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## Test 887: Allis-Chalmers 190 XT (Diesel)

Nebraska Tractor Test Lab

University of Nebraska-Lincoln, [tractortestlab@unl.edu](mailto:tractortestlab@unl.edu)

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# NEBRASKA TRACTOR TEST 887 - ALLIS-CHALMERS ONE-NINETY XT DIESEL

(ALSO ALLIS-CHALMERS 200 DIESEL)

## POWER TAKE-OFF PERFORMANCE

| Hp   | Crank-<br>shaft<br>speed<br>rpm | Fuel Consumption |                    | Hp-hr<br>per<br>gal | Temperature Degrees F |                    |                    | Barometer<br>inches of<br>Mercury |
|--|---------------------------------|------------------|--------------------|---------------------|-----------------------|--------------------|--------------------|-----------------------------------|
|  |                                 | Gal<br>per<br>hr | Lb<br>per<br>hp-hr |                     | Cooling<br>medium     | Air<br>wet<br>bulb | Air<br>dry<br>bulb |                                   |
| MAXIMUM POWER AND FUEL CONSUMPTION               |                                 |                  |                    |                     |                       |                    |                    |                                   |
| Rated Engine Speed—Two Hours                     |                                 |                  |                    |                     |                       |                    |                    |                                   |
| 93.64  | 2200                            | 5.704            | 0.422              | 16.42               | 189                   | 59                 | 75                 | 29.115                            |
| Standard Power Take-off Speed (540 rpm)—One Hour |                                 |                  |                    |                     |                       |                    |                    |                                   |
| 89.71  | 1937                            | 5.347            | 0.412              | 16.78               | 197                   | 60                 | 76                 | 29.080                            |
| VARYING POWER AND FUEL CONSUMPTION—TWO HOURS     |                                 |                  |                    |                     |                       |                    |                    |                                   |
| 84.48  | 2335                            | 5.406            | 0.443              | 15.63               | 182                   | 59                 | 76                 | .....                             |
| 0.00   | 2435                            | 1.777            | .....              | .....               | 170                   | 58                 | 74                 | .....                             |
| 43.28  | 2394                            | 3.611            | 0.577              | 11.99               | 175                   | 59                 | 75                 | .....                             |
| 94.21  | 2200                            | 5.705            | 0.419              | 16.51               | 189                   | 60                 | 77                 | .....                             |
| 21.79  | 2415                            | 2.684            | 0.852              | 8.12                | 172                   | 59                 | 74                 | .....                             |
| 64.17  | 2365                            | 4.513            | 0.487              | 14.22               | 178                   | 60                 | 75                 | .....                             |
| Av 51.32   | 2357                            | 3.949            | 0.533              | 13.00               | 178                   | 59                 | 75                 | 29.028                            |

## DRAWBAR PERFORMANCE

| Hp  | Draw-<br>bar<br>pull<br>lbs | Speed<br>miles<br>per<br>hr | Crank-<br>shaft<br>speed<br>rpm | Slip<br>of<br>drivers<br>% | Fuel Consumption |                    |                     | Temp Degrees F      |                    |                    |        | Barom-<br>eter<br>inches of<br>Mercury |
|---|-----------------------------|-----------------------------|---------------------------------|----------------------------|------------------|--------------------|---------------------|---------------------|--------------------|--------------------|--------|--|
|   |                             |                             |                                 |                            | Gal<br>per<br>hr | Lb<br>per<br>hp-hr | Hp-hr<br>per<br>gal | Cool-<br>ing<br>med | Air<br>wet<br>bulb | Air<br>dry<br>bulb |        |  |
| VARYING DRAWBAR POWER AND FUEL CONSUMPTION WITH BALLAST     |                             |                             |                                 |                            |                  |                    |                     |                     |                    |                    |        |  |
| Maximum Available Power—Two Hours—4th Gear                  |                             |                             |                                 |                            |                  |                    |                     |                     |                    |                    |        |  |
| 79.12   | 7128                        | 4.16                        | 2199                            | 9.89                       | 5.703            | 0.499              | 13.87               | 168                 | 46                 | 53                 | 28.915 |  |
| 75% of Pull at Maximum Power—Ten Hours—4th Gear             |                             |                             |                                 |                            |                  |                    |                     |                     |                    |                    |        |  |
| 66.51   | 5430                        | 4.59                        | 2346                            | 6.83                       | 5.090            | 0.530              | 13.07               | 176                 | 44                 | 52                 | 28.952 |  |
| 50% of Pull at Maximum Power—Two Hours—4th Gear             |                             |                             |                                 |                            |                  |                    |                     |                     |                    |                    |        |  |
| 46.26   | 3611                        | 4.80                        | 2385                            | 4.15                       | 4.509            | 0.675              | 10.26               | 180                 | 46                 | 53                 | 28.888 |  |
| MAXIMUM POWER WITH BALLAST                                  |                             |                             |                                 |                            |                  |                    |                     |                     |                    |                    |        |  |
| 76.17   | 8917                        | 3.20                        | 2214                            | 14.89                      | 3rd Gear .....   |                    | 175                 | 52                  | 61                 |                    | 28.710 |  |
| 80.84   | 7257                        | 4.18                        | 2202                            | 9.66                       | 4th Gear .....   |                    | 184                 | 46                  | 50                 |                    | 28.775 |  |
| 82.72   | 6344                        | 4.89                        | 2200                            | 8.08                       | 5th Gear .....   |                    | 179                 | 47                  | 52                 |                    | 28.820 |  |
| 84.06   | 5107                        | 6.17                        | 2200                            | 6.03                       | 6th Gear .....   |                    | 175                 | 47                  | 52                 |                    | 28.820 |  |
| 81.75   | 3183                        | 9.63                        | 2202                            | 3.75                       | 7th Gear .....   |                    | 186                 | 58                  | 73                 |                    | 28.710 |  |
| 80.15   | 2169                        | 13.86                       | 2205                            | 2.56                       | 8th Gear .....   |                    | 172                 | 45                  | 49                 |                    | 28.880 |  |
| MAXIMUM POWER WITHOUT BALLAST                               |                             |                             |                                 |                            |                  |                    |                     |                     |                    |                    |        |  |
| 58.90   | 5108                        | 4.32                        | 2354                            | 14.45                      | 4th Gear .....   |                    | 182                 | 62                  | 74                 |                    | 28.600 |  |
| VARYING DRAWBAR PULL AND TRAVEL SPEED WITH BALLAST—4th Gear |                             |                             |                                 |                            |                  |                    |                     |                     |                    |                    |        |  |
| Pounds pull   |                             |                             |                                 | 7257                       | 7890             | 8373               | 8200                | 7713                | 7162               |                    |        |  |
| Horsepower  |                             |                             |                                 | 80.84                      | 77.68            | 71.80              | 61.45               | 50.44               | 40.35              |                    |        |  |
| Crankshaft Speed, rpm                                       |                             |                             |                                 | 2202                       | 1979             | 1758               | 1524                | 1309                | 1113               |                    |        |  |
| Miles per hour  |                             |                             |                                 | 4.18                       | 3.69             | 3.27               | 2.81                | 2.45                | 2.11               |                    |        |  |
| Slip of drivers, %  |                             |                             |                                 | 9.66                       | 11.18            | 13.13              | 12.17               | 10.81               | 9.79               |                    |        |  |

## TIRES, BALLAST and WEIGHT

|                            |                      | With Ballast       | Without Ballast    |
|----------------------------|----------------------|--------------------|--------------------|
| Rear tires                 | —No, size, ply & psi | Two 18.4-34; 8; 16 | Two 18.4-34; 8; 16 |
|                            | Ballast              | 963 lb each        | None               |
|                            | Cast iron            | 700 lb each        | None               |
| Front tires                | —No, size, ply & psi | Two 7.50-16; 6; 28 | Two 7.50-16; 6; 28 |
|                            | Ballast              | None               | None               |
|                            | Cast iron            | None               | None               |
| Height of drawbar          |                      | 20½ inches         | 21½ inches         |
| Static weight              | —Rear                | 8645 lb            | 5320 lb            |
|                            | Front                | 2480 lb            | 2450 lb            |
| Total weight with operator |                      | 11300 lb           | 7945 lb            |

Department of Agricultural Engineering

Dates of Test: APRIL 10 TO APRIL 16, 1965

Manufacturer: ALLIS-CHALMERS MANUFACTURING COMPANY, MILWAUKEE, WISCONSIN

**FUEL, OIL and TIME** Fuel No 2 Diesel Cetane No 57.0 (rating taken from oil company's typical inspection data) Specific gravity converted to 60°/60° 0.8312 Weight per gallon 6.920 lb Oil SAE 20-20W API service classification DS To Motor 2.688 gal Drained from motor 1.908 gal Transmission and final-drive lubricant E.P. 80 Total time engine was operated 41 hours.

**ENGINE** Make Allis-Chalmers Diesel Type 6 cylinder vertical with turbo-charger Serial No 2D02474 Crankshaft mounted lengthwise Rated rpm 2200 Bore and stroke 3¼" x 4¼" Compression ratio 16.25 to 1 Displacement 301 cu in Cranking system 12 volt electric (two 12-volt batteries) Lubrication pressure Air cleaner dry type replaceable pleated paper element Oil filter full flow replaceable pleated paper cartridge Oil cooler engine coolant heat exchanger for crank-case oil and radiator for hydraulic oil Fuel filter two sediment bowls and one dual media replaceable cartridge Muffler was not used Cooling medium temperature control thermostat.

**CHASSIS** Type standard Serial No 190 3454 DXT Tread width rear 64" to 80" front 60" to 84" Wheel base 105¾" 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 31.6" Vertical distance above roadway 39.4" 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 operator controlled partial range power shifting Advertised speeds mph first 2.1 second 3.0 third 3.6 fourth 4.4 fifth 5.1 sixth 6.3 seventh 9.6 eighth 13.6 reverse 2.8 and 3.9 Clutch single plate dry disc operated by foot pedal Brakes contracting band and disc operated by two foot pedals which can be locked Steering hydraulic with power assist Turning radius (on concrete surface with brake applied) right 133" left 133" (on concrete surface without brake) right 156" left 156" Turning space diameter (on concrete surface with brake applied) right 281" left 281" (on concrete surface without brake) right 300" left 300" Belt pulley 1845 rpm at 2200 engine rpm diam 9" face 6⅞" Belt speed 4347 rpm Power take-off 540 rpm at 1937 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 and second gears were not run as it was necessary to limit the pull in third gear to avoid excessive wheel slippage.

We, the undersigned, certify that this is a true and correct report of official Tractor Test 887.

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. H. Kramer, 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,  $\frac{1}{2}$  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 trans-

mission, 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.



Allis-Chalmers One-Ninety XT Diesel