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Test 682: Cockshutt Model 560 (Diesel)

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: November 10, 1958 to November 26, 1958
Manufacturer: COCKSHUTT FARM EQUIPMENT
LIMITED, BRANTFORD, CANADA
Manufacturer's rating: Not Rated

NEBRASKA TRACTOR TEST NO. 682

COCKSHUTT 560 DIESEL

BELT HORSEPOWER TESTS

Hp	Crank shaft speed rpm	Fuel Consumption			Temp. Deg. F.			Barometer inches of mercury
		Gal per hr	Hp-hr per gal	Lb per hp-hr	Cooling medium	Air wet bulb	Air dry bulb	
TESTS B & C—100% MAXIMUM POWER—TWO HOURS								
48.52	1651	2.736	17.73	0.396	171	58	70	29.042
TEST D—RATED POWER—ONE HOUR								
42.95	1674	2.448	17.54	0.401	161	61	69	29.055
TEST E—VARYING POWER—TWO HOURS (20 minute runs; last line average)								
42.88	1672	2.445	17.54	0.401	165	63	72
1.48	1765	0.815	1.82	3.872	127	61	70
22.09	1714	1.553	14.22	0.494	138	61	69
46.37	1657	2.603	17.81	0.395	171	62	71
11.25	1742	1.144	9.83	0.715	124	59	67
32.62	1691	1.972	16.54	0.425	150	62	70
26.12	1707	1.756	15.24	0.461	146	61	70	29.067

DRAWBAR HORSEPOWER TESTS

Hp	Draw bar pull lbs	Speed miles per hr	Crank shaft speed rpm	Slip of drive wheels %	Fuel Consumption			Temp. Deg. F.			Barometer inches of mercury
					Gal per hr	Hp-hr per gal	Lb per hp-hr	Cool- ing med	Air wet bulb	Air dry bulb	
TEST H—RATED POWER—TEN HOURS—4th Gear											
35.21	2758	4.79	1677	3.23	2.322	15.16	0.464	152	53	55	28.595
TESTS F & G—OPERATING MAXIMUM POWER											
28.55	6706	1.60	1653	14.12	1st Gear (part throttle)			140	36	39	28.970
39.02	6682	2.19	1655	14.42	2nd Gear(part throttle)			149	44	48	28.970
45.61	5228	3.27	1650	7.40	3rd Gear			157	41	45	28.670
45.32	3673	4.63	1649	4.82	4th Gear			158	42	46	28.670
42.08	2290	6.89	1653	2.92	5th Gear			157	60	69	28.605
36.05	1004	13.46	1660	0.71	6th Gear			151	53	55	28.560
TEST J—OPERATING MAXIMUM POWER											
45.45	3692	4.62	1645	4.65	4th Gear			147	18	20	29.300
TEST K—PULL-SPEED CHARACTERISTIC—4th Gear											
Pounds Pull		2758	3673	4050	4150		4150	4200	4100		
Horsepower		35.21	45.32	44.3	40.9		35.4	30.2	25.1		
Miles Per Hour		4.79	4.63	4.1	3.7		3.2	2.7	2.3		

FUEL, OIL, WATER and TIME Fuel Diesel Cetane No. 50.8 (rating taken from oil company's typical inspection data) Weight per gallon 7.030 lb Oil SAE 20-20W To motor 2.161 gal Drained from motor 2.107 gal Water used 0.298 gal Total time motor was operated 41 hours.

CHASSIS Type Standard Serial No. CN 5121 D Tread width rear 64" front 57" Wheel base 87 3/4" Hydraulic control system direct engine drive with throw out lever Advertised speeds mph first 1.81 second 2.50 third 3.45 fourth 4.67 fifth 6.94 sixth 13.20 reverse first 3.19 second 6.08 Belt pulley diam. 10" Face 8 1/2" rpm 1195 Belt speed 3130 fpm Belt flat Length 72' Width 7" Thickness 0.216" Maximum slip 0.63% Clutch single plate dry disc operated by foot pedal Seat pressed steel on conical spring with shock absorber Brakes double disc operated by two foot pedals Equalized by locking together Power take-off "live" power take-off with independent clutch Steering aided by hydraulic power steering.

ENGINE Make Perkins Diesel Type 4 cylinder vertical Serial No. 6072 Crankshaft mounted lengthwise Head I Lubrication pressure Bore and stroke 4 1/4" x 4 3/4" Rated rpm 1650 Compression ratio 16 to 1 Displacement 269.5 cu. in. Valves port diameter Inlet 1 1/16" Exhaust 1 3/8" Governor variable speed centrifugal Starting system 12 volt (2-6 volt batteries) Air cleaner oil washed wire screen Muffler was used Oil filter replaceable paper element Fuel filter one first stage metal screen and water trap, one primary filter with replaceable paper element and one final stage filter with replaceable paper element Cooling medium temperature control thermostat.

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 50.5 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 and K were made with the same setting.

Rear light bracket broke during test "H."

TIRES, WHEELS AND WEIGHT

	Tests F, G, H & K	Test J
Rear wheels		
Type	Cast iron	Cast iron
Liquid ballast	825 lb each	None
Added cast iron	250 lb each	None
Rear tires		
No. and size	Two 15-34	Two 15-34
Ply	6	6
Air pressure	16 lb	16 lb
Front wheels		
Type	Cast iron	Cast iron
Liquid ballast	None	None
Added cast iron	None	None
Front tires		
No. and size	Two 7.50-18	Two 7.50-18
Ply	4	4
Air pressure	24 lb	24 lb
Height of drawbar	16 1/2 inches	17 inches
Static weight		
Rear end	6600 lb	4450 lb
Front end	2670 lb	2670 lb
Total weight as tested with operator	9445 lb	7295 lb

HORSEPOWER SUMMARY

	Drawbar	Belt
1. Sea level (calculated) maximum horsepower (based on 60° F and 29.92" Hg)	46.65	50.47
2. Observed maximum horsepower (tests F and B)	45.32	48.52
3. Seventy-five per cent of calculated maximum drawbar horsepower and eighty-five per cent of calculated maximum belt horsepower (ASAE and SAE ratings)	34.99	42.90

We, the undersigned, certify that this a true and correct report of official Tractor Test No. 682.

L. F. LARSEN
Engineer-in-Charge

L. W. HURLBUT, Chairman
G. W. STEINBRUEGGE
J. J. SULEK
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 manual throttle control lever is set so that 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 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 manual throttle control lever is set the same as for tests B and C allowing the governor to control engine speed at part throttle. Load is applied until 85% of maximum corrected horsepower found in test B is obtained.

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.

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. When rubber tires are used, all tests are made on the concrete test course. The same tires, wheels and weights are used for all tests except J. All crawler type tractors are tested on an earthen test course which is maintained by grading, sprinkling and rolling so that it remains very nearly the same for each test.

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 the 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 manual throttle control lever is set so that 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 15%. 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 horsepower the manual throttle control lever is set the same as in tests F and G allowing the governor to maintain engine speed at part throttle. 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: This is intended to show the pull, horsepower, and travel speed of the tractor at rated horsepower (taken from test H); maximum horsepower (taken from test G); and at least four other conditions obtained by reducing travel speed in 10% increments by overload.

