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## Test 837: Allis-Chalmers Series II D15 (Gasoline)

Nebraska Tractor Test Lab

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

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# NEBRASKA TRACTOR TEST 837 - ALLIS-CHALMERS SERIES II D15 GASOLINE

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								
46.18	2000	3.783	0.502	12.21	179	65	75	29.162

Standard Power Take-off Speed (540 rpm)—One Hour								
42.35	1760	3.495	0.506	12.12	179	65	75	29.163

### VARYING POWER AND FUEL CONSUMPTION—TWO HOURS

40.92	2086	3.440	0.515	11.90	171	65	75	.....
0.00	2185	1.233	.....	.....	157	65	74	.....
20.84	2125	2.231	0.656	9.34	168	65	75	.....
46.06	2000	3.729	0.496	12.35	179	66	76	.....
10.58	2153	1.757	1.018	6.02	156	67	77	.....
31.35	2130	2.799	0.547	11.20	167	67	78	.....
Av 24.96	2113	2.531	0.622	9.86	166	66	76	29.132

## 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											
38.33	3761	3.82	2003	7.24	3.805	0.609	10.07	190	70	85	28.800

75% of Pull at Maximum Power—Ten Hours—4th Gear											
31.67	2892	4.11	2094	4.71	3.118	0.604	10.16	173	69	84	28.613

50% of Pull at Maximum Power—Two Hours—4th Gear											
21.58	1906	4.25	2133	3.33	2.456	0.698	8.79	170	71	89	28.703

### MAXIMUM POWER WITH BALLAST

27.05	6157	1.65	2113	14.83	1st Gear	.....	172	66	73	28.600
38.06	5735	2.49	2001	11.90	2nd Gear	.....	172	66	73	28.600
38.17	4988	2.87	2003	11.02	3rd Gear	.....	178	67	76	28.910
39.00	3851	3.80	2001	7.72	4th Gear	.....	179	67	76	28.910
39.60	3193	4.65	2000	6.15	5th Gaer	.....	183	68	80	28.880
39.17	2426	6.05	2002	4.57	6th Gear	.....	182	68	80	28.880
37.36	1387	10.10	2005	2.83	7th Gear	.....	179	68	80	28.880

### MAXIMUM POWER WITHOUT BALLAST

29.70	2912	3.83	2086	14.88	4th Gear	.....	171	55	60	28.890
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### VARYING DRAWBAR PULL AND TRAVEL SPEED WITH BALLAST—4th Gear

Pounds pull	3851	3971	4056	4043	3964	3765
Horsepower	39.00	35.94	32.69	28.57	23.96	18.86
Crankshaft speed rpm	2001	1795	1601	1402	1199	989
Miles per hour	3.80	3.39	3.02	2.65	2.27	1.88
Slip of drivers %	7.72	8.09	8.31	8.41	8.09	7.67

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		480 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		47 lb each	None
	Cast iron		236 lb each	None
Height of drawbar			22½ inches	24½ inches
Static weight	—Rear		5740 lb	2380 lb
	—Front		2035 lb	1470 lb
Total weight with operator			7950 lb	4025 lb

Department of Agricultural Engineering

Dates of Test: April 30 to May 13, 1963

Manufacturer: ALLIS-CHALMERS MANUFAC-TURING COMPANY, MILWAUKEE, WIS-CONSIN

Manufacturer's Power Rating: Not rated

**FUEL, OIL and TIME** Fuel regular gasoline Octane No Motor 84.4 Research 92.2 (rating taken from oil company's typical inspection data) Specific gravity converted to 60°/60° 0.7365 Weight per gallon 6.131 lb Oil SAE 10W-30 API service classification MS, DM To motor 0.986 gal Drained from motor 0.901 gal Transmission lubricant SAE 80 E.P. FINAL drive lubricant SAE 20 engine oil Total time engine was operated 46½ hours.

**ENGINE** Make Allis-Chalmers gasoline Type 4 cylinder vertical Serial No 160-1056R Crank-shaft mounted lengthwise Rated rpm 2000 Bore and stroke 3⅝" x 3⅞" Compression ratio 8.0 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 sediment bowl with screen Muffler was used Cooling medium temperature control thermostat.

**CHASSIS** Type standard Serial No D15-13443 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 33.6" Vertical distance above roadway 30.0" 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 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 6⅞/16" 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 837.

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 Gasoline