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Test 950: International 500 (Gasoline)

Nebraska Tractor Test Lab

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NEBRASKA TRACTOR TEST 950 - INTERNATIONAL 500 GASOLINE

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 | | | | | | | | | |
|------------------------------|------|-------|-------|-------|-----|----|----|--------|--|
| 37.22 | 2001 | 3.174 | 0.527 | 11.73 | 172 | 60 | 75 | 29.077 | |

VARYING POWER AND FUEL CONSUMPTION—TWO HOURS

| | | | | | | | | | |
|----------|------|-------|-------|-------|-----|----|----|--------|--|
| 33.13 | 2094 | 2.994 | 0.559 | 11.07 | 172 | 62 | 76 | | |
| 0.00 | 2214 | 1.301 | | | 162 | 62 | 77 | | |
| 17.02 | 2151 | 2.184 | 0.793 | 7.79 | 170 | 61 | 76 | | |
| 37.02 | 1999 | 3.164 | 0.528 | 11.70 | 174 | 61 | 75 | | |
| 8.64 | 2189 | 1.732 | 1.240 | 4.99 | 166 | 61 | 75 | | |
| 25.32 | 2135 | 2.601 | 0.635 | 9.73 | 172 | 62 | 77 | | |
| Av 20.19 | 2130 | 2.329 | 0.713 | 8.67 | 169 | 61 | 76 | 29.077 | |

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—4th Gear (2nd DD) | | | | | | | | | | | | |
|--|------|------|------|------|-------|-------|------|-----|----|----|--------|--|
| 31.24 | 5345 | 2.19 | 1994 | 2.99 | 3.214 | 0.636 | 9.72 | 166 | 31 | 32 | 29.285 | |
| 75% of Pull at Maximum Power—Ten Hours—4th Gear (2nd DD) | | | | | | | | | | | | |
| 24.74 | 3975 | 2.33 | 2100 | 1.90 | 2.829 | 0.707 | 8.75 | 165 | 41 | 43 | 29.462 | |
| 50% of Pull at Maximum Power—Two Hours—4th Gear (2nd DD) | | | | | | | | | | | | |
| 17.13 | 2680 | 2.40 | 2137 | 0.95 | 2.405 | 0.868 | 7.12 | 170 | 64 | 67 | 29.080 | |

MAXIMUM POWER WITH BALLAST

| | | | | | | | | | | |
|-------|------|------|------|------|--------------------|-----|----|----|--------|--|
| 30.74 | 7988 | 1.44 | 2011 | 6.06 | 3rd Gear (2nd TA) | 168 | 32 | 34 | 29.280 | |
| 31.37 | 5293 | 2.22 | 2005 | 2.02 | 4th Gear (2nd DD) | 169 | 58 | 63 | 29.060 | |
| 30.88 | 4888 | 2.37 | 2001 | 2.14 | 5th Gear (3rd TA) | 165 | 58 | 63 | 29.060 | |
| 30.64 | 3604 | 3.19 | 2001 | 1.44 | 6th Gear (4th TA) | 164 | 58 | 63 | 29.060 | |
| 30.73 | 3258 | 3.54 | 1998 | 1.17 | 7th Gear (3rd DD) | 168 | 61 | 66 | 29.060 | |
| 30.68 | 2641 | 4.36 | 1992 | 0.86 | 8th Gear (5th TA) | 168 | 61 | 66 | 29.060 | |
| 29.91 | 2353 | 4.77 | 2002 | 0.68 | 9th Gear (4th DD) | 168 | 61 | 66 | 29.060 | |
| 28.19 | 1629 | 6.49 | 1994 | 0.37 | 10th Gear (5th DD) | 165 | 61 | 66 | 29.060 | |

VARYING DRAWBAR PULL AND TRAVEL SPEED WITH BALLAST—4th Gear (2nd DD)

| | | | | | | |
|-----------------------|-------|-------|-------|-------|-------|-------|
| Pounds pull | 5293 | 5503 | 5699 | 5860 | 5903 | 5648 |
| Horsepower | 31.37 | 29.17 | 26.73 | 23.99 | 20.89 | 16.52 |
| Crankshaft speed, rpm | 2005 | 1799 | 1593 | 1396 | 1209 | 1005 |
| Miles per hour | 2.22 | 1.99 | 1.76 | 1.54 | 1.33 | 1.10 |
| Slip of drivers, % | 2.02 | 2.23 | 2.41 | 2.71 | 2.94 | 2.94 |

Department of Agricultural Engineering

Dates of Test: OCTOBER 24 TO NOVEMBER 2, 1966

Manufacturer: INTERNATIONAL HARVESTER COMPANY OF CANADA LTD., HAMILTON, ONTARIO, CANADA

FUEL, OIL and TIME Fuel Regular gasoline Octane No Motor 84.0 Research 92.2 (rating taken from oil company's typical inspection data) **Specific gravity converted to 60°/60°** 0.7426 **Weight per gallon** 6.182 lb **Oil** SAE 20-20W **API service classification** MS, DM **To motor** 1.436 gal **Drained from motor** 1.181 gal **Transmission lubricant** IH Hy Tran fluid **Final drive lubricant** SAE 90 **Total time engine was operated** 37½ hours.

ENGINE Make International Gasoline **Type** 4 cylinder vertical **Serial No** C 146 7414 **Crankshaft mounted lengthwise** **Rated rpm** 2000 **Bore and stroke** 3⅜" x 4⅜" **Compression ratio** 7.60 to 1 **Displacement** 145.3 cu in **Carburetor size** 1" **Ignition system** battery **Cranking system** 12 volt electric **Lubrication pressure** **Air cleaner** dry type with replaceable paper element **Oil filter** replaceable paper element **Fuel filter** screen and replaceable paper element **Muffler** was used **Cooling medium** temperature control thermostat.

CHASSIS **Type** tracklayer **Serial No** H 2048-TD **Tread width** 48" **Wheel base** 67" **Drawbar height** 15½" **Measured length of track** 17½ ft **Cleats integral with shoes** **Cleats per track** 35 **Size of cleats** 12" x 2" **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** 31.7" **Vertical distance above roadway** 21.3" **Horizontal distance from center of rear wheel tread** 0.1" to the right **Hydraulic control system** direct engine drive **Transmission** selective gear fixed ratio with partial range operator controlled power shifting **Advertised speeds mph** third 1.53 fourth 2.26 fifth 2.42 sixth 3.24 seventh 3.58 eighth 4.40 ninth 4.79 tenth 6.52 **reverse** 1.43 and 2.12 **Clutch** single plate dry disc operated by foot pedal **Brakes** contracting bands operated independently by two hand levers or by one foot pedal **Steering** hand levers controlling multiple disc clutches and brakes **Turning space diameter** (with brake applied) right 153" left 153" **Power take-off** 980 rpm at 2000 engine rpm.

TOTAL WEIGHT with operator 7970 pounds including front weights 125 pounds, and crankcase guard 100 pounds.

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 these gears are omitted from the tractor when equipped with torque amplifier drive.

We, the undersigned, certify that this is a true and correct report of official Tractor Test 950.

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, $\frac{1}{2}$ 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 trans-

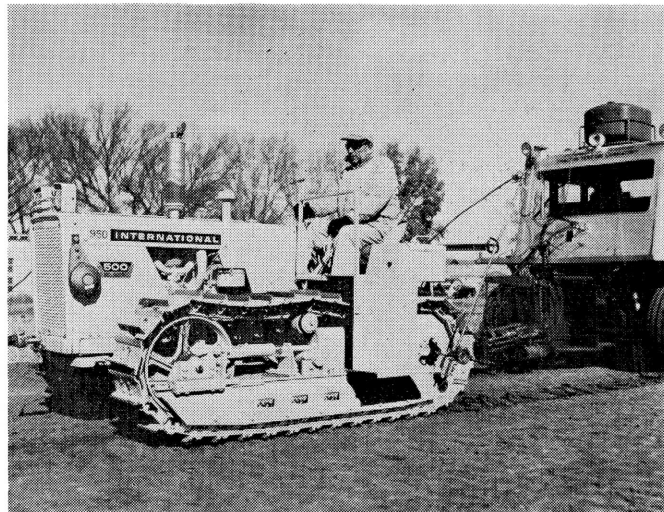
mission, etc.) on horsepower, speed and fuel consumption. These runs are made around the entire test course which has two 180 degree turns with a minimum radius of 50 feet. The drawbar pull is set at 3 different levels as follows: (1) as near to the pull at maximum power as possible and still have the 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.



International 500 Gasoline