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Test 1001: Ford 4000, 4600 and 4610 8-Speed Gasoline (Also Ford 4000 Gasoline Row Crop and Super Utility)

Nebraska Tractor Test Lab

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NEBRASKA TRACTOR TEST 1001 – FORD 4000 GASOLINE

ALSO FORD 4000 GASOLINE ROW CROP AND SUPER UTILITY

ALSO FORD 4600 GASOLINE

ALSO FORD 4610 GASOLINE

8-SPEED

POWER TAKE-OFF PERFORMANCE

| Hp | Crank- shaft speed rpm | Fuel Consumption | | Temperature Degrees F | | | | |
|--|---------------------------------|------------------|--------------------|-----------------------|-------------------|--------------------|--------------------|-----------------------------------|
| | | Gal per hr | Lb per hp-hr | Hp-hr per gal | Cooling medium | Air wet bulb | Air dry bulb | Barometer inches of Mercury |
| * MAXIMUM POWER AND FUEL CONSUMPTION | | | | | | | | |
| Rated Engine Speed—Two Hours | | | | | | | | |
| 52.18 | 2200 | 4.477 | 0.523 | 11.66 | 205 | 55 | 75 | 29.100 |
| Standard Power Take-off Speed (540 rpm)—One Hour | | | | | | | | |
| 47.14 | 1810 | 3.897 | 0.504 | 12.10 | 207 | 55 | 75 | 29.130 |
| VARYING POWER AND FUEL CONSUMPTION—TWO HOURS | | | | | | | | |
| 45.97 | 2279 | 4.012 | 0.532 | 11.46 | 200 | 58 | 79 | |
| 0.00 | 2433 | 1.664 | | | 158 | 58 | 80 | |
| 23.68 | 2349 | 2.831 | 0.728 | 8.36 | 185 | 55 | 75 | |
| 52.16 | 2200 | 4.485 | 0.524 | 11.63 | 205 | 56 | 76 | |
| 12.15 | 2410 | 2.314 | 1.160 | 5.25 | 180 | 57 | 77 | |
| 34.98 | 2315 | 3.397 | 0.592 | 10.30 | 188 | 56 | 76 | |
| Av | 28.16 | 2331 | 3.117 | 0.675 | 9.03 | 186 | 56 | 77 29.163 |

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 | | | | | | | | | | | |
| 44.81 | 4191 | 4.01 | 2206 | 7.65 | 4.591 | 0.624 | 9.76 | 172 | 41 | 45 | 28.830 |
| 75% of Pull at Maximum Power—Ten Hours—4th Gear | | | | | | | | | | | |
| 35.98 | 3171 | 4.25 | 2294 | 5.69 | 3.777 | 0.640 | 9.53 | 182 | 51 | 60 | 28.671 |
| 50% of Pull at Maximum Power—Two Hours—4th Gear | | | | | | | | | | | |
| 26.95 | 2258 | 4.48 | 2366 | 3.84 | 3.311 | 0.749 | 8.14 | 174 | 38 | 41 | 28.870 |
| MAXIMUM POWER WITH BALLAST | | | | | | | | | | | |
| 26.86 | 6096 | 1.65 | 2317 | 13.39 | 2nd Gear | | | 177 | 45 | 51 | 28.760 |
| 42.15 | 5633 | 2.81 | 2200 | 11.73 | 3rd Gear | | | 184 | 47 | 55 | 28.770 |
| 43.98 | 4140 | 3.98 | 2200 | 7.91 | 4th Gear | | | 187 | 47 | 56 | 28.770 |
| 43.99 | 3396 | 4.86 | 2203 | 6.42 | 5th Gear | | | 189 | 49 | 59 | 28.760 |
| 43.69 | 2669 | 6.14 | 2199 | 5.13 | 6th Gear | | | 184 | 50 | 59 | 28.760 |
| 40.32 | 1373 | 11.01 | 2197 | 2.81 | 7th Gear | | | 183 | 50 | 61 | 28.750 |
| MAXIMUM PULL WITHOUT BALLAST | | | | | | | | | | | |
| 30.93 | 4054 | 2.86 | 2296 | 14.58 | 3rd Gear | | | 170 | 42 | 53 | 28.560 |
| VARYING DRAWBAR PULL AND TRAVEL SPEED WITH BALLAST—4th Gear | | | | | | | | | | | |
| Pounds pull | | | | 4140 | 4382 | 4605 | 4741 | 4845 | 4953 | 4788 | |
| Horsepower | | | | 43.98 | 41.76 | 38.46 | 34.80 | 30.33 | 25.74 | 20.04 | |
| Crankshaft speed rpm | | | | 2200 | 1982 | 1749 | 1540 | 1319 | 1095 | 880 | |
| Miles per hour | | | | 3.98 | 3.57 | 3.13 | 2.75 | 2.35 | 1.95 | 1.57 | |
| Slip of drivers, % | | | | 7.91 | 8.30 | 8.96 | 9.18 | 9.51 | 9.61 | 9.40 | |

TIRES, BALLAST and WEIGHT

| | | With Ballast | Without Ballast |
|------------------------------|----------------------|--------------------|--------------------|
| Rear tires | —No, size, ply & psi | Two 14.9-30; 6; 16 | Two 14.9-30; 6; 14 |
| | —Liquid | 554 lb each | None |
| | Cast iron | 1006 lb each | None |
| Front tires | —No, size, ply & psi | Two 7.50-16; 4; 24 | Two 7.50-16; 4; 24 |
| | —Liquid | 91 lb each | None |
| | Cast iron | 119 lb each | None |
| Height of drawbar | | 22½ inches | 24 inches |
| Static weight with operator— | Rear | 6200 lb | 3080 lb |
| | Front | 2050 lb | 1630 lb |
| | Total | 8250 lb | 4710 lb |

Department of Agricultural Engineering

Date of Test: November 13 to November 25, 1968

Manufacturer: FORD MOTOR COMPANY,
FORD TRACTOR OPERATIONS, BIRMINGHAM, MICHIGAN

FUEL, OIL and TIME Fuel regular gasoline Octane No Motor 84.8 Research 93.2 (rating taken from oil company's typical inspection data) Specific gravity converted to 60°/60° 0.7320 Weight per gallon 6.094 lb Oil SAE 10W-30 API service classification MS DG DM To motor 1.457 gal Drained from motor 1.196 gal Transmission lubricant Ford oil ESN-M2C77-A or M-4864-A Final-drive lubricant Ford oil ESN-M2C53-A or M-2C53-B Total time engine was operated 40 hours.

ENGINE Make Ford gasoline Type 3 cylinder vertical Serial No D008734 Crankshaft mounted lengthwise Rated rpm 2200 Bore and stroke 4.4" x 4.4" Compression ratio 7.75 to 1 Displacement 201 cu in Carburetor size 1½/16" Ignition system battery Cranking system 12 volt electric Lubrication pressure Air cleaner dry type with replaceable pleated paper element and dust unloader Oil filter Full flow replaceable cotton blend element Fuel filter edge type filter in sediment bowl Muffler was used Cooling medium temperature control thermostat.

CHASSIS Type standard Serial No C209845 Tread width rear 52" to 80" front 52" to 80" Wheel base 84.5" 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 30.7" Vertical distance above roadway 29.8" 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 1.5 second 2.0 third 3.5 fourth 4.7 fifth 5.6 sixth 7.0 seventh 12.3 eighth 16.8 reverse 2.3 and 8.1 Clutch single plate dry disc operated by foot pedal Brakes oil cooled multiple disc mechanically operated by two foot pedals which can be locked Steering mechanical with power assist Turning radius (on concrete surface with brake applied) right 120" left 120" (on concrete surface without brake) right 138" left 138" Turning space diameter (on concrete surface with brake applied) right 252" left 252" (on concrete surface without brake) right 291" left 291" Belt pulley 1208 rpm at 2200 engine rpm diam 10.25" face 6.5" Belt speed 3241 fpm Power take-off 540 rpm at 1810 engine rpm.

REPAIRS AND ADJUSTMENTS: During preliminary pto runs, cylinder head was removed and combustion chambers cleaned.

REMARKS: All test results were determined from observed data obtained in accordance with the SAE and ASAE test code. First gear was not run as it was necessary to limit the pull in second gear because of the stability formula. Eighth gear was not run because it exceeded 15 mph.

We, the undersigned, certify that this is a true and correct report of official Tractor Test 1001.

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.



FORD 4000 GASOLINE 8-SPEED