

परीक्षण रिपोर्ट

LABORATORY TEST REPORT (Initial)

संख्या / No. : T-982/1506/2015

माह / Month : September, 2015

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INDIA FARM MACHINERY TRAINING & TESTING INSTITUTES LIMITED, FARMTRAC CHAMPION F2 TRACTOR



सत्यमेव जयते

भारत सरकार

कृषि एवं किसान कल्याण मंत्रालय  
(कृषि, सहकारिता एवं किसान कल्याण विभाग)

GOVERNMENT OF INDIA

MINISTRY OF AGRICULTURE AND FARMERS WELFARE

DEPARTMENT OF AGRICULTURE, CO-OPERATION AND FARMERS WELFARE)

केन्द्रीय कृषि मशीनरी प्रशिक्षण एवं परीक्षण संस्थान

ट्रैक्टर नगर, बुदनी (म.प्र.) ४६६ ४४५

CENTRAL FARM MACHINERY TRAINING & TESTING INSTITUTE

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T-982/1506/2015

**ESCORTS LIMITED, FARMTRAC CHAMPION F2 TRACTOR – Commercial (Initial)**

**Manufacturer** : M/s. Escorts Limited,  
Plot No 2 & 3, Sector-13,  
Faridabad – 121 007 (Haryana)

**Test requested by** : M/s. Escorts R & D Centre,  
15/5, Mathura Road,  
Faridabad – 121 003 (Haryana)

**Place of running-in** : At applicant's works.

**Duration of said running-in, (h):**

- Engine : 20

- Transmission : 30

**Method of Selection** : The tractor was submitted directly by the applicant for test. Hence, method of selection is not known.

**1. SPECIFICATIONS****1.1 Tractor:**

**Make** : Escorts Limited

**Model** : Farmtrac Champion F2

**Brand name** : Farmtrac

**Type** : Four wheeled, rear-wheel driven, General Purpose Agricultural Tractor.

**Year of manufacture** : 2014

**Chassis number** : T05 2315691

**Country of origin** : India

**Variants, if any \*** : None

**Optional feature provided during ICT****Optional feature****Additional test carried out**

i) Different tyre size : Physical Inspection and Nominal Speed test  
(One step lower from 13.6-28,12 PR to 12.4-28, 12PR)

**1.2 Engine:**

**Make** : Escorts Limited

**Model** : E3.234-3A

**Type** : Four stroke, naturally aspirated, water cooled, direct injection, diesel engine.

**Serial number** : E - 2320152

**1.2.1 Engine speed(Manufacturer's recommended production setting), (rpm):**

- Maximum speed at no load : 2475 to 2525

- Low idle speed : 600 to 700

- Speed at maximum torque : 1200 to 1300

**Rated speed, (rpm):**

- For PTO use : 2200

- For drawbar use : 2200

**1.3 Cylinder & Cylinder Head:**

**Number** : Three

**Disposition** : Vertical, Inline

**Bore/stroke, (mm)** : 95/110



T-982/1506/2015

**ESCORTS LIMITED, FARMTRAC CHAMPION F2 TRACTOR – Commercial (Initial)**

**16. ADJUSTMENTS, DEFECTS, BREAKDOWNS AND REPAIRS**

Sl. No.	Adjustments/Defects/Breakdowns and Repairs	Tractor hours
1.	..... Nil.....	

**17. SUMMARY OF OBSERVATIONS, COMMENTS & RECOMMENDATIONS**

17.1 Evaluative (mandatory) / Non-evaluative (Non-mandatory) parameters applicable for qualifying Minimum Performance criteria as per Clause-4 (Table-1) of IS: 12207-2014 for acceptance of the tractor for the purpose of subsidies/NABARD financing are summarized as under:

Sl. No	Characteristic	Category (Evaluative / Non Evaluative)	Requirements as per IS: 12207-2014	Values declared by the applicant(D)/ Requirement (R)	As observed	Whether meets the requirements (Yes/No)
1	2	3	4	5	6	7
<b>17.1.1</b>	<b>PTO Performance :</b>					
a)	Maximum power under 2 h test, (kW) (Natural ambient condition)	Evaluative	Declared value to be achieved with a tolerance of: -5 / +10% for PTO power >26 kW, -7.5/+10% for PTO power ≤ 26 kW or -5 / +10% for Engine power >26 kW, -7.5/+10% for Engine power ≤ 26 kW	27.8 (D)	28.1	Yes
b)	Power at rated engine speed, (kW)	Non Evaluative	-do-	27.8 (D)	28.1	Yes
c)	Specific fuel consumption corresponding to maximum power, (g/kWh)	Non Evaluative	± 5%	250 (D)	249	Yes
d)	Maximum equivalent crankshaft torque, (Nm)	Non Evaluative	± 8%	143.0 (D)	147.1	Yes
e)	Back-up torque, percent	Non Evaluative	10 percent, min.	10% Min (D)	20.6	Yes
f)	<b>Maximum operating temperature, (°C)</b>					
1)	Engine oil	Non Evaluative	The declared value should not exceed the max. value specified by the oil company and the observed value under high ambient condition should not exceed the declaration.	125 (D)	108	Yes
2)	Coolant (water)	Evaluative	The declared value should not exceed the boiling temperature of coolant under the pressurized or otherwise and the observed value under high ambient condition should not exceed the declaration.	118 (D)	97	Yes



T-982/1506/2015

**ESCORTS LIMITED, FARMTRAC CHAMPION F2 TRACTOR - Commercial (Initial)**

1	2	3	4	5	6	7
g)	Engine oil consumption, (g/kWh)	Evaluative	Not exceeding 1% of SFC at max. power under High ambient conditions	2.50 (D)	0.23	Yes
				2.52 (R)		
h)	Smoke level	Evaluative	Maximum light absorption coefficient of 3.25 per meter or equivalent BOSCH No. 5.2 or 75 Hatridge value (As per CMVR)	3.25 per meter (R)	0.32 per meter	Yes
<b>17.1.2 Drawbar performance :</b>						
a)	Maximum drawbar pull with ballast corresponding to 15 percent wheel slip, (kN)	Non Evaluative	Minimum 65% of static mass with ballast	16.32 Minimum (R)	21.46	Yes
				16.30 Minimum (D)		
b)	Max. drawbar pull without ballast corresponding to 15 percent wheel slip, (kN)	Evaluative	Minimum 65% of static mass of tractor without ballast	Minimum 12.24 (R)	16.13	Yes
				Minimum 12.0 (D)		
c)	Maximum drawbar power without ballast, (kW).	Evaluative	Minimum 80 % of PTO power as referred in SI No. i) a) of PTO performance in case of tractors having total static mass > 1500 kg Minimum 75 % of PTO power as referred in SI No. i) a) of PTO performance in case of light weight tractors having 1500 kg total static mass of tractor Minimum 75 % of the engine power as referred in SI No. i) a) of engine performance in case of tractors which do not have a PTO shaft.	22.5 Minimum (R)	26.1	Yes
				22.5 Minimum (D)		
d)	Maximum transmission oil temperature (°C)	Non Evaluative	The declared value should not exceed the maximum value specified by oil company	125 (D)	105	Yes
<b>17.1.3 Power lift and hydraulic pump performance :</b>						
a)	Maximum lifting capacity throughout the range of lift, (kN):					
	1) At hitch points	Non Evaluative	[Tolerance of minus 10%]	13.7 (D)	15.79	Yes
	2) With the standard frame	Evaluative	The lift capacity should at least be 24 kg/PTO kW. and it should be 21.5 kg/engine kW where the tractor is not provided with a PTO shaft	6.7 (R) (Minimum)	14.51	Yes
			9.8 (D)			
b)	Maximum drop in the height of the point of application of the force after each 5 minutes interval for a total duration of 30 Minutes, (mm)	Non Evaluative	Observed value should not exceed 50 mm.	50 (D)	88	No



T-982/1506/2015

**ESCORTS LIMITED, FARMTRAC CHAMPION F2 TRACTOR - Commercial (Initial)**

1	2	3	4	5	6	7
<b>17.1.4</b>	<b>Brake performance at 25 kmph:</b>					
<b>a)</b>	Maximum stopping distance at a force, equal to or less than 600 N on brake pedal with ballast* (m):					
1)	Cold brake	Evaluative	10	10 (R)	7.77	Yes
2)	Hot brake	Evaluative	10	10 (R)	7.64	Yes
<b>b)</b>	Maximum force exerted on the brake pedal to achieve a deceleration of 2.5 m/s <sup>2</sup> (N)	Evaluative	600	600 (R)	243 to 289	Yes
<b>17.1.5</b>	<b>Noise measurement:</b>					
<b>a)</b>	Maximum ambient noise emitted by the tractor dB(A)	Evaluative	As per CMVR	86 (R)	83	Yes
<b>b)</b>	Maximum noise at operator's ear level dB(A)	Evaluative	As per CMVR	96 (R)	94	Yes
<b>17.1.6</b>	<b>Amplitude of mechanical vibrations at :</b>					
1)	Left foot rest	Non Evaluative	100 microns (max)	100 (R)	140	No
2)	Right foot rest				30	Yes
3)	Seat (with driver seated)				20	Yes
4)	Steering Wheel				120	No
<b>17.1.7</b>	<b>Haulage requirements :</b>					
<b>a)</b>	Gross mass of the trailers, (tones):					
1)	Two wheel	Non	--	5.0 (D)	5.0	Yes
2)	Four wheel	Evaluative	--	6.0 (D)	6.0	Yes
<b>b)</b>	Distance travelled / litre of fuel consumption, (km/l):					
1)	Two wheel	Non	--	6.5 to 7.5 (D)	5.04 to 5.91	No
2)	Four wheel	Evaluative	--	6.5 to 7.5 (D)	6.26 to 6.36	No
<b>c)</b>	Fuel consumption (ml/km/tonne):					
1)	Two wheel	Non	--	27 to 33 (D)	33.37 to 33.85	No
2)	Four wheel	Evaluative	--	27 to 33 (D)	26.19 to 26.59	No
<b>17.1.8</b>	<b>Wetland cultivation :</b>					
	Sealing for the following assemblies:	Evaluative	The identified assemblies should essentially meet the requirement of IS: 11082. No water ingress in the identified assembly given in column-2. If tractor does not meet the requirements of wetland cultivation, it may be recommended for dry land operation only.	There should be no ingress of water and/or mud	No ingress of water and/or mud was observed	Yes
1)	Clutch assembly	-do-				
2)	Brake housings	-do-				
3)	Front axle hubs	-do-				



**T-982/1506/2015**      **ESCORTS LIMITED, FARMTRAC CHAMPION F2 TRACTOR – Commercial (Initial)**

1	2	3	4	5	6	7
<b>17.1.9 Safety features :</b>						
a)	Guards against moving and hot parts	Evaluative	Belt drives, pulley, silencer, hydraulic pipes (As per IS 12239 (part 2))	Conforms	Conforms*	Yes
b)	Lighting arrangement (Tractor having more than 1150 mm rear track width)	Evaluative	As per CMVR	--	Provided	Yes
c)	Seating requirement (Tractors having more than 1150 mm rear track width)	Non-Evaluative	Should meet the requirements of IS 12343 (as amended from time to time)	--	Conforms	Yes
d)	Technical requirements for PTO shaft	Non-Evaluative	Should meet the requirements of IS 4931 (as amended from time to time)	--	<b>Does not meet the requirement</b>	<b>No</b>
e)	Dimension of three point linkage	Non-Evaluative	Should meet the requirements of IS 4468 (part 1) (as amended from time to time)	--	-do-	<b>No</b>
f)	Specification of linkage and swinging drawbars	Non-Evaluative	Should meet the requirements of IS 12953 and IS 12362 (part 3) (as amended from time to time)	--	Conforms	Yes

*\*Remark: The guards against moving hot parts are not fully guarded. The year of manufacturer of the test sample is before the date of implementation of relevant IS:12207-2014. Therefore, for prospective effects of implementation of Indian standard this conforms to IS:12239 (Part-2)-1999 (reaffirmed in march, 2009)*

<b>17.1.10 Labelling of tractors (Provision of one ing plate):</b>						
1)	Make	Evaluative	Should conform to the requirements of CMVR along-with declared value of PTO HP	--	Escorts limited	Yes
2)	Model	Evaluative		--	Farmtrac Champion F2	Yes
3)	Year of manufacture	Evaluative		--	2014	Yes
4)	Engine number	Evaluative		--	E 2320152	Yes
5)	Chassis number	Evaluative		--	T 2315691	Yes
6)	Declaration of PTO power, (kW)	Evaluative		--	27.8 (37.2)	Yes

<b>17.1.11 Discard limit for:</b>						
(a)	Cylinder bore diameter, (mm)	Evaluative	To be specified by the manufacturer	95.30 (D)	94.97 to 95.07	Yes
(b)	Clearance between piston & cylinder liner at skirt, (mm)	Non-Evaluative		0.50 (D)	0.105 to 0.189	Yes
<b>(c) Ring end gap (mm):</b>						
	- Top comp. ring	Evaluative	-do-	3.00	0.30 to 0.40	Yes
	- 2 <sup>nd</sup> comp. ring		-do-	3.00	0.70 to 0.95	Yes
	- Oil ring		-do-	3.00	0.25 to 0.35	Yes



T-982/1506/2015

**ESCORTS LIMITED, FARMTRAC CHAMPION F2 TRACTOR – Commercial (Initial)**

T-982

1	2	3	4	5	6	7
(d)	<b>Ring groove clearance (mm):</b>					
	- Top comp. ring	Evaluative	-do-	0.50	Tapered	Yes
	- 2 <sup>nd</sup> comp. ring		-do-	0.50	0.093 to 0.113	Yes
	- Oil ring		-do-	0.50	0.059 to 0.068	Yes
(e)	<b>Clearance of main bearings (mm):</b>					
	- Diametrical clearance	Evaluative	To be specified by the manufacturer	0.40	0.106 to 0.202	Yes
	- Crankshaft end float	Evaluative		0.75	0.35	Yes
(f)	<b>Clearance of big end bearings, (mm):</b>					
	- Diametrical	Evaluative	-do-	0.40	0.117 to 0.139	Yes
	- Axial	Evaluative	-do-	0.75	0.30	Yes
(g)	Clearance between king pin and bush, (mm)	Non Evaluative	-do-	0.50	0.246 to 0.308	Yes
(h)	Clearance between centre pin and bush, (mm)	Non Evaluative	-do-	0.50	0.248 to 0.277	Yes

17.1.12 Literature (Submission to test agency)						
(a)	Operator manual	Evaluative	Provided/Not Provided	As per relevant IS Code (IS 8132)	Provided	Yes
(b)	Parts Catalogue	Evaluative	Provided/Not Provided	As per relevant IS Code (IS 8132)	Provided	Yes
(c)	Workshop/Service manual	Evaluative	Provided/Not Provided	As per relevant IS Code (IS 8132)	Provided	Yes

17.1.13 CATEGORY OF BREAKDOWNS / DEFECTS :					
S. No.	Category of breakdowns	Category (Evaluative / Non Evaluative)	Requirements as per IS: 12207-2014	As observed	Whether meets the requirements (Yes/No.)
1.	Critical	Evaluative	No critical breakdown	None	Yes
2.	Major	Evaluative	Not more than two and neither of them should be repetitive in nature	None	Yes
3.	Minor	Evaluative	Not more than five and frequency of each should not be more than two.	None	Yes
4.	Total breakdowns	Evaluative	In no case, the total number of breakdowns should exceed five, that is, (2 major + 3 minor) or 5 minor breakdowns.	None	Yes

17.2 Optional requirements as per Clause-4 (Table-2) of IS:12207-2014:				
S. No.	Characteristic	Requirements as per IS: 12207-2014	As observed	Whether meets the requirements (Yes/No.)
1.	Fitment of ROPS	With a provision for fitment of ROPS.	Not provided	Not applicable
		If ROPS fitted it should meet the requirement of IS:11821-1992	Not provided	Not applicable
2.	Accessories	Trailer hitch, front tow hook, linkage drawbar may be provided.	Provided	Yes



T-982/1506/2015

**ESCORTS LIMITED, FARMTRAC CHAMPION F2 TRACTOR –  
Commercial (Initial)****17.3 Conformity with following IS:**

- i) Guidelines for declaration of power and specific fuel consumption and labeling of agricultural tractors (First revision) [IS 10273:1987 (Reaffirmed in March, 2009)] : **Conforms**
- ii) Agricultural tractors – Rear mounted power take-off - Types 1, 2 and 3 (third revision) [IS: 4931-1995 (Reaffirmed in March, 2009)] : **Does not conform**
- iii) Agricultural wheeled tractors - Rear mounted three-point linkage: Part 1 Categories 1, 2, 3 & 4 (fourth revision) [IS 4468 (Part-I):1997 (Reaffirmed in March, 2007)/ISO 730-1:1994] : **Does not conform**
- iv) Drawbar for agricultural tractors – Link type [IS 12953:1990 (Reaffirmed in March, 2007)] : **Conforms**
- v) Agricultural tractors - Operator's seat technical requirement [IS 12343 -1998 (First revision) (Reaffirmed in March, 2009)] : **Conforms**
- vi) Guide for safety & comfort of operator of agricultural tractors: Part 1 General requirements (first revision) : [IS 12239 (PT-1)-1996 (Reaffirmed in February, 2012)/ISO 4254-1:1989] : **Does not conform**
- vii) Tractors and machinery for agriculture and forestry – Technical means for ensuring safety Part 2: Tractors (first revision) IS 12239 (PT-2)-1999 (Reaffirmed in March, 2009)] : **Does not conform**
- viii) Tractors and machinery for agriculture and forestry, powered lawn and garden equipment – Symbols for operator controls and other displays [IS: 6283 (Part-1 & Part-2) -2006 & 2007(Reaffirmed in March, 2009)/ISO 3767-2:1991]] : **Conforms**
- ix) Guide lines for location and operation of operator controls on agricultural tractors and machinery (first revision) (IS: 8133 – 1983) (Reaffirmed in March, 2009)] : **Does not conform**
- x) Agricultural Tractor & Machinery Lighting device for travel on public roads (IS: 14683-1999) (Reaffirmed in March, 2009)] : **Conforms**

**17.4 Salient Observations:****17.4.1 Laboratory tests:****17.4.1.1 PTO Performance:**

- i) The backup torque is 20.6%.
- ii) The specific fuel consumption corresponding to maximum power was measured as 249 g/kWh against the declaration of 250 g/kWh, which is within the tolerance limit of IS: 12207-2014.

**17.4.1.2 Drawbar performance test:**

During 10 hour drawbar test, the creeping of LHS & RHS rear tyre over the rims was observed as 35 mm & 55 mm respectively, which was considered on higher side. This may be looked into for necessary corrective action.





T-982/1506/2015

**ESCORTS LIMITED, FARMTRAC CHAMPION F2 TRACTOR – Commercial (Initial)**

**17.4.1.3 Hydraulic Performance:**

- i) The maximum Cumulative drop in height of lift during load maintenance test was **88 mm** which near to required limit of 50mm, this should be looked into for necessary corrective action.
- ii) The maximum tilt angle of mast from vertical over the full range of lift was observed as **8.4** degrees against the minimum requirement of 10 degree as per IS: 12224-1987. This should be looked into for necessary corrective action.

**17.4.1.4 Mechanical Vibration:**

The amplitude of mechanical vibration on various assemblies marked as (\*) in Chapter 8 of this test report is on higher side, especially at the foot rest, steering control wheel. This calls for dampening down of vibrations to improve the operational comfort and service life of components.

**17.4.1.5 Three point linkage:**

The lateral distance from lower hitch point to center line of tractor does not meet the requirements of IS-4468-(Part I)-1997. This should be looked into for necessary corrective action.

**17.4.1.6 Specifications of Power Take-off Shaft:**

The dimensions of PTO master shield do not meet the requirements. This should be looked into for necessary corrective action.

**17.4.1.7 Haulage performance:**

- (i) The distance travelled per liter of fuel consumption with two wheel & four wheel trailer were observed as 5.25 to 5.51 km/l & 4.56 to 4.60 against the declaration of 6.5 to 7.5 km/l respectively. This does not meet the requirement of IS: 12207-2014 and therefore, should be looked into for necessary corrective action.
- (ii) The Specific Fuel consumption (ml/km/ one) with two & four wheel trailers were observed as 36.26 to 38.08 & 36.26 to 36.52 respectively against the declaration of 27 to 33 ml/km/ one. This does not meet the requirement of IS: 12207-2003 and therefore, should be looked into for necessary corrective action.

**17.4.1.8 Field performance test:**

**Wet land cultivation:**

- (i) No ingress of mud and / or water was noticed during puddling operation of the tractor and meet the requirements of IS: 11082-1984 (Technical requirements of agricultural tractors for wetland operation). Therefore, the tractor is recommended as suitable for wetland operation (Puddling).
- (ii) For wet land cultivation the applicant specified half cage wheel for test. During operation the applicant used full cage wheel. This should be mentioned clearly and boldly in all the literature relevant to this tractor model.

**17.5 Maintenance / Service Problems:**

No noticeable maintenance or service problem was observed during the test.

**17.6 Recommendation with regard to safety on tractor:**

The following requirements, inter alia, may be considered for incorporation on the tractor:

- i) Provision for spark arresting device in exhaust system.
- ii) The working clearance around the hydraulic draft and position control levers may be provided as per IS: 12239 (Part-2) – 1999.
- iii) Fuel shut-off knob does not remain in "STOP" position.



T-982/1506/2015

**ESCORTS LIMITED, FARMTRAC CHAMPION F2 TRACTOR - Commercial (Initial)****17.7 Adequacy of Literature supplied with machine:**

**17.7.1** Operator's manual, Service manual & part's catalogue of Farmtrac Champion F2 tractor was supplied with the tractor for reference during the testing. Following points should be reviewed w.r.t. the literature supplied :

- i) The printing quality in case of operator's manual is very poor and one can't easily read the figures mentioned in the catalogue, besides only one side of the catalogue is printed, as per environmental concerns both side of papers can be used in quality manner.
- ii) Literature can be supplied in regional languages to understand end customer use.

**17.7.3** The literatures should also be brought out in national as well as other regional languages for the guidance of users and service personnel.

**18. Citizen charter**

Duration of Test	Test duration under citizen charter	Whether the report released within time frame given citizen charter	Remark, if any
10 Months	11 Months (October , 2014 to August , 2014)	No	Delay for PTO performance test.

**TESTING AUTHORITY:**

**P. C. MESHRAM**  
SENIOR AGRICULTURAL ENGINEER

**C.R. LOHI**  
DIRECTOR

Test Report compiled by **Shri. Chanchlesh Singh Raghuwanshi** ,Senior Tech. Assistant

**19. APPLICANT'S COMMENTS**

Para No.	Our Reference	Applicant's comments
19.1	17.3(ii),(iii),(vi),(vii),(ix),17.4.1.3 & 17.6	These being studied & corrective action would be taken in near future.
19.2	17.4.1.4,17.4.1.5,17.4.16,17.4.1.7 & 17.7.1	Your valuable comments & suggestions for improvement are well taken. Under our policy of continuous product improvement these aspects are future being looked into & will try to eliminate these deviation soon wherever necessary.



T-982/1506/2015

ESCORTS LIMITED, FARMTRAC CHAMPION F2 TRACTOR -  
Commercial (Initial)**ANNEXURE-I****BRIEF SPECIFICATION OF IMPLEMENTS USED DURING FIELD TEST**

S. No	Item	Mould Board Plough	Rotavator
1.	Make	Escort	Maschio Itali
2.	Type	Mounted	Mounted
3.	No. of bottom/blades	03	36, in 7 flanges
4.	Type of bottom /blades	General Purpose	Hatchet
5.	Size of bottom/blades, (mm)	310	245 x 75 x 6
6.	Spacing between bottom /flanges, (mm)	210	245
7.	Lower hitch point span, (mm)	760	735
8.	Mast height, (mm)	510	470 & 610
9.	<b>Overall dimensions, (mm):</b>		
	- Length	1920	1020
	- Width	1015	1985
	- Height	1070	1045
10.	Gross mass, (kg)	340	440

**ANNEXURE - II****BRIEF SPECIFICATION OF FULL CAGE WHEEL**

S. No.	Items	Specifications
1.	Type	Full cage wheel
2.	Dia, (mm)	1250
3.	Width, (mm)	1010
4.	No. and types of lugs	32, straight lugs made up of MS-angle section welded to angle iron frame.
5.	Size of angle section, (mm)	40 x 40 x 6
6.	Length of lugs, (mm)	500
7.	Spacing of lugs, (mm)	180
8.	Weight of each cage wheels (kg)	170

**ANNEXURE- III****TRACTOR RUN HOURS DURING TEST**

<b>A.</b>	<b>LABORATORY AND TRACK TESTS:</b>	<b>HOURS</b>
1.	Running-in	--
2.	PTO performance test	11.5
3.	Power lift and hydraulic pump performance test	2.7
4.	Drawbar performance test	16.6
5.	Turning ability	0.2
6.	Location of centre of gravity	0.2
7.	Operator's field of vision	Nil
8.	Brake test	1.0
9.	Noise measurement	1.5
10.	Air cleaner oil-pull over test	3.9
11.	Mechanical vibration test	1.0
12.	Nominal speed test	1.0
<b>B.</b>	<b>FIELD TEST:</b>	
1.	Mould Board ploughing	10.0
2.	Rotavation	10.8
3.	Puddling (including 5 hrs water proof test)	15.8
<b>C.</b>	<b>HAULAGE TEST:</b>	6.0
<b>D.</b>	Miscellaneous test and other run hours including idle run, transportation, trials and preparation for test	3.8
	<b>TOTAL:</b>	86.0