HNR

ELECTRICAL CALCULATION COVER SHEET

Calculation No:3442.053.ECAL.001,
Calculation Title: SHORT CIRCUIT ANALYSIS OF SUS-H & MCC-1
Project ID # 1000256
Project Title: CCN CHILLED WATER SYSTEM OPTIMIZATION MASTER PLAN

ORIGINAL AND REVISED CALCULATION/ANALYSIS APPROVAL

	Rev._A Name/Signature/Date	Rev. B Name/Signature/Date	Rev. 0 Name/Signature/Date
Originator: MARTY HALL	10/16/01		9-3-02
Checked By: BILL HERBST	10/16/01		9-3-02
Approved By: MIKE SLAMAN	10/16/01		9/3/02
Other:			

AFFECTED DOCUMENTS

Document Number	Document Title	Rev. Number

Record of Revision

Rev.	Reason for Revision
REV A	FIRST SUBMITTAL OF CALCULATIONS
Rev 0	Issued for Construction - No technical changes to Calc.

Holmes & Narver | Raytheon

CALCULATION CHECKLIST

Task/Project #: 100062
task order 053
CCN CHILLED WATER SYSTEM OPTIMIZATION MASTER PLAN

Calculation Number: 3442.053.ECAL.001 PAGE 2 of 18 | Revision A0 MH

Reviewer/Checker : BILL HERBST

Date

Reviewer performed or supervised subject calculation.
_____NO _____YES Justification Attachment _____, _____ pages

Alternate Verification method approved _____ Method _____

ITEM(S) CHECKED	Accept Y/N	OBJECTIVE EVIDENCE Sheets		INITIAL/ DATE
1. Cover forms properly completed.	Y			WDH 10/16/01
2. Calculation Sheet headers complete with calc. no., rev., etc.	Y			
3. Calculation Sheet contents complete per format.	Y			
4. Listed attachments included.	Y			
5. Calculation Objective clearly described.	Y			
6. Criteria are suitable and properly referenced to task-specific documents.	Y			
7. Assumptions and data described and attached or referenced to task documents.	Y			
8. Calculation method identified and appropriate for the design activity.	Y			
9. Calculation results reasonable and correctly described in Results and Conclusions.	Y			
10. Computer Program identified with version and revision.	Y			
11. Computer Program references method used, etc.	Y			
12. Computer input/output provided.	Y			
13. Computer run traceable to calculation.	Y			
14. Computer input data within permissible design input range.	Y			
15. Computer Program validation/verification addressed.	Y			

REMARKS

William D Herbst Date 10-16-01
Checker Print Name & Sign
BILL HERBST

Marty Hall Date 10-16-01
Preparer Print Name & Sign
MARTY HALL

Form EP 3.3-3F July 2000

Holmes & Narver | Raytheon

ELECTRICAL DESIGN CALCULATION SHEET

Project Title: CCN CHILLED WATER SYSTEM OPTIMIZATION MASTER PLAN

Project ID #100256

Calculation No. 3442.053.ECAL.001

Rev. No. A0 MH

Calculation Title: SHORT CIRCUIT ANALYSIS OF SUS-H & MCC-1

PERFORMED BY MARTY HALL 10/16/01 DATE

CHECKED BY BILL HERBST 10/16/01 DATE

INTRODUCTION

Purpose: Verify the available short circuit capability at the adjustable speed drive.

Scope: Calculate the available fault current at the adjustable speed drives.

DESIGN BASIS

Design Inputs: Available fault at SUS-H is 29043.9 AIC.

Wire size from SUS-H to MCC-1 is Parallel 350 KCM.1.

Wire size from MCC-1 to adjustable speed drives is #2AWG.

These design inputs were taken from existing drawings.

Criteria: The breaker rating cannot be less than the available fault current.

Assumptions: Assume length of wire is 50' from SUS H to MCC-1 and 50' from MCC-1 to ASD

REFERENCES

SKM Power Tools for Windows Version 3.8.10

National Electrical Code

As-Built Drawings 16523 AB825 E-43 REV A 3-17-00, 16523 AB825 E-44 REV 0 5-15-97

METHODS

The methodology used to perform these calculations came from a preprogrammed software package, SKM Power Tools Version 3.8.10 software.

RESULTS AND CONCLUSIONS

The available fault at the adjustable speed drives will be 14839 AIC. The main breaker in the ASD should have a rating of 22,000 AIC.

ATTACHMENT A:

SKM POWER TOOLS FOR WINDOWS COMPUTER INPUT/OUTPUT FAULT ANALYSIS

TOTAL 14 PAGES

Oct 11, 2001 10:49:49

ALL INFORMATION PRESENTED IS FOR REVIEW, APPROVAL
INTERPRETATION AND APPLICATION BY A REGISTERED ENGINEER ONLY

SKM POWER*TOOLS FOR WINDOWS
SHORT CIRCUIT ANALYSIS REPORT
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ALL PU VALUES ARE EXPRESSED ON A 100 MVA BASE

SWING GENERATORS

SOURCE NAME	VOLTAGE	ANGLE
FEEDER S-22	1.00	0.00

********** P R E - F A U L T V O L T A G E P R O F I L E **********

BUS# NAME	BASE VOLTS	PU VOLTS	ANGLE (D)
ASD	480.00	1.0000	-30.
MCC-1 BUS	480.00	1.0000	-30.
SUS-H	480.00	1.0000	-30.
TRANS PRI	13200.00	1.0000	0.
TRANS SEC	480.00	1.0000	-30.

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**************** F A U L T   A N A L Y S I S   R E P O R T ***************

                FAULT TYPE: 3PH
                MODEL INDUCTION MOTOR CONTRIBUTION: YES
                MODEL TRANSFORMER TAPS: YES
                MODEL TRANSFORMER PHASE SHIFT: YES
==============================================================================

ASD             VOLTAGE BASE LL:                    480.0 (VOLTS)
                INI. SYM. RMS FAULT CURRENT:  14839.4 /  -76. ( AMPS/DEG )
                THEVENIN EQUIVALENT IMPEDANCE:    5.594 +j   5.866 (PU)
                THEVENIN IMPEDANCE X/R RATIO:     1.049

                 ASYM    RMS   INTERRUPTING AMPS
                1/2 CYCLES    2 CYCLES    3 CYCLES    5 CYCLES    8 CYCLES
                   14876.4     14839.4     14839.4     14839.4     14839.4

                INI. SYM. RMS FAULTED BUS VOLTAGES ( PU / DEG )
                        AT TIME =     0.5 CYCLES
                ---PHASE A---        ---PHASE B---        ---PHASE C---
                0.0000 /  180.0     0.0000 /   60.0     0.0000 /  -60.0

                INI.    RMS   FAULTED CURRENT ( AMPS / DEG )
                        AT TIME =     0.5 CYCLES
                ---PHASE A---        ---PHASE B---        ---PHASE C---
                14839.4 / -76.4    14839.4 / 163.6     14839.4 /  43.6

ASD             ==== INI. SYM. RMS SYSTEM BUS VOLTAGES ( PU / DEG ) =======
                    FIRST BUS FROM FAULT    AT TIME =     0.5 CYCLES
                          ---PHASE A---     ---PHASE B---     ---PHASE C---
  MCC-1 BUS          480.0  0.5630 / -60.  0.5630 / 180.  0.5630 /  60.
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ASD             ====== INI.    RMS   SYSTEM BRANCH FLOWS ( AMPS ) =========
                     FIRST BUS FROM FAULT    AT TIME =     0.5 CYCLES
                              VBASE LL  -PHASE A-     -PHASE B-     -PHASE C-
 MCC-1 BUS      ASD              480. 14839.4/ -76. 14839.4/ 164. 14839.4/  44.

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  MCC-1 BUS      VOLTAGE BASE LL:                    480.0 (VOLTS)
                 INI. SYM. RMS FAULT CURRENT:  25307.5 / -105. ( AMPS/DEG )
                 THEVENIN EQUIVALENT IMPEDANCE:    1.210 +j   4.596 (PU)
                 THEVENIN IMPEDANCE X/R RATIO:     3.797

                  ASYM    RMS   INTERRUPTING AMPS
                 1/2 CYCLES    2 CYCLES    3 CYCLES    5 CYCLES    8 CYCLES
                    29753.7     25341.3     25308.7     25307.5     25307.5

                 INI. SYM. RMS FAULTED BUS VOLTAGES ( PU / DEG )
                         AT TIME =     0.5 CYCLES
                 ---PHASE A---        ---PHASE B---        ---PHASE C---
                 0.0000 /   45.0      0.0000 /   45.0      0.0000 /   45.0

                 INI.    RMS   FAULTED CURRENT ( AMPS / DEG )
                         AT TIME =     0.5 CYCLES
                 ---PHASE A---        ---PHASE B---        ---PHASE C---
                 25307.5 /-105.2    25307.5 / 134.8      25307.5 /  14.8

  MCC-1 BUS      ==== INI. SYM. RMS SYSTEM BUS VOLTAGES ( PU / DEG ) =======
                     FIRST BUS FROM FAULT    AT TIME =     0.5 CYCLES
                           ---PHASE A---      ---PHASE B---      ---PHASE C---
   SUS-H             480.0  0.1415 / -53.  0.1415 /-173.  0.1415 /  67.
   ASD               480.0  0.0000 /-122.  0.0000 / 118.  0.0000 /  -2.

MCC-1 BUS       ====== INI.    RMS   SYSTEM BRANCH FLOWS ( AMPS ) =========
                     FIRST BUS FROM FAULT    AT TIME =     0.5 CYCLES
                              VBASE LL  -PHASE A-     -PHASE B-     -PHASE C-
 SUS-H          MCC-1 BUS        480. 25307.5/-105. 25307.5/ 135. 25307.5/  15.
 MCC-1 BUS      ASD              480.     0.0/ 149.     0.0/  29.     0.0/ -91.

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SUS-H          VOLTAGE BASE LL:                    480.0 (VOLTS)
               INI. SYM. RMS FAULT CURRENT:  29043.9 / -109. ( AMPS/DEG )
               THEVENIN EQUIVALENT IMPEDANCE:    0.800 +j   4.063 (PU)
               THEVENIN IMPEDANCE X/R RATIO:     5.077

                ASYM    RMS   INTERRUPTING AMPS
               1/2 CYCLES   2 CYCLES    3 CYCLES    5 CYCLES    8 CYCLES
                  36509.6     29248.9     29061.2     29044.1     29043.9

               INI. SYM. RMS FAULTED BUS VOLTAGES ( PU / DEG )
                       AT TIME =     0.5 CYCLES
               ---PHASE A---        ---PHASE B---        ---PHASE C---
               0.0000 /  180.0     0.0000 /   60.0     0.0000 /  -60.0

               INI.    RMS   FAULTED CURRENT ( AMPS / DEG )
                       AT TIME =     0.5 CYCLES
               ---PHASE A---        ---PHASE B---        ---PHASE C---
               29043.9 /-108.9    29043.9 / 131.1     29043.9 /  11.1

SUS-H          ==== INI. SYM. RMS SYSTEM BUS VOLTAGES ( PU / DEG ) =======
                   FIRST BUS FROM FAULT    AT TIME =     0.5 CYCLES
                         ---PHASE A---     ---PHASE B---     ---PHASE C---
  TRANS SEC         480.0  0.0015 / -81.  0.0015 / 159.  0.0015 /  39.
  MCC-1 BUS         480.0  0.0000 /-122.  0.0000 / 118.  0.0000 /  -2.

SUS-H          ====== INI.    RMS   SYSTEM BRANCH FLOWS ( AMPS ) =========
                   FIRST BUS FROM FAULT    AT TIME =     0.5 CYCLES
                             VBASE LL  -PHASE A-     -PHASE B-     -PHASE C-
TRANS SEC      SUS-H            480. 29043.9/-109. 29043.9/ 131. 29043.9/  11.
SUS-H          MCC-1 BUS        480.     0.0/  95.     0.0/ -25.     0.0/-145.

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TRANS PRI      VOLTAGE BASE LL:                    13200.0 (VOLTS)
               INI. SYM. RMS FAULT CURRENT:  32804.0 /  -45. ( AMPS/DEG )
               THEVENIN EQUIVALENT IMPEDANCE:    0.094 +j   0.094 (PU)
               THEVENIN IMPEDANCE X/R RATIO:     1.000

                ASYM    RMS   INTERRUPTING AMPS
               1/2 CYCLES    2 CYCLES    3 CYCLES    5 CYCLES    8 CYCLES
                  32865.2     32804.0     32804.0     32804.0     32804.0

               INI. SYM. RMS FAULTED BUS VOLTAGES ( PU / DEG )
                       AT TIME =     0.5 CYCLES
               ---PHASE A---        ---PHASE B---        ---PHASE C---
               0.0000 /   90.0     0.0000 /  -30.0     0.0000 / -150.0

               INI.    RMS   FAULTED CURRENT ( AMPS / DEG )
                       AT TIME =     0.5 CYCLES
               ---PHASE A---        ---PHASE B---        ---PHASE C---
               32804.0 / -45.0    32804.0 /-165.0     32804.0 /  75.0

TRANS PRI      ==== INI. SYM. RMS SYSTEM BUS VOLTAGES ( PU / DEG ) =======
                   FIRST BUS FROM FAULT    AT TIME =     0.5 CYCLES
                         ---PHASE A---     ---PHASE B---     ---PHASE C---
  TRANS SEC          480.0  0.0000 / 146.  0.0000 /  26.  0.0000 / -94.

TRANS PRI      ====== INI.    RMS   SYSTEM BRANCH FLOWS ( AMPS ) =========
                   FIRST BUS FROM FAULT    AT TIME =     0.5 CYCLES
                             VBASE LL  -PHASE A-     -PHASE B-     -PHASE C-
 FEEDER S-22   TRANS PRI      13200. 32804.0/ -45. 32804.0/-165. 32804.0/  75.
 TRANS PRI     TRANS SEC      13200.     0.0/ -99.     0.0/ 141.     0.0/  21.

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TRANS SEC      VOLTAGE BASE LL:                    480.0 (VOLTS)
               INI. SYM. RMS FAULT CURRENT:  29072.5 / -109. ( AMPS/DEG )
               THEVENIN EQUIVALENT IMPEDANCE:    0.795 +j   4.060 (PU)
               THEVENIN IMPEDANCE X/R RATIO:     5.109

                ASYM    RMS   INTERRUPTING AMPS
               1/2 CYCLES    2 CYCLES    3 CYCLES    5 CYCLES    8 CYCLES
                  36598.0     29284.1     29090.6     29072.6     29072.5

               INI. SYM. RMS FAULTED BUS VOLTAGES ( PU / DEG )
                       AT TIME =     0.5 CYCLES
               ---PHASE A---        ---PHASE B---        ---PHASE C---
               0.0000 /  -26.6     0.0000 / -146.6     0.0000 /   93.4

               INI.    RMS   FAULTED CURRENT ( AMPS / DEG )
                       AT TIME =     0.5 CYCLES
               ---PHASE A---        ---PHASE B---        ---PHASE C---
               29072.5 /-108.9    29072.5 / 131.1     29072.5 /  11.1

TRANS SEC      ==== INI. SYM. RMS SYSTEM BUS VOLTAGES ( PU / DEG ) =======
                   FIRST BUS FROM FAULT    AT TIME =     0.5 CYCLES
                         ---PHASE A---     ---PHASE B---     ---PHASE C---
  TRANS PRI       13200.0  0.9734 /   1.  0.9734 /-119.  0.9734 / 121.
  SUS-H             480.0  0.0000 /-122.  0.0000 / 118.  0.0000 /  -2.

TRANS SEC      ====== INI.    RMS   SYSTEM BRANCH FLOWS ( AMPS ) =========
                   FIRST BUS FROM FAULT    AT TIME =     0.5 CYCLES
                              VBASE LL  -PHASE A-     -PHASE B-     -PHASE C-
TRANS PRI      TRANS SEC      13200.  1057.2/ -79.  1057.2/ 161.  1057.2/  41.
TRANS SEC      SUS-H            480.     0.0/  43.     0.0/ -77.     0.0/ 163.

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***************** F A U L T   A N A L Y S I S   R E P O R T ****************

                FAULT TYPE: SLG
                MODEL INDUCTION MOTOR CONTRIBUTION: YES
                MODEL TRANSFORMER TAPS: YES
                MODEL TRANSFORMER PHASE SHIFT: YES
==============================================================================

ASD             VOLTAGE BASE LL:                    480.0 (VOLTS)
                INI. SYM. RMS FAULT CURRENT:  10703.0 /  -67. ( AMPS/DEG )
                THEVENIN EQUIVALENT IMPEDANCE:   27.030 +j  20.150 (PU)
                THEVENIN IMPEDANCE X/R RATIO:     0.745
                SEQUENCE EQUIVALENT IMPEDANCE Z1:   5.594 +j   5.866 (PU)
                                              Z2:   5.594 +j   5.866 (PU)
                                              Z0:  15.841 +j   8.419 (PU)

                 ASYM    RMS   INTERRUPTING AMPS
                1/2 CYCLES    2 CYCLES    3 CYCLES    5 CYCLES    8 CYCLES
                   10705.4     10703.0     10703.0     10703.0     10703.0

                INI. SYM. RMS FAULTED BUS VOLTAGES ( PU / DEG )
                        AT TIME =     0.5 CYCLES
                ---PHASE A---       ---PHASE B---       ---PHASE C---
                0.0000 /  -45.0     1.0852 / -166.6     1.2635 /   98.6

                INI.    RMS   FAULTED CURRENT ( AMPS / DEG )
                        AT TIME =     0.5 CYCLES
                ---PHASE A---       ---PHASE B---       ---PHASE C---
                10703.0 / -66.7       0.0 / -66.7         0.0 / -66.7

ASD             ==== INI. SYM. RMS SYSTEM BUS VOLTAGES ( PU / DEG ) =======
                    FIRST BUS FROM FAULT    AT TIME =     0.5 CYCLES
                          ---PHASE A---     ---PHASE B---     ---PHASE C---
  MCC-1 BUS          480.0  0.6906 / -53.  1.0181 /-151.  1.0144 /  92.
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ASD             ====== INI.    RMS   SYSTEM BRANCH FLOWS ( AMPS ) =========
                     FIRST BUS FROM FAULT    AT TIME =     0.5 CYCLES
                              VBASE LL  -PHASE A-     -PHASE B-     -PHASE C-
 MCC-1 BUS      ASD               480. 10703.0/ -67.     0.0/ -67.     0.0/ -67.

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 MCC-1 BUS      VOLTAGE BASE LL:                    480.0 (VOLTS)
                INI. SYM. RMS FAULT CURRENT:  23812.6 / -103. ( AMPS/DEG )
                THEVENIN EQUIVALENT IMPEDANCE:    4.447 +j  14.486 (PU)
                THEVENIN IMPEDANCE X/R RATIO:     3.257
                SEQUENCE EQUIVALENT IMPEDANCE Z1:   1.210 +j   4.596 (PU)
                                              Z2:   1.210 +j   4.596 (PU)
                                              Z0:   2.026 +j   5.294 (PU)

                 ASYM    RMS   INTERRUPTING AMPS
                1/2 CYCLES    2 CYCLES    3 CYCLES    5 CYCLES    8 CYCLES
                   27052.1     23823.2     23812.8     23812.6     23812.6

                INI. SYM. RMS FAULTED BUS VOLTAGES ( PU / DEG )
                        AT TIME =     0.5 CYCLES
                ---PHASE A---        ---PHASE B---        ---PHASE C---
                0.0000 /  -90.0      0.9996 / -154.1      1.0633 /   91.8

                INI.    RMS   FAULTED CURRENT ( AMPS / DEG )
                        AT TIME =     0.5 CYCLES
                ---PHASE A---        ---PHASE B---        ---PHASE C---
                23812.6 /-102.9        0.0 /-102.9          0.0 /-102.9

 MCC-1 BUS      ==== INI. SYM. RMS SYSTEM BUS VOLTAGES ( PU / DEG ) =======
                    FIRST BUS FROM FAULT    AT TIME =     0.5 CYCLES
                          ---PHASE A---     ---PHASE B---     ---PHASE C---
   SUS-H             480.0  0.2099 / -55.  0.9991 /-150.  0.9945 /  90.
   ASD               480.0  0.0000 /-122.  0.9996 /-154.  1.0633 /  92.

MCC-1 BUS       ====== INI.    RMS   SYSTEM BRANCH FLOWS ( AMPS ) =========
                    FIRST BUS FROM FAULT    AT TIME =     0.5 CYCLES
                              VBASE LL  -PHASE A-     -PHASE B-     -PHASE C-
 SUS-H          MCC-1 BUS         480. 23812.6/-103.     0.0/-103.     0.0/-103.
 MCC-1 BUS      ASD               480.     0.0/ 151.     0.0/ -29.     0.0/ -29.

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SUS-H          VOLTAGE BASE LL:                    480.0 (VOLTS)
               INI. SYM. RMS FAULT CURRENT:  29261.1 / -109. ( AMPS/DEG )
               THEVENIN EQUIVALENT IMPEDANCE:    2.335 +j  12.109 (PU)
               THEVENIN IMPEDANCE X/R RATIO:     5.186
               SEQUENCE EQUIVALENT IMPEDANCE Z1:   0.800 +j   4.063 (PU)
                                             Z2:   0.800 +j   4.063 (PU)
                                             Z0:   0.734 +j   3.982 (PU)

                ASYM    RMS   INTERRUPTING AMPS
               1/2 CYCLES    2 CYCLES    3 CYCLES    5 CYCLES    8 CYCLES
                  36960.8     29490.3     29281.5     29261.3     29261.1

               INI. SYM. RMS FAULTED BUS VOLTAGES ( PU / DEG )
                       AT TIME =     0.5 CYCLES
               ---PHASE A---       ---PHASE B---       ---PHASE C---
               0.0000 /   45.0     0.9998 / -149.5     0.9928 /   89.7

               INI.    RMS   FAULTED CURRENT ( AMPS / DEG )
                       AT TIME =     0.5 CYCLES
               ---PHASE A---       ---PHASE B---       ---PHASE C---
               29261.1 /-109.1       0.0 /-109.1         0.0 /-109.1

SUS-H          ==== INI. SYM. RMS SYSTEM BUS VOLTAGES ( PU / DEG ) =======
                   FIRST BUS FROM FAULT    AT TIME =     0.5 CYCLES
                         ---PHASE A---     ---PHASE B---     ---PHASE C---
   TRANS SEC        480.0  0.0041 / -83.  1.0008 /-149.  0.9903 /  90.
   MCC-1 BUS        480.0  0.0000 /-122.  0.9998 /-150.  0.9928 /  90.

SUS-H          ====== INI.    RMS   SYSTEM BRANCH FLOWS ( AMPS ) =========
                   FIRST BUS FROM FAULT    AT TIME =     0.5 CYCLES
                              VBASE LL  -PHASE A-     -PHASE B-     -PHASE C-
 TRANS SEC      SUS-H            480. 29261.1/-109.     0.0/-109.     0.0/-109.
 SUS-H          MCC-1 BUS        480.     0.0/  91.     0.0/ -80.     0.0/ -80.
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```
TRANS PRI      VOLTAGE BASE LL:                    13200.0 (VOLTS)
               INI. SYM. RMS FAULT CURRENT:          0.1 /  -45. ( AMPS/DEG )
               THEVENIN EQUIVALENT IMPEDANCE:  INFINITE
               THEVENIN IMPEDANCE X/R RATIO:        1.000
               SEQUENCE EQUIVALENT IMPEDANCE Z1:   0.094 +j   0.094 (PU)
                                             Z2:   0.094 +j   0.094 (PU)
                                             Z0: INFINITE

                ASYM    RMS   INTERRUPTING AMPS
               1/2 CYCLES   2 CYCLES    3 CYCLES    5 CYCLES    8 CYCLES
                     0.1         0.1         0.1         0.1         0.1

               INI. SYM. RMS FAULTED BUS VOLTAGES ( PU / DEG )
                       AT TIME =     0.5 CYCLES
               ---PHASE A---       ---PHASE B---       ---PHASE C---
               0.0000 / -157.9     1.7320 / -150.0     1.7320 /  150.0

               INI.    RMS   FAULTED CURRENT ( AMPS / DEG )
                       AT TIME =     0.5 CYCLES
               ---PHASE A---       ---PHASE B---       ---PHASE C---
                   0.1 / -45.0         0.0 / -45.0         0.0 / -45.0

TRANS PRI      ==== INI. SYM. RMS SYSTEM BUS VOLTAGES ( PU / DEG ) =======
                   FIRST BUS FROM FAULT    AT TIME =     0.5 CYCLES
                         ---PHASE A---     ---PHASE B---     ---PHASE C---
  TRANS SEC          480.0  1.0000 / -30.  1.0000 /-150.  1.0000 /  90.

TRANS PRI      ====== INI.    RMS   SYSTEM BRANCH FLOWS ( AMPS ) =========
                   FIRST BUS FROM FAULT    AT TIME =     0.5 CYCLES
                             VBASE LL  -PHASE A-     -PHASE B-     -PHASE C-
FEEDER S-22    TRANS PRI     13200.     0.1/ -45.     0.0/ -45.     0.0/ -45.
TRANS PRI      TRANS SEC     13200.     0.0/ -99.     0.0/  81.     0.0/  81.

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TRANS SEC      VOLTAGE BASE LL:                        480.0 (VOLTS)
               INI. SYM. RMS FAULT CURRENT:  29333.4 / -109. ( AMPS/DEG )
               THEVENIN EQUIVALENT IMPEDANCE:    2.290 +j  12.086 (PU)
               THEVENIN IMPEDANCE X/R RATIO:     5.278
               SEQUENCE EQUIVALENT IMPEDANCE Z1:   0.795 +j   4.060 (PU)
                                             Z2:   0.795 +j   4.060 (PU)
                                             Z0:   0.700 +j   3.966 (PU)

                ASYM    RMS   INTERRUPTING AMPS
               1/2 CYCLES    2 CYCLES    3 CYCLES    5 CYCLES    8 CYCLES
                  37199.4     29583.3     29356.6     29333.6     29333.4

               INI. SYM. RMS FAULTED BUS VOLTAGES ( PU / DEG )
                       AT TIME =     0.5 CYCLES
               ---PHASE A---       ---PHASE B---       ---PHASE C---
               0.0000 /   90.0     1.0009 / -149.4     0.9902 /   89.7

               INI.    RMS   FAULTED CURRENT ( AMPS / DEG )
                       AT TIME =     0.5 CYCLES
               ---PHASE A---       ---PHASE B---       ---PHASE C---
               29333.4 /-109.3       0.0 /-109.3         0.0 /-109.3

TRANS SEC      ==== INI. SYM. RMS SYSTEM BUS VOLTAGES ( PU / DEG ) =======
                   FIRST BUS FROM FAULT    AT TIME =     0.5 CYCLES
                          ---PHASE A---     ---PHASE B---     ---PHASE C---
  TRANS PRI       13200.0  0.9920 /   1.  1.0000 /-120.  0.9813 / 120.
  SUS-H             480.0  0.0000 /-122.  1.0009 /-149.  0.9902 /  90.

TRANS SEC      ====== INI.    RMS   SYSTEM BRANCH FLOWS ( AMPS ) =========
                   FIRST BUS FROM FAULT    AT TIME =     0.5 CYCLES
                              VBASE LL  -PHASE A-     -PHASE B-     -PHASE C-
TRANS PRI      TRANS SEC      13200.   615.8/-109.     0.0/  70.   615.8/  71.
TRANS SEC      SUS-H            480.     0.0/  42.     0.0/-138.     0.0/-138.

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********** F A U L T A N A L Y S I S S U M M A R Y **********

BUS NAME	VOLTAGE L-L	AVAILABLE FAULT CURRENT 3 PHASE	X/R	LINE/GRND	X/R
ASD	480.	14839.4	1.0	10703.04	0.7
MCC-1 BUS	480.	25307.5	3.8	23812.55	3.3
SUS-H	480.	29043.9	5.1	29261.15	5.2
TRANS PRI	13200.	32804.0	1.0	0.07	1.0
TRANS SEC	480.	29072.5	5.1	29333.43	5.3

********** FAULT ANALYSIS REPORT COMPLETED **********