OECD Approval No. : 2/2 182
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Report on test in accordance with
OECD STANDARD CODE 2
for the Official Testing of Agricultural and Forestry Tractors



Agricultural Tractor

RENAULT CERES 316 (4 WD) TRACTOR

M 1322 – 30 km/h

Manufactured by	:	**M/s International Tractors Ltd.** Village - Chak Gujran P.O. - Piplanwala, Jalandhar Road, Distt. **HOSHIARPUR** (Punjab) 146 022, **INDIA**
Submitted for test by	:	**The manufacturer**
Report No.	:	**T- 506/988/08/OECD**
Date	:	**October, 2004**

GOVERNMENT OF INDIA
Ministry of Agriculture, (Deptt. of Agriculture and Co-opn.)
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Statement

The information opposite each item in the specification portion of this report has been validated by the Testing Station. An item marked [C] indicates to the test report user that the information declared by the manufacturer has been checked whereas an item marked [D] indicates that the manufacturer's declaration has been endorsed.

[C]	Tractor manufacturer's name and address	:	**M/s International Tractors Limited,** Village - Chak Gujran, P.O. - Piplanwala, Jalandhar Road, Distt. **HOSHIARPUR** (PUNJAB) 146 022, INDIA
[D]	Location of tractor assembly	:	Village - Chak Gujran, P.O. - Piplanwala, Jalandhar Road, Distt. **HOSHIARPUR** (PUNJAB) 146 022, INDIA
[D]	Submitted for test by	:	The manufacturer
[C]	Selected for test by	:	The manufacturer with agreement of the testing station.
[D]	Place of running-in	:	Village - Chak Gujran, P.O. - Piplanwala, Jalandhar Road, Distt. **HOSHIARPUR** (PUNJAB) 146 022, INDIA
[D]	Duration of running-in	:	35 hours
[C]	Location of test	:	Government of India, Central Farm Machinery Training and Testing Institute, P.O.- Tractor Nagar, BUDNI – 466445 (M.P.), INDIA

1. SPECIFICATIONS OF TRACTOR

1.1 Identification:

1.1.1

[C]	Make of tractor	:	RENAULT
[C]	Model (trade name)	:	CERES 316
[C]	Type	:	4 WD, Agricultural Tractor

1.1.2 Numbers:

[D]	1st Serial No. or prototype	:	M 1322 WB 13200001K01
[C]	Serial No.	:	M 1322 WB 13200030A03

1.1.3 Other specification:

[D]	Model(s) for other countries	:	None
[C]	Transmission type or gear ranges	:	28 – speed, Mechanical synchromesh
[C]	Speed version	:	30 km/h
[D]	Manufacturer identification or technical type No.	:	M 1322

1.2	**Engine:**		
[C]	Make	:	Sonalika
[C]	Model	:	4100F Ceres
[C]	Type	:	4 stroke, water cooled, direct injection, diesel engine
[C]	Serial No.	:	RS 4100 F 22I22598
1.2.1	**Cylinders:**		
[C]	Number and disposition	:	Four, Vertical, In-line
[D]	Bore/Stroke	:	100mm / 110mm
[D]	Capacity	:	3456 cm^3
[D]	Compression ratio	:	17.4:1
[D]	Arrangement of valves	:	Overhead
[D]	Cylinder liners	:	Wet
1.2.2	**Supercharging**	:	Not provided
1.2.3	**Fuel system:**		
[C]	Fuel feed system	:	Lift pump piston - type, integral with fuel injection pump.
	Filter(s):		
[C]	Make	:	MICO LIC BOSCH, India
[C]	Model	:	F 002 H20 109
[C]	Type	:	Primary Cloth and secondary Paper element
[C]	Number	:	Two
[D]	**Capacity of fuel tank**	:	143 dm^3
	Injection pump:		
[C]	Make	:	MICO LIC BOSCH, India
[C]	Model	:	E 040 1338 00
[C]	Type	:	Plunger, In-line,
[C]	Serial Number		28600001
	Manufacturer's production setting of injection pump:		
[C]	Flow rate (rated engine speed & full load)	:	12.10 to 12.80 dm^3 /h
[D]	Timing	:	18 $\pm$ 1° before TDC
	Injectors:		
[D]	Make	:	MICO LIC BOSCH, India
[D]	Model	:	F 002 C70 211 287
[D]	Type	:	Multihole
[D]	Injection pressure	:	20.59 + 0.98 MPa
1.2.4	**Governor:**		
[C]	Make	:	MICO LIC BOSCH, India
[C]	Model	:	E 042 123 100
[C]	Type	:	Mechanical, variable speed
[C]	Governed range of engine speed	:	600-2550 rev/min
[C]	Rated engine speed	:	2350 $\pm$ 50 rev/min

1.2.5	**Air cleaner:**		
	Pre-cleaner:		
[C]	Make	:	LUMAX
[C]	Model	:	None
[C]	Type	:	Centrifugal with transparent dust collector
[C]	Location of air intake	:	On top of main air cleaner tube, forward of radiator outside the bonnet.
	Main cleaner:		
[C]	Make	:	LUMAX
[C]	Model	:	None
[C]	Type	:	Oil bath
[C]	Maintenance indicator	:	None
1.2.6	**Lubricating System:**		
[D]	Type of feed pump	:	Gear type
[C]	Type of filter(s)	:	Spin-on type with paper element
[C]	Number of filter(s)	:	One
1.2.7	**Cooling System:**		
[C]	Type of coolant	:	Water
[D]	Type of pump	:	Centrifugal, belt driven
	Specification of fan:		
[C]	Number of fan blades	:	6
[C]	Fan diameter	:	380 mm
[D]	Coolant capacity	:	11.3 dm^3
[C]	Type of temperature control	:	Thermostat
[D]	Superpressure system	:	49 kPa
1.2.8	**Starting system:**		
[C]	Make	:	LUCAS TVS, India
[C]	Model	:	3SM114 PE
[C]	Type	:	Electrical, solenoid operated
[D]	Starter motor power rating	:	2.9 kW
[C]	Cold starting aid	:	None
[C]	Safety device	:	Starting inoperable unless main gear shifting lever is in neutral position.
1.2.9	**Electrical System:**		
[C]	Voltage	:	12 V
	Generator:		
[C]	Make	:	LUCAS TVS, India
[C]	Model	:	A 115 - 36
[C]	Type	:	Alternator
[D]	Power	:	0.54 kW
	Battery:		
[C]	Number	:	One
[D]	Rating	:	120 Ah at 20 hours

1.2.10 Exhaust System:

[C]	Make	:	ARVIN
[C]	Model	:	None
[C]	Type	:	Vertical (updraft),
[C]	Location	:	On right hand side of engine

1.3 Transmission:

1.3.1 Clutch (Travel and power take-off):

[D]	Make	:	LUK- INDIA
[D]	Model	:	None
[D]	Type	:	Dual dry for traveling and PTO
[D]	Number of plates	:	Two
[D]	Diameter of plates	:	280 mm (Both travel & PTO)
[C]	Method of operation:		
	- Travel	:	By a pedal on LHS
	- PTO	:	By a hand lever on LHS

1.3.2 Gear Box:

[D]	Make	:	RENAULT
[D]	Model	:	B41-26
[D]	Type	:	Mechanical, Synchromesh

[C] **Description**

		Forward	Reverse
[C]	Number of gears	5	5
[C]	Number of groups	2 ('T' &'Ra')	2 ('T' &'Ra')
[C]	Number of ranges	3 ('L, `M' & `H')	('L', `M' & `H')
[C]	Total of arrangements*	28	28

* '5T' and '5 Ra' in the high range are not available.

'T' = Tortoise 'Ra' = Rabbit 'L' = Low 'M' = Medium 'H' = High

[D] Available options : None

1.3.3 Rear axle and final drives:

[D]	Make	:	RENAULT
[D]	Model	:	P-11
[D]	Type	:	Crown wheel and pinion with spur gear reduction
	Differential lock:		
[D]	Type	:	Dog clutch
[C]	Method of engagement	:	By a hand lever
[C]	Method of disengagement	:	By depressing the service brake pedal

1.3.4 Front axle and final drives:

[D] - Make : DANA
[D] - Model : 015 RSD
[D] - Type : Rigid oscillating double step down axle through bevel gearing and epicycloids de-multiplication.
- Differential lock : None

1.3.5. Total ratios and travelling speeds:

	Movement	GEAR	GROUP	RANGE	Number of engine revolutions for one revolution of the driving wheels	Nominal travelling speed (*) at rated engine speed of 2350 rev/min, (km/h)
	1	2	3	4	5	6
[C]	Forward	1	T	L	1358.03	0.44
[C]		2			973.38	0.61
[C]		3			691.36	0.86
[C]		4			457.87	1.30
[C]		5			348.92	1.70
[C]		1	Ra		1170.39	0.51
[C]		2			804.74	0.74
[C]		3			571.77	1.04
[C]		4			378.27	1.57
[C]		5			288.55	2.06
[C]		1	T	M	355.95	1.67
[C]		2			248.46	2.39
[C]		3			176.46	3.36
[C]		4			116.64	5.09
[C]		5			88.88	6.68
[C]		1	Ra		293.38	2.02
[C]		2			204.87	2.90
[C]		3			146.29	4.06
[C]		4			96.37	6.16
[C]		5			73.48	8.08
[C]		1	T	H	82.18	7.22
[C]		2			57.45	10.34
[C]		3			40.79	14.56
[C]		4			26.99	22.00
[C]		1	Ra		68.01	8.73
[C]		2			47.50	12.50
[C]		3			33.72	17.61
[C]		4			22.32	26.61

	1	2	3	4	5	6
[C]	Reverse	1	T	L	1337.02	0.44
[C]		2			990.44	0.60
[C]		3			703.77	0.84
[C]		4			468.13	1.27
[C]		5			358.91	1.65
[C]		1	Ra		1181.65	0.50
[C]		2			824.96	0.72
[C]		3			579.65	1.02
[C]		4			383.58	1.55
[C]		5			292.47	2.03
[C]		1	T	M	360.47	1.65
[C]		2			251.74	2.36
[C]		3			178.72	3.32
[C]		4			118.28	5.02
[C]		5			90.24	6.58
[C]		1	Ra		298.02	1.99
[C]		2			208.23	2.85
[C]		3			147.85	4.02
[C]		4			97.82	6.07
[C]		5			74.59	7.96
[C]		1	T	H	83.47	7.11
[C]		2			58.29	10.19
[C]		3			41.38	14.35
[C]		4			27.39	21.68
[C]		1	Ra		69.01	8.60
[C]		2			48.20	12.32
[C]		3			34.22	17.35
[C]		4			22.64	26.23

*Calculated with a tyre dynamic radius index of 670mm(ISO 4251-1-1998)

'T' = Tortoise 'Ra' = Rabbit 'L' = Low 'M' = Medium 'H' = High

[C] Number of revolutions of front wheels for one revolution of rear wheels 1.391

1.4 Power take-off:

1.4.1. Main Power Take-Off:

[C]	Type	:	Independent
[C]	Method of engagement	:	Mechanically by a hand lever.
[C]	Number of shafts	:	One
[C]	Method of changing power take-off shaft ends and speeds	:	By hand lever and physically replacing the PTO shaft end.

1.4.1.1 Power take-off proportional to engine speed:

Power take-off at 540 (rev/min):

[C]	- Location	:	At rear of tractor
[C]	- Diameter of power take-off shaft end	:	34.84 mm
[C]	- Number of splines		6 (in conformity with ISO 500:1991)
[C]	- Height above ground	:	680 mm
[C]	- Distance from the median plane of the tractor	:	0 mm
[C]	- Distance behind rear wheel axis	:	405 mm
[C]	- PTO speed at rated engine speed	:	602 rev/min.
[C]	- Engine speed at standard power take-off speed	:	2108 rev/min.
[C]	Ratio of rotation speeds (Engine speed/ PTO speed	:	3.904:1
[D]	Power restriction	:	None
[D]	Maximum torque transmissible	:	1500 Nm
[C]	Direction of rotation (viewed from Behind tractor)	:	Clockwise

Power take-off at 1000 (rev/min):

[C]	- Location	:	At rear of tractor
[C]	- Diameter of power take-off shaft end	:	34.84 mm
[C]	- Number of splines	:	21 (in conformity with ISO 500:1991)
[C]	- Height above ground	:	680 mm
[C]	- Distance from the median plane of the tractor	:	0 mm
[C]	- Distance behind rear wheel axis	:	405 mm
[C]	- PTO speed at rated engine speed	:	1108 rev/min
[C]	- Engine speed at standard power take off speed	:	2120 rev/min
[C]	- Ratio of rotation speeds (Engine Speed/PTO speed)	:	2.120:1
[D]	- Power restriction	:	None
[D]	- Maximum torque transmissible	:	1500 Nm
[C]	- Direction of rotation (viewed from behind tractor)	:	Clockwise

1.4.1.2	**Power take-off proportional to ground speed**	:	None
1.4.2	**Optional power take-off**	:	None
1.5	**Hydraulic power-lift:**		
[C]	Make	:	Renault
[C]	Model	:	R 21
[C]	Type of hydraulic system	:	Open centre
[C]	Type and number of cylinders	:	Single acting, one
[C]	Type of linkage lock for transport	:	None
[D]	Relief valve pressure setting (tolerance)	:	15.2 ± 0.5 MPa
[D]	Opening pressure of cylinder safety valve	:	Not Applicable
[D]	Lift pump type	:	Gear type
[D]	Transmission between pump and engine	:	Gear drive
[C]	Number and Type of filters	:	Two, first hydraulic circuit oil suction strainer and second hydraulic circuit oil filter.
[C]	Site of oil reservoir	:	Transmission housing
	Type, number and location of tapping points:		
[C]	- Type	:	Quick coupling
[C]	- Number	:	3
[C]	- Location	:	Behind the operator's seat
[D]	- Maximum volume of oil available to external cylinders	:	10 dm^3

1.6 Three point linkage:

[C] Category : 2 (In conformity of ISO 730-1:1994 + Corr.1:1995 and ISO 730-2 : 1979

[C] Category adapter : None

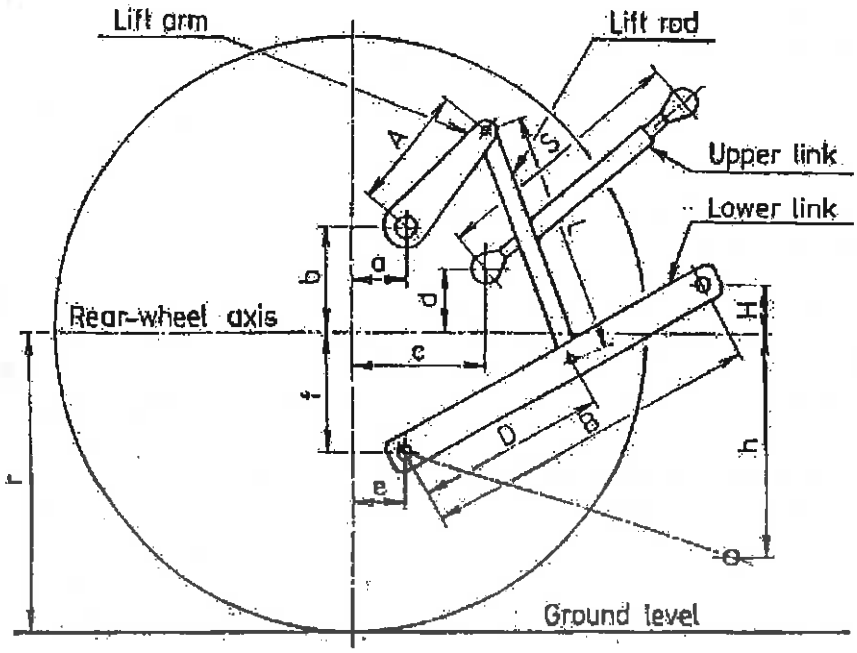


Fig. 1 .1

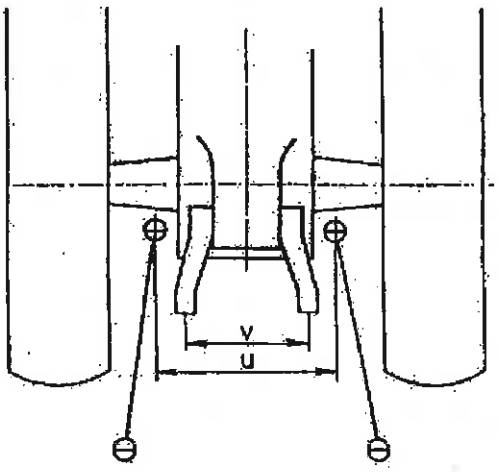


Fig. 1.2

Table : Linkage Geometry dimensions:

			Dimension or range, mm	Settings used during test, mm
[C]	Length of lift arms:	**(A)**	235	235
[C]	Length of lower links:	**(B)**	845	845
	Distance of lift arm pivot point from rear-wheel axis:			
[C]	- Horizontally	**(a)**	110	110
[C]	- Vertically	**(b)**	320	320
[C]	Horizontal distance between the 2 lower link points:	**(u)**	455	455
[C]	Horizontal distance between the 2 lift arm end points:	**(v)**	600	600
[C]	Length of upper link:	**(S)**	From 575 to 775	695
	Distance of upper link pivot point from rear wheel axis:			
[C]	- Horizontally	**(c)**	310	310
[C]	- Vertically	**(d)**	215,280 and 340	340
	Distance of lower link pivot point from rear wheel axis:			
[C]	- Horizontally	**(e)**	160	160
[C]	- Vertically	**(f)**	115	115
[C]	Distance of lower link pivot points to lift rod pivot points on lower links:	**(D)**	280,325, 385,430 and 490	385
[C]	Length of lift rods:	**(L)**	From 490 to 645	585
	Height of lower hitch points relative to the rear-wheel axis:			
[C]	- in low position	**(h)**	From 230 to 570	470
[C]	- in high position	**(H)**	From 0 to 300	110
[C]	Height above ground of lower hitch points when locked in transport position (*)	-	Any height within lift range	

(*) Assuming r=670mm, tyre dynamic radius index of ISO:4251-1:1998

1.7	**Swinging drawbar:**		
[C]	- Type	:	Clevis
[C]	- Height above ground	:	390 mm
[C]	- Type of adjustment	:	None
[C]	- Distance of hitch point from rear wheel axis, horizontally	:	780 mm
	Distance of hitch point from power take-off shaft end:		
[C]	- Vertically	:	290 mm
[C]	- Horizontally	:	375 mm
	Lateral adjustment (centre of clevis)		
[C]	- Right hand	:	240 mm
[C]	- Left hand	:	240 mm
[C]	- Distance of pivot point from rear-wheel axis, horizontally	:	195 mm
[C]	- Diameter of drawbar pinhole	:	32.9 mm
[D]	- Maximum vertical permissible load	:	18.39 kN
1.8	**Trailer hitch:**		
[C]	Type	:	Clevis
[C]	Hole diameter	:	34.0 mm
[C]	Height above ground	:	642mm to 863 mm
[C]	Distance of hitch point from rear-wheel axis, horizontally	:	572
	Distance of hitch point from power take-off shaft end:		
[C]	- Vertically	:	- 38 mm to +283 mm
[C]	- Horizontally	:	167 mm
[D]	Maximum vertical permissible load	:	14.71 kN
1.9	**Holed drawbar:**		
[C]	Number of holes	:	7
[C]	Distance between holes	:	80 mm
[C]	Hole diameter	:	25 mm
[C]	Thickness/Width of drawbar	:	30.5 mm / 75 mm
	Height above ground:		
[C]	- Minimum	:	100 mm
[C]	- Maximum	:	970 mm
[C]	Horizontal distance to power take-off shaft end (rear)	:	600 mm

1.10 Steering:

[D]	Make	:	DANFOSS
[D]	Model	:	None
[D]	Type	:	Open centre
[D]	Method of operation	:	Hydrostatic power assisted
[D]	Pump(s)	:	Gear type
[D]	Ram(s)	:	Double acting cylinder
[D]	Working pressure	:	14 MPa

1.11 Brakes:

1.11.1 Service brake:

[D]	Make	:	Kalyani Brakes Limited (India)
[D]	Model	:	None
[D]	Type	:	Wet disc
[C]	Method of operation	:	Mechanical, Independent or coupled pedal operation.
[C]	Trailer braking take-off	:	None

1.11.2 Parking brake:

[C]	Type	:	Common with service brake
[C]	Method of operation	:	By a hand lever with ratchet on LHS of operator's seat.

1.12 Wheels:

	Number		
[C]	Front	:	Two, steering as well as driving
[C]	Rear	:	Two, driving
[C]	Wheel base	:	2440 mm

Track width adjustment:

		Minimum [mm]	Maximum [mm]	Adjustment method
[D]	Front	1532	1846	Reversing wheels and offset lug rims.
[D]	Rear	1562	1842	Reversing wheels and offset lug rims.

1.13 Protective structure:

[D]	Make	:	Renault Agriculture
[D]	Model	:	ET 83-A
[D]	Type	:	Rear rod
[D]	Manufacturer's name & address	:	International Tractors Ltd., Village – Chak Gujran, P.O. Piplanwala, Jalandhar road, HOSHIARPUR – 146 022 (Punjab) INDIA

Protective device:

[D]	- Cab/frame/roll guard / other	:	Roll guard
[D]	- Tiltable/not tiltable	:	Tiltable
	OECD approval:		
[D]	- Approval Number	:	Not available/Not applicable
[D]	- Date of approval	:	Not available/Not applicable
[D]	Nos. of minor modification certificates, if any	:	Not applicable

1.14 Seat:

1.14.1 Driver's seat:

[C]	Make	:	SPACK
[C]	Model	:	None
[C]	Type	:	Cushioned
[C]	Seat and steering wheel reversible	:	No
[C]	Type of suspension	:	Helical Coil springs
[C]	Type of damping	:	Hydraulic shock absorber
	Range of adjustment:		
[C]	Longitudinally	:	± 70 mm
[C]	Vertically	:	Nil
[C]	Safety belt	:	Not provided

1.14.2	Optional driver's seat(s)	:	Not provided
1.14.3	Passenger seat	:	Not provided

1.15 Lighting:

		Height above ground of centre	Size	Distance from outside edge of lights to median plane of tractor
		[mm]	[mm]	[mm]
[C]	Head lights	1060	140 x 40	198
[C]	Side lights	1057	45 x 55	732
[C]	Rear lights	1440	90 x 75	782
[C]	Reflectors	1440	45 x 52	802

2. TEST CONDITIONS

2.1 Overall dimensions (unballasted tractor)

Length [mm]	Width		Height at top of	
	Minimum [mm]	Maximum [mm]	Protective structure [mm]	Exhaust pipe [mm]
4035	2080	2279	2560	2325

2.2 Ground clearance (unballasted tractor) : 260 mm

Clearance – limiting part : Swinging Drawbar

2.3 Tractor Mass(with roll guard):

	Unballasted	
	Without driver	With driver
	[kg]	[kg]
Front	1355	1360
Rear	1995	2065
Total	3350	3425

2.4 Tyres and track width specifications:

Tyres		Front	Rear
- Dimensions		12.4 R20	16.9-28
- Ply rating		116A8	12
- Type		Pneumatic, traction	Pneumatic traction
- Maximum load (tyre manufacturer's)	kN	12.26	16.33
- Maximum load (tractor manufacturer's)	kN	12.26	16.33
- Inflation pressure (tyre manufacturer's)	kPa	160	110
- Dynamic radius index	mm	468	670
Chosen track width	mm	1650	1635

2.5 Fuel:

Type : High speed diesel conforming to IS:1460-2000

Density at 15 °C : 0.839 g/cm^3

2.6 Oils and lubrication:

2.6.1 Capacity and change interval:

	Capacity (dm^3)	Oil change (h)	Filter change (h)
Air cleaner oil	0.9	10	--
Engine oil sump	12.5	250	250
Gear box, Hydraulic, steering, service brake and rear axle	60	900	Hydraulic circuit oil filter after 250 hours. Hydraulic circuit strainer after 900 hours.
Front axle	5.5	900	--
Final drive (front)	0.6	900	--

2.6.2 Specifications:

	Recommended	Used during test
Engine and Air cleaner oil:		
Type	SAE 20W 40	As recommended
Viscosity	14.0 – 16.0 cSt at 100°C	
Classification	API CD4	
Transmission, hydraulic fluid, steering oil, service brake & Rear axle:		
Type	ELF SF 31	As recommended
Viscosity	30 cSt at 65 °C	
Classification	API GL4	

Front Drive oil (Differential Casing, final Drive):		As recommended
Type	ELF TRANSELF BLS 90	
Viscosity	194 cSt AT 40 °C	
Classification	API GL5	

2.6.3 Grease:

Number of lubricating points:

Grease nipples : 7

Grease cups : 1

3 COMPULSORY TESTS RESULTS

3.1 Main power take-off:

Date and location of tests : **27.06.2003 at CFMT&TI,BUDNI, INDIA**

Type of dynamometer bench : Hydraulic, Schenck D1100 – 1e

Power	Speed		Fuel consumption			Specific energy
	Engine	PTO	Hourly		Specific	
kW	(rev/min)		l/h	kg/h	g/kWh	kWh/l
3.1.1 Maximum Power – Two-Hour Test:						
36.4	2249	576	11.99	10.06	276	3.04
3.1.2 Power at Rated Engine Speed:						
36.3	2350	602	12.31	10.33	284	2.95
3.1.3 Standard Power Take-Off Speed [540 ± 10 (rev/min)]:						
36.0	2108	540	11.34	9.52	265	3.17
3.1.4 Part Loads:						
3.1.4.1 The torque corresponding to maximum power at rated engine speed:						
36.3	2350	602	12.31	10.33	284	2.95
3.1.4.2 85 % of torque obtained in 3.1.4.1:						
32.2	2448	627	11.61	9.74	303	2.77
3.1.4.3 75 % of torque defined in 3.1.4.2:						
24.3	2463	631	9.65	8.10	333	2.52
3.1.4.4 50 % of torque defined in 3.1.4.2:						
16.3	2479	635	7.96	6.68	410	2.05
3.1.4.5 25 % of torque defined in 3.1.4.2:						
8.2	2495	639	6.49	5.45	662	1.27
3.1.4.6 Unloaded:						
0.4	2510	643	5.03	4.22	10550	0.08
3.1.5 Part Loads at Standard Power Take-Off Speed [540± 10 (rev/min)]:						
3.1.5.1 The torque corresponding to maximum power:						
36.0	2108	540	11.34	9.52	265	3.17
3.1.5.2 85 % of torque obtained in 3.1.5.1:						
33.5	2311	592	11.17	9.37	279	3.00
3.1.5.3 75 % of torque defined in 3.1.5.2:						
25.3	2327	596	9.33	7.83	309	2.72
3.1.5.4 50 % of torque defined in 3.1.5.2:						
17.0	2338	599	7.53	6.32	372	2.26
3.1.5.5 25 % of torque defined in 3.1.5.2:						
8.5	2346	601	5.97	5.01	589	1.42
3.1.5.6 Unloaded:						
0.3	2362	605	4.42	3.71	11594	0.07

No load maximum engine speed : 2510 rev/min

Torque (equivalent crankshaft) at maximum power:
-At rated engine speed : 147.54 Nm
-At 2 - hour test : 154.54 Nm

Maximum torque (equivalent crankshaft) : 196.47 Nm
(Engine speed : 1152 rev/min)

Mean atmospheric conditions:		
-Temperature	:	22 °C
-Pressure	:	97.5 kPa
-Relative humidity	:	75%
Maximum temperatures:		
-Coolant	:	85 °C
-Engine oil	:	111 °C
-Fuel	:	37 °C
-Engine air intake	:	29 °C

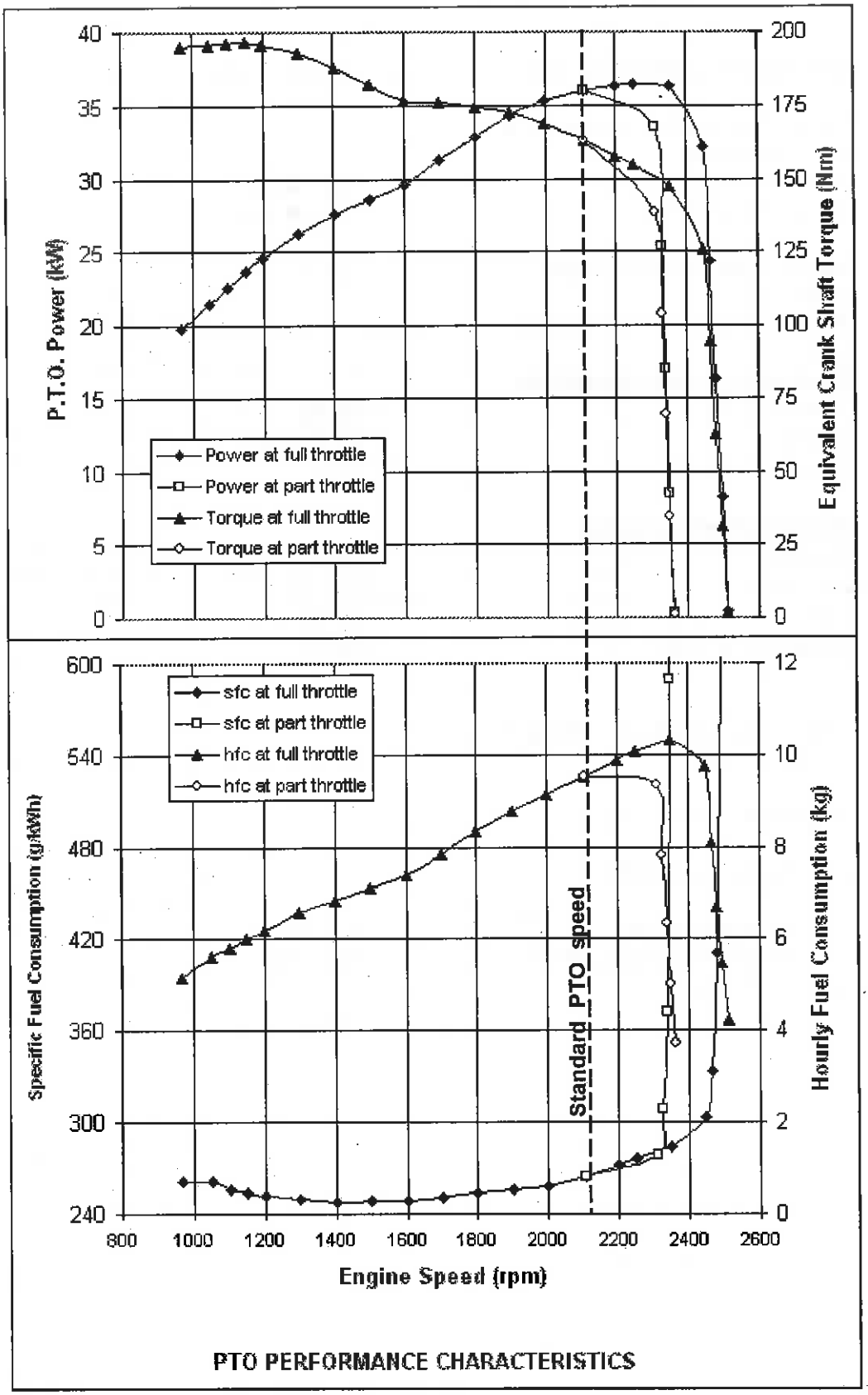
3.2 Hydraulic power and lifting force:

Date of tests : 19.8.2003 and 22.8.2003

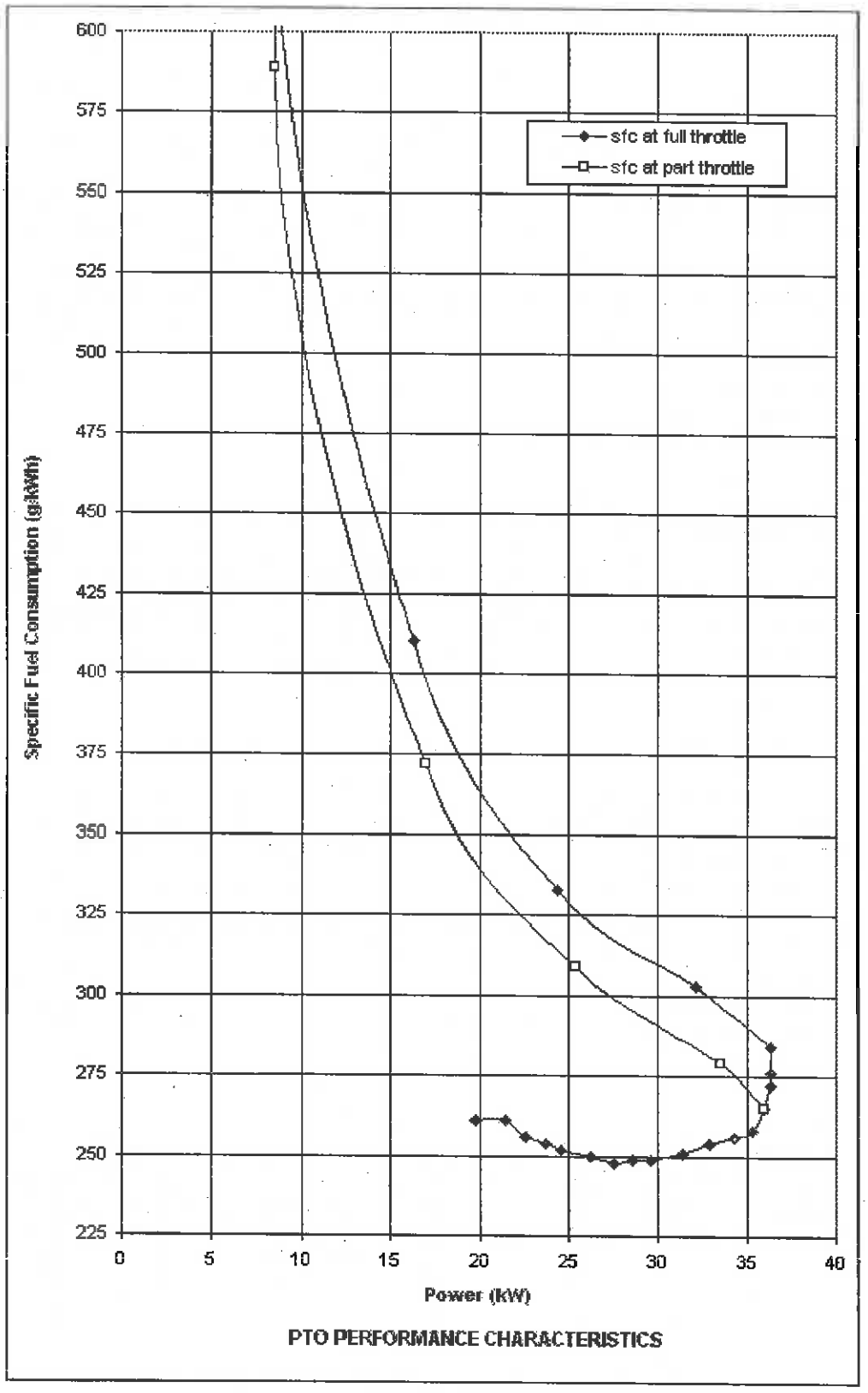
3.2.1 Hydraulic Power Test:

3.2.1.1 Hydraulic Fluid Data:

- Hydraulic fluid type : ELF SF 31
- Viscosity index (ISO 3448 + Corr1:1993) : Max. 100
- Viscosity at 65 °C : 30 cSt



PTO PERFORMANCE CHARACTERISTICS


sfc at full throttle
sfc at part throttle
Specific Fuel Consumption (g/kWh)
600
575
550
525
500
475
450
425
400
375
350
325
300
275
250
225
0
5
10
15
20
25
30
35
40
Power (kW)
PTO PERFORMANCE CHARACTERISTICS

3.2.1.2 Compulsory Reporting (Test Results):

		Press-ure, MPa	Reservoir oil Temp. °C		Engine speed, rev/min	Flow rate, l/min	Power, kW
			Min	Max.			
1	2	3	4	5	6	7	8
1	Rated Engine speed (Manufacturer's specification)	--	--	--	2350	--	--
2.	Maximum (sustained) pressure with relief valve open as measured at the coupler. Pump stalled- No	17.5	60	65	2471	0.0	0.0
3.	Flow rate corres-ponding to a hydraulic pressure equivalent to 90% of the actual relief valve pressure setting and corresponding hydraulic power.	15.7	64		2475	40.12	10.6
4.	Maximum available flow and maximum power from one coupler pair	15.2	64		2475	42.10	10.7
5.	Maximum available flow and maximum power from coupler pairs operating simultaneously (flow through two or in over coupler pair if required)	Not applicable	Not applicable		Not applicable	Not applicable	Not applicable

3.2.2 Power Lift Test:

- Linkage settings for test - See **Table at Page 10, and Fig. 1.1 & 1.2**

	At hitch point	On the frame
Height of lower hitch points above ground in down position	200 mm	200 mm
Vertical movement: - Without lifting force - With lifting force	 580 mm 550 mm	 580 mm 545 mm
Maximum corrected force exerted through full range	17.9 kN	16.9 kN
Corresponding pressure of hydraulic fluid	15.7 MPa	15.7 MPa
Moment about rear wheel axle	18.0 kNm	27.3 kNm
Maximum tilt angle of mast from vertical	--	5 degree

Lifting height relative to the horizontal plane including the lower link pivot points.													
mm	-320	-300	-200	-100	0	+100	+200	+225	+230	--	--	--	--
Lifting forces (the values of the force measured have been corrected to correspond to a hydraulic pressure equivalent to 90% of actual relief valve pressure setting of the hydraulic lift system.)													
At the hitch point in (kN)	17.9	18.4	18.9	19.3	19.6	19.8	20.4	--	20.6	--	--	--	--
Corresponding pressure 15.7 MPa													
At the frame in (kN)	17.7	17.6	17.7	17.7	17.5	17.1	17.0	16.9	--	--	--	--	--
Corresponding pressure 15.7 MPa													

3.3 Drawbar power test (unballasted tractor):

Date(s) of tests : 11.12.03 to 16.12.03

Type of track : Concrete

Height of drawbar above ground	Tyre inflation pressure	
	Front	Rear
mm	kPa	kPa
400	110	100

Gear Number, Group & Range	Drawbar power, kW	Draw-bar pull, kN	Speed, Km/h	Engine speed, rev/min	Slip of wheels (%)	Specific fuel cons-umption, g/kWh	Specific Energy, kWh/l	Temperature, (°C)			Atmospheric conditions		
								Fuel	Cool-ant	Eng-ine oil	Temp °C	R.H. %	Pres-sure, kPa
3.3.1	**Maximum Power in tested Gears (Unballasted tractor):**												
2 – T – M	17.7	29.1	2.19	2473	15.1	466	1.80	33	85	109	27	64	98.1
2 – Ra – M	21.2	29.0	2.63	2465	15.0	432	1.94	31	86	110	26	69	98.3
3 – Ra – M	26.1	27.0	3.48	2243	12.6	369	2.27	30	87	110	25	77	98.4
4 – T – M	25.5	20.4	4.50	2227	8.2	378	2.22	29	87	109	24	80	98.5
4 – Ra – M	26.0	17.1	5.48	2209	6.3	361	2.32	30	87	113	28	57	98.3
3 – T – M	24.3	29.2	3.00	2403	14.9	407	2.06	35	86	111	29	51	98.3
5 – T – M	26.2	15.7	6.02	2222	7.8	359	2.34	36	88	113	29	49	98.3
1 – T – H	27.6	14.3	6.95	2359	6.7	359	2.34	35	87	110	28	64	98.5
5 – Ra – M	25.5	12.4	7.39	2228	7.3	371	2.26	34	87	111	27	68	98.6
1– Ra – H	27.3	12.5	7.87	2200	4.2	343	2.45	32	87	110	26	73	98.6
2 – T – H	26.6	10.0	9.56	2239	5.4	364	2.30	29	86	105	23	84	98.8
2– Ra – H	26.9	8.4	11.49	2207	5.5	351	2.39	37	87	112	27	72	98.2
3 – T – H	25.1	6.7	13.54	2227	5.3	378	2.22	39	87	110	28	59	98.2

3.3.2	**Fuel Consumption:**												
3.3.2.1	In Selected gear at Maximum power at rated engine speed:												
1 – T – H	27.6	14.4	6.90	2352	4.9	360	2.33	31	86	108	24	74	98.3
3.3.2.1.1	75% of pull corresponding to maximum power at rated engine speed												
1 – T – H	22.0	10.8	7.33	2467	6.2	407	2.06	31	85	111	25	72	98.3
3.3.2.1.2	50% of pull corresponding to maximum power at rated engine speed												
1 – T – H	14.9	7.2	7.45	2481	4.5	492	1.71	32	84	111	25	72	98.2
3.3.2.1.3	Next higher gear at reduced engine speed: Same pull and traveling speed as in 3.3.2.1.1:												
5 – Ra – M	22.2	10.8	7.38	2223	4.4	390	2.15	31	86	109	25	74	98.2
3.3.2.1.4	Next higher gear at reduced engine speed: Same pull and traveling speed as in 3.3.2.1.2:												
5 – Ra – M	15.1	7.2	7.53	2241	4.2	465	1.80	32	84	107	25	71	98.2
3.3.2.2	In Selected gear nearest to 7.5 km/h at rated engine speed:												
1 – T – H	27.6	14.4	6.90	2352	4.9	360	2.33	31	86	108	24	74	98.3
3.3.2.2.1	75% of pull corresponding to maximum power at rated engine speed:												
1 – T – H	22.0	10.8	7.33	2467	6.2	407	2.06	31	85	111	25	72	98.2
3.3.2.2.2	50% of pull corresponding to maximum power at rated engine speed:												
1 – T – H	14.9	7.2	7.45	2481	4.5	492	1.71	32	84	111	25	72	98.2
3.3.2.2.3	Next higher gear at reduced engine speed: Same pull and traveling speed as in 3.3.2.2.1:												
5 – Ra – M	22.2	10.8	7.38	2223	4.4	390	2.15	31	86	109	25	74	98.2
3.3.2.2.4	Next higher gear at reduced engine speed: Same pull and traveling speed as in 3.3.2.2.2:												
5 – Ra – M	15.1	7.2	7.53	2241	4.2	465	1.80	32	84	107	25	71	98.2

T = Tortoise Ra = Rabbit M = Medium H = High

N.B. – Fan speed was not measured

4 REPAIRS AND ADJUSTMENTS DURING TESTS : None

5 REMARKS : None

TEST CARRIED OUT AT C.F.M.T.&. T.I, BUDNI (M.P.), INDIA

TESTING AUTHORITY

P.K. PANDEY	R.K. SINGHAI	S.C. JAIN
TEST ENGINEER	SENIOR TEST ENGINEER	DIRECTOR

Draft Test report complied by: Mr. G. R. Ambalkar, Senior Technical Assistant and
Mr. P.C. Jain, Assistant Engineer (T)