

SARGENT & LUNDY

ENGINEERS
CHICAGO

Calcs. For EUC (1A1 or 1B1) PT

PRIMARY & SECONDARY FUSES

X Safety-Related

Non-Safety-Related

Calc. No. 19BD-12

Rev. 0 Date 11-19-84

Page 1 of 8

Client JIL POWER COMPANY

Project CLINTON

Proj. No. 4536-00 Equip. No. VARIOUS

Prepared by AK Hottel

Date 11-31-84

Reviewed by J.D. [Signature]

Date 11-7-84

Approved by Mark V. [Signature]

Date 11-19-84

RESPONSIBLE DIVISION: EPED

FILE NO.: 19BD

Method of Review:- Detailed review performed 11-7-84

PURPOSE :- The purpose of this calculation is to illustrate graphically that, in the event of a fault in the synchroscope the PT secondary (120V) branch fuse (6A) for the synchroscope circuit will clear the fault current first, before the HI-side (4.16KV) fuse is affected.

ASSUMPTIONS:-

FOR REFERENCE ONLY

1. The ²³ PT impedance data (not being available see ²³ letter dated 10-25-84 file SA-K-2968) is very similar to the Micran industries data (see telephone conversation memo dated 11-01-89 file SA-K-2968)
2. Failure of the synchroscope results in fault current @ synchroscope terminals
3. The internal wiring in the 4.16 KV SWGR (#12) is not included as part of circuit resistance which is a worst case assumption

REFERENCES ①. SAL S/D E02-1AP09, SAT.002 Rev. F
E02-1AP12 Sat 11, 12, 19 Rev. T, N, K
↓
13, 14, 20 Rev. P, L, K

- ② B/M DWGS. ENC05-413 item #82, ENC05-6A item X71 spec. K-2968
- ③ ²³ TIME-CURRENT curve for CLE-PTOSE FUSE (4.16KV) COPIES ATTACHED
Bussman Time-current curve for 6A fuse (120V) FOR REF
- ④ SAL Standard ESA 102

UNCONTROLLED COPY

Form GO-308.1 Rev. 2

SARGENT & LUNDY**ENGINEERS
CHICAGO**Calc. For Bus (1A1 or 1B1) PT Primary &
Secondary Fuses☒ Safety-Related☐ Non-Safety-Related

Calc. No. 19BD-12

Rev. C Date 11-19-85

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Client ILL. POWER

Project Clinton

Proj. No. 4536-00 Equip. No. Various

Prepared by A.K. Katerji

Date 10.31.85

Reviewed by

Date

Approved by

Date

References continued from Page 1

⑤ S&L wiring diagrams for wiring & cable #

E03 - 1AP09EC SAT. 2 Rev. J

↓ - 09EA SAT. 2 L

↓ 09EH SAT. 1 L

↓ 09EB SAT. - G

E03 - 1PB77-15C SAT 1B2 Rev. C & D

E03 - 1PT32F SAT 1 Rev. G

E03 - 1PCT1-15B SAT. 1 Rev. B

E03 - 1PB77-14D SAT. 1, Rev. B SAT. 2 Rev. C

E03 - 1PB77-14C SAT. 1 Rev. D

E03 - 1PT30E SAT. 1 Rev. E

E03 - 1AP07EK SAT 2 L

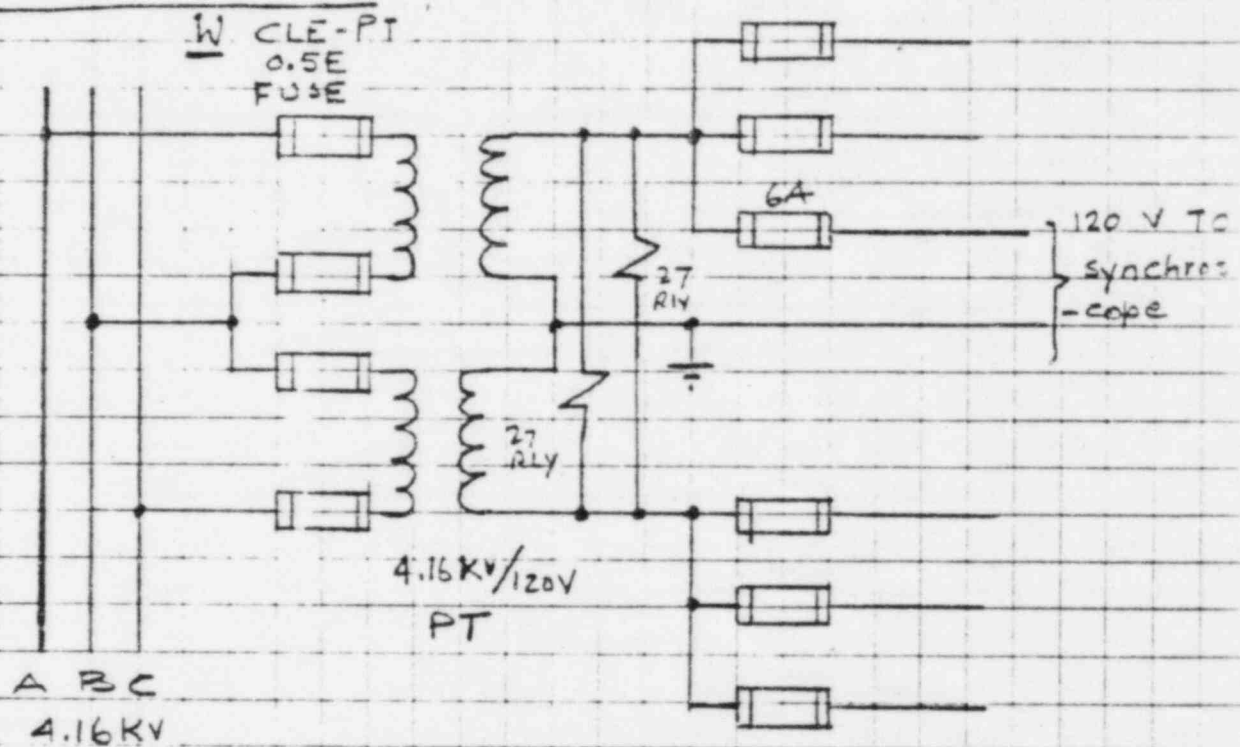
↓ EH ↓ 2 J

↓ EC ↓ 1 K

⑥ Clinton CIS4 report dated Oct 19, 1984
for cable pulled length.⑦ GE PGCC Wire List DWG 287A5650 Rev. 7
& 287A5663 Rev. 8 (4.10.84)

Client ILL. POWER Company
 Project CLINTON
 Proj. No. 4536-00 Equip No. Various

Prepared by A. K. Honeji Date 10-31-8
 Reviewed by C Date
 Approved by Date

CIRCUIT-DATA :

Typical PT CONNECTIONS for
BUS 1A1 & 1B1

- The synchroscope is classified as non-IE. Both the PT and the fuses are classified as IE.

Client

Prepared by

Date

Project

Reviewed by

Date

Proj. No. 4536-00 Equip. No.

Approved by

Date

- ② The cables from the PT secondary @ the 4.16 KV SWGR buses 1A1 & 1B1 are classified as associated and are routed with IE cables all the way up to the instrument (synchroscope) in the main control room.

The ca#s are 1AP20E, H 22E, 1DG11H
(for Bus 1A1) (C1A)
1AP23D, J 21H, 1DG31H
(for Bus 1B1) (C2A)

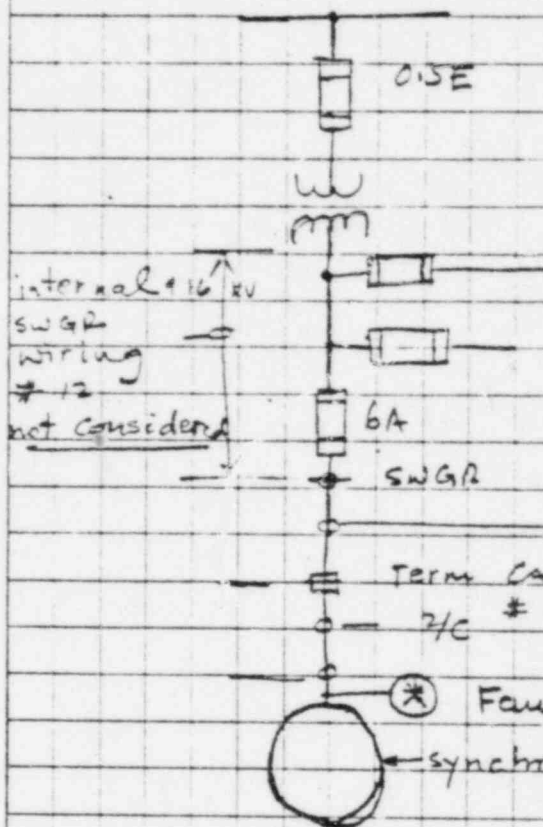
③ DATA

CABLE #	AWG/Conductor	Segregation Code	Length (FT)
1AP20E	#19/22	C1A	215
1AP20H	↓	↓	215
1AP22E	↓	↓	211
1DG11H	↓	↓	197
LH1-1-AP17-1-009	#16	DIVIA	21
1AP23D	19/22	C2A	357
1AP23J	↓	↓	320
1AP21H	↓	↓	310
1DG31H	↓	↓	338
LH1-1-AP12-1-010	#16	DIV2A	76
" " " " 011			76

Client ILL. POWER CO
Project Clinton
Proj. No. 4536-00 Equip. No. Various

Prepared by J.K. Kottig Date 11/31/84
Reviewed by _____ Date _____
Approved by _____ Date _____

④ PT information



PT impedance reflected
on Primary Voltage - 5.5
PT impedance reflected
on Secondary Voltage - 45
See tele. con. memo date
11/01/84 with Micron Ind.

2/c #19/22 fld cable 197 ft.
Term. C.A.S.
2/c #16 GE internal wiring 21 ft

* Fault @ synchroscope terminals

per ESA-102 Resistance of
19/22, 1/c per 100 ft = .1132
#16, 1/c, 100 ft = .1132
= .533

CALCULATION :-

Resistance 19/22 - 2/c - 197 ft = .1132 x 2 x 1.97 = .446
" #16 - 2/c - 21 ft = .533 x 2 x .21 = .223
Resistance of PT Cir. = .45

I fault @ synchroscope
reflected 4.16 base
$$\frac{120}{1.12} = 107.14$$

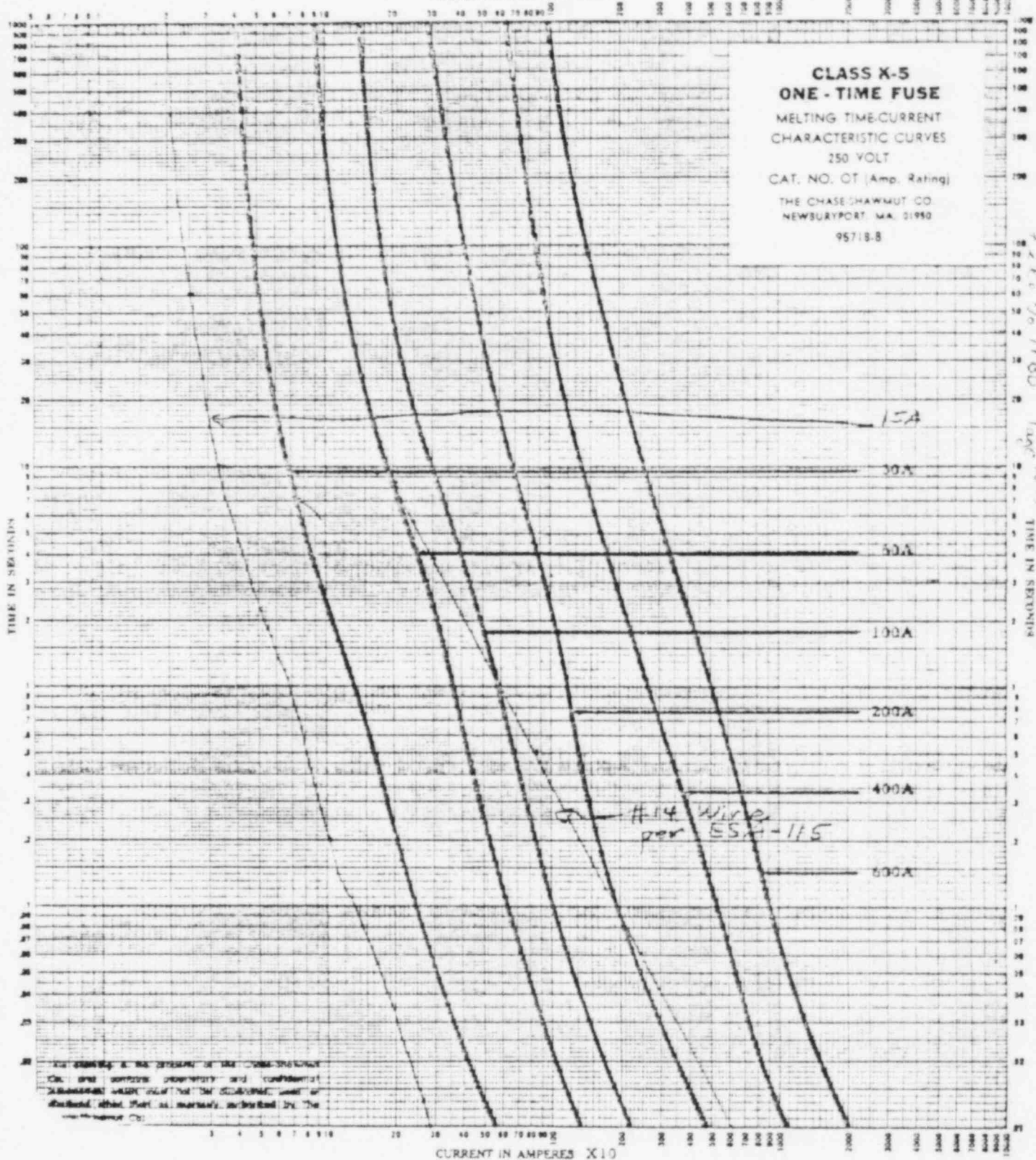
$$\frac{107.14}{34} = 3.15$$

Conclusions :-

By comparing the curves (attached) the 6A (120) fuses will clear the fault @ synchroscope terminals before the Hi-side fuse is affected.

CURRENT IN AMPERES X10

**CLASS X-5
ONE-TIME FUSE**
MELTING TIME-CURRENT
CHARACTERISTIC CURVES
250 VOLT
CAT. NO. OT (Amp. Rating)
THE CHASE CHAMMUT CO.
NEWBURYPORT, MA. 01950
95718-8



Calc. for Bus (LAL or LBI) PT Primary & Secondary Fuses

Illinois Power Company
Clinton Power Station - Unit 1

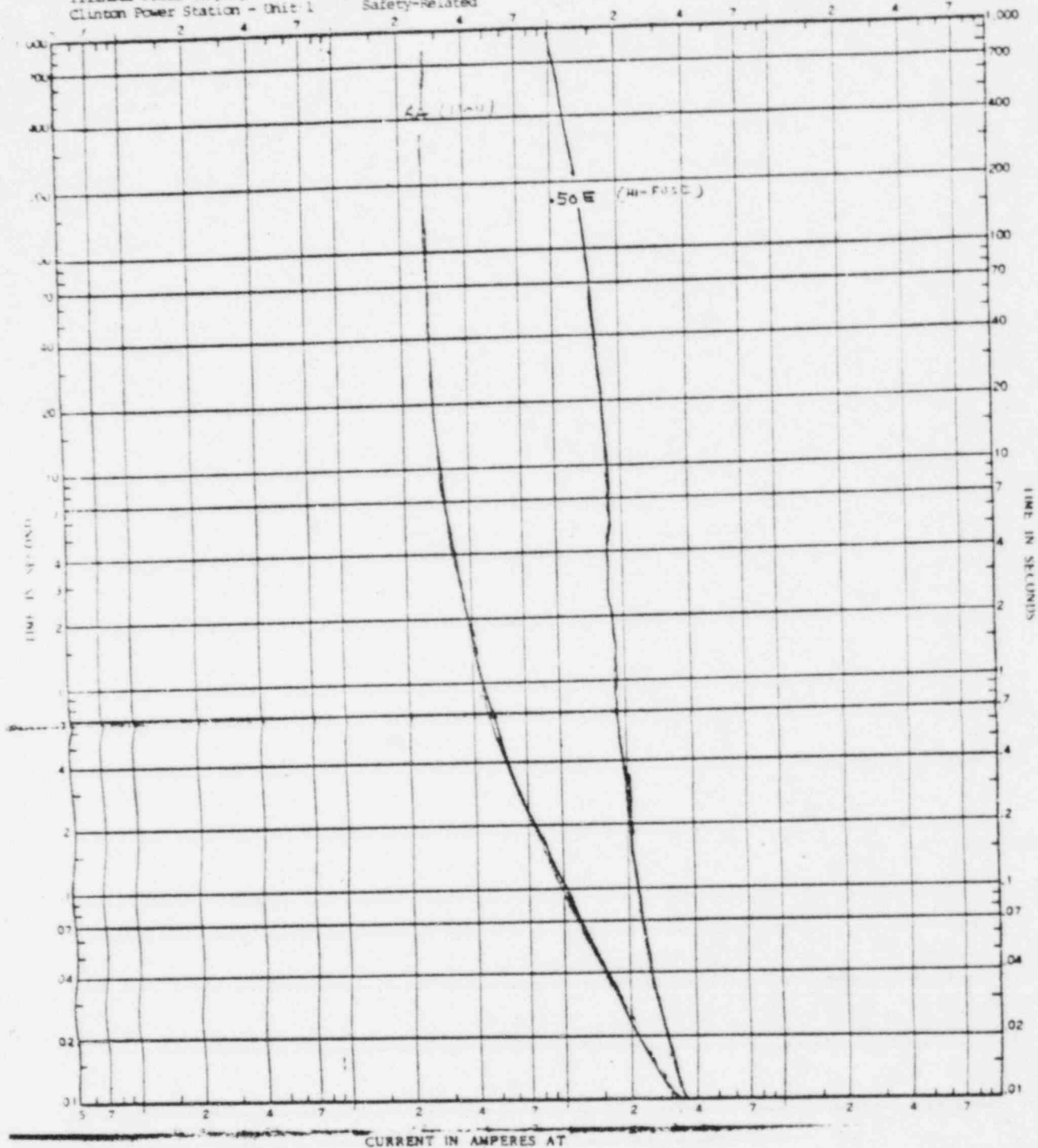
Safety-Related

Calc # 14-BD-12

Proj # 4536-00, Jan 11-19-84

Rev 0

PG 6 OF 8



for comparison
Low voltage fuse
Current x factor
to 4.16 KV base

PT $\frac{4.16}{120}$
CLG-PT fuse per ENGOS - 4B item #12 Spec K 2468

Busbar
6A KWH: - 1A ENGOS - 6A item #11 Spec K 2468

SARGENT & LUNDY
ENGINEERS

6-15-70

ESB-198

Form # 151 Busbar is 6A fuse 2 poles.

Curve # G for CLG-PT fuse on 1A side, mounted
of PT

1c. For Bus (LAL or LBL) PT Primary & Secondary Fuses

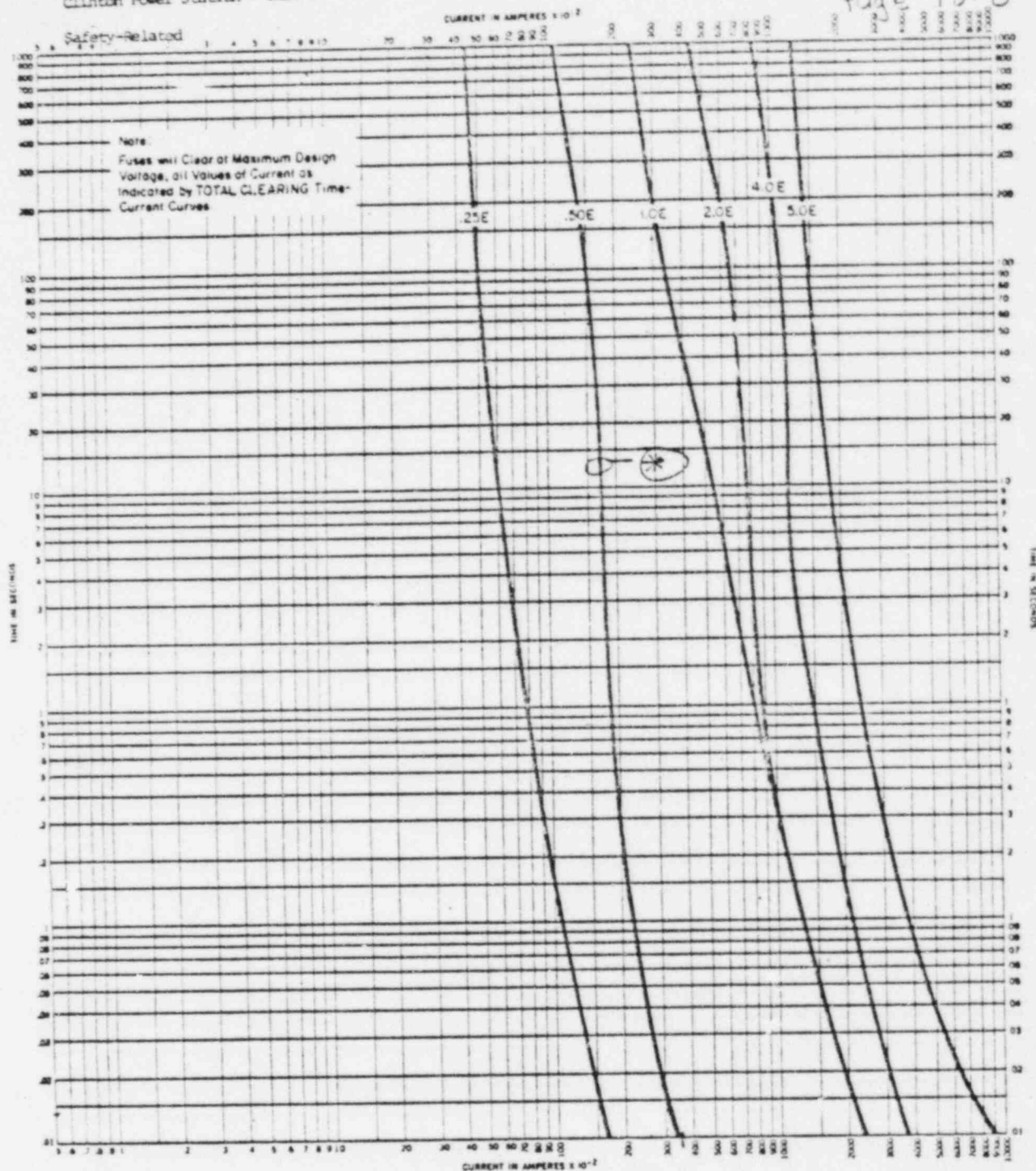
Illinois Power Company
Clinton Power Station - Unit 1

14-ED-12

Proj No 536-00

Rev. 0 Date: 8-19-84

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Type CLE-PT (Non-Indicating) Current Limiting Power Fuses

Total clearing time-current characteristics, 2.0 Kv to 5.5 Kv

Curves are based on tests starting with fuse units at an ambient temperature of 25°C and without voltage load. Curves are plotted to maximum test points so variations should be negative.

Westinghouse Electric Corporation
Switchgear Division, Component Sales, East Pittsburgh, PA 15112
Printed in USA

Curve No.

8

See information

Reference No. 180827

March, 1977

⊛ used in illustration

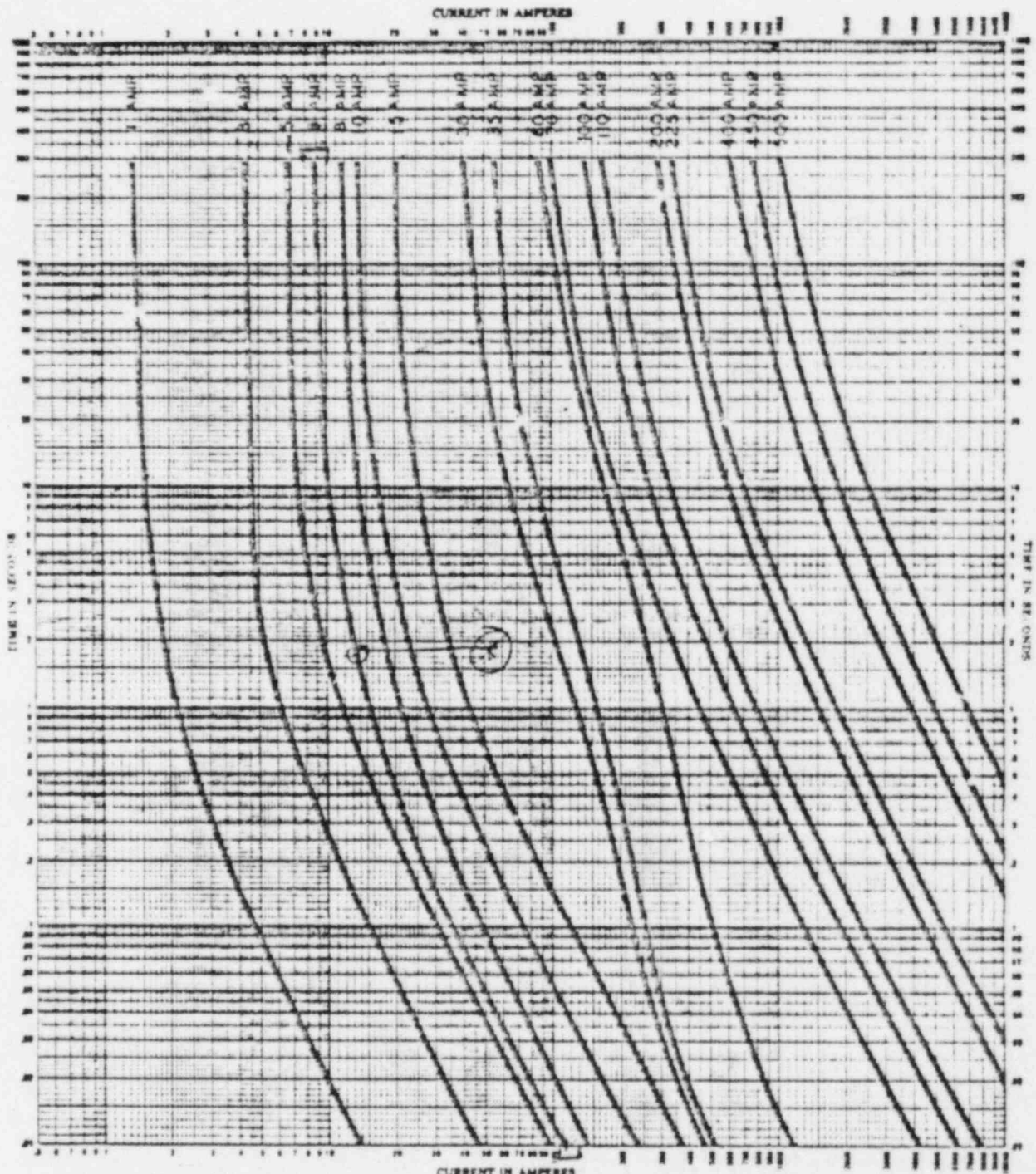
Calc. For Bus (LAL or LBL) PT Primary & Secondary Fuses

Illinois Power Company
Clinton Power Station - Unit 1

Safety-Related

19-D-12
Proj No 4536-00
Rev C Date: 11-19-84
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(*) used in illustration



Total Clearing Time-Current Characteristic Curves

For

NON ONE-TIME Fuses (250V)

1-60 A 250 V AC

1-60 A 250 V AC
50,000 A short circuit capability

Bussmann

No. 1-21
Date 4-21-81