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Test 1603: Hesston 160-90 Turbo Powershift Fiat Diesel 16-Speed

Nebraska Tractor Test Lab
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NEBRASKA TRACTOR TEST 1603
HESSTON 160-90 TURBO POWERSHIFT FIAT DIESEL 16 SPEED

Department of Agricultural Engineering

Dates of Test: September 30 to October 7, 1986

Manufacturer: FIAT TRATTORI S.p.A. Via Picodella Mirandola 72- 41100, Modena, Italy

POWER TAKE-OFF PERFORMANCE

Power Hp *(kW)*	Crank shaft speed rpm	Fuel Consumption gal/hr *(l/h)*	lb/hp.hr *(kg/kW.h)*	Hp.hr/gal *(kW.h/l)*	Temperature °F *(°C)* Cooling medium	Air wet bulb	Air dry bulb	Barometer inch Hg *(kPa)*
MAXIMUM POWER AND FUEL CONSUMPTION								
Rated Engine Speed — Two hours (PTO Speed — 1061 rpm)								
142.64 *(106.37)*	2200	8.858 *(33.530)*	0.433 *(0.263)*	16.10 *(3.172)*	179 *(81.6)*	62 *(16.7)*	75 *(23.9)*	28.85 *(97.42)*
Standard Power Take-off Speed (1000 rpm) — One Hour								
141.40 *(105.44)*	2074	8.471 *(32.067)*	0.418 *(0.254)*	16.69 *(3.288)*	179 *(81.5)*	62 *(16.6)*	75 *(23.7)*	28.86 *(97.46)*
VARYING POWER AND FUEL CONSUMPTION — Two Hours								
124.72 *(93.01)*	2264	8.024 *(30.373)*	0.449 *(0.273)*	15.54 *(3.062)*	177 *(80.6)*	62 *(16.4)*	74 *(23.3)*	....
0.00 *(0.00)*	2431	2.801 *(10.602)*	....	....	175 *(79.4)*	63 *(16.9)*	75 *(23.9)*	....
64.95 *(48.43)*	2359	5.288 *(20.015)*	0.568 *(0.345)*	12.28 *(2.420)*	176 *(80.0)*	62 *(16.4)*	74 *(23.1)*	....
144.00 *(107.38)*	2200	8.863 *(33.549)*	0.429 *(0.261)*	16.25 *(3.201)*	179 *(81.7)*	62 *(16.7)*	74 *(23.3)*	....
33.11 *(24.69)*	2397	4.117 *(15.586)*	0.867 *(0.527)*	8.04 *(1.584)*	176 *(79.7)*	63 *(16.9)*	75 *(23.6)*	....
95.58 *(71.28)*	2313	6.583 *(24.918)*	0.480 *(0.292)*	14.52 *(2.860)*	177 *(80.6)*	63 *(17.2)*	76 *(24.2)*	....
Av **77.06** ***Av*** ***(57.46)***	**2327**	**5.946** ***(22.507)***	**0.538** ***(0.327)***	**12.96** ***(2.553)***	**177** ***(80.3)***	**62** ***(16.8)***	**74** ***(23.6)***	**28.85** ***(97.41)***

DRAWBAR PERFORMANCE
(Front Wheel Drive Engaged)

Power Hp *(kW)*	Drawbar pull lbs *(kN)*	Speed mph *(km/h)*	Crank-shaft speed rpm	Slip %	Fuel Consumption gal/hr *(l/h)*	lb/hp.hr *(kg/kW.h)*	Hp.hr/gal *(kW.h/l)*	Temp. °F *(°C)* Cool-ing med	Air wet bulb	Air dry bulb	Barom. inch Hg *(kPa)*
Maximum Available Power — Two Hours 8th(III-2) Gear											
122.39 *(91.26)*	8468 *(37.67)*	5.42 *(8.72)*	2199	2.41	8.791 *(33.278)*	0.501 *(0.305)*	13.92 *(2.742)*	181 *(82.5)*	57 *(13.9)*	68 *(19.7)*	29.00 *(97.91)*
75% of Pull at Maximum Power — Ten Hours 8th(III-2) Gear											
97.93 *(73.03)*	6450 *(28.69)*	5.69 *(9.16)*	2298	1.88	7.576 *(28.680)*	0.539 *(0.328)*	12.93 *(2.546)*	181 *(82.7)*	57 *(14.1)*	59 *(14.8)*	28.72 *(96.99)*
50% of Pull at Maximum Power — Two Hours 8th(III-2) Gear											
67.16 *(50.08)*	4300 *(19.13)*	5.86 *(9.43)*	2354	1.44	6.052 *(22.909)*	0.628 *(0.382)*	11.10 *(2.186)*	180 *(82.2)*	58 *(14.4)*	59 *(15.0)*	28.75 *(97.07)*
50% of Pull at Reduced Engine Speed — Two Hours 12th(III-4) Gear											
67.11 *(50.04)*	4300 *(19.13)*	5.85 *(9.42)*	1599	1.53	4.919 *(18.620)*	0.511 *(0.311)*	13.64 *(2.688)*	179 *(81.4)*	61 *(16.1)*	62 *(16.7)*	28.67 *(96.80)*

FUEL, OIL AND TIME: Fuel No. 2 Diesel **Cetane No.** 49.5(rating taken from oil company's inspection data) **Specific gravity converted to 60/60°F *(15/15°C)*** 0.8375 **Fuel weight** 6.973 lbs/gal *(0.836 kg/l)* **Oil SAE** 15W40 **API service classification** SF-CD **To motor** 3.721 gal *(14.087 l)* **Drained from motor** 3.223 gal *(12.199 l)* **Transmission lubricant** type A automatic transmission fluid **Hydraulic and front axle lubricant** Oliofiat AF87S **Total time engine was operated** 41.0 hours.

ENGINE: Make Fiat/IVECO Diesel **Type** six cylinder vertical with turbocharger **Serial No.** 8365.25*505*759919* **Crankshaft** lengthwise **Rated rpm** 2200 **Bore and stroke** 4.528″ × 5.118″ *(115 mm × 130 mm)* **Compression ratio** 15.5 to 1 **Displacement** 494 cu in *(8102 ml)* **Starting system** 12 volt **Lubrication** pressure **Air cleaner** two paper elements and centrifugal precleaner **Oil filter** one full flow cartridge **Oil cooler** engine coolant heat exchanger for crankcase oil, engine coolant heat exchanger for transmission oil **Fuel filter** one paper cartridge, one paper element and sediment bowl **Muffler** vertical **Cooling medium temperature control** one thermostat.

CHASSIS: Type front wheel assist with duals **Serial No.** 160-90PSDT/I*262727* **Tread width** rear 64″ *(1625 mm)* to 123″ *(3125 mm)* front 64″ *(1625 mm)* to 92″ *(2337 mm)* **Wheel base** 113.8″ *(2890 mm)* **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 37.2″ *(945 mm)* Vertical distance above roadway 42.5″ *(1080 mm)* Horizontal distance from center of rear wheel tread 0″ *(0 mm)* to the right/left **Hydraulic control system** direct engine drive **Transmission** selective gear fixed ratio with partial (4) range operator controlled powershift **Advertised speeds mph *(km/h)*** first 2.0 *(3.3)* second 2.5 *(4.0)* third 3.0 *(4.9)* fourth 3.8 *(6.1)* fifth 4.2 *(6.7)* sixth 4.6 *(7.4)* seventh 5.1 *(8.2)* eighth 5.6 *(9.1)* ninth 6.1 *(9.9)* tenth 6.8 *(11.0)* eleventh 7.6 *(12.3)* twelfth 8.4 *(13.6)* thirteenth 10.4 *(16.8)* fourteenth 12.7 *(20.5)* fifteenth 15.4 *(24.8)* sixteenth 19.1 *(30.7)* reverse 1.6 *(2.6)*, 2.0 *(3.2)*, 2.4 *(3.9)*, 3.0 *(4.8)*, 3.3 *(5.4)* 3.7 *(5.9)*, 4.0 *(6.5)*, 4.5 *(7.3)*, 4.9 *(7.9)*, 5.5 *(8.8)*, 6.1 *(9.8)*, 6.8 *(10.9)*, 8.1 *(13.1)*, 10.2 *(16.4)*, 12.3 *(19.8)*, 15.3 *(24.6)* **Clutch** dual dry disc hydraulically power actuated and operated by foot pedal **Brakes** multiple wet disc hydraulically operated by two foot

MAXIMUM POWER IN SELECTED GEARS

111.80 *(83.37)*	18256 *(81.21)*	2.30 *(3.70)*	2265	9.60	2nd(I-2) Gear	180 *(82.2)*	44 *(6.7)*	46 *(7.8)*	29.18 *(98.54)*
123.00 *(91.72)*	16353 *(72.74)*	2.82 *(4.54)*	2199	5.78	3rd(I-3) Gear	182 *(83.3)*	54 *(12.2)*	65 *(18.3)*	29.12 *(98.33)*
124.52 *(92.86)*	13374 *(59.49)*	3.49 *(5.62)*	2198	4.04	4th(I-4) Gear	182 *(83.3)*	54 *(12.2)*	65 *(18.3)*	29.09 *(98.23)*
126.05 *(93.99)*	11869 *(52.79)*	3.98 *(6.41)*	2200	3.36	5th(II-1) Gear	182 *(83.1)*	54 *(12.2)*	65 *(18.3)*	29.09 *(98.23)*
126.34 *(94.22)*	10674 *(47.48)*	4.44 *(7.14)*	2201	2.93	6th(III-1) Gear	182 *(83.3)*	55 *(12.8)*	65 *(18.3)*	29.08 *(98.20)*
125.41 *(93.52)*	9656 *(42.95)*	4.87 *(7.84)*	2200	2.67	7th(II-2) Gear	182 *(83.1)*	55 *(12.8)*	66 *(18.9)*	29.07 *(98.17)*
124.21 *(92.62)*	8586 *(38.19)*	5.43 *(8.73)*	2202	2.41	8th(III-2) Gear	181 *(82.8)*	57 *(13.9)*	68 *(20.0)*	29.04 *(98.06)*
122.60 *(91.42)*	7740 *(34.43)*	5.94 *(9.56)*	2202	2.23	9th(II-3) Gear	181 *(82.8)*	57 *(13.9)*	68 *(20.0)*	29.03 *(98.03)*
122.30 *(91.20)*	6948 *(30.90)*	6.60 *(10.62)*	2200	1.97	10th(III-3) Gear	181 *(82.8)*	57 *(13.9)*	68 *(20.0)*	29.03 *(98.03)*
121.26 *(90.42)*	6283 *(27.95)*	7.24 *(11.65)*	2200	1.70	11th(II-4) Gear	181 *(82.5)*	57 *(13.9)*	68 *(20.0)*	29.02 *(98.00)*
118.64 *(88.47)*	5530 *(24.60)*	8.05 *(12.95)*	2200	1.62	12th(III-4) Gear	181 *(82.5)*	57 *(13.9)*	68 *(20.0)*	29.02 *(98.00)*

LUGGING ABILITY IN 8th(III-2) GEAR

Crankshaft Speed rpm	2202	1976	1749	1543	1322	1094
Pull—lbs *(kN)*	8586 *(38.19)*	9356 *(41.62)*	10103 *(44.94)*	10740 *(47.77)*	10982 *(48.85)*	10267 *(45.67)*
Increase in Pull %	0	9	18	25	28	20
Power—Hp *(kW)*	124.21 *(92.62)*	121.22 *(90.39)*	115.62 *(86.22)*	108.11 *(80.61)*	94.70 *(70.62)*	73.41 *(54.74)*
Speed—Mph *(km/h)*	5.43 *(8.73)*	4.86 *(7.82)*	4.29 *(6.91)*	3.77 *(6.07)*	3.23 *(5.20)*	2.68 *(4.31)*
Slip %	2.41	2.67	2.84	3.01	3.19	2.84

TRACTOR SOUND LEVEL WITH CAB	Front Wheel Drive Disengaged dB(A)	Engaged dB(A)
Maximum Available Power—Two Hours	80.5	80.5
75% of Pull at Maximum Power—Ten Hours		79.0
50% of Pull at Maximum Power—Two Hours		80.0
50% of Pull at Reduced Engine Speed—Two Hours		77.0
Bystander in 16th (IV-4) gear	88.0	

DRAWBAR PERFORMANCE
(Front Wheel Drive Disengaged)

Power Hp *(kW)*	Drawbar pull lbs *(kN)*	Speed mph *(km/h)*	Crank-shaft speed rpm	Slip %	Fuel Consumption gal/hr *(l/h)*	lb/hp.hr *(kg/kW.h)*	Hp.hr/gal *(kW.h/l)*	Temp. °F *(°C)* Cool-ing med	Air wet bulb	Air dry bulb	Barom. inch Hg *(kPa)*
Maximum Available Power — Two Hours 8th(III-2) Gear											
122.86 *(91.62)*	8577 *(38.15)*	5.37 *(8.64)*	2200	2.80	8.805 *(33.332)*	0.500 *(0.304)*	13.95 *(2.749)*	181 *(82.5)*	51 *(10.6)*	58 *(14.4)*	29.15 *(98.44)*

MAXIMUM POWER IN SELECTED GEARS

108.78 *(81.12)*	15060 *(66.99)*	2.71 *(4.36)*	2263	11.75	3rd(I-3) Gear	180 *(82.2)*	47 *(8.3)*	52 *(11.1)*	29.18 *(98.54)*
125.91 *(93.89)*	10780 *(47.95)*	4.38 *(7.05)*	2199	3.78	6th(III-1) Gear	182 *(83.1)*	56 *(13.3)*	67 *(19.4)*	29.05 *(98.10)*
125.74 *(93.77)*	9786 *(43.53)*	4.82 *(7.75)*	2201	3.27	7th(II-2) Gear	182 *(83.1)*	55 *(12.8)*	66 *(18.9)*	29.07 *(98.17)*
125.52 *(93.60)*	8773 *(39.02)*	5.37 *(8.64)*	2200	2.84	8th(III-2) Gear	182 *(83.1)*	56 *(13.3)*	67 *(19.4)*	29.06 *(98.13)*

TIRES, BALLAST AND WEIGHT		With Ballast	Without Ballast
Rear Tires	—No., size, ply & psi *(kPa)*	Four 20.8R38; 8; 16 *(110)*	Four 20.8R38; 8; 16 *(110)*
Ballast	—Liquid (each)	None	None
	—Test Equip. (each)	64 lb *(29 kg)*	None
Front Tires	—No., size, ply & psi *(kPa)*	Two 16.9R28; 10; 16 *(110)*	Two 16.9R28; 10; 16 *(110)*
Ballast	—Liquid (each)	None	None
	—Test Equip. (each)	23 lb *(10 kg)*	None
Height of Drawbar		18.5 in *(470 mm)*	18.5 in *(470 mm)*
Static Weight with Operator—Rear		12405 lb *(5627 kg)*	12150 lb *(5511 kg)*
	—Front	5815 lb *(2638 kg)*	5770 lb *(2617 kg)*
	—Total	18220. lb *(8265 kg)*	17920 lb *(8128 kg)*

pedals which can be locked together **Steering** hydrostatic **Turning radius** (on concrete surface with brake applied) right 196″ *(4.98 mm)* left 202″ *(5.13 m)*(on concrete surface without brake) right 265″ *(6.72 m)* left 270″ *(6.86 m)* **Turning space diameter** (on concrete surface with brake applied) right 412″ *(10.46 m)* left 424″ *(10.77 m)*(on concrete surface without brake) right 550″ *(13.97 m)* left 560″ *(14.22 m)* **Power take-off** 540 rpm at 1950 engine rpm and 1000 rpm at 2074 engine rpm **Unladen tractor mass** 16010 lb *(7262 kg)*.

REPAIRS AND ADJUSTMENTS: No repairs or adjustments.

REMARKS: All test results were determined from observed data obtained in accordance with SAE and ASAE test codes and the technically equivalent ISO test codes or official Nebraska test procedure. For the maximum power tests, the fuel temperature at the injection pump return was maintained at 129°F *(54.0°C)*. Eleven gears were chosen between 15% slip and 10 mph *(16.1 km/h)*. The pull in 2nd (I-2) gear was limited to avoid tractor bouncing.

We, the undersigned, certify that this is as true and correct report of official Tractor Test No. **1603,** October 31, 1986.

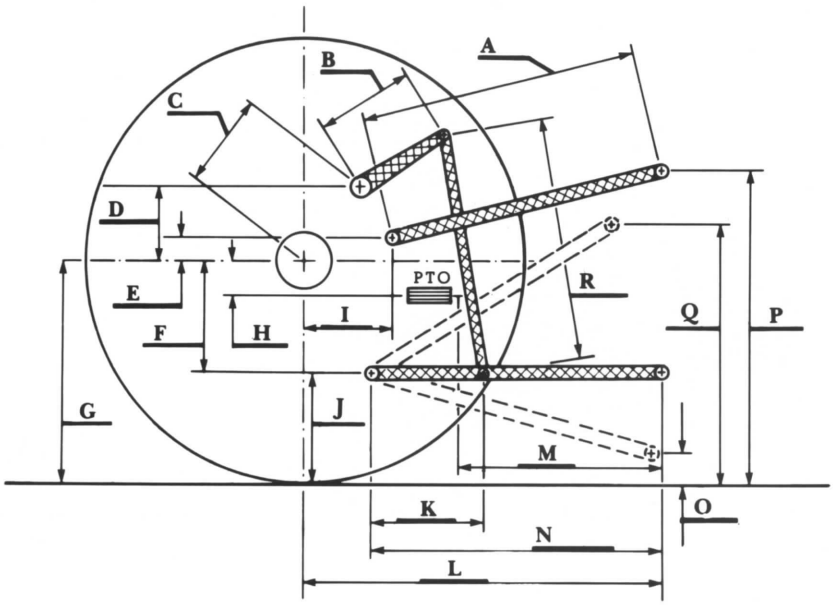
LOUIS I. LEVITICUS
Engineer-in-Charge

K. VON BARGEN
L. L. BASHFORD
R. D. GRISSO, JR.
Board of Tractor Test Engineers

THREE POINT HITCH PERFORMANCE

Observed Maximum Pressure psi *(kPa)*	2475 *(17060)*	
Location	remote outlet	
Hydraulic oil temperature °F *(°C)*	193 *(89)*	
Location	hydraulic filter	
	Maximum Lift Capacity	**Lift Capacity for Transport**
QUICK ATTACH	no	
CATEGORY	II	*not measured
LOAD lbs *(kg)*	12822 *(5816)*	
TIME sec	3.48	
HITCH POINT MOVEMENT in *(mm)*		
Lowest position	11.4 *(290)*	
Top of timed range	35.4 *(899)*	
Highest position	37.5 *(953)*	
LOAD CG MOVEMENT in *(mm)*		
Lowest position	12.5 *(318)*	
Top of timed range	35.3 *(897)*	
Highest position	37.6 *(955)*	

*Implement load capacity for transport purposes not specified by manufacturer.



Hitch Dimensions as Tested — No Load

	inch	*mm*
A	31.3	*794*
B	10.8	*275*
C	16.9	*430*
D	16.1	*409*
E	9.0	*229*
F	11.0	*280*
G	33.8	*858*
H	2.5	*64*
I	16.7	*425*
J	22.8	*578*
K	21.5	*546*
L	48.5	*1232*
M	26.2	*665*
N	40.0	*1016*
O	8.0	*203*
P	41.8	*1060*
Q	37.0	*940*
R	35.1	*892*

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