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Test 653: Ford Model 841 (Diesel)

Nebraska Tractor Test Lab

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Department of Agricultural Engineering

Dates of test: June 2 to 10, 1958

Manufacturer: FORD MOTOR COMPANY,
BIRMINGHAM, MICHIGAN

Manufacturer's rating: 35 maximum drawbar horse-
power and 37 maximum belt horsepower (cor-
rected to standard conditions)

NEBRASKA TRACTOR TEST NO. 653

FORD 841 DIESEL

BELT HORSEPOWER TESTS

Hp	Crank shaft speed rpm	Fuel Consumption			Temp. Deg. F.			Barometer inches of mercury
		Gal per hr	Hp-hr per gal	Lb per hp-hr	Cooling medium	Air wet bulb	Air dry bulb	
* TESTS B & C—100% MAXIMUM POWER—TWO HOURS								
39.88	2000	2.809	14.20	0.493	178	65	74	29.117
TEST D—RATED POWER—ONE HOUR								
35.35	2106	2.441	14.48	0.483	178	63	72	29.155
TEST E—VARYING POWER—TWO HOURS (20 minute runs; last line average)								
35.44	2107	2.444	14.50	0.483	178	63	72
1.79	2228	0.806	2.22	3.151	131	61	70
18.35	2178	1.530	11.99	0.584	154	61	70
39.95	2005	2.817	14.18	0.493	178	62	71
9.30	2205	1.119	8.31	0.842	146	60	69
27.02	2144	1.959	13.79	0.507	171	60	70
21.98	2145	1.779	12.36	0.566	160	61	70	29.170

DRAWBAR HORSEPOWER TESTS

Hp	Draw bar pull lbs	Speed miles per hr	Crank shaft speed rpm	Slip of drive wheels %	Fuel Consumption			Temp. Deg. F.			Barometer inches of mercury
					Gal per hr	Hp-hr per gal	Lb per hp-hr	Cool- ing med	Air wet bulb	Air dry bulb	
TEST H—RATED POWER—TEN HOURS—5th Gear											
28.91	2451	4.42	2123	5.51	2.143	13.49	0.519	173	62	70	29.083
TESTS F & G—100% MAXIMUM POWER											
26.56	4705	2.12	2000	11.70	1st Gear (part throttle)			164	70	75	28.775
32.29	4696	2.58	2006	11.84	2nd Gear (part throttle)			173	70	75	28.775
36.79	4266	3.23	1999	11.01	3rd Gear.....			167	54	60	29.240
35.83	3455	3.89	2002	8.49	4th Gear.....			174	58	64	29.250
36.77	3408	4.05	2000	8.33	5th Gear.....			174	57	63	29.230
36.12	2670	5.07	1996	6.44	6th Gear.....			176	48	65	29.230
36.06	2229	6.07	1995	5.33	7th Gear.....			174	48	65	29.230
35.98	2161	6.24	1998	5.16	8th Gear.....			172	48	65	29.230
35.98	1577	8.56	2006	3.66	9th Gear.....			167	59	69	29.245
35.00	1409	9.31	2007	3.31	10th Gear.....			175	59	69	29.245
34.99	1000	13.12	2002	2.18	11th Gear.....			177	59	69	29.245
26.43	669	14.82	1499	1.32	12th Gear.....			176	59	69	29.245
TEST J—OPERATING MAXIMUM POWER											
27.31	2634	3.89	2001	13.96	5th Gear (part throttle)			181	83	88	28.635
TEST K—SPEED-PULL CHARACTERISTIC											
Pounds Pull	2451		3408		3450		3600		3600		3600
Horsepower		28.91		36.77		34.0		30.7		26.9	23.4
Miles Per Hour		4.42		4.05		3.7		3.2		2.8	2.4

TIRES, WHEELS AND WEIGHT

Tests F, G, H & K		Test J
Rear wheels		
Type	Pressed steel	Pressed steel
Liquid ballast	372 lb each	None
Added cast iron	978 lb each	None
Rear tires		
No. and size	Two 13.6-28	Two 13.6-28
Ply	4	4
Air pressure	14 lb	14 lb
Front wheels		
Type	Pressed steel	Pressed steel
Liquid ballast	None	None
Added cast iron	None	None
Front tires		
No. and size	Two 6.00-16	Two 6.00-16
Ply	4	4
Air pressure	28 lb	28 lb
Height of drawbar	17 inches	18½ inches
Static weight		
Rear end	4714 lb	2014 lb
Front end	1370 lb	1370 lb
Total weight as tested with operator	6259 lb	3559 lb

FUEL, OIL, WATER and TIME Fuel Diesel Ce-
tane No. ASTM 52 (rating taken from oil company's
typical inspection data) Weight per gallon 6.998 lb
Oil SAE 30 To motor 1.455 gal Drained from motor
1.059 gal Water used 0.048 gal Total time motor
was operated 40 hours.

CHASSIS Type Standard Serial No. 841DS-24161
Tread width rear 52" to 76" front 52" to 80"
Wheel base 74.5" Hydraulic control system direct
engine drive Advertised speeds mph first 2.46 second
2.99 Third 3.67 Fourth 4.32 Fifth 4.46 Sixth 5.57
Seventh 6.50 Eighth 6.79 Ninth 9.06 Tenth 9.83
Eleventh 13.56 Twelfth 15.47 (At 1500 RPM) Re-
verse First 2.57 Second 3.85 Third 5.84 Belt pulley
diam. 9" Face 6½" rpm 1360 Belt speed 3199 fpm
Belt flat Length 71' Width 6" Thickness 0.215"
Maximum slip 0.87% Clutch single plate dry disc
operated by foot pedal Seat pressed steel cushioned
by rubber in torsion Brakes internal expanding shoes
operated by two foot pedals located on right side of
tractor Equalized by foot action Power take-off con-
ventional type Steering aided by hydraulic power
steering.

ENGINE Make Ford Diesel Type 4 cylinder verti-
cal Serial No. 841DS-24161 Crankshaft mounted
lengthwise Head I Lubrication pressure Bore and
stroke 3.90" x 3.60" Rated rpm 2000 Compression
ratio 16.8 to 1 Displacement 172 cu. in. Valves port
diameter Inlet 1.46" Exhaust 1.26" Governor variable
speed centrifugal Starting system 12 volt battery Air
cleaner oil washed wire mesh Muffler was used Oil
filter full flow with replaceable paper element Fuel
filter one replaceable paper element Cooling medium
temperature control thermostat.

REPAIRS AND ADJUSTMENTS No repairs or
adjustments.

REMARKS All test results were determined from
observed data and without allowances, additions or
deductions. Tests B and F were made with fuel pump
set to develop approximately 41.5 corrected maxi-
mum belt horsepower and data from these tests were
used in determining the horsepower to be developed
in tests D and H, respectively. Tests C, D, E, G, H,
J, and K were made with the same setting.

HORSEPOWER SUMMARY

	Drawbar	Belt
1. Sea level (calculated) maximum horsepower (based on 60°F and 29.92" Hg)	37.75	41.53
2. Observed maximum horsepower (tests F and B)	36.77	39.88
3. Seventy-five per cent of calcu- lated maximum drawbar horse- power and eighty-five per cent of calculated maximum belt horsepower (ASAE and SAE ratings)	28.31	35.30

We, the undersigned, certify that this is a true
and correct report of official Tractor Test No. 653.

L. F. LARSEN
Engineer-in-Charge

L. W. HURLBUT, Chairman
G. W. STEINBRUEGGE
J. J. SULEK
Board of Tractor
Test Engineers

EXPLANATION OF TEST REPORT

TEST A: The manufacturer's representative operates the tractor for a minimum of 12 hours using light to heavy drawbar loads in each gear.

This serves as a period for limber up, general observation and adjustments. Adjustments that are permissible include valve tappet clearance, breaker point gap, spark plug gaps, clutch and others of a similar nature. No new parts or accessories can be installed without having mention made of it in the report.

No data are recorded during this preliminary run except the time that the engine is operated.

BELT HORSEPOWER TESTS

TEST B: The manual throttle control lever is set so that the throttle valve is held wide open and the belt load on the dynamometer is adjusted so that the engine is at the rated speed recommended by the manufacturer. Carburetor, ignition timing and manifold adjustments are all set for maximum engine power.

This test is designed to determine maximum belt horsepower of the tractor at rated speed and to measure fuel consumption at the maximum power on the belt.

TEST C: For tractors with carburetors the best fuel economy does not always occur when the engine develops maximum power at rated speed. Test C is intended to allow the manufacturer's representative to select a more economical fuel setting even though there is a slight loss of power. *This more practical carburetor setting is used in all later tests except test F.* The throttle valve is wide open and load adjusted to give rated rpm. Tests B and C are the same for diesel tractors which have an altogether different fuel system.

TEST D: The manual throttle control lever is set the same as for tests B and C allowing the governor to control engine speed at part throttle. Load is applied until 85% of maximum corrected horsepower found in test B is obtained.

This rating is somewhat less than the maximum belt horsepower in order that the operator may have a certain amount of reserve.

TEST E: Varying load serves to show the range of engine speeds when the engine is controlled by the governor during the following varied loads, of 20 minutes each; rated load, no load, $\frac{1}{2}$ rated load, maximum load at wide open throttle valve, $\frac{1}{4}$ and $\frac{3}{4}$ rated load.

The average result of this test shows the average power and fuel consumption. Since the average tractor is subjected to varying loads, these data serve well in predicting fuel consumption and efficiency of a tractor in general use.

DRAWBAR HORSEPOWER TESTS

In all drawbar tests the pull exerted by the tractor is transmitted by a hydraulic pressure cylinder to a recording instrument in the test car. When rubber tires are used, all tests are made on the concrete test course. The same tires, wheels and weights are used for all tests except J. All crawler type tractors are tested on an earthen test course which is maintained by grading, sprinkling and rolling so that it remains very nearly the same for each test.

TEST F: A drawbar test, the results of which are used to determine the rated drawbar horsepower in test H. The carburetor is set to develop maximum power as in test B. The rated gear recommended by manufacturer as plow gear is used in the test. The drawbar load is adjusted to give rated engine speed.

TEST G: Maximum drawbar horsepower is determined in each gear when the carburetor is set for fuel economy as in test C. The manual throttle control lever is set so that the throttle valve is held wide open and the load is applied so that the engine runs at rated engine speed.

When operating in low gear it is not uncommon for the tractor to develop less drawbar horsepower than in rated gear because of excessive wheel slippage. When excessive wheel slippage occurs the load is reduced until slippage approaches 15%. When the load is reduced it is necessary to operate the tractor engine at part throttle and control engine speed by governor action.

TEST H: Intended to test the ability of the tractor to run continuously for 10 hours at rated drawbar horsepower and to determine the fuel consumption during that time. Rated drawbar horsepower is 75% of 100% maximum drawbar horsepower (Test F), corrected to standard conditions.

When operating at rated horsepower the manual throttle control lever is set the same as in tests F and G allowing the governor to maintain engine speed at part throttle. This rating is less than maximum drawbar horsepower in order that the operator may have a certain amount of reserve.

TEST J: The tractor is operated in rated gear with all added weight removed. This test shows the effect of the removal of added weight on the performance of the tractor when compared with test G.

Removal of wheel weights generally increases wheel slippage and decreases drawbar horsepower.

TEST K: This is intended to show the pull, horsepower, and travel speed of the tractor at rated horsepower (taken from test H); maximum horsepower (taken from test G); and at least four other conditions obtained by reducing travel speed in 10% increments by overload.

