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Test 782: Case 741 (LPG)

Nebraska Tractor Test Lab

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NEBRASKA TRACTOR TEST 782 - CASE 741 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		Hp-hr per gal	Temp Degrees F			Barometer inches of mercur
		Gal per hr	Lb per hp-hr		Cool- ing med	Air wet bulb	Air dry bulb	
MAXIMUM POWER AND FUEL CONSUMPTION								
Rated Engine Speed—Two Hours								
57.92	1700	6.176	0.453	9.38	197	55	75	28.940
VARYING POWER AND FUEL CONSUMPTION—TWO HOURS								
50.88	1755	6.078	0.508	8.37	190	55	75	.....
0.00	1847	1.913	.....	.....	158	53	73	.....
26.35	1818	3.974	0.641	6.63	185	53	73	.....
58.44	1701	6.261	0.455	9.33	197	55	75	.....
13.39	1848	3.064	0.972	4.37	180	53	73	.....
38.61	1778	4.962	0.546	7.78	188	54	74	.....
Av 31.28	1791	4.375	0.594	7.15	183	54	74	28.973

DRAWBAR PERFORMANCE

Hp	Draw-bar pull lbs	Speed miles per hr	Crank shaft speed rpm	Slip of drivers %	Fuel Consumption		Hp-hr per gal	Temperature Degrees F			Barometer inches of mercury
					Gal per hr	Lb per hp hr		Cooling medium	Air wet bulb	Air dry bulb	
VARYING DRAWBAR POWER AND FUEL CONSUMPTION WITH BALLAST											
Maximum Available Power—Two Hours—4th Gear											
52.51	4795	4.11	1702	5.13	6.367	0.515	8.25	187	37	42	28.900
75% of Pull at Maximum Power—Ten Hours—4th Gear											
42.14	3618	4.37	1789	3.98	5.681	0.573	7.42	189	38	46	28.914
50% of Pull at Maximum Power—Two Hours—4th Gear											
29.07	2412	4.52	1819	2.26	4.616	0.675	6.30	185	35	40	28.860
MAXIMUM POWER WITH BALLAST											
39.96	7666	1.95	1793	14.94	2nd Gear		175	24	26	29.020	
49.36	7030	2.63	1700	11.89	3rd Gear		175	26	28	29.020	
51.91	4809	4.05	1701	6.45	4th Gear		188	31	36	29.050	
51.09	3561	5.38	1703	4.41	5th Gear		187	31	36	29.050	
49.85	2408	7.76	1699	2.87	6th Gear		185	31	36	29.050	
48.07	1680	10.73	1700	2.30	7th Gear		185	31	36	29.050	
MAXIMUM POWER WITHOUT BALLAST											
50.75	4773	3.99	1701	8.12	4th Gear		185	47	59	28.940	
VARYING DRAWBAR PULL AND TRAVEL SPEED WITH BALLAST—4th Gear											
Pounds pull			4800	5000	5150	4900	4750	4150			
Horsepower			51.9	48.0	43.9	36.6	30.4	22.1			
Miles per hour			4.1	3.6	3.2	2.8	2.4	2.0			

TIRES, BALLAST and WEIGHT

		With Ballast	Without Ballast
Rear tires	—No, size, ply & psi	Two 15.5-38;8;20	Two 15.5-38;8;20
Ballast	—Liquid	575 lb each	None
	—Cast iron	720 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		18.5 inches	19 inches
Static weight	—Rear	7440 lb	4850 lb
	—Front	2000 lb	2020 lb
Total weight with operator		9615 lb	7045 lb

Department of Agricultural Engineering

Dates of Test: November 7 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 2.129 gal Drained from motor 1.692 gal Transmission and final-drive lubricant SAE 10W Type engine oil Total time engine was operated 38 hours.

ENGINE Make Case LPG Type 4 cylinder vertical Serial No 816 1052 Crankshaft mounted lengthwise Rated rpm 1700 Bore and stroke 4" x 5" Compression ratio 8.0 to 1 Displacement 251 cu in Carburetor size 1 1/4" Ignition system battery Cranking system 12 volt electric Lubrication pressure Air cleaner oil washed wire mesh Oil filter replaceable pleated paper element Fuel filter replaceable pleated paper element Muffler was used Cooling medium temperature control thermostat and radiator shutter.

CHASSIS Type standard Serial No 816 1052 Tread width rear 52" to 88" front 53" to 82" Wheel base 101 3/4" 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 35.4" Horizontal distance from center of rear wheel tread 0" to the right/left Hydraulic control system direct engine drive Transmission selective gear fixed ratio Advertised speeds mph first 1.5 second 2.1 third 2.9 fourth 4.3 fifth 5.6 sixth 8.0 seventh 10.7 eighth 15.7 reverse 2.0 and 7.2 Clutch single plate operated by foot pedal 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 148" left 145" (on concrete surface without brake) right 191" left 190" Turning space diameter (on concrete surface with brake applied) right 306" left 302" (on concrete surface without brake) right 390" left 390" Belt pulley 1322 rpm at 1700 engine rpm diam 10 1/2" face 7 1/4" Belt speed 3634 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 was not run as it was necessary to limit the pull in second gear to avoid excessive wheel slippage. Eighth gear was not run as it exceeded 15 mph.

We, the undersigned, certify that this is a true and correct report of official Tractor Test 782.

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

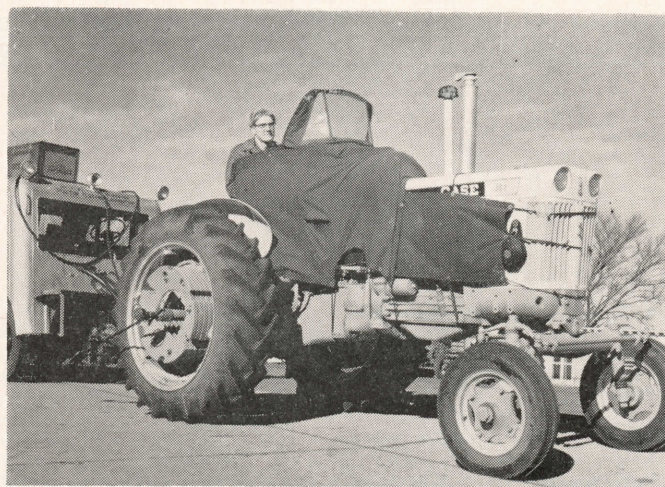
turns with a minimum radius of 50 feet. The drawbar pull is set at 3 different levels as follows: (1) as near to the pull at maximum power as possible and still have the tractor maintain the travel speed at maximum horsepower on the straight sections of the test course; (2) 75% of the pull at maximum 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 741 LPG