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## Test 787: Case 630C (Diesel)

Nebraska Tractor Test Lab

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# NEBRASKA TRACTOR TEST 787 - CASE 630C 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									
48.85	2250	3.862	0.546	12.65	188	60	75	28.817	
Standard Power Take-off Speed (540 rpm)—One Hour									
45.24	1966	3.492	0.533	12.96	189	59	75	28.785	
VARYING POWER AND FUEL CONSUMPTION—TWO HOURS									
42.72	2317	3.314	0.536	12.89	182	58	73	.....	
0.00	2386	1.138	....	....	149	58	72	.....	
21.72	2355	2.219	0.706	9.79	168	58	72	.....	
49.09	2251	3.856	0.543	12.73	188	60	74	.....	
10.95	2373	1.659	1.047	6.60	154	59	73	.....	
32.34	2338	2.688	0.574	12.03	172	60	73	.....	
Av	26.14	2336	2.479	0.655	10.54	169	59	73	28.783

## DRAWBAR PERFORMANCE

Hp	Draw- bar pull lbs	Speed miles per hr	Crank shaft speed rpm	Slip of driv- ers %	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	
VARYING DRAWBAR POWER AND FUEL CONSUMPTION WITH BALLAST											
Maximum Available Power—Two Hours—5th Gear											
43.71	3615	4.53	2244	5.23	3.854	0.609	11.34	176	46	54	28.860
37.15	4349	3.20	2183	5.72	3.738	0.695	9.94	182	60	75	Torq. Conv.
75% of Pull at Maximum Power—Ten Hours and Two Hours—5th Gear											
35.39	2773	4.79	2332	3.66	3.163	0.617	11.19	171	48	59	28.898
33.35	3274	3.82	2278	4.05	3.529	0.731	9.45	179	65	76	Torq. Conv.
50% of Pull at Maximum Power—Two Hours—5th Gear											
23.98	1830	4.91	2359	2.13	2.595	0.747	9.24	169	54	61	28.673
23.49	2199	4.01	2343	2.65	2.823	0.830	8.32	174	61	70	Torq. Conv.
MAXIMUM POWER WITH BALLAST											
34.21	7190	1.78	2323	14.71	1st Gear	.....	168	44	53	28.880	
44.44	6270	2.66	2251	10.82	2nd Gear	.....	172	36	42	28.860	
45.69	5793	2.96	2251	9.44	3rd Gear	.....	173	36	42	28.860	
45.44	4692	3.63	2250	7.33	4th Gear	.....	173	36	42	28.860	
45.00	3730	4.52	2249	5.72	5th Gear	.....	176	47	56	28.870	
44.24	2748	6.04	2248	4.18	6th Gear	.....	177	47	56	28.870	
27.61	7145	1.45	2324	14.66	1st Gear	Torq. Conv...	169	44	53	28.880	
37.82	6918	2.05	2289	13.75	2nd Gear	Torq. Conv...	173	38	44	28.900	
39.18	6536	2.25	2270	11.52	3rd Gear	Torq. Conv...	173	38	44	28.900	
39.89	5499	2.72	2264	8.99	4th Gear	Torq. Conv...	174	44	53	28.880	
40.40	4416	3.43	2267	7.03	5th Gear	Torq. Conv...	178	44	53	28.880	
40.01	3301	4.55	2251	4.98	6th Gear	Torq. Conv...	178	47	56	28.870	
MAXIMUM POWER WITHOUT BALLAST											
32.94	2823	4.38	2307	14.60	5th Gear	.....	175	59	73	28.645	
26.41	2792	3.55	2308	14.54	5th Gear	Torq. Conv...	174	59	73	28.645	
VARYING DRAWBAR PULL AND TRAVEL SPEED WITH BALLAST—5th Gear											
Pounds pull		3750		3950		4100		4250		4300	
Horsepower		45.0		42.1		39.4		35.1		31.0	
Miles per hour		4.5		4.0		3.6		3.1		2.7	
Pounds pull (Torq. Conv.)		4400		4800		5250		5650		6100	
Horsepower (Torq. Conv.)		40.4		39.7		37.8		36.2		32.5	
Miles per hour (Torq. Conv.)		3.4		3.1		2.7		2.4		2.0	

## TIRES, BALLAST and WEIGHT

		With Ballast	Without Ballast
Rear tires	—No, size, ply & psi	Two 16.9-28;6;16	Two 16.9-28;6;16
Ballast	—Liquid	628 lb each	None
	—Cast iron	1800 lb each	None
Front tires	—No, size, ply & psi	Two 7.50-16;4;28	Two 7.50-16;4;28
Ballast	—Liquid	None	None
	—Cast iron	None	None
Height of Drawbar		14½ inches	16½ inches
Static weight	—Rear	7600 lb	2743 lb
	—Front	1950 lb	1920 lb
Total weight with operator		9725 lb	4838 lb

Department of Agricultural Engineering

Dates of Test: April 7 to April 21, 1961

Manufacturer: J. I. CASE COMPANY, RACINE, WISCONSIN

Manufacturer's Power Rating: 50 Belt Horsepower (corrected to Standard Conditions)

**FUEL, OIL and TIME** Fuel No 2 Diesel Cetane No 54 (rating taken from oil company's typical inspection data) Specific gravity converted to 60°/60° 0.8297 Weight per gallon 6.908 lb Oil SAE 20-20W API service classification DS To motor 1.357 gal Drained from motor 0.822 gal Transmission and final-drive lubricant SAE 90 Type multi-purpose gear lubricant (E.P.) Total time engine was operated 52½ hours.

**ENGINE** Make Case Diesel Type 4 cylinder vertical Serial No 601-80-3226 Crankshaft mounted lengthwise Rated rpm 2250 Bore and stroke 3⅜" x 4½" Compression ratio 17.5 to 1 Displacement 188.4 cu in Cranking system 12 volt electric (two 6 volt batteries) Lubrication pressure Air cleaner oil washed wire mesh Oil filter replaceable treated paper element Oil cooler engine coolant heat exchanger for torque converter oil Fuel filter replaceable treated paper element Muffler was used Cooling medium temperature control thermostat.

**CHASSIS** Type standard Serial No 6153217 Tread width rear 48" to 76" front 52" Wheel base 79¼" 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 35.1" Vertical distance above roadway 31.3" 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 torque converter with lockout Advertised speeds mph first 1.77 second 2.60 third 2.86 fourth 3.43 fifth 4.20 sixth 5.52 seventh 8.46 eighth 13.64 reverse 2.04 and 3.40 Clutch multiple disc main hydraulic power-clutch operated by piston through foot pedal control valve and single disc direct drive hydraulic clutch, locking turbine to engine through hand operated control valve Brakes double disc operated by two foot pedals Steering power assisted Turning radius (on concrete surface with brake applied) right 118" left 122" (on concrete surface without brake) right 130" left 135" Turning space diameter (on concrete surface with brake applied) right 248" left 256" (on concrete surface without brake) right 273" left 281" Belt pulley 1283 rpm at 2250 engine rpm diam 9¼" face 6⅝" Belt speed 3105 fpm Power take-off 541 rpm at 1970 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.

Only 12 gears, as selected by the manufacturer's representative are used in making the maximum power runs with ballast.

We, the undersigned, certify that this is a true and correct report of official Tractor Test 787.

L. F. LARSEN

Engineer-in-Charge

L. W. HURLBUT  
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.



Case 630C Diesel