

University of Nebraska - Lincoln

DigitalCommons@University of Nebraska - Lincoln

Nebraska Tractor Tests

Tractor Test and Power Museum, The Lester F. Larsen

3-30-1984

Test 1509: Ford 2110 (12x4) Manual Diesel 12-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 1509: Ford 2110 (12x4) Manual Diesel 12-Speed" (1984). *Nebraska Tractor Tests*. 1820.

<https://digitalcommons.unl.edu/tractormuseumlit/1820>

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 1509

FORD 2110 (12x4) MANUAL DIESEL

12 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 Engine Speed—Two Hours (PTO Speed—564 rpm)								
34.79 (25.94)	2500	2.520 (9.538)	0.507 (0.308)	13.81 (2.720)	207 (97.2)	60 (15.6)	75 (23.8)	28.89 (97.54)
Standard Power Take-off Speed (540 rpm)—One Hour								
34.91 (26.03)	2392	2.492 (9.433)	0.500 (0.304)	14.01 (2.760)	210 (98.8)	60 (15.7)	75 (24.0)	28.86 (97.46)
VARYING POWER AND FUEL CONSUMPTION—Two Hours								
30.31 (22.60)	2559	2.259 (8.552)	0.522 (0.317)	13.41 (2.643)	198 (91.9)	60 (15.6)	75 (23.9)	..... .....
0.00 (0.00)	2653	0.926 (3.505)	..... .....	..... .....	166 (74.4)	60 (15.6)	75 (23.9)	..... .....
15.46 (11.53)	2612	1.565 (5.923)	0.708 (0.431)	9.88 (1.947)	173 (78.3)	60 (15.6)	75 (23.9)	..... .....
34.67 (25.85)	2500	2.525 (9.558)	0.510 (0.310)	13.73 (2.705)	206 (96.7)	60 (15.6)	75 (23.9)	..... .....
7.81 (5.82)	2638	1.217 (4.609)	1.091 (0.664)	6.41 (1.263)	167 (75.0)	60 (15.6)	75 (23.9)	..... .....
22.93 (17.10)	2582	1.903 (7.205)	0.581 (0.353)	12.05 (2.373)	184 (84.2)	60 (15.6)	75 (23.9)	..... .....
Av Av	18.53 (13.82)	2590 (6.559)	1.733 (0.398)	10.69 (2.107)	182 (83.4)	60 (15.6)	75 (23.9)	28.81 (97.29)

DRAWBAR PERFORMANCE

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 8th (3-2) Gear											
28.84 (21.51)	1918 (8.53)	5.64 (9.08)	2500	6.14	2.444 (9.250)	0.593 (0.361)	11.80 (2.325)	180 (81.9)	51 (10.6)	54 (11.9)	28.84 (97.37)
75% of Pull at Maximum Power—Ten Hours 8th (3-2) Gear											
23.94 (17.86)	1527 (6.79)	5.88 (9.46)	2579	5.16	2.186 (8.276)	0.639 (0.389)	10.95 (2.157)	176 (80.1)	53 (11.7)	55 (12.8)	28.52 (96.29)
50% of Pull at Maximum Power—Two Hours 8th (3-2) Gear											
16.40 (12.23)	1018 (4.53)	6.04 (9.72)	2603	3.47	1.815 (6.870)	0.774 (0.471)	9.04 (1.780)	172 (77.5)	45 (6.9)	49 (9.2)	28.41 (95.94)
50% of Pull at Reduced Engine Speed—Two Hours 10th (4-1) Gear											
16.41 (12.24)	1018 (4.53)	6.05 (9.73)	1566	3.23	1.308 (4.949)	0.558 (0.339)	12.55 (2.472)	174 (78.9)	46 (7.8)	53 (11.7)	28.41 (95.92)
MAXIMUM POWER IN SELECTED GEARS											
24.82 (18.51)	3868 (17.21)	2.41 (3.87)	2549	14.81	5th (2-2) Gear			176 (79.7)	51 (10.6)	53 (11.7)	28.86 (97.46)
29.06 (21.67)	3704 (16.47)	2.94 (4.74)	2499	13.37	6th (2-3) Gear			176 (80.0)	51 (10.6)	53 (11.7)	28.86 (97.46)
29.91 (22.31)	2618 (11.65)	4.28 (6.90)	2501	8.19	7th (3-1) Gear			181 (82.8)	50 (10.0)	52 (11.1)	28.87 (97.49)
30.61 (22.83)	2036 (9.05)	5.64 (9.08)	2500	6.14	8th (3-2) Gear			179 (81.7)	49 (9.4)	51 (10.6)	28.88 (97.52)
30.80 (22.97)	1648 (7.33)	7.01 (11.28)	2500	4.79	9th (3-3) Gear			178 (81.1)	49 (9.4)	51 (10.6)	28.88 (97.52)
30.00 (22.37)	1169 (5.20)	9.62 (15.49)	2498	3.41	10th (4-1) Gear			179 (81.4)	50 (10.0)	52 (11.1)	28.87 (97.49)

Department of Agricultural Engineering

Dates of Test: March 30 to April 13, 1984

Manufacturer: ISHIKAWAJIMA-SHIBAURA
MACHINERY COMPANY, LTD., Tokyo, Japan

FUEL, OIL AND TIME: Fuel No. 2 Diesel
Cetane No. 46.0 (rating taken from oil company's
inspection data) Specific gravity converted to 60°/
60° (15°/15°) 0.8405 Fuel weight 6.998 lbs/gal
(0.839 kg/l) Oil SAE 30 API service classifi-
cation SE, SF, CC, CD To motor 1.916 gal (7.251 l)
Drained from motor 1.785 gal (6.757 l) Trans-
mission and final drive lubricant Ford 134 fluid
Total time engine was operated 36.5 hours.

ENGINE: Make Shibaura Diesel Type four
cylinder vertical Serial No. *T854B-10092*
Crankshaft lengthwise Rated rpm 2500 Bore
and stroke 3.346" × 3.937" (85 mm × 100 mm)
Compression ratio 21 to 1 Displacement 138.5
cu in (2270 ml) Starting system 12 volt Lubri-
cation pressure Air cleaner one paper element
Oil filter one full flow cartridge Fuel filter one
paper element Muffler vertical Cooling me-
dium temperature control one thermostat.

CHASSIS: Type standard Serial No.
*2110*UV00043* Tread width rear 48.0" (1219
mm) to 71.8" (1824 mm) front 48.0" (1219 mm) to
72.0" (1829 mm) Wheel base 73.4" (1864 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 28.2" (716
mm) Vertical distance above roadway 30.3" (770
mm) Horizontal distance from center of rear wheel
tread 0.2" (5 mm) to the left Hydraulic control
system direct engine drive Transmission selec-
tive gear fixed ratio Advertised speeds mph (km/
h) first 1.0 (1.6) second 1.3 (2.1) third 1.6 (2.6)
fourth 2.3 (3.7) fifth 3.0 (4.8) sixth 3.6 (5.8) sev-
enth 5.0 (8.0) eighth 6.4 (10.3) ninth 7.8 (12.6)
tenth 10.8 (17.4) eleventh 13.7 (22.0) twelfth 16.5
(26.6) reverse 1.2 (1.9), 2.7 (4.3), 5.8 (9.3), 12.5
(20.1) Clutch single dry disc operated by foot
pedal Brakes drum and shoe operated by two
foot pedals which can be locked together Steer-
ing power assist Turning radius (on concrete
surface with brake applied) right 114.2" (2.90 m)
left 114.2" (2.90 m) (on concrete surface without
brake) right 125.0" (3.18 m) left 125.0" (3.18 m)
Turning space diameter (on concrete surface with
brake applied) right 235" (5.96 m) left 235" (5.96
m) (on concrete surface without brake) right 256"
(6.50 m) left 256" (6.50 m) Power take-off 540
rpm at 2392 engine rpm.

LUGGING ABILITY IN 8th (3-2) GEAR

Crankshaft Speed rpm	2500	2253	1999	1750	1502	1234
Pull—lbs (kN)	2036 (9.05)	2270 (10.17)	2421 (10.85)	2432 (10.90)	2399 (10.75)	2377 (10.65)
Increase in Pull %	0	11	19	19	18	17
Power—Hp (kW)	30.61 (22.83)	30.54 (22.78)	28.71 (21.41)	25.20 (18.80)	21.37 (15.94)	17.41 (12.98)
Speed—Mph (km/h)	5.64 (9.08)	5.05 (8.12)	4.45 (7.16)	3.89 (6.25)	3.34 (5.38)	2.75 (4.42)
Slip %	6.14	6.90	7.44	7.77	7.44	7.23

TRACTOR SOUND LEVEL WITHOUT CAB

	dB(A)
Maximum Available Power—Two Hours	90.5
75% of Pull at Maximum Power—Ten Hours	91.0
50% of Pull at Maximum Power—Two Hours	90.5
50% of Pull at Reduced Engine Speed—Two Hours	84.5
Bystander in 12th (4-3) gear	82.0

TIRES, BALLAST AND WEIGHT

	With Ballast	Without Ballast
Rear Tires		
—No., size, ply & psi (kPa)	Two 13.6-28; 4; 14 (95)	Two 13.6-28; 4; 14 (95)
Ballast		
—Liquid (each)	432 lb (196 kg)	None
—Cast Iron (each)	250 lb (113 kg)	None
Front Tires		
—No., size, ply & psi (kPa)	Two 6.00-16; 4; 32 (220)	Two 6.00-16; 4; 32 (220)
Ballast		
—Liquid (each)	None	None
—Cast Iron (each)	52 lb (24 kg)	None
Height of Drawbar	16.5 in (420 mm)	16.5 in (420 mm)
Static Weight with Operator—Rear	3650 lb (1656 kg)	2285 lb (1037 kg)
—Front	1455 lb (660 kg)	1350 lb (612 kg)
—Total	5105 lb (2316 kg)	3635 lb (1649 kg)

REPAIRS and ADJUSTMENTS: No repairs or adjustments.

REMARKS: All test results were determined from observed data obtained in accordance with SAE and ASAE test codes and the technically equivalent ISO test codes or official Nebraska test procedure. For the maximum power tests, the fuel temperature at the injection pump was maintained at 141°F (60.6°C). Six gears were chosen between 15% slip and 10 mph (16.1 km/h). During inspection, it was found that the intake valves and valve seats on cylinders 1 and 4 had adhesive wear markings (metal transfer). In cylinder No. 4, light scratches were found.

We, the undersigned, certify that this is a true and correct report of official Tractor Test No. 1509, June 14, 1984.

LOUIS I. LEVITICUS

Engineer-in-Charge

K. VON BARGEN

W. E. SPLINTER

L. L. BASHFORD

Board of Tractor Test Engineers



Ford 2110 (12x4) Manual Diesel