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Test 1209: Case1410 Manual (David Brown 1410 Synchronesh) Diesel

Nebraska Tractor Test Lab

University of Nebraska-Lincoln, tractortestlab@unl.edu

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NEBRASKA TRACTOR TEST 1209

CASE 1410 MANUAL (David Brown 1410 Synchronesh) DIESEL

POWER TAKE-OFF PERFORMANCE

Hp	Crankshaft speed rpm	Fuel Consumption Gal per hr	Lb per hp-hr	Hp-hr per gal	Cooling medium	Temperature Degrees F Air wet bulb	Air dry bulb	Barometer inches of Mercury
MAXIMUM POWER AND FUEL CONSUMPTION								
Rated Engine Speed—Two Hours (PTO Speed—598 rpm)								
80.88	2300	4.789	0.411	16.89	181	55	75	29.240
Standard Power Take-off Speed (540 rpm)—One Hour								
79.35	2078	4.543	0.397	17.47	181	51	75	29.230
VARYING POWER AND FUEL CONSUMPTION—Two Hours								
69.63	2329	4.123	0.411	16.89	177	52	76	.....
0.00	2451	1.069	.....	.....	170	51	74	.....
35.00	2346	2.444	0.484	14.32	175	52	76	.....
81.16	2299	4.746	0.406	17.10	180	51	75	.....
18.16	2425	1.852	0.707	9.81	171	51	74	.....
52.62	2349	3.228	0.425	16.30	176	51	75	.....
Av 42.76	2366	2.910	0.472	14.69	175	51	75	29.210

DRAWBAR PERFORMANCE

Hp	Draw-bar pull lbs	Speed miles per hr	Crankshaft speed rpm	Slip of drivers %	Fuel Consumption Gal per hr	Lb per hp-hr	Hp-hr per gal	Temp Degrees F Cooling med	Air wet bulb	Air dry bulb	Barometer inches of Mercury
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VARYING DRAWBAR POWER AND FUEL CONSUMPTION WITH BALLAST

Maximum Available Power—Two Hours 7th (L-2) Gear											
67.08	4709	5.34	2301	7.15	4.723	0.488	14.20	178	61	70	28.925
75% of Pull at Maximum Power—Ten Hours 7th (L-2) Gear											
54.17	3661	5.55	2331	4.86	3.768	0.482	14.38	175	55	73	28.913
50% of Pull at Maximum Power—Two Hours 7th (L-2) Gear											
37.49	2455	5.73	2379	3.83	3.011	0.557	12.45	174	54	59	28.940
50% of Pull at Reduced Engine Speed—Two Hours 9th (HS3) Gear											
37.40	2444	5.74	1745	3.39	2.470	0.458	15.15	175	64	78	28.885

MAXIMUM POWER WITH BALLAST

49.79	7846	2.38	2324	14.99	3rd (HS1) Gear	176	54	60	28.860
64.20	7051	3.41	2299	13.10	5th (LS3) Gear	178	55	74	29.070
66.12	6074	4.08	2300	10.05	6th (HS2) Gear	178	54	71	29.080
69.25	4882	5.32	2300	7.52	7th (L-2) Gear	178	53	69	29.120
68.78	3915	6.59	2300	5.86	8th (H-1) Gear	178	53	70	29.100
67.95	2682	9.50	2300	4.27	10th (L-3) Gear	178	55	72	29.060

VARYING DRAWBAR PULL AND TRAVEL SPEED WITH BALLAST 7th (L-2) Gear

Pounds Pull	4882	5269	5343	5408	5280	4980
Horsepower	69.25	66.47	59.90	53.17	44.39	35.11
Crankshaft Speed rpm	2300	2064	1837	1614	1376	1148
Miles Per Hour	5.32	4.73	4.20	3.69	3.15	2.64
Slip of Drivers %	7.52	8.40	8.67	8.67	8.40	7.86

TRACTOR SOUND LEVEL WITHOUT CAB dB(A)

Maximum Available Power 2 Hours	97.0
75% of Pull at Max. Power 10 Hours	96.0
50% of Pull at Max. Power 2 Hours	94.5
50% of Pull at Reduced Engine Speed 2 Hours	92.5
Bystander in 12th (H-3) gear	86.0

TIRES, BALLAST AND WEIGHT

		With Ballast	Without Ballast
Rear Tires	—No., size, ply & psi	Two 18.4-34; 6; 16	Two 18.4-34; 6; 16
Ballast	—Liquid	1010 lb each	None
	Cast Iron	540 lb each	None
Front Tires	—No., size, ply & psi	Two 11L-15; 6; 28	Two 11L-15; 6; 28
Ballast	—Liquid	None	None
	Cast Iron	30 lb each	None
Height of drawbar		20.5 inches	20.5 inches
Static weight with operator—rear		8325 lb	5225 lb
front		2585 lb	2525 lb
total		10910 lb	7750 lb

Department of Agricultural Engineering

Dates of Test: May 4 to 14, 1976

Manufacturer: DAVID BROWN TRACTORS, LTD.—DIV. OF J. I. CASE CO., MELTHAM, HUDDERSFIELD, YORKSHIRE, ENGLAND.

FUEL, OIL AND TIME Fuel No. 2 Diesel Cetane No 51.7 (rating taken from oil company's typical inspection data) Specific gravity converted to 60°/60° 0.8328 Weight per gallon 6.934 Oil SAE 20-20W API Service Classification MS/DS also ML, MM, DG, DM To motor 2.144 gal Drained from motor 1.571 gal Transmission and final drive lubricant Multi-purpose oil 20W/30 Total time engine was operated 48.5 hours.

ENGINE Make David Brown Diesel Type 4 cylinder vertical with turbocharger Serial No 455011-120796 Crankshaft mounted lengthwise Rated rpm 2300 Bore and stroke 3.939" x 4.500" Compression ratio 16 to 1 Displacement 219 cu in Cranking system 12 volt Lubrication pressure Air cleaner replaceable paper element Oil filter full flow paper element Oil cooler radiator for crankcase oil Fuel filter primary and secondary paper elements Muffler vertical Cooling medium temperature control thermostat.

CHASSIS Type standard Serial No 1410/1 1050722 Tread width rear 64" to 84" front 60" to 84" Wheel base 90" 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 31.4" Vertical distance above roadway 36.7" 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 1.4 second 2.2 third 2.7 fourth 3.4 fifth 3.8 sixth 4.4 seventh 5.6 eighth 6.8 ninth 7.6 tenth 9.7 eleventh 11.2 twelfth 19.3 reverse 2.3, 4.5, 5.7, 11.4 Clutch single plate dry disc operated by foot pedal Brakes multiple wet disc operated by foot pedals Steering hydrostatic Turning radius (on concrete surface with brake applied) right 142" left 142" (on concrete surface without brake) right 159" left 159" Turning space diameter (on concrete surface with brake applied) right 298" left 298" (on concrete surface without brake) right 332" left 332" Power take-off 540 rpm at 2078 engine rpm.

REPAIRS AND ADJUSTMENTS: 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. Temperature at injection pump was 149°F. Six gears were chosen between 15% slip and 15 mph.

We, the undersigned, certify that this is a true and correct report of official Tractor Test 1209.

LOUIS I. LEVITICUS
Engineer-in-Charge

G. W. STEINBRUEGGE, Chairman
W. E. SPLINTER
D. E. LANE
Board of Tractor Test Engineers

EXPLANATION OF TEST REPORT

GENERAL CONDITIONS

Each tractor is a production model equipped for common usage. Power consuming accessories may be disconnected only when the means for disconnecting can be reached from the operator station. 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, $\frac{1}{2}$ 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 use.

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 mph. The slip 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 68583.



CASE 1410 MANUAL (David Brown 1410 Synchromesh) DIESEL