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Test 838: Allis-Chalmers Series II D15 (LPG)

Nebraska Tractor Test Lab

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NEBRASKA TRACTOR TEST 838 - ALLIS CHALMERS SERIES II D15 LPG

The University of Nebraska Agricultural Experiment Station

E. F. Frolik, Dean; H. H. Kramer, Director, Lincoln, Nebraska

POWER TAKE-OFF PERFORMANCE

Hp	Crank- shaft speed rpm	Fuel Consumption		Hp-hr per gal	Temperature Degrees F			Barometer inches of Mercury	
		Gal per hr	Lb per hp-hr		Cooling medium	Air wet bulb	Air dry bulb		
MAXIMUM POWER AND FUEL CONSUMPTION									
Rated Engine Speed—Two Hours									
43.55	2000	4.648	0.454	9.37	181	62	75	28.715	
Standard Power Take-off Speed (540 rpm)—One Hour									
39.66	1760	4.169	0.447	9.51	182	62	75	28.720	
VARYING POWER AND FUEL CONSUMPTION—TWO HOURS									
37.81	2044	4.165	0.468	9.08	174	62	75	.....
0.00	2152	1.391	.....	.....	158	63	75	.....
19.31	2084	2.696	0.593	7.16	168	62	75	.....
43.80	2000	4.687	0.455	9.34	180	63	76	.....
9.72	2103	2.033	0.889	4.78	160	62	76	.....
28.72	2070	3.402	0.503	8.44	170	63	76	.....
Av	23.23	2075	3.062	0.560	7.59	168	62	75	28.723

DRAWBAR PERFORMANCE

Hp	Draw- bar pull lbs	Speed miles per hr	Crank- shaft speed rpm	Slip of drivers %	Fuel Consumption			Temp Degrees F			Barometer inches of Mercury
					Gal per hr	Lb per hp-hr	Hp-hr per gal	Cool- ing med	Air wet bulb	Air dry bulb	
VARYING DRAWBAR POWER AND FUEL CONSUMPTION WITH BALLAST											
Maximum Available Power—Two Hours—4th Gear											
36.02	3530	3.83	2002	7.34	4.441	0.524	8.11	192	72	86	28.565
75% of Pull at Maximum Power—Ten Hours—4th Gear											
30.12	2811	4.02	2053	5.16	3.806	0.537	7.91	174	62	71	28.898
50% of Pull at Maximum Power—Two Hours—4th Gear											
21.07	1918	4.12	2071	3.61	2.882	0.581	7.31	183	75	93	28.490
MAXIMUM POWER WITH BALLAST											
27.55	6447	1.60	2049	14.34	1st Gear			174	59	66	28.780
36.43	5589	2.44	2000	13.08	2nd Gear			181	58	75	28.960
36.65	4805	2.86	2001	11.47	3rd Gear			181	69	79	29.065
37.84	3745	3.79	2003	8.36	4th Gear			178	69	80	29.050
37.81	3047	4.65	2003	6.63	5th Gear			174	69	80	29.050
37.74	2344	6.04	1999	5.07	6th Gear			178	69	80	29.040
36.48	1353	10.11	2005	2.87	7th Gear			177	69	80	29.040
MAXIMUM POWER WITHOUT BALLAST											
29.30	2970	3.70	2044	14.91	4th Gear			173	62	73	29.000

VARYING DRAWBAR PULL AND TRAVEL SPEED WITH BALLAST—4th Gear

Pounds pull	3745	3807	3886	3880	3724	3461
Horsepower	37.84	34.48	31.22	27.44	22.58	17.88
Crankshaft speed rpm	2003	1800	1600	1408	1202	1020
Miles per hour	3.79	3.40	3.01	2.65	2.27	1.94
Slip of drivers %	8.36	8.57	8.78	8.67	8.36	7.93

TIRES, BALLAST and WEIGHT

		With Ballast	Without Ballast
Rear tires	—No, size, ply & psi	Two 14.9-26; 6; 16	Two 14.9-26; 6; 16
Ballast	—Liquid	538 lb each	None
	Cast iron	1200 lb each	None
Front tires	—No, size, ply & psi	Two 6.00-16; 6; 36	Two 6.00-16; 6; 20
Ballast	—Liquid	34 lb each	None
	Cast iron	236 lb each	None
Height of drawbar		22 inches	24½ inches
Static weight	—Rear	5890 lb	2415 lb
	—Front	2040 lb	1500 lb
Total weight with operator		8105 lb	4090 lb

Department of Agricultural Engineering

Dates of Test: April 30 to May 14, 1963

Manufacturer: ALLIS-CHALMERS MANUFACTURING COMPANY, MILWAUKEE, WISCONSIN

Manufacturer's Power Rating: Not rated

FUEL, OIL and TIME Fuel commercial propane Specific gravity converted to 60°/60° 0.5103 Weight per gallon 4.25 lb Oil SAE 10W-30 API service classification MS DM To motor 0.986 gal Drained from motor 0.877 gal Transmission lubricant SAE 80 E.P. Final drive lubricant SAE 20W engine oil Total time engine was operated 44½ hours.

ENGINE Make Allis-Chalmers LPG Type 4 cylinder vertical Serial No 160-10475 Crankshaft mounted lengthwise Rated rpm 2000 Bore and stroke 3⅝" x 3⅞" Compression ratio 9.0 to 1 Displacement 160 cu in Carburetor size 1" Ignition system battery Cranking system 12 volt electric Lubrication pressure Air cleaner dry type with built-in precleaner using a replaceable pleated paper element Oil filter replaceable pleated paper element Fuel filter replaceable paper element Muffler was used Cooling medium temperature control thermostat.

CHASSIS Type standard Serial No D15-13442 Tread width rear 54" to 80" front 51" to 78" Wheel base 87" 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 37.70" Vertical distance above roadway 28.75" Horizontal distance from center of rear wheel tread 0" to the right/left Hydraulic control system constant running only when power director clutch is used Transmission selective gear fixed ratio plus operator controlled partial range power shifting Advertised speeds mph first 1.8 second 2.7 third 3.1 fourth 4.0 fifth 4.7 sixth 6.1 seventh 9.9 eighth 15.3 reverse 3.1 and 4.7 Clutch single plate dry disc operated by foot pedal Power Director Clutch two multi-disc wet clutches operated by hand lever Brakes internal expanding shoe operated by two foot pedals Steering mechanical with power assist Turning radius (on concrete surface with brake applied) right 111" left 111" (on concrete surface without brake) right 119" left 119" Turning space diameter (on concrete surface with brake applied) right 232" left 232" (on concrete surface without brake) right 248" left 248" Belt pulley 1678 rpm at 2000 engine rpm diam 9" face 6°/16" Power take-off 540 rpm at 1760 engine rpm Belt speed 3956 fpm.

REPAIRS and ADJUSTMENTS No repairs or adjustments.

REMARKS All test results were determined from observed data obtained in accordance with the SAE and ASAE test code.

Eighth gear was not run as it exceeded 15 mph.

We, the undersigned, certify that this is a true and correct report of official Tractor Test 838.

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

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

BELT OR 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 belt pulley or 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, $\frac{1}{2}$ 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. If the manufacturer specifies a different rated crankshaft speed for drawbar operations, then the position of the manually operated governor control is changed to provide the high-idle speed specified by the manufacturer in the operating instructions.

Varying Power and Fuel Consumption With Ballast. The varying power runs are made to show the effect of speed-control devices (engine governor, automatic trans-

mission, 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 3 different levels 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; and (3) 50% of the pull at maximum power. Prior to 1958, fuel consumption data (10 hour test) were shown only for the pull obtained at maximum power for tractors having torque converters and at 75% of the pull obtained at maximum power for gear-type tractors.

Maximum Power with Ballast. Maximum power is measured on straight level sections of the test course. Data are shown for not more than 12 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 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.

Maximum Power Without Ballast. All added ballast is removed from the tractor. The maximum drawbar power of the tractor is determined by the same procedure used for getting maximum power with ballast. The gear (or travel speed) is the same as that used in the 10-hour test.

Varying Power 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.

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



Allis-Chalmers Series II D15 LPG