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Test 780: Case 841C (LPG)

Nebraska Tractor Test Lab

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NEBRASKA TRACTOR TEST 780 - CASE 841C LPG

The University of Nebraska Agricultural Experiment Station

E. F. Frolik, Dean and Acting Director, Lincoln, Nebraska

POWER TAKE-OFF PERFORMANCE

Hp	Crank shaft speed rpm	Fuel Consumption Gal per hr	Lb per hp-hr	Hp-hr per gal	Temp Cool- ing med	Degrees F Air wet bulb	Air dry bulb	Barometer inches of mercury
MAXIMUM POWER AND FUEL CONSUMPTION								
Rated Engine Speed—Two Hours								
65.96	1900	7.144	0.460	9.23	194	52	75	29.363
Standard Power Take-off Speed (540 rpm)—One Hour								
62.60*	1682	6.428	0.436	9.74	195	53	76	29.330
VARYING POWER AND FUEL CONSUMPTION—TWO HOURS								
58.79	1996	7.024	0.508	8.37	194	52	73	.....
0.00	2074	2.555	.....	.....	188	52	73	.....
29.86	2027	4.758	0.677	6.28	189	53	75	.....
66.08	1901	7.228	0.465	9.14	197	54	77	.....
15.04	2042	3.536	0.999	4.25	185	52	75	.....
44.37	2006	5.788	0.554	7.67	191	53	75	.....
Av 35.69	2008	5.148	0.613	6.93	190	52	75	29.310

DRAWBAR PERFORMANCE

Hp	Draw- bar pull lbs	Speed miles per hr	Crank shaft speed rpm	Slip of drivers %	Fuel Consumption		Temperature Degrees F					Barometer inches of mercury
					Gal per hr	Lb per hp hr	Hp-hr per gal	Cooling medium	Air wet bulb	Air dry bulb		
VARYING DRAWBAR POWER AND FUEL CONSUMPTION WITH BALLAST												
Maximum Available Power—Two Hours—4th Gear												
57.46	4645	4.64	1902	4.63	7.091	0.524	8.10	188	48	50	28.488	
53.30	5510	3.63	1914	5.38	7.116	0.567	7.49	190	45	53	Torq. Conv.	
75% of Pull at Maximum Power—Ten Hours and Two Hours—4th Gear												
47.46	3562	5.00	2007	3.59	6.517	0.584	7.28	188	50	53	28.780	
44.92	4105	4.10	2030	3.79	7.048	0.667	6.37	186	46	50	Torq. Conv.	
50% of Pull at Maximum Power—Two Hours—4th Gear												
33.05	2423	5.11	2047	2.26	5.315	0.684	6.22	180	49	51	28.473	
31.26	2763	4.24	2061	2.48	5.661	0.770	5.52	188	50	61	Torq. Conv.	
MAXIMUM POWER WITH BALLAST												
49.52	8296	2.24	2012	13.67	2nd Gear			185	47	56	28.810	
54.77	6697	3.07	1901	8.71	3rd Gear			183	47	54	28.810	
57.31	4643	4.63	1898	4.56	4th Gear			188	46	48	28.500	
56.09	3441	6.11	1899	3.23	5th Gear			187	50	63	28.495	
55.15	2353	8.79	1899	2.44	6th Gear			187	50	63	28.495	
52.17	1608	12.17	1906	1.64	7th Gear			187	50	63	28.495	
46.69	8369	2.09	1866	13.95	3rd Gear	Torq. Conv.	184	47	54	28.810		
50.95	5418	3.53	1896	6.32	4th Gear	Torq. Conv.	185	44	50	28.820		
51.37	4025	4.79	1900	3.72	5th Gear	Torq. Conv.	188	50	63	28.495		
51.28	2919	6.59	1883	2.80	6th Gear	Torq. Conv.	187	50	63	28.495		
48.67	1969	9.27	1892	1.86	7th Gear	Torq. Conv.	186	49	62	28.530		
48.41	1532	11.85	1854	1.35	8th Gear	Torq. Conv.	184	49	62	28.530		
MAXIMUM POWER WITHOUT BALLAST												
56.98	4739	4.51	1906	7.01	4th Gear			178	43	53	28.920	
51.16	5443	3.53	1926	9.55	4th Gear Torq. Conv.			178	43	53	28.920	
VARYING DRAWBAR PULL AND TRAVEL SPEED WITH BALLAST—4th Gear												
Pounds pull			4650	4850	5000		5100	4850		4700		
Horsepower			57.3	53.0	48.0		43.5	34.9		28.8		
Miles per hour			4.6	4.1	3.6		3.2	2.7		2.3		
Pounds pull (Torq. Conv.)			5400	5850	6500		7050	7700				
Horsepower (Torq. Conv.)			51.0	49.9	48.5		45.1	43.1				
Miles per hour (Torq. Conv.)			3.5	3.2	2.8		2.4	2.1				

TIRES, BALLAST and WEIGHT		With Ballast	Without Ballast
Rear tires	—No, size, ply & psi	Two 15.5-38;8;24	Two 15.5-38;8;14
Ballast	—Liquid	630 lb each	None
	—Cast iron	1125 lb each	None
Front tires	—No, size, ply & psi	Two 6.00-16;6;36	Two 6.00-16;6;36
Ballast	—Liquid	None	None
	—Cast iron	None	None
Height of drawbar		19 inches	18.5 inches
Static weight	—Rear	8660 lb	5150 lb
	—Front	2090 lb	2130 lb
Total weight with operator		10,925 lb	7455 lb

Department of Agricultural Engineering

Dates of Test: November 4 to November 19, 1960

Manufacturer: J. I. CASE COMPANY, RACINE, WISCONSIN

Manufacturer's Power Rating: Not Rated

FUEL, OIL and TIME Fuel commercial propane Specific gravity converted to 60°/60° 0.5103 Weight per gallon 4.25 lb Oil SAE 10W API service classification MS, DG To motor 2.083 gal Drained from motor 1.702 gal Transmission and final-drive lubricant SAE 10W Type engine oil Total time engine was operated 49½ hours.

ENGINE Make Case LPG Type 4 cylinder vertical Serial No 816 1059 Crankshaft mounted lengthwise Rated rpm 1900 Bore and stroke 4¼" x 5" Compression ratio 8.37 to 1 Displacement 284 cu in Carburetor size 1¼" Ignition system battery Cranking system 12 volt electric Lubrication pressure Air cleaner oil washed wire mesh Oil filter replaceable pleated paper element Oil cooler engine coolant heat exchanger for torque converter oil Fuel filter replaceable pleated paper element Muffler was used Cooling medium temperature control thermostat and radiator shutter.

CHASSIS Type standard Serial No 816 1059 Tread width rear 52" to 88" front 53" to 82" Wheel base 101¼" 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 31.6" Vertical distance above roadway 35.5" Horizontal distance from center of rear wheel tread 0" to the right/left Hydraulic control system direct engine drive Transmission selective gear fixed ratio plus torque converter with lockout Advertised speeds mph first 1.7 second 2.4 third 3.3 fourth 4.8 fifth 6.2 sixth 8.9 seventh 12.1 eighth 17.6 reverse 2.2 and 8.0 Clutch multiple disc main power clutch actuated hydraulically by foot pedal and a single disc clutch engaging engine directly with power clutch and transmission actuated hydraulically by hand lever Brakes double disc operated independently by foot pedals which can be locked together Steering power assisted Turning radius (on concrete surface with brake applied) right 137" left 138" (on concrete surface without brake) right 191" left 190" Turning space diameter (on concrete surface with brake applied) right 385" left 388" (on concrete surface without brake) right 390" left 390" Belt pulley 1027 rpm at 1900 engine rpm diam 10½" face 7¼" Belt speed 2820 fpm Power take-off 545 rpm at 1700 engine rpm.

REPAIRS and ADJUSTMENTS No repairs or adjustments.

REMARKS All test results were determined from observed data obtained in accordance with the SAE and ASAE test code.

First gear direct drive, first and second gear torque converter were not run as it was necessary to limit the pull in second gear direct drive and third gear torque converter to avoid excessive wheel slippage. Eighth gear direct drive was not run as it was over 15 mph.

We, the undersigned, certify that this is a true and correct report of official Tractor Test 780.

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

GENERAL CONDITIONS

Each tractor is a production model equipped for common usage. Power consuming accessories can be disconnected only when it is convenient for the operator to do so in practice. Additional weight can be added as ballast if the manufacturer regularly supplies it for sale. The static tire loads and the inflation pressures must conform to recommendations in the Tire Standards published by the Society of Automotive Engineers.

PREPARATION FOR PERFORMANCE RUNS

The engine crankcase is drained and refilled with a measured amount of new oil conforming to specifications in the operators manual. The fuel used and the maintenance operations must also conform to the published information delivered with the tractor. The tractor is then limbered-up for 12 hours on drawbar work in accordance with the manufacturer's published recommendations. The manufacturer's representative is present to make appropriate decisions regarding mechanical adjustments.

The tractor is equipped with approximately the amount of added ballast that is used during maximum drawbar tests. The tire tread-bar height must be at least 65% of new tread height prior to the maximum power run.

BELT OR POWER TAKE-OFF PERFORMANCE

Maximum Power and Fuel Consumption. The manufacturer's representative makes carburetor, fuel pump, ignition and governor control settings which remain unchanged throughout all subsequent runs. The governor and the manually operated governor control lever is set to provide the high-idle speed specified by the manufacturer for maximum power. Maximum power is measured by connecting the belt pulley or the power take-off to a dynamometer. The dynamometer load is then gradually increased until the engine is operating at the rated speed specified by the manufacturer for maximum power. The corresponding fuel consumption is measured.

Varying Power and Fuel Consumption. Six different horsepower levels are used to show corresponding fuel consumption rates and how the governor causes the engine to react to the following changes in dynamometer load: 85% of the dynamometer torque at maximum power; minimum dynamometer torque, $\frac{1}{2}$ the 85% torque; maximum power; $\frac{1}{4}$ and $\frac{3}{4}$ of the 85% torque. Since a tractor is generally subjected to varying loads the average of the results in this test serve well for predicting the fuel consumption of a tractor in general usage.

DRAWBAR PERFORMANCE

All engine adjustments are the same as those used in the belt or power take-off tests. If the manufacturer specifies a different rated crankshaft speed for drawbar operations, then the position of the manually operated governor control is changed to provide the high-idle speed specified by the manufacturer in the operating instructions.

Varying Power and Fuel Consumption With Ballast. The varying power runs are made to show the effect of speed-control devices (engine governor, automatic transmissions, etc.) on horsepower, speed and fuel consumption. These runs are made around the entire test course which has two 180 degree

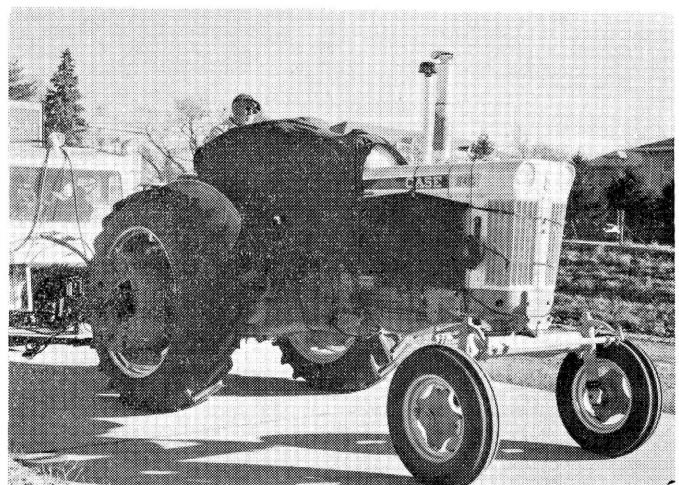
turns with a minimum radius of 50 feet. The drawbar pull is set at 3 different levels as follows: (1) as near to the pull at maximum power as possible and still have the tractor maintain the travel speed at maximum horsepower on the straight sections of the test course; (2) 75% of the pull at maximum power; and (3) 50% of the pull at maximum power. Prior to 1958, fuel consumption data (10 hour test) were shown only for the pull obtained at maximum power for tractors having torque converters and at 75% of the pull obtained at maximum power for gear-type tractors.

Maximum Power with Ballast. Maximum power is measured on straight level sections of the test course. Data are shown for not more than 12 different gears or travel speeds. Some gears or travel speeds may be omitted because of high slippage of the traction members or because the travel speed may exceed the safe-limit for the test course. The maximum safe speed for the Nebraska Test Course has been set at 15 miles per hour. The slippage limits have been set at 15% and 7% for pneumatic tires and steel tracks or lugs, respectively. Higher slippage gives widely varying results.

Maximum Power Without Ballast. All added ballast is removed from the tractor. The maximum drawbar power of the tractor is determined by the same procedure used for getting maximum power with ballast. The gear (or travel speed) is the same as that used in the 10-hour test.

Varying Power and Travel Speed with Ballast. Travel speeds corresponding to drawbar pulls beyond the maximum power range are obtained to show the "lugging ability" of the tractor. The run starts with the pull at maximum power; then additional drawbar pull is applied to cause decreasing speeds. The run is ended by one of three conditions; (1) maximum pull is obtained, (2) the maximum slippage limit is reached, or (3) some other operating limit is reached.

For additional information about the Nebraska Tractor Tests write to the Department of Agricultural Engineering, University of Nebraska, Lincoln, Nebraska.



Case 841C LPG