CEMAGREF

CENTRE NATIONAL
DU MACHINISME AGRICOLE
DU GÉNIE RURAL
DES EAUX ET DES FORÊTS

GROUPEMENT D'ANTONY
Parc de Tourvoie
B.P. 121, 92185 Antony Cedex
Tél. : (1) 40 96 61 21 - Télex : 632 672 F
Télécopie : (1) 40 96 61 62

Division Tracteurs et Machines Agricoles

# TEST REPORT N° 8913

DATE 21th may 1992

## OECD TEST OF AN AGRICULTURAL TRACTOR (RESTRICTED CODE) 50.12

Reference text : O.E.C.D code II



**OECD Approval**

N° 1365 Restricted Code

Date 2nd April 1992

**Tested equipment**

| | |
|---|---|
| Nature | : TRACTOR |
| Make | : MASSEY FERGUSON |
| Model | : B 610/4 |
| Trade name | : 3670-4 (PS/4) |
| Number of driving wheels | : 4 |
| Type | : standard |

**Submitted for tests by**

Name : MASSEY FERGUSON S.A.

Address : avenue Blaise Pascal
BP 307
60026 BEAUVAIS CEDEX

Phone : 44.89.33.33 Telex : 140396 F

This test report may only be duplicated as a whole

CEMAGREF

## GENERALITIES

Tractor manufacturer's name and address : MASSEY FERGUSON S.A, BP 307 avenue Blaise Pascal 60026 BEAUVAIS

Submitted for tests by : MASSEY FERGUSON S.A.

Selected for tests by the manufacturer with the agreement of CEMAGREF

Place of running in : BEAUVAIS

Duration of running in : 20 h

Date of arrival of the equipment in CEMAGREF : 10th october 1991

## SPECIFICATIONS

### 2.1 Tested tractor

Make : MASSEY FERGUSON
Model : B 610/4
Trade name : 3670-4 (PS/4)
Number of driving wheels : 4
Type : standard
Serial number : S 176 128
1st serial number : S 176 128

### 2.2 Engine

#### 2.2.1 Identification

Make : VALMET
Model : 620 DS
Type : 4 strokes - Direct injection diesel turbocharged
Serial number : A 1557

#### 2.2.2 Cylinders

Number : 6
Disposition : vertical, in line
Bore/stroke : 108/120 mm
Capacity : 6590 $cm^3$
Compression ratio : 16,5/1
Arrangement of valves : overhead in line, 1/1 per cylinder
Cylinders liners : wet

#### 2.2.3 Supercharging

Make : SCHWITZER
Model : turbo charger
Type : S2B, 7621 DAE/1.0D9
Supercharging pressure : 1,3 bar

#### 2.2.4 Fuel system

Fuel feed system : piston fuel feed pump
Make, type and model of fuel filter : CAV 2 FASL 5863 B 045
Capacity of fuel tank : 260 l (315 l with auxiliary fuel tank)
Make, type and model of injection pump : BOSCH PES 6 A 95 D 320 RS 2806
Serial number : 06224039
Manufacturer's setting of injection pump
at rated engine speed and full load : 94-96 $mm^3$/stroke
Injection pump timing : 22±0,5° before TDC
Make, type and model of injectors : STANADYNE - HNS 781736 or NOZZLE - NBS 770620
Injection pressure : 230 bars

#### 2.2.5 Governor

Make : BOSCH
Type : RVS, 500-1100 AOC 21782 R
Model : mechanical, incorporated into fuel injection pump
Governed range of engine speed : 1000 - 2370 rev/min

CEMAGREF

2.2.6 Rated engine speed : 2200 rev/min

2.2.7 Air cleaner

Pre-cleaner : . Make : DONALDSON
. Type and model : cyclone incorporated into main
. Location : under bonnet
.Location of air intake : in front of engine
Main : . Make : DONALDSON
. Type and model : dry, FLB12-0297
. Location : under bonnet

Maintenance indicator : lamp on desk board

2.2.8 Lubrication system

Type of feed pump : gear
Total oil capacity including filter : 21,2 l
Oil change period : 250 h
Type and number of filter : 1 cartridge
Filter change period : 250 h
Recommended oil : see "fuel and lubricants used in test"

2.2.9 Cooling system

Type of coolant : water or water anti-freeze mixture
Type of pump : centrifugal
Description of fan
. Belt driven (visco-static)
. Number of fan blades : 9
. Fan diameter : 560 mm
Coolant capacity : 29,7 l
Type of temperature control : thermostatic
Surpressure system : 0,5 bar

2.2.10 Starting system

Safety device : switch operated by main clutch pedal
Make : MAGNETI MARELLI
Type and model : pre-engaged M 127
Power : 2,8 kW
Cold starting aid : CAV - Thermostart

2.2.11 Electrical system

Voltage : 12 V negative earth
Generator : alternator
. Make : VALEO
. Type and model : alternator 70 A
. Power : 840 W
Batteries
. Number : 2 (FULMEN 465 temperate climate - 505 cold climate)
. Cold starting capacity : 420 A for 60 s at -18°C (465)
550 A for 60 s at -18°C (505)

2.2.12 Exhaust system

Make : LUCHAIRE
Type : perforated
Model : 111
Location : under bonnet with vertical stack pipe
Height of outlet above ground : 2905 mm

2.3 Transmission

2.3.1 Clutch (travel)

Mak : VALEO
Type : dry, single plate clutch, pushed type
Number of plates : 1
Diameter of plates : 350 mm
Method of operation (for travel) : foot pedal

CEMAGREF

## 2.3 Transmission (continued)

### 2.3.2 Gear box

Make : MASSEY FERGUSON
Type and model : mechanically operated gear shift, speedshift
Arrangement : 4 gears with four positions speed shift,
2 ranges and one reverse groupe
Number of speeds : 32 forward and 32 reverse gears
Available option : néant/none

### 2.3.3 Rear axle and final drives

Make : MASSEY FERGUSON
Type and model : crown wheel and pinion and inboard epicyclic reduction
Differential lock :
. Type and model : mechanical hydraulically actuated
. Method of engagement : electrical switch
. Method of disengagement : when brake pedal is depressed

### 2.3.4 Front axle and final drive

Make : GKN
Type and model : crown wheel and pinion and outboard epicyclic gear reduction
Differential lock : hydraulic
Driven : mechanical spring

### 2.3.6 Total ratios and travelling speeds

| Range | Gear | Overall gear ratios | Rated forward speed km/h (*) |
|---|---|---|---|
| T forward | 1 A | 300,734 | 2,538 |
| | 1 B | 256,946 | 2,971 |
| | 1 C | 217,681 | 3,507 |
| | 1 D | 185,980 | 4,105 |
| | 2 A | 198,158 | 3,852 |
| | 2 B | 169,306 | 4,509 |
| | 2 C | 143,433 | 5,322 |
| | 2 D | 122,545 | 6,229 |
| | 3 A | 138,711 | 5,503 |
| | 3 B | 118,514 | 6,441 |
| | 3 C | 100,403 | 7,603 |
| | 3 D | 85,782 | 8,899 |
| | 4 A | 101,910 | 7,491 |
| | 4 B | 87,071 | 8,767 |
| | 4 C | 73,766 | 10,348 |
| | 4 D | 63,023 | 12,112 |
| T reverse | 1 A | 306,999 | 2,487 |
| | 1 B | 262,299 | 2,910 |
| | 1 C | 222,216 | 3,435 |
| | 1 D | 189,855 | 4,021 |
| | 2 A | 202,286 | 3,774 |
| | 2 B | 172,833 | 4,417 |
| | 2 C | 146,422 | 5,213 |
| | 2 D | 125,098 | 6,102 |

T : Turtle, A B C D : quadrupler positions

(*) Calculated for the rated engine speed 2200 rpm and dynamic index ratio of 20.8 - 42 tyres : 920 mm

CEMAGREF

2.3.6 Total ratios and travelling speeds

| Gamme Range | Rapport de vitesse Gear | Démultiplication totale Overall gear ratios | Vitesse nominale d'avancement Rated forward speed km/h (*) |
|---|---|---|---|
| T reverse | 3 A | 141,600 | 5,391 |
| | 3 B | 120,983 | 6,310 |
| | 3 C | 102,495 | 7,448 |
| | 3 D | 87,569 | 8,717 |
| | 4 A | 104,033 | 7,338 |
| | 4 B | 88,885 | 8,588 |
| | 4 C | 75,303 | 10,137 |
| | 4 D | 64,336 | 11,865 |
| L avant forward | 1 A | 91,294 | 8,362 |
| | 1 B | 78,002 | 9,787 |
| | 1 C | 66,082 | 11,552 |
| | 1 D | 56,458 | 13,521 |
| | 2 A | 60,155 | 12,690 |
| | 2 B | 51,396 | 14,852 |
| | 2 C | 43,542 | 17,532 |
| | 2 D | 37,201 | 20,520 |
| | 3 A | 42,109 | 18,128 |
| | 3 B | 35,977 | 21,218 |
| | 3 C | 30,480 | 25,045 |
| | 3 D | 26,041 | 29,314 |
| | 4 A | 30,937 | 24,675 |
| | 4 B | 26,432 | 28,880 |
| | 4 C | 22,393 | / |
| | 4 D | 19,132 | / |
| L reverse | 1 A | 93,196 | 8,191 |
| | 1 B | 79,627 | 9,587 |
| | 1 C | 67,459 | 11,316 |
| | 1 D | 57,634 | 13,245 |
| | 2 A | 61,408 | 12,431 |
| | 2 B | 52,467 | 14,549 |
| | 2 C | 44,449 | 17,174 |
| | 2 D | 37,976 | 20,101 |
| | 3 A | 42,986 | 17,758 |
| | 3 B | 36,727 | 20,786 |
| | 3 C | 31,115 | 24,534 |
| | 3 D | 26,583 | 28,716 |
| | 4 A | 31,581 | 24,171 |
| | 4 B | 26,983 | 28,290 |
| | 4 C | 22,860 | / |
| | 4 D | 19,531 | / |

L : rabbit, A B C D : quadrupler positions

(*) Calculated for the rated engine speed 2200 rpm and dynamic index ratio of 20.8 - 42 tyres : 920 mm
Number of revolutions of front wheels for one revolution of rear wheels : 1,336

Valtra 905

CEMAGREF

## 2.4 Main power take-off

### 2.4.1 General specifications

Type : rear independant power take-off (wet, hydraulic, multiplate clutch)

Engagement by lever with electrical switch located at the middle of the upper right hand side console

Number of shafts : 1

Method of changing power take-off speed : speed and spline change achieved by physically replacing the 540 rev/min shaft by the 1000 rev/min and vice-versa

### 2.4.2 Power take-off proportional to engine speed

**540 rev/min**

Location : at the rear of the tractor on vertical center plane
Diameter of power take-off shaft : 34,9 mm
Number of splines : 6 (in accordance with ISO R 500-1979)
Height above ground : 767 mm with types 20.8-42
Distance from the median plane of the tractor : 0 mm
Distance behind rear axle : 550 mm

Power take-off speed : 596 rev/min
for rated engine speed : 2200 rev/min

Engine speed : 1993 rev/min
for standard power take-off speed : 540 rev/min

Engine to power take-off ratio : 3,69
Power restriction : none
Direction of rotation (viewed facing driving end) : clockwise

**1000 rev/min**

Location : at the rear of the tractor on vertical center plane
Diameter of power take-off shaft : 34,9 mm
Number of splines : 21 (in accordance with ISO R 500-1979)
Height above ground : 767 mm with types 20.8-42
Distance from the median plane of the tractor : 0 mm
Distance behind rear axle : 499 mm

Power take-off speed : 1053 rev/min
for rated engine speed : 2200 rev/min

Engine speed : 2090 rev/min
for standard power take-off speed : 1000 rev/min

Engine to power take-off ratio : 2,09
Power restriction : none
Direction of rotation (viewed facing driving end) : clockwise

### 2.4.3 Power take-off proportional to ground speed :

None

CEMAGREF

## 2.5 Power lift

Make : MASSEY FERGUSON
Type : top link, electronic position, draft or mixed control, open centre system
Type and number of cylinders : 2, single acting, diameter 89 mm
Type of linkage lock for transport : hydraulic lock
Relief valve pressure setting : 188 bars
Opening pressure of cylinder safety valve : 200 bars
Lift pump type : gear
Transmission between pump and engine : mechanical
Make and number of filters : 1 - PUROLATOR
Time between oil changes : 1200 h
Time between filter changes : 600 h
Oil capacity : 88 l
Site of oil tank : transmission housing
Type and number of tapping points : 2 - on lift cover
Maximum volume of oil available to external cylinders : 34 l
Recommended oil : see "fuel and lubricants used in test"

## 2.6 Three-point linkage

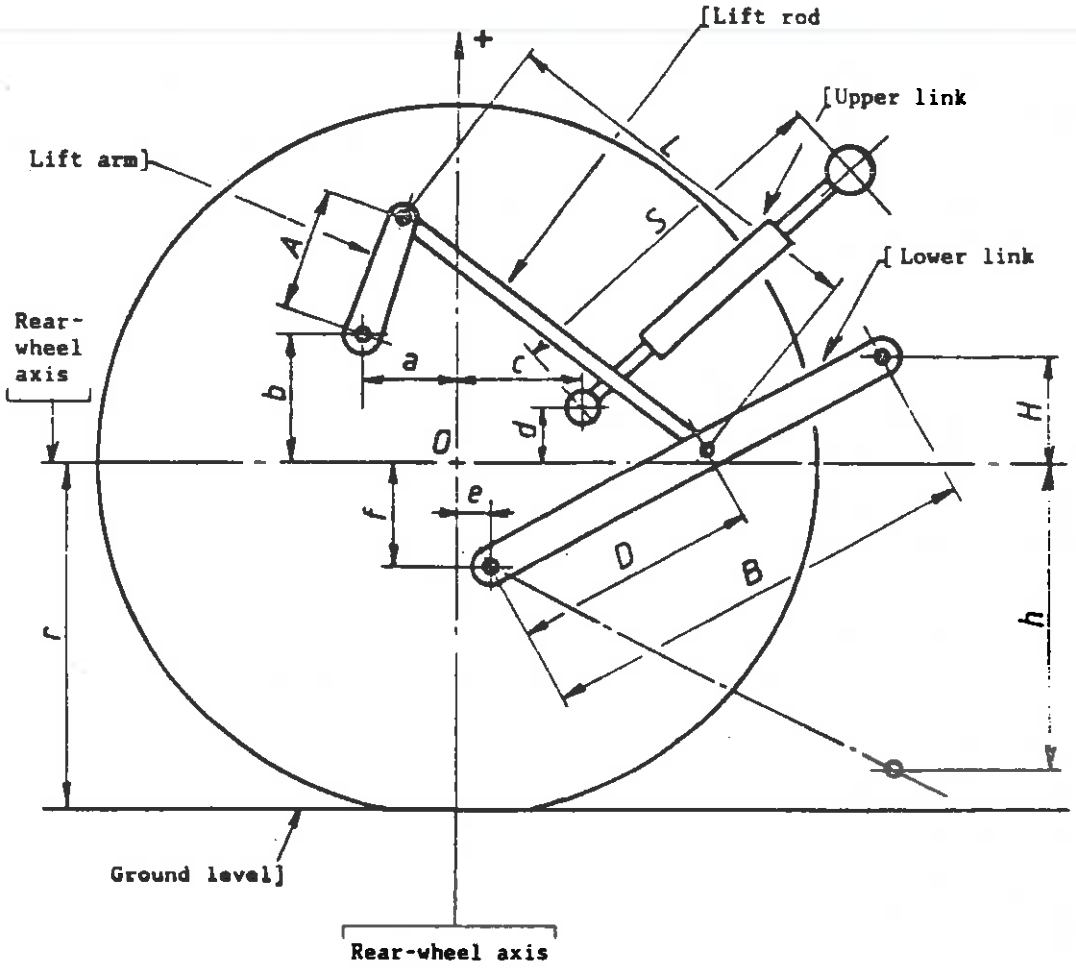
Category : II - III (in accordance with ISO 730/1-1977 art.II)
Category adapter : by changing the rockshafts
Controls : . position control by linear sensor measuring the rockshaft position
. draft control by pin sensors at each lower link

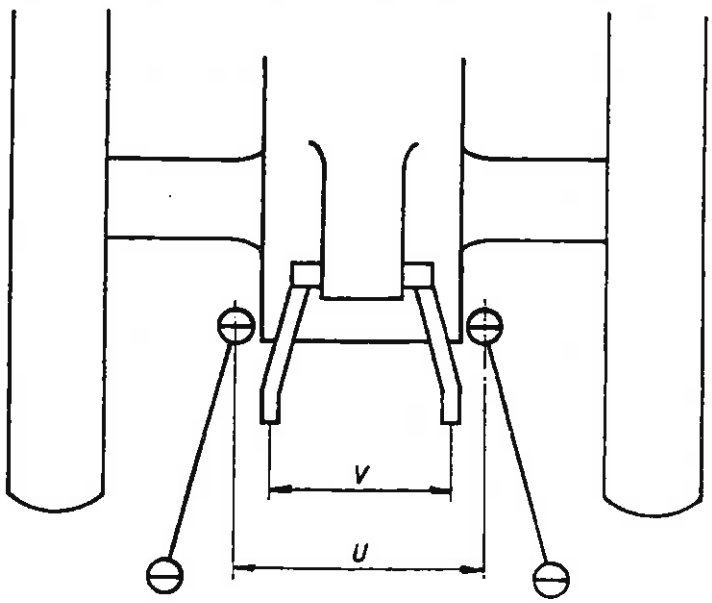
| Linkage dimensions (mm) | | | | Settings used for test |
|---|---|---|---|---|
| Rear tyres : dynamic index radius | 20.8 - 42 | (r) | ~~920~~ adjd 905 | |
| Front tyres : dynamic index radius | 16.9 - 30 | (r') | ~~670~~ 695 | |
| Length of lift arms | | (A) | 362 | |
| Length of lower links | | (B) | 975 | |
| Distance of lift arm pivot point from rear wheels centre line | horizontally | (a) | 185,8 | |
| | vertically | (b) | 431,8 | |
| Horizontal distance between the two lower link points | | (u) | 511 | |
| Horizontal distance between the two lift arm end points | | (v) | 610 | |
| Length of upper link | | (S) | from 740 to 830 | 790 |
| Distance of upper link pivot point from rear wheels centre | horizontally | (c) | 428 | |
| | vertically | (d) | 121\|179\|237 | 179 |
| Distance of lower link pivot point from rear wheels centre | horizontally | (e) | 224 | |
| | vertically | (f) | 300 | |
| Distance of lower link points to lift rod pivot points on lower link | | (D) | 548\|600 | 548 |
| Length of lift rods | | (L) | from 675 to 860 | 860 |
| Height of lower hitch points relative to the rear wheels centre - in low position | | (h) | from 274 to 693 | 657 |
| - in high position | | (H) | from -27 to 312 | -27 |
| Height of lower hitch points when locked in transport position (*) | | | from 892 to1204 | |

(*) Assuming the dynamic index radius = 920 mm (ISO 4251/1-1984)

CEMAGREF

## 2.7 Linkage geometry



CEMAGREF

## 2.8 Swinging drawbar

Height above ground : . maximum : 596 mm
. minimum : 596 mm
Type of adjustment : none
Distance of pivot point from rear axle centre : 897 mm
Distance of pivot point from power take-off shaft end : . vertically : 297 mm
. horizontally : 347 mm (540 RPM) - 397 mm (1000 RPM)
Lateral adjustment : 306 mm right and left hands
Distance of pivot point from rear axle horizontally : 227 mm
Diameter drawbar pin hole : 30 mm
Maximum vertical permissible load : 15 kN

## 2.9 Trailer hitch

Height above ground : . maximum : 1007 mm
. minimum : 836 mm
Distance of hitch point from rear axle centre, horizontally : 751 mm
Distance of hitch point from power take-off shaft end :
. vertically above maximum : 240 mm
minimum : 69 mm
. horizontally : 200 mm (540 RPM) - 250 mm (1000 RPM)
Diameter of pin hole : 30 mm
Maximum vertical permissible load : 20 kN

## 2.10 Linkage drawbar

Height above ground : . maximum : 1185 mm
. minimum : 170 mm
Horizontal distance to power take-off shaft end : 640 mm (540 RPM) - 690 mm (1000 RPM)
Number of holes : 9
Distance between holes : 80 mm
Hole diameter : 25 mm
Thickness and width of drawbar : 30 X 80 mm

## 2.11 Front towing hitch

Vertical height at centre of clevis : 995 mm
Width of clevis : 60 mm
Diameter of pin hole : 30 mm

## 2.12 Steering

Method of operation : hydrostatic steering system, gear box housing mounted on gear pump
Make : DANFOSS steering unit
Model : OSPC - LS
Type : open center type with integral system relief valves, anti-shock end and anti-cavitation valves
Working pressure : 15,7 to 16,2 MPa
Oil capacity : 88 l
Oil change period : 1200 h
Filter change period : 600 h
Recommended oil : see "fuels and lubricants used in test"

## 2.13 Brakes

### 2.13.1 Service brake

Make : MASSEY FERGUSON and GIRLING
Model : oil-immersed, 486,5 cm² friction area on each brake
Type : single disk brake, hydraulic actuated Girling hydraulic master cylinder
MF hydraulic slave annular piston.
Method of operation : independant or dependant operation of twin pedals (which can be latched)

### 2.13.2 Parking brake

Make and type : SIRMAC - HUSCO - 4 disks
Method of operation : hand lever - cable and rod

2.13.3 Trailer brake

Make : BOSCH
Type : hydraulically actuated valve to regulate oil flow and pressure to the trailer brakes proportional and progressive trailer/tractor braking effort is achieved by linking their services together via a sensive valve
Method of operation : automatic, as the right hand side tractor brake pedal is depressed
Maximum braking pressure : 130-150 bars
Maximum flow : 32 l/min

2.14 WHEELS

2.14.1 Number and location

. Front : 2 steering and driving
. Rear : 2 driving

2.14.2 Wheelbase : 2925 mm

2.14.3 Track width adjustment

| | Minimum mm | Maximum mm | Adjustment method |
|---|---|---|---|
| Front | 1686 | 2174 | Reversing wheels and off-set lug rims |
| Rear | 1871 | 2125 | Reversing wheels and off-set lug rims |

2.17 Protective structure specifications

2.17.1 Specifications

Manufacturer's name : MASSEY FERGUSON S.A.
Trade name : 3000 D
Type of structure : . cab
. tiltable : no
CEMAGREF test : 8915
OECD approval number : CSS 077/9

Description : the cab is made up from 3 major sub-assemblies, the plateform, side pillars and roof and the front pillars. These sub-assemblies are bolted together to form the complete cab structure

2.17.2 Driver's seat

Make : GRAMMER DS 85H/90 AR
Type of suspension : parallelogram
Type of damping : gas cylinder
Range of adjustment . longitudinal : 150 mm
. vertical : 60 mm

2.17.3 Miscellaneous

Passenger's seat : either factory fitted or as an accessory
Location : left of the operator
Number of places : 1

CEMAGREF

2.18 Lighting

Unrestricted beam angle of head light in plan view in accordance with French regulation

| | Height above ground of centre (mm) | Size (mm) | Distance from outside edge of tractor to centre at 2174 mm track width (mm) |
|---|---|---|---|
| Headlights | 1282 | 167 x 107 | 950 |
| Sidelights | 1761 | 120 x 80 | 442 |
| Rearlights | 1830 | 300 x 62 | 316 |
| Reflectors | 742 | 98 x 62 | 561 |

## 3. CONDITIONS DURING TEST

### 3.1 Overall dimensions

| LENGTH m | WIDTH | | HEIGHT | |
|---|---|---|---|---|
| | min m | max m | exhaust silencer m | at top of protective structure |
| 5,165 | 2,391 | 2,442 | 2,905 | 2,905 |

3.2 Ground clearance : 443 mm limited by drawbar bracket

3.3 Tractor mass (kg)

(with or without driver but with tanks full and cab)

| | Without driver kg | With driver kg |
|---|---|---|
| Front | 2595 | 2595 |
| Rear | 3995 | 4055 |
| Total | 6590 | 6650 |

CEMAGREF

### 3.4 Tyres and track width specifications

| | Front | Rear | |
|---|---|---|---|
| Tyres : | GOOD YEAR | GOOD YEAR | |
| . dimensions | 16.9 - 30 | 20.8-42 | |
| . ply rating | 8 | 10 | |
| . type of casing | cross ply | cross ply | |
| . maximum load (tyre manufacturer's) | 23 | 36,3 | kN |
| . maximum load (tractor manufacturer's) | 23 | 36,3 | kN |
| . inflation pressure (tyre manufacturer's) | 1,6 | 1,6 | bar |
| . dynamic radius index | 670 | 920 | mm |
| Chosen track width : | 1854 | 1922 | mm |

### 3.5 Recommended and used during test lubricants

| | |
|---|---|
| Engine oil<br>. Type<br>. Viscosity<br>. Classification | B.P<br>TERRAC MANAGER<br>10 W 30<br>MIL L 2140 C |
| Transmission oils<br>. Type<br>. Viscosity<br>. Classification | B.P<br>TERRAC MANAGER<br>10 W 30<br>MIL L 2140 C |
| Final drives oils<br>. Type<br>. Viscosity<br>. Classification | B.P<br>TERRAC TRANS<br>85 W 140<br>O.L. |
| Front differential and final drives<br>. Type<br>. Viscosity<br>. Classification | B.P<br>TERRAC MANAGER<br>10 W 30<br>MIL L 2140 C |
| Hydraulic fluid<br>. Type<br>. Viscosity<br>. Classification | B.P<br>TERRAC MANAGER<br>10 W 30<br>MIL L 2140 C |
| Steering oil<br>. Type<br>. Viscosity<br>. Classification | B.P<br>TERRAC MANAGER<br>10 W 30<br>MIL L 2140 C |

- Grease : B.P TERRAC CHARGE

  . Number of lubrication points : 10

### 3.5 Fuel

. Type : Diesel Oil
. Gravity at 15°C : 0,851
. Viscosity : (NFT 60.100) : 4,84 cSt

CEMAGREF

## 4. COMPULSORY TESTS RESULTS

### 4.1 Main power take-off performance

Location and date of tests : ANTONY, 17th october 1991
Type of dynamometer : SCHENCK W 700

| Power | Speed | | Fuel consumption | | Specific energy |
|---|---|---|---|---|---|
| | engine | power take-off | hourly | specific | |
| kW | rev/min | | l/h | g/kWh | kWh/l |
| MAXIMUM POWER - TWO HOURS TEST | | | | | |
| 114,9 | 2150 | 1029 | 31,03 | 230 | 3,70 |
| MAXIMUM POWER AT RATED ENGINE SPEED | | | | | |
| 113,9 | 2202 | 1053 | 31,15 | 233 | 3,66 |
| PART LOADS (governor control being set for maximum power at rated engine speed)<br>(1) Torque corresponding to 85% of the torque at maximum power at rated engine speed | | | | | |
| 99,2 | 2248 | 1076 | 27,69 | 237 | 3,58 |
| (2) 75% of the torque defined in (1) | | | | | |
| 75,20 | 2277 | 1089 | 22,42 | 254 | 3,35 |
| (3) 50% of the torque defined in (1) | | | | | |
| 50,5 | 2308 | 1104 | 17,30 | 291 | 2,92 |
| (4) 25% of the torque defined in (1) | | | | | |
| 25,6 | 2330 | 1115 | 12,12 | 402 | 2,12 |
| (5) Unloaded | | | | | |
| - | 2350 | 1124 | 7,27 | - | - |
| MAXIMUM POWER AT STANDARD POWER TAKE-OFF SPEED (1000 ± 25 rev/min) | | | | | |
| 114,8 | 2096 | 1003 | 30,67 | 227 | 3,74 |
| PART LOADS (governor control being set for maximum power at standard power take-off speed)<br>(6) Torque corresponding to 85% of the torque at maximum power at standard power take-off speed | | | | | |
| 96,7 | 2130 | 1019 | 26,55 | 234 | 3,64 |
| (7) 75% of the torque defined in (6) | | | | | |
| 73,4 | 2158 | 1033 | 21,44 | 249 | 3,42 |
| (8) 50% of the torque defined in (6) | | | | | |
| 49,40 | 2184 | 1045 | 16,45 | 283 | 3,00 |
| (9) 25% of the torque defined in (6) | | | | | |
| 25,7 | 2213 | 1059 | 11,33 | 375 | 2,27 |
| (10) Unloaded | | | | | |
| - | 2234 | 1069 | 6,65 | - | - |

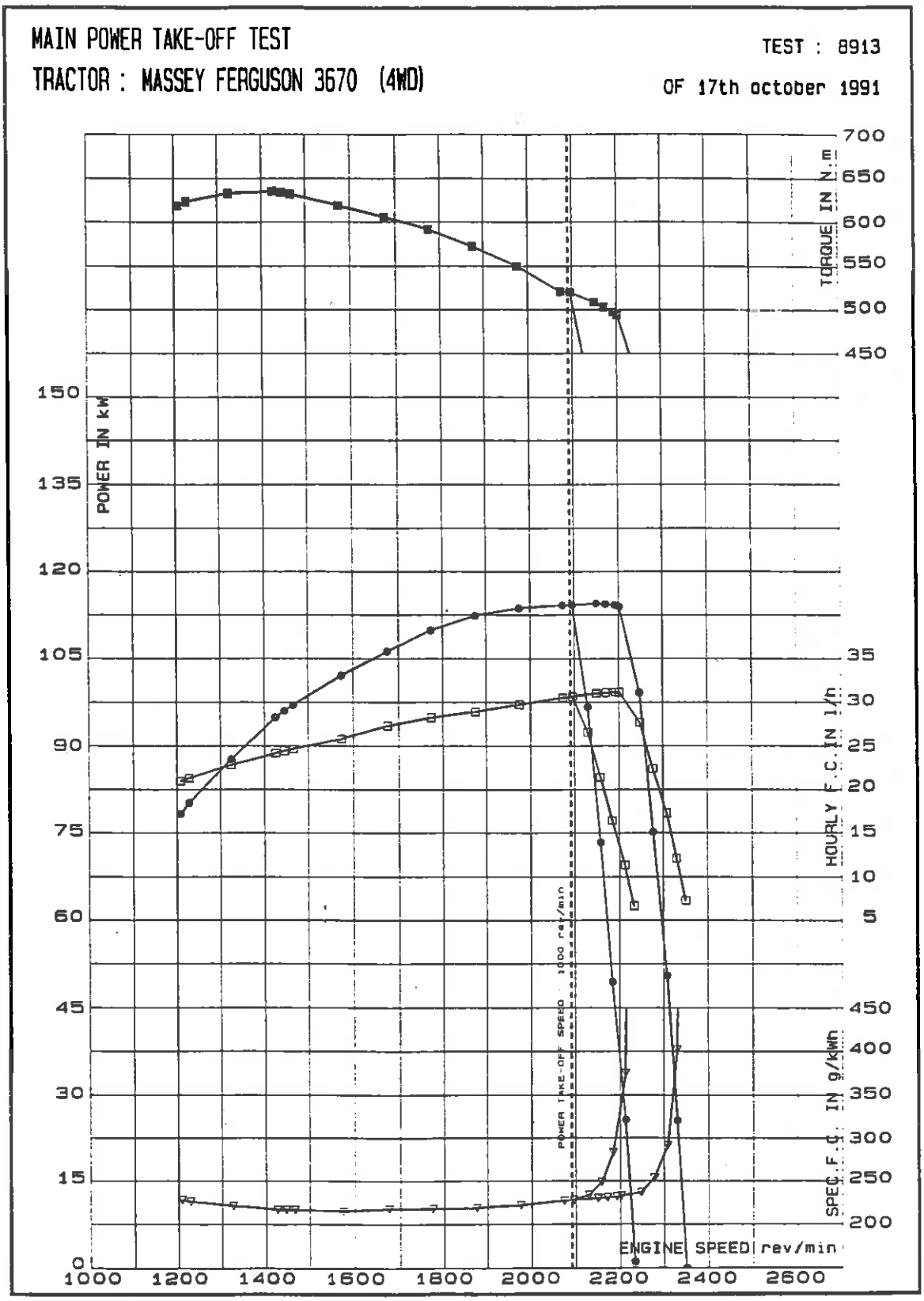
CEMAGREF

MAIN POWER TAKE-OFF TEST

TRACTOR : MASSEY FERGUSON 3670 (4WD)

TEST : 8913

OF 17th october 1991



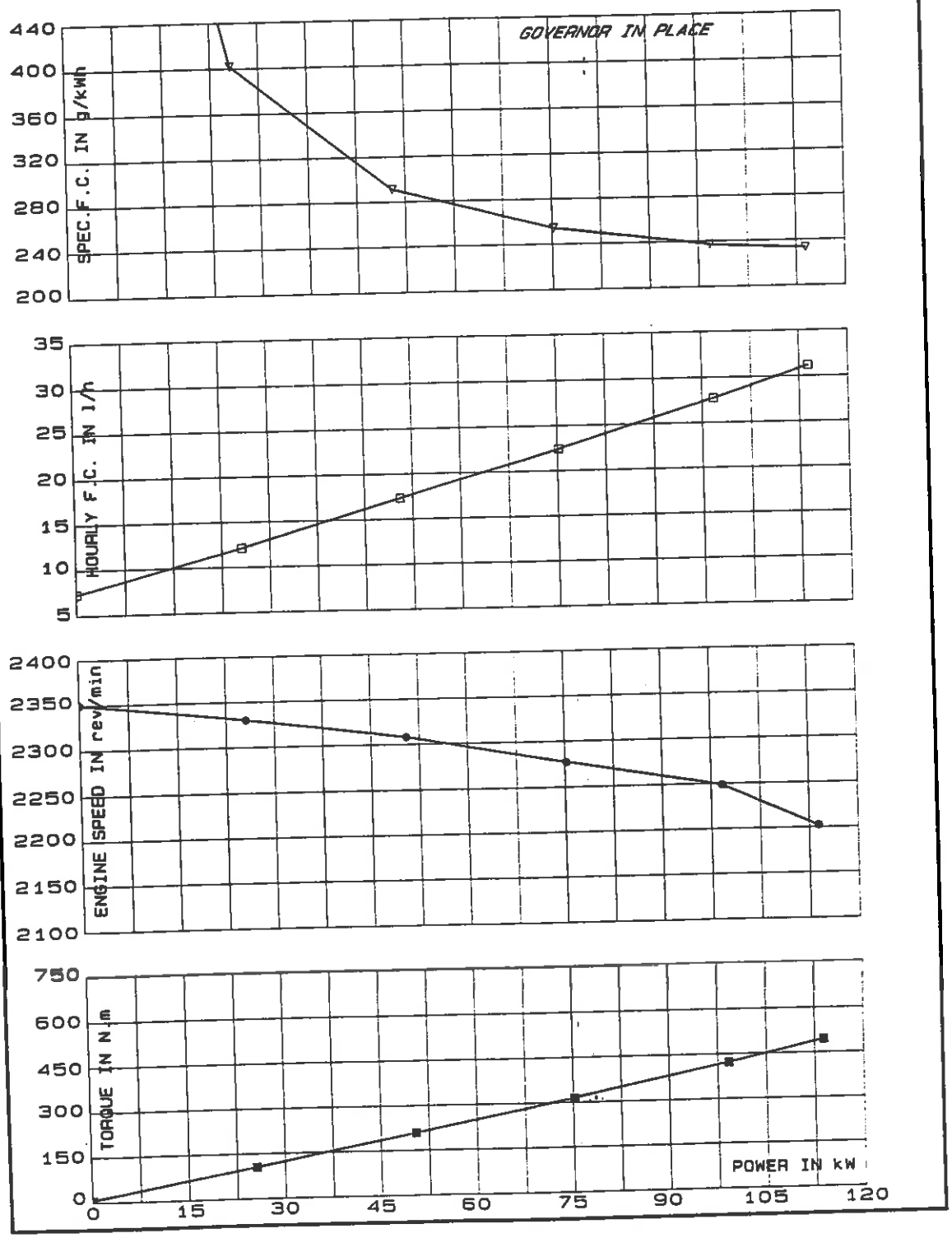
CEMAGREF

MAIN POWER TAKE-OFF TEST

TRACTOR : MASSEY FERGUSON 3670 (4WD)

TEST : 8913

OF : 17th october 1991



CEMAGREF

4.1 Main power take-off performance (continued)

Other results

No load, maximum engine speed : 2350 rev/min

Equivalent crankshaft torque at maximum power : 510,4 N.m

Equivalent crankshaft torque at maximum power at rated engine speed : 494 N.m

Maximum equivalent crankshaft torque : 635,3 N.m at 1426 rev/min

Mean atmospheric conditions

Temperature : 21 °C

Pressure : 1010 mbar

Relative humidity : 50 %

Maximum temperatures

Coolant : 91 °C

Engine oil : 112 °C

Fuel : 47 °C

Air intake : 31 °C

.Fuel consumption at variyng load

| Charge | Governor control being set for maximum power at rated engine speed | | Governor control being set for maximum power at standard pto speed | |
|---|---|---|---|---|
| | at 85% (1) | at 50% of 85% (2) | at 85% (1) | at 50% of 85% (2) |
| Hourly consumption (l/h) | 27,69 | 17,30 | 26,55 | 16,45 |
| Standard specific consumption (g/kWh) | 237 | 291 | 234 | 283 |

(1) 85% of the torque corresponding to maximum power for the position of the governor hand lever

(2) 50% of the torque defined in (1)

CEMAGREF

## 4.2 Lifting force and hydraulic power

Date : 22nd october 1991

### 4.2.1 Hydraulic power test

#### 4.2.1.1 Hydraulique Pump (lift and auxiliary service connection number 3 and 4)

- Tapping point used for test : auxiliary service connection
- Sustained pressure with relief valve open : 190 bars
- Pump delivery rate at minimum pressure : 55,0 l/min

| | Flow rate l/min | Pressure bars | Power kW |
|---|---|---|---|
| Flow rate corresponding to a hydraulic pressure equivalent to 90 percent of the actual relief valve pressure setting and corresponding hydraulic power | 48,7 | 171 | 13,9 |
| Flow rate and hydraulic pressure corresponding to maximum hydraulic power | 48,7 | 171 | 13,9 |

#### 4.2.1.2 Hydraulique Pump (auxiliary service connection number 1 and 2)

- Tapping point used for test : auxiliary service connection
- Sustained pressure with relief valve open : 181 bars
- Pump delivery rate at minimum pressure : 40,0 l/min

| | Flow rate l/min | Pressure bars | Power kW |
|---|---|---|---|
| Flow rate corresponding to a hydraulic pressure equivalent to 90 percent of the actual relief valve pressure setting and corresponding hydraulic power | 37,2 | 163 | 10,1 |
| Flow rate and hydraulic pressure corresponding to maximum hydraulic power | 37,2 | 163 | 10,1 |

## 4.2 Lifting force and hydraulic power

### 4.2.2 Power lift test

**Hydraulic fluid : see "fuel and lubricants used in tests"**

| | | at the hitch point | on the frame |
|---|---|---|---|
| Height of lower hitch point above ground in low position | mm | 235 | 197 |
| Vertical movement | mm | 630 | 714 |
| Maximum force exerted through full range | kN | 53,7 | 48,9 |
| Corresponding pressure of hydraulic fluid | bar | 171 | 171 |
| Moment about rear axle | kN.m | 63,7 | 87,8 |
| Maximum tilt angle of mast over range of lift | degree | / | 4,2° |

### 4.2.2 Power lift test

| Lifting height (1) | mm | -395 | -357 | -300 | -200 | -100 | 0 | +100 | +200 | +273 | +319 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Lifting force (2) | at the hitch point kN | - | 53,7 | 54,5 | 56,6 | 58,6 | 60,5 | 62,1 | 63,2 | 59,6 | - |
| | at the frame kN | 50,6 | 50,6 | 50,7 | 51,0 | 51,3 | 51,1 | 51,0 | 50,3 | 49,7 | 48,9 |

Corresponding pressure : 171 bars

(1) Lifting height relative to the horizontal plane including the lower link pivot points
(2) The values of force measured are corrected to correspond to a hydraulic pressure equivalent to 90% of the actual relief valve pressure setting or to maximum power delivered by the hydraulic system, whichever is lower.

CEMAGREF

## 4.3 Drawbar performance (unballasted tractor)

Date and location of test : 21st and 22nd october 1991, Antony

Type of track : Tarmacadam

Height of drawbar above ground : 0,65 m

| Tyres | Front | Rear |
|---|---|---|
| . Size : | 16.9 - 30 | 20.8 - 42 |
| . Inflation pressure (bar) : | 1,2 | 1,1 |

Atmospheric conditions : 21st and 22nd october 1991

| | | |
|---|---|---|
| . Temperature : | 7°C | 10°C |
| . Pressure : | 1028 mbar | 1025 mbar |
| . Relative humidity : | 50 % | 60 % |

| Gear ratio | Travelling speed km/h | Drawbar pull kN | Power kW | Engine speed rev/min | Wheelslip % | Specific consumption g/kWh | Specific energy kW/l | Temperatures (1) °C | (2) °C | (3) °C |
|---|---|---|---|---|---|---|---|---|---|---|
| MAXIMUM POWER IN TESTED GEAR | | | | | | | | | | |
| 1 T A | 2,29 | 59,6 | 37,9 | 2328 | 15 | 394 | 2,17 | 38 | 76 | 93 |
| 1 T B | 2,66 | 59,2 | 43,7 | 2314 | 15 | 377 | 2,27 | 41 | 79 | 91 |
| 1 T C | 3,14 | 59,2 | 51,7 | 2304 | 15 | 349 | 2,45 | 41 | 76 | 92 |
| 2 T A | 3,45 | 59,6 | 57,1 | 2294 | 15 | 332 | 2,58 | 42 | 79 | 100 |
| 1 T D | 3,67 | 59,5 | 60,6 | 2290 | 15 | 329 | 2,60 | 42 | 79 | 98 |
| 2 T B | 3,97 | 59,5 | 65,6 | 2281 | 15 | 320 | 2,67 | 42 | 79 | 100 |
| 2 T C | 4,92 | 58,7 | 80,2 | 2262 | 11 | 293 | 2,92 | 42 | 79 | 102 |
| 3 T A | 5,04 | 59,1 | 82,7 | 2259 | 11 | 291 | 2,94 | 44 | 79 | 103 |
| 2 T D | 5,64 | 58,9 | 92,4 | 2238 | 11 | 288 | 2,97 | 43 | 79 | 103 |
| 3 T B | 5,87 | 58,7 | 95,8 | 2226 | 10 | 281 | 3,05 | 45 | 79 | 105 |
| 4 T A | 7,03 | 52,1 | 101,8 | 2187 | 6 | 263 | 3,24 | 44 | 78 | 103 |
| 3 T C | 7,10 | 51,4 | 101,4 | 2166 | 6 | 264 | 3,23 | 43 | 78 | 103 |
| 1 L A | 7,81 | 47,3 | 102,6 | 2150 | 5 | 260 | 3,27 | 47 | 78 | 102 |
| 4 T B | 8,19 | 45,3 | 103,2 | 2140 | 4 | 258 | 3,29 | 44 | 78 | 102 |
| 3 T D | 8,30 | 44,3 | 102,0 | 2134 | 4 | 260 | 3,27 | 40 | 76 | 102 |
| 1 L B | 9,15 | 40,8 | 103,6 | 2127 | 4 | 256 | 3,32 | 45 | 79 | 106 |
| 4 T C | 9,67 | 38,0 | 102,0 | 2114 | 3 | 260 | 3,27 | 43 | 79 | 105 |
| 1 L C | 10,87 | 34,5 | 104,2 | 2121 | 3 | 257 | 3,32 | 39 | 78 | 104 |
| 4 T D | 11,34 | 32,2 | 101,4 | 2104 | 2 | 262 | 3,25 | 45 | 76 | 104 |
| 2 L A | 11,99 | 31,2 | 103,5 | 2108 | 2 | 256 | 3,33 | 44 | 79 | 103 |
| 1 L D | 12,67 | 29,1 | 102,4 | 2097 | 2 | 258 | 3,30 | 42 | 77 | 101 |
| 2 L B | 13,97 | 26,6 | 103,2 | 2097 | 2 | 256 | 3,32 | 47 | 78 | 101 |
| 2 L C | 16,27 | 22,3 | 100,9 | 2088 | 3 | 260 | 3,27 | 42 | 80 | 105 |

CEMAGREF

4.3 Drawbar performance (unballasted tractor) (continued)

| Gear ratio | Travelling speed km/h | Drawbar pull kN | Power kW | Engine speed rev/min | Wheelslip % | Specific consumption g/kWh | Specific energy kW/l | Temperatures (1) °C | (2) °C | (3) °C |
|---|---|---|---|---|---|---|---|---|---|---|
| TRANSMISSION AND FUEL CONSUMPTION CHARACTERISTICS<br>(1) Maximum drawbar power in tested gear | | | | | | | | | | |
| 1 L C | 10,87 | 34,5 | 104,2 | 2121 | 3 | 257 | 3,32 | 39 | 78 | 104 |
| (2) 75% of pull at maximum power at rated engine speed | | | | | | | | | | |
| 1 L C | 11,78 | 24,2 | 79,3 | 2267 | 2 | 281 | 3,02 | 44 | 79 | 103 |
| (3) 50% of pull at maximum power at rated engine speed | | | | | | | | | | |
| 1 L C | 12,05 | 16,0 | 53,6 | 2297 | 1 | 347 | 2,46 | 44 | 79 | 100 |
| (4) next higher gear at reduced engine speed, same pull and travelling speed as in (2) | | | | | | | | | | |
| 4 T D | 11,81 | 24,0 | 78,7 | 2167 | 2 | 284 | 3,00 | 42 | 76 | 100 |
| (5) next higher gear at reduced engine speed, same pull and travelling speed as in (3) | | | | | | | | | | |
| 4 T D | 12,05 | 16,0 | 53,6 | 2193 | 1 | 330 | 2,58 | 40 | 80 | 100 |
| (6) next higher gear at reduced engine speed, same pull and travelling speed as in (2) | | | | | | | | | | |
| 2 L A | 11,79 | 24,1 | 78,9 | 2064 | 2 | 257 | 3,32 | 42 | 79 | 100 |
| (7) next higher gear at reduced engine speed, same pull and travelling speed as in (3) | | | | | | | | | | |
| 2 L A | 12,04 | 15,9 | 53,3 | 2091 | 1 | 303 | 2,81 | 42 | 80 | 99 |
| (8) Maximum drawbar power in selected gear nearest to 7,5 km/h | | | | | | | | | | |
| 4 T A | 7,03 | 52,1 | 101,8 | 2187 | 6 | 263 | 3,24 | 44 | 78 | 103 |
| (9) 75% of pull at maximum power | | | | | | | | | | |
| 4 T A | 7,51 | 38,2 | 79,6 | 2272 | 3 | 276 | 3,08 | 44 | 79 | 101 |
| (10) 50% of pull at maximum power | | | | | | | | | | |
| 4 T A | 7,74 | 25,7 | 55,2 | 2303 | 2 | 311 | 2,74 | 43 | 78 | 99 |
| (11) Higher gear at reduced engine speed; same pull and travelling speed as in (9) | | | | | | | | | | |
| 1 L A | 7,50 | 38,0 | 79,2 | 2038 | 3 | 260 | 3,27 | 46 | 79 | 100 |
| (12) Higher gear at reduced engine speed; same pull and travelling speed as in (10) | | | | | | | | | | |
| 1 L A | 7,75 | 25,8 | 55,6 | 2067 | 2 | 281 | 3,03 | 47 | 78 | 100 |

(1) Fuel temperature - (2) Coolant temperature - (3) Engine oil temperature

A speed sensor release the front axle above 15 km/h

CEMAGREF

## 5. OPTIONAL TESTS RESULTS

### 5.2 Measurement of external noise level

Date of test : 23rd october 1991
Type of sound level meter : BRUEL & KJAER 2209
Type of track : Tarmacadam
Gear : 3 L D
Travelling speed before acceleration : 23,5 km/h
Sound level : 84 dB(A)

## 6. REPAIRS AND ADJUSTMENTS DURING TESTS

none

| Le Technicien chargé des essais | L'Ingénieur responsable des essais | Le Chef de la Division Tracteurs et Machines Agricoles |
|---|---|---|
| M.HOCQUEL | E.HUGO | J.F.GOUPILLON |

- This test report was approved for publication by the requester of the test -

| Diffusion 1992 | |
|---|---|
| N°042 | 1ère édition |