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5-10-1954

Test 518: McCormick Super WD-9

Nebraska Tractor Test Lab

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The Experiment Station
University of Nebraska College of Agriculture
W. V. Lambert, Director, Lincoln, Nebraska

Department of Agricultural Engineering
Dates of test: May 10 to May 19, 1954
Manufacturer: INTERNATIONAL HARVESTER
COMPANY, CHICAGO, ILLINOIS
Manufacturer's rating: Not rated

NEBRASKA TRACTOR TEST NO. 518

MCCORMICK SUPER WD-9

BELT HORSEPOWER TESTS

Hp	Crank shaft speed rpm	Fuel Consumption			Water used gal per hour	Temp Deg F		Barometer inches of mercury		
		Gal per hour	Hp-hr per gal	Lb per hp-hour		Cooling med	Air			
TESTS B & C 100% MAXIMUM LOAD—Two Hours										
* 65.19	1500	4.458	14.62	0.477	0.00	187	55	28.870		
TEST D—RATED LOAD—ONE HOUR										
57.24	1500	3.890	14.71	0.474	0.00	188	64	28.905		
TEST E—VARYING LOAD—TWO HOURS (20 minute runs; last line average)										
57.40	1503	3.895	14.74	0.474	...	190	66	.....	
1.20	1542	1.225	0.98	7.125	...	182	67	.....	
29.34	1527	2.416	12.14	0.575	...	184	69	.....	
59.50	1338	4.054	14.68	0.475	...	182	70	.....	
14.82	1534	1.780	8.33	0.838	...	184	71	.....	
43.38	1514	3.129	13.86	0.503	...	178	70	.....	
34.27	1493	2.750	12.46	0.560	0.00	183	69	28.915		
TORQUE (At Dynamometer)										
Eng rpm	1498	1422	1349	1280	1204	1123	1039	968	895	822
Lb-ft	481.3	499.5	504.9	511.9	524.3	528.5	530.3	530.3	524.1	508.9
Dyn rpm	694	653	616	583	546	513	477	444	411	378

DRAWBAR HORSEPOWER TESTS

Hp	Draw bar pull lb	Speed miles per hr	Crank shaft speed rpm	Slip of drive wheels %	Fuel Consumption			Water used gal per hour	Temp Deg F		Barometer inches of mercury
					Gal per hour	Hp-hr per gal	Lb per hp-hr		Cooling med	Air	
TESTS F & G—100% MAXIMUM LOAD											
46.34	8416	2.06	1505	16.04	.....	Not Recorded	.....	.....	171	60	29.040
54.01	6908	2.93	1498	11.20	.....	Not Recorded	.....	.....	176	64	28.915
57.37	4955	4.34	1499	6.57	.....	Not Recorded	.....	.....	177	60	28.900
57.27	3993	5.38	1496	4.75	.....	Not Recorded	.....	.....	175	60	28.910
47.89	1092	16.45	1512	0.00	.....	Not Recorded	.....	.....	170	55	29.030
TEST H—RATED LOAD—TEN HOURS—3rd Gear											
44.72	3779	4.44	1500	4.66	3.556	12.58	0.555	0.00	179	77	28.850
TEST J—OPERATING MAXIMUM LOAD—3rd Gear											
54.86	4938	4.17	1500	12.23	.....	Not Recorded	.....	.....	177	71	28.935
TEST K—OPERATING MAXIMUM LOAD—3rd Gear											
42.19	3964	3.99	1505	14.79	.....	Not Recorded	.....	.....	168	65	29.080

TIRES, WHEELS AND WEIGHT

	Tests F, G & H	Test J	Test K
Rear wheels			
Type	Cast iron	Cast iron	Cast iron
Liquid ballast	1604 lb each	None	None
Added cast iron	280 lb each	None	None
Rear tires			
No. and size	Two 18-26	Two 18-26	Two 14-34
Ply	8	8	6
Air pressure	12 lb	12 lb	12 lb
Front wheels			
Type	Cast iron	Cast iron	Cast iron
Liquid ballast	None	None	None
Added cast iron	None	None	None
Front tires			
No. and size	Two 7.50-18	Two 7.50-18	Two 7.50-18
Ply	6	6	6
Air pressure	28 lb	28 lb	28 lb
Height of drawbar	20 inches	21½ inches	22 inches
Static weight			
Rear end	9735 lb	5967 lb	4346 lb
Front end	2880 lb	2885 lb	2898 lb
Total weight as tested with operator	12,790 lb	9,027 lb	7,419 lb

FUEL, OIL and TIME Diesel Fuel Cetane No. 50 weight per gallon 6.979 lb. OIL SAE 20; to motor 2.687 gal; drained from motor 2.136 gal Total time motor was operated 42½ hours.

CHASSIS TYPE Standard Serial No. 722 J Tread width rear 66½" front 52" Wheel base 83⅝" Hydraulic control system Direct engine drive Advertised speeds mph first 2⅜ second 3⅜ third 4½ fourth 5½ fifth 15¼ reverse 3 Belt pulley diam. 14" face 8½" rpm 707 Belt speed 2593 fpm Clutch single plate dry disc operated by foot pedal Seat pressed steel with canvas covered felt pad Brakes Disc brake operated by right foot on adjacent pedals either independently or interlocked Equalized by locking pedals together Power take-off Standard type.

ENGINE Make International Harvester Type 4-cylinder vertical Diesel Serial No. 928 Crankshaft mounted lengthwise Head I Lubrication pressure Bore and Stroke 4.5" x 5.5" Rated rpm 1500 Compression ratio 15.61 to 1 Displacement 350 cu. in. Port Diameter Valves Inlet 1 21/32" Exhaust 1 15/32" Governor variable speed centrifugal Carburetor Size ¾" (for starting only) Ignition System battery (for starting only) Starting System 12 volt Air Cleaner Oil washed wire screen Muffler was used Oil Filter partial flow replaceable element Fuel filter One cotton auxiliary filter and one treated paper element Cooling medium temperature control thermostat and shutter.

REPAIRS AND ADJUSTMENTS No repairs or adjustments.

REMARKS All test results were determined from observed data and without allowances, additions or deductions. Tests B and F were made with fuel pump set to develop approximately 67 corrected maximum belt horsepower and data from these tests were used in determining the horsepower to be developed in tests D and H, respectively. Tests C, D, E, G, H, J, & K were made with the same setting.

HORSEPOWER SUMMARY

	Drawbar	Belt
1. Sea level (calculated) maximum horsepower (based on 60° F and 29.92" HG)	59.40	67.24
2. Observed maximum horsepower (tests F and B)	57.37	65.19
3. Seventy-five per cent of calculated maximum drawbar horsepower and eighty-five per cent of calculated maximum belt horsepower (formerly ASAE and SAE ratings)	44.55	57.15

We, the undersigned, certify that this is a true and correct report of official tractor test No. 518.

L. F. LARSEN
Engineer-in-Charge

C. W. SMITH
L. W. HURLBUT
F. D. YUNG
Board of Tractor
Test Engineers

EXPLANATION OF TEST REPORT

TEST A: The manufacturer's representative operates the tractor for a minimum of 12 hours using light to heavy drawbar loads in each gear.

This serves as a period for limber up, general observation and adjustments. Adjustments that are permissible include valve tappet clearance, breaker point gap, spark plug gaps, clutch and others of a similar nature. No new parts or accessories can be installed without having mention made of it in the report.

No data are recorded during this preliminary run except the time that the engine is operated.

BELT HORSEPOWER TESTS

TEST B: The throttle valve is held wide open, and the belt load on the dynamometer is adjusted so that the engine is at the rated speed recommended by the manufacturer. Carburetor, ignition timing and manifold adjustments are all set for maximum engine power.

This test is designed to determine maximum belt horsepower of the tractor at rated speed and to measure fuel consumption at the maximum power on the belt.

TEST C: For tractors with carburetors the best fuel economy does not always occur when the engine develops maximum power at rated speed. Test C is intended to allow the manufacturer's representative to select a more economical fuel setting even though there is a slight loss of power. *This more practical carburetor setting is used in all later tests except test F.* The throttle valve is held wide open and load adjusted to give rated rpm. Tests B and C are the same for diesel tractors which have an altogether different fuel system.

TEST D: The throttle control lever is set so that the governor will maintain rated engine speed when rated load is applied. Rated load is 85% of 100% maximum, as obtained in test B, corrected to standard conditions.

This rating is somewhat less than the maximum belt horsepower in order that the operator may have a certain amount of reserve.

TEST E:

Varying load serves to show the range of engine speeds when the engine is controlled by the governor during the following varied loads of 20 minutes each: rated load, no load, $\frac{1}{2}$ rated load, maximum load at wide open throttle valve, $\frac{1}{4}$ and $\frac{3}{4}$ rated load.

The average result of this test shows the average power and fuel consumption. Since the average tractor is subjected to varying loads, these data serve well in predicting fuel consumption and efficiency of a tractor in general use.

Torque, lb-ft at dynamometer, is obtained with wide open throttle and sufficient load is applied to give several readings.

DRAWBAR HORSEPOWER TESTS

In all drawbar tests the pull exerted by the tractor is transmitted by a hydraulic pressure cylinder to a recording instrument in the test car. All tests are made on the same dirt test course which is maintained by grading, sprinkling and rolling

so that it remains very nearly the same throughout the season. The same tires, wheels and weights are used for all tests except J and K.

TEST F: A drawbar test, the results of which are used to determine the rated drawbar horsepower in test H. The carburetor is set to develop maximum power as in test B. The rated gear recommended by manufacturer as plow gear is used in this test. The drawbar load is adjusted to give rated engine speed.

TEST G: Maximum drawbar horsepower is determined in each gear when the carburetor is set for fuel economy as in test C. The throttle valve is held wide open and the load is applied so that the engine runs at rated engine speed.

When operating in low gear it is not uncommon for the tractor to develop less drawbar horsepower than in rated gear because of excessive wheel slippage. When excessive wheel slippage occurs the load is reduced until slippage approaches 16%. When the load is reduced it is necessary to operate the tractor engine at part throttle and control engine speed by governor action.

TEST H: Intended to test the ability of the tractor to run continuously for 10 hours at rated drawbar horsepower and to determine the fuel consumption during that time. Rated drawbar horsepower is 75% of 100% maximum drawbar horsepower (Test F), corrected to standard conditions.

When operating at rated load the throttle control lever is set to maintain rated engine speed. This rating is less than maximum drawbar horsepower in order that the operator may have a certain amount of reserve.

TEST J: The tractor is operated in rated gear with all added weight removed. This test shows the effect of the removal of added weight on the performance of the tractor when compared with test G.

Removal of wheel weights generally increases wheel slippage and decreases drawbar horsepower.

TEST K: Similar to test J except that the smallest tires and lightest wheels offered by the manufacturer are used.

