

University of Nebraska - Lincoln

DigitalCommons@University of Nebraska - Lincoln

Nebraska Tractor Tests

Tractor Test and Power Museum, The Lester F. Larsen

January 1978

Test 1288: Ford FW-30 Diesel w/o PTO (20-Speed)

Nebraska Tractor Test Lab

University of Nebraska-Lincoln, tractortestlab@unl.edu

Follow this and additional works at: <https://digitalcommons.unl.edu/tractormuseumlit>



Part of the [Energy Systems Commons](#), [History of Science, Technology, and Medicine Commons](#), [Other Mechanical Engineering Commons](#), [Physical Sciences and Mathematics Commons](#), [Science and Mathematics Education Commons](#), and the [United States History Commons](#)

Nebraska Tractor Test Lab, "Test 1288: Ford FW-30 Diesel w/o PTO (20-Speed)" (1978). *Nebraska Tractor Tests*. 1607.

<https://digitalcommons.unl.edu/tractormuseumlit/1607>

This Article is brought to you for free and open access by the Tractor Test and Power Museum, The Lester F. Larsen at DigitalCommons@University of Nebraska - Lincoln. It has been accepted for inclusion in Nebraska Tractor Tests by an authorized administrator of DigitalCommons@University of Nebraska - Lincoln.

NEBRASKA TRACTOR TEST 1288 — FORD FW-30 DIESEL
and FORD FW-30 DIESEL WITHOUT PTO
20 SPEED

POWER TAKE-OFF PERFORMANCE

Power Hp (kW)	Crank shaft speed rpm	Fuel Consumption			Temperature °F (°C)			Barometer inch Hg (kPa)	
		gal/hr (l/h)	lb/hp.hr (kg/kW.h)	Hp.hr/gal (kW.h/l)	Cooling medium	Air wet bulb	Air dry bulb		
MAXIMUM POWER AND FUEL CONSUMPTION									
Rated PTO HP—One Hour—Full Throttle Setting (PTO Speed 1010 rpm)									
105.31 (78.53)	2766	10.914 (41.315)	0.720 (0.438)	9.65 (1.901)	168 (75.4)	64 (17.7)	75 (24.1)	29.230 (98.705)	
Rated PTO HP—One Hour—Minimum Throttle Setting (PTO Speed 993 rpm)									
105.46 (78.64)	2357	9.351 (35.396)	0.616 (0.375)	11.28 (2.222)	169 (76.3)	63 (17.4)	75 (24.0)	29.215 (98.655)	
VARYING POWER AND FUEL CONSUMPTION—Two Hours— Minimum Throttle Setting									
91.01 (67.86)	2380	8.565 (32.421)	0.654 (0.398)	10.63 (2.093)	169 (76.1)	64 (18.1)	77 (25.0)	..... .....
0.00 (0.00)	2430	4.202 (15.908)	..... .....	..... .....	162 (72.2)	62 (16.9)	74 (23.1)	..... .....
47.61 (35.51)	2412	6.409 (24.262)	0.935 (0.569)	7.43 (1.463)	166 (74.7)	63 (17.2)	74 (23.6)	..... .....
105.71 (78.83)	2354	9.325 (35.298)	0.613 (0.373)	11.34 (2.233)	170 (76.7)	64 (17.5)	75 (23.9)	..... .....
23.98 (17.88)	2423	5.308 (20.093)	1.538 (0.935)	4.52 (0.890)	166 (74.2)	63 (17.2)	74 (23.3)	..... .....
69.88 (52.11)	2398	7.450 (28.203)	0.741 (0.450)	9.38 (1.848)	168 (75.6)	64 (17.5)	74 (23.6)	..... .....
Av Av	56.37 (42.03)	2400 (26.031)	6.877 (0.515)	0.847 (0.515)	8.20 (1.615)	167 (74.9)	63 (17.4)	75 (23.8)	29.207 (98.627)

DRAWBAR PERFORMANCE (FW-30)

Power Hp (kW)	Drawbar pull lbs (kN)	Speed mph (km/h)	Crank- shaft speed rpm	Slip %	Fuel Consumption			Temp-°F (°C)			Barom. inch Hg (kPa)
					gal/hr (l/h)	lb/hp.hr (kg/kW.h)	Hp.hr/gal (kW.h/l)	Cool- ing med	Air wet bulb	Air dry bulb	
Maximum Available Power—Two Hours 9th (3LS) Gear											
205.20 (153.02)	13131 (58.41)	5.86 (9.43)	2598	3.95	14.968 (56.658)	0.506 (0.308)	13.71 (2.701)	172 (77.8)	56 (13.3)	71 (21.4)	29.075 (98.182)
75% of Pull at Maximum Power—Ten Hours 9th (3LS) Gear											
170.59 (127.21)	10127 (45.05)	6.32 (10.17)	2777	3.11	13.940 (52.767)	0.568 (0.345)	12.24 (2.411)	168 (75.4)	53 (11.9)	63 (17.0)	29.045 (98.081)
50% of Pull at Maximum Power—Two Hours 9th (3LS) Gear											
117.32 (87.48)	6751 (30.03)	6.52 (10.49)	2839	2.20	11.643 (44.075)	0.689 (0.419)	10.08 (1.985)	168 (75.6)	60 (15.6)	63 (17.2)	28.830 (97.355)
50% of Pull at Reduced Engine Speed—Two Hours 14th (4LO) Gear											
117.60 (87.69)	6750 (30.03)	6.53 (10.51)	1529	2.29	7.882 (29.837)	0.466 (0.283)	14.92 (2.939)	173 (78.1)	57 (13.6)	62 (16.4)	28.875 (97.507)
MAXIMUM POWER IN SELECTED GEARS											
170.93 (127.46)	27803 (123.67)	2.31 (3.71)	2714	14.89	2nd (1LO) Gear			169 (76.1)	54 (12.2)	57 (13.9)	28.800 (97.253)
186.44 (139.03)	27688 (123.16)	2.53 (4.06)	2599	13.79	3rd (1HS) Gear			171 (76.9)	54 (12.2)	57 (13.9)	28.800 (97.253)
191.94 (143.13)	24191 (107.61)	2.98 (4.79)	2601	9.95	4th (1HO) Gear			171 (77.2)	62 (16.7)	77 (25.0)	28.870 (97.490)
201.62 (150.35)	21664 (96.37)	3.49 (5.62)	2599	7.74	5th (2LS) Gear			171 (77.2)	62 (16.7)	77 (25.0)	28.880 (97.523)
205.11 (152.95)	19263 (85.69)	3.99 (6.43)	2599	6.29	6th (2LO) Gear			170 (76.7)	61 (16.1)	77 (25.0)	28.900 (97.591)
207.66 (154.85)	17064 (75.91)	4.56 (7.34)	2601	5.19	7th (2HS) Gear			173 (78.1)	56 (13.3)	72 (22.2)	29.050 (98.097)
208.74 (155.66)	15117 (67.24)	5.18 (8.33)	2599	4.47	8th (2HO) Gear			172 (77.5)	57 (13.9)	73 (22.8)	29.050 (98.097)
211.18 (157.48)	13496 (60.04)	5.87 (9.44)	2600	3.82	9th (3LS) Gear			173 (78.1)	57 (13.9)	73 (22.8)	29.050 (98.097)
212.02 (158.11)	11981 (53.30)	6.64 (10.68)	2598	3.41	10th (3LO) Gear			171 (77.2)	56 (13.3)	72 (22.2)	29.050 (98.097)
209.93 (156.54)	10450 (46.48)	7.53 (12.12)	2599	2.91	11th (3HS) Gear			172 (77.5)	56 (13.3)	71 (21.7)	29.050 (98.097)
207.96 (155.08)	9160 (40.74)	8.51 (13.70)	2599	2.66	12th (3HO) Gear			172 (77.8)	56 (13.3)	71 (21.7)	29.050 (98.097)

LUGGING ABILITY IN 9th (3LS) GEAR

Crankshaft Speed rpm	2600	2338	2081	1831	1557	1306	1044
Pull—lbs (kN)	13496 (60.04)	14719 (65.47)	16100 (71.62)	17344 (77.15)	18327 (81.52)	18740 (83.36)	18375 (81.74)
Increase in Pull %	0	9	19	29	36	39	36
Power—Hp (kW)	211.18 (157.48)	206.21 (153.77)	199.43 (148.72)	188.00 (140.19)	167.95 (125.24)	143.63 (107.11)	112.93 (84.21)
Speed—Mph (km/h)	5.87 (9.44)	5.25 (8.45)	4.65 (7.48)	4.06 (6.54)	3.44 (5.53)	2.87 (4.63)	2.30 (3.71)
Slip %	3.82	4.39	4.87	5.51	5.98	6.14	5.98

Department of Agricultural Engineering

Dates of Test: September 25 to October 14, 1978

Manufacturer: STEIGER TRACTOR, INC., 3101
First Avenue North, Fargo, North Dakota
58102.

FUEL, OIL AND TIME: Fuel No. 2 Diesel
Cetane No. 50.4 (rating taken from oil company's
typical inspection data) Specific gravity converted
to 60°/60° (15°/15°) 0.8342 Fuel weight 6.946 lbs/
gal (0.832 kg/l) Oil SAE 30 API service classifi-
cation SB/SE-CA/CD To motor 5.393 gal (20.411
l) Drained from motor 3.309 gal (12.525 l)
Transmission and drop box lubricant Ford
M2C48-A or equivalent Final drive lubricant SAE
90 Total time engine was operated 58.5 hours.

ENGINE: Make Cummins Diesel Type 8 cylin-
der vee Serial No. 10697786 Crankshaft
lengthwise Rated rpm 2600 Bore and stroke 5.5"
x 4.75" (140 mm x 121 mm) Compression ratio 15.5
to 1 Displacement 903 cu in (14800 ml) Cranking
system 12 volt Lubrication pressure Air cleaner
primary and secondary paper elements with as-
pirator Oil filter one full flow paper cartridge and
one bypass element Oil cooler engine coolant heat
exchanger for crankcase oil, radiator for transmis-
sion and dropbox oil, radiator for hydrostatic PTO
oil Fuel filter two paper cartridges Muffler verti-
cal Cooling medium temperature control 2 ther-
mostats.

CHASSIS: Type four wheel drive with duals
Serial No. X300085 Tread width rear 80.0" (2032
mm) to 139.4" (3540 mm) front 80.0" (2032 mm) to
139.4" (3540 mm) Wheel base 132.5" (3365 mm)
Center of gravity (without operator or ballast, with
minimum tread, with fuel tank filled and tractor
serviced for operation) Horizontal distance for-
ward from center-line of rear wheels 75.2" (1910
mm) Vertical distance above roadway 47.2" (1200
mm) Horizontal distance from center of rear wheel
tread 0" (0 mm) to the right/left Hydraulic control
system direct engine drive Transmission selective
gear fixed ratio Advertised speeds mph (km/h)
first 2.2 (3.5) second 2.5 (4.0) third 2.8 (4.5) fourth
3.1 (5.0) fifth 3.6 (5.8) sixth 4.0 (6.5) seventh 4.6
(7.3) eighth 5.1 (8.2) ninth 5.8 (9.3) tenth 6.5 (10.5)
eleventh 7.4 (11.8) twelfth 8.3 (13.3) thirteenth 9.5
(15.3) fourteenth 10.7 (17.3) fifteenth 12.2 (19.6)
sixteenth 13.7 (22.0) seventeenth 15.2 (24.5) eigh-
teenth 17.2 (27.6) nineteenth 19.3 (31.1) twentieth
21.8 (35.1) reverse 2.2 (3.5), 2.5 (4.0), 2.8 (4.5), 3.1
(5.0) Clutch two dry plates hydraulically operated
by foot pedal Brakes multiple dry disc hydraulically
operated by foot pedal Steering hydrostatic
and articulated Turning radius (on concrete sur-
face without brake) right 257" (6.53 m) left 261"
(6.63 m) Turning space diameter (on concrete sur-
face without brake) right 537" (13.64 m) left 546"
(13.87 m) Power take-off hydrostatic drive nomi-
nally 1000 rpm within engine speed range 2350 to
high idle.

TRACTOR SOUND LEVEL WITH CAB	With PTO dB(A)	W/O PTO dB(A)
Maximum Available Power—Two Hours	76.5	77.0
75% of Pull at Maximum Power—Ten Hours	77.5	78.5
50% of Pull at Maximum Power—Two Hours	78.0	79.0
50% of Pull at Reduced Engine Speed—Two Hours	74.5	75.0
Bystander in 18th (5LO) Gear	95.5	95.5

DRAWBAR PERFORMANCE (FW 30 Without PTO)											
Power Hp (kW)	Drawbar pull lbs (kN)	Speed mph (km/h)	Crank- shaft speed rpm	Slip %	Fuel Consumption			Temp. °F (°C)			
					gal/hr (l/h)	lb/hp.hr (kg/kW.h)	Hp.hr/gal (kW.h/l)	Cool- ing med	Air wet bulb	Air dry bulb	Barom. inch Hg (kPa)
Maximum Available Power—Two Hours 9th (3LS) Gear											
212.68 (158.60)	13638 (60.66)	5.85 (9.41)	2599	4.15	15.022 (56.863)	0.490 (0.298)	14.16 (2.789)	170 (76.7)	57 (13.6)	73 (22.8)	28.990 (97.895)
75% of Pull at Maximum Power—Two Hours 9th (3LS) Gear											
176.87 (131.89)	10532 (46.85)	6.30 (10.13)	2785	3.66	13.893 (52.590)	0.546 (0.332)	12.73 (2.508)	167 (74.7)	57 (13.9)	61 (16.1)	28.825 (97.338)
50% of Pull at Maximum Power—Two Hours 9th (3LS) Gear											
122.48 (91.34)	7083 (31.51)	6.48 (10.44)	2827	2.29	11.175 (42.304)	0.634 (0.386)	10.96 (2.159)	167 (75.0)	60 (15.3)	65 (18.1)	28.885 (97.540)
50% of Pull at Reduced Engine Speed—Two Hours 14th (4LO) Gear											
121.96 (90.94)	7052 (31.37)	6.48 (10.44)	1517	2.20	7.900 (29.906)	0.450 (0.274)	15.44 (3.041)	173 (78.1)	56 (13.3)	64 (17.5)	28.885 (97.540)

MAXIMUM POWER IN SELECTED GEARS										
191.06 <i>(142.47)</i>	28302 <i>(125.90)</i>	2.53 <i>(4.07)</i>	2634	14.76	3rd (1HS) Gear	169 <i>(75.8)</i>	55 <i>(12.8)</i>	58 <i>(14.4)</i>	28.800 <i>(97.253)</i>	
196.75 <i>(146.72)</i>	25115 <i>(111.72)</i>	2.94 <i>(4.73)</i>	2600	11.08	4th (1HO) Gear	171 <i>(77.2)</i>	61 <i>(16.1)</i>	77 <i>(25.0)</i>	28.910 <i>(97.625)</i>	
209.44 <i>(156.18)</i>	22616 <i>(100.60)</i>	3.47 <i>(5.59)</i>	2599	8.19	5th (2LS) Gear	171 <i>(77.2)</i>	61 <i>(16.1)</i>	77 <i>(25.0)</i>	28.920 <i>(97.659)</i>	
212.68 <i>(158.60)</i>	20041 <i>(89.15)</i>	3.98 <i>(6.40)</i>	2600	6.60	6th (2LO) Gear	171 <i>(77.2)</i>	60 <i>(15.6)</i>	76 <i>(24.4)</i>	28.920 <i>(97.659)</i>	
215.33 <i>(160.57)</i>	17755 <i>(78.98)</i>	4.55 <i>(7.32)</i>	2600	5.43	7th (2HS) Gear	169 <i>(76.1)</i>	54 <i>(12.2)</i>	65 <i>(18.3)</i>	29.010 <i>(97.962)</i>	
217.05 <i>(161.85)</i>	15756 <i>(70.08)</i>	5.17 <i>(8.31)</i>	2600	4.71	8th (2HO) Gear	169 <i>(76.1)</i>	53 <i>(11.7)</i>	64 <i>(17.8)</i>	29.020 <i>(97.996)</i>	
220.38 <i>(164.34)</i>	14130 <i>(62.85)</i>	5.85 <i>(9.41)</i>	2599	4.07	9th (3LS) Gear	170 <i>(76.4)</i>	51 <i>(10.6)</i>	61 <i>(16.1)</i>	29.030 <i>(98.030)</i>	
219.06 <i>(163.35)</i>	12404 <i>(55.18)</i>	6.62 <i>(10.66)</i>	2599	3.58	10th (3LO) Gear	169 <i>(76.1)</i>	55 <i>(12.8)</i>	66 <i>(18.9)</i>	29.010 <i>(97.962)</i>	
216.90 <i>(161.75)</i>	10825 <i>(48.15)</i>	7.51 <i>(12.09)</i>	2601	3.17	11th (3HS) Gear	170 <i>(76.4)</i>	56 <i>(13.3)</i>	67 <i>(19.4)</i>	29.000 <i>(97.929)</i>	
216.66 <i>(161.56)</i>	9556 <i>(42.51)</i>	8.50 <i>(13.68)</i>	2599	2.67	12th (3HO) Gear	170 <i>(76.7)</i>	56 <i>(13.3)</i>	69 <i>(20.6)</i>	29.000 <i>(97.929)</i>	

LUGGING ABILITY IN 9th (3LS) GEAR							
Crankshaft Speed rpm	2599	2330	2081	1816	1560	1300	1033
Pull—lbs (kN)	14130 (62.85)	15364 (68.34)	16619 (73.92)	18087 (80.46)	18870 (83.94)	19600 (87.18)	18934 (84.22)
Increase in Pull %	0	9	18	28	34	39	34
Power—Hp (kW)	220.38 (164.34)	213.95 (159.55)	205.66 (153.36)	194.05 (144.71)	173.17 (129.13)	149.28 (111.32)	114.99 (85.74)
Speed—Mph (km/h)	5.85 (9.41)	5.22 (8.40)	4.64 (7.47)	4.02 (6.47)	3.44 (5.54)	2.86 (4.60)	2.28 (3.67)
Slip %	4.07	4.55	5.03	5.67	5.98	6.29	5.98

TIRES, BALLAST AND WEIGHT			
Rear Tires		With Ballast	Without Ballast
—No., size, ply & psi (kPa)		Four 24.5-32; 10; inner 16 (110); outer 14 (95)	Four 24.5-32; 10; inner 16 (110); outer 14 (95)
Ballast		None	None
—Liquid (each)		None	None
—Cast Iron (each)		None	None
Front Tires		Four 24.5-32; 10; inner 16 (110); outer 14 (95)	Four 24.5-32; 10; inner 16 (110); outer 14 (95)
Ballast		None	None
—Liquid (each inner)		None	None
—Cast Iron (each)		None	None
Height of Drawbar		18.5 in (470 mm)	18.5 in (470 mm)
Static Weight with Operator—Rear		13610 lb (6173 kg)	13610 lb (6173 kg)
Front		18110 lb (8215 kg)	17700 lb (8029 kg)
Total		31720 lb (14388 kg)	31310 lb (14202 kg)

NOTE: The Power take-off on this tractor does not transmit full engine power. The speed and the power are controlled by electrohydraulic system. The PTO test was run at two speeds: Full throttle setting and the minimum setting which would maintain standard PTO speed and advertised power. The following maximum variations were observed during the PTO runs:

	Eng. RPM	PTO RPM
Full Throttle	2761-2775	No Variation
Minimum Throttle	2346-2365	No Variation
85% Torque	2368-2386	No Variation
¾ × 85% Torque	2393-2408	No Variation
½ × 85% Torque	2407-2419	1046-1060
¼ × 85% Torque	2414-2426	1051-1071

REPAIRS and ADJUSTMENTS: During preliminary PTO tests a PTO hydraulic hose failed. This hose and the motor pressure control switch were replaced.

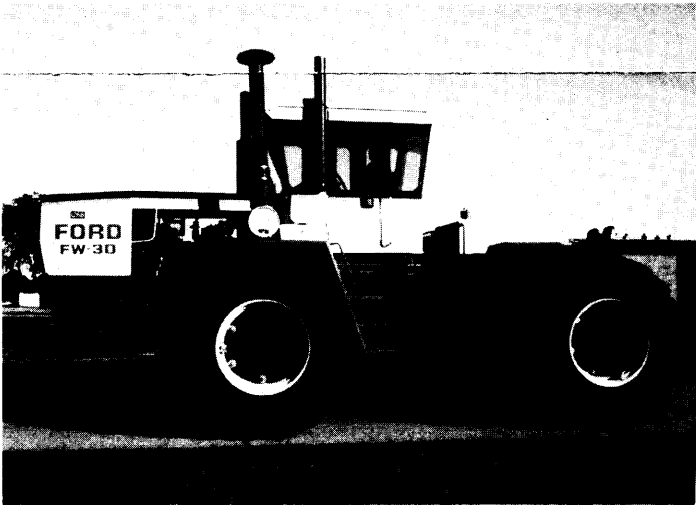
REMARKS: All test results were determined from observed data obtained in accordance with SAE and ASAE test code or official Nebraska test procedure. Temperature at injection pump was 140°F (60.0°C). Eleven gears were chosen between 15% slip and 10 mph (16.1 km/h).

We, the undersigned, certify that this is a true and correct report of official Tractor Test **1288**.

L. I. LEVITICUS
Engineer-in-Charge

G. W. STEINBRUEGGE
W. E. SPLINTER
K. VON BARGEN
Board of Tractor Test Engineers

The Agricultural Experiment Station
Institute of Agriculture and Natural Resources
University of Nebraska—Lincoln
H. W. Ottoson, Director



Ford FW-30 Diesel