



SWARAJ, 963 XT-ST 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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SWARAJ 963 XT-ST TRACTOR – Commercial (Initial)

Manufacturer	:	M/s. Mahindra & Mahindra Ltd. Swaraj Division Phase- IV, Industrial Area S.A.S. Nagar, Distt. - Mohali- 160 055 (Punjab)
Test requested by (applicant)	:	The manufacturer
Selected for test by	:	Applicant
Place of running-in	:	At manufacturer's works
Duration of said running-in (h):		
- Engine	:	28
- Transmission	:	32
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	:	Swaraj
Model	:	963 XT-ST
Variants, if any	:	None
Brand name	:	Swaraj
Type	:	Four wheeled, rear wheel driven, General Purpose Agricultural Tractor.
Year of manufacture	:	2015
Chassis number	:	WVCB68940900002
Country of Origin	:	INDIA
1.2 Engine:		
Make	:	M/s Swaraj Engines Ltd.
Model	:	RB33XMT-60
Type	:	Four stroke, turbocharged, water cooled, direct injection, diesel engine.
Serial number	:	60.1001/SUB02031
Engine speed (Manufacturer's recommended production setting), (rpm) :		
- Maximum speed at no load,(rpm)	:	2100 to 2200
- Low idle speed, (rpm)	:	580 to 700
- Speed at max. torque, (rpm)	:	1100 to 1300
Rated speed, (rpm):		
- For PTO use	:	2000
- For drawbar use	:	2000
1.3 Cylinder & Cylinder Head:		
Numbers	:	Three
Disposition	:	Vertical, inline
Bore/stroke, (mm)	:	110/122
Capacity as specified by the applicant, (cc)	:	3478
Compression ratio, (apa)	:	19(±0.5) : 1
Type of cylinder head	:	Monoblock



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Clearance between centre pin and bush, mm : 0.14 to 0.20

Against discard limit of 0.80 mm

14.6 Steering system:

Visual condition of the components of complete steering assembly : Normal

14.7 Starter motor & Alternator:

Presence of soil/oil in housing : None
Condition of bearings and other Components : Normal

15. ADJUSTMENTS, DEFECTS, BREAKDOWNS AND REPAIRS

S. No.	Adjustments/Defects/Breakdowns and repairs	Category of breakdown	Tractor run hours
1.	After the noise level test at by-stander's position, a leakage of oil from tappet cover gasket was noticed, and rectified by tightening nut & bolts of tappet cover.	Mn7	1.8

16. SUMMARY OF OBSERVATIONS, COMMENTS & RECOMMENDATIONS

16.1 Evaluative (mandatory) / Non-evaluation (Non-mandatory) parameter 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:

S. 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
16.1.1	PTO Performance :					
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 >26kW. -7.5/+10% for PTO power ≤ 26kW	38.5 (D)	37.0	Yes
b)	Power at rated engine speed, (kW)	Non Evaluative	-do-	38.5 (D)	37.0	Yes
c)	Specific fuel consumption corresponding to maximum power, (g/kWh)	Non Evaluative	+ 5%	272 (D)	268	Yes
d)	Maximum equivalent crankshaft torque, (Nm)	Non Evaluative	± 8%	243.0 (D)	240.4	Yes
e)	Back-up torque, percent	Non Evaluative	10 percent, min.	10 percent, min (R)	36.1	Yes



1	2	3	4	5	6	7	
f)	Maximum operating temperature ($^{\circ}\text{C}$):						
	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.	130 (D)	117	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.	115 (D)	92	Yes
g)	Engine oil consumption, (g/kWh)	Evaluative	Not exceeding 1% of SFC at max. power under high ambient conditions	2.75 (R) 1% of SFC, max. (D)	0.95	Yes	
h)	Smoke level	Evaluative	Maximum light absorption coefficient of 3.25 per metre or equivalent BOSCH No. 5.2 or 75 Hatridge value (As per CMVR)	3.25 per metre (R)	0.88 per meter	Yes	
16.1.2 Drawbar performance :							
a)	Maximum drawbar pull with ballast corresponding to 15 percent wheel slip, (kN).	Non Evaluative	Minimum 65% of static mass of tractor with ballast	22.00 (D)	25.86	Yes	
				21.16 (R) Minimum			
b)	Maximum drawbar pull without ballast corresponding to 15 percent wheel slip, (kN).	Evaluative	Minimum 65% of static mass of tractor without ballast	17.00 (D)	20.97	Yes	
				16.96 (R) Minimum			
c)	Maximum drawbar power without ballast (kW).	Evaluative	Minimum 80% of PTO power as referred in Sl. No. i) a) of PTO performance in case of tractors having total static mass >1500 kg. Minimum 75% of PTO power as referred in Sl. No. i) a) of PTO performance in case of light weight tractors. Minimum 75% of the engine power as referred in Sl. No. i) a) of PTO performance in case of tractors which do not have a PTO shaft.	30.8 (D)	30.3	Yes	
				29.6 (R) Minimum			
d)	Maximum transmission oil temperature ($^{\circ}\text{C}$)	Non Evaluative	The declared value should not exceed the maximum value specified by oil company.	120 (D)	106	Yes	



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1	2	3	4	5	6	7
16.1.3	Power lift and hydraulic pump performance :					
a)	Maximum lifting capacity throughout the range of lift, (kN):					
1)	At hitch points	Non Evaluative	[Tolerance of minus 10%]	21.57 (D)	20.10	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	17.65 (D) 8.71 (R) Minimum	19.00	Yes
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 minute, (mm)	Non Evaluative	The observed value should not exceed 50 mm	50 (D) 50 (R)	188	No
16.1.4	Brake performance at 25 kmph:					
a)	Maximum stopping distance at a force, equal to or less than 600 N on brake pedal with road ballast, (m):					
1)	Cold brake	Evaluative	10	10 (R)	6.46	Yes
2)	Hot brake	Evaluative	10	10 (R)	6.76	Yes
b)	Maximum force exerted on the brake pedal to achieve a deceleration of 2.5 m/s ² , (N)	Evaluative	600	600 (R)	131 to 135	Yes
c)	Whether parking brake is effective at a force of 600 N at foot pedal(s) or 400 N at hand lever	Evaluative	Yes/No	Yes (R)	Yes	Yes
16.1.5	Noise measurement :					
a)	Maximum ambient noise emitted by the tractor, dB(A)	Evaluative	As per CMVR	88 (R)	84	Yes
b)	Maximum noise at operator's ear level, dB(A)	Evaluative	As per CMVR	96 (R)	92	Yes
16.1.6	Amplitude of mechanical vibrations at :					
1)	Left foot rest	Non Evaluative	100 microns (max)	100 (R)	70	Yes
2)	Right foot rest			100 (R)	80	Yes
3)	Seat (with driver seated)			100 (R)	90	Yes
4)	Steering wheel			100 (R)	100	Yes
16.1.7	Air cleaner:					
	Air cleaner oil pull over, (%)	Non Evaluative	0.25 % (maximum)	Dry type air cleaner is provided	NA	--



1	2	3	4	5	6	7
16.1.8	Haulage requirements :					
a)	Gross mass of the trailers, (tones):					
	1) Two wheel	Non	--	6.0 (D)	6.0	Yes
	2) Four wheel	Evaluative	--	8.0 (D)	8.0	Yes
b)	Distance travelled / litre of fuel consumption, (km/l):					
	1) Two wheel	Non	--	4.0 to 5.0 (D)	4.64 to 4.70	Yes
	2) Four wheel	Evaluative	--	4.0 to 5.0 (D)	4.10 to 4.14	Yes
c)	Fuel consumption, (ml/km/tonne):					
	1) Two wheel	Non	--	25.0 to 30.0 (D)	35.5 to 35.9	No
	2) Four wheel	Evaluative	--	45.0 to 50.0 (D)	30.2 to 30.5	Yes
16.1.9	Wetland cultivation (Puddling Operation):					
	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.	There should be no ingress of water and/or mud	No ingress of water and/or mud was observed.	Yes
	1) Clutch assembly	-do-	If tractor does not meet the requirements of wetland cultivation, it may be recommended for dry land operation only.			
	2) Brake housings	-do-				
	3) Front axle hubs	-do-				
	4) Engine oil	-do-				
	5) Transmission oil	-do-				
16.1.10	Safety features :					
a)	Guards against moving and hot parts	Evaluative	Belt drives, pulleys, silencer, hydraulic pipes (As per IS 12239 Part 2)	--	Meets the requirements	Yes
b)	Lighting arrangement	Evaluative	As per CMVR	--	Meets the requirements	Yes
c)	Seating requirements (Tractors having more than 1150 mm track width)	Non Evaluative	Should meet the requirements of IS 12343 (as amended from time to time)	--	Does not meet the requirement	No
d)	Technical requirements for PTO shaft	Non Evaluative	Should meet the requirements of IS 4931 (as amended from time to time)	--	Does not meet the requirement	No
e)	Dimensions of three point linkage	Non Evaluative	Should meet the requirements of IS 4468 (Part 1) (as amended from time to time)	--	Does not meet the requirement	No
f)	Specifications of linkage drawbar	Non Evaluative	Should meet the requirements of IS 12953 (as amended from time to time)	--	Meets the requirements	Yes
	Specifications of swinging drawbar	Non Evaluative	Should meet the requirements of IS 12362 (Part 3) (as amended from time to time)	--	Not provided	NA



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1	2	3	4	5	6	7
16.1.11	Labeling of tractors (Provision of labeling plate):					
	1) Make	Evaluative	Should conform to the requirements of CMVR	--	SWARAJ	Yes
	2) Model	Evaluative		--	963 XT-ST	Yes
	3) Year of manufacture	Evaluative		--	WV (2015)	Yes
	4) Engine serial number	Evaluative		--	60.1001/S UB02031	Yes
	5) Chassis number	Evaluative		--	WVCB6894 0900002	Yes
	6) Declaration of PTO power, (kW)	Evaluative		--	38.5	Yes
16.1.12	Discard limit for:					
(a)	Cylinder bore diameter, (mm)	Evaluative	To be specified by the manufacturer and supported by printed literature.	110.225	110.02 to 110.04	Yes
(b)	Clearance between piston & cylinder liner at skirt, (mm)	Non Evaluative		0.50	0.118 to 0.138	Yes
(c)	Ring end gap (mm):					
	- Top comp. ring.	Evaluative	-do-	1.75	0.62 to 0.63	Yes
	- 2 nd comp. ring.		-do-	1.75	0.63	Yes
	- Oil ring.		-do-	1.75	0.60	Yes
(d)	Ring groove clearance (mm):					
	- Top comp. ring.	Evaluative	-do-	0.25	Taper rings	--
	- 2 nd comp. ring.		-do-	0.25	0.060 to 0.075	Yes
	- Oil ring.		-do-	0.25	0.045 to 0.051	Yes
(e)	Clearance of main bearings (mm):					
	- Diametrical clearance	Evaluative	-do-	0.30	0.068 to 0.106	Yes
	- Crankshaft end float	Evaluative	-do-	0.50	0.30	Yes
(f)	Clearance of big end bearings, (mm):					
	- Diametrical	Evaluative	-do-	0.30	0.096 to 0.123	Yes
	- Axial	Evaluative	-do-	0.60	0.20 to 0.25	Yes
(g)	Clearance between king pin and bush, (mm)	Non Evaluative	-do-	0.60	0.11 to 0.15	Yes
(h)	Clearance between center pin and bush, (mm)	Non Evaluative	-- do--	0.80	0.14 to 0.20	Yes
16.1.13	Literature (Submission to test agency):					
(a)	Operator manual	Evaluative	Provided/ Not provided	Provided	Provided	Yes
(b)	Parts Catalogue	Evaluative	Provided/ Not provided	Provided	Provided	Yes
(c)	Workshop/ Service manual	Evaluative	Provided/ Not provided	Provided	Provided	Yes



16.1.14 CATEGORY OF BREAKDOWNS / DEFECTS :					
1	2	3	4	5	6
S. No.	Characteristic	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.	One (Mn7)	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.	One (Mn7)	Yes

16.2 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	2	3	4	5
1.	Fitment of ROPS	With a provision for fitment of ROPS.	Not provided	No
		If ROPS fitted it should meet the requirement of IS: 11821-1992.	ROPS not fitted	Not applicable
2.	Accessories	Trailer hitch, front tow hook may be provided.	Trailer hitch is provided	Yes
			Front tow hook is not provided	No

16.3 Conformity with following IS:

- i) Guide lines 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 - Three-point linkage: Part 1 Categories 1, 2, 3 & 4 (Fourth Revision) [IS 4468 (Part-1):1997/ ISO 730-1:1994 (Reaffirmed in March, 2009)] : 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)] : Does not conform
- 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, powered lawn and garden equipment – Symbols for operator controls and other displays [IS: 6283 (Part-1) – 2006 (Reaffirmed in March, 2009) and IS: 6283 (Part-2)-2007 (Reaffirmed in March, 2009)]/ISO 3767-2:1991] : Conforms



- viii) Tractors and machinery for agriculture and forestry – : Conforms
Technical means for ensuring safety Part 2: Tractors (first revision) [(IS 12239 (PT-2) 1999) (Re-affirmed in March, 2009)]
- ix) Guide lines for location and operation of operator : Conforms
controls on agricultural tractors and machinery (first revision) (IS: 8133 – 1983) (Re-affirmed in March, 2009)
- x) Agricultural Tractor & Machinery Lighting device for : Conforms
travel on public roads (IS: 14683-1999) (Re-affirmed in March, 2009)

16.4 Salient Observations:

16.4.1 Laboratory tests:

16.4.1.1 PTO Performance:

- i) The maximum PTO power was observed as 37.0 kW against the declaration of 38.5 kW which meets the requirement of IS: 12207-2014 with regard to tolerance limit.
- ii) The specific fuel consumption corresponding to maximum power was recorded as observed as **269 g/kWh** against the declaration of 272 g/kWh, which is within the tolerance limit of IS: 12207-2014.
- ii) The backup torque is **36.1%**.
- iv) The maximum PTO power under natural ambient conditions was recorded as 37.0 kW, whereas the maximum PTO power under high ambient conditions was recorded as 34.4 kW. The percentage drop in the PTO power is 7.0%, which is considered on higher side. This should be looked into for necessary corrective action.

16.4.1.2 Drawbar performance:

The creeping of RHS tyre over rim was recorded as 10 mm during 10 hours drawbar performance test. This should be looked into for necessary corrective action.

16.4.1.3 Hydraulic Performance:

- i) The moment about rear axle with standard frame was recorded as **30.50 kN-m** whereas the moment about front axle was calculated as **20.96 kN-m**. The moment about rear axle is on higher side as compared to the moment about front axle. It is therefore recommended that the lifting capacity of the hydraulic system may be reduced suitably or additional ballast mass may be provided at front axle to avoid front lifting of tractor.
- ii) During the hydraulic load maintenance test the drop in vertical height of the lower links was observed as **188 mm** against the maximum permissible limit of 50 mm. It indicates an internal leakage in the hydraulic system. This may be looked into for necessary corrective action.
- iii) Maximum tilt angle of mast from vertical was observed as 4.4 degrees only and therefore does not meet the requirement of IS: 12224-1987 (Reaffirmed in March, 2009). This should be looked into for necessary corrective action.

16.4.1.4 Mechanical Vibration:

The amplitude of mechanical vibration on various assemblies marked as (*) in Chapter-8 of this test report is on very higher side. This calls for dampening down of vibrations to improve the operational comfort and service life of components.

**16.4.1.5 Haulage requirements:**

The specific fuel consumption with two wheel trailer was recorded as **35.46 to 35.86 ml/km/tonne** against the declared value of 25.00 to 30.00 ml/km/tonne. This should be looked into.

16.4.1.6 Three point linkage:

The lateral distance from lower hitch point to centre line of tractor does not meet the requirement of IS: 4468 (Part-1) -1997. This should be looked into for necessary corrective action.

16.4.1.7 Operator's Seat:

- i) The vertical distance from seat index point to centre of clutch pedal and brake pedal.
- ii) The longitudinal distance from seat index point to centre of steering control wheel.

The above i) and ii) parameters does not meet the requirement of IS: 12343-1998. This should be looked into for necessary corrective action.

16.4.1.8 Nominal speed:

The high reverse gear (HR) is locked internally, by modified gear box top cover (Pt. No. P714150D).

It is therefore recommended that this modification shall be strictly incorporated in the production line of this tractor.

16.4.2 Field performance test:**16.4.2.1 Wet land cultivation (Puddling operation):**

No ingress of water/or mud in various assemblies/components was noticed during wetland cultivation of tractor. Hence, it meets the requirements of IS: 11082-1984 (technical requirements of agricultural tractors for wetland operation). The tractor is found suitable for wetland operation (Puddling).

16.5 Maintenance / Service Problems:

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

16.6 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) Provision of PTO shaft master shield.
- iii) Vertical distance from seat index point to centre of clutch pedal & brake pedal and longitudinal distance from seat index point to centre of steering control wheel should be within the limit of easy handling of tractor.

16.7 Adequacy of Literature supplied with machine:**16.7.1** The following literature was supplied with the tractor for reference during the test:

- i) Operator's manual
- ii) Spare Parts Catalogue
- iii) Service manual

16.7.2 The operator's manual may be revised as per IS: 8132-1999 with the inclusion of, inter alia, the following:

- i) High idling speed of engine as "2100 – 2200 rpm" instead of "1100 - 1300 rpm."
- ii) Valve clearance (cold) as "0.25 – 0.30 (I) & 0.30 – 0.35 (E)" instead of "0.25 (I), 0.30 (E)".
- iii) Clutch as "Dual" instead of "Single".



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- 16.7.3 The printed literature supplied with the test sample is in English. The literature may be brought out as per IS: 8132-1999 (Reaffirmed in March, 2009) for the guidance of user and service personnel in national as well as other regional languages.

17. CITIZEN CHARTER

Time frame for Testing & Evaluation as per Citizen Charter	Duration of test	Whether the report is released within the time frame given in the Citizen Charter	Remark
10 Months	10 Months (September,2015 to July, 2016)	Yes	--

TESTING AUTHORITY:


C. K. TIJARE
AGRICULTURAL ENGINEER


C. V. CHIMOTE
TEST ENGINEER


Y. K. RAO
SENIOR AGRICULTURAL
ENGINEER


J.J.R. NARWARE
DIRECTOR

18. APPLICANT'S COMMENTS

Para No.	Our Reference	Applicant's comments
18.1	1.20.1(l) (II), 1.20.4(l), 16.4.1.8, 16.6(I)(II)(III)	These requirements are being revisited for necessary corrective action at our end.
18.2	16.3(ii),(iii),(v),(vi)	Study and trial are under progress for necessary corrective action.
18.3	16.4.1.1(iv), 16.4.1.2, 16.1.10(c),(d),(e)	These requirements are being revisited for necessary corrective action at our end.
18.4	16.4.1.3(i)(ii),(iii), 16.4.1.4, 16.4.1.5, 16.4.1.6, 16.4.1.7	Study and trial are under progress for necessary corrective action.
18.5	16.7.2(i)(ii),(iii), 16.7.3	Suggested corrections are incorporated and literature are already printed in all regional languages for end users.

**ANNEXURE - I****BRIEF SPECIFICATION OF IMPLEMENTS USED DURING FIELD TEST**

Sl. No.	Item	Disc Plough	Rotavator	Puddler
1.	Make	M/s Mahindra & Mahindra	M/s Sonalika	M/s ACE
2.	Type	Mounted	Mounted	Mounted
3.	No. of bottom / blades/discs	3	48 (in 9 flanges)	12 (6 in each gang)
4.	Type of bottom / blades/discs	Plain concave	Hatchet	Notched
5.	Size of bottom / blade/disc, (mm)	625	265 x 73 x 7	500
6.	Spacing of bottom/blade/disc, (mm)	455	250	180
7.	Lower hitch point span, (mm)	690	715	835
8.	Mast height, (mm)	455	525	510
9.	Overall dimensions, (mm):			
	- Length	1610	1165	1020
	- Width	850	2310	2070
	- Height	1080	995	1050
10.	Gross mass, (kg)	370	450	305

ANNEXURE -II**BRIEF SPECIFICATION OF HALF CAGE WHEELS**

Sl No.	Items	Specification
1.	Type	Half cage wheel
2.	Outer dia, (mm)	1800
3.	Width, (mm)	355
4.	No. and types of lugs	12, Straight lugs made of M.S. angle section welded to angle iron frame
5.	Size of angle section, (mm)	50 x 45 x 5
6.	Length of lug, (mm)	350
7.	Spacing of lug, (mm)	205
8.	Weight of each cage wheels, (kg)	100



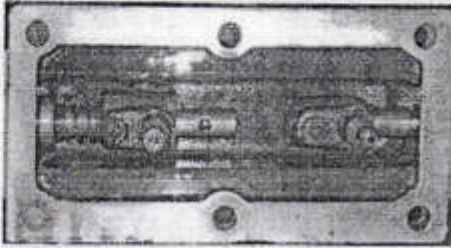
ANNEXURE-III

TRACTOR RUN HOURS DURING TEST

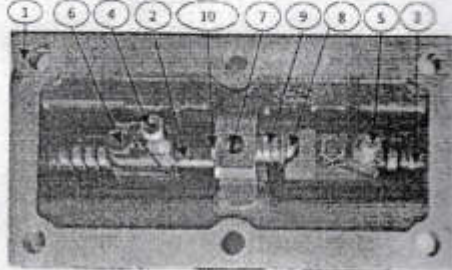
A.	LABORATORY AND TRACK TESTS:	HOURS
1.	Running-in	--
2.	PTO performance test	11.58
3.	Power lift and hydraulic pump performance test	3.78
4.	Drawbar performance test	21.42
5.	Turning ability	0.40
6.	Location of centre of gravity	Nil
7.	Operator's field of vision	0.10
8.	Brake test	2.31
9.	Noise measurement	1.92
10.	Mechanical vibration test	1.00
11.	Theoretical speed test	1.50
B.	FIELD TEST:	
1.	Disc ploughing	10.35
2.	Rotavation	10.50
3.	Wetland cultivation (including water proof)	15.17
C.	HAULAGE TEST:	5.28
D.	Miscellaneous test and other run hours including idle run, transportation, trials and preparation for test	6.55
	TOTAL:	91.78

ANNEXURE-IV

COMPARISION OF OLD AND MODIFIED TOP COVER SHIFTING



OLD DESIGN



NEW DESIGN

Old Parts	New / Replaced Parts
1. TOP COVER SHIFTING	1. TOP COVER SHIFTING(P714150D)
2. CROSS ROD MAIN ASSY	2. CROSS ROD MAIN ASSY(P714124B)
3. CROSS ROD RANGE ASSY	3. CROSS ROD RANGE ASSY(P714127B)
4. LEVER (GEAR SHIFTING)	4. LEVER (GEAR SHIFTING)(P714130C)
5. LEVER (RANGE SHIFTING)	5. LEVER (RANGE SHIFTING)(P714129B)
6. LOCKING SCREW M10	6. LOCKING SCREW M10(P1000323BA)
	7. LOCKING PIN (REVERSE) P10003018A)
	8. SLIDING PIN (REVERSE) P10003032A)
	9. SPRING (REVERSE)(P10003040A)
	10. V-RING FOR SHAFT Ø14(P10003195A)

**ANNEXURE-V****DIMENSIONS OF STANDARD AND OPTIONAL FRONT AXLE**