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## Test 793: Allis-Chalmers H3 (Diesel)

Nebraska Tractor Test Lab

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

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# NEBRASKA TRACTOR TEST 793 - ALLIS-CHALMERS H3 DIESEL

The University of Nebraska Agricultural Experiment Station

E. F. Frolik, Dean; A. W. Epp, Acting Director, Lincoln, Nebraska

## POWER TAKE-OFF PERFORMANCE

Hp	Crank shaft speed rpm	Fuel Consumption		Hp-hr per gal	Temp. Degrees F			Barometer inches of mercury
		Gal per hr	Lb per hp-hr		Cool- ing med	Air wet bulb	Air dry bulb	
MAXIMUM POWER AND FUEL CONSUMPTION								
Rated Engine Speed—Two Hours								
32.11	1650	2.852	0.542	11.26	174	59	75	28.820
VARYING POWER AND FUEL CONSUMPTION—TWO HOURS								
29.12	1761	2.611	0.547	11.15	173	59	75	.....
0.00	1934	1.131	....	....	160	59	75	.....
15.09	1826	1.775	0.718	8.50	165	59	75	.....
32.36	1650	2.838	0.535	11.40	173	59	76	.....
7.65	1851	1.456	1.161	5.25	165	59	76	.....
22.19	1790	2.164	0.595	10.25	172	59	76	.....
Av 17.74	1802	1.996	0.686	8.89	168	59	75	28.853

## DRAWBAR PERFORMANCE

Hp	Draw-bar pull lbs	Speed miles per hr	Crank shaft speed rpm	Slip of drivers %	Fuel Consumption		Temperature Degrees F			Barometer inches of mercury	
					Gal per hr	Lb per hp-hr	Hp-hr per gal	Cooling medium	Air wet bulb		Air dry bulb
VARYING DRAWBAR POWER AND FUEL CONSUMPTION WITH BALLAST											
Maximum Available Power—Two Hours—2nd Gear High Range											
25.48	5099	1.87	1646	3.41	2.894	0.693	8.80	174	62	77	28.828
75% of Pull at Maximum Power—Ten Hours—2nd Gear High Range											
21.56	4026	2.01	1759	3.13	2.562	0.725	8.42	170	63	72	28.836
50% of Pull at Maximum Power—Two Hours—2nd Gear High Range											
15.09	2701	2.10	1806	1.64	2.118	0.856	7.12	170	61	75	28.803
MAXIMUM POWER WITH BALLAST											
24.71	7893	1.17	1738	6.39	1st Gear Low Range		170	58	70	29.030	
27.22	7204	1.42	1652	4.75	1st Gear High Range		170	58	70	28.955	
26.85	6779	1.49	1653	4.49	2nd Gear Low Range		175	60	74	28.920	
27.26	5413	1.89	1652	3.19	2nd Gear High Range		175	63	75	28.860	
26.11	4476	2.19	1648	2.80	3rd Gear Low Range		175	63	75	28.860	
25.00	3382	2.77	1646	1.88	3rd Gear High Range		175	63	75	28.860	
23.35	2353	3.72	1649	1.03	4th Gear Low Range		175	63	75	28.860	
22.35	1787	4.69	1647	0.69	4th Gear High Range		175	63	75	28.860	
VARYING DRAWBAR PULL AND TRAVEL SPEED WITH BALLAST—											
2nd Gear High Range											
Pounds pull		5400	5450	5550	5700		5300	4650			
Horsepower		27.3	24.7	22.2	19.8		15.5	11.2			
Miles per hour		1.9	1.7	1.5	1.3		1.1	0.9			

Department of Agricultural Engineering

Dates of Test: May 12 to May 25, 1961

Manufacturer: ALLIS-CHALMERS MANUFACTURING COMPANY, MILWAUKEE, WISCONSIN  
Manufacturer's Power Rating: Not Rated

**FUEL, OIL and TIME** Fuel regular gasoline Octane No Motor 84.7 Research 92.2 (rating taken from oil company's typical inspection data) Specific gravity converted to 60°/60° 0.7328 Weight per gallon 6.100 lb Oil SAE 10W-30 API service classification MS, DM To motor 0.955 gal Drained from motor 0.940 gal Transmission and final-drive lubricant SAE 20-20W Type engine oil Total time engine was operated 44 hours.

**ENGINE** Make Allis-Chalmers gasoline Type 4 cylinder vertical Serial No 3-1284-R Crankshaft mounted lengthwise Rated rpm 1650 Bore and stroke 3 1/2" x 3 3/8" Compression ratio 7.5 to 1 Displacement 149 cu in Carburetor size 7/8" Ignition system battery Cranking system 12 volt electric Lubrication pressure Air cleaner oil washed wire screen Oil filter replaceable pleated paper element Fuel filter sediment bowl with felt filter Muffler was used Cooling medium temperature control thermostat.

**CHASSIS** Type tracklayer Serial No H3 1439 Tread width 48" Wheel base 64" Drawbar height 12" Measured length of track 17 ft. Cleats integral with shoes Cleats per track 34 Size of cleats 14" x 2" 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 29 3/8" Vertical distance above roadway 20 1/4" Horizontal distance from center of rear wheel tread 0" to the right/left Hydraulic control system direct engine drive Transmission selective gear fixed ratio plus operator controlled partial range power shifting Advertised speeds mph (High range) first 1.5 second 2.0 third 2.9 fourth 4.8 reverse 2.2 (Low range) first 1.2 second 1.6 third 2.3 fourth 3.8 reverse 1.8 Clutch single plate dry disc operated by foot pedal Power director clutch two multi-disc wet clutches operated by hand lever Brakes contracting bands operated by two foot pedals Steering two hand levers controlling dry multi-disc clutches Turning space diameter (with brake applied) right 155" left 155" Power take-off 538 rpm at 1650 engine rpm.

**TOTAL WEIGHT** with operator 7395 lbs including hydraulic system 128 lb, heavy duty grill 62 lb, and track roller and idler guards 197 lb.

**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.

We, the undersigned, certify that this is a true and correct report of official Tractor Test 793.

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 transmissions, 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 H3 Gasoline