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Test 1300: Ford TW-20 Diesel 16-Speed

Nebraska Tractor Test Lab

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NEBRASKA TRACTOR TEST 1300 — FORD TW-20 DIESEL

16 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—1146 rpm)									
135.60 (101.11)	2199	8.934 (33.817)	0.459 (0.279)	15.18 (2.990)	192 (89.0)	57 (13.8)	75 (23.9)	28.897 (97.580)	
Standard Power Take-off Speed—One Hour (PTO Speed—1000 rpm)									
131.43 (98.01)	1918	8.105 (30.682)	0.430 (0.261)	16.22 (3.194)	190 (87.9)	57 (13.8)	75 (23.8)	28.940 (97.726)	
VARYING POWER AND FUEL CONSUMPTION—Two Hours									
123.84 (92.35)	2364	8.827 (33.415)	0.497 (0.302)	14.03 (2.764)	190 (87.5)	58 (14.2)	76 (24.4)	..... .....
0.00 (0.00)	2446	2.971 (11.247)	..... .....	..... .....	186 (85.6)	56 (13.6)	74 (23.6)	..... .....
63.10 (47.05)	2410	5.848 (22.135)	0.646 (0.393)	10.79 (2.126)	186 (85.8)	57 (13.9)	76 (24.2)	..... .....
138.19 (103.05)	2200	9.038 (34.214)	0.456 (0.277)	15.29 (3.012)	192 (88.6)	57 (13.9)	74 (23.6)	..... .....
31.91 (23.80)	2426	4.289 (16.235)	0.936 (0.570)	7.44 (1.466)	186 (85.6)	56 (13.1)	74 (23.1)	..... .....
93.82 (69.96)	2386	7.307 (27.661)	0.543 (0.330)	12.84 (2.529)	188 (86.7)	58 (14.2)	76 (24.4)	..... .....
Av Av	75.14 (56.03)	2372	6.380 (24.151)	0.592 (0.360)	11.78 (2.320)	188 (86.6)	57 (13.8)	75 (23.9)	28.977 (97.850)

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 (5PD) Gear											
116.64 (86.98)	8795 (39.12)	4.97 (8.00)	2201	5.20	8.917 (33.755)	0.533 (0.324)	13.08 (2.577)	193 (89.4)	59 (15.0)	74 (23.3)	28.580 (96.510)
75% of Pull at Maximum Power—Ten Hours 8th (5PD) Gear											
98.46 (73.42)	6782 (30.17)	5.44 (8.76)	2379	3.92	8.181 (30.970)	0.579 (0.352)	12.04 (2.371)	189 (87.4)	33 (0.6)	38 (3.1)	29.116 (98.320)
50% of Pull at Maximum Power—Two Hours 8th (5PD) Gear											
67.50 (50.34)	4533 (20.16)	5.58 (8.99)	2412	2.78	6.692 (25.333)	0.691 (0.420)	10.09 (1.987)	190 (87.5)	31 (−0.7)	33 (0.3)	29.045 (98.081)
50% of Pull at Reduced Engine Speed—Two Hours 11th (6PD) Gear											
67.58 (50.40)	4537 (20.18)	5.59 (8.99)	1561	2.70	4.808 (18.202)	0.496 (0.302)	14.06 (2.769)	188 (86.7)	32 (0.0)	34 (0.8)	29.040 (98.064)
MAXIMUM POWER IN SELECTED GEARS											
94.00 (70.10)	14155 (62.97)	2.49 (4.01)	2392	14.94	3rd (2PD) Gear			193 (89.4)	27 (−2.7)	29 (−1.6)	29.120 (98.334)
112.63 (83.99)	14052 (62.51)	3.01 (4.84)	2201	11.41	4th (3PD) Gear			194 (90.0)	58 (14.4)	74 (23.3)	28.600 (96.578)
113.64 (84.74)	13710 (60.99)	3.11 (5.00)	2200	10.15	5th (2DD) Gear			195 (90.3)	58 (14.4)	73 (22.8)	28.600 (96.578)
116.28 (86.71)	10700 (47.60)	4.08 (6.56)	2200	6.50	6th (3DD) Gear			194 (90.0)	56 (13.3)	70 (21.1)	28.630 (96.679)
119.61 (89.19)	10590 (47.11)	4.24 (6.82)	2200	6.50	7th (4PD) Gear			194 (90.0)	56 (13.3)	70 (21.1)	28.630 (96.679)
119.30 (88.97)	8998 (40.03)	4.97 (8.00)	2202	5.09	8th (5PD) Gear			193 (89.2)	52 (11.1)	63 (17.2)	28.670 (96.814)
118.60 (88.44)	8015 (35.65)	5.55 (8.93)	2199	4.64	9th (4DD) Gear			195 (90.3)	57 (13.9)	71 (21.7)	28.630 (96.679)
121.37 (90.50)	7032 (31.28)	6.47 (10.42)	2198	3.87	10th (5DD) Gear			194 (89.7)	57 (13.9)	71 (21.7)	28.630 (96.679)
121.47 (90.58)	5804 (25.82)	7.85 (12.63)	2200	3.17	11th (6PD) Gear			194 (90.0)	57 (13.9)	71 (21.7)	28.620 (96.645)
118.73 (88.54)	4476 (19.91)	9.95 (16.01)	2198	2.30	12th (7PD) Gear			194 (90.0)	57 (13.9)	72 (22.2)	28.610 (96.612)

Department of Agricultural Engineering

Dates of Test: March 22 to April 10, 1979

Manufacturer: FORD MOTOR CO.-FORD
TRACTOR OPER., 2500 E. Maple Rd., Troy,
Michigan 48084

FUEL, OIL AND TIME: Fuel No. 2 Diesel
Cetane No. 49.0 (rating taken from oil company's
typical inspection data) **Specific gravity converted
to 60°/60° (15°/15°)** 0.8368 **Fuel weight** 6.967 lbs/
gal (0.835 kg/l) **Oil SAE 30 API service classifi-
cation SB/SE-CA/CD** To motor 4.342 gal (16.435
l) **Drained from motor** 3.904 gal (14.775 l)
Transmission and final drive lubricant Ford
M2C-53-A **Total time engine was operated** 67.0
hours.

ENGINE: Make Ford Diesel **Type** Six cylinder
vertical with turbocharger **Serial No.** *H347448*
Crankshaft lengthwise **Rated rpm** 2200 **Bore and
stroke** 4.4" × 4.4" (112 mm × 112 mm) **Compression
ratio** 15.6 to 1 **Displacement** 401 cu in (6572
ml) **Cranking System** 12 volt **Lubrication** pres-
sure **Air cleaner** two paper elements with cen-
trifugal precleaner **Oil filter** one full flow paper
element **Oil cooler** engine coolant heat exchanger
for crankcase oil, radiator for hydraulic and trans-
mission oil **Fuel filter** one paper element **Muffler**
vertical **Cooling medium temperature control**
thermostat.

CHASSIS: **Type** standard with duals **Serial No.**
C-597155 **Tread width** rear 60.0" (1524 mm) to
112.0" (2845 mm) front 60.0" (1524 mm) to 84.0"
(2134 mm) **Wheel base** 109.7" (2785 mm) **Center of
gravity** (without operator or ballast, with minimum
tread, with fuel tank filled and tractor serviced for
operation) Horizontal distance forward from
center-line of rear wheels 33.3" (846 mm) Vertical
distance above roadway 44.6" (1133 mm) Horizontal
distance from center of rear wheel tread 0.4" (10
mm) to the left **Hydraulic control system** direct
engine drive **Transmission** selective gear fixed
ratio with partial (2) range operator controlled
power shift **Advertised speeds mph (km/h)** first
1.7 (2.8) second 2.2 (3.6) third 2.7 (4.3) fourth 3.4
(5.4) fifth 3.4 (5.5) sixth 4.3 (7.0) seventh 4.5 (7.2)
eighth 5.2 (8.4) ninth 5.8 (9.3) tenth 6.7 (10.8)
eleventh 8.0 (12.9) twelfth 10.1 (16.3) thirteenth
10.3 (16.6) fourteenth 13.0 (20.9) fifteenth 13.5
(21.7) sixteenth 17.4 (27.9) reverse 1.9 (3.0), 2.4
(3.9), 5.6 (9.0), 7.2 (11.6) **Clutch** single dry disc
operated by foot pedal **Brakes** single wet disc op-
erated hydraulically by two foot pedals which can
be locked together **Steering** hydrostatic **Turning
radius** (on concrete surface with brake applied)
right 158" (4.01 m) left 160" (4.06 m) (on concrete
surface without brake applied) right 178" (4.52 m)
left 180" (4.57 m) **Turning space diameter** (on
concrete surface with brake applied) right 330"
(8.38 m) left 334" (8.48 m) (on concrete surface
without brake) right 370" (9.40 m) left 374" (9.50
m) **Power take-off** 1000 rpm at 1918 engine rpm
and 540 rpm at 1873 rpm.

LUGGING ABILITY IN 8th (5PD) GEAR

Crankshaft Speed rpm	2202	1982	1760	1540	1315	1097
Pull—lbs (kN)	8998 (40.03)	10027 (44.60)	10578 (47.05)	10750 (47.82)	10256 (45.62)	9013 (40.09)
Increase in Pull %	0	11	18	19	14	0
Power—Hp (kW)	119.30 (88.97)	118.84 (88.62)	110.71 (82.56)	98.30 (73.30)	80.36 (59.93)	59.48 (44.35)
Speed—Mph (km/h)	4.97 (8.00)	4.44 (7.15)	3.92 (6.32)	3.43 (5.52)	2.94 (4.73)	2.47 (3.98)
Slip %	5.09	5.91	6.35	6.50	6.21	5.32

TRACTOR SOUND LEVEL WITH CAB

dB(A)

Maximum Available Power—Two Hours	81.5
75% of Pull at Maximum Power—Ten Hours	82.0
50% of Pull at Maximum Power—Two Hours	82.0
50% of Pull at Reduced Engine Speed—Two Hours	80.0
Bystander in 16th (8DD) gear	89.5

TIRES, BALLAST AND WEIGHT

Rear Tires		With Ballast	Without Ballast
—No., size, ply & psi (kPa)		Four 18.4-38; 8; 16 (110)	Four 18.4-38; 8; 16 (110)
Ballast	—Liquid (each inner)	992 lb (451 kg)	None
	—Cast Iron (each)	455 lb (206 kg)	None
Front Tires		With Ballast	Without Ballast
—No., size, ply & psi (kPa)		Two 11.00-16; 6; 32 (220)	Two 11.00-16; 6; 32 (220)
Ballast	—Liquid (each)	None	None
	—Cast Iron (each)	70 lb (32 kg)	None
Height of Drawbar		21 in (535 mm)	21 in (535 mm)
Static Weight with Operator—Rear		13540 lb (6142 kg)	9735 lb (4416 kg)
Front		3640 lb (1651 kg)	3500 lb (1588 kg)
Total		17180 lb (7793 kg)	13235 lb (6004 kg)

REPAIRS and ADJUSTMENTS: During the drawbar tests, erratic engine operation was observed resulting in faulty power and fuel consumption data. After readjusting the throttle linkage, the PTO tests and drawbar tests were run over again.

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 169°F (76.4°C). Ten gears were chosen between 15% and 10 mph (16.1 km/h).

We, the undersigned, certify that this is a true and correct report of official Tractor Test No. 1300.

L. I. LEVITICUS

Engineer-in-Charge

G. W. STEINBRUEGGE

W. E. SPLINTER

K. VON BARGEN

Board of Tractor Test Engineers



Ford TW-20 Diesel

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