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Test 1029: International Farmall 544 Hydrostatic Diesel

Nebraska Tractor Test Lab

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NEBRASKA TRACTOR TEST 1029 – INTERNATIONAL FARMALL 544 HYDROSTATIC DIESEL

(ALSO INTERNATIONAL 544 HYDROSTATIC DIESEL)
(ALSO INTERNATIONAL 2544 HYDROSTATIC DIESEL)

POWER TAKE-OFF PERFORMANCE

POWER TAKE-OFF PERFORMANCE								
Hp	Crank- shaft 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								
55.52	2400	4.153	0.520	13.37	189	55	74	28.930
Standard Power Take-off Speed (540 rpm)—One Hour								
50.06	1988	3.544	0.492	14.13	190	56	75	28.910
VARYING POWER AND FUEL CONSUMPTION—TWO HOURS								
49.99	2542	3.852	0.536	12.98	185	57	76	.....
0.00	2640	1.626	.....	.....	177	56	75	.....
25.47	2591	2.614	0.714	9.74	181	55	75	.....
55.87	2401	4.145	0.516	13.48	189	56	75	.....
12.85	2614	2.092	1.132	6.14	177	56	76	.....
37.87	2568	3.209	0.589	11.80	183	57	76	.....
Av	30.34	2.923	0.670	10.38	182	56	75	28.863

DRAWBAR PERFORMANCE

Hp	Draw- bar pull lbs	Speed miles per hr	Fuel Consumption		Temp Degrees F				Barom- eter inches of Mercury
			Slip of drivers %	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—Speed Setting—4.0 MPH—Lo Range										
41.58	3895	4.00	2402	4.98	4.207	0.704	9.88	185	57	66 28.740
75% of Pull at Maximum Power—Ten Hours—Speed Setting—4.0 MPH—Lo Range										
33.91	2939	4.33	2544	3.60	3.650	0.749	9.29	180	54	63 28.654
50% of Pull at Maximum Power—Two Hours—Speed Setting—4.0 MPH—Lo Range										
24.00	1971	4.57	2546	2.32	3.143	0.911	7.64	177	42	45 28.830

MAXIMUM POWER WITH BALLAST

41.57	6579	2.37	2401	9.65	The	Lo Range	185	60	71	28.700
42.10	5808	2.72	2401	8.07	infinitely	Lo Range	181	56	66	28.700
42.22	4925	3.21	2399	6.56	variable	Lo Range	180	56	67	28.700
42.81	4275	3.76	2400	5.62	drive	Lo Range	180	48	54	28.755
42.37	3915	4.06	2401	5.01	control	Lo Range	180	51	58	28.740
42.16	3672	4.31	2405	4.66	was set to	Lo Range	180	54	65	28.740
41.06	3187	4.83	2402	4.04	give the	Lo Range	181	55	64	28.700
42.18	2908	5.44	2399	3.61	travel	Hi Range	184	58	69	28.700
42.53	2672	5.97	2401	3.26	speeds	Hi Range	182	59	69	28.700
42.44	2398	6.64	2398	3.04	shown by	Hi Range	185	59	70	28.680
42.19	2073	7.63	2404	2.47	the manu-	Hi Range	185	60	71	28.680
34.75	899	14.49	2406	0.99	facturer	Hi Range	185	60	71	28.680

MAXIMUM PULL WITHOUT BALLAST

41.13	6098	2.53	2413	14.63	Speed 2.53 mph	Lo Rge	181	62	72	28.810
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VARYING DRAWBAR PULL AND TRAVEL SPEED WITH BALLAST Speed 4.0 MPH—Lo Range

Pounds Pull	3915	4279	4383	4680	4902	4791
Horsepower	42.37	41.35	37.49	34.38	30.35	24.70
Crankshaft speed rpm	2401	2163	1916	1679	1443	1202
Miles per hour	4.06	3.62	3.21	2.75	2.32	1.93
Slip of drivers, %	5.01	5.76	5.76	6.16	6.56	6.43

TIRES, BALLAST and WEIGHT

		With Ballast	Without Ballast
Rear tires	—No, size, ply & psi	Two 14.9-38; 6; 18	Two 14.9-38; 6; 14
	—Liquid	755 lb each	None
	Cast iron	560 lb each	None
Front tires	—No, size, ply & psi	Two 6.00-16; 6; 40	Two 6.00-16; 6; 40
	—Liquid	None	None
	Cast iron	23 lb each	None
Height of drawbar		23½ inches	23½ inches
Static weight with operator—	Rear	7740 lb	5110 lb
	Front	2150 lb	2105 lb
	Total	9890 lb	7215 lb

Department of Agricultural Engineering

Dates of Test: November 1 to November 7, 1969

Manufacturer: INTERNATIONAL HARVESTER COMPANY, CHICAGO, ILLINOIS

FUEL, OIL and TIME Fuel No 2 diesel Cetane 52.2 (rating taken from oil company's typical inspection data) Specific gravity converted to 60°/60° 0.8353 Oil SAE 30 API service classification MS-DS To motor 2.133 gal Drained from motor 1.581 gal Transmission and final-drive lubricant IH Hy-Tran fluid Total time engine was operated 45½ hours.

ENGINE Make International Harvester Type 4 cylinder vertical Serial No 45 P 56 Crankshaft mounted lengthwise Rated rpm 2400 Bore and stroke 3.875" x 5.06" Compression ratio 16 to 1 Displacement 239 cu in Cranking system 12 volt electric Lubrication pressure Air cleaner dry type 2 stage with replaceable paper element Oil filter full flow spin-on paper cartridge Oil cooler radiator for hydraulic system and hydrostatic drive Fuel filter one primary and one final replaceable screw-on paper cartridge Muffler was used Cooling medium temperature control thermostat.

CHASSIS Type tricycle Serial No 13152 Tread width rear 54" to 96" front 8" to 16" Wheel base 90.5" 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 29.3" Vertical distance above roadway 38.2" Horizontal distance from center of rear wheel tread 0" to the right/left Hydraulic control system direct engine drive Transmission infinitely variable hydrostatic using a variable displacement pump and motor Sliding gears give high and low ranges Advertised speeds mph forward 0 to 8 low range, 0 to 21½ high range; reverse 0 to 3½ low range, 0 to 10 high range Clutch none—hydrostatic drive can be controlled by foot pedal Brakes dry mechanical disc operated by two foot pedals which can be locked together Steering hydrostatic Turning radius (on concrete surface with brake applied) right 104" left 104" (on concrete surface without brake) right 108½" left 108½" Turning space diameter (on concrete surface with brake applied) right 223" left 223" (on concrete surface without brake) right 231" left 231" Belt pulley 1263 rpm at 2400 engine rpm. diam 11" face 7½" Belt speed 3637 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. The slower travel speeds were not run as the maximum drawbar pull was limited by the stability formula. Travel speeds above 15 mph were not run.

We, the undersigned, certify that this is a true and correct report of official Tractor Test 1029.

L. F. LARSEN

Engineer-In-Charge

G. W. STEINBRUEGGE, Chairman

W. E. SPLINTER

D. E. LANE

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, $\frac{1}{2}$ 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

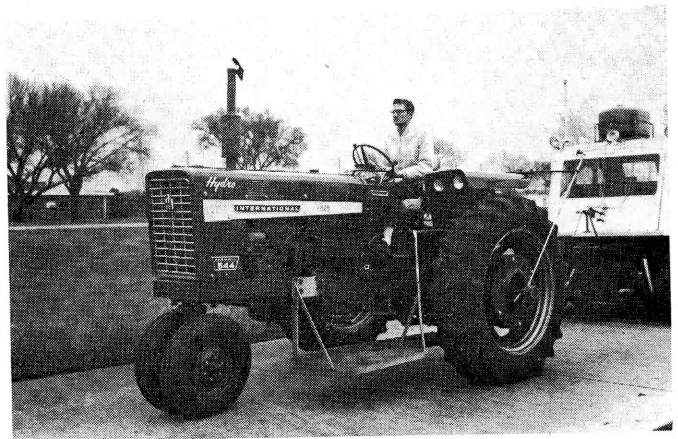
speed-control devices (engine, governor, automatic transmission, etc.) on horsepower, speed and fuel consumption. These runs are made around the entire test course which has two 180 degree turns with a minimum radius of 50 feet. The drawbar pull is set at 3 different levels as follows: (1) as near to 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 HYDROSTATIC DIESEL