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6-7-1957

## Test 623: Allis-Chalmers D-14 Gasoline

Nebraska Tractor Test Lab

University of Nebraska-Lincoln, [tractortestlab@unl.edu](mailto:tractortestlab@unl.edu)

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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: June 1, 1957 to June 7, 1957  
Manufacturer: ALLIS-CHALMERS MANUFACTURING  
COMPANY, MILWAUKEE, WISCONSIN  
Manufacturer's rating: Not Rated

NEBRASKA TRACTOR TEST NO. 623

ALLIS-CHALMERS D-14

**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		
TEST B—100% MAXIMUM LOAD—TWO HOURS									
34.08	1650	3.042	11.20	0.547	174	62	73	28.957	
TEST C—OPERATING MAXIMUM LOAD—ONE HOUR									
32.62	1650	2.717	12.01	0.510	166	60	69	28.953	
TEST D—RATED LOAD—ONE HOUR									
30.75	1651	2.589	11.88	0.516	170	64	76	28.960	
TEST E—VARYING LOAD—TWO HOURS (20 minute runs; last line average)									
30.67	1648	2.557	11.99	0.511	168	64	75	.....	
1.56	1862	1.171	1.33	4.596	143	60	68	.....	
16.17	1752	1.807	8.95	0.685	149	61	70	.....	
30.62	1490	2.542	12.05	0.508	171	62	71	.....	
8.34	1809	1.391	6.00	1.022	147	62	72	.....	
23.89	1731	2.243	10.65	0.575	162	62	73	.....	
18.54	1715	1.952	9.50	0.645	157	62	71	28.957	
TEST L—OPERATING MAXIMUM TORQUE									
% of rated rpm (engine)	100	95	90	84	80	75	70	65	55
% of rated-speed torque	100	102	104	105	105	105	104	102	98

**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 LOAD—TEN HOURS—3rd Gear High Range											
24.50	1866	4.92	1651	4.84	2.367	10.35	0.592	174	67	86	28.797
TEST F—100% MAXIMUM LOAD											
30.91	2396	4.84	1649	6.42	3rd gear	High Range	163	59	65	28.870	
TEST G—OPERATING MAXIMUM LOAD											
25.22	4847	1.95	1651	15.11	1st gear H.R. (prt-thrtl)			151	59	66	28.790
30.17	3029	3.74	1654	7.87	2nd gear High Range			190	64	86	28.945
30.27	2332	4.87	1650	5.82	3rd gear High Range			185	66	84	28.940
25.68	761	12.65	1648	2.63	4th gear High Range			160	62	71	28.780
17.60	4841	1.36	1653	15.77	1st gear L.R. (prt-thrtl)			143	59	66	28.790
28.30	4253	2.50	1651	12.33	2nd gear Low Range			163	62	71	28.780
29.03	3273	3.33	1651	8.65	3rd gear Low Range			182	64	86	28.945
27.55	1173	8.81	1649	3.74	4th gear Low Range			161	62	71	28.780
TEST J—OPERATING MAXIMUM LOAD											
28.00	2318	4.53	1648	13.38	3rd gear High Range			182	66	89	28.745
TEST K—OPERATING MAXIMUM LOAD											
22.72	1974	4.32	1649	12.54	3rd gear H.R. (prt-thrtl)			168	66	85	28.765

**TIRES, WHEELS AND WEIGHT**

	Tests F, G, & H	Test J	Test K
<b>Rear wheels</b>			
Type	Pressed steel	Pressed steel	Pressed steel
Liquid ballast	393 lb each	None	None
Added cast iron	1170 lb each	None	None
<b>Rear tires</b>			
No. and size	Two 12-26	Two 12-26	Two 11-26
Ply	6	6	4
Air pressure	18 lb	14 lb	12 lb
<b>Front wheels</b>			
Type	Pressed steel	Pressed steel	Pressed steel
Liquid ballast	38 lb each	None	None
Added cast iron	90 lb each	None	None
<b>Front tires</b>			
No. and size	Two 5.50-16	Two 5.50-16	Two 5.50-16
Ply	4	4	4
Air pressure	24 lb	24 lb	24 lb
<b>Height of drawbar</b>	23 inches	24 inches	22 inches
<b>Static weight</b>			
Rear end	5400 lb	2274 lb	2174 lb
Front end	1430 lb	1174 lb	1170 lb
<b>Total weight as tested with operator</b>	7005 lb	3623 lb	3519 lb

**FUEL, OIL, WATER and TIME** Fuel Gasoline Octane No. ASTM 82.8 Research 89.4 (rating taken from oil company's typical inspection data) Weight per gallon 6.125 lb Oil SAE 20-20W To motor 1.009 gal Drained from motor 0.993 gal Water used 0.088 gal Total time motor was operated 44 hours.

**CHASSIS** Type Tricycle Serial No. D 14 1093 Tread width rear 54" to 80" front 8 3/4" and 15 1/2" Wheel base 85 3/4" Hydraulic control system direct engine drive Advertised speeds mph first 2 1/2 second 3 3/4 third 4 3/4 fourth 12 reverse 3 3/4 (Using power director) first 1 1/2 second 2 3/4 third 3 3/4 fourth 8 1/2 reverse 2 3/4 Belt pulley diam. 9" Face 6 9/16" rpm 1384 Belt speed 3260 fpm Belt flat Length 71' Width 6" Thickness 0.215" Maximum slip 0.69% Clutch single plate dry disc operated by foot pedal Seat pressed steel on coil spring with shock absorber Brakes internal expanding shoe operated by two foot pedals Equalized by foot action Power take-off continuous running when power director is used Steering power steering not available.

**ENGINE** Make Allis-Chalmers Type 4 cylinder vertical Serial No. 149-1481 B Crankshaft mounted lengthwise Head I Lubrication pressure Bore and stroke 3 1/2" x 3 3/8" Rated rpm 1650 Compression ratio 7.5 to 1 Displacement 149 cu. in. Valve port diameter Inlet 1 1/4" Exhaust 1 1/8" Governor variable speed centrifugal Carburetor size 7/8" Ignition system battery Starting system 6 volt battery Air cleaner oil washed wire mesh Muffler was used Oil filter replaceable waste packed cartridge 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 carburetor set for 100% 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 and L were made with an operating setting of the carburetor (selected by the manufacturer) of 95.4% of maximum belt horsepower.

**HORSEPOWER SUMMARY**

	Drawbar	Belt
1. Sea level (calculated) maximum horsepower (based on 60° F. and 29.92" Hg)	32.19	35.65
2. Observed maximum horsepower (tests F and B)	30.91	34.08
3. Seventy-five per cent of calculated maximum drawbar horsepower and eighty-five per cent of calculated maximum belt horsepower (ASAE and SAE ratings)	24.14	30.30

We, the undersigned, certify that this is a true and correct report of official Tractor Test No. 623.

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 throttle valve is 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 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.

**TEST L:** This torque test is run with wide open throttle. Loads are applied to reduce engine speed in approximately ten 5% increments. Rated speed equals 100%. The corresponding dynamometer torque is recorded as a per cent of torque at rated speed.

### DRAWBAR HORSEPOWER TESTS

In all drawbar tests the pull exerted by the tractor is transmitted by a hydraulic pressure cylinder to a recording instru-

ment in the test car. When rubber tires are used, all tests are made on the concrete test course. All crawler type tractors are tested on a 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.

