

University of Nebraska - Lincoln

DigitalCommons@University of Nebraska - Lincoln

---

Nebraska Tractor Tests

Tractor Test and Power Museum, The Lester F. Larsen

---

11-16-1966

## Test 957: Farmall 706 (Gasoline)

Nebraska Tractor Test Lab

University of Nebraska-Lincoln, [tractortestlab@unl.edu](mailto: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 957: Farmall 706 (Gasoline)" (1966). *Nebraska Tractor Tests*. 1321.  
<https://digitalcommons.unl.edu/tractormuseumlit/1321>

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 957 - FARMALL 706 GASOLINE

(ALSO INTERNATIONAL FARMALL 756 GASOLINE)

## 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								
76.56	2300	6.298	0.509	12.16	180	55	75	29.238
Standard Power Take-off Speed (1000 rpm)—One Hour								
71.80	2071	5.762	0.496	12.46	181	54	75	29.190
VARYING POWER AND FUEL CONSUMPTION—TWO HOURS								
69.55	2461	6.202	0.551	11.21	179	55	77	.....
0.00	2582	2.698	.....	.....	172	53	74	.....
35.35	2500	4.416	0.772	8.00	177	53	73	.....
76.25	2300	6.275	0.509	12.15	183	55	77	.....
18.25	2561	3.649	1.236	5.00	173	53	75	.....
52.59	2487	5.309	0.624	9.91	179	54	76	.....
Av 42.00	2482	4.758	0.700	8.83	177	54	75	29.163

## DRAWBAR PERFORMANCE

Hp	Draw-bar pull lbs	Speed miles per hr	Crank-shaft speed rpm	Slip of drivers %	Fuel Consumption		Hp-hr per gal	Temp Degrees F			Barometer inches of Mercury
					Gal per hr	Lb per hp-hr		Cooling med	Air wet bulb	Air dry bulb	

### VARYING DRAWBAR POWER AND FUEL CONSUMPTION WITH BALLAST

<b>Maximum Available Power—Two Hours—10th Gear (1st HI-DD)</b>											
65.67	4270	5.77	2297	4.89	6.322	0.595	10.39	181	46	52	28.810
<b>75% of Pull at Maximum Power—Ten Hours—10th Gear (1st HI-DD)</b>											
55.58	3310	6.30	2471	3.46	5.852	0.651	9.50	179	45	52	28.434
<b>50% of Pull at Maximum Power—Two Hours—10th Gear (1st HI-DD)</b>											
38.73	2256	6.44	2500	2.44	4.984	0.795	7.77	173	47	47	28.815

### MAXIMUM POWER WITH BALLAST

62.34	8387	2.79	2411	14.93	5th Gear (3rd LO-TA)	171	36	39	28.950	
65.19	6656	3.67	2299	8.45	6th Gear (3rd LO-DD)	172	36	39	28.950	
65.93	6435	3.84	2301	8.07	7th Gear (4th LO-TA)	171	36	39	28.950	
68.29	5805	4.41	2301	6.90	8th Gear (1st HI-TA)	172	43	47	28.870	
66.95	4977	5.04	2302	5.78	9th Gear (4th LO-DD)	171	43	47	28.870	
67.63	4404	5.76	2299	5.03	10th Gear (1st HI-DD)	169	43	47	28.870	
67.87	4253	5.98	2300	5.03	11th Gear (2nd HI-TA)	170	43	47	28.870	
66.93	3229	7.77	2301	3.72	12th Gear (2nd HI-DD)	172	43	47	28.870	
65.58	2307	10.66	2308	2.58	13th Gear (3rd HI-TA)	172	43	47	28.870	
62.77	1709	13.77	2308	2.00	14th Gear (3rd HI-DD)	174	43	47	28.870	
62.40	1637	14.29	2299	1.79	15th Gear (4th HI-TA)	176	43	47	28.870	

### MAXIMUM POWER WITHOUT BALLAST

65.99	4425	5.59	2298	6.88	10th Gear (1st HI-DD)	178	38	46	29.200	
-------	------	------	------	------	-----------------------	-----	----	----	--------	--

### VARYING DRAWBAR PULL AND TRAVEL SPEED WITH BALLAST 10th Gear (1st HI-DD)

Pounds pull	4404	4592	4727	4824	4892	4808
Horsepower	67.63	63.02	57.86	51.76	45.01	37.21
Crankshaft speed, rpm	2299	2063	1842	1615	1386	1164
Miles per hour	5.76	5.15	4.59	4.02	3.45	2.90
Slip of drivers, %	5.03	5.30	5.57	5.57	5.57	5.57

### TIRES, BALLAST and WEIGHT

		With Ballast	Without Ballast
Rear tires	—No, size, ply & psi	Two 15.5-38; 8; 22	Two 15.5-38; 8; 16
	—Liquid	730 lb each	None
	Cast iron	None	None
Front tires	—No, size, ply & psi	Two 6.50-16; 6; 40	Two 6.50-16; 6; 40
	—Liquid	None	None
	Cast iron	None	None
Height of drawbar		17½ inches	18 inches
Static weight with operator—Rear		7940 lb	6480 lb
	Front	2290 lb	2220 lb
	Total	10230 lb	8700 lb

### Department of Agricultural Engineering

Dates of Test: NOVEMBER 16 to NOVEMBER 28, 1966

Manufacturer: INTERNATIONAL HARVESTER COMPANY, CHICAGO, ILLINOIS

**FUEL, OIL and TIME** Fuel regular gasoline Octane No Motor 84.0 Research 92.2 (rating taken from oil company's typical inspection data) Specific gravity converted to 60°/60° 0.7426 Weight per gallon 6.182 lb Oil SAE 30 API Service classification MS, DM To motor 2.032 gal Drained from motor 1.926 gal Transmission and final-drive lubricant IH Hy-tran fluid Total time engine was operated 42 hours.

**ENGINE** Make International Case Type 6 cylinder vertical Serial No 502 Crankshaft mounted lengthwise Rated rpm 2300 Bore and stroke 3.75" x 4.39" Compression ratio 7.5 to 1 Displacement 290.8 cu in Carburetor size 1⅜" Ignition system battery Cranking system 12 volt electric Lubrication pressure Air cleaner two stage dry type with automatic dust unloader using replaceable pleated paper element Oil filter full flow replaceable paper element Oil cooler radiator for transmission and hydraulic oil Fuel filter sediment bowl and screen Muffler was used Cooling medium temperature control thermostat.

**CHASSIS** Type Standard Serial No 36388S-Y Tread width rear 56" to 94" front 50" to 74" Wheel base 104.8" 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 27.8" Vertical distance above roadway 33.8" Horizontal distance from center of rear wheel tread 0" to the right/left Hydraulic control system direct engine drive Transmission selective gear fixed ratio with partial range operator controlled power shifting Advertised speeds mph first 1¼ second 1¾ third 1¾ fourth 2¼ fifth 3 sixth 4 seventh 4 eighth 4½ ninth 5¼ tenth 6 eleventh 6¼ twelfth 8 thirteenth 10¼ fourteenth 13¼ fifteenth 14¼ sixteenth 18½ Reverse first 2¼ second 3 third 3 fourth 4 fifth 5¼ sixth 6¾ seventh 7 eighth 9 Clutch single plate dry disc operated by foot pedal Brakes dry disc hydraulically power actuated and operated by two foot pedals Steering hydraulic with power assist Turning radius (on concrete surface with brake applied) right 128" left 128" (on concrete surface without brake) right 162" left 162" Turning space diameter (on concrete surface with brake applied) right 264" left 264" (on concrete surface without brake) right 330" left 330" Belt pulley 1055 rpm at 2300 engine rpm diam 11" face 7½" Belt speed 3038 fpm Power take-off 539 or 1014 rpm at 2100 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, second, third, and fourth gears were not run as it was necessary to limit the pull in fifth gear to avoid excessive wheel slippage. Sixteenth 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 957.

L. F. LARSEN

Engineer-in-Charge

G. W. STEINBRUEGGE, Chairman

J. J. SULEK

D. E. LANE

Board of Tractor Test Engineers

The University of Nebraska Agricultural Experiment Station  
E. F. Frolik, Dean; H. H. Kramer, Director, Lincoln, Nebraska

# 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,  $\frac{1}{2}$  of 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 trans-

mission, 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.



Farmall 706 Gasoline