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9-8-1965

## Test 909: Farmall 656 (Gasoline)

Nebraska Tractor Test Lab

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# NEBRASKA TRACTOR TEST 909 - FARMALL 656 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								
* 63.85	1800	5.208	0.503	12.26	182	62	75	29.120
VARYING POWER AND FUEL CONSUMPTION—TWO HOURS								
58.95	1955	5.102	0.534	11.55	176	62	75	.....
0.00	2012	1.848	.....	.....	168	62	75	.....
30.17	2000	3.288	0.672	9.18	176	62	74	.....
63.75	1801	5.199	0.503	12.26	182	63	75	.....
15.08	2003	2.626	1.074	5.74	170	62	74	.....
44.32	1960	4.076	0.567	10.87	180	62	75	.....
Av 35.38	1955	3.690	0.643	9.59	175	62	75	29.095

## DRAWBAR PERFORMANCE

Hp	Draw-bar pull lbs	Speed miles per hr	Crank-shaft speed rpm	Slip of drivers %	Fuel Consumption			Temp Degrees F			Barom-eter inches of Mercury
					Gal per hr	Lb per hp-hr	Hp-hr per gal	Cool-ing med	Air wet bulb	Air dry bulb	
VARYING DRAWBAR POWER AND FUEL CONSUMPTION WITH BALLAST											
Maximum Available Power—Two Hours—7th Gear (3rd DD)											
53.23	4199	4.75	1791	5.49	5.182	0.600	10.27	189	66	72	28.970
75% of Pull at Maximum Power—Ten Hours—7th Gear (3rd DD)											
44.66	3239	5.17	1915	3.76	4.729	0.653	9.44	184	70	73	28.655
50% of Pull at Maximum Power—Two Hours—7th Gear (3rd DD)											
31.70	2209	5.38	1968	2.53	3.712	0.722	8.54	181	66	72	28.955
MAXIMUM POWER WITH BALLAST											
49.27	7486	2.47	1876	14.95	3rd Gear (2nd TA)			185	64	67	28.990
51.61	6275	3.08	1801	9.66	4th Gear (3rd TA)			183	64	67	29.010
54.20	5315	3.82	1801	7.44	5th Gear (2nd DD)			183	64	67	29.010
53.63	4440	4.53	1799	6.00	6th Gear (4th TA)			181	64	67	29.010
54.80	4318	4.76	1798	5.79	7th Gear (3rd DD)			182	66	71	28.980
54.94	3002	6.86	1798	3.81	8th Gear (4th DD)			181	66	71	28.980
54.51	1923	10.63	1802	2.31	9th Gear (5th TA)			181	66	71	28.980
MAXIMUM POWER WITHOUT BALLAST											
54.21	4415	4.60	1799	9.66	7th Gear (3rd DD)			185	49	52	29.040
VARYING DRAWBAR PULL AND TRAVEL SPEED WITH BALLAST—7th Gear (3rd DD)											
Pounds pull				4318	4362	4393	4365	4202	4019		
Horsepower				54.80	49.95	44.64	38.45	31.63	25.50		
Crankshaft speed, rpm				1798	1622	1441	1250	1064	895		
Miles per hour				4.76	4.29	3.81	3.30	2.82	2.38		
Slip of drivers, %				5.79	5.73	5.73	5.73	5.59	5.32		

## TIRES, BALLAST and WEIGHT

		With Ballast	Without Ballast
Rear tires	—No. size, ply & psi	Two 15.5-38; 6; 18	Two 15.5-38; 6; 14
	—Liquid	825 lb each	None
	Cast iron	140 lb each	None
Front tires	—No. size, ply & psi	Two 6.00-16; 6; 40	Two 6.00-16; 6; 32
	—Liquid	None	None
	Cast iron	150 lb each	None
Height of drawbar		21 inches	22 inches
Static weight	—Rear	6790 lb	4860 lb
	Front	2200 lb	1900 lb
Total weight with operator		9165 lb	6935 lb

## Department of Agricultural Engineering

Dates of Test: SEPTEMBER 8 to SEPTEMBER 17, 1965

Manufacturer: INTERNATIONAL HARVESTER COMPANY, CHICAGO, ILLINOIS

**FUEL, OIL and TIME** Fuel Regular gasoline Octane No Motor 85.2 Research 92.3 (rating taken from oil company's typical inspection data) Specific gravity converted to 60°/60° 0.7410 Weight per gallon 6.168 lb Oil SAE 30 API service classification MS, DM To motor 2.090 gal Drained from motor 2.015 gal Transmission and final-drive lubricant IH Hy-Tran fluid Total time engine was operated 42½ hours.

**ENGINE** Make International gasoline Type 6 cylinder vertical Serial No 56550 Crankshaft mounted lengthwise Rated rpm 1800 Bore and stroke 3<sup>9</sup>/<sub>16</sub>" x 4.390" Compression ratio 7.60 to 1 Displacement 262.5 cu in Carburetor size 1¼" Ignition system battery Cranking system 12 volt electric Lubrication pressure Air cleaner dry type with replaceable treated paper element Oil filter replaceable pleated paper element Oil cooler radiator for transmission and hydraulic oil Fuel filter sediment bowl with strainer Muffler was used Cooling medium temperature control thermostat.

**CHASSIS** Type tricycle Serial No 8619 Tread width rear 50" to 96" Front 8" or 16" Wheel base 96.3" 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 30.6" Vertical distance above roadway 34.95" 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 1.7 second 2.5 third 2.7 fourth 3.4 fifth 4.1 sixth 4.7 seventh 5.0 eighth 7.0 ninth 10.7 tenth 15.9 reverse 1.9 and 2.8 Clutch single plate dry disc operated by foot pedal Brakes double disc operated by two foot pedals which can be locked Steering hydraulic with power assist Turning radius (on concrete surface with brake applied) right 109" left 109" (on concrete surface without brake) right 114" left 114" Turning space diameter (on concrete with brake applied) right 218" left 218" (on concrete surface without brake) right 233" left 233" Belt pulley 1059 rpm at 1800 engine rpm diam 11" face 7½" Belt speed 3051 fpm Power take-off 1004 rpm at 1800 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 and second gears were not run as it was necessary to limit the pull in third gear to avoid excessive wheel slippage.

Tenth 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 909.

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 656 Gasoline