

DOCUMENT TITLE PAGE

Continuation Numbers (if applicable)	Cummins Report # <u>0721-80008</u>	REPORT DISTRIBUTION Master
Program Project No.		(1) Info Center 50120
300		(2) Info Center
Inst. Center No.		(3) Info Center
		(4) Author M. Thommen-50231
Title	Driveability NTCC-300 MVT (CPL 456) Rated 300 HP @ 1800 RPM	(5) P.F. Finke - 50194
Project No.		(6) C.W. Hoefflin - 50194
		(7) R.E. Hoffmeister 50196
Author	M. Thommen	(8) R.W. Jones - 50194
4/22/80		(9) M.S. Lantz - 50231
		(10) S.O. Saarinen-50194
Inst. No. 0721	Dept. Name Vehicle Test	(11) J.C. Walter - 50114
		(12) Vehicle Test 50231(5)

SUMMARY

PROPOSE:

To establish base driveability data on the California engines equipped with mechanical variable timing for further engine development and comparisons.

DISCUSSION:

Complete driveability tests were run according to Cummins' Test Method 20) using Test Unit 21 (Attachments 1 and 2) and the Endurance Load Trailer Unit 150. Data acquisition was done with the new MACSYM-2 system using a resolution of 4 H₂.

RESULTS:

The predicted delay time was 12-16 sec. from advanced to fully retarded timing after rail pressure reached 25 PSI. The actual delay time was 22-25 sec. in all driveability tests. All the detail results are shown in attachments 3-36.

RECOMMENDATION:

1. Make this data available to BC-II/III Engine Group and retain for future comparisons.
2. Driveability test with an NTC-350 (CPL 450) is already scheduled in Vehicle Test to compare it to the California NTCC-350 MVT (CPL 456).

Thommen

M. Thommen

Engineer - Vehicle Test

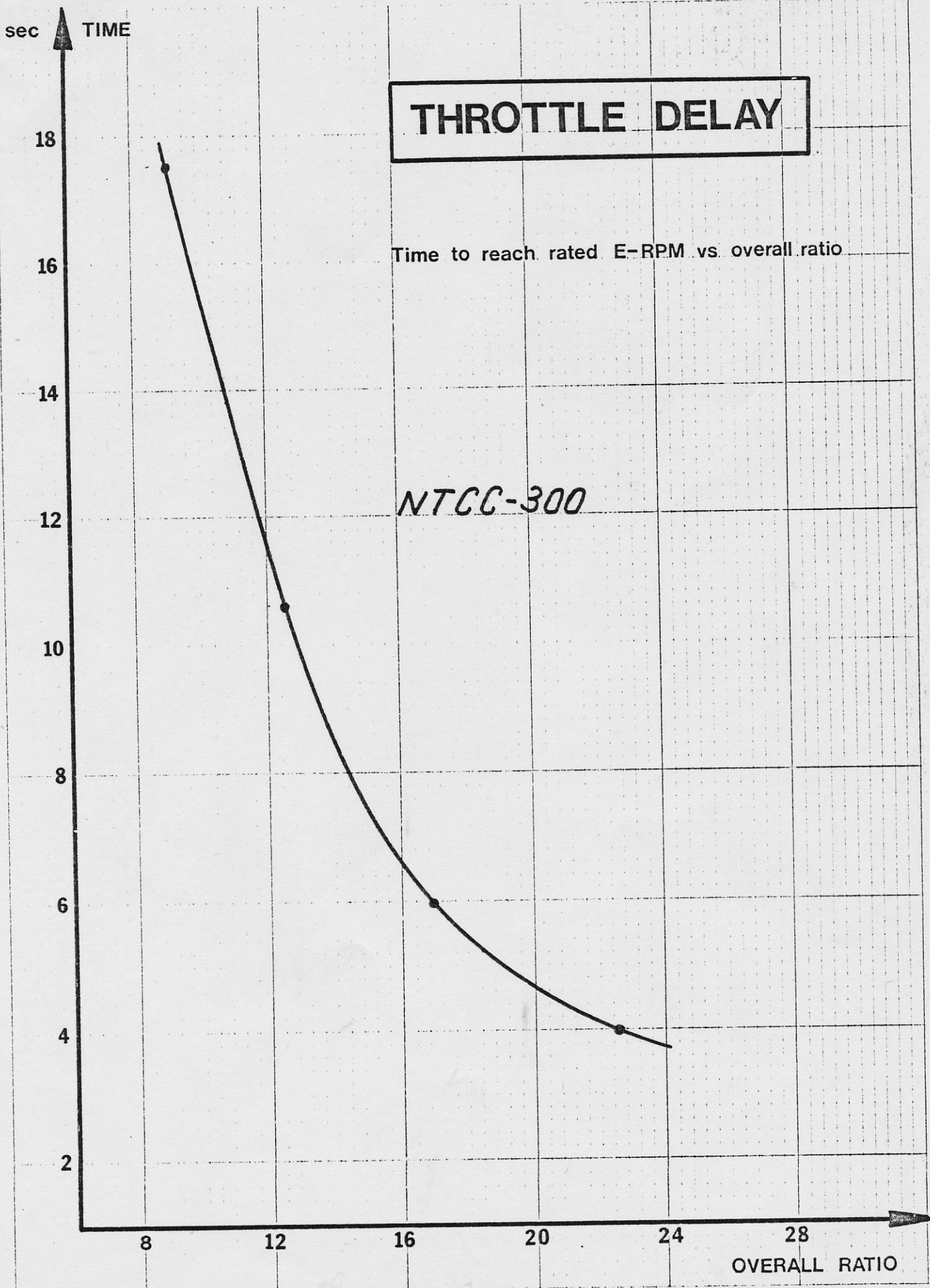
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*****
*
* VEHICLE SPECIFICATION # 21 LAST UPDATE 12/01/79
*
*****
*
* VEHICLE MAKE: KENWORTH TYPE: TRACTOR
*
* MODEL: K-100 CONF/DRIVE: COE / 6X4
*
* YEAR: 1965 WHEELBASE: 174
*
* S/N: 201953 LIC-PLATE: 10534N/TRACT 72+
*
-----
*
* ENGINE MAKE: CUMMINS H.P. @ RPM: 300 @ 1800
*
* MODEL: NTCC-300 MVT FT.LB @ RPM: 1000 @ 1300
*
* YEAR: 1979 CPL: 0456
*
* S/N: 10821919 FUEL PUMP: RE-179
*
* FLYW. TEETH: 118
*
-----
*
* RADIATOR AREA: 1200 CORE THICK:
*
* FLOW: VERTICAL FINS/IN:
*
-----
*
* CLUTCH MAKE: SPICER SIZE: 14"
*
* TYPE: 2-PLATE/ORGANIC/DAMPENED
*
-----
*
* TRANSMISSION MAKE: FULLER TRAN. TEETH: 31.5
*
* MODEL: RTO-1213
*
-----
*
* REAR AXLE MAKE: ROCKWELL RATIO: 3.70
*
* MODEL: SQHD WHEEL TYPE: SPOKE
*
-----
*
* FRONT TIRES MAKE: MICHELIN SIZE/PLY: 10.00R20 / 14
*
-----
*
* BACK TIRES MAKE: MICHELIN SIZE/PLY: 10.00R20 / 14
*
*****

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DR-121179 DRIVEABILITY DATA FILE

PROGRAM DESCRIPTION: DRIVEABILITY NTCC-300 MVT
 PROG-PROJ NO / DEPT: 30-300 / 0773
 ENGINEER: MORITZ THOMMEN
 TECHNICIAN: JOHN BEEKER
 INSTRUMENTATION: MIKE NAGEL
 DRIVER: BEN KLEFFMAN
 TRUCK # / TRAILER #: 21 / 150
 TRUCK MAKE / MODEL: KENWORTH / K-125
 CONV / COE: COE
 ENGINE MAKE / MODEL: CUMMINS / NTCC-300 MVT
 HP @ RPM: 300 @ 1800
 FT.LB @ RPM: 1000 @ 1300
 SERIAL NO: 10821919
 CPL / FUEL PUMP CODE: CPL 0456 / RE-179
 TRANSMISSION MAKE: FULLER
 MODEL: RTO-1213
 CLUTCH MAKE / MODEL: SPICER / CERAMIC-UNDAMPENED-2-PLATE
 REAR AXLE RATIO: 3.70
 TIRES MAKE / SIZE F: MICHELIN / 10.00R20
 TIRES MAKE / SIZE R: MICHELIN / 10.00R20
 REV / MILE: 498
 LOW IDLE: 711 RPM 2.1 PSI RAIL 0.11 "HG BOOST
 HIGH IDLE: 1997 RPM 12.7 PSI RAIL 4.46 "HG BOOST
 GOVERNOR BREAK: 1826 RPM 123.5 PSI RAIL

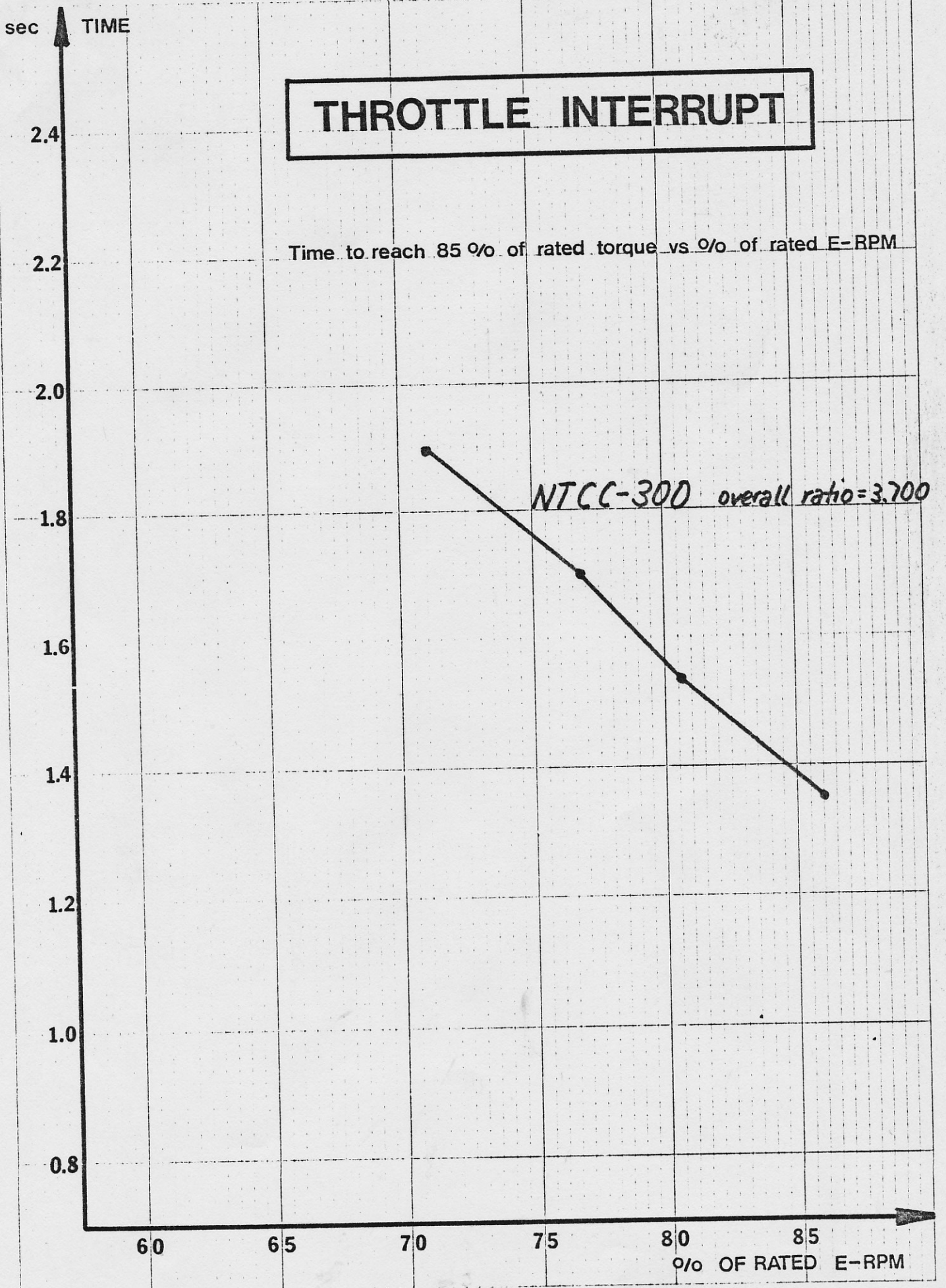


THROTTLE DELAY

Time to reach rated E-RPM vs. overall ratio

NTCC-300

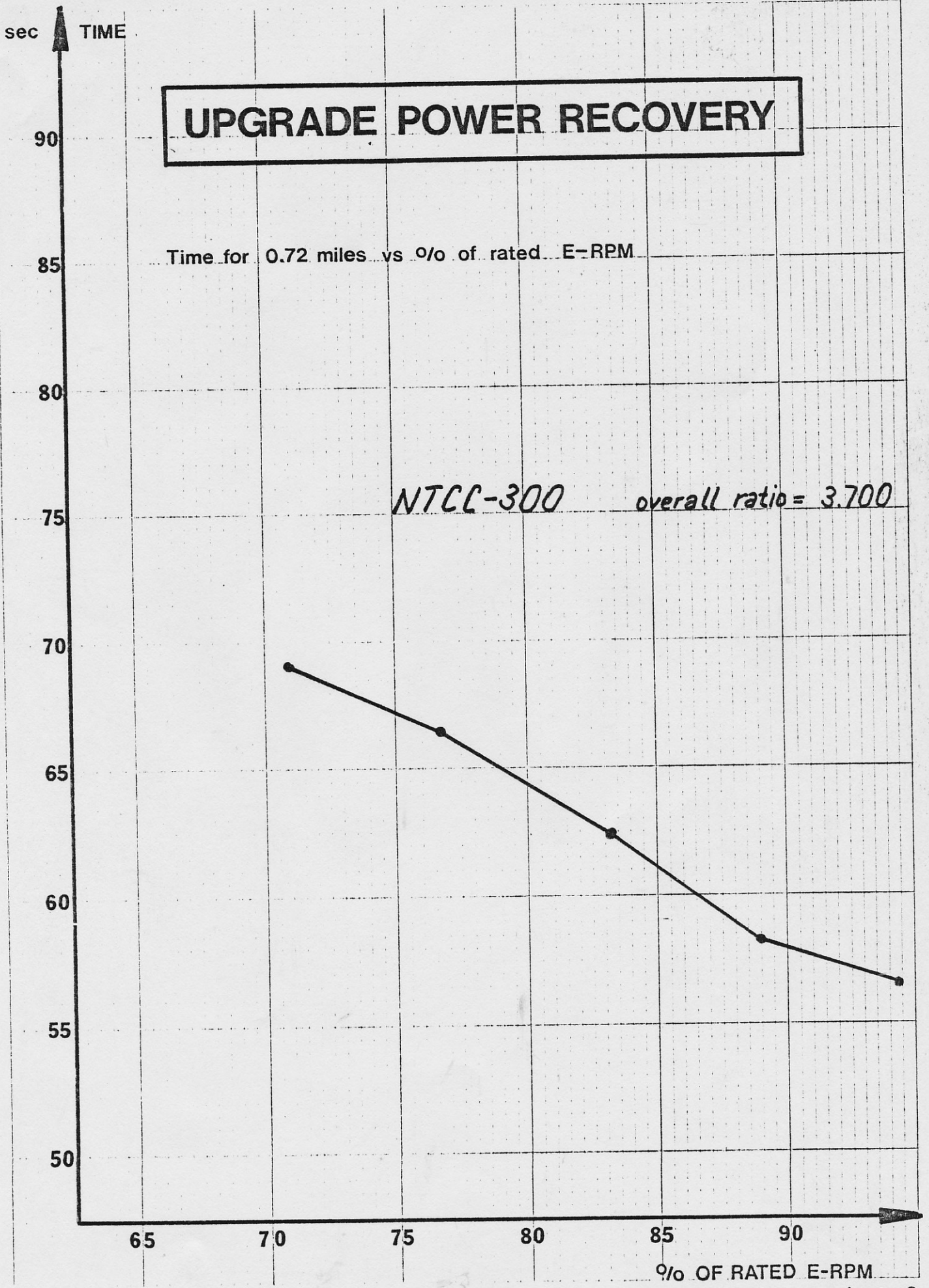
THROTTLE INTERRUPT



NTCC-300 overall ratio=3.700

Monk Thomas April-17-80

UPGRADE POWER RECOVERY



monte thomson April 17 1980

DRIVEABILITY TESTS

UNIT: 21
AXLE: 3.70
12/13/79

MAKE: KENH
MODEL: K-125
PRES: 10.00R20

TRANSMISSION: R10-1213
GVW: 72,000
NICC-300 MVT
THROTTLE DELAY / 3RD GEAR / 5.95 SEC



DRIVEABILITY TESTS

TRANSMISSION: R10-1213
CVW: 72,000

MAKE: KENH
MODEL: K-125
TIRES: 10.00R20

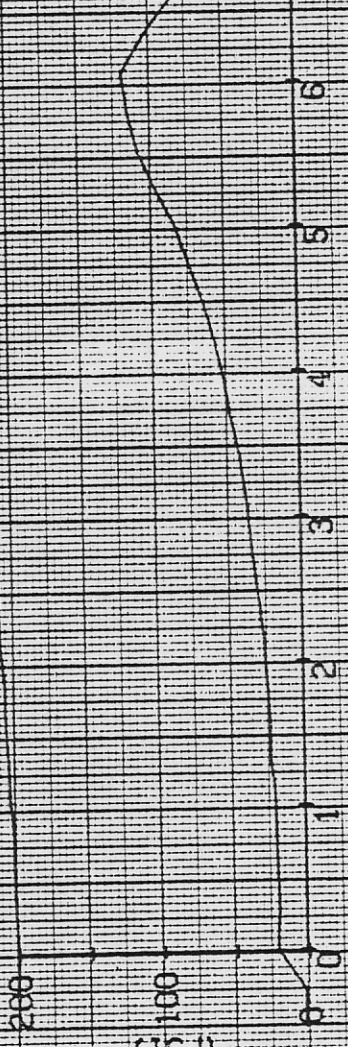
UNIT: 21
AXLE: 3.70
12/13/79

ID-121336 KLEEFMAN N100-300 MVT
THROTTLE DELAY / 3RD GEAR / 5.95 SEC

% SMOKE OPACITY



RAIL PRESSURE (PSID)



INT. WELD PRESS (IN HG)



TIME (SECONDS)

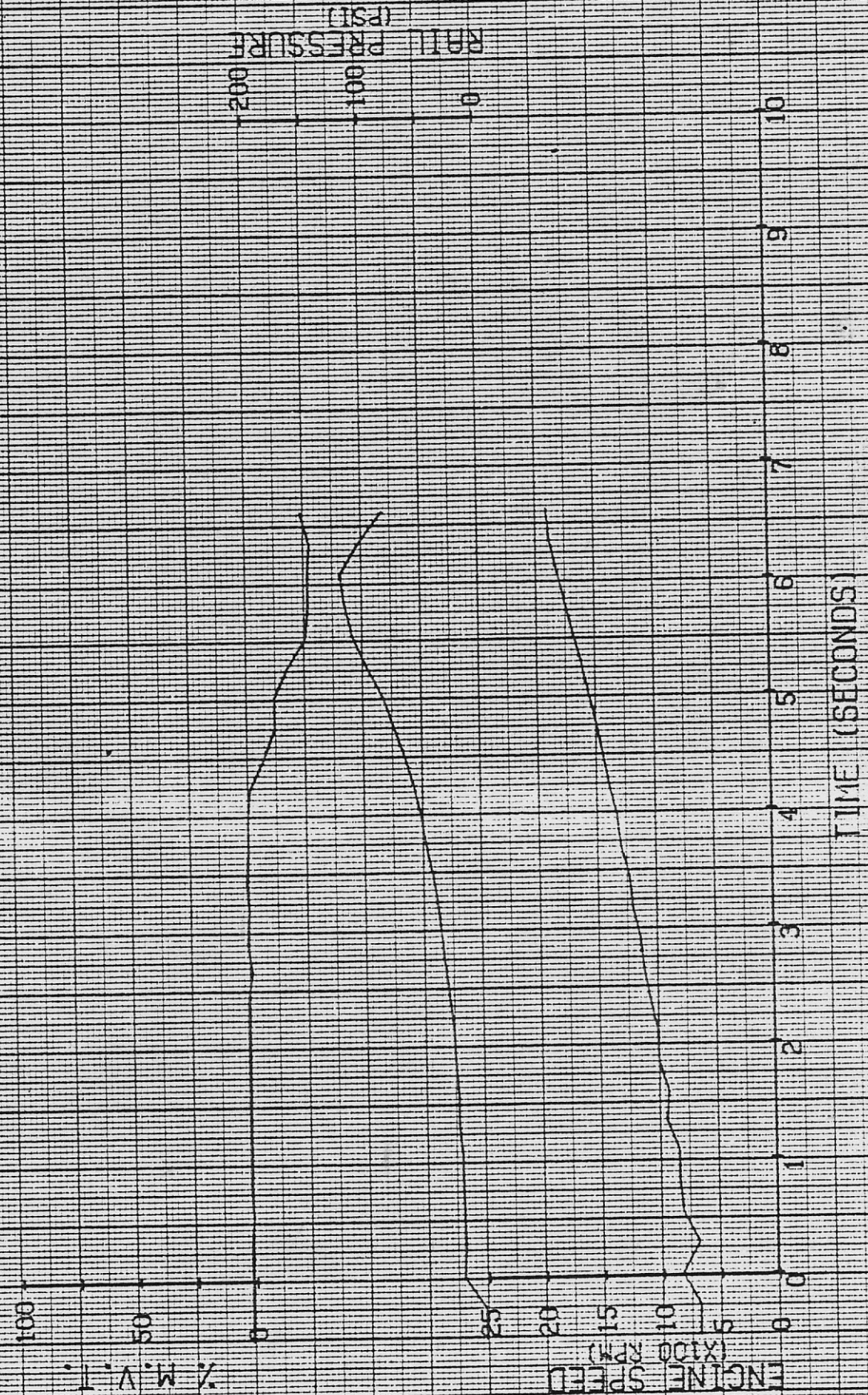
DRIVEABILITY TEST

UNIT: 21
AXLE: 3.70
12/13/79

MAKE: KENW
MODEL: K-125
TYRES: 10.00R20

TRANSMISSION: R10-1213
CVT: 72.000

ID-121336 KLEEFMAN
THROTTLE DELAY / BRD GEAR / 5.95 SEC
NTCC-300 MVT



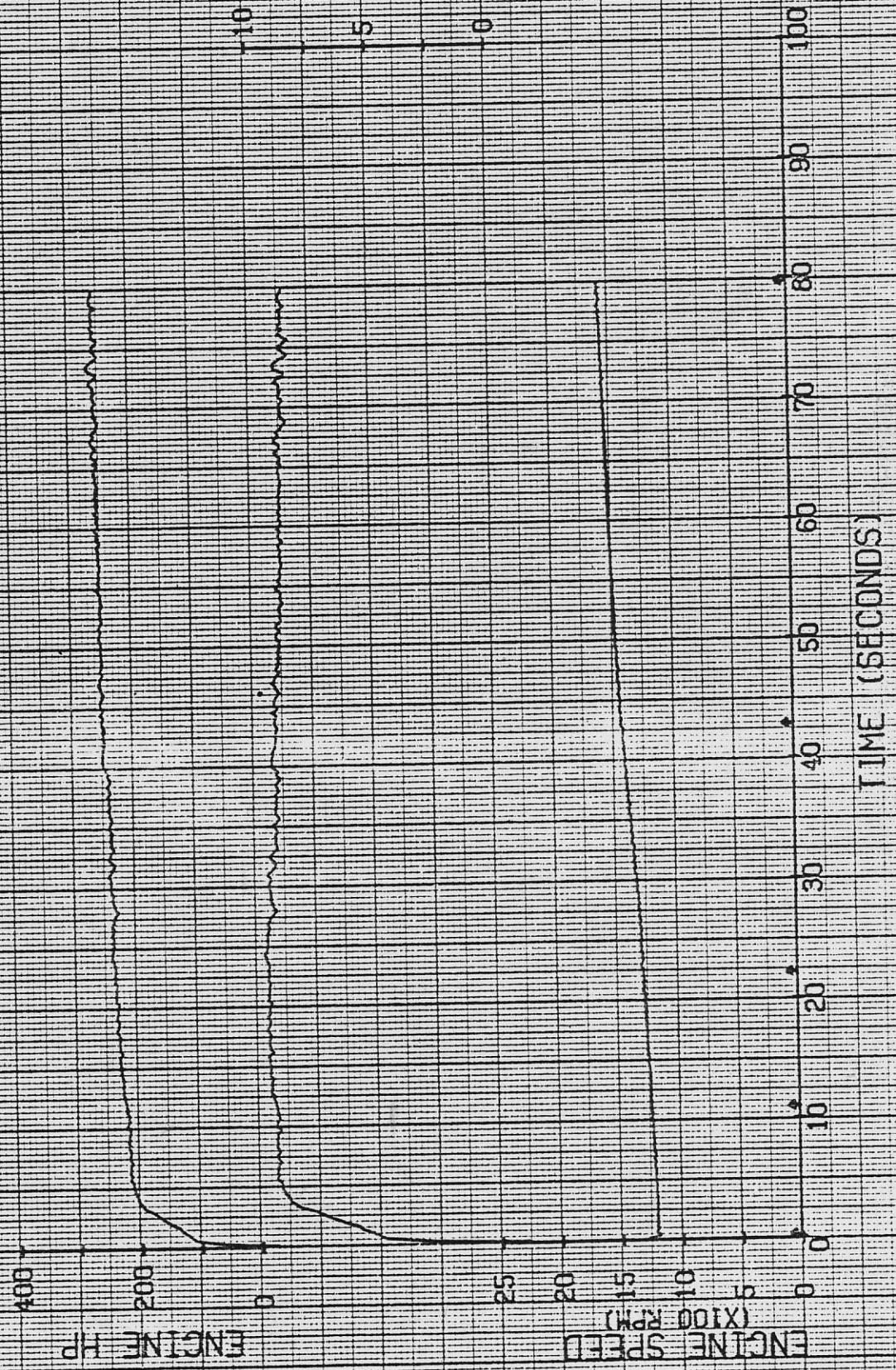
DRIVEABILITY TESTS

UNIT: 21
AXLE: 3.70
12/12/79

MAKE: KENW
MODEL: K-125
TIRES: 10.00R20

PA-121226 KLEFFEMAN NICC-300 MVT
PASSING TEST ACCELERATION 7 8TH DI GEAR

TRANSMISSION: RTD-1213
CVW: 72.000



TIME (SECONDS)

ENGINE HP

ENGINE SPEED (X100 RPM)

ENGINE TORQUE (X100 LB.FT.)

DRIVEABILITY TESTS

UNIT: 21
AXLE: 3.70
12/12/79

MAKE: KENH
MODEL: K-125
TIRES: 10.00R20

PA-121226 KLEEMAN N100-300 MYT
PASSING TEST ACCELERATION / 8TH DI GEAR

TRANSMISSION: RT0-1213
GVW: 72,000

% SMOKE OPACITY

100
50
0

RAIL PRESSURE (PSI)

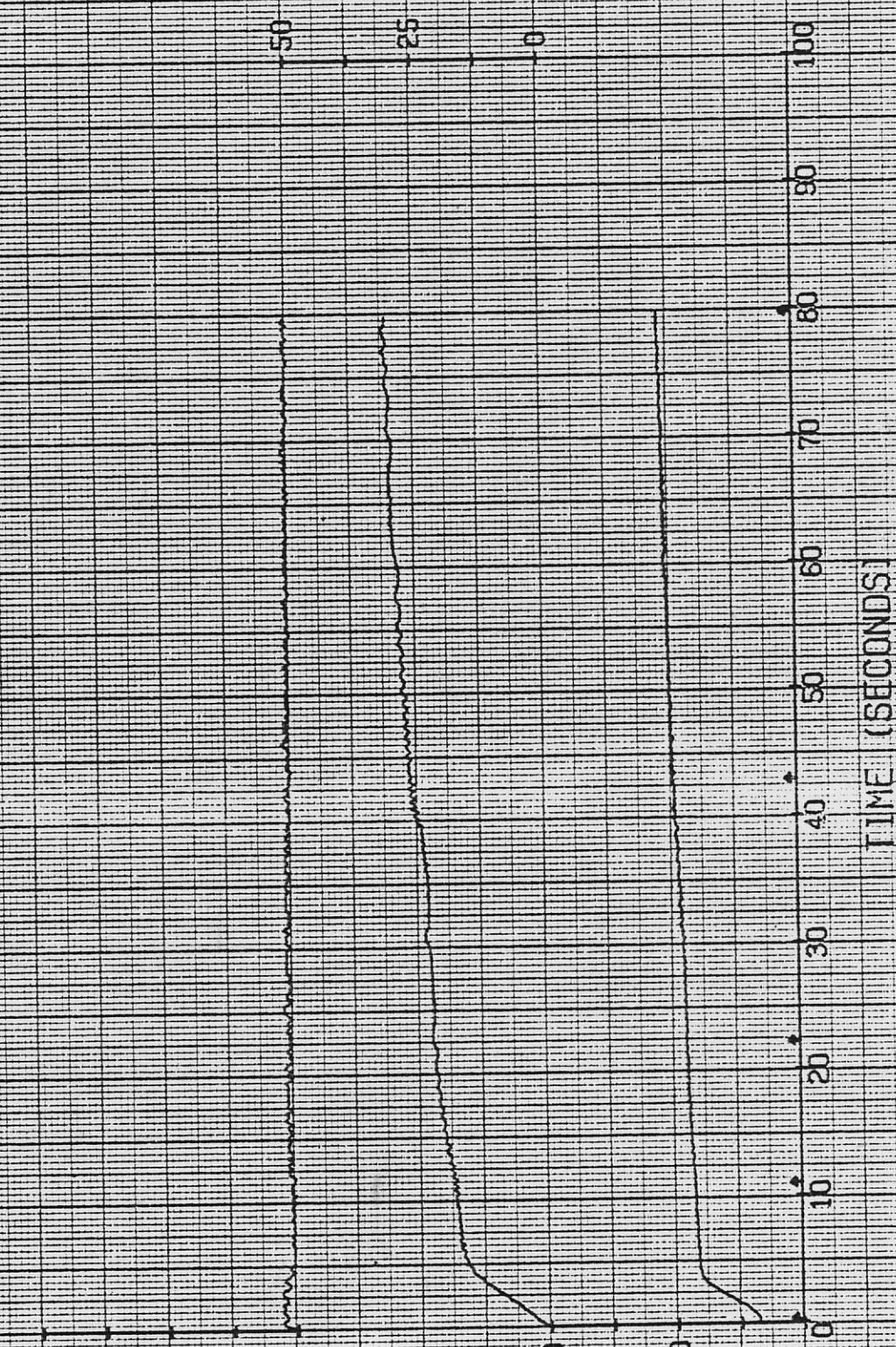
200
100
0

INT MFLD PRESS (IN HG)

50
25
0

100
90
80
70
60
50
40
30
20
10
0

TIME (SECONDS)



DRIVEABILITY TEST

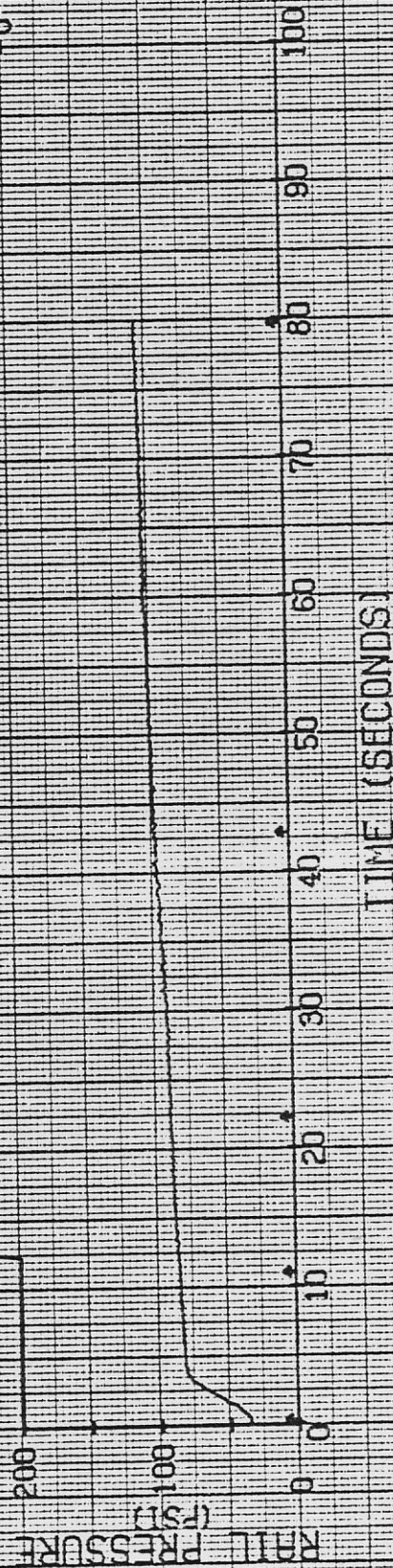
TRANSMISSION: RT0-1213
GVW: 72,000

MAKE: KENH
MODEL: K-125
TIRES: 10,00R20

UNIT: 21
AXLE: 3.70
12/12/79

PA-121226 KLEEFMAN NTCC-300 MVT
PASSING TEST ACCELERATION / 8TH DI CEAR

100
50
0
% M.V.T.



TIME (SECONDS)

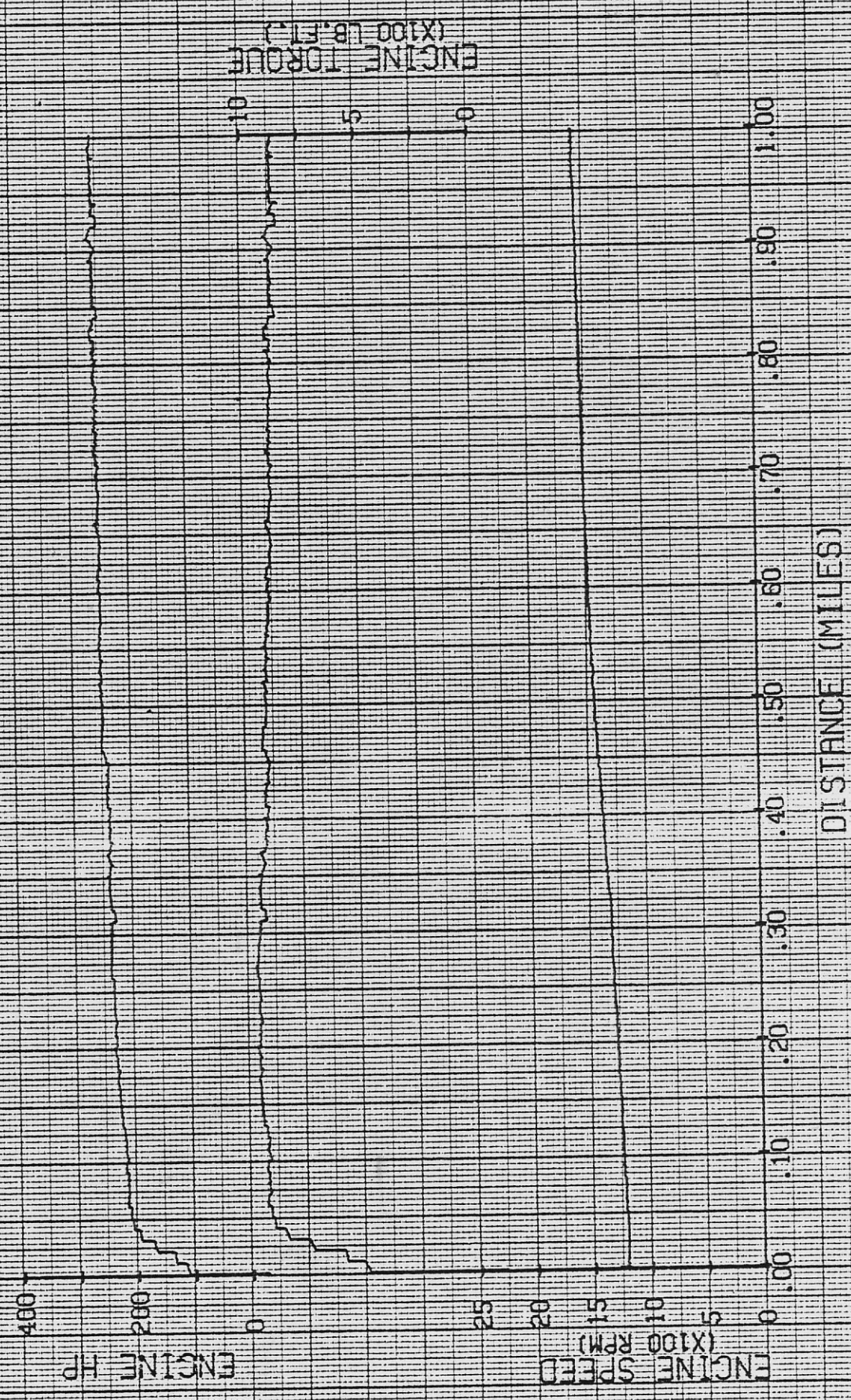
DRIVEABILITY TESTS

UNIT, 21
AXLE, 3.70
12/12/79

MAKE, KENH
MODEL, K-125
TIRES, 10.00R20

PA-121226 KLEFFMAN NTCC-300 MVT
PASSING TEST ACCELERATION / 8TH DI GEAR

TRANSMISSION, RT0-1213
GVA, 72.000



ENGINE TORQUE (X100 LB.FT.)

DRIVEABILITY TEST

UNIT: 21
AXLE: 3.70
12/12/79

MAKE: KENW
MODEL: K-125
TIRES: 10.00R20

PA-121226 KLEFEMAN
NTCC-300 MVT
PASSING TEST ACCELERATION / 8TH DT GEAR

TRANSMISSION: RT0-1213
CVN: 72,000

% SMOKE OPACITY

100
50
0

RAIL PRESSURE (PSI)

200
100
0

INT WELD PRESS (IN HG)

50
25
0

1.00
.90
.80
.70
.60
.50
.40
.30
.20
.10
0.00

DISTANCE (MILES)



DRIVEABILITY TESTS

UNIT, 21
AXLE, 3.70
12/12/79

MAKE, KENW
MODEL, K-125
TIRES, 10.00R20

TRANSMISSION, RT0-1213
CVW, 72.000

PA-121226 KLEEFMAN N1CC-300 MVT
PASSING TEST ACCELERATION 7 8TH DI GEAR



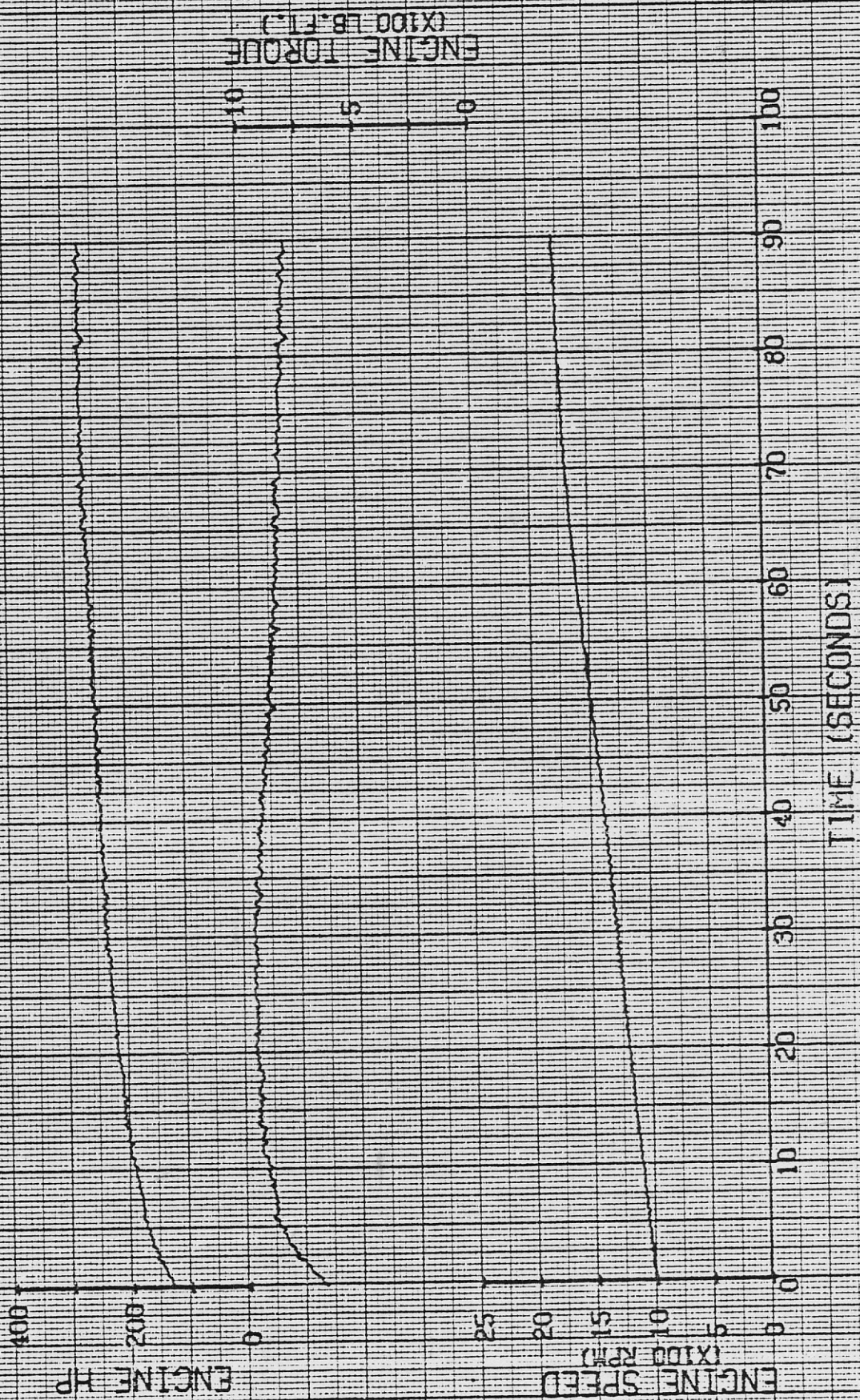
DRIVEABILITY TEST

UNIT: 21
AXLE: 3.70
12/12/79

MAKE: KENN
MODEL: K-125
TIRES: 10.00R20

TRANSMISSION: RT0-1213
CVT: 72.000

PL-121229 KLEFEMAN NTCC-300 MVT
PART THROTTLE ACCELERATION / 1000 RPM



DRIVEABILITY TEST

TRANSMISSION: RT0-1213
CVH: 72,000

MODEL: K-125

TIRES: 10.00R20

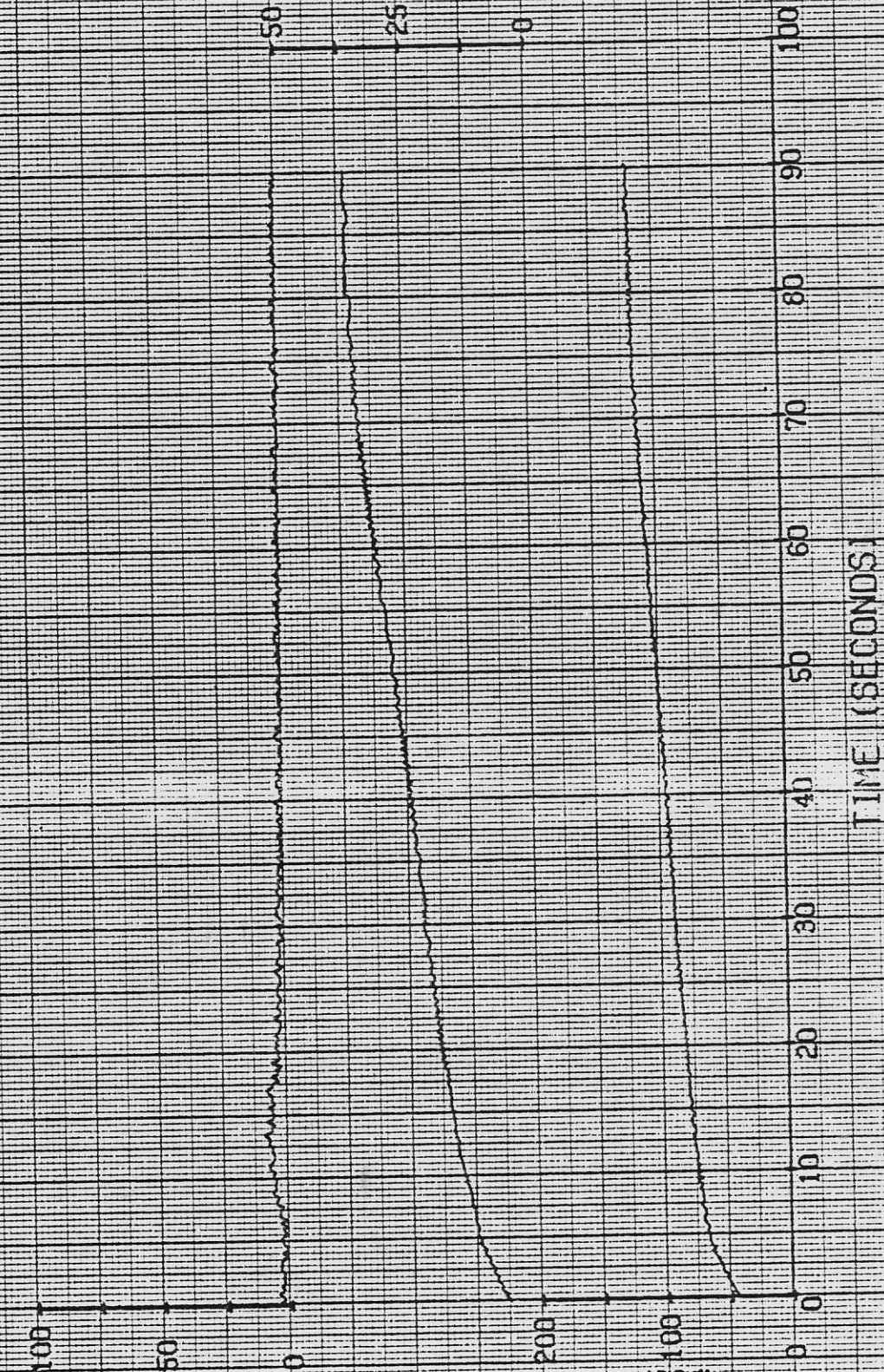
PL-121229 KLEFFMAN NICC-300 MYI
PART THROTTLE ACCELERATION / 1000 RPM

UNITY 21
AXLE: 3:70

% SMOKE OPACITY

RAIL PRESSURE (PSI)

INT. MFD. PRESS (IN HG)



TIME (SECONDS)

DRIVEABILITY TEST

TRANSMISSION, R70-1213
GVW, 72,000

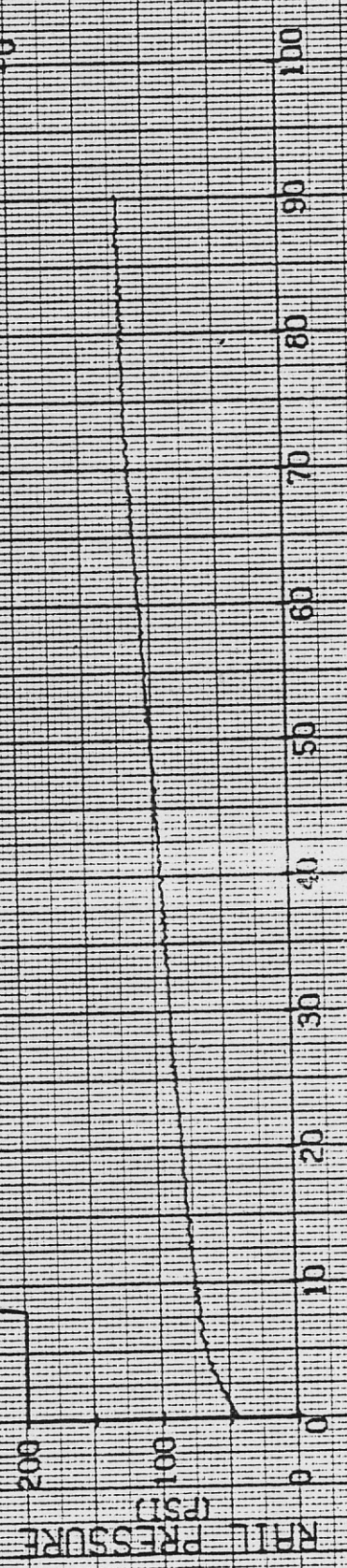
MODE, K-125
TIRES, 10.00R20

MAKE, KENW

UNITY 21
AXLE, 3.70
12/12/79

PL-121229 KLEFEMAN NICC=300 MVT
PART THROTTLE ACCELERATION / 1000 RPM

100
50
0
% M.V.T.



TIME (SECONDS)

RAIL PRESSURE
PSID

DRIVEABILITY TEST

TRANSMISSION, RTD-1213
GVW, 72,000

MODEL, K-125

TIRES, 10.00R20

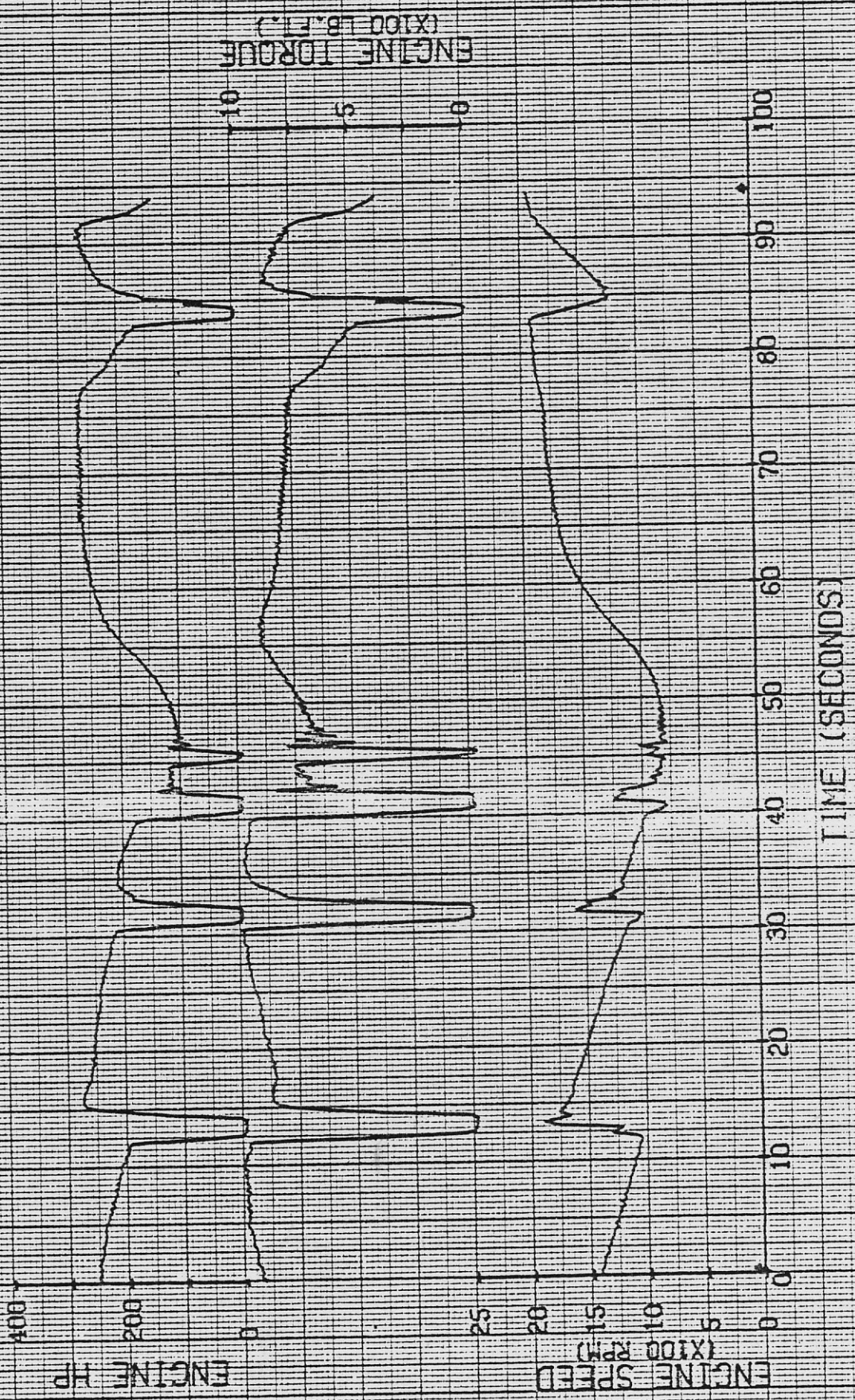
NICC-300 MVT

MAKE, KENH

SC-121205 KLEEFMAN
STEVENS CREEK HILL

UNIT, 21
AXLE, 3.70

12/12/79



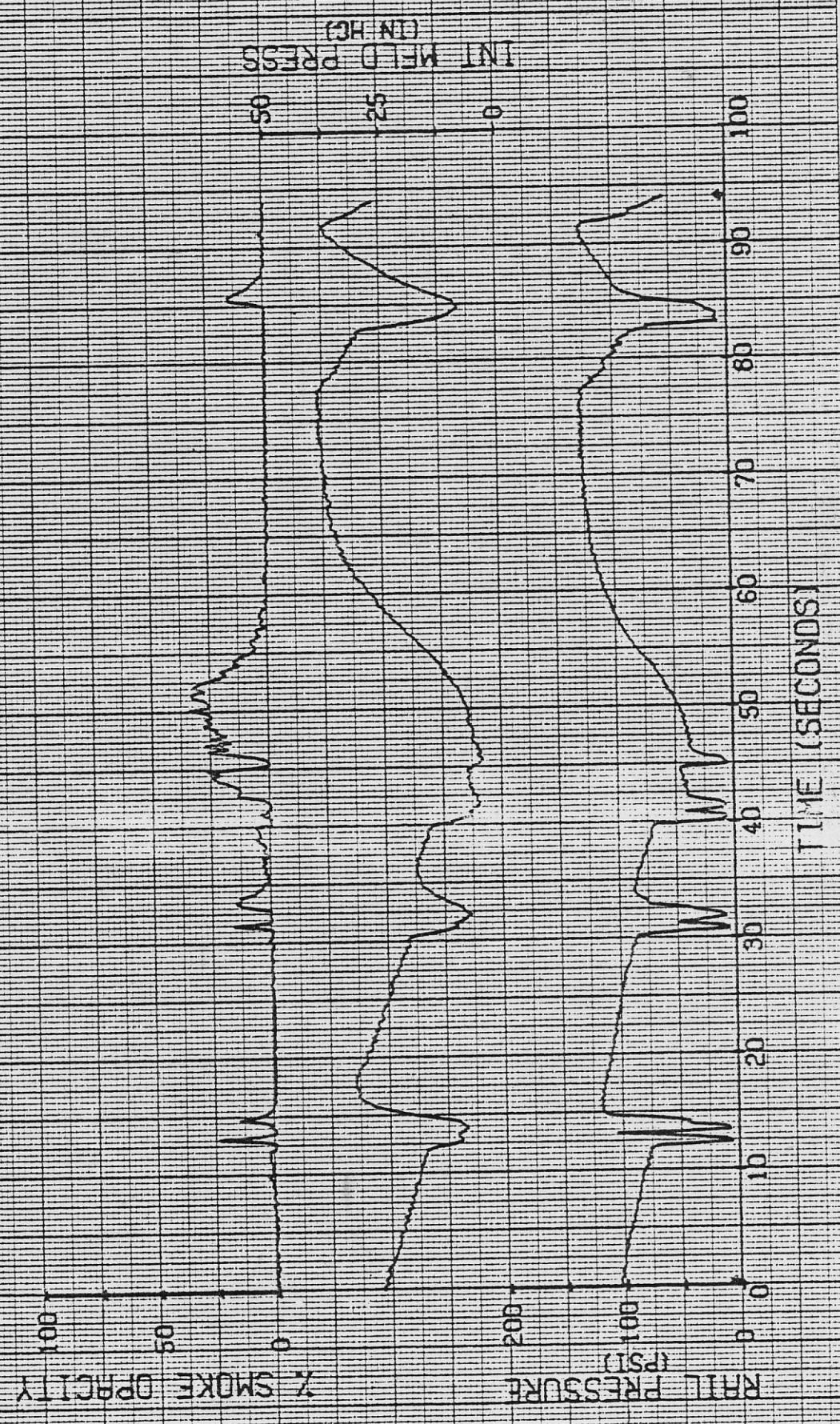
DRIVEABILITY TESTS

TRANSMISSION: R10-1213
CVT: 72.000

MODEL: K-12S
TIRES: 10.00R20

SC-121205 KLEFFMAN
STEVENS CREEK HILL
NICC-300 MVI

UNITY 21
AXLES 3.70



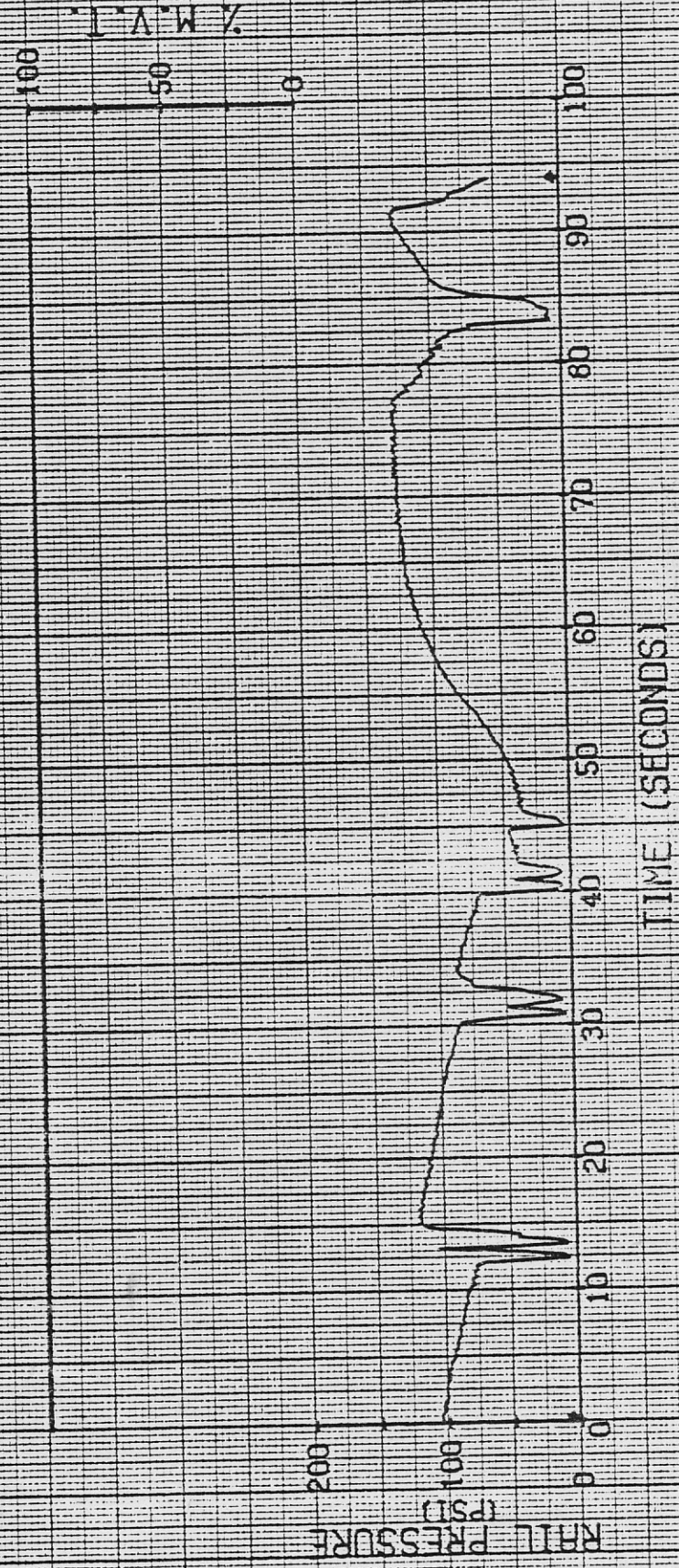
DRIVEABILITY TEST

TRANSMISSION, RT0-1213
CVW, 72.000

MODEL, K-125
TIRES, 10.00R20

SC-121205 KLEFFMAN
STEVENS CREEK HILL
NTCC-300 MVT

UNIT, 21
AXLE, 3.70
12/12/79



DRIVEABILITY TESTS

UNIT, 21

AXLE, 3.70

12/13/79

CS-121347

KLEFFMAN

NICC-300 MVT

GRADE START /

1ST GEAR /

WITH SHIFT

MAKE, KENW

MODEL, K-125

TIRES, 10.00R20

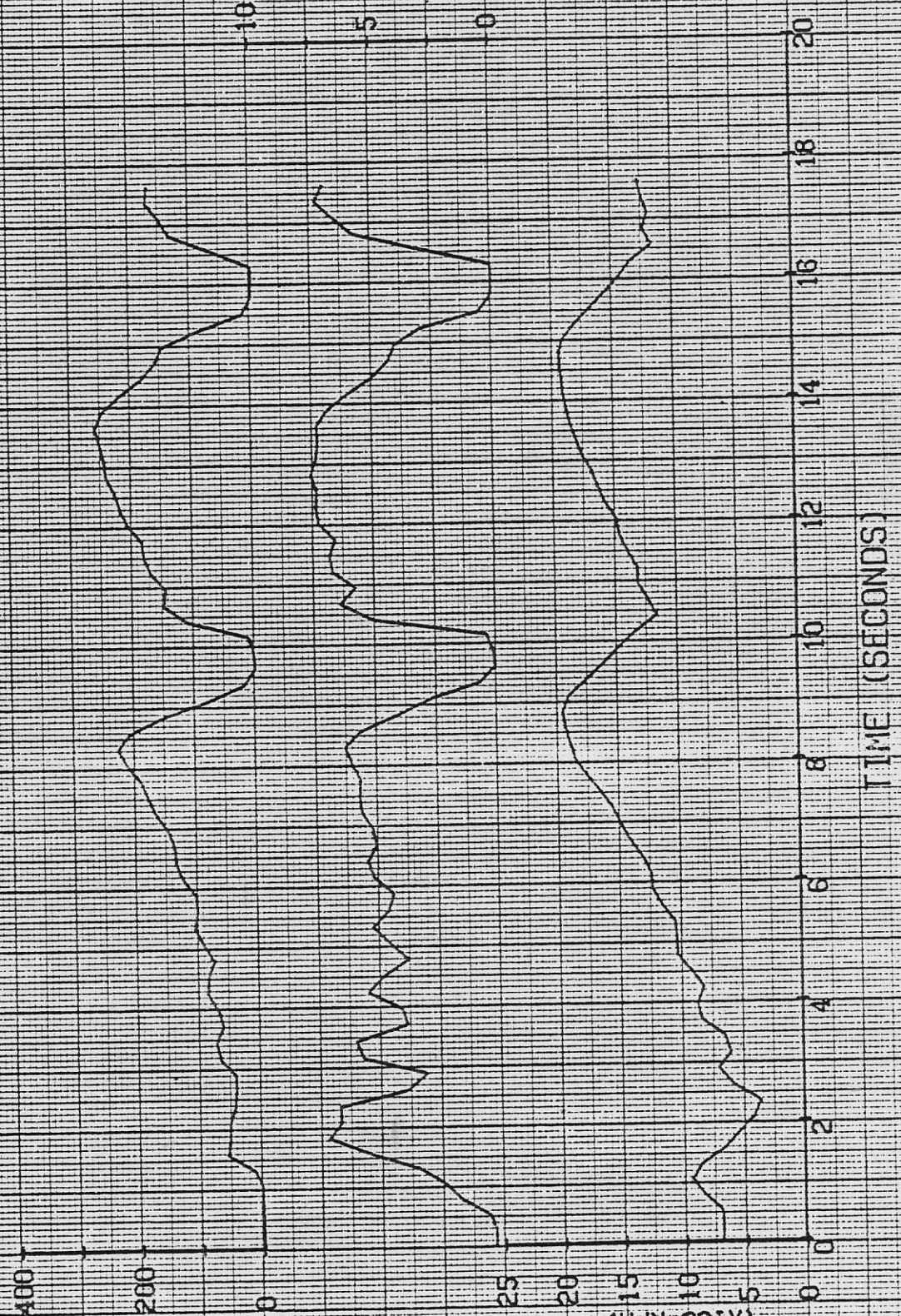
TRANSMISSION, R10-1213

C/W, 72.000

ENGINE HP

ENGINE SPEED
(X100 RPM)

ENGINE TORQUE
(X100 LB.FT.)



TIME (SECONDS)

DRIVEABILITY TESTS

UNIT, 21
AXLE, 3.70
12/13/79

MAKE, KENW
MODEL, K-125
TIRES, 10.00R20
CS-121347 KLEFFMAN
GRADE START / 1ST GEAR / WITH SHIF

TRANSMISSION, RT0-1213
CVW, 72.000



DRIVEABILITY TESTS

UNIT: 21
AXLE: 3.70
12/13/79

MAKE: KENW
MODEL: K-125
TYRES: 10.00R20

CS-121347 KLEFFMAN N100-300 MVT
GRADE START / 1ST GEAR / WITH SHIFT

TRANSMISSION: R10-1213
GVW: 72,000



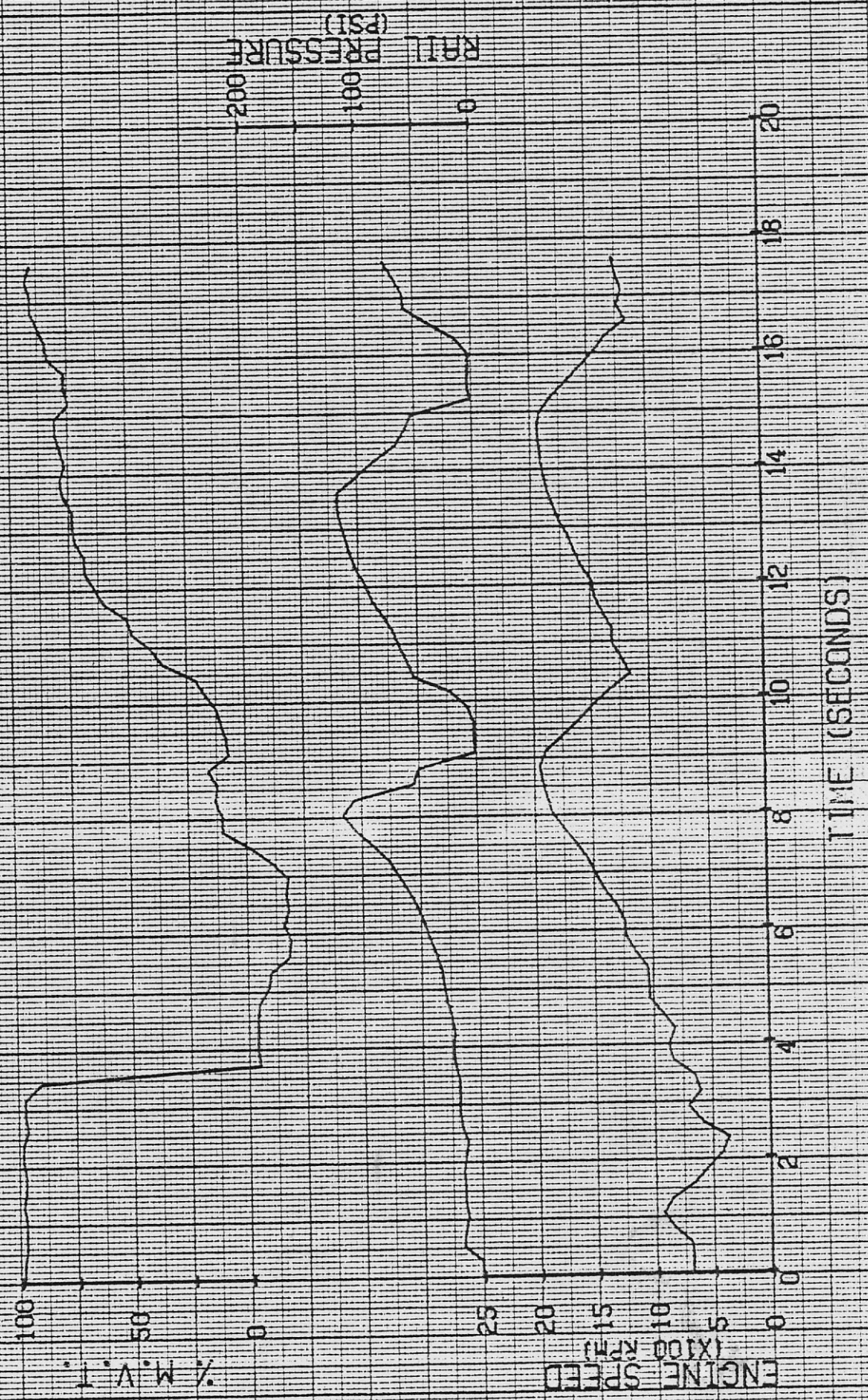
DRIVEABILITY TESTS

UNIT: 21
AXLE: 3.70
12/13/79 CS-121347 KLEFFMAN NICC-300 MYT
GRADE START / WITH SHIFT

MAKE: KENW
MODEL: X-125

TIRES: 10.00R20

TRANSMISSION: RT0-1213
GVW: 72,000



DRIVEABILITY TESTS

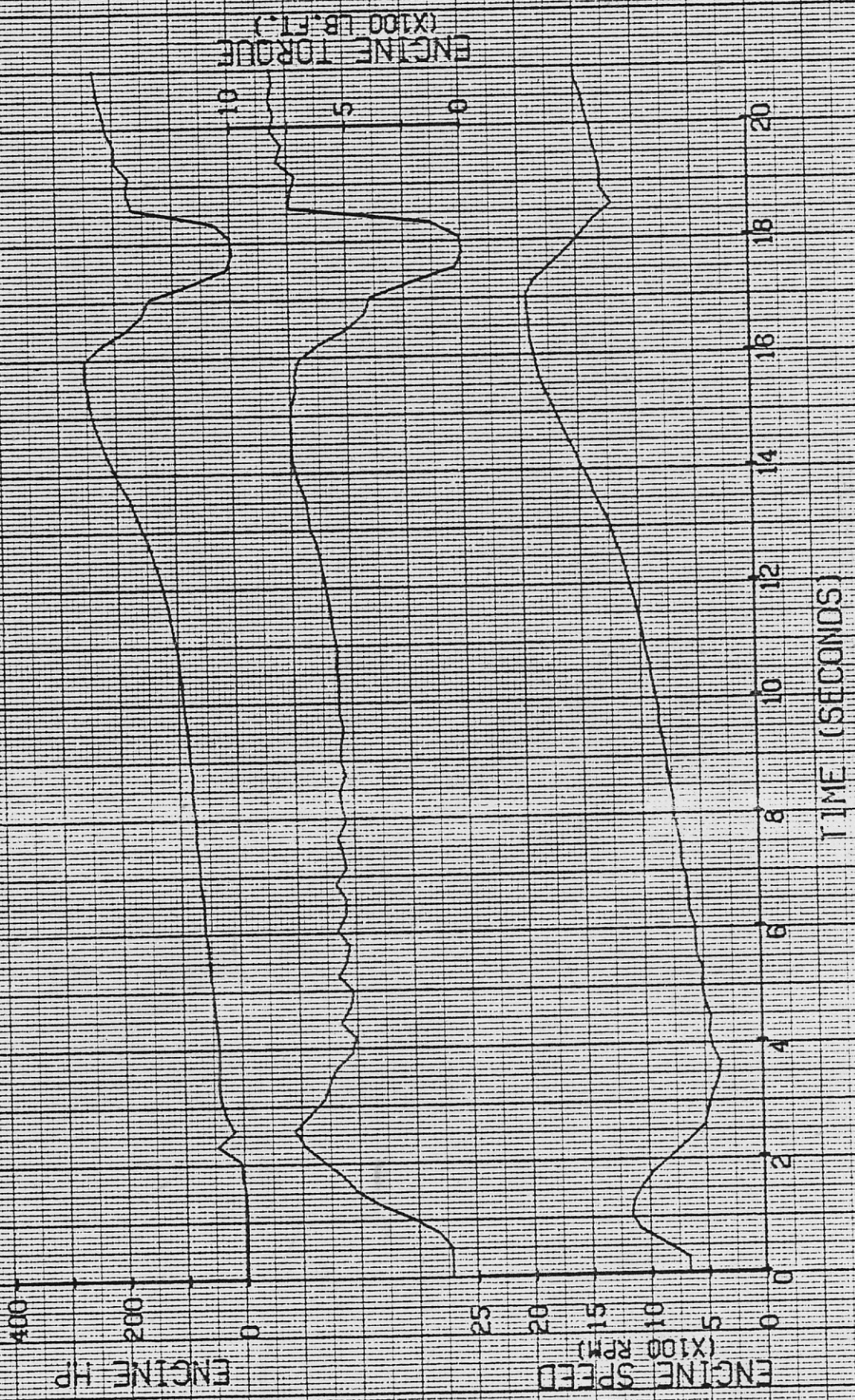
TRANSMISSION, R10-1213
GVM, 72.000

MODEL, K-125

TIRES, 10.00R20

UNIT, 21
AXLE, 3.70

CS-121349 KLEFFMAN NTCC-300 MVT
GRADE START / 2ND GEAR / WITH SHIFT

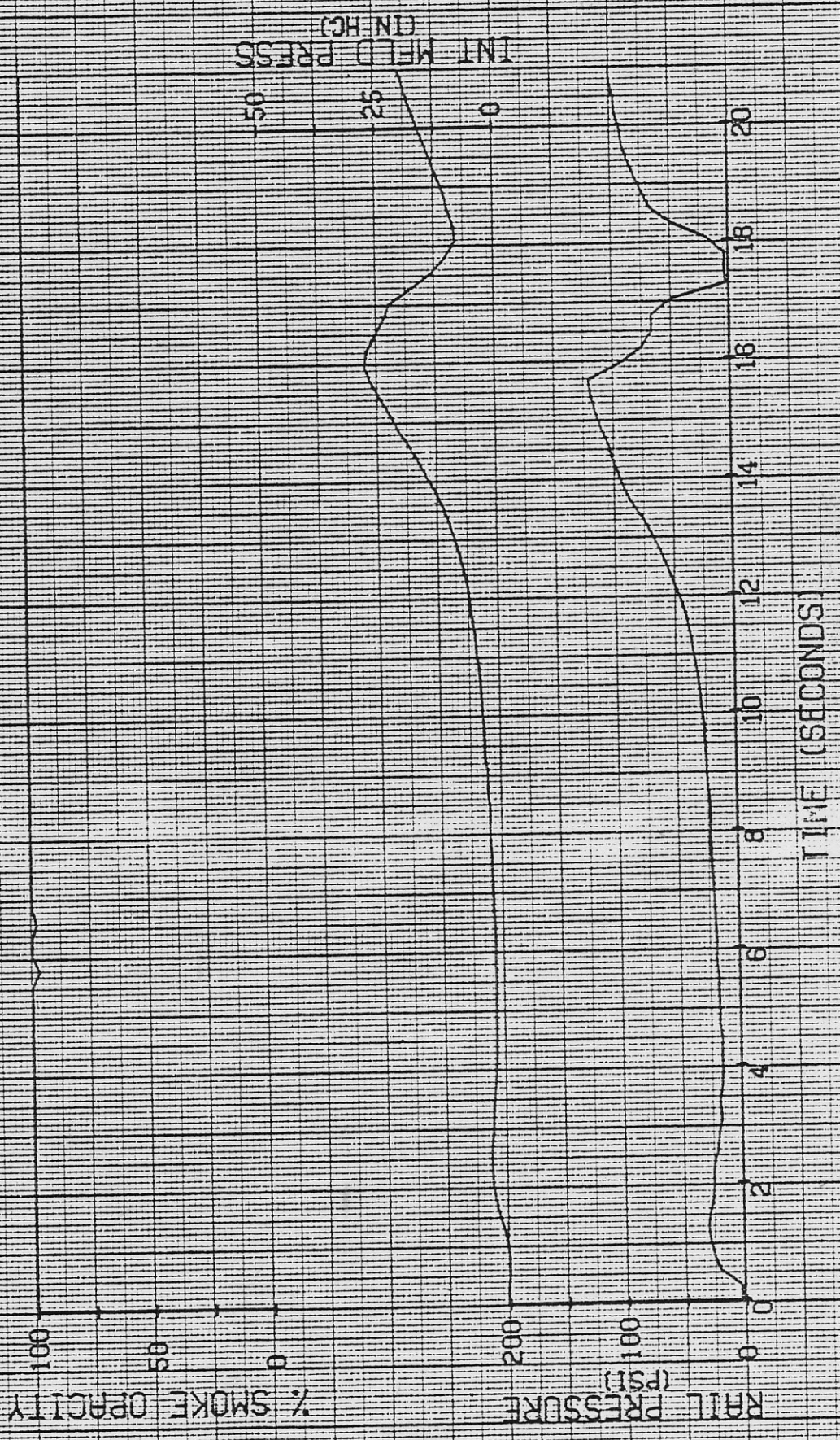


DRIVEABILITY TESTS

UNIT, 21
AXLE, 3-70
12/13/79

MAKE, KENW
MODEL, K-125
TIRES, 10.00R20
CS-121349 KLEFFMAN N1CC-300 MVT
GRADE START / 2ND GEAR / WITH SHUF

TRANSMISSION, RT0-1213
GVW, 72,000



DRIVEABILITY TESTS

JNH, 21

AXLE, 3.70

12/13/79

CS-121349 KLEEFMAN

GRADE START / 2ND GEAR / WITH SHUF

MAKE, KENH

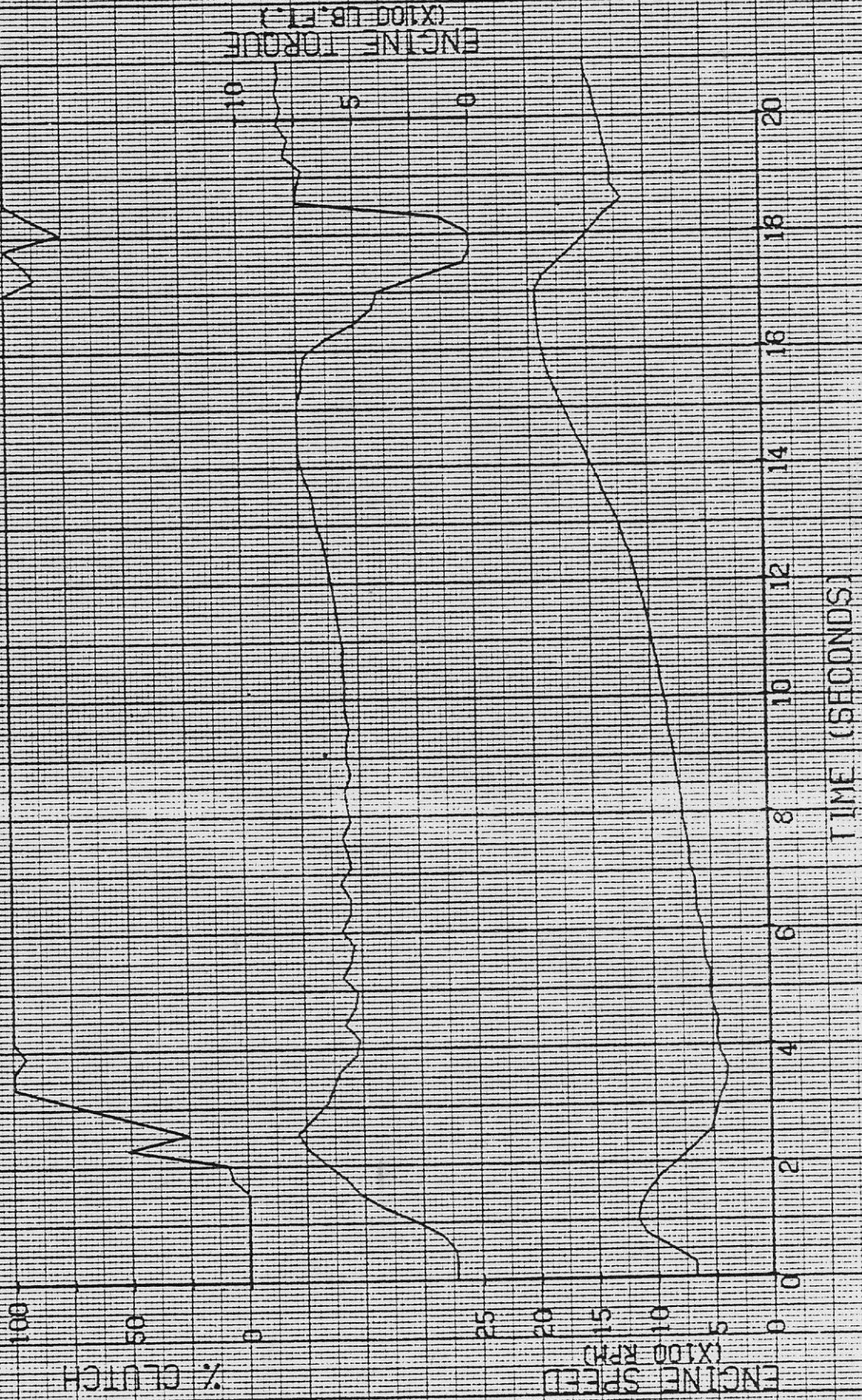
MODEL, K-125

TIRES, 10.00R20

NICC-300 MVT

TRANSMISSION, RTD-1213

GVWT 72,000



DRIVEABILITY TESTS

UNIT, 21
AXLE, 3-70
12/13/79

MAKE, KENW
MODEL, K-125
TIRES, 10.00R20

CS-121349 KLEFFMAN N100-300 MVT
GRADE START / 2ND GEAR / WITH SHIF

TRANSMISSION, RT0-1213
GVW, 72,000



DRIVEABILITY TEST

UNIT: 21
AXLE: 3.70
12/12/79

MAKE: KENW
MODEL: K-125
TIRES: 10.00R20
NICO-300 MVT
THROTTLE INTERRUPT / 1400 RPM

TRANSMISSION: RT0-1213
CYW: 72.000



DRIVEABILITY TEST

TRANSMISSION: RT10-1213
GVW: 72,000

MODEL: K-125
FIRES: 10.00R20

UNIT: 21
AXLE: 3.70
12/12/79 T1-121219 KLEEFMAN N100-300 MVT
THROTTLE INTERRUPT / 1400 RPM

% SMOKE OPACITY

RAIL PRESSURE (PSI)

INT MFLD PRESS (IN HG)



DRIVEABILITY TESTS

TRANSMISSION: R10-1213
CVW: 72.000

MODEL: K-125
TIRES: 10.00R20

UNIT: 21
AXLE: 3.70
12/12/79 TI-121219 KLEFEMEN NICC-300 MVT
THROTTLE INTERRUPT / 1400 RPM



TIME (SECONDS)

% M.V.I.

ENGINE SPEED
(X100 RPM)

RAIL PRESSURE
(PSI)

DRIVEABILITY TEST

TRANSMISSION: RT0-1213
CVH: 72.000

MODEL: K-125
FIRES: 10.00x20

UNIT: 21
AXLE: 3.70
12/12/79

UR-121218 KLEFEMAN NTCC-300 MVT
UPGRADE POWER RECOVERY / 1400 RPM



ENGINE TORQUE
(X100 LB.FT.)

10
5
0

TIME (SECONDS)

DRIVEABILITY TESTS

TRANSMISSION: R10-1213
CVT: 72,000

MODEL: K-125
TIRES: 10,00R20

UR: 121218 KLEFFEMAN NICC-300 MVT
UPGRADE POWER RECOVERY / 1400 RPM

UNIT: 21
AXLE: 3.70

% SMOKE OPACITY

RAIL PRESSURE (PSID)

INT WELD PRESS (IN HG)



TIME (SECONDS)

DRIVEABILITY TEST

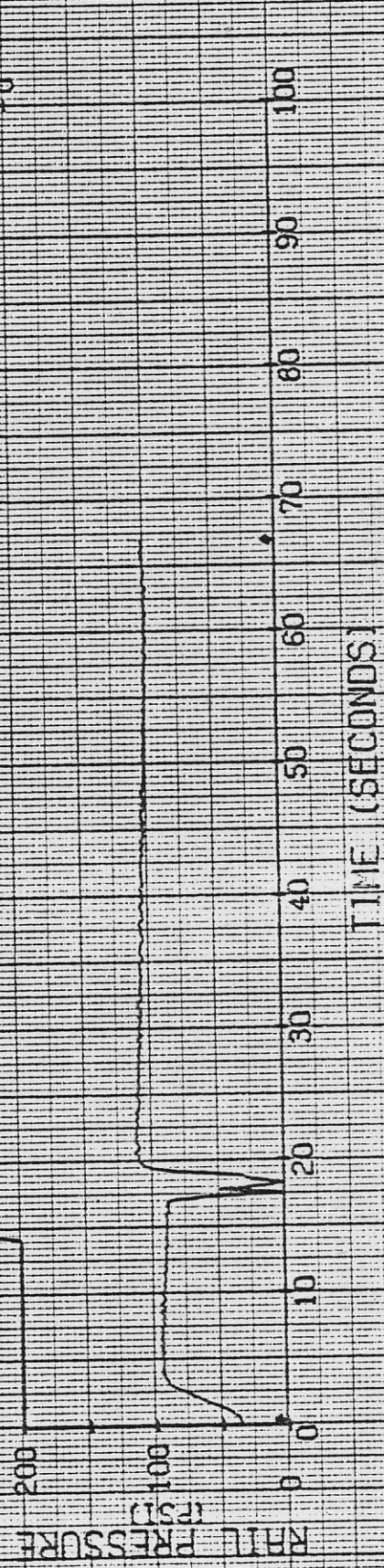
TRANSMISSION: R10-1213
CVT: 72.000

MODEL: K-125
TIRES: 10.00R20

MAKE: KENH

UNIT: 21
AXLE: 3.70

UR-121218 KLEFFMAN NICC-300 MVT
UPGRADE POWER RECOVERY / 1400 RPM



% M.V.T.

100
50
0

TIME (SECONDS)

DRIVEABILITY TESTS

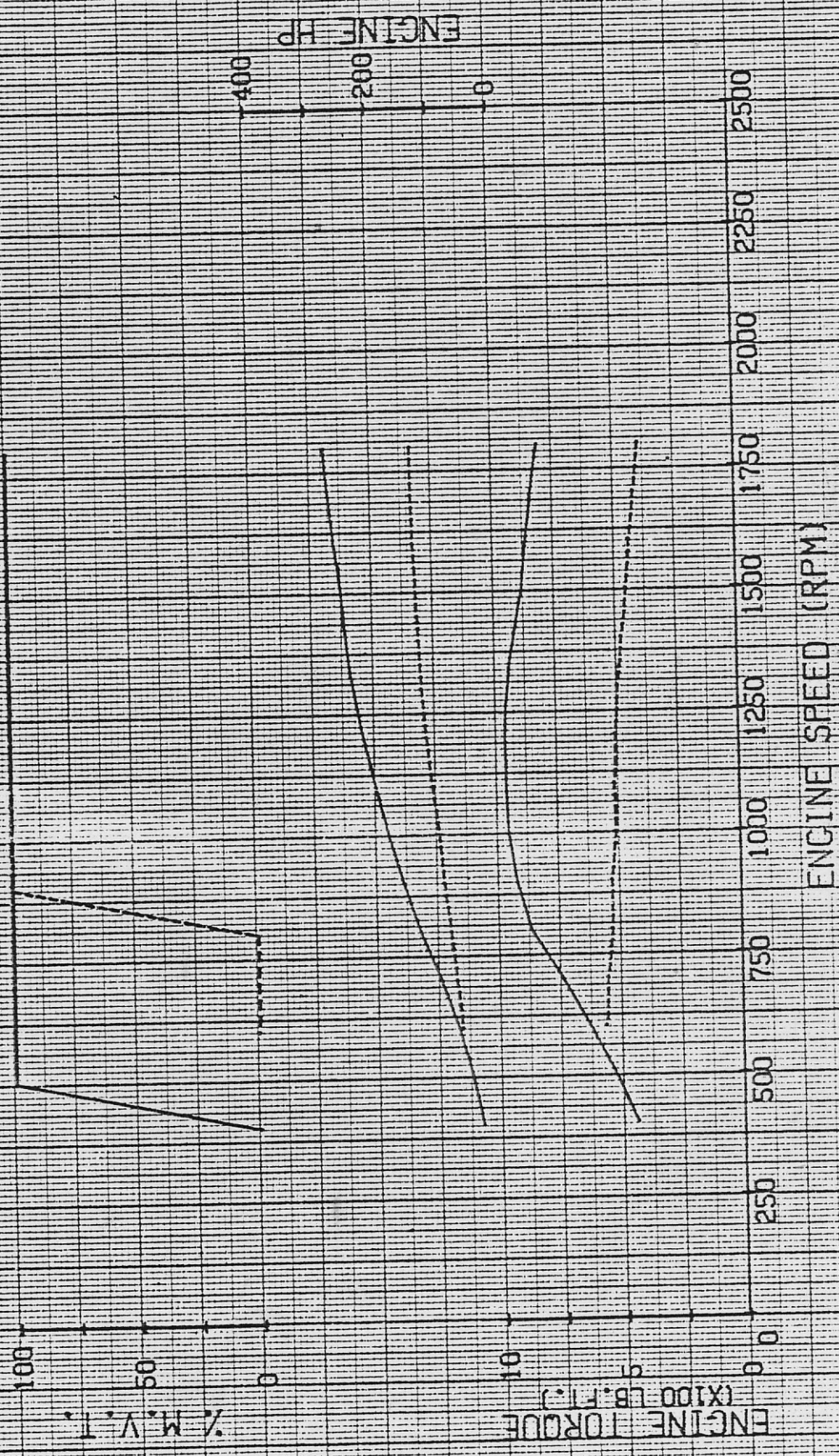
UNIT: 21
 AXLE: 3.70
 TRANSMISSION: RT0-1213
 CVW: 72,000

MAKER: KENN
 MODEL: K-125

TIRES: 10.00R20

12/11/79 IC-121104 KLEFFMAN NICC-300 MVT
 TORQUE CURVE / 5TH DI GEAR / WITH AIR

12/11/79 IC-121101 KLEFFMAN NICC-300 MVT
 TORQUE CURVE / 3RD GEAR / NO AIR



DRIVEABILITY TESTS

TRANSMISSION: RT0-1213
CVN: 72.000

MODEL: K-125
TIRES: 10.00R20

UNIT: 21
AXLE: 3.70
12/11/79

TC-121101 KLEFFMAN N10C-300 MVT
TORQUE CURVE / 5TH DI GEAR / WITH AIR

12/11/79 TC-121104 KLEFFMAN N10C-300 MVT
TORQUE CURVE / 3RD GEAR / NO AIR

