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AUTH. NAME AUTHOR AFFILIATION
 TUCKER, H.B. Duke Power Co.
 RECIPIENT NAME RECIPIENT AFFILIATION
 Document Control Branch (Document Control Desk)

SUBJECT: Advises that motors will start & accelerate to rated speed at predicted worst case voltage conditions.

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Duke Power Company
P.O. Box 33198
Charlotte, N.C. 28242

HAL B. Tucker
Vice President
Nuclear Production
(704)373-4531



DUKE POWER

March 21, 1990

U. S. Nuclear Regulatory Commission
Document Control Desk
Washington, DC 20555

Subject: Oconee Nuclear Station
Docket Nos. 50-269, -270, -287
RBS and HPI Overcurrent Relays
TAC Nos. 73399/73400/73401

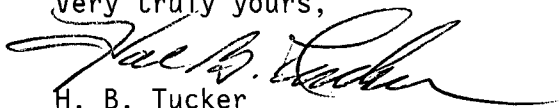
Gentlemen:

By a letter dated February 21, 1990, I had provided additional information concerning the High Pressure Injection Pump and Reactor Building Spray Pump motor overcurrent relay settings. My February 21, 1990 letter had attached a February 6, 1990 Westinghouse letter but did not include the curves that were provided by the Westinghouse letter. Accordingly, please find attached the Westinghouse letter with the curves.

Further, the information provided by my February 21, 1990 letter stated that the analysis of the data was "...from an actual test performed by Westinghouse on a HPI pump motor in 1974." The 1974 test performed was of an actual motor that was installed at Oconee.

Based on the above information and that provided by my February 21, 1990, it is concluded that these motors will start and accelerate to rated speed at the predicted worst case voltage conditions with no adverse effect upon the motors performance and/or life.

Very truly yours,


H. B. Tucker

PFG102/td

cc: Mr. S. D. Ebnetter
Regional Administrator
U. S. Nuclear Regulatory
Commission - Region II
101 Marietta St. NW
Suite 2900
Atlanta, GA 30323

Mr. L. A. Wiens
Office of Nuclear Reactor Regulation
U. S. Nuclear Regulatory Commission
Washington, DC 20555
Mr. P. H. Skinner
NRC Resident Inspector
Oconee Nuclear Station

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Westinghouse
Electric Corporation

Energy Systems

February 6, 1990

Duke Power Co.
422 South Church Street
Charlotte, NC 28242

Attn: B. L. Peele

Subject: Duke P.O. T52431-76, W G.O. CH16957
DE File: 83440314.00-00-1006-01 Oconee Station

Please find attached the motor curves requested by the subject purchase order. We have also included curves for 90 and 80 percent along with a thermal limit curve.

The 65% curve illustrates that the motor will not lock up at this value.

Please contact me if I can be of any further assistance.

Regards,

Les Bollinger
Domestic Customer Programs

Art Anderson
Mechanical Equipment

crb

cc: Mary Richardson W Charlotte

WESTINGHOUSE ELECTRIC CORPORATION
HEAVY INDUSTRIAL MOTOR PARTS SUPPORT CENTER
ROUND ROCK, TEXAS

HIMPSC ENGINEERING REPORT
ER 90-004

DATE: February 5, 1990

SUBJECT: Study to develop Speed-Torque and Thermal Limit
curves for motor S.O. 68F20801.

DISTRIBUTION: Westinghouse Electric Corporation
Energy Center
Attn: A.A. Anderson ECW-342
Northern Pike Road
Monroeville, Pa. 15146

ABSTRACT: Speed vs. Torque, Current, and Time as well as
Thermal Limit curves were developed for this unit
over the range of 65% to 100% voltage.

ATTACHMENTS: Speed-Torque curves DMC020590C-1 through C-14
Thermal Limit curve DMC020590C-15.

Duane McEachron

Duane McEachron
Manager, Engineering
Heavy Industrial Motor Parts Support Center
Round Rock, Tx

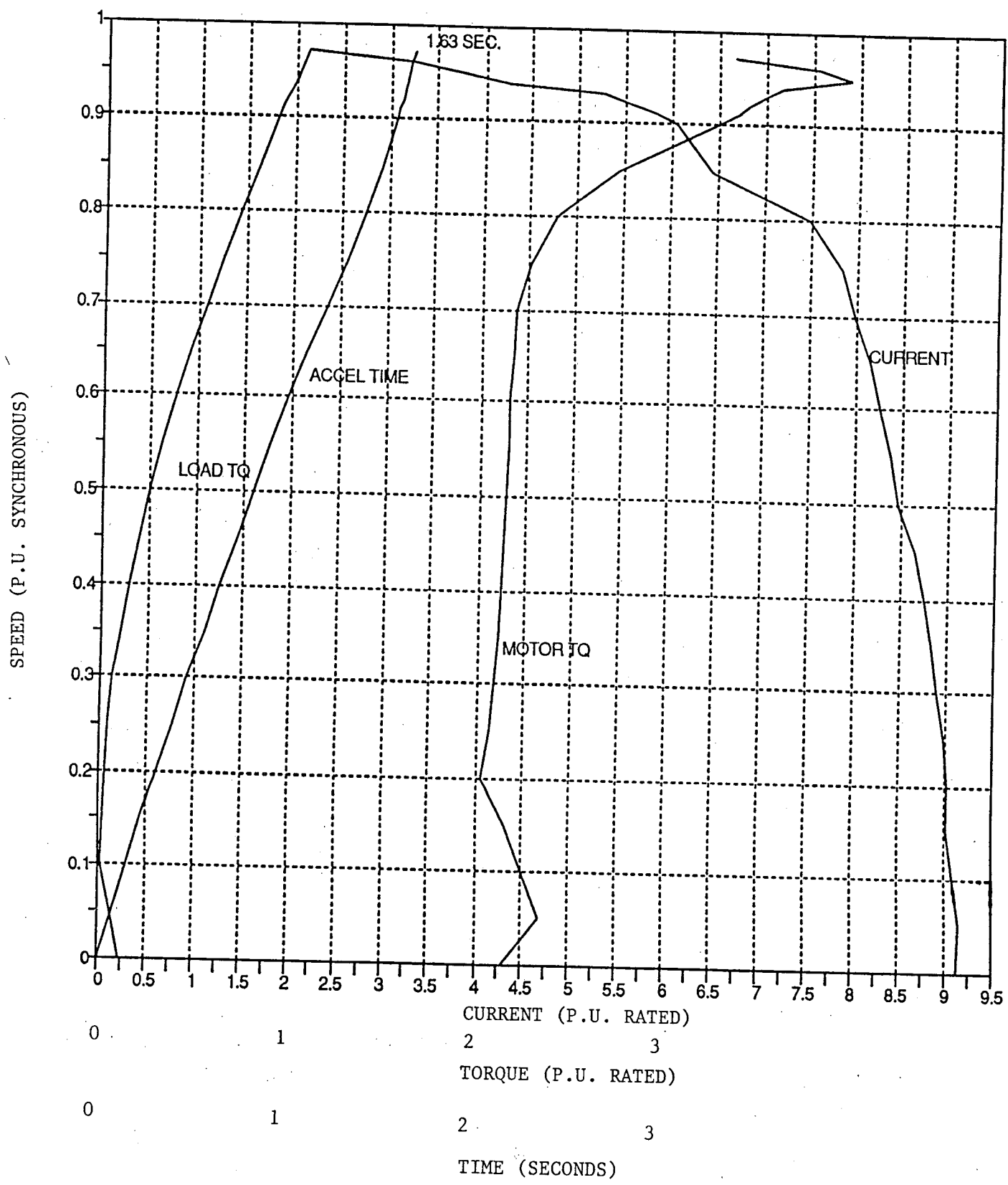
DISCUSSION:

Performance calculations were made on motor S.O. 68F20801 using Westinghouse Proprietary design program ME7337 to develop data for Speed-Torque and Thermal Limit curves for voltages down to the minimum voltage at which the motor would start. Calculations were based on the original design using a load inertia of 32 lb-ft² and the 600 psig reactor pressure valve open curve from Babcock and Wilcox load torque curve HH 42868 dated April 23, 1968. These calculations indicated that the motor would not start the load at voltage below 84% of rated voltage.

Further investigation showed that this design had been tested for torque and current at Buffalo on S.O. 74L10298 in June of 1974. The test data indicated considerable different performance than calculated data. The test data was assumed to be more accurate and was used to generate the attached curves. The test data was taken only at 80% voltage so multipliers were developed from the design program calculations for all other voltages.

**INDUCTION MOTOR STARTING CHARACTERISTICS
(CALCULATED) AT 100% LINE VOLTAGE**

CUSTOMER DUKE POWER APPLICATION INJECTION PUMP DRIVE ENGR D. MCEACHRON
 S.O. 68F20801/74L10298 LOAD CURVE HH42868
 HP 600 VOLTS 4000 PH 3 HZ 60 POLES 2 RPM(FL) 3587
 PF 0.091 FL AMPS 75.2 LOCKED AMPS(%) 912 RPM(SYN) 3600
 FL TORQUE (LB-FT) 878 LOCKED TORQUE (%) 215
 LOAD INERTIA (LB-FT-SQ) 32 MOTOR INERTIA (LB-FT-SQ) 216 FRAME 686.5

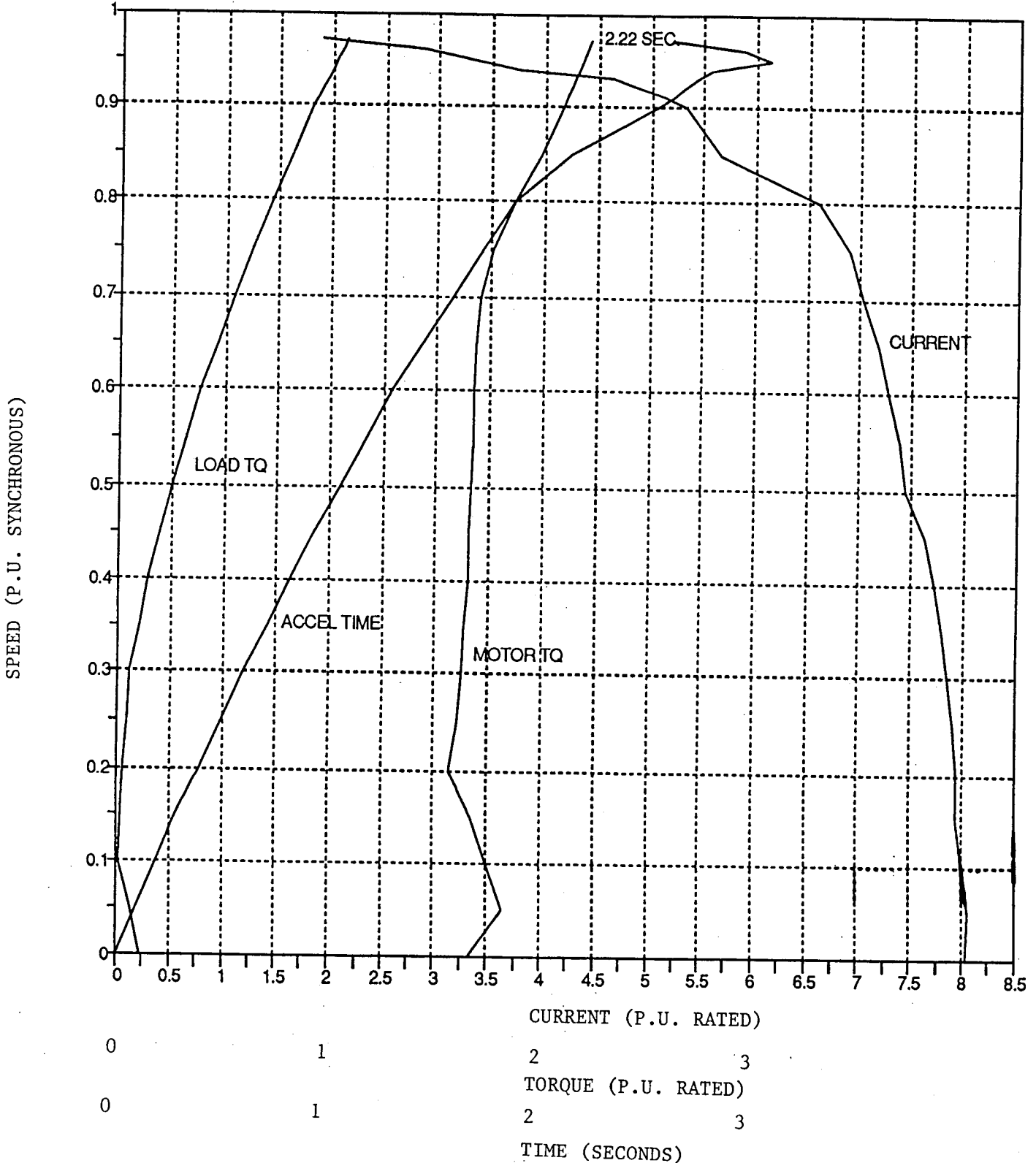


WESTINGHOUSE HIMSC, ROUND ROCK, TEXAS

SIGNATURE *D. McEachron* DATE 2/5/90 CURVE DMC020590C-1

INDUCTION MOTOR STARTING CHARACTERISTICS (CALCULATED) AT 90% LINE VOLTAGE

CUSTOMER DUKE POWER APPLICATION INJECTION PUMP DRIVE ENGR D. MCEACHRON
 S.O. 68F20801/74L10298 LOAD CURVE HH42868
 HP 600 VOLTS 4000 PH 3 HZ 60 POLES 2 RPM(FL) 3587
 PF 0.091 FL AMPS 75.2 LOCKED AMPS(%) 803 RPM(SYN) 3600
 FL TORQUE (LB-FT) 878 LOCKED TORQUE (%) 167
 LOAD INERTIA (LB-FT-SQ) 32 MOTOR INERTIA (LB-FT-SQ) 216 FRAME 686.5

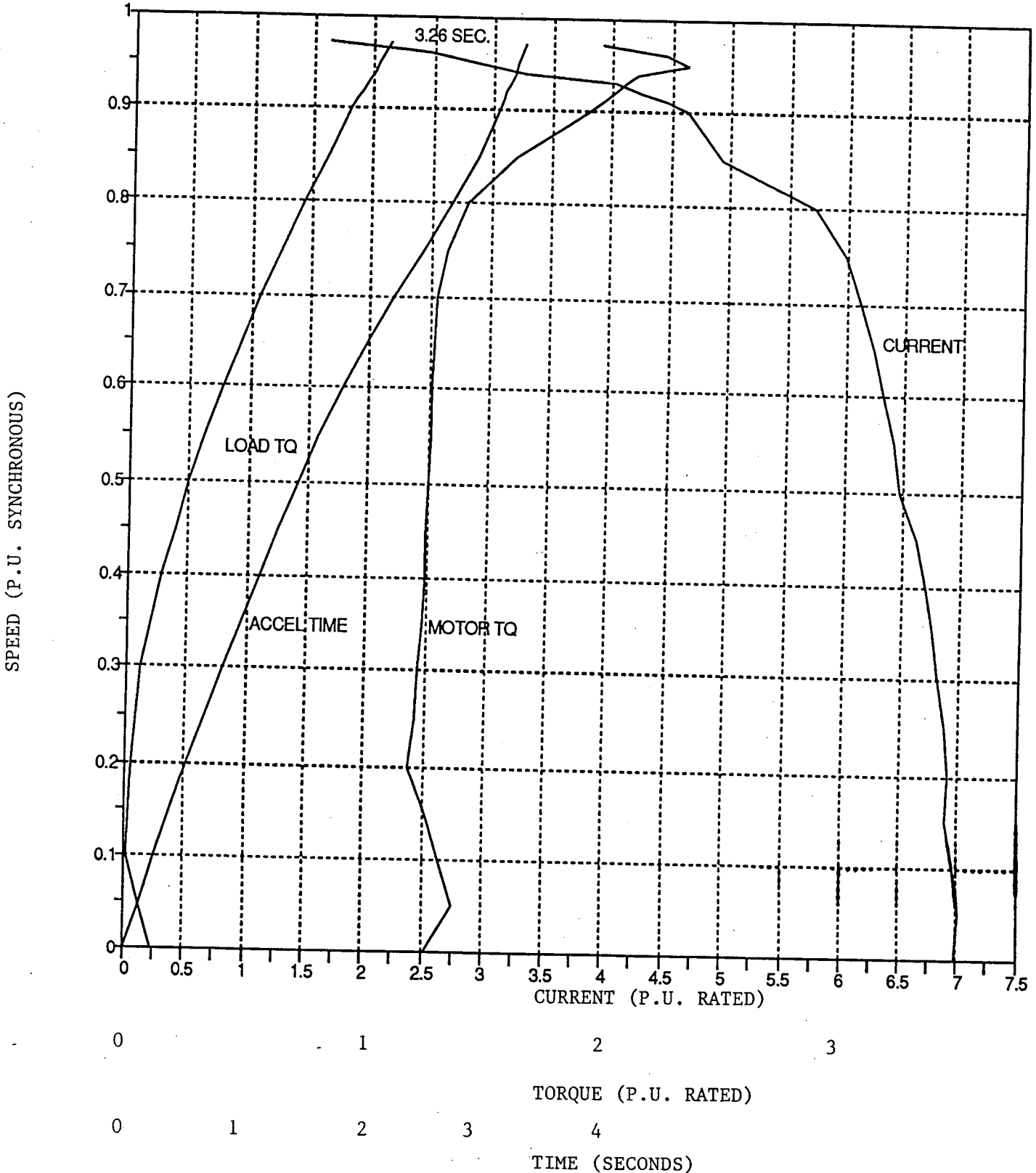


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INDUCTION MOTOR STARTING CHARACTERISTICS (CALCULATED) AT 80% LINE VOLTAGE

CUSTOMER DUKE POWER APPLICATION INJECTION PUMP DRIVE ENGR D. MCEACHRON
 S.O. 68F20801/74L10298 LOAD CURVE HH42868
 HP 600 VOLTS 4000 PH 3 HZ 60 POLES 2 RPM(FL) 3587
 PF 0.091 FL AMPS 75.2 LOCKED AMPS(%) 698 RPM(SYN) 3600
 FL TORQUE (LB-FT) 878 LOCKED TORQUE (%) 126
 LOAD INERTIA (LB-FT-SQ) 32 MOTOR INERTIA (LB-FT-SQ) 216 FRAME 686.5

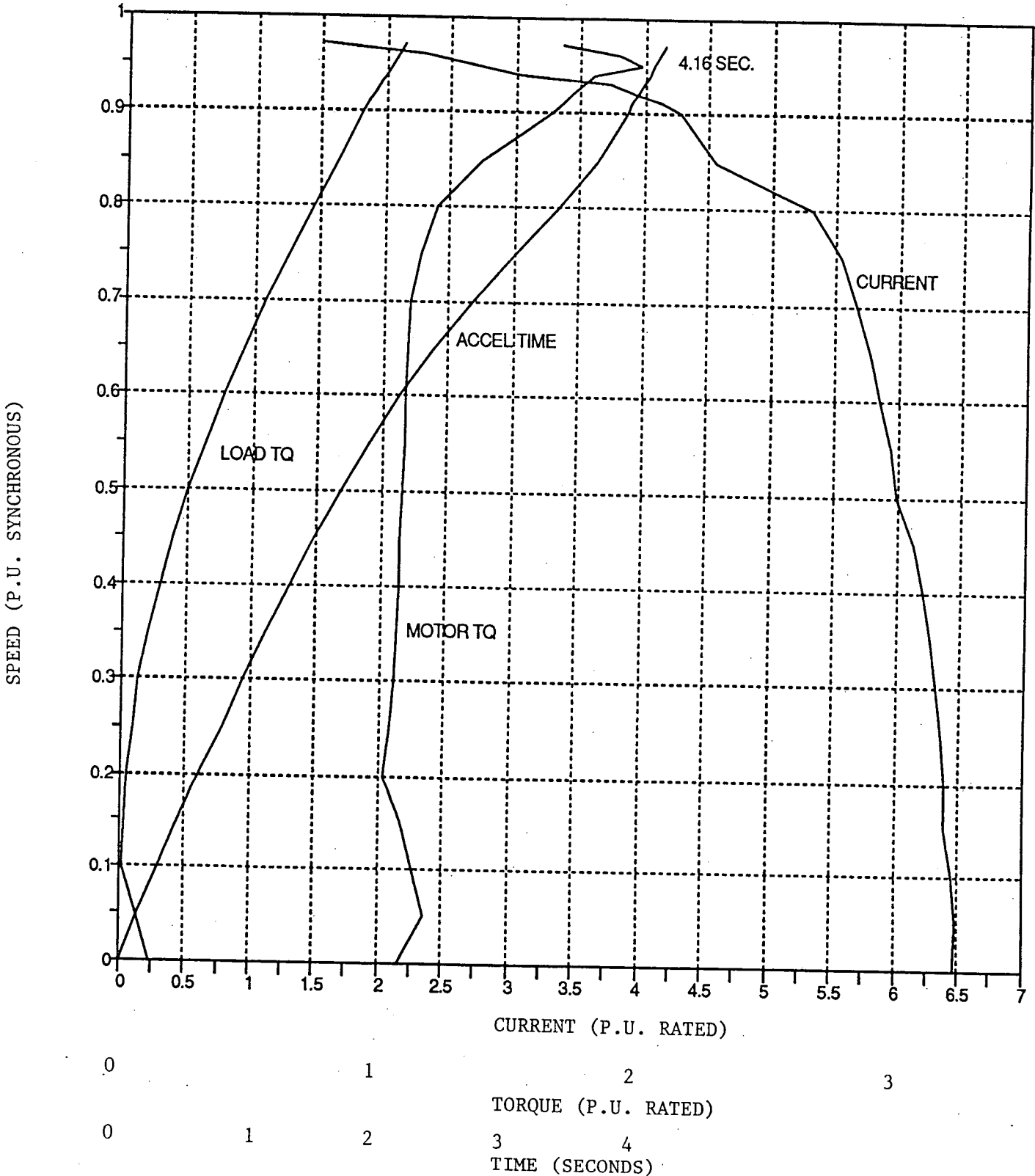


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**INDUCTION MOTOR STARTING CHARACTERISTICS
(CALCULATED) AT 75% LINE VOLTAGE**

CUSTOMER DUKE POWER APPLICATION INJECTION PUMP DRIVE ENGR D. MCEACHRON
 S.O. 68F20801/74L10298 LOAD CURVE HH42868
 HP 600 VOLTS 4000 PH 3 HZ 60 POLES 2 RPM(FL) 3587
 PF 0.091 FL AMPS 75.2 LOCKED AMPS(%) 646 RPM(SYN) 3600
 FL TORQUE (LB-FT) 878 LOCKED TORQUE (%) 108
 LOAD INERTIA (LB-FT-SQ) 32 MOTOR INERTIA (LB-FT-SQ) 216 FRAME 686.5

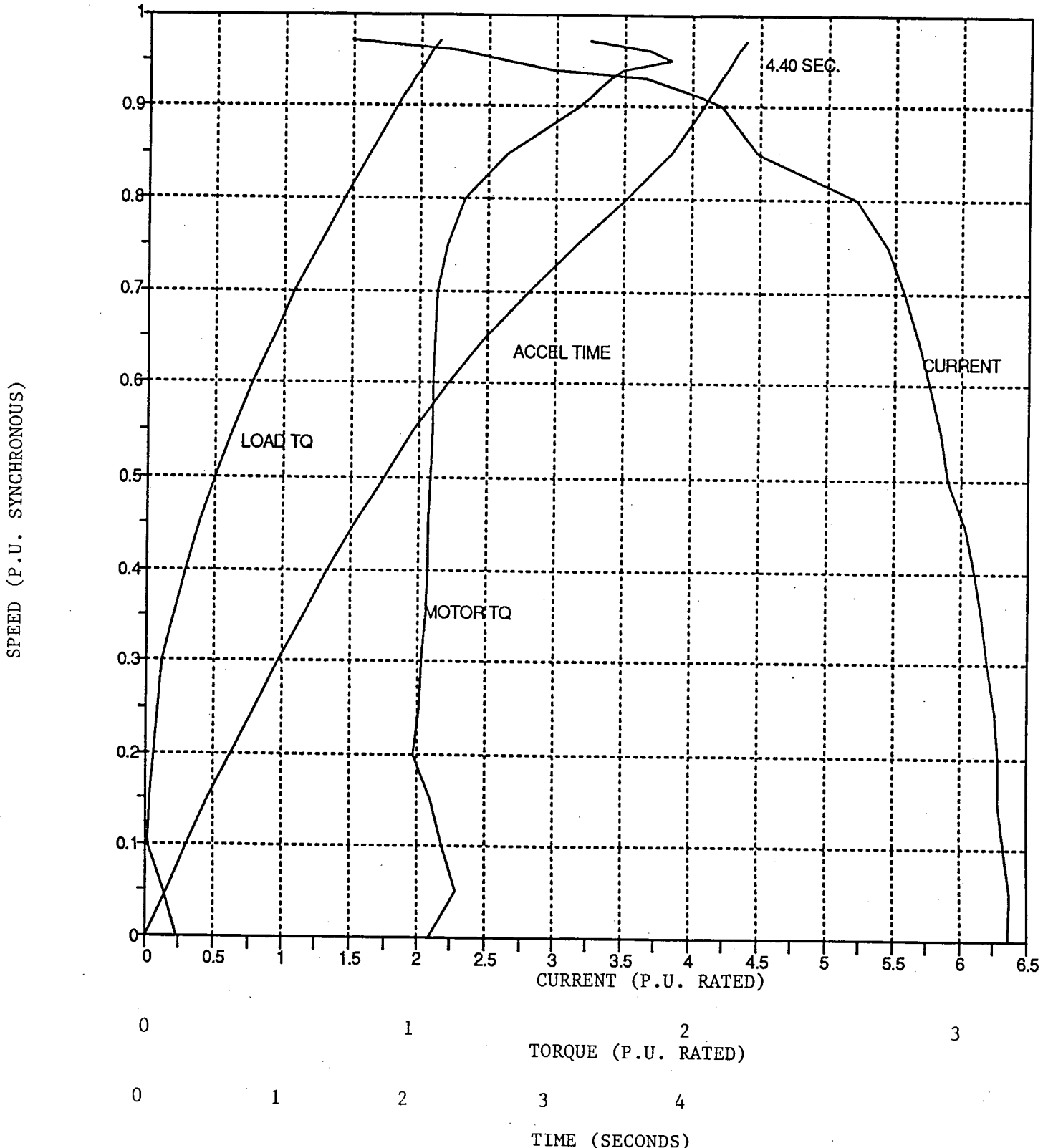


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SIGNATURE *D. McEachron* DATE 2-5-90 CURVE DMC020590C-4

INDUCTION MOTOR STARTING CHARACTERISTICS
(CALCULATED) AT 74% LINE VOLT

CUSTOMER DUKE POWER APPLICATION INJECTION PUMP DRIVE ENGR D. MCEACHRON
 S.O. 68F20801/74L10298 LOAD CURVE HH42868
 HP 600 VOLTS 4000 PH 3 HZ 60 POLES 2 RPM(FL) 3587
 PF 0.091 FL AMPS 75.2 LOCKED AMPS(%) 636 RPM(SYN) 3600
 FL TORQUE (LB-FT) 878 LOCKED TORQUE (%) 105
 LOAD INERTIA (LB-FT-SQ) 32 MOTOR INERTIA (LB-FT-SQ) 216 FRAME 686.5

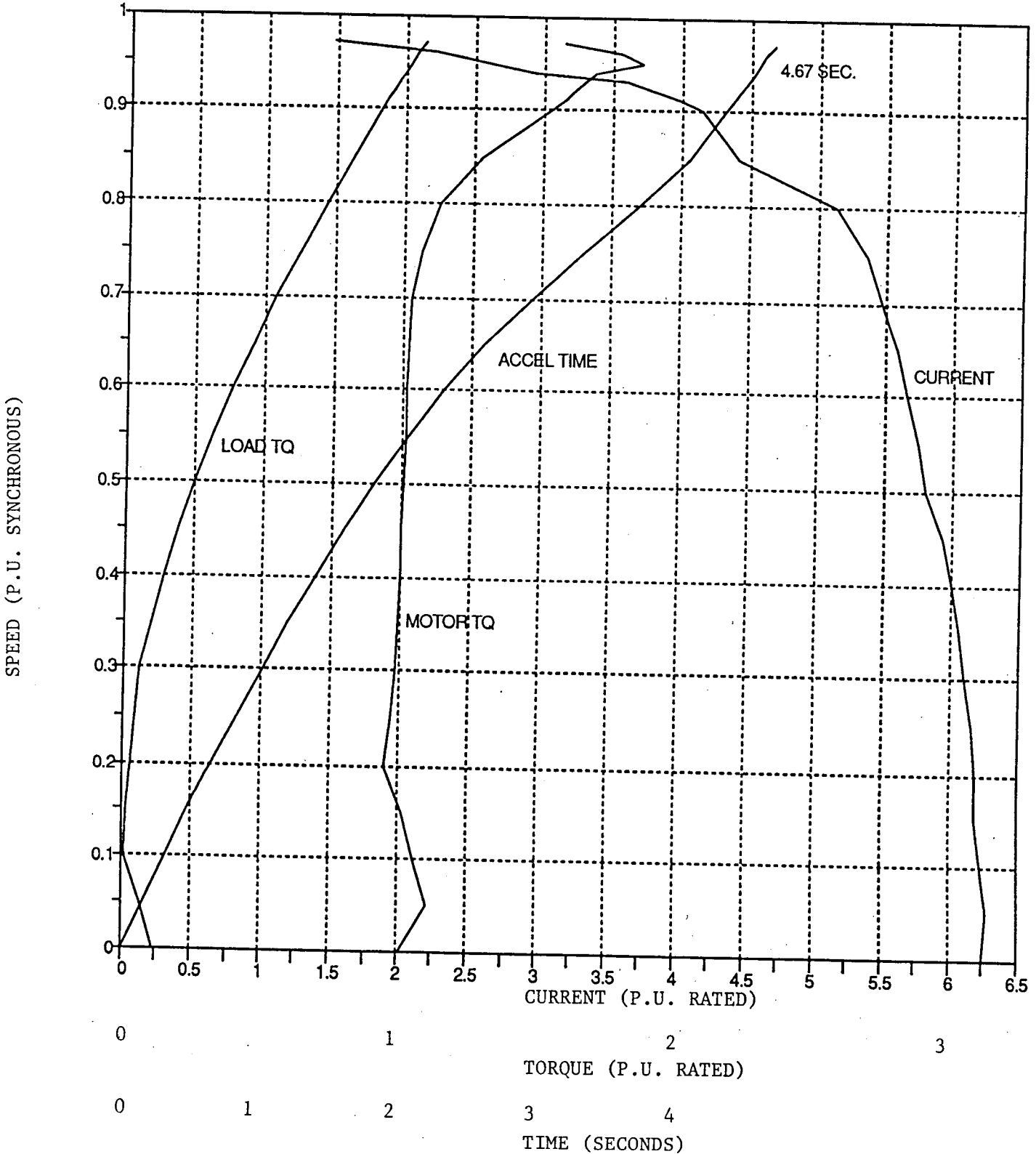


WESTINGHOUSE HIMSC, ROUND ROCK, TEXAS

SIGNATURE D McEachron DATE 2-5-90 CURVE DMC020590C-5

**INDUCTION MOTOR STARTING CHARACTERISTICS
(CALCULATED) AT 73% LINE VOLTAGE**

CUSTOMER DUKE POWER APPLICATION INJECTION PUMP DRIVE ENGR D. MCEACHRON
 S.O. 68F20801/74L10298 LOAD CURVE HH42868
 HP 600 VOLTS 4000 PH 3 HZ 60 POLES 2 RPM(FL) 3587
 PF 0.091 FL AMPS 75.2 LOCKED AMPS(%) 625 RPM(SYN) 3600
 FL TORQUE (LB-FT) 878 LOCKED TORQUE (%) 101
 LOAD INERTIA (LB-FT-SQ) 32 MOTOR INERTIA (LB-FT-SQ) 216 FRAME 686.5



WESTINGHOUSE HIMSC, ROUND ROCK, TEXAS

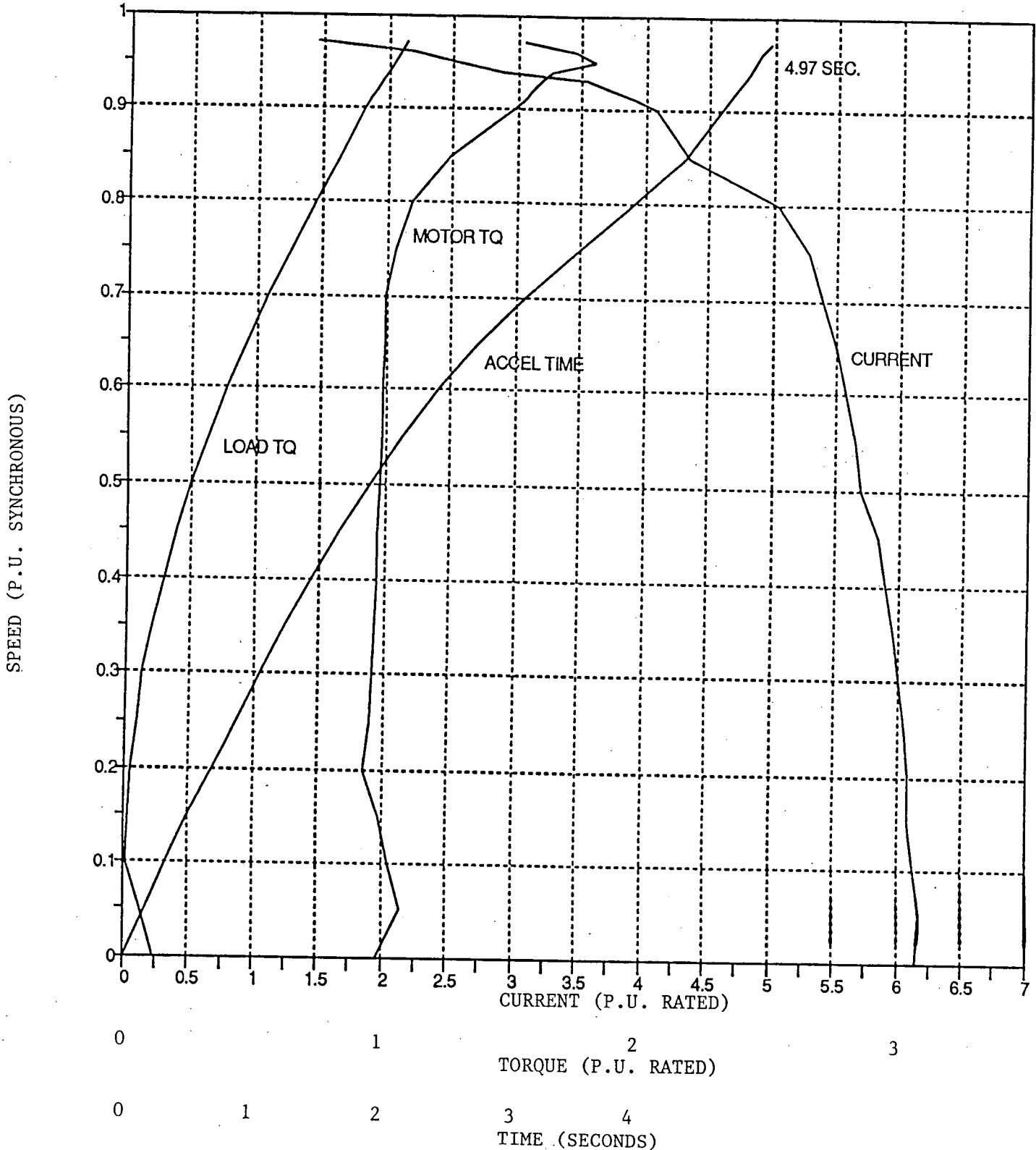
SIGNATURE *D. McEachron*

DATE 2-5-90

CURVE DMC020590C-6

INDUCTION MOTOR STARTING CHARACTERISTICS (CALCULATED) AT 72% LINE VOLTAGE

CUSTOMER DUKE POWER APPLICATION INJECTION PUMP DRIVE ENGR D. MCEACHRON
 S.O. 68F20801/74L10298 LOAD CURVE HH42868
 HP 600 VOLTS 4000 PH 3 HZ 60 POLES 2 RPM(FL) 3587
 PF 0.091 FL AMPS 75.2 LOCKED AMPS(%) 615 RPM(SYN) 3600
 FL TORQUE (LB-FT) 878 LOCKED TORQUE (%) 98
 LOAD INERTIA (LB-FT-SQ) 32 MOTOR INERTIA (LB-FT-SQ) 216 FRAME 686.5



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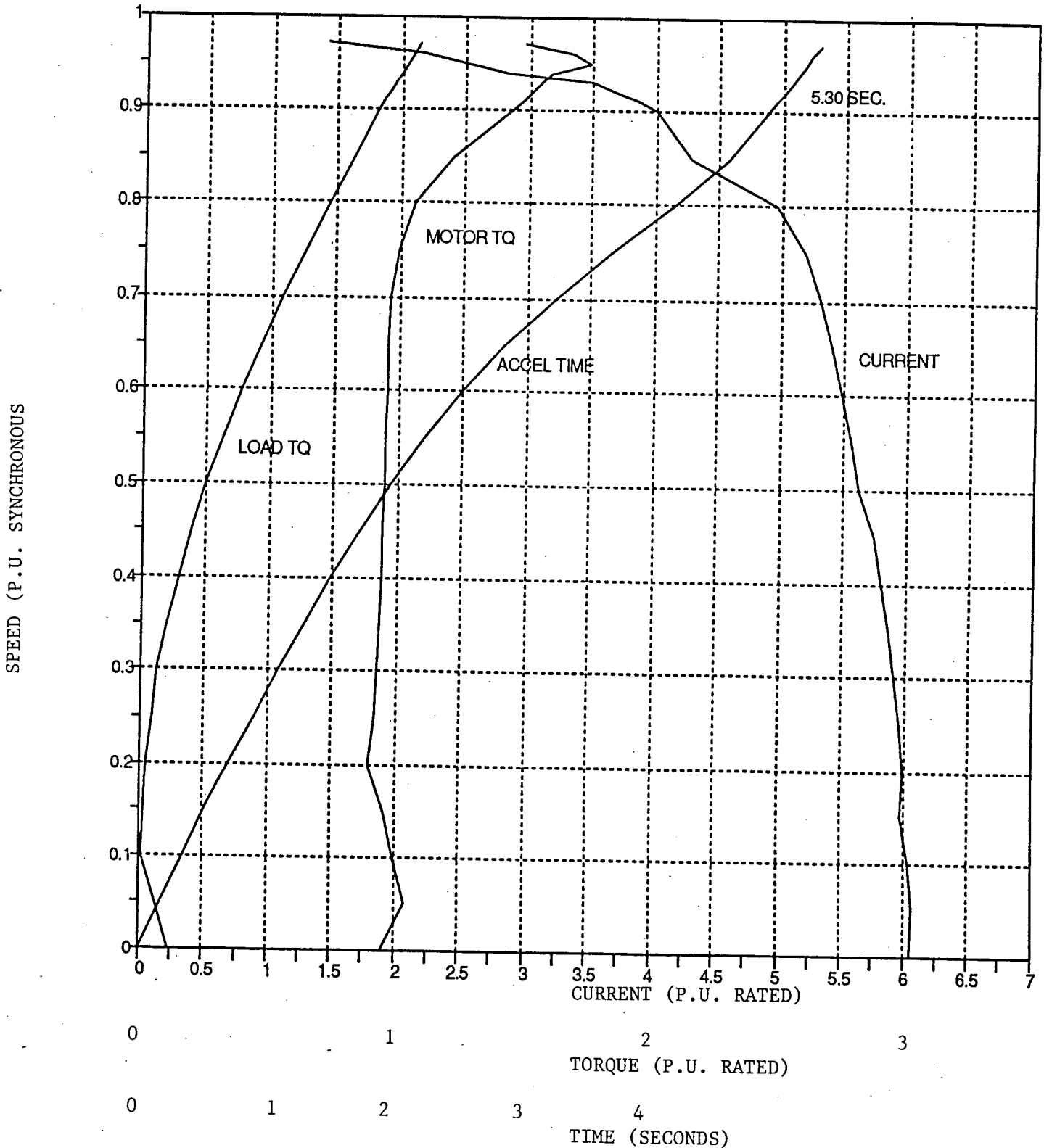
DATE 2-5-90

CURVE DMC020590C-7

INDUCTION MOTOR STARTING CHARACTERISTICS

(CALCULATED) AT 71% LINE VOLT

CUSTOMER DUKE POWER APPLICATION INJECTION PUMP DRIVE ENGR D. MCEACHRON
 S.O. 68F20801/74L10298 LOAD CURVE HH42868
 HP 600 VOLTS 4000 PH 3 HZ 60 POLES 2 RPM(FL) 3587
 PF 0.091 FL AMPS 75.2 LOCKED AMPS(%) 605 RPM(SYN) 3600
 FL TORQUE (LB-FT) 878 LOCKED TORQUE (%) 95
 LOAD INERTIA (LB-FT-SQ) 32 MOTOR INERTIA (LB-FT-SQ) 216 FRAME 686.5

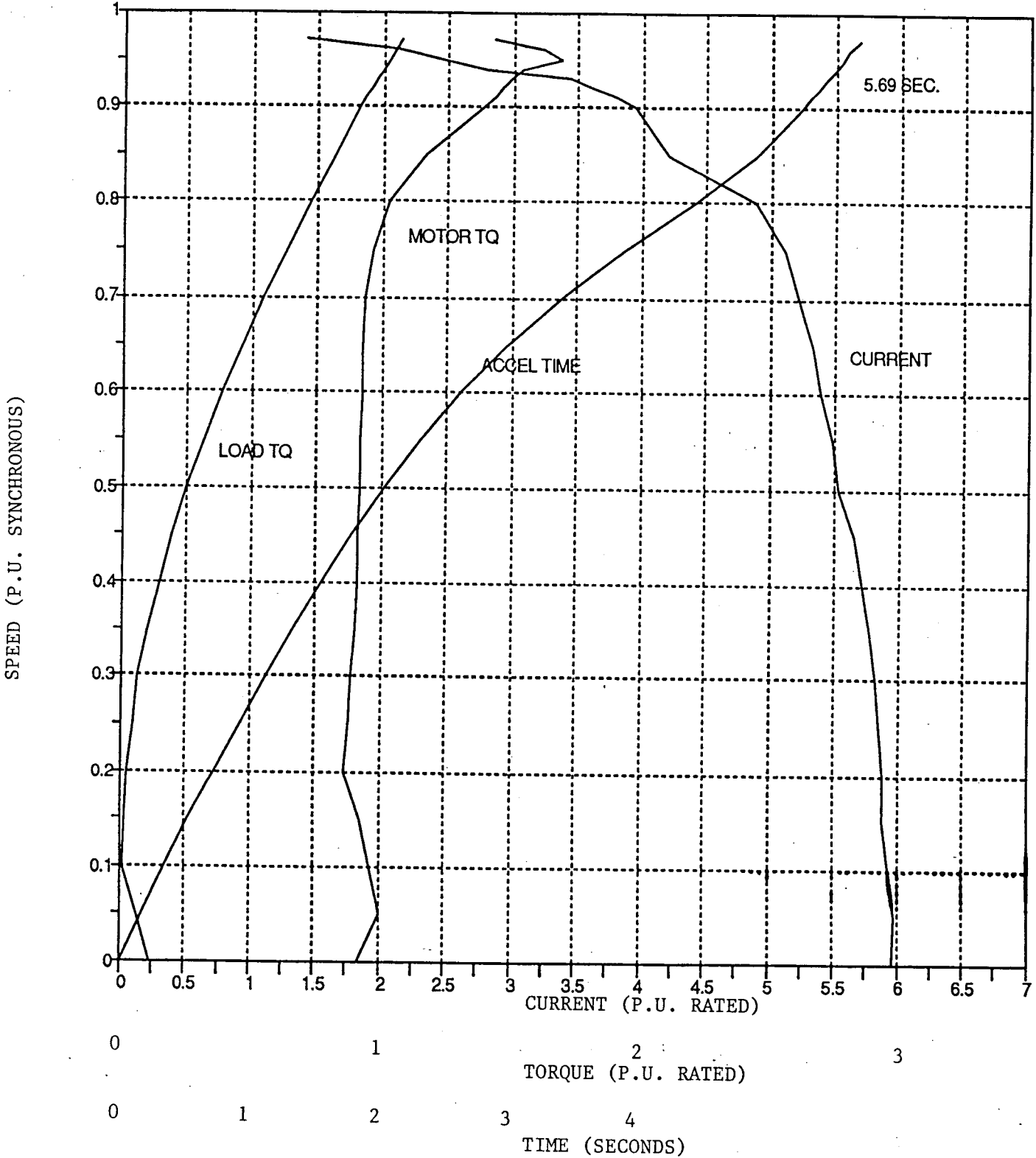


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SIGNATURE *D. McEachron* DATE 2-5-90 CURVE DMC020590C-8

INDUCTION MOTOR STARTING CHARACTERISTICS (CALCULATED) AT 70% LINE VOLTAGE

CUSTOMER DUKE POWER APPLICATION INJECTION PUMP DRIVE ENGR D. MCEACHRON
 S.O. 68F20801/74L10298 LOAD CURVE HH42868
 HP 600 VOLTS 4000 PH 3 HZ 60 POLES 2 RPM(FL) 3587
 PF 0.091 FL AMPS 75.2 LOCKED AMPS(%) 595 RPM(SYN) 3600
 FL TORQUE (LB-FT) 878 LOCKED TORQUE (%) 92
 LOAD INERTIA (LB-FT-SQ) 32 MOTOR INERTIA (LB-FT-SQ) 216 FRAME 686.5

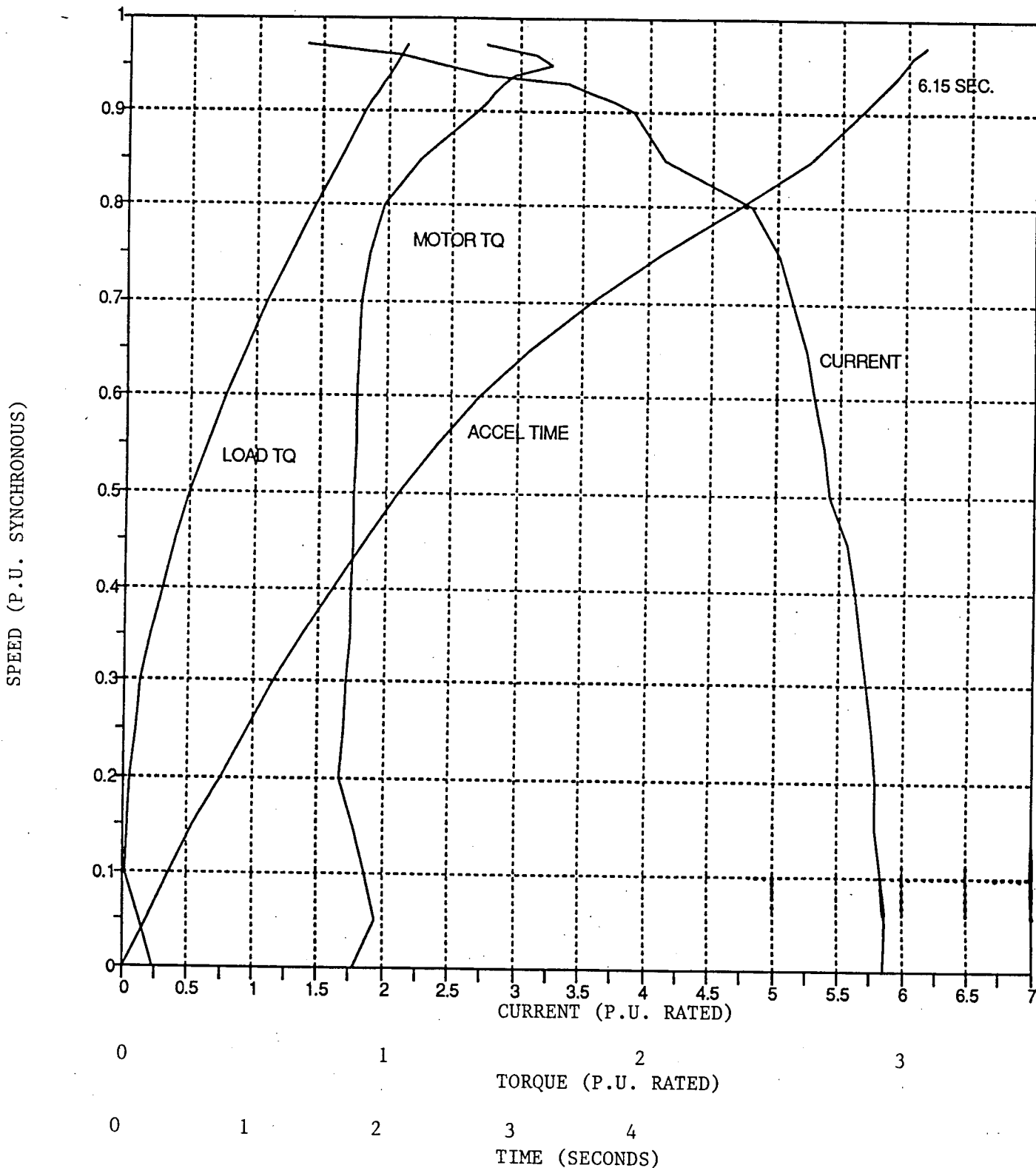


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SIGNATURE *D. McEachron* DATE 2-5-90 CURVE DMC020590C-9

**INDUCTION MOTOR STARTING CHARACTERISTICS
(CALCULATED) AT 69% LINE VOLT**

CUSTOMER DUKE POWER APPLICATION INJECTION PUMP DRIVE ENGR D. MCEACHRON
 S.O. 68F20801/74L10298 LOAD CURVE HH42868
 HP 600 VOLTS 4000 PH 3 HZ 60 POLES 2 RPM(FL) 3587
 PF 0.091 FL AMPS 75.2 LOCKED AMPS(%) 585 RPM(SYN) 3600
 FL TORQUE (LB-FT) 878 LOCKED TORQUE (%) 88
 LOAD INERTIA (LB-FT-SQ) 32 MOTOR INERTIA (LB-FT-SQ) 216 FRAME 686.5

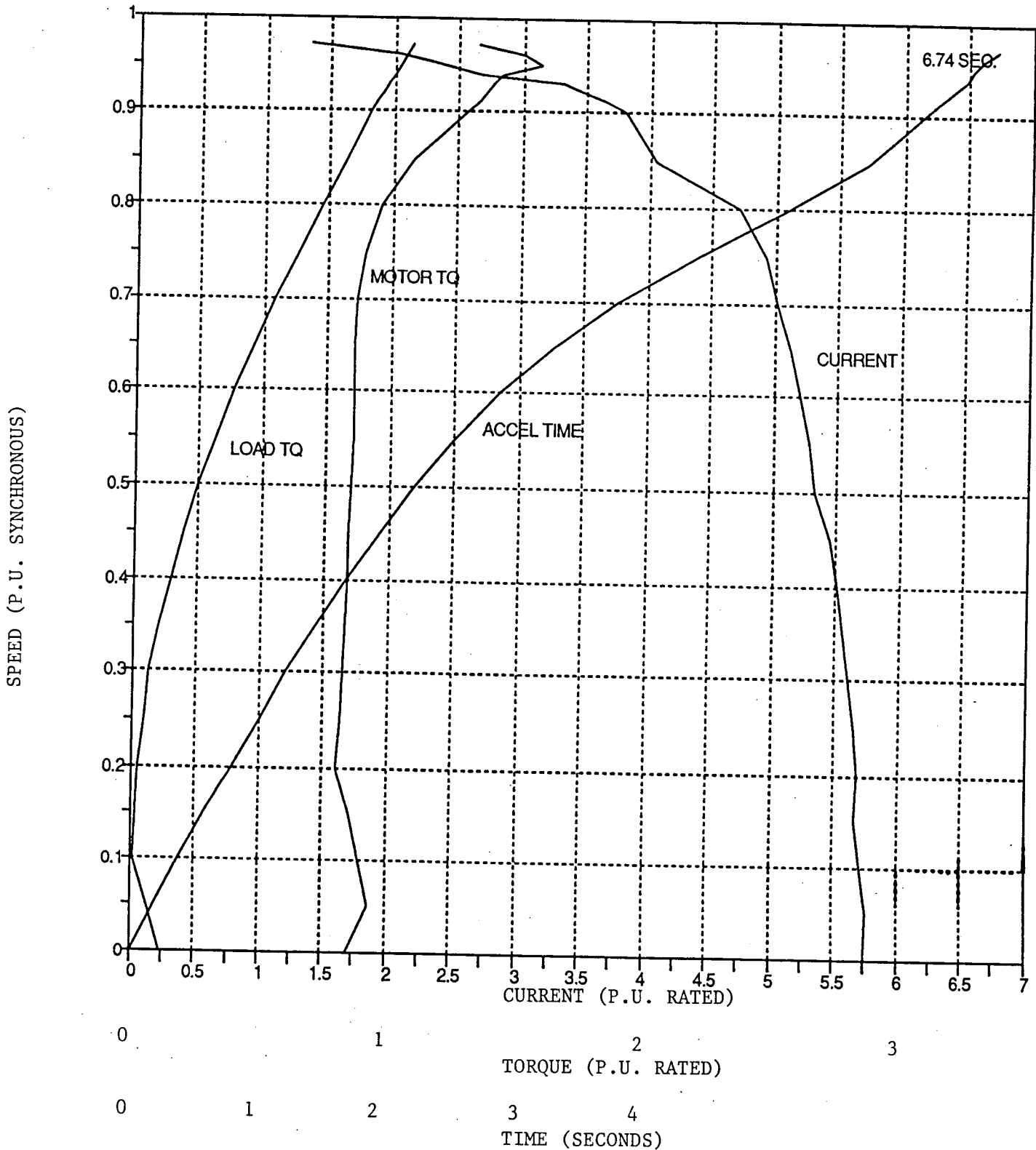


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INDUCTION MOTOR STARTING CHARACTERISTICS (CALCULATED) AT 68% LINE VOLTAGE

CUSTOMER DUKE POWER APPLICATION INJECTION PUMP DRIVE ENGR D. MCEACHRON
 S.O. 68F20801/74L10298 LOAD CURVE HH42868
 HP 600 VOLTS 4000 PH 3 HZ 60 POLES 2 RPM(FL) 3587
 PF 0.091 FL AMPS 75.2 LOCKED AMPS(%) 573 RPM(SYN) 3600
 FL TORQUE (LB-FT) 878 LOCKED TORQUE (%) 85
 LOAD INERTIA (LB-FT-SQ) 32 MOTOR INERTIA (LB-FT-SQ) 216 FRAME 686.5



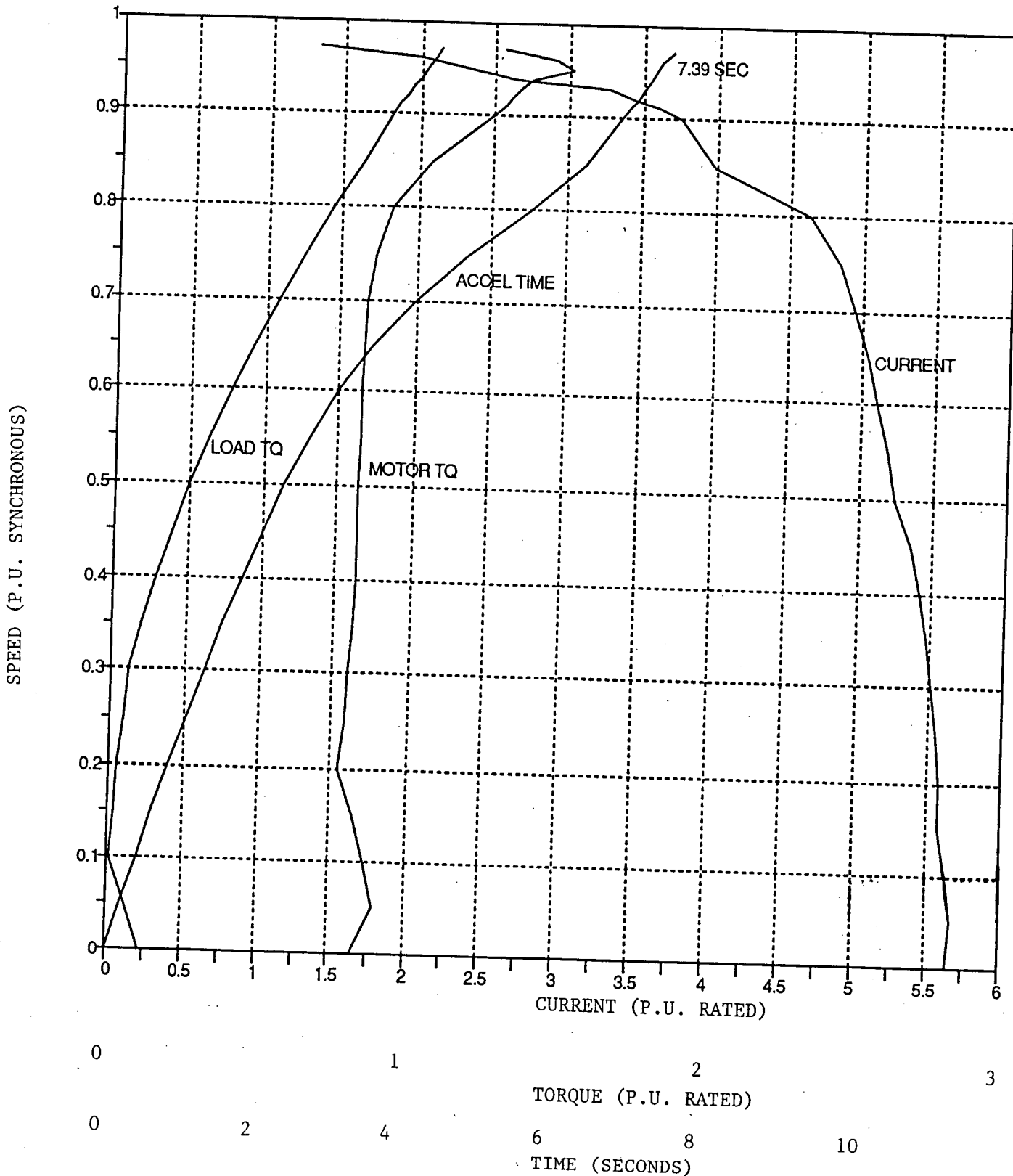
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INDUCTION MOTOR STARTING CHARACTERISTICS

(CALCULATED) AT 67% LINE VOLTAGE

CUSTOMER DUKE POWER APPLICATION INJECTION PUMP DRIVE ENGR D. MCEACHRON
 S.O. 68F20801/74L10298 LOAD CURVE HH42868
 HP 600 VOLTS 4000 PH 3 HZ 60 POLES 2 RPM(FL) 3587
 PF 0.091 FL AMPS 75.2 LOCKED AMPS(%) 565 RPM(SYN) 3600
 FL TORQUE (LB-FT) 878 LOCKED TORQUE (%) 82
 LOAD INERTIA (LB-FT-SQ) 32 MOTOR INERTIA (LB-FT-SQ) 216 FRAME 686.5

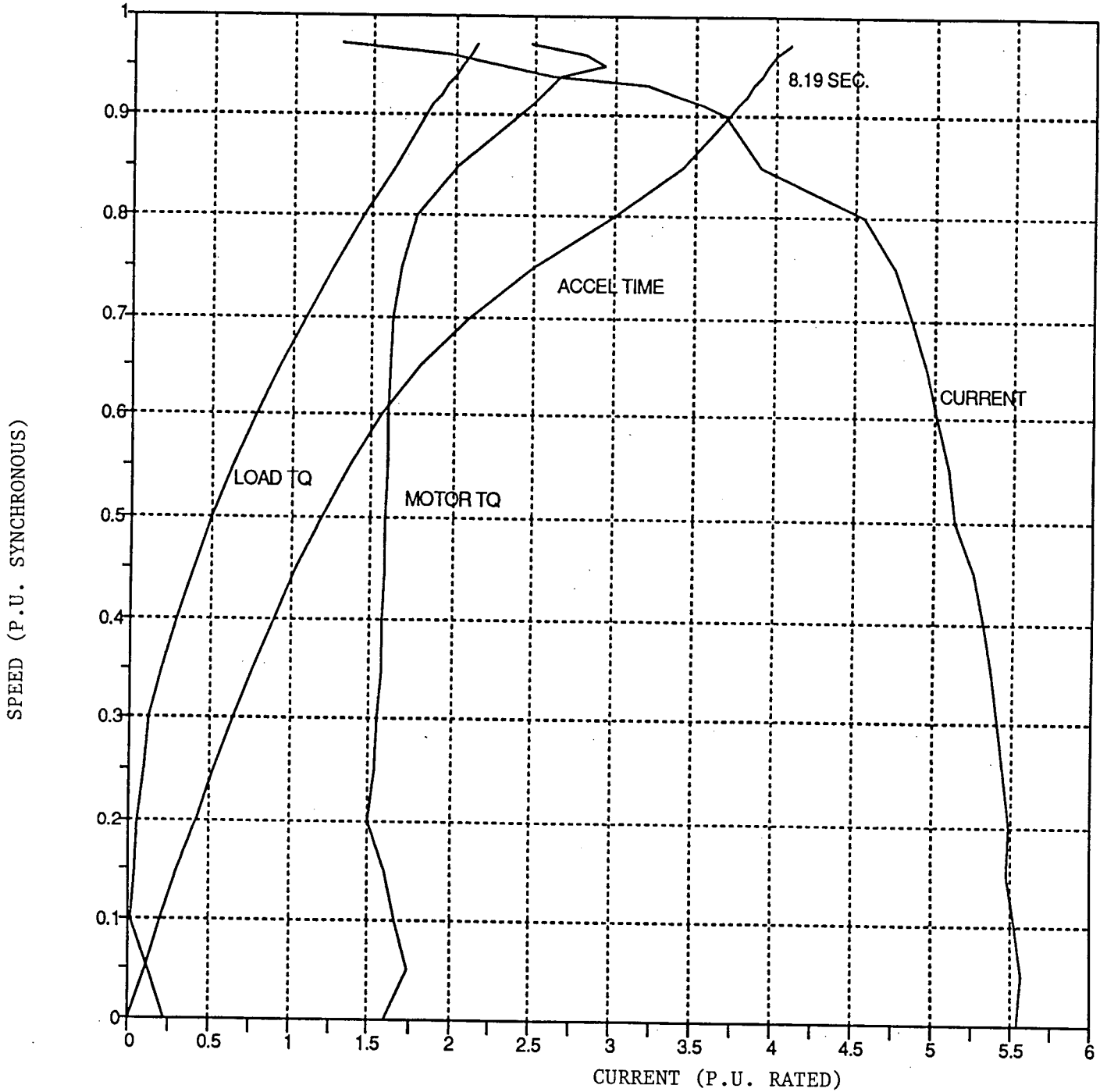


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INDUCTION MOTOR STARTING CHARACTERISTICS (CALCULATED) AT 66% LINE VOLTAGE

CUSTOMER DUKE POWER APPLICATION INJECTION PUMP DRIVE ENGR D. MCEACHRON
 S.O. 68F20801/74L10298 LOAD CURVE HH42868
 HP 600 VOLTS 4000 PH 3 HZ 60 POLES 2 RPM(FL) 3587
 PF 0.091 FL AMPS 75.2 LOCKED AMPS(%) 554 RPM(SYN) 3600
 FL TORQUE (LB-FT) 878 LOCKED TORQUE (%) 80
 LOAD INERTIA (LB-FT-SQ) 32 MOTOR INERTIA (LB-FT-SQ) 216 FRAME 686.5



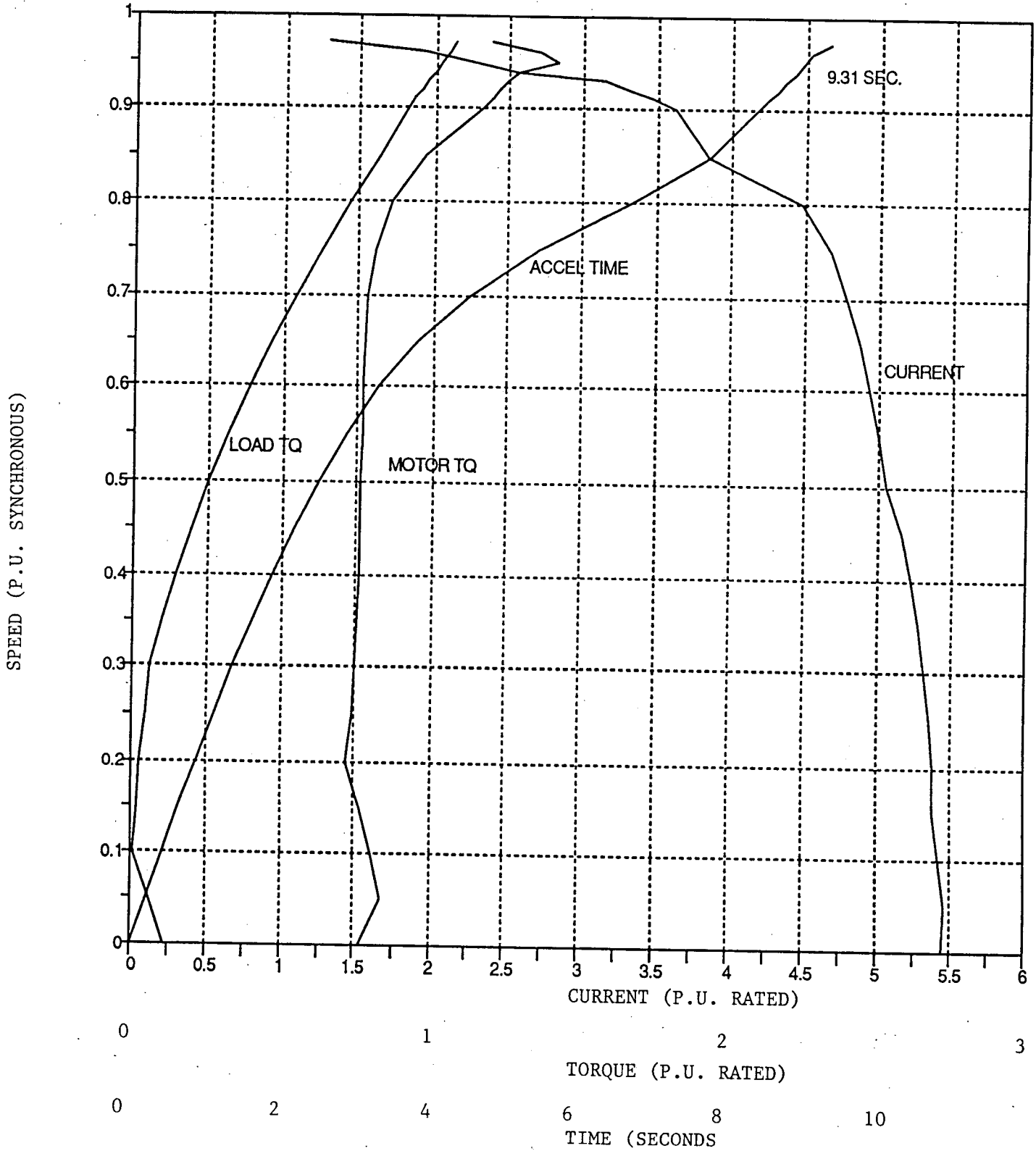
0 1 2 3
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 0 2 4 6 8 10
 TIME (SECONDS)

WESTINGHOUSE HIMSC, ROUND ROCK, TEXAS

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INDUCTION MOTOR STARTING CHARACTERISTICS
 (CALCULATED) AT 65% LINE VOLTAGE

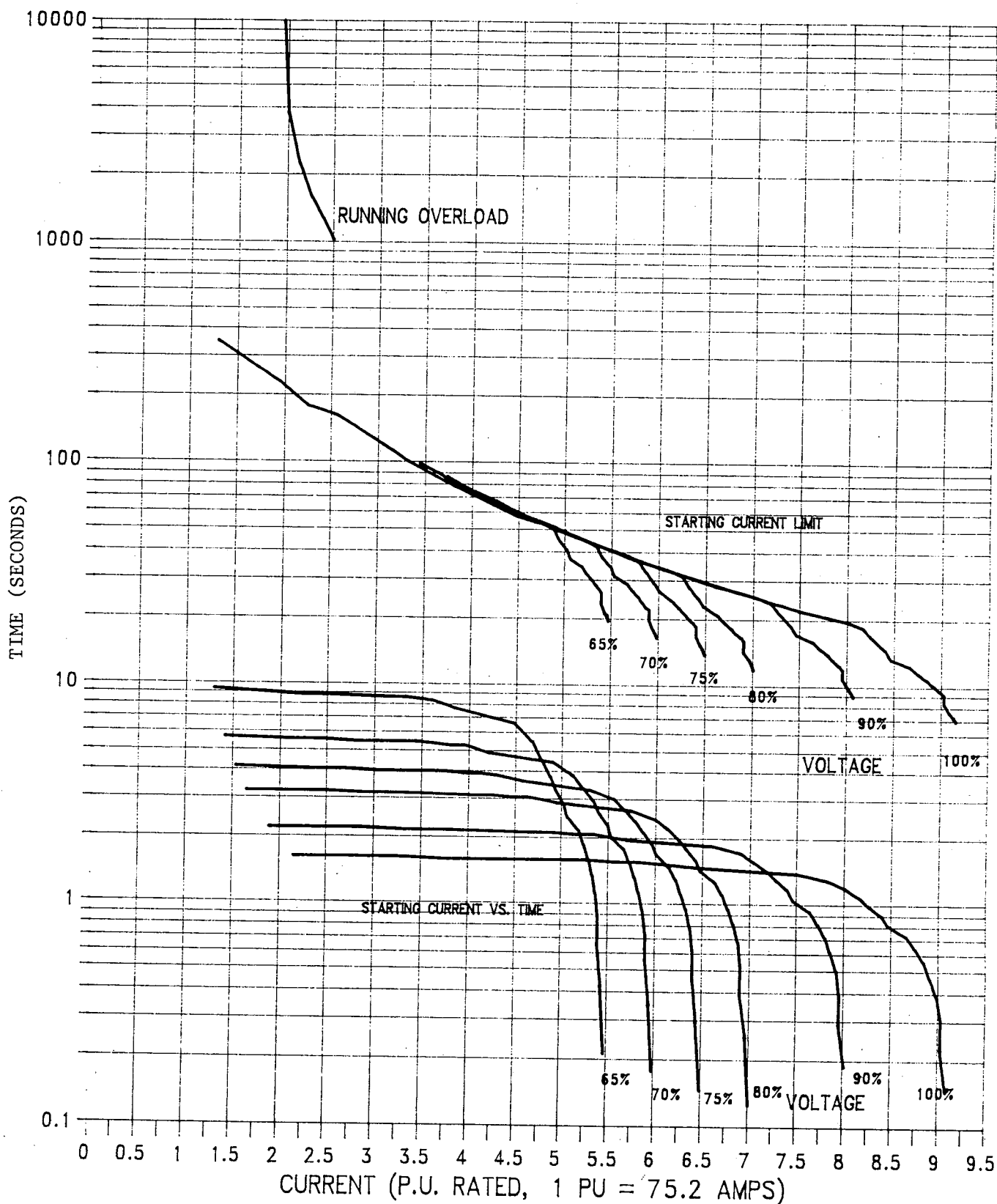
CUSTOMER DUKE POWER APPLICATION INJECTION PUMP DRIVE ENGR D. MCEACHRON
 S.O. 68F20801/74L10298 LOAD CURVE HH42868
 HP 600 VOLTS 4000 PH 3 HZ 60 POLES 2 RPM(FL) 3587
 PF 0.091 FL AMPS 75.2 LOCKED AMPS(%) 544 RPM(SYN) 3600
 FL TORQUE (LB-FT) 878 LOCKED TORQUE (%) 77
 LOAD INERTIA (LB-FT-SQ) 32 MOTOR INERTIA (LB-FT-SQ) 216 FRAME 686.5



WESTINGHOUSE HIMSC, ROUND ROCK, TEXAS

SIGNATURE D. McEachron DATE 2-5-90 CURVE DMC020590C-14

CALCULATED TIME-CURRENT THERMAL LIMIT
 MOTOR S.O. 68F20801/74L10298



WESTINGHOUSE HIMSC, ROUND ROCK, TEXAS

SIGNATURE D Mc Paehran DATE 2-5-90 CURVE DMC020590C-15