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2011

## Test 1997: Versatile 305

Nebraska Tractor Test Lab

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# NEBRASKA OECD TRACTOR TEST 1997–SUMMARY 778

## VERSATILE 305 DIESEL

### 16 SPEED

#### POWER TAKE-OFF PERFORMANCE

| Power<br>HP<br>(kW)                      | Crank<br>shaft<br>speed<br>rpm | Gal/hr<br>(l/h)  | lb/hp.hr<br>(kg/kW.h) | Hp.hr/gal<br>(kW.h/l) | Mean Atmospheric<br>Conditions |
|--|--------------------------------|------------------|-----------------------|-----------------------|--------------------------------|
| MAXIMUM POWER AND FUEL CONSUMPTION       |                                |                  |                       |                       |                                |
| Rated Engine Speed—(PTO speed—1104 rpm)  |                                |                  |                       |                       |                                |
| 255.79<br>(190.74)                       | 2101                           | 16.20<br>(61.32) | 0.447<br>(0.272)      | 15.79<br>(3.11)       |                                |
| Maximum Power (1 hour)                   |                                |                  |                       |                       |                                |
| 314.39<br>(234.44)                       | 1949                           | 17.86<br>(67.60) | 0.401<br>(0.244)      | 17.61<br>(3.47)       |                                |
| Standard Power Take-off Speed (1000 rpm) |                                |                  |                       |                       |                                |
| 313.79<br>(233.99)                       | 1904                           | 17.68<br>(66.92) | 0.398<br>(0.242)      | 17.75<br>(3.50)       |                                |

#### VARYING POWER AND FUEL CONSUMPTION

|                    |      |                  |                  |                 |                       |
|--------------------|------|------------------|------------------|-----------------|-----------------------|
| 255.79<br>(190.74) | 2101 | 16.20<br>(61.32) | 0.447<br>(0.272) | 15.79<br>(3.11) | Air temperature       |
| 221.29<br>(165.02) | 2138 | 15.38<br>(58.22) | 0.490<br>(0.298) | 14.39<br>(2.83) | 74°F (23°C)           |
| 168.59<br>(125.71) | 2172 | 13.10<br>(49.60) | 0.549<br>(0.334) | 12.87<br>(2.53) | Relative humidity     |
| 113.30<br>(84.49)  | 2192 | 10.71<br>(40.53) | 0.667<br>(0.406) | 10.58<br>(2.08) | 64%                   |
| 57.65<br>(42.99)   | 2226 | 7.20<br>(27.25)  | 0.881<br>(0.536) | 8.01<br>(1.58)  | Barometer             |
| 5.18<br>(3.86)     | 2248 | 4.67<br>(17.67)  | 6.364<br>(3.871) | 1.11<br>(0.22)  | 28.36" Hg (96.04 kPa) |

Maximum torque - 944 lb.-ft. (1280 Nm) at 1450 rpm

Maximum torque rise - 47.6%

Torque rise at 1699 engine rpm - 43%

Power increase at 1949 engine rpm - 22.9%

#### DRAWBAR PERFORMANCE

##### UNBALLASTED - FRONT DRIVE ENGAGED

##### FUEL CONSUMPTION CHARACTERISTICS

| Power<br>Hp<br>(kW)                          | Drawbar<br>pull<br>lbs<br>(kN) | Speed<br>mph<br>(km/h) | Crank-<br>shaft<br>speed<br>rpm | Slip<br>% | Fuel Consumption<br>lb/hp.hr<br>(kg/kW.h) | Hp.hr/gal<br>(kW.h/l) | Temp. °F (°C)<br>cool-<br>ing<br>med | Air<br>dry<br>bulb | Barom.<br>inch<br>Hg<br>(kPa) |
|--|--------------------------------|------------------------|---------------------------------|-----------|---|-----------------------|--------------------------------------|--------------------|-------------------------------|
| Maximum Power—7th Gear                       |                                |                        |                                 |           |   |                       |                                      |                    |                               |
| 210.50<br>(156.97)                           | 15385<br>(68.43)               | 5.13<br>(8.26)         | 2100                            | 6.4       | 0.548<br>(0.333)                          | 12.89<br>(2.54)       | 185<br>(85)                          | 65<br>(19)         | 28.59<br>(96.82)              |
| 75% of Pull at Maximum Power—7th Gear        |                                |                        |                                 |           |   |                       |                                      |                    |                               |
| 165.20<br>(123.19)                           | 11591<br>(51.56)               | 5.35<br>(8.60)         | 2145                            | 4.4       | 0.624<br>(0.379)                          | 11.32<br>(2.23)       | 184<br>(84)                          | 69<br>(21)         | 28.62<br>(96.92)              |
| 50% of Pull at Maximum Power—7th Gear        |                                |                        |                                 |           |   |                       |                                      |                    |                               |
| 113.90<br>(84.93)                            | 7725<br>(34.36)                | 5.53<br>(8.89)         | 2179                            | 2.8       | 0.745<br>(0.453)                          | 9.48<br>(1.87)        | 182<br>(83)                          | 72<br>(22)         | 28.62<br>(96.92)              |
| 75% of Pull at Reduced Engine Speed—9th Gear |                                |                        |                                 |           |   |                       |                                      |                    |                               |
| 165.32<br>(123.28)                           | 11543<br>(51.34)               | 5.38<br>(8.65)         | 1499                            | 4.3       | 0.521<br>(0.317)                          | 13.56<br>(2.67)       | 187<br>(86)                          | 69<br>(21)         | 28.62<br>(96.92)              |
| 50% of Pull at Reduced Engine Speed—9th Gear |                                |                        |                                 |           |   |                       |                                      |                    |                               |
| 114.05<br>(85.05)                            | 7771<br>(34.56)                | 5.50<br>(8.85)         | 1512                            | 2.8       | 0.554<br>(0.337)                          | 12.73<br>(2.51)       | 182<br>(83)                          | 71<br>(22)         | 28.62<br>(96.92)              |

**Location of tests:** Nebraska Tractor Test Laboratory, University of Nebraska, Lincoln, Nebraska 68583-0832

**Dates of tests:** June 21 - 24, 2011

**Manufacturer:** Versatile, Canada

**FUEL, OIL and TIME:** Fuel No. 2 Diesel Specific gravity converted to 60°/60°F (15°/15°C) 0.8476 Fuel weight 7.057 lbs/gal (0.846 kg/l) Oil SAE 15W40 API service classification CI-4 Transmission and hydraulic lubricant New Holland Multi-Tran fluid Front axle lubricant SAE 85W-140 API GL-5 Total time engine was operated: 20.0 hours

**ENGINE:** Make Cummins Diesel Type six cylinder vertical with turbocharger and air to air intercooler Serial No. \*73082277\* Crankshaft lengthwise Rated engine speed 2100 Bore and stroke 4.488" x 5.315" (114.0 mm x 135.0 mm) Compression ratio 17.5 to 1 Displacement 505 cu in (8268 ml) Starting system 12 volt Lubrication pressure Air cleaner two paper elements and aspirator Oil filter one full flow cartridge Oil cooler engine coolant heat exchanger for crankcase oil, radiator for hydraulic and transmission oil Fuel filter two paper elements Fuel cooler radiator for pump return fuel Muffler vertical Cooling medium temperature control thermostat and variable speed fan

**ENGINE OPERATING PARAMETERS:** Fuel rate: 112.0-118.0 lb/h (51.4 - 56.6 kg/h) High idle: 2240-2260 rpm Turbo boost: nominal 22.5 - 25.4 psi (155 - 175 kPa) as measured 24.0 psi (165 kPa)

**CHASSIS:** Type front wheel assist Serial No. \*505327\*305\* Tread width rear 60.0" (1524 mm) to 132.0" (3355 mm) front 60.0" (1524 mm) to 88.0" (2235 mm) Wheelbase 125.4" (3185 mm) Hydraulic control system direct engine drive Transmission selective gear fixed ratio with full range operator controlled powershift Nominal travel speeds mph (km/h) first 1.79 (2.89) second 2.16 (3.47) third 2.58 (4.15) fourth 3.09 (4.98) fifth 3.72 (5.98) sixth 4.44 (7.15) seventh 5.36 (8.62) eighth 6.41 (10.32) ninth 7.69 (12.38) tenth 9.20 (14.80) eleventh 11.02 (17.75) twelfth 13.23 (21.29) thirteenth 15.82 (25.47) fourteenth 19.10 (30.73) fifteenth 22.91 (36.87) sixteenth 27.42 (44.13) reverse 2.23 (3.59), 2.67 (4.30), 3.20 (5.15), 3.83 (6.17), 4.60 (7.40), 5.50 (8.85), 6.64 (10.69), 7.97 (12.82), 9.53 (15.34) Clutch multiple wet disc electrohydraulically operated by foot pedal Brakes wet disc hydraulically operated by two foot pedals that can be locked together Steering hydrostatic Power take-off 540 rpm at 1880 engine rpm or 1000 rpm at 1904 engine rpm Unladen tractor mass 22160 lb (10052 kg)

## DRAWBAR PERFORMANCE @ 2100 ENGINE RPM

### UNBALLASTED - FRONT DRIVE ENGAGED MAXIMUM POWER IN SELECTED GEARS

| Power<br>Hp<br>(kW) | Drawbar<br>pull<br>lbs<br>(kN) | Speed<br>mph<br>(km/h) | Crank-<br>shaft<br>speed<br>rpm | Slip<br>% | Fuel Consumption<br>lb/hp.hr<br>(kg/kW.h) | Temp.°F (°C)<br>cool-<br>ing<br>med | Air<br>dry<br>bulb | Barom.<br>inch<br>Hg<br>(kPa) |                  |
|---------------------|--------------------------------|------------------------|---------------------------------|-----------|---|-------------------------------------|--------------------|-------------------------------|------------------|
| 5th Gear            |                                |                        |                                 |           |   |                                     |                    |                               |                  |
| 173.55<br>(129.41)  | 19358<br>(86.11)               | 3.36<br>(5.41)         | 2139                            | 13.1      | 0.658<br>(0.400)                          | 10.73<br>(2.11)                     | 183<br>(84)        | 65<br>(18)                    | 28.59<br>(96.82) |
| 6th Gear            |                                |                        |                                 |           |   |                                     |                    |                               |                  |
| 201.04<br>(149.92)  | 18587<br>(82.68)               | 4.06<br>(6.53)         | 2099                            | 10.6      | 0.577<br>(0.351)                          | 12.23<br>(2.41)                     | 187<br>(86)        | 65<br>(18)                    | 28.58<br>(96.78) |
| 7th Gear            |                                |                        |                                 |           |   |                                     |                    |                               |                  |
| 210.50<br>(156.97)  | 15385<br>(68.43)               | 5.13<br>(8.26)         | 2100                            | 6.4       | 0.548<br>(0.333)                          | 12.89<br>(2.54)                     | 185<br>(85)        | 65<br>(19)                    | 28.59<br>(96.82) |
| 8th Gear            |                                |                        |                                 |           |   |                                     |                    |                               |                  |
| 210.42<br>(156.91)  | 12631<br>(56.19)               | 6.25<br>(10.06)        | 2098                            | 4.9       | 0.549<br>(0.334)                          | 12.85<br>(2.53)                     | 186<br>(85)        | 66<br>(19)                    | 28.60<br>(96.85) |
| 9th Gear            |                                |                        |                                 |           |   |                                     |                    |                               |                  |
| 206.50<br>(153.98)  | 10257<br>(45.62)               | 7.55<br>(12.15)        | 2098                            | 3.8       | 0.562<br>(0.342)                          | 12.55<br>(2.47)                     | 185<br>(85)        | 67<br>(19)                    | 28.60<br>(96.85) |
| 10th Gear           |                                |                        |                                 |           |   |                                     |                    |                               |                  |
| 209.13<br>(155.95)  | 8607<br>(38.29)                | 9.11<br>(14.66)        | 2099                            | 3.2       | 0.553<br>(0.336)                          | 12.77<br>(2.52)                     | 186<br>(85)        | 67<br>(20)                    | 28.60<br>(96.85) |

**REPAIRS AND ADJUSTMENTS:** A shim was added to the 3 point lift pressure control valve before the lift test.

**REMARKS:** All test results were determined from observed data obtained in accordance with official OECD, SAE and Nebraska test procedures. An oil leak was noted from the left rear axle seal. Tests continued without repair. For the maximum power tests the fuel temperature at the fuel pump inlet was maintained at 147°F (64°C). The performance results on this summary were taken from OECD tests conducted under the Code 2 Test Procedure.

We, the undersigned, certify that this is a true and correct report of official Tractor Test No. **1997**, Nebraska Summary 778, July 6, 2011.

Roger M. Hoy  
Director

M.F. Kocher  
D.R. Keshwani  
P.J. Jasa  
Board of Tractor Test Engineers

| TRACTOR SOUND LEVEL WITH CAB | Front Wheel Drive |                     |
|------------------------------|-------------------|---------------------|
|                              | Engaged<br>dB(A)  | Disengaged<br>dB(A) |
| At no load in 6th gear       | 78.0              | 78.0                |
| Bystander in 16th gear       |                   | 83.0                |

| TIRES, BALLAST AND WEIGHT                      | With Ballast               | Without Ballast           |
|--|----------------------------|---------------------------|
| <b>Rear Tires</b> -No., size, ply & psi (kPa)  | Four 520/85R46;***;10(70)  | Two 520/85R46;***;17(115) |
| <b>Ballast</b> - Duals (total)                 | 2090 lb (948 kg)           | None                      |
| - Cast Iron (total)                            | 1760 lb (798 kg)           | None                      |
| <b>Front Tires</b> -No., size, ply & psi (kPa) | Four 380/80R38;***;16(110) | Two 380/80R38;***;20(140) |
| <b>Ballast</b> - Duals (total)                 | 1260 lb (571 kg)           | None                      |
| - Cast Iron (total)                            | 3445 lb (1563 kg)          | None                      |
| <b>Height of Drawbar</b>                       | 24.5 in (620 mm)           | 24.5 in (620 mm)          |
| <b>Static Weight with operator</b> - Rear      | 17930 lb (8133 kg)         | 14615 lb (6629 kg)        |
| - Front  | 12960 lb (5878 kg)         | 7720 lb (3502 kg)         |
| - Total  | 30890 lb(14011 kg)         | 22335 lb(10131 kg)        |

**DRAWBAR PERFORMANCE @ 1950 ENGINE RPM**  
**UNBALLASTED - FRONT DRIVE ENGAGED**  
**MAXIMUM POWER IN SELECTED GEARS**

| Power<br>Hp<br>(kW) | Drawbar<br>pull<br>lbs<br>(kN) | Speed<br>mph<br>(km/h) | Crank-<br>shaft<br>speed<br>rpm | Slip<br>% | Fuel Consumption<br>lb/hp.hr<br>(kg/kW.h) | Consumption<br>Hp.hr/gal<br>(kW.h/l) | Temp. °F (°C)<br>cool-<br>ing<br>med | Air<br>dry<br>bulb | Barom.<br>inch<br>Hg<br>(kPa) |
|---------------------|--------------------------------|------------------------|---------------------------------|-----------|---|--------------------------------------|--------------------------------------|--------------------|-------------------------------|
| 5th Gear            |                                |                        |                                 |           |   |                                      |                                      |                    |                               |
| 173.93<br>(129.70)  | 19348<br>(86.06)               | 3.37<br>(5.42)         | 2139                            | 12.8      | 0.655<br>(0.398)                          | 10.78<br>(2.12)                      | 184<br>(84)                          | 65<br>(18)         | 28.58<br>(96.78)              |
| 6th Gear            |                                |                        |                                 |           |   |                                      |                                      |                    |                               |
| 201.14<br>(149.99)  | 18500<br>(82.29)               | 4.08<br>(6.57)         | 2101                            | 10.1      | 0.576<br>(0.350)                          | 12.26<br>(2.41)                      | 186<br>(85)                          | 65<br>(18)         | 28.59<br>(96.82)              |
| 7th Gear            |                                |                        |                                 |           |   |                                      |                                      |                    |                               |
| 232.48<br>(173.36)  | 18086<br>(80.45)               | 4.82<br>(7.76)         | 2040                            | 9.4       | 0.517<br>(0.314)                          | 13.65<br>(2.69)                      | 187<br>(86)                          | 65<br>(19)         | 28.60<br>(96.85)              |
| 8th Gear            |                                |                        |                                 |           |   |                                      |                                      |                    |                               |
| 254.90<br>(190.08)  | 16996<br>(75.60)               | 5.63<br>(9.05)         | 1950                            | 7.9       | 0.496<br>(0.301)                          | 14.24<br>(2.81)                      | 192<br>(89)                          | 66<br>(19)         | 28.60<br>(96.85)              |
| 9th Gear            |                                |                        |                                 |           |   |                                      |                                      |                    |                               |
| 257.74<br>(192.19)  | 14018<br>(62.35)               | 6.90<br>(11.10)        | 1950                            | 5.6       | 0.491<br>(0.299)                          | 14.36<br>(2.83)                      | 192<br>(89)                          | 67<br>(19)         | 28.60<br>(96.85)              |
| 10th Gear           |                                |                        |                                 |           |   |                                      |                                      |                    |                               |
| 261.03<br>(194.65)  | 11728<br>(52.17)               | 8.35<br>(13.44)        | 1950                            | 4.5       | 0.484<br>(0.294)                          | 14.58<br>(2.87)                      | 192<br>(89)                          | 68<br>(20)         | 28.60<br>(96.85)              |

**DRAWBAR PERFORMANCE @ 1950 ENGINE RPM**  
**BALLASTED - FRONT DRIVE ENGAGED**  
**MAXIMUM POWER IN SELECTED GEARS**

| Power<br>Hp<br>(kW) | Drawbar<br>pull<br>lbs<br>(kN) | Speed<br>mph<br>(km/h) | Crank-<br>shaft<br>speed<br>rpm | Slip<br>% | Fuel Consumption<br>lb/hp.hr<br>(kg/kW.h) | Temp. °F (°C)   | Barom.<br>inch<br>Hg<br>(kPa) |            |                  |
|---------------------|--------------------------------|------------------------|---------------------------------|-----------|---|-----------------|-------------------------------|------------|------------------|
| 4th Gear            |                                |                        |                                 |           |   |                 |                               |            |                  |
| 203.08<br>(151.44)  | 27996<br>(124.53)              | 2.72<br>(4.38)         | 2083                            | 13.2      | 0.578<br>(0.351)                          | 12.21<br>(2.41) | 190<br>(88)                   | 74<br>(24) | 28.73<br>(97.29) |
| 5th Gear            |                                |                        |                                 |           |   |                 |                               |            |                  |
| 234.68<br>(175.00)  | 26647<br>(118.53)              | 3.31<br>(5.32)         | 2029                            | 9.9       | 0.523<br>(0.318)                          | 13.49<br>(2.66) | 192<br>(89)                   | 75<br>(24) | 28.71<br>(97.22) |
| 6th Gear            |                                |                        |                                 |           |   |                 |                               |            |                  |
| 253.97<br>(189.38)  | 24443<br>(108.73)              | 3.90<br>(6.28)         | 1949                            | 7.4       | 0.500<br>(0.304)                          | 14.12<br>(2.78) | 194<br>(90)                   | 76<br>(24) | 28.70<br>(97.19) |
| 7th Gear            |                                |                        |                                 |           |   |                 |                               |            |                  |
| 264.68<br>(197.37)  | 20587<br>(91.57)               | 4.83<br>(7.77)         | 1950                            | 5.1       | 0.479<br>(0.291)                          | 14.74<br>(2.90) | 194<br>(90)                   | 76<br>(25) | 28.70<br>(97.19) |
| 8th Gear            |                                |                        |                                 |           |   |                 |                               |            |                  |
| 263.64<br>(196.59)  | 16889<br>(75.12)               | 5.86<br>(9.42)         | 1951                            | 4.1       | 0.482<br>(0.293)                          | 14.63<br>(2.88) | 193<br>(89)                   | 77<br>(25) | 28.71<br>(97.22) |
| 9th Gear            |                                |                        |                                 |           |   |                 |                               |            |                  |
| 259.23<br>(193.31)  | 13786<br>(61.32)               | 7.05<br>(11.35)        | 1950                            | 3.3       | 0.489<br>(0.297)                          | 14.44<br>(2.84) | 194<br>(90)                   | 78<br>(26) | 28.69<br>(97.16) |
| 10th Gear           |                                |                        |                                 |           |   |                 |                               |            |                  |
| 259.53<br>(193.53)  | 11451<br>(50.94)               | 8.50<br>(13.67)        | 1950                            | 2.6       | 0.491<br>(0.298)                          | 14.39<br>(2.83) | 194<br>(90)                   | 77<br>(25) | 28.69<br>(97.16) |

## HYDRAULIC PERFORMANCE

CATEGORY: III

QuickAttach: Yes

OECD Static test

Maximum force exerted through whole range: 15791 lb (70.2 kN)

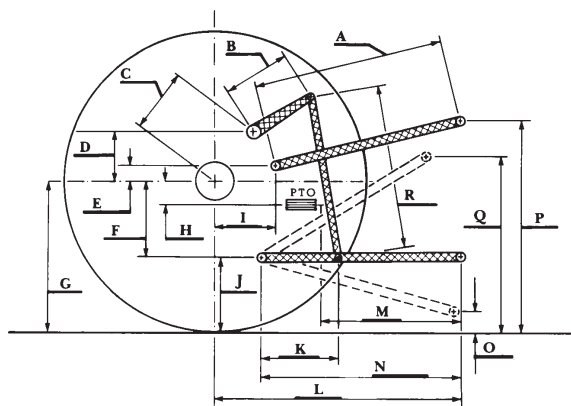
|  |                         |                              |
|--|-------------------------|------------------------------|
|  | <u>Hydraflow system</u> | <u>Hydraflow plus system</u> |
| i) Sustained pressure at compensator cutoff: | 2873 psi (198 bar)      | 2881 psi (199 bar)           |

|  |                        |                        |
|--|------------------------|------------------------|
| ii) Pump delivery rate at minimum pressure and rated engine speed: | 36.7 GPM (138.7 l/min) | 58.1 GPM (220.0 l/min) |
|--|------------------------|------------------------|

|   |                        |                        |
|---|------------------------|------------------------|
| iii) Pump delivery rate at maximum hydraulic power: | 33.4 GPM (126.3 l/min) | 57.9 GPM (219.2 l/min) |
|---|------------------------|------------------------|

|                    |                    |                    |
|--------------------|--------------------|--------------------|
| Delivery pressure: | 2119 psi (146 bar) | 2409 psi (166 bar) |
|--------------------|--------------------|--------------------|

|        |                   |                   |
|--------|-------------------|-------------------|
| Power: | 41.2 HP (30.8 kW) | 81.4 Hp (60.7 kW) |
|--------|-------------------|-------------------|



## HITCH DIMENSIONS AS TESTED—NO LOAD

|     | inch | mm   |
|-----|------|------|
| A   | 29.2 | 743  |
| B   | 15.0 | 380  |
| C   | 19.2 | 487  |
| D   | 20.7 | 395  |
| E   | 15.6 | 206  |
| F   | 12.8 | 324  |
| G   | 37.4 | 950  |
| H   | 3.0  | 75   |
| I   | 23.3 | 591  |
| J   | 24.6 | 626  |
| K   | 19.8 | 503  |
| L   | 52.6 | 1336 |
| *L' | 57.7 | 1466 |
| M   | 29.4 | 746  |
| N   | 36.5 | 926  |
| O   | 9.0  | 230  |
| P   | 48.9 | 1241 |
| Q   | 40.6 | 1030 |
| R   | 35.3 | 897  |

\*L' to Quick Attach ends



**VERSATILE 305 DIESEL**