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Test 1017: Allis-Chalmers 220 Diesel

Nebraska Tractor Test Lab

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NEBRASKA TRACTOR TEST 1017 – ALLIS-CHALMERS TWO-TWENTY DIESEL

POWER TAKE-OFF PERFORMANCE

Hp	Crank-shaft speed rpm	Fuel Consumption		Temperature Degrees F				
		Gal per hr	Lb per hp-hr	Hp-hr per gal	Cooling medium	Air wet bulb	Air dry bulb	Barometer inches of Mercury
MAXIMUM POWER AND FUEL CONSUMPTION								
Rated Engine Speed—Two Hours								
135.95	2200	8.679	0.441	15.66	188	58	75	28.997
VARYING POWER AND FUEL CONSUMPTION—TWO HOURS								
122.04	2324	8.240	0.467	14.81	187	64	75	.....
0.00	2449	2.983	.....	.....	176	64	76	.....
62.50	2381	5.566	0.615	11.23	182	61	75	.....
137.43	2201	8.748	0.440	15.71	188	59	75	.....
31.75	2417	4.246	0.924	7.48	178	59	75	.....
92.73	2354	6.881	0.513	13.48	184	59	75	.....
Av 74.41	2354	6.111	0.567	12.18	183	61	75	28.965

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	Cooling med	Air wet bulb	Air dry bulb		
VARYING DRAWBAR POWER AND FUEL CONSUMPTION WITH BALLAST												
Maximum Available Power—Two Hours—4th Gear												
117.21	10086	4.36	2206	7.18	8.656	0.510	13.54	190	61	64	28.720	
75% of Pull at Maximum Power—Ten Hours—4th Gear												
98.12	7797	4.72	2347	5.56	8.038	0.566	12.21	189	64	69	28.702	
50% of Pull at Maximum Power—Two Hours—4th Gear												
67.69	5178	4.90	2384	3.42	6.385	0.652	10.60	188	70	83	28.663	
MAXIMUM POWER WITH BALLAST												
95.55	15710	2.28	2339	14.82	2nd Gear		192	61	63	28.700		
114.40	13200	3.25	2200	10.52	3rd Gear		187	57	65	28.780		
120.26	10373	4.35	2201	7.25	4th Gear		191	57	65	28.780		
121.56	7698	5.92	2199	5.14	5th Gear		191	62	71	28.770		
117.47	4904	8.98	2199	3.42	6th Gear		191	63	73	28.770		
114.64	3261	13.18	2202	2.21	7th Gear		189	64	73	28.770		
MAXIMUM PULL WITHOUT BALLAST												
98.17	8557	4.30	2355	14.92	4th Gear		188	72	84	28.545		
VARYING DRAWBAR PULL AND TRAVEL SPEED WITH BALLAST												
Pounds Pull				10373	11630	12360	12212	12228	11836			
Horsepower				120.26	119.97	111.54	96.92	82.71	67.90			
Crankshaft speed rpm				2201	1982	1752	1539	1312	1107			
Miles per hour				4.35	3.87	3.38	2.98	2.54	2.15			
Slip of drivers %				7.25	8.27	9.27	9.27	9.27	8.70			

TIRES, BALLAST, and WEIGHT

		With Ballast	Without Ballast
Rear tires	—No, size, ply & psi	Two 24.5-32; 10; 18	Two 24.5-32; 10; 16
	—Liquid	1678 lb each	None
	Cast iron	2250 lb each	None
Front tires	—No, size, ply & psi	Two 10.00-16; 6; 28	Two 10.00-16; 6; 28
	—Liquid	None	None
	Cast iron	17 lb each	None
Height of drawbar		18 inches	19½ inches
Static weight with operator—Rear		15960 lb	8105 lb
	Front	4090 lb	4055 lb
	Total	20050 lb	12160 lb

Department of Agricultural Engineering

Date of Test: June 17 to June 24, 1969

Manufacturer: ALLIS-CHALMERS MANUFACTURING COMPANY, MILWAUKEE, WISCONSIN

FUEL, OIL and TIME Fuel No 2 diesel Cetane No 52.2 (rating taken from oil company's typical inspection data) Specific gravity converted to 60°/60° 0.8299 Weight per gallon 6.910 lb Oil SAE 30 API service classification MS, DS To motor 3.408 gal Drained from motor 2.369 gal Transmission and final-drive lubricant Allis-Chalmers Power Fluid 821 Total time engine was operated 40½ hours.

ENGINE Make Allis-Chalmers diesel Type 6 cylinder vertical with turbo charger Serial No 3D-10005 Crankshaft mounted lengthwise Rated rpm 2200 Bore and stroke 4.25" x 5.00" Compression ratio 16 to 1 Displacement 426 cu in Cranking system 12 volt electric (two 12 volt batteries) Lubrication pressure Air cleaner dry type with replaceable pleated paper element Oil filter two full flow replaceable pleated paper cartridges Oil cooler engine coolant heat exchanger for engine oil and radiator for transmission and hydraulic system Fuel filter sediment bowl and screen and one dual media replaceable paper cartridge Muffler was used Cooling medium temperature control thermostat.

CHASSIS Type standard Serial No 220-1138 Tread width rear 71" to 86" front 64" to 84" Wheel base 99.96" 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 34.9" Vertical distance above roadway 35.7" Horizontal distance from center of rear wheel tread 0" to the right/left Hydraulic control system direct engine drive Transmission selective gear fixed ratio Advertised speeds mph first 1.7 second 2.5 third 3.7 fourth 4.7 fifth 6.3 sixth 9.4 seventh 13.5 eighth 17.4 reverse 2.0 and 7.3 Clutch single plate dry disc operated by foot pedal Brakes dry triple disc actuated by two foot pedals which can be locked together Steering hydrostatic power Turning radius (on concrete surface with brake applied) right 136" left 136" (on concrete surface without brake) right 157" left 157" Turning space diameter (on concrete surface with brake applied) right 286" left 286" (on concrete surface without brake) right 328" left 328" Power take-off 1000 rpm at 2200 engine rpm.

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. First gear was not run as it was necessary to limit the pull in second gear to avoid excessive wheel slippage. 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 1017.

L. F. LARSEN

Engineer-In-Charge

G. W. STEINBRUEGGE, Chairman

W. E. SPLINTER

D. E. LANE

Board of Tractor Test Engineers

The University of Nebraska Agricultural Experiment Station
E. F. Frolik, Dean; H. W. Ottoson, Director; Lincoln, Nebraska

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, $\frac{1}{2}$ of 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 transmission, 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 Pull without Ballast. All added ballast is removed from the tractor. The drawbar pull is determined at slip limits of 15% for pneumatic tires or 7% for steel tracks or lugs. The tractor is operated at the fastest possible travel speed.

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 TWO-TWENTY DIESEL