ENTERGY

ARKANSAS NUCLEAR ONE
CALCULATION COVER SHEET (Cont.)

Calc. No.: 85-E-0118-01 Unit: 2

Rev. No.: 2 Verification Method: Design Review: X
Alternate Calculation: _____ Qualification Testing:

Pages Revised and/or Added: ENTIRE CALC ReTyped, Appendices I THRU VII ADDED

Purpose of Revision: To update CALC Methodology, Developed conductor sustained overload capability, Redevelop figures, Add References, update Breakers setpoint

Initiating Documents	Resulting Document(s)	Key Design Input Docs.

Amends Calc(s): _____

Supercedes Calc(s): _____

Computer Software(Ver.): _____

By: EUGENE MILLER / EM / 8-9-93 Rvw'd: _____ / _____ / _____
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(Print Name) (Initials) (Date) (Print Name) (Initials) (Date)

(App. II: Vincent Bond VB 8/13/93

Rev. No.: _____ Verification Method: Design Review: _____
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By: _____ / _____ / _____ Rvw'd: _____ / _____ / _____
Chk'd: _____ / _____ / _____ Apv'd: _____ / _____ / _____
(Print Name) (Initials) (Date) (Print Name) (Initials) (Date)

Check if Additional Revisions: _____

CY 09-01-89

Calculation Cover Sheet

Calc. No.: 85E-0118-01

Calc. Title: RB Penetration Overcurrent Protection Study

Unit: 2

Category: Q

System(s): 2Y, 2D, RB, 2B

Topic(s): PPST, PRCO

Calc. Type: EG

Component No(s).:

Plt Area: Bldg. ______ Elev. ______ Room ______ Wall ______ Coordinates: ______

Abstract (Include Purpose/Results): To incorporate changes per CALC 85D-2075-15, CALC 86D-2013-01, and CALC 89D-2044-04

Rev. No: 1

Verification Method: Design Review: X

Alternate Calculation: ______ Qualification Testing: ______

Pages Revised and/or Added: 9-11, Table 1 pg. 1, Summary 2, 5, 8, 41, 42, 44, 47,73-93

Purpose of Revision: To update list of settings.

Initiating Documents	Resulting Document(s)	Reference Docs.

Amends Calc(s):

Supercedes Calc(s): 85E-0118-01 Rev. 0, 85D-2075-15, 86D-2013-01, 89D-2044-04

Computer Software(Ver.):

By: Brian Williams / BCW / 4/22/91

Rvw'd: / /

Chk'd: Tom Kisielnicki / tjk / 4-22-91

Apv'd: J.G. Dobbs / JGD / 4-22-91

(Print Name) (Initials) (Date)

Check If Additional Revisions: ✓

APL ARKANSAS NUCLEAR ONE

CALCULATION 85-E-0118-01

REVISION 2

THIS REVISION INCORPORATES THE FOLLOWING CHANGES

- Defines the Penetration Study Scope and Bases
- Clarify the calculation methodology
- Develop curves that reflect the penetration conductors intermediate characteristics for sustained overloads (10-1000s)
- Clarify the methodology for selecting the fuse on the figures
- Re-developed figures using Captor program
  Note: This program is NON-Q software. All curves produced by Captor were checked for 3 points with manufacturer published characteristics.
- Included a reference section for protective devices setpoint data
- Incorporated the CEA power supply limitations that was addressed in Calc. 85D-2075-15 (Appendix III)
- Added various reference documents (Penetration configuration, 6.9KV breaker data, and Memorandum IC-85-093)
- Page number and paragraph numbers are not marked with a revision block due to the complete rewrite
- Acceptance Criterion in Appendix I, Penetration Summary, changed due to the renumbering of the text but not annotated as such in the summary listing
- Incorporate changes per Design Change Packages

DCP 86-2116D	DCP 83-2217
DCP 90-2017	DCP 87-2042
DCP 85-2111	DCP 85-2152
DCP 83-2171	DCP 81-2034
DCP 87-2060	DCP 86-2992
DCP 83-2080	DCP 86-2055
DCP 87-2073	

BY: E M DATE: 8-6-93
Ck'd: DS DATE: 8/12/93

INDEX

1. PURPOSE

2. REFERENCES

2 3. DESIGN BASES

4. METHODOLOGY

2 5. ASSUMPTIONS

6. PENETRATION ACCEPTANCE CRITERIA

7. CONCLUSION

APPENDICES

I. PENETRATION MODULE SUMMARY

II. CAPABILITY CURVES

III. INSTRUMENTATION ACCEPTANCE CRITERIA

2 IV. CABLE INTERMEDIATE CHARACTERISTICS METHODOLOGY

V. FUSE COMPARISON CURVES AND METHODOLOGY

VI PENETRATION PROTECTIVE DEVICE SETPOINT REFERECES

VII PORTION OF REFERENCES INCLUDED IN CALCULATION

Rev. 2 BY: EM DATE: 8-6-93
Rev. 2 Ck'd: DS DATE: 8/12/93

1.0 PURPOSE

2

The purpose of the calculation is summarized as follows:

- document that each containment penetration conductor overcurrent protective device is in compliance with Regulatory Guide 1.63 to the extent stated in the Safety Analysis Report, Section 8.3.1.2,

2

- provide containment penetration conductor damage curves (250°C insulation limit), conductor intermediate characteristic (sustained overcurrent region) curves, and overcurrent protection device curves for all circuits 120 volts and above,

- identify any conductor protection not in compliance with SAR Section 8.3.1.2 and recommend corrective action,

- evaluate each penetration circuit intermediate characteristics for protection up to 1000 seconds. The evaluation should be based on the conductor short circuit and intermediate characteristic curve.

1.1 SCOPE

The intent of this calculation is to show coordination between the conductor withstand capability (conductor failure curve based on 250°C) at maximum fault current and the breaker or protective device response time. In cases where the instantaneous portion of the breaker curve overlaps the conductor capability curve, the circuit maximum available short circuit current will be shown to demonstrate the penetration acceptability. Although not regarded by the ANO license bases, the conductor intermediate characteristics have been plotted on the curves to demonstrate that the penetrations have dual protection at maximum fault conditions and at least one protective device that protects for the full range of the conductor intermediate characteristics. Thermal overload heaters are installed in many low voltage circuits (480vac) and will offer an additional level of protection for the penetrations on low energy faults; however, the heaters will not be shown in the calculation because they are not covered by Tech. Spec. surveillances.

2

The calculation will not provide a complete analysis of each circuit with respect to full load current, locked rotor current, or thermal overload heater protection. Considering the design practice of selecting a penetration pigtail the same size or one size larger than the cable supplying the power circuits (Reference 2.7) and the size of the penetration module conductor in relation to its pigtail (Appendix III), it is reasonable to conclude that the penetration conductors are adequately sized to carry the circuit full load current and momentary inrush current.

2.0 REFERENCES

2.1 ANO-2 Protective Device Coordination Study, Calculation No. 84E-0103-01.

2.2 ANO-2 Protective Device Coordination Study , Calculation No. 84E-0103-52

2.3 IEEE 317-1971, Electrical Penetration Assemblies in Containment Structures for Nuclear Fueled Power Generating Stations

2.4 IEEE 317-1983, Electrical Penetration Assemblies in Containment Structures for Nuclear Power Generating Stations

2 2.5 Regulatory Guide 1.63, October 1973-Electrical Penetration Assemblies in Containment Structures For Water-Cooled Nuclear Power Plants

2.6 IEEE 242-1986, Protection and Coordination of Industrial and Commercial Power Systems

2.7 ANO-2 Safety Analysis Report, Section 8.3.1.2

2.8 ICEA P-32-382, Short Circuit Characteristics of Insulated Cable

2.9 Amphenol Sams Design Verification Test Report No. 123-1275

2.10 Amphenol Sams letter (JEP: 3:327) to Bechtel Corporation dated March 28, 1973

2.11 Manufacturers Time Current Curves for Breakers and Fuses: Computer Aided Plotting for Time Overcurrent Reporting (CAPTOR), by SKM Systems Analysis, Inc.; Copyright 1984-1992

2.12 Electrical Drawings
E-2625 Sheets A thru 400

Rev. 2 BY: EM DATE: 8-6-93
Rev. 2 Ck'd: DS DATE: 8/12/93

2.12.1 Entergy/ANO drawings (Control Power Transformers)
NOTE: Some control circuits shown on drawing E-2086 Sh.2 do not go through penetration modules; therefore, a redundant fuse requirement is not imposed on those circuits and will not be addressed in this calculation.

E-2083	Sheet 1	Rev. 23	E-2083 Sheet 2 Rev. 3
E-2085	Sheet 1	Rev. 4	
E-2086	Sheet 1	Rev. 9	E-2086 Sheet 1A Rev. 2
E-2086	Sheet 2	Rev. 5	

2.12.2 MCC Vendor drawings

E-2011	Series
E-2037	Sheets 1 and 2

2.13 Annunciator Manual

Technology Incorporated, Instruments and Controls J. O. 61-1518

2.14 Fuse Control Procedure 1025.056

2.15 Specification E-2412, 600 Volt Single and Multi-conductor Copper Ethylene Propylene Insulated Power and Control Cable

2.16 ICEA P-46-426, Power Cable Ampacities

2.17 NFPA 70 National Electrical Code-1990

2.18 Safety Evaluation Report (SER) related to amendment no. 69, Docket No. 50-368

2.19 Procedure 2307.008, Containment Penetration Overcurrent Prot. Device Testing (Rev. 10)

2.20 Calc. 89-D-2030-02, 125VDC Battery System Protection, 2D13 (Rev. 2)

2.21 Calc. 92-E-0037-05, ANO-2 Short Circuit Study (Preliminary)

2.22 Calc. 91-E-0093-04, 2D01 System Short Circuit Study

2.23 Lighting Panel Schedules, E-2060

2.24 Memorandum IC-85-093, Containment Electrical Penetration Protection Regulatory Guide 1.63

Rev 2 BY: LM DATE: 8-13-93
Rev 2 Ck'd DS DATE: 8/13/93

2.25. IEEE 241-1990, Electric Power Systems in Commercial Buildings

2.26 Okonite Product Data; Effective: March 11, 1988

2.27 NES-13, ANO Engineering Standard for Environmental Qualification Service Conditions

2.28 SCEW Sheet 2A112, Environmental Qualification Documentation for Bunker Ramo/Amphenol Sams EPA's

2.30 IEEE 241-1990, Electrical Power Systems in Commercial Buildings

Rev. 2 BY: EM DATE: 8-6-93
Rev. 2 Ck'd: DS DATE: 8/12/93

3.0 DESIGN BASES

The ANO-2 license basis for electrical penetration overcurrent and short circuit protection consisted of a commitment for compliance with IEEE-317, 1971, as stated in the SAR. Regulatory Guide 1.63, 1973 was not considered in the design of the penetrations; however, the penetrations are in partial compliance with R.G. 1.63. The backup protection is not in full compliance with IEEE-279 concerning electrical independence, on-line testability, bypassing or manual initiation. The SAR identifies the nine basic types of penetrations installed and how the penetration circuits are protected against maximum short circuit faults.

IEEE-317-1971 provides the requirement for the mechanical and electrical design of the penetration assemblies and the criteria for construction, testing, and installation. Regulatory Guide 1.63, revision 0, endorsed IEEE 317-1972 as providing an acceptable method of complying with GDC 50 of Appendix A and with Appendix B to 10CFR50 with respect to mechanical, electrical, and test requirements for the design, qualification, construction, installation, and testing of electrical penetration assemblies. The Requlatory Guide position C.1 specifically states "The electric penetration assembly should be designed to withstand, without loss of mechanical integrity, the maximum possible fault current versus time conditions (which could occur because of single random failures of circuit overload protection devices) within the two leads of any one single-phase circuit or the three leads of any three-phase circuit." The 1971 edition (section 4.0, Mechanical and Electrical Design) did not have any specific requirements for complying with overload protection.

Based on the SAR, Regulatory Guide 1.63 (revision 0) and SER (Ref. 2.18) issued, ANO-2 is committed to provided backup protection for maximum short circuit faults.

4.0 METHODOLOGY

4.1 A list, taken from electrical containment penetration drawings (Reference 2.12), was created identifying all penetration schemes. Using this list and electrical drawings, a detailed study was made to determine the circuit power source for each penetration conductor.

4.2 Using the protective device coordination study (Reference 2.1 and 2.2), vendor drawings (Reference 2.12), and procedure (Ref. 2.14), the penetration conductor protective device's type and setting were determined.

Rev. 2 BY: EM DATE: 8-13-93
Rev. 2 Ck'd DS DATE: 8/13/93

4.3 Figures

4.3.1 Bases for I^2t Curves (Time VS. Current Plots)

Conductor damage curves (I^2t = constant) were plotted using values from IEEE 317, 1983, Table A5 (Reference 2.4) for each cable size penetrating containment. These values were derived from ICEA P-32-382-1969 (Reference 2.8) for 90°C rated insulation with a maximum short circuit temperature of 250°C. Amphenol Sams Test Report 123-1275 (Reference 2.9) used the short circuit values from these standards as the basis for their test. The test report concluded that the assemblies were able to withstand the three phase short circuit tests as specified in IEEE 317 and ICEA P-32-382. Since the test results were based on a prototype test module, the IEEE withstand values accurately reflect the installed equipment characteristics.

2 4.3.2 Bases for Breaker and Fuse Curves

Breakers - The conductor protective devices were determined from references 2.1, 2.2, and 2.12 and their trip curves superimposed on the appropriate penetration conductor damage curve. The protective device trip curves (inverse-time) are replotted using CAPTOR (Reference 2.11). The plotted curves were verified against the manufacturer's curves.

Fuses - The conductor protective fuse and its type was determined from References 2.12 and 2.14. In cases where a specific fuse model number has been listed in a procedure or drawing, its tripping characteristic has been plotted on the figures. In cases where the exact model number is not known, a comparison of different fuses has been conducted (Appendix II) and the fuse reflecting the slowest response time was plotted. This method was used for figures 4, and 9.

Rev. 2 BY: [illegible] DATE: 8-13-93
Rev. 2 Ck'd: DS DATE: 8/13/93

4.3.3 Conductor Intermediate Characteristic Curve (10-1000 seconds)

Since the 250°C conductor insulation damage curve is only applicable for a short period of time (2s per IEEE 317-1983 section 4.2.5, ≈10s indicated in IEEE 242 section 8.5.2, 10s per IEEE 241 section 8.5.6 and CAPTOR), a conductor insulation damage curve was developed to evaluate the adequacy of protection between 10 and 1000 seconds. The conductor intermediate curve is based on an equation in Reference 2.6 that uses the conductor emergency operating temperature (130°C) and installation configuration to determine the percentage of overcurrent a conductor can withstand for any given time. These percentages are used with the conductor ampacity rating taken from the NEC (Reference 2.17) for conductor size #10AWG thru #14AWG and ICEA P-46-426 for conductor larger than #8AWG. The methodology used in developing the intermediate characteristics curves is presented in Appendix IV. 2

5.0 ASSUMPTIONS

5.1 The conductor rated temperature is 90°C and the overload temperature is 130°C per Reference 2.15.

5.2 For conservatism, the cable is assumed to have been operating at its rated temperature prior to the overload condition.

5.3 The conductors are assumed to be single conductor cables in free air.

6.0 ACCEPTANCE CRITERIA

The following subsection presents the acceptance criteria and evaluations on certain classes of penetration circuits presented in Appendix I (Penetration Cable Summary). Although all circuits are not protected by double breakers/fuses (instruments, 50VA CPT's, communciation circuits, etc.), they are in compliance with Regulatory Guide 1.63 to the degree stated in the SAR (Ref. 2.7). 2

Rev. 2 BY: EM DATE: 8-11-93
Rev. 2 Ck'd DS DATE: 8/12/93

6.1 120VAC MCC Control Circuits

All 120V AC MCC control circuits are fed by number 14AWG conductors or larger. The maximum available short circuit current for a 50 VA transformer is much less than the continuous current rating of the conductor. Therefore, no backup protection is required. Primary protection for the circuits is provided by a one amp fuse in the hot leg secondary of the transformer. MCC control circuits with transformers larger than 50VA have redundant fuses with amp ratings as specified in the SAR (Ref. 2.7). Redundant fuses are to be the same type as the primary fuses. The fuses are sized as follows:

△2

Transformer	Max S.C. Current	Fuse Rating
50 VA	--	1 AMP
100 VA	10.39	1 AMP
150 VA	22.73	2 AMP
200 VA	32.24	3 AMP
250 VA	57.23	3 AMP

6.2 DC Control Circuits

In all cases the DC circuits are ungrounded. Each polarity of the DC circuit is fused. A DC fault would only have to blow one fuse to clear the fault. Either fuse could be considered the primary protective device and the other fuse could be considered the backup protective device.

6.3 Control Element Drive Mechanism (CEA):

Each control element drive mechanism is fed from a non-class 1E 240-volt AC, 4-pole circuit breaker, rated at 10 amps for phases A, B, and C and 300 amps for the neutral. Backup protection is provided by 3-pole, non class 1E, 40 amp subgroup circuit breakers. The primary and secondary breakers are located outside containment.

Rev 2 BY: EM DATE: 8-6-93
Rev 2 Ck'd DS DATE: 8/12/93

6.4 Current Transformer Secondary

The current transformer penetration conductors are #6 AWG. The continuous current rating of a #6 conductor is 109 amps (Ref. 2.16) and it can withstand a fault current of ≈6536 amps for 5 cycles. Assuming a momentary (1/2 cycle) fault current of 74476 amps on 2H1 per Ref. 2.21 (74196 amps on 2H2) and the CT does not saturate, the maximum secondary current on the 600/5 ratio CT would be 620.8 amps for 1/2 cycles. The differential relays associated with these CT's have instantaneous trip units set at .25 amps. Upon receiving a trip signal, the breaker will clear the fault within 5 cycles (Ref. Appendix VII). The backup protection for these circuits is an Time Overcurrent Relay set to clear a fault of this magnitude in less than 0.67 seconds (Ref. 2.2). The #6 conductors can withstand the CT secondary current of 620.8 amps for ≈9 seconds. The maximum available secondary current will not exceed the conductor insulation damage threshold.

6.5 Instrumentation Circuits

The maximum short circuit current available from all analog instrumentation and radiation monitor detector circuits is well below the damage threshold of the penetration conductors for these circuits. Appendix III, which incorporated Memorandum IC-85-093 (Ref. 2.24), will be referenced in this study to give a brief description of the current limiting capabilities of the instrumentation circuitry penetrating containment.

6.6 Annunciator Circuits

The alarm contacts or actuators are supplied with 125VDC by the annunciator power supply. The annunciator input signal is made through a high resistance, limiting the current to one milliamp. Therefore, the maximum short circuti current available from the annunciator is well below the damage threshold of the penetration conductors for these circuits.

6.7 De-energized Circuits

This subsection addresses penetration conductors that are normally de-energized during power operation.

Rev. 2 BY: [illegible] DATE: 8-13-93
Rev. 2 Ck'd: DS DATE: 8/13/93

6.7.1 Containment Building Crane

The containment building crane is fed from breaker 52-131. It is only energized during an outage. Secondary protection can be provided by utilizing breaker 52-112 overcurrent relays.

6.7.2 Spare Conductors

These circuits have no current flow, therefore, they have no effect on the conductor damage threshold. They are, however, listed as conductors penetrating containment.

6.8 Coax and Triax Cable

Coax and triax are not considered current carrying conductors. An evaluation of coax and triax circuits confirms the maximum current is less than the continuous rating of the conductor.

6.9 Miscellaneous Circuits

All schemes not covered in section 6.1 through 6.8 are supplied by number 16 and number 14 AWG conductors. These circuits (computer inputs, thermocouple, transmitters, communication schemes) are low energy and have current limiting means which is below the damage threshold of the conductors.

6.10 AC Power Circuits (120 Volts and Above)

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Conductors that have maximum fault currents that can exceed the conductor insulation damage threshold of 250°C have redundant secondary protective devices per Section C.1 of Regulatory Guide 1.63, 1973. These protective devices are set to trip on short circuit current and overcurrent conditions while maintaining the conductor's mechanical integrity. Although not required by the ANO-2 license basis, the penetration conductors are protected in the conductor intermediate range by at least one protective device.

△2

6.10.1 In cases where the breaker instantaneous element curve overlaps the conductor damage threshold (figures 3 and 5), the available fault current at the penetration is 160 amps. This calculated fault current is based on the shortest cable length of 250 feet (163ft of 2/c #14 and 87ft of 2/c #10AWG; cables 2Q019C and 2Y109A, respectively) to the penetration and a phase to phase fault (208VAC). For conservatism, a voltage variation factor of 1.5 will be used to obtain a fault current of 240 amps. This current will be superimposed on Figures 3 and 5. The calculated fault

Rev. 2 BY: [illegible] DATE: 8-13-93
Rev. 2 Ck'd: DS DATE: 8/13/93

current indicates the breaker will operate in its thermal region and will prevent conductor insulation damage. The breakers are offering adequate secondary protection.

9.0 CONCLUSION

Each penetration conductor has been addressed with respect to its scheme number, penetration conductor size, primary and secondary protective device settings, and primary and secondary protective device type. In cases where a conductor has the possibility of exceeding its 250°C insulation damage threshold, redundant fuses or breakers ensure the containment penetration conductor electrical and mechanical integrity is maintained. For sustained overload conditions (low energy faults), one of the two protective devices provides assurance that the conductor will not exceed its emergency operating temperature of 130°C.

A summary of the protection for each penetration conductor is presented in Appendix I. The conductor protective device setpoint has been plotted on the conductor I^2t curve in Appendix II. Appendix VI list documents where the setpoint data were obtained for development of the figures/curves.

Rev. 2 BY: EM DATE: 8-11-93
Rev. 2 Ck'd: DS DATE: 8/12/93

APPENDIX I
PENETRATION CABLE SUMMARY

This section lists each containment penetration number and its use. Each penetration conductor has been addressed in respect to its penetration conductor size, scheme number, primary and secondary protective device. The summary references the appropriate acceptance criterion and figure in Appendix II for each penetration conductor. Notes have been added, where appropriate, for further clarification.

APPENDIX I

PENETRATION SUMMARY
CALCULATION 85-E-0118-01

F=Fuse
M=Mag Only
TM=Therm Mag

PENT NUMBER	MOD NO.	COND NUMBER	COND SIZE	SCHEME NUMBER	PRIMARY DEVICE	PRI TYPE	SECOND DEVICE	SEC TYPE	FIG NO.	ACCEPT CRIT.	NOTES:
2WR21-1	A-G	A-G	750MCM	2H11	152-11		SEE NOTE		42	6.10	2H13,14 OR 15
2WR21-2	A-G	A-G	750MCM	2H22	152-22		SEE NOTE		42	6.10	2H23,24,OR 25
2WR21-3	A-G	A-G	750MCM	2H21	152-21		SEE NOTE		42	6.10	2H23,24,OR 25
2WR21-4	A-G	A-G	750MCM	2H12	152-12		SEE NOTE		42	6.10	2H13,14,OR 15
2WR22-1	A	1	250MCM	2B731	N/A		N/A			6.10	NEUTRAL CONDUCTOR
2WR22-1	A	2-3	250MCM	N/A	N/A		N/A			6.7.2	SPARE
2WR22-1	C	1-3	350MCM	N/A	N/A		N/A			6.7.2	SPARE
2WR22-1	D	1-3	250MCM	2B131	52-131		NONE			6.7.1	
2WR22-1	E-F	1-3	350MCM	2B731	52-731		52-732		38	6.10	
2WR22-2	C-D	1-3	350MCM	2B824	52-824		52-823		38	6.10	
2WR22-2	E	1	250MCM	2B824	N/A		N/A			6.10	NEUTRAL CONDUCTOR
2WR22-2	E	2-3	250MCM	N/A	N/A		N/A			6.7.2	SPARE
2WR22-2	F	1-3	250MCM	N/A	N/A		N/A			6.7.2	SPARE
2WR23-1	A	1-3	250MCM	N/A	N/A		N/A			6.7.2	SPARE

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PENT NUMBER	MOD NO.	COND NUMBER	COND SIZE	SCHEME NUMBER	PRIMARY DEVICE	PRI TYPE	SECOND DEVICE	SEC TYPE	FIG NO.	ACCEPT CRIT.	NOTES:
2WR23-1	C-D	1-3	250MCM	2B922	52-922		52-912		34	6.10	
2WR23-1	E	1-3	250MCM	2B54J2	52-54J2	TM	52-54J3	TM	36	6.10	
2WR23-1	F	1-3	350MCM	2B523	52-523		52-512		28	6.10	
2WR23-2	C-D	1-3	250MCM	2B1023	52-1023		52-1012		34	6.10	
2WR23-2	E	1-3	250MCM	2B54K2	52-54K2	TM	52-54J4	TM	36	6.10	
2WR23-2	F	1-3	350MCM	2B623	52-623		52-612		28	6.10	
2WR24-1	A	1-2	250MCM	2D0318	72-0318	TM	72-0320	TM	37	6.10	
2WR24-1	A	3	250MCM	2M003							WELDING OUTLET
2WR24-1	C-D	1-3	250MCM	2B923	52-923		52-912		34	6.10	
2WR24-1	E-F	1-3	250MCM	2B1022	52-1022		52-1012		34	6.10	
2WR25									2	6.3	CEA CONT.,PENT 2WR25-1 THRU 7,
2WR26-1	A	1-7	14AWG	2B71B6	1 AMP	F				6.1	NO SEC DEVICE
2WR26-1	A	17-25	14AWG	2B71D2	1 AMP	F				6.1	NO SEC DEVICE
2WR26-1	A	26-34	14AWG	2B71D3	1 AMP	F				6.1	NO SEC DEVICE

APPENDIX I

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PENT NUMBER	MOD NO.	COND NUMBER	COND SIZE	SCHEME NUMBER	PRIMARY DEVICE	PRI TYPE	SECOND DEVICE	SEC TYPE	FIG NO.	ACCEPT CRIT.	NOTES:
2WR26-1	A	35-43	14AWG	2B71E1	1 AMP	F				6.1	NO SEC DEVICE
2WR26-1	A	44-50	14AWG	2B71G2	1 AMP	F				6.1	NO SEC DEVICE
2WR26-1	A	51-57	14AWG	2B71H4	1 AMP	F	1 AMP	F	1	6.1	
2WR26-1	A	58-64	14AWG	2B71H5	1 AMP	F	1 AMP	F	1	6.1	
2WR26-1	A	65-67	14AWG	2B71G1	1 AMP	F				6.1	NO SEC DEVICE
2WR26-1	A	68-69	14AWG	2K045						6.6	
2WR26-1	A	8-16	14AWG	2B71D1	1 AMP	F				6.1	NO SEC DEVICE
2WR26-1	C	1-7	14AWG	2B71F2	1 AMP	F				6.1	NO SEC DEVICE
2WR26-1	C	15-21	14AWG	2B71E3	1 AMP	F				6.1	NO SEC DEVICE
2WR26-1	C	22-25	14AWG	2Q013	6 AMP	F	2Y1-9	TM	3	6.10.1	
2WR26-1	C	26-32	14AWG	2B71E2	1 AMP	F				6.1	NO SEC DEVICE
2WR26-1	C	33-39	14AWG	2B71C2	1 AMP	F				6.1	NO SEC DEVICE
2WR26-1	C	40-46	14AWG	2B71C1	1 AMP	F				6.1	NO SEC DEVICE
2WR26-1	C	47-48	14AWG	N/A	N/A		N/A			6.7.2	CHANGED PER DCP 85-2111(SPARE)

APPENDIX I
PENETRATION SUMMARY
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PENT NUMBER	MOD NO.	COND NUMBER	COND SIZE	SCHEME NUMBER	PRIMARY DEVICE	PRI TYPE	SECOND DEVICE	SEC TYPE	FIG NO.	ACCEPT CRIT.	NOTES:
2WR26-1	C	49-52	14AWG	2I027	6 AMP	F	2Y1-7	TM	3	6.10.1	
2WR26-1	C	53-56	14AWG	2B54K3	1 AMP	F	1 AMP	F	1	6.1	
2WR26-1	C	57-63	14AWG	2B71C3	1 AMP	F				6.1	NO SEC DEVICE
2WR26-1	C	64-65	14AWG	2I292						6.5	REF MEMO IC-85-093 MODEL NO. 1
2WR26-1	C	66-67	14AWG	2I290						6.5	REF MEMO IC-85-093 MODEL NO.1
2WR26-1	C	68-69	14AWG	N/A	N/A		N/A			6.7.2	SPARE
2WR26-1	C	8-14	14AWG	2B71F3	1 AMP	F				6.1	NO SEC DEVICE
2WR26-1	D	1-4	6 AWG	2H11						6.4	RCP CT CIRCUIT
2WR26-1	D	11-22	6 AWG	N/A	N/A		N/A			6.7.2	SPARE
2WR26-1	D	5-7	6 AWG	2H11	21PA-19	TM	2B15-C1	M	30	6.10	RCP HTR CIRCUIT
2WR26-1	D	8-10	6 AWG	2B54K3	52-54K3	M	52-54J8	TM	29	6.10	
2WR26-1	F	1-9	12AWG	2B71B4						6.9	NSS SYSTEM, TO COMPUTER
2WR26-1	F	10-16	12AWG	2B71B4						6.9	NSS SYSTEM, COMPUTER

APPENDIX I

PENETRATION SUMMARY
CALCULATION 85-E-0118-01

F=Fuse
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PENT NUMBER	MOD NO.	COND NUMBER	COND SIZE	SCHEME NUMBER	PRIMARY DEVICE	PRI TYPE	SECOND DEVICE	SEC TYPE	FIG NO.	ACCEPT CRIT.	NOTES:
2WR26-1	F	17-18	12AWG	2B63L2	5A	F	31LA-10	TM	23	6.10	FUSE IN 2TB414
2WR26-1	F	19-27	12AWG	2K103	10A	F	2Y1-25	TM	11	6.10	
2WR26-1	F	28-30	12AWG	2B61L4	52-61L4	M	52-61L1	TM	13	6.10	REVISED PER DCP 86-2013
2WR26-1	F	31-39	12AWG	2B61L4	1A	F	1A	F	1	6.1	
2WR26-1	F	40-55	12AWG	N/A	N/A		N/A			6.7.2	SPARE
2WR26-1	G	1-14	14AWG	2J069	6A&10A	F			10	6.2	DC CIRCUIT
2WR26-1	G	15-17	14AWG	N/A	N/A		N/A		2	6.7.2	SPARE
2WR26-1	G	18-25	14AWG	2C010						6.9	
2WR26-1	G	26-27	14AWG	2J025						6.9	
2WR26-1	G	28-29	14AWG	2C011						6.9	
2WR26-1	G	30-33	14AWG	2K029						6.6	
2WR26-1	G	34-35	14AWG	N/A	N/A		N/A			6.7.2	SPARE
2WR26-1	G	36-39	14AWG	2K045						6.6	
2WR26-1	G	40-42	14AWG	2Q008	N/A		N/A			6.7.2	NOT GOING THRU PENT ON SCHEME DWG(SPARE)

APPENDIX I
PENETRATION SUMMARY
CALCULATION 85-E-0118-01

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PENT NUMBER	MOD NO.	COND NUMBER	COND SIZE	SCHEME NUMBER	PRIMARY DEVICE	PRI TYPE	SECOND DEVICE	SEC TYPE	FIG NO.	ACCEPT CRIT.	NOTES:
2WR26-1	G	43-52	14AWG	2J130	6A	F	6A	F	7	6.10	
2WR26-1	G	53-54	14AWG	2U005	6A	F	2Y1-23	TM	3	6.10.1	
2WR26-1	G	55-61	14AWG	2B71B5	1A	F	1A	F	1	6.1	
2WR26-1	G	62	14AWG	N/A	N/A		N/A			6.7.2	SPARE
2WR26-1	G	63-64	14AWG	2B51D3	5A	F	43LA-12	TM	9	2 6.10	2TB409
2WR26-1	G	65-66	14AWG	2B51D4	5A	F	43LA-12	TM	9	6.10	2TB409
2WR26-1	G	67-69	14AWG	N/A	N/A		N/A			6.7.2	SPARE
2WR26-2	A	1-7	14AWG	2B81G4	1A	F	1A	F	1	6.1	
2WR26-2	A	15-21	14AWG	2B81E2	1A	F				6.1	NO SEC DEVICE
2WR26-2	A	22-28	14AWG	2B81F2	1A	F				6.1	NO SEC DEVICE
2WR26-2	A	29-37	14AWG	2B81E3	1A	F				6.1	NO SEC DEVICE
2WR26-2	A	38-46	14AWG	2B81D1	1A	F				6.1	NO SEC DEVICE
2WR26-2	A	47-55	14AWG	2B81D2	1A	F				6.1	NO SEC DEVICE
2WR26-2	A	56-64	14AWG	2B81D3	1A	F				6.1	NO SEC DEVICE

APPENDIX I
PENETRATION SUMMARY
CALCULATION 85-E-0118-01

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PENT NUMBER	MOD NO.	COND NUMBER	COND SIZE	SCHEME NUMBER	PRIMARY DEVICE	PRI TYPE	SECOND DEVICE	SEC TYPE	FIG NO.	ACCEPT CRIT.	NOTES:
2WR26-2	A	65-66	14AWG	N/A	N/A		N/A			6.7.2	SPARE
2WR26-2	A	67-68	14AWG	2K045						6.6	
2WR26-2	A	69	14AWG	N/A	N/A		N/A			6.7.2	SPARE
2WR26-2	A	8-14	14AWG	2B81G5	1A	F	1A	F	1	6.1	
2WR26-2	C	1-4	14AWG	2I029	6A	F	2Y1-7	TM	3	6.10.1	
2WR26-2	C	12-18	14AWG	2B81C2	1A	F				6.1	NO SEC DEVICE
2WR26-2	C	19-25	14AWG	2B81F3	1A	F				6.1	NO SEC DEVICE
2WR26-2	C	26-27	14AWG	N/A	N/A		N/A			6.7.2	CHANGED PER DCP 85-2111(SPARE)
2WR26-2	C	28-31	14AWG	2Q014	6A	F	2Y2-9	TM	3	6.10.1	
2WR26-2	C	32-35	14AWG	2B64J1	1A	F	1A	F	1	6.1	
2WR26-2	C	36-43	14AWG	2C010						6.9	
2WR26-2	C	44-45	14AWG	2C011						6.9	
2WR26-2	C	46-52	14AWG	2J070	6&10A	F			10	6.10	DC CIRCUIT
2WR26-2	C	5-11	14AWG	2B81C3	1A	F				6.1	NO SEC DEVICE

APPENDIX I
PENETRATION SUMMARY
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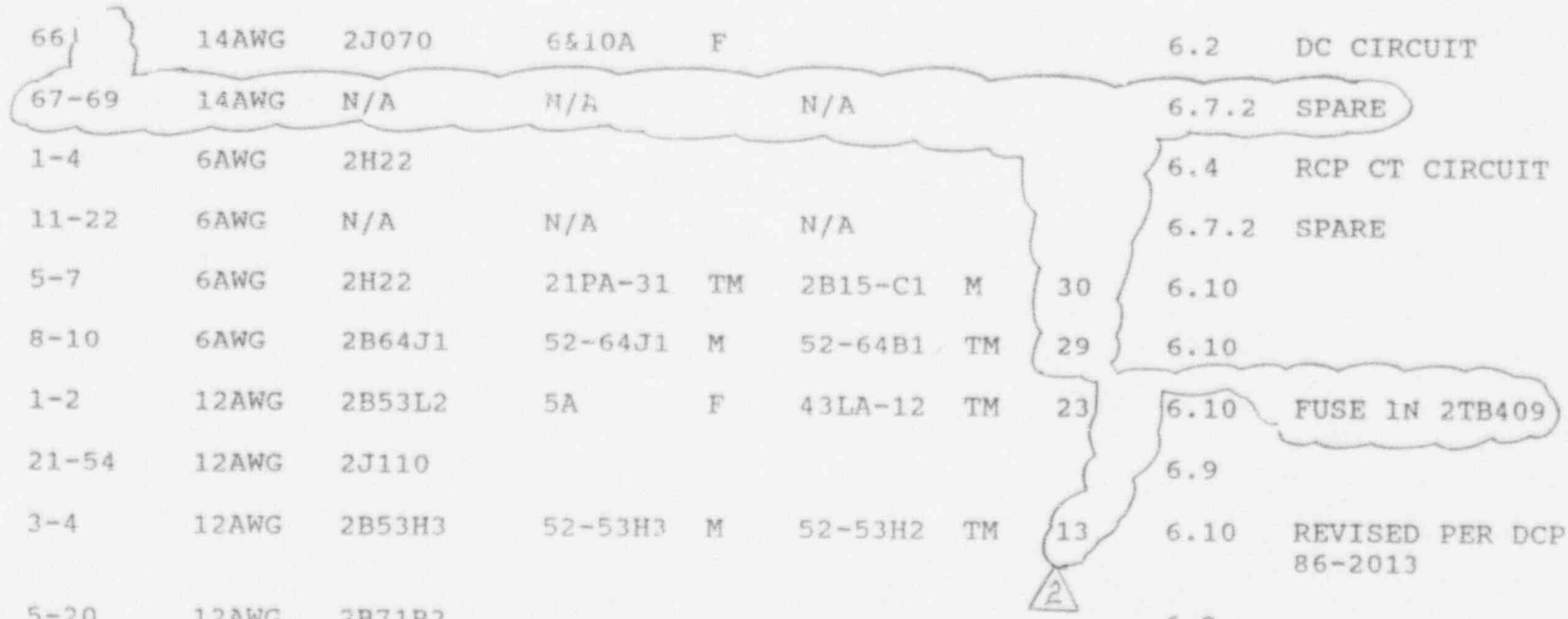
PENT NUMBER	MOD NO.	COND NUMBER	COND SIZE	SCHEME NUMBER	PRIMARY DEVICE	PRI TYPE	SECOND DEVICE	SEC TYPE	FIG NO.	ACCEPT CRIT.	NOTES:
2WR26-2	C	53-58	14AWG	2J070	.10A	F				6.2	DC CIRCUIT
2WR26-2	C	59-65	14AWG	2B81C1	1A	F				6.1	NO SEC DEVICE
2WR26-2	C	66	14AWG	2J070	6&10A	F				6.2	DC CIRCUIT
2WR26-2	C	67-69	14AWG	N/A	N/A		N/A			6.7.2	SPARE
2WR26-2	D	1-4	6AWG	2H22						6.4	RCP CT CIRCUIT
2WR26-2	D	11-22	6AWG	N/A	N/A		N/A			6.7.2	SPARE
2WR26-2	D	5-7	6AWG	2H22	21PA-31	TM	2B15-C1	M	30	6.10	
2WR26-2	D	8-10	6AWG	2B64J1	52-64J1	M	52-64B1	TM	29	6.10	
2WR26-2	F	1-2	12AWG	2B53L2	5A	F	43LA-12	TM	23	6.10	FUSE 1N 2TB409
2WR26-2	F	21-54	12AWG	2J110						6.9	
2WR26-2	F	3-4	12AWG	2B53H3	52-53H3	M	52-53H2	TM	13	6.10	REVISED PER DCP 86-2013
2WR26-2	F	5-20	12AWG	2B71B3						6.9	
2WR26-2	F	55	12AWG	2B53H2						6.10	NEUTRAL CONDUCTOR
2WR26-2	G	1-3	14AWG	2B81E1	1A	F				6.1	NO SEC DEVICE



APPENDIX I
PENETRATION SUMMARY
CALCULATION 85-E-0118-01

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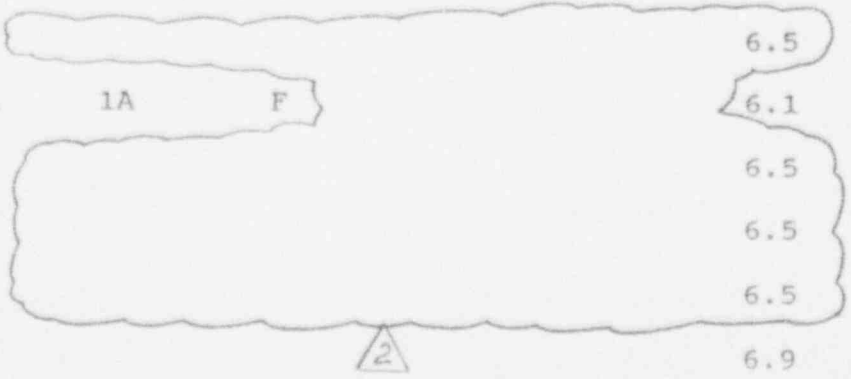
PENT NUMBER	MOD NO.	COND NUMBER	COND SIZE	SCHEME NUMBER	PRIMARY DEVICE	PRI TYPE	SECOND DEVICE	SEC TYPE	FIG NO.	ACCEPT CRIT.	NOTES:
2WR26-2	G	11-12	14AWG	N/A	N/A		N/A			6.7.2	SPARE
2WR26-2	G	13-18	14AWG	2B53H3	1A	F				6.1	NO SEC DEVICE
2WR26-2	G	19-20	14AWG	2I377						6.5	REF MEMO IC-85-093 MODEL NO 1
2WR26-2	G	21-22	14AWG	2I293						6.5	REF MEMO IC-85-093 MODEL NO 1
2WR26-2	G	23-24	14AWG	2I29I						6.5	REF MEMO IC-85-093
2WR26-2	G	25-28	14AWG	2K036						6.6	
2WR26-2	G	29-38	14AWG	2J130	6A	F	6A	F	7	6.10	
2WR26-2	G	39-41	14AWG	2U019						6.5	
2WR26-2	G	4-6	14AWG	2B81F1	1A	F				6.1	NO SEC DEVICE
2WR26-2	G	42-44	14AWG	2U019						6.5	
2WR26-2	G	45-47	14AWG	2U019						6.5	
2WR26-2	G	48-50	14AWG	2U019						6.5	
2WR26-2	G	51-53	14AWG	2C458						6.9	



APPENDIX I
PENETRATION SUMMARY
CALCULATION 85-E-0118-01

F=Fuse
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PENT NUMBER	MOD NO.	COND NUMBER	COND SIZE	SCHEME NUMBER	PRIMARY DEVICE	PRI TYPE	SECOND DEVICE	SEC TYPE	FIG NO.	ACCEPT CRIT.	NOTES:
2WR26-2	G	54-62	14AWG	2K103	10A	F	2Y1-25	TM	5	6.10.1	
2WR26-2	G	63-64	14AWG	2B61D3	5A	F	31LA-6	TM	9	6.10	FUSE IN 2TB407
2WR26-2	G	65-66	14AWG	2B61D4	5A	F	31LA-6	TM	9	6.10	FUSE IN 2TB407
2WR26-2	G	67-69	14AWG	2B53H3	1A	F	(2)			6.1	NO SEC DEVICE
2WR26-2	G	7-10	14AWG	2K045						6.6	
2WR26-3	A	1-2	14AWG	2H11	15A	F			2	6.2	DC CIRCUIT
2WR26-3	A	11-17	14AWG	2J069	6&10A	F			10	6.2	DC CIRCUIT
2WR26-3	A	18-21	14AWG	2B54K4	1A	F	1A	F	1	6.1	
2WR26-3	A	22-23	14AWG	2B5 A4	5A	F	31LA-10	TM	9	6.10	FUSE IN 2TB414
2WR26-3	A	24-25	14AWG	2B61A4	5A	F	31LA-6	TM	9	6.10	FUSE IN 2TB414
2WR26-3	A	26-27	14AWG	2B31E1	1A	F				6.1	NO SEC DEVICE
2WR26-3	A	28-29	14AWG	2B41E4	1A	F				6.1	NO SEC DEVICE
2WR26-3	A	3-4	14AWG	2H21	15A	F			2	6.2	DC CIRCUIT
2WR26-3	A	30-33	14AWG	2I028	6A	F	2Y1-7	TM	3	6.10.1	
										(2)	

APPENDIX I
PENETRATION SUMMARY
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PENT NUMBER	MOD NO.	COND NUMBER	COND SIZE	SCHEME NUMBER	PRIMARY DEVICE	PRI TYPE	SECOND DEVICE	SEC TYPE	FIG NO.	ACCEPT CRIT.	NOTES:
2WR26-3	A	34-36	14AWG	2K101	6A	F	2Y1-23	TM	3	6.10.1	
2WR26-3	A	37-39	14AWG	2K102	6A	F	2Y2-23	TM	3	6.10.1	
2WR26-3	A	40-47	14AWG	2C010						6.9	
2WR26-3	A	48-49	14AWG	2C011						6.9	
2WR26-3	A	5-6	14AWG	N/A	N/A		N/A			6.7.2	CHANGED PER DCP 85-2111(SPARE)
2WR26-3	A	50-51	14AWG	2J026						6.9	
2WR26-3	A	52-55	14AWG	2C008						6.9	
2WR26-3	A	56-57	14AWG	N/A	N/A		N/A			6.7.2	SPARE
2WR26-3	A	58-60	14AWG	2Q008	N/A		N/A			6.7.2	NOT SHOWN ON SCHEME DWG E-2782(SPARE)
2WR26-3	A	61-62	14AWG	2K017						6.6	
2WR26-3	A	63-69	14AWG	N/A	N/A		N/A			6.7.2	SPARES
2WR26-3	A	7-10	14AWG	2Q013	6A	F	2Y1-9	TM	3	6.10.1	
2WR26-3	C	1-9	14AWG	2J123	6A	F	6A	F	7	6.10	

APPENDIX I
PENETRATION SUMMARY
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PENT NUMBER	MOD NO.	COND NUMBER	COND SIZE	SCHEME NUMBER	PRIMARY DEVICE	PRI TYPE	SECOND DEVICE	SEC TYPE	FIG NO.	ACCEPT CRIT.	NOTES:
2WR26-3	C	10-16	14AWG	2J123	6A	F	6A	F	7	6.10	
2WR26-3	C	17-22	14AWG	N/A	N/A		N/A			6.7.2	SPARES
2WR26-3	C	23-24	14AWG	2Q019	6A	F	2Y1-9	TM	3	6.10.1	
2WR26-3	C	25-32	14AWG	2K029						6.6	
2WR26-3	C	33-44	14AWG	2J123	6A	F	6A	F	7	6.10	
2WR26-3	C	45-47	14AWG	2J134	6A	F	6A	F	7	6.10	
2WR26-3	C	48-51	14AWG	N/A	N/A		N/A			6.7.2	SPARES
2WR26-3	C	52-53	14AWG	2J069	6	F			10	6.2	DC CIRCUIT
2WR26-3	C	54-56	14AWG	2J134	6A	F	6A	F	7	6.10	
2WR26-3	C	57-64	14AWG	2U015	6A	F	2Y1-23	TM	3	6.10.1	
2WR26-3	C	65	14AWG	N/A	N/A		N/A			6.7.2	SPARE
2WR26-3	C	66-69	14AWG	2J123	6A	F	6A	F	7	6.10	
2WR26-3	D	1-4	6AWG	2H21						6.4	RCP CT CIRCUIT
2WR26-3	D	11	6AWG	2B54K2						6.10	NEUTRAL CIRCUIT

APPENDIX I
PENETRATION SUMMARY
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PENT NUMBER	MOD NO.	COND NUMBER	COND SIZE	SCHEME NUMBER	PRIMARY DEVICE	PRI TYPE	SECOND DEVICE	SEC TYPE	FIG NO.	ACCEPT CRIT.	NOTES:
2WR26-3	D	12-22	6AWG	N/A	N/A		N/A			6.7.2	SPARES
2WR26-3	D	5-7	6AWG	2H21	21PA-25	TM	52-15C1	M	30	6.10	
2WR26-3	D	8-10	6AWG	2B54K4	52-54K4	M	52-54F3	TM	29	6.10	
2WR26-3	F	1-2	12AWG	2B63L1	5A	F	31LA-10	TM	23	6.10	
2WR26-3	F	3-5	12AWG	2B31G2	52-31G1	TM	52-31G2	M	13	6.10	PER DCP 82-2072
2WR26-3	F	6-8	12AWG	2B41F5	52-41F4	TM	52-41F5	M	13	6.10	PER DCP 82-2072
2WR26-3	F	9-55	12AWG	N/A	N/A		N/A			6.7.2	SPARE
2WR26-4	A	1-2	14AWG	2H22	15A	F			2	6.2	DC CIRCUIT
2WR26-4	A	12-15	14AWG	2B64K1	1A	F	1A	F	1	6.1	
2WR26-4	A	16-17	14AWG	N/A	N/A		N/A			6.7.2	CHANGED PER DCP 85-2111
2WR26-4	A	18-21	14AWG	2Q014	6A	F	2Y1-9	TM	3	6.10.1	
2WR26-4	A	22-29	14AWG	2C010						6.9	REF PARAGH 6.9
2WR26-4	A	3-4	14AWG	2H12	15A	F			2	6.2	DC CIRCUIT
2WR26-4	A	30,31	14AWG	2C011						6.9	

APPENDIX I
PENETRATION SUMMARY
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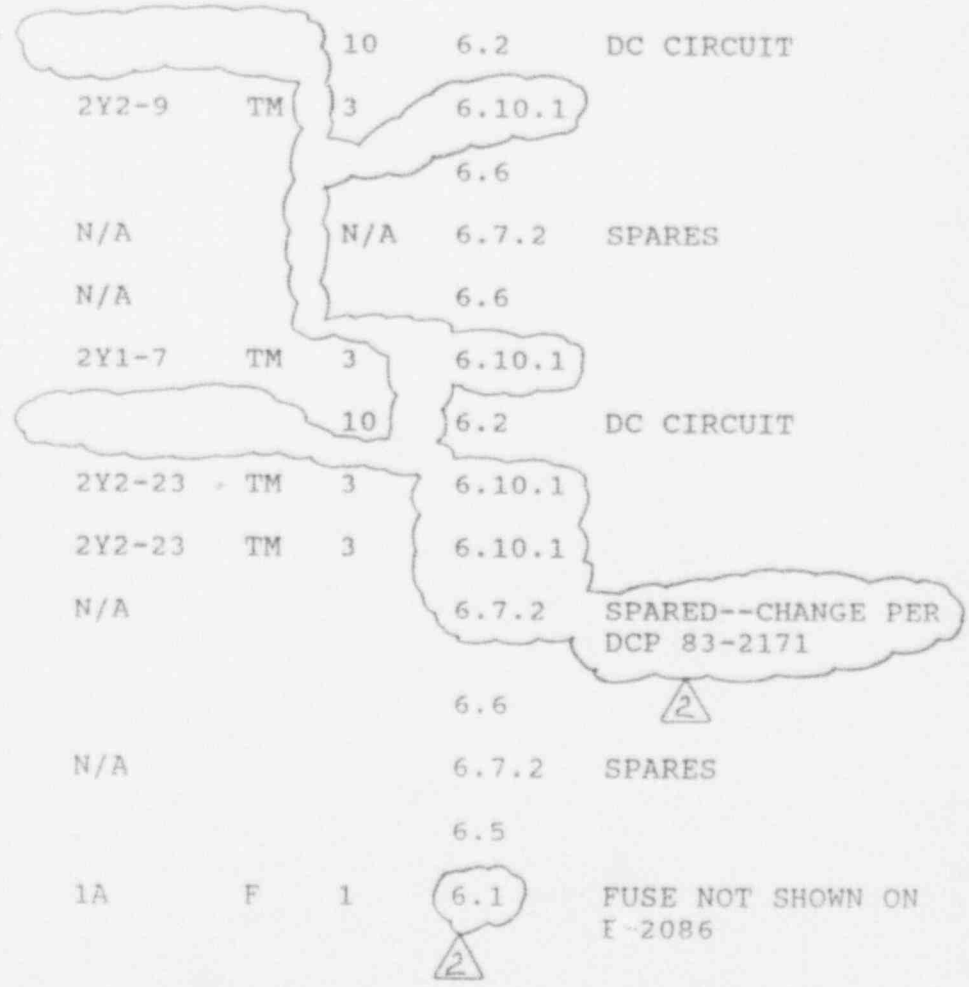
PENT NUMBER	MOD NO.	COND NUMBER	COND SIZE	SCHEME NUM3ER	PRIMARY DEVICE	PRI TYPE	SECOND DEVICE	SEC TYPE	FIG NO.	ACCEPT CRIT.	NOTES:
2WR26-4	A	32-33	14AWG	2J070	6&10A	F			10	6.2	DC CIRCUIT
2WR26-4	A	34-35	14AWG	2Q023	6A	F	2Y2-9	TM	3	6.10.1	
2WR26-4	A	36-39	14AWG	2K036						6.6	
2WR26-4	A	40-41	14AWG	N/A	N/A		N/A		N/A	6.7.2	SPARES
2WR26-4	A	42-45	14AWG	2K036	N/A		N/A			6.6	
2WR26-4	A	46-49	14AWG	2I030	6A	F	2Y1-7	TM	3	6.10.1	
2WR26-4	A	5-11	14AWG	2J070	6&10A	F			10	6.2	DC CIRCUIT
2WR26-4	A	50-54	14AWG	2U019	6A	F	2Y2-23	TM	3	6.10.1	
2WR26-4	A	55-62	14AWG	2U015	6A	F	2Y2-23	TM	3	6.10.1	
2WR26-4	A	63-64	14AWG	2K059	N/A		N/A			6.7.2	SPARED--CHANGE PER DCP 83-2171
2WR26-4	A	65-66	14AWG	2K017						6.6	
2WR26-4	A	67-69	14AWG	N/A	N/A		N/A			6.7.2	SPARES
2WR26-4	C	1-37	14AWG	2I410						6.5	
2WR26-4	C	38-44	14AWG	2B31G2	1A	F	1A	F	1	6.1	FUSE NOT SHOWN ON E-2086



APPENDIX I

PENETRATION SUMMARY
CALCULATION 85-E-0118-01

F=Fuse
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PENT NUMBER	MOD NO.	COND NUMBER	COND SIZE	SCHEME NUMBER	PRIMARY DEVICE	PRI TYPE	SECOND DEVICE	SEC TYPE	FIG NO.	ACCEPT CRIT.	NOTES:
2WR26-4	C	45-51	14AWG	2B41F5	1A	F	1A	F	1	6.1	FUSE NOT SHOWN ON E-2086
2WR26-4	C	52-58	14AWG	2B71A3	1A	F	1A	F	1	6.1	FUSE NOT SHOWN ON E-2086
2WR26-4	C	59-65	14AWG	2B81A3	1A	F	1A	F	1	6.1	FUSE NOT SHOWN ON E-2086
2WR26-4	C	66-69	14AWG	N/A	N/A					6.7.2	SPARES
2WR26-4	D	1-4	6AWG	2H12						6.4	RCP CT CIRCUIT
2WR26-4	D	11-22	6AWG	N/A	N/A		N/A			6.7.2	SPARES
2WR26-4	D	5-7	6AWG	2H12	21PA-20	TM	52-15C1	M	30	6.10	
2WR26-4	D	8-10	6AWG	2B64K1	52-64K1	M	52-64H2	TM	29	6.10	
2WR26-4	F	1-2	12AWG	2B53L1	5A	F	43LA-12	TM	23	6.10	FUSE IN 2TB409
2WR26-4	F	3-50	12AWG	2I410						6.9	
2WR26-4	F	51-55	12AWG	N/A	N/A		N/A			6.7.2	SPARE
2WR27-1	A	1-8,11	14AWG	2I023						6.5	REF MEMO IC-85-093 MODEL NO 3

2

APPENDIX I

PENETRATION SUMMARY
CALCULATION 85-E-0118-01

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PENT NUMBER	MOD NO.	COND NUMBER	COND SIZE	SCHEME NUMBER	PRIMARY DEVICE	PRI TYPE	SECOND DEVICE	SEC TYPE	FIG NO.	ACCEPT CRIT.	NOTES:
2WR27-1	A	17,10,18	14AWG	2I052						6.5	REF MEMO IC-85-093 MODEL NO 3
2WR27-1	A	20,19,12	14AWG	2I051						6.5	REF MEMO IC-85-093 MODEL NO 3
2WR27-1	A	21,13,14	14AWG	2I051						6.5	REF MEMO IC-85-093 MODEL NO 3
2WR27-1	A	22,23,31	14AWG	2I052						6.5	REF MEMO IC-85-093 MODEL NO 3
2WR27-1	A	24,33,32	14AWG	2I052						6.5	REF MEMO IC-85-093 MODEL NO 3
2WR27-1	A	28,29,37	14AWG	2I376						6.5	REF MEMO IC-85-093 MODEL NO 1
2WR27-1	A	34,25,26	14AWG	2I225						6.5	REF MEMO IC-85-093 MODEL NO 3
2WR27-1	A	36,35,27	14AWG	2I225						6.5	REF MEMO IC-85-093 MODEL NO 3
2WR27-1	A	38,30,39	14AWG	2I364						6.5	REF MEMO IC-85-093 MODEL NO 1
2WR27-1	A	47,55,46	14AWG	2I055						6.5	REF MEMO IC-85-093 MODEL NO 3

APPENDIX I
PENETRATION SUMMARY
CALCULATION 85-E-0118-01

F=Fuse
M=Mag Only
TM=Therm Mag

PENT NUMBER	MOD NO.	COND NUMBER	COND SIZE	SCHEME NUMBER	PRIMARY DEVICE	PRI TYPE	SECOND DEVICE	SEC TYPE	FIG NO.	ACCEPT CRIT.	NOTES:
2WR27-1	A	50,49,41	14AWG	2I055						6.5	REF MEMO IC-85-093 MODEL NO 3
2WR27-1	A	51,42,43	14AWG	2I056						6.5	REF MEMO IC-85-093 MODEL NO 3
2WR27-1	A	54,53,45	14AWG	2I055						6.5	REF MEMO IC-85-093 MODEL NO 3
2WR27-1	A	56,48,40	14AWG	2I055						6.5	REF MEMO IC-85-093 MODEL NO 3
2WR27-1	A	57,58,65	14AWG	2I056						6.5	REF MEMO IC-85-093 MODEL NO 3
2WR27-1	A	59,52,44	14AWG	2I056						6.5	REF MEMO IC-85-093 MODEL NO 3
2WR27-1	A	64,69,63	14AWG	2I066						6.5	REF MEMO IC-85-093 MODEL NO 1 DCP87-2060
2WR27-1	A	66,60,61	14AWG	2I056						6.5	REF MEMO IC-85-093 MODEL NO 3
2WR27-1	A	68,67,62	14AWG	2I065						6.5	CHANGED PER DCP 87-2060 2

APPENDIX I

PENETRATION SUMMARY
CALCULATION 85-E-0118-01

F=Fuse
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PENT NUMBER	MOD NO.	COND NUMBER	COND SIZE	SCHEME NUMBER	PRIMARY DEVICE	PRI TYPE	SECOND DEVICE	SEC TYPE	FIG NO.	ACCEPT CRIT.	NOTES:
2WR27-1	A	9,16,15	14AWG	2I051						6.5	REF MEMO IC-85-093 MODEL NO 3
2WR27-1	C	1,2,7,6	16AWG	N/A	N/A		N/A			6.7.2	SPARES--CHANGED PER DCP 83-2080
2WR27-1	C	11,19,18	16AWG	2I017						6.5	COND 10 REF MEMO IC-85-093 MODEL NO 8
2WR27-1	C	13,21,12	16AWG	2I009						6.9	COND 5
2WR27-1	C	14,15,23	16AWG	2I019						6.9	PICK COND 22
2WR27-1	C	16,17,25	16AWG	2I017						6.5	COND 24 AND REF MEMO IC-85-093 MODEL 9
2WR27-1	C	26,27,36	16AWG	2I017						6.5	COND 35 REF MEMO IC-85-093 MODEL NO 9
2WR27-1	C	29,20,30	16AWG	2C012						6.9	PICK UP COND 39
2WR27-1	C	32,42,41	16AWG	2C012						6.9	PICK UP COND 31
2WR27-1	C	37,28,38	16AWG	2I019						6.9	PICK UP COND. 47

2

APPENDIX I

PENETRATION SUMMARY
CALCULATION 85-E-0118-01

F=Fuse
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PENT NUMBER	MOD NO.	COND NUMBER	COND SIZE	SCHEME NUMBER	PRIMARY DEVICE	PRI TYPE	SECOND DEVICE	SEC TYPE	FIG NO.	ACCEPT CRIT.	NOTES:
2WR27-1	C	44,53,43	16AWG	2I019						6.9	PICK UP COND 34
2WR27-1	C	49,58,48	16AWG	2I019						6.9	PICK UP COND. 40
2WR27-1	C	55,54,45	16AWG	2C012						6.9	PICK UP COND. 46
2WR27-1	C	60,50,51	16AWG	2I019						6.9	PICK UP COND. 52
2WR27-1	C	63,64,72	16AWG	2C012						6.9	PICK UP COND. 71
2WR27-1	C	66,65,56	16AWG	2C012						6.9	PICK UP COND. 57
2WR27-1	C	67,59,68	16AWG	2I019						6.5	COND 75, REF MEMO IC-85-093 MODEL NO 8
2WR27-1	C	70,69,61	16AWG	2C012						6.9	PICK UP COND. 62
2WR27-1	C	73,74,81	16AWG	2I019						6.5	COND 80, REF MEMO IC-85-093 MODEL NO 8
2WR27-1	C	77,83,82	16AWG	2I019						6.5	COND 76, REF MEMO IC-85-093 MODEL NO 8
2WR27-1	C	84,78,79	16AWG	2I290						6.5	COND 85, REF MEMO IC-85-093 MODEL NO 1

APPENDIX I

PENETRATION SUMMARY
CALCULATION 85-E-0118-01

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PENT NUMBER	MOD NO.	COND NUMBER	COND SIZE	SCHEME NUMBER	PRIMARY DEVICE	PRI TYPE	SECOND DEVICE	SEC TYPE	FIG NO.	ACCEPT CRIT.	NOTES:
2WR27-1	C	9,8,3,4	16AWG	2I017						6.5	REF MEMO IC-85-093 MODEL NO 8
2WR27-1	D	CBL NO.1	COAX	2B71B4						6.8	
2WR27-1	D	CBL NO.2	COAX	2I178						6.8	
2WR27-1	D	CBL NO.3	COAX	2I178						6.8	
2WR27-1	D	CBL NO.4	COAX	2I178						6.9	
2WR27-1	D	CBL NO.5	COAX	2I178						6.8	
2WR27-1	D	CBL NO.6	COAX	N/A						6.7.2	SPARE
2WR27-1	E	14,23,32	16AWG	2I239						6.5	COND 22 REF MEMO IC-85-093 MODEL NO 13
2WR27-1	E	16,24,15	16AWG	2I238						6.5	COND 8 REF MEMO IC-85-093 MODEL NO 13
2WR27-1	E	18,19,28	16AWG	N/A						6.7.2	SPARE
2WR27-1	E	20,12,13	16AWG	2I017						6.5	COND 21 REF MEMO IC-85-093 MODEL NO 9

APPENDIX I
PENETRATION SUMMARY
CALCULATION 85-E-0118-01

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PENT NUMBER	MOD NO.	COND NUMBER	COND SIZE	SCHEME NUMBER	PRIMARY DEVICE	PRI TYPE	SECOND DEVICE	SEC TYPE	FIG NO.	ACCEPT CRIT.	NOTES:
2WR27-1	E	35,25,17	16AWG	2I017						6.5	COND 26 REF MEMO IC-85-093 MODEL NO 9
2WR27-1	E	37,38,36	16AWG	2I562	N/A		N/A			6.5	46, 47 SPARES
2WR27-1	E	4,11,10		N/A	N/A		N/A			6.7.2	COND. 1 SPARES
2WR27-1	E	40,39,29	16AWG	N/A	N/A		N/A			6.7.2	COND 30 SPARES
2WR27-1	E	42-44,33	16AWG	2I286						6.5	COND.34, MEMO IC-85-093 MOD 1
2WR27-1	E	50,41,51	16AWG	2I017						6.5	COND 60 REF MEMO IC-85-093 MODEL NO 8
2WR27-1	E	54,45,55	16AWG	2I017						6.5	COND 64 REF MEMO IC-85-093 MODEL NO 8
2WR27-1	E	56,57,66	16AWG	2I019						6.5	COND 65 REF MEMO IC-85-093 MODEL NO 12

APPENDIX I
PENETRATION SUMMARY
CALCULATION 85-E-0118-01

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PENT NUMBER	MOD NO.	COND NUMBER	COND SIZE	SCHEME NUMBER	PRIMARY DEVICE	PRI TYPE	SECOND DEVICE	SEC TYPE	FIG NO.	ACCEPT CRIT.	NOTES:
2WR27-1	E	58,48,49	16AWG	2I019						6.5	COND 59 REF MEMO IC-85-093 MODEL NO 2
2WR27-1	E	62,61,52	16AWG	N/A	N/A		N/A			6.7.2	SPARES
2WR27-1	E	67-81	16AWG	COMMUN.					2	6.9	COMMUNICATION
2WR27-1	E	7,6,5,1,	16AWG	2I009						6.5	COND 2,4,11,10,9,3 MEMO IC-85-093 MOD.3
2WR27-1	E	85,84,83	16AWG	2I292						6.5	COND 82 REF MEMO IC-85-093 MODEL NO 1
2WR27-1	E	W10	16AWG	N/A	N/A		N/A			6.7.2	USE CABLE NO'S, SPARE
2WR27-1	F	1-91	20AWG	N/A						6.7.2	SPARES
2WR27-1	G	1,2,6	14AWG	2I081						6.5	REF MEMO IC-85-093 ATTACHMENT B-G1
2WR27-1	G	11,4,5	14AWG	2I081						6.5	REF MEMO IC-85-093 ATTACHMENT B-G1
2WR27-1	G	17,10,18	14AWG	2I507						6.5	COND 22,23,31 MEMO IC-85-093 MODEL NO 2

APPENDIX I
PENETRATION SUMMARY
CALCULATION 85-E-0118-01

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PENT NUMBER	MOD NO.	COND NUMBER	COND SIZE	SCHEME NUMBER	PRIMARY DEVICE	PRI TYPE	SECOND DEVICE	SEC TYPE	FIG NO.	ACCEPT CRIT.	NOTES:
2WR27-1	G	20,19,12	14AWG	2I324						6.5	REF MEMO IC-85-093 MODEL NO 1
2WR27-1	G	21,13,14	14AWG	N/A						6.7.2	SPARE PER DCP 83-2217
2WR27-1	G	24,33,32	14AWG	2371B4						6.9	COND 28,29,37 (NSS SYSTEM)
2WR27-1	G	7,3,8	14AWG	2I081						6.5	REF MEMO IC-85-093 ATTACHMENT B-G1
2WR27-1	G	9,16,15	14AWG	2I325						6.5	REF MEMO IC-85-093 MODEL NO 11
2WR27-1	G	W11-W19	14AWG	2B71B4						6.9	(USED CABLE NO)NSS SYSTEM
2WR27-1	G	W20	14AWG	2I563	N/A		N/A			6.5	CHANGED PER DCP 87-2042
2WR27-1	G	W21-W23	14AWG	N/A	N/A		N/A			6.7.2	SPARES
2WR27-2	A	1,2,6	14AWG	2I083						6.9	
2WR27-2	A	11,4,5	14AWG	2I054						6.5	REF MEMO IC-85-093 MODEL NO 3

2

APPENDIX I
PENETRATION SUMMARY
CALCULATION 85-E-0118-01

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PENT NUMBER	MOD NO.	COND NUMBER	COND SIZE	SCHEME NUMBER	PRIMARY DEVICE	PRI TYPE	SECOND DEVICE	SEC TYPE	FIG NO.	ACCEPT CRIT.	NOTES:
2WR27-2	A	17,10,18	14AWG	2I227						6.5	REF MEMO IC-85-093 MODEL NO 3
2WR27-2	A	20,19,12	14AWG	2I054						6.5	REF MEMO IC-85-093 MODEL NO 3
2WR27-2	A	21,13,14	14AWG	2I054						6.5	REF MEMO IC-85-093 MODEL NO 3
2WR27-2	A	22,23,31	14AWG	2I068						6.5	REF MEMO IC-85-093 MODEL NO 3
2WR27-2	A	24,33,32	14AWG	2I068						6.5	REF MEMO IC-85-093 MODEL NO 3
2WR27-2	A	28,29,37	14AWG	2I068						6.5	REF MEMO IC-85-093 MODEL NO 3
2WR27-2	A	34,25,26	14AWG	2I025						6.5	REF MEMO IC-85-093 MODEL NO 3
2WR27-2	A	36,35,27	14AWG	2I025						6.5	REF MEMO IC-85-093 MODEL NO 3
2WR27-2	A	38,30,39	14AWG	2I068						6.5	REF MEMO IC-85-093 MODEL NO 3
2WR27-2	A	47,55,46	14AWG	2I325						6.5	REF MEMO IC-85-093 MODEL NO 11

APPENDIX I
PENETRATION SUMMARY
CALCULATION 85-E-0118-01

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PENT NUMBER	MOD NO.	COND NUMBER	COND SIZE	SCHEME NUMBER	PRIMARY DEVICE	PRI TYPE	SECOND DEVICE	SEC TYPE	FIG NO.	ACCEPT CRIT.	NOTES:
2WR27-2	A	50,49,41	14AWG	2I364						6.5	REF MEMO IC-85-093 MODEL NO 1
2WR27-2	A	51,42,43	14AWG	2M035						6.9	COND 57,58,65 REACT TRIP&ESP TIME TEST
2WR27-2	A	54,53,45	14AWG	2I025						6.5	REF MEMO IC-85-093 MODEL NO 3
2WR27-2	A	56,48,40	14AWG	2I376						6.5	REF MEMO IC-85-093 MODEL NO 1
2WR27-2	A	59,52,44	14AWG	2I360						6.9	PA SPEAKER
2WR27-2	A	60-64,66	14AWG	2M035						6.9	COND 67-69 REACT TRIP&ESP TIME TEST
2WR27-2	A	7,3,8	14AWG	2I083						6.9	
2WR27-2	A	9,16,15	14AWG	2I227						6.5	REF MEMO IC-85-093 MODEL NO 3
2WR27-2	C	1,2,7,6	16AWG	2I238						6.5	REF MEMO IC-85-093 MODEL NO 13
2WR27-2	C	11,19,18	16AWG	2C014						6.9	CONT COND 10

APPENDIX I
PENETRATION SUMMARY
CALCULATION 85-E-0118-01

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PENT NUMBER	MOD NO.	COND NUMBER	COND SIZE	SCHEME NUMBER	PRIMARY DEVICE	PRI TYPE	SECOND DEVICE	SEC TYPE	FIG NO.	ACCEPT CRIT.	NOTES:
2WR27-2	C	13,21,12	16AWG	2C014						6.9	CONT COND 5
2WR27-2	C	14,15,23	16AWG	2C014						6.9	CONT COND 22
2WR27-2	C	16,17,25	16AWG	2C014						6.9	CONT COND 24
2WR27-2	C	26,27,36	16AWG	2I021						6.9	CONT COND 35
2WR27-2	C	29,20,30	16AWG	2C014						6.9	CONT COND 39
2WR27-2	C	32,42,41	16AWG	2C014						6.9	CONT COND 31
2WR27-2	C	37,28,38	16AWG	2I010						6.9	CONT COND 47
2WR27-2	C	44,53,43	16AWG	2I021						6.9	CONT COND 34
2WR27-2	C	49,58,48	16AWG	2I021						6.9	CONT. COND. 40
2WR27-2	C	55,54,45	16AWG	2I021						6.9	CONT COND 46
2WR27-2	C	60,50,51	16AWG	2I021						6.9	CONT COND 52
2WR27-2	C	63,64,72	16AWG	2I021						6.5	COND 71 REF MEMO IC-85-093 MODEL NO 8
2WR27-2	C	66,65,56	16AWG	2I021						6.5	COND 57 REF MEMO IC-85-093 MODEL NO 8

APPENDIX I
PENETRATION SUMMARY
CALCULATION 85-E-0118-01

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PENT NUMBER	MOD NO.	COND NUMBER	COND SIZE	SCHEME NUMBER	PRIMARY DEVICE	PRI TYPE	SECOND DEVICE	SEC TYPE	FIG NO.	ACCEPT CRIT.	NOTES:
2WR27-2	C	67,59,68	16AWG	2I021						6.5	COND 75 REF MEMO IC-85-093 MODEL NO 12
2WR27-2	C	70,69,61	16AWG	2I021						6.5	COND 62 REF MEMO IC-85-093 MODEL NO 8
2WR27-2	C	73,74,81	16AWG	2I021						6.5	COND 80 REF MEMO IC-85-093 MODEL NO 12
2WR27-2	C	77,83,82	16AWG	2I377						6.5	COND 76 REF MEMO IC85-093 MODEL NO 1
2WR27-2	C	84,78,79	16AWG	2I293						6.5	COND 85 REF MEMO IC-85-093 MODEL NO 1
2WR27-2	C	9,8,3,4	16AWG	2I239						6.5	REF MEMO IC-85-093 MODEL NO 13
2WR27-2	D	3	COAX	2I539						6.8	
2WR27-2	D	6	COAX	2I178						6.8	
2WR27-2	D	CBL 1,2	COAX	N/A	N/A		N/A			6.7.2	COND. 4 & 5 SPARE

2

APPENDIX I
PENETRATION SUMMARY
CALCULATION 85-E-0118-01

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PENT NUMBER	MOD NO.	COND NUMBER	COND SIZE	SCHEME NUMBER	PRIMARY DEVICE	PRI TYPE	SECOND DEVICE	SEC TYPE	FIG NO.	ACCEPT CRIT.	NOTES:
2WR27-2	E	14,23,32	16AWG	2I287						6.5	COND 22 REF MEMO IC-85-093 MODEL NO 1
2WR27-2	E	16,24,15	16AWG	2I291						6.5	COND 8 REF MEMO IC-85-093 MODEL NO 1
2WR27-2	E	20,12,13	16AWG	N/A	N/A		N/A			6.7.2	SPARES,21,18,19,28 ,27
2WR27-2	E	35,25,17	16AWG	N/A	N/A		N/A			6.7.2	SPARE PER DCP 85-2152
2WR27-2	E	37,38	16AWG	2I562	N/A		N/A			6.5	46, 47 SPARES
2WR27-2	E	4,11,10,	16AWG	N/A	N/A		N/A			6.7.2	SPARES 1, 9 AND 3
2WR27-2	E	7,6,5	16AWG	2I010						6.5	COND 2 REF MEMO IC-85-093 MODEL NO 3
2WR27-2	E	START,62	16AWG	N/A	N/A		N/A			6.7.2	SPARES END W/82,REF SHT 139 DWG E-2625
2WR27-2	E	W6-W9	16AWG	N/A	N/A		N/A			6.7.2	SPARE
2WR27-2	F	1	COAX	2M035			2			6.8	

APPENDIX I
PENETRATION SUMMARY
CALCULATION 85-E-0118-01

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PENT NUMBER	MOD NO.	COND NUMBER	COND SIZE	SCHEME NUMBER	PRIMARY DEVICE	PRI TYPE	SECOND DEVICE	SEC TYPE	FIG NO.	ACCEPT CRIT.	NOTES:
2WR27-2	F	2,3	COAX	N/A	N/A					6.7.2	SPARE
2WR27-2	F	4	COAX	2B71B3						6.8	
2WR27-2	F	5	COAX	2I178						6.8	
2WR27-2	F	6	COAX	2I178						6.8	
2WR27-2	G	1-20,22	14AWG	2B71B3						6.9	COND 23,24,31-33
2WR27-2	G	28,29,37	14AWG	2M035						6.9	COMMUNICATION
2WR27-2	G	34&25	14AWG	2U019	N/A		N/A			6.7.2	SPARE
2WR27-2	G	38,30,39	14AWG	2B71B3						6.9	COND 36,35,27
2WR27-2	G	42&51	14AWG	N/A	N/A		N/A			6.7.2	SPARE
2WR27-2	G	47&55	14AWG	2U019	N/A		N/A			6.7.2	SPARE
2WR27-2	G	49-50	14AWG	2U031	6	F	2Y1-4	TM	3	6.10.1	
2WR27-2	G	52,59	14AWG	2U031	6	F	2Y1-4	TM	3	6.10.1	
2WR27-2	G	53-54	14AWG	2U019	N/A		N/A			6.7.2	SPARE
2WR27-2	G	56,48,40	14AWG	N/A	N/A		N/A			6.7.2	SPARE

APPENDIX I
PENETRATION SUMMARY
CALCULATION 85-E-0118-01

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PENT NUMBER	MOD NO.	COND NUMBER	COND SIZE	SCHEME NUMBER	PRIMARY DEVICE	PRI TYPE	SECOND DEVICE	SEC TYPE	FIG NO.	ACCEPT CRIT.	NOTES:
2WR27-2	G	57,58,65	14AWG	N/A	N/A		N/A			6.7.2	SPARE
2WR27-2	G	64,69,63	14AWG	N/A						6.7.2	SPARE
2WR27-2	G	66.60.61	14AWG	N/A						6.7.2	SPARE
2WR27-2	G	68,67,62	14AWG	N/A						6.7.2	SPARE
2WR27-3	A	1,2,6	14AWG	2I211						6.9	
2WR27-3	A	11,4,5,	14AWG	COMM						6.5	COND 20,19,12,REF MEMO 1C-85-093,MOD #3
2WR27-3	A	17,18,10	14AWG	2I027						6.5	REF MEMO 1C-85-093,MOD #3
2WR27-3	A	20,19,12	14AWG	2I557						6.9	
2WR27-3	A	21,13,14	14AWG	2I018						6.5	REF MEMO 1C-85-093,MOD #3
2WR27-3	A	22,23,31	14AWG	2I028						6.5	REF MEMO 1C-85-093,MOD #3
2WR27-3	A	24,32,33	14AWG	2I028						6.5	REF MEMO 1C-85-093,MOD #3

APPENDIX I
PENETRATION SUMMARY
CALCULATION 85-E-0118-01

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PENT NUMBER	MOD NO.	COND NUMBER	COND SIZE	SCHEME NUMBER	PRIMARY DEVICE	PRI TYPE	SECOND DEVICE	SEC TYPE	FIG NO.	ACCEPT CRIT.	NOTES:
2WR27-3	A	28,29,37	14AWG	2I226						6.5	REF MEMO 1C-85-093,MOD #3
2WR27-3	A	34,25,26	14AWG	2I015						6.5	REF MEMO 1C-85-093,MOD #1
2WR27-3	A	36,35,27	14AWG	2I199						6.5	REF MEMO 1C-85-093,MOD #1
2WR27-3	A	38,30,39	14AWG	2I226						6.5	REF MEMO 1C-85-093,MOD #3
2WR27-3	A	47,55,46	14AWG	2I018						6.5	REF MEMO 1C-85-093,MOD #3
2WR27-3	A	50,49,41	14AWG	2I326						6.5	REF MEMO 1C-85-093,MOD #1
2WR27-3	A	51,42,43	14AWG	2I024						6.5	REF MEMO 1C-85-093,MOD #3
2WR27-3	A	54,53,45	14AWG	2I015						6.5	REF MEMO 1C-85-093,MOD #1
2WR27-3	A	56,48,40	14AWG	2I041						6.5	REF MEMO 1C-85-093,MOD #3
2WR27-3	A	57,58,65	14AWG	2I024						6.5	REF MEMO 1C-85-093,MOD #3

APPENDIX I
PENETRATION SUMMARY
CALCULATION 85-E-0118-01

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PENT NUMBER	MOD NO.	COND NUMBER	COND SIZE	SCHEME NUMBER	PRIMARY DEVICE	PRI TYPE	SECOND DEVICE	SEC TYPE	FIG NO.	ACCEPT CRIT.	NOTES:
2WR27-3	A	59,52,44	14AWG	2I024						6.5	REF MEMO 1C-85-093,MOD #3
2WR27-3	A	62-64	14AWG	N/A	N/A		N/A			6.7.2	COND 67-69 SPARES
2WR27-3	A	66,60,61	14AWG	2I325						6.5	REF MEMO 1C-85-093,MOD #11
2WR27-3	A	7,3,8	14AWG	2I045						6.5	REF MEMO IC-85-093 MODEL NO 3
2WR27-3	A	9,16,15	14AWG	2I027						6.5	REF MEMO 1C-85-093,MOD #3
2WR27-3	C	1,2,7,6	16AWG	2I013						6.9	
2WR27-3	C	11,19,18	16AWG	2I020						6.9	COND 10,
2WR27-3	C	13,21,12	16AWG	2I020						6.9	COND 05,
2WR27-3	C	14,15,23	16AWG	2I013						6.9	COND 22,
2WR27-3	C	16,17,25	16AWG	2I013						6.9	COND 24,
2WR27-3	C	26,27,36	16AWG	2I013						6.9	COND 35,
2WR27-3	C	29,20,30	16AWG	2I017						6.9	COND 39,

APPENDIX I
PENETRATION SUMMARY
CALCULATION 85-E-0118-01

F=Fuse
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PENT NUMBER	MOD NO.	COND NUMBER	COND SIZE	SCHEME NUMBER	PRIMARY DEVICE	PRI TYPE	SECOND DEVICE	SEC TYPE	FIG NO.	ACCEPT CRIT.	NOTES:
2WR27-3	C	32,42,41	16AWG	2I020						6.9	COND 31,
2WR27-3	C	37,28,38	16AWG	2I033						6.9	COND 47,
2WR27-3	C	44,53,43	16AWG	2I013						6.9	COND 34,
2WR27-3	C	49,58,48	16AWG	2I020						6.9	COND 40,
2WR27-3	C	55,54,45	16AWG	2I018						6.9	COND 46,
2WR27-3	C	60,50-52	16AWG	2I020						6.9	
2WR27-3	C	63,64,72	16AWG	2I508						6.5	COND 71
2WR27-3	C	70,69,61	16AWG	N/A	N/A		N/A			6.7.2	COND 62, SPARES
2WR27-3	C	9,8,3,4	16AWG	2I013						6.9	
2WR27-3	C	W17-W21	16AWG	N/A	N/A		N/A			6.7.2	USE CABLE NOS., SPARES
2WR27-3	D	1-5	COAX	2R388						6.5	REF MEMO IC-85-093 ATTACHMENT B-G9
2WR27-3	D	6	COAX	N/A	N/A		N/A			6.7.2	SPARE
2WR27-3	E	14,23,32	16AWG	2I239						6.5	COND 22 ,REF MEMO IC-85-093,MOD #13

APPENDIX I
PENETRATION SUMMARY
CALCULATION 85-E-0118-01

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PENT NUMBER	MOD NO.	COND NUMBER	COND SIZE	SCHEME NUMBER	PRIMARY DEVICE	PRI TYPE	SECOND DEVICE	SEC TYPE	FIG NO.	ACCEPT CRIT.	NOTES:
2WR27-3	E	16,24,15	16AWG	2I238						6.5	COND 8,REF MEMO IC-85-093,MOD #13
2WR27-3	E	18,19,28	16AWG	2I020						6.5	COND 27 ,REF MEMO IC-85-093,MOD #8
2WR27-3	E	20,12,13	16AWG	2I020						6.5	COND 21 ,REF MEMO IC-85-093,MOD #8
2WR27-3	E	35,25,17	16AWG	2I020						6.5	COND 26 ,REF MEMO IC-85-093,MOD #8
2WR27-3	E	37,38,36	16AWG	2I562					N/A	6.5	46, 47 SPARES
2WR27-3	E	4,11,10,	16AWG	2I009						6.5	COND 9,3, REF MEMO IC-85-093,MOD #3
2WR27-3	E	42-44	16AWG	2I033						6.5	COND 33,34,REF MEMO IC-85-093,MOD #3
2WR27-3	E	50,41,51	16AWG	2I017						6.5	COND 60, REF MEMO IC-85-093,MOD #9
2WR27-3	E	54,45,55	16AWG	2I018						6.5	COND 64, REF MEMO IC-85-093,MOD #8
2WR27-3	E	56,57,66	16AWG	2I020						6.5	COND 65, REF MEMO IC-85-093,MOD #12

APPENDIX I
PENETRATION SUMMARY
CALCULATION 85-E-0118-01

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PENT NUMBER	MOD NO.	COND NUMBER	COND SIZE	SCHEME NUMBER	PRIMARY DEVICE	PRI TYPE	SECOND DEVICE	SEC TYPE	FIG NO.	ACCEPT CRIT.	NOTES:
2WR27-3	E	58,49,48	16AWG	2I033						6.5	COND 59, REF MEMO IC-85-093,MOD #7
2WR27-3	E	7,6,5,1	16AWG	N/A	N/A		N/A			6.7.2	SPARE
2WR27-3	E	82-85	16AWG	2I020						6.5	REF MEMO IC-85-093, MOD #12
2WR27-3	E	W16-18	16AWG	N/A	N/A		N/A			6.7.2	USED CABLES, SPARES
2WR27-3	E	W9,10,11	16AWG	N/A	N/A		N/A			6.7.2	USED CABLE NOS. SPARES
2WR27-3	F	W1-12	20AWG	COMM						6.9	USED CABLES,
2WR27-3	F	W13-W28	20AWG	N/A	N/A		N/A			6.7.2	USE CABLE NOS., SPARES
2WR27-4	A	1,2,6	14AWG	2I083						6.9	USED CABLES,
2WR27-4	A	11,4,5	14AWG	2I053						6.5	REF MEMO IC-85-093, MOD #3
2WR27-4	A	17,10,8	14AWG	2I050						6.5	REF MEMO IC-85-093, MOD #3
2WR27-4	A	20,19,12	14AWG	2I053						6.5	REF MEMO IC-85-093, MOD #3

APPENDIX I
PENETRATION SUMMARY
CALCULATION 85-E-0118-01

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PENT NUMBER	MOD NO.	COND NUMBER	COND SIZE	SCHEME NUMBER	PRIMARY DEVICE	PRI TYPE	SECOND DEVICE	SEC TYPE	FIG NO.	ACCEPT CRIT.	NOTES:
2WR27-4	A	21,13,14	14AWG	2I029						6.5	REF MEMO IC-85-093, MOD #3
2WR27-4	A	22,23,31	14AWG	2I030						6.5	REF MEMO IC-85-093, MOD #3
2WR27-4	A	24,32,33	14AWG	COMM						6.9	
2WR27-4	A	28,29,37	14AWG	2I410						6.9	
2WR27-4	A	34,25,26	14AWG	2I067						6.5	REF MEMO IC-85-093, MOD #3
2WR27-4	A	36,35,27	14AWG	2I228						6.5	REF MEMO IC-85-093, MOD #3
2WR27-4	A	38,30,39	14AWG	2I228						6.5	REF MEMO IC-85-093, MOD #3
2WR27-4	A	47,55,46	14AWG	2I067						6.5	REF MEMO IC-85-093, MOD #3
2WR27-4	A	50,49,41	14AWG	2I026						6.5	REF MEMO IC-85-093, MOD #3
2WR27-4	A	51,42,43	14AWG	2I026						6.5	REF MEMO IC-85-093, MOD #3

APPENDIX I
PENETRATION SUMMARY
CALCULATION 85-E-0118-01

F=Fuse
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PENT NUMBER	MOD NO.	COND NUMBER	COND SIZE	SCHEME NUMBER	PRIMARY DEVICE	PRI TYPE	SECOND DEVICE	SEC TYPE	FIG NO.	ACCEPT CRIT.	NOTES:
2WR27-4	A	54,53,45	14AWG	2I067						6.5	REF MEMO IC-85-093, MOD #3
2WR27-4	A	56,48,40	14AWG	2I067						6.5	REF MEMO IC-85-093, MOD #3
2WR27-4	A	57,58,65	14AWG	2I325						6.5	REF MEMO IC-85-093, MOD #11
2WR27-4	A	59,52,44	14AWG	2I026						6.5	REF MEMO IC-85-093, MOD #3
2WR27-4	A	60-64	14AWG	2I410						6.9	COND 66-69,
2WR27-4	A	7,3,8	14AWG	2I053						6.5	REF MEMO IC-85-093, MOD #3
2WR27-4	A	9,16,15	14AWG	2I029						6.5	REF MEMO IC-85-093, MOD #3
2WR27-4	C	1,2,7,6	16AWG	2I238						6.5	REF MEMO IC-85-093, MOD #13
2WR27-4	C	11,19,18	16AWG	2I015						6.9	COND 10,
2WR27-4	C	13,21,12	16AWG	2I015						6.9	COND 05,
2WR27-4	C	14,15,23	16AWG	2I022						6.5	COND 22, REF MEMO IC-85-093, MOD #8

APPENDIX I
PENETRATION SUMMARY
CALCULATION 85-E-0118-01

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PENT NUMBER	MOD NO.	COND NUMBER	COND SIZE	SCHEME NUMBER	PRIMARY DEVICE	PRI TYPE	SECOND DEVICE	SEC TYPE	FIG NO.	ACCEPT CRIT.	NOTES:
2WR27-4	C	16,17,25	16AWG	2I022						6.5	COND 24, REF MEMO IC-85-093, MOD #8
2WR27-4	C	26,27,36	16AWG	2I015						6.9	COND 35,
2WR27-4	C	29,20,30	16AWG	2I022						6.9	COND 39,
2WR27-4	C	32,42,41	16AWG	2I022						6.9	COND 31,
2WR27-4	C	37,28,38	16AWG	2I015						6.9	COND 47,
2WR27-4	C	44,53,43	16AWG	2I015						6.9	COND 34,
2WR27-4	C	49,58,48	16AWG	2I022						6.5	COND 40, REF MEMO IC-85-093, MOD #8
2WR27-4	C	55,54,45	16AWG	2I015						6.9	COND. 46
2WR27-4	C	60,50-52	16AWG	2I022						6.9	
2WR27-4	C	63,64,72	16AWG	2I022						6.5	COND 71, REF MEMO IC-85-093, MOD #12
2WR27-4	C	66,65,56	16AWG	2I022						6.9	COND 57,
2WR27-4	C	67,59,68	16AWG	2I022						6.9	COND 75,
2WR27-4	C	70,69,61	16AWG	2I022						6.5	COND 62, REF MEMO IC-85-093, MOD #12

APPENDIX I

PENETRATION SUMMARY
CALCULATION 85-E-0118-01

F=Fuse
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PENT NUMBER	MOD NO.	COND NUMBER	COND SIZE	SCHEME NUMBER	PRIMARY DEVICE	PRI TYPE	SECOND DEVICE	SEC TYPE	FIG NO.	ACCEPT CRIT.	NOTES:
2WR27-4	C	73,74,81	16AWG	2I010						6.5	COND 80, REF MEMO IC-85-093, MOD #10
2WR27-4	C	76-79	16AWG	N/A						6.7.2	SPARED PER DCP 81-2034
2WR27-4	C	9,8,3,4	16AWG	2I239						6.5	REF MEMO IC-85-093, MOD #13
2WR27-4	D	1-5	COAX	2R389						6.8	
2WR27-4	D	6	COAX	2I178						6.8	
2WR27-4	E	19,28,27	16AWG	2I410						6.9	
2WR27-4	E	37,38,47	16AWG	2I396						6.9	PICK UP COND. 36,46
2WR27-4	E	4,11,3	16AWG	2I562						6.5	9, 10 SPARES
2WR27-4	E	40,39,29	16AWG	2I396						6.9	PICK UP COND. 30,31
2WR27-4	E	43,42,33	16AWG	2I396						6.9	COND 34,44,
2WR27-4	E	57,66,65	16AWG	2I410						6.9	
2WR27-4	E	62,61,52	16AWG	2I396						6.9	PICK UP COND. 53,63
2WR27-4	E	7,6,5,1,	16AWG	2I010						6.9	COND 2

APPEND I

PENETRATION SUMMARY
CALCULATION 85-E-0118-01

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PENT NUMBER	MOD NO.	COND NUMBER	COND SIZE	SCHEME NUMBER	PRIMARY DEVICE	PRI TYPE	SECOND DEVICE	SEC TYPE	FIG NO.	ACCEPT CRIT.	NOTES:
2WR27-4	E	73,74,81	16AWG	2I396						6.9	COND 80,72,
2WR27-4	E	76,75,67	16AWG	2I396						6.9	COND 68,69,
2WR27-4	E	79,78,77	16AWG	2I396						6.9	COND 70,71,
2WR27-4	E	82-85	16AWG	2I557						6.9	
2WR27-4	E	9 (2)	16AWG	N/A	N/A		N/A			6.7.2	COND 3,15,16,8,24, SPARES
2WR27-4	E	W12-14	16AWG	N/A						6.7.2	USED CABLE NO'S. SPARE
2WR27-4	E	W4-7	16AWG	N/A						6.7.2	SPARED PER DCP 81-2034
2WR27-4	F	W1-W7	20AWG	COMM						6.9	USED CABLE NOS,
2WR27-4	F	W10-W12	20AWG	COMM						6.9	
2WR27-4	F	W13-W28	20AWG	N/A						6.7.2	USED CABLE NOS SPARE PER DCP81-2034
2WR27-4	F	W8-W9	20AWG	N/A						6.7.2	
2WR27-4	G	1-85	16AWG	2I396			(2)			6.9	

APPENDIX I
PENETRATION SUMMARY
CALCULATION 85-E-0118-01

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PENT NUMBER	MOD NO.	COND NUMBER	COND SIZE	SCHEME NUMBER	PRIMARY DEVICE	PRI TYPE	SECOND DEVICE	SEC TYPE	FIG NO.	ACCEPT CRIT.	NOTES:
2WR28-1	A	1,2,8	TYPE EX	2B533						6.9	
2WR28-1	A	10,9,3	TYPE EX	2B533						6.9	
2WR28-1	A	13,12,6	TYPE EX	2B633						6.9	
2WR28-1	A	15,14,7	TYPE EX	2B633						6.9	
2WR28-1	A	25,24,16	TYPE EX	2B633						6.9	
2WR28-1	A	4,5,11	TYPE EX	2B533						6.9	
2WR28-1	A	W7-W28	TYPE EX	N/A	N/A		N/A			6.7.2	SPARES, USED CABLE NOS.
2WR28-1	C	1-12	RAD MON	2M012						6.9	
2WR28-1	D	1-12	RAD MON	2M013						6.9	
2WR28-1	E	W1	14AWG	2I556						6.5	
2WR28-1	E	W17-W23	14AWG	N/A	N/A		N/A			6.7.2	SPARES
2WR28-1	E	W2	14AWG	N/A						6.7.2	
2WR28-1	E	W3-W16	14AWG	2I560						6.5	
2WR28-1	F	1-121	18AWG	2I560	N/A		N/A			6.5	

APPENDIX I
PENETRATION SUMMARY
CALCULATION 85-E-0118-01

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2WR28-1	G	1-12	RAD MON	2M004						6.5	
2WR40-1	A	1-3	350MCM	R2B53L1	52-53L1	M	52-53K5	TM	39	6.10	
2WR40-1	B	1-3	350MCM	R2B53L2	52-53L2	M	52-53K6	TM	39	6.10	
2WR40-1	C	1-3	12AWG	N/A	N/A		N/A			6.7.2	SPARES
2WR40-1	C	12-17	12AWG	R2D27A3	3A	F	3A	F	12	6.2	
2WR40-1	C	18-25	12AWG	N/A	N/A		N/A			6.7.2	SPARES
2WR40-1	C	26-28	12AWG	R2B51E4	52-51E4	M	52-51C1	TM	13	6.10	REVISED PER DCP 8 -2013
2WR40-1	C	29-31	12AWG	R2B51K2	52-51K2	M	52-5134	TM	16	6.10	REVISED PER DCP 86-2013
2WR40-1	C	32-37	12AWG	N/A	N/A		N/A			6.7.2	SPARES
2WR40-1	C	38-40	12AWG	R2B54G2	52-54G2	M	52-54C5	TM	15	6.10	
2WR40-1	C	4-5	12AWG	R2B51D3	1A	F	1A	F	1	6.1	
2WR40-1	C	41-43	12AWG	N/A	N/A		N/A		2	6.7.2	SPARES
2WR40-1	C	44-55	12AWG	N/A	N/A		N/A			6.7.2	SPARES

APPENDIX I
PENETRATION SUMMARY
CALCULATION 85-E-0118-01

F=Fuse
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2WR40-1	C	6-7	12AWG	R2B51D4	1A	F	1A	F	1	6.1	
2WR40-1	C	8-11	12AWG	R2V047	6A	F	2RS1-6	TM	3	6.10.1	
2WR40-1	D	1-3	350MCM	R2B533	52-533		52-512		40	6.10	
2WR40-1	E	1	350KCM	R2B533						6.10	NEUTRAL CONDUCTOR
2WR40-1	E	2 & 3	350KCM	N/A	N/A		N/A			6.7.2	SPARES
2WR40-1	F	1-3	8AWG	R2B51D3	52-51D3	M	52-51H4	TM	27	6.10	
2WR40-1	F	10-12	8AWG	R2B51K4	52-51K4	M	52-51L6	TM	26	6.10	REVISED PER DCP 86-2013
2WR40-1	F	13-17	8AWG	R2D27A3	72-27A3	M	72-27A2	TM	18	6.10	DC CIRCUIT
2WR40-1	F	18-31	8AWG	N/A	N/A		N/A			6.7.2	SPARES
2WR40-1	F	4-6	8AWG	R2B51D4	52-51D4	M	52-51H5	TM	27	6.10	
2WR40-1	F	7-9	8AWG	R2B51K3	52-51K3	M	52-51L5	TM	26	6.10	REVISED PER DCP 86-2013
2WR40-1	G	1-3	2AWG	2B51A4	52-51A4	M	52-51H2	TM	31	6.10	
2WR40-1	G	10-12	2AWG	2B51K1	52-51K1	M	52-51L4	TM	33	6.10	

APPENDIX I
PENETRATION SUMMARY
CALCULATION 85-E-0118-01

F=Fuse
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2WR40-1	G	4-6	2AWG	2B51F2	52-51F2	M	52-51H8	TM	32	6.10	
2WR40-1	G	7-9	2AWG	2B51H1	52-51H1	M	52-51L3	TM	32	6.10	
2WR40-2	A	1-3	350MCM	G2B63L1	52-63L1	M	52-63J1	TM	39	6.10	
2WR40-2	B	1-3	350MCM	G2B63L2	52-63L2	M	52-63J2	M	39	6.10	
2WR40-2	C	1-3	12AWG	N/A	N/A		N/A			6.7.2	SPARES
2WR40-2	C	12-17	12AWG	G2D26A3	3A	F	3A	F	12	6.2	
2WR40-2	C	18-20	12AWG	G2B63F2	52-63F2	M	52-63E1	TM	16	6.10	
2WR40-2	C	21-22	12AWG	N/A	N/A		N/A			6.7.2	SPARES
2WR40-2	C	23-25	12AWG	G2B61L2	52-61L2	M	52-61D2	TM	16	6.10	
2WR40-2	C	26-55	12AWG	N/A	N/A		N/A			6.7.2	SPARES
2WR40-2	C	4-5	12AWG	G2B61D3	1A	F	1A	F	1	6.1	
2WR40-2	C	6-7	12AWG	G2B61D4	1A	F	1A	F	1	6.1	
2WR40-2	C	8-11	12AWG	G2V045	6A	F	2RS2-6	TM	3	6.10.1	
2WR40-2	D&E	1-3	350MCM	G2B633	52-633		52-612		40	6.10	

2

APPENDIX I
PENETRATION SUMMARY
CALCULATION 85-E-0118-01

F=Fuse
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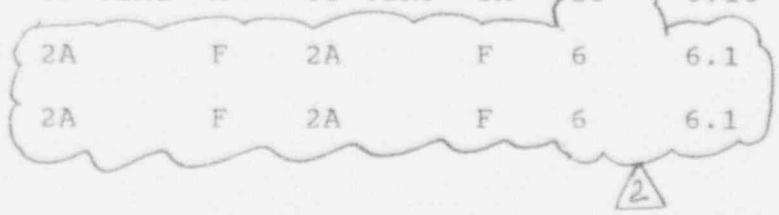
PENT NUMBER	MOD NO.	COND NUMBER	COND SIZE	SCHEME NUMBER	PRIMARY DEVICE	PRI TYPE	SECOND DEVICE	SEC TYPE	FIG NO.	ACCEPT CRIT.	NOTES:
2WR40-2	E	2-3	350MCM	N/A	N/A		N/A			6.7.2	SPARES
2WR40-2	F	1-3	8AWG	G2B61D3	52-61D3	M	52-61H4	TM	21	6.10	
2WR40-2	F	10-12	8AWG	G2B61L3	52-61L3	M	52-61K4	TM	13	6.10	
2WR40-2	F	13-15	8AWG	N/A	N/A		N/A			6.7.2	SPARE PER PEAR 86-2992
2WR40-2	F	16-20	8AWG	G2D26A3	72-26A3	M	72-26A2	TM	19	6.10	DC CIRCUIT
2WR40-2	F	21-31	8AWG	N/A	N/A		N/A			6.7.2	SPARES
2WR40-2	F	4-6	8AWG	G2B61D4	52-61D4	M	52-61H5	TM	27	6.10	
2WR40-2	F	7-9	8AWG	N/A	N/A		N/A			6.7.2	SPARES
2WR40-2	G	1-3	2AWG	G2B61A4	52-61A4	M	52-61H3	TM	31	6.10	
2WR40-2	G	10-12	2AWG	G2B61H2	52-61H2	M	52-61K7	M	33	6.10	
2WR40-2	G	4-6	2AWG	G2B61F2	52-61F2	M	52-61H6	TM	24	6.10	
2WR40-2	G	7-9	2AWG	G2B61H1	52-61H1	M	52-61K3	TM	25	6.10	
2WR41-1	A	1-6	14AWG	R2B51B2	2A	F	2A	F	6	6.1	
2WR41-1	A	13-18	14AWG	R2B51M1	2A	F	2A	F	6	6.1	



APPENDIX I
PENETRATION SUMMARY
CALCULATION 85-E-0118-01

F=Fuse
M=Mag Only
TM=Therm Mag

PENT NUMBER	MOD NO.	COND NUMBER	COND SIZE	SCHEME NUMBER	PRIMARY DEVICE	PRI TYPE	SECOND DEVICE	SEC TYPE	FIG NO.	ACCEPT CRIT.	NOTES:
2WR41-1	A	19-24	14AWG	R2B51F2	2A	F	2A	F	6	6.1	
2WR41-1	A	25-30	14AWG	R2B51H1	2A	F	2A	F	6	6.1	
2WR41-1	A	31-36	14AWG	R2B51G2	2A	F	2A	F	6	6.1	
2WR41-1	A	37-42	14AWG	R2B51K3	2A	F	2A	F	6	6.1	
2WR41-1	A	43-48	14AWG	R2B51K4	2A	F	2A	F	6	6.1	
2WR41-1	A	49-54	14AWG	R2B51F1	2A	F	2A	F	6	6.1	
2WR41-1	A	55-57	14AWG	R2B51H1	6A	F			17	6.2	DC CIRCUIT
2WR41-1	A	58-60	14AWG	R2B51F2	6A	F			17	6.2	DC CIRCUIT
2WR41-1	A	61-69	14AWG	N/A	N/A		N/A			6.7.2	SPARES
2WR41-1	A	7-12	14AWG	R2B51L1	2A	F	2A	F	6	6.2	
2WR41-1	B	1-3	12AWG	R2B51B2	52-51B2	M	52-51H3	TM	13	6.10	
2WR41-1	B	10-12	12AWG	R2B51F1	52-51F1	M	52-51H7	TM	15	6.10	
2WR41-1	B	13-28	12AWG	N/A	N/A		N/A			6.7.2	SPARES
2WR41-1	B	29-31	12AWG	R2B51G3	52-51G3	M	52-51H9	TM	16	6.10	

2

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PENT NUMBER	MOD NO.	COND NUMBER	COND SIZE	SCHEME NUMBER	PRIMARY DEVICE	PRI TYPE	SECOND DEVICE	SEC TYPE	FIG NO.	ACCEPT CRIT.	NOTES:
2WR41-1	B	32-55	12AWG	N/A	N/A		N/A			6.7.2	SPARES
2WR41-1	B	4-6	12AWG	R2B51L1	52-51L1	M	52-51L7	TM	13	6.10	
2WR41-1	B	7-9	12AWG	R2B51M1	52-51M1	M	52-51L8	TM	13	6.10	
2WR41-1	C	1-6	14AWG	R2B51G3	2A	F	2A	F	6	6.1	
2WR41-1	C	15-18	14AWG	R2SI30D	6A				17	6.2	DC CIRCUIT
2WR41-1	C	19-22	14AWG	N/A	N/A		N/A			6.7.2	SPARES
2WR41-1	C	23-26	14AWG	R2S025	6A	F			17	6.2	DC CIRCUIT
2WR41-1	C	27-30	14AWG	R2S015	6A	F			17	6.2	DC CIRCUIT
2WR41-1	C	31-37	14AWG	R2S053	10A	F			8	6.2	DC CIRCUIT
2WR41-1	C	38-47	14AWG	R2S108	6A	F			17	6.2	DC CIRCUIT
2WR41-1	C	48-50	14AWG	N/A	N/A		N/A			6.7.2	SPARES
2WR41-1	C	51-54	14AWG	R2S106	6A	F			17	6.2	DC CIRCUIT
2WR41-1	C	55-60	14AWG	R2B51E4	1A	F	1A	F	1	6.1	
2WR41-1	C	61-66	14AWG	R2B51K2	1A	F				6.1	50VA CPT

2

APPENDIX I
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PENT NUMBER	MOD NO.	COND NUMBER	COND SIZE	SCHEME NUMBER	PRIMARY DEVICE	PRI TYPE	SECOND DEVICE	SEC TYPE	FIG NO.	ACCEPT CRIT.	NOTES:
2WR41-1	C	67-69	14AWG	R2J300	6A	F	2RS1-12	TM	3	6.10.1	
2WR41-1	C	7	14AWG	N/A	N/A		N/A			6.7.2	SPARES
2WR41-1	C	8-14	14AWG	R2S068	10A	F			8	6.2	DC CIRCUIT
2WR41-1	D	1-7	14AWG	R2B51E2	2A	F	2A	F	6	6.1	
2WR41-1	D	16-17	14AWG	R2B52E4	2A	F	2A	F	6	6.1	
2WR41-1	D	18-19	14AWG	R2B51A4	2A	F	2A	F	6	6.1	
2WR41-1	D	20-25	14AWG	R2B51N3	1A	F	1A	F	1	6.1	
2WR41-1	D	26-31	14AWG	R2B53G1	2A	F	2A	F	6	6.1	
2WR41-1	D	32-37	14AWG	R2B53G2	2A	F	2A	F	6	6.1	
2WR41-1	D	38-41	14AWG	N/A	N/A		N/A			6.7.2	SPARES
2WR41-1	D	42-48	14AWG	R2B54G2	2A	F	2A	F	6	6.1	
2WR41-1	D	49-50	14AWG	N/A						6.7.2	SPARES
2WR41-1	D	51-64	14AWG	R2S121	6A	F			4	6.2	DC CIRCUIT
2WR41-1	D	65-69	14AWG	R2S127	5A	F				6.2	DC CIRCUIT

2

APPENDIX I
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PENT NUMBER	MOD NO.	COND NUMBER	COND SIZE	SCHEME NUMBER	PRIMARY DEVICE	PRI TYPE	SECOND DEVICE	SEC TYPE	FIG NO.	ACCEPT CRIT.	NOTES:
2WR41-1	D	8-15	14AWG	R2B51K1	2A	F	2A	F	6	6.1	2
2WR41-1	E	1-3	12AWG	R2B51E2	52-51E2	M	52-51H6	TM	14	6.10	
2WR41-1	E	10-12	12AWG	R2B53G1	52-53G1	M	52-53A5	TM	15	6.10	
2WR41-1	E	13-15	12AWG	R2B53G2	52-53G2	M	52-53A6	TM	15	6.10	
2WR41-1	E	16-55	12AWG	N/A	N/A		N/A			6.7.2	SPARES
2WR41-1	E	4-6	12AWG	N/A	N/A		N/A			6.7.2	SPARES
2WR41-1	E	7-9	12AWG	R2B51N3	52-51N3	M	52-51L9	TM	15	6.10	
2WR41-1	F	1-69	14AWG	N/A	N/A		N/A			6.7.2	SPARES
2WR41-1	G	1-3 2	250MCM	R2B51G2	52-51G2	M	52-51L2	TM	41	6.10	
2WR41-2	A	1-6	14AWG	G2B63F2	2A	F	2A	F	6	6.1	
2WR41-2	A	13-18	14AWG	G2B61G4	2A	F	2A	F	6	6.1	
2WR41-2	A	19-24	14AWG	G2B61G3	2A	F	2A	F	6	6.1	
2WR41-2	A	25-30	14AWG	G2B61F2	2A	F	2A	F	6	6.1	
2WR41-2	A	31-36	14AWG	G2B61H1	2A	F	2A	F	6	6.1	2

APPENDIX I
PENETRATION SUMMARY
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PENT NUMBER	MOD NO.	COND NUMBER	COND SIZE	SCHEME NUMBER	PRIMARY DEVICE	PRI TYPE	SECOND DEVICE	SEC TYPE	FIG NO.	ACCEPT CRIT.	NOTES:
2WR41-2	A	37-42	14AWG	G2B63G4	2A	F	2A	F	6	6.1	
2WR41-2	A	43-50	14AWG	G2B61H2	2A	F	2A	F	6	6.1	
2WR41-2	A	51-56	14AWG	G2B61N2	2A	F	2A	F	6	6.1	
2WR41-2	A	57-59	14AWG	G2B61F2	6A	F			17	6.2	DC CIRCUIT
2WR41-2	A	60-62	14AWG	G2B61H1	6A	F			17	6.2	DC CIRCUIT
2WR41-2	A	63-69	14AWG	N/A	N/A		N/A			6.7.2	SPARES
2WR41-2	A	7-12	14AWG	G2B61L3	2A	F	2A	F	6	6.1	
2WR41-2	B	1-6	12AWG	N/A	N/A		N/A			6.7.2	SPARES
2WR41-2	B	10-12	12AWG	G2B61G3	52-61G3	M	52-61H7	TM	13	6.10	
2WR41-2	B	13-18	12AWG	N/A	N/A		N/A			6.7.2	SPARES
2WR41-2	B	19-21	12AWG	G2B63G4	52-63G4	M	52-63E2	TM	20	6.10	
2WR41-2	B	22-24	12AWG	N/A	N/A		N/A			6.7.2	SPARES
2WR41-2	B	25-27	12AWG	G2B61N2	52-61N2	M	52-61K6	TM	13	6.10	
2WR41-2	B	28-30	12AWG	G2B61G2	52-61G2	M	52-61K8	TM	16	6.10	

2

APPENDIX I
PENETRATION SUMMARY
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PENT NUMBER	MOD NO.	COND NUMBER	COND SIZE	SCHEME NUMBER	PRIMARY DEVICE	PRI TYPE	SECOND DEVICE	SEC TYPE	FIG NO.	ACCEPT CRIT.	NOTES:
2WR41-2	B	31-55	12AWG	N/A	N/A		N/A			6.7.2	SPARES
2WR41-2	B	7-9	12AWG	G2B61G4	52-61G4	M	52-61H8	TM	13	6.10	
2WR41-2	C	1-4	14AWG	G2S107	6A	F			17	6.2	DC CIRCUIT
2WR41-2	C	11-13	14AWG	G2J301	6A	F	2RS1-12	TM	3	6.10.1	
2WR41-2	C	14-17	14AWG	G2S131						6.5	
2WR41-2	C	18-69	14AWG	N/A	N/A		N/A			6.7.2	SPARES
2WR41-2	C	5-10	14AWG	G2B61L2	1A	F	1A	F	1	6.1	
2WR41-2	D	1-6	14AWG	G2B64E3	2A	F	2A	F	6	6.1	CHANGED PER DCP 86-2055
2WR41-2	D	13-14	14AWG	G2B61F3	2A	F	2A	F	6	6.1	
2WR41-2	D	15-16	14AWG	G2B61A4	2A	F	2A	F	6	6.1	
2WR41-2	D	17-20	14AWG	N/A	N/A		N/A			6.7.2	SPARES
2WR41-2	D	21-27	14AWG	G2S054	10A	F			8	6.2	DC CIRCUIT
2WR41-2	D	28-33	14AWG	G2B64D4	2A	F	2A	F	6	6.1	
2WR41-2	D	34-39	14AWG	G2B64E4	2A	F	2A	F	6	6.1	

2

APPENDIX I

PENETRATION SUMMARY
CALCULATION 85-E-0118-01

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PENT NUMBER	MOD NO.	COND NUMBER	COND SIZE	SCHEME NUMBER	PRIMARY DEVICE	PRI TYPE	SECOND DEVICE	SEC TYPE	FIG NO.	ACCEPT CRIT.	NOTES:
2WR41-2	D	40-45	14AWG	G2B61G2	2A	F	2A	F	6	6.1	
2WR41-2	D	46-50	14AWG	N/A	N/A		N/A			6.7.2	SPARES
2WR41-2	D	51-55	14AWG	G2S122	6A	F			4	6.2	DC CIRCUIT
2WR41-2	D	56-60	14AWG	G2S122	6A	F			4	6.2	DC CIRCUIT
2WR41-2	D	61-64	14AWG	G2S122	6A	F			4	6.2	DC CIRCUIT
2WR41-2	D	65-69	14AWG	N/A	N/A		N/A			6.7.2	SPARES
2WR41-2	D	7-12	14AWG	G2B62E5	2A	F	2A	F	6	6.1	CHANGE TO 2A PER JR#871888
2WR41-2	E	1-3	12AWG	G2B64E3	52-64E3	M	52-64B4	TM	13	6.10	
2WR41-2	E	10-12	12AWG	G2B64E4	52-64E4	M	52-64C2	TM	15	6.10	
2WR41-2	E	13-55	12AWG	N/A	N/A		N/A			6.7.2	SPARES
2WR41-2	E	4-6	12AWG	N/A	N/A		N/A			6.7.2	SPARES
2WR41-2	E	7-9	12AWG	G2B64D4	52-64D4	M	52-64B3	TM	13	6.10	
2WR41-2	F	1-2	COAX	G2M038						6.8	CHANGED PER DCP 87-2073

2

APPENDIX I
PENETRATION SUMMARY
CALCULATION 85-E-0118-01

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PENT NUMBER	MOD NO.	COND NUMBER	COND SIZE	SCHEME NUMBER	PRIMARY DEVICE	PRI TYPE	SECOND DEVICE	SEC TYPE	FIC NO.	ACCEPT CRIT.	NOTES:
2WR41-2	F	3-5	COAX	N/A	N/A		N/A			6.7.2	SPARE
2WR41-2	G	1-3	250MCM	G2B62E5	52-62E5	M	52-62C2	TM	35	6.10	
2WR42-1	A	1,2,7,13	14AWG	N/A	N/A		N/A			6.7.2	12,5,6 SPARES
2WR42-1	A	10,4,11	14AWG	R2I073						6.5	REF MEMO IC-85-093 MODEL NO 1
2WR42-1	A	14,15,22	14AWG	R2I074						6.5	REF MEMO IC-85-093 MODEL NO 1
2WR42-1	A	16,24,23	14AWG	R2I089						6.5	
2WR42-1	A	17-18	14AWG	N/A	N/A		N/A			6.7.2	SPARES
2WR42-1	A	20,28,19	14AWG	R2I090						6.5	
2WR42-1	A	25-27	14AWG	R2I001						6.5	REF MEMO IC-85-093 MODEL NO 2
2WR42-1	A	29,21,30	14AWG	R2I261						6.5	REF MEMO IC-85-093 MODEL NO 1
2WR42-1	A	32,33,41	14AWG	R2I001						6.5	REF MEMO IC-85-093 MODEL NO 2
2WR42-1	A	34,35,43	14AWG	R2I414	N/A		N/A			6.5	COND 62,61,54 PER DCP 83-2217

APPENDIX I

PENETRATION SUMMARY
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PENT NUMBER	MOD NO.	COND NUMBER	COND SIZE	SCHEME NUMBER	PRIMARY DEVICE	PRI TYPE	SECOND DEVICE	SEC TYPE	FIG NO.	ACCEPT CRIT.	NOTES:
2WR42-1	A	40,31	14AWG	N/A	N/A		N/A			6.7.2	SPARES
2WR42-1	A	44,36,45	14AWG	R2I016						6.5	REF MEMO IC-85-093 MODEL NO 1
2WR42-1	A	46,37,38	14AWG	R2I318						6.5	REF MEMO IC-85-093 MODEL NO 1
2WR42-1	A	48,47,39	14AWG	R2I039						6.5	REF MEMO IC-85-093 MODEL NO 1
2WR42-1	A	49,50,58	14AWG	R21499						6.5	REF MEMO IC-85-093 MODEL NO 19
2WR42-1	A	53,67	14AWG	N/A	N/A		N/A			6.7.2	SPARES
2WR42-1	A	55,56	14AWG	N/A	N/A		N/A			4.7.2	SPARES
2WR42-1	A	59,51	14AWG	N/A	N/A		N/A			6.7.2	42, SPARES
2WR42-1	A	62,61,54	14AWG	2I414						6.5	SEE APPENDIX III MODEL NO 5
2WR42-1	A	63,69,68	14AWG	R2I002						6.5	REF MEMO IC-85-093 MODEL NO 1
2WR42-1	A	65,64,57	14AWG	R21501						6.5	REF MEMO IC-85-093 MODEL NO 20

APPENDIX I
PENETRATION SUMMARY
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PENT NUMBER	MOD NO.	COND NUMBER	COND SIZE	SCHEME NUMBER	PRIMARY DEVICE	PRI TYPE	SECOND DEVICE	SEC TYPE	FIG NO.	ACCEPT CRIT.	NOTES:
2WR42-1	A	66,60,52	14AWG	R2I002						6.5	REF MEMO IC-85-093 MODEL NO 1
2WR42-1	A	9,8,3	14AWG	R2I011						6.5	REF MEMO IC-85-093 MODEL NO 1
2WR42-1	B	1,2	COAX	N/A						6.7.2	SPARE PER DCP 87-2073
2WR42-1	B	3,4,5,6	COAX	N/A						6.7.2	SPARE
2WR42-1	C	SEE NOTE	16AWG	R2R002						6.9	DWG E-2625 SHT 237 (INCORE DETECTORS)
2WR42-1	C	SEE NOTE	16AWG	R2R010						6.9	DWG E-2625 SHT 238 (INCORE DETECTORS)
2WR42-1	C	SEE NOTE	16AWG	R2R008						6.9	DWG E-2625 SHT 239(INCORE DETECTORS)
2WR42-1	C	SEE NOTE	16AWG	R2R003						6.9	DWG E-2625 SHT 240 (INCORE DETECTORS)
2WR42-1	C	SEE NOTE	16AWG	R2R004						6.9	DWG E-2625 SHT 241(INCORE DETECTORS)

APPENDIX I
PENETRATION SUMMARY
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PENT NUMBER	MOD NO.	COND NUMBER	COND SIZE	SCHEME NUMBER	PRIMARY DEVICE	PRI TYPE	SECOND DEVICE	SEC TYPE	FIG NO.	ACCEPT CRIT.	NOTES:
2WR42-1	C	SEE NOTE	16AWG	R2R001						6.9	DWG E-2625 SHT 242(INCORE DETECTORS)
2WR42-1	D	SEE NOTE	16AWG	R2R005						6.9	DWG E-2625 SHT 243(INCORE DETECTORS)
2WR42-1	D	SEE NOTE	16AWG	R2R006						6.9	DWG E-2625 SHT 244(INCORE DETECTORS)
2WR42-1	D	SEE NOTE	16AWG	R2R011						6.9	DWG E-2625 SHT 245 (INCORE DETECTORS)
2WR42-1	D	SEE NOTE	16AWG	R2R007						6.9	DWG E-2625 SHT 246(INCORE DETECTORS)
2WR42-1	D	SEE NOTE	16AWG	R2R009						6.9	DWG E-2625 SHT 247(INCORE DETECTORS)
2WR42-1	D	SEE NOTE	16AWG	N/A	N/A		N/A			6.7.2	NOTE DWG E-2625 SHT 248 (SPARES)
2WR42-1	E	SEE NOTE	COAX	R2R384						6.8	DWG E-2625 SHT 249

APPENDIX I

PENETRATION SUMMARY
CALCULATION 85-E-0118-01

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PENT NUMBER	MOD NO.	COND NUMBER	COND SIZE	SCHEME NUMBER	PRIMARY DEVICE	PRI TYPE	SECOND DEVICE	SEC TYPE	FIG NO.	ACCEPT CRIT.	NOTES:
2WR42-1	E	SEE NOTE	COAX	R2R384						6.8	DWG E-2625 SHT 249
2WR42-1	E	SEE NOTE	COAX	R2R384						6.8	DWG E-2625 SHT 249
2WR42-1	E	SEE NOTE	COAX	R2R384						6.8	DWG E-2625 SHT 249
2WR42-1	E	SEE NOTE	COAX	R2R384						6.8	DWG E-2625 SHT 249
2WR42-1	E	SEE NOTE	COAX	R2R384						6.8	DWG E-2625 SHT 249
2WR42-1	F	1,2,7,6	16AWG	R2I234						6.5	REF MEMO IC-85-093 MODEL NO 13
2WR42-1	F	11,19,18	16AWG	R2I243						6.5	COND 10 MEMO IC-85-093 MODEL NO 17
2WR42-1	F	13,21,12	16AWG	R2R384						6.5	COND 5 MEMO IC-85-093 ATTACHMENT B-G9
2WR42-1	F	14,15,23	16AWG	R2I234						6.5	COND 22 REF MEMO IC-85-093 MODEL NO 13
2WR42-1	F	16,17,25	16AWG	R2I234						6.5	COND 24 REF MEMO IC-85-093 MODEL NO 13

APPENDIX I

PENETRATION SUMMARY
CALCULATION 85-E-0118-01

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PENT NUMBER	MOD NO.	COND NUMBER	COND SIZE	SCHEME NUMBER	PRIMARY DEVICE	PRI TYPE	SECOND DEVICE	SEC TYPE	FIG NO.	ACCEPT CRIT.	NOTES:
2WR42-1	F	26,27,36	16AWG	R2I288						6.5	COND 35 MEMO IC-85-093 MODEL NO 1
2WR42-1	F	37,28,38	16AWG	R2I496						6.5	COND 47 REF MEMO IC-85-093 MODEL NO 10
2WR42-1	F	49,58,48	16AWG	R2I002	N/A		N/A			6.5	
2WR42-1	F	60,50,51	16AWG	R2I496						6.5	COND 52 REF MEMO IC-85-093 MODEL NO 10
2WR42-1	F	67,59,68	16AWG	R2I551	N/A		N/A			6.5	COND 75 E-2625 SHT 252,253 (SPARES)
2WR42-1	F	9,8,3,4	16AWG	R2I234						6.5	REF MEMO IC-85-093 MODEL NO 13
2WR42-1	F	SEE NOTE	16AWG	R2S117						6.5	DWG E-2625 SHT 251 MEMO IC-85-093 MOD 18
2WR42-1	F	W15	16AWG	R2I002						6.5	
2WR42-1	F	W16-W17	16AWG	N/A						6.7.2	SPARE

APPENDIX I

PENETRATION SUMMARY
CALCULATION 85-E-0118-01

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PENT NUMBER	MOD NO.	COND NUMBER	COND SIZE	SCHEME NUMBER	PRIMARY DEVICE	PRI TYPE	SECOND DEVICE	SEC TYPE	FIG NO.	ACCEPT CRIT.	NOTES:
2WR42-1	F	W19	16AWG	R2I016						6.5	
2WR42-1	F	W20-W21	16AWG	N/A						6.7.2	SPARES
2WR42-1	G	1-69	14AWG	N/A	N/A		N/A			6.7.2	SPARES
2WR42-2	A	1,2,7,13	14AWG	N/A	N/A		N/A		2	6.7.2	CONT COND 12,5,6, SPARES
2WR42-2	A	10,4,11	14AWG	G2I075						6.5	REF MEMO IC-85-093 MODEL NO 1
2WR42-2	A	14,15,22	14AWG	G2I076						6.5	REF MEMO IC-85-093 MODEL NO 1
2WR42-2	A	16,24,23	14AWG	G2I091						6.5	
2WR42-2	A	20,28,19	14AWG	G2I092						6.5	
2WR42-2	A	27,26,25	14AWG	G2I003						6.5	COND 17,18 REF MEMO IC-85-093 MOD NO 2
2WR42-2	A	29,21,30	14AWG	G2I262						6.5	REF MEMO IC-85-093 MODEL NO 1
2WR42-2	A	32,33,41	14AWG	G2I003						6.5	COND 40,31 REF MEMO IC-85-093 MODEL NO 2

APPENDIX I

PENETRATION SUMMARY
CALCULATION 85-E-0118-01

F=Fuse
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PENT NUMBER	MOD NO.	COND NUMBER	COND SIZE	SCHEME NUMBER	PRIMARY DEVICE	PRI TYPE	SECOND DEVICE	SEC TYPE	FIG NO.	ACCEPT CRIT.	NOTES:
2WR42-2	A	34,35,43	14AWG	G2I547	N/A		N/A			6.5	
2WR42-2	A	44,36,45	14AWG	G2I045						6.5	REF MEMO IC-85-093 MODEL NO 1
2WR42-2	A	46,37,38	14AWG	G2I319						6.5	REF MEMO IC-85-093 MODEL NO 1
2WR42-2	A	48,47,39	14AWG	G2I040						6.5	REF MEMO IC-85-093 MODEL NO 1
2WR42-2	A	49,50,58	14AWG	G2I500						6.5	REF MEMO IC-85-093 MODEL NO 19
2WR42-2	A	62,61,54	14AWG	G2I547						6.5	
2WR42-2	A	63,69,68	14AWG	G2I004					2	6.5	COND 55,56 REF MEMO IC-85-093 MODEL NO 2
2WR42-2	A	65,64,57	14AWG	N/A	N/A		N/A			6.7.2	CONT COND 59,41,42 (SPARES)
2WR42-2	A	66,60,52	14AWG	G2I004						6.5	COND 53,67 REF MEMO IC-85-093 MODEL NO 2
2WR42-2	A	9,8,3	14AWG	G2I012						6.5	REF MEMO IC-85-093 MODEL NO 1

APPENDIX I
PENETRATION SUMMARY
CALCULATION 85-E-0118-01

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PENT NUMBER	MOD NO.	COND NUMBER	COND SIZE	SCHEME NUMBER	PRIMARY DEVICE	PRI TYPE	SECOND DEVICE	SEC TYPE	FIG NO.	ACCEPT CRIT.	NOTES:
2WR42-2	B	1-2	COAX	N/A						6.7.2	SPARE
2WR42-2	B	3-6	COAX	N/A	N/A		N/A			6.7.2	SPARES
2WR42-2	C	SEE NOTE	16AWG	G2RO16						6.9	DWG E-2625 SHT 261 (INCORE DETECTORS)
2WR42-2	C	SEE NOTE	16AWG	N/A	N/A		N/A			6.7.2	NOTE DWG E-2625 SHT 262, SPARES
2WR42-2	C	SEE NOTE	16AWG	G2R017						6.9	DWG E-2625 SHT 263,(INCORE DETECTORS)
2WR42-2	C	SEE NOTE	16AWG	G2R015						6.9	DWG E-2625 SHT 264,(INCORE DETECTORS)
2WR42-2	C	SEE NOTE	16AWG	G2R013						6.9	DWG E-2625 SHT 265,(INCORE DETECTORS)
2WR42-2	C	SEE NOTE	16AWG	G2R012						6.9	DWG E-2625 SHT 266,(INCORE DETECTORS)
2WR42-2	D	SEE NOTE	16AWG	G2R018						6.9	DWG E-2625 SHT 267,(INCORE DETECTORS)

APPENDIX I
PENETRATION SUMMARY
CALCULATION 85-E-0118-01

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PENT NUMBER	MOD NO.	COND NUMBER	COND SIZE	SCHEME NUMBER	PRIMARY DEVICE	PRI TYPE	SECOND DEVICE	SEC TYPE	FIG NO.	ACCEPT CRIT.	NOTES:
2WR42-2	D	SEE NOTE	16AWG	G2R019						6.9	DWG E-2625 SHT 268,(INCORE DETECTORS)
2WR42-2	D	SEE NOTE	16AWG	G2R022						6.9	DWG E-2625 SHT 269,(INCORE DETECTORS)
2WR42-2	D	SEE NOTE	16AWG	G2R020						6.9	DWG E-2625 SHT 270,(INCORE DETECTORS)
2WR42-2	D	SEE NOTE	16AWG	G2R021						6.9	DWG E-2625 SHT 271,(INCORE DETECTORS)
2WR42-2	D	SEE NOTE	16AWG	N/A	N/A		N/A			6.9	NOTE DWG E-2625 SHT 272, SPARES
2WR42-2	E	1-6	COAX	G2R385						6.5	REF MEMO IC-85-093 ATTACHMENT B-G9
2WR42-2	F	1,2,7,6	16AWG	G2I235						6.5	REF MEMO IC-85-093 MODEL NO 13
2WR42-2	F	11,19,18	16AWG	G2I244						6.5	COND 10 REF MEMO IC-85-093 MODEL NO 17

APPENDIX I
PENETRATION SUMMARY
CALCULATION 85-E-0118-01

F=Fuse
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PENT NUMBER	MOD NO.	COND NUMBER	COND SIZE	SCHEME NUMBER	PRIMARY DEVICE	PRI TYPE	SECOND DEVICE	SEC TYPE	FIG NO.	ACCEPT CRIT.	NOTES:
2WR42-2	F	13,21,12	16AWG	G2R385						6.5	COND 5 MEMO IC-85-093 ATTACHMENT B-G9
2WR42-2	F	14,15,23	16AWG	G2I235						6.5	COND 22 MEMO IC-85-093 MODEL NO 13
2WR42-2	F	16,17,25	16AWG	G2I235						6.5	COND 24 MEMO IC-85-093 MODEL NO 13
2WR42-2	F	26,27,36	16AWG	G2I289						6.5	COND 35 REF MEMO IC-85-093 MODEL NO 1
2WR42-2	F	37,28,38	16AWG	G2I382						6.5	COND 47 REF MEMO IC-85-093 MODEL NO 17
2WR42-2	F	49,58,48	16AWG	G2I497						6.5	COND 40 REF MEMO IC-85-093 MODEL NO 10
2WR42-2	F	60,50,51	16AWG	G2I497						6.5	COND 52 REF MEMO IC-85-093 MODEL NO 10

APPENDIX I
PENETRATION SUMMARY
CALCULATION 85-E-0118-01

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PENT NUMBER	MOD NO.	COND NUMBER	COND SIZE	SCHEME NUMBER	PRIMARY DEVICE	PRI TYPE	SECOND DEVICE	SEC TYPE	FIG NO.	ACCEPT CRIT.	NOTES:
2WR42-2	F	9,8,3,4	16AWG	G2I235						6.5	REF MEMO IC-85-093 MODEL NO 13
2WR42-2	F	SEE NOTE	16AWG	N/A	N/A		N/A			6.7.2	NOTE DWG E-2625 SHT 277, SPARES
2WR42-2	F	W15	16AWG	G2I004						6.5	
2WR42-2	F	W16	16AWG	G2I004						6.5	
2WR42-2	F	W17	16AWG	G2I045	N/A		N/A			6.5	
2WR42-2	F	W18	16AWG	G2I552						6.5	
2WR42-2	F	W8-W11	16AWG	G2S118						6.5	DWG E-2625 SHT 275 MEMO IC-85-093 MOD 18
2WR42-2	G	1-9	14AWG	G2R014						6.9	
2WR42-2	G	10-33	14AWG	N/A	N/A		N/A			6.7.2	NOTE DWG E-2625 SHT 279, SPARES
2WR42-2	G	W12-W23	14AWG	G2R014						6.9	
2WR42-2	G	W24-W28	14AWG	N/A	N/A		N/A		2	6.7.2	NOTE DWG E-2625 SHT 280, SPARES

APPENDIX I
PENETRATION SUMMARY
CALCULATION 85-E-0118-01

F=Fuse
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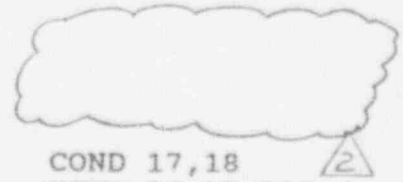
PENT NUMBER	MOD NO.	COND NUMBER	COND SIZE	SCHEME NUMBER	PRIMARY DEVICE	PRI TYPE	SECOND DEVICE	SEC TYPE	FIG NO.	ACCEPT CRIT.	NOTES:
2WR42-3	A	1,2,7,13	14AWG	N/A	N/A		N/A			6.7.2	CONT COND 1,2,5,6, SPARES
2WR42-3	A	10,4,11	14AWG	Y2I077						6.5	REF MEMO IC-85-093 MODEL NO 1
2WR42-3	A	14,15,22	14AWG	Y2I078						6.5	REF MEMO IC-85-093 MODEL NO 1
2WR42-3	A	16,24,23	14AWG	Y2I093						6.5	
2WR42-3	A	20,28,19	14AWG	Y2I094						6.5	
2WR42-3	A	27,26,25	14AWG	Y2I005						6.5	COND 17,18 MEMO IC-85-093 MODEL NO 2
2WR42-3	A	29,21,30	14AWG	Y2I263						6.5	REF MEMO IC-85-093 MODEL NO 1
2WR42-3	A	32,33,41	14AWG	Y2I005						6.5	COND 40,31 REF MEMO IC-85-093 MOD NO 2
2WR42-3	A	46,37,38	14AWG	Y2I320						6.5	REF MEMO IC-85-093 MODEL NO 1
2WR42-3	A	63,69,68	14AWG	Y2I006						6.5	COND 55,56 MEMO IC-85-093 MODEL NO 2



APPENDIX I
PENETRATION SUMMARY
CALCULATION 85-E-0118-01

F=Fuse
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PENT NUMBER	MOD NO.	COND NUMBER	COND SIZE	SCHEME NUMBER	PRIMARY DEVICE	PRI TYPE	SECOND DEVICE	SEC TYPE	FIG NO.	ACCEPT CRIT.	NOTES:
2WR42-3	A	66,60,52	14AWG	Y2I006						6.5	COND 53,67 MEMO IC-85-093 MODEL NO 2
2WR42-3	A	9,8,3	14AWG	Y2I013						6.5	REF MEMO IC-85-093 MODEL NO 1
2WR42-3	A	W11-W14	14AWG	N/A	N/A		N/A			6.7.2	SPARES
2WR42-3	A	W17-W19	14AWG	N/A	N/A		N/A			6.7.2	SPARES
2WR42-3	B	1	COAX	Y2R386						6.5	REF MEMO IC-85-093 ATTACHMENT B-G9
2WR42-3	B	2-5	COAX	N/A	N/A		N/A			6.7.2	SPARES
2WR42-3	C	SEE NOTE	16AWG	Y2R025						6.9	DWG E-2625 SHT 285 (INCORE DETECTORS)
2WR42-3	C	SEE NOTE	16AWG	Y2R027						6.9	DWG E-2625 SHT 286,(INCORE DETECTORS)
2WR42-3	C	SEE NOTE	16AWG	Y2R028						6.9	DWG E-2625 SHT 287,(INCORE DETECTORS)
2WR42-3	C	SEE NOTE	16AWG	Y2R026						6.9	DWG E-2625 SHT 288,(INCORE DETECTORS)

APPENDIX I
PENETRATION SUMMARY
CALCULATION 85-E-0118-01

F=Fuse
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PENT NUMBER	MOD NO.	COND NUMBER	COND SIZE	SCHEME NUMBER	PRIMARY DEVICE	PRI TYPE	SECOND DEVICE	SEC TYPE	FIG NO.	ACCEPT CRIT.	NOTES:
2WR42-3	C	SEE NOTE	16AWG	Y2R024						6.9	DWG E-2625 SHT 289,(INCORE DETECTORS)
2WR42-3	C	SEE NOTE	16AWG	Y2R023						6.9	DWG E-2625 SHT 290,(INCORE DETECTORS)
2WR42-3	D	SEE NOTE	16AWG	Y2R032						6.9	DWG E-2625 SHT 291,(INCORE DETECTORS)
2WR42-3	D	SEE NOTE	16AWG	Y2R029						6.9	DWG E-2625 SHT 292,(INCORE DETECTORS)
2WR42-3	D	SEE NOTE	16AWG	Y2R031						6.9	DWG E-2625 SHT 293,(INCORE DETECTORS)
2WR42-3	D	SEE NOTE	16AWG	Y2R033						6.9	DWG E-2625 SHT 294,(INCORE DETECTORS)
2WR42-3	D	SEE NOTE	16AWG	N/A	N/A		N/A			6.7.2	NOTE DWG E-2625 SHT 295, SPARES
2WR42-3	D	SEE NOTE	16AWG	N/A	N/A		N/A			6.7.2	NOTE DWG E-2625 SHT 296, SPARES

APPENDIX I
PENETRATION SUMMARY
CALCULATION 85-E-0118-01

F=Fuse
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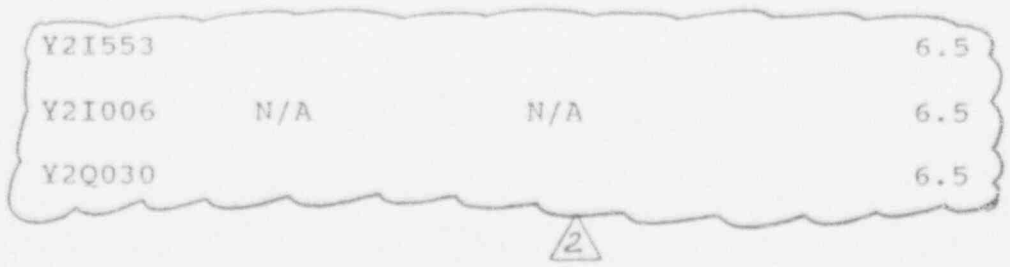
PENT NUMBER	MOD NO.	COND NUMBER	COND SIZE	SCHEME NUMBER	PRIMARY DEVICE	PRI TYPE	SECOND DEVICE	SEC TYPE	FIG NO.	ACCEPT CRIT.	NOTES:
2WR42-3	E	1, 3-6	COAX	Y2R386						6.5	REF MEMO IC-85-093 ATTACHMENT B-G9
2WR42-3	E	2	COAX	N/A	N/A		N/A			6.7.2	SPARE
2WR42-3	F	1,2,7,6	16AWG	Y2I236						6.5	REF MEMO IC-85-093 MODEL NO 13
2WR42-3	F	11,19,18	16AWG	N/A	N/A		N/A			6.7.2	CONT COND 10, SPARES
2WR42-3	F	13,21,12	16AWG	Y2R386						6.5	COND 5 MEMO IC-85-093 ATTACHMENT B-G9
2WR42-3	F	14,15,23	16AWG	Y2I236						6.5	COND 22 MEMO IC-85-093 MODEL NO 13
2WR42-3	F	16,17,25	16AWG	Y2I236						6.5	COND 24 MEMO IC-85-093 MODEL NO 13
2WR42-3	F	29,20,30	16AWG	Y2I553						6.5	
2WR42-3	F	37,28,38	16AWG	Y2I006	N/A		N/A			6.5	
2WR42-3	F	49,58,48	16AWG	Y2Q030						6.5	



APPENDIX I
PENETRATION SUMMARY
CALCULATION 85-E-0118-01

F=Fuse
M=Mag Only
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PENT NUMBER	MOD NO.	COND NUMBER	COND SIZE	SCHEME NUMBER	PRIMARY DEVICE	PRI TYPE	SECOND DEVICE	SEC TYPE	FIG NO.	ACCEPT CRIT.	NOTES:
2WR42-3	F	55,54,45	16AWG	Y2I006						6.5	
2WR42-3	F	60,50,51	16AWG	Y2Q030						6.5	
2WR42-3	F	9,8,3,4	16AWG	Y2I236						6.5	REF MEMO IC-85-093 MODEL NO 13
2WR42-3	F	W15-W21	16AWG	N/A	N/A		N/A			6.7.2	NOTE DWG E-2625,SHT. 300 SPARES
2WR42-3	F	W7-W9	16AWG	N/A	N/A		N/A			6.7.2	NOTE DWG E-2625, SHT 299, SPARES
2WR42-3	G	47,55,46	14AWG	Y2Q030						6.5	COND 22,23,31 MEMO IC-85-093 MODEL NO 4
2WR42-3	G	54,53,45	14AWG	N/A						6.7.2	SPARES
2WR42-3	G	59,52,44	14AWG	Y2Q030						6.5	
2WR42-3	G	W1-W11	14AWG	N/A	N/A		N/A			6.7.2	SPARES
2WR42-3	G	W12-W13	14AWG	Y2Q030						6.5	MEMO IC-85-093 MODEL NO 1
2WR42-3	G	W16-W17	14AWG	N/A	N/A		N/A			6.7.2	NOTE DWG E-2625 SHT 303, SPARES

APPENDIX I

PENETRATION SUMMARY
CALCULATION 85-E-0118-01

F=Fuse
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PENT NUMBER	MOD NO.	COND NUMBER	COND SIZE	SCHEME NUMBER	PRIMARY DEVICE	PRI TYPE	SECOND DEVICE	SEC TYPE	FIG NO.	ACCEPT CRIT.	NOTES:
2WR42-3	G	W19-W23	14AWG	N/A	N/A		N/A			6.7.2	NOTE DWG E-2625 SHT 304, SPARES
2WR42-4	A	1,2,7,13	14AWG	N/A	N/A		N/A			6.7.2	CONT COND 12,5,6, SPARES
2WR42-4	A	10,4,11	14AWG	B2I079						6.5	REF MEMO IC-85-093 MODEL NO 1
2WR42-4	A	14,15,22	14AWG	B2I080						6.5	REF MEMO IC-85-093 MODEL NO 1
2WR42-4	A	16,24,23	14AWG	B2I087						6.5	[redacted] 2
2WR42-4	A	20,28,19	14AWG	B2I088						6.5	
2WR42-4	A	27,26,25	14AWG	B2I007						6.5	COND 17,18 MEMO IC-85-093 MODEL NO 2
2WR42-4	A	29,21,30	14AWG	B2I264						6.5	REF MEMO IC-85-093 MODEL NO 1
2WR42-4	A	32,33,41	14AWG	B2I007						6.5	COND 40,31 MEMO IC-85-093 MODEL NO 2
2WR42-4	A	34,35,43	14AWG	B2Q029						6.5	COND 62,61,54 MEMO IC-85-093 MOD NO 4

APPENDIX I
PENETRATION SUMMARY
CALCULATION 85-E-0118-01

F=Fuse
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PENT NUMBER	MOD NO.	COND NUMBER	COND SIZE	SCHEME NUMBER	PRIMARY DEVICE	PRI TYPE	SECOND DEVICE	SEC TYPE	FIG NO.	ACCEPT CRIT.	NOTES:
2WR42-4	A	44,36,45	14AWG	B2Q029						6.5	COND 48,47,39 MEMO IC-85-093 MOD NO 4
2WR42-4	A	46,37,38	14AWG	B2I321						6.5	REF MEMO IC-85-093 MODEL NO 4
2WR42-4	A	49,50,58	14AWG	N/A	N/A		N/A			6.7.2	CONT COND 65,64,57,59,51,42, SPARES
2WR42-4	A	63,69,68	14AWG	B2I008						6.5	COND 55,56, MEMO IC-85-093 MODEL NO 2
2WR42-4	A	66,60,52	14AWG	B2I008						6.5	COND 53,67 MEMO IC-85-093 MODEL NO 2
2WR42-4	A	9,8,3	14AWG	B2I014						6.5	REF MEMO IC-85-093 MODEL NO 1
2WR42-4	B	1-5	COAX	N/A	N/A		N/A			6.7.2	USED CABLE NOS., SPARES
2WR42-4	C	SEE NOTE	16AWG	B2R037						6.9	DWG E-2625 SHT 309 (INCORE DETECTORS)

APPENDIX I
PENETRATION SUMMARY
CALCULATION 85-E-0118-01

F=Fuse
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PENT NUMBER	MOD NO.	COND NUMBER	COND SIZE	SCHEME NUMBER	PRIMARY DEVICE	PRI TYPE	SECOND DEVICE	SEC TYPE	FIG NO.	ACCEPT CRIT.	NOTES:
2WR42-4	C	SEE NOTE	16AWG	B2R035						6.9	DWG E-2625 SHT 310(INCORE DETECTORS)
2WR42-4	C	SEE NOTE	16AWG	B2R036						6.9	DWG E-2625 SHT 311,(INCORE DETECTORS)
2WR42-4	C	SEE NOTE	16AWG	B2R038						6.9	DWG E-2625 SHT 312,(INCORE DETECTORS)
2WR42-4	C	SEE NOTE	16AWG	B2R039						6.9	DWG E-2625 SHT 313,(INCORE DETECTORS)
2WR42-4	C	SEE NOTE	16AWG	B2R034						6.9	DWG E-2625 SHT 314,(INCORE DETECTORS)
2WR42-4	D	SEE NOTE	16AWG	B2R041						6.9	DWG E-2625 SHT 315, (INCORE DETECTORS)
2WR42-4	D	SEE NOTE	16AWG	B2R044						6.9	DWG E-2625 SHT 316,(INCORE DETECTORS)
2WR42-4	D	SEE NOTE	16AWG	B2R040						6.9	DWG E-2625 SHT 317,(INCORE DETECTORS)

APPENDIX I
PENETRATION SUMMARY
CALCULATION 85-E-0118-01

F=Fuse
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PENT NUMBER	MOD NO.	COND NUMBER	COND SIZE	SCHEME NUMBER	PRIMARY DEVICE	PRI TYPE	SECOND DEVICE	SEC TYPE	FIG NO.	ACCEPT CRIT.	NOTES:
2WR42-4	D	SEE NOTE	16AWG	B2R043						6.9	DWG E-2625 SHT 318,(INCORE DETECTORS)
2WR42-4	D	SEE NOTE	16AWG	B2R042						6.9	DWG E-2625 SHT 319,(INCORE DETECTORS)
2WR42-4	D	SEE NOTE	16AWG	N/A	N/A		N/A			6.7.2	NOTE DWG E-2625 SHT 320, SPARES
2WR42-4	E	1-6	COAX	B2R387						6.5	REF PARAGH 4.8(MEMO IC-85-093 ATT. B-G9)
2WR42-4	F	1,2,7,6	16AWG	B2I237						6.5	REF MEMO IC-85-093 MODEL NO 13
2WR42-4	F	11,19,18	16AWG	B2I554	N/A		N/A			6.9	
2WR42-4	F	13,21,12	16AWG	B2R387						6.5	COND 5 MEMO IC-85-093 ATTACHMENT B-G9
2WR42-4	F	14,15,23	16AWG	B2I237						6.5	COND 22 MEMO IC-85-093 MODEL NO 13

APPENDIX I

PENETRATION SUMMARY
CALCULATION 85-E-0118-01

F=Fuse
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PENT NUMBER	MOD NO.	COND NUMBER	COND SIZE	SCHEME NUMBER	PRIMARY DEVICE	PRI TYPE	SECOND DEVICE	SEC TYPE	FIG NO.	ACCEPT CRIT.	NOTES:
2WR42-4	F	16,17,25	16AWG	B2I237						6.5	COND 24 MEMO IC-85-093 MODEL NO 13
2WR42-4	F	9,8,3,4	16AWG	B2I237						6.5	REF MEMO IC-85-093 MODEL NO 13
2WR42-4	F	SEE NOTE	16AWG	N/A	N/A		N/A			6.7.2	NOTE DWG E-2625 SHT 325, SPARES
2WR42-4	F	W7	16AWG	B2I008	N/A		N/A			6.5	
2WR42-4	F	W8	16AWG	B2I008						6.5	
2WR42-4	F	W9-W12	16AWG	N/A	N/A		N/A		2	6.7.2	NOTE DWG E-2625 SHT 323, SPARES
2WR42-4	G	1,2,6,7,	14AWG	N/A	N/A		N/A			6.7.2	SPARES
2WR42-4	G	11,4,5,	14AWG	N/A	N/A		N/A			6.7.2	SPARES
2WR42-4	G	17,10,18	14AWG	B2Q029						6.5	COND 22,23,31 MEMO IC-85-093 MOD NO 4
2WR42-4	G	21,13,14	14AWG	B2Q029						6.5	COND 9,16,15 MEMO IC-85-093 MODEL NO 4

APPENDIX I

PENETRATION SUMMARY
CALCULATION 85-E-0118-01

F=Fuse
M=Mag Only
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PENT NUMBER	MOD NO.	COND NUMBER	COND SIZE	SCHEME NUMBER	PRIMARY DEVICE	PRI TYPE	SECOND DEVICE	SEC TYPE	FIG NO.	ACCEPT CRIT.	NOTES:
2WR42-4	G	SEE NOTE	14AWG	N/A	N/A		N/A			6.7.2	NOTE DWG E-2625 SHT 327, SPARES
2WR42-4	G	SEE NOTE	14AWG	N/A	N/A		N/A			6.7.2	NOTE DWG E-2625 SHT 328, SPARES
2WR43-1	A	SEE NOTE	16AWG	Y2R301	5A	F				6.5	DWG E-2625 SHT 329 CEA POSI XMIT& SWITCH
2WR43-1	A	SEE NOTE	16AWG	Y2R302	5A	F				6.5	DWG E-2625 SHT 329 CEA POSI XMIT & SWIT
2WR43-1	A	SEE NOTE	16AWG	Y2R303	5A	F				6.5	DWG E-2625 SHT 330,CEA POSI XMIT & SWIT
2WR43-1	A	SEE NOTE	16AWG	Y2R305	5A	F				6.5	DWG E-2625 SHT 330,CEA POSI XMIT & SWIT
2WR43-1	A	SEE NOTE	16AWG	Y2R306	5A	F				6.5	DWG E-2625 SHT 331,CEA POSI XMIT & SWIT
2WR43-1	A	SEE NOTE	16AWG	Y2R307	5A	F				6.5	DWG E-2625 SHT 331,CEA POSI XMIT & SWIT

APPENDIX I
PENETRATION SUMMARY
CALCULATION 85-E-0118-01

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PENT NUMBER	MOD NO.	COND NUMBER	COND SIZE	SCHEME NUMBER	PRIMARY DEVICE	PRI TYPE	SECOND DEVICE	SEC TYPE	FIG NO.	ACCEPT CRIT.	NOTES:
2WR43-1	A	SEE NOTE	16AWG	Y2R309	5A	F				6.5	DWG E-2625 SHT 332,CEA POSI XMIT & SWIT
2WR43-1	A	SEE NOTE	16AWG	N/A	N/A		N/A			6.7.2	NOTE DWG E-2625 SHT 332, SPARES
2WR43-1	C	SEE NOTE	16AWG	Y2R310	5A	F				6.5	DWG E-2625 SHT 333,CEA POSI XMIT & SWIT
2WR43-1	C	SEE NOTE	16AWG	Y2R311	5A	F				6.5	DWG E-2625 SHT 333,CEA POSI XMIT & SWIT
2WR43-1	C	SEE NOTE	16AWG	Y2R313	5A	F				6.5	DWG E-2625 SHT 334,CEA POSI XMIT & SWIT
2WR43-1	C	SEE NOTE	16AWG	Y2R314	5A	F				6.5	DWG E-2625 SHT 334,CEA POSI XMIT & SWIT
2WR43-1	C	SEE NOTE	16AWG	Y2R315	5A	F				6.5	DWG E-2625 SHT 335,CEA POSI XMIT & SWIT
2WR43-1	C	SEE NOTE	16AWG	Y2R316	5A	F				6.5	DWG E-2625 SHT 335,CEA POSI XMIT & SWIT

APPENDIX I

PENETRATION SUMMARY
CALCULATION 85-E-0118-01

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PENT NUMBER	MOD NO.	COND NUMBER	COND SIZE	SCHEME NUMBER	PRIMARY DEVICE	PRI TYPE	SECOND DEVICE	SEC TYPE	FIG NO.	ACCEPT CRIT.	NOTES:
2WR43-1	C	SEE NOTE	16AWG	Y2R317	5A	F				6.5	DWG E-2625 SHT 336,CEA POSI XMIT & SWIT
2WR43-1	C	SEE NOTE	16AWG	Y2R320	5A	F				6.5	DWG E-2625 SHT 336,CEA POSI XMIT & SWIT
2WR43-1	D	1-5	COAX	N/A	N/A		N/A			6.7.2	SPARES
2WR43-1	E	SEE NOTE	16AWG	Y2R321	5A	F				6.5	DWG E-2625 SHT 337,CEA POSI XMIT & SWIT
2WR43-1	E	SEE NOTE	16AWG	Y2R322	5A	F				6.5	DWG E-2625 SHT 337,CEA POSI XMIT & SWIT
2WR43-1	E	SEE NOTE	16AWG	Y2R323	5A	F				6.5	DWG E-2625 SHT 338,CEA POSI XMIT & SWIT
2WR43-1	E	SEE NOTE	16AWG	Y2R325	5A	F				6.5	DWG E-2625 SHT 338,CEA POSI XMIT & SWIT
2WR43-1	E	SEE NOTE	16AWG	Y2R326	5A	F				6.5	DWG E-2625 SHT 339,CEA POSI XMIT & SWIT

APPENDIX I
PENETRATION SUMMARY
CALCULATION 85-E-0118-01

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PENT NUMBER	MOD NO.	COND NUMBER	COND SIZE	SCHEME NUMBER	PRIMARY DEVICE	PRI TYPE	SECOND DEVICE	SEC TYPE	FIG NO.	ACCEPT CRIT.	NOTES:
2WR43-1	E	SEE NOTE	16AWG	Y2R327	5A	F				6.5	DWG E-2625 SHT 339,CEA POSI XMIT & SWIT
2WR43-1	E	SEE NOTE	16AWG	Y2R329	5A	F				6.5	DWG E-2625 SHT 340,CEA POSI XMIT & SWIT
2WR43-1	E	SEE NOTE	16AWG	Y2R330	5A	F				6.5	DWG E-2625 SHT 340,CEA POSI XMIT & SWIT
2WR43-1	F	SEE NOTE	16AWG	Y2R331	5A	F				6.5	DWG E-2625 SHT 341,CEA POSI XMIT & SWIT
2WR43-1	F	SEE NOTE	16AWG	Y2R332	5A	F				6.5	DWG E-2625 SHT 341,CEA POSI XMIT & SWIT
2WR43-1	F	SEE NOTE	16AWG	Y2R333	5A	F				6.5	DWG E-2625 SHT 342,CEA POSI XMIT & SWIT
2WR43-1	F	SEE NOTE	16AWG	Y2R336	5A	F				6.5	DWG E-2625 SHT 342,CEA POSI XMIT & SWIT

APPENDIX I

PENETRATION SUMMARY
CALCULATION 85-E-0118-01

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PENT NUMBER	MOD NO.	COND NUMBER	COND SIZE	SCHEME NUMBER	PRIMARY DEVICE	PRI TYPE	SECOND DEVICE	SEC TYPE	FIG NO.	ACCEPT CRIT.	NOTES:
2WR43-1	F	SEE NOTE	16AWG	Y2R337	5A	F				6.5	DWG E-2625 SHT 343,CEA POSI XMIT & SWIT
2WR43-1	F	SEE NOTE	16AWG	Y2R338	5A	F				6.5	DWG E-2625 SHT 343,CEA POSI XMIT & SWIT
2WR43-1	F	SEE NOTE	16AWG	Y2R339	5A	F				6.5	DWG E-2625 SHT 344,CEA POSI XMIT & SWIT
2WR43-1	F	SEE NOTE	16AWG	Y2R340	5A	F				6.5	DWG E-2625 SHT 344,CEA POSI XMIT & SWIT
2WR43-1	G	1-6	COAX	N/A	N/A		N/A			6.7.2	SPARES
2WR43-2	A	1,2,7,6	16AWG	G2R201	5A	F				6.5	CEA POSI TRANSMITTER
2WR43-2	A	11,19,18	16AWG	G2R208	5A	F				6.5	CONT COND 10, CEA POSI XMIT
2WR43-2	A	13,21,12	16AWG	G2R207	5A	F				6.5	CONT COND 5,CEA POSI XMIT
2WR43-2	A	14,15,23	16AWG	G2R204	5A	F				6.5	CONT COND. 22 CEA POSI XMIT

APPENDIX I
PENETRATION SUMMARY
CALCULATION 85-E-0118-01

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PENT NUMBER	MOD NO.	COND NUMBER	COND SIZE	SCHEME NUMBER	PRIMARY DEVICE	PRI TYPE	SECOND DEVICE	SEC TYPE	FIG NO.	ACCEPT CRIT.	NOTES:
2WR43-2	A	16,17,25	16AWG	G2R205	5A	F				6.5	CONT COND 24,CEA POSI XMIT
2WR43-2	A	26,27,36	16AWG	G2R209	5A	F				6.5	CONT COND 35, CEA POSI XMIT
2WR43-2	A	29,20,30	16AWG	G2R213	5A	F				6.5	CONT COND 39,CEA POSI XMIT
2WR43-2	A	32,42,41	16AWG	G2R212	5A	F				6.5	CONT COND 31,CEA POSI XMIT
2WR43-2	A	37,28,38	16AWG	G2R217	5A	F				6.5	CONT COND 47,CEA POSI XMIT
2WR43-2	A	44,53,43	16AWG	G2R211	5A	F				6.5	CONT COND 34,CEA POSI XMIT
2WR43-2	A	49,58,48	16AWG	G2R219	5A	F				6.5	CONT COND 40, CEA POSI XMIT
2WR43-2	A	55,54,45	16AWG	G2R216	5A	F				6.5	CONT COND 46,CEA POSI XMIT
2WR43-2	A	60,50,51	16AWG	G2R218	5A	F				6.5	CONT COND 52, CEA POSI XMIT
2WR43-2	A	70,69,61	16AWG	G2R220	5A	F				6.5	CONT COND 62,CEA POSI XMIT

APPENDIX I
PENETRATION SUMMARY
CALCULATION 85-E-0118-01

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PENT NUMBER	MOD NO.	COND NUMBER	COND SIZE	SCHEME NUMBER	PRIMARY DEVICE	PRI TYPE	SECOND DEVICE	SEC TYPE	FIG NO.	ACCEPT CRIT.	NOTES:
2WR43-2	A	9,8,3,4	16AWG	G2R203	5A	F				6.5	CEA POSI XMIT
2WR43-2	A	SEE NOTE	16AWG	N/A	N/A		N/A			6.7.2	NOTE DWG E-2625 SHT 347, SPARES
2WR43-2	A	SEE NOTE	16AWG	N/A	N/A		N/A			6.7.2	NOTE DWG E-2625 SHT 348, SPARES
2WR43-2	C	1,2,7,6	16AWG	G2R221	5A	F				6.5	CEA POSI XMIT
2WR43-2	C	11,19,18	16AWG	G2R228	5A	F				6.5	CONT COND 10,CEA POSI XMIT
2WR43-2	C	13,21,12	16AWG	G2R227	5A	F				6.5	CONT COND 5, CEA POSI XMIT
2WR43-2	C	14,15,23	16AWG	G2R224	5A	F				6.5	CONT COND 22, CEA POSI XMIT
2WR43-2	C	16,17,25	16AWG	G2R225	5A	F				6.5	CONT COND 24,CEA POSI XMIT
2WR43-2	C	26,27,36	16AWG	G2R229	5A	F				6.5	CONT COND 35, CEA POSI XMIT
2WR43-2	C	29,20,30	16AWG	G2R234	5A	F				6.5	CONT COND 39,CEA POSI XMIT

APPENDIX I

PENETRATION SUMMARY
CALCULATION 85-E-0118-01

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PENT NUMBER	MOD NO.	COND NUMBER	COND SIZE	SCHEME NUMBER	PRIMARY DEVICE	PRI TYPE	SECOND DEVICE	SEC TYPE	FIG NO.	ACCEPT CRIT.	NOTES:
2WR43-2	C	32,42,41	16AWG	G2R233	5A	F				6.5	CONT COND 31,CEA POSI XMIT
2WR43-2	C	37,28,38	16AWG	G2R236	5A	F				6.5	CONT COND 47, CEA POSI XMIT
2WR43-2	C	44,53,43	16AWG	G2R232	5A	F				6.5	CONT COND 34,CEA POSI XMIT
2WR43-2	C	49,58,48	16AWG	G2R240	5A	F				6.5	CONT COND 40,CEA POSI XMIT
2WR43-2	C	55,54,45	16AWG	G2R235	5A	F				6.5	CONT COND 46,CEA POSI XMIT
2WR43-2	C	60,50,51	16AWG	G2R237	5A	F				6.5	CONT COND 52,CEA POSI XMIT
2WR43-2	C	63,64,72	16AWG	G2R242	5A	F				6.5	CONT COND 71,CEA POSI XMIT
2WR43-2	C	70,69,61	16AWG	G2R241	5A	F				6.5	CONT COND 62,CEA POSI XMIT
2WR43-2	C	9,8,3,4	16AWG	G2R223	5A	F				6.5	CEA POSI XMIT
2WR43-2	C	SEE NOTE	16AWG	N/A	N/A		N/A			6.7.2	NOTE DWG E-2625 SHT 351 , SPARES

APPENDIX I
PENETRATION SUMMARY
CALCULATION 85-E-0118-01

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PENT NUMBER	MOD NO.	COND NUMBER	COND SIZE	SCHEME NUMBER	PRIMARY DEVICE	PRI TYPE	SECOND DEVICE	SEC TYPE	FIG NO.	ACCEPT CRIT.	NOTES:
2WR43-2	C	SEE NOTE	16AWG	N/A	N/A		N/A			6.7.2	NOTE DWG E-2625 SHT 352 , SPARES
2WR43-2	D	1-3	TRIAX	G2R402						6.8	REF MEMO IC-85-093 MODEL NO 6
2WR43-2	E	1,2,7,6	16AWG	G2R243	5A	F				6.5	CEA POSI XMIT
2WR43-2	E	11,19,18	16AWG	G2R249	5A	F				6.5	CONT COND 10,CEA POSI XMIT
2WR43-2	E	13,21,12	16AWG	G2R248	5A	F				6.5	CONT COND 5, CEA POSI XMIT
2WR43-2	E	14,15,23	16AWG	G2R245	5A	F				6.5	CONT COND 22, CEA POSI XMIT
2WR43-2	E	16,17,25	16AWG	G2R247	5A	F				6.5	CONT COND 24,CEA POSI XMIT
2WR43-2	E	26,27,36	16AWG	G2R252	5A	F				6.5	CONT COND 35,CEA POSI XMIT
2WR43-2	E	29,20,30	16AWG	G2R255	5A	F				6.5	CONT COND 39,CEA POSI XMIT
2WR43-2	E	32,42,41	16AWG	G2R254	5A	F				6.5	CONT COND 31, CEA POSI XMIT

APPENDIX I
PENETRATION SUMMARY
CALCULATION 85-E-0118-01

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PENT NUMBER	MOD NO.	COND NUMBER	COND SIZE	SCHEME NUMBER	PRIMARY DEVICE	PRI TYPE	SECOND DEVICE	SEC TYPE	FIG NO.	ACCEPT CRIT.	NOTES:
2WR43-2	E	37,28,38	16AWG	G2R257	5A	F				6.5	CONT COND 47, CEA POSI XMIT
2WR43-2	E	44,53,43	16AWG	G2R253	5A	F				6.5	CONT COND 34,CEA POSI XMIT
2WR43-2	E	49,58,48	16AWG	G2R260	5A	F				6.5	CONT COND 40,CEA POSI XMIT
2WR43-2	E	55,54,45	16AWG	G2R256	5A	F				6.5	CONT COND 46,CEA POSI XMIT
2WR43-2	E	60,50,51	16AWG	G2R259	5A	F				6.5	CONT COND 52,CEA POSI XMIT
2WR43-2	E	70,69,61	16AWG	G2R261	5A	F				6.5	CONT COND 62, CEA POSI XMIT
2WR43-2	E	9,8,3,4	16AWG	G2R244	5A	F				6.5	CEA POSI XMIT
2WR43-2	E	SEE NOTE	16AWG	N/A	N/A		N/A			6.7.2	NOTE DWG E-2625 SHT 355, SPARES
2WR43-2	E	SEE NOTE	16AWG	N/A	N/A		N/A			6.7.2	NOTE DWG E-2625 SHT 356, SPARES
2WR43-2	F	1,2,7,6	16AWG	G2R264	5A	F				6.5	CEA POSI XMIT

APPENDIX I

PENETRATION SUMMARY
CALCULATION 85-E-0118-01

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PENT NUMBER	MOD NO.	COND NUMBER	COND SIZE	SCHEME NUMBER	PRIMARY DEVICE	PRI TYPE	SECOND DEVICE	SEC TYPE	FIG NO.	ACCEPT CRIT.	NOTES:
2WR43-2	F	11,19,18	16AWG	G2R269	5A	F				6.5	CONT COND 10, CEA POSI XMIT
2WR43-2	F	13,21,12	16AWG	G2R268	5A	F				6.5	CONT COND 5, CEA POSI XMIT
2WR43-2	F	14,15,23	16AWG	G2R266	5A	F				6.5	CONT COND 22, CEA POSI XMIT
2WR43-2	F	16,17,25	16AWG	G2R267	5A	F				6.5	CONT COND 24,CEA POSI XMIT
2WR43-2	F	26,27,36	16AWG	G2R273	5A	F				6.5	CONT COND 35,CEA POSI XMIT
2WR43-2	F	29,20,30	16AWG	G2R276	5A	F				6.5	COND 39,CEA POSI XMIT
2WR43-2	F	32,42,41	16AWG	G2R275	5A	F				6.5	CONT COND 31,CEA POSI XMIT
2WR43-2	F	37,28,38	16AWG	G2R278	5A	F				6.5	CONT COND 47,CEA POSI XMIT
2WR43-2	F	44,43,53	16AWG	G2R274	5A	F				6.5	CONT COND 34,CEA POSI XMIT
2WR43-2	F	49,58,48	16AWG	G2R280	5A	F				6.5	CONT COND 40,CEA POSI XMIT

APPENDIX I

PENETRATION SUMMARY
CALCULATION 85-E-0118-01

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PENT NUMBER	MOD NO.	COND NUMBER	COND SIZE	SCHEME NUMBER	PRIMARY DEVICE	PRI TYPE	SECOND DEVICE	SEC TYPE	FIG NO.	ACCEPT CRIT.	NOTES:
2WR43-2	F	55,54,45	16AWG	G2R277	5A	F				6.5	CONT COND 46, CEA POSI XMIT
2WR43-2	F	60,50,51	16AWG	G2R279	5A	F				6.5	CONT COND 52,CEA POSI XMIT
2WR43-2	F	70,69,61	16AWG	G2R281	5A	F				6.5	CONT COND 62, CEA POSI XMIT
2WR43-2	F	9,8,3,4	16AWG	G2R265	5A	F				6.5	CEA POSI XMIT
2WR43-2	F	SEE NOTE	16AWG	N/A	N/A		N/A			6.7.2	NOTE DWG E-2625 SHT 359, SPARES
2WR43-2	F	SEE NOTE	16AWG	N/A	N/A		N/A			6.7.2	NOTE DWG E-2625 SHT 360, SPARES
2WR43-2	G	1-3	TRIAX	G2R402	N/A		N/A			6.2	REF MEMO IC-85-093,MODEL NO. 6
2WR43-3	A	1-85	16AWG	N/A	N/A		N/A			6.7.2	SPARES
2WR43-3	C	1,2,7,6	16AWG	R2R202	5A	F				6.5	CEA POSI XMIT & SWITCHES
2WR43-3	C	11,19,18	16AWG	R2R222	5A	F				6.5	CONT COND 10,CEA POSI XMIT

APPENDIX I

PENETRATION SUMMARY
CALCULATION 85-E-0118-01

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PENT NUMBER	MOD NO.	COND NUMBER	COND SIZE	SCHEME NUMBER	PRIMARY DEVICE	PRI TYPE	SECOND DEVICE	SEC TYPE	FIG NO.	ACCEPT CRIT.	NOTES:
2WR43-3	C	13,21,12	16AWG	R2R215	5A	F				6.5	CONT COND 5,CEA POSI XMIT
2WR43-3	C	14,15,23	16AWG	R2R210	5A	F				6.5	CONT COND 22,CEA POSI XMIT
2WR43-3	C	16,17,25	16AWG	R2R214	5A	F				6.5	CONT COND 24, CEA POSI XMIT
2WR43-3	C	26,27,36	16AWG	R2R226	5A	F				6.5	CONT COND 35,CEA POSI XMIT
2WR43-3	C	29,20,30	16AWG	R2R238	5A	F				6.5	CONT COND 39,CEA POSI XMIT
2WR43-3	C	32,42,41	16AWG	R2R231	5A	F				6.5	CONT COND 31,CEA POSI XMIT
2WR43-3	C	44,53,43	16AWG	R2R230	5A	F				6.5	CONT COND 34,CEA POSI XMIT
2WR43-3	C	9,8,3,4	16AWG	R2R206	5A	F				6.5	CEA POSI XMIT
2WR43-3	C	SEE NOTE	16AWG	N/A	N/A		N/A			6.7.2	NOTE DWG E-2625,SHT 366,367,368,SPARES
2WR43-3	D	1-3	TRIAX	R2R401						6.8	REF MEMO IC-85-093 MODEL NO 6

APPENDIX I
PENETRATION SUMMARY
CALCULATION 85-E-0118-01

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PENT NUMBER	MOD NO.	COND NUMBER	COND SIZE	SCHEME NUMBER	PRIMARY DEVICE	PRI TYPE	SECOND DEVICE	SEC TYPE	FIG NO.	ACCEPT CRIT.	NOTES:
2WR43-3	E	1-2	COAX	R2M037						6.8	
2WR43-3	E	3-5	COAX	N/A	N/A		N/A		2	6.7.2	SPARES
2WR43-3	F	1,2,7,6	16AWG	R2R239	5A	F				6.5	CEA POSI XMIT
2WR43-3	F	11,19,18	16AWG	R2R262	5A	F				6.5	CONT COND 10,CEA POSI XMIT
2WR43-3	F	13,21,12	16AWG	R2R258	5A	F				6.5	CONT COND 5,CEA POSI XMIT
2WR43-3	F	14,15,23	16AWG	R2R250	5A	F				6.5	CONT COND 22,CEA POSI XMIT
2WR43-3	F	16,17,25	16AWG	R2R251	5A	F				6.5	CONT COND 24,CEA POSI XMIT
2WR43-3	F	26,27,36	16AWG	R2R263	5A	F				6.5	CONT COND 35, CEA POSI XMIT
2WR43-3	F	29,20,30	16AWG	R2R272	5A	F				6.5	CONT COND 39,CEA POSI XMIT
2WR43-3	F	32,42,41	16AWG	R2R271	5A	F				6.5	CONT COND 31, CEA POSI XMIT
2WR43-3	F	44,53,43	16AWG	R2R270	5A	F				6.5	CONT COND 34,CEA POSI XMIT

APPENDIX I
PENETRATION SUMMARY
CALCULATION 85-E-0118-01

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PENT NUMBER	MOD NO.	COND NUMBER	COND SIZE	SCHEME NUMBER	PRIMARY DEVICE	PRI TYPE	SECOND DEVICE	SEC TYPE	FIG NO.	ACCEPT CRIT.	NOTES:
2WR43-3	F	9,8,3,4	16AWG	R2R246	5A	F				6.5	CEA POSI XMIT
2WR43-3	F	SEE NOTE	16AWG	N/A	N/A		N/A			6.7.2	NOTE DWT E-2625 SHT 370,371,372,SPARES
2WR43-3	G	1-9	14AWG	R2R030						6.9	
2WR43-3	G	10-33	14AWG	N/A	N/A		N/A			6.7.2	SPARES
2WR43-3	G	34-69,85	14AWG	R2R030						6.9	
2WR43-3	G	70-84	14AWG	N/A	N/A		N/A			6.7.2	SPARES
2WR43-4	A	SEE NOTE	16AWG	B2R304	5A	F				6.5	DWG E-2625 SHT 373,CEA POSI XMIT
2WR43-4	A	SEE NOTE	16AWG	B2R308	5A	F				6.5	DWG E-2625 SHT 373,CEA POSI XMIT
2WR43-4	A	SEE NOTE	16AWG	B2R312	5A	F				6.5	DWG E-2625 SHT 374,CEA POSI XMIT
2WR43-4	A	SEE NOTE	16AWG	B2R318	5A	F				6.5	DWG E-2625 SHT 374,CEA POSI XMIT
2WR43-4	A	SEE NOTE	16AWG	B2R319	5A	F				6.5	DWG E-2625 SHT 375,CEA POSI XMIT

APPENDIX I
PENETRATION SUMMARY
CALCULATION 85-E-0118-01

F=Fuse
M=Mag Only
TM=Therm Mag

PENT NUMBER	MOD NO.	COND NUMBER	COND SIZE	SCHEME NUMBER	PRIMARY DEVICE	PRI TYPE	SECOND DEVICE	SEC TYPE	FIG NO.	ACCEPT CRIT.	NOTES:
2WR43-4	A	SEE NOTE	16AWG	B2R324	5A	F				6.5	DWG E-2625 SHT 375,CEA POSI XMIT
2WR43-4	A	SEE NOTE	16AWG	B2R328	5A	F				6.5	DWG E-2625 SHT 376,CEA POSI XMIT
2WR43-4	A	SEE NOTE	16AWG	N/A	N/A		N/A			6.7.2	NOTE DWG E-2625 SHT 376, SPARES
2WR43-4	D	SEE NOTE	16AWG	B2R334	5A	F				6.5	DWG E-2625 SHT 377,CEA POSI XMIT
2WR43-4	D	SEE NOTE	16AWG	B2R335	5A	F				6.5	DWG E-2625 SHT 377, CEA POSI XMIT
2WR43-4	D	SEE NOTE	16AWG	B2R342	5A	F				6.5	DWG E-2625 SHT 378, CEA POSI XMIT
2WR43-4	D	SEE NOTE	16AWG	B2R343	5A	F				6.5	DWG E-2625 SHT 378, CEA POSI XMIT
2WR43-4	D	SEE NOTE	16AWG	B2R348	5A	F				6.5	DWG E-2625 SHT 379,CEA POSI XMIT
2WR43-4	D	SEE NOTE	16AWG	B2R354	5A	F				6.5	DWG E-2625 SHT 379,CEA POSI XMIT
2WR43-4	D	SEE NOTE	16AWG	B2R355	5A	F				6.5	DWG E-2625 SHT 380,CEA POSI XMIT

APPENDIX I
PENETRATION SUMMARY
CALCULATION 85-E-0118-01

F=Fuse
M=Mag Only
TM=Therm Mag

PENT NUMBER	MOD NO.	COND NUMBER	COND SIZE	SCHEME NUMBER	PRIMARY DEVICE	PRI TYPE	SECOND DEVICE	SEC TYPE	FIG NO.	ACCEPT CRIT.	NOTES:
2WR43-4	D	SEE NOTE	16AWG	N/A	N/A		N/A			6.7.2	NOTE DWG E-2625 SHT 380, SPARES
2WR43-4	F	SEE NOTE	16AWG	B2R360	5A	F				6.5	DWG E-2625 SHT 381,CEA POSI XMIT
2WR43-4	F	SEE NOTE	16AWG	B2R366	5A	F				6.5	DWG E-2625 SHT 381,CEA POSI XMIT
2WR43-4	F	SEE NOTE	16AWG	B2R367	5A	F				6.5	DWG E-2625 SHT 382,CEA POSI XMIT
2WR43-4	F	SEE NOTE	16AWG	B2R376	5A	F				6.5	DWG E-2625 SHT 382,CEA POSI XMIT
2WR43-4	F	SEE NOTE	16AWG	B2R377	5A	F				6.5	DWG E-2625 SHT 383, CEA POSI XMIT
2WR43-4	F	SEE NOTE	16AWG	B2R378	5A	F				6.5	DWG E-2625 SHT 383, CEA POSI XMIT
2WR43-4	F	SEE NOTE	16AWG	N/A	N/A		N/A			6.7.2	NOTE DWG E-2625 SHT 384, SPARES
2WR43-4	G	1-5	COAX	N/A	N/A		N/A			6.7.2	SPARES
2WR43-5	A	SEE NOTE	16AWG	Y2R341	5A	F				6.5	DWG E-2625 SHT 385,CEA POSI XMIT

APPENDIX I

PENETRATION SUMMARY
CALCULATION 85-E-0118-01

F=Fuse
M=Mag Only
TM=Therm Mag

PENT NUMBER	MOD NO.	COND NUMBER	COND SIZE	SCHEME NUMBER	PRIMARY DEVICE	PRI TYPE	SECOND DEVICE	SEC TYPE	FIG NO.	ACCEPT CRIT.	NOTES:
2WR43-5	A	SEE NOTE	16AWG	Y2R344	5A	F				6.5	DWG E-2625 SHT 385, CEA POSI XMIT
2WR43-5	A	SEE NOTE	16AWG	Y2R345	5A	F				6.5	DWG E-2625 SHT 386,CEA POSI XMIT
2WR43-5	A	SEE NOTE	16AWG	Y2R346	5A	F				6.5	DWG E-2625 SHT 386,CEA POSI XMIT
2WR43-5	A	SEE NOTE	16AWG	Y2R347	5A	F				6.5	DWG E-2625 SHT 387,CEA POSI XMIT
2WR43-5	A	SEE NOTE	16AWG	Y2R349	5A	F				6.5	DWG E-2625 SHT 387,CEA POSI XMIT
2WR43-5	A	SEE NOTE	16AWG	N/A	N/A		N/A			6.7.2	NOTE DWG E-2625 SHT 388, SPARES
2WR43-5	C	SEE NOTE	16AWG	Y2R350	5A	F				6.5	DWG E-2625 SHT 389,CEA POSI XMIT
2WR43-5	C	SEE NOTE	16AWG	Y2R351	5A	F				6.5	DWG E-2625 SHT 389,CEA POSI XMIT
2WR43-5	C	SEE NOTE	16AWG	Y2R352	5A	F				6.5	DWG E-2625 SHT 390,CEA POSI XMIT
2WR43-5	C	SEE NOTE	16AWG	Y2R353	5A	F				6.5	DWG E-2625 SHT 390, CEA POSI XMIT

APPENDIX I
PENETRATION SUMMARY
CALCULATION 85-E-0118-01

F=Fuse
M=Mag Only
TM=Therm Mag

PENT NUMBER	MOD NO.	COND NUMBER	COND SIZE	SCHEME NUMBER	PRIMARY DEVICE	PRI TYPE	SECOND DEVICE	SEC TYPE	FIG NO.	ACCEPT CRIT.	NOTES:
2WR43-5	C	SEE NOTE	16AWG	Y2R356	5A	F				6.5	DWG E-2625 SHT 391,CEA POSI XMIT
2WR43-5	C	SEE NOTE	16AWG	Y2R357	5A	F				6.5	DWG E-2625 SHT 391,CEA POSI XMIT
2WR43-5	C	SEE NOTE	16AWG	Y2R358	5A	F				6.5	DWG E-2625 SHT 392,CEA POSI XMIT
2WR43-5	C	SEE NOTE	16AWG	Y2R359	5A	F				6.5	DWG E-2625 SHT 392,CEA POSI XMIT
2WR43-5	E	SEE NOTE	16AWG	Y2R361	5A	F				6.5	DWG E-2625 SHT 393,CEA POSI XMIT
2WR43-5	E	SEE NOTE	16AWG	Y2R362	5A	F				6.5	DWG E-2625 SHT 393,CEA POSI XMIT
2WR43-5	E	SEE NOTE	16AWG	Y2R363	5A	F				6.5	DWG E-2625 SHT 394,CEA POSI XMIT
2WR43-5	E	SEE NOTE	16AWG	Y2R364	5A	F				6.5	DWG E-2625 SHT 394,CEA POSI XMIT
2WR43-5	E	SEE NOTE	16AWG	Y2R365	5A	F				6.5	DWG E-2625 SHT 395,CEA POSI XMIT
2WR43-5	E	SEE NOTE	16AWG	Y2R368	5A	F				6.5	DWG E-2625 SHT 395,CEA POSI XMIT

APPENDIX I

PENETRATION SUMMARY
CALCULATION 85-E-0118-01

F=Fuse
M=Mag Only
TM=Therm Mag

PENT NUMBER	MOD NO.	COND NUMBER	COND SIZE	SCHEME NUMBER	PRIMARY DEVICE	PRI TYPE	SECOND DEVICE	SEC TYPE	FIG NO.	ACCEPT CRIT.	NOTES:
2WR43-5	E	SEE NOTE	16AWG	Y2R369	5A	F				6.5	DWG E-2625 SHT 396,CEA POSI XMIT
2WR43-5	E	SEE NOTE	16AWG	Y2R370	5A	F				6.5	DWG E-2625 SHT 396,CEA POSI XMIT
2WR43-5	F	SEE NOTE	16AWG	Y2R371	5A	F				6.5	DWG E-2625 SHT 397, CEA POSI XMIT
2WR43-5	F	SEE NOTE	16AWG	Y2R372	5A	F				6.5	DWG E-2625 SHT 397, CEA POSI XMIT
2WR43-5	F	SEE NOTE	16AWG	Y2R373	5A	F				6.5	DWG E-2625 SHT 398, CEA POSI XMIT
2WR43-5	F	SEE NOTE	16AWG	Y2R374	5A	F				6.5	DWG E-2625 SHT 398,CEA POSI XMIT
2WR43-5	F	SEE NOTE	16AWG	Y2R375	5A	F				6.5	DWG E-2625 SHT 399, CEA POSI XMIT
2WR43-5	F	SEE NOTE	16AWG	Y2R379	5A	F				6.5	DWG E-2625 SHT 399,CEA POSI XMIT
2WR43-5	F	SEE NOTE	16AWG	Y2R380	5A	F				6.5	DWG E-2625 SHT 400,CEA POSI XMIT
2WR43-5	F	SEE NOTE	16AWG	Y2R381	5A	F				6.5	DWG E-2625 SHT 400, CEA POSI XMIT

APPENDIX II

Appendix II includes figures that illustrate the protection provided pentration conductors assuming a fault inside containment. Curves, plotted and referenced by figure numbers (figure. no. 1 thru 42) show the relationship between the protective device type/setting and the conductor damage threshold. The maximum fault current is the value from the load centers, MCCs, or power panels. In cases where the breaker curve crosses the conductor 250°C damage line the fault current at the penetration is calculated (section 6.10) to show acceptability. The conductor emergency overload capability has been plotted on each curve to show the level of protection afforded the penetration conductor from 10s to 1000s. The figure should be viewed as follows:

DEVICE LABELS ON FIGURE

C Damage = 250°C conductor damage curve--
conductor size is given under "bus rec" where the device type and temperature rating is given (the penetration conductor size is considered the bus and will be reflected under each device label); "qty/ph" is stating the number of conductors per phase

C Overload = cable 130°C emergency overload operating range--
conductor size is given under "bus rec" while the "device type" is listed as a fuse (for purpose of plotting using Captor), "cartridge" and "size" give the conductor normal ampacity rating with no derating

XXX fuse = primary or secondary protective device (see one line diagram on Appendix II figures)
this section gives the "device type" with a short description of the protective device, "cartridge" gives a range of fuse curves while "size" gives the fuses specific amp rating

Pri/Sec breaker = primary or secondary protective device (see one line diagram)
the "device type" gives a short description of the protective device, the "frame size" is given, as well as the breaker "trip" rating

NOTE: Adjustable magnetic breakers (BKR 1) were entered into Captor under the fuse program; therefore, the breaker trip setting and corresponding amps are listed in the

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Rev. 2 Ck'd: [illegible] DATE: 8/13/93

description section of "device type" while the "cartridge" and "size" list the breaker rating.

MAX ISC = represents the maximum fault current at the bus (this is a conservative approach to show conductor acceptability) The current value was installed in the Captor fuse program to plot.The short description includes the bus (MCC, LC, etc.) from which the maximum fault current exists and the amount of short circuit current. The "cartridge" and "size" has no meaning but were only entered for the purpose of getting an output from Captor.

ISC = this represents the maximum fault current at the penetration The data given is interpreted in the same manner as "MAX ISC". The method for determing the fault current at the penetration is presented in section 6.10.1 of the calculation.

PROTECTIVE DEVICE TRIP CURVE REFERENCE

Figure 1

Primary device - Bussmann catalog; Buss Electronic Fuses, SFB, copyrighted May 1991-- U.L File E19180;CSA file 53787

Secondary device - same as primary

Figure 2

Primary device - 1991 Gould Shawmut Advisor, page 56(Note: 15 amp curve has been extrapolated from 30 amp curve)

Secondary device - same as primary

Figure 3

Primary device - Bussmann catalog; Buss Electronic Fuses, SFB, copyrighted May 1991-- U.L File E19180;CSA file 47233 (Note: 6 amp curve has been extrapolated from 5 amp curve)

Secondary device - ITE Gould curve #TD-4947 Rev. 1

Rev. 2 BY: [illegible] DATE: 8-13-93
Rev. 2 Ck'd: [illegible] DATE: 8/13/93

Figure 4

Primary device - Bussmann catalog; Buss Fuses and Accessories, Full-Line Catalog FLC, copyrighted June 1990, Form 250 (Note: conservatively used 6.25 amp fuse curve data for 6 amp curve)

Secondary device - same as primary

Figure 5

Primary device - Bussmann catalog; Buss Electronic Fuses, SFB, copyrighted May 1991-- U.L File E19180;CSA file 47233

Secondary device - ITE Gould curve # TD-4947 Rev. 1

Figure 6

Primary device - Bussmann catalog; Buss Electronic Fuses, SFB, copyrighted May 1991-- U.L File E19180;CSA file 53787

Secondary device - same as primary

Figure 7

Primary device - Bussmann catalog; Buss Electronic Fuses, SFB, copyrighted May 1991-- U.L File E19180;CSA file 47233 (Note: 6 amp curve has been extrapolated from 5 amp curve)

Secondary device - same as primary

Figure 8

Primary device - Bussmann catalog; Buss Electronic Fuses, SFB, copyrighted May 1991-- U.L File E19180;CSA file 47233

Secondary device - same as primary

Figure 9

Primary device - Bussmann catalog; Buss Fuses and Accessories, Full-Line Catalog FLC, copyrighted June 1990, Form 309

Secondary device - GE curve # GES-6107C

Figure 10

Primary device - Bussmann catalog; Buss Electronic Fuses, SFB, copyrighted May 1991-- U.L File E19180;CSA file 47233 (Note: 6 amp curve has been extrapolated from 5 amp curve)

Secondary device - same as primary

Rev. 2 BY: [illegible] DATE: 8-6-93
Rev. 2 Ck'd: [illegible] DATE: 8/12/93 8/13/93

Figure 11

Primary device - Bussmann catalog; Buss Electronic Fuses, SFB, copyrighted May 1991-- U.L File E19180;CSA file 47233

Secondary device - ITE Gould curve #TD-4947 Rev. 1

Figure 12

Primary device - 1991 Gould Shawmut Advisor, Page 69

Secondary device - same as primary

Figure 13

Primary device - ITE Magnetic only breaker that will trip instantaneous when current reaches its setpoint.

Secondary device - ITE Gould Curve #TD-4999 Sh. 1, Rev. 4

Figure 14

Primary device - same as figure 13

Secondary device - ITE Gould Curve #TD-4999 Sh. 1, Rev. 4

Figure 15

Primary device - same as figure 13

Secondary device - ITE Gould Curve #TD-4999 Sh. 1, Rev. 4

Figure 16

Primary device - same as figure 13

Secondary device - ITE Gould Curve #TD-4999 Sh. 1, Rev. 4

Figure 17

Primary device - Bussmann catalog; Buss Electronic Fuses, SFB, copyrighted May 1991-- U.L File E19180;CSA file 47233 (Note: 6 amp curve has been extrapolated from 5 amp curve)

Secondary device same as primary

Figure 18

Primary device - same as figure 13

Secondary device - ITE Gould curve #TD-4947 Rev. 1

Rev. 2 BY: [illegible] DATE: 8-12-93
Rev. 2 Ck'd: [illegible] DATE: 8/13/93

Figure 19
Primary device - same as figure 13

Secondary device - ITE Gould curve #TD-4947 Rev. 1

Figure 20
Primary device - same as figure 13

Secondary device - ITE Gould Curve #TD-4999 Sh. 1, Rev. 4

Figure 21
Primary device - same as figure 13

Secondary device - ITE Gould Curve #TD-4999 Sh. 2, Rev. 4

Figure 22
Intentionally left blank

Figure 23
Primary device - Bussmann catalog; Buss Fuses and Accessories, Full-Line Catalog FLC, copyrighted June 1990, Form 249

Secondary device - GE curve #GES-6107C

Figure 24
Primary device - same as figure 13

Secondary device - ITE Gould Curve #TD-4999 Sh. 1, Rev. 4

Figure 25
Primary device - same as figure 13

Secondary device - ITE Gould Curve #TD-4999 Sh. 2, Rev. 4

Figure 26
Primary device - same as figure 13

Secondary device - ITE Gould Curve #TD-4999 Sh. 1, Rev. 4

Figure 27
Primary device - same as figure 13

Secondary device - ITE Gould Curve #TD-4999 Sh. 2, Rev. 4

Rev. 2 BY: [illegible] DATE: 8-6-93
Rev. 2/2 Ck'd: [illegible] DATE: 8/12/93 8/13/93

Figure 28
Primary device - ITE curve #TD-6693

Secondary device - GE curve #GES-7001 B

Figure 29
Primary device - same as figure 13

Secondary device - ITE Gould Curve #TD-4999 Sh. 1, Rev. 4

Figure 30
Primary device - Westinghouse curve #SC-3509-77

Secondary device - same as figure 13
Note: Secondary protective device appears to be marginal sized to protect the conductor. However, the maximum short circuit current is based on a fault at the MCC. The short circuit current at the penetration will be considerable less after field cable lengths are considered. The breaker is acceptable as is.

Figure 31
Primary device - same as figure 13

Secondary device - ITE Gould Curve #TD-4999 Sh. 2, Rev. 4

Figure 32
Primary device - same as figure 13

Secondary device - ITE Gould Curve #TD-4999 Sh. 2, Rev. 4

Figure 33
Primary device - same as figure 13

Secondary device - ITE Gould Curve #TD-4999 Sh. 2, Rev. 4

Figure 34
Primary device - ITE curve #TD-6693

Secondary device - GE curve #GES-7001 B

Figure 35
Primary device - same as figure 13

Secondary device - ITE Gould Curve #TD-4999 Sh. 1, Rev. 4

Rev. 2 BY: EM DATE: 8-13-93
Rev. 2 Ck'd: DS DATE: 8/13/93

Figure 36
Primary device - ITE Gould curve #TD-4999 Sh. 2, Rev. 4

Secondary device - same as primary device

Figure 37
Primary device - Westinghouse curve #SC-3514-77

Secondary device - same as primary device

Figure 38
Primary device - ITE curve #TD-6694

Secondary device - same as primary

Figure 39
Primary device - ITE curve #TD-4948 Sh. 2, Rev. 1

Secondary device - same as primary

Figure 40
Primary device - ITE curve #TD-6693

Secondary device - GE curve #GES-7001 B

Figure 41
Primary device - same as figure 13

Secondary device - ITE Gould Curve #TD-4999 Sh. 2, Rev. 4

Figure 42
Primary device - GE curve #GES-7004 B

Secondary device - GE curve #GES-7002 B

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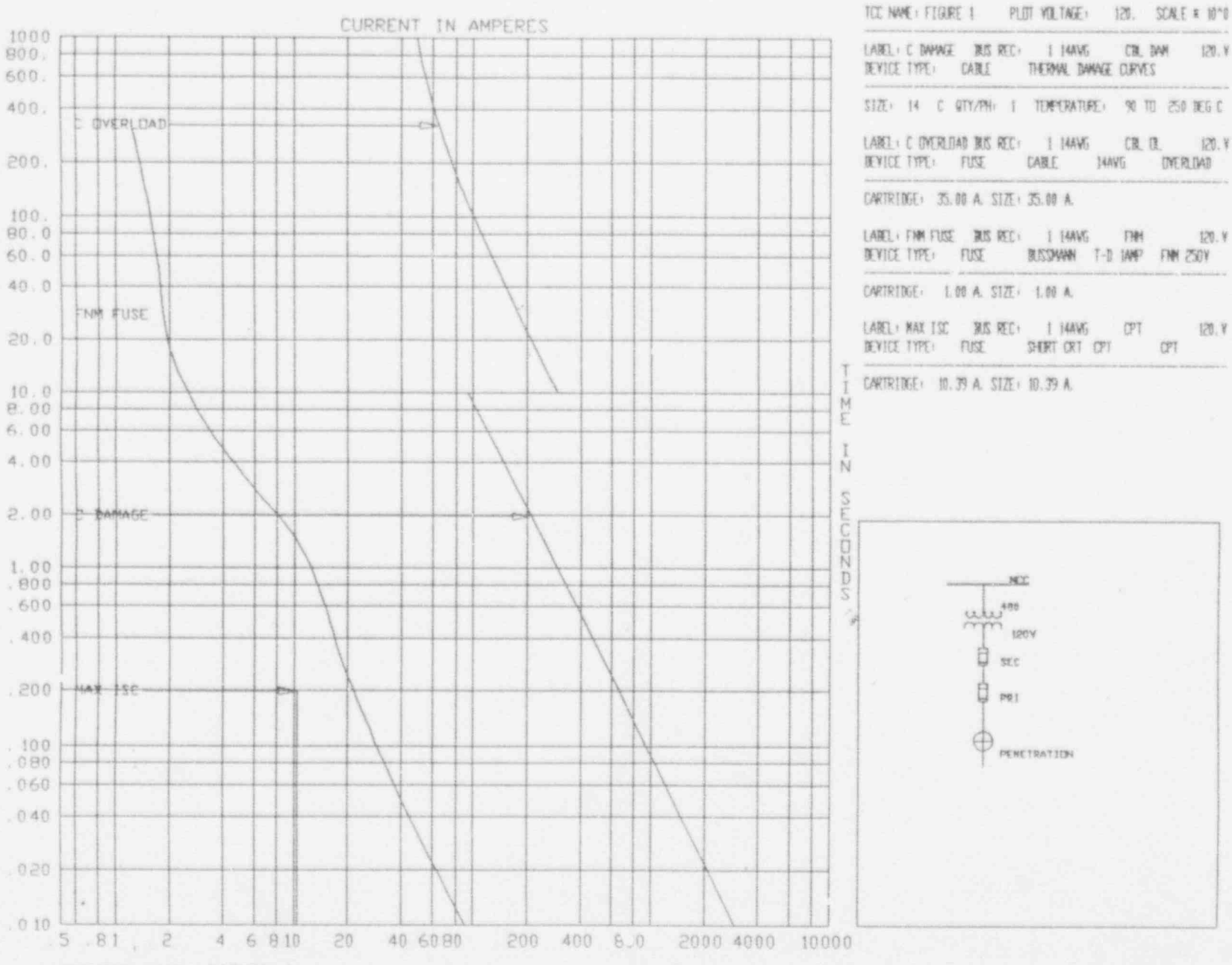
Rev. 2 Ck'd: DS DATE: 8/13/93



TCC NAME: FIGURE 1 PLOT VOLTAGE: 120. SCALE X 10^0

LABEL: C DAMAGE BUS REC: 1 14AWG CBL DAM 120.V
DEVICE TYPE: CABLE THERMAL DAMAGE CURVES

SIZE: 14 C QTY/PH: 1 TEMPERATURE: 90 TO 250 DEG C

LABEL: C OVERLOAD BUS REC: 1 14AWG CBL OL 120.V
DEVICE TYPE: FUSE CABLE 14AWG OVERLOAD

CARTRIDGE: 35.00 A. SIZE: 35.00 A.

LABEL: FNM FUSE BUS REC: 1 14AWG FNM 120.V
DEVICE TYPE: FUSE BUSSMANN T-D 1AMP FNM 250V

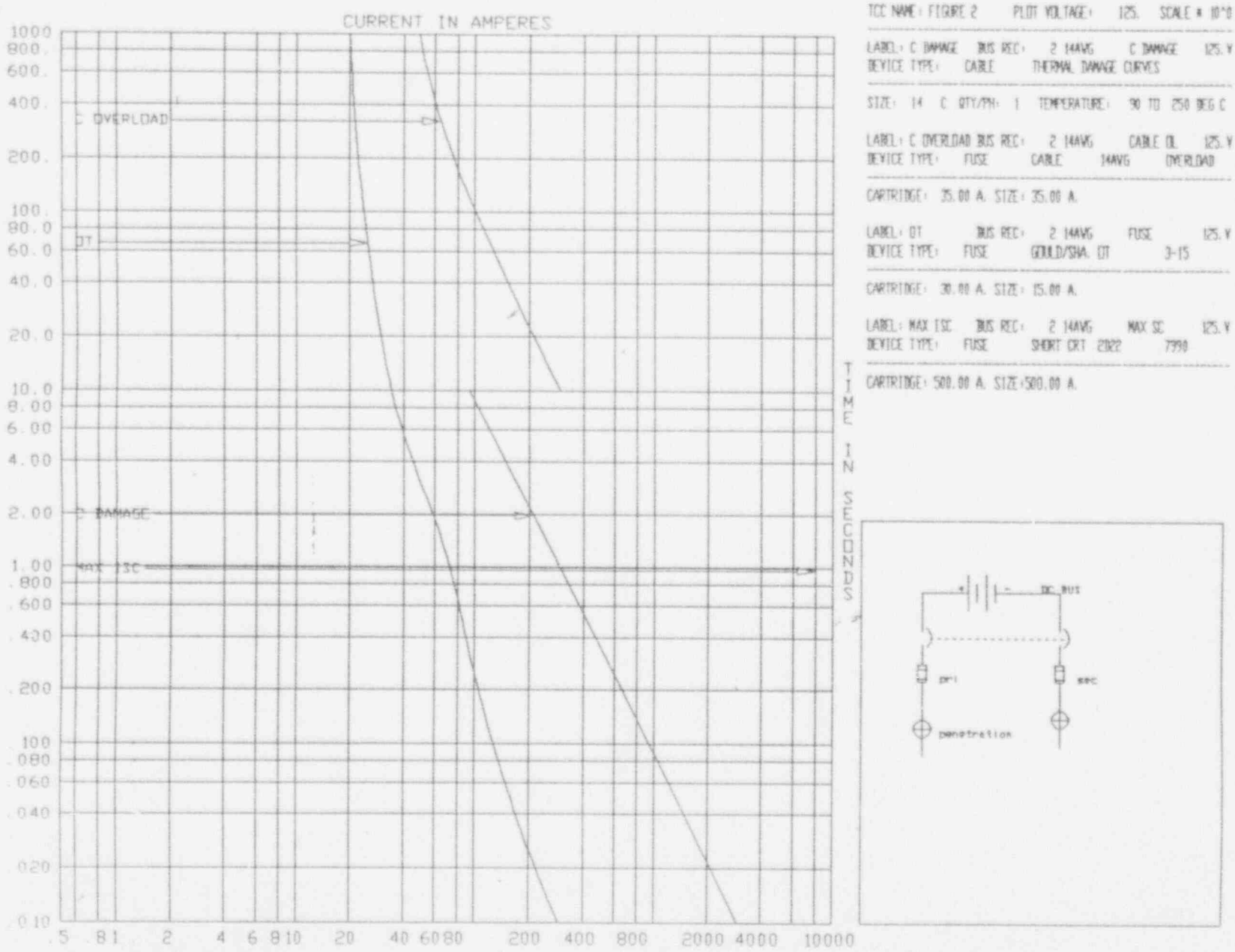
CARTRIDGE: 1.00 A. SIZE: 1.00 A.

LABEL: MAX ISC BUS REC: 1 14AWG CPT 120.V
DEVICE TYPE: FUSE SHORT CRT CPT CPT

CARTRIDGE: 10.39 A. SIZE: 10.39 A.

DRAWING NAME: FIGURE 1
CURRENT SCALE X 10^0 REFERENCE VOLTAGE 120

APPENDIX II
CALC. 85-E-0118-01



TCC NAME: FIGURE 2 PLOT VOLTAGE: 125. SCALE = 10^0

LABEL: C DAMAGE BUS REC: 2 14AWG C DAMAGE 125.V
DEVICE TYPE: CABLE THERMAL DAMAGE CURVES

SIZE: 14 C QTY/PH: 1 TEMPERATURE: 90 TO 250 DEG C

LABEL: C OVERLOAD BUS REC: 2 14AWG CABLE OL 125.V
DEVICE TYPE: FUSE CABLE 14AWG OVERLOAD

CARTRIDGE: 35.00 A. SIZE: 35.00 A.

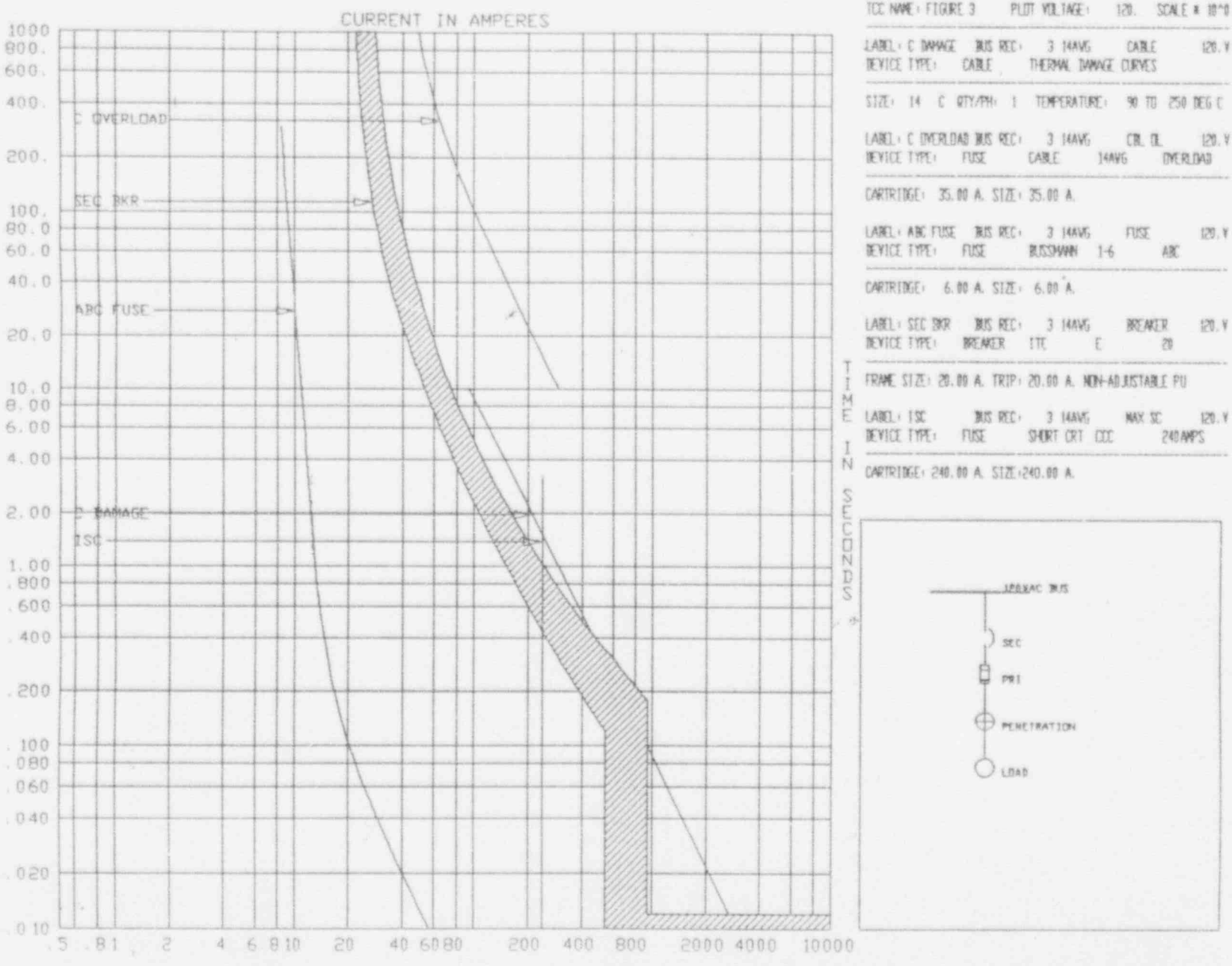
LABEL: OT BUS REC: 2 14AWG FUSE 125.V
DEVICE TYPE: FUSE GOULD/SHA. OT 3-15

CARTRIDGE: 30.00 A. SIZE: 15.00 A.

LABEL: MAX ISC BUS REC: 2 14AWG MAX SC 125.V
DEVICE TYPE: FUSE SHORT CKT 2022 7990

CARTRIDGE: 500.00 A. SIZE: 500.00 A.

APPENDIX II
CALC. 85-E-0118-01



TCC NAME: FIGURE 3 PLOT VOLTAGE: 120. SCALE X 10^0

LABEL: C DAMAGE BUS REC: 3 14AVG CABLE 120.V
DEVICE TYPE: CABLE THERMAL DAMAGE CURVES

SIZE: 14 C QTY/PH: 1 TEMPERATURE: 90 TO 250 DEG C

LABEL: C OVERLOAD BUS REC: 3 14AVG CBL OL 120.V
DEVICE TYPE: FUSE CABLE 14AVG OVERLOAD

CARTRIDGE: 35.00 A. SIZE: 35.00 A.

LABEL: ABC FUSE BUS REC: 3 14AVG FUSE 120.V
DEVICE TYPE: FUSE BUSSMANN 1-6 ABC

CARTRIDGE: 6.00 A. SIZE: 6.00 A.

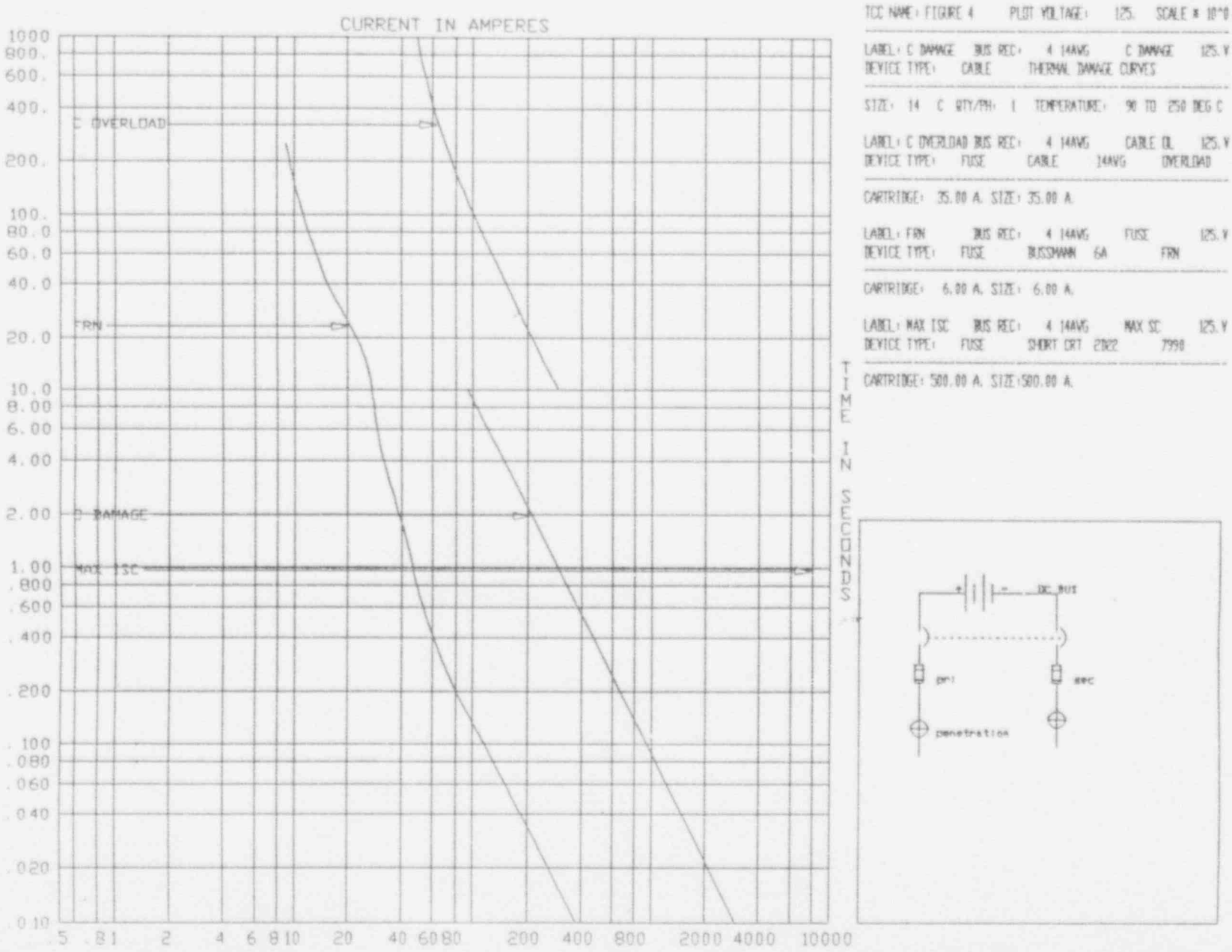
LABEL: SEC BKR BUS REC: 3 14AVG BREAKER 120.V
DEVICE TYPE: BREAKER ITE E 20

FRAME SIZE: 20.00 A. TRIP: 20.00 A. NON-ADJUSTABLE PU

LABEL: ISC BUS REC: 3 14AVG MAX SC 120.V
DEVICE TYPE: FUSE SHORT CRT CCC 240AMPS

CARTRIDGE: 240.00 A. SIZE: 240.00 A.

APPENDIX II
CALC. 85-E-0118-01



TCC NAME: FIGURE 4 PLOT VOLTAGE: 125. SCALE X 10^0

LABEL: C DAMAGE BUS REC: 4 14AWG C DAMAGE 125.V
DEVICE TYPE: CABLE THERMAL DAMAGE CURVES

SIZE: 14 C QTY/PH: 1 TEMPERATURE: 90 TO 250 DEG C

LABEL: C OVERLOAD BUS REC: 4 14AWG CABLE OL 125.V
DEVICE TYPE: FUSE CABLE 14AWG OVERLOAD

CARTRIDGE: 35.00 A. SIZE: 35.00 A.

LABEL: FRN BUS REC: 4 14AWG FUSE 125.V
DEVICE TYPE: FUSE BUSSMANN 6A FRN

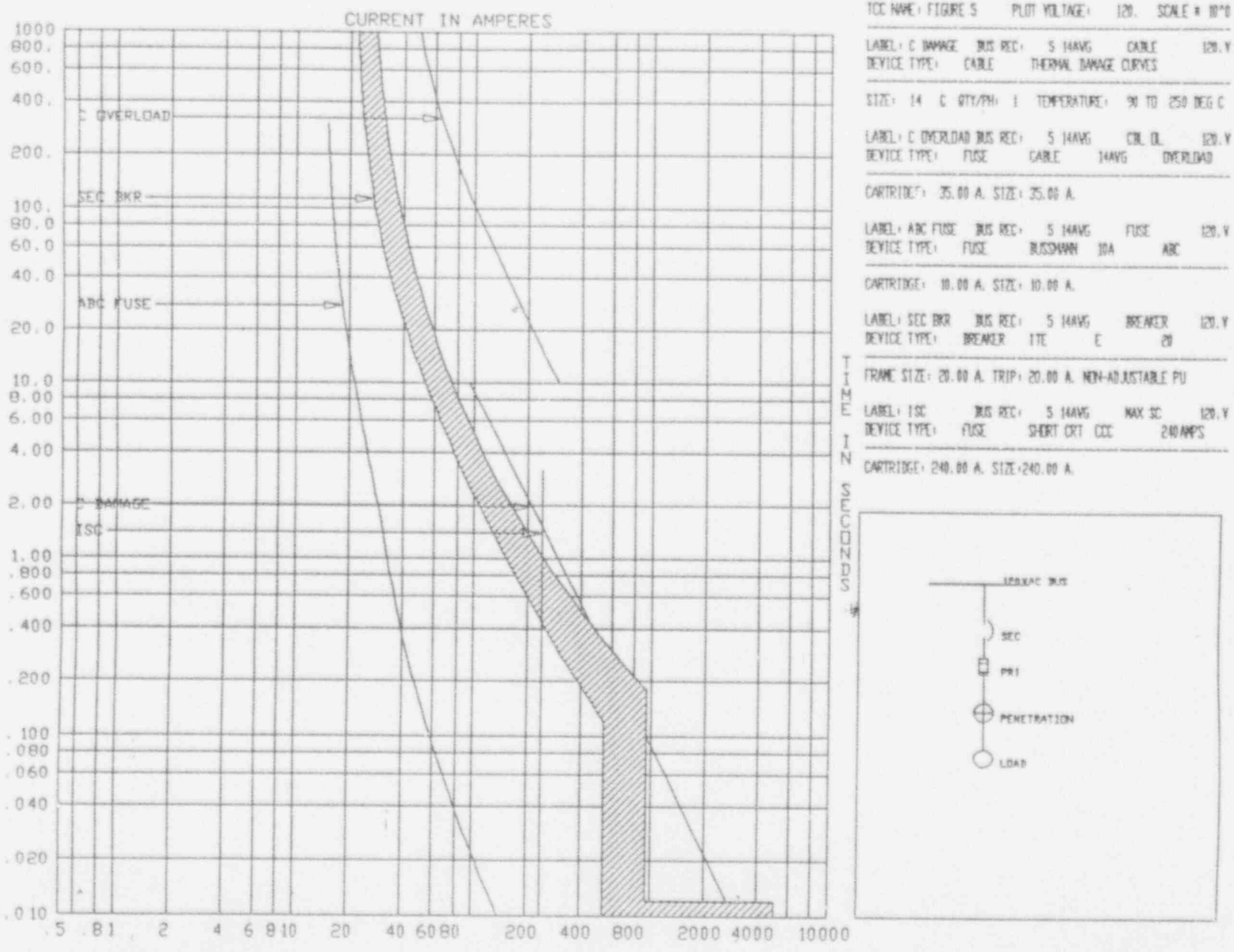
CARTRIDGE: 6.00 A. SIZE: 6.00 A.

LABEL: MAX ISC BUS REC: 4 14AWG MAX SC 125.V
DEVICE TYPE: FUSE SHORT CRT 2802 7990

CARTRIDGE: 500.00 A. SIZE: 500.00 A.

DRAWING NAME: FIGURE 4
CURRENT SCALE X 10^0 REFERENCE VOLTAGE 125

APPENDIX II
CALC. 85-E-0118-01



DRAWING NAME: FIGURE 5
CURRENT SCALE X 10^0 REFERENCE VOLTAGE 120

TCC NAME: FIGURE 5 PLOT VOLTAGE: 120. SCALE X 10^0

LABEL: C DAMAGE BUS REC: 5 14AWG CABLE 120.V
DEVICE TYPE: CABLE THERMAL DAMAGE CURVES

SIZE: 14 C QTY/PH: 1 TEMPERATURE: 90 TO 250 DEG C

LABEL: C OVERLOAD BUS REC: 5 14AWG CBL OL 120.V
DEVICE TYPE: FUSE CABLE 14AWG OVERLOAD

CARTRIDGE: 35.00 A. SIZE: 35.00 A.

LABEL: ABC FUSE BUS REC: 5 14AWG FUSE 120.V
DEVICE TYPE: FUSE BUSSMANN 10A ABC

CARTRIDGE: 10.00 A. SIZE: 10.00 A.

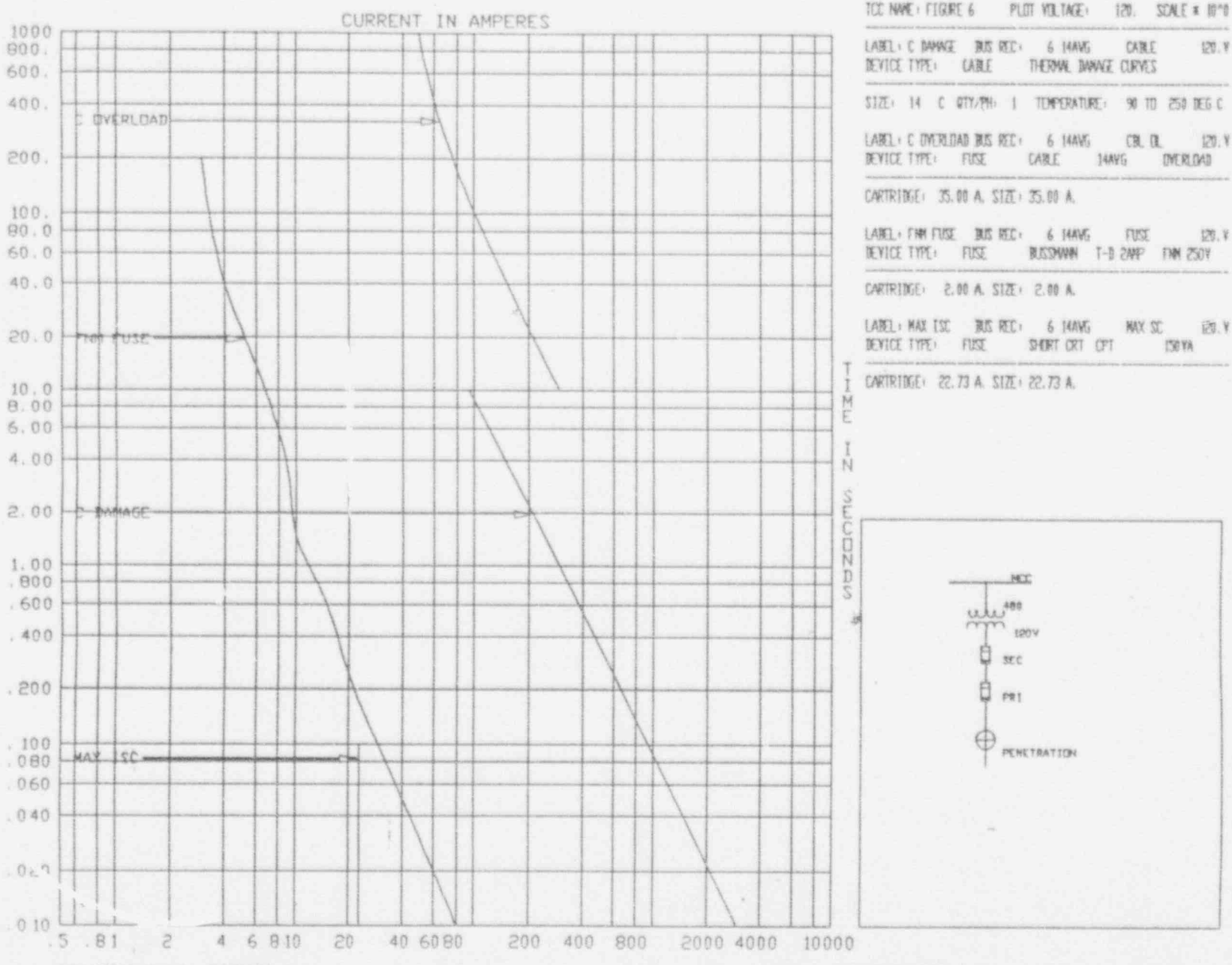
LABEL: SEC BKR BUS REC: 5 14AWG BREAKER 120.V
DEVICE TYPE: BREAKER ITE E 20

FRAME SIZE: 20.00 A. TRIP: 20.00 A. NON-ADJUSTABLE PU

LABEL: ISC BUS REC: 5 14AWG MAX SC 120.V
DEVICE TYPE: FUSE SHORT CRT CCC 240 AMPS

CARTRIDGE: 240.00 A. SIZE: 240.00 A.

APPENDIX II
CALC. 85-E-0118-01



TCC NAME: FIGURE 6 PLOT VOLTAGE: 120. SCALE X 10^0

LABEL: C DAMAGE BUS REC: 6 14AWG CABLE 120.V
DEVICE TYPE: CABLE THERMAL DAMAGE CURVES

SIZE: 14 C QTY/PH: 1 TEMPERATURE: 90 TO 250 DEG C

LABEL: C OVERLOAD BUS REC: 6 14AWG CBL OL 120.V
DEVICE TYPE: FUSE CABLE 14AWG OVERLOAD

CARTRIDGE: 35.00 A. SIZE: 35.00 A.

LABEL: FNM FUSE BUS REC: 6 14AWG FUSE 120.V
DEVICE TYPE: FUSE BUSSMANN T-D 2AMP FNM 250V

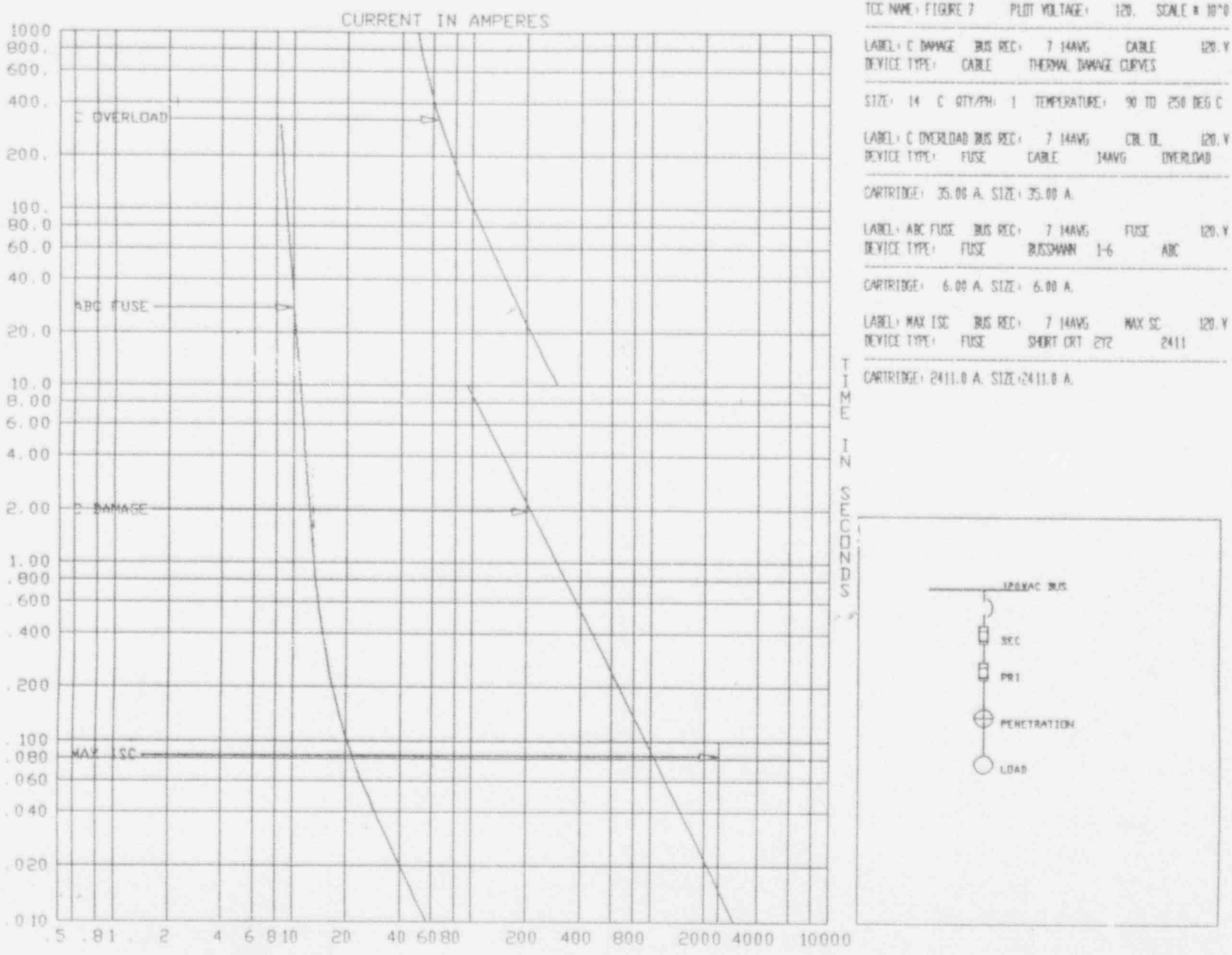
CARTRIDGE: 2.00 A. SIZE: 2.00 A.

LABEL: MAX ISC BUS REC: 6 14AWG MAX SC 120.V
DEVICE TYPE: FUSE SHORT CRT CPT 150 VA

CARTRIDGE: 22.73 A. SIZE: 22.73 A.

DRAWING NAME: FIGURE 6
CURRENT SCALE X 10^0 REFERENCE VOLTAGE 120

APPENDIX II
CALC. 85-E-0118-01



TCC NAME: FIGURE 7 PLOT VOLTAGE: 120. SCALE X 10^0

LABEL: C DAMAGE BUS REC: 7 14AWG CABLE 120.Y
DEVICE TYPE: CABLE THERMAL DAMAGE CURVES

SIZE: 14 C QTY/PH: 1 TEMPERATURE: 90 TO 250 DEG C

LABEL: C OVERLOAD BUS REC: 7 14AWG CBL OL 120.Y
DEVICE TYPE: FUSE CABLE 14AWG OVERLOAD

CARTRIDGE: 35.00 A. SIZE: 35.00 A.

LABEL: ABC FUSE BUS REC: 7 14AWG FUSE 120.Y
DEVICE TYPE: FUSE BUSSMANN 1-6 ABC

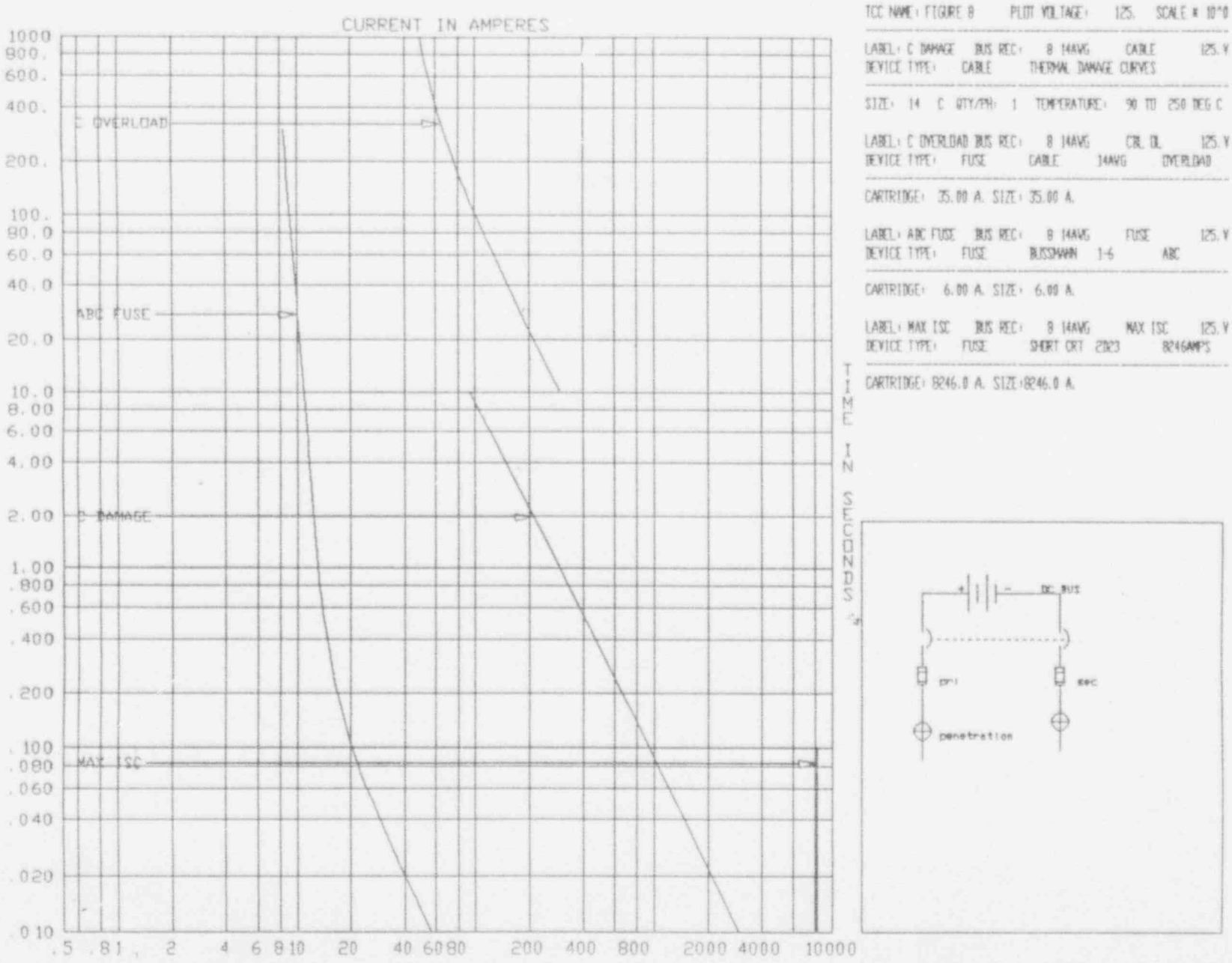
CARTRIDGE: 6.00 A. SIZE: 6.00 A.

LABEL: MAX ISC BUS REC: 7 14AWG MAX SC 120.Y
DEVICE TYPE: FUSE SHORT CKT 2Y2 2411

CARTRIDGE: 2411.0 A. SIZE: 2411.0 A.

DRAWING NAME: FIGURE 7
CURRENT SCALE X 10^0 REFERENCE VOLTAGE 120

APPENDIX II
CALC. 85-E-0118-01



DRAWING NAME: FIGURE 8
CURRENT SCALE X 10^0 REFERENCE VOLTAGE 125

TCC NAME: FIGURE 8 PLOT VOLTAGE: 125. SCALE X 10^0

LABEL: C DAMAGE BUS REC: B 14AWG CABLE 125.V
DEVICE TYPE: CABLE THERMAL DAMAGE CURVES

SIZE: 14 C QTY/PH: 1 TEMPERATURE: 90 TO 250 DEG C

LABEL: C OVERLOAD BUS REC: B 14AWG CBL OL 125.V
DEVICE TYPE: FUSE CABLE 14AWG OVERLOAD

CARTRIDGE: 35.00 A. SIZE: 35.00 A.

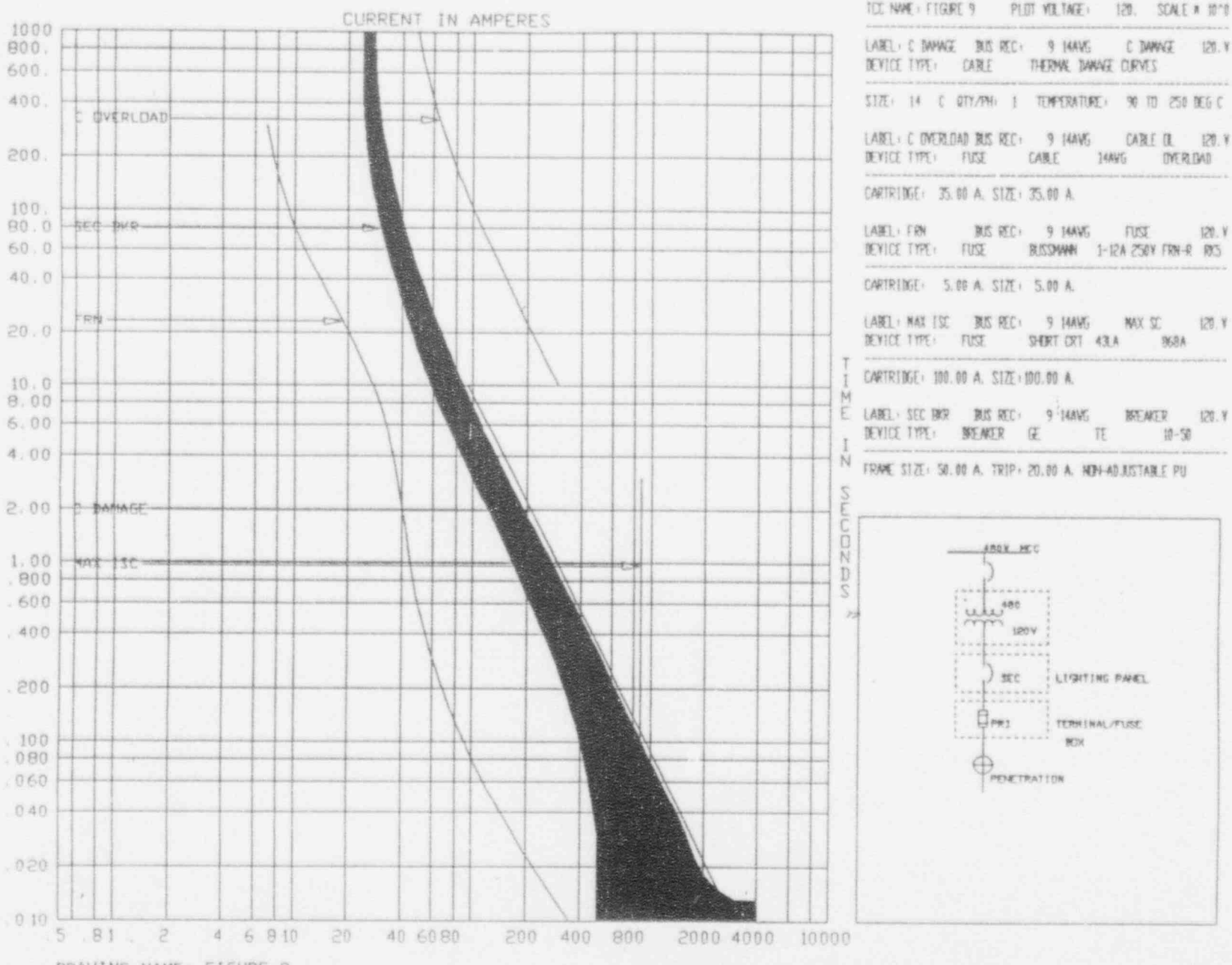
LABEL: ABC FUSE BUS REC: B 14AWG FUSE 125.V
DEVICE TYPE: FUSE BUSSMANN 1-6 ABC

CARTRIDGE: 6.00 A. SIZE: 6.00 A.

LABEL: MAX ISC BUS REC: B 14AWG MAX ISC 125.V
DEVICE TYPE: FUSE SHORT CRT 2023 8246AMPS

CARTRIDGE: 8246.0 A. SIZE: 8246.0 A.

APPENDIX II
CALC. 85-E-0118-01



DRAWING NAME: FIGURE 9
CURRENT SCALE X 10^0 REFERENCE VOLTAGE 120

TCC NAME: FIGURE 9 PLOT VOLTAGE: 120. SCALE X 10^0

LABEL: C DAMAGE BUS REC: 9 14AWG C DAMAGE 120.V
DEVICE TYPE: CABLE THERMAL DAMAGE CURVES

SIZE: 14 C QTY/PH: 1 TEMPERATURE: 90 TO 250 DEG C

LABEL: C OVERLOAD BUS REC: 9 14AWG CABLE OL 120.V
DEVICE TYPE: FUSE CABLE 14AWG OVERLOAD

CARTRIDGE: 35.00 A. SIZE: 35.00 A.

LABEL: FRN BUS REC: 9 14AWG FUSE 120.V
DEVICE TYPE: FUSE BUSSMANN 1-12A 250V FRN-R RK5

CARTRIDGE: 5.00 A. SIZE: 5.00 A.

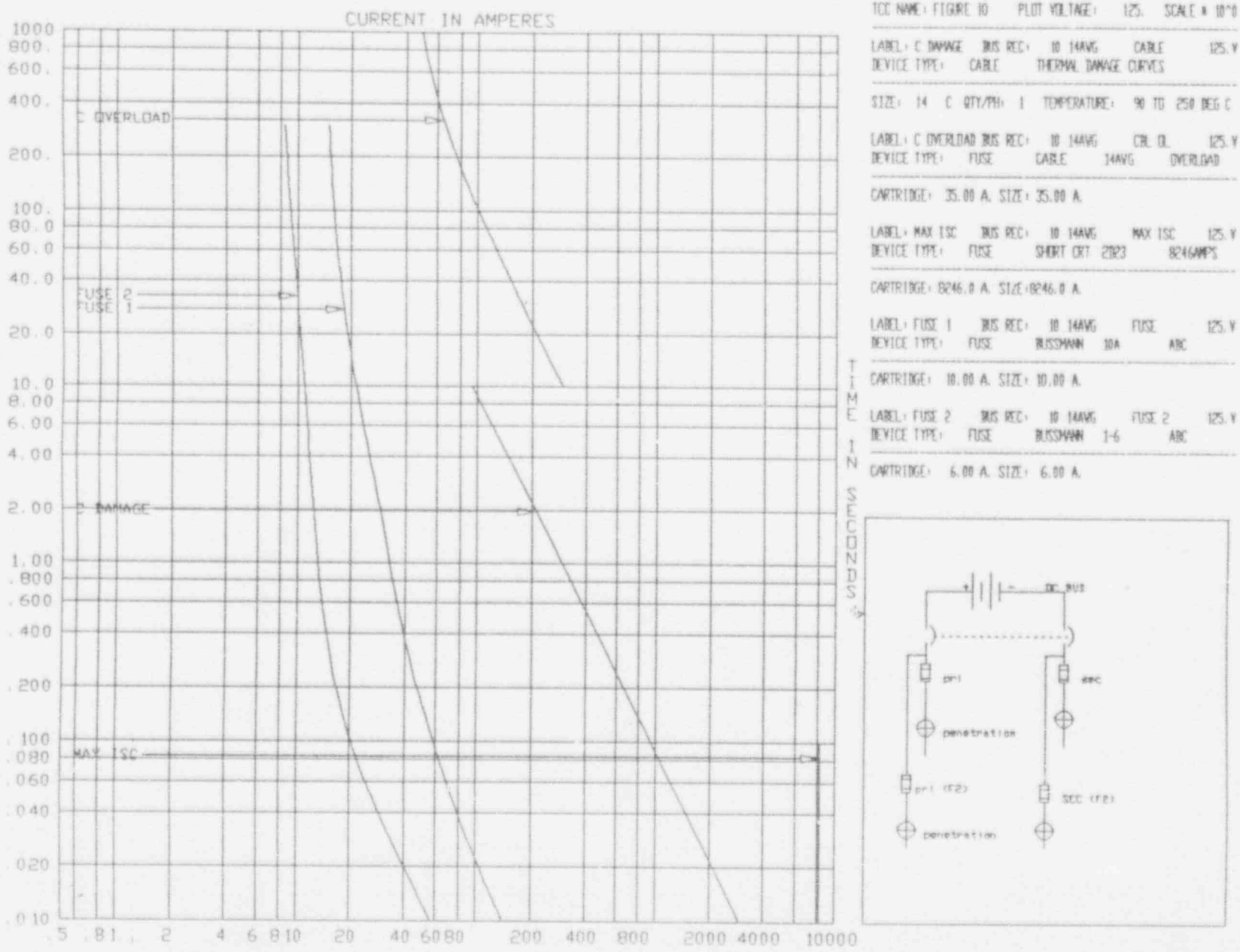
LABEL: MAX ISC BUS REC: 9 14AWG MAX SC 120.V
DEVICE TYPE: FUSE SHORT CKT 43LA 868A

CARTRIDGE: 100.00 A. SIZE: 100.00 A.

LABEL: SEC BKR BUS REC: 9 14AWG BREAKER 120.V
DEVICE TYPE: BREAKER GE TE 10-50

FRAME SIZE: 50.00 A. TRIP: 20.00 A. NON-ADJUSTABLE PU

APPENDIX II
CALC. 85-E-0118-01



DRAWING NAME: FIGURE 10
CURRENT SCALE X 10^0 REFERENCE VOLTAGE 125

TCC NAME: FIGURE 10 PLOT VOLTAGE: 125. SCALE X 10^0

LABEL: C DAMAGE BUS REC: 10 14AWG CABLE 125.V
DEVICE TYPE: CABLE THERMAL DAMAGE CURVES

SIZE: 14 C QTY/PH: 1 TEMPERATURE: 90 TO 250 DEG C

LABEL: C OVERLOAD BUS REC: 10 14AWG CBL OL 125.V
DEVICE TYPE: FUSE CABLE 14AWG OVERLOAD

CARTRIDGE: 35.00 A. SIZE: 35.00 A.

LABEL: MAX ISC BUS REC: 10 14AWG MAX ISC 125.V
DEVICE TYPE: FUSE SHORT CKT 2323 8246AMPS

CARTRIDGE: 8246.0 A. SIZE: 8246.0 A.

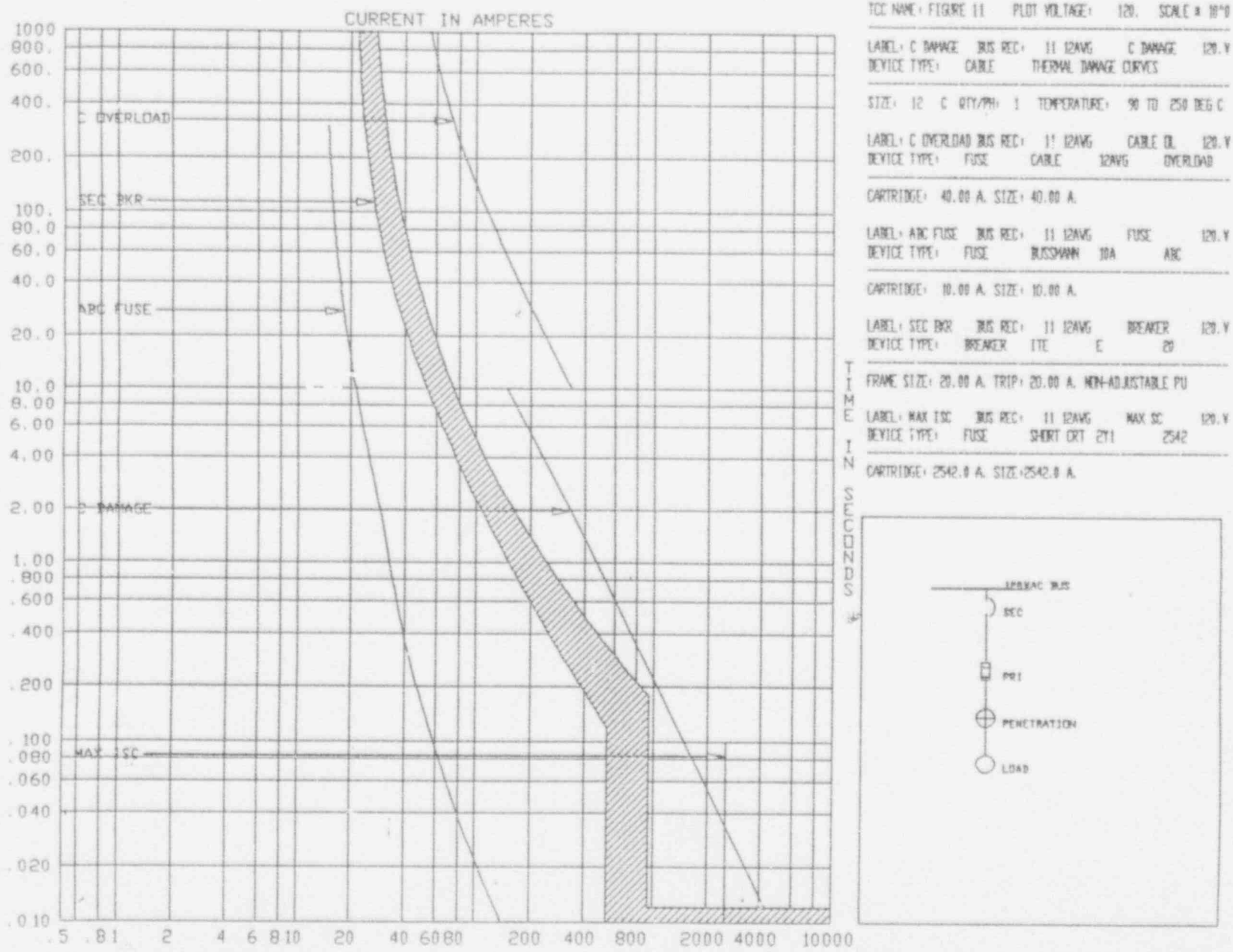
LABEL: FUSE 1 BUS REC: 10 14AWG FUSE 125.V
DEVICE TYPE: FUSE BUSSMANN 10A ABC

CARTRIDGE: 10.00 A. SIZE: 10.00 A.

LABEL: FUSE 2 BUS REC: 10 14AWG FUSE 2 125.V
DEVICE TYPE: FUSE BUSSMANN 1-6 ABC

CARTRIDGE: 6.00 A. SIZE: 6.00 A.

APPENDIX II
CALC. 85-E-0118-01



DRAWING NAME: FIGURE 11
CURRENT SCALE X 10^0 REFERENCE VOLTAGE 120

TCC NAME: FIGURE 11 PLOT VOLTAGE: 120. SCALE X 10^0

LABEL: C DAMAGE BUS REC: 11 12AWG C DAMAGE 120.V
DEVICE TYPE: CABLE THERMAL DAMAGE CURVES

SIZE: 12 C QTY/PH: 1 TEMPERATURE: 90 TO 250 DEG C

LABEL: C OVERLOAD BUS REC: 11 12AWG CABLE OL 120.V
DEVICE TYPE: FUSE CABLE 12AWG OVERLOAD

CARTRIDGE: 40.00 A. SIZE: 40.00 A.

LABEL: ABC FUSE BUS REC: 11 12AWG FUSE 120.V
DEVICE TYPE: FUSE BUSSMANN 10A ABC

CARTRIDGE: 10.00 A. SIZE: 10.00 A.

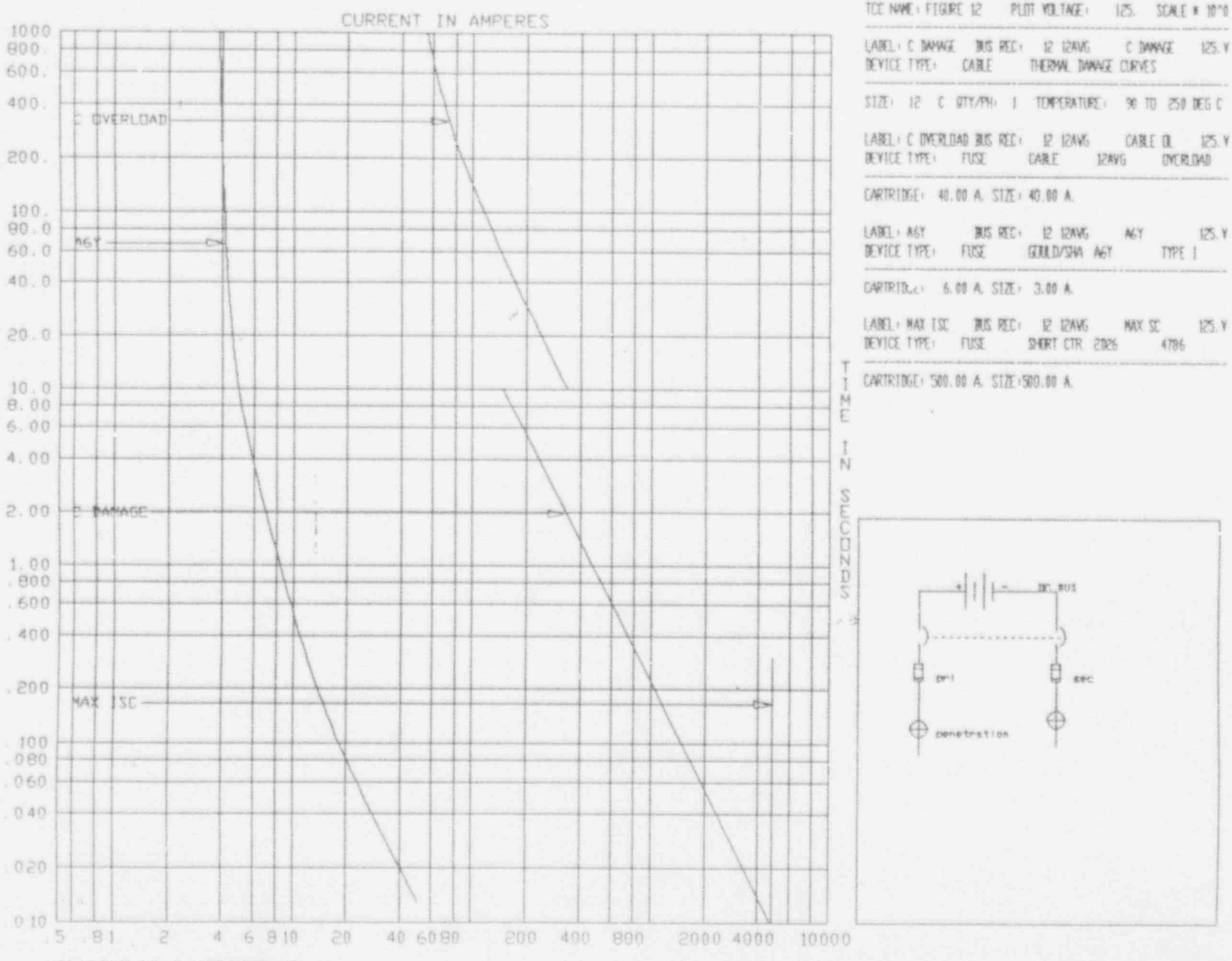
LABEL: SEC BKR BUS REC: 11 12AWG BREAKER 120.V
DEVICE TYPE: BREAKER ITE E 20

FRAME SIZE: 20.00 A. TRIP: 20.00 A. NON-ADJUSTABLE PU

LABEL: MAX ISC BUS REC: 11 12AWG MAX SC 120.V
DEVICE TYPE: FUSE SHORT CRT ZYI 2542

CARTRIDGE: 2542.0 A. SIZE: 2542.0 A.

APPENDIX II
CALC. 85-E-0118-01



DRAWING NAME: FIGURE 12
CURRENT SCALE X 10^0 REFERENCE VOLTAGE 125

TCC NAME: FIGURE 12 PLOT VOLTAGE: 125. SCALE X 10^0

LABEL: C DAMAGE BUS REC: 12 12AWG C DAMAGE 125.V
DEVICE TYPE: CABLE THERMAL DAMAGE CURVES

SIZE: 12 C QTY/PH: 1 TEMPERATURE: 90 TO 250 DEG C

LABEL: C OVERLOAD BUS REC: 12 12AWG CABLE OL 125.V
DEVICE TYPE: FUSE CABLE 12AWG OVERLOAD

CARTRIDGE: 40.00 A. SIZE: 40.00 A.

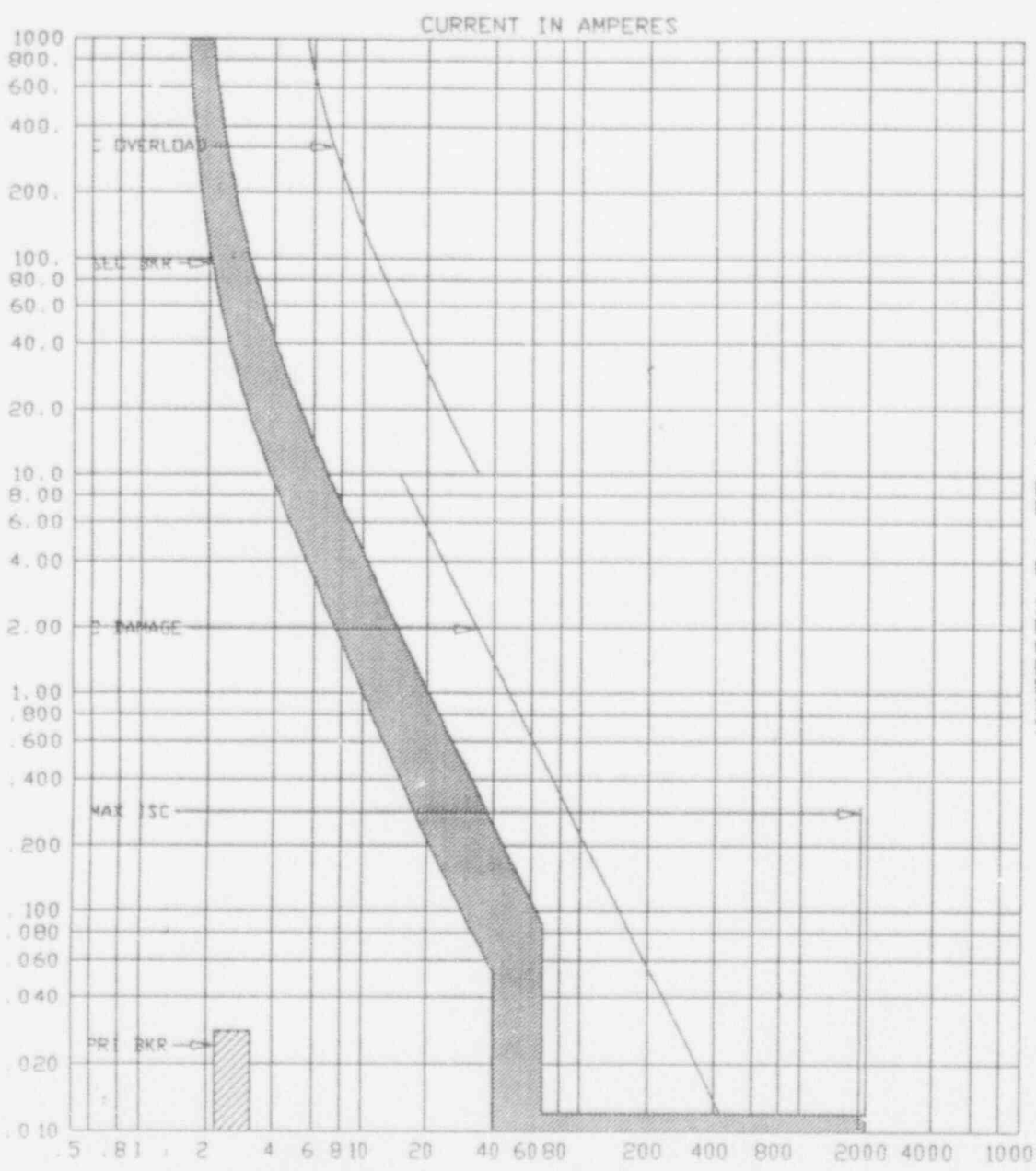
LABEL: A6Y BUS REC: 12 12AWG A6Y 125.V
DEVICE TYPE: FUSE GOULD/SHA A6Y TYPE J

CARTRID.E: 6.00 A. SIZE: 3.00 A.

LABEL: MAX ISC BUS REC: 12 12AWG MAX SC 125.V
DEVICE TYPE: FUSE SHORT CTR 2025 4786

CARTRIDGE: 500.00 A. SIZE: 500.00 A.

APPENDIX II
CALC. 85-E-0118-01



DRAWING NAME: FIGURE 13
CURRENT SCALE X 10^ 1 REFERENCE VOLTAGE 480

TCC NAME: FIGURE 13 PLOT VOLTAGE: 480. SCALE = 10^1

LABEL: C DAMAGE BUS REC: 13 12AWG C DAMAGE 480.Y
DEVICE TYPE: CABLE THERMAL DAMAGE CURVES

SIZE: 12 C QTY/PH: 1 TEMPERATURE: 90 TO 250 DEG C

LABEL: C OVERLOAD BUS REC: 13 12AWG CABLE OL 480.Y
DEVICE TYPE: FUSE CABLE 12AWG OVERLOAD

CARTRIDGE: 40.00 A. SIZE: 40.00 A.

LABEL: SEC BKR BUS REC: 13 12AWG BREAKER 480.Y
DEVICE TYPE: BREAKER ITE HE 15

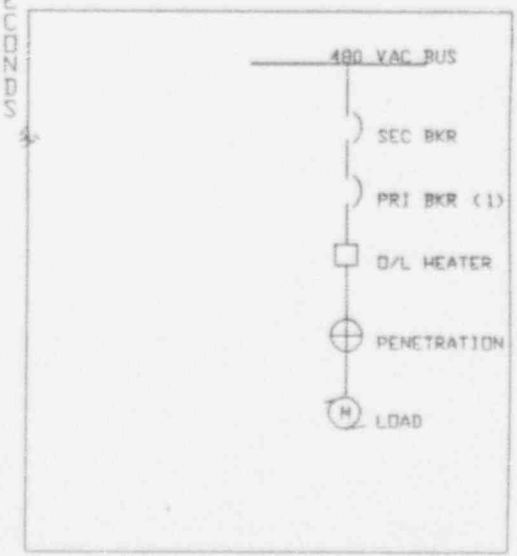
FRAME SIZE: 15.00 A. TRIP: 15.00 A. NON-ADJUSTABLE PU

LABEL: PRI BKR BUS REC: 13 12AWG BKR 1 480.Y
DEVICE TYPE: FUSE ITE HE (5) 22A (3)

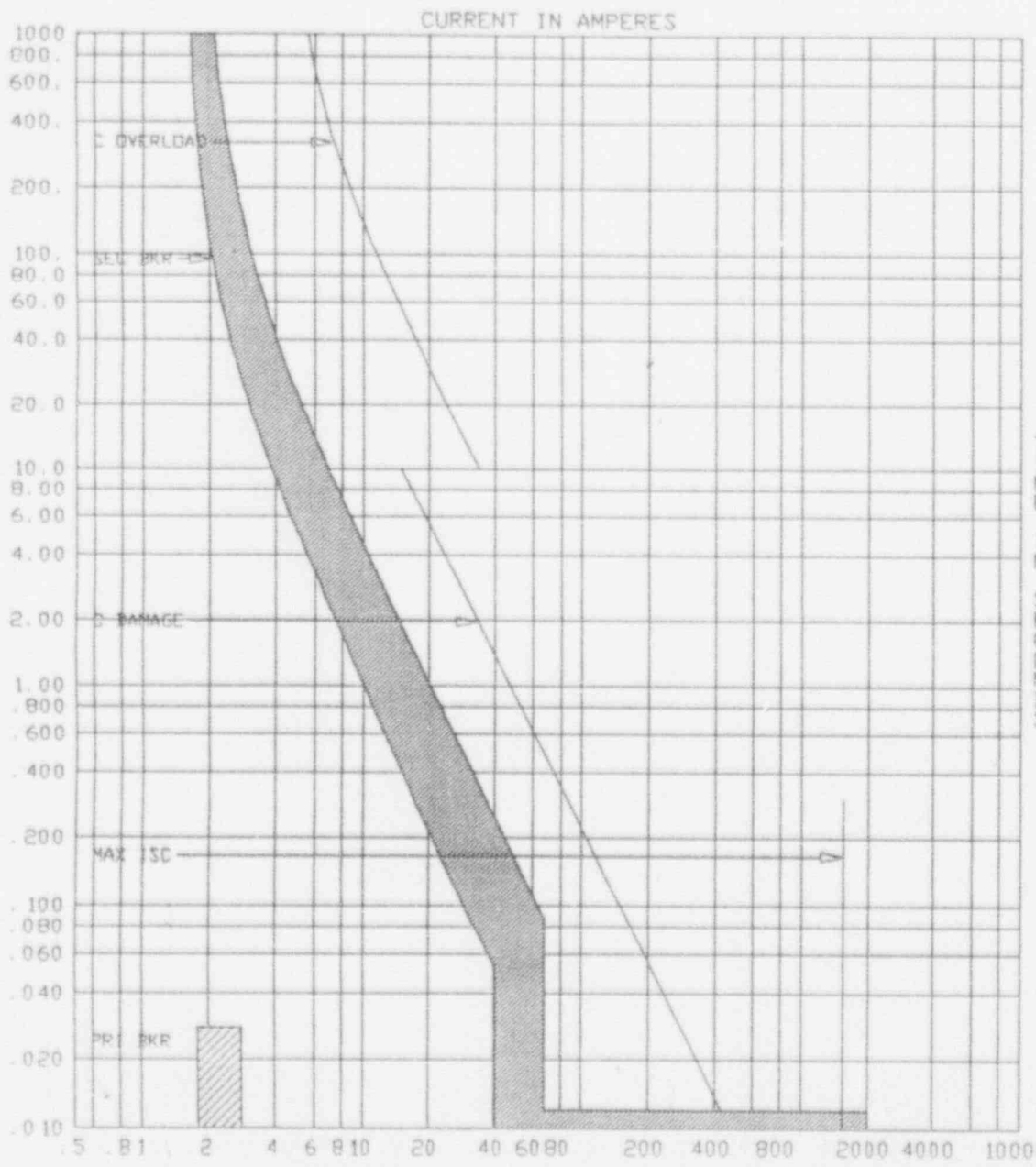
CARTRIDGE: 5.00 A. SIZE: 5.00 A.

LABEL: MAX ISC BUS REC: 13 12AWG MAX SC 480.Y
DEVICE TYPE: FUSE SHORT CRT 2864 1B612

CARTRIDGE: 500.00 A. SIZE:500.00 A.



APPENDIX II
CALC. 85-E-0118-01



DRAWING NAME: FIGURE 14
CURRENT SCALE X 10^ 1 REFERENCE VOLTAGE 480

TCC NAME: FIGURE 14 PLOT VOLTAGE: 480. SCALE X 10^1

LABEL: C DAMAGE BUS REC: 14 12AWG C DAMAGE 480.Y
DEVICE TYPE: CABLE THERMAL DAMAGE CURVES

SIZE: 12 C QTY/PH: 1 TEMPERATURE: 90 TO 250 DEG C

LABEL: C OVERLOAD BUS REC: 14 12AWG CABLE OL 480.Y
DEVICE TYPE: FUSE CABLE 12AWG OVERLOAD

CARTRIDGE: 40.00 A. SIZE: 40.00 A.

LABEL: SEC BKR BUS REC: 14 12AWG BREAKER 480.Y
DEVICE TYPE: BREAKER ITE HE 15

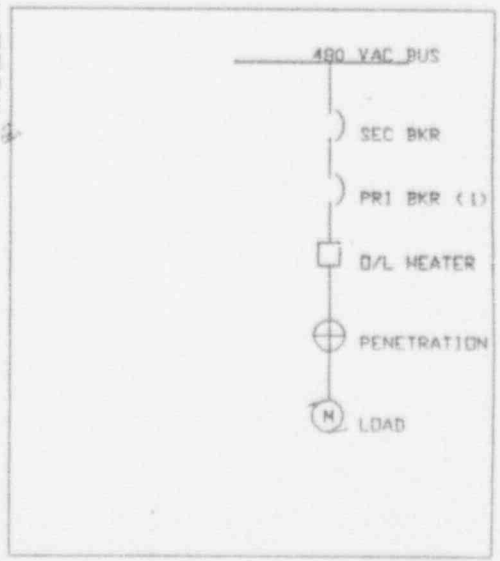
FRAME SIZE: 15.00 A. TRIP: 15.00 A. NON-ADJUSTABLE PU

LABEL: PRI BKR BUS REC: 14 12AWG BKR 1 480.Y
DEVICE TYPE: FUSE ITE HE (5) 18A (2)

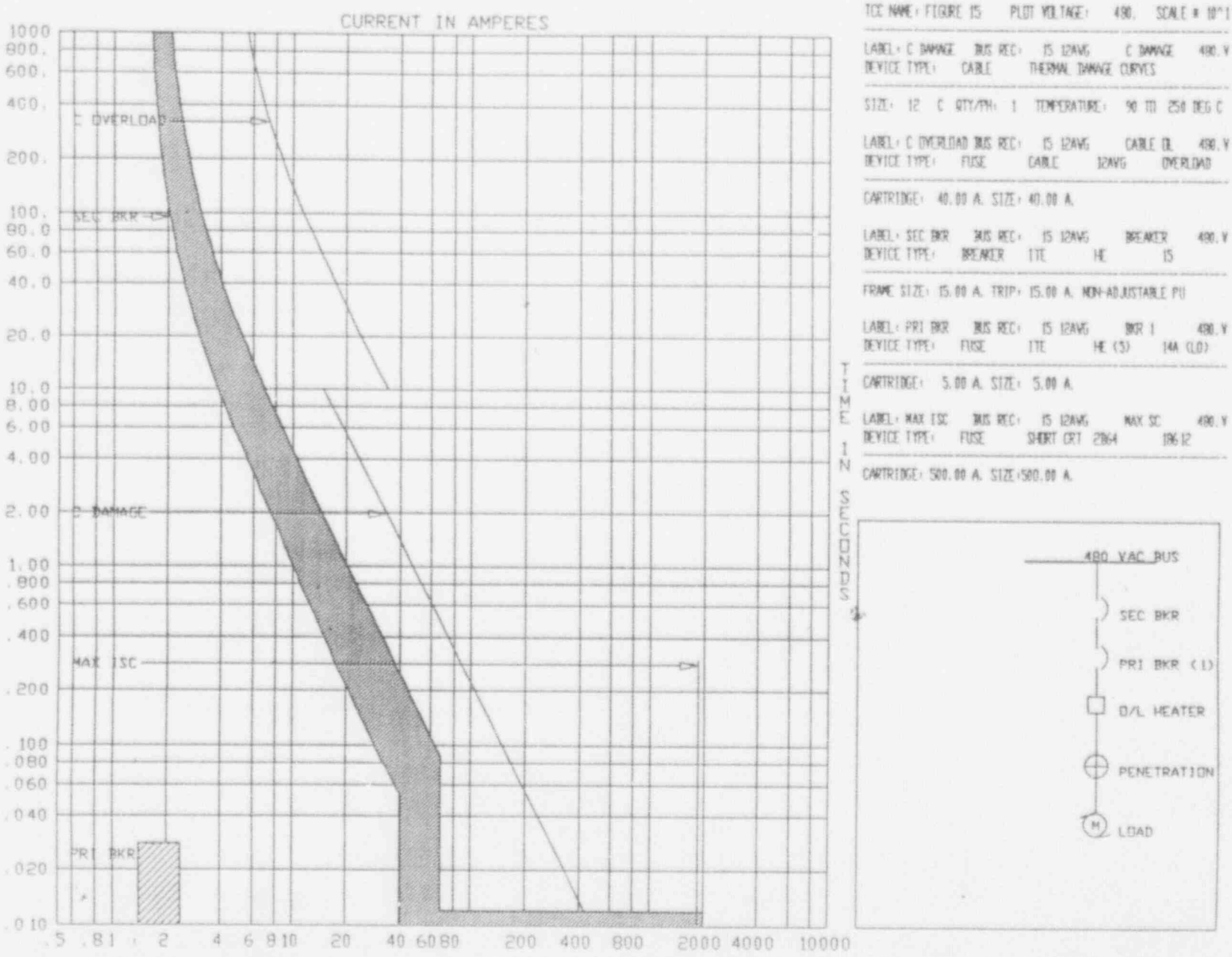
CARTRIDGE: 5.00 A. SIZE: 5.00 A.

LABEL: MAX ISC BUS REC: 14 12AWG MAX SC 480.Y
DEVICE TYPE: FUSE SHERT CRT 2351 15518A

CARTRIDGE: 500.00 A. SIZE: 500.00 A.



APPENDIX II
CALC. 85-E-0118-01



DRAWING NAME: FIGURE 15
CURRENT SCALE X 10^ 1 REFERENCE VOLTAGE 480

TCC NAME: FIGURE 15 PLOT VOLTAGE: 480. SCALE X 10^1

LABEL: C DAMAGE BUS REC: 15 12AWG C DAMAGE 480.V
DEVICE TYPE: CABLE THERMAL DAMAGE CURVES

SIZE: 12 C QTY/PH: 1 TEMPERATURE: 90 TO 250 DEG C

LABEL: C OVERLOAD BUS REC: 15 12AWG CABLE OL 480.V
DEVICE TYPE: FUSE CABLE 12AWG OVERLOAD

CARTRIDGE: 40.00 A. SIZE: 40.00 A.

LABEL: SEC BKR BUS REC: 15 12AWG BREAKER 480.V
DEVICE TYPE: BREAKER ITE HE 15

FRAME SIZE: 15.00 A. TRIP: 15.00 A. NON-ADJUSTABLE PU

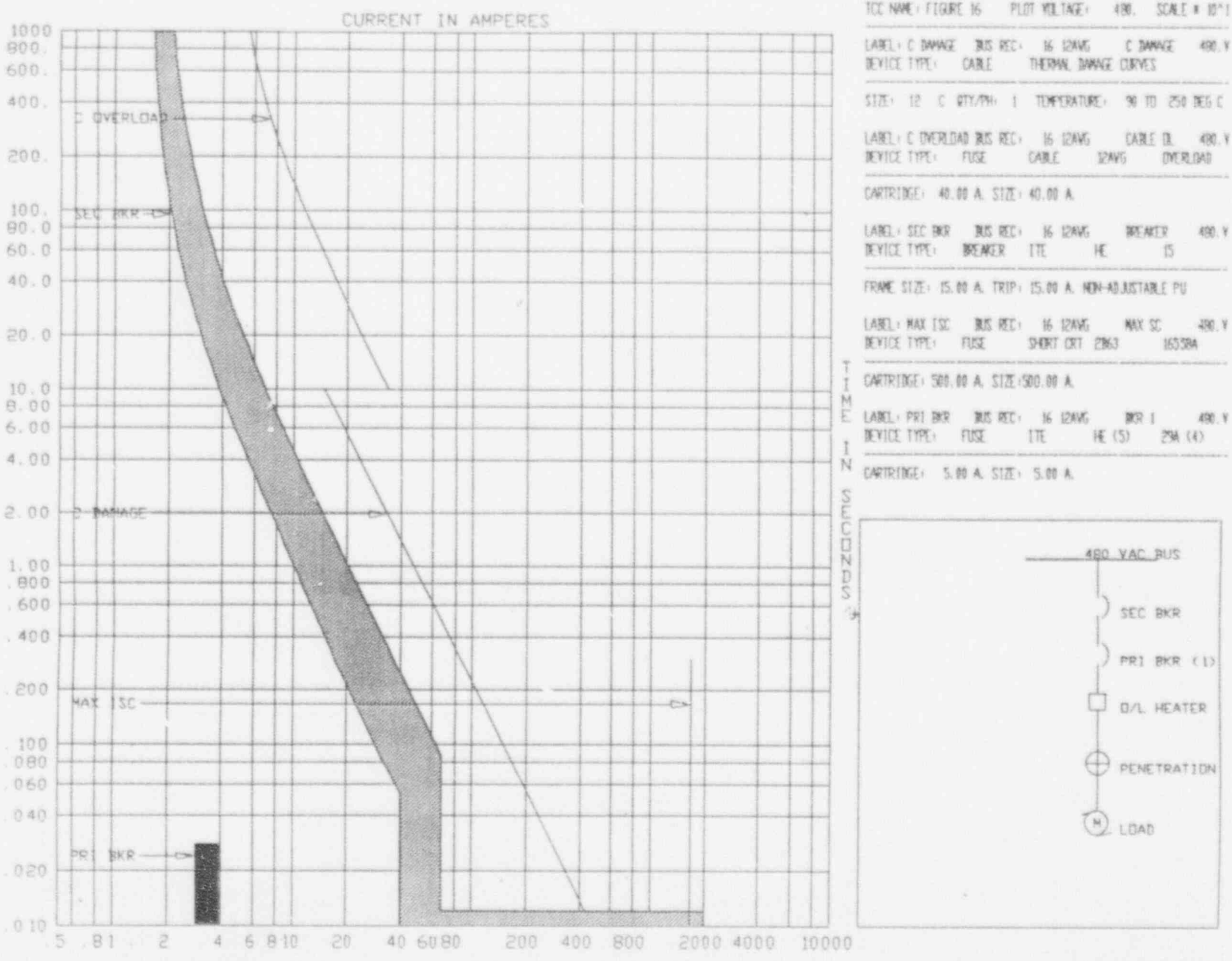
LABEL: PRI BKR BUS REC: 15 12AWG BKR 1 480.V
DEVICE TYPE: FUSE ITE HE (S) 14A (LO)

CARTRIDGE: 5.00 A. SIZE: 5.00 A.

LABEL: MAX ISC BUS REC: 15 12AWG MAX SC 480.V
DEVICE TYPE: FUSE SHORT CRT 2864 19612

CARTRIDGE: 500.00 A. SIZE: 500.00 A.

APPENDIX II
CALC. 85-E-0118-01



DRAWING NAME: FIGURE 16
CURRENT SCALE X 10^ 1 REFERENCE VOLTAGE 480

TCC NAME: FIGURE 16 PLOT VOLTAGE: 480. SCALE X 10^1

LABEL: C DAMAGE BUS REC: 16 12AWG C DAMAGE 480.Y
DEVICE TYPE: CABLE THERMAL DAMAGE CURVES

SIZE: 12 C QTY/PH: 1 TEMPERATURE: 90 TO 250 DEG C

LABEL: C OVERLOAD BUS REC: 16 12AWG CABLE OL 480.Y
DEVICE TYPE: FUSE CABLE 12AWG OVERLOAD

CARTRIDGE: 40.00 A. SIZE: 40.00 A.

LABEL: SEC BKR BUS REC: 16 12AWG BREAKER 480.Y
DEVICE TYPE: BREAKER ITE HE 15

FRAME SIZE: 15.00 A. TRIP: 15.00 A. NON-ADJUSTABLE PU

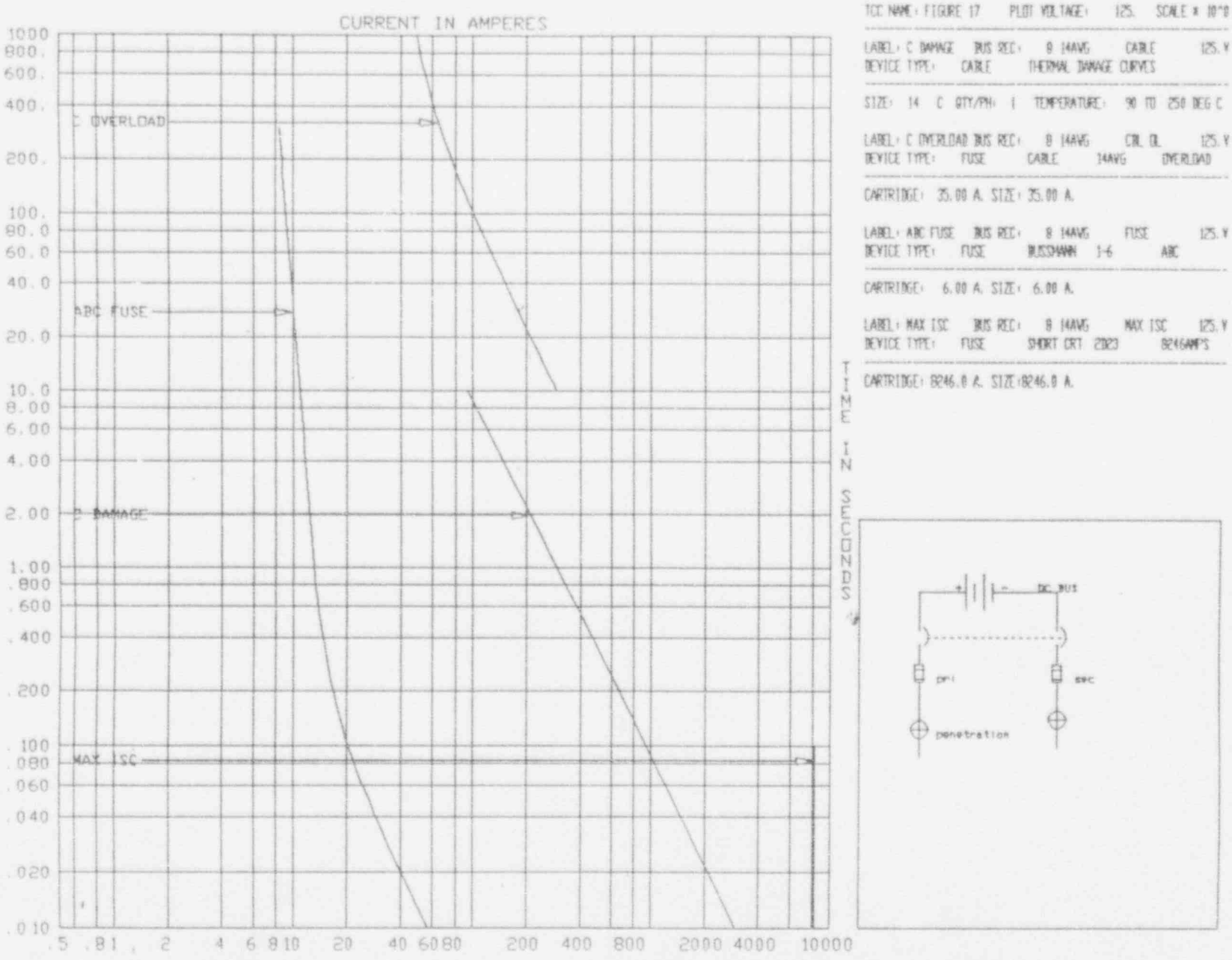
LABEL: MAX ISC BUS REC: 16 12AWG MAX SC 480.Y
DEVICE TYPE: FUSE SHORT CRT 23KA 16538A

CARTRIDGE: 500.00 A. SIZE: 500.00 A.

LABEL: PRI BKR BUS REC: 16 12AWG BKR 1 480.Y
DEVICE TYPE: FUSE ITE HE (5) 25A (4)

CARTRIDGE: 5.00 A. SIZE: 5.00 A.

APPENDIX II
CALC. 85-E-0118-01



TCC NAME: FIGURE 17 PLOT VOLTAGE: 125. SCALE X 10^0

LABEL: C DAMAGE BUS REC: B 14AWG CABLE 125. V
DEVICE TYPE: CABLE THERMAL DAMAGE CURVES

SIZE: 14 C QTY/PH: 1 TEMPERATURE: 90 TO 250 DEG C

LABEL: C OVERLOAD BUS REC: B 14AWG CBL OL 125. V
DEVICE TYPE: FUSE CABLE 14AWG OVERLOAD

CARTRIDGE: 35.00 A. SIZE: 35.00 A.

LABEL: ABC FUSE BUS REC: B 14AWG FUSE 125. V
DEVICE TYPE: FUSE BUSSMANN 1-6 ABC

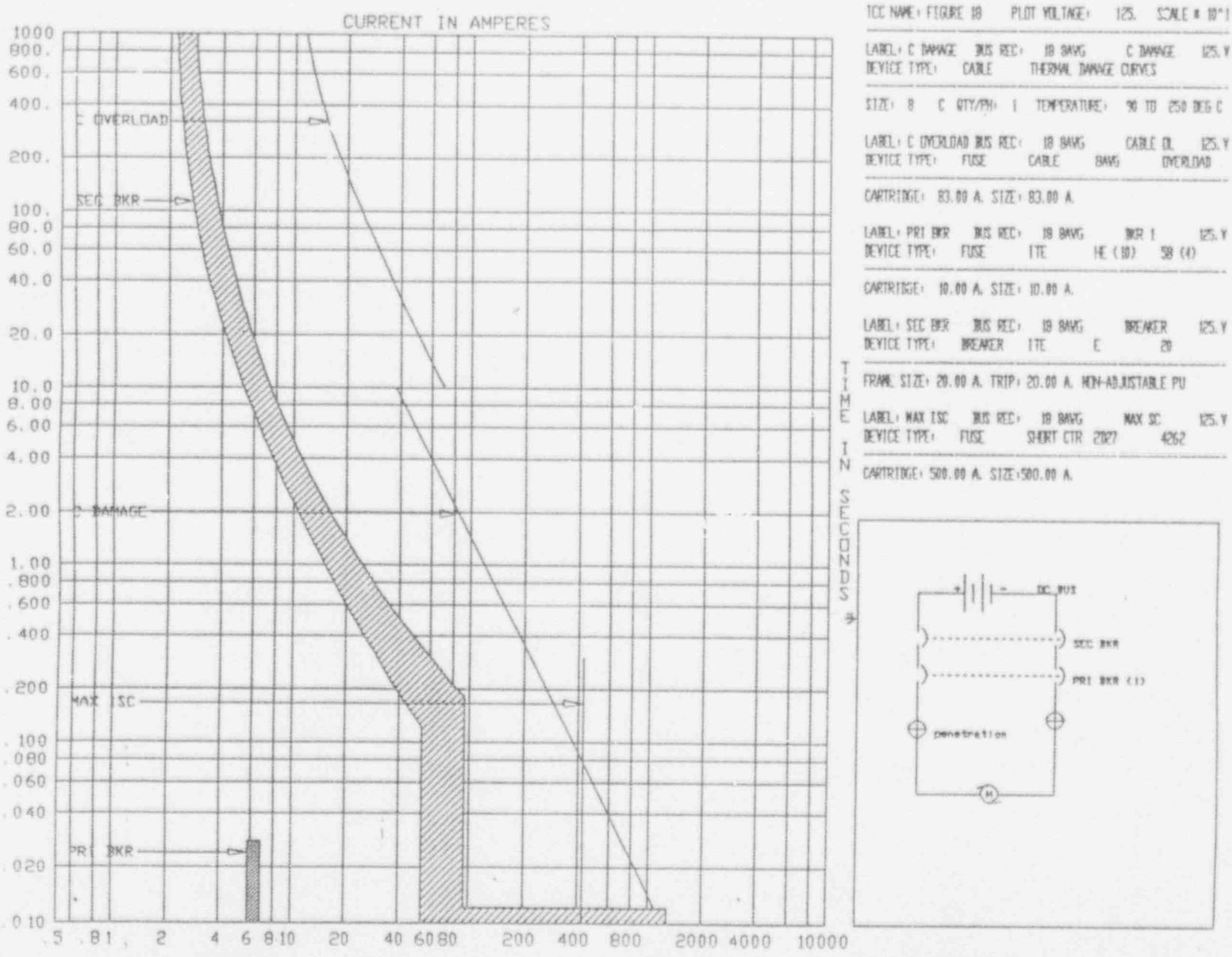
CARTRIDGE: 6.00 A. SIZE: 6.00 A.

LABEL: MAX ISC BUS REC: B 14AWG MAX ISC 125. V
DEVICE TYPE: FUSE SHORT CRT ZONE 8246AMPS

CARTRIDGE: 8246.0 A. SIZE: 8246.0 A.

DRAWING NAME: FIGURE 17
CURRENT SCALE X 10^0 REFERENCE VOLTAGE 125

APPENDIX II
CALC. 85-E-0118-01



DRAWING NAME: FIGURE 18
CURRENT SCALE X 10^ 1 REFERENCE VOLTAGE 125

TCC NAME: FIGURE 18 PLOT VOLTAGE: 125. SCALE = 10^1

LABEL: C DAMAGE BUS REC: 18 BAMG C DAMAGE 125.Y
DEVICE TYPE: CABLE THERMAL DAMAGE CURVES

SIZE: 8 C QTY/PH: 1 TEMPERATURE: 90 TO 250 DEG C

LABEL: C OVERLOAD BUS REC: 18 BAMG CABLE OL 125.Y
DEVICE TYPE: FUSE CABLE BAMG OVERLOAD

CARTRIDGE: 83.00 A. SIZE: 83.00 A.

LABEL: PRI BKR BUS REC: 18 BAMG BKR 1 125.Y
DEVICE TYPE: FUSE ITE HE (18) 58 (4)

CARTRIDGE: 10.00 A. SIZE: 10.00 A.

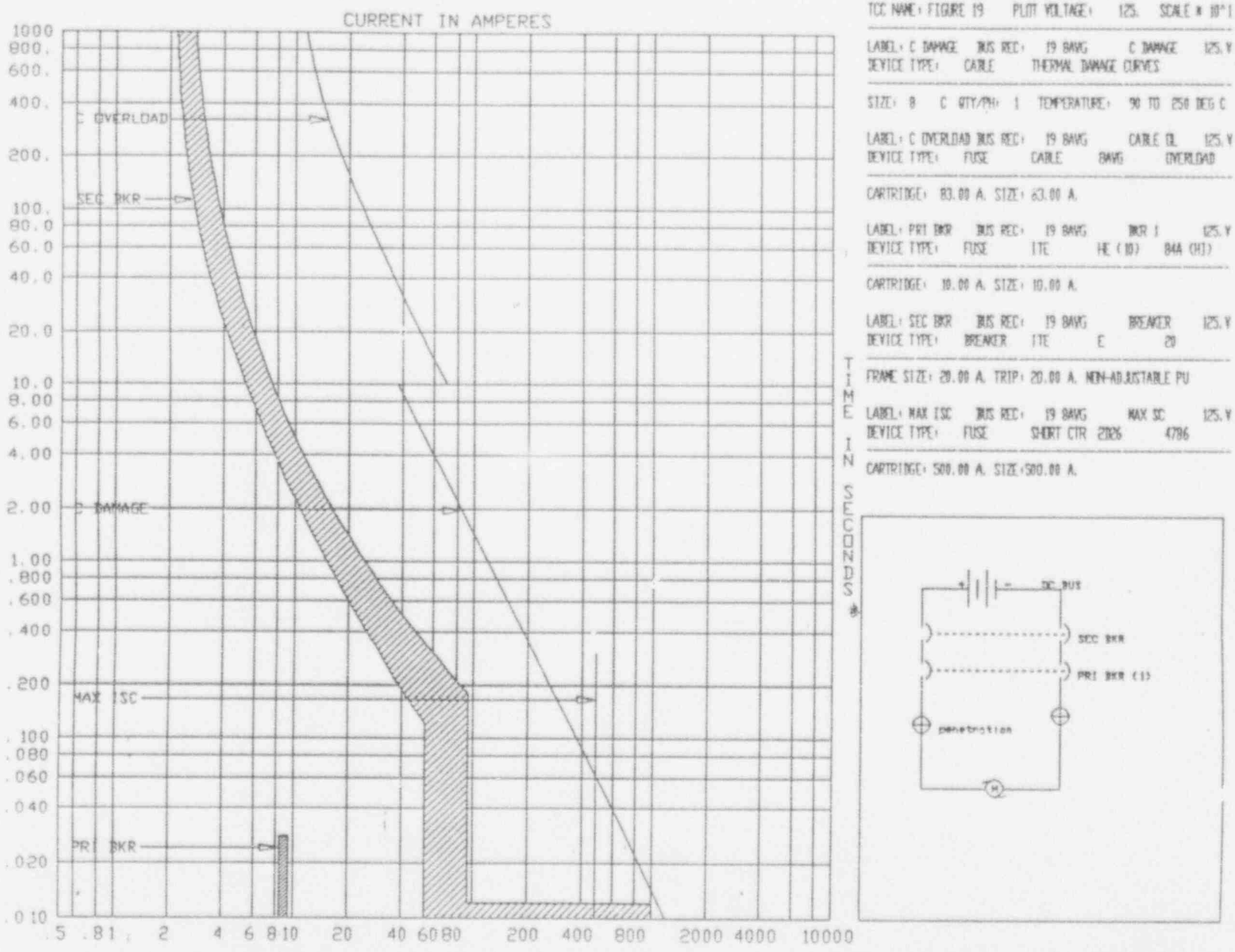
LABEL: SEC BKR BUS REC: 18 BAMG BREAKER 125.Y
DEVICE TYPE: BREAKER ITE E 20

FRAME SIZE: 20.00 A. TRIP: 20.00 A. NON-ADJUSTABLE PU

LABEL: MAX ISC BUS REC: 18 BAMG MAX SC 125.Y
DEVICE TYPE: FUSE SHORT CTR 2027 4262

CARTRIDGE: 500.00 A. SIZE: 500.00 A.

APPENDIX II
CALC. 85-E-0118-01



DRAWING NAME: FIGURE 19
CURRENT SCALE X 10^ 1 REFERENCE VOLTAGE 125

TCC NAME: FIGURE 19 PLOT VOLTAGE: 125. SCALE X 10^1

LABEL: C DAMAGE BUS REC: 19 BAWG C DAMAGE 125.V
DEVICE TYPE: CABLE THERMAL DAMAGE CURVES

SIZE: 8 C QTY/PH: 1 TEMPERATURE: 90 TO 250 DEG C

LABEL: C OVERLOAD BUS REC: 19 BAWG CABLE CL 125.V
DEVICE TYPE: FUSE CABLE BAWG OVERLOAD

CARTRIDGE: 83.00 A. SIZE: 63.00 A.

LABEL: PRI BKR BUS REC: 19 BAWG BKR 1 125.V
DEVICE TYPE: FUSE ITE HE (10) 84A (H1)

CARTRIDGE: 10.00 A. SIZE: 10.00 A.

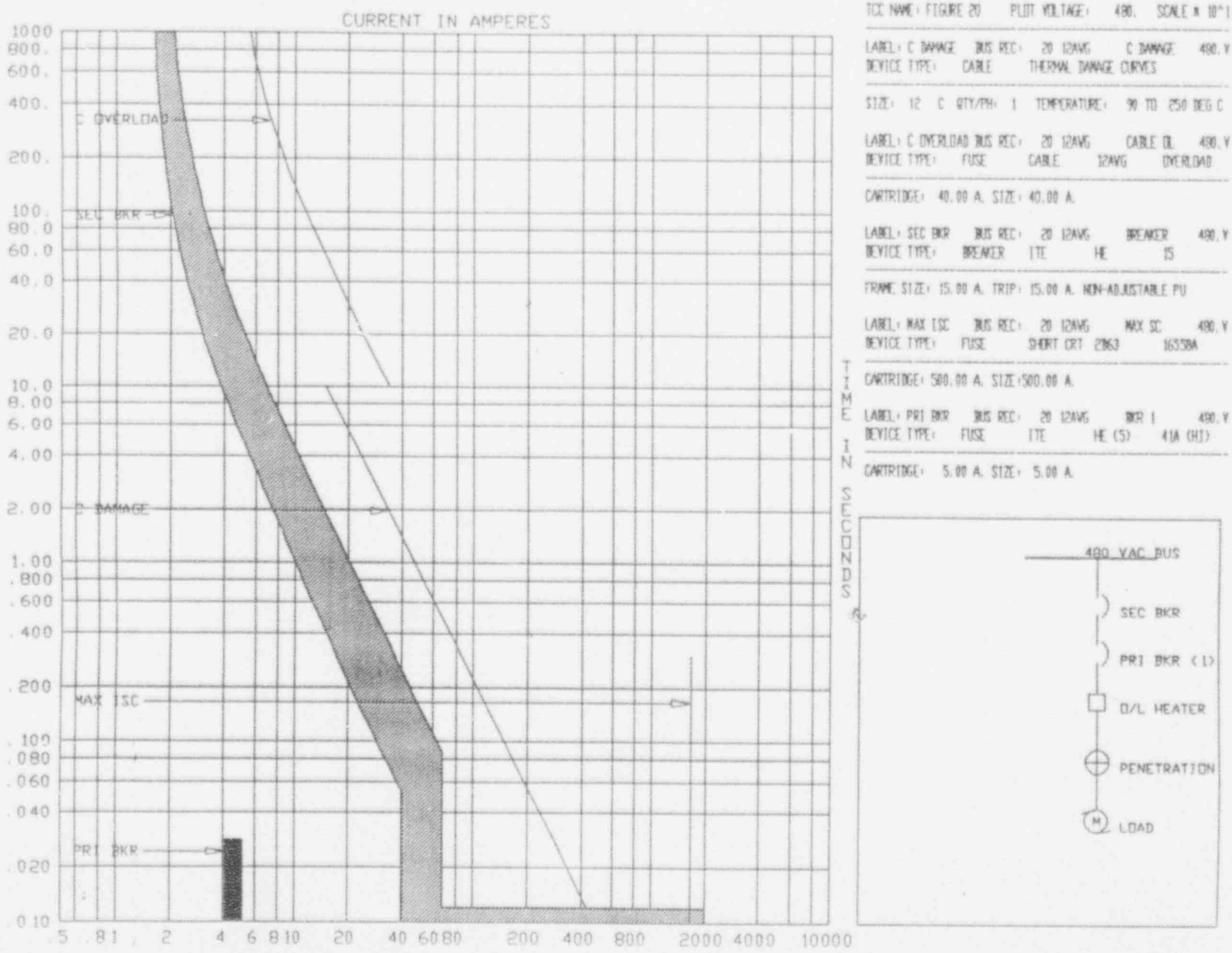
LABEL: SEC BKR BUS REC: 19 BAWG BREAKER 125.V
DEVICE TYPE: BREAKER ITE E 20

FRAME SIZE: 20.00 A. TRIP: 20.00 A. NON-ADJUSTABLE PU

LABEL: MAX ISC BUS REC: 19 BAWG MAX SC 125.V
DEVICE TYPE: FUSE SHORT CTR 23826 4786

CARTRIDGE: 500.00 A. SIZE: 500.00 A.

APPENDIX II
CALC. 85-E-0118-01



DRAWING NAME: FIGURE 20
CURRENT SCALE X 10^ 1 REFERENCE VOLTAGE 480

TCC NAME: FIGURE 20 PLOT VOLTAGE: 480. SCALE X 10^1

LABEL: C DAMAGE BUS REC: 20 12AWG C DAMAGE 480.Y
DEVICE TYPE: CABLE THERMAL DAMAGE CURVES

SIZE: 12 C QTY/PH: 1 TEMPERATURE: 90 TO 250 DEG C

LABEL: C OVERLOAD BUS REC: 20 12AWG CABLE OL 480.Y
DEVICE TYPE: FUSE CABLE 12AWG OVERLOAD

CARTRIDGE: 40.00 A. SIZE: 40.00 A.

LABEL: SEC BKR BUS REC: 20 12AWG BREAKER 480.Y
DEVICE TYPE: BREAKER ITE HE 15

FRAME SIZE: 15.00 A. TRIP: 15.00 A. NON-ADJUSTABLE PU

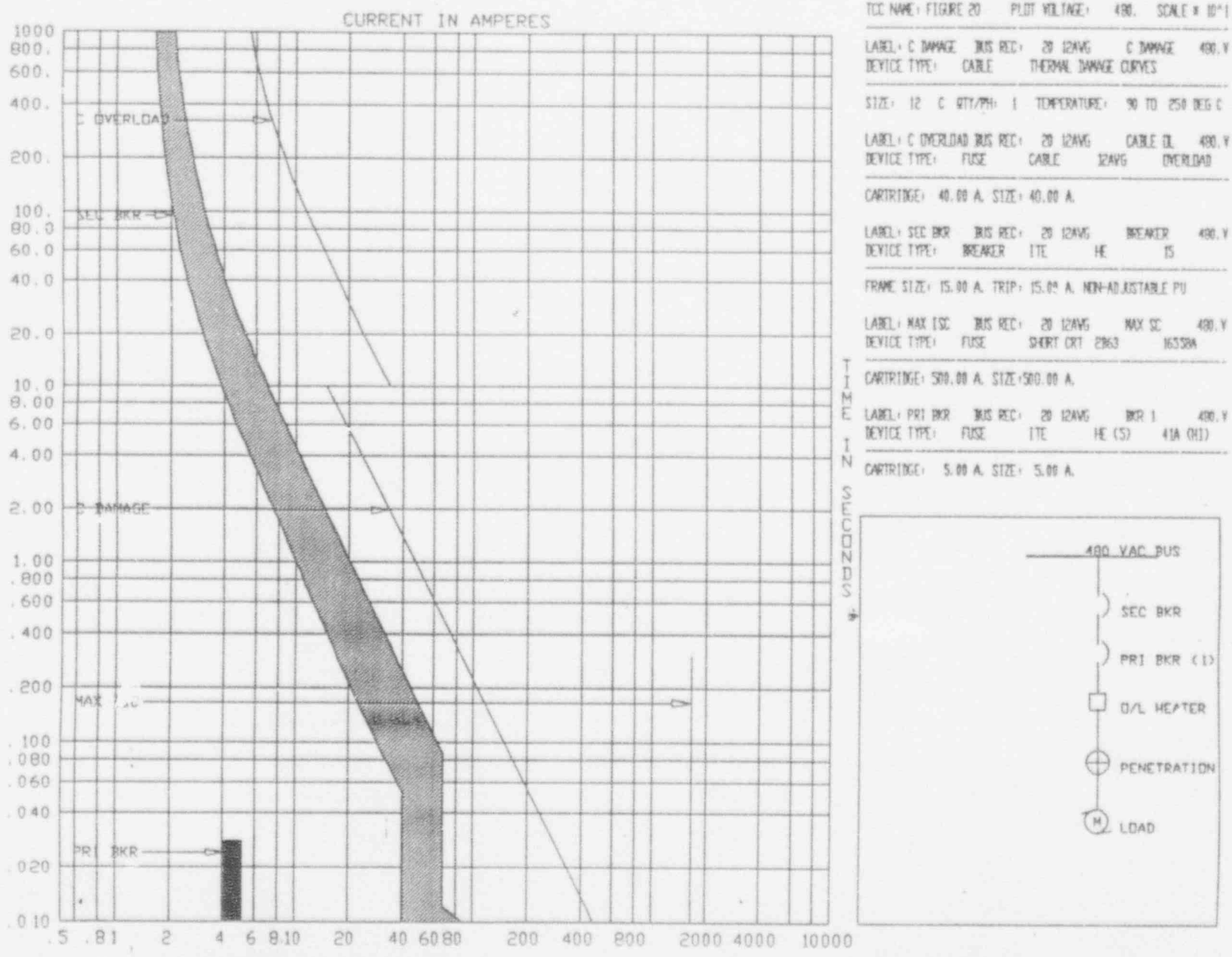
LABEL: MAX ISC BUS REC: 20 12AWG MAX SC 480.Y
DEVICE TYPE: FUSE SHORT CKT 23KA 165.5KA

CARTRIDGE: 500.00 A. SIZE: 500.00 A.

LABEL: PRI BKR BUS REC: 20 12AWG BKR 1 480.Y
DEVICE TYPE: FUSE ITE HE (S) 41A (HI)

CARTRIDGE: 5.00 A. SIZE: 5.00 A.

APPENDIX II
CALC. 85-E-0118-01



TCC NAME: FIGURE 20 PLOT VOLTAGE: 480. SCALE X 10^1

LABEL: C DAMAGE BUS REC: 20 12AWG C DAMAGE 480.Y
DEVICE TYPE: CABLE THERMAL DAMAGE CURVES

SIZE: 12 C QTY/PH: 1 TEMPERATURE: 90 TO 250 DEG C

LABEL: C OVERLOAD BUS REC: 20 12AWG CABLE OL 480.Y
DEVICE TYPE: FUSE CABLE 12AWG OVERLOAD

CARTRIDGE: 40.00 A. SIZE: 40.00 A.

LABEL: SEC BKR BUS REC: 20 12AWG BREAKER 480.Y
DEVICE TYPE: BREAKER ITE HE 15

FRAME SIZE: 15.00 A. TRIP: 15.00 A. NON-ADJUSTABLE PU

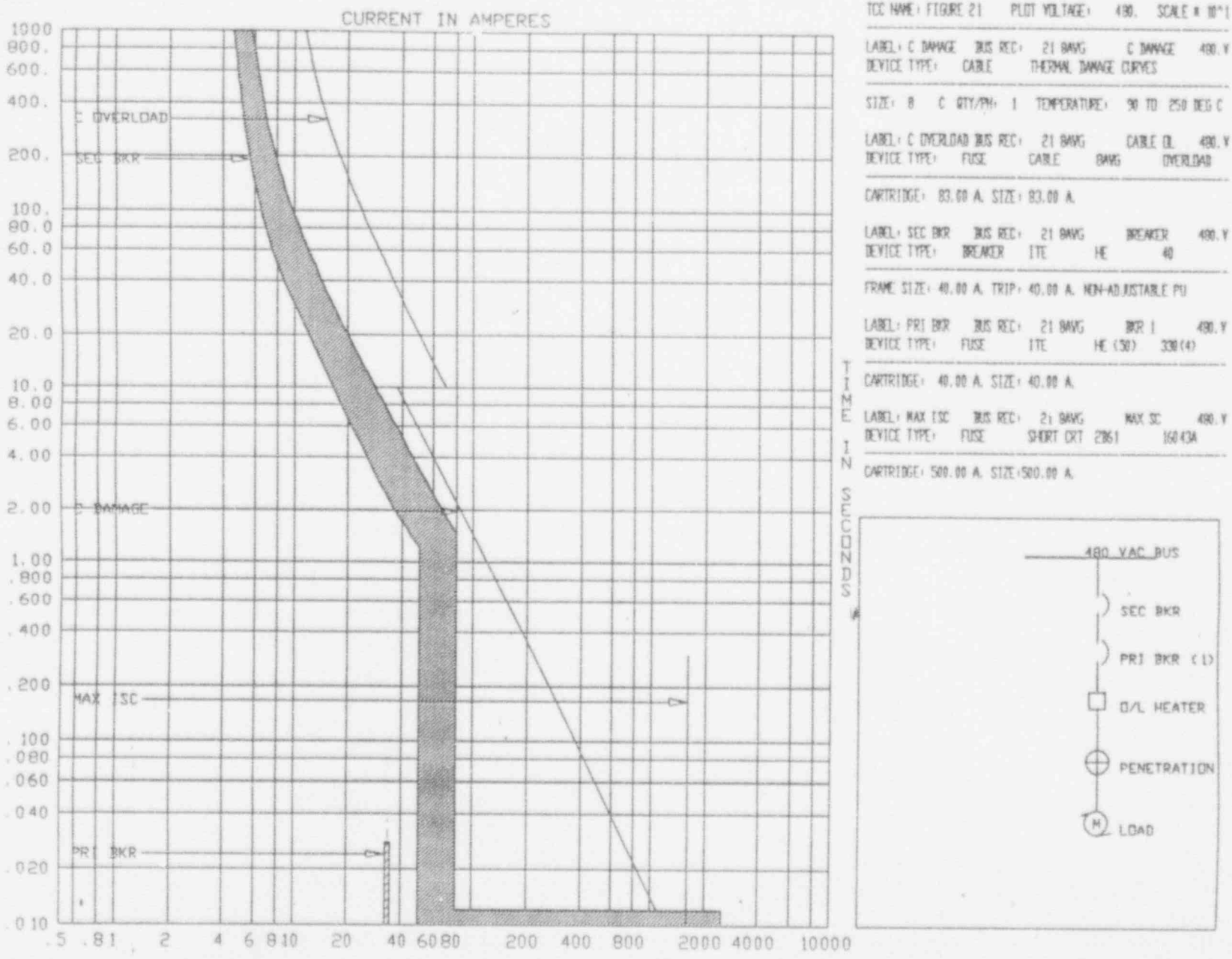
LABEL: MAX ISC BUS REC: 20 12AWG MAX SC 480.Y
DEVICE TYPE: FUSE SHORT CKT 23KA 16538A

CARTRIDGE: 500.00 A. SIZE: 500.00 A.

LABEL: PRI BKR BUS REC: 20 12AWG BKR 1 480.Y
DEVICE TYPE: FUSE ITE HE (S) 41A (H1)

CARTRIDGE: 5.00 A. SIZE: 5.00 A.

APPENDIX II
CALC. 85-E-0118-01



DRAWING NAME: FIGURE 21
CURRENT SCALE X 10^ 1 REFERENCE VOLTAGE 480

TCC NAME: FIGURE 21 PLOT VOLTAGE: 480. SCALE X 10^1

LABEL: C DAMAGE BUS REC: 21 BAMG C DAMAGE 480.Y
DEVICE TYPE: CABLE THERMAL DAMAGE CURVES

SIZE: 8 C QTY/PH: 1 TEMPERATURE: 90 TO 250 DEG C

LABEL: C OVERLOAD BUS REC: 21 BAMG CABLE OL 480.Y
DEVICE TYPE: FUSE CABLE BAMG OVERLOAD

CARTRIDGE: 83.00 A. SIZE: 83.00 A.

LABEL: SEC BKR BUS REC: 21 BAMG BREAKER 480.Y
DEVICE TYPE: BREAKER ITE HE 40

FRAME SIZE: 40.00 A. TRIP: 40.00 A. NON-ADJUSTABLE PU

LABEL: PRI BKR BUS REC: 21 BAMG BKR 1 480.Y
DEVICE TYPE: FUSE ITE HE (50) 330(4)

CARTRIDGE: 40.00 A. SIZE: 40.00 A.

LABEL: MAX ISC BUS REC: 21 BAMG MAX SC 480.Y
DEVICE TYPE: FUSE SHORT CKT 2361 16043A

CARTRIDGE: 500.00 A. SIZE: 500.00 A.

APPENDIX II
CALC. 85-E-0118-01

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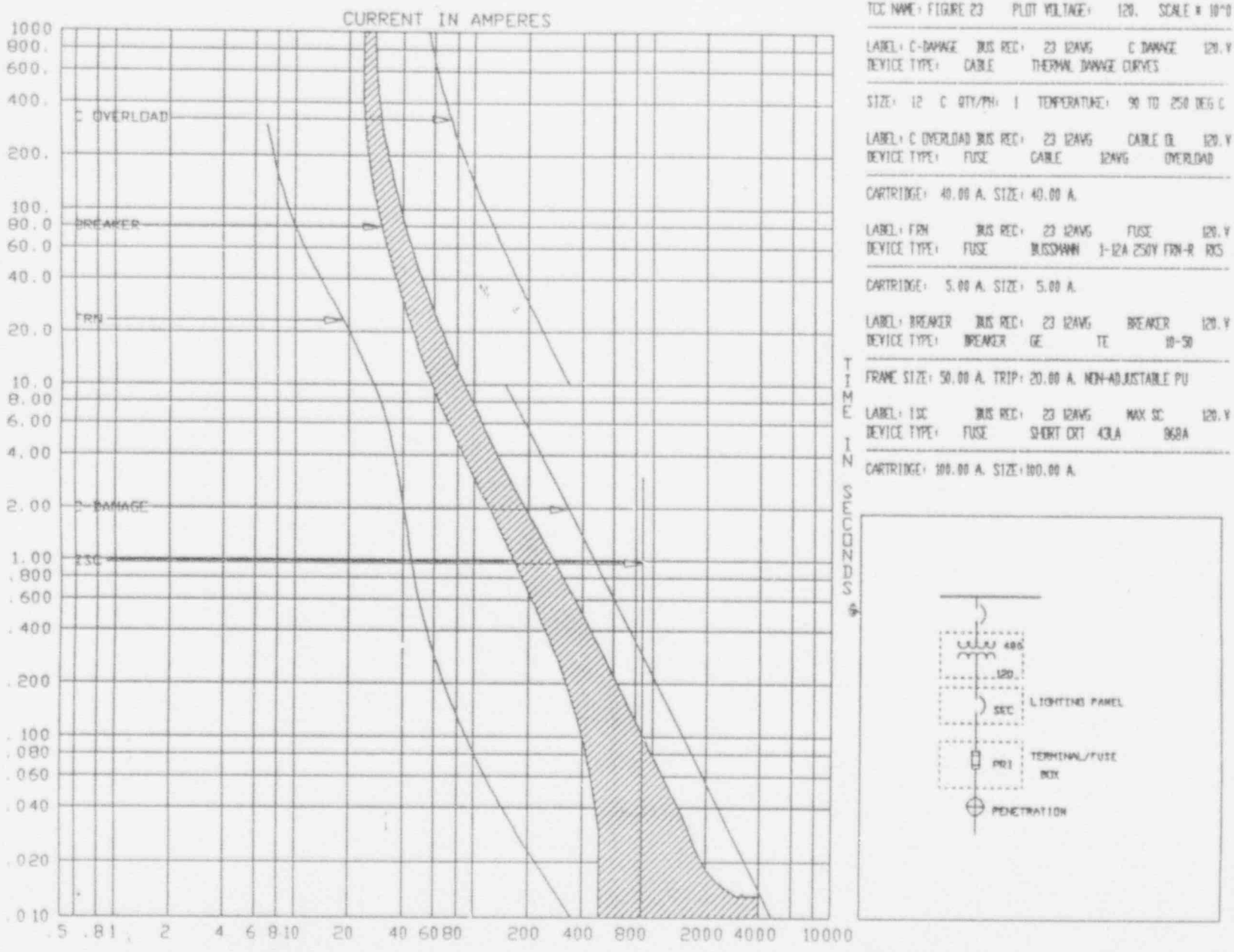
DRAWING NAME: FIGURE 22



DRAWING NAME: FIGURE 23
CURRENT SCALE X 10^0 REFERENCE VOLTAGE 120

TCC NAME: FIGURE 23 PLOT VOLTAGE: 120. SCALE X 10^0

LABEL: C-DAMAGE BUS REC: 23 12AWG C DAMAGE 120.V
DEVICE TYPE: CABLE THERMAL DAMAGE CURVES

SIZE: 12 C QTY/PH: 1 TEMPERATURE: 90 TO 250 DEG C

LABEL: C OVERLOAD BUS REC: 23 12AWG CABLE OL 120.V
DEVICE TYPE: FUSE CABLE 12AWG OVERLOAD

CARTRIDGE: 40.00 A. SIZE: 40.00 A.

LABEL: FRN BUS REC: 23 12AWG FUSE 120.V
DEVICE TYPE: FUSE BUSSMANN 1-12A 250V FRN-R RKS

CARTRIDGE: 5.00 A. SIZE: 5.00 A.

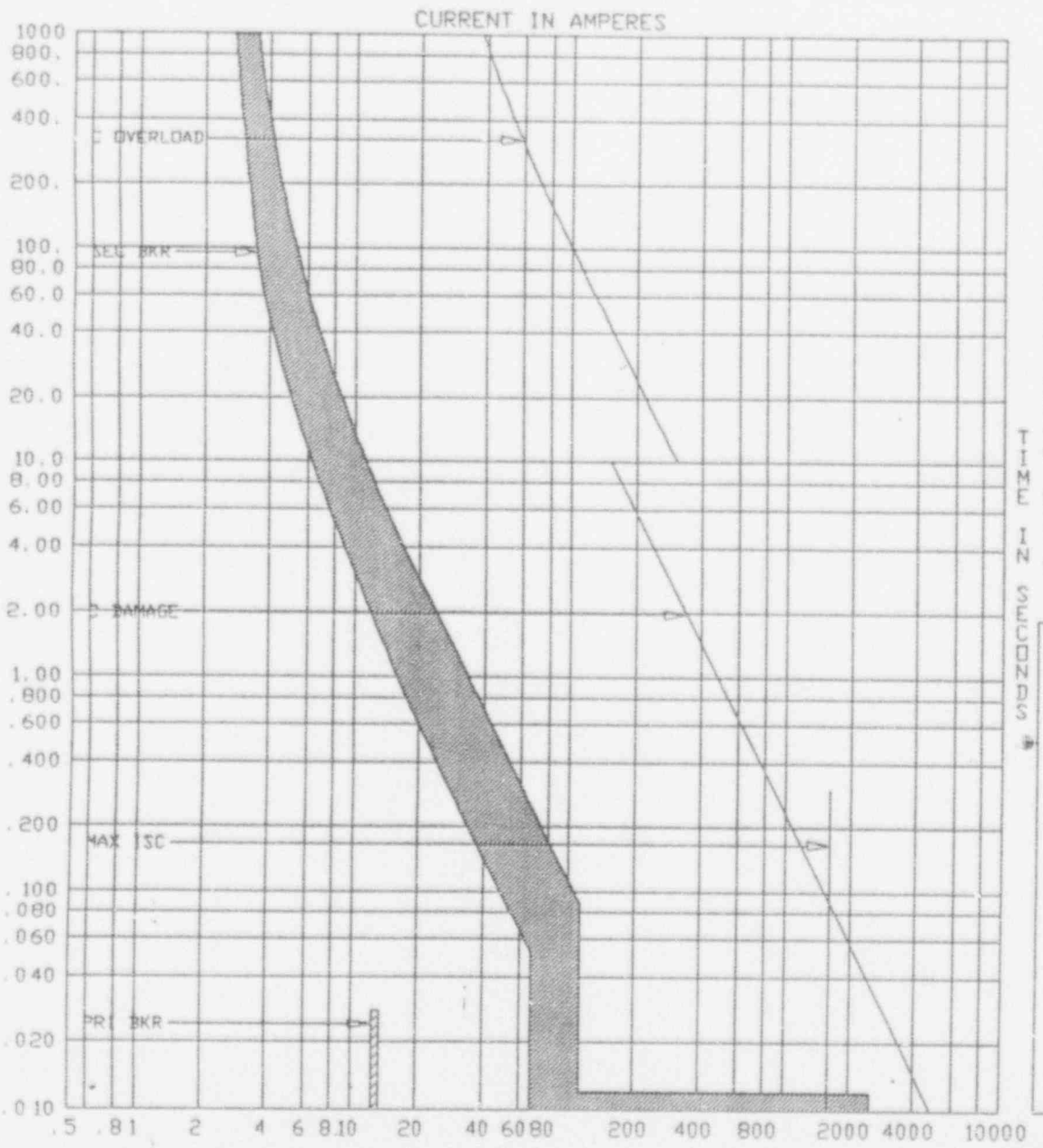
LABEL: BREAKER BUS REC: 23 12AWG BREAKER 120.V
DEVICE TYPE: BREAKER GE TE 10-50

FRAME SIZE: 50.00 A. TRIP: 20.00 A. NON-ADJUSTABLE PU

LABEL: ISC BUS REC: 23 12AWG MAX SC 120.V
DEVICE TYPE: FUSE SHORT CKT 43KA 86KA

CARTRIDGE: 100.00 A. SIZE: 100.00 A.

APPENDIX II
CALC. 85-E-0118-01



TCC NAME: FIGURE 24 PLOT VOLTAGE: 480. SCALE X 10^1

LABEL: C DAMAGE BUS REC: 24 2AVG C DAMAGE 480.Y
DEVICE TYPE: CABLE THERMAL DAMAGE CURVES

SIZE: 2 C QTY/PH: 1 TEMPERATURE: 90 TO 250 DEG C

LABEL: C OVERLOAD BUS REC: 24 2AVG CABLE OL 480.Y
DEVICE TYPE: FUSE CABLE 2AVG OVERLOAD

CARTRIDGE: 192.00 A. SIZE: 192.00 A.

LABEL: SEC BKR BUS REC: 24 2AVG BREAKER 480.Y
DEVICE TYPE: BREAKER ITE HE 25

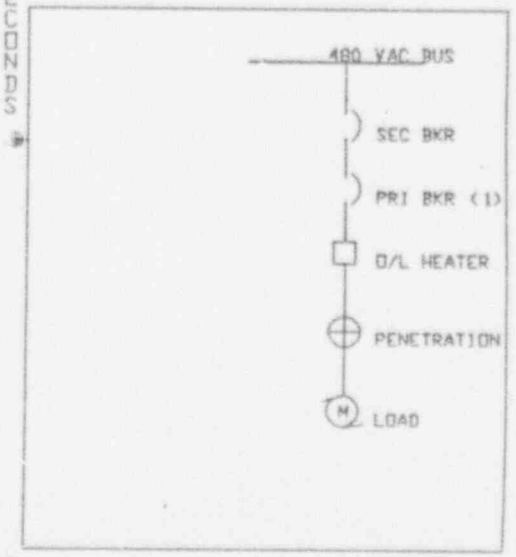
FRAME SIZE: 25.00 A. TRIP: 25.00 A. NON-ADJUSTABLE PU

LABEL: PRI BKR BUS REC: 24 2AVG BKR 1 480.Y
DEVICE TYPE: FUSE ITE HE (25) KLSA (3)

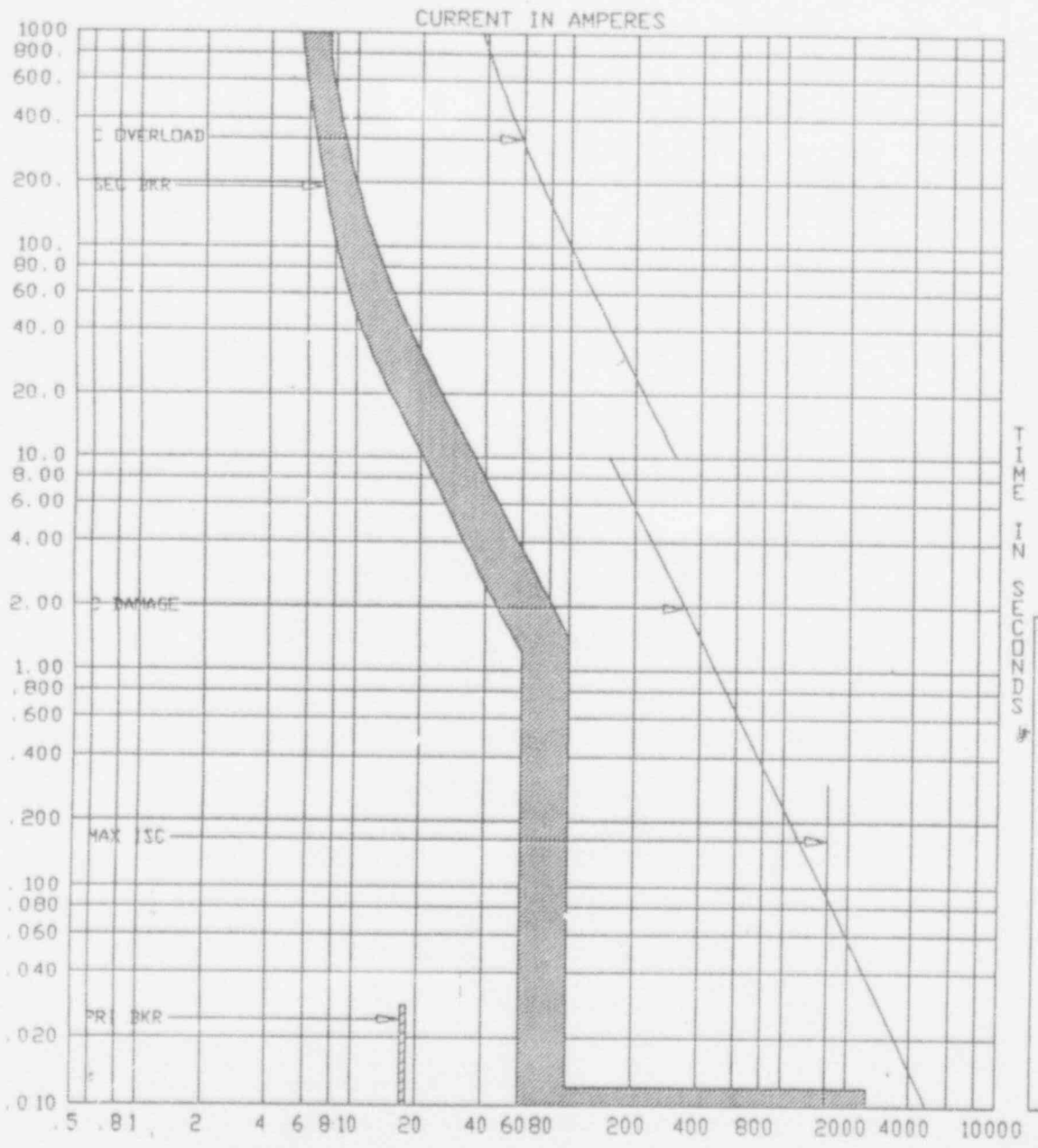
CARTRIDGE: 25.00 A. SIZE: 25.00 A.

LABEL: MAX ISC BUS REC: 24 2AVG MAX SC 480.Y
DEVICE TYPE: FUSE SHORT CKT 2861 16043A

CARTRIDGE: 500.00 A. SIZE: 500.00 A.



DRAWING NAME: FIGURE 24
CURRENT SCALE X 10^ 1 REFERENCE VOLTAGE 480



DRAWING NAME: FIGURE 25
CURRENT SCALE X 10^ 1 REFERENCE VOLTAGE 480

TCC NAME: FIGURE 25 PLOT VOLTAGE: 480. SCALE X 10^1

LABEL: C DAMAGE BUS REC: 25 2AWG C DAMAGE 480.Y
DEVICE TYPE: CABLE THERMAL DAMAGE CURVES

SIZE: 2 C QTY/PH: 1 TEMPERATURE: 90 TO 250 DEG C

LABEL: C OVERLOAD BUS REC: 25 2AWG CABLE OL 480.Y
DEVICE TYPE: FUSE CABLE 2AWG OVERLOAD

CARTRIDGE: 192.00 A. SIZE:192.00 A.

LABEL: SEC BKR BUS REC: 25 2AWG BREAKER 480.Y
DEVICE TYPE: BREAKER ITE HE 50

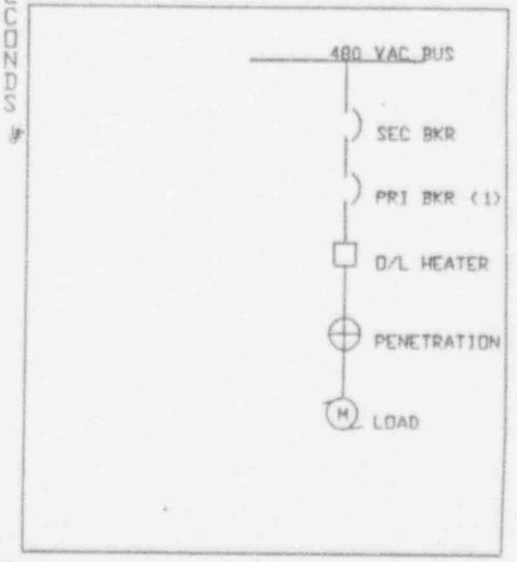
FRAME SIZE: 50.00 A. TRIP: 50.00 A. NON-ADJUSTABLE PU

LABEL: PRI BKR BUS REC: 25 2AWG BKR 1 480.Y
DEVICE TYPE: FUSE ITE HE (25) 170 (4)

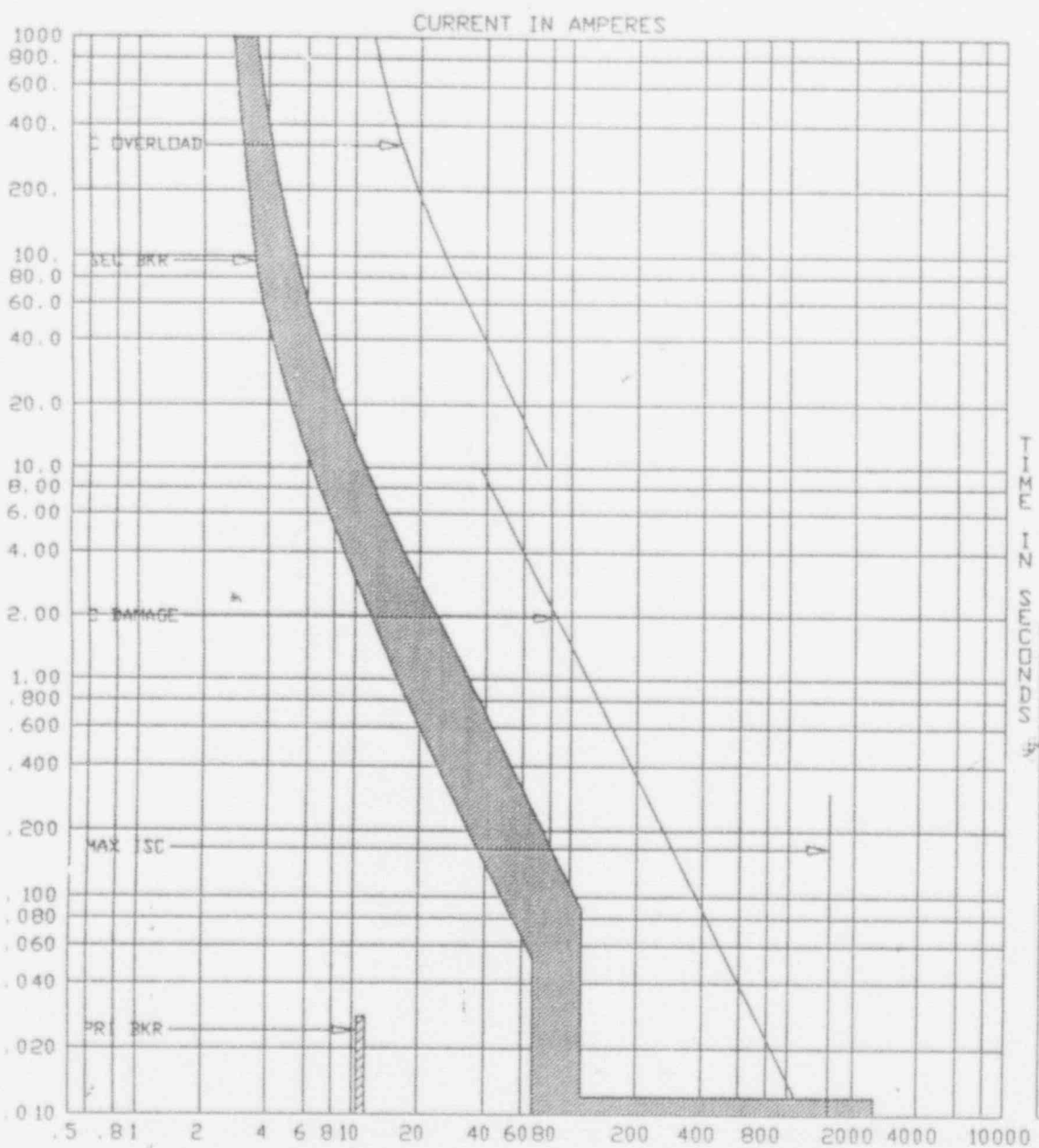
CARTRIDGE: 25.00 A. SIZE: 25.00 A.

LABEL: MAX ISC BUS REC: 25 2AWG MAX SC 480.Y
DEVICE TYPE: FUSE SHORT CKT 2861 16043A

CARTRIDGE: 500.00 A. SIZE:500.00 A.



APPENDIX II
CALC. 85-E-0118-01



DRAWING NAME: FIGURE 26
CURRENT SCALE X 10^ 1 REFERENCE VOLTAGE 480

TCC NAME: FIGURE 26 PLOT VOLTAGE: 480. SCALE # 10^1

LABEL: C DAMAGE BUS REC: 26 BAYG C DAMAGE 480.Y
DEVICE TYPE: CABLE THERMAL DAMAGE CURVES

SIZE: 8 C QTY/PH: 1 TEMPERATURE: 90 TO 250 DEG C

LABEL: C OVERLOAD BUS REC: 26 BAYG CABLE OL 480.Y
DEVICE TYPE: FUSE CABLE C-26 OVERLOAD

CARTRIDGE: 80.00 A. SIZE: 80.00 A.

LABEL: SEC BKR BUS REC: 26 BAYG BREAKER 480.Y
DEVICE TYPE: BREAKER ITE HE 25

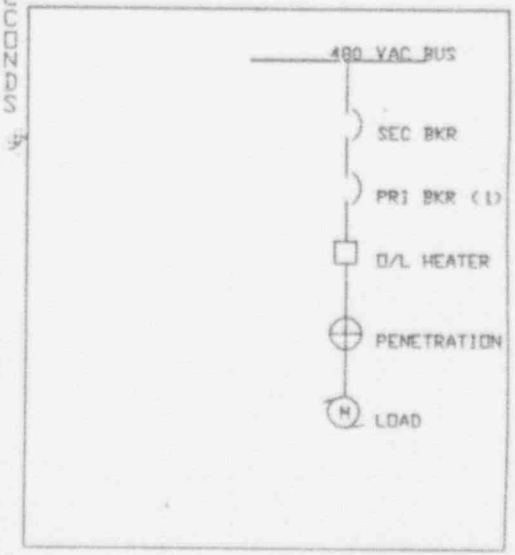
FRAME SIZE: 25.00 A. TRIP: 25.00 A. NON-ADJUSTABLE PU

LABEL: PRI BKR BUS REC: 26 BAYG BKR 1 480.Y
DEVICE TYPE: FUSE ITE HE (25) 105 (2)

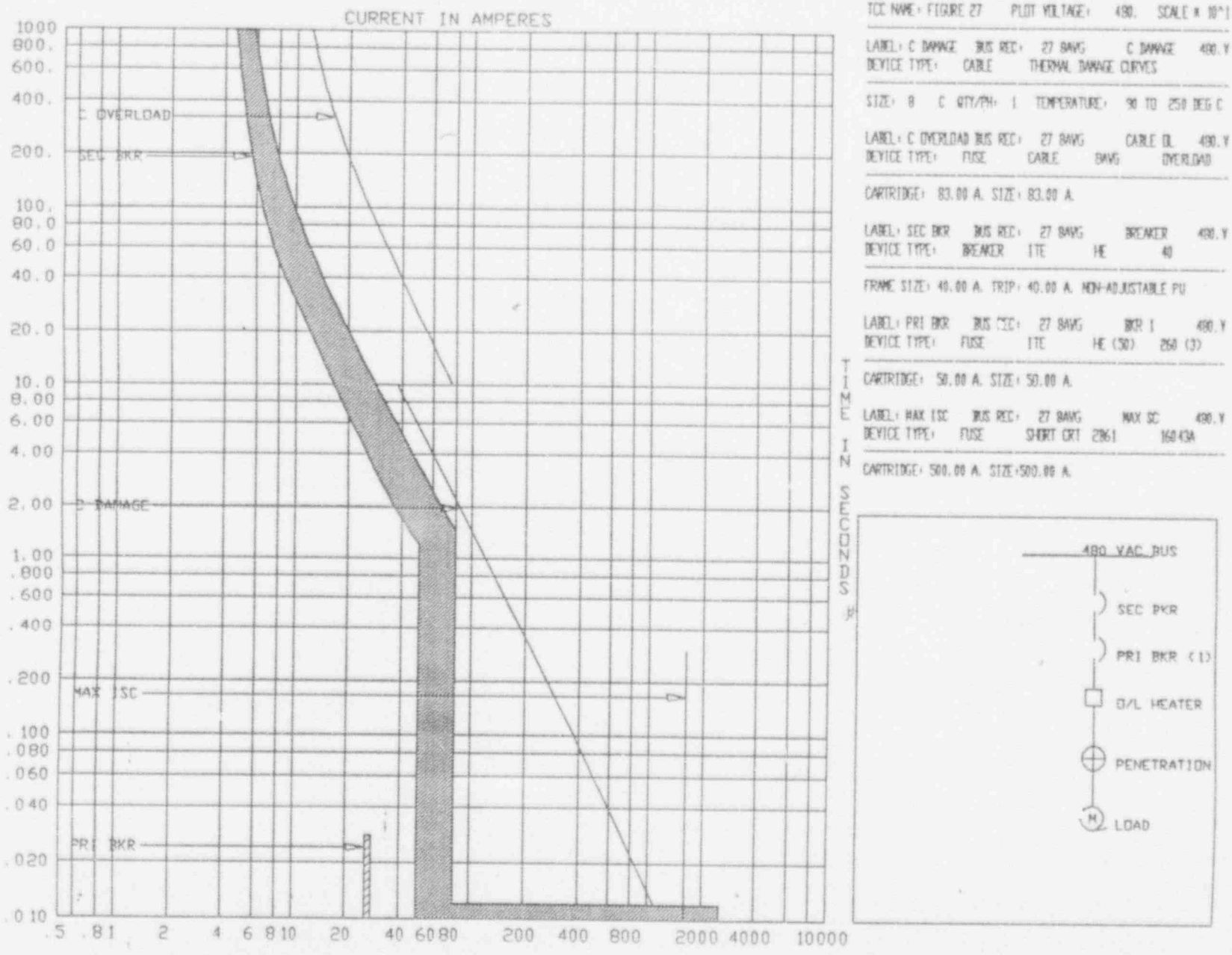
CARTRIDGE: 25.00 A. SIZE: 25.00 A.

LABEL: MAX ISC BUS REC: 26 BAYG MAX SC 480.Y
DEVICE TYPE: FUSE SHORT CKT 2351 15518A

CARTRIDGE: 500.00 A. SIZE: 500.00 A.



APPENDIX II
CALC. 85-E-0118-01



DRAWING NAME: FIGURE 27
CURRENT SCALE X 10^ 1 REFERENCE VOLTAGE 480

TCC NAME: FIGURE 27 PLOT VOLTAGE: 480. SCALE X 10^1

LABEL: C DAMAGE BUS REC: 27 BAVG C DAMAGE 480.Y
DEVICE TYPE: CABLE THERMAL DAMAGE CURVES

SIZE: 8 C QTY/PH: 1 TEMPERATURE: 90 TO 250 DEG C

LABEL: C OVERLOAD BUS REC: 27 BAVG CABLE OL 480.Y
DEVICE TYPE: FUSE CABLE BAVG OVERLOAD

CARTRIDGE: 83.00 A. SIZE: 83.00 A.

LABEL: SEC BKR BUS REC: 27 BAVG BREAKER 480.Y
DEVICE TYPE: BREAKER ITE HE 40

FRAME SIZE: 40.00 A. TRIP: 40.00 A. NON-ADJUSTABLE PU

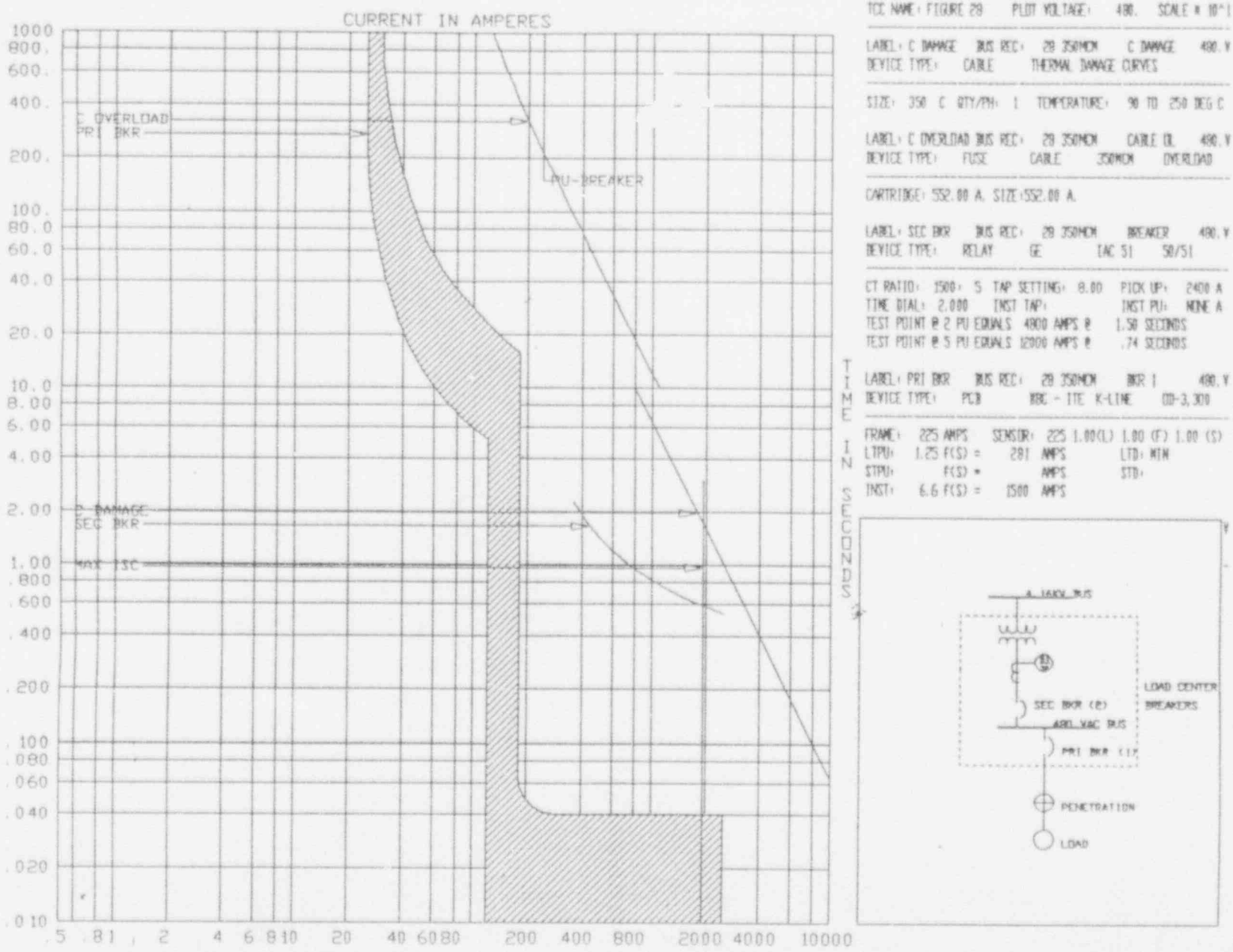
LABEL: PRI BKR BUS REC: 27 BAVG BKR 1 480.Y
DEVICE TYPE: FUSE ITE HE (50) 250 (3)

CARTRIDGE: 50.00 A. SIZE: 50.00 A.

LABEL: MAX ISC BUS REC: 27 BAVG MAX SC 480.Y
DEVICE TYPE: FUSE SHORT CKT 2861 16043A

CARTRIDGE: 500.00 A. SIZE: 500.00 A.

APPENDIX II
CALC. 85-E-0118-01



DRAWING NAME: FIGURE 28
CURRENT SCALE X 10^ 1 REFERENCE VOLTAGE 480

TCC NAME: FIGURE 28 PLOT VOLTAGE: 480. SCALE X 10^1

LABEL: C DAMAGE BUS REC: 28 350MCM C DAMAGE 480.Y
DEVICE TYPE: CABLE THERMAL DAMAGE CURVES

SIZE: 350 C QTY/PH: 1 TEMPERATURE: 90 TO 250 DEG C

LABEL: C OVERLOAD BUS REC: 28 350MCM CABLE OL 480.Y
DEVICE TYPE: FUSE CABLE 350MCM OVERLOAD

CARTRIDGE: 552.00 A. SIZE:552.00 A.

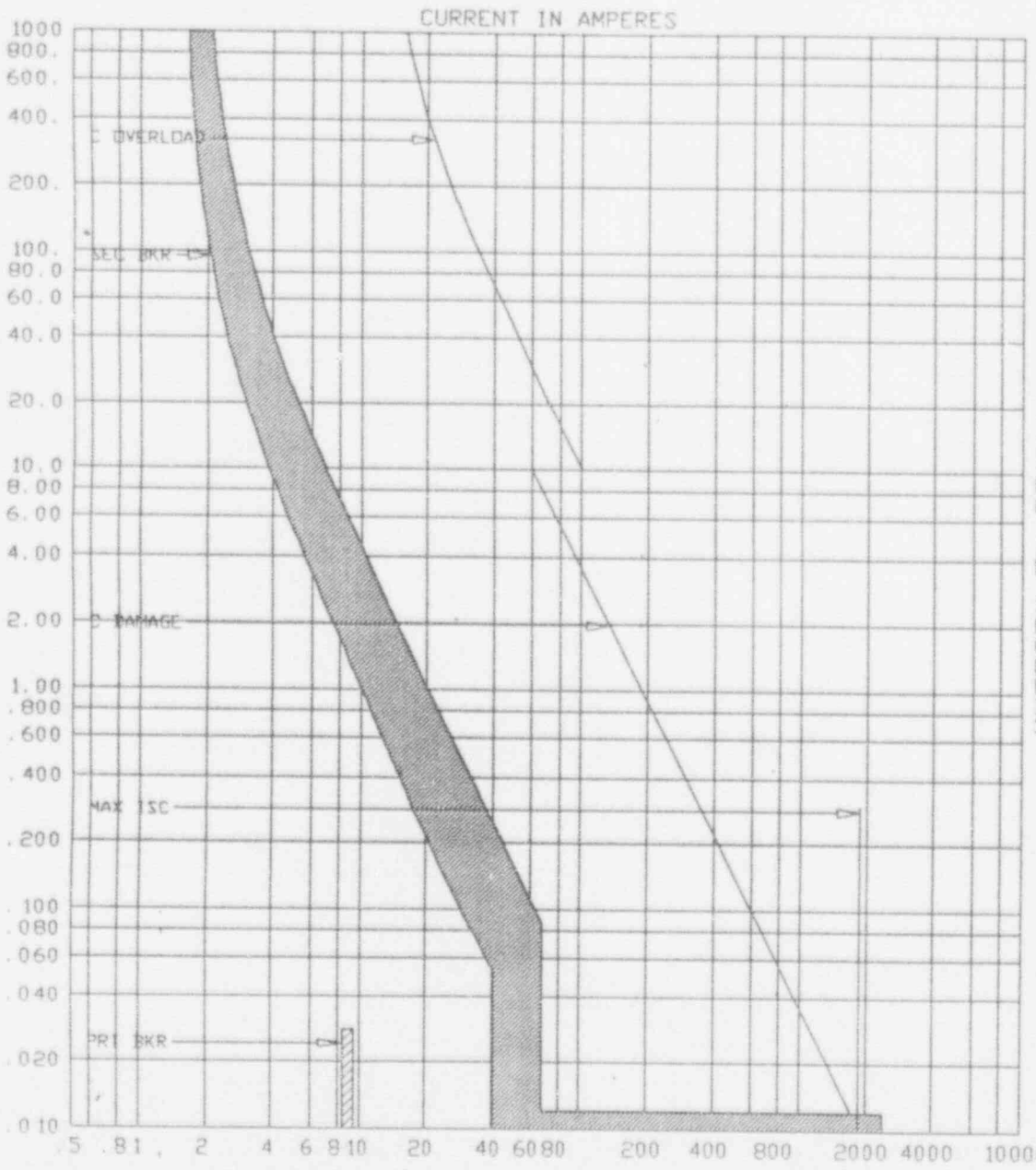
LABEL: SEC BKR BUS REC: 28 350MCM BREAKER 480.Y
DEVICE TYPE: RELAY GE IAC 51 50/51

CT RATIO: 1500: 5 TAP SETTING: 8.00 PICK UP: 2400 A
TIME DIAL: 2.000 INST TAP: INST PU: NONE A
TEST POINT @ 2 PU EQUALS 4800 AMPS @ 1.58 SECONDS
TEST POINT @ 5 PU EQUALS 12000 AMPS @ .74 SECONDS

LABEL: PRI BKR BUS REC: 28 350MCM BKR 1 480.Y
DEVICE TYPE: PCB BBC - ITE K-LINE CD-3,300

FRAME: 225 AMPS SENSOR: 225 1.00(L) 1.00 (F) 1.00 (S)
LTPU: 1.25 F(S) = 281 AMPS LTD: MIN
STPU: F(S) = AMPS STD:
INST: 6.6 F(S) = 1500 AMPS

APPENDIX II
CALC. 85-E-0118-01



DRAWING NAME: FIGURE 29
CURRENT SCALE X 10^ 1 REFERENCE VOLTAGE 480

TCC NAME: FIGURE 29 PLOT VOLTAGE: 480. SCALE X 10^1

LABEL: C DAMAGE BUS REC: 29 6AWG C DAMAGE 480.Y
DEVICE TYPE: CABLE THERMAL DAMAGE CURVES

SIZE: 6 C QTY/PH: 1 TEMPERATURE: 90 TO 250 DEG C

LABEL: C OVERLOAD BUS REC: 29 6AWG CABLE OL 480.Y
DEVICE TYPE: FUSE CABLE 6AWG OVERLOAD

CARTRIDGE: 109.00 A. SIZE: 109.00 A.

LABEL: SEC BKR BUS REC: 29 6AWG BREAKER 480.Y
DEVICE TYPE: BREAKER ITE HE 15

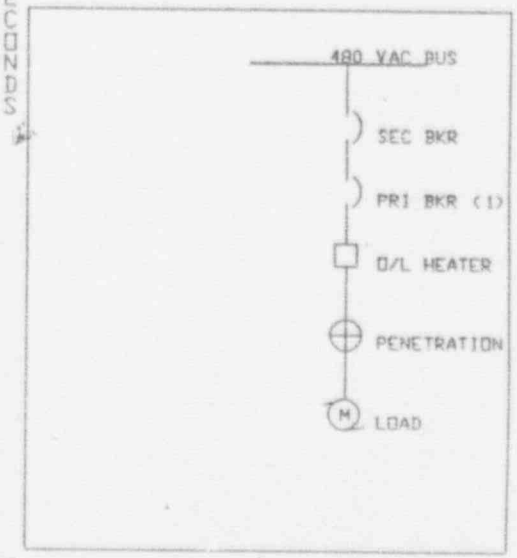
FRAME SIZE: 15.00 A. TRIP: 15.00 A. NON-ADJUSTABLE PU

LABEL: PRI BKR BUS REC: 29 6AWG BKR 1 480.Y
DEVICE TYPE: FUSE ITE HE (10) 84A (HI)

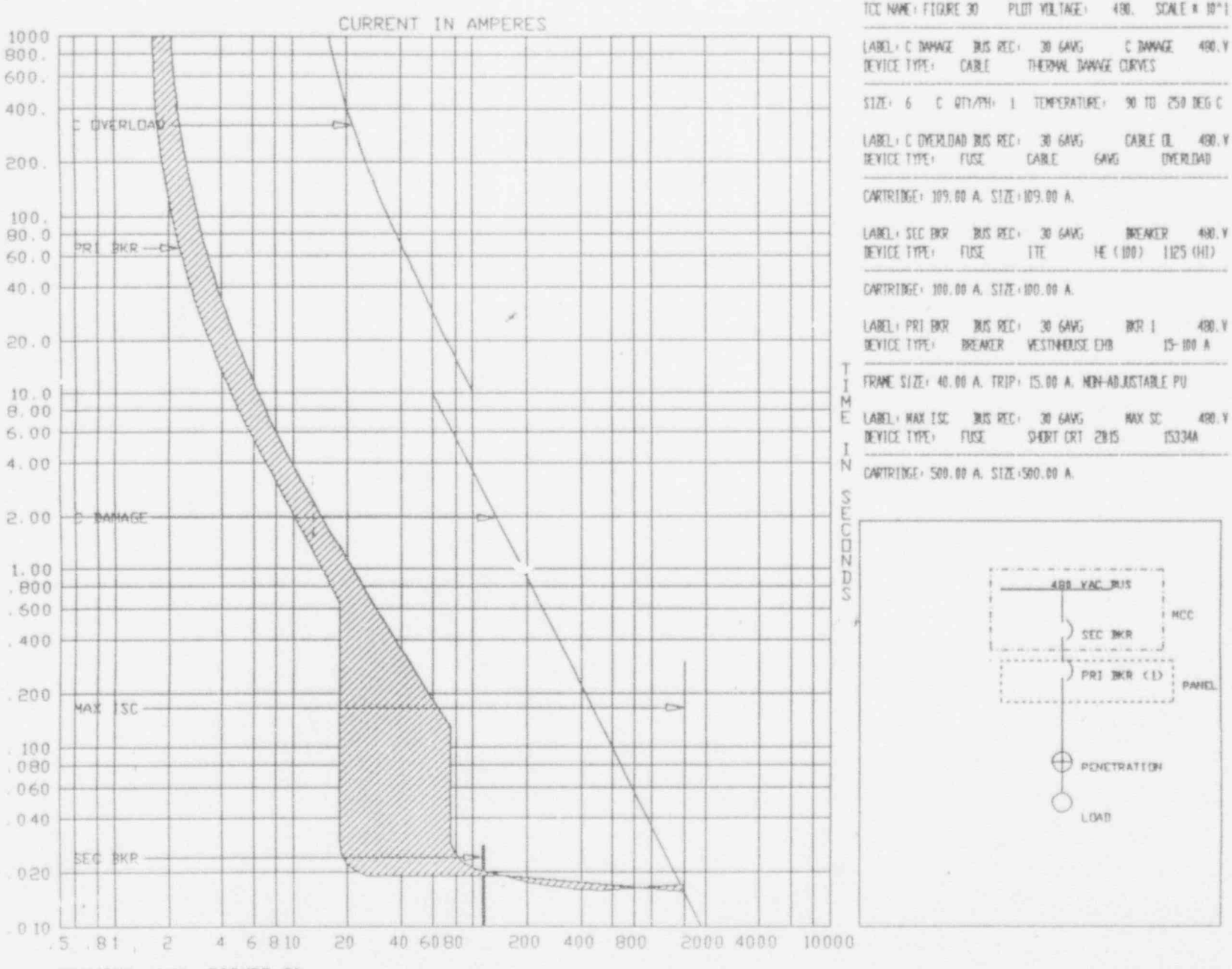
CARTRIDGE: 10.00 A. SIZE: 10.00 A.

LABEL: MAX ISC BUS REC: 29 6AWG MAX SC 480.Y
DEVICE TYPE: FUSE SHORT CKT 2864 18612

CARTRIDGE: 500.00 A. SIZE: 500.00 A.



APPENDIX II
CALC. 85-E-0118-01



DRAWING NAME: FIGURE 30
CURRENT SCALE X 10^ 1 REFERENCE VOLTAGE 480

TCC NAME: FIGURE 30 PLOT VOLTAGE: 480. SCALE X 10^1

LABEL: C DAMAGE BUS REC: 30 6AWG C DAMAGE 480.Y
DEVICE TYPE: CABLE THERMAL DAMAGE CURVES

SIZE: 6 C QTY/PH: 1 TEMPERATURE: 90 TO 250 DEG C

LABEL: C OVERLOAD BUS REC: 30 6AWG CABLE OL 480.Y
DEVICE TYPE: FUSE CABLE 6AWG OVERLOAD

CARTRIDGE: 109.00 A. SIZE: 109.00 A.

LABEL: SEC BKR BUS REC: 30 6AWG BREAKER 480.Y
DEVICE TYPE: FUSE ITE ME (100) 1125 (HI)

CARTRIDGE: 100.00 A. SIZE: 100.00 A.

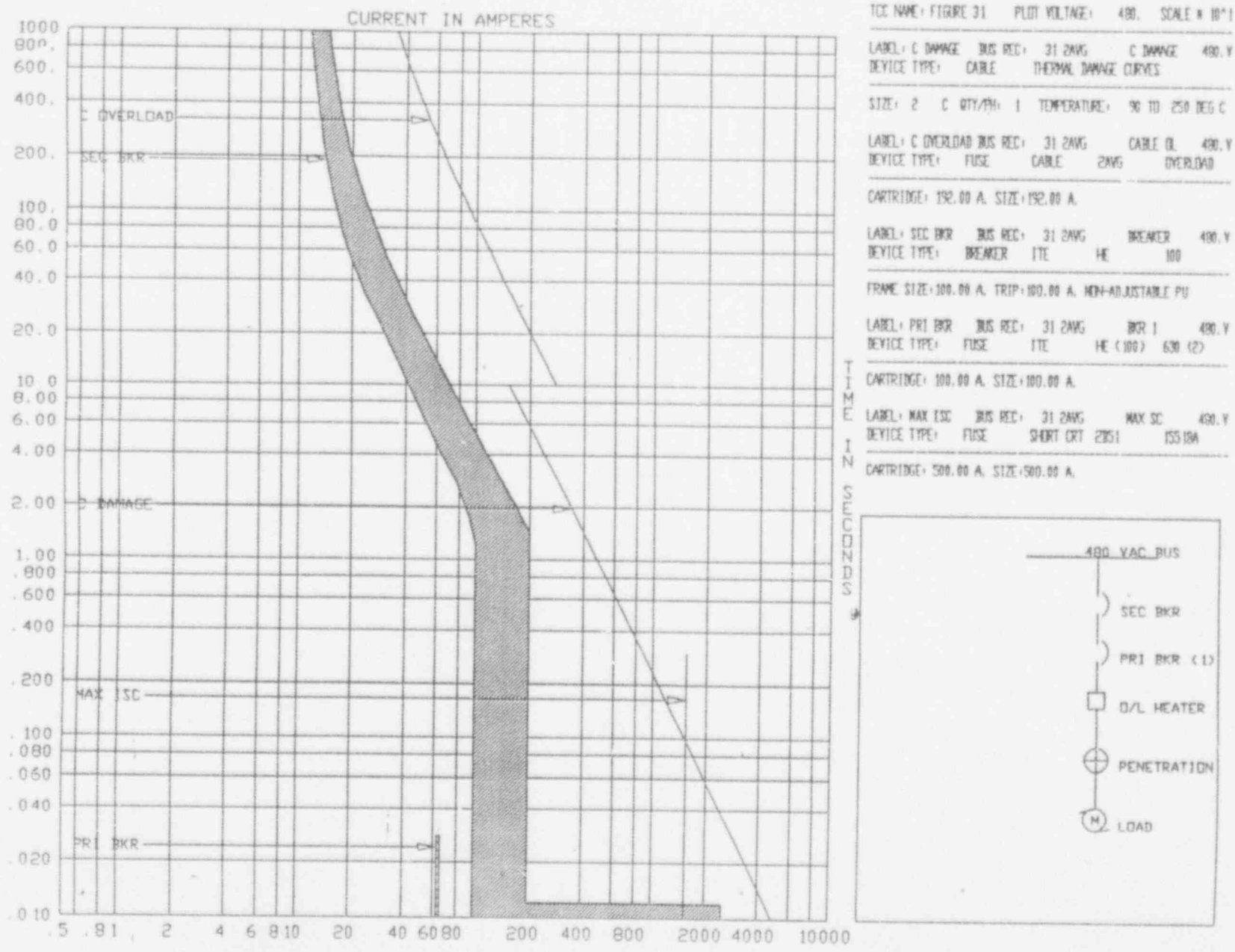
LABEL: PRI BKR BUS REC: 30 6AWG BKR 1 480.Y
DEVICE TYPE: BREAKER WESTINGHOUSE EHB EF-100 A

FRAME SIZE: 40.00 A. TRIP: 15.00 A. NON-ADJUSTABLE PU

LABEL: MAX ISC BUS REC: 30 6AWG MAX SC 480.Y
DEVICE TYPE: FUSE SHORT CRT 2815 15334A

CARTRIDGE: 500.00 A. SIZE: 500.00 A.

APPENDIX II
CALC. 85-E-0118-01



DRAWING NAME: FIGURE 31
CURRENT SCALE X 10^ 1 REFERENCE VOLTAGE 480

TCC NAME: FIGURE 31 PLOT VOLTAGE: 480. SCALE X 10^1

LABEL: C DAMAGE BUS REC: 31 2AWG C DAMAGE 480.Y
DEVICE TYPE: CABLE THERMAL DAMAGE CURVES

SIZE: 2 C QTY/PH: 1 TEMPERATURE: 90 TO 250 DEG C

LABEL: C OVERLOAD BUS REC: 31 2AWG CABLE OL 480.Y
DEVICE TYPE: FUSE CABLE 2AWG OVERLOAD

CARTRIDGE: 152.00 A. SIZE: 152.00 A.

LABEL: SEC BKR BUS REC: 31 2AWG BREAKER 480.Y
DEVICE TYPE: BREAKER ITE HE 100

FRAME SIZE: 100.00 A. TRIP: 100.00 A. NON-ADJUSTABLE PU

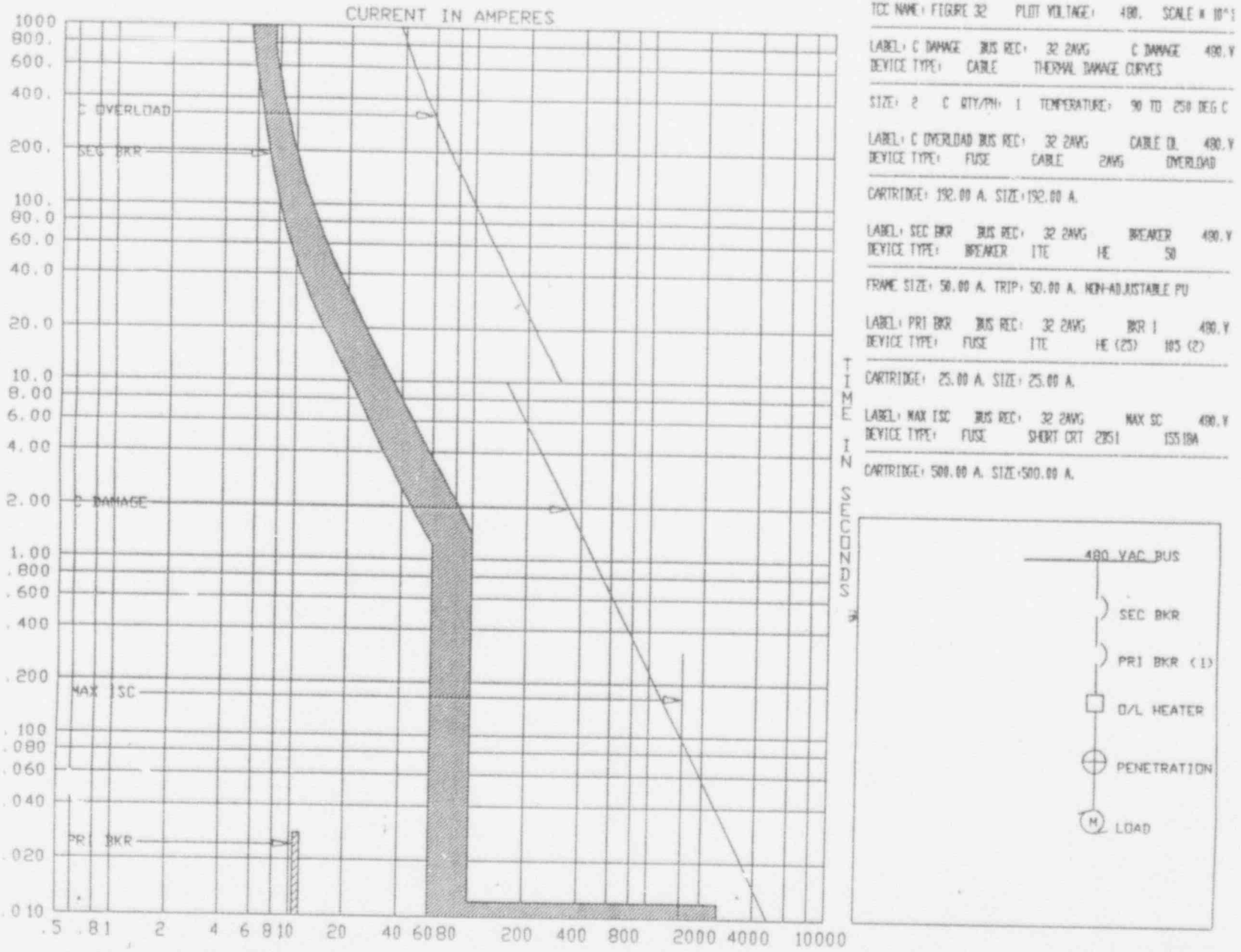
LABEL: PRI BKR BUS REC: 31 2AWG BKR 1 480.Y
DEVICE TYPE: FUSE ITE HE (100) 630 (2)

CARTRIDGE: 100.00 A. SIZE: 100.00 A.

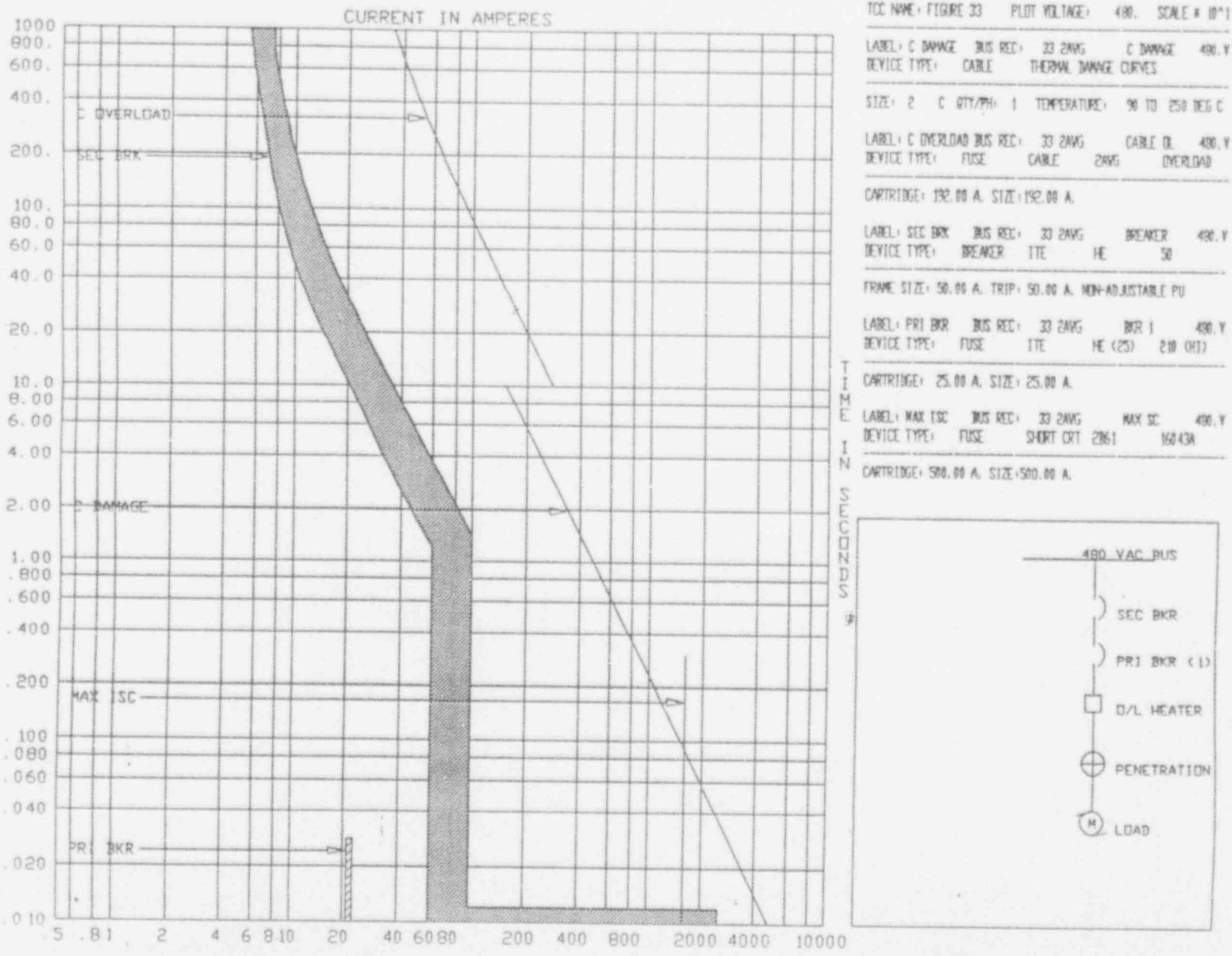
LABEL: MAX ISC BUS REC: 31 2AWG MAX SC 480.Y
DEVICE TYPE: FUSE SHORT CKT 2351 155 KA

CARTRIDGE: 500.00 A. SIZE: 500.00 A.

APPENDIX II
CALC. 85-E-0118-01



APPENDIX II
CALC. 85-E-0118-01



TCC NAME: FIGURE 33 PLOT VOLTAGE: 480. SCALE X 10^1

LABEL: C DAMAGE BUS REC: 33 2AWG C DAMAGE 480.Y
DEVICE TYPE: CABLE THERMAL DAMAGE CURVES

SIZE: 2 C QTY/PH: 1 TEMPERATURE: 90 TO 250 DEG C

LABEL: C OVERLOAD BUS REC: 33 2AWG CABLE OL 480.Y
DEVICE TYPE: FUSE CABLE 2AWG OVERLOAD

CARTRIDGE: 192.00 A. SIZE: 192.00 A.

LABEL: SEC BRK BUS REC: 33 2AWG BREAKER 480.Y
DEVICE TYPE: BREAKER ITE HE 50

FRAME SIZE: 50.00 A. TRIP: 50.00 A. NON-ADJUSTABLE PU

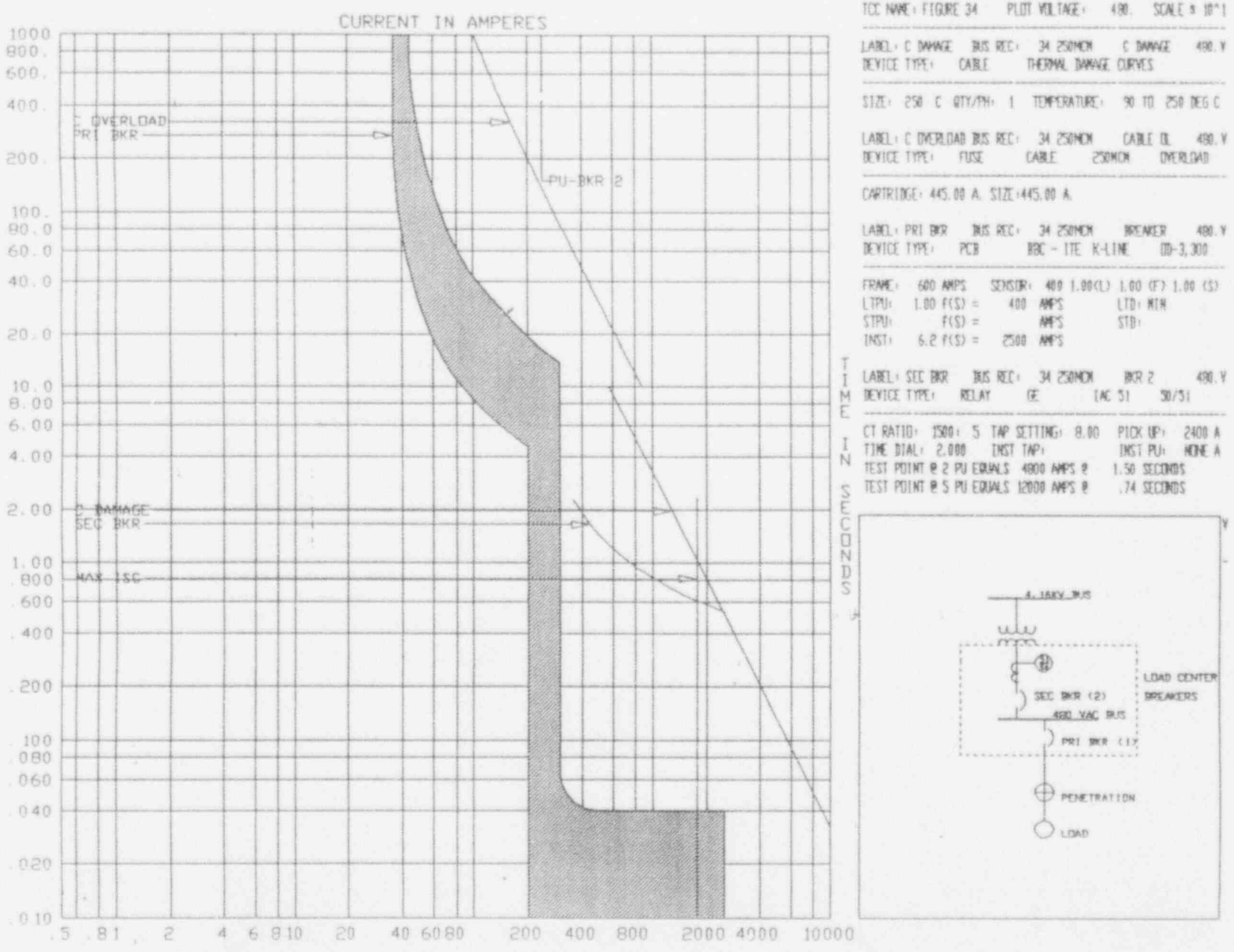
LABEL: PRI BKR BUS REC: 33 2AWG BKR 1 480.Y
DEVICE TYPE: FUSE ITE HE (25) 210 (H1)

CARTRIDGE: 25.00 A. SIZE: 25.00 A.

LABEL: MAX ISC BUS REC: 33 2AWG MAX SC 480.Y
DEVICE TYPE: FUSE SHORT CKT 2861 16043A

CARTRIDGE: 500.00 A. SIZE: 500.00 A.

DRAWING NAME: FIGURE 33
CURRENT SCALE X 10^ 1 REFERENCE VOLTAGE 480



TCC NAME: FIGURE 34 PLOT VOLTAGE: 480. SCALE X 10^1

LABEL: C DAMAGE BUS REC: 34 250MCM C DAMAGE 480.Y
DEVICE TYPE: CABLE THERMAL DAMAGE CURVES

SIZE: 250 C QTY/PH: 1 TEMPERATURE: 90 TO 250 DEG C

LABEL: C OVERLOAD BUS REC: 34 250MCM CABLE OL 480.Y
DEVICE TYPE: FUSE CABLE 250MCM OVERLOAD

CARTRIDGE: 445.00 A. SIZE:445.00 A.

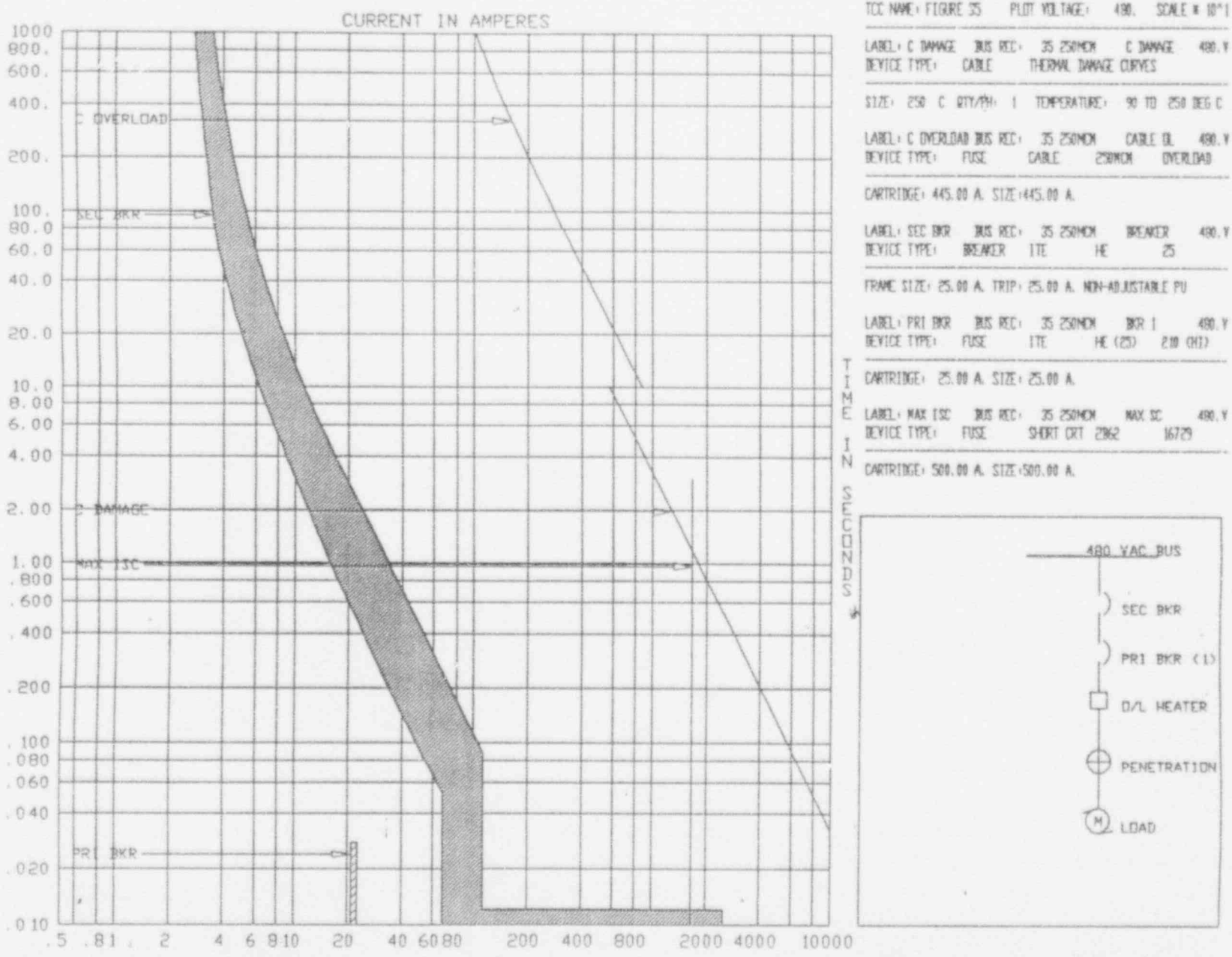
LABEL: PRI BKR BUS REC: 34 250MCM BREAKER 480.Y
DEVICE TYPE: PCB BBC - ITE K-LINE ID-3,300

FRAME: 600 AMPS SENSOR: 400 1.00(L) 1.00 (F) 1.00 (S)
LTPU: 1.00 F(S) = 400 AMPS LTD: MIN
STPU: F(S) = AMPS STD:
INST: 6.2 F(S) = 2500 AMPS

LABEL: SEC BKR BUS REC: 34 250MCM BKR 2 480.Y
DEVICE TYPE: RELAY GE IAC 51 50/51

CT RATIO: 1500: 5 TAP SETTING: 8.00 PICK UP: 2400 A
TIME DIAL: 2.000 INST TAP: INST PU: NONE A
TEST POINT @ 2 PU EQUALS 4800 AMPS @ 1.50 SECONDS
TEST POINT @ 5 PU EQUALS 12000 AMPS @ .74 SECONDS

APPENDIX II
CALC. 85-E-0118-01



TCC NAME: FIGURE 35 PLOT VOLTAGE: 480. SCALE X 10^1

LABEL: C DAMAGE BUS REC: 35 250MCM C DAMAGE 480.Y
DEVICE TYPE: CABLE THERMAL DAMAGE CURVES

SIZE: 250 C QTY/PH: 1 TEMPERATURE: 90 TO 250 DEG C

LABEL: C OVERLOAD BUS REC: 35 250MCM CABLE OL 480.Y
DEVICE TYPE: FUSE CABLE 250MCM OVERLOAD

CARTRIDGE: 445.00 A. SIZE:445.00 A.

LABEL: SEC BKR BUS REC: 35 250MCM BREAKER 480.Y
DEVICE TYPE: BREAKER ITE HE 25

FRAME SIZE: 25.00 A. TRIP: 25.00 A. NON-ADJUSTABLE PU

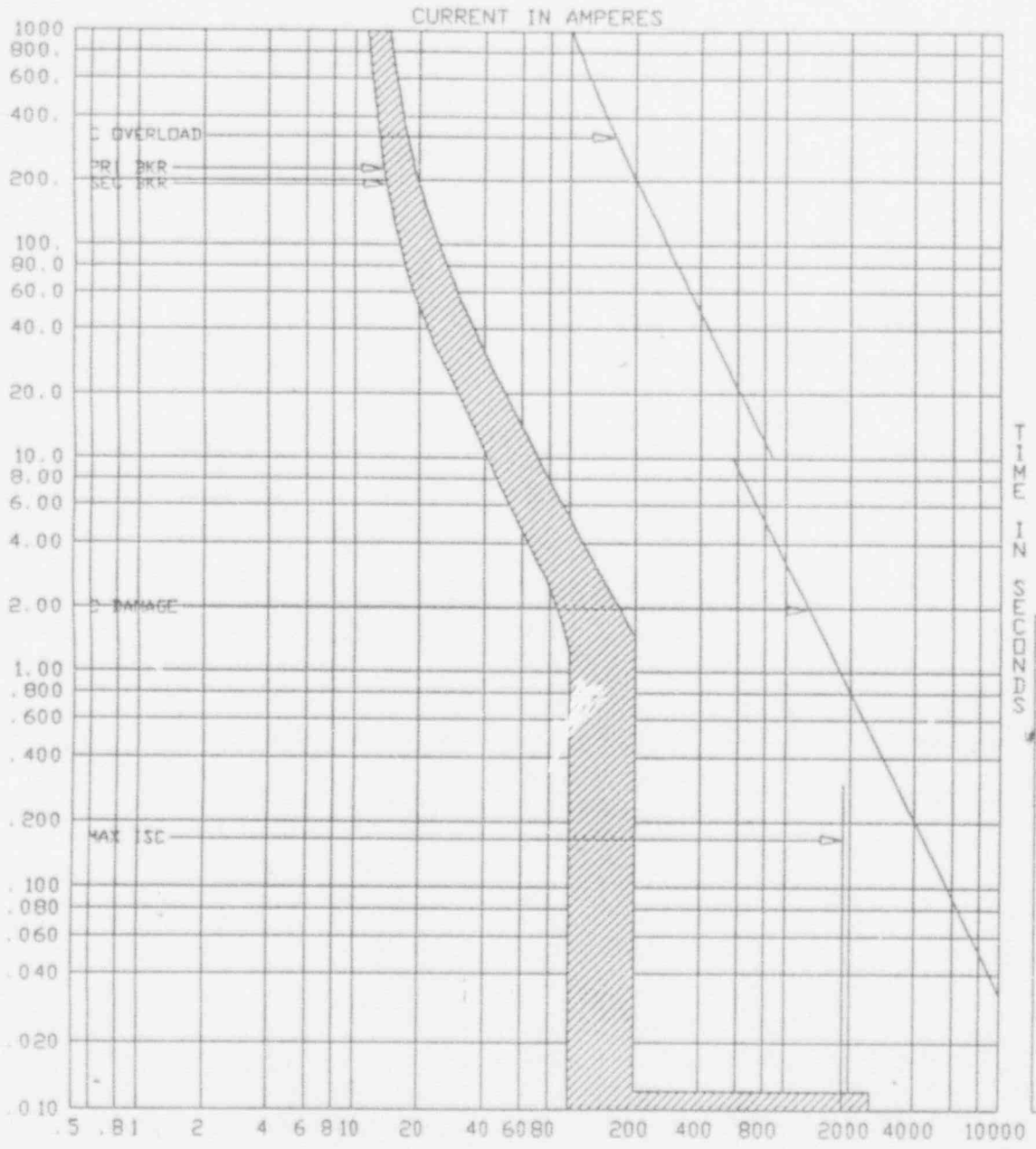
LABEL: PRI BKR BUS REC: 35 250MCM BKR 1 480.Y
DEVICE TYPE: FUSE ITE HE (25) 210 (HI)

CARTRIDGE: 25.00 A. SIZE: 25.00 A.

LABEL: MAX ISC BUS REC: 35 250MCM MAX SC 480.Y
DEVICE TYPE: FUSE SHORT CKT 2862 16729

CARTRIDGE: 500.00 A. SIZE:500.00 A.

DRAWING NAME: FIGURE 35
CURRENT SCALE X 10^ 1 REFERENCE VOLTAGE 480



TCC NAME: FIGURE 36 PLOT VOLTAGE: 480. SCALE X 10^1

LABEL: C DAMAGE BUS REC: 36 250MCM C DAMAGE 480.Y
DEVICE TYPE: CABLE THERMAL DAMAGE CURVES

SIZE: 250 C QTY/PH: 1 TEMPERATURE: 90 TO 250 DEG C

LABEL: C OVERLOAD BUS REC: 36 250MCM CABLE OL 480.Y
DEVICE TYPE: FUSE CABLE 250MCM OVERLOAD

CARTRIDGE: 445.00 A. SIZE:445.00 A.

LABEL: SEC BKR BUS REC: 36 250MCM BREAKER 480.Y
DEVICE TYPE: BREAKER ITE HE 100

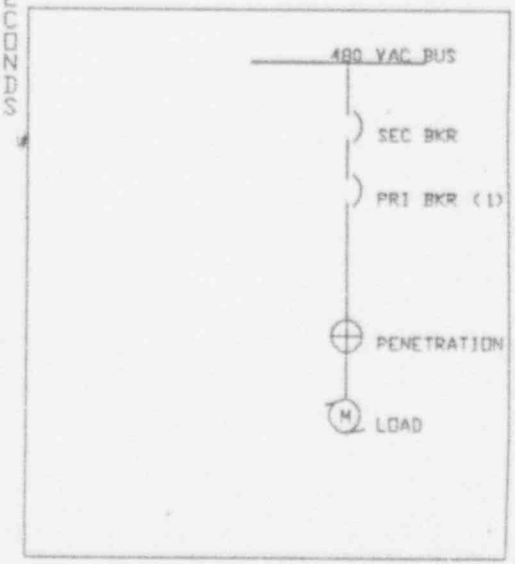
FRAME SIZE:100.00 A. TRIP:100.00 A. NON-ADJUSTABLE PU

LABEL: PRI BKR BUS REC: 36 250MCM BKR 1 480.Y
DEVICE TYPE: BREAKER ITE HE 100

FRAME SIZE:100.00 A. TRIP:100.00 A. NON-ADJUSTABLE PU

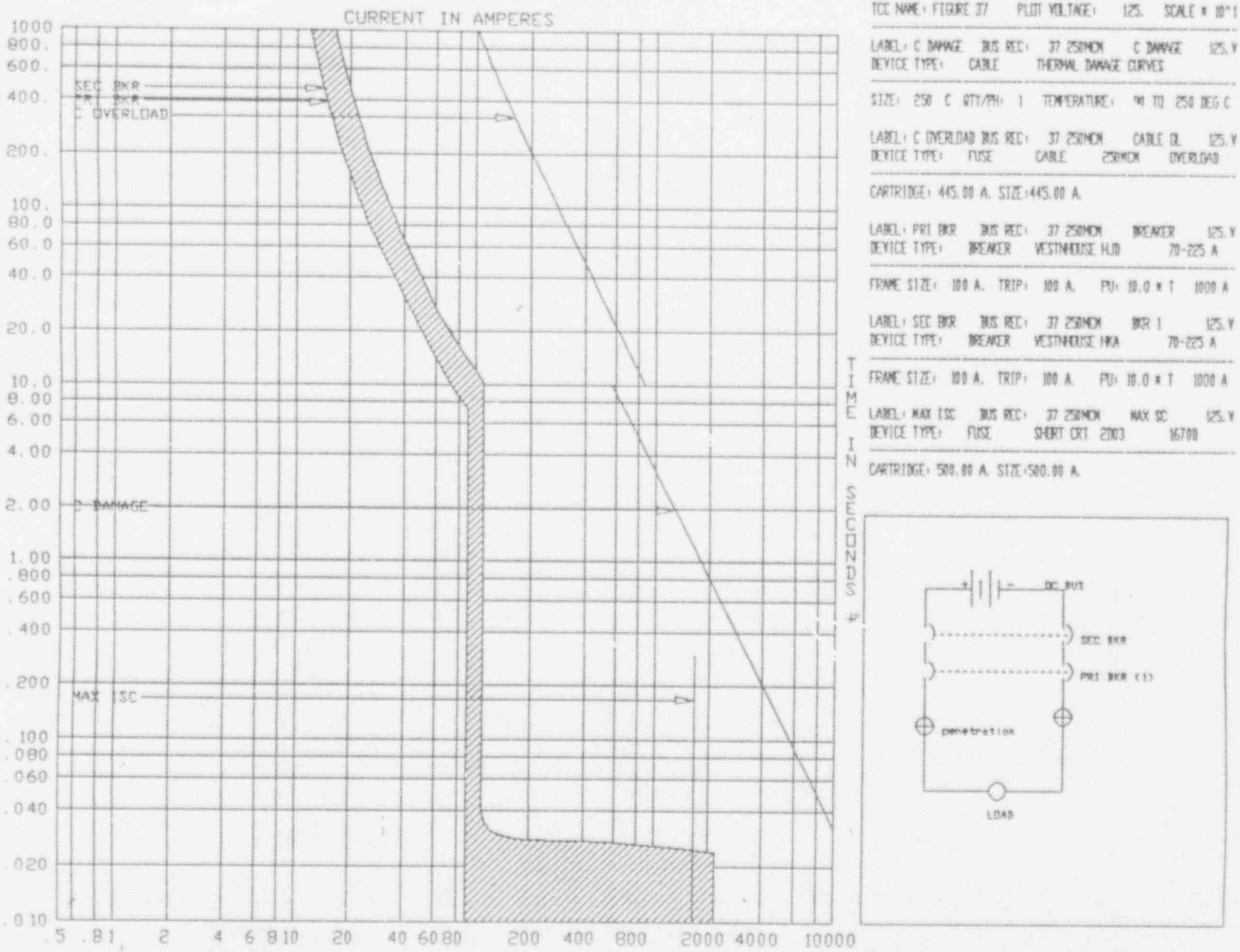
LABEL: MAX ISC BUS REC: 36 250MCM MAX SC 480.Y
DEVICE TYPE: FUSE SHORT CKT 21KA 10595A

CARTRIDGE: 500.00 A. SIZE:500.00 A.



DRAWING NAME: FIGURE 36
CURRENT SCALE X 10^ 1 REFERENCE VOLTAGE 480

APPENDIX II
CALC. 85-E-0118-01



TCC NAME: FIGURE 37 PLOT VOLTAGE: 125. SCALE X 10^1

LABEL: C DAMAGE BUS REC: 37 25MVA C DAMAGE 125.V
DEVICE TYPE: CABLE THERMAL DAMAGE CURVES

SIZE: 250 C QTY/PH: 1 TEMPERATURE: 90 TO 250 DEG C

LABEL: C OVERLOAD BUS REC: 37 25MVA CABLE OL 125.V
DEVICE TYPE: FUSE CABLE 25MVA OVERLOAD

CARTRIDGE: 445.00 A. SIZE:445.00 A.

LABEL: PRI BKR BUS REC: 37 25MVA BREAKER 125.V
DEVICE TYPE: BREAKER WESTINGHOUSE HLD 70-225 A

FRAME SIZE: 100 A. TRIP: 100 A. PU: 10.0 X T 1000 A

LABEL: SEC BKR BUS REC: 37 25MVA BKR 1 125.V
DEVICE TYPE: BREAKER WESTINGHOUSE HKA 70-225 A

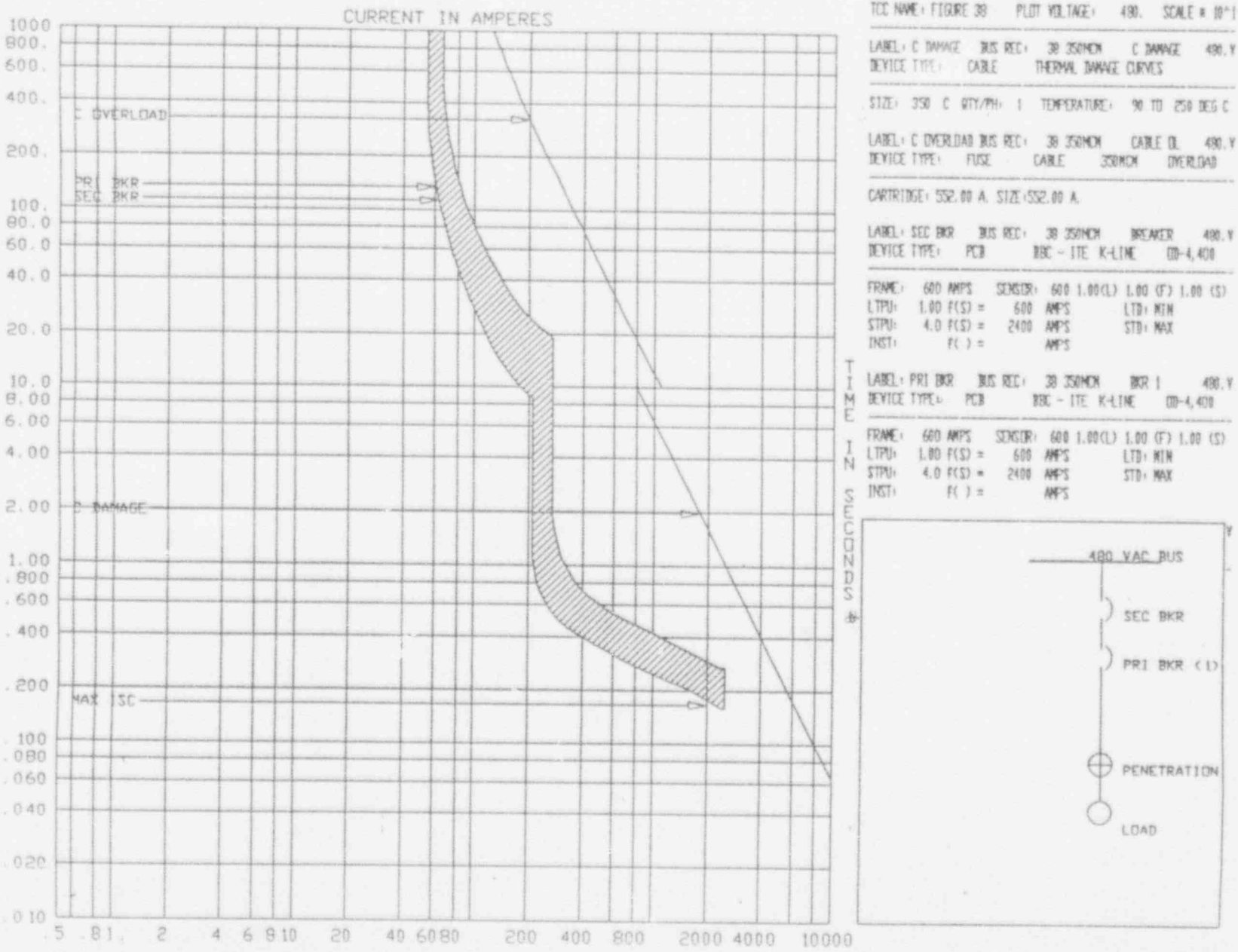
FRAME SIZE: 100 A. TRIP: 100 A. PU: 10.0 X T 1000 A

LABEL: MAX ISC BUS REC: 37 25MVA MAX SC 125.V
DEVICE TYPE: FUSE SHORT CKT 2303 16700

CARTRIDGE: 500.00 A. SIZE:500.00 A.

DRAWING NAME: FIGURE 37
CURRENT SCALE X 10^ 1 REFERENCE VOLTAGE 125

APPENDIX II
CALC. 85-E-0118-01



DRAWING NAME: FIGURE 38
CURRENT SCALE X 10^ 1 REFERENCE VOLTAGE 480

TCC NAME: FIGURE 38 PLOT VOLTAGE: 480. SCALE = 10^1

LABEL: C DAMAGE BUS REC: 38 350MCM C DAMAGE 480.Y
DEVICE TYPE: CABLE THERMAL DAMAGE CURVES

SIZE: 350 C QTY/PH: 1 TEMPERATURE: 90 TO 250 DEG C

LABEL: C OVERLOAD BUS REC: 38 350MCM CABLE OL 480.Y
DEVICE TYPE: FUSE CABLE 350MCM OVERLOAD

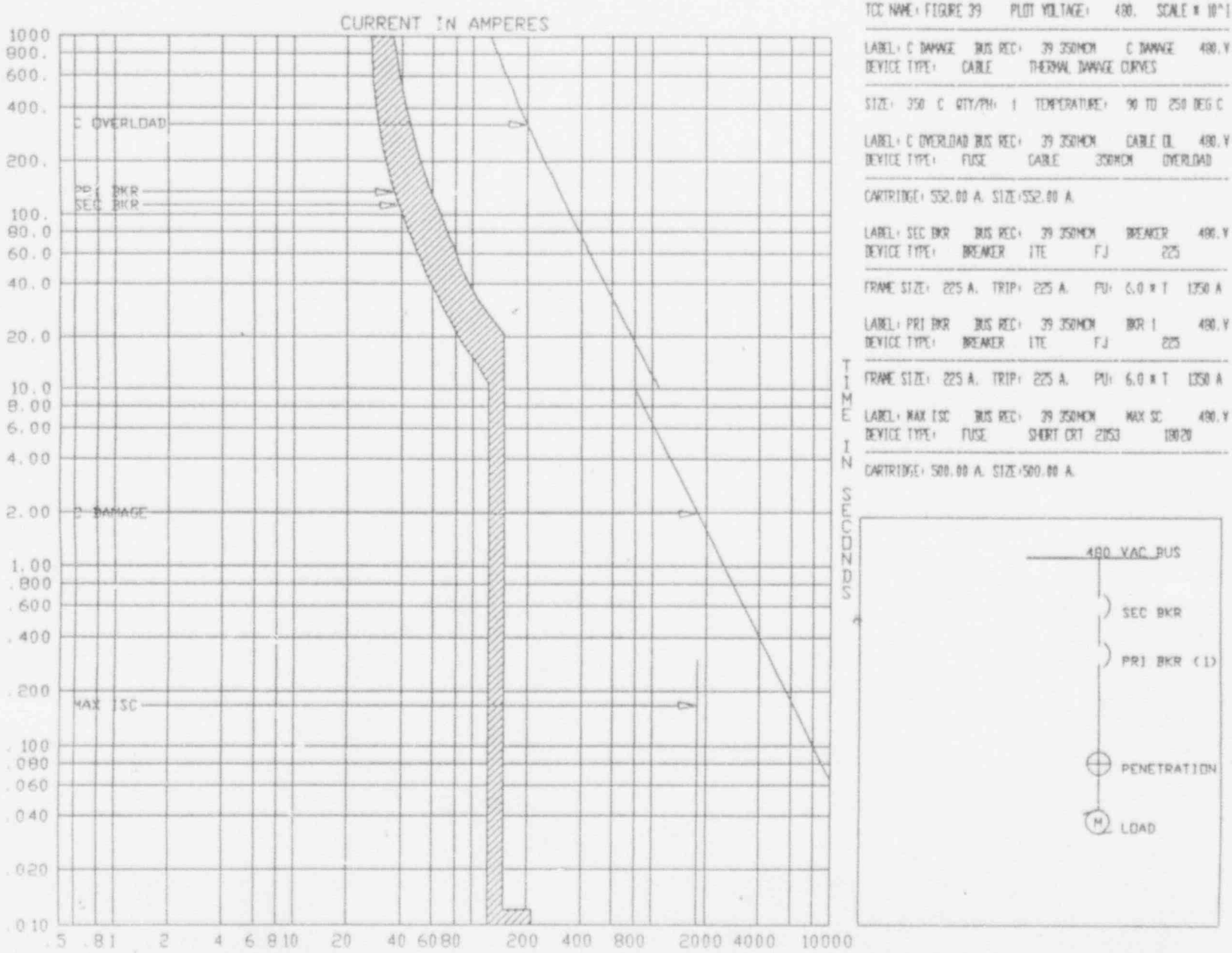
CARTRIDGE: 552.00 A. SIZE: 552.00 A.

LABEL: SEC BKR BUS REC: 38 350MCM BREAKER 480.Y
DEVICE TYPE: PCB BBC - ITE K-LINE CD-4,400

FRAME: 600 AMPS SENSOR: 600 1.00(L) 1.00 (F) 1.00 (S)
LTPU: 1.00 F(S) = 600 AMPS LTD: MIN
STPU: 4.0 F(S) = 2400 AMPS STD: MAX
INST: F( ) = AMPS

LABEL: PRI BKR BUS REC: 38 350MCM BKR 1 480.Y
DEVICE TYPE: PCB BBC - ITE K-LINE CD-4,400

FRAME: 600 AMPS SENSOR: 600 1.00(L) 1.00 (F) 1.00 (S)
LTPU: 1.00 F(S) = 600 AMPS LTD: MIN
STPU: 4.0 F(S) = 2400 AMPS STD: MAX
INST: F( ) = AMPS



TCC NAME: FIGURE 39 PLOT VOLTAGE: 480. SCALE X 10^1

LABEL: C DAMAGE BUS REC: 39 350MCM C DAMAGE 480.Y
DEVICE TYPE: CABLE THERMAL DAMAGE CURVES

SIZE: 350 C QTY/PH: 1 TEMPERATURE: 90 TO 250 DEG C

LABEL: C OVERLOAD BUS REC: 39 350MCM CABLE OL 480.Y
DEVICE TYPE: FUSE CABLE 350MCM OVERLOAD

CARTRIDGE: 552.00 A. SIZE:552.00 A.

LABEL: SEC BKR BUS REC: 39 350MCM BREAKER 480.Y
DEVICE TYPE: BREAKER ITE FJ 225

FRAME SIZE: 225 A. TRIP: 225 A. PU: 6.0 X T 1350 A

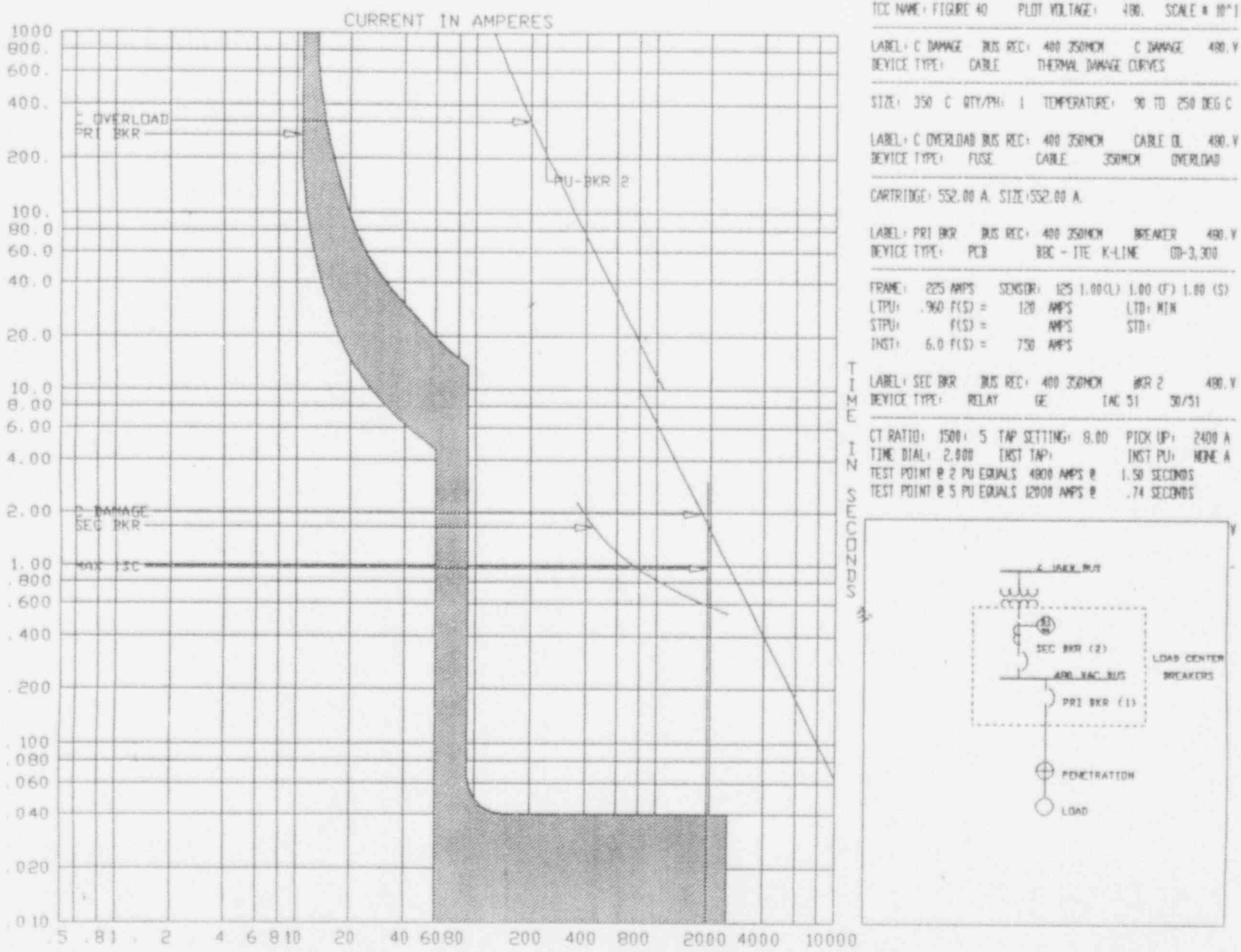
LABEL: PRI BKR BUS REC: 39 350MCM BKR 1 480.Y
DEVICE TYPE: BREAKER ITE FJ 225

FRAME SIZE: 225 A. TRIP: 225 A. PU: 6.0 X T 1350 A

LABEL: MAX ISC BUS REC: 39 350MCM MAX SC 480.Y
DEVICE TYPE: FUSE SHORT CKT 21153 18020

CARTRIDGE: 500.00 A. SIZE:500.00 A.

DRAWING NAME: FIGURE 39
CURRENT SCALE X 10^ 1 REFERENCE VOLTAGE 480



DRAWING NAME: FIGURE 40
CURRENT SCALE X 10^ 1 REFERENCE VOLTAGE 480

TCC NAME: FIGURE 40 PLOT VOLTAGE: 480. SCALE X 10^1

LABEL: C DAMAGE BUS REC: 400 350MCM C DAMAGE 480.V
DEVICE TYPE: CABLE THERMAL DAMAGE CURVES

SIZE: 350 C QTY/PH: 1 TEMPERATURE: 90 TO 250 DEG C

LABEL: C OVERLOAD BUS REC: 400 350MCM CABLE OL 480.V
DEVICE TYPE: FUSE CABLE 350MCM OVERLOAD

CARTRIDGE: 552.00 A. SIZE:552.00 A.

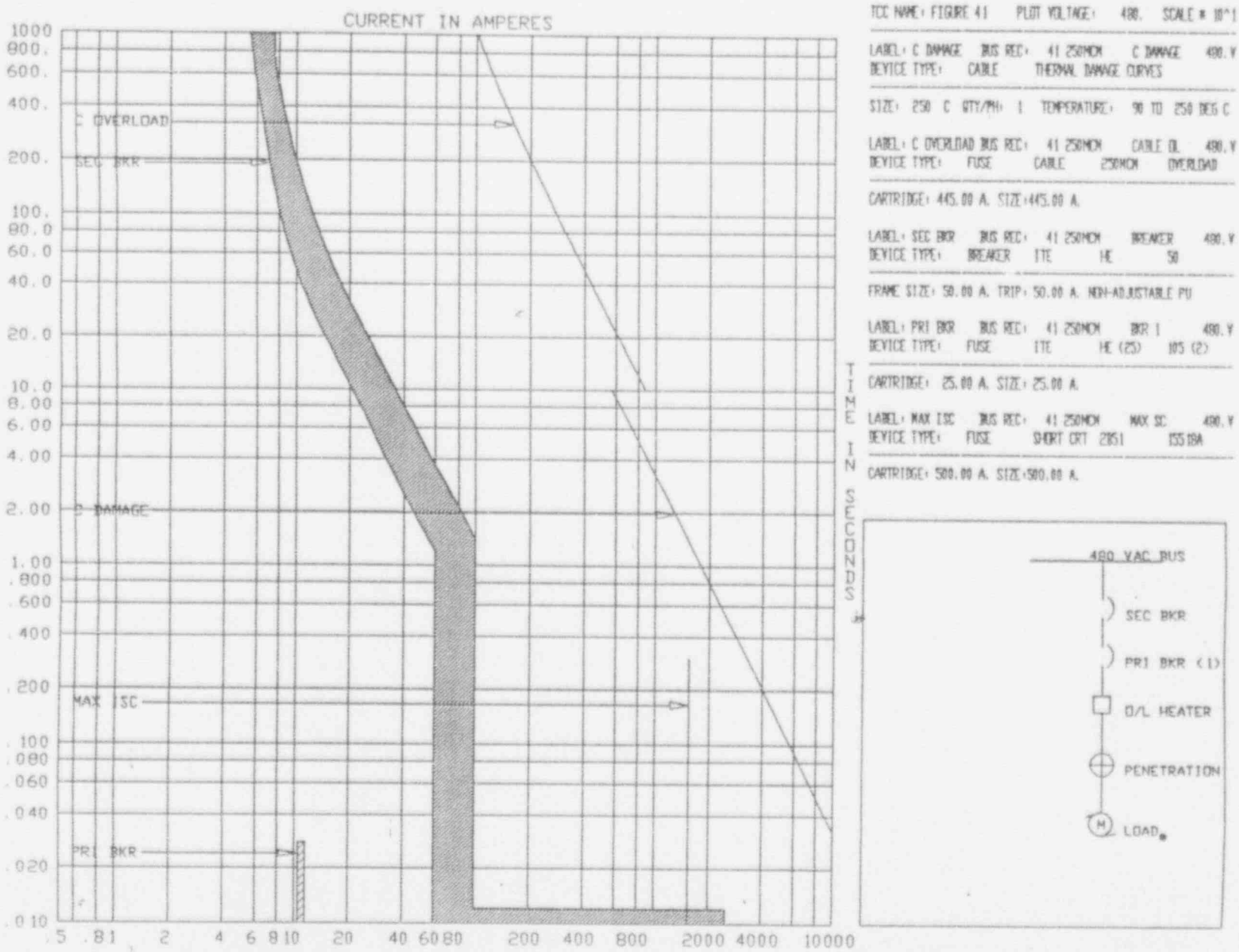
LABEL: PRI BKR BUS REC: 400 350MCM BREAKER 480.V
DEVICE TYPE: PCB BBC - ITE K-LINE CD-3,300

FRAME: 225 AMPS SENSOR: 125 1.00(L) 1.00 (F) 1.00 (S)
LTPU: .960 F(S) = 120 AMPS LTD: MIN
STPU: F(S) = AMPS STD:
INST: 6.0 F(S) = 750 AMPS

LABEL: SEC BKR BUS REC: 400 350MCM #BR 2 480.V
DEVICE TYPE: RELAY GE IAC 51 50/51

CT RATIO: 1500: 5 TAP SETTING: 8.00 PICK UP: 2400 A
TIME DIAL: 2.000 INST TAP: INST PU: NONE A
TEST POINT @ 2 PU EQUALS 4800 AMPS @ 1.50 SECONDS
TEST POINT @ 5 PU EQUALS 12000 AMPS @ .74 SECONDS

APPENDIX II
CALC. 85-E-0118-01



DRAWING NAME: FIGURE 41
CURRENT SCALE X 10^ 1 REFERENCE VOLTAGE 480

TCC NAME: FIGURE 41 PLOT VOLTAGE: 480. SCALE = 10^1

LABEL: C DAMAGE BUS REC: 41 250MCM C DAMAGE 480.Y
DEVICE TYPE: CABLE THERMAL DAMAGE CURVES

SIZE: 250 C QTY/PH: 1 TEMPERATURE: 90 TO 250 DEG C

LABEL: C OVERLOAD BUS REC: 41 250MCM CABLE OL 480.Y
DEVICE TYPE: FUSE CABLE 250MCM OVERLOAD

CARTRIDGE: 445.00 A. SIZE: 445.00 A.

LABEL: SEC BKR BUS REC: 41 250MCM BREAKER 480.Y
DEVICE TYPE: BREAKER ITE HE 50

FRAME SIZE: 50.00 A. TRIP: 50.00 A. NON-ADJUSTABLE PU

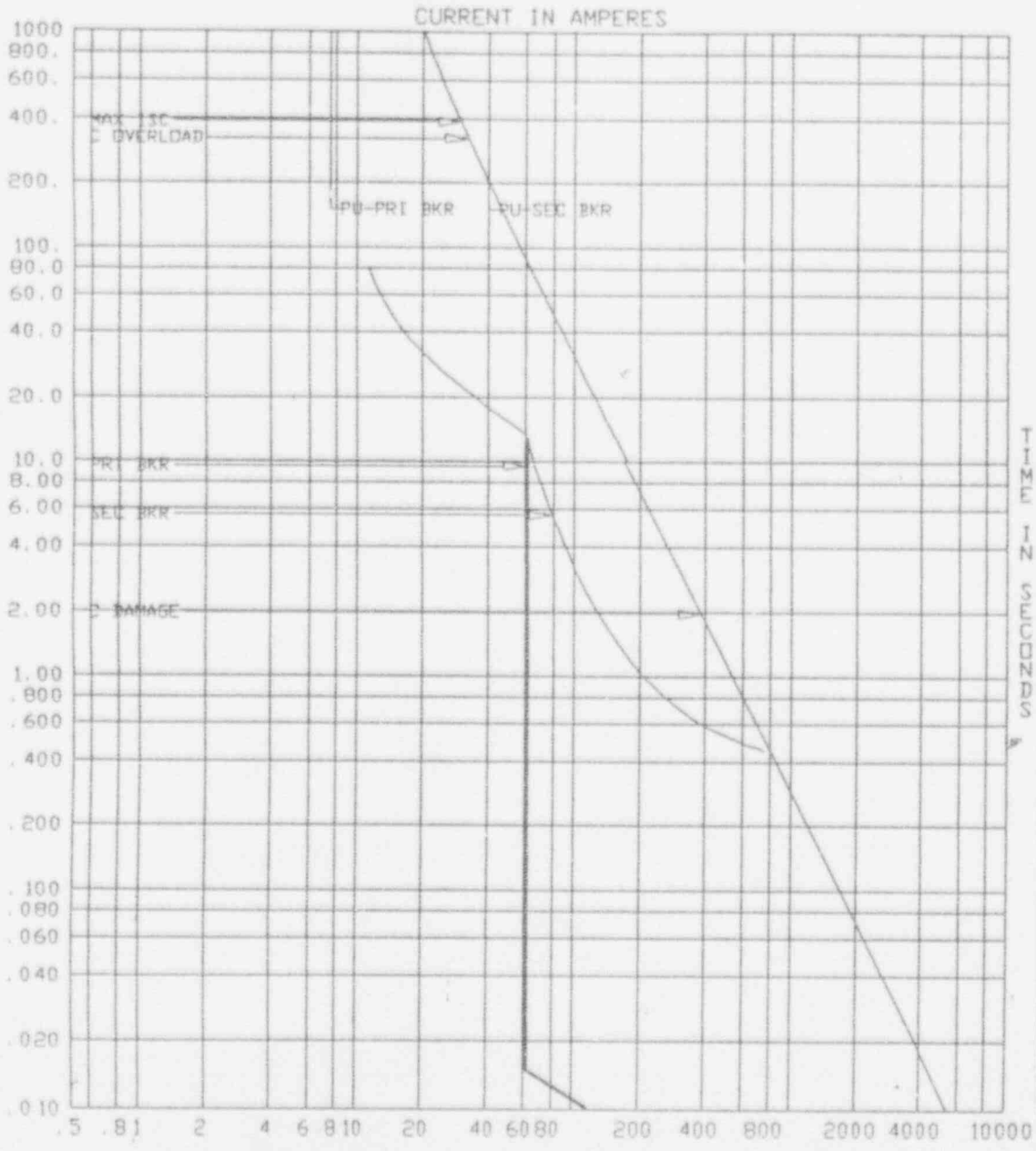
LABEL: PRI BKR BUS REC: 41 250MCM BKR 1 480.Y
DEVICE TYPE: FUSE ITE HE (25) 105 (2)

CARTRIDGE: 25.00 A. SIZE: 25.00 A.

LABEL: MAX ISC BUS REC: 41 250MCM MAX SC 480.Y
DEVICE TYPE: FUSE SHORT CRT 23151 15519A

CARTRIDGE: 500.00 A. SIZE: 500.00 A.

APPENDIX II
CALC. 85-E-0118-01



DRAWING NAME: FIGURE 42
CURRENT SCALE X 10^ 2 REFERENCE VOLTAGE 6900

TCC NAME: FIGURE 42 PLOT VOLTAGE: 6900. SCALE X 10^2

LABEL: C DAMAGE BUS REC: 42 750MCM C DAMAGE 6900.Y
DEVICE TYPE: CABLE THERMAL DAMAGE CURVES

SIZE: 750 C QTY/PH: 1 TEMPERATURE: 90 TO 250 DEG C

LABEL: C OVERLOAD BUS REC: 42 750MCM CABLE OL 6900.Y
DEVICE TYPE: FUSE CABLE 750MCM OVERLOAD

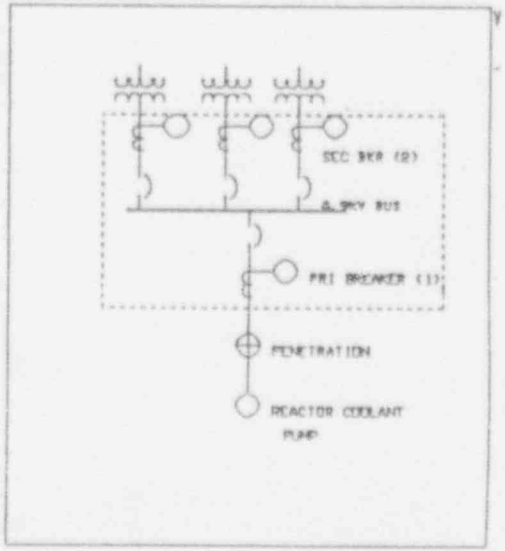
CARTRIDGE: 889.00 A. SIZE:889.00 A.

LABEL: SEC BKR BUS REC: 42 750MCM SEC BKR 6900.Y
DEVICE TYPE: RELAY GE IAC 53 50/51

CT RATIO: 2000: 5 TAP SETTING: 10.0 PICK UP: 4000 A
TIME DIAL: 4.000 INST TAP: INST PU: NONE A
TEST POINT @ 2 PU EQUALS 8000 AMPS @ 5.50 SECONDS
TEST POINT @ 5 PU EQUALS 20000 AMPS @ 1.05 SECONDS

LABEL: PRI BKR BUS REC: 42 750MCM PRI BKR 6900.Y
DEVICE TYPE: RELAY GE IAC 66 50/51

CT RATIO: 600: 5 TAP SETTING: 6.30 PICK UP: 756 A
TIME DIAL: 5.000 INST TAP: 50 INST PU: 6800. A
TEST POINT @ 2 PU EQUALS 1512 AMPS @ 45.00 SECONDS
TEST POINT @ 5 PU EQUALS 3780 AMPS @ 18.70 SECONDS



APPENDIX II
CALC. 85-E-0118-01

APPENDIX III

INSTRUMENTATION ACCEPTANCE CRITERIA

This appendix provides documentation of the instrument circuitry penetrating containment. The data were obtained from Memo IC-85-093 (Ref. 2.24) and have been revised to reflect components additions and/or deletions. Table 1 lists the instruments providing power to containment instrumentation. The components and CEA power supplies listed have transformer-type isolation and/or current -limiting means that will maintain the fault current well below the conductor 250°C damage limit. This appendix supports the SAR statements regarding the instrumentation circuitry compliance with Regulatory Guide 1.63. A summary of each instrument type with its data sheet, model no., and notes is listed below. A description of the model no. and its current limitation follows the table.

TABLE 1

INSTRUMENT	DATA SHEET	MODEL NO.	NOTES
2PWR-1031-1	903-024	22	see instru. index
2PWR-1031-2	903-024	22	see instru. index
2PWR-1031-3	903-024	22	see instru. index
2PWR-1031-4	903-024	22	see instru. index
2PWR-1041-1	903-024	1	
2PWR-1041-2	903-024	1	
2PWR-1041-3	903-024	1	
2PWR-1041-4	903-024	1	
2PWR-1079	M2516-53	1	
2PWR-1131-1	903-024	22	see instru. index
2PWR-1131-2	903-024	22	see instru. index
2PWR-1131-3	903-024	22	see instru. index
2PWR-1131-4	903-024	22	see instru. index
2PWR-1141-1	903-024	1	
2PWR-1141-3	903-024	1	
2PWR-1141-4	903-024	1	
2PWR-1179	M2516-53	1	
2PY-1141-2C	M2516-131	5	
2LY-1179A	M2516-131	5	
2PWR-2200L	M2516-54	1	
2PWR-2200P	M2516-54	1	
2PWR-4601-1	903-024	2	
2PWR-4601-2	903-024	2	
2PWR-4635-3		2	see instru. index
2PWR-4635-4		1	see instru. index

Rev. 2 BY: EM DATE: 8-11-93
Rev. 2 Ck'd DS DATE: 8/12/93

2PWR-4662	M2516-52	1	
2PWR-4671-1		20	DCP 84-2038; M-2580A-1
2PWR-4710-1	903-037	2	
2PWR-4710-2	903-037	2	
2PWR-4710-3	903-037	2	
2PWR-4710-4	903-037	2	
2PWR-4711-1	903-037	2	
2PWR-4711-2	903-037	2	
2PWR-4711-3	903-037	2	
2PWR-4711-4	903-037	2	
2PWR-4712-3	M2516-63	4	
2PWR-4712-4		4	DCP 82-2059, P.R. #58523
2PWR-4713-3	M2516-63	4	
2PWR-4713-4		4	DCP 82-2059, P.R. # 58523
2PWR-4715	903-219	3	
2PWR-4735-1		1	see instru. index
2PWR-4735-2		2	see instru. index
2PWR-4735-3		3	see instru. index
2PWR-4735-4		1	see instru. index
2PWR-4820	903-219	3	
2PWR-4870	903-219	3	
2PWR-4924	903-219	3	
2PWR-4925	903-219	3	
2PWR-4926	903-219	3	
2PWR-4927	903-219	3	
2LY-4627-2A	M2516-131	5	DCP 85-2012
2PWR-4601-3	903-024	2	
2PWR-4601-4	903-024	2	
2PWR-4610-1	903-037	2	
2PWR-4610-2	903-037	2	
2PWR-4610-3	903-037	2	
2PWR-4610-4	903-037	2	
2PWR-4611-1	903-037	2	
2PWR-4611-2	903-037	2	
2PWR-4611-3	903-037	2	
2PWR-4611-4	903-037	2	
2PWR-4612A-3	M2516-63	4	
2PWR-4612A-4		4	DCP82-2059, P.R. #58523
2PWR-4613-3	M2516-63	4	
2PWR-4613-4		4	DCP82-2059, P.R. #58523

Rev. 2 BY: [illegible] DATE: 8-12-93
Rev. 2 Ck'd DS DATE: 8/13/93

2PWR-4615	903-219	3	
2PWR-4622		2	Per M2201, panel 2c32 list
2PWR-4623-1	903-024	2	
2PWR-4623-2	M2516-48	1	
2PWR-4624-1	903-024	1	
2PWR-4624-3	903-024	1	
2PWR-4624-4	903-024	1	
2PWR-4625	903-024	1	
2PWR-4626A	903-024	1	
2PWR-4626B	903-024	1	
2PWR-4627-1	903-024	1	
2PWR-4635-1		2	see instru. index
2PWR-4635-2		2	see instru. index
2PY-4624-2C	M2516-131	5	DCP85-2012
2TI-4825	M2538-46	7	
2TIS-4607	M2536-44	9	
2TIS-4608	M2538-44	9	
2TIS-4609	M2538-44	9	
2TIS-4630	M2538-45	8	
2TIS-4631	M2538-45	8	
2TIS-4694	M2538-45	8	
2TT-4614-1		10	DCP80-2155
2TT-4614-1A		10	DCP80-2155
2TT-4714-2		10	DCP80-2155
2TT-4714-2A		2	DCP80-2155
2VYI-4633-1		18	DCP79-2164
2VYI-4634-1		18	DCP79-2164
2PWR-5000	903-219	3	
2PWR-5020	903-219	3	
2PWR-5088	M2516-52	1	
2PWR-5105	M2516-53	1	
2PWR-5106	M2516-53	1	
2PWR-5108	903-219	3	
2PWR-5109	903-219	3	
2PWR-5601-1	M2516-57	1	
2PWR-5602-2	M2516-57	1	
2PWR-5603-3	M2516-57	1	
2PWR-5604-4	M2516-57	1	
2PWR-5605-1	M2516-91	19	
2PWR-5606-2	M2516-91	19	
2PWR-5618	903-219	3	
2PWR-5620	903-219	3	
2PWR-5661M	M2516-52	1	
2PWR-5661T	M2516-52	1	

Rev. 2 BY: EM DATE: 8-6-93
Rev. 2 Ck'd: DS DATE: 8/12/93

2PWR-5662M	M2516-52	1	
2PWR-5662T	M2516-52	1	
2PWR-5663-1	M2516-47	1	
2PWR-5663M	M2516-52	1	
2PWR-5664-2	M2516-48	1	
2PWR-5664M	M2516-52	1	
2PWR-5665M	M2516-51	1	
2PWR-5691	M2516-52	1	
2PWR-5692	M2516-52	1	
2PWR-5694	M2516-52	1	
2PWR-5695	M2516-52	1	
2LT-5641-2	M2526-2	17	
2LT-5645-1	M2526-2	17	
2LT-5646-2	M2526-2	17	
2PWR-6002	903-219	3	
2PWR-6008	M2516-98	2	
2PWR-6012	903-219	3	
2PWR-6018	M2516-98	2	
2PWR-6022	903-219	3	
2PWR-6028	M2516-98	2	
2PWR-6032	903-219	3	
2PWR-6038	M2516-98	2	
2PWR-6120-1		13	M2001-C9,RCP SSSS (UNIT 2)
2PWR-6120-2		13	M2001-C9,RCP SSSS (UNIT 2)
2PWR-6120-3		13	M2001-C9,RCP SSSS (UNIT 2)
2PWR-6120-4		13	M2201-C9,RCP SSSS (UNIT 2)
2PWR-6121-A		13	M2001-C9,RCP SSSS (UNIT 2)
2PWR-6121-B		13	M2001-C9,RCP SSSS (UNIT 2)
2TIS-6040	M2538-45	8	
2TIS-6043	M2538-45	8	
2TIS-6050	M2538-45	8	
2TIS-6053	M2538-45	8	
2TIS-6060	M2538-45	8	
2TIS-6063	M2538-45	8	
2TIS-6070	M2538-45	8	
2TIS-6073	M2538-44	8	
2TIS-6080	M2538-44	8	
2TIS-6090	M2538-44	8	
2TIS-6100	M2538-44	8	

Rev. 2 BY: EM DATE: 8-6-93
Rev. 2 Ck'd DS DATE: 8/12/93

2TIS-6110	M2538-44	8	
2TS-6085	M2539-3	11	
2TS-6095	M2539-3	11	
2TS-6105	M2539-3	11	
2TS-6115	M2539-3	11	
2UR-6004		12	see instru. index
2UR-6014		12	see instru. index
2UR-6024		12	see instru. index
2UR-6034		12	see instru. index
2RITS-8905		15	2C25 rad. monitoring sys. manual, ANO-2
2RITS-8909		15	2C25 rad. monitoring sys. manual, ANO-2
2RITS-8912		15	2C25 rad. monitoring sys. manual, ANO-2
2RITS-8923		15	2C25 rad. monitoring sys. manual, ANO-2
2RITS-8925-1		14	11406-J-2401-7
2RITS-8925-2		14	11406-J-2401-7
2JY-9000-1		6	Gamma-Metrics Instr. manual, P.O. 67149-57-1,replaces rev. 0
2JY-9003-2		6	Gamma-Metrics Instr. manual, P.O. 67149-57-1,replaces rev. 0
Safety Channel	E-2205-10	16	V/P M2001-K2
Safety Channel	E-2205-10	16	V/P M2001-K2
Safety Channel	E-2205-10	16	V/P M2001-K2
Safety Channel	E-2205-10	16	V/P M2001-K2
Start-up/Control Channel	E-2205-11	16	V/P M2001-K2
Start-up/Control Channel	E-2205-11	16	V/P M2001-K2
Power Supply	E-2728-1	2	V/P M2001-N1-10(1), 4,2,13
Power Supply	E-2728-1	2	V/P M2001-N1-10(1), 4,2,13

Rev. 2 BY: EM DATE: 8-6-93
Rev. 2 Ck'd: DS DATE: 8/12/93

Power Supply	E-2728-1	2	V/P M2001-N1-10(1), 4,2,13
Power Supply	E-2728-2	2	V/P M2001-N1-10(1), 4,2,13
Power Supply	E-2728-2	2	V/P M2001-N1-10(1), 4,2,13
Power Supply	E-2728-2	2	V/P M2001-N1-10(1), 4,2,13
Power Supply	E-2258	21	DCP85-2075D
2D101	E-2585-2	26	TM# I207-0200
2LT-4792	M2516 Sh. 161	25	
2LT-4791	M2516 Sh. 161	25	
2PY-4600-1A		27	see instru. index
2PY-4600-2A		27	see instru. index
2PY-4600-3A		27	see instru. index
2PY-4600-4A		27	see instru. index

DESCRIPTION OF COMPONENTS

MODEL NO.	DESCRIPTION
1.	Fischer & Porter #55GL1151A, Power Supply Slow-Blow 1/32 amp fuse on tranformer primary side of power supply. Transformer isolation of 120 VAC input from 4-20ma DC output.
2.	Fischer & Porter # 55GL1154A, Power Supply Same limitations as 1 above
3.	Fischer & Porter #55GL1155, Power Supply Primary of transformer has 1 amp fuse (120 VAC); secondary side to terminal output has 1/2 amp fuse.
4.	Lambda #LCS-A-24, Power Supply "External overload protection; automatic electronic current limiting circuit limits the output current to a preset valve thereby providing protection for the load as well as the power supply"
5.	Foxboro #N-2AI-I2V, #2AX+PS9 Single Nest Power Supply Overload or short circuit current from either the ±15VDC output is limited to a value between 1.55 and 1.70 amps.

Rev. 2 BY: EMT DATE: 8-11-93
Rev. 2 Ck'd: DTS DATE: 8/12/93

6. Gamma-Metrics Amplifier Assy. #RCS-101
"Amplifier is powered from 117 VAC and provides ±15 volts for the circuitry and also provides detector excitation voltage. The ac power is filtered in the amplifier assembly and the ±15 volt power is filtered to prevent electrical noise from affecting internal circuitry. The high voltage detector excitation voltage is filtered to prevent electrical noise from reaching the preamplifier input circuitry." 3A,120VAC fuse at input, per ANO-2. See E-2995-1, Rev. 3-2

7. Sigma #9270 DIN-01-B-V-B
One 20 amp circuit breaker provides 120 VAC to several Sigma instruments, but each of these instruments has transformer isolation between input voltage and output DC voltages.

8. Sigma # 9270 DIN-10-B-V-B
Same limitations as 7 above

9. Sigma # 9270 DIN-20-B-V-B
Same limitations as 7 above

10. Rochester Instruments #SC-1372
Isolated RTD transmitter: full input isolation; the filtered 24 vdc... drives a constant-current series regulator to generat 12 volt and 3.6 volt bias levels which are tightly regulated over ±20% power supply changes.

11. Acromag #HR-3306-D-9
Information per Ruhl Diggerhoff (Acromag) 6/19/85: transformer isolation of input voltage from output voltage: RTD voltage <1 volt, RTD current <2ma when in circuit; open circuit output voltage ≈6 volts, not over 12 volts maximum.

12. Texas Instruments #TiGraph 200
Power input board converts 115VAC, 60Hz input power to 320VDC. Power input board provides isolated dc voltage to start switching mode power supply, provides protection against high current in power line. Output of 320VDC power supply has fuse protection (4 amp) against shorts.

Rev. 2 BY: EM DATE: 8-11-93
Rev. 2 Ck'd: DS DATE: 8/12/93

13. Bently Nevada Signal Processor Assy. #18740-01
"In the rectifier power supply..., the input is applied through two 1-amp, slow blow (time-lag) fuses to a full-wave bridge rectifier whenever the input source is ungrounded. If the power source is grounded, the input is applied only through fuse F1." F1 is 1 amp.

14. General Atomic Signal Processor #RP-2C, #RP-23 Power Supply
Power supply has both input lines fused, provides overload and short-circuit protection. (Two 1 amp fuses on 117VAC input to isolation transformer.)

15. Westinghouse Rad. Monitoring System Area Monitor #1103
120 VAC power input is fused at 2 amps.

16. General Atomic Power Supply #V-008, Buffer Amplifier #ELC 274-0000-1
Constant current short-circuit protection to protect supply. One and two amp fuses are listed as spare parts for the unit. Buffer amplifier is fused.

17. GEMS #36562 Receiver Module
115VAC, 60Hz fused input (1 amp); transformer isolation of input and output (dc voltage)

18. Unholtz - Dickie Signal Conditioning Amplifier #P22 MHA1-VM
"Separate, isolated power supplies are provided for each channel." Power: 105-125 VAC, 60Hz, 5VA.

19. Lambda #LXS-CC-28-R, Power Supply
Same limitations as number 4

20. Lambda #LCS-B, Power Supply
Same limitations as number 4

21. Computer Products #040-5484-001, Dual Power Supply
Input side of ±15 volt power supply is fused with a 3 amp, 250 volt, normal blow fuse. Out put is fused with a 5 amp, 125volt, normal blow fuse. Output side also has internal current limiting circuitry which limit output to 7 amps.

22. Acopian #28EB08
105-125VAC, 60HZ single phase input; single output model rated at 28VDC with an output current of 0.08 amps. Regulated output with short circuit protection.

Rev. 2 BY SM DATE 8-11-93
Rev. 2 Ck'd DS DATE 8/12/93

23. Foxboro #610AT-0I

120VAC, 60HZ input, primary of transformer has a 3/8A fuse; secondary side to terminal output has 1/8 amp fuse. Fuse data from "schematic diagram and parts list".

24. Bently Nevada #72050-01-09

Slow-blow line fuses located in the power input module are rated at 2.5 amps. "Each unregulated voltage is fused within the power supply".

25. Fischer & Porter #53MC5212A21AAXXXXXX

120VAC, 60Hz input with 1 amp in-line fuse. 4-20 mA output signal with a limitation of 80 mA

26. Power Conversion Products Inc.#28-5

120VAC is applied to the isolation transformer where it is rectified and filtered to 28VDC. The output current is limited to 5 amps plus 10% during overloads. A 5 amp thermal type circuit breaker is provided in the input line and the output is fused with a 8 amp fuse. Breaker and fuse data from component parts list.

27. Foxboro #N-2AI-I2V; #2AX+DP11, Style A

Overload or short circuit current from either the ±15VDC output is fused-limited to a value of 3 amps.

Rev. 2 BY: EM DATE: 8-11-93
Rev. 2 Ck'd: DS DATE: 8/12/93

APPENDIX IV

CABLE INTERMEDIATE CHARACTERISTICS
BUNKER RAMO PENETRATIONS

1.0 INTRODUCTION

The penetration modules are molded out of glass reinforced epoxy (bisphenol-A). The feedthrough conductors are solid non-insulated copper with stud type connectors on each end and encased in the epoxy. The ends of the conductors are exposed so that pigtail cables are connected to the stud and covered with heat shrink tubing. A more detailed explanation with a picture of the penetration physical configuration is provided in Appendix VII.

IEEE 317 short circuit withstand values (Reference 3.2) are based on a single conductor in air insulated with crosslinked polyethylene or ethylene propylene rubber. Furthermore, the IEEE values are based on conductors sized (Circular Mils) per the industry standard. The penetration module conductors are insulated with epoxy and have a conductor area (circular mils) of 2.5 to 4 times the size of the industry standard for conductor sizes #20 to 4/0AWG (Reference Appendix VII). Amphenol Sams did not provide I^2t values for the larger penetration conductors but rather based all their test on the pigtail conductors that are sized per industry standards (Reference 3.5 & 3.6). From this, it is obvious that the module feed through conductor can withstand short circuit and overload current values in excess of the pigtail conductors. How much can only be determined by an analysis that shows the stress and strain of glass reinforced epoxy under short circuit conditions.

This evaluation will not attempt to determine the maximum withstand and overload capability of the module conductors. The evaluation will analyze the intermediate (10-1000 seconds) overload capability of the module pigtail that will be represented as a single conductor cable in air. The conductor ampacity will be based on NEC, Table 310-17 for conductors sizes #14AWG through #10 AWG and ICEA P-46-426 for conductors #8AWG and larger. Since in all likelihood the module conductor will withstand higher fault and overload current than the pigtail due to its solid construction and larger size, this will be a conservative approach to

Rev. 2 BY: EM DATE: 8-13-93
Rev. 2 Ck'd. DS DATE: 8/13/93

determine the long-time (intermediate) overload protection of the penetrations.

2.0 PURPOSE

This evaluation determines a single conductor cable maximum safe overload capability from 10 seconds to 1000 seconds.

3.0 REFERENCES:

This references section repeats a few of the documents listed in the main body of the calculation. It is presented in this fashion for convenience.

3.1 IEEE-242-1986 (section 8.5.2), Recommended Practice for Protection and Coordination of Industry and Commercial Power Systems

3.2 IEEE-317-1983, Electrical Penetration Assemblies in Containment Structures for Nuclear Power Generating Stations

3.3 ICEA P-46-426, Power Cable Ampacity -- Volume 1-- Copper Conductor

3.4 NFPA, NEC-1990, National Electrical Code

3.5 AMPHENOL SAMS LETTER (JEP:3:27) TO BECHTEL CORPORATION DATED MARCH 28, 1973

3.6 AMPHENOL SAMS DESIGN VERIFICATION TEST REPORT NO. 123-1275

3.7 Okonite Product Data; Effective: March 11, 1988

3.8 NES-13, ANO Engineering Standard for Environmental Qualification Service Conditions

3.9 SCEW Sheet 2A112, Environmental Qualification Documentation for Bunker Ramo/Amphenol Sams EPA's

4.0 ASSUMPTIONS AND GIVEN

4.1 The cable emergency operating temperature is 130°C (Reference 3.7)

4.2 Although cables are sized for 125% of the connected load full load current, this evaluation will conservatively assume that the cable has been operating at its rated current and temperature (90°C) prior to the overload condition.

4.3 The conductor maximum current values are taken from NEC Table 310-17 (1990) and ICEA P-46-426 for a single conductor in air

4.4 The overload condition is limited between 10-1000 seconds.

4.5 The conductor ampacity rating will be based on its published ambient temperature, no derating (see attachment 2).

4.6 With the exception of ≈ 3 inches (Reference 3.9) passing through the header plate, the conductors are installed in air. Therefore, the conductors' ampacity rating and K factor (Ref. 3.1) in determining the percentage of overload will be based on a conductor installed in air

5.0 CALCULATION

5.1 PERCENTAGE OVERLOAD

Under short circuit conditions, the temperature of the conductor rises rapidly. Therefore, ICEA recommends a transient temperature limit for short-circuit duration times not to exceed 10 seconds. For times greater than 10 seconds, the cable should be evaluated on its ability to dissipate heat from its installation relative to its heat generation. The complete relationship for determination of long time (intermediate) overload rating is presented in IEEE 242-1986 section 8.5.2.4 (Ref. 3.1). The equation uses various temperature parameters, the cable emergency operating temperature, a constant for cable size and installation to develop a percentage of overload current for any given time in seconds.

Rev. 2 BY: E M DATE: 8-6-93
Rev. 2 Ck'd: DS DATE: 8/12/93

ANO-2 has numerous conductors operating under various conditions. To prevent the cumbersome task of justifying each conductor operating current prior to the event, it is conservatively assumed that the conductor has been operating at its rated current/temperature (90°C) prior to the overload condition. The service ambient temperature will be based on the ambient temperature of the ampacity tables. Using the tables ambient temperature will not affect the value of the emergency operating current if derating to service temperature was considered first and then the emergency operating current is computed. See attachment 2 of this appendix for a conductor evaluated using the derated approach.

With this in mind, the following equation (Ref. 3.1) will determine the relationship for intermediate overload rating:

$$\frac{I_E}{I_N}\% = \sqrt{\frac{\frac{T_E - T_O}{T_N - T_O} - e^{-t/k}}{1 - e^{-t/k}} \times \frac{230 + T_N}{230 + T_E}} \times 100$$

where

I_E = emergency operating current rating

I_N = normal current rating

T_E = conductor emergency operating temperature (130°C)

T_N = conductor normal operating temperature (90°C)

T_O = ambient temperature (30°C)

Note: 30°C will be used where ampacity ratings are taken from NEC

t = time after start of emergency loading in hours (the example presented will evaluate at 10, 100 and 1000 seconds)

K = a constant, dependent on cable size and installation type [will use a factor of .33 which is for cable size < #2 in air, 1.00 for cable sizes #2-#4/0, and 1.5 for cable sizes ≥ 250MCM (Reference Table 43)]

230 = zero resistance temperature value (234 for copper)

e = 2.7183 (base for natural logarithms)

The percentage of overload calculated for a specific duration will be multiplied by the conductor ampacity rating to give the maximum current the conductor can withstand for a specific time interval. These intervals will be used to plot a conductor overload capability curve.

Rev. 2 BY: BM DATE: 8-11-93
Rev. 2 Ck'd: DS DATE: 8/12/93

EXAMPLE: Evaluation of a cable < #2AWG in air yield:

AT 10 SECONDS

$$\%_0 = \sqrt{\frac{\frac{130-40}{90-40} - 2.7183^{-.0027778/1}}{1-2.7183^{-.0027778/1}} \times \frac{230+90}{230+130}} \times 100$$

$$\%_0 = \sqrt{\frac{0.8028}{.00277} \times .888889} \times 100$$

$$\%_0 = \sqrt{257.62} \times 100$$

$= 1605\%_0$ of conductor normal ampacity (current rating)

AT 100 SECONDS

$$\%_o = \sqrt{\frac{1.8-2.7183^{-.027778/1}}{1-2.7183^{-.027778/1}} \times .88889} \times 100$$

$$\%_0 = \sqrt{\frac{0.8274}{0.0274} \times .888889} \times 100$$

$$\%_0 = \sqrt{26.84} \times 100$$

$= 518\%_0$ of conductor normal ampacity (current rating)

Rev. 2 BY: SM DATE: 8-6-93
Rev. 2 Ck'd: DS DATE: 8/12/93

AT 1000 SECONDS

$$\%_0 = \sqrt{\frac{1.8 - 2.7183^{-.27778/1}}{1 - 2.7183^{-.27778/1}} \times .888889 \times 100}$$

$$\%_0 = \sqrt{\frac{1.0425}{.2425} \times .888889 \times 100}$$

$$\%_0 = \sqrt{3.821} \times 100$$

$$= 195\%_0 \text{ of conductor normal ampacity (current rating)}$$

There are various observations pointed out in IEEE 242

1) absolute values of the short-time temperature and the emergency operating temperature are not precise
2) tests by Georgia Power and Light showed no appreciable degradation when temperature is exceeded by 50°C
3) 130°C emergency operating temperature has a time value of 36 hours for no undue deterioration

Also, it is recognized that an overload condition between 10 to 100s will not allow sufficient time for heat to dissipated. Times over 100s will see heat dissipation. From the figures, it can be seen that the intermediate characteristics curve and the I^2t curve do not match in this region. This mismatch is due to the two equations where one is based on the insulation and surrounding installation methods dissipating heat (thermal resistivity) while the other is based on no heat transfer from the conductor in the short time frame of the fault. To bring these two points together will require establishing varying allowable temperatures and *K*-factors over the entire range of the intermediate zone. Considering the observations stated, the method used to develop the intermediate characteristic curve is a conservative approach in determining the amount of current the cable can withstand for a given time.

Rev. 2 BY: EM DATE: 8-11-93
Rev. 2 Ck'd: DS DATE: 8/12/93

6.0 CONCLUSION

Attachment 1 to Appendix IV provides acceptable overcurrent values for penetration conductor sizes #14AWG, 12AWG, 8AWG, 6AWG, 2AWG, 250MCM, 350MCM, and 750MCM cables.

Since no derating for actual service temperature was included in the method used to tabulate overcurrent values on the figures, Attachment 2 is included to give the viewer a comparison of the effects on the current values when the cables are derated for actual service temperature.

ATTACHMENT 1 NOTES:

- The percentage (%) of cable overload (O/L) given in the table is derived from the time in hours, K constant, cable emergency O/L temperature, ambient temperature, and cable normal operating temperature columns. Note that the K constant changes for conductors sizes #2 through 750MCM and thus the percentage of overload will change.

- The percentage of overload is multiplied by the conductor ampacity rating to give the maximum current values for specific periods of time.

Rev. 2 BY: LM DATE: 8-11-93
Rev. 2 Ck'd: DS DATE: 8/12/93

Notes:

CABLE INTERMEDIATE CHARACTERISTICS

1. Conductors #14AWG and 12AWG are based on an ambient temperature of 30°C while conductors #8 thru 750MCM are based on 40°C ambient.

% CABLE O/L	TIME (SECONDS)	#14AWG=35 AMPS O/L CURRENT =	TIME (HOURS)	K CONSTANT IN AIR	CABLE EMERGENCY O/L TEMP.	AMBIENT TEMP.	CABLE NORMAL OPER. TEMP.
846.08	10	296.13	0.002777778	0.33	130	30	90
603.21	20	211.12	0.005555556	0.33	130	30	90
390.73	50	136.76	0.013888889	0.33	130	30	90
286.87	100	100.40	0.027777778	0.33	130	30	90
217.11	200	75.99	0.055555556	0.33	130	30	90
188.26	300	65.89	0.083333333	0.33	130	30	90
172.10	400	60.23	0.111111111	0.33	130	30	90
166.38	450	58.23	0.125	0.33	130	30	90
161.68	500	56.59	0.138888889	0.33	130	30	90
157.73	550	55.21	0.152777778	0.33	130	30	90
154.38	600	54.03	0.166666667	0.33	130	30	90
151.50	650	53.02	0.180555556	0.33	130	30	90
148.99	700	52.15	0.194444444	0.33	130	30	90
144.85	800	50.70	0.222222222	0.33	130	30	90
140.19	950	49.07	0.263888889	0.33	130	30	90
138.93	1000	48.63	0.277777778	0.33	130	30	90

TIME (SECONDS)	#12 AWG 40 AMPS (k = 0.33) O/L =	#8 AWG 83 AMPS (k = 0.33) O/L =	#6 AWG 109 AMPS (k = 0.33) O/L =	#2 AWG 192 AMPS (K = 1.00) O/L =	250MCM 445.0 AMPS (K = 1.5) O/L =	350 MCM 552 AMPS (K = 1.5) O/L =	750 MCM 889 AMPS (K = 1.5) O/L =
10	338.43	768.48	1009.20	3079.45	8734.27	10834.43	17448.92
20	241.28	547.33	718.78	2182.78	6186.03	7673.46	12358.17
50	156.29	353.53	464.28	1390.44	3931.25	4876.52	7853.67
100	114.75	258.47	339.43	994.81	2801.92	3475.64	5597.54
200	86.64	194.27	255.12	719.62	2012.19	2496.02	4019.86
300	75.31	167.56	220.04	600.52	1687.87	2068.91	3331.99
400	68.84	152.51	200.29	531.08	1465.72	1818.15	2928.14
450	66.55	147.17	193.28	505.83	1391.84	1726.50	2780.65
500	64.67	142.77	187.50	484.69	1329.79	1649.54	2656.59
550	63.09	139.08	182.64	466.68	1276.79	1583.79	2550.71
600	61.75	135.93	178.52	451.14	1230.89	1526.85	2459.01
650	60.60	133.22	174.96	437.56	1190.87	1476.97	2378.67
700	59.60	130.87	171.86	425.56	1155.10	1432.84	2307.60
800	57.94	126.97	166.74	405.37	1094.84	1358.10	2187.23
950	56.08	122.56	160.96	381.82	1024.17	1270.43	2046.04
1000	55.57	121.38	159.40	375.30	1004.50	1246.03	2006.74

Rev: 2 By: EM DATE: 8-13-93
Rev: 2 By: DJS DATE 8/13/93

ATTACHMENT 2

ADJUSTMENT FOR CHANGE IN TEMPERATURE

The ampacity values given in the tables (Reference 2.3 and 2.4) have been adjusted for an ambient temperature of 55°C. The method used is as follows:

Ampacity ratings for conductor sizes #12 and 14AWG are taken from NEC Table 310-17 and a correction factor of .76 is used to account for the higher ambient temperature.

Ampacity rating for conductor sizes #8, 6, 2, 250mcm, 350mcm, and 750mcm are taken from IPCEA P-46-426 and correct for temperature based on the method shown in section II.B. Since ambient temperature is the only parameter that will change the equation is

$$I' = I\sqrt{\frac{T_r - T_e - DELTA\,TD}{T_r - T_n - DELTA\,TD}}$$

Where
I = current at ambient temperature given at the head of the table
I' = current at new ambient temperature
T_r = conductor rated temperature
T_e = new ambient temperature
T_n = ambient temperature given at the head of the table
DELTA TD = dielectric loss temperature rise

Correcting the ampacity of a 8KV, 750MCM cable with rubber insulation rated for 90°C, installed in an ambient air temperature of 55°C, and a DELTA TD of 0.18 yields

$$I' = 889\sqrt{\frac{90-55-.18}{90-40-.18}}$$

$$I' = 889 \times .836$$

$$I' = 743.2$$

Solving the equation for the other conductors covered by this standard yields a correction factor of .837. A Correction factor of .836 will be used for cable sizes #8-750MCM.

Rev 2 BY: C'M DATE: 8-11-93
Rev 2 Ck'd: DS DATE: 8/12/93

The conductor overload capability in amps will be based on the derated values presented in the tables below.

conductor size	conductor voltage rating	IPCEA ampacity rating	ampacity rating @ 55°C amb.
750MCM	8KV	889	743.2
350MCM	1KV	552	461.5
250MCM	1KV	445	372.0
#2AWG	1KV	192	160.5
#6AWG	1KV	109	91.1
#8AWG	1KV	83	69.4

conductor size	conductor voltage rating	NEC ampacify rating	ampacity rating @ 55°C amb.
#12AWG	< 2KV	40	30.4
#14AWG	< 2KV	35	26.6

Since the ambient temperature of the conductors are adjusted to 55°C for ampacity rating, the ambient temperature in the intermediate characteristic equation will also be changed to 55°C. This will yield:

Evaluation of a cable < #2AWG in air yields:

AT 10 SECONDS

$$\%_0 = \sqrt{\frac{\frac{130-55}{90-55} - 2.7183^{-.0027778/1}}{1-2.7183^{-.0027778/1}} \times \frac{230+90}{230+130}} \times 100$$

$$\%_0 = \sqrt{\frac{1.1457}{.00277} \times .888889} \times 100$$

$$\%_0 = \sqrt{367.65} \times 100$$

$$= 1917\%_0 \text{ of conductor FLC}$$

Rev 2 BY: EM DATE: 8-11-93
Rev 2 Ck'd DS DATE 8/12/93

AT 100 SECONDS

$$\%_o = \sqrt{\frac{2.1429 - 2.7183^{-.027778/1}}{1 - 2.7183^{-.027778/1}} \times .88889 \times 100}$$

$$\%_0 = \sqrt{\frac{1.1703}{0.0274} \times .888889 \times 100}$$

$$\%_0 = \sqrt{37.96} \times 100$$

$$= 616\%_0 \text{ of conductor FLC}$$

AT 1000 SECONDS

$$\%_0 = \sqrt{\frac{2.1429 - 2.7183^{-.27778/1}}{1 - 2.7183^{-.27778/1}} \times .888889 \times 100}$$

$$\%_0 = \sqrt{\frac{1.3854}{.2425} \times .888889 \times 100}$$

$$\%_0 = \sqrt{5.075} \times 100$$

$$= 2.25\%_0 \text{ of conductor FLC}$$

The attached table shows a tabulation for each conductor which can be compared to attachment 1 of this appendix.

Rev. 2 BY: EM DATE: 8-6-93
Rev. 2 Ck'd. DS DATE: 8/12/93

Notes:

1. Conductors overload capacity are based on an ambient of 55°C.

% CABLE O/L	TIME (SECONDS)	#14AWG - 28AMPS O/L CURRENT =	TIME (HOURS)	K CONSTANT IN AIR	CABLE EMERGENCY O/L TEMP.	AMBIENT TEMP.	CABLE NORMAL OPER. TEMP.
1104.91	10	293.91	0.002777778	0.33	130	55	90
785.75	20	209.01	0.005555556	0.33	130	55	90
505.35	50	134.42	0.013888889	0.33	130	55	90
367.05	100	97.63	0.027777778	0.33	130	55	90
272.86	200	72.58	0.055555556	0.33	130	55	90
233.26	300	62.05	0.083333333	0.33	130	55	90
210.77	400	56.06	0.111111111	0.33	130	55	90
202.75	450	53.93	0.125	0.33	130	55	90
196.11	500	52.17	0.138888889	0.33	130	55	90
190.53	550	50.68	0.152777778	0.33	130	55	90
185.76	600	49.41	0.166666667	0.33	130	55	90
181.65	650	48.32	0.180555556	0.33	130	55	90
178.06	700	47.36	0.194444444	0.33	130	55	90
172.10	800	45.78	0.222222222	0.33	130	55	90
165.35	950	43.98	0.263888889	0.33	130	55	90
163.53	1000	43.50	0.277777778	0.33	130	55	90

TIME (SECONDS)	#12 AWG 30.4 AMPS (k = 0.33) O/L =	#8 AWG 69.4 AMPS (k = 0.33) O/L =	#6 AWG 81.1 AMPS (k = 0.33) O/L =	#2 AWG 180.5 AMPS (K = 1.00) O/L =	250MCM 372.0 AMPS (K = 1.5) O/L =	350 MCM 481.5 AMPS (K = 1.5) O/L =	750 MCM 743.2 AMPS (K = 1.5) O/L =
10	335.89	766.81	1006.57	3075.19	8723.89	10822.79	17429.03
20	238.87	545.31	715.82	2178.63	6178.56	7662.58	12339.83
50	153.62	350.71	460.37	1385.71	3921.23	4864.64	7834.02
100	111.58	254.73	334.38	989.00	2790.13	3461.41	5574.26
200	82.95	189.37	248.58	712.14	1997.34	2477.89	3990.39
300	70.81	161.88	212.50	591.77	1650.57	2047.68	3297.59
400	64.07	146.27	192.01	521.29	1446.37	1794.36	2889.83
450	61.64	140.71	184.70	495.59	1371.58	1701.57	2740.21
500	59.62	136.10	178.66	474.03	1308.68	1623.54	2614.55
550	57.92	132.23	173.57	455.64	1254.88	1556.80	2507.06
600	56.47	128.92	169.23	439.73	1208.23	1498.92	2413.86
650	55.22	126.06	165.48	425.81	1167.30	1448.15	2332.10
700	54.13	123.57	162.21	413.51	1131.06	1403.18	2259.68
800	52.32	119.44	156.79	392.72	1069.55	1326.88	2138.81
950	50.27	114.76	150.64	368.41	997.22	1237.14	1992.29
1000	49.71	113.49	148.97	361.66	977.03	1212.10	1951.97

Rev: 2 By: EJH DATE: 8-13-93
Rev: 2 By: DS DATE 8/18/93

APPENDIX V

FUSE SELECTION METHODOLOGY

All circuits penetrating containment that are protected by a fuse were reviewed to determine the fuse amp rating and manufacturer. The decision as to what fuse to plot on the figures was based on two factors.

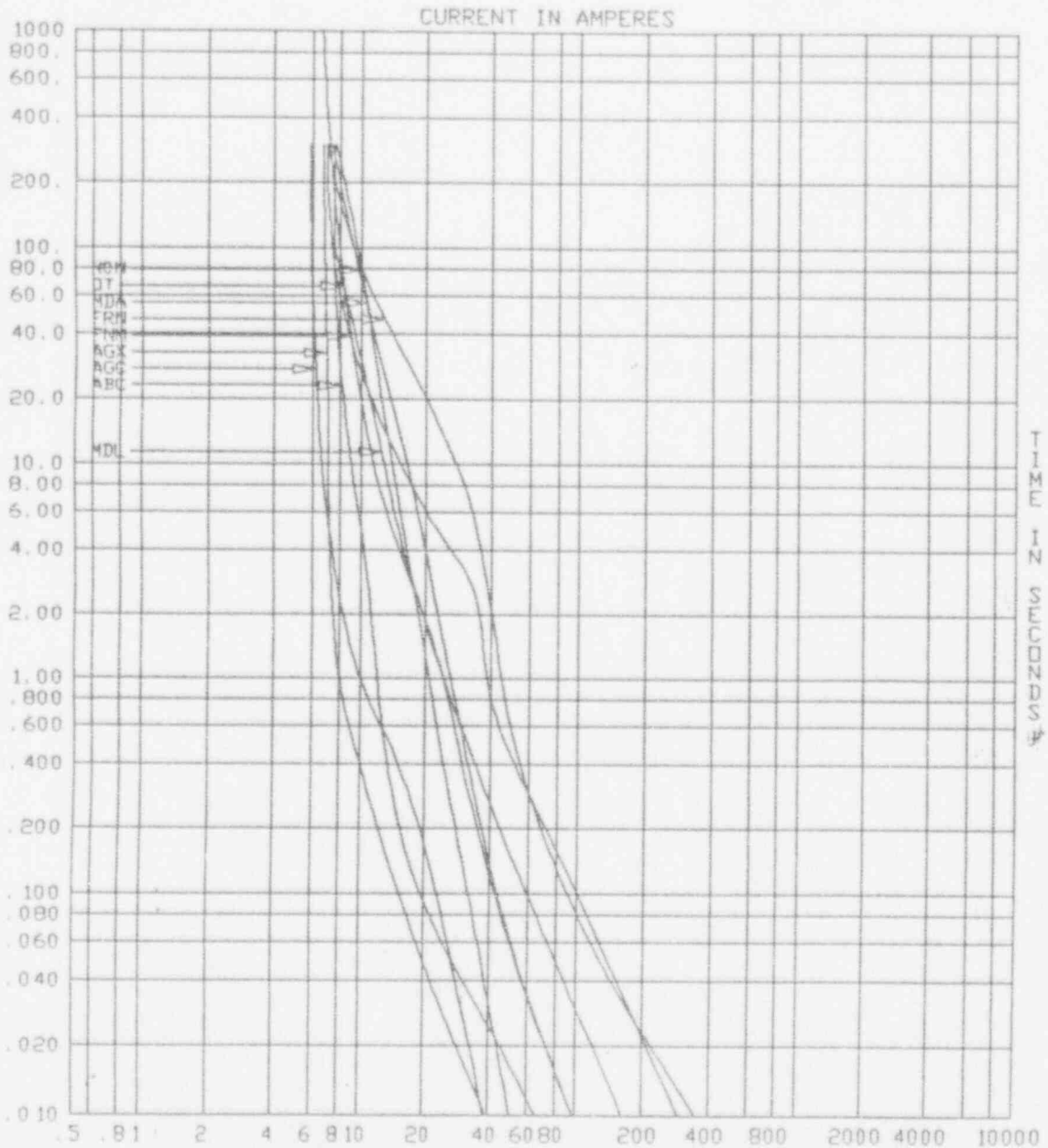
1) Fuses located on vendor drawings or listed in a control procedure have the manufacturer and model number stated. In these cases, the figures in Appendix II reflect the installed fuse

2) In cases where the fuse type is unknown, a review of the various 125 and 250V fuses used in various control panels and ANO stock was performed. The tripping characteristics of approximatly nine different 5 amp and six different 6 amp fuses were compared and plotted. The fuse type that showed the slowest tripping characteristics were selected for the figures. This approach was used for figures 4 and 9.

Note: In some cases, the original vendor specified the fuse size but not the fuse type

Each figure is named after its fuse rating.

Example: Drawing name "3A fuse" is for a 3 amp fuse.
The report to the right of the plot gives information on each fuse type with the fuse amp rating listed as "size".



DRAWING NAME: 5A FUSE
CURRENT SCALE X 10^0 REFERENCE VOLTAGE 125

TCC NAME: 5A FUSE PLOT VOLTAGE: 125. SCALE # 10^0

LABEL: ABC BUS REC: 1 FUSE ABC 125.V
DEVICE TYPE: FUSE BUSSMANN 1-6 ABC

CARTRIDGE: 6.00 A. SIZE: 5.00 A.

LABEL: AGC BUS REC: 1 FUSE AGC 125.V
DEVICE TYPE: FUSE BUSSMANN AGC 3-5

CARTRIDGE: 5.00 A. SIZE: 5.00 A.

LABEL: AGX BUS REC: 1 FUSE AGX 125.V
DEVICE TYPE: FUSE BUSSMANN AGX 1-5

CARTRIDGE: 5.00 A. SIZE: 5.00 A.

LABEL: FNM BUS REC: 1 FUSE FNM 125.V
DEVICE TYPE: FUSE BUSSMANN FNM 3.5, 15A

CARTRIDGE: 5.00 A. SIZE: 5.00 A.

LABEL: FRN BUS REC: 1 FUSE FRN 125.V
DEVICE TYPE: FUSE BUSSMANN 1-12A 250V FRN-R RKS

CARTRIDGE: 5.00 A. SIZE: 5.00 A.

LABEL: DT BUS REC: 1 FUSE DT 125.V
DEVICE TYPE: FUSE GOULD/SHA. DT 3-15

CARTRIDGE: 30.00 A. SIZE: 5.00 A.

LABEL: MDA BUS REC: 1 FUSE MDA 125.V
DEVICE TYPE: FUSE BUSSMANN MDA 1-15

CARTRIDGE: 15.00 A. SIZE: 5.00 A.

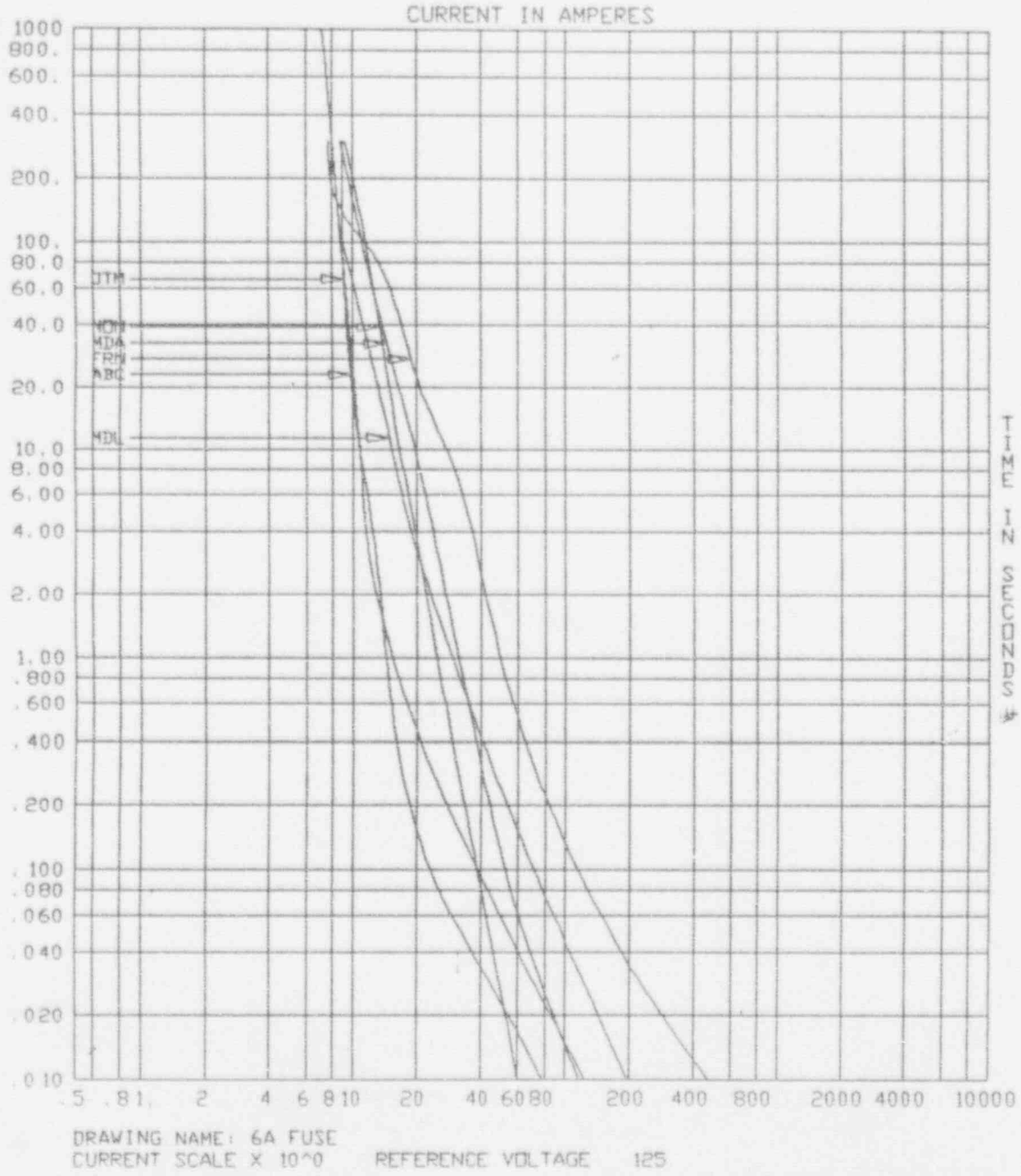
LABEL: MDL BUS REC: 1 FUSE MDL 125.V
DEVICE TYPE: FUSE BUSSMANN MDL 1-8A

CARTRIDGE: 8.00 A. SIZE: 5.00 A.

LABEL: MDN BUS REC: 1 FUSE MDN 125.V
DEVICE TYPE: FUSE BUSSMANN MDN 1-15A

CARTRIDGE: 15.00 A. SIZE: 5.00 A.

APPENDIX V
CALC. 85-E-0118-01



TCC NAME: 6A FUSE PLOT VOLTAGE: 125. SCALE X 10^0

LABEL: ABC	BUS REC:	1 FUSE	ABC			125. V
DEVICE TYPE:	FUSE	BUSSMANN	1-6	ABC		
CARTRIDGE:	6.00 A.	SIZE:	6.00 A.			
LABEL: FRN	BUS REC:	1 FUSE	FRN			125. V
DEVICE TYPE:	FUSE	BUSSMANN	1-12A 250V	FRN-R	RKS	
CARTRIDGE:	7.00 A.	SIZE:	6.00 A.			
LABEL: MDA	BUS REC:	1 FUSE	MDA			125. V
DEVICE TYPE:	FUSE	BUSSMANN	MDA	1-15		
CARTRIDGE:	15.00 A.	SIZE:	6.00 A.			
LABEL: MDL	BUS REC:	1 FUSE	MDL			125. V
DEVICE TYPE:	FUSE	BUSSMANN	MDL	1-8A		
CARTRIDGE:	8.00 A.	SIZE:	6.00 A.			
LABEL: MDN	BUS REC:	1 FUSE	MDN			125. V
DEVICE TYPE:	FUSE	BUSSMANN	MDN	1-15A		
CARTRIDGE:	15.00 A.	SIZE:	6.00 A.			
LABEL: OTM	BUS REC:	1 FUSE	OTM			125. V
DEVICE TYPE:	FUSE	GOULD/SHA.	OTM	1-10A		
CARTRIDGE:	10.00 A.	SIZE:	6.00 A.			

APPENDIX V
CALC. 85-E-0118-01

APPENDIX VI

PENETRATION SETPOINT REFERENCE DOCUMENTS

This appendix is a detailed reference source for the calculation setpoints plotted on the curves or determined as acceptable in the acceptance criteria section of the calculation. Specific drawing numbers, calculation numbers in the protection coordination study, vendor drawing numbers and procedures are listed.

Rev 2 BY: EM DATE: 8-11-93
Rev 2 Ck'd DS DATE: 8/12/93

APPENDIX VI
PENETRATION SETPOINT RERERENCE
DOCUMENTS CALCULATION 85-E-0118-01

PENT NUMBER	MOD NO	COND. NUMBER	SCHEME NUMBER	SCHEME DRAWING	COMPONENT NUMBER	SETPOINT REFERENCE	PRI/SEC DEVICE MODEL/TYPE	PRIMARY DEVICE LOCATION
ZZZZZZZZ	ZZZ	ZZZZZZZZ	ZZZZZZZZ	ZZZZZZZZZZ	ZZZZZZZZZZZZ	ZZZZZZZZZZZZZZZZZZZZ	ZZZZZZZZZZZZ	ZZZZZZZZ
2WR21-1	A-G	A-G	2H11	E-2181	2P32A	84E-0103-049/051	150/151M	2H11
2WR21-2	A-G	A-G	2H22	E-2181	2P32A	84E-0103-056/057	150/151M	2H22
2WR21-3	A-G	A-G	2H21	E-2181	2P32B	84E-0103-055/057	150/151M	2H21
2WR21-4	A-G	A-G	2H12	E-2181	2P32D	84E-0103-050/051	150/151M	2H12
2WR22-1	A	1	2B731	E-2108	2B71	84E-0103-117/118	N/A	2B731
2WR22-1	A	2-3	N/A	N/A	N/A	N/A		N/A
2WR22-1	C	1-3	N/A	N/A	N/A	N/A		N/A
2WR22-1	D	1-3	2B131	E-2431	2LM2	N/A	N/A	2B1
2WR22-1	E-F	1-3	2B731	E-2108	2B71	84E-0103-117/118	OD4-L.T/S.T.	2B7
2WR22-2	C-D	1-3	2B824	E-2108	2B81	84E-0103-124/125	OD4-L.T/S.T.	2B8
2WR22-2	E	1	2B824	E-2108	2B81	84E-0103-124/125	N/A	2B8
2WR22-2	E	2-3	N/A	N/A	N/A	N/A		N/A
2WR22-2	F	1-3	N/A	N/A	N/A	N/A		N/A
2WR23-1	A	1-3	N/A	N/A	N/A	N/A		N/A
2WR23-1	C-D	1-3	2B922	E-2190	PZR. HEATERS	84E-0103-130/128	OD3/OD4-51	
2WR23-1	E	1-3	2B54J2	E-2431	2M6	CALC. 84E-0103-001	HE	2B54
2WR23-1	F	1-3	2B523	E-2191	RPP HEATERS	CALC. 84E-0103-28/24	OD3/OD4-51	2B5
2WR23-2	C-D	1-3	2B1023	E-2190	PZR. HEATERS	84E-0103-137/133	OD3/OD4-51	2B10
2WR23-2	E	1-3	2B54K2	E-2431	2X27	CALC. 84E-0103-001	HE	2B54
2WR23-2	F	1-3	2B623	E-2191	RPP HEATERS	CALC. 84E-0103-35/31	OD3/OD4-51	2B6
2WR24-1	A	1-2	2D0318	E-2432	2SO2	PROC. 2307.008	HKA	2D03
2WR24-1	A	3	2M003	E-2432	N/A	N/A		
2WR24-1	C-D	1-3	2B923	E-2191	PZP HEATERS	84E-0103-131/128	OD3/OD4-51	2B9
2WR24-1	E-F	1-3	2B1022	E-2191	PZR. HEATERS	84E-0103-136/133	OD3/OD4-51	2B10
2WR25					CEA	N/A	N/A	
2WR26-1	A	1-7	2B71B6	E-2227	2CV-4856	6600-E2011-33/117	A6Y	2B71
2WR26-1	A	17-25	2B71D2	E-2375	2CV-3858	6600-E2011-33/117	A6Y	2B71
2WR26-1	A	26-34	2B71D3	E-2375	2CV-3861	6600-E2011-33/117	A6Y	2B71
2WR26-1	A	35-43	2B71E1	E-2375	2CV-3849	6600-E2011-33/117	A6Y	2B71
2WR26-1	A	44-50	2B71G2	E-2326	2HCD-8310	6600-E2011-33/117	A6Y	2B71
2WR26-1	A	51-57	2B71H4	E-2326	2VSF-35A	6600-E2011-33/117	A6Y	2B71
2WR26-1	A	58-64	2B71H5	E-2326	2VSF-35B	6600-E2011-33/117	A6Y	2B71
2WR26-1	A	65-67	2B71G1	E-2326	2HCD8251	6600-E2011-33/117	A6Y	2B71
2WR26-1	A	68-69	2K045	E-2455	ANNUN	N/A	N/A	2C17
2WR26-1	A	8-16	2B71D1	E-2375	2CV-3846	6600-E2011-33/117	A6Y	2B71
2WR26-1	C	1-7	2B71F2	E-2188	2CV-4691	6600-E2011-33/117	A6Y	2B71
2WR26-1	C	15-21	2B71E3	E-2194	2CV-5082	6600-E2011-33/117	A6Y	2B71
2WR26-1	C	22-25	2Q013	E-2181	CTRL CIRCUIT	6600-E2011	ABC/EE1B020	2C21
2WR26-1	C	26-32	2B71E2	E-2206	2CV-5081	6600-E2011-33/117	A6Y	2B71
2WR26-1	C	33-39	2B71C2	E-2394	2CV-2203	6600-E2011-33/117	A6Y	2B71
2WR26-1	C	40-46	2B71C1	E-2426	2CV-1015	6600-E2011-33/117	A6Y	2B71
2WR26-1	C	47-48	N/A	N/A	N/A	N/A		N/A
2WR26-1	C	49-52	2I027	E-2710	2SS6082/83	N/A	N/A	2C21

APPENDIX VI
PENETRATION SETPOINT RERERENCE
DOCUMENTS CALCULATION 85-E-0118-01

PENT NUMBER	MOD NO	COND. NUMBER	SCHEME NUMBER	SCHEME DRAWING	COMPONENT NUMBER	SETPOINT REFERENCE	PRI/SEC DEVICE MODEL/TYPE	PRIMARY DEVICE LOCATION
ZZZZZZZZ	ZZZ	ZZZZZZZZ	ZZZZZZZZ	ZZZZZZZZZZ	ZZZZZZZZZZZZ	ZZZZZZZZZZZZZZZZZZZZ	ZZZZZZZZZZZZ	ZZZZZZZZ
2WR26-1	C	53-56	2B54K3	E-2182	2P63A1,A2	PROC. 1025.056	FNM	2B54
2WR26-1	C	57-63	2B71C3	E-2262	2CV-5850	6600-E2011-33/117	A6Y	2B71
2WR26-1	C	64-65	2I292	E-2756	2PWR-5663			
2WR26-1	C	66-67	2I290	E-2756	2PWR-5661			
2WR26-1	C	68-69	N/A	N/A	N/A	N/A		N/A
2WR26-1	C	8-14	2B71F3	E-2188	2CV-4692	6600-E2011-33/117	A6Y	2B71
2WR26-1	D	1-4	2H11	E-2181	CT CIRCUIT	N/A	N/A	2H11
2WR26-1	D	11-22	N/A	N/A	N/A	N/A		N/A
2WR26-1	D	5-7	2H11	E-2181	HTR. CIRCUIT	E-2061-14		21P2
2WR26-1	D	8-10	2B54K3	E-2182	2P63A1,A2	CALC. 84E-0103-001	HE	2B54
2WR26-1	F	1-9	2B71B4	E-2205	NSS SYSTEM	6600-E2011-33/117	A6Y	2B71
2WR26-1	F	10-16	2B71B4	E-2205	NSS SYSTE,	6600-E2011-33/117	A6Y	2B71
2WR26-1	F	17-18	2B63L2	E-2361	2VSF-1D	E-2674-1/		2TB414
2WR26-1	F	19-27	2K103	E-2427	EVAC ALARM	6600-M2201-29	ABC	2C22
2WR26-1	F	28-30	2B61L4	E-2784	2CV-4651	CALC. 84E-0103-001	HE	2B61
2WR26-1	F	31-39	2B61L4	E-2784	2CV-4651	PROC. 1025.056	FNM	2B61
2WR26-1	F	40-55	N/A	N/A	N/A	N/A		N/A
2WR26-1	G	1-14	2J069	E-2199	CTRL CIRCUIT	PROC. 1025.056	ABC	2C33
2WR26-1	G	15-17	N/A	N/A	N/A	N/A		N/A
2WR26-1	G	18-25	2C010	E-2483	COMPUTER	N/A	N/A	2C96A
2WR26-1	G	26-27	2J025	E-2331	CMPTR INPUT	N/A	N/A	--
2WR26-1	G	28-29	2C011	E-2483	COMPUTER	N/A	N/A	N/A
2WR26-1	G	30-33	2K029	E-2457	ANNUN	N/A	N/A	2C14
2WR26-1	G	34-35	N/A	N/A	N/A	N/A		N/A
2WR26-1	G	36-39	2K045	E-2455	ANNUN	N/A	N/A	2C17
2WR26-1	G	40-42	2Q008	E-2782	N/A	N/A		
2WR26-1	G	43-52	2J130	E-2263	CTRL CIRCUIT	6600-M2211-	ABC	2C116
2WR26-1	G	53-54	2U005	E-2571	2SV3209	6600-M2201-29	ABC	2C22
2WR26-1	G	55-61	2B71B5	E-2498	2P157	6600-E2011-33/117	A6Y	2B71
2WR26-1	G	62	N/A	N/A	N/A	N/A		N/A
2WR26-1	G	63-64	2B51D3	E-2367	2VSFM-31A-1	E-2674-1/		2TB409
2WR26-1	G	65-66	2B51D4	E-2367	2VSFM-31C-1	E-2674-1		2TB409
2WR26-1	G	67-69	N/A	N/A	N/A	N/A		N/A
2WR26-2	A	1-7	2B81G4	E-2326	2VSFM-35C	6600-E2011-38/117	A6Y	2B81
2WR26-2	A	15-21	2B81E2	E-2326	2HCD-8311	6600-E2011-38/117	A6Y	2B81
2WR26-2	A	22-28	2B81F2	E-2326	2HCD-8312	6600-E2011-38/117	A6Y	2B81
2WR26-2	A	29-37	2B81E3	E-2375	2CV-3860	6600-E2011-38/117	A6Y	2B81
2WR26-2	A	38-46	2B81D1	E-2375	2CV-3862	6600-E2011-38/117	A6Y	2B81
2WR26-2	A	47-55	2B81D2	E-2375	2CV-3863	6600-E2011-38/117	A6Y	2B81
2WR26-2	A	56-64	2B81D3	E-2375	2CV-3875	6600-E2011-38/117	A6Y	2B81
2WR26-2	A	65-66	N/A	N/A	N/A	N/A		N/A
2WR26-2	A	67-68	2K045	E-2455	ANNUN	N/A	N/A	2C17
2WR26-2	A	69	N/A	N/A	N/A	N/A		N/A

APPENDIX VI
PENETRATION SETPOINT RERERENCE
DOCUMENTS CALCULATION 85-E-0118-01

PENT NUMBER	MOD NO	COND. NUMBER	SCHEME NUMBER	SCHEME DRAWING	COMPONENT NUMBER	SETPOINT REFERENCE	PRI/SEC DEVICE MODEL/TYPE	PRIMARY DEVICE LOCATION
zzzzzzzz	zzz	zzzzzzzz	zzzzzzzz	zzzzzzzzzz	zzzzzzzzzzzz	zzzzzzzzzzzzzzzzzzzz	zzzzzzzzzzzz	zzzzzzzz
2WR26-2	A	8-14	2B81G5	E-2326	2VSFM-35D	6600-E2011-38/117	A6Y	2B81
2WR26-2	C	1-4	2I029	E-2710	2SS6012	6600-2211-	ABC	2C21
2WR26-2	C	12-18	2B81C2	E-2183	2CV-4685	6600-E2011-38/117	A6Y	2B81
2WR26-2	C	19-25	2B81F3	E-2183	2CV-4693	6600-E2011-38/117	A6Y	2B81
2WR26-2	C	26-27	N/A	N/A	N/A	N/A		
2WR26-2	C	28-31	2Q014	E-2181	CTRL CIRCUIT	6600-M2211-	ABC	2C21
2WR26-2	C	32-35	2B64J1	E-2182	2PM63C1,C2	PROC. 1025.056	FNM	2B64
2WR26-2	C	36-43	2C010	E-2483	COMPUTER	N/A	N/A	2C96A
2WR26-2	C	44-45	2C011	E-2483	COMPUTER	N/A	N/A	2C96A
2WR26-2	C	46-52	2J070	E-2199	CTRL CIRCUIT	PROC. 1025.056	ABC	2C33
2WR26-2	C	5-11	2B81C3	E-2262	2CV-5858	6600-E2011-38/117	A6Y	2B81
2WR26-2	C	53-58	2J070	E-2199	CTRL CIRCUIT	PROC. 1025.056	ABC	2C33
2WR26-2	C	59-65	2B81C1	E-2426	2CV-1065	6600-E2011-38/117	A6Y	2B81
2WR26-2	C	66	2J070	E-2199	CTRL CIRCUIT	PROC. 1025.056	ABC	2C33
2WR26-2	C	67-69	N/A	N/A	N/A	N/A		N/A
2WR26-2	D	1-4	2H22	E-2181	N/A			2H22
2WR26-2	D	11-22	N/A	N/A	N/A	N/A		N/A
2WR26-2	D	5-7	2H22	E-2181	HTR CIRCUIT	E-2061-14/HE		21PA
2WR26-2	D	8-10	2B64J1	E-2182	2PM63C1,C2	CALC. 84E-0103-001	HE	2B64
2WR26-2	F	1-2	2B53L2	E-2361	2VSF1B	E-2674-1/		2TB409
2WR26-2	F	21-54	2J110	E-2269	FUEL HDLING			2C153
2WR26-2	F	3-4	2B53H3	E-2784	2CV-4652	CALC. 84E-0103-001	HE	2B53
2WR26-2	F	5-20	2B71B3	E-2205	NSS SYSTEM	6600-E2011-33/117	A6Y	2B71
2WR26-2	F	55	2B53H2	E-2784	N/A	N/A		2B53
2WR26-2	G	1-3	2B81E1	E-2326	2HCD-8252	6600-E2011-38/117	A6Y	2B81
2WR26-2	G	11-12	N/A	N/A	N/A	N/A		N/A
2WR26-2	G	13-18	2B53H3	E-2784	2CV-4652	PROC. 1025.056	FNM	2B53
2WR26-2	G	19-20	2I377	E-2756	2PWR-5665			2C14
2WR26-2	G	21-22	2I293	E-2756	2PWR-5664			2C14
2WR26-2	G	23-24	2I291	E-2756	2PWR-5662			2C14
2WR26-2	G	25-28	2K036	E-2457	ANNUN	N/A	N/A	2C14
2WR26-2	G	29-38	2J130	E-2263	CTRL CIRCUIT	6600-M2211-	ABC	2C116
2WR26-2	G	39-41	2U019	E-2585	2D101	TM #I207.0200		2C22
2WR26-2	G	4-6	2B81F1	E-2326	2HCD-8253	6600-E2011-38/117	A6Y	2B81
2WR26-2	G	42-44	2U019	E-2585	2D101	TM #I207.0200		2C22
2WR26-2	G	45-47	2U019	E-2585	2D101	TM #I207.0200		2C22
2WR26-2	G	48-50	2U019	E-2585	2D101	TM #I207.0200		2C22
2WR26-2	G	51-53	2C458	E-2483	COMPUTER	N/A	N/A	2C96A
2WR26-2	G	54-62	2K103	E-2427	EVAC ALARM	6600-M2201-29	ABC	2C22
2WR26-2	G	63-64	2B61D3	E-2367	2VSF-31B-2	E-2674-1/		2TB407
2WR26-2	G	65-66	2B61D4	E-2367	2VSF-31D	E-2674-1/		2TB407
2WR26-2	G	67-69	2B53H3	E-2784	2CV-4652	PROC. 1025.56	FNM	2B53
2WR26-2	G	7-10	2K045	E-2455	ANNUN	N/A	N/A	2C17

APPENDIX VI
PENETRATION SETPOINT RERERENCE
DOCUMENTS CALCULATION 85-E-0118-01

PENT NUMBER	MOD NO	COND. NUMBER	SCHEME NUMBER	SCHEME DRAWING	COMPONENT NUMBER	SETPOINT REFERENCE	PRI/SEC DEVICE MODEL/TYPE	PRIMARY DEVICE LOCATION
ZZZZZZZZ	ZZZ	ZZZZZZZZ	ZZZZZZZZ	ZZZZZZZZZZ	ZZZZZZZZZZZZ	ZZZZZZZZZZZZZZZZZZZZ	ZZZZZZZZZZZZ	ZZZZZZZZ
2WR26-3	A	1-2	2H11	E-2181	CTRL CIRCUIT	RL#06602190/PO-E2008	OT	2H11
2WR26-3	A	11-17	2J069	E-2199	CTRL CIRCUIT	PROC. 1025.056	ABC	2C33
2WR26-3	A	18-21	2B54K4	E-2182	2P63B1,B2	PROC. 1025.056	FNM	2B54
2WR26-3	A	22-23	2B51A4	E-2366	2VSF34A-1	E-2674-1/		2TB414
2WR26-3	A	24-25	2B61A4	E-2366	2VSF34B-2	E-2674-1/		2TB407
2WR26-3	A	26-27	2B31E1	E-2391	2P41A	6600-E2011-24/117	A6Y	2B31
2WR26-3	A	28-29	2B41E4	E-2391	2PM41B	6600-E2011-13/117	A6Y	2B41
2WR26-3	A	3-4	2H21	E-2181	2P32B	RL#06602190/PO-E2008	OT	2H21
2WR26-3	A	30-33	2I028	E-2710	2SS6092	6600-M2201B-	ABC	2C21
2WR26-3	A	34-36	2K101	E-2427	EVAC ALARM	6600-M2201B-29	ABC	2C22
2WR26-3	A	37-39	2K102	E-2427	EVAC ALARM	6600-M2201B-29	ABC	2C22
2WR26-3	A	40-47	2C010	E-2483	COMPUTER	N/A	N/A	2C96A
2WR26-3	A	48-49	2C011	E-2483	COMPUTER	N/A	N/A	2C96A
2WR26-3	A	5-6	N/A	N/A	N/A	N/A		N/A
2WR26-3	A	50-51	2J026	E-2331	CMPTR INPUT	N/A	N/A	--
2WR26-3	A	52-55	2C008	E-2483	COMPUTER	N/A	N/A	2C96B
2WR26-3	A	56-57	N/A	N/A	N/A	N/A		N/A
2WR26-3	A	58-60	2Q008	E-2782	N/A	N/A		
2WR26-3	A	61-62	2K017	E-2453	ANNUN	N/A	N/A	2C12
2WR26-3	A	63-69	N/A	N/A	N/A	N/A		N/A
2WR26-3	A	7-10	2Q013	E-2181	CTRL CIRCUIT	6600-M2201-	ABC	2C21
2WR26-3	C	1-9	2J123	E-2498	CTRL CIRCUIT	6600-M2211-	ABC	2C116
2WR26-3	C	10-16	2J123	E-2498	CTRL CIRCUIT	6600-M2211-	ABC	2C116
2WR26-3	C	17-22	N/A	N/A	N/A	N/A		N/A
2WR26-3	C	23-24	2Q019	E-2181	CTRL CIRCUIT	6600-M2201-	ABC	2C21
2WR26-3	C	25-32	2K029	E-2457	ANNUN	N/A	N/A	2C14
2WR26-3	C	33-44	2J123	E-2498	CTRL CIRCUIT	6600-M2211-	ABC	2C116
2WR26-3	C	45-47	2J134	E-2262	CTRL CIRCUIT	6600-M2211-	ABC	2C116
2WR26-3	C	48-51	N/A	N/A	N/A	N/A		N/A
2WR26-3	C	52-53	2J069	E-2199	CTRL CIRCUIT	PROC. 1025.056	ABC	2C33
2WR26-3	C	54-56	2J134	E-2262	CTRL CIRCUIT	6600-M2211-	ABC	2C116
2WR26-3	C	57-64	2U015	E-2581	2ZIU-08	6600-M2201-29	ABC	2C22
2WR26-3	C	65	N/A	N/A	N/A	N/A		N/A
2WR26-3	C	66-69	2J123	E-2498	CTRL CIRCUIT	6600-M2211-	ABC	2C116
2WR26-3	D	1-4	2H21	E-2181	CT CIRCUIT	N/A	N/A	2H21
2WR26-3	D	11	2B54K2	E-2431	N/A	N/A		2B54
2WR26-3	D	12-22	N/A	N/A	N/A	N/A		N/A
2WR26-3	D	5-7	2H21	E-2181	HTR CIRCUIT	E2061		21PA
2WR26-3	D	8-10	2B54K4	E-2182	2P63B1,B2	CALC. 84E-0103-001	HE	2B54
2WR26-3	F	1-2	2B63L1	E-2361	2VSF1C			2B63
2WR26-3	F	3-5	2B31G2	E-2785	2CV-4654	CALC. 84E-0103-047	HE	2B31
2WR26-3	F	6-8	2B41F5	E-2785	2CV-4656	CALC. 84E-0103-047	HE	2B41
2WR26-3	F	9-55	N/A	N/A	N/A	N/A		N/A

APPENDIX VI
PENETRATION SETPOINT RERERENCE
DOCUMENTS CALCULATION 85-E-0118-01

PENT NUMBER	MOD NO	COND. NUMBER	SCHEME NUMBER	SCHEME DRAWING	COMPONENT NUMBER	SETPOINT REFERENCE	PRI/SEC DEVICE MODEL/TYPE	PRIMARY DEVICE LOCATION
ZZZZZZZZ	ZZZ	ZZZZZZZZ	ZZZZZZZZ	ZZZZZZZZZZ	ZZZZZZZZZZZZ	ZZZZZZZZZZZZZZZZZZZZ	ZZZZZZZZZZZZ	ZZZZZZZZ
2WR26-4	A	1-2	2H22	E-2181	2P32C	RL#06602190/PO-E2008	OT	2H22
2WR26-4	A	12-15	2B64K1	E-2182	2PM63D1,D2	PROC. 1025.056	FNM	2B64
2WR26-4	A	16-17	N/A	N/A	N/A	N/A		N/A
2WR26-4	A	18-21	2Q014	E-2181	CTRL CIRCUIT	6600-M2201-	ABC	2C21
2WR26-4	A	22-29	2C010	E-2483	COMPUTER	N/A	N/A	2C96A
2WR26-4	A	3-4	2H12	E-2181	2P32D	RL#06602190/PO-E2008	OT	2H12
2WR26-4	A	30,31	2C011	E-2483	COMPUTER	N/A	N/A	2C96A
2WR26-4	A	32-33	2J070	E-2199	CTRL CIRCUIT	PROC. 1025.056	ABC	2C33
2WR26-4	A	34-35	2Q023	E-2181	CTRL CIRCUIT	6600-M2201-	ABC	2C21
2WR26-4	A	36-39	2K036	E-2457	ANNUN	N/A	N/A	2C14
2WR26-4	A	40-41	N/A	N/A	N/A	N/A		N/A
2WR26-4	A	42-45	2K036	E-2457	ANNUN	N/A	N/A	2C14
2WR26-4	A	46-49	2I030	E-2710	2SS6012	N/A	N/A	2C21
2WR26-4	A	5-11	2J070	E-2199	CTRL CIRCUIT	PROC. 1025.056	ABC	2C33
2WR26-4	A	50-54	2U019	E-2585	FIRE PROT	6600-M2201-29	ABC	2C22
2WR26-4	A	55-62	2U015	E-2581	2ZIU-09	6600-M2201-29	ABC	2C22
2WR26-4	A	63-64	2K059	E-2458	ANNUN	N/A	N/A	2C22
2WR26-4	A	65-66	2K017	E-2453	ANNUN	N/A	N/A	2C12
2WR26-4	A	67-69	N/A	N/A	N/A	N/A		N/A
2WR26-4	C	1-37	2I410	E-2757	COMPUTER		N/A	
2WR26-4	C	38-44	2B31G2	E-2785	2CV4654	6600-E2011-24/117	A6Y	2B31
2WR26-4	C	45-51	2B41F5	E-2785	2CV-4656	6600-E2011-13/117	A6Y	2B41
2WR26-4	C	52-58	2B71A3	E-2785	2CV-4655	6600-E2011-33/117	A6Y	2B71
2WR26-4	C	59-65	2B81A3	E-2785	2CV-4653	6600-E2011-38/117	A6Y	2B81
2WR26-4	C	66-69	N/A	N/A	N/A	N/A		
2WR26-4	D	1-4	2H12	E-2181	CT CIRCUIT	N/A	N/A	2H12
2WR26-4	D	11-22	N/A	N/A	N/A	N/A		N/A
2WR26-4	D	5-7	2H12	E-2181		E-2060-14		21PA
2WR26-4	D	8-10	2B64K1	E-2182	2PM63D1,D2	CALC. 84E-0103-001	HE	2B64
2WR26-4	F	1-2	2B53L1	E-2361	2VSF1A	E-2674-1/		2TB409
2WR26-4	F	3-50	2I410	E-2757	COMPUTER	N/A	N/A	
2WR26-4	F	51-55	N/A	N/A	N/A	N/A		N/A
2WR27-1	A	1-8,11	2I023	E-2709	2PWR-6002			2C21
2WR27-1	A	17,10,18	2I052	E-2719	2PWR-5020			2C21
2WR27-1	A	20,19,12	2I051	E-2719	2PWR-5000			2C21
2WR27-1	A	21,13,14	2I051	E-2719	2PWR-5618			2C21
2WR27-1	A	22,23,31	2I052	E-2719	2PWR-5618			2C21
2WR27-1	A	24,33,32	2I052	E-2719	2PWR-5020			2C21
2WR27-1	A	28,29,37	2I376	E-2751	2PWR-5692			2C21
2WR27-1	A	34,25,26	2I225	E-2732	2PWR-4924			2C21
2WR27-1	A	36,35,27	2I225	E-2732	2PWR-4925			2C21
2WR27-1	A	38,30,39	2I364	E-2751	2PWR-5691			2C21
2WR27-1	A	47,55,46	2I055	E-2720	2PWR-5618			2C21

APPENDIX VI
PENETRATION SETPOINT RERERENCE
DOCUMENTS CALCULATION 85-E-0118-01

PENT NUMBER	MOD NO	COND. NUMBER	SCHEME NUMBER	SCHEME DRAWING	COMPONENT NUMBER	SETPOINT REFERENCE	PRI/SEC DEVICE MODEL/TYPE	PRIMARY DEVICE LOCATION
ZZZZZZZZ	ZZZ	ZZZZZZZZ	ZZZZZZZZ	ZZZZZZZZZZ	ZZZZZZZZZZZZ	ZZZZZZZZZZZZZZZZZZZZ	ZZZZZZZZZZZ	ZZZZZZZZ
2WR27-1	A	50,49,41	2I055	E-2720	2PWR-5620			2C21
2WR27-1	A	51,42,43	2I056	E-2720	2PWR-5618			2C21
2WR27-1	A	54,53,45	2I055	E-2720	2PWR-5000			2C21
2WR27-1	A	56,48,40	2I055	E-2720	2PWR-5000			2C21
2WR27-1	A	57,58,65	2I056	E-2720	2PWR-5020			2C21
2WR27-1	A	59,52,44	2I056	E-2720	2PWR-5020			2C20
2WR27-1	A	64,69,63	2I066	E-2722	2PWR-5106			2C21
2WR27-1	A	66,60,61	2I056	E-2720	2PWR-5620			2C21
2WR27-1	A	68,67,62	2I065	E-2722	2PWR-5105			2C21
2WR27-1	A	9,16,15	2I051	E-2719	2PWR-5000			2C21
2WR27-1	C	1,2,7,6	N/A	N/A	N/A	N/A		N/A
2WR27-1	C	11,19,18	2I017	E-2706	COMPUTER			
2WR27-1	C	13,21,12	2I009	E-2702	2PWR-4615			2C21
2WR27-1	C	14,15,23	2I019	E-2708	COMPUTER			
2WR27-1	C	16,17,25	2I017	E-2706	COMPUTER			
2WR27-1	C	26,27,36	2I017	E-2706	COMPUTER			
2WR27-1	C	29,20,30	2C012	E-2483	COMPUTER	N/A	N/A	2C99B
2WR27-1	C	32,42,41	2C012	E-2483	COMPUTER	N/A	N/A	2C99B
2WR27-1	C	37,28,38	2I019	E-2708	COMPUTER			
2WR27-1	C	44,53,43	2I019	E-2708	COMPUTER			
2WR27-1	C	49,58,48	2I019	E-2708	COMPUTER			
2WR27-1	C	55,54.45	2C012	E-2483	COMPUTER	N/A	N/A	2C99B
2WR27-1	C	60,50,51	2I019	E-2708	COMPUTER			
2WR27-1	C	63,64,72	2C012	E-2483	COMPUTER	N/A	N/A	2C99B
2WR27-1	C	66,65,56	2C012	E-2483	COMPUTER	N/A	N/A	2C99B
2WR27-1	C	67,59,68	2I019	E-2708	2TIS-6043			2C14
2WR27-1	C	70,69,61	2C012	E-2483	COMPUTER	N/A	N/A	2C99B
2WR27-1	C	73,74,81	2I019	E-2708	2TIS-6080			2C14
2WR27-1	C	77,83,82	2I019	E-2708	2TIS-6040			2C14
2WR27-1	C	84,78,79	2I290	E-2756	2PWR-5661M			2C14
2WR27-1	C	9,8,3,4	2I017	E-2706	COMPUTER			
2WR27-1	D	CBL NO.1	2B71B4	E-2205	NSS SYSTEM	6600-E2011-33/117	A6Y	2B71
2WR27-1	D	CBL NO.2	2I178	E-2726	2VBR-4660			
2WR27-1	D	CBL NO.3	2I178	E-2726	2VBR-4660			
2WR27-1	D	CBL NO.4	2I178	E-2726	2VBR-4660			
2WR27-1	D	CBL NO.5	2I178	E-2726	2VBR-4660			
2WR27-1	D	CBL NO.6	N/A	N/A	N/A	N/A		N/A
2WR27-1	E	14,23,32	2I239	E-2731	2SY-6121-B			2C21
2WR27-1	E	16,24,15	2I238	E-2731	2SY-6121-A			2C21
2WR27-1	E	18,19,28	N/A	N/A	N/A	N/A		N/A
2WR27-1	E	20,12,13	2I017	E-2706	2TIS-4609			2C04
2WR27-1	E	35,25,17	2I017	E-2706	2TIS-4607			2C04
2WR27-1	E	37,38,36	2I562	E-2703	2PY-4600-1A	N/A		2C409

APPENDIX VI
PENETRATION SETPOINT RERERENCE
DOCUMENTS CALCULATION 85-E-0118-01

PENT NUMBER	MOD NO	COND. NUMBER	SCHEME NUMBER	SCHEME DRAWING	COMPONENT NUMBER	SETPOINT REFERENCE	PRI/SEC DEVICE MODEL/TYPE	PRIMARY DEVICE LOCATION
ZZZZZZZZ	ZZZ	ZZZZZZZZ	ZZZZZZZZ	ZZZZZZZZZZ	ZZZZZZZZZZZZ	ZZZZZZZZZZZZZZZZZZZZ	ZZZZZZZZZZZZ	ZZZZZZZZ
2WR27-1	E	4,11,10	N/A	N/A	N/A	N/A		N/A
2WR27-1	E	40,39,29	N/A	N/A	N/A	N/A		N/A
2WR27-1	E	42-44,33	2I286	E-2754	2PWR-5661T			2C21
2WR27-1	E	50,41,51	2I017	E-2706	2TIS-4630			2C04
2WR27-1	E	54,45,55	2I017	E-2706	2TIS-4631			2C04
2WR27-1	E	56,57,66	2I019	E-2708	2URS-6004			2C14
2WR27-1	E	58,48,49	2I019	E-2708	2URS-6004			2C14
2WR27-1	E	62,61,52	N/A	N/A	N/A	N/A		N/A
2WR27-1	E	67-81	COMMUN.	E-2056	N/A			
2WR27-1	E	7,6,5,1,	2I009	E-2702	2PWR-4615			2C21
2WR27-1	E	85,84,83	2I292	E-2756	2PWR-5663			2C14
2WR27-1	E	W10	N/A	N/A	N/A	N/A		N/A
2WR27-1	F	1-91	N/A	N/A	N/A	N/A		N/A
2WR27-1	G	1,2,6	2I081	E-2728	FDWTR INSTRU			2C27A
2WR27-1	G	11,4,5	2I081	E-2728	FDWTR INSTRU			2C27A
2WR27-1	G	17,10,18	2I507	E-2337	2PWR-6008			2C32
2WR27-1	G	20,19,12	2I324	E-2754	2PWR-4662			2C21
2WR27-1	G	21,13,14	N/A	N/A	N/A	N/A		N/A
2WR27-1	G	24,33,32	2B71B4	E-2205	NSS SYSTEM	6600-E2011-33/117	A6Y	2B71
2WR27-1	G	7,3,8	2I081	E-2728	FDWTR INSTRU			2C27A
2WR27-1	G	9,16,15	2I325	E-2754	2TS-6085			2C14
2WR27-1	G	W11-W19	2B71B4	E-2205	NSS SYSTEM	6600-E2011-33/117	A6Y	2B71
2WR27-1	G	W20	2I563	E-2751-24	2LI-4792			2C04
2WR27-1	G	W21-W23	N/A	N/A	N/A	N/A		N/A
2WR27-2	A	1,2,6	2I083	E-2728	FDWTR INSTRU			2C27B
2WR27-2	A	11,4,5	2I054	E-2719	2PWR-4927			2C21
2WR27-2	A	17,10,18	2I227	E-2732	2PWR-4924			2C21
2WR27-2	A	20,19,12	2I054	E-2719	2PWR-5108			2C21
2WR27-2	A	21,13,14	2I054	E-2719	2PWR-4926			2C21
2WR27-2	A	22,23,31	2I068	E-2720	2PWR-4926			2C21
2WR27-2	A	24,33,32	2I068	E-2720	2PWR-5108			2C21
2WR27-2	A	28,29,37	2I068	E-2720	2PWR-4927			2C21
2WR27-2	A	34,25,26	2I025	E-2709	2PWR-6022			2C21
2WR27-2	A	36,35,27	2I025	E-2709	2PWR-6022			2C21
2WR27-2	A	38,30,39	2I068	E-2720	2PWR-5108			2C21
2WR27-2	A	47,55,46	2I325	E-2754	2TS-6105			2C14
2WR27-2	A	50,49,41	2I364	E-2751	2PWR-5694			2C21
2WR27-2	A	51,42,43	2M035	E-2516	COMM			
2WR27-2	A	54,53,45	2I025	E-2709	2PWR-6022			2C21
2WR27-2	A	56,48,40	2I376	E-2751	2PWR-5695			2C21
2WR27-2	A	59,52,44	2I360	E-2727	COMM			2C03
2WR27-2	A	60-64,66	2M035	E-2516	COMM			
2WR27-2	A	7,3,8	2I083	E-2728	FDWTR INSTRU			2C27B

APPENDIX VI
PENETRATION SETPOINT RERERENCE
DOCUMENTS CALCULATION 85-E-0118-01

PENT NUMBER	MOD NO	COND. NUMBER	SCHEME NUMBER	SCHEME DRAWING	COMPONENT NUMBER	SETPOINT REFERENCE	PRI/SEC DEVICE MODEL/TYPE	PRIMARY DEVICE LOCATION
ZZZZZZZZ	ZZZ	ZZZZZZZZ	ZZZZZZZZ	ZZZZZZZZZZ	ZZZZZZZZZZZZ	ZZZZZZZZZZZZZZZZZZZZ	ZZZZZZZZZZZZ	ZZZZZZZZ
2WR27-2	A	9,16,15	2I227	E-2732	2PWR-4925			2C21
2WR27-2	C	1,2,7,6	2I238	E-2731	2SY-6121-A			2C21
2WR27-2	C	11,19,18	2C014	E-2483	COMPUTER	N/A	N/A	2C99B
2WR27-2	C	13,21,12	2C014	E-2483	COMPUTER	N/A	N/A	2C99B
2WR27-2	C	14,15,23	2C014	E-2483	COMPUTER	N/A	N/A	2C99B
2WR27-2	C	16,17,25	2C014	E-2483	COMPUTER	N/A	N/A	2C99B
2WR27-2	C	26,27,36	2I021	E-2708	COMPUTER			
2WR27-2	C	29,20,30	2C014	E-2483	COMPUTER	N/A	N/A	2C99B
2WR27-2	C	32,42,41	2C014	E-2483	COMPUTER	N/A	N/A	2C99B
2WR27-2	C	37,28,38	2I010	E-2702	2PWR-4715			2C21
2WR27-2	C	44,53,43	2I021	E-2708	COMPUTER			
2WR27-2	C	49,58,48	2I021	E-2708	COMPUTER			
2WR27-2	C	55,54,45	2I021	E-2708	COMPUTER			
2WR27-2	C	60,50,51	2I021	E-2708	COMPUTER			
2WR27-2	C	63,64,72	2I021	E-2708	2TIS-6100			2C14
2WR27-2	C	66,65,56	2I021	E-2708	2TIS-6060			2C14
2WR27-2	C	67,59,68	2I021	E-2708	2URS-6024			2C14
2WR27-2	C	70,69,61	2I021	E-2708	2TIS-6063			2C14
2WR27-2	C	73,74,81	2I021	E-2708	2URS-6024			2C14
2WR27-2	C	77,83,82	2I377	E-2756	2PWR-5665			2C14
2WR27-2	C	84,78,79	2I293	E-2756	2PWR-5664M			2C14
2WR27-2	C	9,8,3,4	2I239	E-2731	2SY-6121-B			2C21
2WR27-2	D	3	2I539	E-	N/A	N/A	N/A	
2WR27-2	D	6	2I178	E-2726		N/A	N/A	
2WR27-2	D	CBL 1,2	N/A	N/A	N/A	N/A		N/A
2WR27-2	E	14,23,32	2I287	E-2754	2PWR-5662T			2C21
2WR27-2	E	16,24,15	2I291	E-2756	2PWR-5662M			2C21
2WR27-2	E	20,12,13	N/A	N/A	N/A	N/A		N/A
2WR27-2	E	35,25,17	N/A	N/A	N/A	N/A		N/A
2WR27-2	E	37,38	2I562	E-2703-6	2PY-4600-2A			2C409
2WR27-2	E	4,11,10,	N/A	N/A	N/A	N/A		N/A
2WR27-2	E	7,6,5	2I010	E-2702	2PWR-4715			2C21
2WR27-2	E	START,62	N/A	N/A	N/A	N/A		N/A
2WR27-2	E	W6-W9	N/A	N/A	N/A	N/A		N/A
2WR27-2	F	1	2M035	E-2516		N/A	N/A	
2WR27-2	F	2,3	N/A	N/A	N/A	N/A	N/A	N/A
2WR27-2	F	4	2B71B3	E-2205	NSS SYSTEM	6600-E2011-33/117	A6Y	2B71
2WR27-2	F	5	2I178	E-2726	N/A	N/A	N/A	
2WR27-2	F	6	2I178	E-2726	N/A	N/A	N/A	
2WR27-2	G	1-20,22	2B71B3	E-2205	NSS SYSTEM	6600-E2011-33/117	A6Y	2B71
2WR27-2	G	28,29,37	2M035	E-2516				
2WR27-2	G	34&25	2U019		N/A			
2WR27-2	G	38,30,39	2B71B3	E-2205	NSS SYSTEM	6600-E2011-33/117	A6Y	2B71

APPENDIX VI
PENETRATION SETPOINT RERERENCE
DOCUMENTS CALCULATION 85-E-0118-01

PENT NUMBER	MOD NO	COND. NUMBER	SCHEME NUMBER	SCHEME DRAWING	COMPONENT NUMBER	SETPOINT REFERENCE	PRI/SEC DEVICE MODEL/TYPE	PRIMARY DEVICE LOCATION
zzzzzzzz	zzz	zzzzzzzz	zzzzzzzz	zzzzzzzzzz	zzzzzzzzzzzz	zzzzzzzzzzzzzzzzzzzz	zzzzzzzzzzz	zzzzzzzz
2WR27-2	G	42&51	N/A	N/A	N/A	N/A		N/A
2WR27-2	G	47&55	2U019		N/A			
2WR27-2	G	49-50	2U031	E-2581-7	2ZIU-17	E-2996-5,10		2C341
2WR27-2	G	52,59	2U031	E-2581-7	2ZIU-17	E-2996-5,10		2C341
2WR27-2	G	53-54	2U019		N/A			
2WR27-2	G	56,48,40	N/A	N/A	N/A	N/A		N/A
2WR27-2	G	57,58,65	N/A	N/A	N/A	N/A		N/A
2WR27-2	G	64,69,63	N/A	N/A	N/A	N/A		N/A
2WR27-2	G	66.60.61	N/A	N/A	N/A	N/A		N/A
2WR27-2	G	68,67,62	N/A	N/A	N/A	N/A		N/A
2WR27-3	A	1,2,6	2I211	E-2751	2PWR-2200L			2C112
2WR27-3	A	11,4,5,	COMM	E-2056	COMM			
2WR27-3	A	17,18,10	2I027	E-2710	2PWR6002			
2WR27-3	A	20,19,12	2I557	E-2831	COMM			
2WR27-3	A	21,13,14	2I018	E-2707	2PWR-4870			2C21
2WR27-3	A	22,23,31	2I028	E-2710	2PWR6012			
2WR27-3	A	24,32,33	2I028	E-2710	2PWR6012			
2WR27-3	A	28,29,37	2I226	E-2732	2PWR-4925			2C21
2WR27-3	A	34,25,26	2I015	E-2704	2PWR-4626A			2C21
2WR27-3	A	36,35,27	2I199	E-2753	2PWR-2200P			2C112
2WR27-3	A	38,30,39	2I226	E-2732	2PWR-4924			2C21
2WR27-3	A	47,55,46	2I018	E-2707	2PWR-4870			2C21
2WR27-3	A	50,49,41	2I326	E-2753	2PWR-5088			2C21
2WR27-3	A	51,42,43	2I024	E-2709	2PWR-6012			2C21
2WR27-3	A	54,53,45	2I015	E-2704	2PWR-4626B			2C21
2WR27-3	A	56,48,40	2I041	E-2716	2PWR-4820			2C21
2WR27-3	A	57,58,65	2I024	E-2709	2PWR-6012			2C21
2WR27-3	A	59,52,44	2I024	E-2709	2PWR-6012			2C21
2WR27-3	A	62-64	N/A	N/A	N/A	N/A		N/A
2WR27-3	A	66,60,61	2I325	E-2754	2TS-6095			2C14
2WR27-3	A	7,3,8	2I045	E-2707	2PWR-4625			2C32
2WR27-3	A	9,16,15	2I027	E-2710	2PWR6002			
2WR27-3	C	1,2,7,6	2I013	E-2483	COMPUTER	N/A	N/A	2C99B
2WR27-3	C	11,19,18	2I020	E-2708	COMPUTER			
2WR27-3	C	13,21,12	2I020	E-2708	COMPUTER			
2WR27-3	C	14,15,23	2I013	E-2483	COMPUTER	N/A	N/A	2C99B
2WR27-3	C	16,17,25	2I013	E-2483	COMPUTER	N/A	N/A	2C99B
2WR27-3	C	26,27,36	2I013	E-2483	COMPUTER	N/A	N/A	2C99B
2WR27-3	C	29,20,30	2I017	E-2706	COMPUTER			
2WR27-3	C	32,42,41	2I020	E-2708	COMPUTER			
2WR27-3	C	37,28,38	2I033	E-2712	COMPUTER			
2WR27-3	C	44,53,43	2I013	E-2483	COMPUTER	N/A	N/A	2C99B
2WR27-3	C	49,58,48	2I020	E-2708	COMPUTER			

APPENDIX VI
PENETRATION SETPOINT RERERENCE
DOCUMENTS CALCULATION 85-E-0118-01

PENT NUMBER	MOD NO	COND. NUMBER	SCHEME NUMBER	SCHEME DRAWING	COMPONENT NUMBER	SETPOINT REFERENCE	PRI/SEC DEVICE MODEL/TYPE	PRIMARY DEVICE LOCATION
ZZZZZZZZ	ZZZ	ZZZZZZZZ	ZZZZZZZZ	ZZZ-ZZZZZZ	ZZZZZZZZZZZZ	ZZZZZZZZZZZZZZZZZZZZ	ZZZZZZZZZZZZ	ZZZZZZZZ
2WR27-3	C	55,54,45	2I018	E-2707	COMPUTER			
2WR27-3	C	60,50-52	2I020	E-2708	COMPUTER			
2WR27-3	C	63,64,72	2I508	E-2337	2PWR-6018			2C32
2WR27-3	C	70,69,61	N/A	N/A	N/A	N/A		N/A
2WR27-3	C	9,8,3,4	2I013	E-2483	COMPUTER	N/A	N/A	2C99B
2WR27-3	C	W17-W21	N/A	N/A	N/A	N/A		N/A
2WR27-3	D	1-5	2R388	E-2205	NSS SYSTEM			
2WR27-3	D	6	N/A	N/A	N/A	N/A		N/A
2WR27-3	E	14,23,32	2I239	E-2731	2SY-6121-B			2C21
2WR27-3	E	16,24,15	2I238	E-2731	2SY-6121-A			2C21
2WR27-3	E	18,19,28	2I020	E-2708	2TIS-6050			2C14
2WR27-3	E	20,12,13	2I020	E-2708	2TIS-6090			2C14
2WR27-3	E	35,25,17	2I020	E-2708	2TIS-6053			2C14
2WR27-3	E	37,38,36	2I562	E-2703-6	2PY-4600-3A			2C409
2WR27-3	E	4,11,10,	2I009	E-2702	2PWR-4615			2C21
2WR27-3	E	42-44	2I033	E-2712	2PWR-4820			2C21
2WR27-3	E	50,41,51	2I017	E-2706	2TIS-4608			2C07
2WR27-3	E	54,45,55	2I018	E-2707	2TIS-4694			2C21
2WR27-3	E	56,57,66	2I020	E-2708	2URS-6014			2C14
2WR27-3	E	58,49,48	2I033	E-2712	2TI-4825			2C09
2WR27-3	E	7,6,5,1	N/A	N/A	N/A	N/A		N/A
2WR27-3	E	82-85	2I020	E-2708	2URS-6014			2C14
2WR27-3	E	W16-18	N/A	N/A	N/A	N/A		N/A
2WR27-3	E	W9,10,11	N/A	N/A	N/A	N/A		N/A
2WR27-3	F	W1-12	COMM	E-2831	COMM			
2WR27-3	F	W13-W28	N/A	N/A	N/A	N/A		N/A
2WR27-4	A	1,2,6	2I083	E-2728	FDWRT INSTRU			2C27B
2WR27-4	A	11,4,5	2I053	E-2719	2PWR-5109			2C21
2WR27-4	A	17,10,8	2I030	E-2710	2PWR6022			
2WR27-4	A	20,19,12	2I053	E-2719	2PWR-4926			2C21
2WR27-4	A	21,13,14	2I029	E-2710	2PWR6032			
2WR27-4	A	22,23,31	2I030	E-2710	2PWR6032			
2WR27-4	A	24,32,33	COMM	E-2056	COMM			
2WR27-4	A	28,29,37	2I410	E-2757	COMPUTER			
2WR27-4	A	34,25,26	2I067	E-2720	2PWR-4926			2C21
2WR27-4	A	36,35,27	2I228	E-2732	2PWR-4924			2C21
2WR27-4	A	38,30,39	2I228	E-2732	2PWR-4925			2C21
2WR27-4	A	47,55,46	2I067	E-2720	2PWR-4927			2C21
2WR27-4	A	50,49,41	2I026	E-2709	2PWR-6032			2C21
2WR27-4	A	51,42,43	2I026	E-2709	2PWR-6032			2C21
2WR27-4	A	54,53,45	2I067	E-2720	2PWR-5109			2C21
2WR27-4	A	56,48,40	2I067	E-2720	2PWR-5109			2C21
2WR27-4	A	57,58,65	2I325	E-2754	2TS-6115			2C14

APPENDIX VI
PENETRATION SETPOINT RERERENCE
DOCUMENTS CALCULATION 85-E-0118-01

PENT NUMBER	MOD NO	COND. NUMBER	SCHEME NUMBER	SCHEME DRAWING	COMPONENT NUMBER	SETPOINT REFERENCE	PRI/SEC DEVICE MODEL/TYPE	PRIMARY DEVICE LOCATION
ZZZZZZZZ	ZZZ	ZZZZZZZZ	ZZZZZZZZ	ZZZZZZZZZZ	ZZZZZZZZZZZZ	ZZZZZZZZZZZZZZZZZZZZ	ZZZZZZZZZZZZ	ZZZZZZZZ
2WR27-4	A	59,52,44	2I026	E-2709	2PWR-6032			2C21
2WR27-4	A	60-64	2I410	E-2757	COMPUTER			
2WR27-4	A	7,3,8	2I053	E-2719	2PWR-4927			2C21
2WR27-4	A	9,16,15	2I029	E-2710	2PWR6022			
2WR27-4	C	1,2,7,6	2I238	E-2731	2SY-6121-A			2C21
2WR27-4	C	11,19,18	2I015	E-2483	COMPUTER	N/A	N/A	2C99B
2WR27-4	C	13,21,12	2I015	E-2483	COMPUTER	N/A	N/A	2C99B
2WR27-4	C	14,15,23	2I022	E-2708	2TIS-6073			2C14
2WR27-4	C	16,17,25	2I022	E-2708	2TIS-6110			2C14
2WR27-4	C	26,27,36	2I015	E-2483	COMPUTER	N/A	N/A	2C99B
2WR27-4	C	29,20,30	2I022	E-2708	COMPUTER			
2WR27-4	C	32,42,41	2I022	E-2708	COMPUTER			
2WR27-4	C	37,28,38	2I015	E-2483	COMPUTER	N/A	N/A	2C99B
2WR27-4	C	44,53,43	2I015	E-2483	COMPUTER	N/A	N/A	2C99B
2WR27-4	C	49,58,48	2I022	E-2708	2TIS-6070			2C14
2WR27-4	C	55,54,45	2I015	E-2483	COMPUTER	N/A	N/A	2C99B
2WR27-4	C	60,50-52	2I022	E-2708	COMPUTER			
2WR27-4	C	63,64,72	2I022	E-2708	2URS-6034			2C14
2WR27-4	C	66,65,56	2I022	E-2708	COMPUTER			
2WR27-4	C	67,59,68	2I022	E-2708	COMPUTER			
2WR27-4	C	70,69,61	2I022	E-2708	2URS-6034			2C14
2WR27-4	C	73,74,81	2I010	E-2702	COMPUTER			
2WR27-4	C	76-79	N/A	N/A	N/A	N/A		
2WR27-4	C	9,8,3,4	2I239	E-2731	2SY-6121-B			2C21
2WR27-4	D	1-5	2R389	E-2205	NSS SYSTEM			
2WR27-4	D	6	2I178	E-2726				
2WR27-4	E	19,28,27	2I410	E-2757	COMPUTER			
2WR27-4	E	37,38,47	2I396	E-2757	COMPUTER			
2WR27-4	E	4,11,3	2I562	2-2703-6	2PY-4600-4A			2C409
2WR27-4	E	40,39,29	2I396	E-2757	COMPUTER			
2WR27-4	E	43,42,33	2I396	E-2757	COMPUTER			
2WR27-4	E	57,66,65	2I410	E-2757	COMPUTER			
2WR27-4	E	62,61,52	2I396	E-2757	COMPUTER			
2WR27-4	E	7,6,5,1,	2I010	E-2702	2PWR-4715			2C21
2WR27-4	E	73,74,81	2I396	E-2757	COMPUTER			
2WR27-4	E	76,75,67	2I396	E-2757	COMPUTER			
2WR27-4	E	79,78,77	2I396	E-2757	COMPUTER			
2WR27-4	E	82-85	2I557	E-2831	COMM			
2WR27-4	E	9	N/A	N/A	N/A	N/A		N/A
2WR27-4	E	W12-14	N/A	N/A	N/A	N/A		N/A
2WR27-4	E	W4-7	N/A	N/A	N/A	N/A		N/A
2WR27-4	F	W1-W7	COMM		COMM			
2WR27-4	F	W10-W12	COMM		COMM			

APPENDIX VI
PENETRATION SETPOINT RERERENCE
DOCUMENTS CALCULATION 85-E-0118-01

PENT NUMBER	MOD NO	COND. NUMBER	SCHEME NUMBER	SCHEME DRAWING	COMPONENT NUMBER	SETPOINT REFERENCE	PRI/SEC DEVICE MODEL/TYPE	PRIMARY DEVICE LOCATION
ZZZZZZZZ	ZZZ	ZZZZZZZZ	ZZZZZZZZ	ZZZZZZZZZZ	ZZZZZZZZZZZZ	ZZZZZZZZZZZZZZZZZZZZ	ZZZZZZZZZZZZ	ZZZZZZZZ
2WR27-4	F	W13-W28	N/A	N/A	N/A	N/A		N/A
2WR27-4	F	W8-W9	N/A	N/A	N/A	N/A	N/A	N/A
2WR27-4	G	1-85	2I396	E-2757	COMPUTER	N/A	N/A	
2WR28-1	A	1,2,8	2B533	E-2379	N/A	N/A	N/A	2C182
2WR28-1	A	10,9,3	2B533	E-2379	N/A	N/A	N/A	2C182
2WR28-1	A	13,12,6	2B633	E-2379	N/A	N/A	N/A	2C184
2WR28-1	A	15,14,7	2B633	E-2379	N/A	N/A	N/A	2C184
2WR28-1	A	25,24,16	2B633	E-2379	N/A	N/A	N/A	2C184
2WR28-1	A	4,5,11	2B533	E-2379	N/A	N/A	M/A	2C182
2WR28-1	A	W7-W28	N/A	N/A	N/A	N/A	N/A	N/A
2WR28-1	C	1-12	2M012	E-2433	2RITS-8905	N/A	N/A	2C25
2WR28-1	D	1-12	2M013	E-2433	2RITS-8909	N/A	N/A	2C25
2WR28-1	E	W1	2I556	E-2751-23	2LI-4791	N/A	N/A	2C04
2WR28-1	E	W17-W23	N/A	N/A	N/A	N/A	N/A	N/A
2WR28-1	E	W2	N/A	N/A	N/A	N/A	N/A	N/A
2WR28-1	E	W3-W16	2I560	E-2760	2PWR-6076	N/A	N/A	2C404
2WR28-1	F	1-121	2I560	E-2760	2PWR-6056	N/A	N/A	2C404
2WR28-1	G	1-12	2M004	E-2433	2RITS-8912	N/A	N/A	2C25
2WR40-1	A	1-3	R2B53L1	E-2361	2VSF1A	84E-0103-001	HE	2B53
2WR40-1	B	1-3	R2B53L2	E-2361	2VSF1B	84E-0103-001	HE	2B53
2WR40-1	C	1-3	N/A	N/A	N/A	N/A	N/A	N/A
2WR40-1	C	12-17	R2D27A3	E-2566	2CV-4698-1	PO-E2037/RL#06653876	A6Y3	2D27
2WR40-1	C	18-25	N/A	N/A	N/A	N/A		N/A
2WR40-1	C	26-28	R2B51E4	E-2302	2CV-4730-1	84E-0103-001	HE	2B51
2WR40-1	C	29-31	R2B51K2	E-2302	2CV-4741-1	84E-0103-001	HE	2B51
2WR40-1	C	32-37	N/A	N/A	N/A	N/A		N/A
2WR40-1	C	38-40	R2B54G2	E-2378	2CV-8233-1	84E-0103-001	HE	2B54
2WR40-1	C	4-5	R2B51D3	E-2367	2VSFM31A-1	PROC. 1025.056	FNM	2B51
2WR40-1	C	41-43	N/A	N/A	N/A	N/A		N/A
2WR40-1	C	44-55	N/A	N/A	N/A	N/A		N/A
2WR40-1	C	6-7	R2B51D4	E-2367	2VSFM31C-1	PROC. 1025.056	FNM	2B51
2WR40-1	C	8-11	R2V047	E-2362	CTRL CIRCUIT	PROC. 1025.056	ABC	2C17
2WR40-1	D	1-3	R2B533	E-2379	2M55A	84E-0103-030/024	OD3/OD4-51	2B5
2WR40-1	E	1	R2B533	E-2379		N/A	N/A	2B5
2WR40-1	E	2 & 3	N/A	N/A	N/A	N/A		N/A
2WR40-1	F	1-3	R2B51D3	E-2367	2VSFM31A-1	84E-0103-001	HE	2B51
2WR40-1	F	10-12	R2B51K4	E-2369	2CV-8291-1	84E-0103-001	HE	2B51
2WR40-1	F	13-17	R2D27A3	E-2566	2CV-4698-1	84E-0103-001	HE/EF	2D27
2WR40-1	F	18-31	N/A	N/A	N/A	N/A		N/A
2WR40-1	F	4-6	R2B51D4	E-2367	2VSFM31C-1	84E-0103-001	HE	2B51
2WR40-1	F	7-9	R2B51K3	E-2369	2CV-8289-1	84E-0103-001	HE	2B51
2WR40-1	G	1-3	2B51A4	E-2366	22VSF34A-1	84E-0103-001	HE	2B51
2WR40-1	G	10-12	2B51K1	E-2214	2CV-5647-1	84E-0103-001	HE	2B51

APPENDIX VI
PENETRATION SETPOINT RERERENCE
DOCUMENTS CALCULATION 85-E-0118-01

PENT NUMBER	MOD NO	COND. NUMBER	SCHEME NUMBER	SCHEME DRAWING	COMPONENT NUMBER	SETPOINT REFERENCE	PRI/SEC DEVICE MODEL/TYPE	PRIMARY DEVICE LOCATION
ZZZZZZZZ	ZZZ	ZZZZZZZZ	ZZZZZZZZ	ZZZZZZZZZZ	ZZZZZZZZZZZZ	ZZZZZZZZZZZZZZZZZZZZ	ZZZZZZZZZZZZ	ZZZZZZZZ
2WR40-1	G	4-6	2B51F2	E-2202	2CV-5003-1	84E-0103-001	HE	2B51
2WR40-1	G	7-9	2B51H1	E-2202	2CV-5023-1	84E-0103-001	HE	2B51
2WR40-2	A	1-3	G2B63L1	E-2361	2VSF1C	84E-0103-001	HE	2B63
2WR40-2	B	1-3	G2B63L2	E-2361	2VSF1D	84E-0103-001	HE	2B63
2WR40-2	C	1-3	N/A	N/A	N/A	N/A		N/A
2WR40-2	C	12-17	G2D26A3	E-2302	2CV-4740-2	PO-E2037/RL#06653876	A6Y3	2D26
2WR40-2	C	18-20	G2B63F2	E-2369	2CV-3850-2	84E-0103-001	HE	2B63
2WR40-2	C	21-22	N/A	N/A	N/A	N/A		N/A
2WR40-2	C	23-25	G2B61L2	E-2302	2CV-4731-2	84E-0103-001	HE	2B61
2WR40-2	C	26-55	N/A	N/A	N/A	N/A		N/A
2WR40-2	C	4-5	G2B61D3	E-2367	2VSF31B-2	PROC. 1025.056	FNM	2B61
2WR40-2	C	6-7	G2B61D4	E-2367	2VSF31D	PROC. 1025.056	FNM	2B61
2WR40-2	C	8-11	G2V045	E-2362	CTRL CIRCUIT	PROC. 1025.056	ABC	2C16
2WR40-2	D&E	1-3	G2B633	E-2379	2M55B	84E-0103-037/031	OD3/OD4-51	2B6
2WR40-2	E	2-3	N/A	N/A	N/A	N/A		N/A
2WR40-2	F	1-3	G2B61D3	E-2367	2VSF31B-2	CALC. 84E-0103-001	HE	2B61
2WR40-2	F	10-12	G2B61L3	E-2232	2CV-4820-2	CALC. 84E-0103-001	HE	2B61
2WR40-2	F	13-15	N/A	N/A	N/A	N/A		N/A
2WR40-2	F	16-20	G2D26A3	E-2302	2CV-4740-2	CALC. 84E-0103-001	HE/EF	2D26
2WR40-2	F	21-31	N/A	N/A	N/A	N/A		N/A
2WR40-2	F	4-6	G2B61D4	E-2367	2VSF31D	CALC. 84E-0103-001	HE	2B61
2WR40-2	F	7-9	N/A	N/A	N/A	N/A		N/A
2WR40-2	G	1-3	G2B61A4	E-2366	2VSF34B-2	CALC. 84E-0103-001	HE	2B61
2WR40-2	G	10-12	G2B61H2	E-2214	2CV-5648-2	CALC. 84E-0103-001	HE	2B61
2WR40-2	G	4-6	G2B61F2	E-2202	2CV-5043-2	CALC. 84E-0103-001	HE	2B61
2WR40-2	G	7-9	G2B61H1	E-2202	2CV-5063-2	CALC. 84E-0103-001	HE	2B61
2WR41-1	A	1-6	R2B51B2	E-2408	2CV-2060-1	PROC. 1025.056	KTK	2B51
2WR41-1	A	13-18	R2B51M1	E-2233	2CV-4821-1	PROC. 1025.056	FNM	2B51
2WR41-1	A	19-24	R2B51F2	E-2202	2CV-5003-1	PROC. 1025.056	FNM	2B51
2WR41-1	A	25-30	R2B51H1	E-2202	2CV-5023-1	PROC. 1025.056	FNM	2B51
2WR41-1	A	31-36	R2B51G2	E-2209	2CV-5084-1	PROC. 1025.056	FNM	2B51
2WR41-1	A	37-42	R2B51K3	E-2369	2CV-8289-1	PROC. 1025.056	FNM	2B51
2WR41-1	A	43-48	R2B51K4	E-2369	2CV-8291-1	PROC. 1025.056	FNM	2B51
2WR41-1	A	49-54	R2B51F1	E-2226	2CV-4846-1	PROC. 1025.056	FNM	2B51
2WR41-1	A	55-57	R2B51H1	E-2202	2CV-5023-1	PROC. 1025	ABC	2C17
2WR41-1	A	58-60	R2B51F2	E-2202	2CV-5003-1	PROC. 1025	ABC	2C17
2WR41-1	A	61-69	N/A	N/A	N/A	N/A		N/A
2WR41-1	B	7-12	R2B51L1	E-2411	2CV-2401-1	PROC. 1025.056	FNM	2B51
2WR41-1	B	1-3	R2B51B2	E-2408	2CV-2060-1	CALC. 84E-0103-001	HE	2B51
2WR41-1	B	10-12	R2B51F1	E-2226	2CV-4846-1	CALC. 84E-0103-001	HE	2B51
2WR41-1	B	13-28	N/A	N/A	N/A	N/A		N/A
2WR41-1	B	29-31	R2B51G3	E-2597	2CV-5105-1	CALC. V-2CV-5105-04	HE	2B51
2WR41-1	B	32-55	N/A	N/A	N/A	N/A		N/A

APPENDIX VI
PENETRATION SETPOINT RERERENCE
DOCUMENTS CALCULATION 85-E-0118-01

PENT NUMBER	MOD NO	COND. NUMBER	SCHEME NUMBER	SCHEME DRAWING	COMPONENT NUMBER	SETPOINT REFERENCE	PRI/SEC DEVICE MODEL/TYPE	PRIMARY DEVICE LOCATION
ZZZZZZZZ	ZZZ	ZZZZZZZZ	ZZZZZZZZ	ZZZZZZZZZZ	ZZZZZZZZZZZZ	ZZZZZZZZZZZZZZZZZZZZ	ZZZZZZZZZZZZ	ZZZZZZZZ
2WR41-1	B	4-6	R2B51L1	E-2411	2CV-2401-1	CALC. 84E-0103-001	HE	2B51
2WR41-1	B	7-9	R2B51M1	E-2233	2CV-4821-1	CALC. V-2CV-4821-01	HE	2B51
2WR41-1	C	1-6	R2B51G3	E-2597	2CV-5105-1	PROC. 1025.056	FNM	2B51
2WR41-1	C	15-18	R2SI30D	E-2576	CTRL CIRCUIT	6600-M2201-324	ABC	2C33
2WR41-1	C	19-22	N/A	N/A	N/A	N/A		N/A
2WR41-1	C	23-26	R2S025	E-2378	CTRL CIRCUIT	PROC. 1025.056	ABC	2C17
2WR41-1	C	27-30	R2S015	E-2378	CTRL CIRCUIT	PROC. 1025.056	ABC	2C17
2WR41-1	C	31-37	R2S053	E-2200	CTRL CIRCUIT	PROC. 1025.056	ABC	2C17
2WR41-1	C	38-47	R2S108	E-2576	CTRL CIRCUIT	PROC. 1025.056	ABC	2C17
2WR41-1	C	48-50	N/A	N/A	N/A	N/A		N/A
2WR41-1	C	51-54	R2S106	E-2576	CTRL CIRCUIT	6600-M2201-324	ABC	2C33-1
2WR41-1	C	55-60	R2B51E4	E-2302	2CV-4730-1	PROC. 1025.056	FNM	2B51
2WR41-1	C	61-66	R2B51K2	E-2302	2CV-4741-1	PROC. 1025.056	FNM	2B51
2WR41-1	C	67-69	R2J300	E-2302	CTRL CIRCUIT	6600-M2201-324	ABC	2C33-1
2WR41-1	C	7	N/A	N/A	N/A	N/A		N/A
2WR41-1	C	8-14	R2S068	E-2262	CTRL CIRCUIT	6600-M2201-116	ABC	2C17
2WR41-1	D	1-7	R2B51E2	E-2395	2CV-2202-1	PROC. 1025.056	FNM	2B51
2WR41-1	D	16-17	R2B52E4	E-2218	2CV-5630-1	PROC. 1025.056	FNM	2B52
2WR41-1	D	18-19	R2B51A4	E-2366	2VSF34A-1	PROC. 1025.056	FNM	2B51
2WR41-1	D	20-25	R2B51N3	E-2366	2HCD-8243-1	PROC. 1025.056	FNM	2B51
2WR41-1	D	26-31	R2B53G1	E-2368	2UCD-8203-1	PROC. 1025.056	FNM/KTK	2B53
2WR41-1	D	32-37	R2B53G2	E-2368	2UCD-8209-1	PROC. 1025.056	FNM/KTK	2B53
2WR41-1	D	38-41	N/A	N/A	N/A	N/A		N/A
2WR41-1	D	42-48	R2B54G2	E-2378	2CV-8233-1	PROC. 1025.056	FNM	2B54
2WR41-1	D	49-50	N/A	N/A		N/A		N/A
2WR41-1	D	51-64	R2S121	E-2705	CTRL CIRCUIT			2C336-1
2WR41-1	D	65-69	R2S127	E-2378	CTRL CIRCUIT	PROC. 1025.056	ABC	2C17
2WR41-1	D	8-15	R2B51K1	E-2214	2CV-5647-1	PROC. 1025.056	FNM	2B51
2WR41-1	E	1-3	R2B51E2	E-2395	2CV-2202-1	CALC. 84E-0103-001	HE	2B51
2WR41-1	E	10-12	R2B53G1	E-2368	2UCD-8203-1	CALC. 84E-0103-001	HE	2B53
2WR41-1	E	13-15	R2B53G2	E-2368	2UCD-8209-1	CALC. 84E-0103-001	HE	2B53
2WR41-1	E	16-55	N/A	N/A	N/A	N/A		N/A
2WR41-1	E	4-6	N/A	N/A	N/A	N/A		N/A
2WR41-1	E	7-9	R2B51N3	E-2366	2HCD-8243-1	CALC. 84E-0103-001	HE	2B51
2WR41-1	F	1-69	N/A	N/A	N/A	N/A		N/A
2WR41-1	G	1-3	R2B51G2	E-2209	2CV-5084-1	CALC. 84E-0103-001	HE	2B51
2WR41-2	A	1-6	G2B63F2	E-2369	2CV-3850-2	PROC. 1025.056	FNM/BAN	2B63
2WR41-2	A	13-18	G2B61G4	E-2235	2CV-4827-2	PROC. 1025.056	FNM	2B61
2WR41-2	A	19-24	G2B61G3	E-2235	2CV-4831-2	PROC. 1025.056	FNM	2B61
2WR41-2	A	25-30	G2B61F2	E-2202	2CV-5043-2	PROC. 1025.056	FNM	2B61
2WR41-2	A	31-36	G2B61H1	E-2202	2CV-5063-2	PROC. 1025.056	FNM	2B61
2WR41-2	A	37-42	G2B63G4	E-2344	2CV-5254-2	PROC. 1025.056	FNM	2B63
2WR41-2	A	43-50	G2B61H2	E-2214	2CV-5648-2	PROC. 1025.056	FNM	2B61

APPENDIX VI
PENETRATION SETPOINT RERERENCE
DOCUMENTS CALCULATION 85-E-0118-01

PENT NUMBER	MOD NO	COND. NUMBER	SCHEME NUMBER	SCHEME DRAWING	COMPONENT NUMBER	SETPOINT REFERENCE	PRI/SEC DEVICE MODEL/TYPE	PRIMARY DEVICE LOCATION
ZZZZZZZZ	ZZZ	ZZZZZZZZ	ZZZZZZZZ	ZZZZZZZZZZ	ZZZZZZZZZZZZ	ZZZZZZZZZZZZZZZZZZZZ	ZZZZZZZZZZZZ	ZZZZZZZZ
2WR41-2	A	51-56	G2B61N2	E-2366	2HCD-8244-2	PROC. 1025.056	FNM	2B61
2WR41-2	A	57-59	G2B61F2	E-2202	2CV-5043-2	PROC. 1025.056	ABC	2C17
2WR41-2	A	60-62	G2B61H1	E-2202	2CV-5063-2	PROC. 1025.056	ABC	2C17
2WR41-2	A	63-69	N/A	N/A	N/A	N/A		N/A
2WR41-2	A	7-12	G2B61L3	E-2232	2CV-4820-2			2B61
2WR41-2	B	1-6	N/A	N/A	N/A	N/A		N/A
2WR41-2	B	10-12	G2B61G3	E-2235	2CV-4831-2	CALC. 84E-0103-001	HE	2B61
2WR41-2	B	13-18	N/A	N/A	N/A	N/A		N/A
2WR41-2	B	19-21	G2B63G4	E-2344	2CV-5254-2	CALC. 84E-0103-001	HE	2B63
2WR41-2	B	22-24	N/A	N/A	N/A	N/A		N/A
2WR41-2	B	25-27	G2B61N2	E-2366	2HCD-8244-2	CALC. 84E-0103-001	HE	2B61
2WR41-2	B	28-30	G2B61G2	E-2597	2CV-5106-2	CALC. V-2CV-5106-04	HE	2B61
2WR41-2	B	31-55	N/A	N/A	N/A	N/A		N/A
2WR41-2	B	7-9	G2B61G4	E-2235	2CV-4827-2	CALC. 84E-0103-001	HE	2B61
2WR41-2	C	1-4	G2S107	E-2576	2SV-8351-1	6600-M2201-324	ABC	2C33-1
2WR41-2	C	11-13	G2J301	E-2302	CTRL CIRCUIT	6600-M2201-324	ABC	2C33-2
2WR41-2	C	14-17	G2S131					
2WR41-2	C	18-69	N/A	N/A	N/A	N/A		N/A
2WR41-2	C	5-10	G2B61L2	E-2302	2CV-4731-2	PROC. 1025.056	FNM	2B61
2WR41-2	D	1-6	G2B64E3	E-2234	2CV-4824-2	PROC. 1025.056	FNM	2B64
2WR41-2	D	13-14	G2B61F3	E-2218	2CV-5631-2	PROC. 1025.056	FNM	2B61
2WR41-2	D	15-16	G2B61A4	E-2366	2VSF-34B-2	PROC. 1025.056	FNM	2B61
2WR41-2	D	17-20	N/A	N/A	N/A	N/A		N/A
2WR41-2	D	21-27	G2S054	E-2200	CTRL CIRCUIT	6600-M2201-250	ABC	2C16
2WR41-2	D	28-33	G2B64D4	E-2368	2UCD-8216-2	PROC. 1025.056	FNM	2B64
2WR41-2	D	34-39	G2B64E4	E-2368	2UCD-8222-2	PROC. 1025.056	FNM	2B64
2WR41-2	D	40-45	G2B61G2	E-2597	2CV-5106-2	PROC. 1025.056	FNM	2B61
2WR41-2	D	46-50	N/A	N/A	N/A	N/A		N/A
2WR41-2	D	51-55	G2S122	E-2705	CTRL CIRCUIT			2C336-2
2WR41-2	D	56-60	G2S122	E-2705	CTRL CIRCUIT			2C336-2
2WR41-2	D	61-64	G2S122	E-2705	CTRL CIRCUIT			2C336-2
2WR41-2	D	65-69	N/A	N/A	N/A	N/A		N/A
2WR41-2	D	7-12	G2B62E5	E-2209	2CV-5086-2	PROC. 1025.056	FNM/KTK	2B62
2WR41-2	E	1-3	G2B64E3	E-2234	2CV-4824-2	CALC. 84E-0103-001	HE	2B64
2WR41-2	E	10-12	G2B64E4	E-2368	2UCD-8222-2	CALC. 84E-0103-001	HE	2B64
2WR41-2	E	13-55	N/A	N/A	N/A	N/A		N/A
2WR41-2	E	4-6	N/A	N/A	N/A	N/A		N/A
2WR41-2	E	7-9	G2B64D4	E-2368	2UCD-8216-2	CALC. 84E-0103-001	HE	2B64
2WR41-2	F	1-2	G2M038	E-2433	2RITS-8925-2			2C336-2
2WR41-2	F	3-5	N/A	N/A	N/A	N/A		N/A
2WR41-2	G	1-3	G2B62E5	E-2209	2CV-5086-2	CALC. 84E-0103-001	HE	2B62
2WR42-1	A	1,2,7,13	N/A	N/A	N/A	N/A		N/A
2WR42-1	A	10,4,11	R2I073	E-2724	2PWR-1041-1			2C15

APPENDIX VI
PENETRATION SETPOINT RERERENCE
DOCUMENTS CALCULATION 85-E-0118-01

PENT NUMBER	MOD NO	COND. NUMBER	SCHEME NUMBER	SCHEME DRAWING	COMPONENT NUMBER	SETPOINT REFERENCE	PRI/SEC DEVICE MODEL/TYPE	PRIMARY DEVICE LOCATION
ZZZZZZZZ	ZZZ	ZZZZZZZZ	ZZZZZZZZ	ZZZZZZZZZZ	ZZZZZZZZZZZZ	ZZZZZZZZZZZZZZZZZZZZ	ZZZZZZZZZZZZ	ZZZZZZZZ
2WR42-1	A	14,15,22	R2I074	E-2724	2PWR-1141-1			2C15
2WR42-1	A	16,24,23	R2I089	E-2725	2PWR-1031-1C			2C15
2WR42-1	A	17-18	N/A	N/A	N/A	N/A		N/A
2WR42-1	A	20,28,19	R2I090	E-2725	2PWR-1131-1C			2C15
2WR42-1	A	25-27	R2I001	E-2701	2PWR-4611-1			2C15
2WR42-1	A	29,21,30	R2I261	E-2703	2PWR-4601-1			2C15
2WR42-1	A	32,33,41	R2I001	E-2701	2PWR-4711-1			
2WR42-1	A	34,35,43	R2I414	E-2751	2LY-1079-1A			2C02
2WR42-1	A	40,31	N/A	N/A	N/A	N/A		N/A
2WR42-1	A	44,36,45	R2I016	E-2704	2LY-4627-1A			2C336
2WR42-1	A	46,37,38	R2I318	E-2753	2PWR-5601-1			2C15
2WR42-1	A	48,47,39	R2I039	E-2707	2PWR-4623-1			2C21
2WR42-1	A	49,50,58	R21499	E-2753	2PWR-5605-1			2C336
2WR42-1	A	53,67	N/A	N/A	N/A	N/A		N/A
2WR42-1	A	55,56	N/A	N/A	N/A	N/A		N/A
2WR42-1	A	59,51	N/A	N/A	N/A	N/A		N/A
2WR42-1	A	62,61,54	2I414	E-2751	2LY-1179-1A			2C02
2WR42-1	A	63,69,68	R2I002	E-2701	2PWR-4610-1			2C15
2WR42-1	A	65,64,57	R21501	E-2705	2PWR-4671-1			2C336
2WR42-1	A	66,60,52	R2I002	E-2701	2PWR-4635-1			2C15
2WR42-1	A	9,8,3	R2I011	E-2703	2PWR-4624-1			2C15
2WR42-1	B	1,2	N/A	N/A	N/A	N/A		N/A
2WR42-1	B	3,4,5,6	N/A	N/A	N/A	N/A		N/A
2WR42-1	C	SEE NOTE	R2R002	E-2259	INCORE DET.			2C15
2WR42-1	C	SEE NOTE	R2R010	E-2259	INCORE DET.			2C15
2WR42-1	C	SEE NOTE	R2R008	E-2259	INCORE DET.			2C15
2WR42-1	C	SEE NOTE	R2R003	E-2259	INCORE DET.			2C15
2WR42-1	C	SEE NOTE	R2R004	E-2259	INCORE DET.			2C15
2WR42-1	C	SEE NOTE	R2R001	E-2259	INCORE DET.			2C15
2WR42-1	D	SEE NOTE	R2R005	E-2259	INCORE DET.			2C15
2WR42-1	D	SEE NOTE	R2R006	E-2259	INCORE DET.			2C15
2WR42-1	D	SEE NOTE	R2R011	E-2259	INCORE DET.			2C15
2WR42-1	D	SEE NOTE	R2R007	E-2259	INCORE DET.			2C15
2WR42-1	D	SEE NOTE	R2R009	E-2259	INCORE DET.			2C15
2WR42-1	D	SEE NOTE	N/A	N/A	N/A	N/A		
2WR42-1	E	SEE NOTE	R2R384	E-2205	NSS SYSTEM			
2WR42-1	E	SEE NOTE	R2R384	E-2205	NSS SYSTEM			
2WR42-1	E	SEE NOTE	R2R384	E-2205	NSS SYSTEM			
2WR42-1	E	SEE NOTE	R2R384	E-2205	NSS SYSTEM			
2WR42-1	E	SEE NOTE	R2R384	E-2205	NSS SYSTEM			
2WR42-1	E	SEE NOTE	R2R384	E-2205	NSS SYSTEM			
2WR42-1	F	1,2,7,6	R2I234	E-2731	2SY-6120-1			2C15
2WR42-1	F	11,19,18	R2I243	E-2751	2LT-5645-1			2C18

APPENDIX VI
PENETRATION SETPOINT RERERENCE
DOCUMENTS CALCULATION 85-E-0118-01

PENT NUMBER	MOD NO	COND. NUMBER	SCHEME NUMBER	SCHEME DRAWING	COMPONENT NUMBER	SETPOINT REFERENCE	PRI/SEC DEVICE MODEL/TYPE	PRIMARY DEVICE LOCATION
2WR42-1	F	13,21,12	R2R384	E-2205	NSS SYSTEM			
2WR42-1	F	14,15,23	R2I234	E-2731	2SY-6120-1			2C15
2WR42-1	F	16,17,25	R2I234	E-2731	2SY-6120-1			2C15
2WR42-1	F	26,27,36	R2I288	E-2754	2PWR-5663-1			2C21
2WR42-1	F	37,28,38	R2I496	E-2702	2TT-4614-1			2C21
2WR42-1	F	49,58,48	R2I002	E-2701	2PWR-4710-1			2C15
2WR42-1	F	60,50,51	R2I496	E-2702	2TT-4614-1A			2C21
2WR42-1	F	67,59,68	R2I551	E-2701	2PWR-4735-1B			2C336
2WR42-1	F	9,8,3,4	R2I234	E-2731	2SY-6120-1			2C15
2WR42-1	F	SEE NOTE	R2S117	E-2726	2VYI-4633-1			
2WR42-1	F	W15	R2I002	E-2701	2PWR-4735-1A			2C15
2WR42-1	F	W16-W17	N/A	N/A	N/A	N/A		N/A
2WR42-1	F	W19	R2I016	E-2704	2TY-4627-1A			2C336
2WR42-1	F	W20-W21	N/A	N/A	N/A	N/A		N/A
2WR42-1	G	1-69	N/A	N/A	N/A	N/A		N/A
2WR42-2	A	1,2,7,13	N/A	N/A	N/A	N/A		N/A
2WR42-2	A	10,4,11	G2I075	E-2724-2	2PWR-1041-2			2C15
2WR42-2	A	14,15,22	G2I076	E-2724	2PY-1141-2C			2C15
2WR42-2	A	16,24,23	G2I091	E-2725	2PWR-1031-2C			2C15
2WR42-2	A	20,28,19	G2I092	E-2725	2PWR-1131-2C			2C15
2WR42-2	A	27,26,25	G2I003	E-2701	2PWR-4611-2			2C15
2WR42-2	A	29,21,30	G2I262	E-2703	2PWR-4601-2			2C15
2WR42-2	A	32,33,41	G2I003	E-2701	2PWR-4711-2			2C15
2WR42-2	A	34,35,43	G2I547	E-2751	2LY-1079-2			2C02
2WR42-2	A	44,36,45	G2I045	E-2707	2LY-4627-2A			2C384
2WR42-2	A	46,37,38	G2I319	E-2753	2PWR-5602-2			2C15
2WR42-2	A	48,47,39	G2I040	E-2753	2PWR-4623-2			2C21
2WR42-2	A	49,50,58	G2I500	E-2753	2PWR-5606-2			2C336
2WR42-2	A	62,61,54	G2I547	E-2751-21	2LY-1079-2			2C02
2WR42-2	A	63,69,68	G2I004	E-2701	2PWR-4610-2			2C15
2WR42-2	A	65,64,57	N/A	N/A	N/A	N/A		N/A
2WR42-2	A	66,60,52	G2I004	E-2701	2PWR-4635-2			2C15
2WR42-2	A	9,8,3	G2I012	E-2703	2PY-4624-2C			2C384
2WR42-2	B	1-2	N/A	N/A	N/A	N/A		N/A
2WR42-2	B	3-6	N/A	N/A	N/A	N/A		N/A
2WR42-2	C	SEE NOTE	G2R016	E-2259	INCORE DET.			2C15
2WR42-2	C	SEE NOTE	N/A	N/A	N/A	N/A		N/A
2WR42-2	C	SEE NOTE	G2R017	E-2259	INCORE DET.			2C15
2WR42-2	C	SEE NOTE	G2R015	E-2259	INCORE DET.			2C15
2WR42-2	C	SEE NOTE	G2R013	E-2259	INCORE DET.			2C15
2WR42-2	C	SEE NOTE	G2R012	E-2259	INCORE DET.			2C15
2WR42-2	D	SEE NOTE	G2R018	E-2259	INCORE DET.			2C15
2WR42-2	D	SEE NOTE	G2R019	E-2259	INCORE DET.			2C15

APPENDIX VI
PENETRATION SETPOINT RERERENCE
DOCUMENTS CALCULATION 85-E-0118-01

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ZZZZZZZZ	ZZZ	ZZZZZZZZ	ZZZZZZZZ	ZZZZZZZZZZ	ZZZZZZZZZ	ZZZZZZZZZZZZZZZZZZZZ	ZZZZZZZZZZZZ	ZZZZZZZZ
2WR42-2	D	SEE NOTE	G2R022	E-2259	INCORE DET.			2C15
2WR42-2	D	SEE NOTE	G2R020	E-2259	INCORE DET.			2C15
2WR42-2	D	SEE NOTE	G2R021	E-2259	INCORE DET.			2C15
2WR42-2	D	SEE NOTE	N/A	N/A	N/A	N/A		N/A
2WR42-2	E	1-6	G2R385	E-2205	NSS SYSTEM			
2WR42-2	F	1,2,7,6	G2I235	E-2731	2SY-6120-2			2C15
2WR42-2	F	11,19,18	G2I244	E-2751	2LT-5645-1			2C02
2WR42-2	F	13,21,12	G2R385	E-2205	NSS SYSTEM			
2WR42-2	F	14,15,23	G2I235	E-2731	2SY-6120-2			2C15
2WR42-2	F	16,17,25	G2I235	E-2731	2SY-6120-2			2C15
2WR42-2	F	26,27,36	G2I289	E-2754	2PWR-5664-2			2C21
2WR42-2	F	37,28,38	G2I382	E-2751	2LT-5641-2			2C02
2WR42-2	F	49,58,48	G2I497	E-2702-6	2TT-4714-2A			2C384
2WR42-2	F	60,50,51	G2I497	E-2702-6	2TT-4714-2			2C21
2WR42-2	F	9,8,3,4	G2I235	E-2731	2SY-6120-2			2C15
2WR42-2	F	SEE NOTE	N/A	N/A	N/A	N/A		N/A
2WR42-2	F	W15	G2I004	E-2701	2PWR-4710-2			2C15
2WR42-2	F	W16	G2I004	E-2701	2PWR-4735-2A			2C15
2WR42-2	F	W17	G2I045	E-2707	2TY-4627-2A			2C384
2WR42-2	F	W18	G2I552	E-2701	2PWR-4735-2B			2C336
2WR42-2	F	W8-W11	G2S118	E-2726	2VYI-4634-1			2C336-1
2WR42-2	G	1-9	G2R014	E-2259	INCORE DET.			2C15
2WR42-2	G	10-33	N/A	N/A	N/A	N/A		N/A
2WR42-2	G	W12-W23	G2R014	E-2259	INCORE DET.			2C15
2WR42-2	G	W24-W28	N/A	N/A	N/A	N/A		N/A
2WR42-3	A	1,2,7,13	N/A	N/A	N/A	N/A		N/A
2WR42-3	A	10,4,11	Y2I077	E-2724-3	2PWR-1041-3			2C15
2WR42-3	A	14,15,22	Y2I078	E-2724	2PWR-1141-3			2C15
2WR42-3	A	16,24,23	Y2I093	E-2725	2PWR-1031-3			2C15
2WR42-3	A	20,28,19	Y2I094	E-2725	2PWR-1131-3			2C15
2WR42-3	A	27,26,25	Y2I005	E-2701	2PWR-4611-3			2C15
2WR42-3	A	29,21,30	Y2I263	E-2703	2PWR-4601-3			2C15
2WR42-3	A	32,33,41	Y2I005	E-2701	2PWR-4711-3			2C15
2WR42-3	A	46,37,38	Y2I320	E-2753-29	2PWR-5603-3			
2WR42-3	A	63,69,68	Y2I006	E-2701	2PWR-4710-3			2C15
2WR42-3	A	66,60,52	Y2I006	E-2701	2PWR-4635-3			2C15
2WR42-3	A	9,8,3	Y2I013	E-2703	2PWR-4624-3			2C15
2WR42-3	A	W11-W14	N/A	N/A	N/A	N/A		N/A
2WR42-3	A	W17-W19	N/A	N/A	N/A	N/A		N/A
2WR42-3	B	1	Y2R386	E-2205	NSS SYSTEM			
2WR42-3	B	2-5	N/A	N/A	N/A	N/A		N/A
2WR42-3	C	SEE NOTE	Y2R025	E-2259	INCORE DET.			2C15
2WR42-3	C	SEE NOTE	Y2R027	E-2259	INCORE DET.			2C15

APPENDIX VI
PENETRATION SETPOINT RERERENCE
DOCUMENTS CALCULATION 85-E-0118-01

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ZZZZZZZZ	ZZZ	ZZZZZZZZ	ZZZZZZZZ	ZZZZZZZZZZ	ZZZZZZZZZZZZ	ZZZZZZZZZZZZZZZZZZZZ	ZZZZZZZZZZZZ	ZZZZZZZZ
2WR42-3	C	SEE NOTE	Y2R028	E-2259	INCORE DET.			2C15
2WR42-3	C	SEE NOTE	Y2R026	E-2259	INCORE DET.			2C15
2WR42-3	C	SEE NOTE	Y2R024	E-2259	INCORE DET.			2C15
2WR42-3	C	SEE NOTE	Y2R023	E-2259	INCORE DET.			2C15
2WR42-3	D	SEE NOTE	Y2R032	E-2259	INCORE DET.			2C15
2WR42-3	D	SEE NOTE	Y2R029	E-2259	INCORE DET.			2C15
2WR42-3	D	SEE NOTE	Y2R031	E-2259	INCORE DET.			2C15
2WR42-3	D	SEE NOTE	Y2R033	E-2259	INCORE DET.			2C15
2WR42-3	D	SEE NOTE	N/A	N/A	N/A	N/A		N/A
2WR42-3	D	SEE NOTE	N/A	N/A	N/A	N/A		N/A
2WR42-3	E	1, 3-6	Y2R386	E-2205	NSS SYSTEM			
2WR42-3	E	2	N/A	N/A	N/A	N/A		N/A
2WR42-3	F	1,2,7,6	Y2I236	E-2731	2SY-6120-3			2C15
2WR42-3	F	11,19,18	N/A	N/A	N/A	N/A		N/A
2WR42-3	F	13,21,12	Y2R386	E-2205	NSS SYSTEM			
2WR42-3	F	14,15,23	Y2I236	E-2731	2SY-6120-3			2C15
2WR42-3	F	16,17,25	Y2I236	E-2731	2SY-6120-3			2C15
2WR42-3	F	29,20,30	Y2I553	E-2701	2PWR-4735-3B			2C336
2WR42-3	F	37,28,38	Y2I006	E-2701	2PWR-4710-3			2C15
2WR42-3	F	49,58,48	Y2Q030	E-2701	2PWR-4712-3			2C336
2WR42-3	F	55,54,45	Y2I006	E-2701	2PWR-4735-3A			2C15
2WR42-3	F	60,50,51	Y2Q030	E-2701	2PWR-4612A-3			2C336
2WR42-3	F	9,8,3,4	Y2I236	E-2731	2SY-6120-3			2C15
2WR42-3	F	W15-W21	N/A	N/A	N/A	N/A		N/A
2WR42-3	F	W7-W9	N/A	N/A	N/A	N/A		N/A
2WR42-3	G	47,55,46	Y2Q030	E-2701	2PWR-4713-3			2C336
2WR42-3	G	54,53,45	N/A	N/A	N/A	N/A		N/A
2WR42-3	G	59,52,44	Y2Q030	E-2701	2PWR-4612A-3			
2WR42-3	G	W1-W11	N/A	N/A	N/A	N/A		N/A
2WR42-3	G	W12-W13	Y2Q030	E-2701	2PWR-4613-3			2C336
2WR42-3	G	W16-W17	N/A	N/A	N/A	N/A		N/A
2WR42-3	G	W19-W23	N/A	N/A	N/A	N/A		N/A
2WR42-4	A	1,2,7,13	N/A	N/A	N/A	N/A		N/A
2WR42-4	A	10,4,11	B2I079	E-2724	2PWR-1041-4			2C15
2WR42-4	A	14,15,22	B2I080	E-2724	2PWR-1141-4			2C15
2WR42-4	A	16,24,23	B2I087	E-2725	2PWR-1031-4			2C15
2WR42-4	A	20,28,19	B2I088	E-2725	2PWR-1131-4			2C15
2WR42-4	A	27,26,25	B2I007	E-2701	2PWR-4611-4			2C15
2WR42-4	A	29,21,30	B2I264	E-2703	2PWR-4601-4			2C15
2WR42-4	A	32,33,41	B2I007	E-2701	2PWR-4711-4			2C15
2WR42-4	A	34,35,43	B2Q029	E-2701	2PWR-4713-4			2C336
2WR42-4	A	44,36,45	B2Q029	E-2701	2PWR-4613-4			2C336
2WR42-4	A	46,37,38	B2I321	E-2753	2PWR-5604-4			2C15

APPENDIX VI
PENETRATION SETPOINT RERERENCE
DOCUMENTS CALCULATION 85-E-0118-01

PENT NUMBER	MOD NO	COND. NUMBER	SCHEME NUMBER	SCHEME DRAWING	COMPONENT NUMBER	SETPOINT REFERENCE	PRI/SEC DEVICE MODEL/TYPE	PRIMARY DEVICE LOCATION
ZZZZZZZZ	ZZZ	ZZZZZZZZ	ZZZZZZZZ	ZZZZZZZZZZ	ZZZZZZZZZZZZ	ZZZZZZZZZZZZZZZZZZZZ	ZZZZZZZZZZZZ	ZZZZZZZZ
2WR42-4	A	49,50,58	N/A	N/A	N/A	N/A		N/A
2WR42-4	A	63,69,68	B2I008	E-2701	2PWR-4710-4			2C15
2WR42-4	A	66,60,52	B2I008	E-2701	2PWR-4635-4			2C15
2WR42-4	A	9,8,3	B2I014	E-2703	2PWR-4624-4			2C15
2WR42-4	B	1-5	N/A	N/A	N/A	N/A		N/A
2WR42-4	C	SEE NOTE	B2R037	E-2259	INCORE DET.			2C15
2WR42-4	C	SEE NOTE	B2R035	E-2259	INCORE DET.			2C15
2WR42-4	C	SEE NOTE	B2R036	E-2259	INCORE DET.			2C15
2WR42-4	C	SEE NOTE	B2R038	E-2259	INCORE DET.			2C15
2WR42-4	C	SEE NOTE	B2R039	E-2259	INCORE DET.			2C15
2WR42-4	C	SEE NOTE	B2R034	E-2259	INCORE DET.			2C15
2WR42-4	D	SEE NOTE	B2R041	E-2259	INCORE DET.			2C15
2WR42-4	D	SEE NOTE	B2R044	E-2259	INCORE DET.			2C15
2WR42-4	D	SEE NOTE	B2R040	E-2259	INCORE DET.			2C15
2WR42-4	D	SEE NOTE	B2R043	E-2259	INCORE DET.			2C15
2WR42-4	D	SEE NOTE	B2R042	E-2259	INCORE DET.			2C15
2WR42-4	D	SEE NOTE	N/A	N/A	N/A	N/A		N/A
2WR42-4	E	1-6	B2R387	E-2205	NSS SYSTEM			
2WR42-4	F	1,2,7,6	B2I237	E-2205	NSS SYSTEM			
2WR42-4	F	11,19,18	B2I554	E-2205	NSS SYSTEM			
2WR42-4	F	13,21,12	B2R387	E-2205	NSS SYSTEM			
2WR42-4	F	14,15,23	B2I237	E-2205	NSS SYSTEM			
2WR42-4	F	16,17,25	B2I237	E-2205	NSS SYSTEM			
2WR42-4	F	9,8,3,4	B2I237	E-2205	NSS SYSTEM			
2WR42-4	F	SEE NOTE	N/A	N/A	N/A	N/A		N/A
2WR42-4	F	W7	B2I008	E-2701	2PWR-4710-4			2C15
2WR42-4	F	W8	B2I008	E-2701	2PWR-4735-4A			2C15
2WR42-4	F	W9-W12	N/A	N/A	N/A	N/A		N/A
2WR42-4	G	1,2,6,7,	N/A	N/A	N/A	N/A		N/A
2WR42-4	G	11,4,5,	N/A	N/A	N/A	N/A		N/A
2WR42-4	G	17,10,18	B2Q029	E-2701	2PWR-4612A-4			2C336
2WR42-4	G	21,13,14	B2Q029	E-2701	2PWR-4612A-4			2C336
2WR42-4	G	SEE NOTE	N/A	N/A	N/A	N/A		N/A
2WR42-4	G	SEE NOTE	N/A	N/A	N/A	N/A		N/A
2WR43-1	A	SEE NOTE	Y2R301	E-2258	CEA1			2C15
2WR43-1	A	SEE NOTE	Y2R302	E-2258	CEA2			2C15
2WR43-1	A	SEE NOTE	Y2R303	E-2258	CEA3			2C15
2WR43-1	A	SEE NOTE	Y2R305	E-2258	CEA5			2C15
2WR43-1	A	SEE NOTE	Y2R306	E-2258	CEA6			2C15
2WR43-1	A	SEE NOTE	Y2R307	E-2258	CEA7			2C15
2WR43-1	A	SEE NOTE	Y2R309	E-2258	CEA9			2C15
2WR43-1	A	SEE NOTE	N/A	N/A	N/A	N/A		N/A
2WR43-1	C	SEE NOTE	Y2R310	E-2258	CEA10			2C15

APPENDIX VI
PENETRATION SETPOINT RERERENCE
DOCUMENTS CALCULATION 85-E-0118-01

PENT NUMBER	MOD NO	COND. NUMBER	SCHEMS NUMBER	SCHEME DRAWING	COMPONENT NUMBER	SETPOINT REFERENCE	PRI/SEC DEVICE MODEL/TYPE	PRIMARY DEVICE LOCATION
ZZZZZZZZ	ZZZ	ZZZZZZZZ	ZZZZZZZZ	ZZZZZZZZZZ	ZZZZZZZZZZZZ	ZZZZZZZZZZZZZZZZZZZZ	ZZZZZZZZZZZZ	ZZZZZZZZ
2WR43-1	C	SEE NOTE	Y2R311	E-2258	CEA11			2C15
2WR43-1	C	SEE NOTE	Y2R313	E-2258	CEA13			2C15
2WR43-1	C	SEE NOTE	Y2R314	E-2258	CEA14			2C15
2WR43-1	C	SEE NOTE	Y2R315	E-2258	CEA15			2C15
2WR43-1	C	SEE NOTE	Y2R316	E-2258	CEA16			2C15
2WR43-1	C	SEE NOTE	Y2R317	E-2258	CEA17			2C15
2WR43-1	C	SEE NOTE	Y2R320	E-2258	CEA20			2C15
2WR43-1	D	1-5	N/A	N/A	N/A	N/A		N/A
2WR43-1	E	SEE NOTE	Y2R321	E-2258	CEA21			2C15
2WR43-1	E	SEE NOTE	Y2R322	E-2258	CEA22			2C15
2WR43-1	E	SEE NOTE	Y2R323	E-2258	CEA23			2C15
2WR43-1	E	SEE NOTE	Y2R325	E-2258	CEA25			2C15
2WR43-1	E	SEE NOTE	Y2R326	E-2258	CEA26			2C15
2WR43-1	E	SEE NOTE	Y2R327	E-2258	CEA27			2C15
2WR43-1	E	SEE NOTE	Y2R329	E-2258	CEA29			2C15
2WR43-1	E	SEE NOTE	Y2R330	E-2258	CEA30			2C15
2WR43-1	F	SEE NOTE	Y2R331	E-2258	CEA31			2C15
2WR43-1	F	SEE NOTE	Y2R332	E-2258	CEA32			2C15
2WR43-1	F	SEE NOTE	Y2R333	E-2258	CEA33			2C15
2WR43-1	F	SEE NOTE	Y2R336	E-2258	CEA36			2C15
2WR43-1	F	SEE NOTE	Y2R337	E-2258	CEA37			2C15
2WR43-1	F	SEE NOTE	Y2R338	E-2258	CEA38			2C15
2WR43-1	F	SEE NOTE	Y2R339	E-2258	CEA39			2C15
2WR43-1	F	SEE NOTE	Y2R340	E-2258	CEA40			2C15
2WR43-1	G	1-6	N/A	N/A	N/A	N/A		N/A
2WR43-2	A	1,2,7,6	G2R201	E-2258	CEA1			2C15
2WR43-2	A	11,19,18	G2R208	E-2258	CEA8			2C15
2WR43-2	A	13,21,12	G2R207	E-2258	CEA7			2C15
2WR43-2	A	14,15,23	G2R204	E-2258	CEA4			2C15
2WR43-2	A	16,17,25	G2R205	E-2258	CEA5			2C15
2WR43-2	A	26,27,36	G2R209	E-2258	CEA9			2C15
2WR43-2	A	29,20,30	G2R213	E-2258	CEA13			2C15
2WR43-2	A	32,42,41	G2R212	E-2258	CEA12			2C15
2WR43-2	A	37,28,38	G2R217	E-2258	CEA17			2C15
2WR43-2	A	44,53,43	G2R211	E-2258	CEA11			2C15
2WR43-2	A	49,58,48	G2R219	E-2258	CEA19			2C15
2WR43-2	A	55,54,45	G2R216	E-2258	CEA16			2C15
2WR43-2	A	60,50,51	G2R218	E-2258	CEA18			2C15
2WR43-2	A	70,69,61	G2R220	E-2258	CEA20			2C15
2WR43-2	A	9,8,3,4	G2R203	E-2258	CEA3			2C15
2WR43-2	A	SEE NOTE	N/A	N/A	N/A	N/A		N/A
2WR43-2	A	SEE NOTE	N/A	N/A	N/A	N/A		N/A
2WR43-2	C	1,2,7,6	G2R221	E-2258	CEA21			2C15

APPENDIX VI
PENETRATION SETPOINT RERERENCE
DOCUMENTS CALCULATION 85-E-0118-01

PENT NUMBER	MOD NO	COND. NUMBER	SCHEME NUMBER	SCHEME DRAWING	COMPONENT NUMBER	SETPOINT REFERENCE	PRI/SEC DEVICE MODEL/TYPE	PRIMARY DEVICE LOCATION
ZZZZZZZZ	ZZZ	ZZZZZZZZ	ZZZZZZZZ	ZZZZZZZZZZ	ZZZZZZZZZZZZ	ZZZZZZZZZZZZZZZZZZZZ	ZZZZZZZZZZZZ	ZZZZZZZZ
2WR43-2	C	11,19,18	G2R228	E-2258	CEA28			2C15
2WR43-2	C	13,21,12	G2R227	E-2258	CEA27			2C15
2WR43-2	C	14,15,23	G2R224	E-2258	CEA24			2C15
2WR43-2	C	16,17,25	G2R225	E-2258	CEA25			2C15
2WR43-2	C	26,27,36	G2R229	E-2258	CEA29			2C15
2WR43-2	C	29,20,30	G2R234	E-2258	CEA34			2C15
2WR43-2	C	32,42,41	G2R233	E-2258	CEA33			2C15
2WR43-2	C	37,28,38	G2R236	E-2258	CEA36			2C15
2WR43-2	C	44,53,43	G2R232	E-2258	CEA32			2C15
2WR43-2	C	49,58,48	G2R240	E-2258	CEA40			2C15
2WR43-2	C	55,54,45	G2R235	E-2258	CEA35			2C15
2WR43-2	C	60,50,51	G2R237	E-2258	CEA37			2C15
2WR43-2	C	63,64,72	G2R242	E-2258	CEA42			2C15
2WR43-2	C	70,69,61	G2R241	E-2258	CEA41			2C15
2WR43-2	C	9,8,3,4	G2R223	E-2258	CEA23			2C15
2WR43-2	C	SEE NOTE	N/A	N/A	N/A	N/A		N/A
2WR43-2	C	SEE NOTE	N/A	N/A	N/A	N/A		N/A
2WR43-2	D	1-3	G2R402	E-2727	2JY-9003-2			
2WR43-2	E	1,2,7,6	G2R243	E-2258	CEA43			2C15
2WR43-2	E	11,19,18	G2R249	E-2258	CEA49			2C15
2WR43-2	E	13,21,12	G2R248	E-2258	CEA48			2C15
2WR43-2	E	14,15,23	G2R245	E-2258	CEA45			2C15
2WR43-2	E	16,17,25	G2R247	E-2258	CEA47			2C15
2WR43-2	E	26,27,36	G2R252	E-2258	CEA52			2C15
2WR43-2	E	29,20,30	G2R255	E-2258	CEA55			2C15
2WR43-2	E	32,42,41	G2R254	E-2258	CEA54			2C15
2WR43-2	E	37,28,38	G2R257	E-2258	CEA57			2C15
2WR43-2	E	44,53,43	G2R253	E-2258	CEA53			2C15
2WR43-2	E	49,58,48	G2R260	E-2258	CEA60			2C15
2WR43-2	E	55,54,45	G2R256	E-2258	CEA56			2C15
2WR43-2	E	60,50,51	G2R259	E-2258	CEA59			2C15
2WR43-2	E	70,69,61	G2R261	E-2258	CEA61			2C15
2WR43-2	E	9,8,3,4	G2R244	E-2258	CEA44			2C15
2WR43-2	E	SEE NOTE	N/A	N/A	N/A	N/A		N/A
2WR43-2	E	SEE NOTE	N/A	N/A	N/A	N/A		N/A
2WR43-2	F	1,2,7,6	G2R264	E-2258	CEA64			2C15
2WR43-2	F	11,19,18	G2R269	E-2258	CEA69			2C15
2WR43-2	F	13,21,12	G2R268	E-2258	CEA68			2C15
2WR43-2	F	14,15,23	G2R266	E-2258	CEA66			2C15
2WR43-2	F	16,17,25	G2R267	E-2258	CEA67			2C15
2WR43-2	F	26,27,36	G2R273	E-2258	CEA73			2C15
2WR43-2	F	29,20,30	G2R276	E-2258	CEA76			2C15
2WR43-2	F	32,42,41	G2R275	E-2258	CEA75			2C15

APPENDIX VI
PENETRATION SETPOINT RERERENCE
DOCUMENTS CALCULATION 85-E-0118-01

PENT NUMBER	MOD NO	COND. NUMBER	SCHEME NUMBER	SCHEME DRAWING	COMPONENT NUMBER	SETPOINT REFERENCE	PRI/SEC DEVICE MODEL/TYPE	PRIMARY DEVICE LOCATION
ZZZZZZZZ	ZZZ	ZZZZZZZZ	ZZZZZZZZ	ZZZZZZZZZZ	ZZZZZZZZZZZZ	ZZZZZZZZZZZZZZZZZZZZ	ZZZZZZZZZZZZ	ZZZZZZZZ
2WR43-2	F	37,28,38	G2R278	E-2258	CEA78			2C15
2WR43-2	F	44,43,53	G2R274	E-2258	CEA74			2C15
2WR43-2	F	49,58,48	G2R280	E-2258	CEA80			2C15
2WR43-2	F	55,54,45	G2R277	E-2258	CEA77			2C15
2WR43-2	F	60,50,51	G2R279	E-2258	CEA79			2C15
2WR43-2	F	70,69,61	G2R281	E-2258	CEA81			2C15
2WR43-2	F	9,8,3,4	G2R265	E-2258	CEA65			2C15
2WR43-2	F	SEE NOTE	N/A	N/A	N/A	N/A		N/A
2WR43-2	F	SEE NOTE	N/A	N/A	N/A	N/A		N/A
2WR43-2	G	1-3	G2R402	E-2258				2C15
2WR43-3	A	1-85	N/A	N/A	N/A	N/A		N/A
2WR43-3	C	1,2,7,6	R2R202	E-2258	CEA2			2C15
2WR43-3	C	11,19,18	R2R222	E-2258	CEA22			2C15
2WR43-3	C	13,21,12	R2R215	E-2258	CEA15			2C15
2WR43-3	C	14,15,23	R2R210	E-2258	CEA10			2C15
2WR43-3	C	16,17,25	R2R214	E-2258	CEA14			2C15
2WR43-3	C	26,27,36	R2R226	E-2258	CEA26			2C15
2WR43-3	C	29,20,30	R2R238	E-2258	CEA38			2C15
2WR43-3	C	32,42,41	R2R231	E-2258	CEA31			2C15
2WR43-3	C	44,53,43	R2R230	E-2258	CEA30			2C15
2WR43-3	C	9,8,3,4	R2R206	E-2258	CEA6			2C15
2WR43-3	C	SEE NOTE	N/A	N/A	N/A	N/A		N/A
2WR43-3	D	1-3	R2R401	E-2727	2JY-9003-1			
2WR43-3	E	1-2	R2M037	E-2433-5	2RITS-8925-1			2C336-2
2WR43-3	E	3-5	N/A	N/A	N/A	N/A		N/A
2WR43-3	F	1,2,7,6	R2R239	E-2258	CEA39			2C15
2WR43-3	F	11,19,18	R2R262	E-2258	CEA62			2C15
2WR43-3	F	13,21,12	R2R258	E-2258	CEA58			2C15
2WR43-3	F	14,15,23	R2R250	E-2258	CEA50			2C15
2WR43-3	F	16,17,25	R2R251	E-2258	CEA51			2C15
2WR43-3	F	26,27,36	R2R263	E-2258	CEA63			2C15
2WR43-3	F	29,20,30	R2R272	E-2258	CEA72			2C15
2WR43-3	F	32,42,41	R2R271	E-2258	CEA71			2C15
2WR43-3	F	44,53,43	R2R270	E-2258	CEA70			2C15
2WR43-3	F	9,8,3,4	R2R246	E-2258	CEA46			2C15
2WR43-3	F	SEE NOTE	N/A	N/A	N/A	N/A		N/A
2WR43-3	G	1-9	R2R030	E-2259	INCORE DET.			2C15
2WR43-3	G	10-33	N/A	N/A	N/A	N/A		N/A
2WR43-3	G	34-69,85	R2R030	E-2259	INCORE DET.			2C15
2WR43-3	G	70-84	N/A	N/A	N/A	N/A		N/A
2WR43-4	A	SEE NOTE	B2R304	E-2258	CEA4			2C15
2WR43-4	A	SEE NOTE	B2R308	E-2258	CEA8			2C15
2WR43-4	A	SEE NOTE	B2R312	E-2258	CEA12			2C15

APPENDIX VI
PENETRATION SETPOINT RERERENCE
DOCUMENTS CALCULATION 85-E-0118-01

PENT NUMBER	MOD NO	COND. NUMBER	SCHEME NUMBER	SCHEME DRAWING	COMPONENT NUMBER	SETPOINT REFERENCE	PRI/SEC DEVICE MODEL/TYPE	PRIMARY DEVICE LOCATION
ZZZZZZZZ	ZZZ	ZZZZZZZZ	ZZZZZZZZ	ZZZZZZZZZZ	ZZZZZZZZZZZZ	ZZZZZZZZZZZZZZZZZZZZ	ZZZZZZZZZZZZ	ZZZZZZZZ
2WR43-4	A	SEE NOTE	B2R318	E-2258	CEA18			2C15
2WR43-4	A	SEE NOTE	B2R319	E-2258	CEA19			2C15
2WR43-4	A	SEE NOTE	B2R324	E-2258	CEA24			2C15
2WR43-4	A	SEE NOTE	B2R328	E-2258	CEA28			2C15
2WR43-4	A	SEE NOTE	N/A	N/A	N/A	N/A		N/A
2WR43-4	D	SEE NOTE	B2R334	E-2258	CEA34			2C15
2WR43-4	D	SEE NOTE	B2R335	E-2258	CEA35			2C15
2WR43-4	D	SEE NOTE	B2R342	E-2258	CEA42			2C15
2WR43-4	D	SEE NOTE	B2R343	E-2258	CEA43			2C15
2WR43-4	D	SEE NOTE	B2R348	E-2258	CEA48			2C15
2WR43-4	D	SEE NOTE	B2R354	E-2258	CEA54			2C15
2WR43-4	D	SEE NOTE	B2R355	E-2258	CEA55			2C15
2WR43-4	D	SEE NOTE	N/A	N/A	N/A	N/A		N/A
2WR43-4	F	SEE NOTE	B2R360	E-2258	CEA60			2C15
2WR43-4	F	SEE NOTE	B2R366	E-2258	CEA66			2C15
2WR43-4	F	SEE NOTE	B2R367	E-2258	CEA67			2C15
2WR43-4	F	SEE NOTE	B2R376	E-2258	CEA76			2C15
2WR43-4	F	SEE NOTE	B2R377	E-2258	CEA77			2C15
2WR43-4	F	SEE NOTE	B2R378	E-2258	CEA78			2C15
2WR43-4	F	SEE NOTE	N/A	N/A	N/A	N/A		N/A
2WR43-4	G	1-5	N/A	N/A	N/A	N/A		N/A
2WR43-5	A	SEE NOTE	Y2R341	E-2258	CEA41			2C15
2WR43-5	A	SEE NOTE	Y2R344	E-2258	CEA44			2C15
2WR43-5	A	SEE NOTE	Y2R345	E-2258	CEA45			2C15
2WR43-5	A	SEE NOTE	Y2R346	E-2258	CEA46			2C15
2WR43-5	A	SEE NOTE	Y2R347	E-2258	CEA47			2C15
2WR43-5	A	SEE NOTE	Y2R349	E-2258	CEA49			2C15
2WR43-5	A	SEE NOTE	N/A	N/A	N/A	N/A		N/A
2WR43-5	C	SEE NOTE	Y2R350	E-2258	CEA50			2C15
2WR43-5	C	SEE NOTE	Y2R351	E-2258	CEA51			2C15
2WR43-5	C	SEE NOTE	Y2R352	E-2258	CEA52			2C15
2WR43-5	C	SEE NOTE	Y2R353	E-2258	CEA53			2C15
2WR43-5	C	SEE NOTE	Y2R356	E-2258	CEA56			2C15
2WR43-5	C	SEE NOTE	Y2R357	E-2258	CEA57			2C15
2WR43-5	C	SEE NOTE	Y2R358	E-2258	CEA58			2C15
2WR43-5	C	SEE NOTE	Y2R359	E-2259	INCORE DET.			2C15
2WR43-5	E	SEE NOTE	Y2R361	E-2258	CEA61			2C15
2WR43-5	E	SEE NOTE	Y2R362	E-2258	CEA62			2C15
2WR43-5	E	SEE NOTE	Y2R363	E-2258	CEA63			2C15
2WR43-5	E	SEE NOTE	Y2R364	E-2258	CEA64			2C15
2WR43-5	E	SEE NOTE	Y2R365	E-2258	CEA65			2C15
2WR43-5	E	SEE NOTE	Y2R368	E-2258	CEA68			2C15
2WR43-5	E	SEE NOTE	Y2R369	E-2258	CEA69			2C15

APPENDIX VI
PENETRATION SETPOINT RERERENCE
DOCUMENTS CALCULATION 85-E-0118-01

PENT NUMBER	MOD NO	COND. NUMBER	SCHEME NUMBER	SCHEME DRAWING	COMPONENT NUMBER	SETPOINT REFERENCE	PRI/SEC DEVICE MODEL/TYPE	PRIMARY DEVICE LOCATION
ZZZZZZZZ	ZZZ	ZZZZZZZZ	ZZZZZZZZ	ZZZZZZZZZZ	ZZZZZZZZZZZZ	ZZZZZZZZZZZZZZZZZZZZ	ZZZZZZZZZZZ	ZZZZZZZZ
2WR43-5	E	SEE NOTE	Y2R370	E-2258	CEA70			2C15
2WR43-5	F	SEE NOTE	Y2R371	E-2258	CEA71			2C15
2WR43-5	F	SEE NOTE	Y2R372	E-2258	CEA72			2C15
2WR43-5	F	SEE NOTE	Y2R373	E-2258	CEA73			2C15
2WR43-5	F	SEE NOTE	Y2R374	E-2258	CEA74			2C15
2WR43-5	F	SEE NOTE	Y2R375	E-2258	CEA75			2C15
2WR43-5	F	SEE NOTE	Y2R379	E-2258	CEA79			2C15
2WR43-5	F	SEE NOTE	Y2R380	E-2258	CEA80			2C15
2WR43-5	F	SEE NOTE	Y2R381	E-2258	CEA81			2C15

APPENDIX VII

This appendix includes several references that are used to support statements in the body of the calculation and present an illustration of the penetration module construction. Each reference is listed as an attachment:

A. Physical Configuration of Bunker Ramo Penetration, Arkansas Nuclear One Unit 2 -- Attachment A to SCEW sheet 2A112

B. Stress and Strain Analysis of Glass Reinforced Epoxy Modules Under Short Circuit Test Conditions for Electric Penetration Assemblies Used in Nuclear Power Plants -- Appendix C to Amphenol Sams test Report #123-2029

C. Module Conductor, circular mil VS wire size -- Attachment B to Amphenol Sams letter (JEP: 3:327) to Bechtel Corporation dated March 28, 1973

D. General Electric data sheet on Metal-Clad Switchgear power circuit breaker

E. Memorandum IC-85-093, Containment Electrical Penetration Protection - Regulatory Guide 1.63

F. IEEE 242-1986; pages (343-350) from Chapter 8, Conductor Protection

Rev. 2 BY: [illegible] DATE: 8-6-93
Rev. 2 Ck'd. DS DATE: 8/12/93

APPENDIX ~~VIII~~
CALCULATION 85-E-0118-01 PAGE 1 OF 5

ATTACHMENT A

PHYSICAL CONFIGURATION OF BUNKER RAMO PENETRATIONS ARKANSAS NUCLEAR ONE UNIT - 2

The penetrations are a unitized header assembly construction that utilizes glass reinforced epoxy modules as illustrated in Figure 1.

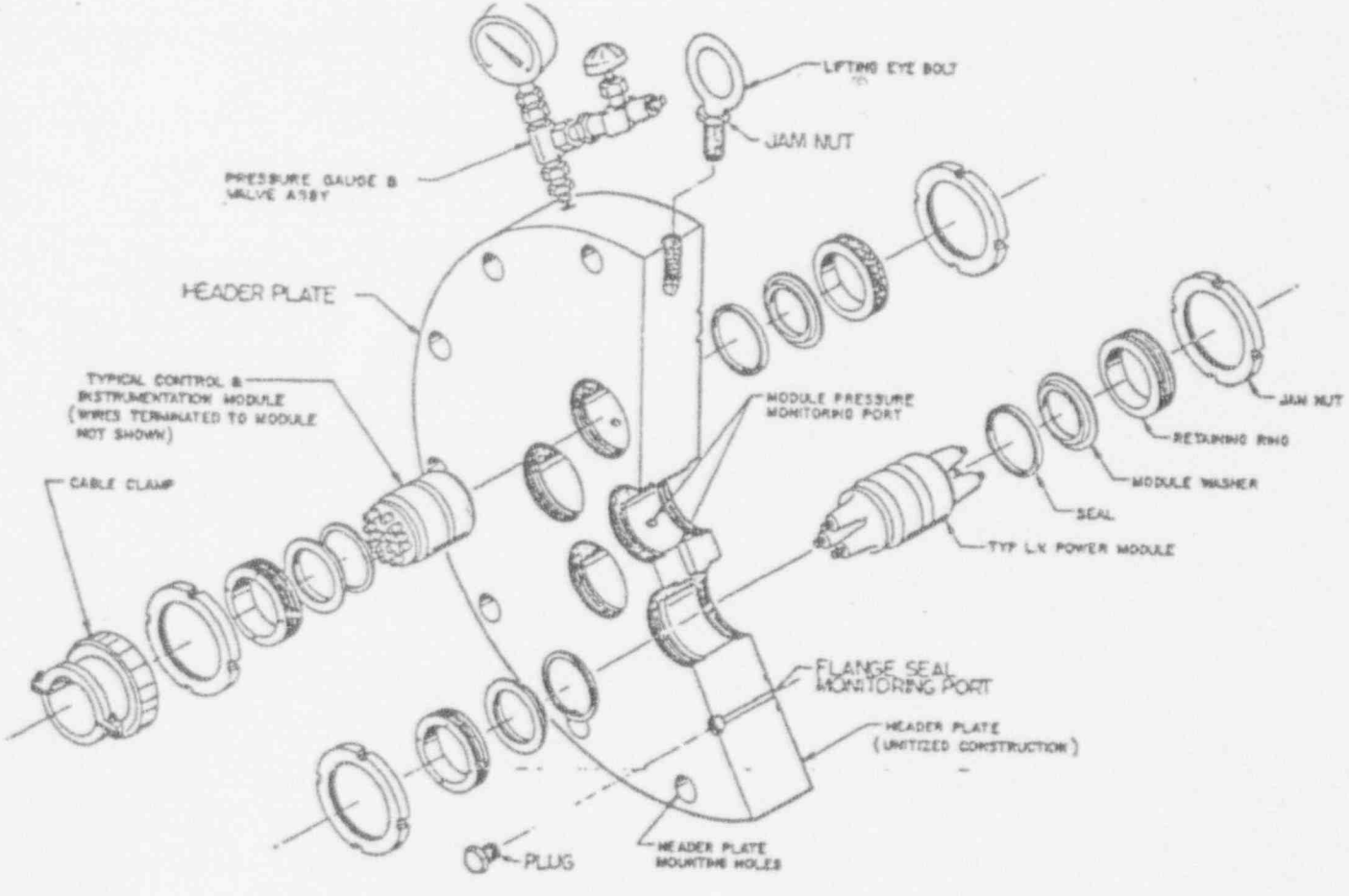


Figure 1

The assembly consists of a single header plate, approximately 3 inches thick, into which modules are installed. The header plate is attached to a welded neck flange with mounting studs and nuts. Redundant O-rings are used between the header plate and the flange face to assure leak free integrity.

The module is held in the header plate cavity by a retaining shoulder on one face of the plate and a stainless steel retaining ring which threads into the opposite face. A leak free assembly is achieved by mounting special self energizing polyurethane seals on both ends of the module.

A representation of the feedthrough module is shown in Figure 2.

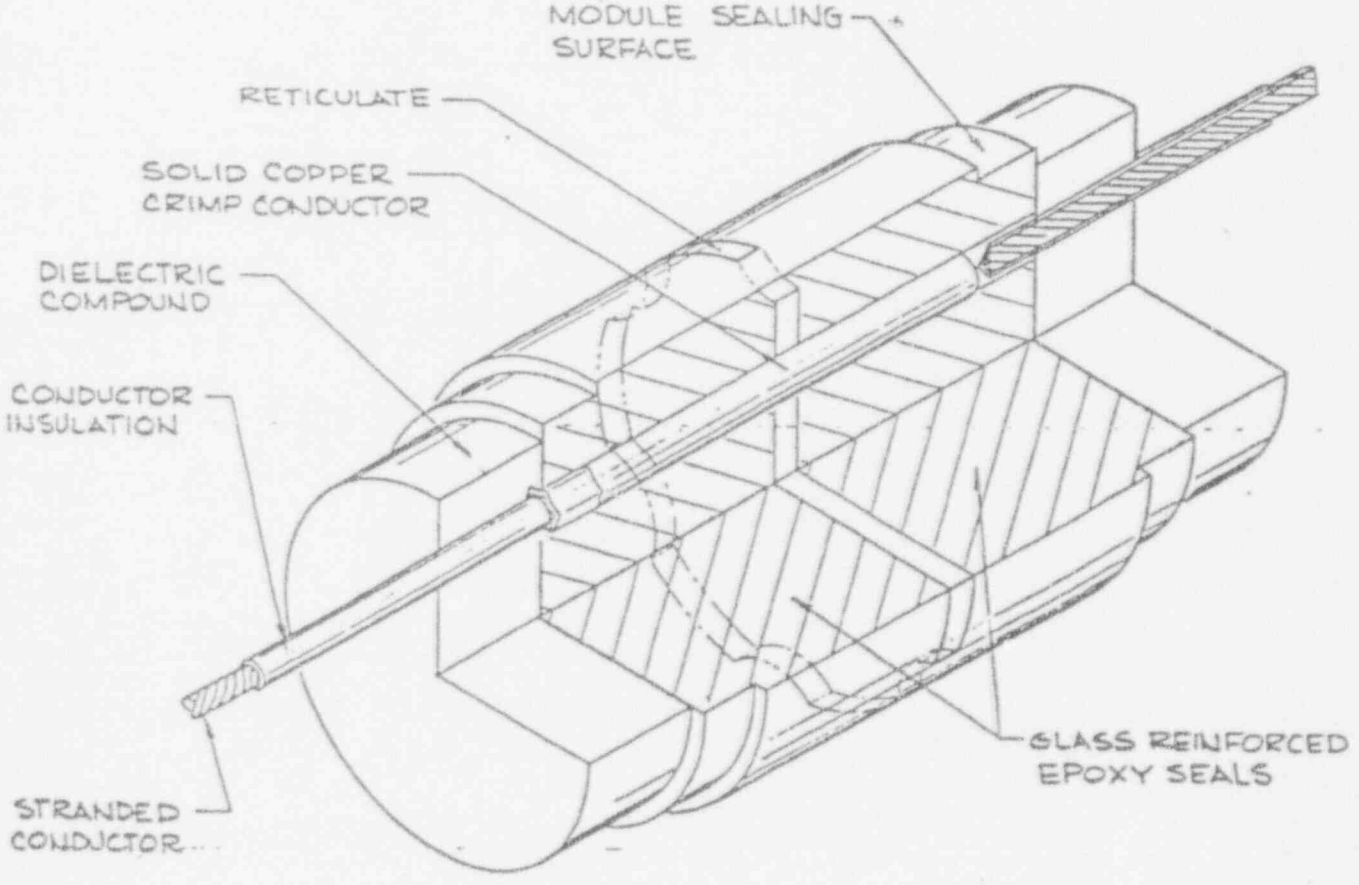


Figure 2

The module is molded out of a bisphenol-A type epoxy. The feedthrough conductors are solid non-insulated copper. They are arranged with stud type connectors on each end and are encased in the epoxy. A gas permeable reticulate is also molded into the center of the module to accommodate pressurized leak testing of the assembly after installation. The assembly was molded so that the ends of the stud connectors were exposed after the epoxy hardened. After the epoxy cured, pigtail cables were connected to the stud-type connectors and covered with heat shrink tubing (Reference Detail A of Figure 3). On those modules with 69 #14 AWG cables, the cable bundle diameter exceeded the module hole diameter. A one foot (maximum) length of single conductor #14 AWG was connected to the module as described above and spliced to the appropriate pigtail cable on the inboard side (Reference Detail B of Figure 3).

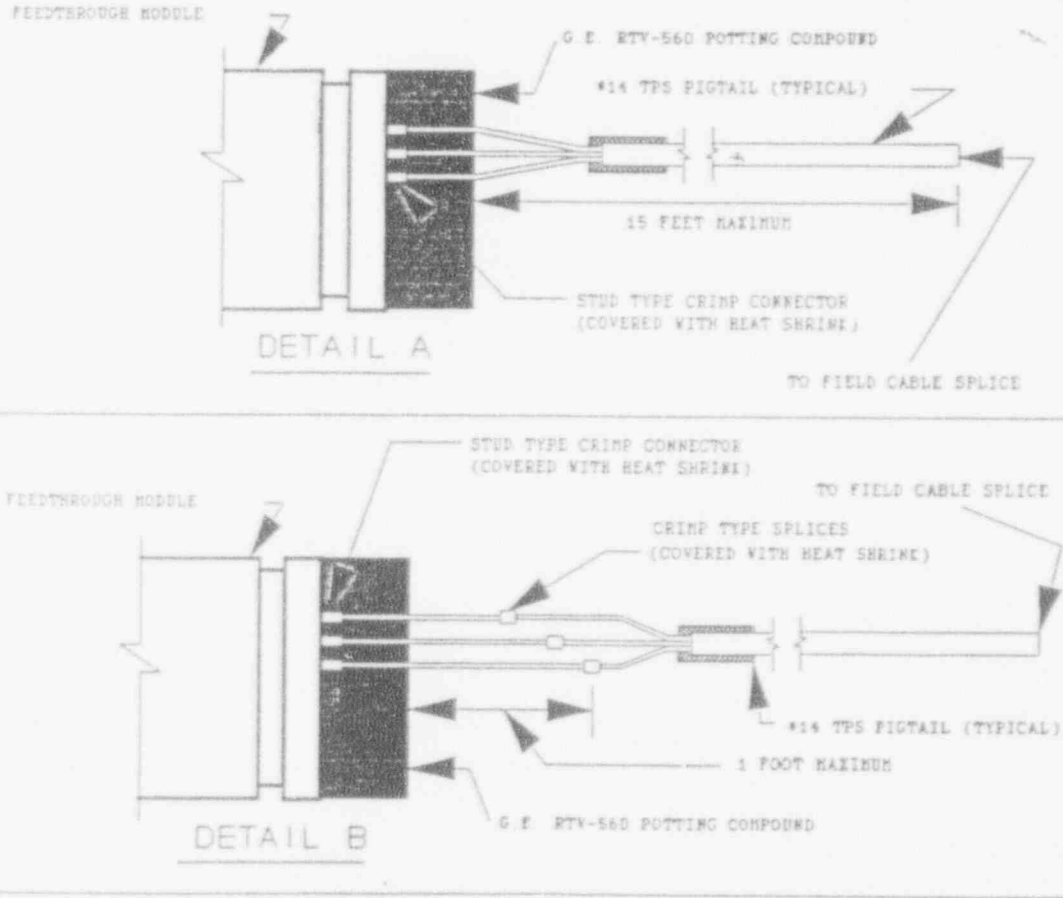
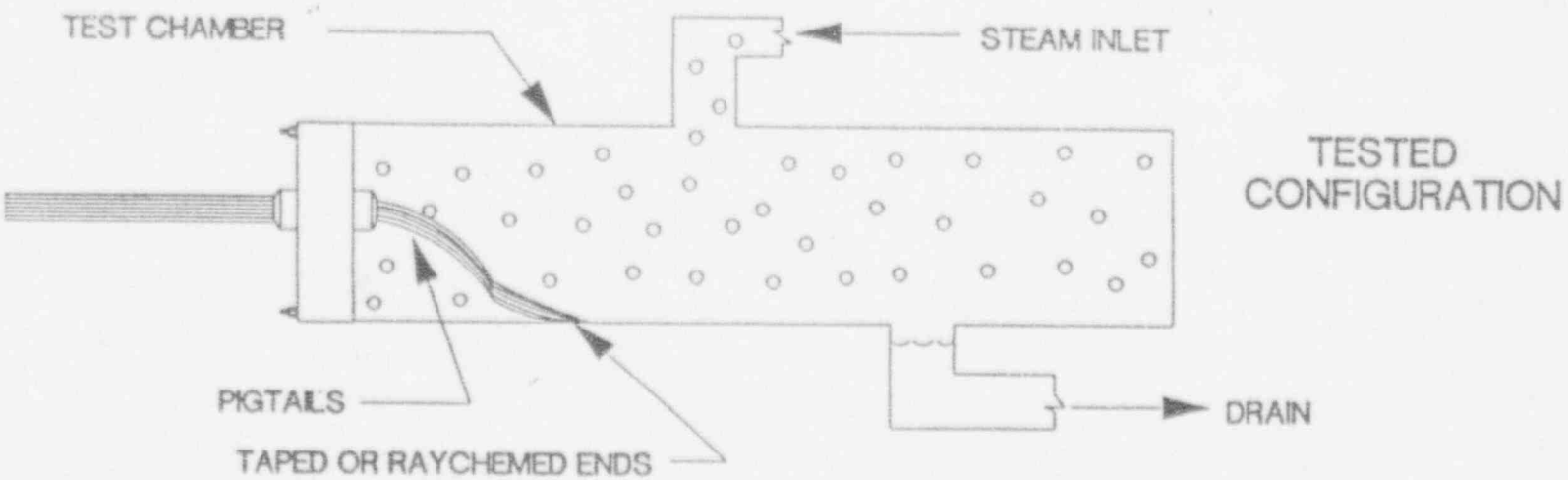


Figure 3

The configuration consisting of two inboard splices was used in all calculations for conservatism. After the pigtails were attached the connections at the module were sealed with approximately 1 inch of G.E. RTV-560 potting compound.

After assembly of the penetration is complete, a means of monitoring the integrity of the assembly is provided through porting in the header plate between all the modules. The porting allows the pressurization of the modules and the gas permeable reticulate, molded into each module, provides a gas path from the outside diameter of the module to each of the feedthrough conductors.



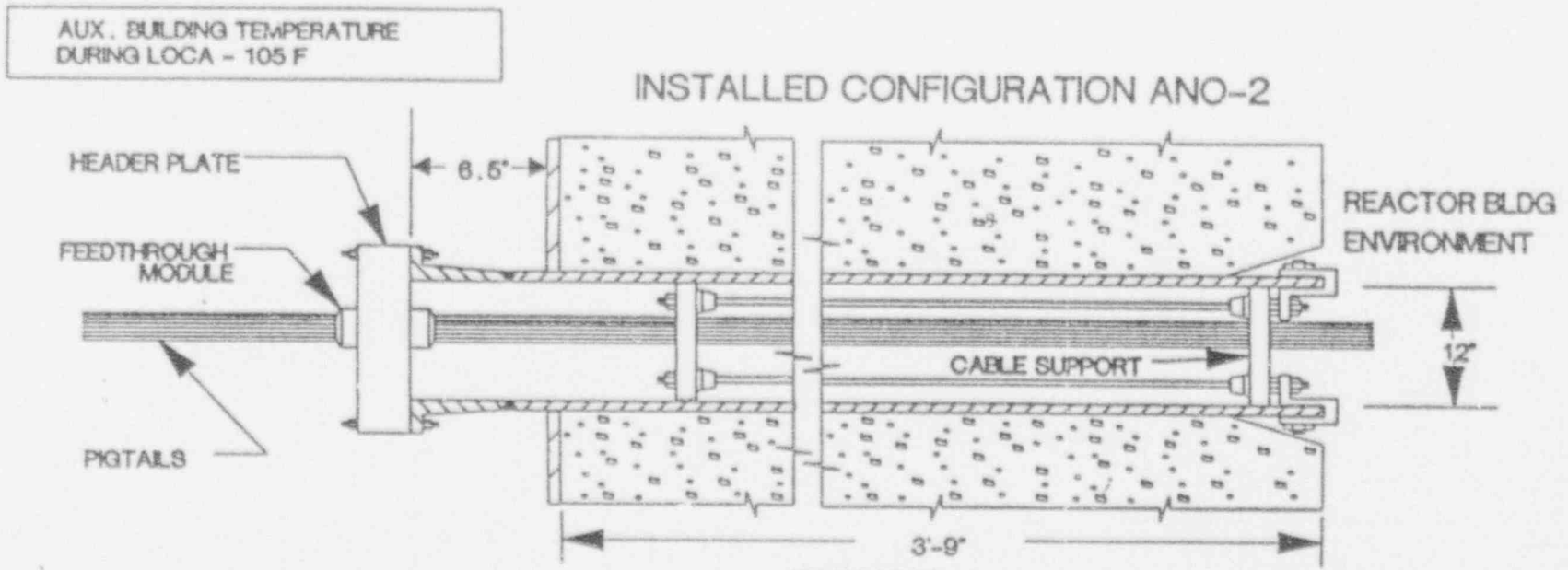


FIGURE 4

CALC 85-E-0118-01
ATTACHMENT A
APPENDIX VIII
PAGE 5 OF 5

APPENDIX C

STRESS AND STRAIN ANALYSIS OF GLASS REINFORCED EPOXY MODULES UNDER SHORT CIRCUIT TEST CONDITIONS FOR ELECTRIC PENETRATION ASSEMBLIES USED IN NUCLEAR POWER PLANTS

REPORT NO. U-75-51

REV. 1

DATE: JUNE 18, 1974

STRESS AND STRAIN ANALYSIS

of

GLASS REINFORCED EPOXY MODULES

UNDER

SHORT CIRCUIT TEST CONDITIONS

For

ELECTRIC PENETRATION ASSEMBLIES

USED IN

NUCLEAR POWER PLANTS

Amphenol SAMS Division
BUNKER RAMO CORPORATION
Chatsworth, California

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TABLE OF CONTENTS

ABSTRACT ii

I. Introduction 1

II. Analysis 2

III. Example Calculation 6

IV. Conclusion 8

Fig 1. Bearing Stress 8

Fig 2. Hoop Stress 9

Fig 3. Shear Stress 10

Table 1 - Modular Conductor Temperature Rise 10

Table 2 - Thermal Strain & Hoop Stress 11

Table 3 - Electromagnetic Force & Bearing Stress 12

ABSTRACT

Analysis of stress and strain of Amphenol Low Voltage Electric Penetration Assembly Glass Reinforced Epoxy Modules under short circuit conditions shows that the 350 Kcmil conductor is subjected to the highest level of stress and should be used as the basis of acceptance of short circuit capability of all other AWG sizes.

1. Introduction:

The following Analysis details the methods of determining strain and stress of the conductors, used in Amphenol's Low Voltage Electric Penetration Assembly modules under short circuit conditions.

II. ANALYSIS

Short Circuit current will generate a considerable amount of heat which can not be dissipated easily due to low heat transfer capabilities of glass reinforced epoxy used as module material in Amphenol's Electric Penetration Assemblies. Thermal expansion of the conductor will produce internal (compressive) stress in the copper and hoop stress in the epoxy. An increase in conductor length will also develop a shear stress between conductor and epoxy.

In order to find the increase in copper conductor temperature, formula (1), given by Insulated Power Cable Engineers Association (IPCEA), publication P-32-382, is used

$$\left(\frac{I}{A}\right)^2 t = 0.0297 \log_{10} \left(\frac{T_2 + 234}{T_1 + 234}\right) \quad (1)$$

Where:

- I = Short Circuit current, amps
- A = Conductor area, circular mils (CM)
- t = Time of short circuit - seconds
- T_1 = Maximum operating temperature, 90°C
- T_2 = Max. short circuit temperature rise after t seconds °C.

Equation (1) can be tranformed to:

$$\log_{10}\left(\frac{T_2 + 234}{T_1 + 234}\right) = K$$

Where:

$$K = \frac{t}{0.0297}\left(\frac{I}{A}\right)^2 \quad (2)$$

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25-E-0118-01
ATTACHMENT B
PAGE 5 OF
APPENDIX VII

or,

$$10^k = \frac{T_2 + 234}{T_1 + 234}$$

$$T_2 = (T_1 + 234)\ 10^k - 234$$

Subtracting T_1 from both sides of previous equation.

$$T_2 - T_1 = \Delta T = T_1 \times 10^k + 234 \times 10^k - 234 - T_1$$

or

$$\Delta T = T_1\ (10^k - 1) + 234\ (10^k - 1)$$

Finally

$$\Delta T = (10^k - 1)\ (T_1 + 234) \quad . \ . \ . \ . \ . \ . \ . \ . \ . \quad (3)$$

where ΔT is the temperature differential in Celsius units (Centigrade) and will be called $(\Delta T)c$.

To convert $(\Delta T)c$ to $(\Delta T)f$ where F is Fahrenheit units, the following relationship holds:

$$(^oF) = \frac{9}{5}\ (^oC) + 32$$

$$(^oF_2 - {}^oF_1) = (\Delta T)_F = \left[\frac{9}{5}\ \left(^oC_2\right) + 32\right] - \left[\frac{9}{5}\ \left(^oC_1\right) + 32\right]$$

$$(\Delta T)_F = \frac{9}{5}\left(^oC_2 - {}^oC_1\right) = \frac{9}{5}\ (\Delta T)_C$$

$$\text{or} \quad (\Delta T)_F = 1.8\ (\Delta T)_C \quad . \ . \ . \ . \ . \ . \ . \ . \quad (4)$$

Thermal strain of the conductor is found from the equation (Ref. Strength of Materials by S. Timoshenko, 3rd edition, page 28, Equation 12)

$$\varepsilon = \alpha\ (\Delta T)_F$$

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Where:

ε = thermal strain of conductor, in/in

α = coefficient of thermal expansion of copper, 9.8×10^{-6} in/in$^{\circ}$F

$(\Delta T)_f$ = temperature increase, $^{\circ}$F

The stress in epoxy is determined from Hooke's Law (Ref. Strength of Materials by S. Timoshenko, 3rd Edition, Page 4, Eq. 4)

$$\sigma_H = \varepsilon E \qquad (6)$$

Where:

σ_H = epoxy hoop stress, psi

E = Modules of elasticity for Amphenol's glass reinforced epoxy, as determined by experimental testing is:

3×10^5 to 4.5×10^5 psi

The longitudinal thermal elongation is assumed to be symetrical and increasing from zero (at center) to its maximum value at the end of the epoxy (Fig. 3).

Maximum shear will be

$$\tau_{max} = \frac{P_{max}}{A}$$

Where A = πD is circumference of the conductor for 1 inch length.

Thermal load, P, is:

$$dP = \alpha \varepsilon (\Delta T)_f dA = \sigma_H \times 1'' dx$$

$$P_{max} = \int_0^{\ell/2} \sigma_H \, dx = \frac{\sigma_H \ell}{2}$$

Therefore: $\tau_{max} = \frac{\sigma_H \ell}{2 \pi D} \qquad (7)$

ATTACHMENT B

PAGE 9 OF 16

APPENDIX VII

Where:

τ_{max} = Maximum shear stress, psi

D = Conductor diameter, inch

ℓ = Conductor length, inch

The Electromagnetic forces between conductors during short circuit condition are described by equation (8), given by Equation 3 of American National Standard C37.32-1972.

$$F = M \frac{5.4\ I_s^2}{10^7\ S} \quad \ldots \ldots \ldots \ldots (8)$$

Where:

F = electromagnetic force between conductors, LB/FT of conductor

M = Fault Current Multiplying factor, M = 6.9 (AC, 3 phase RMS Symmetrical)

I_s = Short circuit current, amperes

S = Spacing between conductor centerlines, inches

- Bearing stress σ_B (Ref. Wytrzymalosc Materialow by R. Kurowski and M.E. Niezgodzinski, page 80, Fig. 55 and Eq. 26) due to electromagnetic forces will be:

$$\sigma_B = \frac{F}{12D} \ (psi) \quad \ldots \ldots \ldots \ldots (9)$$

Conductor sizes, short circuit current values, thermal conditions, and strain and stress values, for module conductor sizes #10 AWG thru 500 Kcmils, are given in Tables 1, 2 and 3.

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III EXAMPLE: CALCULATION

85-E-0118-01

ATTACHMENT A

PAGE 10 OF 26

APPENDIX III

A. CONDUCTOR ANALYSIS

Data: D = 0.250 in

A = 62,500 (Cmils)

I_s = 1,680 amperes

t = $\frac{30 \text{ cycles}}{60}$ = 0.5 sec.

T_1 = 90°C

ℓ = 1.858 in

S = 0.376 in

E = 4.5×10^5 PSI

α = 9.8×10^{-6} in/in °F

Find K, Equation (2):

$$K = \frac{t}{0.0297}\left(\frac{I_s}{A}\right)^2 = \frac{0.5}{0.0297}\left(\frac{1,680}{62,500}\right)^2$$

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$K = 0.0122$

Find $(\Delta T)_c$, Equation (3):

$$\Delta T = (10^K - 1)(T_1 + 234) = (10^{0.0122} - 1)(90 + 234)$$

$(\Delta T)_c = 9.20$ °C ⚠1

Find $(\Delta T)_F$, Equation (4):

$(\Delta T)_F = 1.8 \times 9.20 = 16.57$°F ⚠1

Strain ε, Equation (5):

$$\varepsilon = \alpha (\Delta T)_F = 9.8 \times 10^{-6} \times 16.57 = 1.62 \times 10^{-4} \frac{\text{in}}{\text{in}}$$

Hoop Stress σ_H, Equation (6):

$$\sigma_H = E\varepsilon = 1.62 \times 10^{-4} \times 4.5 \times 10^5 = 73.05 \text{ psi}$$ ⚠1

Max. Shear Stress, τ_{max}, equation (7):

$$\tau_{max} = \frac{G\,L}{2\pi D} = \frac{73.05 \times 1.858}{2 \times \pi \times 0.25} = 86.11 \text{ psi}$$ (1)

Electromagnetic Force F, Equation (8)

$$F = \frac{6.9 \times 5.4 \times 1.680^2}{10^7 \times 0.376} = 27.97 \text{ (Lb/ft)}$$ (1)

Bearing Stress, Equation (9)

$$\sigma_B = \frac{F}{12D} = \frac{27.97}{12 \times 0.250} = 9.32 \text{ psi}$$ (1)

IV. CONCLUSIONS

Maximum stress occcurs in the 500 Kcmil module but this module is most often used as either ground return or relatively low amperage DC auxiliary equipment and is usually not subject to short circuit conditions. Therefore, the higher strain and stre of an active module circuit would be in the 3 x 350 Kcmil Bushing Module.

Successful short circuit testing of the 350 Kcmil bushing module has demonstrated the capability of the Glass reinforced Epoxy material to withstand short circuit conditions for all the other AVG sites modules.

Date

FIG. 1

FIG. 2

FIG. 3

TABLE 1

MODULAR CONDUCTOR TEMPERATURE RISE

NOMINAL CONDUCTOR SIZE	DIA MILS (D)	AREA* CM (A)	MAXIMUM ALLOWABLE IPCBA SHORT CIRCUIT CURRENT, AMPS (I_s)(τ=.167) 10 Cycles	(I_s)(τ=.5) 30 Cycles	K (Eq 2)	MODULE CONDUCTOR TEMPERATURE RISE °C ΔT (Eq 3)	[illegible] ΔT (Eq 4)
#10	188.0	35,344	1,830	1,056	0.015	11.41	20.53
#8	250.0	62,500	2,910	1,680	0.012	9.20	16.57
#6	312.0	97,344	4,625	2,670	0.013	9.50	17.20
#4	375.0	140,625	7,356	4,247	0.015	11.66	20.99
#2	438.0	191,844	11,695	6,752	0.021	15.94	28.69
#1/0	562.0	315,844	18,604	10,741	0.019	14.86	26.74
250 Kcmil	625.00	390,625	44,060	25,438	0.071	57.89	104.20
350 Kcmil	625.0	390,625	61,684	35,613	0.140	12*.17	221.71
500 Kcmil	750.0	562,500	88,120	50,876	0.138	120.96	217.62

NOTE: In all cases the temperature rise in the module conductor is lower than [illegible] will more readily withstand the [illegible] circuit conditions.

* Area of Penetration Module Conductors

** Where T_1 = 90°C

85-E-0118-01 ATTACHMENT B PAGE … OF 16

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TABLE 2

THERMAL STRAIN & HOOP STRESS σ_{HW} AND SHEAR

SIZE	ε x10^{-4} (Eq. 5)	σ_{11} PSI (Eq. 6)	ε_{in}	τ_{max} (Eq. 7)
#10	7.01	90.56	1.858	142.44
#8	1.62	73.05	1.858	86.41
#6	2.69	76.11	1.858	72.14
#4	2.06	92.56	1.858	72.99
#2	2.81	126.51	1.858	85.41
#1/0	2.62	117.92	1.858	62.05
250 Kcmil	10.21	459.53	4.358	509.96
350 Kcmil	21.73	977.74	4.358	1,085.05
500 Kcmil	21.33	959.72	4.843	986.32

TABLE 3

ELECTROMAGNETIC FORCE AND BEARING STRESS

NOMINAL CONDUCTOR SIZE	MAXIMUM ALLOWABLE IPCEA SHORT CIRCUIT CURRENT, AMPS. 10 Cycles	MAXIMUM ALLOWABLE IPCEA SHORT CIRCUIT CURRENT, AMPS. 30 Cycles	S, in	ELECTROMAGNETIC FORCE F (Lb/Ft.) F* 10 Cycles	ELECTROMAGNETIC FORCE F (Lb/Ft.) F* 30 Cycles	BEARING STRESS σ_B (PSI) (Eq. 9) 10 Cycles	BEARING STRESS σ_B (PSI) (Eq. 9) 30 Cycles
#10	1830	1056	0.312	39.99	13.32	17.73	[illegible]
#8	2910	1680	0.376	83.92	27.07	27.07	[illegible]
#6	4625	2670	0.424	187.98	62.65	50.21	16.73
#4	7356	4247	0.470	428.97	142.99	95.33	31.78
#2	11695	6752	0.532	957.93	319.30	182.25	60.75
#1/0	18604	10741	0.792	1628.28	542.76	241.44	80.48
250 Kcmil	44060	25438	1.174	6161.18	2053.72	821.49	273.83
350 Kcmil	61684	35613	1.174	12075.91	4025.24	1610.12	53[illegible].70
500 Kcmil	88120	50876	1.350	21431.77	7143.89	2381.31	79[illegible]

*F (Eq. 8) where m = 6.9

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PAGE 16 OF 16
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ATTACHMENT "B"
(Supplement #1)

85-E-0118-01
PAGE 1 OF 1
ATTACHMENT C
APPENDIX III

MODULE CONDUCTOR

CIRCULAR MIL VS WIRE SIZE

PIGTAIL WIRE		MODULE CONDUCTOR		CONDUCTOR TERM.	CONTACT TO WIRE AREA RATIO
AWG	CIR. MIL	DIA.	CIR. MIL		
20	1,020	.063	3,969		3.9
18	1,620	.081	6,561		4.1
16	2,580	.102	10,404		4.0
14	4,110	.125	15,625		3.8
12	6,530	.156	24,336	CRIMP	3.7
10	10,380	.188	35,344		3.4
8	16,510	.250	62,500		3.7
6	26,240	.312	97,344		3.7
4	41,740	.375	140,625		3.3
2	66,360	.438	191,844		2.9
1/0	105,600	.562	315,844		3.0
2/0	133,100	.625	390,625		2.9
4/0	211,600	.750	562,500		2.7
250 KCmil	250,000	.625	390,625	SOCKET WITH	1.5
350 KCmil	350,000	.625	390,625	SET SCREWS	1.1
500 KCmil	500,000	.750	562,500		1.1
750 KCmil	750,000	.875	765,625		1.0
1000 KCmil	1,000,000	1.000	1,000,000	THREADED	1.0
1750 KCmil	1,750,000)	1.500	2,250,000		1.2
2000 KCmil	2,000,000)				1.1

NOTE: The conductors throughout the EPA module and thru both hermetic seals are considerably larger than the wire size specified for the crimped pigtail wires. The module conductors are three to four times as large as the conductor to which they are crimped. An AWG #8 pigtail is terminated to an EPA module conductor which is almost equivalent to an AWG #2 wire. See circular mil tabulation above.

~~Attachment 5~~ Ex
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~~Page 1 of 3~~
ATTACHMENT D
BSE-0118-01
Page 1 of 1
APPENDIX VII

GENERAL ELECTRIC

SWITCHGEAR DEPARTMENT

METAL-CLAD SWITCHGEAR

Power Circuit Breaker Data

MAGNE-BLAST TYPE AM-7.2-500—1200 AND 2000 AMPERES

PAGE OF

NOMINAL IDENTIFICATION*

Nominal voltage class, kv	7.2
Nominal 3-phase mva class	500

RATED VALUES*

Rated maximum voltage, kv	8.25
Rated voltage range factor, (K)	1.25
Rated continuous current (amp at 60 Hz)	1200 2000
Rated short circuit current, amperes	33000
Rated interrupting time (cycles on 60-Hz Base)	5
Rated permissible tripping delay (seconds)	2

OPERATING TIME (Cycles on 60-Hz Base)

	1200	2000
Time from energizing trip coil until contacts part	3	3
Time from energizing control relay (maximum)		
Until contacts touch	5	6
Until contacts are fully closed	6	7

INSULATION LEVEL†

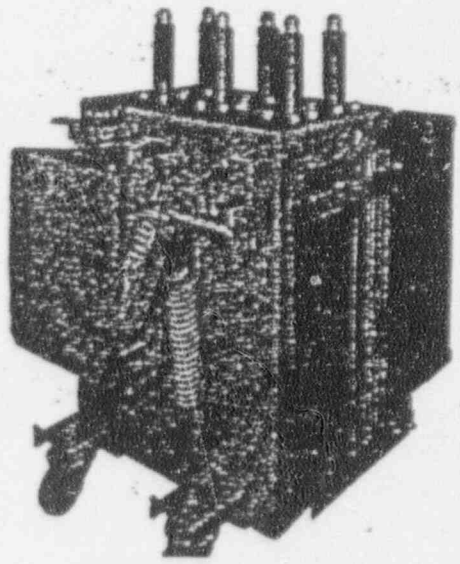
Rated one-minute dry voltage withstand (kv)	36
Rated impulse withstand, crest (kv)	95

RELATED REQUIRED CAPABILITIES*

Maximum voltage divided by K, (kv)	6.6
Maximum symmetrical interrupting capability in rms amperes	41000
3-second short-time current carrying capability in rms amperes	41000
Closing and latching capability	
Total rms amperes	66000

PHYSICAL DESIGN

Net weight (lbs) approx	1200-ampere breaker 2100 2000-ampere breaker 2300
Shipping weight (lbs) approx	1200-ampere breaker 2300 2000-ampere breaker 2500
Net weight of box barrier (lbs) approx	35
Net weight of each arc chute approx	200



(Photo 8034807

Approximate Dimensions

Height	54 in.
Width	32 in.
Depth	57 in.

OPERATING VOLTAGES AND CURRENTS

Rated Control Voltage	Stored Energy				Shunt Trip Coil		
	Closing Voltage Range	Closing Spring Release Coil (Amp)	Average Spring Motor (Amp)	Fuse Rating (Amp)	Tripping Voltage Range	Tripping Current at Rated Voltage (Amp)	Fuse Rating (Amp)
230 V. A-c	190–250	4.0	9	10	190–250	10	35
250 V. D-c	180–260	3.0	7	10	140–280	5	35
125 V. D-c	90–130	6.0	14	15	70–140	6	35
48 V. D-c	34–50	6.5	32	30	28– 60	6.5	35
24 V. D-c	.....	.....	.....	.....	14– 30	13	35

REPRESENTATIVE INTERRUPTING TESTS

Test KV	Frequency (Hertz)	RMS Amperes Initial in Arc	MVA Interrupted	Cycles of Arc	Interrupting Time (Cycles) §
8.25	60	181	216	1.2	4.3
8.25	60	211	720	1.3	4.8
8.25	60	892	1,250	1.3	4.8
8.25	60	14200	200	0.6	3.4
8.25	60	23000	330	0.7	3.4
8.25	60	25000	500	0.8	3.4
8.25	60	28000	550	0.8	3.3
4.4	60	22000	250	0.8	3.3
4.4	60	36000	410	0.8	3.4
4.4	60	49000	560	0.8	3.6
					4.3

* Based on USASI and NEMA Standards. (CO—15 second—CO duty cycle.)
† Dry values are corrected to 25 C, 760 mm Hg, and 65 per cent relative humidity.
‡ Magnetizing current.
§ Spring charging time—4 seconds.

25-87 (3M)

ATTACHMENT "B"
(Supplement #1)

85-E-0118-01
PAGE 1 OF 1
ATTACHMENT C
APPENDIX III

MODULE CONDUCTOR

CIRCULAR MIL VS WIRE SIZE

PIGTAIL WIRE		MODULE CONDUCTOR			
AWG	CIR. MIL	DIA.	CIR. MIL	CONDUCTOR TERM.	CONTACT TO WIRE AREA RATIO
20	1,020	.063	3,969		3.9
18	1,620	.081	6,561		4.1
16	2,580	.102	10,404		4.0
14	4,110	.125	15,625		3.8
12	6,530	.156	24,336	CRIMP	3.7
10	10,380	.188	35,344		3.4
8	16,510	.250	62,500		3.7
6	26,240	.312	97,344		3.7
4	41,740	.375	140,625		3.3
2	66,360	.438	191,844		2.9
1/0	105,600	.562	315,844		3.0
2/0	133,100	.625	390,625		2.9
4/0	211,600	.750	562,500		2.7
250 KCmil	250,000	.625	390,625	SOCKET WITH	1.5
350 KCmil	350,000	.625	390,625	SET SCREWS	1.1
500 KCmil	500,000	.750	562,500		1.1
750 KCmil	750,000	.875	765,625		1.0
1000 KCmil	1,000,000	1.000	1,000,000	THREADED	1.0
1750 KCmil	1,750,000)	1.500	2,250,000		1.2
2000 KCmil	2,000,000)				1.1

NOTE: The conductors throughout the EPA module and thru both hermetic seals are considerably larger than the wire size specified for the crimped pigtail wires. The module conductors are three to four times as large as the conductor to which they are crimped. An AWG #8 pigtail is terminated to an EPA module conductor which is almost equivalent to an AWG #2 wire. See circular mil tabulation above.

~~Attachment 5 Enc~~
~~Calc 92-E-0037-08~~
~~Page 1 of 3~~
ATTACHMENT D
BSE-0118-01
Page 1 of 1
APPENDIX VII

GENERAL ELECTRIC

SWITCHGEAR DEPARTMENT

METAL-CLAD SWITCHGEAR

Power Circuit Breaker Data

MAGNE-BLAST TYPE AM-7.2-500—1200 AND 2000 AMPERES

PAGE OF

NOMINAL IDENTIFICATION*

Nominal voltage class, kv	7.2
Nominal 3-phase mva class	500

RATED VALUES*

Rated maximum voltage, kv	8.25
Rated voltage range factor, (K)	1.25
Rated continuous current (amp at 60 Hz)	1200 2000
Rated short circuit current, amperes	33000
Rated interrupting time (cycles on 60-Hz Base)	5
Rated permissible tripping delay (seconds)	2

OPERATING TIME (Cycles on 60-Hz Base)

	1200	2000
Time from energizing trip coil until contacts part	3	3
Time from energizing control relay (maximum)		
Until contacts touch	5	6
Until contacts are fully closed	6	7

INSULATION LEVEL†

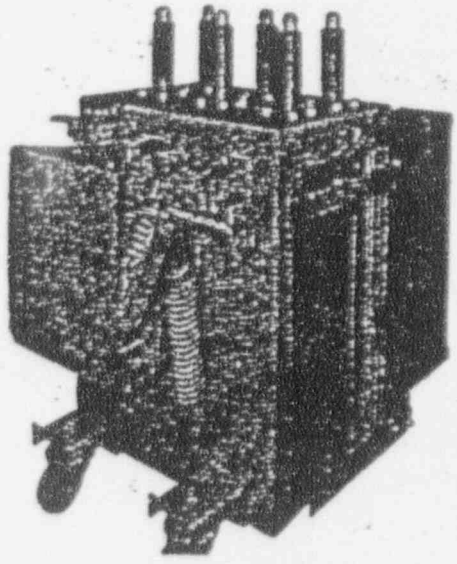
Rated one-minute dry voltage withstand (kv)	36
Rated impulse withstand, crest (kv)	95

RELATED REQUIRED CAPABILITIES*

Maximum voltage divided by K, (kv)	6.6
Maximum symmetrical interrupting capability in rms amperes	41000
3-second short-time current carrying capability in rms amperes	41000
Closing and latching capability Total rms amperes	66000

PHYSICAL DESIGN

Net weight (lbs) approx	1200-ampere breaker 2100 2000-ampere breaker 2300
Shipping weight (lbs) approx	1200-ampere breaker 2300 2000-ampere breaker 2500
Net weight of box barrier (lbs) approx	35
Net weight of each arc chute approx	200



(Photo 8034807)

Approximate Dimensions

Height	54 in.
Width	32 in.
Depth	57 in.

OPERATING VOLTAGES AND CURRENTS

Rated Control Voltage	Stored Energy				Shunt Trip Coil		
	Closing Voltage Range	Closing Spring Release Coil (Amp)	Average Spring Motor (Amp)	Fuse Rating (Amp)	Tripping Voltage Range	Tripping Current at Rated Voltage (Amp)	Fuse Rating (Amp)
230 V. A-c	190–250	4.0	9	10	190–250	10	3.5
250 V. D-c	180–260	3.0	7	10	140–280	3	3.5
125 V. D-c	90–130	6.0	14	15	70–140	6	3.5
48 V. D-c	34–50	6.5	32	30	28– 60	6.5	3.5
24 V. D-c	.....	.....	.....	.....	14– 30	23	3.5

REPRESENTATIVE INTERRUPTING TESTS

Test KV	Frequency (Hertz)	RMS Amperes Initial In Arc	MVA Interrupted	Cycles of Arc	Interrupting Time (Cycles) ‡
8.25	60	15‡	216	1.2	4.2
8.25	60	81‡	720	1.3	4.8
8.25	60	99‡	1,250	1.3	4.8
8.25	60	14200	200	1.3	4.8
8.25	60	23000	330	0.6	3.4
8.25	60	35000	500	0.7	3.4
8.25	60	38000	550	0.8	3.3
6.6	60	22000	250	0.5	3.3
6.6	60	36000	410	0.8	3.4
6.6	60	49000	560	0.6	3.6
				0.8	4.3

* Based on USASI and NEMA Standards. (CO—15 second—CO duty cycle.)
† Dry values are corrected to 25 C, 760 mm Hg, and 65 per cent relative humidity.
‡ Magnetizing current.
§ Spring charging time—4 seconds.

25-67 (TEM)

FORM AR731 REV 11.72

APPENDIX VII

RAB 85E-00118-01

ATTACHMENT E

ARKANSAS POWER & LIGHT COMPANY

INTRA COMPANY CORRESPONDENCE

July 1, 1985

We need to initiate some action to follow up on our end to review all penetrations, as we discussed. MC

IC-85-093

MEMORANDUM

RECEIVED JUL 3 1985 ARKANSAS POWER & LIGHT CO. Engineering Services/I&C & Elect.

TO: Mr. J. Ted Enos

FROM: Richard Rothwell RR

PAGE 1 OF

SUBJECT: Arkansas Nuclear One - Unit 2
Containment Electrical Penetration Protection
Regulatory Guide 1.63

REF: Memorandum from Robert D. Morehead to Mr. John M. Griffin, dated 3/5/85.

The FSAR statements regarding the instrumentation circuitry compliance with Regulatory Guide 1.63 are basically correct, as far as they go. A compilation of all instrumentation circuitry penetrating containment reveals a number of power supplies and devices not included in the FSAR listing. From available information, each of the power supplies and devices not listed has transformer-type isolation and/or current-limiting means (usually fusing). Devices stating fuse ratings or current limits all have values well below the damage threshold of the penetration conductors for these circuits.

85E-00118-01
APPENDIX VII
ATTACHMENT E

Attachment A to this memo provides documentation of the instrumentation circuitry penetrating containment. Included are the individual instruments providing power to containment instrumentation, model numbers of these instruments, and brief descriptions of their current limiting capabilities. Attachment B is a proposed revision to the FSAR (page 8.3-46), which expands the types of power sources available to correspond with the findings in Attachment A. In summary, this documentation verifies our belief that the instrumentation power supplies are current limiting and cannot threaten the penetration assemblies.

RR:PD:lw

Attachments

cc: R. D. Morehead
T. G. Campbell
D. R. Sikes
W. M. Cawthon

85E-00118-01
APPENDIX III
ATTACHMENT E

ATTACHMENT A

IC-85-093

INSTRUMENT	SCHEME	DATA SHEET	MODEL NO.	NOTES
2PWR-1031-1	E-2725-1	903-024	1	
2PWR-1031-2	E-2725-2	903-024	1	
2PWR-1031-3	E-2725-3	903-024	1	
2PWR-1031-4	E-2725-4	903-024	1	
2PWR-1041-1	E-2724-1	903-024	1	
2PWR-1041-2	E-2724-2	903-024	1	
2PWR-1041-3	E-2724-3	903-024	1	
2PWR-1041-4	E-2724-4	903-024	1	
2PWR-1079	E-2751-21	M2516-53	1	
2PWR-1131-1	E-2725-1	903-024	1	
2PWR-1131-2	E-2725-2	903-024	1	
2PWR-1131-3	E-2725-3	903-024	1	
2PWR-1131-4	E-2725-4	903-024	1	
2PWR-1141-1	E-2724-1	903-024	1	
2PWR-1141-2	E-2724-2	903-024	1	
2PWR-1141-3	E-2724-3	903-024	1	
2PWR-1141-4	E-2724-4	903-024	1	
2PWR-1179	E-2751-21	M2516-53	1	
2PY-1141-2C	E-2724-2A	M2516-131	5	
2LY-1179A	E-2751-21	M2516-131	5	
2PWR-2200L	E-2751-11	M2516-54	1	
2PWR-2200P	E-2753-16	M2516-54	1	
2PWR-4601-1	E-2703-5	903-024	1	
2PWR-4601-2	E-2703-5	903-024	1	

85E-00118-01
APPENDIX VII
PAGE 4 OF 16
ATTACHMENT E

INSTRUMENT	SCHEME	DATA SHEET	MODEL NO.	NOTES
2PWR-4635-3	E-2701-7		1	See Instrument Inde
2PWR-4635-4	E-2701-8		1	See Instrument Inde
2PWR-4662	E-2754-11	M2516-52	1	
2PWR-4671-1	E-2705-2		20	DCP 84-2038; M-2580A-1, Rev. 3-2
2PWR-4710-1	E-2701-9	903-037	2	
2PWR-4710-2	E-2701-10	903-037	2	
2PWR-4710-3	E-2701-7	903-037	2	
2PWR-4710-4	E-2701-8	903-037	2	
2PWR-4711-1	E-2701-1	903-037	2	
2PWR-4711-2	E-2701-2	903-037	2	
2PWR-4711-3	E-2701-3	903-037	2	
2PWR-4711-4	E-2701-4	903-037	2	
2PWR-4712-3	E-2701-5	M2516-63	4	
2PWR-4712-4	E-2701-5A		4	DCP 82-2059, P.R. #58523
2PWR-4713-3	E-2701-5	M2516-63	4	
2PWR-4713-4	E-2701-5A		4	DCP 82-2059, P.R. #58523
2PWR-4715	E-2702-4	903-219	3	
2PWR-4735-1	E-2701-9		1	See Instrument Ind
2PWR-4735-2	E-2701-10		1	See Instrument Ind
2PWR-4735-3	E-2701-7		1	See Instrument Ind
2PWR-4735-4	E-2701-8		1	See Instrument Ind
2PWR-4820	E-2716	903-219	3	
2PWR-4870	E-2707-1	903-219	3	
2PWR-4924*	E-2732	903-219	3	
2PWR-4925*	E-2732	903-219	3	
2PWR-4926*	E-2719-3,-4 E-2720-3,-4	903-219	3	
2PWR-4927*	E-2719-3,-4 E-2720-3,-4	903-219	3	
2LY-4627-2A	E-2704-3	M2516-131	5	DCP 85-2012

INSTRUMENT	SCHEME	DATA SHEET	MODEL NO.	NOTES
2PWR-4601-3	E-2703-5	903-024	1	
2PWR-4601-4	E-2703-5	903-024	1	
2PWR-4610-1	E-2701-9	903-037	2	
2PWR-4610-2	E-2701-10	903-037	2	
2PWR-4610-3	E-2701-7	903-037	2	
2PWR-4610-4	E-2701-8	903-037	2	
2PWR-4611-1	E-2701-1	903-037	2	
2PWR-4611-2	E-2701-2	903-037	2	
2PWR-4611-3	E-2701-3	903-037	2	
2PWR-4611-4	E-2701-4	903-037	2	
2PWR-4612A-3	E-2701-5	M2516-63	4	
2PWR-4612A-4	E-2701-5A		4	DCP 82-2059, P.R. #58523
2PWR-4613-3	E-2701-5	M2516-63	4	
2PWR-4613-4	E-2701-5A		4	DCP 82-2059, P.R. #58523
2PWR-4615*	E-2702-2	903-219	3	
2PWR-4622	E-2707-2		2	Per M2201, Panel 2C32 List
2PWR-4623-1	E-2707-2	903-024	1	
2PWR-4623-2	E-2753-25	M2516-48	1	
2PWR-4624-1	E-2703-1	903-024	1	
2PWR-4624-2	E-2703-2	903-024	1	
2PWR-4624-3	E-2703-3	903-024	1	
2PWR-4624-4	E-2703-4	903-024	1	
2PWR-4625	E-2707-2	903-024	1	
2PWR-4626A	E-2704-2	903-024	1	No "A" listed, just 2PWR-4626
2PWR-4626B	E-2704-2	903-024	1	No "B" listed, just 2PWR-4626
2PWR-4627-1	E-2704-3	903-024	1	
2PWR-4635-1	E-2701-9		1	See Instrument Inc
2PWR-4635-2	E-2701-10		1	See Instrument Inc

ATTACHMENT 2
85E-00118-01
APPENDIX VII
PAGE 6 OF 7

INSTRUMENT	SCHEME	DATA SHEET	MODEL NO.	NOTES
2PY-4624-2C	E-2703-2	M2516-131	5	DCP 85-2012
2TI-4825	E-2712-1	M2530-46	7	
2TIS-4607	E-2706	M2538-44	9	
2TIS-4608	E-2706	M2538-44	9	
2TIS-4609	E-2706	M2538-44	9	
2TIS-4630	E-2706	M2538-45	8	
2TIS-4631	E-2706	M2538-45	8	
2TIS-4694	E-2707-1	M2538-45	8	
2TT-4614-1	E-2702-5		10	DCP 80-2155
2TT-4614-1A	E-2702-5		10	DCP 80-2155
2TT-4714-2	E-2702-6		10	DCP 80-2155
2TT-4714-2A	E-2702-6		10	DCP 80-2155
2VYI-4633-1	E-2726-2		18	DCP 79-2164
2VYI-4634-1	E-2726-2		18	DCP 79-2164
2PWR-5000	E-2719-1 E-2720-1	903-219	3	
2PWR-5020	E-2719-2 E-2720-2	903-219	3	
2PWR-5088	E-2753-7	M2516-52	1	
2PWR-5105	E-2753-26	M2516-53	1	
2PWR-5106	E-2753-26	M2516-53	1	
2PWR-5108	E-2719-4 E-2720-4	903-219	3	
2PWR-5109	E-2719-3 E-2720-3	903-219	3	

INSTRUMENT	SCHEME	DATA SHEET	MODEL NO.	NOTES
2PWR-5601-1	E-2753-22	M2516-57	1	
2PWR-5602-2	E-2753-22	M2516-57	1	
2PWR-5603-3	E-2753-29	M2516-57	1	
2PWR-5604-4	E-2753-29	M2516-57	1	
2PWR-5605-1	E-2753-31	M2516-91	19	
2PWR-5606-2	E-2753-31	M2516-91	19	
2PWR-5618*	E-2719-1,-2	903-219	3	
	E-2720-1,-2			
2PWR-5620	E-2720-1,-2	903-219	3	
2PWR-5661M } ?	E-2756-1	M2516-52	1	
2PWR-5661T }	E-2754-11	M2516-52	1	
2PWR-5662M	E-2756-1	M2516-52	1	
2PWR-5662T	E-2754-11	M2516-52	1	
2PWR-5663-1*	E-2756-14	M2516-47	1	
2PWR-5663M	E-2756-1	M2516-52	1	
2PWR-5664-2	E-2756-14	M2516-48	1	
2PWR-5664M	E-2756-1	M2516-52	1	
2PWR-5665M	E-2756-1	M2516-51	1	
2PWR-5691*	E-2751-8	M2516-52	1	
2PWR-5692*	E-2751-11	M2516-52	1	
2PWR-5694	E-2751-8	M2516-52	1	
2PWR-5695*	E-2751-11	M2516-52	1	
2LT-5641-2	E-2751-17	M2526-2	17	
2LT-5645-1	E-2751-2	M2526-2	17	
2LT-5646-2	E-2751-2	M2526-2	17	
2PWR-6002*	E-2709-1	903-219	3	
	E-2710			
2PWR-6008*	E-2337	M2516-98	2	
2PWR-6012	E-2709-2	903-219	3	
	E-2710			
2PWR-6018	E-2337	M2516-98	2	

ATTACHMENT E
85E-00118-01
APPENDIX VII
PAGE 8 OF 16

INSTRUMENT	SCHEME	DATA SHEET	MODEL NO.	NOTES
2PWR-6022	E-2709-3 E-2710	903-219	3	
2PWR-6028	E-2337	M2516-98	2	
2PWR-6032	E-2709-4 E-2710	903-219	3	
2PWR-6038	E-2337	M2516-98	2	
2SY-6120-1	E-2731		13	M2001-C9, RCP SSSS (Unit 2)
2SY-6120-2	E-2731		13	M2001-C9, RCP SSSS (Unit 2)
2SY-6120-3	E-2731		13	M2001-C9, RCP SSSS (Unit 2)
2SY-6120-4	E-2731		13	M2001-C9, RCP SSSS (Unit 2)
2SY-6121-A	E-2731		13	M2001-C9, RCP SSSS (Unit 2)
2SY-6121-B	E-2731		13	M2001-C9, RCP SSSS (Unit 2)
2TIS-6040	E-2708-1	M2538-45	8	
2TIS-6043	E-2708-1	M2538-15	8	
2TIS-6050	E-2708-2	M2538-45	8	
2TIS-6053	E-2708-2	M2538-45	8	
2TIS-6060	E-2708-3	M2538-45	8	
2TIS-6063	E-2708-3	M2538-45	8	
2TIS-6070	E-2708-4	M2538-45	8	
2TIS-6073	E-2708-4	M2538-44	8	
2TIS-6080	E-2708-1	M2538-44	8	
2TIS-6090	E-2708-2	M2538-44	8	
2TIS-6100	E-2708-3	M2538-44	8	
2TIS-6110	E-2708-4	M2538-44	8	

INSTRUMENT	SCHEME	DATA SHEET	MODEL NO.	NOTES
2TS-6085	E-2754-12	M2539-3	11	
2TS-6095	E-2754-12	M2539-3	11	
2TS-6105	E-2754-12	M2539-3	11	
2TS-6115	E-2754-12	M2539-3	11	
2UR-6004	E-2708-1		12	See Instrument Ind
2UR-6014	E-2708-2		12	See Instrument Ind
2UR-6024	E-2708-3		12	See Instrument Ind
2UR-6034	E-2708-4		12	See Instrument Ind
2RITS-8905	E-2433-1		15	2C25 Rad. Monitoring System Manual, ANO-2
2RITS-8909	E-2433-1		15	2C25 Rad. Monitoring System Manual, ANO-2
2RITS-8912	E-2433-1		15	2C25 Rad. Monitoring System Manual, ANO-2
2RITS-8923	E-2433-1		15	2C25 Rad. Monitoring System Manual, ANO-2
2RITS-8925-1	E-2433-5		14	11406-J-2401-7
2TITS-8925-2	E-2433-5		14	11406-J-2401-7
2JY-9000-1	E-2727-7		6	Gamma-Metrics Instruction Manual P.O. 67149-57-1, replaces Rev. 0

INSTRUMENT	SCHEME	DATA SHEET	MODEL NO.	NOTES
2JY-9003-2	E-2939-1		6	Gamma-Metrics Instruction Manual P.O. 67149-57-1, replaces Rev. 0
(Safety Channel)	E-2205-10		16	6600-2-M2001-K2
(Safety Channel)	E-2205-10		16	6600-2-M2001-K2
(Safety Channel)	E-2205-10		16	6600-2-M2001-K2
(Safety Channel)	E-2205-10		16	6600-2-M2001-K2
(Start-Up/ Control Channel)	E-2205-11		16	6600-2-M2001-K2
(Start-Up/ Control Channel)	E-2205-11		16	6600-2-M2001-K2
(Power Supply)	E-2728-1		2	See: 6600-M-2001-N1-10(1)-4,-2-7, -13-5
(Power Supply)	E-2728-1		2	"
(Power Supply)	E-2728-1		2	"
(Power Supply)	E-2728-3		2	"
(Power Supply)	E-2728-3		2	"
(Power Supply)	E-2728-3		2	"

MODEL NUMBER

1) Fischer & Porter #55GL1151A
2) Fischer & Porter #55GL1154A
3) Fischer & Porter #55GL1155
4) Lambda #LCS-A-24
5) Foxboro #N-2AI-I2V, #2AX-PS9 Single Nest Power Supply
6) Gamma-Metrics Amplifier Assy. #RCS-101
7) Sigma #9270 DIN-01-B-V-B
8) Sigma #9270 DIN-10-B-V-B
9) Sigma #9270 DIN-00-B-V-B
10) Rochester Instruments #SC-1372
11) Acromag #HI-3308-D-9
12) Texas Instruments # TiGraph 200
13) Bently Nevada Signal Processor Assy. #18740-01
14) General Atomic Signal Processor #RP-2C, #RP-23 Power Supply
15) Westinghouse Rad. Monitoring System Area Monitor #1103
16) General Atomic Power Supply # V-008, Buffer Amplifier #ELC 274-0000-1
17) GEMS #36562 Receiver Module
18) Unholtz - Dickie Signal Conditioning Amplifier #P22 MHA1-VM
19) Lambda #LXS-CC-28-R
20) Lambda #LCS-B

CIRCUIT PROTECTION

Model No.	Description
1*, 2*	Slow-Blow 1/32 amp fuse on transformer primary side of power supply. Transformer isolation of 120 VAC input from 4-20 ma DC output.
3*	Primary of transformer has 1 amp fuse (120 VAC); secondary side to terminal output has 1/2 amp fuse.
4*, 19*, 20*	"External overload protection; automatic electronic current limiting circuit limits the output current to a preset valve thereby providing protection for the load as well as the power supply."
5	Overload or short circuit current from either the +15VDC or -15VDC output is limited to a value between 1.55 and 1.70 amps.
6	"Amplifier is powered from 117 VAC and provides +15 volts and -15 volts for the circuitry and also provides detector excitation voltage. The ac power is filtered in the amplifier assembly and the ±15 volt power is filtered to prevent electrical noise from affecting internal circuitry. The high voltage detector excitation voltage is filtered to prevent electrical noise from reaching the preamplifier input circuitry." 3A, 120VAC fuse at input, per AP&L. See E-2995-1, Rev. 3-2.

7, 8, 9	One 20 amp circuit breaker provides 120 VAC to several Sigma instruments, but each of these instruments has transformer isolation between input voltage and output DC voltages.
10	Isolated RTD transmitter: full input isolation; "the filtered 24 vdc... drives a constant-current series regulator to generate 12 volt and 3.6 volt bias levels which are tightly regulated over ±20% power supply changes."
11	Information per Ruhl Diggerhoff (Acromag) 6/19/85: transformer isolation of input voltage from output voltage; RTD voltage <1 volt, RTD current <2 ma when in circuit; open circuit output voltage ~6 volts, not over 12 volts maximum.
12	Power input board converts 115VAC, 60 Hz input power to 320 VDC. Power input board provides isolated dc voltage to start switching mode power supply, provides protection against high current in power line. Output of 320 VDC power supply has fuse protection (1 amp) against shorts
13	"In the rectifier power supply..., the input is applied through two 1-ampere, slow blow (time-lag) fuses to a full-wave bridge rectifier whenever the input source is ungrounded. If the power source is grounded, the input is applied only through fuse F1." F1 is 1-amp.
14	Power supply has both input lines fused, provides overload and short-circuit protection. (Two 1 amp fuses on 117VAC input to isolation transformer.)
15	120 VAC power input is fused at 2 amps.

16	Constant current short-circuit protection to protect supply. One and two amp fuses are listed as spare parts for the unit. Buffer amplifier is fused.
17	115VAC, 60 Hz fused input (1 amp); transformer isolation of input and output (dc voltage).
18	"Separate, isolated power supplies are provided for each channel." Power: 105-125 VAC, 60 Hz, 5VA.

*Power Supply

ATTACHMENT B

IC-85-093

G - Instrumentation Circuits

1. All analog instrumentation circuits are supplied by Number 16 and Number 14 AWG conductors. These circuits are low energy, fed by power supplies with the following ratings:

24V DC	20 ma	Single Unit
28V DC	20 ma	Single Unit
45V DC	20 ma	Five Unit

Single unit power supplies are provided with a fuse of 1/16 amp or less in the input (120-volt ac input) or with an automatic electronic current limiting circuit at the output. Five-unit power supplies are provided with 1/2-amp fuse in the output and 1-amp fuse in the input (120-volt ac input).

2. Transformer-type isolation is provided on some of the devices connected to RTD's. These devices have 120-volt ac inputs with milliampere dc outputs, and include indicators, transmitters, and switches. Recorders connected to RTD's have fuse protection (1 amp) against shorts, as well as transformer-type isolation between input and output levels.

3. Transformer-type isolation is provided in the radiation monitoring indicators, as well as short circuit protection and fusing (1 amp) of transformer input (117 volts ac).

4. A rectifier power supply with the 117-volt ac input fused at 1 ampere powers the RCP speed indicators.

5. Isolated power supplies are provided by the signal conditioning amplifier to the RCS relief valve indicators.

6. Transformer-type isolation between the 120-volt ac input and the 4-20 ma dc output, with the input fused at 1 ampere, powers instrumentation circuitry from level transmitters.

7. Isolator-powered circuitry is protected by the current-limiting capabilities of the isolator's nest power supply, which limits the output to a value between 1.55 and 1.70 amperes.

8. External fusing (3 amp, 120-volt ac) is provided for the Neutron Flux isolators.

9. Ex-core detection power supplies have constant current short-circuit protection, with fusing of the buffer amplifiers.

10. Radiation monitoring detectors are provided with 2-amp fuses in their input (120-volt ac). The high voltage power supply is rated at 2500 volts, 1 ma, equipped with a short circuit protection device. The radiation monitoring circuits are wired with multi-conductor cable assemblies containing one coax and nine multi-stranded Number 22 AWG conductors.

The maximum short circuit currents available from the above instrumentation circuits are well below the damage threshold of the penetration conductors for these circuits.

CALC. 85-E-0118-01
APPENDIX VII
ATTACHMENT F
Page 1 of 8

Table 42
Typical Normal and Emergency Loading of Insulated Cables

Insulation	Cable Type	Normal Voltage	Normal Loading (°C)	Emergency Loading (°C)
Thermoplastic	T, TW	600 V	60	85
	THW	600 V	75	90
	THI	600 V	90	105
	Polyethylene	0–15 kV	75	95
		>15 kV	75	90
Thermosetting	R, RW, RU	600 V	60	85
	XHHW	600 V	75	90
	RHW, RH-RW	0–2 kV	75	95
	Cross-linked polyethylene	5–15 kV	90	130
	Ethylene-propylene	5–15 kV	90	130
Varnished polyester		15 kV	85	105
Varnished cambric		0–5 kV	85	102
		15 kV	77	85
Paper lead		15 kV	80	95
Silicone rubber		15 kV	125	150

Normal loading temperature of a cable determines its current-carrying capacity under given conditions. In regular service, rated loads or normal loading temperatures are reached only occasionally because cable sizes are generally selected conservatively in order to cover the uncertainties of load variations. Table 42 shows the maximum operating temperatures of various types of insulated cables.

8.5.2.2 Cable Current and Temperature. The temperature of a cable rises as the square of its current. The cable temperature for a given steady load may be expressed as a function of percent full load by the formula

$$T_X = T_a + (T_N - T_a)\,(I_X/I_N)^2$$

Figure 156 shows this relation for cables rated at normal loading temperatures of 60, 75, 85, and 90 °C.

8.5.2.3 Intermediate and Long Time Zones. Looking at the intermediate and long time ranges from 10 s out to infinity, the definition of temperature versus current versus time is related to the heat dissipation capability of the installation relative to its heat generation, plus the thermal inertias of all parts. The tolerable temperatures are related, as in the previous section, to the thermal degradation characteristics of the insulation. The thermal degradation severity is, however, related inversely to time, so a temperature safely reached during a fault, and maintained for only a few seconds, could cause severe life reduction if it

CALC. 85-E-0118-01
APPENDIX VII
ATTACHMENT F
Page 2 of 8

were maintained for even a few minutes. Lower temperatures, above the rated continuous operating temperature, can be tolerated for intermediate times.

The ability of a cable to dissipate heat is a factor of its surface area, while its ability to generate heat is a function of the conductor cross section, for a given current. Thus, the reduction of ampacity per unit cross-section area as the wire sizes increase tends to increase the permissive short-time current for these sizes relative to their ampacities. It may be seen later that the extension of the intermediate characteristic, on a constant I^2t basis, will protect the smallest wire sizes, and will over-protect the largest sizes, as shown in Fig 159. Constant I^2t protection is readily available, and is actually the most common, so a simplification of protection systems is possible.

The continuous current, or ampacity, ratings of cable have been long established and pose no problems for protection. The greatest unknown in the cable thermal characteristic occurs in the intermediate time zone, or the transition from short-time to long-time or continuous state.

8.5.2.4 Development of Intermediate Characteristics. Cable, with its own thermal inertia and that of its surroundings, will take from 1–6 h to change from initial to final temperature as the result of a current change. Consequently, overloads substantially greater than its continuous rating may be placed on a cable for this range of times.

Additionally, all cables except polyethylene (not cross-linked) will withstand, for moderate periods, temperatures substantially greater than their rated operating temperatures. This is a change recently developed from work done within ICEA and published by that organization. (See references in 8.9.) For example, EPR and XLP have emergency ratings of 130 °C, based on maximum time per overload of 36 h, three such periods per year maximum, and an average of one such period per year over the life of the cable. Thermoplastic types degrade in this marginal range by progressive evaporation of the plasticizer, and can operate for several hours at the next higher grade operating temperature 90 °C for 75 °C rating, and so forth) with negligible loss of life. So emergency operating overloads may reasonably be applied to cables within the time and temperature ratings. This should be the basis of application of protection of the cables.

The complete relationship for determination of intermediate overload rating is as follows:

percent overload capability

$$\frac{I_E}{I_N}\,\% = \sqrt{\frac{\dfrac{T_E - T_O}{T_N - T_O} - \left(\dfrac{I_O}{I_N}\right)^2 \cdot e^{-zK}}{1 - e^{-zK}}} \cdot \frac{230 + T_N}{230 + T_E} \cdot 100$$

where

I_E = emergency operating current rating
I_N = normal current rating
I_O = operating current prior to emergency
T_E = conductor emergency operating temperature
T_N = conductor normal operating temperature

T_O = ambient temperature
t = time after start of emergency loading in hours
K = a constant, dependent on cable size and installation type (Table 43)
230 = zero resistance temperature value (234 for copper, 228 for aluminum)
e = 2.7183 (base for natural logarithms)

If the cable has been operated at its rated current prior to the excursion, then $I_O/I_N = 1$ and its square = 1, so the relation is simplified to:

$$\frac{I_E}{I_N}\% = \sqrt{\frac{\frac{T_E - T_O}{T_N - T_O} - e^{-tK}}{1 - e^{-tK}} \cdot \frac{230 + T_N}{230 + T_E}} \cdot 100$$

This is the basic equation used in this chapter as representing the maximum safe capability of the cable.

While many medium voltage cables *are* operated at substantially less than full rated capacity, most low-voltage cables *are* operated near their rated ampacity. Even for medium-voltage cable, there are times when full loading is impressed. Regardless of preloading, protection should be coordinated with cable characteristics, not loading. Therefore, data presented here is based on 100% preloading, by the preceding equation. Factors are developed for approximating the characteristic for lower preloadings. For such preloadings, data presented here will be even more conservative.

Intermediate zone characteristics of medium voltage cables and 75 and 90 °C thermoplastic cables are tabulated in Table 44 with the characteristics of medium voltage cable illustrated graphically in Fig 159. These all apply to preloading at rated ampacity at 40 °C ambient temperature. For lower ambient temperatures and when cable ampacities have been increased to take this into account, it will be necessary to *reduce* the intermediate overload current percent by the following factors for each decrease in ambient temperature below 40 °C:

EPR-XLP	0.004
THH	0.002
THW	0.0037

For preloading less than 100% of rating, emergency overload percentages can be increased by the following factors:

	Preloading		
	75%	80%	90%
All insulation types	1.33	1.25	1.11

NOTE: This may safely be done only for permanent preloadings of these percentages.

CALC. 85-E-0118-01
APPENDIX VII
ATTACHMENT F
Page 4 of 8

Table 43
K Factors for Eqs in 8.5.2.4

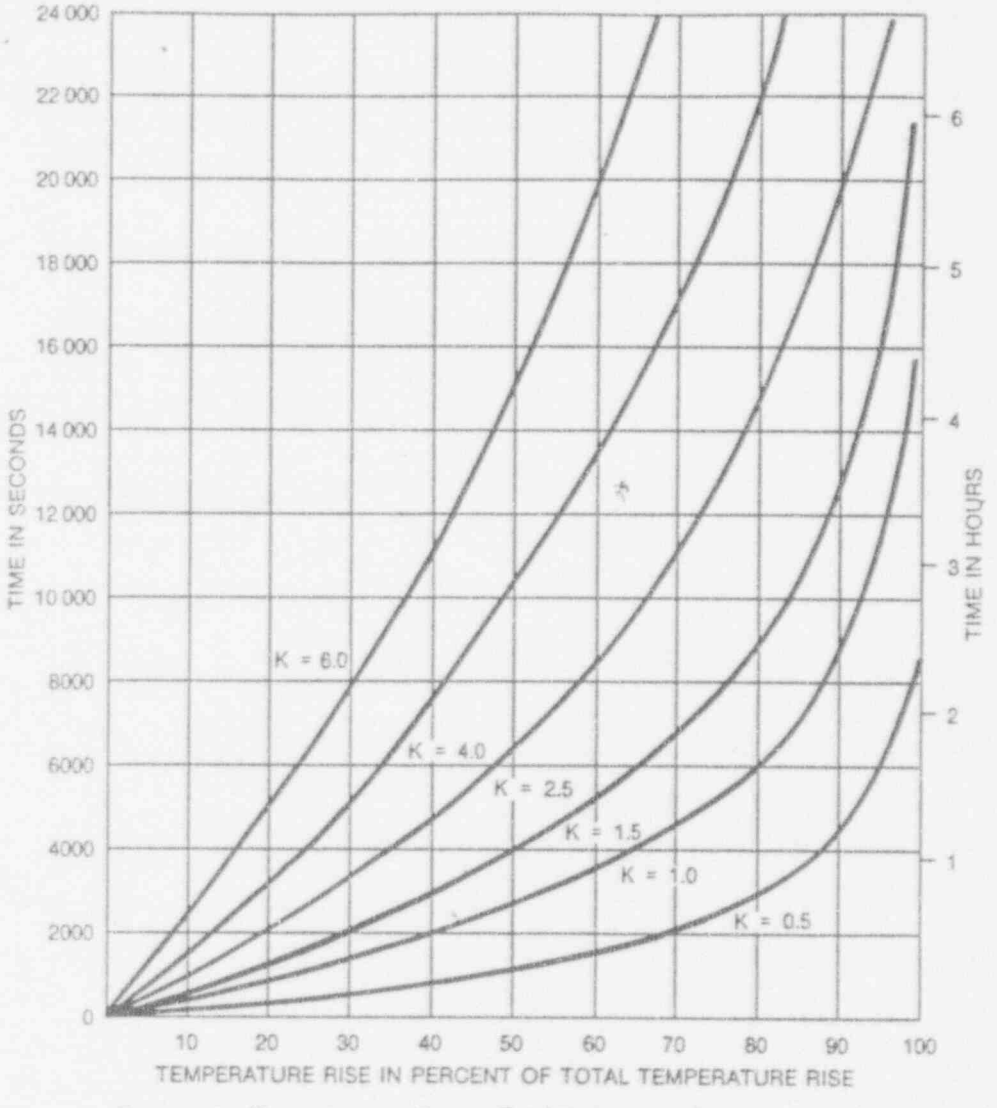
Cable Size	Air		UG Duct	Direct Buried
	No Cond	In Cond		
<#2	0.33	0.67	1.00	1.25
#2–#4/0	1.00	1.50	2.50	3.00
≥250 MCM	1.50	2.50	4.00	6.00

Table 44
Emergency Overload Current
I_E—Percent of Continuous Rating
at 40 °C Ambient

Time		Values of K					
s	h	0.5	1	1.5	2.5	4	6
		EPR–XLP	T_N = 90 °C		T_E = 130 °C		
10	0.00278	1136	1602	1963	2533	3200	3916
100	0.0278	374	518	629	807	1018	1244
1000	0.278	160	195	226	277	339	407
10 000	2.78	126	128	132	140	152	168
18 000	5.0	126	127	128	131	137	147
		THH	T_N = 90 °C		T_E = 105 °C		
10	0.00278	725	1020	1248	1610	2033	2487
100	0.0278	250	338	407	518	651	794
1000	0.278	127	146	163	192	229	270
10 000	2.78	111	112	114	118	124	131
18 000	5.0	111	111	112	113	116	121
		THW	T_N = 75 °C		T_E = 95 °C		
10	0.00278	987	1390	1703	2197	2775	3396
100	0.0278	329	452	548	702	884	1080
1000	0.278	148	177	202	245	298	357
10 000	2.78	121	123	125	132	142	154
18 000	5.0	121	121	122	125	130	137

8.5.2.5 Direct Buried Cables. With direct buried cables, the conductor operating temperature needs to be kept at no more than 65 °C to keep the outside surface temperature below 60 °C, unless there is an ample supply of moisture in the soil. For higher surface temperature, moisture in the normal soil migrates

CALC. 85-E-0118-01
APPENDIX VII
ATTACHMENT F
Page 5 of 8



Temperature Rise — Percent Total Temperature Rise
Temperature at any Time — Initial Temperature and Temperature Rise
Final Temperature — Initial Temperature and Total Temperature Rise

K = 0.5	Small Cable in Air
K = 1.0	Medium Size Cable in Air Small Cable Underground
K = 1.5	Large Cable in Air Small Cable Direct Burial
K = 2.5	Medium Cable Underground Medium Cable Direct Burial
K = 4.5	Large Cable Underground
K = 6.0	Large Cable Direct Burial

(See Table 43)

Fig 158
Rate of Temperature Rise Due to Current Increase

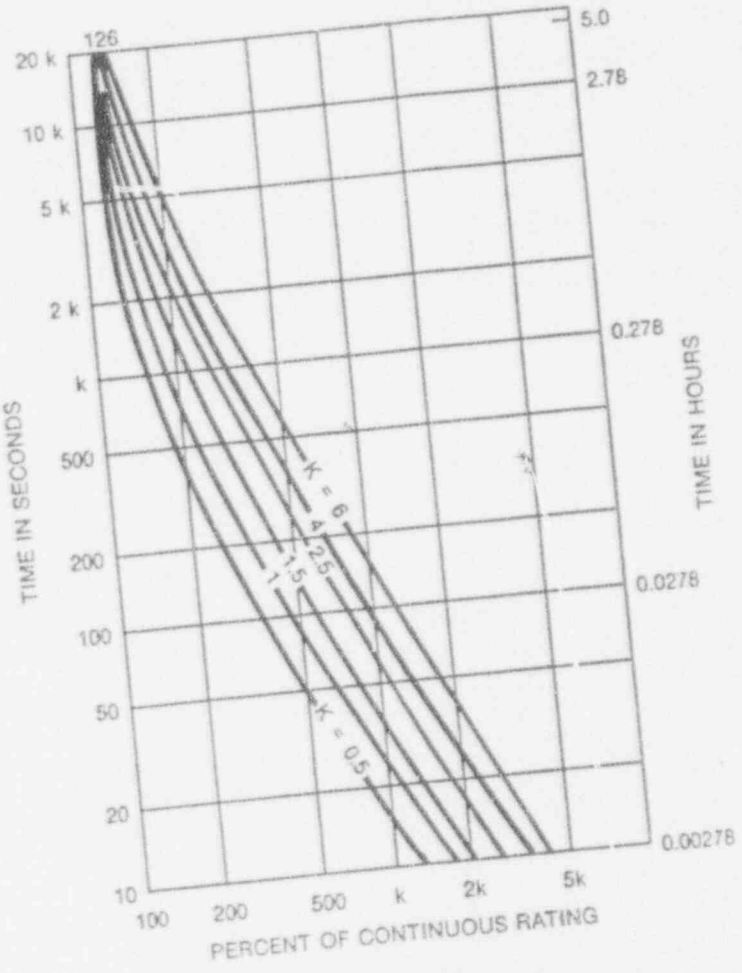


Fig 159
(a) Emergency Overload Current Percent of
Continuous Rating EPR — XLP Insulated 40 °C Ambient

away from the cable, raising the soil thermal resistivity and resulting in overtemperature of the cables. So for purposes of intermediate time emergency overload, a maximum conductor temperature of 80 °C has been selected as suitable to preserve this thermal resistivity condition for the times involved. Consequently, the tables and curves shown for air and duct use will not be applicable. Table 45 lists values applicable for direct buried installations. The short-time ratings for 250 °C are still applicable for this service since the times involved will not cause moisture migration.

8.5.2.6 **Additional Observations.** The absolute values of the short-time temperature and the emergency operating loading temperature are not precise.

CALC. 85-E-0118-01
APPENDIX VII
ATTACHMENT F
Page 7 of 8

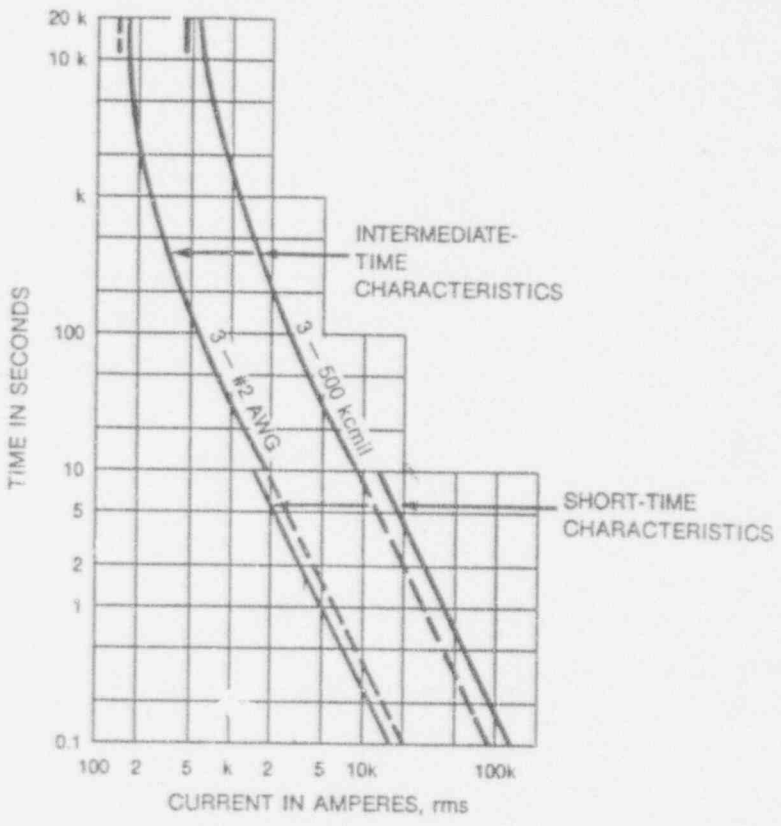


Fig 159 *(Continued)*
(b) Ratings of Small and Large Cable in Conduit in Air Intermediate and Short Time EPR and XLP

They are values selected and proven to apply to the respective cable types without undue deterioration. For example, tests by Georgia Power Company of fault conditions imposed on medium voltage cable showed no appreciable degradation even where the nominal short-time temperature was exceeded by about 50 °C. Likewise, the 130 °C emergency operating temperature has an applicable time value of 36 h for no undue deterioration. It is only logical to deduce that this insulation can tolerate a somewhat higher temperature, say 150–175 °C, for a shorter time than 36 h. This condition is undoubtedly true, but its inclusion in calculations would complicate them unduly.

There is a compensating factor in the intermediate time range. An overcurrent of from 10–100 s range, for example, would not have sufficient time to cause heat to be dissipated by earth that was in contact with the cable. Times of over 100 s, and certainly 1000 s, would see this region of the heat dissipation chain contributing to the action. So, it is somewhat illogical to attribute the surrounding media's heat dissipation characteristics in the shorter portion of the interme-

CALC. 85-E-0118-01
APPENDIX VII
ATTACHMENT F
Page 8 of 8

Table 45
Emergency Overload Current
I_E—Percent of Continuous Rating
at 20 °C Ambient
Direct Buried, T_N = 65 °C, T_E = 80 °C

Time		Values of K		
s	h	1.5	3	6
10	0.00278	1313	1853	2616
100	0.0278	427	594	834
1000	0.278	168	213	282
10 000	2.78	115	121	134
18 000	5.0	113	116	123

diate time zone. Yet, a rigorous mathematical consideration would again substantially complicate the analysis.

So there is a tradeoff; the ability of insulation to withstand higher than nominal operating temperatures for shorter periods is considered adequate compensation for the lack of contribution of the surrounding media in absorbing heat during the shorter portion of the intermediate zone. Without this convention, it would be necessary to establish both varying allowable temperatures and K-factors over the whole range of the intermediate zone, an undue burden when it is apparent that the present method yields satisfactory results.

Even the 36 h nominal limit for 130 °C operation for MV cable does not mean that lower operating temperatures cannot be tolerated for longer periods. For example, 120 °C might be tolerated for 75 h, 110° for 150 h, and 100° for 500 h, just to illustrate the nature of the situation. Setting a continuous protective device to trip at precisely the 90 °C ampacity is almost certain to result in nuisance tripping on power surges, and so forth. So the setting of the device will, in all likelihood, be at something like 110% of rated cable ampacity, or an operating temperature of 100 °C. It will be left to visual or similar monitoring to keep the continuous loading of a cable from exceeding its rated ampacity for long periods of time.

8.5.3 Overload Protective Devices

8.5.3.1 Time–Current Characteristics. The time–current overload characteristics (Fig 159) of the cables differ from the short-circuit current characteristic (Figs 150 and 151). The overloads can be sustained for a much longer time than the short-circuit current, but the principle of protection is the same. A protective device will provide maximum protection if its time–current characteristic closely matches that of the cable overload characteristic. Thermal overcurrent relays generally offer better protection than do induction overcurrent relays because thermal relays operate on a long-time basis and their response time is proportional to the temperature of the cable or the square of its current.

8.5.3.2 Overcurrent Relays. Very inverse or extreme inverse relays of the