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Test 982: Ursus C-350 (Diesel)

Nebraska Tractor Test Lab

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NEBRASKA TRACTOR TEST 982 – URSUS C-350 DIESEL

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								
43.34	2000	2.969	0.478	14.60	189	63	75	29.255
VARYING POWER AND FUEL CONSUMPTION—TWO HOURS								
38.08	2067	2.599	0.477	14.65	180	63	75	.....
0.00	2224	0.915	.....	.....	165	62	74	.....
19.92	2164	1.740	0.610	11.45	173	63	74	.....
42.19	2001	2.878	0.476	14.66	188	63	75	.....
10.12	2198	1.203	0.830	8.41	167	62	74	.....
29.33	2122	2.105	0.501	13.93	175	62	74	.....
Av 23.27	2129	1.907	0.572	12.20	175	62	74	29.265

DRAWBAR PERFORMANCE

Hp	Draw- bar pull lbs	Speed miles per hr	Crank- shaft speed rpm	Slip of drivers %	Fuel Consumption			Temp Degrees F			Barom- eter 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—7th Gear (2nd Hi)												
36.53	3301	4.15	1999	6.90	2.941	0.562	12.42	188	67	69	29.143	
75% of Pull at Maximum Power—Ten Hours—7th Gear—(2nd Hi)												
29.51	2494	4.44	2062	3.54	2.250	0.533	13.12	187	68	84	28.985	
50% of Pull at Maximum Power—Two Hours—7th Gear (2nd Hi)												
21.50	1715	4.70	2162	2.59	1.866	0.606	11.52	180	64	81	28.995	

MAXIMUM POWER WITH BALLAST

29.98	5723	1.96	2020	12.95	4th Gear (4th Lo)	184	72	84	28.915	
34.08	4577	2.79	2000	6.90	5th Gear (1st Hi)	192	72	84	28.915	
37.28	3993	3.50	2001	6.27	6th Gear (5th Lo)	187	63	69	29.110	
37.67	3329	4.24	2001	4.81	7th Gear (2nd Hi)	184	63	69	29.110	
37.69	2354	6.00	2000	3.61	8th Gear (3rd Hi)	180	63	69	29.110	
35.74	1439	9.31	2002	2.44	9th Gear (4th Hi)	185	65	73	29.100	

MAXIMUM PULL WITHOUT BALLAST

29.32	3982	2.76	2037	9.98	5th Gear (1st Hi)	194	74	90	28.800	
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VARYING DRAWBAR PULL AND TRAVEL SPEED WITH BALLAST 7th Gear (2nd Hi)

Pounds pull	3329	3610	3655	3720	3691	3591
Horsepower	37.67	36.64	33.04	29.17	24.86	20.06
Crankshaft speed, rpm	2001	1804	1607	1397	1199	993
Miles per hour	4.24	3.81	3.39	2.94	2.53	2.09
Slip of drivers, %	4.81	5.52	5.52	5.75	5.52	5.52

TIRES, BALLAST and WEIGHT

		With Ballast	Without Ballast
Rear tires	—No, size, ply & psi	Two 14.9-28; 6; 16	Two 14.9-28; 6; 14
Ballast	—Liquid	375 lb each	None
	Cast iron	390 lb each	None
Front tires	—No, size, ply & psi	Two 6.00-18; 6; 36	Two 6.00-18; 6; 24
Ballast	—Liquid	None	None
	Cast iron	190 lb each	None
Height of drawbar		23½ inches	24 inches
Static weight with operator—Rear		4770 lb	3240 lb
Front		2020 lb	1640 lb
Total weight with operator		6790 lb	4880 lb

Department of Agricultural Engineering

Dates of Test: July 1 to July 18, 1968

Manufacturer: ZAKLADY MECHANICZNE
"URSUS," URSUS K/WARSZAWA POLAND

FUEL, OIL and TIME Fuel No 2 Diesel Cetane No 52.4 (rating taken from oil company's typical inspection data) Specific gravity converted to 60°/60° 0.8387 Weight per gallon 6.984 lb Oil SAE 30 API service classification DS To motor 2.549 gal Drained from motor 2.395 gal Transmission and final-drive lubricant SAE 30 for drive assembly SAE 80 for reduction gears Total time engine was operated 55½ hours.

ENGINE Make ZM "Ursus" Type 4 cylinder vertical Serial No 20437 Crankshaft mounted lengthwise Rated rpm 2000 Bore and stroke 3.74" x 4.33" Compression ratio 17 to 1 Displacement 190.32 cu in Cranking system 12 volt electric (two 6-volt batteries) Lubrication pressure Air cleaner oil washed wire mesh Oil filter dual with gauze elements Oil cooler not used Fuel filter sediment bowl and screen, double filter with replaceable felt cartridge and replaceable paper cartridge Muffler was used Cooling medium temperature control thermostat and radiator curtain.

CHASSIS Type standard Serial No 20360 Tread width rear 53" to 71" front 53" to 69" Wheel base 83.66" Center of gravity (without operator or ballast, with minimum tread, with fuel tank filled and tractor serviced for operation) Horizontal distance forward from centerline of rear wheels 28.2" Vertical distance above roadway 32.5" Horizontal distance from center of rear wheel tread 0" to the right/left Hydraulic control system direct engine or ground drive controlled by pto shift lever Transmission selective gear fixed ratio Advertised speeds mph first 0.70 second 1.04 third 1.45 fourth 2.23 fifth 3.72 sixth 2.99 seventh 4.45 eighth 6.21 ninth 9.53 tenth 15.91 reverse 0.91 and 3.91 Clutch single plate dry disc operated by foot pedal Brakes contracting bands operated by hand lever and internal expanding shoes operated by foot pedal with hydraulic bypass for independent wheel brake Steering no power assistance Turning radius (on concrete surface with brake applied) right 134" left 134" (on concrete surface without brake) right 150" left 150" Turning space diameter (on concrete surface with brake applied) right 278" left 278" (on concrete surface without brake) right 310" left 310" Belt pulley 1153 rpm at 2000 engine rpm diam 9.84" face 5.9" Power take-off 542 rpm at 2000 engine rpm Belt speed 2970 fpm.

REPAIRS and ADJUSTMENTS During the 2-hour 50% run the throttle vibrated partly shut. The throttle lever friction brake was adjusted. During the 10-hour test the plastic sediment bowl cracked. The sediment bowl assembly was removed and a substitute line installed.

REMARKS All test results were determined from observed data obtained in accordance with the SAE and ASAE test code. First, second, and third gears were not run as it was necessary to limit the pull in fourth gear because of the stability formula and to avoid excessive slippage. Tenth 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 982.

L. F. LARSEN

Engineer-in-Charge

G. W. STEINBRUEGGE, Chairman
J. J. SULEK
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

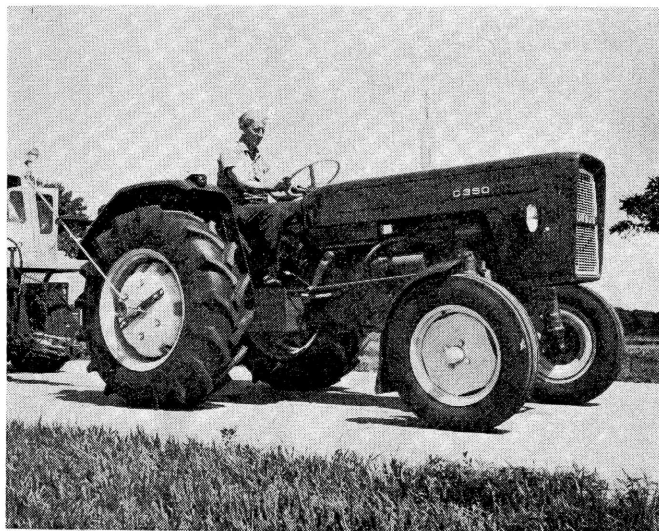
speed-control devices (engine, governor, automatic transmission, etc.) on horsepower, speed and fuel consumption. These runs are made around the entire test course which has two 180 degree turns with a minimum radius of 50 feet. The drawbar pull is set at 3 different levels as follows: (1) as near to 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.



URSUS C-350 DIESEL