

University of Nebraska - Lincoln

DigitalCommons@University of Nebraska - Lincoln

Nebraska Tractor Tests

Tractor Test and Power Museum, The Lester F. Larsen

1-1-1959

Test 722: International Model 660 (LPG)

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 722: International Model 660 (LPG)" (1959). *Nebraska Tractor Tests*. 1143.

<https://digitalcommons.unl.edu/tractormuseumlit/1143>

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 722 - INTERNATIONAL 660 LPG

University of Nebraska Agricultural Experiment Station

W. V. Lambert, Director, Lincoln, Nebraska

POWER TAKE-OFF PERFORMANCE

Hp	Crank shaft speed rpm	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		
MAXIMUM POWER AND FUEL CONSUMPTION									
Rated Engine Speed—Two Hours									
80.63	2400	8.947	0.472	9.01	162	69	75	28.780	
VARYING POWER AND FUEL CONSUMPTION—TWO HOURS									
69.41	2432	7.680	0.470	9.04	160	68	75	.....
0.86	2573	2.534	12.523	0.34	139	67	73	.....
35.44	2483	5.153	0.618	6.88	151	68	75	.....
81.67	2400	9.078	0.472	9.00	163	69	76	.....
18.14	2542	3.762	0.881	4.82	145	68	74	.....
52.43	2448	6.473	0.525	8.10	153	67	73	.....
Av	42.99	2479	5.780	0.571	7.44	152	68	74	28.795

DRAWBAR PERFORMANCE

Hp	Draw-bar pull lbs	Speed miles per hr	Crank shaft speed rpm	% Slip of drive wheels	Fuel Consumption Gal per hr	Lb per hp-hr	Hp-hr per gal	Temp. Degrees F Cool- ing med	Air wet bulb	Air dry bulb	Barometer inches of mercury
VARYING DRAWBAR POWER AND FUEL CONSUMPTION WITH BALLAST											
Maximum Available Power—Two Hours—3rd Gear											
69.66	4933	5.30	2400	5.20	8.834	0.539	7.89	158	52	66	28.635
75% of Pull at Maximum Power—Ten Hours—3rd Gear											
55.35	3778	5.49	2452	3.83	7.334	0.563	7.55	148	44	49	28.791
50% of Pull at Maximum Power—Two Hours—3rd Gear											
37.60	2509	5.62	2476	2.55	5.854	0.662	6.42	150	52	65	28.595
MAXIMUM POWER WITH BALLAST											
70.03	7157	3.67	2402	8.04	2nd Gear	.....	145	38	43	28.820	
70.76	5029	5.28	2402	5.66	3rd Gear	.....	152	44	51	28.770	
69.77	3502	7.47	2404	3.98	4th Gear	.....	156	50	62	28.700	
57.02	9165	2.33	2442	14.92	2nd Gear	Torq-Amp..	145	44	49	28.900	
67.85	7390	3.44	2401	8.78	3rd Gear	Torq-Amp..	146	37	43	28.740	
69.87	5298	4.95	2398	5.59	4th Gear	Torq-Amp..	148	38	43	28.820	
67.49	2225	11.38	2398	2.63	5th Gear	Torq-Amp..	160	50	62	28.700	
MAXIMUM POWER WITHOUT BALLAST											
65.21	5130	4.77	2403	15.00	3rd Gear	.....	150	44	54	28.980	
VARYING DRAWBAR PULL AND TRAVEL SPEED WITH BALLAST—3rd Gear											
Pounds pull	5050		5150		5200	5250	5300	5350			5100
Horsepower	70.8		64.5		58.2	51.8	43.8	37.1			28.6
Miles per hour	5.3		4.7		4.2	3.7	3.1	2.6			2.1

TIRES, BALLAST and WEIGHT

		With Ballast	Without Ballast
Rear tires	—No, size, ply & psi	Two 15-34;6;16	Two 15-34;6;16
	—Liquid	1072 lb each	None
	—Cast iron	1015 lb each	None
Front tires	—No, size, ply & psi	Two 7.50-18;6;36	Two 7.50-18;6;36
	—Liquid	None	None
	—Cast iron	237 lb each	None
Height of drawbar		21 inches	22 inches
	—Rear	9710 lb	5335 lb
	—Front	3314 lb	2840 lb
Total weight with operator		13200 lb	8350 lb

Department of Agricultural Engineering

Dates of Test: October 3 to October 12, 1959

Manufacturer: INTERNATIONAL HARVESTER

COMPANY, CHICAGO, ILLINOIS

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 20-20W API service classification MS and DG To motor 1.939 gal Drained from motor 1.753 gal Transmission and final-drive lubricant IH Hy-Tran Fluid Total time motor was operated 42 hours.

ENGINE Make International LPG Type 6 cylinder vertical Serial No 9687C Crankshaft mounted length-wise Rated rpm 2400 Lubrication pressure Bore and stroke 3⁹/₁₆" x 4²⁵/₆₄" Compression ratio 8.75 to 1 Displacement 263 cu in Carburetor size 1¹/₂" Ignition system battery Cranking system 12 volt electric Air cleaner oil washed wire screen Muffler was used Oil filter replaceable radial fin paper element Cooling medium temperature control thermostat.

CHASSIS Type standard Serial No 1045 Tread Width rear 60" to 80" front 51" Wheel base 85¹/₂" 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 29.2" Vertical distance above roadway 33.4" Horizontal distance from center of rear wheel tread 0" to the right or left Hydraulic control system direct engine drive Transmission fixed ratio operator controlled partial range power shifting Advertised speeds mph first 2.15 second 3.81 third 5.33 fourth 7.41 fifth 16.52 reverse 2.80 (Using Torque Amplifier) first 1.45 second 2.57 third 3.60 fourth 5.00 fifth 11.14 reverse 1.89 Belt pulley diam 11" face 7¹/₂" rpm 1054 Belt speed 3034 fpm Clutch single plate dry disc over center operated by hand lever Brakes double disc brakes operated by two foot pedals which can be locked together Power take-off 544 rpm at 2400 engine rpm Steering power assisted Turning radius (on concrete surface with brake applied) right 150" left 150" (on concrete surface without brake) right 170" left 170" Turning space diameter (on concrete surface with brake applied) right 320" left 320" (on concrete surface without brake) right 360" left 360".

REPAIRS AND ADJUSTMENTS No repairs or adjustments.

REMARKS All test results were determined from observed data obtained in accordance with SAE and ASAE test code. First gear direct drive and first gear torque amplifier drive were not run as it was necessary to limit the pull in second gear torque amplifier drive to avoid excessive wheel slippage. Fifth 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 No 722.

L. F. LARSEN

Engineer-in-Charge

L. W. HURLBUT

G. W. STEINBRUEGGE

J. B. 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

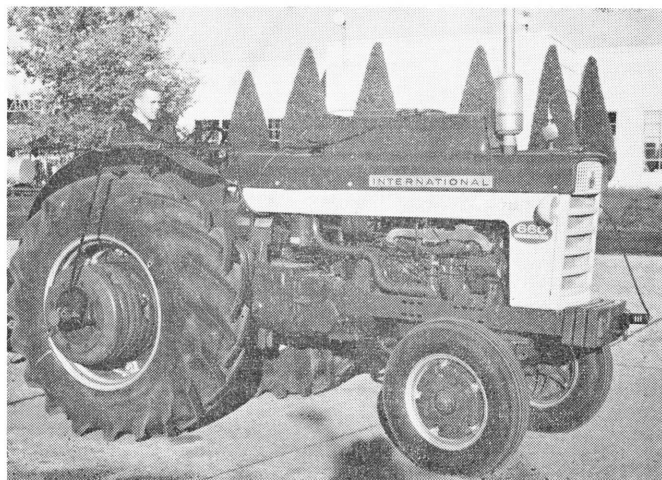
turns with a minimum radius of 50 feet. The drawbar pull is set at 3 different levels as follows: (1) as near to the pull at maximum power as possible and still have the tractor maintain the travel speed at maximum horsepower on the straight sections of the test course; (2) 75% of the pull at maximum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



International 660 LPG