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Test 984: International Farmall 544 (Gasoline)

Nebraska Tractor Test Lab

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NEBRASKA TRACTOR TEST 984 - INTERNATIONAL FARMALL 544 GASOLINE

POWER TAKE-OFF PERFORMANCE

Hp	Crankshaft speed rpm	Fuel Consumption		Temperature Degrees F				
		Gal per hr	Lb per hp-hr	Hp-hr per gal	Cooling medium	Air wet bulb	Air dry bulb	Barometer inches of Mercury
MAXIMUM POWER AND FUEL CONSUMPTION								
Rated Engine Speed—Two Hours								
52.84	2200	4.414	0.517	11.97	179	61	75	29.027
Standard Power Take-off Speed (540 rpm)—One Hour								
50.29	1988	4.072	0.501	12.35	181	62	75	29.030
VARYING POWER AND FUEL CONSUMPTION—Two Hours								
46.68	2285	4.035	0.535	11.57	178	62	74	.....
0.00	2396	1.659	.....	.....	172	62	74	.....
23.74	2323	2.793	0.728	8.50	177	61	73	.....
52.61	2199	4.379	0.515	12.01	181	63	75	.....
12.06	2361	2.216	1.137	5.44	175	63	76	.....
35.51	2319	3.424	0.596	10.37	178	63	76	.....
Av 28.43	2313	3.084	0.671	9.22	177	62	75	29.045

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)											
44.74	3596	4.67	2196	5.95	4.412	0.610	10.14	189	61	76	29.048
75% of Pull at Maximum Power—Ten Hours—7th Gear (3rd DD)											
36.77	2724	5.06	2333	4.03	3.859	0.649	9.53	184	64	76	28.773
50% of Pull at Maximum Power—Two Hours—7th Gear (3rd DD)											
26.43	1926	5.15	2349	3.02	3.342	0.782	7.91	180	64	81	28.910
MAXIMUM POWER WITH BALLAST											
41.10	6521	2.36	2229	14.97	3rd Gear 2nd TA			180	59	70	29.100
43.95	5461	3.02	2201	10.06	4th Gear 3rd TA			180	59	71	29.090
45.40	4547	3.74	2200	7.95	5th Gear 2nd DD			182	59	73	29.080
44.92	3789	4.45	2200	6.28	6th Gear 4th TA			180	60	74	29.080
45.51	3648	4.68	2200	5.95	7th Gear 3rd DD			180	59	68	29.100
45.48	2532	6.74	2197	3.99	8th Gear 4th DD			181	60	74	29.080
42.31	1332	11.91	2199	2.10	9th Gear 5th TA			175	53	55	28.690
MAXIMUM PULL WITHOUT BALLAST											
36.40	5632	2.42	2282	14.89	3rd Gear 2nd TA			175	61	68	28.740

VARYING DRAWBAR PULL AND TRAVEL SPEED WITH BALLAST 7th Gear (3rd DD)

Pounds pull	3648	3871	4081	4320	4451	4274	.....
Horsepower	45.51	43.34	40.23	37.17	32.78	26.36	.....
Crankshaft speed, rpm	2200	1983	1754	1538	1322	1103	.....
Miles per hour	4.68	4.20	3.70	3.23	2.76	2.31	.....
Slip of drivers, %	5.95	6.41	6.80	7.19	7.57	7.32	.....

TIRES, BALLAST and WEIGHT

		With Ballast	Without Ballast
Rear tires	—No, size, ply & psi	Two 13.6-38; 6; 18	Two 13.6-38; 6; 14
Ballast	—Liquid	680 lb each	None
	Cast iron	None	None
Front tires	—No, size, ply & psi	Two 6.00-16; 6; 48	Two 6.00-16; 6; 48
Ballast	—Liquid	None	None
	Cast iron	None	None
Height of drawbar		17 inches	17 inches
Static weight with operator—Rear		6280 lb	4920 lb
	Front	2030 lb	1990 lb
	Total	8310 lb	6910 lb

Department of Agricultural Engineering

Dates of Test: SEPTEMBER 7 to SEPTEMBER 20, 1968

Manufacturer: INTERNATIONAL HARVESTER COMPANY, CHICAGO, ILLINOIS

FUEL, OIL and TIME Fuel Regular gasoline Octane No Motor 85.5 Research 93.2 (rating taken from oil company's typical inspection data) Specific gravity converted to 60°/60° 0.7431 Weight per gallon 6.186 lb Oil SAE 30 API service classification MS, DM To motor 1.680 gal Drained from motor 1.601 gal Transmission and final-drive lubricant IH Hy-Tran Fluid Total time engine was operated 44.5 hours.

ENGINE Make International Type 4 cylinder vertical Serial No 10275 Crankshaft mounted lengthwise Rated rpm 2200 Bore and stroke 3.813" x 4.39" Compression ratio 7.4 to 1 Displacement 200.3 cu in Cranking system 12 volt electric Lubrication pressure Air cleaner two stage dry type with replaceable element, automatic dust unloader and precleaner Oil filter full flow screw-on replaceable cartridge Oil cooler radiator for transmission and hydraulic oil Fuel filter sediment bowl with strainer Muffler was used Cooling medium temperature control thermostat.

CHASSIS Type Standard Serial No 10341 S Tread width rear 54" to 96" front 57" to 88" Wheel base 94" 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 28" Vertical distance above roadway 33.7" 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 1.75 second 2.50 third 2.75 fourth 3.25 fifth 4.00 sixth 4.75 seventh 5.00 eighth 7.00 ninth 12.25 tenth 18.00 reverse 2.00 and 2.75 Clutch single plate dry disc operated by foot pedal Brakes dry double disc mechanically operated by two foot pedals which can be locked together Steering hydrostatic power Turning radius (on concrete surface with brake applied) right 126" left 127" (on concrete surface without brake) right 147" left 148" Turning space diameter (on concrete surface with brake applied) right 266" left 267" (on concrete surface without brake) right 306" left 307" Belt pulley 1159 rpm at 2200 engine rpm diam 11" face 7 1/2" Belt speed 3338 fpm Power take-off 543 rpm at 2000 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 984.

L. F. LARSEN

Engineer-in-Charge

G. W. STEINBRUEGGE, Chairman

W. E. SPLINTER

D. E. LANE

Board of Tractor Test Engineers

The University of Nebraska Agricultural Experiment Station
E. F. Frolik, Dean; H. W. Ottoson, 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 transmission, 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 Pull without Ballast. All added ballast is removed from the tractor. The drawbar pull is determined at slip limits of 15% for pneumatic tires or 7% for steel tracks or lugs. The tractor is operated at the fastest possible travel speed.

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 FARMALL 544 GASOLINE