ISTITUTO SPERIMENTALE PER
LA MECCANIZZAZIONE AGRICOLA
SEZIONE DI TREVIGLIO

O.E.C.D. no.1037
restricted code

Test in accordance with O.E.C.D. Restricted Standard Code for the official testing of agricultural tractors

Report on test of: GOLDONI 933 RS.DT (4WD)



Submitted for test by: GOLDONI S.p.A.
Migliarina di Carpi (MO)

Date of approval O.E.C.D.: 24.12.1986

Period of test: OCTOBER 1986

SEZIONE DI TREVIGLIO - BG ITALY
Via Milano, 43 - tel.0363/49603

TEST n.027

MINISTERO DELL'AGRICOLTURE E DELLE FORESTE
Direzione Generale Produzione Agricola

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All stated dimension and tests referred to tyre size 8.25/16 (4 plr) at front and 8.25/16 (4 plr) at rear, as well as to track width 1010 mm at front and 1010 mm at rear.

- Tractor manufacturer's: GOLDONI S.p.A. Migliarina di Carpi (MO);
- Submitted for test by: the manufacturer;
- Selected by: the manufacturer with the agreement of ISMA;
- Place of running in: GOLDONI - Migliarina di Carpi (MO) ;
- Duration of running in: 30 hrs for engine, 20 hrs for tractor.

I - SPECIFICATIONS OF TRACTOR

TRACTOR

- Make: GOLDONI;
- Model : 933 RS.DT;
- Type: Wheeled tractor, unit constr.,permanent four wheel drive;
- Serial no.: 318801;
- First serial no.: 243082.

ENGINE

- Make: LOMBARDINI;
- Model: 914;
- Type : Air cooled 4 strokes Diesel engine direct injection;
- Serial no.: 2757673.

Cylinders

- Number/disposition: 2 vertical in line;
- Bore/stroke: 95/94 mm;
- Capacity: 1332 cc;
- Compression ratio: 17.8/1;
- Arrangement of valves: Overhead;
- Cylinder liners: without liners.

Fuel system

- Fuel feed system: forced whit diaphragm pump CORONA;
- Make, type and model of fuel filter: FIAMM 273.2175.009 interchangeable filtering cartridge contained in the fuel tank;
- Capacity of fuel tank: 10 l;

- Make, type and model of injection pump: BOSCH PFR 2K 70 in line injection pump;
- Serial number: without number;
- Manufacturer's production setting of injection pump:
  . flow rate 40 ±2 mm3/stroke at rated speed and full load;
  . timing 27°;
- Make, type and model of injectors:BOSCH 710.6531.033 multihole injection nozzles;
- Injection pressure: 210 bar.

Governor

- Make: LOMBARDINI;
- Type: centrifugal and mechanically actuated;
- Model: 914;
- Governor range of engine speed from 950 to 3250 rev/min;
- Rated engine speed : 3000 rev/min.

Air Cleaner

- Main filter
  . Make: METAL;
  . Type: oil bath;
  . Model: ref. 904.3701.099;
  . Oil capacity: 0.38 l;
  . Location : before engine;
- Maintenance indicator : none.

Lubrication system

- Type : forced feed from gear pump;
- Total oil capacity including filter: 3 l;
- Oil change period : 100 hrs;
- Type of filter : interchangeable filtering cartridge, ref. 904.3740.043;
- Number: 1;
- Filter change period: 300 hrs;
- Oil specifications (see p.14)

Cooling system

- Type and detail: forced turbo air cooling type;
- No. of fan blades : 10;
- Diameter : 189 mm;
- Type of temperature control: none.

Starting system

- Safety device: engine start by pushing pedal clutch;
- Make: BOSCH;
- Type: GF 12 V CL 1,5 - ref. 0001314001;
- Model: electromagnetic engagement;
- Power: 1.5 kW for start motor rating;
- Starting system for low temperatures: none.

Electrical equipement

- Voltage: 12 V;
- Generator
  . Make: SAPRISA;
  . Type: alternator 12V 21A - ref. 6381;
  . Power: 250 W - 80 Ah;
- Battery : 1 lead acid;
  . Capacity: 80 Ah at 20 hours.

Exhaust system

- Make: GOLDONI;
- Type: 4 chambers reflection absorption;
- Model: 17306;
- Location: on the operator's left,horizontal;
- Height of outlet above ground: 430 mm.

TRANSMISSION

Clutch: utilized for travelling and PTO of tractor:
- Make: PITTERI E VIOLINI;
- Type : single disc dry clutch;
- Model: F 187.2
- Disc diameter: 187 mm;
- Number of plates: 1;
- Control system: mechanically operated by pedal
  self readjusting.

Gear box

- Make: GOLDONI;
- Type: mechanical without syncronising speed change gear with 3 speeds forward, with 2 ranges speed and 1 reverse group;
- Model: RS.;
- Arrangement: mechanical whit 2 levers;
- No. speeds: 6 forward and 3 reverse;
- Available options: none.

GOLDONI 933 RS.DT (4WD) TEST 027

Front, Rear axles and final drive

- Make: GOLDONI;
- Type: bevel gear differential and epicyclic final drive;
- Model: RS.
- The front and rear axles are constantly mechanically connected; hand operated differential lock, manual disengaging for front axle, automatic for rear axle.

Transmission lubrication

- Oil capacity: 16.5 l;
- Gear box and front axle in a single circuit: 10 l;
- Rear axle: 6.5 l;
- Change period: 800 hrs;
- No filters;
- Recommended oil: see p.14.

Total ratios and speeds

Group	Number of engine revolutions for one revolution of the driving wheels	Nominal traveling speed at a rated engine speed of 3000 rev/min (Km/h)
FORWARD		
1 S	349.729	1.270
2 S	167.449	2.640
3 S	85.026	5.210
1 F	65.067	6.810
2 F	31.157	14.210
3 F	15.813	28.000
REVERSE		
1	266.458	1.660
2	127.577	3.470
3	64.780	6.840

- Tyre size 8.25/16 inflaction pressure: 1.3 bar
- Tyre radius index: 400 mm (E.T.R.T.O. norm).

S = slow - F = fast.

POWER TAKE-OFF

Main power take-off

- Type: not independent, at rear of tractor, in tractor's median plane, engaged or disengaged through hand lever.

Power take-off proportional to engine speed

540 rev/min

- Location:at rear of tractor central position;
- Diameter of power take-off shaft end: 34.8 mm;
- Number of splines: 6 in conformity with "ISO Standard 500 - 1979";
- Height above ground with tyre size 8.25/16: 460 mm;
- Distance from the median plane of the tractor 0 mm;
- Distance behind rear axle: 348 mm;
- PTO speed: 577 rev/min at rated engine speed;
- Engine speed: 2808 rev/min at standard power take-off speed 540 rpm;
- Ratio of rotation speeds (engine speed/p.t.o. speed): 5.20;
- Direction of rotation (viewed facing driving end): clockwise.

- Speed proportional at engine speed:
  . 577 and 879 rev/min at 3000 rev/min of the engine;
  . 2807 or 1843 rev/min with rotating PTO at 540 rev/min.

- Speed proportional to travelling speed:
  . one PTO revolution for 0.162 m advancement;
  . 15.13 PTO rev/min for one revolution of driving wheels.

- Direction of rotation:
  . clockwise in forward speeds;
  . anti-clockwise in reverse speeds.

Accessory PTO

- Location:at rear of tractor central position, under the main PTO;
- Diameter of power take-off shaft end: 30mm;
- Number of splines: 6
- Distance from ground with tyres size 8.25/16: 380 mm;
- Distance from the median plane of the tractor 0 mm;
- Distance behind rear axle: 348 mm;

- Speed proportional at engine speed:
  . 577 and 879 rev/min at 3000 rev/min of the engine;
  . 2807 or 1843 rev/min with rotating PTO at 540 rev/min.

- Speed proportional to travelling speed:
  . one PTO revolution for 0.162 m advancement;
  . 15.13 PTO rev/min for one revolution of driving wheels.

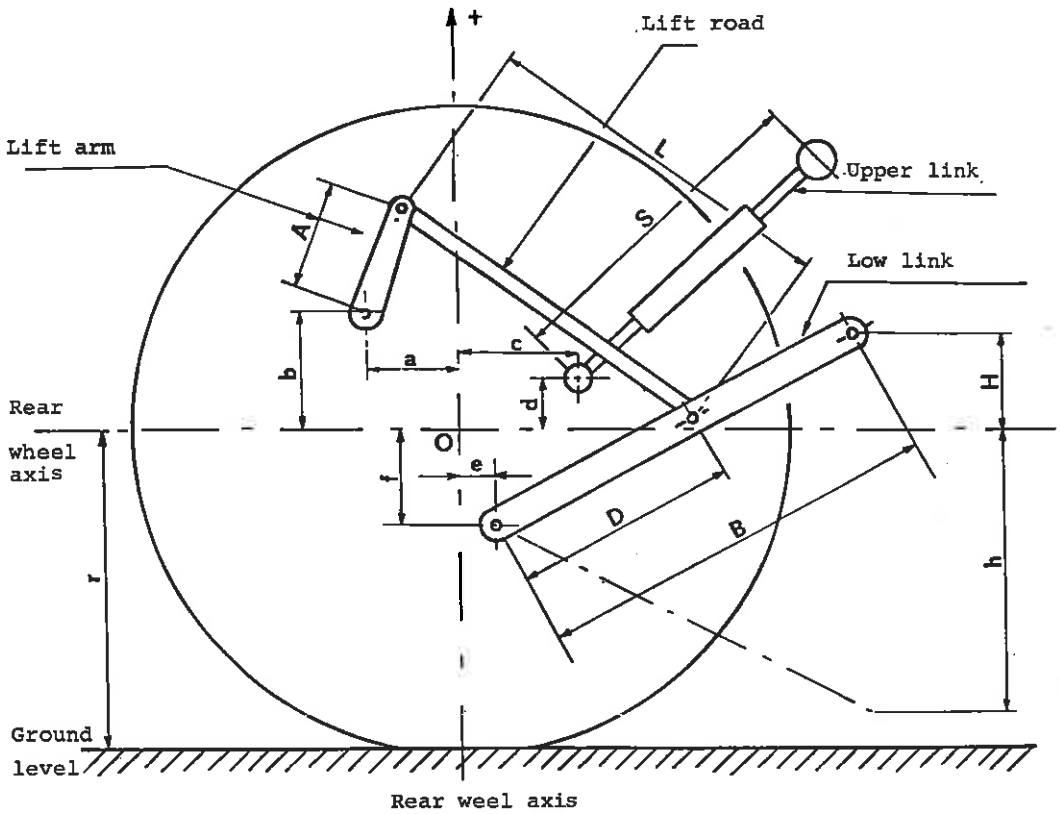
- Direction of rotation:
  . anti-clockwise in forward speeds;
  . clockwise in reverse speeds.

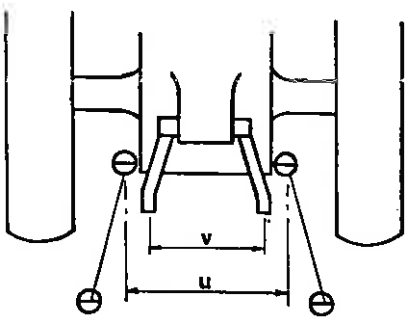
POWER LIFT

- Make: GOLDONI;
- Type: hydraulic system;
- Type and number of cylinders: 2 single acting cylinders;
- Type of locking for the transport: mechanical, with screwed tie rods that lock the lower links;
- Exercise valve pressure: 140 bar;
- Opening pressure of cylinder safety valve: 190 bar;
- Piston rod diameter: 54 mm;
- Stroke: 145 mm;
- Lift pump type: HIDROIRMA AP 2/6.5 S218, hydraulic pump, driven directly from engine;
- Transmission between pump and engine: mechanical;
- Oil capacity: 6.8 l;
- Site of oil reservoir: power lift box;
- Position and number of additional plugs: none;
- Four litres of oil, over the standard fill-up, are available in the circuit to operate one extra attachement with no need of additional distributor;
- Type and number of filters: 1, AIAS 19024, metallic cartridge;
- Changing oil and filter: every 800-1000 working hours;
- Recommended oil (see p.14).

Three-point linkage

- Category: 1N, unified, in conformity with ISO/DS 730/2 rules (see arms dimensions reported on annexed scheme)


+
Lift road
Lift arm
Upper link
Low link
L
S
A
a
b
c
d
e
f
D
B
H
h
r
O
Rear
wheel
axis
Ground
level
Rear weel axis


v
u

Specify the settings for the lifting test

Rear tyres (size 8.25/16) radius index	(r)	400 mm
Front tyre (size 8.25/16) radius index	(r')	400 mm
Length of lift arms	(A)	230 mm
Length of lower links	(B)	605 mm
Distance of lift arm :horizontally	(a)	80 mm
pivot point from rear :vertically	(b	285 mm
wheel centre line		
Horizontally distance between the 2 lower link points	(u)	385 mm
Horizontally distance between the 2 lift arm end points	(v)	336 mm
Length of upper link	(S)	490 mm
Distance of upper link horizontally	(c)	224 mm
pivot point from rear vertically	(d)	266 mm
wheel centre line		
Distance of lower link horizontally	(e)	110 mm
pivot point from rear vertically	(f)	109 mm
wheel centre		
Distance of lower link pivot points to lift rod pivot points on lower link	(D)	368 mm
Length of lift rods	(L)	450 mm
Height of lower hitch points:		
- in Low position	(h)	200 mm
- in High position relative to the rear wheel centre line, situated 400 mm above the ground level	(H)	200 mm

SWINGING DRAWBAR: none.

TRAILER HITCH

- Type: GOLDONI DGM-GA 628 B;
- Height above ground: 230 mm min. - 500 mm max.
  tyre size 8.25/16;
- Distance of hitch point from rear axle axis, horizontally: 395 mm;
- Distance of hitch point from power take-off shaft end:
  . vertically: 98 mm;
  . horizontally: 48 mm;
- Maximun vertical permissible load: 1255 daN.
- Range of adjustement: 0
- Diameter of hitch hole: 28 mm.

HOLED DRAWBAR: none.

STEERING

- Specifications: mechanical, TRW model 250 Q ref 15000162 steering wheel acting on the front wheels.

BRAKES

Service brake
- Make: GOLDONI;
- Model: RS.;
- Type: drum brake whit diameter 290*60 shoes acting on the rear wheels. Separate pedal control with rigid connection on mechanical transmission;
- Method of operation: mechanical acting with 2 pedals;
- Trailer braking take off: none.

Parking brake
- Type: hand operated, acting on the service brake;
- Method of operation: mechanically by hand lever.

STEERING WHEELS

- Number: 2;
- Location: at front;
- Tyres: radial;
  . Size: 8.25/16 IM 110;
  . Ply rating: 4;
  . Maximum permissible load on each tyre: 588 daN;

. Corresponding inflation pressure: 1.3 bar;
- Track width: 1010 mm;
- Regulation: none.

DRIVING WHEELS

- Number: 4;
- Location: 2 at front and 2 at rear;
- Tyres:
  . Size: 8.25/16 IM 110;
  . Ply rating: 4
  . Maximum permissible load on each tyre: 588 daN;
  . Corresponding inflation pressure: 1.3 bar;
- Track width: 1010 mm;
- Regulation: none.

WHEELBASE: 1155 mm.

DRIVER'S SEAT

- Make: GOLDONI;
- Type of suspension: rigid, rubber mounting, adjustable back and fore of about 20 mm from mid. position;
- Type of damping: shock absorber;
- Range of adjustment, longitudinal 20 mm;
  vertical none .

LIGHTING

Lighting system in accordance with CEE 78/933

	Height above ground of centre with tyre (mm) (1)	Size (mm)	Distance from out side edge of trac tor to centre at 1010 mm track width (mm)
Headligths	745	125	510
Front park.lights	670	70*20	330
Front finger post	695	70*50	330
Rear park.lights	840	70*60	195
Rear finger post	840	90*60	115
Stop	840	70*60	195
Reflectors	775	40*50	165

(1) Tyre size: 8.25/16 4 plr

TEST CONDITIONS

- Overall dimensions with tyres:
- Front 8.25/16 - Rear 8.25/16

	Length (mm) (mm)	Width (mm) min. (mm)	Width (mm) max. (mm)	Height max. (mm)
Without ballast	2920	1222	1222	1205

Ground clearance

-Clearance-limiting part: 215 mm, below front traction gear.

Track setting

- Front: 1010 mm;
- Rear: 1010 mm;

Tractor mass (without driver but with tanks full without protective structure)

	Units	Front	Rear	Total
Without ballast	kg	660	425	1085

Fuel and lubricants recommended and used in tests

Fuel
Type: AGIP DIESEL, DIN 51601 (in accordance with national standards);
Specific gravity at 15 °C: 0.840 g/cc;

Engine oil
- Type: ESSO TRACTOR LUBE UNIVERSAL SAE 20 W/40;
- Viscosity: 95 cSt;

Transmission oils;
- Type: ESSO gear oil GX 80/W-90;
- Viscosity: 99 cSt;

Hydraulic fluid;
- Type: ESSO NUTO H 68;
- Viscosity: 103 cSt;

Recommended grease: ESSO GP GREASE;
- Number of lubrication points: 5.

II - TEST RESULTS

A. COMPULSORY TESTS RESULTS

1) MAIN POWER TAKE-OFF PERFORMANCE

- Date and location of test: 17 th OCT 1986 - I.S.M.A. TREVIGLIO (BG) ITALY
- Type of dynamometer: ZOELLNER B 350 AC

Power	Speed		Fuel consumption			Specific
	Engine	P.T.O.	Hourly	Specific		Energy
KW	rev/min	rev/min	l/h	Kg/h	g/kWh	KW l/h
MAXIMUM POWER - 2 - HOUR TEST						
21.20	3000	577	7.32	6.15	289	2.90
POWER AT RATED ENGINE SPEED						
21.20	3000	577	7.32	6.15	289	2.90
STANDARD POWER TAKE-OFF SPEED (540+/-10 REV/MIN)						
20.50	2803	539	6.98	5.86	286	2.93
PART LOADS						
i) torque corresponding to maximum power at rated engine speed						
21.20	3000	577	7.32	6.15	289	2.90
ii) 85% of torque obtained in i)						
18.80	3131	602	6.49	5.45	290	2.89
iii) 75% of torque defined in ii)						
14.20	3167	609	5.01	4.21	296	2.84
iv) 50% of torque defined in ii)						
9.70	3210	617	3.65	3.06	315	2.65
v) 25% of torque defined in ii)						
4.80	3238	623	3.14	2.64	550	1.53
vi) unloaded						
---	3250	625	2.26	1.90	---	----

GOLDONI 933 RS.DT (4WD) TEST 027

PART LOADS AT STANDARD POWER TAKE-OFF SPEED

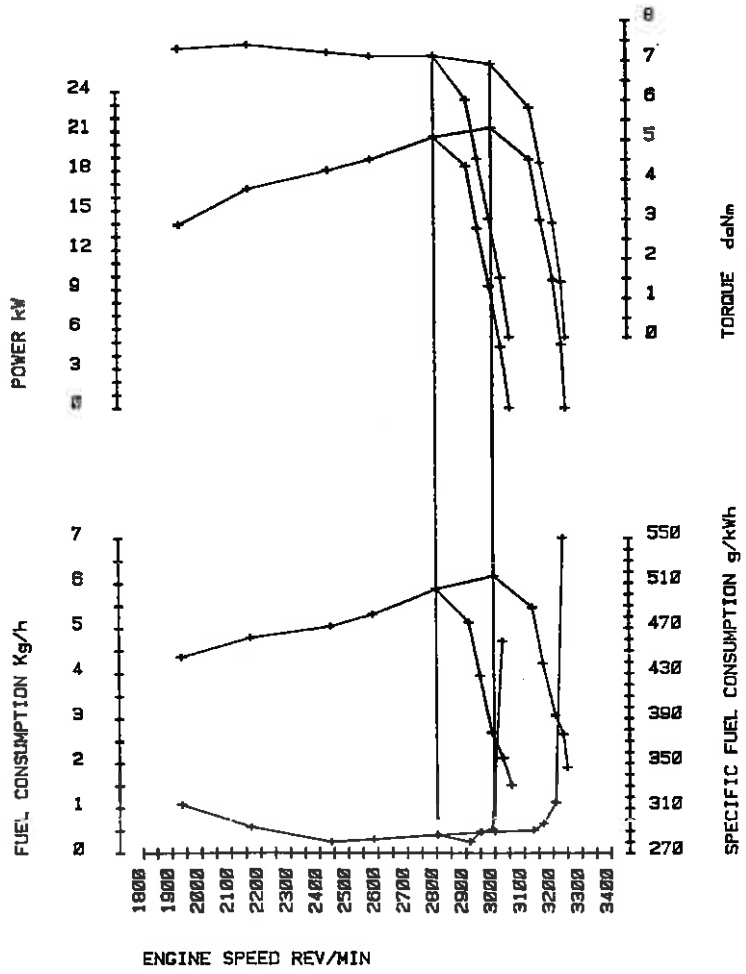
Power	Speed		Fuel consumption			Specific
	Engine	P.T.O.	Hourly	Specific		Energy
kW	rev/min	rev/min	l/h	kg/h	g/kWh	kW h/l
i) The torque corresponding to maximum power available						
20.50	2803	539	6.98	5.86	286	2.93
ii) 85% of torque obtained at maximum power						
18.30	2915	561	6.09	5.12	280	3.00
iii) 75% of torque defined in ii)						
13.60	2953	568	4.69	3.94	289	2.90
iv) 50% of torque defined in ii)						
9.20	**2992**	**576**	**3.18**	**2.68**	**291**	2.88
v) 25% of torque defined in ii)						
4.60	3029	583	2.52	2.12	458	1.83
vi) unload						
-	3058	588	1.78	1.50	-	-

STANDARD SPECIFIC FUEL CONSUMPTION: 290/280/315/291 g/kWh

- No load maximum engine speed: 3250 rev/min;
- Torque (1) at maximum power: 6.9 daNm;
- Maximum torque (1) (engine speed: 2166 rev/min): 7.40 daNm;
- Mean atmospheric conditions : Temperature 20°C;
  Pressure 1016 mbar;
  Relat.humidity 71%.
- Maximum temperatures : Coolant 103°C;
  Engine oil 135°C;
  Fuel 19°C;
  Engine air intake 30°C.

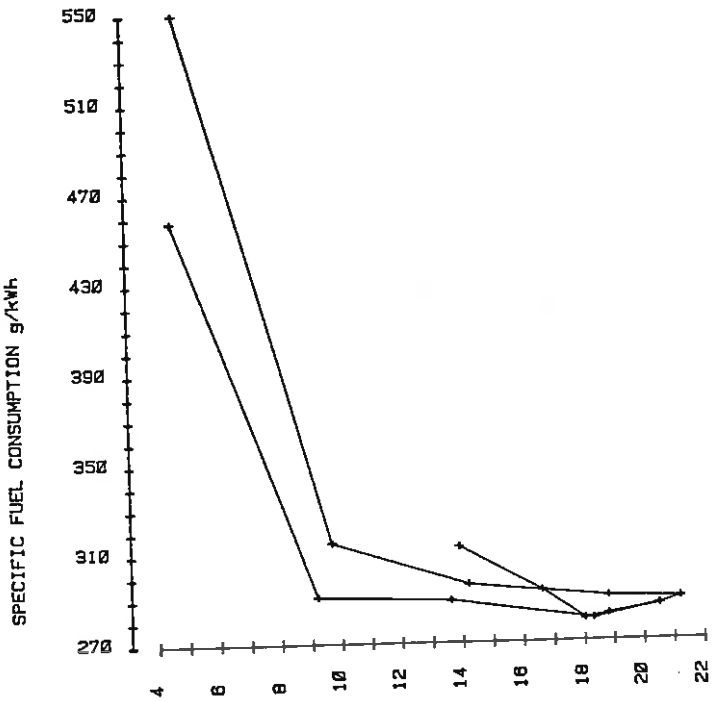
(1) The torque is the equivalent crankshaft torque.

p.t.o. PERFORMANCE



GOLDONI 933 RS.DT (4WD) TEST 027

p.t.o. PERFORMANCE



(2) POWER LIFT AND HYDRAULIC POWER TEST

- Date and location of tests: 27 th OCT 1986 - ISMA Treviglio (BG)

		at hitch point	on the frame
Height of lower hitch point above ground in down position	mm	200	200
Vertical movement	mm	400	415
Maximum corrected force exerted through full range	daN	980	650
Corresponding pressure of hydraulic fluid	bar	140	140
Moment about rear axle	daNm	0	861
Maximum tilt angle of mast over range of lift	Degrees	--	14.7

Lifting heights relative to the horizontal lower links

mm	- 90	0	100	200	300	310	325
Lifting forces at hitch points daN	980	1050	1190	1380	1460	1180	---
Lifting forces at test frame daN	1050	1000	980	960	940	----	750

HYDRAULIC POWER TEST

Sustained pressure with relief valve open: 155 bar;
Pump delivery rate at minimum pressure: 16 l/min;

Hydraulic power	kW	flow rate l/min	pressure bar	oil temp. °C
At 90% of the actual relief valve setting	3.2	14.0	140.0	--
Maximum	3.2	14.0	140.0	--

Tapping point used for test: directley on the hydraulic pump.
Hydraulic fluid: see p.16

ISTITUTO SPERIMENTALE PER
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SEZIONE DI TREVIGLIO

(3) MAXIMUM POWER TRANSMISSION AND FUEL CONSUMPTION AT THE DRAWBAR
(UNBALLASTED TRACTOR)

- Date of tests: 22/10/1986;
- Type of track: concrete;
- Type and size of tyres front: 8.25/16;
  rear : 8.15/16;

Height drawbar above ground : 340 mm;
Tyre inflation pressure : front 1.6 bar;
rear 1.6 bar;

Gear	Pow.	Draw. pull	Speed	Engine speed	Slip of wheel	Specific ener.cons.		Temperat. fuel	cool.eng.		Atm. condit. temp.	hum.	pres.
no.	kW	daN	km/h	rev/min	%	kWh/l	g/kWh	°C	°C	°C	°C	%	mbar
1) MAXIMUM DRAWBAR IN TESTED GEARS													
1S	2.79	922	1.09	3240	15.0	1.17	716	19	65	110	21	80	997
2S	5.57	873	2.30	3230	15.0	1.56	538	19	65	110	21	80	997
3S	10.54	873	4.35	3187	15.0	2.27	370	20	65	110	21	77	997
1F	13.78	871	5.70	3182	15.0	2.52	334	20	67	110	22	75	997
2F	18.04	520	12.5	3000	9.0	2.33	345	20	67	110	22	75	997
3F	13.20	186	25.5	3000	4.0	1.70	492	20	67	110	22	75	997

Gear	Pow.	Draw. pull	Speed	Engine speed	Slip of wheel	Specific ener.cons.	Temperat. fuel	cool.eng.	Atm.condit. temp.	hum.	pres
no	kW	daN	km/h	rev/min	%	kWh/l g/kWh	°C	°C	°C	°C	%	mbar
TRANSMISSION AND FUEL CONSUMPTIOM CHARACTERISTICS												
i) - Selected gear												
2F	18.04	520	12.50	3000	9	2.33 345	20	67	110	22	75	997
ii) - 75% Of pull at maximum power												
2F	14.37	389	13.30	3035	8	2.04 410	20	67	110	22	75	997
iii) - 50% of pull at maximum power												
2F	9.88	260	13.70	3080	6	1.47 572	20	67	110	22	85	997

* Tests in 3F gear cannot be given because the due load was insustainable.

ISTITUTO SPERIMENTALE PER
LA MECCANIZZAZIONE AGRICOLA
SEZIONE DI TREVIGLIO

REMARKS: none

TEST ENGINEER
(ing.Giovanni SANTORO)

THE DIRECTOR OF TESTING STATION
(prof.Giuseppe COLZANI)

HEAD OF ISMA - ROMA
(prof.Alfio CAMMILLI)

Data processing: Ing. G.Giacometti
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