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CODE 2
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NEBRASKA TRACTOR TEST LABORATORY
DEPARTMENT OF BIOLOGICAL SYSTEMS ENGINEERING
INSTITUTE OF AGRICULTURE AND NATURAL RESOURCES
UNIVERSITY OF NEBRASKA - EAST CAMPUS
LINCOLN, NEBRASKA 68583-0832, USA

REPORT ON TEST IN ACCORDANCE WITH OECD STANDARD CODE 2 FOR THE OFFICIAL TESTING OF AGRICULTURAL TRACTORS



CATERPILLAR CHALLENGER 85E
Rubber Track Laying - 30 km/h Version

MANUFACTURED BY:	**Caterpillar Agricultural Products, Inc.** **12101 Barber Greene Road** **De Kalb, IL 60115 USA**
NEBRASKA TEST NO.	**1750**
TEST DATES:	**May 13 - June 2, 1998**

This test report provides the results of the tests conducted in accordance with the OECD Standard Test Code for the Official Testing of Agricultural Tractor Performance - C(87)53 Final, Code 2.

This report has been approved by the OECD Coordinating Centre in Paris on 7 October 1998 for the Caterpillar Challenger 85E, Rubber Track Laying - 30 km/h version, 10-speed transmission with OECD Number 2/1787.

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Dr. Leonard L. Bashford, Director
Nebraska Tractor Test Laboratory and
Chair, Nebraska Tractor Test Board

Dr. Michael F. Kocher, Member
Nebraska Tractor Test Board

David L. Morgan, Assistant Director
Nebraska Tractor Test Laboratory

Dr. Robert D. Grisso, Member
Nebraska Tractor Test Board

Brent T. Sampson
Test Engineer

Date: OCT 19 1998

LINCOLN, NEBRASKA 68583-0832, USA

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- Tractor manufacturer's name and address:	Caterpillar Agricultural Products Inc. 12101 Barber Greene Rd. De Kalb, IL 60115 USA
- Location of tractor assembly:	Same
- Submitted for test by:	The manufacturer
- Selected for test by:	The manufacturer in agreement with the test station.
- Place of running-in:	Caterpillar Proving Grounds Peoria, Illinois USA
- Duration of running-in:	121 hr
- Location of test:	Nebraska Tractor Test Laboratory University of Nebraska Lincoln, Nebraska 68583-0832 USA

1. SPECIFICATIONS OF TRACTOR

1.1 Identification

- Make/Model/Type:	Caterpillar Challenger 85E Unit construction, Rubber Track Laying - 30 km/h
- Number of driving wheels:	Two rubber tracks
- Serial No:	6JS201
- 1st Serial No:	This model is the first of the 6JS series

1.2 Engine

- Make/Model/Type:	Caterpillar 3196 Diesel, direct injection, turbocharged and air to air aftercooled
- Serial No:	6AR00825

1.2.1 *Cylinders*

- Number/disposition:	6, in-line, vertical
- Bore/stroke:	130 mm x 150 mm
- Capacity:	11946 cm^3
- Compression ratio:	16.0 to 1
- Arrangement of valves:	Overhead
- Cylinder liners (wet or dry):	Wet, replaceable

1.2.2 *Supercharging*

- Make/Model/Type:	Garret/1355394/radial flow/exhaust gas driven
- Pressure:	Low Power 128.6 kPa +/- 19.3 kPa High Power 155.0 kPa +/- 23.3 kPa

1.2.3 *Fuel system*

- Fuel feed system:	Engine driven transfer pump
- Make/Model/Type of fuel filter(s):	Caterpillar/133-5673
-primary filter	paper element 1R0762
-secondary filter	paper element
- Capacity of fuel tank:	1060 l
- Make/Model/Type of injection pump:	Caterpillar electronically controlled unit injector system
- Serial No:	None - pump is integral part of engine
- Manufacturer's production setting of injection pump	
- Flow rate (rated engine speed):	
Gears 1 & 2, and PTO	50.6 +/- 2.53 kg/hr
Gears 3 - 10	55.5 +/- 2.76 kg/hr
- Fuel density	0.846 g/cm^3
- Timing:	Variable, electronically controlled
- Make/Model/Type of injectors:	Caterpillar part # 116-5426
- Injection pressure:	
Gears 1 & 2, and PTO	131 MPa
Gears 3 - 10	140 MPa

1.2.4 *Governor*

- Make/Model/Type:	Caterpillar/ADEM II Engine Management
- Governed range of engine:	880 to 2300 rev/min
- Rated engine speed:	2100 rev/min

1.2.5 *Air cleaner*

- Pre-cleaner	
. Make/Model/Type:	Donaldson/Cat #1488281/Dust ejector
. Location of air intake:	Above right front fender
- Main cleaner	
. Make/Model/Type:	Donaldson/Cat # 6I2505 and 6H2506/ Dry paper dual element
. Location of air intake:	Above right front fender
- Maintenance indicator:	Restriction gauge air intake near air cleaner

1.2.6 *Lubrication system*

- Type of feed pump:	Gear pump
- Type of filer(s):	Spin-on, Caterpillar 1R0716
- Number of filters:	One

1.2.7 *Cooling system*

- Type of coolant:	Liquid
- Type of pump:	Centrifugal, gear driven
- Specification of fan or blower	
. Number of fan blades:	8
. Fan diameter:	914 mm
- Coolant capacity:	76 l
- Type of temperature control:	Thermostat
- Superpressure system:	48 kPa

1.2.8 *Starting system*

- Make/Model/Type:	Delco/42MT/solenoid-engaged
- Starter motor power rating:	5.6 kW
- Cold starting aid:	Ether spray in intake manifold
- Safety device:	Transmission neutral switch

1.2.9 *Electrical system*

- Voltage:	12 V
- Generator	
. Make/Model/Type:	Delco Remy/Cat # 1259597
. Power:	145 amps at 2100 engine revs/min
- Battery of accumulators	
. Number:	2
. Rating	950 Cold Cranking Amps

1.2.10 *Exhaust system*

- Make/Model/Type:	Donaldson/305 mm diameter (Cat # 1365108)
- Location:	Muffler and exhaust pipe vertical on right front fender

1.3 Transmission

1.3.1 *Clutch (travel and power take-off/travel alone)*

- Make/Model/Type:	Caterpillar, wet disc, integral with transmission, oil cooled
- Number of plates:	6
- Diameter of plates:	215 mm
- Method of operation:	Hydraulic, pedal actuated

1.3.2 *Gear box*

- Make/Model/Type: Caterpillar, direct drive, full powershift transmission
- Description: Four rotating countershaft clutches and the four stationary planetary clutches

	Forward	Reverse
Number of gears	10	2
Number of ranges/groups	All gears accessible with use of single hand lever.	All gears accessible with use of single hand lever.
Total of arrangements	1	1

- Available options: None

1.3.3 *Rear axle and final drives*

- Make/Model/Type: Caterpillar/outboard single reduction pinion and bull gear

- Differential lock
  - . Type: Not applicable
  - . Method of engagement:
  - . Method of disengagement:

1.3.4 *Front axle and final drives* Not applicable

1.3.5 *Total ratios and traveling speeds*

Gear No.	Group or range	Number of engine revolutions for one revolution of the driving wheels	Nominal traveling speed (*) at rated engine speed of 2100 min^{-1} (rev/min) km/h
1		93.66	4.5
2		65.34	6.4
3		53.05	7.9
4		46.39	9.0
5		40.45	10.4
6		37.01	11.3
7		32.37	13.0
8		28.22	14.9
9		20.81	20.2
10		14.52	28.9
1R		128.23	3.3
2R		55.37	7.6
(*) Calculated with a rear track dynamic radius of 526 mm.			

1.4 Power take-off

1.4.1 *Main power take-off*

- Type:	Independent
- Method of engagement:	Multiple wet clutch hydraulically actuated by lever, independent of main drive clutch
- Number of shafts:	1
- Method of changing power take-off shaft ends and speeds:	None

1.4.1.1 Power take-off proportional to engine speed

Power take-off at 1000 min^{-1} (rev/min)

- Location:	Rear of tractor; center plane
- Diameter of power take-off shaft end:	45 mm
- Number of splines:	20, conforms to ISO 500:1991
- Height above ground:	746 mm
- Distance from the median plane of the tractor:	0 mm
- Distance behind rear-wheel axis:	382 mm
- PTO speed at rated engine speed:	1024 rev/min
- Engine speed at standard power take-off speed:	2050 rev/min
- Ratio of rotation speeds (engine speed/p.t.o. speed):	2.05 to 1
- Power restriction:	Dependent on gear selection
- Maximum torque transmissible:	1898 N-m
- Direction of rotation (viewed from behind tractor):	Clockwise

1.4.2 Optional power take-off — N/A

1.5 Hydraulic power lift

- Make/Model/Type:	Caterpillar
- Type of hydraulic system:	Closed center; load sensing
- Type and number of cylinders (single or double-acting):	N/A
- Type of linkage lock for transport:	N/A
- Compensator pressure setting:	19.981 +/- 0.35 MPa margin pressure = 2.8 +/- 0.10 MPa
- Opening pressure of cylinder line relief valve (if fitted):	N/A
- Lift pump type:	Vickers/PVH63/Axial piston, pressure and flow compensated
- Transmission between pump and engine:	Gear drive from transmission
- Type and number of filters:	1 spin-on cartridge and screen in return line
- Site of oil reservoir:	Behind cab, left side
- Type, number and location of tapping points:	ISO-5675 standard couplings, 4 pairs located at rear of tractor
- Maximum volume of oil available to external cylinders:	40 l

1.6 Three point linkage

Not available on this model.

1.7 Swinging drawbar

- Type:	Oscillating
- Height above ground	
. Maximum:	440 mm
. Minimum:	
- Type of adjustment:	None
- Distance of hitch point from rear-wheel axis, horizontally:	882 mm
- Distance of hitch point from power take-off shaft end	
. Vertically:	306.5 mm
. Horizontally:	500 mm
- Lateral adjustment (centre of clevis)	
. Right hand	431 mm
. Left hand	431 mm
- Distance of pivot point from rear-wheel axis, horizontally:	730.5 mm
- Diameter of drawbar pin hole:	50 mm
- Maximum vertical permissible load:	22.2 kN

1.8 Trailer hitch Not Available

1.9 Holed drawbar N/A

1.10 Steering

- Make/Model/Type:	Caterpillar/Differential Steer
- Method of operation	
. Pump(s):	Sauer-Sundstrand piston pump and Rexroth motor, pilot activated valves, controlled by steering wheel
. Ram(s):	N/A
- Working pressure:	41.5 MPa

1.11 Brakes

1.11.1 *Service brake*

- Make/Model/Type: Caterpillar, multiple wet disc, oil cooled, hydraulically boosted, located in steering differential
- Method of operation: Manual pedal operated
- Trailer braking take-off : None

1.11.2 *Parking brake*

- Type: Caliper, dry disc
- Method of operation: Manual/mechanical, lever operated

1.12 Wheels

- Number N/A
  . Front:
  . Rear:
- Wheelbase: N/A

- Track width adjustment:

	Minimum	Maximum	Adjustment
	mm	mm	method
Rear	2286	2286	None

1.13 Protective structure

- Make/Model/Type: Caterpillar/136-5500/Cab
- Manufacturer's name and address: Caterpillar Inc.
  100 N.E. Adams
  Peoria, IL 61629 USA

- Protective device
  . Cab/frame/rollguard/ other: Cab
  . Tiltable/not tiltable: Not tiltable

- OECD Approval
  . Approval Number: None. Certified to ISO 3449: 1992, ISO 3471: 1986
  . Date of Approval: N/A
  . Nos. of minor modification certificates, if any: N/A

1.14 Seat

1.14.1 *Driver's seat*

- Make/Model/Type:	Sears/(Cat # 136-5411)/low profile
- Seat and steering wheel reversible:	No
- Type of suspension:	Air suspension
- Type of damping:	Air spring and adjustable oil shocks - 3 positions
- Range of adjustment	
. Longitudinally:	177.8 mm
. Vertically:	76 mm (in addition to 80 mm suspension)
- Safety Belt:	Yes

1.14.2 *Optional driver's seat(s)* Not available

1.14.3 *Passenger seat*

- Location:	To the left of driver's seat
- Capacity (number):	1

1.15 Lighting

	Height above ground of centre	Size	Distance from outside edge of lights to median plane of tractor
	mm	mm	mm
Headlights	1842	102 x 305	318
Rear Work Lights	3385	114 x 114	381, 597, 845
Front Work Lights	1457	114 x 114	1041, 1314
Rear Reflectors	1784	184 x 38	965
Rear Lights	1784	184 x 38	965
Stop Lights	1715	44 x 89	927

2. TEST CONDITIONS

2.1 Overall dimensions

	Length	Width		Height at top of	
		minimum	maximum	protective structure	exhaust pipe
	mm	mm	mm	mm	mm
Unballasted	6005	3048	3048	3400	3668
Ballasted	6473	3048	3048	3400	3668

2.2 Ground clearance (unballasted tractor): 378.3 mm

- Clearance-limiting part: Drawbar anchor point

2.3 Tractor mass

Mass (with cab):

	Unballasted		Ballasted	
	Without driver (kg)	With driver (kg)	Without driver (kg)	With driver (kg)
Total	15833	15908	17493	17568

	Number of weights	Weight mass (kg)	Liquid (kg)
Front Bracket	1	70	0
Front Weights	20	45	0
Rear Weights	13	46	0
Test Equipment	1	92	0

2.4 Track specifications

Track materials	Rubber covered steel cables
Track width and base	762 mm, 2721 mm
Dynamic radius (rolling radius)	525.8 mm
Track support system	Four bogie axles with pneumatic suspension
Treadbars: Total per track Number per meter Bar length at top Bar width at top Bar height	 72 8.2 360 mm 40 mm 63 mm
Track length	8529 mm
Track ground contact length	2721 mm

2.5 Tyres and track width specifications

	Front	Rear
Tyres:	N/A	N/A
- dimensions		
- ply rating		
- type		
- maximum load (tyre manufacturer's)		
- maximum load (tractor manufacturer's)		
- inflation pressure (tyre manufacturer's)		
- dynamic radius index		
Chosen track width		

2.6 Fuel

- Type: Grade 2-D, in conformity with national standard.
- Density at 15°C: 0.846 g/cm^3

2.7 Oils and lubricants

2.7.1 *Capacity and change interval*

	Capacity	Oil change	Filter change
	L	H	H
Engine	26	250	250
Gear box	57	1000	500
Front axle	N/A	N/A	N/A
Rear axle	N/A	N/A	N/A
Final drive (front)	N/A	N/A	N/A
Final drive (rear)	216	1000	None
Hydraulic system (*)	68	1000	500
Steering, common with final drive (rear)			

2.7.2 *Specifications (SAE, API, CCMC, ACEA, Mil.L, ISO)*

	Recommended	Used during test
Engine oil . Type: . Viscosity: . Classification:	Caterpillar fluids SAE 15W40 API-CF-4	Same
Transmission oils . Type: . Viscosity: . Classification:	Caterpillar fluids SAE 10W TO-4	Same
Hydraulic fluid . Type: . Viscosity: . Classification:	Caterpillar fluids SAE 10W HYDO	Same
Steering oil . Type: . Viscosity: . Classification:	Caterpillar fluids SAE 10W HYDO	Same

2.7.3 *Grease*

- Number of lubrication points: 3

3. COMPULSORY TESTS RESULTS

3.1 Main power take-off

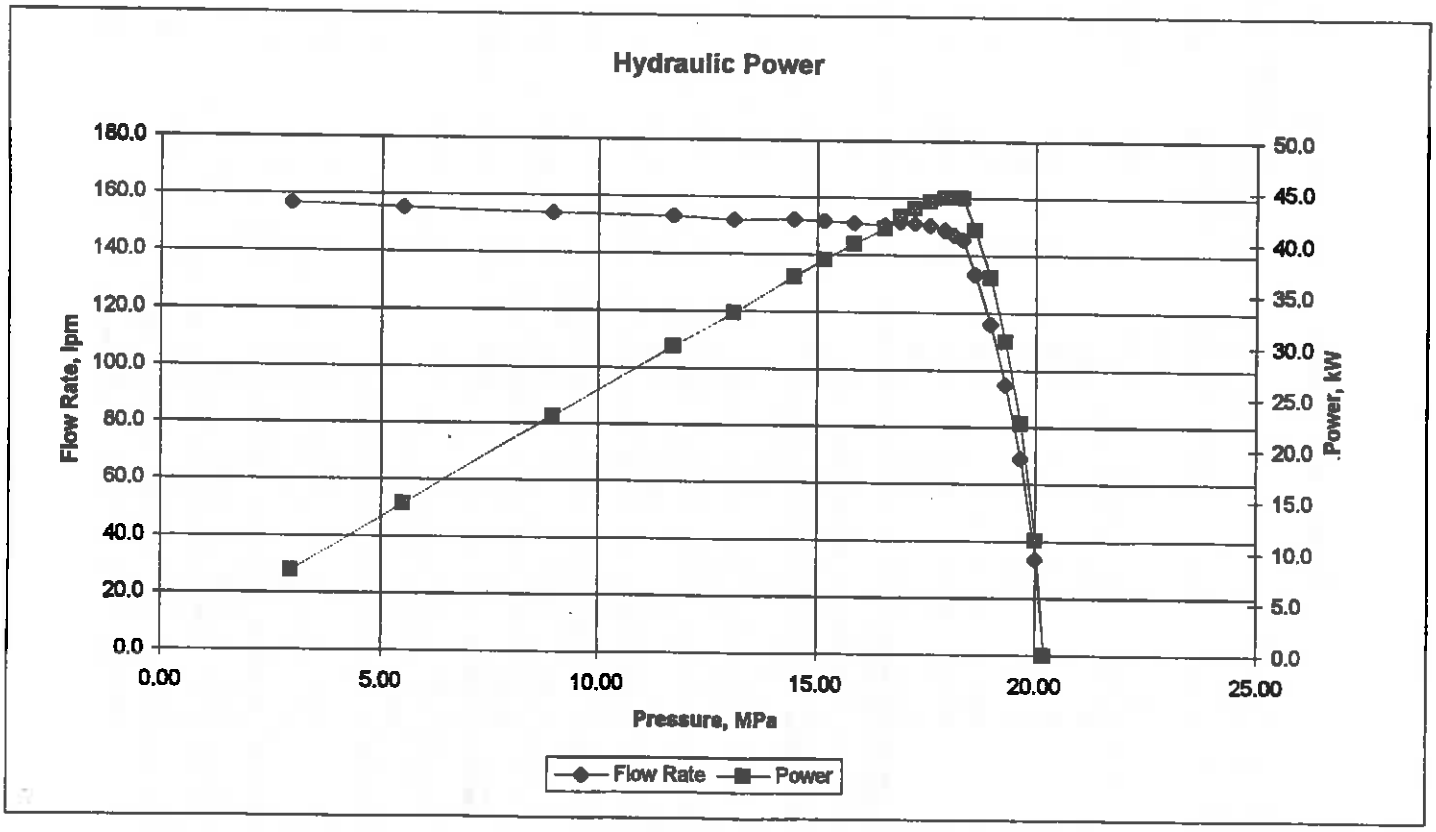
- Date and location of tests: 12-May-98 Nebraska Tractor Test Laboratory, Lincoln, NE, USA
- Type of dynamometer bench: Eaton 700 hp

Power	Speed		Fuel consumption			Specific energy
			Hourly		Specific	
kW	Engine	PTO	kg/h	l/h	g/kWh	kW-h/l
3.1 MAXIMUM POWER - TWO HOUR TEST						
250.33	1800	876	53.21	62.87	213	3.98
3.1.2 POWER AT RATED ENGINE SPEED						
226.14	2100	1023	51.49	60.84	228	3.72
3.1.3 STANDARD POWER TAKE-OFF SPEED						
227.87	2054	1000	51.22	60.52	225	3.77
3.1.4 PART LOADS						
3.1.4.1 the torque corresponding to maxiimum power at rated engine speed						
226.14	2100	1023	51.49	60.84	228	3.72
3.1.4.2 85% of torque obtained in 3.1.4.1						
198.02	2159	1052	47.22	55.79	238	3.55
3.1.4.3 75% of torque defined in 3.1.4.2						
153.00	2230	1086	39.33	46.47	257	3.29
3.1.4.4 50% of torque defined in 3.1.4.2						
105.24	2302	1121	31.71	37.46	301	2.81
3.1.4.5 25% of torque defined in 3.1.4.2						
52.52	2302	1121	22.72	26.85	433	1.96
1.4.6 unloaded						
1.19	2302	1121	14.02	16.56	11742	0.07
3.1.5 PART LOADS AT STANDARD POWER TAKE-OFF SPEED						
3.1.5.1 the torque corresponding to maximum power						
227.87	2054	1000	51.22	60.52	225	3.77
3.1.5.2 85% of torque obtained in 3.1.5.1						
200.83	2131	1037	47.22	55.79	235	3.60
3.1.5.3 75% of torque defined in 3.1.5.2						
152.58	2159	1051	39.05	46.15	256	3.31
3.1.5.4 50% of torque defined in 3.1.5.2						
103.49	2193	1068	30.48	36.02	295	2.87
3.1.5.5 25% of torque defined in 3.1.5.2						
52.25	2225	1084	21.64	25.56	414	2.04
3.1.5.6 unloaded						
1.17	2253	1097	13.47	15.92	11533	0.07

- No load maximum engine speed: 2302 rev/min
- Torque (equivalent crankshaft) at rated speed:
  - At rated engine speed 1028 Nm
  - At 2-hour test 1328 Nm
- Maximum torque (equivalent crankshaft): 1455 Nm
  (engine speed: 1400 rev/min)

Mean atmospheric conditions:		
Dry bulb	25	C
Pressure	97.1	kPa
Relative Humidity	57	%
Maximum temperatures:		
Coolant	88	C
Engine oil	107	C
Fuel	52	C
Engine air intake	47	C

Date of Test: 18-May-98	Caterpillar Challenger 85E	
Location of Test-City-State:	Tractor Test Lab, Lincoln, NE, USA	
Tapping point used for test:	**Remote hydraulic outlets**	
I. Sustained pressure with pump stalled:		
20.20 MPa		
2930 psig		
II. Pump delivery rate at minumum pressure and rated engine speed:		
156.7 l/min		
41.4 gpm		
III. Flow rate, pressure, power:		
90% of relief valve setting		
147.3 l/min	18.13 MPa	44.5 kW
38.9 gpm	*2630 psig*	*59.7 hp*
Maximum hydraulic power:		
147.3 l/min	**18.13 MPa**	44.5 kW
38.9 gpm	*2630 psig*	*59.7 hp*
IV. Hydraulic fluid temperature at flow meter:		
70.0 °C		
158 °F		
This hydraulic system does not use an accumulator. Opening and closing pressures of the unloading valve could not be measured.		



3.3 DRAWBAR POWER TEST(Rubber Track Laying - Unballasted tractor, 1900 rev/min)

OECD Drawbar Data (SI)

Date of tests: 18-May-98 | Fuel density: 0.846 kg/l
Type of track: Concrete | Test number 1750

Gear	Power	Pull	Speed	Engine speed	Slip	SFC	SFE	Temperature, °C					Rel hum-idity	Baro. Pres
	kW	kN	km/h	rev/min		kg/kW.h	kW.h/l	Fuel	Coolant	Oil	Dry	Wet		kPa
I. Maximum Power (unballasted, Track, 1900 rev/min)												Drawbar height:	470 mm	
1	164.88	151.55	3.92	2132	14%	0.296	2.86	51	87	108	22	20	86%	97.43
2	207.81	136.78	5.47	1929	7%	0.257	3.30	53	88	110	23	21	87%	97.46
3	235.85	126.11	6.73	1902	6%	0.251	3.38	55	88	112	25	23	83%	97.49
4	242.78	109.95	7.95	1905	3%	0.243	3.49	53	88	111	22	21	86%	97.83
5	243.63	95.59	9.18	1899	2%	0.242	3.50	53	88	112	23	21	82%	97.83
6	242.77	86.68	10.08	1902	2%	0.242	3.49	55	88	112	24	22	83%	97.87
7	243.37	75.75	11.57	1901	1%	0.241	3.51	53	88	113	23	21	82%	97.49
8	240.20	64.96	13.31	1903	1%	0.246	3.44	54	88	112	24	22	83%	97.46
II. Part loads (unballasted, Track)														
II.1 in selected gear at maximum power at rated engine speed.														
5	222.28	78.42	10.20	2098	1%	0.253	3.34	53	87	111	23	21	87%	97.83
II.1.1 75% of pull at maximum power at rated engine speed														
5	173.20	58.70	10.62	2175	1%	0.272	3.11	53	87	108	25	22	79%	97.90
II.1.2 50% of pull at maximum power at rated engine speed														
5	120.01	39.19	11.02	2250	1%	0.319	2.66	55	87	109	27	23	76%	97.90
II.1.3 higher gear at reduced engine speed, same pull and travel speed as II.1.1														
6	173.11	58.70	10.62	1990	1%	0.264	3.21	54	87	109	26	23	79%	97.93
II.1.4 higher gear at reduced engine speed, same pull and travel speed as II.1.2														
6	119.99	38.96	11.09	2070	1%	0.309	2.74	55	87	108	28	24	73%	97.87
II.1.5 higher gear at reduced engine speed, same pull and travel speed as II.1.3														
7	173.09	58.87	10.59	1735	1%	0.249	3.39	54	88	109	26	23	79%	97.90
II.1.6 higher gear at reduced engine speed, same pull and travel speed as II.1.4														
7	119.80	38.97	11.07	1808	1%	0.280	3.02	55	87	108	28	24	73%	97.90
II.2 in selected gear nearest to 7.5 km/h at rated engine speed.														
3	221.10	103.61	7.68	2098	3%	0.254	3.33	55	88	111	24	22	83%	97.46
II.2.1 75% of pull at maximum power at rated engine speed														
3	174.95	78.10	8.06	2176	1%	0.271	3.12	55	87	110	25	23	83%	97.46
II.2.2 50% of pull at maximum power at rated engine speed														
3	121.55	52.12	8.40	2253	1%	0.310	2.73	56	87	109	26	23	79%	97.46
II.2.3 higher gear at reduced engine speed, same pull and travel speed as II.2.1														
4	175.05	77.92	8.09	1908	2%	0.251	3.37	54	87	109	25	23	83%	97.46
II.2.4 higher gear at reduced engine speed, same pull and travel speed as II.2.2														
4	121.35	52.25	8.36	1962	1%	0.284	2.98	55	87	108	27	24	76%	97.46
II.2.5 higher gear at reduced engine speed, same pull and travel speed as II.2.3														
5	175.05	78.01	8.08	1662	2%	0.242	3.50	54	88	108	26	23	83%	97.46
II.2.6 higher gear at reduced engine speed, same pull and travel speed as II.2.4														
5	121.55	52.36	8.36	1710	1%	0.268	3.16	54	87	106	28	24	76%	97.46

3.3.1 DRAWBAR POWER TEST(Rubber Track Laying - Unballasted tractor,1900 rev/min)

OECD Drawbar Data (US)

Date of tests: 18-May-98 Fuel density: 7.063 lb/gal
Type of track: Concrete Test number 1750

Gear	Power	Pull	Speed	Engine speed	Slip	SFC	SFE	Temperature, °F					Rel humidity	Barom. Press
	hp	lb	mph	rev/min		lb/hp.h	hp.h/gal	Fuel	Coolant	Oil	Dry	Wet		in Hg
I. Maximum Power (unballasted, Track, 1900 rev/min)												Drawbar height:	18.5 in	
1	221.11	34070	2.43	2132	14%	0.486	14.54	124	189	227	71	68	86%	28.77
2	278.68	30751	3.40	1929	7%	0.422	16.75	127	190	230	73	70	87%	28.78
3	316.28	28351	4.18	1902	6%	0.412	17.14	131	190	233	77	73	83%	28.79
4	325.57	24718	4.94	1905	3%	0.399	17.71	127	190	233	72	69	86%	28.89
5	326.71	21489	5.70	1899	2%	0.398	17.74	128	190	233	74	70	82%	28.89
6	325.56	19488	6.26	1902	2%	0.398	17.73	131	190	234	75	71	83%	28.90
7	326.36	17029	7.19	1901	1%	0.396	17.81	127	191	235	74	70	82%	28.79
8	322.11	14605	8.27	1903	1%	0.404	17.48	129	191	234	76	72	83%	28.78
II. Part loads (unballasted, Track)														
II.1 in selected gear at maximum power at rated engine speed.														
5	298.08	17629	6.34	2098	1%	0.417	16.95	128	189	232	73	70	87%	28.89
II.1.1 75% of pull at maximum power at rated engine speed														
5	232.27	13197	6.60	2175	1%	0.447	15.80	127	189	227	77	72	79%	28.91
II.1.2 50% of pull at maximum power at rated engine speed														
5	160.93	8810	6.85	2250	1%	0.524	13.49	132	188	229	80	74	76%	28.91
II.1.3higher gear at reduced engine speed, same pull and travel speed as II.1.1														
6	232.15	13196	6.60	1990	1%	0.434	16.29	129	189	229	78	73	79%	28.92
II.1.4 higher gear at reduced engine speed, same pull and travel speed as II.1.2														
6	160.90	8760	6.89	2070	1%	0.509	13.89	131	188	227	82	75	73%	28.90
II.1.5 higher gear at reduced engine speed, same pull and travel speed as II.1.3														
7	232.12	13234	6.58	1735	1%	0.410	17.23	129	190	228	79	74	79%	28.91
II.1.6 higher gear at reduced engine speed, same pull and travel speed as II.1.4														
7	160.66	8762	6.88	1808	1%	0.461	15.32	131	189	226	82	75	73%	28.91
II.2 in selected gear nearest to 4.6 mph at rated engine speed.														
3	296.50	23294	4.77	2098	3%	0.418	16.89	131	190	232	76	72	83%	28.78
II.2.1 75% of pull at maximum power at rated engine speed														
3	234.61	17557	5.01	2176	1%	0.445	15.85	132	189	230	77	73	83%	28.78
II.2.2 50% of pull at maximum power at rated engine speed														
3	163.00	11717	5.22	2253	1%	0.510	13.84	132	189	229	79	74	79%	28.78
II.2.3 higher gear at reduced engine speed, same pull and travel speed as II.2.1														
4	234.74	17518	5.03	1908	2%	0.413	17.12	129	189	229	77	73	83%	28.78
II.2.4 higher gear at reduced engine speed, same pull and travel speed as II.2.2														
4	162.73	11747	5.20	1962	1%	0.467	15.13	131	189	226	81	75	76%	28.78
II.2.5 higher gear at reduced engine speed, same pull and travel speed as II.2.3														
5	234.74	17537	5.02	1662	2%	0.397	17.77	129	190	226	78	74	83%	28.78
II.2.6 higher gear at reduced engine speed, same pull and travel speed as II.2.4														
5	163.00	11772	5.19	1710	1%	0.441	16.03	130	189	223	82	76	76%	28.78

4.1 DRAWBAR POWER TEST (Rubber Track Laying - Unballasted tractor, 2100 rev/min)

OECD Drawbar Data (SI)

Date of tests: 18-May-98 — Fuel density: 0.846 kg/l
Type of track: Concrete — Test number 1750

Gear	Power	Pull	Speed	Engine speed	Slip	SFC	SFE	Temperature, °C					Rel hum-	Baro. Pres
	kW	kN	km/h	rev/min		kg/kW.h	kW.h/l	Fuel	Coolant	Oil	Dry	Wet	idity	kPa
I. Maximum Power (unballasted, Track, 2100 rev/min)												Drawbar height:	470 mm	
1	163.94	150.15	3.93	2133	14%	0.297	2.85	51	87	109	22	20	86%	97.43
2	195.20	113.52	6.19	2097	3%	0.261	3.24	52	88	110	23	21	87%	97.43
3	221.10	103.61	7.68	2098	3%	0.254	3.33	55	88	111	24	22	83%	97.46
4	221.85	90.00	8.87	2100	2%	0.252	3.35	52	88	111	22	20	86%	97.83
5	222.28	78.42	10.20	2098	1%	0.253	3.34	53	87	111	23	21	87%	97.83
6	220.83	71.27	11.16	2095	1%	0.254	3.33	54	87	112	23	21	82%	97.83
7	220.10	62.01	12.78	2095	1%	0.256	3.31	53	88	111	23	21	87%	97.53
8	216.91	53.12	14.70	2098	1%	0.260	3.25	52	88	111	24	22	83%	97.43

OECD Drawbar Data (US)

Date of tests: 18-May-98 — Fuel density: 7.063 lb/gal
Type of track: Concrete — Test number 1750

Gear	Power	Pull	Speed	Engine speed	Slip	SFC	SFE	Temperature, °F					Rel hum-	Baro. Pres
	hp	lb	mph	rev/min		lb/hp.h	hp.h/gal	Fuel	Coolant	Oil	Dry	Wet	idity	in Hg
I. Maximum Power (unballasted, Track, 2100 rev/min)												Drawbar height:	18.5 in	
1	219.85	33756	2.44	2133	14%	0.489	14.45	124	189	228	71	68	86%	28.77
2	261.77	25520	3.85	2097	3%	0.430	16.43	125	190	231	73	70	87%	28.77
3	296.50	23294	4.77	2098	3%	0.418	16.89	131	190	232	76	72	83%	28.78
4	297.51	20232	5.51	2100	2%	0.415	17.02	126	190	233	71	68	86%	28.89
5	298.08	17629	6.34	2098	1%	0.417	16.95	128	189	232	73	70	87%	28.89
6	296.14	16022	6.93	2095	1%	0.418	16.91	130	189	233	74	70	82%	28.89
7	295.15	13940	7.94	2095	1%	0.420	16.80	128	190	233	73	70	87%	28.80
8	290.89	11942	9.13	2098	1%	0.428	16.51	125	190	231	75	71	83%	28.77

4.2 DRAWBAR POWER TEST (Rubber Track Laying - Ballasted Tractor, 1900 rev/min)

OECD Drawbar Data (SI)

Date of tests: 20-May-98 — Fuel density 0.846 kg/l
Type of track: Concrete — Test number 1750

Gear	Power	Pull	Speed	Engine speed	Slip	SFC	SFE	Temperature, C					Rel hum-idity	Baro. Pres
	kW	kN	km/h	rev/min		kg/kW.h	kW.h/l	Fuel	Coolant	Oil	Dry	Wet		kPa
I. Maximum Power (ballasted, trk at 1900 rev/min)						Tire pressure:	trk	kPa, rear	trk	kPa, front	Drawbar height:		470 mm	
1	171.94	160.62	3.85	2110	15%	0.294	2.88	51	88	109	18	17	90%	97.93
2	211.63	137.82	5.53	1911	6%	0.252	3.36	50	88	110	19	18	86%	97.97
3	240.77	125.41	6.91	1905	4%	0.246	3.44	50	88	111	20	18	86%	97.97
4	242.14	109.19	7.98	1900	3%	0.244	3.47	51	88	111	21	19	91%	98.00
5	243.92	95.27	9.22	1901	2%	0.242	3.50	54	88	113	24	22	83%	97.97
6	241.33	85.91	10.11	1903	2%	0.244	3.46	53	88	112	22	21	86%	97.93
7	240.89	74.92	11.58	1899	1%	0.245	3.46	54	88	112	23	21	82%	97.93
8	240.04	64.94	13.31	1900	1%	0.246	3.44	53	88	113	24	22	83%	97.97

OECD Drawbar Data (US)

Date of tests: 20-May-98 — Fuel density 7.063 lb/gal
Type of track: Concrete — Test number 1750

Gear	Power	Pull	Speed	Engine speed	Slip	SFC	SFE	Temperature, F					Rel hum-idity	Baro. Pres
	hp	lb	mph	rev/min		lb/hp.h	hp.h/gal	Fuel	Coolant	Oil	Dry	Wet		in Hg
I. Maximum Power (ballasted, trk at 1900 rev/min)						Tire pressure:	trk	psig, rear	trk	psig, front	Drawbar height:		18.5 in	
1	230.58	36108	2.39	2110	15%	0.483	14.62	124	190	229	65	63	90%	28.92
2	283.80	30983	3.43	1911	6%	0.414	17.06	122	190	230	67	64	86%	28.93
3	322.88	28193	4.29	1905	4%	0.405	17.46	123	190	232	68	65	86%	28.93
4	324.72	24548	4.96	1900	3%	0.401	17.62	124	191	232	69	67	91%	28.94
5	327.10	21417	5.73	1901	2%	0.398	17.77	129	191	235	75	71	83%	28.93
6	323.63	19314	6.28	1903	2%	0.402	17.58	128	190	233	72	69	86%	28.92
7	323.04	16843	7.19	1899	1%	0.402	17.57	129	191	234	74	70	82%	28.92
8	321.89	14600	8.27	1900	1%	0.404	17.48	128	191	235	75	71	83%	28.93

4.3 DRAWBAR POWER TEST (Rubber Track Laying - Ballasted tractor,2100 rev/min)

OECD Drawbar Data (SI)

Date of tests: 20-May-98 | Fuel density 0.846 kg/l
Type of track: Concrete | Test number 1750

Gear	Power	Pull	Speed	Engine speed	Slip	SFC	SFE	Temperature, C					Rel hum-	Baro. Pres
	kW	kN	km/h	rev/min		kg/kW.h	kW.h/l	Fuel	Coolant	Oil	Dry	Wet	idity	kPa
I. Maximum Power (ballasted, trk at 2100 rev/min)						Tire pressure:	trk	kPa, rear	trk	kPa, front		Drawbar height:	470 mm	
1	174.54	163.28	3.85	2106	15%	0.292	2.90	52	88	110	18	17	90%	97.93
2	195.10	112.26	6.26	2098	3%	0.263	3.22	51	88	110	19	18	90%	97.97
3	222.81	103.71	7.73	2096	2%	0.253	3.34	51	87	111	20	18	86%	97.97
4	220.36	89.18	8.90	2098	2%	0.255	3.32	51	88	111	21	19	86%	98.00
5	220.72	77.60	10.24	2100	1%	0.252	3.35	54	88	106	24	22	83%	97.97
6	218.01	70.16	11.19	2097	1%	0.259	3.27	53	87	111	22	20	82%	97.93
7	217.18	61.00	12.82	2098	1%	0.259	3.27	54	87	111	23	21	82%	97.93
8	215.15	52.67	14.70	2095	1%	0.262	3.23	54	88	112	23	21	82%	97.93

OECD Drawbar Data (US)

Date of tests: 20-May-98 | Fuel density 7.063 lb/gal
Type of track: Concrete | Test number 1750

Gear	Power	Pull	Speed	Engine speed	Slip	SFC	SFE	Temperature, F					Rel hum-	Baro. Pres
	hp	lb	mph	rev/min		lb/hp.h	hp.h/gal	Fuel	Coolant	Oil	Dry	Wet	idity	in Hg
I. Maximum Power (ballasted, trk at 2100 rev/min)						Tire pressure:	trk	psig, rear	trk	psig, front		Drawbar height:	18.5 in	
1	234.06	36708	2.39	2106	15%	0.480	14.73	125	190	230	65	63	90%	28.92
2	261.64	25237	3.89	2098	3%	0.432	16.34	124	190	230	66	64	90%	28.93
3	298.80	23315	4.81	2096	2%	0.416	16.97	123	189	231	68	65	86%	28.93
4	295.50	20049	5.53	2098	2%	0.419	16.87	124	190	232	69	66	86%	28.94
5	295.99	17445	6.36	2100	1%	0.415	17.00	129	190	223	75	71	83%	28.93
6	292.35	15773	6.95	2097	1%	0.426	16.60	128	189	232	72	68	82%	28.92
7	291.25	13714	7.96	2098	1%	0.426	16.58	129	189	232	73	69	82%	28.92
8	288.52	11841	9.14	2095	1%	0.431	16.37	129	190	233	74	70	82%	28.92

Tabulated Drawbar Performance as per Code 2, Paragraph 3.3.3

	Unballasted
Maximum drawbar pull	151.53 kN
Slip	14 %
Corresponding to 7%	136.28 kN

	Ballasted
Maximum drawbar pull	160.62 kN
Slip	15 %
Corresponding to 7%	137.82 kN

5. REPAIRS

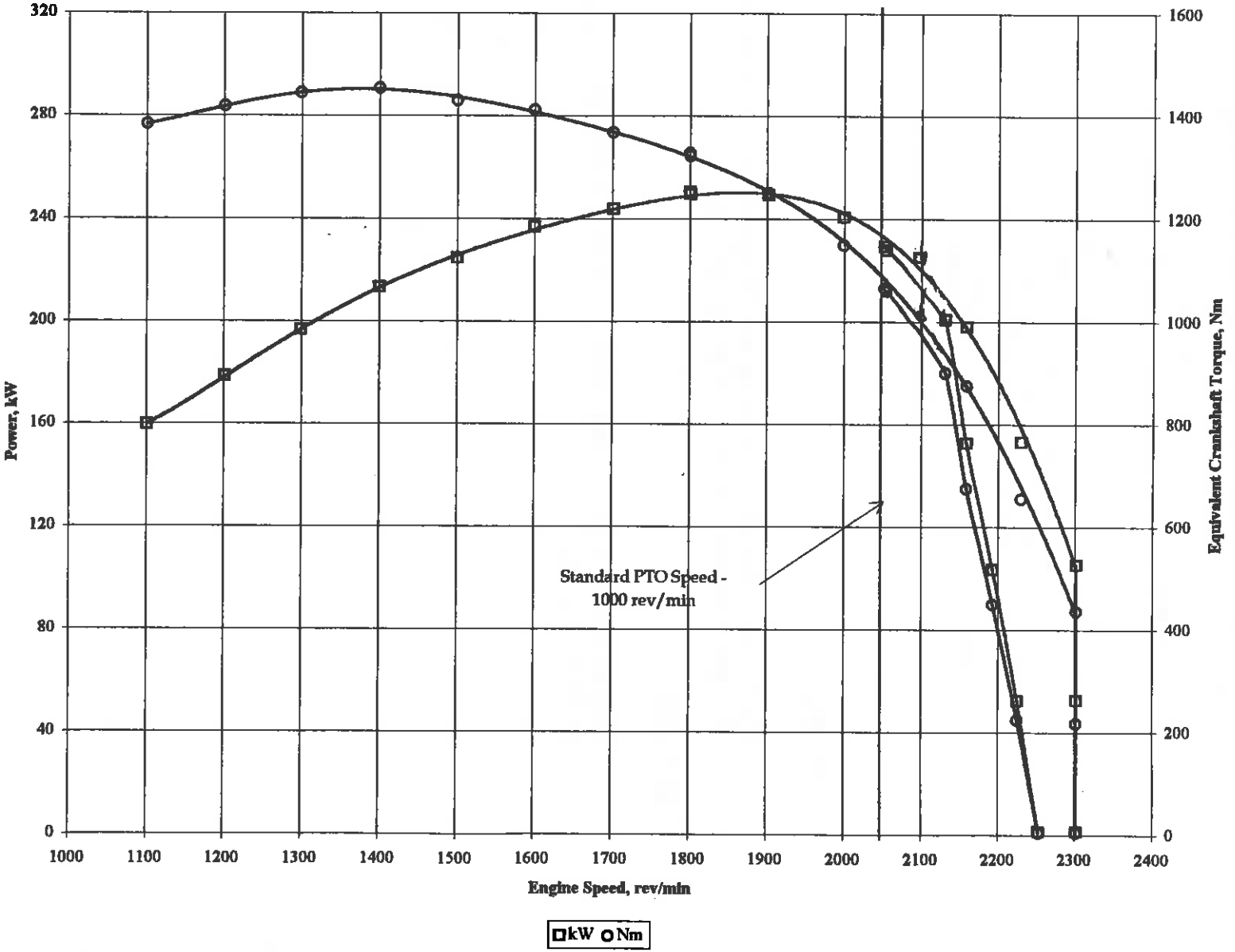
The PTO reduction box failed during the PTO tests at the high power setting. The reduction box was replaced and the test continued.

6. REMARKS

The performance values shown for the high horsepower PTO results are not available to the user.

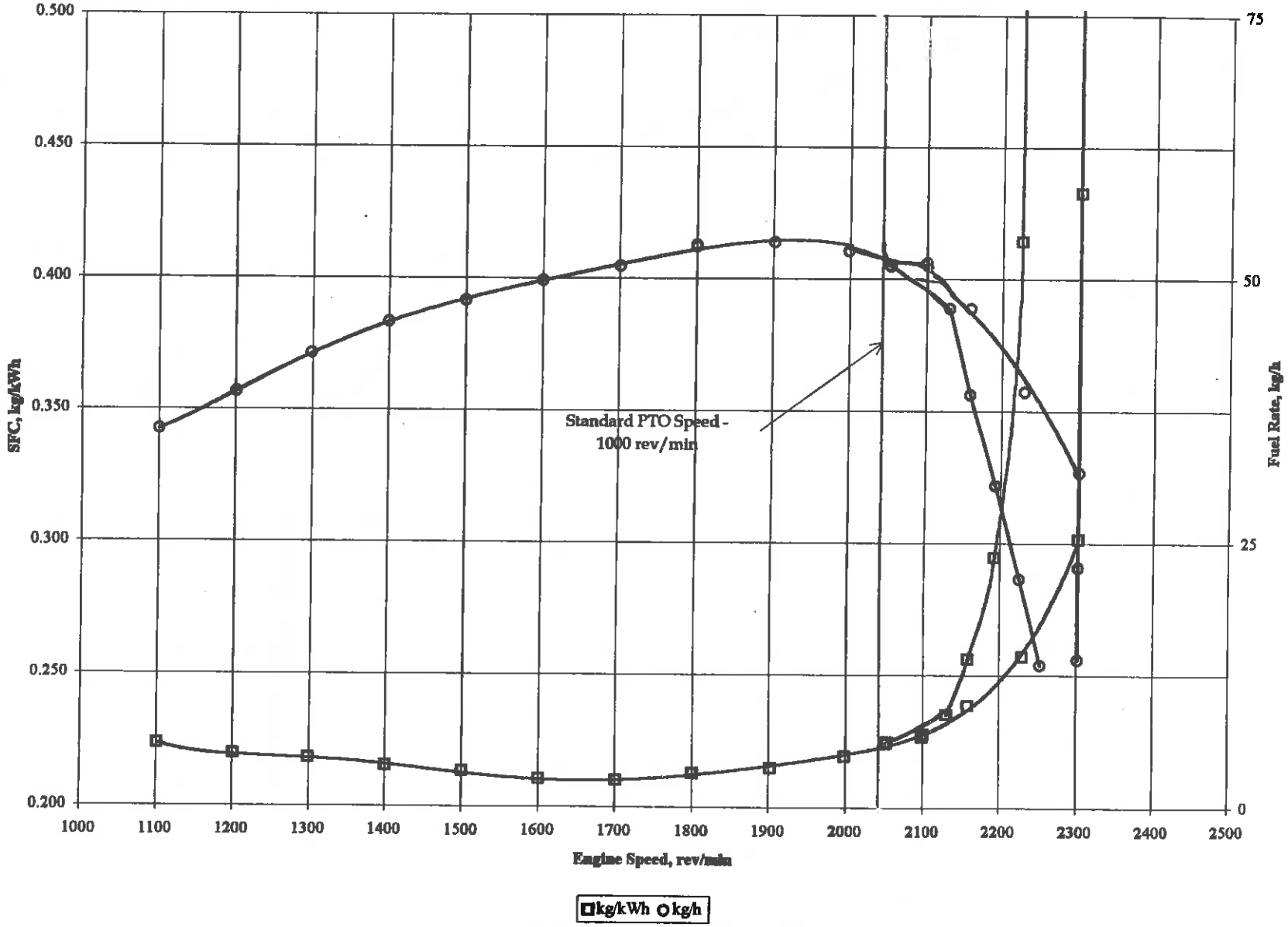
Caterpillar Challenger 85E Low Power

Power and Equivalent Crankshaft Torque



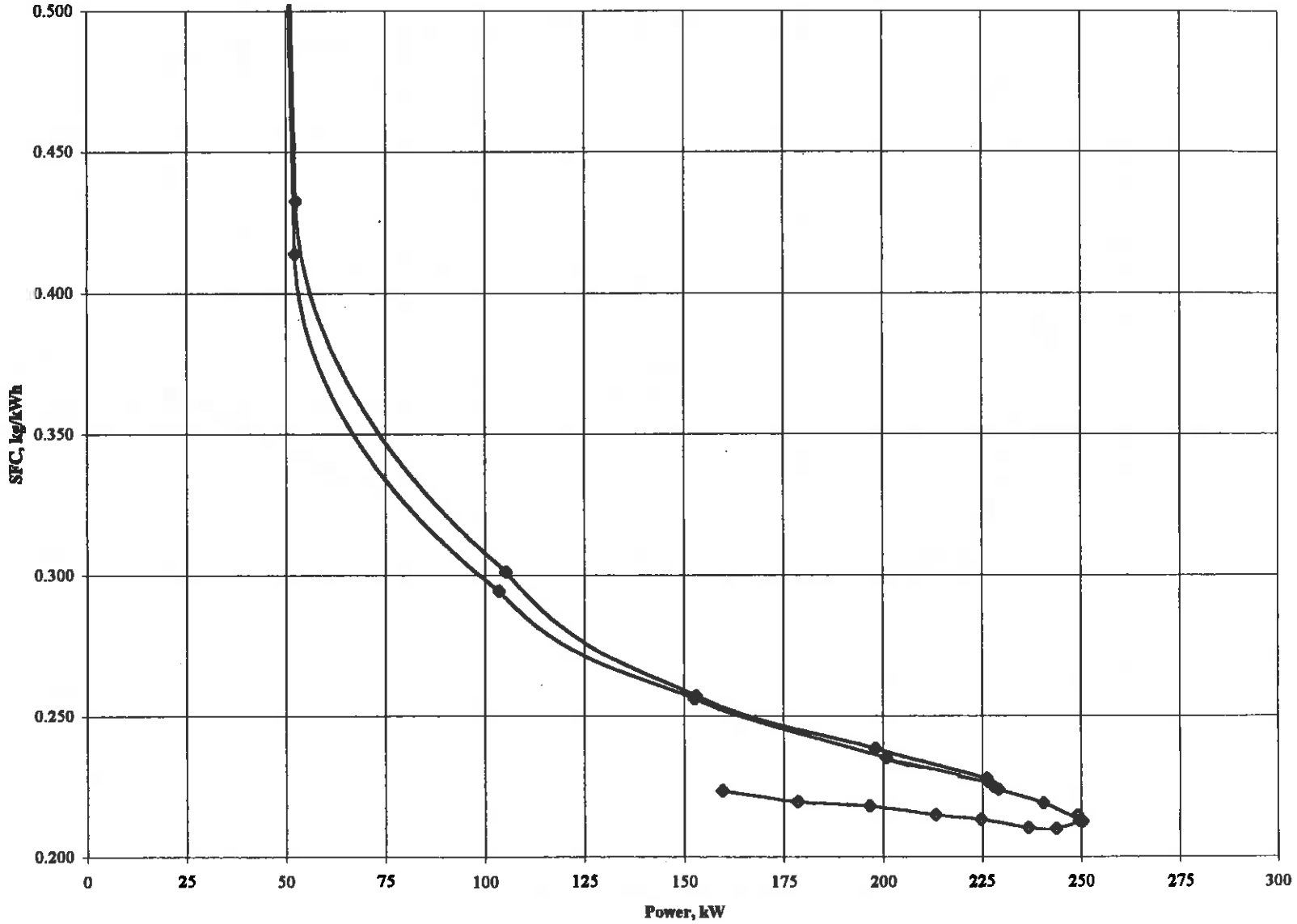
Caterpillar Challenger 85E Low Power

Specific Fuel Consumption and Fuel Rate



Caterpillar Challenger 85E Low Power

Power and Specific Fuel Consumption



6.1 MAIN POWER TAKE-OFF (optional Test - High Power)

- Date and location of tests: 13-May-98 Nebraska Tractor Test Laboratory, Lincoln, NE, USA
- Type of dynamometer bench: Eaton 700 hp

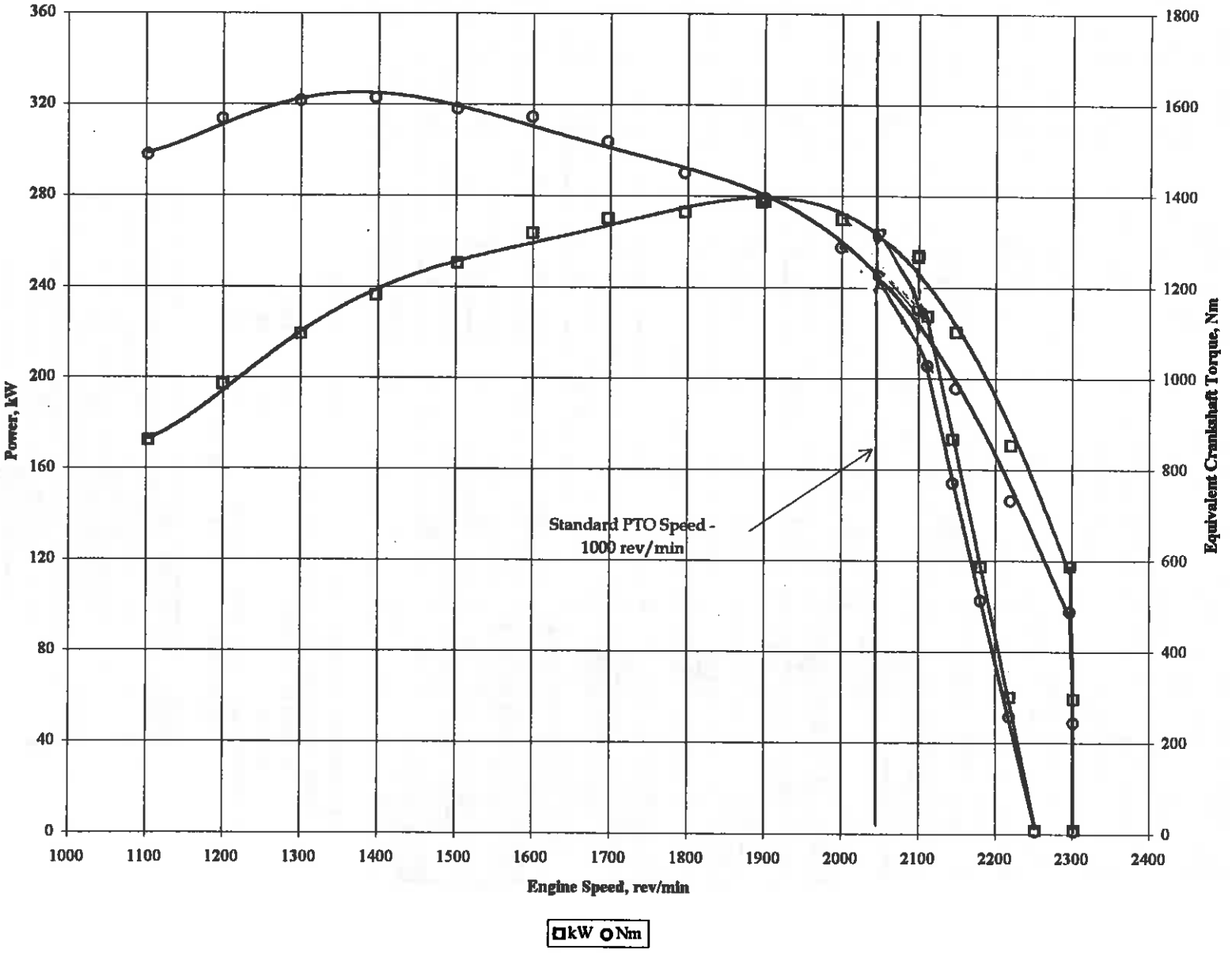
Power	Speed		Fuel consumption			Specific energy
	Engine	PTO	Hourly		Specific	
kW	rev/min		kg/h	l/h	g/kWh	kW-h/l
3.1 MAXIMUM POWER - TWO HOUR TEST						
277.64	1899	925	59.46	70.26	214	3.95
3.1.2 POWER AT RATED ENGINE SPEED						
253.06	2100	1023	56.38	66.61	223	3.80
3.1.3 STANDARD POWER TAKE-OFF SPEED						
260.06	2054	1000	57.16	67.53	220	3.85
3.1.4 PART LOADS						
3.1.4.1 the torque corresponding to maxiimum power at rated engine speed						
253.06	2100	1023	56.38	66.61	223	3.80
3.1.4.2 85% of torque obtained in 3.1.4.1						
220.17	2148	1046	50.76	59.97	231	3.67
3.1.4.3 75% of torque defined in 3.1.4.2						
170.33	2220	1081	42.46	50.16	249	3.40
3.1.4.4 50% of torque defined in 3.1.4.2						
117.38	2297	1118	33.88	40.04	289	2.93
3.1.4.5 25% of torque defined in 3.1.4.2						
58.81	2302	1121	23.68	27.98	403	2.10
1.4.6 unloaded						
1.59	2302	1121	13.88	16.40	8721	0.10
3.1.5 PART LOADS AT STANDARD POWER TAKE-OFF SPEED						
3.1.5.1 the torque corresponding to maximum power						
260.06	2054	1000	57.16	67.53	220	3.85
3.1.5.2 85% of torque obtained in 3.1.5.1						
227.22	2111	1028	51.30	60.62	226	3.75
3.1.5.3 75% of torque defined in 3.1.5.2						
173.06	2144	1044	42.86	50.65	248	3.42
3.1.5.4 50% of torque defined in 3.1.5.2						
117.23	2181	1062	32.79	38.75	280	3.03
3.1.5.5 25% of torque defined in 3.1.5.2						
59.73	2219	1080	23.00	27.17	385	2.20
3.1.5.6 unloaded						
1.56	2252	1097	13.34	15.76	8562	0.10

- No load maximum engine speed: 2302 rev/min
- Torque (equivalent crankshaft) at rated speed:
  - At rated engine speed 1151 Nm
  - At 2-hour test 1396 Nm
- Maximum torque (equivalent crankshaft): 1614 Nm
  (engine speed: 1397 rev/min)

Mean atmospheric conditions:		
Dry bulb	26	°C
Pressure	97.3	kPa
Relative Humidity	68	%
Maximum temperatures:		
Coolant	88	°C
Engine oil	109	°C
Fuel	53	°C
Engine air intake	42	°C

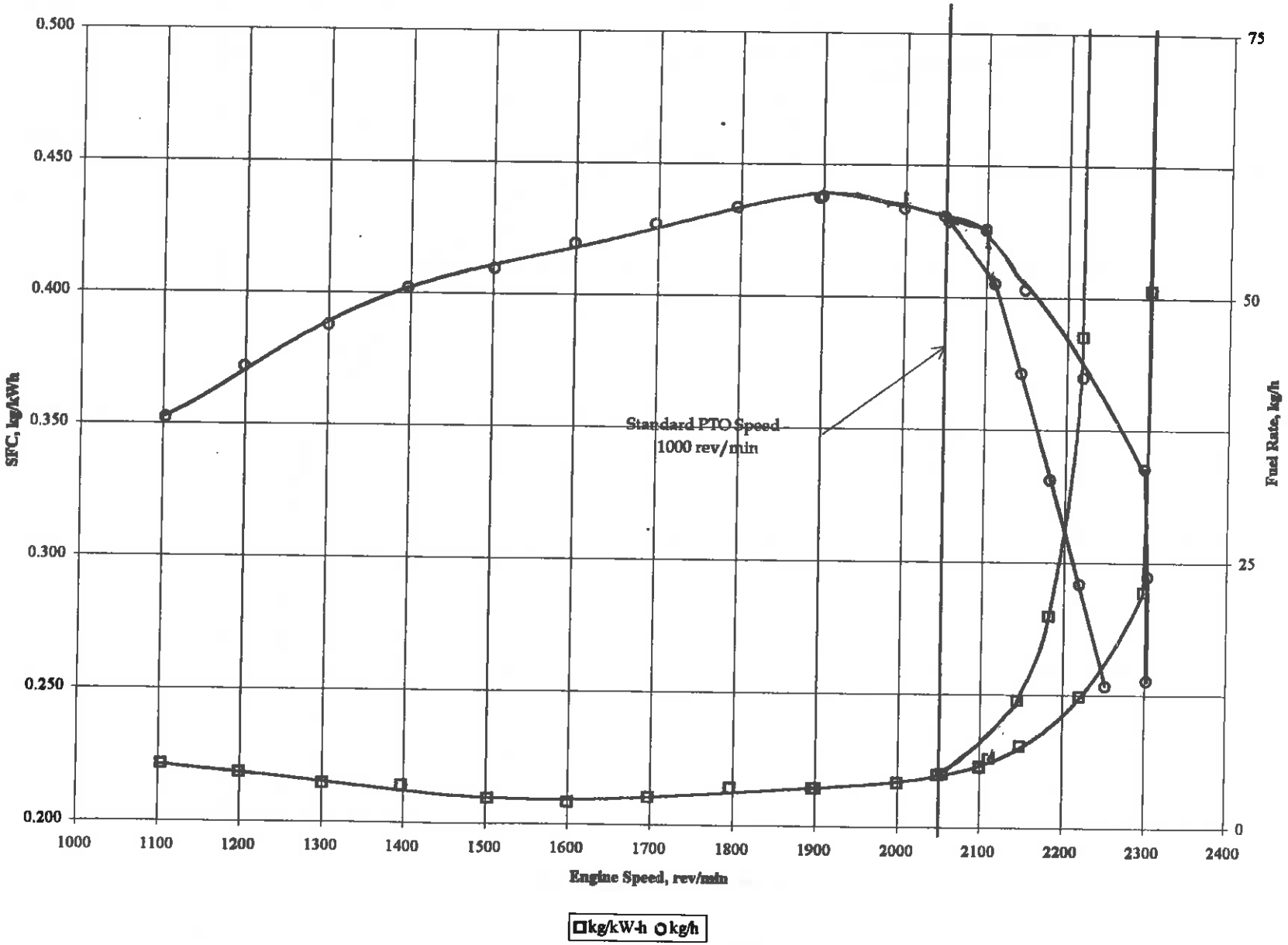
Caterpillar Challenger 85E High Power

Power and Equivalent Crankshaft Torque



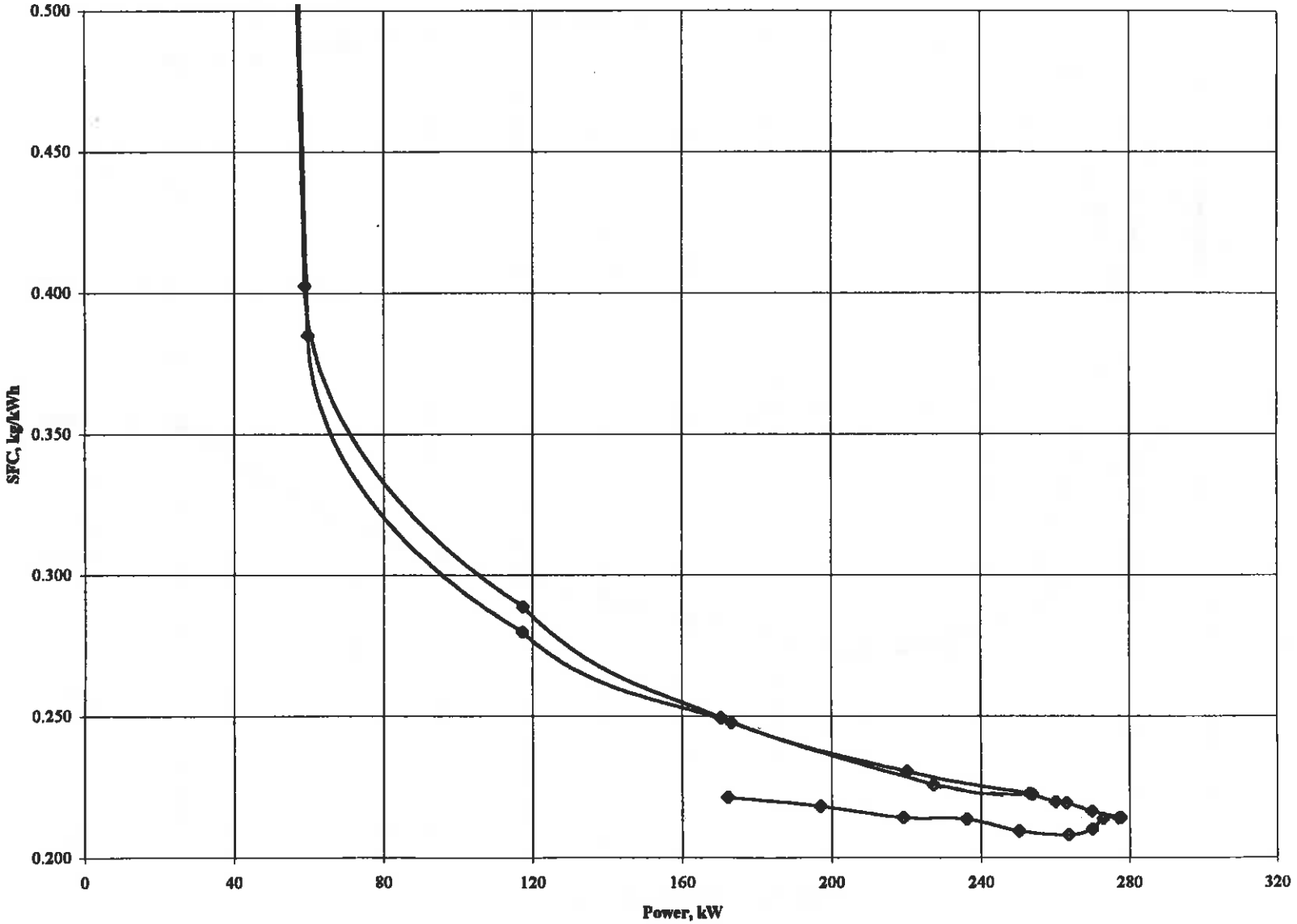
Caterpillar Challenger 85E High Power

Specific Fuel Consumption and Fuel Rate



Caterpillar Challenger 85E High Power

Power and Specific Fuel Consumption



6.2 DRAWBAR POWER TEST (Rubber track Laying - Ballasted Tractor)

OECD Drawbar Data (SI)

Date of test 20-May-98				Fuel density:	0.846 kg/l									
Type of trac Concrete				Test number	1750									
Gear	Power	Pull	Speed	Engine speed	Slip	SFC	SFE	Temperature, °C					Rel hum-idity	Baro. Pres
	kW	kN	km/h	rev/min		kg/kW.h	kW.h/l	Fuel	Coolant	Oil	Dry	Wet		kPa
2 Hours @ Max Power														
5	228.72	89.44	9.21	1898	2%	0.253	3.34	51	88	112	19	18	90%	97.53
I. Lug Run (100 RPM increments)						Tire pressure:		trk	kPa, rear	trk	kPa, front		Drawbar height:	470 mm
5	220.72	77.60	10.24	2100	1%	0.253	3.35	54	88	111	24	22	83%	97.97
5	237.64	87.90	9.73	2002	2%	0.244	3.47	54	88	112	24	22	83%	97.97
5	243.92	95.27	9.22	1901	2%	0.242	3.50	53	88	113	24	22	83%	97.97
5	240.10	99.26	8.71	1800	2%	0.240	3.53	53	88	112	24	22	83%	97.97
5	235.60	103.32	8.21	1700	2%	0.237	3.56	54	88	112	24	22	83%	97.97
5	230.36	107.49	7.71	1602	3%	0.236	3.58	54	89	111	24	22	83%	97.97
5	217.61	108.66	7.21	1499	3%	0.238	3.56	53	89	110	24	22	83%	97.97
5	206.65	110.48	6.73	1402	3%	0.241	3.50	53	89	111	24	22	83%	97.97
5	190.37	109.84	6.24	1300	4%	0.244	3.47	53	89	111	24	22	83%	97.97
5	171.89	107.22	5.77	1201	3%	0.248	3.41	54	88	111	24	22	83%	97.97
5	149.86	101.34	5.33	1103	3%	0.251	3.38	54	89	111	24	22	83%	97.97
II. Part loads (ballasted, trk)														
II.1 in selected gear at maximum power at rated engine speed.														
5	220.72	77.60	10.24	2100	1%	0.253	3.35	54	88	111	24	22	83%	97.97
II.1.1 75% of pull at maximum power at rated engine speed														
5	171.35	58.05	10.62	2172	1%	0.280	3.02	52	87	110	21	19	91%	97.36
II.1.2 50% of pull at maximum power at rated engine speed														
5	118.58	38.71	11.02	2248	1%	0.324	2.61	51	87	109	21	19	91%	97.36

OECD Drawbar Data (US)

Date of test 20-May-98				Fuel density:	7.063 lb/gal									
Type of trac Concrete				Test number	1750									
Gear	Power	Pull	Speed	Engine speed	Slip	SFC	SFE	Temperature, °F					Rel hum-idity	Baro. Pres
	hp	lb	mph	rev/min		lb/hp.h	hp.h/gal	Fuel	Coolant	Oil	Dry	Wet		in Hg
2 Hours @ Max Power														
5	306.71	20107	5.72	1898	2%	0.417	16.95	123	190	234	67	65	90%	28.80
I. Lug Run (100 RPM increments)						Tire pressure:		trk	psig, rear	trk	psig, front		Drawbar height:	18.5 in
5	295.99	17445	6.36	2100	1%	0.415	17.00	129	190	233	75	71	83%	28.93
5	318.68	19761	6.05	2002	2%	0.401	17.62	129	190	234	75	71	83%	28.93
5	327.10	21417	5.73	1901	2%	0.398	17.77	128	191	235	75	71	83%	28.93
5	321.98	22315	5.41	1800	2%	0.394	17.93	128	191	234	75	71	83%	28.93
5	315.94	23227	5.10	1700	2%	0.390	18.09	129	191	234	75	71	83%	28.93
5	308.92	24165	4.79	1602	3%	0.388	18.19	129	192	232	75	71	83%	28.93
5	291.82	24428	4.48	1499	3%	0.391	18.08	128	192	230	75	71	83%	28.93
5	277.12	24837	4.18	1402	3%	0.397	17.79	128	192	231	75	71	83%	28.93
5	255.29	24694	3.88	1300	4%	0.401	17.62	127	192	231	75	71	83%	28.93
5	230.50	24104	3.59	1201	3%	0.407	17.34	129	191	232	75	71	83%	28.93
5	200.96	22782	3.31	1103	3%	0.412	17.15	129	193	231	75	71	83%	28.93
II. Part loads (ballasted, trk)														
II.1 in selected gear at maximum power at rated engine speed.														
5	295.99	17445	6.36	2100	1%	0.415	17.00	129	190	233	75	71	83%	28.93
II.1.1 75% of pull at maximum power at rated engine speed														
5	229.79	13051	6.60	2172	1%	0.461	15.31	126	189	230	69	67	91%	28.75
II.1.2 50% of pull at maximum power at rated engine speed														
5	159.02	8702	6.85	2248	1%	0.532	13.27	124	189	228	69	67	91%	28.75