Comitato di Coordinamento per l'Omologazione
delle Macchine Agricole in Italia

REPORT No. 305/O.E.C.D.

**REPORT ON TEST IN ACCORDANCE WITH O.E.C.D.
TEST CODE FOR AGRICULTURAL TRACTORS**

FERRARI MT 65/30/L DIESEL TRACTOR

Manufactured by: **FERRARI S.p.A.**
LUZZARA (Reggio Emilia) - Italy



DATE OF TESTS: SEPTEMBER - NOVEMBER 1968

This report has been approved by the O.E.C.D. Coordinating Center (C.N.E.E.M.A., France)
as being in accordance with the O.E.C.D. Tractor Test Code
Date of approval: 4th July 1969 Serial No.: 275

CONSIGLIO NAZIONALE DELLE RICERCHE

LABORATORIO

PER LA MECCANIZZAZIONE AGRICOLA

Torino - Italy

This Bulletin is based on engineering tests in accordance with the O.E.C.D. Tractor Code. It does not contain an evaluation of the performance of the tractor on practical farm work.

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OPTIONAL TESTS

- None

PERFORMANCE CURVES

	Fig. No.
a) **Power take-off tests**	
— Power take-off horsepower, equivalent crankshaft torque, hourly and specific fuel consumption / engine speed	1
— Specific fuel consumption / power take-off horsepower	2
b) **Drawbar tests**	
— Power and percentual wheelslip / drawbar pull	3
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Manufacturer:	FERRARI S.p.A. LUZZARA (Reggio Emilia) - Italy
Submitted for tests by:	The manufacturer.
Selection:	Selected by the manufacturer with the agreement of the « LABORATORIO PER LA MECCANIZZAZIONE AGRICOLA ».
Place of running-in:	FERRARI S.p.A. workshop - LUZZARA - Italy.
Duration of running-in:	engine: 50 hrs; power take-off: 20 hrs; transmission: 30 hrs.

SPECIFICATION OF TRACTOR

TRACTOR

Make:	FERRARI.
Model:	MT 65/30/L.
Type:	four wheel drive, articulated steering frame.
Serial number:	50288.

ENGINE

Make:	LOMBARDINI.
Model:	LDA 672.
Type:	4 strokes, direct injection Diesel.
Serial number:	554535.

Cylinders: two cylinders, vertical: bore 95 mm; stroke 95 mm; total capacity 1346 cm^3; compression ratio 17,5 : 1; overhead valves; replaceable cylinder liners.

Fuel system: Forced feed; FISPA diaphragm-type pump, FIAMM model FNA 32/01 cartridge type paper filter; capacity of fuel tank 16 liters.
BOSCH injection pump, model PFR - 2K 70, serial No. 334/2; manufacturer's production setting: 40÷42 mm^3 per cycle at 1500 rev/min of the pump, fuel temperature 15°C. BOSIO injection nozzles, model BLL 160 SL 30; injection pressure 210±5 kg/cm^2.

Governor: Make Lombardini; mechanical type with centrifugal weights, separate from injection pump; governed range of engine speed 1000 to 3200 rev/min, rated engine speed 3000 rev/min.

Air cleaner: FISPA oil bath type, oil capacity 0,5 liters with centrifugal precleaner.

Lubrication system: Forced feed from gear type pump; replaceable cartridge type paper filter; recommended oil change period 100 hrs; recommended paper filter change period 400 hrs. Oil sump capacity 4.350 liters.

Cooling system: Air cooled impeller assisted. Impeller diameter 201 mm with 10 blades.

Starting system: Electric: BOSCH, type JD (R), 12 V, 1,8 HP motor.

ELECTRICAL SYSTEM:

Voltage:	12 Volts.
Generator:	DUCATI, model E 52 1156 54 alternator.
Battery:	FIAMM model 6 D 4 TR, lead, capacity 80 Ah.

TRANSMISSION:

Clutch: make PITTERI-VIOLINI, model F 215 single dry plate type, diameter 215 mm; pedal operated.

Gearbox: Own make; mechanical; sliding gear type; 8 forward speeds and 4 reverse obtained with two geardrives one with two and the other with four speeds.

Front and rear axles and final transmission: Own make, model MT 65; two planetary differential, helical bevel gears; claw clutch lock (on the rear axle) hand lever operated with automatic release; final straight-tooth reduction gears.
The front and rear axels are connected by a double universal joint.

Oil capacities: Gearbox and final front transmission 15 liters; final rear transmission 6 liters; final reduction gears 1 liter each. Recommended oil change period 1200 working hrs.

GEAR	NUMBER OF ENGINE REVOLUTIONS FOR ONE REVOLUTION OF DRIVING WHEELS	NOMINAL TRAVELLING SPEED AT 3000 rev/min ENGINE SPEED km/h
I	323.011	1.27
II	200.457	2.05
III	144.289	2.84
IV	106.110	3.87
V	65.358	6.23
VI	54.093	7.59
VII	47.418	8.65
VIII	17.910	22.91
I R.	227.691	1.80
II R.	141.473	2.90
III R.	101.791	4.03
IV R.	38.585	10.64

POWER TAKE-OFF:

At rear of tractor in vertical centre plane, working indipendent or connected to the main gearbox, hand lever operated.
Diameter 34,9 mm (1 3/8") according to ISO recommendations; 6 splines, height above ground 400 mm.
Speeds of p.t.o. proporzional to an engine speed of 3000 rev/min with anticlockwise direction viewed from tractor rear: 638, 894, 1941, 2720 rev/min.
Speeds of p.t.o. proportional to an engine speed of 3000 rev/min with clockwise direction: 906, 1266 rev/min.
Speed proportional to travelling speed: one revolution of p.t.o. for 0.039 to 0.337 m of travel.
Number of revolutions of p.t.o. for one revolution of driving wheels 16.12 to 68.69.

BELT PULLEY:

Location: At rear of tractor, driven by the p.t.o. directly or by the intermediate of a bevel gear reduction (rate of reduction 14/15).

Diameter/width: 190 mm x 70 mm.

SPEEDS OF PULLEY AT 3000 rev/min ENGINE SPEED

COUPLING			
Direct		Reduction gear	
Rotation speed rev/min	Linear speed m/sec	Rotation speed rev/min	Linear speed m/sec
Clockwise direction			
638	6.34	595	5.92
894	8.89	834	8.29
1941	19.29	1811	18.00
2720	27.04	2538	25.23
Anticlockwise direction			
906	9.01	845	8.41
1266	12.58	1181	11.74

When the reduction is used the direction of rotation may be changed a rotation of 180° of the pulley assembly.

POWER LIFT: Own make, hydraulic model MT 65; operated by a gear type pump, maximum working pressure 100 kg/cm².
Three point locking device for implements, operating force and position controlled.
Total oil capacity of gearbox, final transmission and hydraulic lift: 15 liters.
Vertical maximum lift movement above ground 420 mm (from 280 mm above ground).
Vertical minimum lift movement above ground 360 mm (form 240 mm above ground).

HITCH:

Clevis type, vertical height adjustable on drilled sliding guide: height above ground level of clevis center: three positions from 330 to 710 mm.
Hitch connecting hole: diameter 28 mm, distance from rear axle 330 mm.
Position referred to power take-off: vertical distance (above p.t.o.) 0 to 310 mm, horizontal distance (backwards) 140 mm.

STEERING:

Own make; hydraulic type, working on center tractor pivot with: steering wheel, DANFOSS model ORBITROL hydrostatic actuator, connecting rod.

BRAKES:

Mechanical, type, with drum and expanding shoes on rear axle; operated by a single pedal for normal braking action and by a hand lever with ratchet for parking.

DRIVE WHEELS:

Two at front and two at rear; « Tractor Agricolo » 7.50 - 16 tyres (4 ply rating front tyres and 2 ply rating rear tyres); rim 5.50 F.
Maximum permissible weight on each tyre: front tyres 485 kg at 1,2 kg/cm² pressure; rear tyres 360 kg at 0,8 kg/cm² pressure.
Track width: 680 and 840 mm changed by reversing inner and outer wheel centers.
Wheel base: 1040 mm.

TRACTOR WEIGHTS:
(without driver, with tanks full)

— front 735 kg
— rear 345 kg
— total 1080 kg.

SEAT:

Own make, mounted on a flat spring support; upholtered rubber cushion.

NUMBER OF GREASE POINTS:

Sixteen.

GENERAL DIMENSIONS:

— overall lenght: 2.68 m
— width: minimum 0,87 m, maximum 1.03 m
— minimum ground clearance (to underside of gearbox): 0.28 m.

LIGHTING

	HEIGHT ABOVE GROUND OF CENTER	DIAMETER	DISTANCE OF CENTRE FROM OUTSIDE EDGE OF TRACTOR
	cm	cm	cm
Headlights	95	10	37
Side lights	95	10	37
Rear lights	88	4	23
Reflectors	83	6	23

SPECIAL EQUIPMENT: The tractor may be equipped (optional) with a special device which permits the rotation of the seat of an angle of 180° and its positioning on the tractor hood. This arrangement allows the use of the 4 reverse gears for travelling and the possibility of fixing implements to the p.t.o. in frontal position.

FUELS AND LUBRICANTS USED IN TESTS

LABORATORY TESTS

Fuel: Diesel oil, density 0.831 kg/l at 15°C, cetane number not recorded.

Engine oil: TRACTOR OIL UNIVERSAL S1, SAE 20W-40.

Transmission oil: TRACTOR OIL UNIVERSAL S1, SAE 20W-40.

TESTS ON ARTIFICIAL TRACK

Fuel: Diesel oil, density 0.831 kg/l at 15°C, cetane number not recorded.

Engine oil: TRACTOR OIL UNIVERSAL S1, SAE 20W-40.

Transmission oil: TRACTOR OIL UNIVERSAL S1, SAE 20W-40.

COMPULSORY TESTS

1 POWER TAKE-OFF PERFORMANCE

Date and location of tests: July 1968 - L.M.A. - TURIN (Italy)

Type of dynamometer: Electric, dynamo with swinging frame

POWER	SPEEDS		FUEL CONSUMPTION		
	ENGINE	POWER TAKE-OFF	HOURLY	SPECIFIC	HPh/UNIT VOLUME
HP	rev/min	rev/min	l/h	g/HPh	HPh/l
A - MAXIMUM POWER - 2 hrs					
28.37	3000	638	7.22	212	3.93
B - STANDARD P.T.O. SPEED (540 rev/min)					
26.31	2539	540	6.35	201	4.14
C - SPEED RECOMMENDED BY MANUFACTURER FOR DRAWBAR WORK					
28.37	3000	638	7.22	212	3.93
D - PARTS LOADS					
25.10	3120	664	6.21	206	4.04
—	3192	—	2.29	—	—
12.78	3180	676	3.90	254	3.28
28.37	3000	638	7.22	212	3.93
6.42	3187	679	3.18	343	2.02
19.13	3175	675	4.77	207	4.01

No load maximum engine speed: 3192 rev/min

Crankshaft torque at maximum power: 6.77 mkg

Maximum crankshaft torque: 7.65 mkg at 2000 rev/min

Mean atmospheric conditions:
- temperature 26.5°C
- pressure 745.5 mmHg
- humidity 64%

Maximum working temperatures:
- coolant 90°C
- fuel 28.5°C
- engine oil 125°C

2 DRAWBAR PERFORMANCE

Date of tests: 6-7-8th November 1968
Type of track: cement
Height of drawbar above ground: 330 mm

GEAR	POWER	DRAWBAR PULL	TRAVELLING SPEED	ENGINE SPEED	WHEEL SLIP	FUEL CONSUMPTION		TEMPERATURE			ATMOSPHERIC CONDITIONS		
						HPh/UNIT VOLUME	SPECIFIC	FUEL	COOLING AIR	ENGINE OIL	TEMPE-RATURE	RELATIVE HUMIDITY	PRESSURE
No.	HP	kg	km/h	rev/min	%	HPh/l	g/HPh	°C	°C	°C	°C	%	mmHg
1 - MAXIMUM POWER													
I	4.68	1054	1.20	3194	14.6	—	—	23.0	76.0	112	13.1	96	739.9
II	7.64	1075	1.92	3172	14.6	2.20	390	23.0	76.0	112	13.1	96	739.9
III	10.60	1080	2.65	3159	14.6	2.55	325	23.0	78.0	112	13.0	96	739.9
IV	14.50	1097	3.57	3126	14.4	2.88	289	23.0	78.0	114	13.0	96	739.9
V	21.94	1075	5.51	3002	14.6	3.01	277	25.0	84.0	118	12.5	89	740.2
VI	23.71	903	7.09	3007	10.0	3.19	261	25.0	86.0	120	12.5	89	740.2
VII	24.08	790	8.24	2956	6.7	3.29	253	25.0	86.0	120	12.5	89	740.5
2 - FIVE HOUR TEST AT 75% OF PULL AT MAXIMUM POWER													
VII	18.84	585	8.74	3078	4.5	2.93	283	23.0	84.0	116	7.0	89	739.8
3 - FIVE HOUR TEST AT PULL CORRESPONDING TO 15% WHEELSLIP IN TEST I (*)													
III	11.22	1082	2.80	3148	8.7	2.70	308	23.0	76.0	112	7.5	95	741.2

OIL CONSUMPTION DURING TEN HOURS DURATION OF TESTS (2) and (3): 25 g/h

(*) Test n. 3 was carried out with 300 kg ballast.

3-4 TURNING SPACE AND TURNING CIRCLE

Details of wheel equipment: as in specification without ballast front and rear 840 mm

Track of wheels:

		WITHOUT BRAKES	
		Right Hand	Left Hand
Radius of turning space	m	2.40	2.45
Radius of turning circle	m	2.30	2.35

No « with brake » tests has been carried out since tractor is not provided with steering brakes.

5 LOCATION OF CENTER OF GRAVITY

	mm
Height above ground	539
Distance forward from the vertical plane containing the axis of the rear wheels	665
Distance from the median plane of tractor	0

6 BRAKING

Date of test: 20th November 1968

Type of track: cement

Cold brakes:

Travelling speed of tractor	km/h	19.50
Deceleration	m/s	5.80
Stopping distance	m	5.40
Force on brake pedal	kg	32

Brake fade characteristics (hot tests):

Deceleration hot / deceleration cold x 100: 105%

Stopping distance cold / stopping distance hot x 100: 104%

Force on pedal cold / force on pedal hot x 100: 87%

Efficiency of hand brake:

No rotation of wheel is noticed when tractor is pulled forward or backward with hand brake locked

Pull on hand brake: — cold 35 kg
— hot 35 kg

7 MEASUREMENT OF AMBIENT NOISE EMITTED BY THE TRACTOR

Date of tests: 7th November 1968

Type of sound level meter: ELIT Mod. 905

Type of track: cement

Results of tests:
— gear VIII
— travelling speed 22.10 km/h
— sound level 97 dBA

8 NOISE MEASUREMENT AT THE DRIVER'S EAR LEVEL

Date of tests: 7th November 1968

Type of sound level meter and octave filter: ELIT Mod. 905 and ELIT Mod. 955

Type of track: cement

Type of frequency analyzer: octave type, with 10 frequency bands 31.5 to 16.000 Hz

RESULTS OF TESTS

GEAR	TRAVELLING SPEED km/h	LOUDNESS sones
VI	5.40	92
VII	8.45	119

9 POWER LIFT AND HYDRAULIC PUMP PERFORMANCE

Date and location of tests: 5th November 1968 - L.M.A. - Turin (Italy)

Hydraulic fluid: TRACTOR OIL UNIVERSAL S1, SAE 20W-40
Viscosity index 115

	VERTICAL MOVEMENT	MAXIMUM FORCE EXERTED THROUGH FULL RANGE	PRESSURE	LINKAGE LOAD AT WHICH UNBALLASTED FRONT END OF TRACTOR LIFTS OFF THE GROUND
	mm	kg	kg/cm²	kg
Linkage giving maximum mechanical advantage				
— At lower hitch points (height above ground in down position 240 mm)	360	750	100	—
— On standard frame	390	550	100	500
Linkage giving minimum mechanical advantage				
— At lower hitch points (height above ground in down position 280 mm)	420	700	100	—
— On standard frame	450	520	100	500

Type of linkage lock for transport: hydraulic

Opening pressure of relief valve: 90 kg/cm²

PUMP CHARACTERISTICS:

1) — **opening pressure of relief valve:** 90 kg/cm²
— **sustained pressure of the open relief valve:** 100 kg/cm²

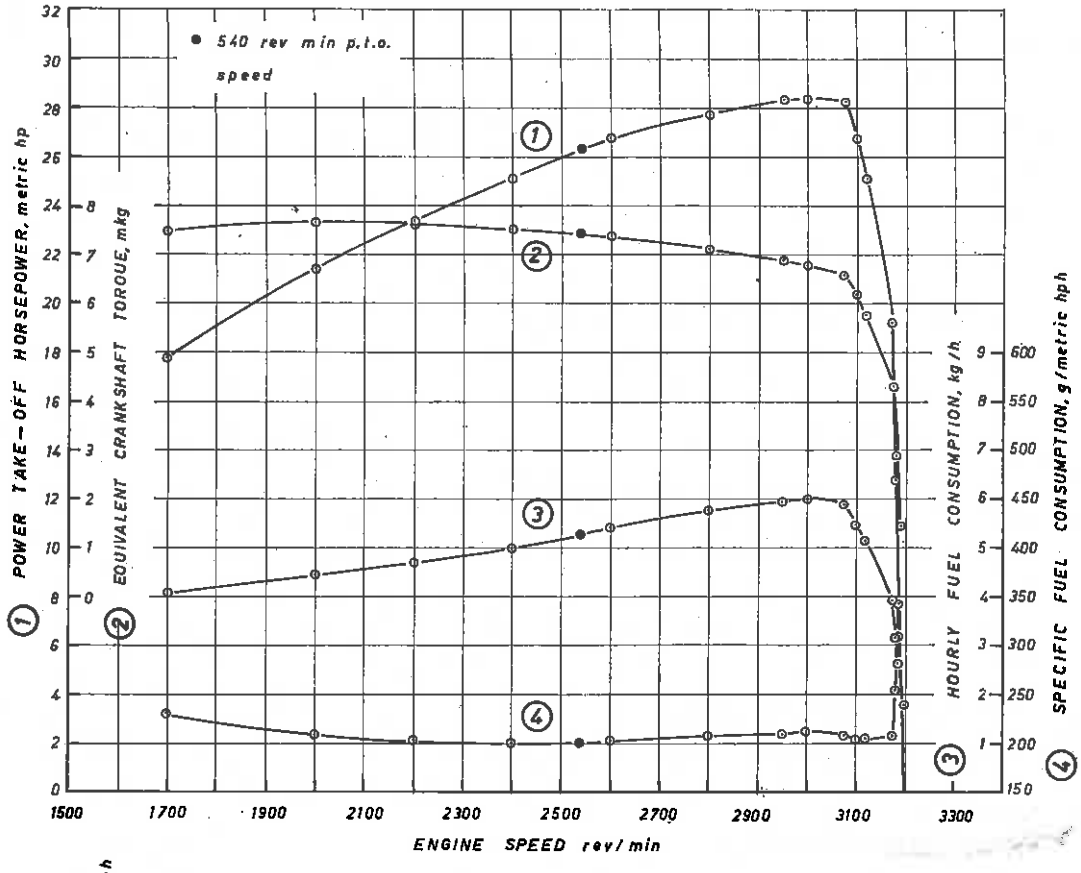
2) — **pump delivery rate at 1500 rev/min at minimum pressure:** 10.1 l/min

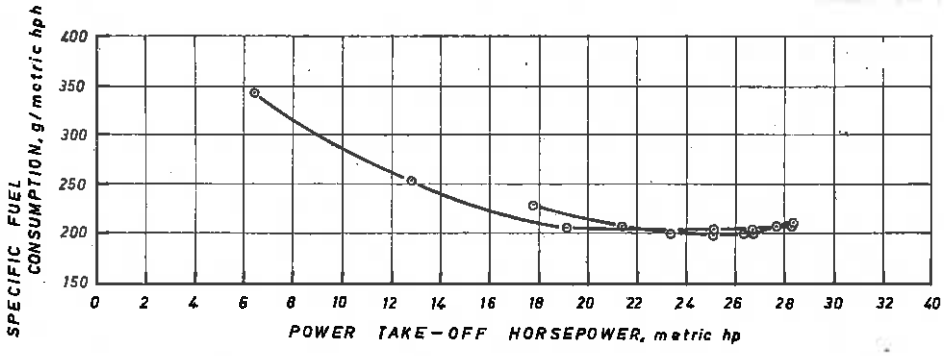
3) — **maximum hydraulic power at 1500 rev/min:** 2.7 HP
— **corresponding pressure:** 100 kg/cm²
— **at delivery rate:** 9.2 l/min

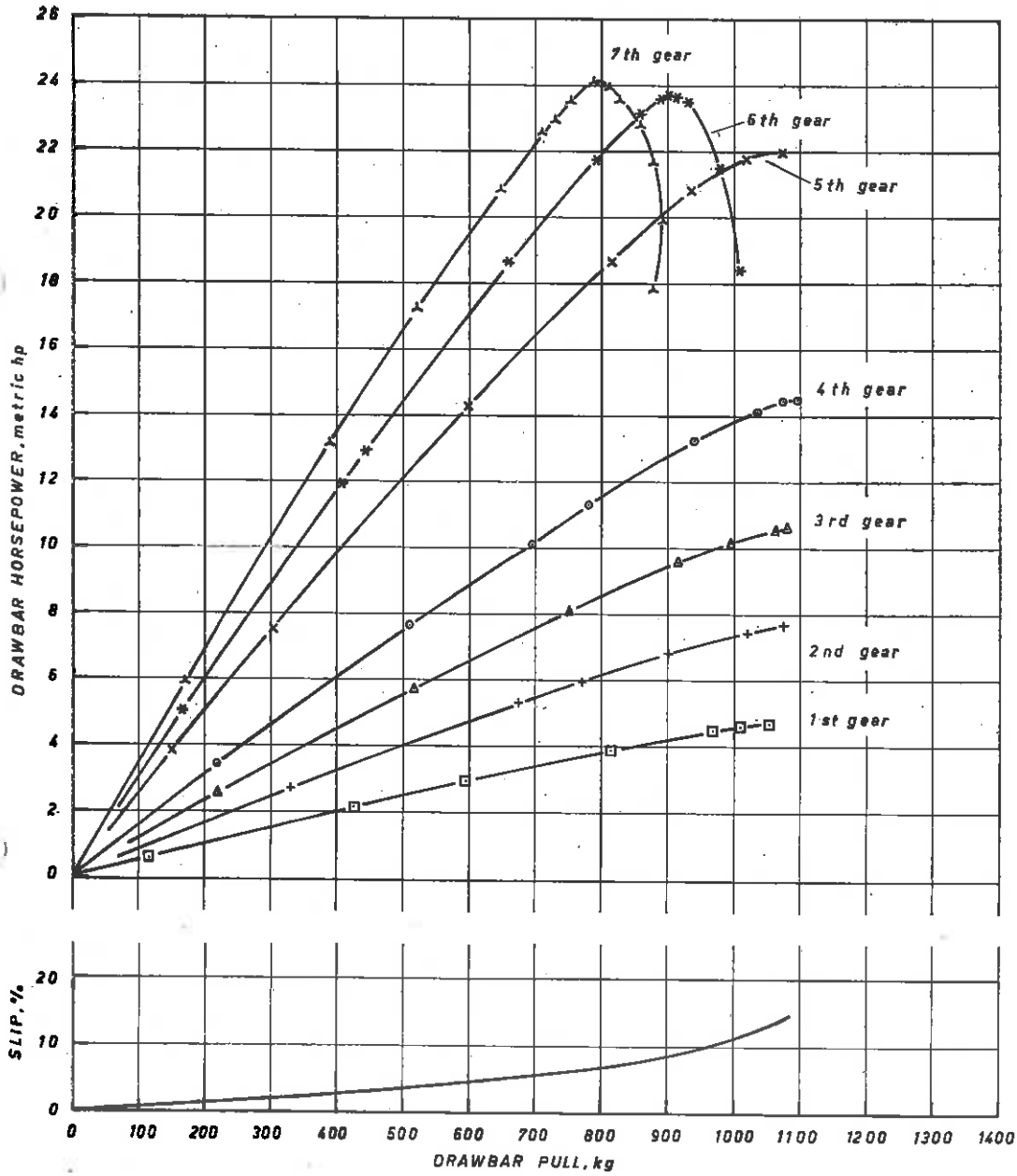
OFFICER IN CHARGE
(Ing. R. Gioia)

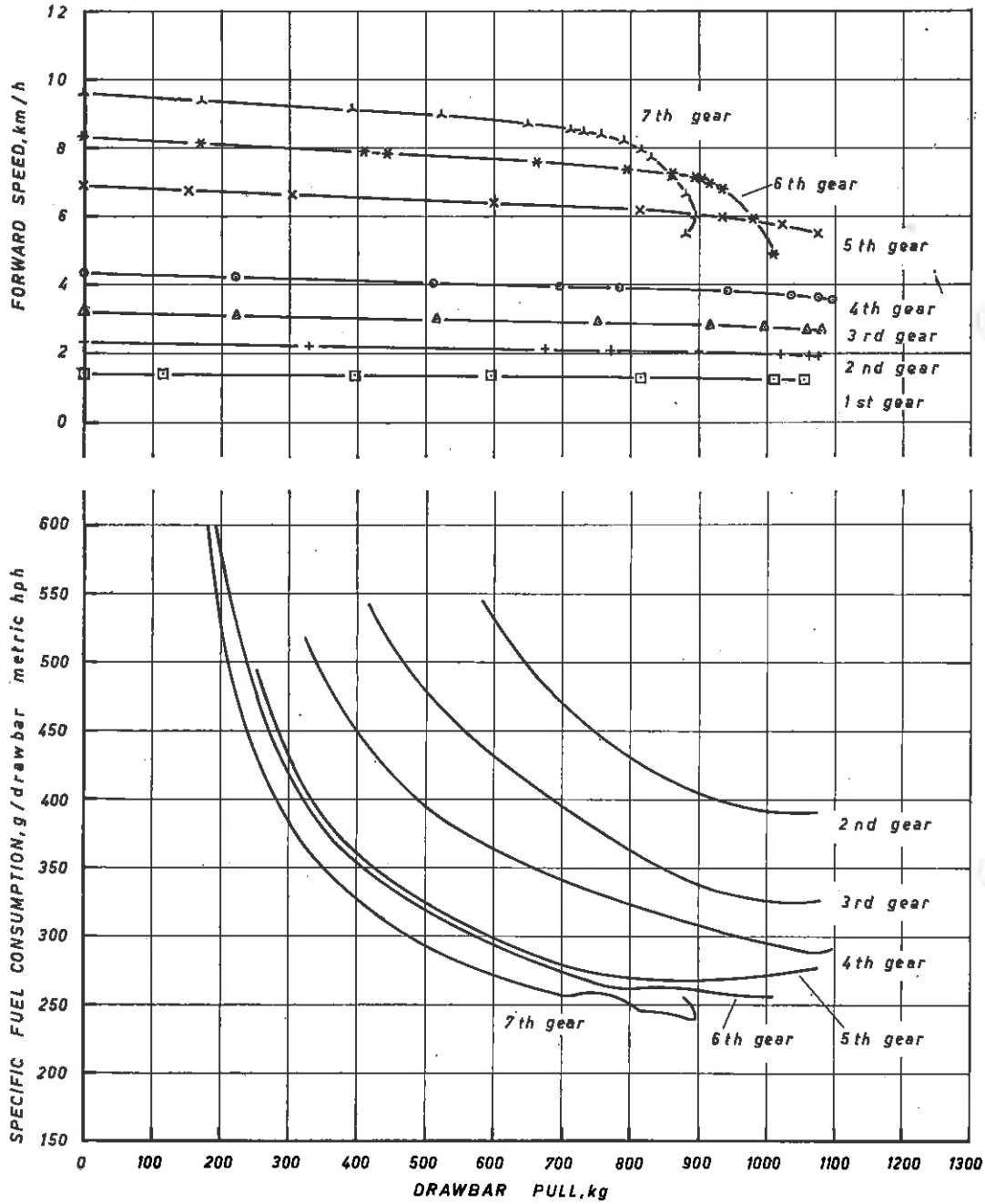
HEAD OF L.M.A.
(Dott. L. Lisa)

Turin, 28th January 1969


● 540 rev min p.t.o. speed
1 POWER TAKE-OFF HORSEPOWER, metric hp
2 EQUIVALENT CRANKSHAFT TORQUE, mkg
3 HOURLY FUEL CONSUMPTION, kg/h
4 SPECIFIC FUEL CONSUMPTION, g/metric hph
ENGINE SPEED rev/min
1500 1700 1900 2100 2300 2500 2700 2900 3100 3300


SPECIFIC FUEL CONSUMPTION, g/metric hph
POWER TAKE-OFF HORSEPOWER, metric hp


7th gear
6th gear
5th gear
4th gear
3rd gear
2nd gear
1st gear
DRAWBAR HORSEPOWER, metric hp
SLIP, %
DRAWBAR PULL, kg
0
2
4
6
8
10
12
14
16
18
20
22
24
26
100
200
300
400
500
600
700
800
900
1000
1100
1200
1300
1400


FORWARD SPEED, km/h
12
10
8
6
4
2
0
7th gear
6th gear
5th gear
4th gear
3rd gear
2nd gear
1st gear
SPECIFIC FUEL CONSUMPTION, g/drawbar metric hph
600
550
500
450
400
350
300
250
200
150
2nd gear
3rd gear
4th gear
7th gear
6th gear
5th gear
0
100
200
300
400
500
600
700
800
900
1000
1100
1200
1300
DRAWBAR PULL, kg