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10-27-1969

## Test 1028: Allis-Chalmers 160 Diesel (Also Allis-Chalmers 6040 Diesel)

Nebraska Tractor Test Lab

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# NEBRASKA TRACTOR TEST 1028 – ALLIS-CHALMERS ONE-SIXTY DIESEL (ALSO ALLIS-CHALMERS 6040 DIESEL)

## POWER TAKE-OFF PERFORMANCE

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									
40.36	2250	2.687	0.463	15.02	189	56	75	29.080	
Standard PowerTake-off Speed (540 rpm)—One Hour									
39.77	2156	2.621	0.458	15.17	192	57	75	29.050	
VARYING POWER AND FUEL CONSUMPTION—TWO HOURS									
35.75	2345	2.342	0.456	15.26	180	57	75	.....	
0.00	2440	0.815	.....	.....	156	55	73	.....	
18.26	2395	1.523	0.580	11.99	168	56	74	.....	
40.52	2251	2.713	0.466	14.94	178	57	75	.....	
9.20	2412	1.139	0.861	8.08	156	56	74	.....	
27.22	2379	1.907	0.487	14.27	170	56	74	.....	
Av	21.83	2370	1.740	0.554	12.55	168	56	74	29.033

## DRAWBAR PERFORMANCE

Hp	Draw- bar pull lbs	Speed miles per hr	Crank- shaft speed rpm	Slip of drivers %	Fuel Consumption		Hp-hr per gal	Temp Degrees F			Barom- eter inches of Mercury
					Gal per hr	Lb per hp-hr		Cool- ing med	Air wet bulb	Air dry bulb	
VARYING DRAWBAR POWER AND FUEL CONSUMPTION WITH BALLAST											
Maximum Available Power—Two Hours—7th (3 Hi) Gear											
36.71	2833	4.86	2253	6.47	2.814	0.533	13.05	164	38	40	28.965
75% of Pull at Mxaimum Power—Ten Hours—7th (3 Hi) Gear											
29.32	2133	5.15	2356	5.13	2.262	0.537	12.96	161	41	45	28.874
50% of Pull at Maximum Power—Two Hours—7th (3 Hi) Gear											
21.11	1506	5.26	2378	4.27	1.849	0.609	11.42	141	41	44	28.780
MAXIMUM POWER WITH BALLAST											
25.71	4569	2.11	2365	13.48	5th Gear (1 Hi)			144	41	45	28.800
35.27	4140	3.19	2250	11.23	6th Gear (2 Hi)			163	40	42	28.840
38.07	2941	4.85	2251	6.47	7th Gear (3 Hi)			165	38	40	28.965
37.38	2039	6.88	2249	4.69	8th Gear (4 Hi)			169	40	43	28.780
34.01	1164	10.96	2257	3.08	9th Gear (5 Hi)			149	40	44	28.780
MAXIMUM PULL WITHOUT BALLAST											
32.86	3901	3.16	2316	14.93	6th Gear (2 Hi)			158	40	48	28.900

## VARYING DRAWBAR PULL AND TRAVEL SPEED WITH BALLAST 7th (3 Hi) Gear

Pounds Pull	2941	3093	3306	3522	3496	3450
Horsepower	38.07	35.61	33.59	30.99	26.58	21.62
Crankshaft speed rpm	2251	2021	1797	1572	1354	1117
Miles per hour	4.85	4.32	3.81	3.30	2.85	2.35
Slip of drivers, %	6.47	7.33	8.18	9.01	8.60	8.81

## TIRES, BALLAST and WEIGHT

		With Ballast	Without Ballast
Rear tires	—No. size, ply & psi	Two 13.6-28; 6; 14	Two 13.6-28; 6; 14
Ballast	—Liquid	465 lb each	None
	—Cast iron	200 lb each	None
Front tires	—No. size, ply & psi	Two 6.00-16; 4; 28	Two 6.00-16; 4; 28
Ballast	—Liquid	None	None
	—Cast iron	30 lb each	None
Height of drawbar		21½ inches	21½ inches
Static weight with operator—Rear		4450 lb	3120 lb
Front		1620 lb	1560 lb
Total		6070 lb	4680 lb

## Department of Agricultural Engineering

Dates of Test: October 27, 1969 to November 4, 1969

Manufacturer: ALLIS-CHALMERS MANUFACTURING COMPANY, MILWAUKEE, WISCONSIN

**FUEL, OIL and TIME** Fuel diesel Cetane No 52.2 (rating taken from oil company's typical inspection data) Specific gravity converted to 60°/60° 0.8353 Weight per gallon 6.955 Oil SAE 20-20W API service classification MS-DS To motor 1.396 gal Drained from motor 1.062 gal Transmission and final-drive lubricant SAE 10W-30 Total time engine was operated 45 hours.

**ENGINE** Make Perkins Type 3 cylinder vertical Serial No 29244D Crankshaft mounted lengthwise Rated rpm 2250 Bore and stroke 3.6" x 5" Compression ratio 17.4 to 1 Displacement 152.7 cu in Cranking system 12 volt electric Lubrication pressure Air cleaner dry type with replaceable pleated paper element Oil filter full flow replaceable pleated paper cartridge Fuel filter two sediment bowls with screens, primary and secondary filters with replaceable elements Muffler was used Cooling medium temperature control thermostat.

**CHASSIS** Type standard Serial No 0140040 Tread width rear 52" to 78" front 52" to 77" Wheel base 76" 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 26.5" Vertical distance above roadway 26.7" Horizontal distance from center of rear wheel tread 0" to the right/left Hydraulic control system constant running Transmission selective gear fixed ratio with synchronized 9th and 10th speeds Advertised speeds mph first 0.6 second 0.9 third 1.3 fourth 1.9 fifth 2.4 sixth 3.7 seventh 5.4 eighth 7.4 ninth 11.6 tenth 15.5 reverse 0.9 and 3.7 Clutch combination dry disc PTO and Transmission operated by single foot pedal Brakes double dry disc operated by two foot pedals which can be locked together Steering hydrostatic Turning radius (on concrete surface with brake applied) right 99" left 99" (on concrete surface without brake) right 119" left 119" Turning space diameter (on concrete surface with brake applied) right 208" left 208" (on concrete surface without brake) right 248" left 248" Power take-off 540 rpm at 2160 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, second, third and fourth gears were not run as it was necessary to limit the pull because of the stability formula. 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 1028.

L. F. LARSEN

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 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 ONE-SIXTY DIESEL