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Test 1154: International Hydro 666, 70 and 86 Gasoline

Nebraska Tractor Test Lab

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NEBRASKA TRACTOR TEST 1154 – INTERNATIONAL HYDRO 70 GASOLINE (ALSO INTERNATIONAL HYDRO 666 GASOLINE AND HYDRO 86 GASOLINE)

POWER TAKE-OFF PERFORMANCE

Hp	Crank- shaft speed rpm	Fuel Consumption Gal per hr	Lb per' hp-hr	Hp-hr per gal	Cooling medium	Temperature Degrees F Air wet bulb	Air dry bulb	Barometer inches of Mercury
MAXIMUM POWER AND FUEL CONSUMPTION								
69.61	Rated Engine Speed—Two Hours (PTO Speed—652 rpm) 2400	6.933	0.609	10.04	194	59	75	28.993
64.10	Standard Power Take-off Speed (540 rpm)—One Hour 1986	5.775	0.551	11.10	197	58	74	28.980
VARYING POWER AND FUEL CONSUMPTION—Two Hours								
62.29	2528	6.802	0.668	9.16	195	60	77	.....
0.00	2634	3.146	.....	.....	179	58	76	.....
31.19	2531	4.790	0.939	6.51	183	58	75	.....
69.38	2401	6.915	0.609	10.03	198	57	74	.....
15.78	2563	3.956	1.532	3.99	181	58	75	.....
46.67	2527	5.796	0.759	8.05	188	57	75	.....
Av 37.55	2530	5.234	0.852	7.17	187	58	75	28.967

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		Cool- ing med	Air wet bulb	Air dry bulb	

VARYING DRAWBAR POWER AND FUEL CONSUMPTION WITH BALLAST

Maximum Available Power—Two Hours—4.0 MPH Lo Range											
53.86	4940	4.09	2400	6.50	7.037	0.799	7.65	178	36	40	28.880

75% of Pull at Maximum Power—Ten Hours—4.0 MPH Lo Range											
44.84	3805	4.42	2508	4.78	6.641	0.905	6.75	179	48	50	28.490

50% of Pull at Maximum Power—Two Hours—4.0 MPH Lo Range											
30.46	2558	4.47	2543	3.22	5.562	1.116	5.48	178	48	51	28.680

50% of Pull at Reduced Engine Speed—Two Hours—7.5 MPH Hi Range											
30.08	2539	4.44	1388	3.44	3.681	0.748	8.17	175	50	50	28.620

MAXIMUM POWER WITH BALLAST

49.66	8427	2.21	2408	14.90	The infinitely	L. Rng.	179	37	42	28.850
54.28	5726	3.55	2400	7.72	variable drive	L. Rng.	188	49	54	28.860
54.27	5043	4.04	2401	6.64	control was set	L. Rng.	184	49	54	28.860
54.62	4478	4.57	2400	5.59	to give the	L. Rng.	184	49	54	28.840
53.66	4003	5.03	2401	5.03	travel speeds	L. Rng.	184	43	52	28.820
55.09	2950	7.00	2399	3.51	shown by mfg.	H. Rng.	182	45	49	28.820

VARYING DRAWBAR PULL AND TRAVEL SPEED WITH BALLAST Speed 4.0 MPH—Lo Range

Pounds Pull	5043	5296	5574	5737	5786	5877	5958	5822
Horsepower	54.27	52.41	48.91	43.46	37.29	31.70	25.41	18.91
Crankshaft Speed rpm	2401	2156	1910	1665	1431	1197	949	722
Miles Per Hour	4.04	3.71	3.29	2.84	2.42	2.02	1.60	1.22
Slip of Drivers %	6.64	7.05	7.45	7.58	7.72	7.98	8.12	7.98

TRACTOR SOUND LEVEL WITHOUT CAB

	dB (A)
Maximum Available Power 2 Hours	100.0
75% of Pull at Max. Power 10 Hours	98.0
50% of Pull at Max. Power 2 Hours	96.5
50% of Pull at Reduced Engine Speed 2 Hours	92.5
Bystander (21.5 MPH Hi Range)	89.0

TIRES, BALLAST AND WEIGHT

		With Ballast	Without Ballast
Rear Tires	—No, size, ply & psi	Two 18.4-34;6;16	Two 18.4-34;6;16
Ballast	—Liquid	1130 lb each	None
	Cast Iron	None	None
Front Tires	—No, size, ply & psi	Two 9.5L-15;6;28	Two 9.5L-15;6;28
Ballast	—Liquid	None	None
	Cast Iron	None	None
Height of drawbar		18½ inches	19 inches
Static weight with operator—rear		7850 lb	5590 lb
	front	2290 lb	2285 lb
	total	10140 lb	7875 lb

Department of Agricultural Engineering

Dates of Test: November 14 to December 3, 1973

Manufacturer: INTERNATIONAL HARVESTER COMPANY, CHICAGO, ILLINOIS

FUEL, OIL AND TIME Fuel lead free gasoline Octane No Motor 82.7 Research 91.6 (rating taken from oil company's typical inspection data) Specific gravity converted to 60°/60° 0.7343 Weight per gallon 6.113 lb I.H. Low ash engine oil SAE 30 recommended or API service classification CD and CC To motor 2.108 gal Drained from motor 1.996 gal Transmission and final drive lubricant I.H. Hy-Tran Fluid Total time engine was operated 60 hours.

ENGINE Make International Gasoline Type 6 cylinder vertical Serial No 291CT2U011046* Crankshaft Mounted lengthwise Rated rpm 2400 Bore and stroke 3.75" x 4.39" Compression ratio 7.5 to 1 Displacement 290.8 cu in Carburetor size 1¼" Ignition system battery Cranking system 12 volt electric Lubrication pressure Air cleaner dual stage dry type with replaceable pleated paper element and automatic dust unloader Oil filter full flow treated paper screw-on cartridge Oil cooler radiator for transmission and hydraulic fluid Fuel filter screen in sediment bowl Muffler was used Cooling medium temperature control thermostat.

CHASSIS Type standard Serial No 2680001 U007506* Tread width rear 60" to 98" front 58" to 82" Wheel base 103" 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 30.2" Vertical distance above roadway 35.6" 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. A range transmission provides Hi and Lo range Advertised speeds mph Lo range—0 to 8; Hi-range 0-21½ reverse Lo Range 0 to 3½ reverse Hi range 0 to 9¼ Clutch none—hydrostatic drive can be controlled by foot pedal Brakes dry double disc actuated by two foot pedals that can be locked together Steering hydrostatic Turning radius (on concrete surface with brake applied) right 144" left 144" (on concrete surface without brake) right 165" left 165" Turning space diameter (on concrete surface with brake applied) right 298" left 298" (on concrete surface without brake) right 339" left 339" Power take-off 543 1pm at 2000 engine rpm.

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 or official Nebraska test procedure.

Six travel speeds were chosen between 15% slip and 15 mph.

We, the undersigned, certify that this is a true and correct report of official Tractor Test 1154.

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. Prior to the maximum power run the tire tread-bar height must be at least 65% of new tread height.

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 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.

Varying Power and Fuel Consumption With Ballast. The varying power runs are made to show the effects 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 4 different runs 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; (3) 50% of the pull at maximum power; and (4) maintaining the same load and travel speed as in (3) by shifting to a higher gear and reducing the engine rpm.

Maximum Power with Ballast. Maximum power is measured on straight level sections of the test course. Data are shown for not more than 6 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 manufacturer's representative has the option of selecting one gear or speed over eight miles per hour. 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.

Varying Drawbar Pull 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.

SOUND MEASUREMENT

Sound is recorded during each of the Varying Power and Fuel Consumption runs as the tractor travels on a straight section of the test course. The dB(A) sound level is obtained with the microphone located near the right ear of the operator. Bystander sound readings are taken with the microphone placed 25 feet from the line of travel of the tractor.

An increase of 10 dB(A) will approximately double the loudness to the human ear.

For additional information about the Nebraska Tractor Tests write to the Department of Agricultural Engineering, University of Nebraska, Lincoln, Nebraska 68503.



INTERNATIONAL HYDRO 70 GASOLINE