January 1920

Test 022: Gray 18-36

Nebraska Tractor Test Lab
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UNIVERSITY OF NEBRASKA

AGRICULTURAL ENGINEERING DEPARTMENT

UNIVERSITY FARM, LINCOLN

Report of Official Tractor Test No. 22

Dates of test June 11 to July 3, 1920.

Name, model and rating of tractor Gray 18-36

Serial No. Engine 1682 Serial No. Chassis 8097

Manufacturer Gray Tractor Co., Minneapolis, Minn.

Tractor equipment used Bosch DU 4 Magneto; Stromberg M3 Carburetor.

Style and dimensions of wheel lugs Spade and Cone 3" high.

Brake Horse Power Tests

Horse Power Developed	Crank Shaft Speed R. P. M.	Length of Test Min.	Fuel Consumption: Kind of Fuel	Fuel Consumption: Amount Used per Hour Gallons	Fuel Consumption: Horse Power Hours per Gallon	Water Consumption Gallons per Hour: In Radiator	In Fuel Mixture	Total	Temperature *Cooling Fluid Deg. F.	Temperature of Atmosphere Deg. F.	Humidity %	Barometric Pressure Inches Mercury
RATED LOAD TEST												
30.46	958	120	Gas	5.22	5.83	2.25	0.00	2.25	209.5	100	63	28.7
		Belt	Slippage 0.97%									
VARYING LOAD TEST												
30.37	955	10	Gas.									
30.67	948	10	"									
1.9[illegible]	1452.5	10	"									
9.6[illegible]	1206.5	10	"									
16.065	1005	10	"									
23.56	987	10	"									
20.37	1022	60	Gas.	3.97	5.21	1.75	0.00	1.75	200	103	62	28.7
MAXIMUM LOAD TEST												
42.20	958	60	Gas.	4.83	6.67	5.50	0.00	5.50	210	103	57	28.7
	Belt	Slippage 1.14%										
HALF LOAD TEST												
15.20	958	60	Gas.	2.74	5.56	0.50	0.00	0.50	196	104	57	28.7
	Belt	Slippage 0.59%										

*Taken in discharge line from engine.

Remarks Gasoline used in this test weighed 6.14 lbs per gallon.

In the varying load test it was necessary to control the speed with the hand throttle. The governor, when set to give rated speed and 30 H.P., would not control the speed when the load was thrown off. The governor was readjusted for the half load test.

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Drawbar Horse Power Tests

Horse Power Developed	Draw Bar Pull Pounds	Speed Miles per Hour	Crank Shaft Speed R. P. M.	Slippage of Drive Wheels % **	Fuel Consumption: Kind of Fuel Used	Fuel Consumption: Amount Used per Hour Gallons	Fuel Consumption: Horse Power Hours per Gallon	Water Used per Hour Gallons	*Temperature of Cooling Fluid Deg. F.	Temperature of Atmosphere Deg. F.	Average Humidity %	Baro Pres Inc Mer
RATED LOAD TEST. TEN HOURS												
19.64	2703	2.73	925	9.91	Gaso.	4.39	4.48	3.53	212	89	55	28
MAXIMUM LOAD TEST (1st 116.5 ft; 2nd 117.5 ft.)												
18.21	3044	2.24	900	25.84	Gaso.	---- Not Recorded----			212	86	60	28
19.15	3390	2.12	1000	25.21	"	"	"		212	88	60	2

*Taken in discharge line from engine.

** For computing slippage, circumference of drive wheels was taken at points of lugs.

Remarks The 10-hour test and the first maximum test were made with the tractor in high gear, the sec maximum test with the tractor in low gear.

The footing was extra good on the testing track during the 10-hour test.

Brief Specifications Case 18-36 H.P. Tractor.

Engine: Four cylinder, vertical, L-head. Bore 4¾", stroke 6½", rated speed 950 r.p.m.

Chassis: Wide drive drum in rear, two guide wheels in front. Rated speeds: Low gear 2½ mi. per hour; high gear 2¾ mi. per hour.

Total weight: 6510 lbs.

Oil Consumption:

During the complete test consisting of about 43 hours running the following oil was used:

For the engine, 2-5/8 gallons of Veedol Special Heavy; 2½ gallon Mobiloil "BB".

For the transmission, None added except 1½ gallons of Used crank case oil on drive chains.

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Repairs and Adjustments. Endurance:

Valves were ground and tappets adjusted after about 13 hour run.

Manufacturer's representative was dissatisfied with the performance of the tractor and was allowed to put on new cylinders and pistons (diameters measured and found to be according to specifications). The tractor was then given an additional 12-hour limbering up run.

Clutch slipped and was washed out with gasoline and re-adjusted. Clutch was tightened twice after this.

Replaced one broken spark plug.

Put on Stromberg in place of Bennett carburetor. All test results as reported in tables herewith were secured with the tractor equipped with the Stromberg carburetor.

Carburetor float valve was ground to stop leak.

At the end of the test there were slight leaks around the plugs above valves and around the spark plug porcelains. There was a good deal of lost motion in the steering gear. Otherwise the tractor was apparently in good condition and there was no indication of undue wear in any part nor of any weakness which might require early repairs.

It is our opinion that the repairs and adjustments necessary during this test do not indicate any mechanical defect so serious as to disqualify the tractor.

General Remarks:

The governor on this tractor, when set to give rated speed and 30 horse power, had no control of the engine speed when the load was thrown off. In our opinion this is not so serious a defect as to disqualify the tractor.

In the advertising literature submitted with the application for test of this tractor we find some statements and claims which cannot be directly compared with the results of this test as reported above. It is our opinion that none of these statements or claims are unreasonable or excessive except the following:

"Today no tractor at any price excells it in quality of construction, simplicity of operation or durability. In all around usefulness and final economy it has proved it superiority."

"The Gray tractor requires no special equipment." (Referring to farm implements.)

"There is no give to any part of it." (The frame)

"It is not possible to make better gears than are used in the Gray Tractor."

"It (the drive chain construction) also gives a large bearing surface so that all danger of wear or stretch is eliminated."

"This air cleaner by a dry process removes all the sand and dust and air before it passes into the carburetor."

"The downward pull of implements---presses the wide drive drum on to the soil sufficiently to insure perfect traction. The pressure is never great enough to pack the soil no matter how soft it may be."

The belt pulley speed is given as 900 r.p.m. This should be changed to 950 r.p.m. to conform to specifications certified.

Carburetor is described as being the Bennett. This should be changed to Stromberg to conform to specifications certified. The tractor equipped with Bennett carburetor was given a brake test and developed only about 26 B.H.P.

We, the undersigned, certify that above is a true and correct report of official tractor test No. 22.

Claude K. Shedd
Engineer-in-Charge

Oscar W. Siegen
E. E. Brandt
Giles M. Haines