cabinet (rod selected), the Full Core Display (rod position), the RPIS Cabinet (rod is being driven), the Rod Select Matrix (continuous drive permissive), and the Plant Process Computer (alarm).

The RSCS Cabinet (panel 659), also known as the Rod Sequence Control Cabinet (RSCC), houses the logic, memory and power supplies for the RSCS. The logic is contained in the RSCS Page and the Memory in the Rod Pattern Controller (RPC) which is a general-purpose computer.

The RSCS Page contains 19 PC cards; one Clock/Logic 1 Card, one Memory 1 Card, one Buffer/Converter 1 Card, one Buffer/Converter 2A Card, one Buffer/Converter 2B Card, one Test 1 Card, one Test 2A Card, one Test 2B Card, one Test 3A Card, one Test 3B Card, one Bypass Control Card and eight Bypass Switch Cards.

The Clock/Logic 1 Card provides the timing and gating signals for the RSCS, the Memory 1 Card generates the alternate word, the Buffer/Converter Cards buffer signals and words to and from the other RMCS cabinets, the Test Cards generate the Request and Position Test Words that allow testing of the RSCS, and the Bypass Control and Switch Cards allow a rod address and position to be bypassed from the Rod Pattern Controller.

The Rod Pattern Controller serves two main functions: 1) To monitor the operator requests for rod motion, check these requests against built-in criteria, and, if necessary, block the RMCS from carrying out the requests, and 2) Provide the operator with needed information when the blocking function is exercised.

The following is a simplified description of the rod pulling sequence control:

1. Starting form all rods full-in 100% rod density), approximately 25% of the control rods can be pulled continuously from 00 to 48 position (75% rod density)

B. SYSTEM DESCRIPTION (Cont)

2. From 75% rod density to the low power set point, the RSCS logic inhibit continuous rod withdrawal until all the rods in the group are at their final banked position. The logic allows operator to move in-sequence rods in the same group to their predetermined bank position before the first rod can be withdrawn to a second banked position. Most of the rods have 3 intermediate bank positions between full-in and full-out.

3. Above the Low Power Setpoint, RSCS is automatically bypassed. The amber and red LED's on the RSCS operator display will be off when reactor power is above Low Power Alarm Point.

4. On reduction of power to approximately 25% Low Power Alarm Point sensed by red and amber LED's illuminated on RSCS panel which allows operator to check rod alignment and avoid a rod block when the power is further reduced to the Low Power Setpoint.

5. When the power is reduced to the Low Power Setpoint, the RSCS logic is automatically energized to enforce the rod insertion sequence.

The operator selects which rod is to be moved by its address. The computer then outputs the results of its pattern equations as permissive to the RMCS. When the rod is selected on the Rod Select Matrix, its pushbutton will illuminate and its associated indicating lamp on the Full Core Display will also illuminate if all permissive conditions are satisfied. On the RSCS display, in the FREE RODS function, the selected rod will be indicated by a blinking amber LED and all other rods assigned to the group will be indicated by a solid amber LED.

C. OPERATING REQUIREMENTS

1.0 The following system are required to be in service to support Rod Sequence Control System operation:

1.1 Control Rod Drive Hydraulic N2-OP-30

1.2 13.8KV/4160V/600V AC Distribution N2-OP-71

1.3 Rod Position Information N2-OP-96

D. PRECAUTIONS AND LIMITATIONS

1.0 Verify compliance with the prescribed control rod pattern as reducing power toward the Low Power Alarm Point (LPAP). Ensure all control rods are at their banking limits as prescribed by the Rod Pattern Controller. Failure to be in compliance before reaching the Low Power Set Point (LPSP) will result in the appropriate rod blocks being applied.

D. PRECAUTIONS AND LIMITATIONS (Cont)

2.0 The RSCS is capable of bypassing up to 8 CRD inputs providing there are no more than 3 in any RSCS group.

3.0 First stage turbine pressure transmitters provide the LPSP signal. Over pressurizing the main turbine during shell warming could result in a false signal causing the RSCS to automatically bypass.

4.0 Exercise care when moving a bypassed control rod. The rod is transparent to the Rod Pattern Controller and a high rod worth could be developed with no rod block protection.

E. STARTUP

1.0 Verify RSCS Operability

1.1 Perform Attachment 2, Electrical Lineup.

1.2 Obtain N2-OSP-RMC-@004, Rod Sequence Control System Operability Surveillance test.

1.3 Verify Rods Full In as follows:

1.3.1 Select ROD F.I display by depressing the RODS F.I./ BYPASS pushbutton at the Operator Display panel at panel P603.

1.3.2 Observe all rod lights illuminate in the display window of the RSCS panel.

1.4 Verify no rods bypassed as follows:

1.4.1 Select BYPASS display by depressing the RODS F.I./ BYPASS pushbutton at the Operator Display panel at panel P603.

1.4.2 Observe no red rod bypassed lights illuminate in the display window of the RSCS panel.

1.5 Perform N2-OSP-RMC-@004, Rod Sequence Control Operability (Self Test Section 7.2) within 8 hours prior to withdrawing control rods for the purpose of making the reactor critical.

1.6 Select SEQ A or SEQ B by depressing the appropriate Select pushbutton.

1.7 Select from the Pull Sheet the first rod to be withdrawn.

E. STARTUP (Cont)

1.8 Verify proper selection as indicated by no error indications.

NOTE: The RSCS Rod Group Sequence will be latched when the first rod is withdrawn.

1.9 After the first in sequence rod is withdrawn complete N2-OSP-RMC-@004, Rod Sequence Control System Operability Surveillance test.

1.10 Verify the latched sequence is the same as the pull sheet sequence as follows:

1.10.1 Select FREE RODS display by depressing ALL RODS/FREE RODS pushbutton at the Operator Display panel at panel P603.

1.10.2 Observe Free Rods indicated by amber lights illuminated in the display window of the RSCS panel.

1.10.3 Compare RSCS indication of free rods as the same as those listed on the pull sheet.

1.11 Verify the RSCS display response during the rod movement.

F. NORMAL OPERATIONS

Not Applicable

This is a preprogrammed computerized system and, therefore, has limited operator functions.

G. SHUTDOWN

Not Applicable

The RSCS is not shutdown by the Operations personnel but has independent rods inputs bypassed instead. Refer to Section H.1.0 of this procedure for bypassing a control rod.

H. OFF NORMAL PROCEDURES

1.0 Bypassing Inoperable Control Rods

NOTE: Inoperable control rods are required to be valved out of service or electrically disarmed except for test purposes. Extreme care must be exercised when moving a bypassed rod because the RSCS will impose no blocks when a rod is bypassed.

H. OFF-NORMAL PROCEDURES (Cont)

1.1 Refer to the Tech Spec limitations on bypassing control rods Section 3.1.3.7 and 3.1.4.2.

1.2 Observe presently bypassed rods as follows:

1.2.1 Select BYPASS display by depressing the RODS F.I./ BYPASS pushbutton at the Operator Display panel at panel P603.

1.2.2 Observe red rod bypassed lights illuminate in the display window of the RSCS panel for rods presently bypassed.

1.2.3 Verify the rod to be bypassed is within the limitations of the Tech Spec.

1.3 Consult the Reactor Analyst to bypass the affected rod.

1.4 Obtain the key to panel P659, Control Rod Bypass Card File from the SSS.

1.5 Verify the rods presently bypassed are the same as those indicated on P603.

1.6 Obtain the control rod binary address code from EITHER the Fault Map at panel P616 OR Attachment 3, Control Rod Binary Address in this procedure.

NOTES:
1. Positioning the Bypass Toggle switches to the left represents 0 and positioning them to the right represents 1.
2. Performance of Step 1.7 requires independent verification by a licensed operator or qualified member of tech staff.

1.7 Perform the following at panel P659:

1.7.1 Select available Bypass Card.

1.7.2 Position the X column toggle switches in accordance with the binary code obtained in Step 1.6 above.

1.7.3 Position the Y row toggle switches in accordance with the binary code obtained in Step 1.6 above.

NOTE: Bypass switch to the right is the BYPASSED position.

1.7.4 Position the NOT BYPASSED/BYPASSED toggle switch to the BYPASSED position.

H. OFF-NORMAL PROCEDURES (Cont)

1.7.5 Verify the control rod is bypassed as follows:

Red indicating light below the bypass switch illuminated.

The associated CRD red bypass indicating light illuminates when the RODS F.I./BYPASSED pushbutton is depressed the RSCS Operator Display panel.

1.8 CSO log control rod is bypassed and independently verified.

1.9 Disarm the HCU for the bypassed CRD in accordance with N2-OP-96, Reactor Manual Control and Rod Position Indication System.

2.0 Unbypassing a Control Rod

2.1 Consult the Reactor Analyst to bypass the affected rod.

2.2 Obtain the key to panel P659, Control Rod Bypass Card File from the SSS.

2.3 Observe presently bypassed rods as follows:

2.3.1 Select BYPASS display by depressing the RODS F.I./ BYPASS pushbutton at the operator display panel.

2.3.2 Observe red rod bypassed lights illuminated in the display window of the RSCS panel for rods presently bypassed.

2.4 Obtain the control rod binary address code from EITHER the Fault Map at panel P616 OR Attachment 3 in this procedure.

NOTES:
1. Not Bypassed to the left is the NOT BYPASSED position.
2. Positioning the Bypass Toggle switches to the left is 0.
3. Performance of Step 2.5 requires independent verification by a second licensed operator or qualified member of tech staff.

2.5 Perform the following at panel P659:

2.5.1 Position the NOT BYPASSED/BYPASSED toggle switches to the NOT BYPASSED position.

2.5.2 Position the X column toggle switches in 0 position.

H. OFF-NORMAL PROCEDURES (Cont)

2.5.3 Position the Y row toggle switches in 0 position.

2.5.4 Verify the control rod is unbypassed as follows:

Red indicating light below the bypass switch extinguished.

The associated CRD red bypass indicating light remains extinguished when the RODS F.I./BYPASSED pushbutton is depressed at the RSCS Operator Display panel.

2.6 CSO log control rod is unbypassed and independently verified.

2.7 Rearm the HCU for the unbypassed CRD in accordance with N2-OP-96, REACTOR MANUAL CONTROL AND ROD POSITION INDICATION SYSTEM.

2.8 Perform the following if the control rod is improperly positioned.

2.8.1 Consult the Reactor Analyst and the SSS.

2.8.2 Position the rod per instructions.

2.8.3 CSO log the results.

3.0 Installing Substitute Position

NOTES: 1. Control rod substitute position information is permitted for each single event. If 2 consecutive events occur for the same rod it may be necessary to declare that rod inoperable and bypass it. Consult with the Reactor Analyst and SSS for a ruling.

2. The following actions are performed at the RSCS Operator Display panel at panel P603 unless otherwise stated.

3.1 Depress the SEL SUB pushbutton.

3.2 Observe INSERT/W/DRAW indicating light is extinguished.

3.3 Perform the appropriate action listed below:

3.3.1 IF a bank limit applies THEN notch the rod to a good position.

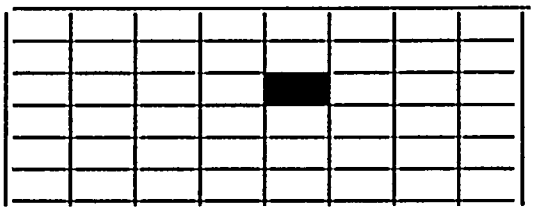
3.3.2 IF no bank limit applies THEN insert/withdraw the rod to a good position.

I. PROCEDURES FOR CORRECTING ALARM CONDITIONS

Reflash: No

603121

ROD SEQUENCE CONTROL SYS INOPERABLE 121



Computer Point	Printout	Source	Setpoint	
RDSBC18	RSCS	RSCS Panel	N/A	*

Automatic Response

Insert and withdraw rod blocks applied

Operator Actions

No CRD motion permitted except by a SCRAM

Possible Causes

Card out of file

RSCS self test failure

Loss of power (5 volts)

References

N2-OP-95B

Technical Specification Section 3.1.4.2

ATTACHMENT 1

VALVE LINEUP SHEET

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ATTACHMENT 2
ELECTRICAL LINEUP SHEET

Page 1 of 1

Component Number	Component Description	Power Supply		Required Position	Actual Position	Initials and Date	Indep. Verif. Init/Date	Remarks
2RDSN03	Power Supply to RSCS Alarm Units	2VBS-PNLA102	9	ON				
2RDSN10	Power Supply to Rod Pattern Controller	2VBS-PNLA101	5	ON				
2RDSN10	Power Supply to RSCS	2VBS-PNLA101	9	ON				

POSITION CODES: O=Open C=Closed T=Tagged R=Removed RO=Racked-Out RI=Racked-In

ATTACHMENT 3
CONTROL ROD BINARY ADDRESS

ROD#	BINARY ID# $X_4X_3X_2X_1X_0Y_4Y_3Y_2Y_1Y_0$
02-43	0 0 0 1 0 0 1 1 0 0
02-39	0 0 0 1 0 0 1 0 1 1
02-35	0 0 0 1 0 0 1 0 1 0
02-31	0 0 0 1 0 0 1 0 0 1
02-27	0 0 0 1 0 0 1 0 0 0
02-23	0 0 0 1 0 0 0 1 1 1
02-19	0 0 0 1 0 0 0 1 1 0
06-47	0 0 0 1 1 0 1 1 0 1
06-43	0 0 0 1 1 0 1 1 0 0
06-39	0 0 0 1 1 0 1 0 1 1
06-35	0 0 0 1 1 0 1 0 1 0
06-31	0 0 0 1 1 0 1 0 0 1
06-27	0 0 0 1 1 0 1 0 0 0
06-23	0 0 0 1 1 0 0 1 1 1
06-19	0 0 0 1 1 0 0 1 1 0
06-15	0 0 0 1 1 0 0 1 0 1
10-51	0 0 1 0 0 0 1 1 1 0
10-47	0 0 1 0 0 0 1 1 0 1
10-43	0 0 1 0 0 0 1 1 0 0
10-39	0 0 1 0 0 0 1 0 1 1
10-35	0 0 1 0 0 0 1 0 1 0
10-31	0 0 1 0 0 0 1 0 0 1
10-27	0 0 1 0 0 0 1 0 0 0
10-23	0 0 1 0 0 0 0 1 1 1
10-19	0 0 1 0 0 0 0 1 1 0
10-15	0 0 1 0 0 0 0 1 0 1
10-11	0 0 1 0 0 0 0 1 0 0
14-55	0 0 1 0 1 0 1 1 1 1
14-51	0 0 1 0 1 0 1 1 1 0
14-47	0 0 1 0 1 0 1 1 0 1
14-43	0 0 1 0 1 0 1 1 0 0
14-39	0 0 1 0 1 0 1 0 1 1
14-35	0 0 1 0 1 0 1 0 1 0
14-31	0 0 1 0 1 0 1 0 0 1

ROD#	BINARY ID# $X_4X_3X_2X_1X_0Y_4Y_3Y_2Y_1Y_0$
14-27	0 0 1 0 1 0 1 0 0 0
14-23	0 0 1 0 1 0 0 1 1 1
14-19	0 0 1 0 1 0 0 1 1 0
14-15	0 0 1 0 1 0 0 1 0 1
14-11	0 0 1 0 1 0 0 1 0 0
14-07	0 0 1 0 1 0 0 0 1 1
18-59	0 0 1 1 0 1 0 0 0 0
18-55	0 0 1 1 0 0 1 1 1 1
18-51	0 0 1 1 0 0 1 1 1 0
18-47	0 0 1 1 0 0 1 1 0 1
18-43	0 0 1 1 0 0 1 1 0 0
18-39	0 0 1 1 0 0 1 0 1 1
18-35	0 0 1 1 0 0 1 0 1 0
18-31	0 0 1 1 0 0 1 0 0 1
18-27	0 0 1 1 0 0 1 0 0 0
18-23	0 0 1 1 0 0 0 1 1 1
18-19	0 0 1 1 0 0 0 1 1 0
18-15	0 0 1 1 0 0 0 1 0 1
18-11	0 0 1 1 0 0 0 1 0 0
18-07	0 0 1 1 0 0 0 0 1 1
18-03	0 0 1 1 0 0 0 0 1 0
22-59	0 0 1 1 1 1 0 0 0 0
22-55	0 0 1 1 1 0 1 1 1 1
22-51	0 0 1 1 1 0 1 1 1 0
22-47	0 0 1 1 1 0 1 1 0 1
22-43	0 0 1 1 1 0 1 1 0 0
22-39	0 0 1 1 1 0 1 0 1 1
22-35	0 0 1 1 1 0 1 0 1 0
22-31	0 0 1 1 1 0 1 0 0 1
22-27	0 0 1 1 1 0 1 0 0 0
22-23	0 0 1 1 1 0 0 1 1 1
22-19	0 0 1 1 1 0 0 1 1 0
22-15	0 0 1 1 1 0 0 1 0 1
22-11	0 0 1 1 1 0 0 1 0 0

ATTACHMENT 3
CONTROL ROD BINARY ADDRESS

ROD#	BINARY ID# $X_4X_3X_2X_1X_0Y_4Y_3Y_2Y_1Y_0$
22-07	0 0 1 1 1 0 0 0 1 1
22-03	0 0 1 1 1 0 0 0 1 0
26-59	0 1 0 0 0 1 0 0 0 0
26-51	0 1 0 0 0 0 1 1 1 0
26-47	0 1 0 0 0 0 1 1 0 1
26-43	0 1 0 0 0 0 1 1 0 0
26-39	0 1 0 0 0 0 1 0 1 1
26-35	0 1 0 0 0 0 1 0 1 0
26-31	0 1 0 0 0 0 1 0 0 1
26-27	0 1 0 0 0 0 1 0 0 0
26-23	0 1 0 0 0 0 0 1 1 1
26-19	0 1 0 0 0 0 0 1 1 0
26-15	0 1 0 0 0 0 0 1 0 1
26-11	0 1 0 0 0 0 0 1 0 0
26-07	0 1 0 0 0 0 0 0 1 1
26-03	0 1 0 0 0 0 0 0 1 0
30-59	0 1 0 0 1 1 0 0 0 0
30-55	0 1 0 0 1 0 1 1 1 1
30-51	0 1 0 0 1 0 1 1 1 0
30-47	0 1 0 0 1 0 1 1 0 1
30-43	0 1 0 0 1 0 1 1 0 0
30-39	0 1 0 0 1 0 1 0 1 1
30-35	0 1 0 0 1 0 1 0 1 0
30-31	0 1 0 0 1 0 1 0 0 1
30-27	0 1 0 0 1 0 1 0 0 0
30-23	0 1 0 0 1 0 0 1 1 1
30-19	0 1 0 0 1 0 0 1 1 0
30-15	0 1 0 0 1 0 0 1 0 1
30-11	0 1 0 0 1 0 0 1 0 0
30-07	0 1 0 0 1 0 0 0 1 1
30-03	0 1 0 0 1 0 0 0 1 0

ROD#	BINARY ID# $X_4X_3X_2X_1X_0Y_4Y_3Y_2Y_1Y_0$
34-59	0 1 0 1 0 1 0 0 0 0
34-55	0 1 0 1 0 0 1 1 1 1
34-51	0 1 0 1 0 0 1 1 1 0
34-47	0 1 0 1 0 0 1 1 0 1
34-43	0 1 0 1 0 0 1 1 0 0
34-39	0 1 0 1 0 0 1 0 1 1
34-35	0 1 0 1 0 0 1 0 1 0
34-31	0 1 0 1 0 0 1 0 0 1
34-27	0 1 0 1 0 0 1 0 0 0
34-23	0 1 0 1 0 0 0 1 1 1
34-19	0 1 0 1 0 0 0 1 1 0
34-15	0 1 0 1 0 0 0 1 0 1
34-11	0 1 0 1 0 0 0 1 0 0
34-07	0 1 0 1 0 0 0 0 1 1
34-03	0 1 0 1 0 0 0 0 1 0
38-59	0 1 0 1 1 1 0 0 0 0
38-55	0 1 0 1 1 0 1 1 1 1
38-51	0 1 0 1 1 0 1 1 1 0
38-47	0 1 0 1 1 0 1 1 0 1
38-43	0 1 0 1 1 0 1 1 0 0
38-39	0 1 0 1 1 0 1 0 1 1
38-35	0 1 0 1 1 0 1 0 1 0
38-31	0 1 0 1 1 0 1 0 0 1
38-27	0 1 0 1 1 0 1 0 0 0
38-23	0 1 0 1 1 0 0 1 1 1
38-19	0 1 0 1 1 0 0 1 1 0
38-15	0 1 0 1 1 0 0 1 0 1
38-11	0 1 0 1 1 0 0 1 0 0
38-07	0 1 0 1 1 0 0 0 1 1
38-03	0 1 0 1 1 0 0 0 1 0
42-59	0 1 1 0 0 1 0 0 0 0

ATTACHMENT 3
CONTROL ROD BINARY ADDRESS

ROD#	BINARY ID# $X_4X_3X_2X_1X_0Y_4Y_3Y_2Y_1Y_0$	ROD#	BINARY ID# $X_4X_3X_2X_1X_0Y_4Y_3Y_2Y_1Y_0$
42-55	0 1 1 0 0 0 1 1 1 1	50-51	0 1 1 1 0 0 1 1 1 0
42-51	0 1 1 0 0 0 1 1 1 0	50-47	0 1 1 1 0 0 1 1 0 1
42-47	0 1 1 0 0 0 1 1 0 1	50-43	0 1 1 1 0 0 1 1 0 0
42-43	0 1 1 0 0 0 1 1 0 0	50-39	0 1 1 1 0 0 1 0 1 1
42-39	0 1 1 0 0 0 1 0 1 1	50-35	0 1 1 1 0 0 1 0 1 0
42-35	0 1 1 0 0 0 1 0 1 0	50-31	0 1 1 1 0 0 1 0 0 1
42-31	0 1 1 0 0 0 1 0 0 1	50-27	0 1 1 1 0 0 1 0 0 0
42-27	0 1 1 0 0 0 1 0 0 0	50-23	0 1 1 1 0 0 0 1 1 1
42-23	0 1 1 0 0 0 0 1 1 1	50-19	0 1 1 1 0 0 0 1 1 0
42-19	0 1 1 0 0 0 0 1 1 0	50-15	0 1 1 1 0 0 0 1 0 1
42-15	0 1 1 0 0 0 0 1 0 1	50-11	0 1 1 1 0 0 0 1 0 0
42-11	0 1 1 0 0 0 0 1 0 0	54-47	0 1 1 1 1 0 1 1 0 1
42-07	0 1 1 0 0 0 0 0 1 1	54-43	0 1 1 1 1 0 1 1 0 0
42-03	0 1 1 0 0 0 0 0 1 0	54-39	0 1 1 1 1 0 1 0 1 1
46-55	0 1 1 0 1 0 1 1 1 1	54-35	0 1 1 1 1 0 1 0 1 0
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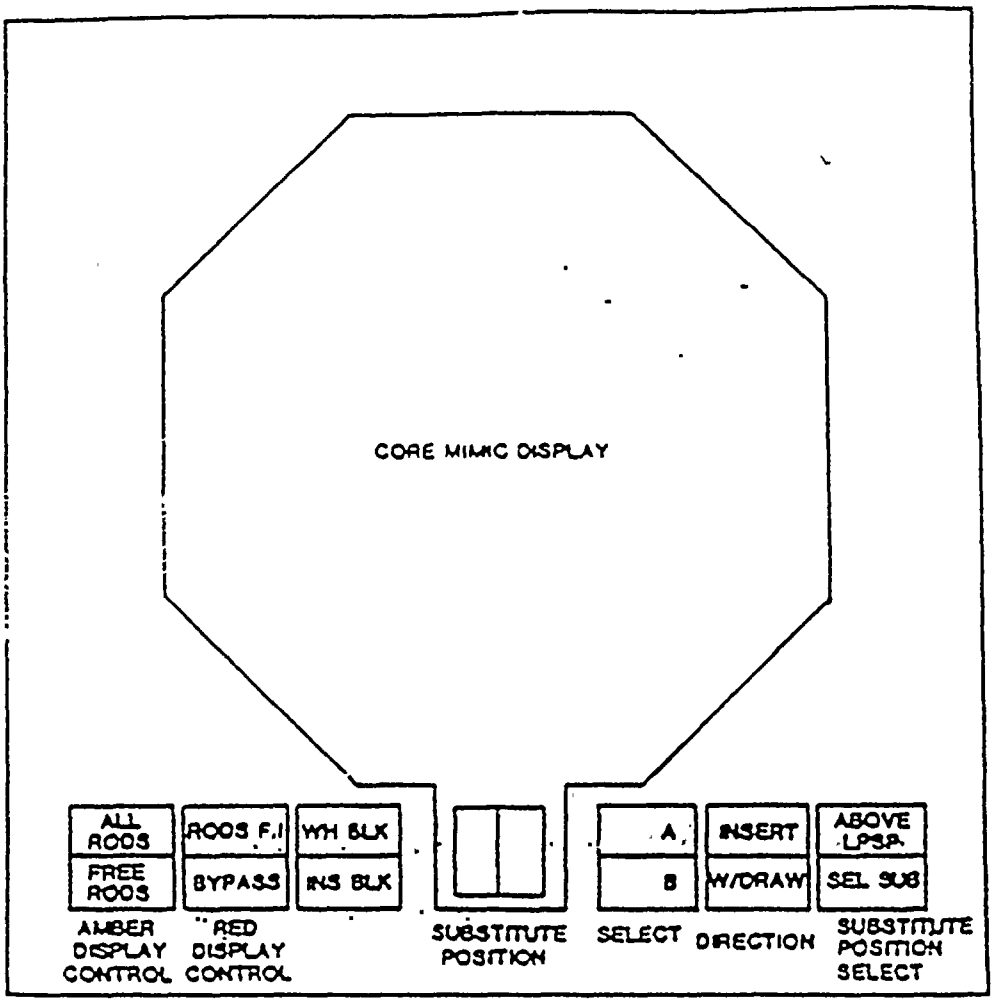
46-31	0 1 1 0 1 0 1 0 0 1	58-43	1 0 0 0 0 0 1 1 0 0
46-27	0 1 1 0 1 0 1 0 0 0	58-39	1 0 0 0 0 0 1 0 1 1
46-23	0 1 1 0 1 0 0 1 1 1	58-35	1 0 0 0 0 0 1 0 1 0
46-19	0 1 1 0 1 0 0 1 1 0	58-31	1 0 0 0 0 0 1 0 0 1
46-15	0 1 1 0 1 0 0 1 0 1	58-27	1 0 0 0 0 0 1 0 0 0
46-11	0 1 1 0 1 0 0 1 0 0	58-23	1 0 0 0 0 0 0 1 1 1
46-07	0 1 1 0 1 0 0 0 1 1	58-19	1 0 0 0 0 0 0 1 1 0

ATTACHMENT 4
FIGURE 1



RSCS DISPLAY PANEL