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Test 1166: Allis-Chalmers 7040 Diesel

Nebraska Tractor Test Lab
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NEBRASKA TRACTOR TEST 1166 – ALLIS-CHALMERS 7040 DIESEL

POWER TAKE-OFF PERFORMANCE

Hp	Crank-shaft speed rpm	Fuel Consumption Gal per hr	Fuel Consumption Lb per hp-hr	Hp-hr per gal	Temperature Degrees F Cooling medium	Temperature Degrees F Air wet bulb	Temperature Degrees F Air dry bulb	Barometer inches of Mercury
MAXIMUM POWER AND FUEL CONSUMPTION								
Rated Engine Speed—Two Hours (PTO Speed—1021 rpm)								
136.49	2300	8.984	0.455	15.19	186	62	75	28.700
Standard Power Take-off Speed (1000 rpm)—One Hour								
136.26	2252	8.879	0.450	15.35	186	63	75	28.680
VARYING POWER AND FUEL CONSUMPTION—Two Hours								
120.78	2396	8.308	0.475	14.54	183	63	75	.....
0.00	2555	3.178	.....	.....	173	61	73	.....
62.71	2483	5.756	0.634	10.89	178	63	75	.....
136.50	2300	8.981	0.455	15.20	187	64	77	.....
31.65	2518	4.467	0.975	7.09	175	65	75	.....
92.48	2444	7.006	0.524	13.20	181	66	76	.....
Av 74.02	2449	6.283	0.587	11.78	179	63	75	28.647

DRAWBAR PERFORMANCE

Hp	Draw-bar pull lbs	Speed miles per hr	Crank-shaft speed rpm	Slip of drivers %	Fuel Consumption Gal per hr	Fuel Consumption Lb per hp-hr	Hp-hr per gal	Temp Degrees F Cool-ing med	Temp Degrees F Air wet bulb	Temp Degrees F Air dry bulb	Barometer inches of Mercury
VARYING DRAWBAR POWER AND FUEL CONSUMPTION WITH BALLAST											
Maximum Available Power—Two Hours—8th Gear (4SL)											
114.23	8981	4.77	2298	6.75	8.827	0.534	12.94	181	46	54	29.125
75% of Pull at Maximum Power—Ten Hours—8th Gear (4SL)											
92.48	6772	5.12	2424	5.12	7.799	0.583	11.86	177	36	42	29.022
50% of Pull at Maximum Power—Two Hours—8th Gear (4SL)											
63.98	4510	5.32	2471	4.23	6.529	0.705	9.80	177	34	37	29.230
50% of Pull at Reduced Engine Speed—Two Hours—12th Gear (2FL)											
63.46	4486	5.31	1699	3.20	4.902	0.534	12.95	179	42	46	29.185
MAXIMUM POWER WITH BALLAST											
105.25	13619	2.90	2333	14.09	3rd Gear (2SL)			181	48	54	28.800
115.65	11613	3.73	2298	9.19	5th Gear (2SH)			182	45	54	29.160
117.12	9199	4.77	2300	6.75	8th Gear (4SL)			182	45	55	29.180
115.57	8131	5.33	2299	5.83	9th Gear (3SH)			182	43	51	29.180
116.21	6619	6.58	2299	4.57	11th Gear (5SL)			181	44	54	29.180
110.78	5045	8.23	2300	3.44	13th Gear (5SH)			180	39	53	29.180

VARYING DRAWBAR PULL AND TRAVEL SPEED WITH BALLAST—8th Gear (4SL)

Pounds Pull	9199	10409	11164	11623	11660	11236
Horsepower	117.12	117.43	111.36	100.63	86.64	69.74
Crankshaft Speed rpm	2300	2077	1841	1609	1382	1151
Miles Per Hour	4.77	4.23	3.74	3.25	2.79	2.33
Slip of Drivers %	6.75	7.80	8.68	9.40	9.40	9.12

TRACTOR SOUND LEVEL (with cab)	**db (A)**
Maximum Available Power 2 Hours	78.0
75% of Pull at Max. Power 10 Hours	78.5
50% of Pull at Max. Power 2 Hours	79.0
50% of Pull at Reduced Engine Speed 2 Hours	76.0
Bystander 20th Gear (5FH)	89.0

TIRES, BALLAST AND WEIGHT		**With Ballast**	**Without Ballast**
Rear Tires	—No., size, ply & psi	Two 20.8-38;10;22	Two 20.8-38;10;22
Ballast	—Liquid	1523 lb each	None
	Cast Iron	1245 lb each	None
Front tires	—No., size, ply & psi	Two 11.00-16;8;36	Two 11.00-16;8;36
Ballast	—Liquid	None	None
	Cast Iron	25 lb each	None
Height of drawbar		21½ inches	22 inches
Static weight with operator	—rear	13630 lb	8095 lb
	front	3750 lb	3700 lb
	total	17380 lb	11795 lb

Department of Agricultural Engineering

Dates of Test: October 29 to November 7, 1974

Manufacturer: ALLIS-CHALMERS CORPORATION, MILWAUKEE, WISCONSIN

FUEL, OIL AND TIME **Fuel** No 2 Diesel **Cetane No** 51.9 (rating taken from oil company's typical inspection data) **Specific gravity converted to 60°/60°** 0.8300 **Weight per gallon** 6.911 lb **Oil** Allis-Chalmers Power Lube 7000 **SAE** 30 **API service classification** SE-CD **To motor** 3.846 gal **Drained from motor** 3.177 gal **Transmission and final drive lubricant** Allis-Chalmers Power Fluid 821 **Total time engine was operated** 58 hours

ENGINE **Make** Allis-Chalmers Diesel **Type** 6 cylinder with turbo-charger **Serial No** 3D-27062 **Crankshaft Mounted** lengthwise **Rated rpm** 2300 **Bore and stroke** 4.25″ x 5.0″ **Compression ratio** 16 to 1 **Displacement** 426 cu in **Cranking system** 12 volt electric (four 12 volt batteries) **Lubrication** pressure **Air cleaner** two stage dry type with replaceable pleated paper primary and safety element and precleaner **Oil filter** two full flow replaceable cartridges **Oil cooler** engine coolant heat exchanger for crankcase oil and radiator for transmission and hydraulic fluid **Fuel filter** replaceable cartridge **Muffler** vertical **Cooling medium temperature control** 2 thermostats.

CHASSIS **Type** standard **Serial No** 7040-1001 **Tread width** rear 64″ to 99″ front 64″ to 88″ **Wheel base** 106″ **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 33.3″ Vertical distance above roadway 37.0″ Horizontal distance from center of rear wheel tread 0″ to the right/left **Hydraulic control system** direct engine drive **Transmission** selective gear fixed ratio with partial range operator controlled power shifting **Advertised speeds mph** first 1.6 second 2.0 third 3.3 fourth 3.7 fifth 4.1 sixth 4.5 seventh 4.5 eighth 5.1 ninth 5.6 tenth 6.2 eleventh 6.8 twelfth 7.3 thirteenth 8.4 fourteenth 9.1 fifteenth 10.1, sixteenth 11.3 seventeenth 12.5 eighteenth 13.9 nineteenth 15.2 twentieth 18.8 reverse 3.1, 3.8, 6.8 and 8.4 **Clutch** multiple wet disc operated by foot pedal **Brakes** wet multiple disc operated hydraulically by two foot pedals that can be locked together **Steering** hydrostatic **Turning radius** (on concrete surface with brake applied) right 150″ left 150″ (on concrete surface without brake) right 170″ left 170″ **Turning space diameter** (on concrete surface with brake applied) right 318″ left 318″ (on concrete surface without brake) right 358″ left 358″ **Power take-off** 1000 rpm at 2252 engine rpm and 1021 at 2300 engine rpm

REPAIRS AND ADJUSTMENT: No repairs or adjustments.

REMARKS: All test results were determined from observed data obtained in accordance with SAE and ASAE test code or official Nebraska test procedure.

First and second gears were not run as it was necessary to limit the pull in third gear because of the tire tangential pull limitation.

Fourth, sixth. seventh, tenth, twelfth, fourteenth, fifteenth, sixteenth, seventeenth eighteenth, nineteenth, and twentieth gears were not run as test procedure requires only six gears.

We, the undersigned, certify that this is a true and correct report of official Tractor Test **1166.**

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
Institute of Agriculture and Natural Resources. H. W. Ottoson, Director

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

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 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, ½ of the 85% torque; maximum power, ¼ and ¾ 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.

Varying Power and Fuel Consumption With Ballast. The varying power runs are made to show the effects 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 4 different runs 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; (3) 50% of the pull at maximum power; and (4) maintaining the same load and travel speed as in (3) by shifting to a higher gear and reducing the engine rpm.

Maximum Power with Ballast. Maximum power is measured on straight level sections of the test course. Data are shown for not more than 6 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 manufacturer's representative has the option of selecting one gear or speed over eight miles per hour. 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.

Varying Drawbar Pull 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.

SOUND MEASUREMENT

Sound is recorded during each of the Varying Power and Fuel Consumption runs as the tractor travels on a straight section of the test course. The dB(A) sound level is obtained with the microphone located near the right ear of the operator. Bystander sound readings are taken with the microphone placed 25 feet from the line of travel of the tractor.

An increase of 10 dB(A) will approximately double the loudness to the human ear.

For additional information about the **Nebraska Tractor Tests** write to the **Department of Agricultural Engineering, University of Nebraska, Lincoln, Nebraska 68503.**

ALLIS-CHALMERS 7040 DIESEL