DIRECTOR GENERAL BORDER ROADS

GENERAL MAINTENANCE INSTRUCTION NO 225
OF
TATA SAFARI (DICOR) 4x4 (CROSS COUNTRY LIGHT VEHICLE)

INTRODUCTION: - Tata Safari LX 4x4 vehicle having 3L DICOR (Direct injection common rail) water cooled engine developing 115 PS @ 300RPM G-76-5/3.87 synchromesh gear box ventilate disc brake on front and drum brake on front and rear tyre. TATA safari is subjected to many external influences such as climate, road condition, industrial pollution and specially designed to give you long trouble free service for 1000 of Kms /miles. However, with proper maintenance care you can get optimum performance your vehicles. We have indicated some of the important maintenance operation to be carried out on the vehicle. Please read the procedure carefully and do the maintenance in time.

Regular pre-check and periodic maintenance are essential to prolong the life of the vehicle. Also it should be ensured that preventative maintenance tasks are carried out timely. Repair to asset defects from developing into major ones are done expeditiously and that the vehicle is operated efficiently at all times there by minimizing breakdown and down time and production losses.

AIM :- To enumerate the details of periodic preventive maintenance of Tata Safari 3 L DICOR

ACTION BY

USER UNIT: - To carryout maintenance schedule and oil changes as per periodic lay down by the instruction and also follow safety precaution for optimum utilization. To be enter the all tasks/records in log book of the vehicle.

FIELD WORKSHOP

(a) To check maint against & lubrication tasks actually carried out by the user unit as per Log book record.

(b) Advise user unit in respect of any discrepancies/short comings noticed.

DETAILS :-

(i)	Maintenance	-	Appendix 'A'
(ii)	Safety tips	-	Appendix 'B'
(iii)	Fuel economy	-	Appendix 'C'
(iv)	Lubricants	-	Appendix 'D'
(v)	Technical Data	-	Appendix 'E'
(vi)	Maintenance schedule	-	Appendix 'F'

(Hari prakash)
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Distribution
Normal

Appendix 'A'

Maintenance

(i) Air filter should be periodically cleaned. Replace the air filter element with a new one when the service indicator shows red band even after cleaning.

(2) If engine over heating occurs, there could be a fault in the cooling system.

(a) Less coolant in the cooling system.

(b) Dist having accumulated inside cooling water passages especially in the radiator core.

(c) Choking of radiator passage or damages.

(d) Defective thermostat.

(e) Defective coolant Temp sensor.

(f) Non operation of electrically operated fans (controlled by ECU)

(g) Coolant leakage

(h) Radiator cap not sealing properly.

(j) AC condenser fan not working properly

(k) Excess refrigerant charging in the AC system

(3) Change oil and oil filter at specified intervals.

(4) Ensure priming pump be used after overhauling of the engine OR after refit the fuel line. This pump until the all air in the fuel line is removed.

(5) Water and other sediments drain from water sedimenter when water level indicator lamp glows in dash board to ensure that no water is allowed to enter the fuel system.

(6) Check gear box oil level, top up if necessary.

(7) Check oil level of transfer case, top up if necessary.

(8) Before checking and removing the oil, warming up of the transfer case is necessary. This should be done by driving the vehicle for some time in 4x4 modes.

(9) Check the oil level of front and rear axle, top up if necessary.

(10) Ensure head lamp must be properly aligned in order to obtain max, proper road illumination and reduce glare for incoming traffic.

(11) Check clutch fluid, top up if necessary.

(12) Check the level of brake fluid, top up if necessary.

(13) Check the oil of power steering, add fluid if necessary.

(14) Bleeding of power steering, when the engine is at steady speed, check for bubble in power steering fluid container OR foaming in the oil, if present it indicates that air is getting sucked in to the system. Check the section line if necessary. Once the system is bled properly and free from foaming there should not be any appreciable change in oil level in the reservoir when the engine is started or stopped, repeated. Now the system is ready for driving.

(15) Always used recommended oil from closed containers, any dirt oil poured in the system will result in damage to pump and gear box.

(16) Check the battery electrolyte level, top up if necessary.

(17) Check battery terminals for corrosion (A white or yellowish powder). To remove it, cover the terminals with solution of baking soda, it will babble up and turn brown, wash it plan water and apply petroleum jelly to prevent future corrosion.

(18) Your safari with a discharge battery may be started by battery from another vehicle directly. This system may be very dangerous. As Tata safari if fully equipped with electronic system. It may damage any parts/system.

(19) Don't connect the battery in parallel while jump start, connect in series.

(20) Do not work under the vehicle when supported by jack other wise personnel injury may occur.

(21) Check tyre pressure inflate if necessary.

(22) Ensure wheel alignment should be checked regularly, it will decrease tyre wear.

(23) Tyre rotation should be necessary; it will help increase the life of tyre.

(24) If any electrical unit in your vehicle has stopped functioning, the fuse should be checked first. Replace it same rating.

(25) Check the relays and transfer case (ECU) for proper functioning, Relays are fitted in four location.

- (a) In the fuse box situated in side bonnet.
- (b) Under driver seat.
- (c) Under co-driver seat.
- (d) Behind glove box.

ECU for transfer case is fitted under RH seat.

(26) Check oil feed pipes, return pipes, air intake and exhaust piping for leakage and restriction.

(27) Check the engine breathing system and oil separator.

(28) Periodically check the engine radiator and air conditioning condensers for leaves, insects and dirt stuck in front surface. These block the air flow and reduce the cooling efficiency. Use light water spray or soft brush to remove them. Run air conditioning at least once a week during winter season.

(29) Check the belt tension.

Appx 'B'

SAFETY TIPS

(1) Avoid frequent and violent accelerations.

(2) Monitor the vehicle fuel consumption regularly and if showing rising trend get the vehicle immediately in authorized company for their rectification.

(3) Switch off the engine during long stop at traffic jams or signals, if you need to keep the engine running, avoid unnecessary revving it up or stopping and starting.

(4) Ensure that recommended maintenance is carried out on the vehicle regularly at the authorized service out lets.

(5) Ensure any leakages of oil or fuel in the vehicle get it repair immediately.

(6) Use only recommended grades and quantity of lubricants.

(7) Ensure fuel filter, oil filter and air breather are checked periodically and replaced if required.

(8) Don't allow unauthorized person to temper with engine setting or to carry modifications on the vehicle.

(9) Part like brake liners, clutch disc should be vacuum cleaned, don't use the compressed air for cleaning these parts which may spread the dust in the atmosphere.

(10) Wearing seat belts properly can protect you from accident or sudden braking and it will reduce the chance of severe injury.

(11) Don't use chemical solvents or strong detergent when cleaning the steering wheel or instrument panel to avoid contamination of the air bag system, wiping with a damp cloth only is recommended.

(12) Don't remove the ignition key while driving, it will lock the steering and can cause loss of control, Remove the key only when the vehicle is parked.

(13) Don't crank the engine more than 10 second continuously, if the engine does not start wait for 30 second before cranking it again.

(14) Don't drive the vehicle with the parking brake 'ON' will cause damage to the rear brakes and the clutch.

(15) Don't move the vehicle till 4H/4L (4x4 high or low) indicator lamp stop blinking. OR both lamps are 'ON' position

(16) Steering wheel should be adjusted only when the vehicle is stationary.

(17) Don't drive the vehicle if the brake fluid level indicator continuously 'ON'(it is sign to brake fluid level in the master cylinder is low or any other defect). Top up the master cylinder and get the defect rectified.

(18) Don't run the vehicle when low oil pressure.

(19) If warning light illuminates, it means there is a little fuel balance in the tank, you should fill the tank at the earliest.

(20) Never remove the cap from the coolant reservoir when the engine is hot.

(21) Ensure bonnet is fully locked before driving the vehicle.

(22) Check the engine oil level, top up if necessary>Oil should not exceed the max. mark.

(23) Check the coolant level in the radiator auxiliary tank, it should be in between max & min lines.

(24) Don't rest your foot on the pedal during driving, this can cause clutch wear and damage.

(25) Ensure try to maintain a constant engine speed and avoid sudden acceleration which can cause wheel spin and loss of traction, possibly leading to bogging down of the vehicle.

(26) Before switch of the engine, run the engine idle for at least 30 second and then switch off. This will allow the oil to lubricate the turbocharger, till it speed is fully reduced and also allows the unit to cool down.

(27) Don't wash engine compartment with high pressure water.

(28) Don't tamper with ECU sensor and connectors.

(29) Don't remove the battery connections when the ignition switch is in 'ON' position. This may damage ECU.

(30) Don't run the vehicle if check engine lamp on dash board is 'ON'.

(31) Avoid driving under the influence of alcohol or drugs.

(32) Avoid using mobile phone, this could divert your attention from the road and result in an accident.

The following checks and adjustment should be done before start/driving the vehicle

(1) Ensure all mirrors, windows and out side lights are clean and unobstructed. Remove dust, frost, snow or ice if any.

(2) Ensure bonnet is fully closed.

(3) Ensure all doors are properly closed or locked.

(4) Check the adjustment of steering wheel.

(5) Check engine oil level, top up if necessary.

Appx 'C'

Fuel economy

(1) Drive smoothly, accelerate gradually and anticipate stops.

(2) Ensure best fuel consumption is achieved at low engine speed, the highest possible gear without labouring the engine.

(3) Driving with accelerator pedal fully depressed means using excessive fuel.

(4) Ensure if possible, don't idle the engine for more then 5 minute. Switch off the engine.

(5) Hard braking, abrupt cornering and rapid acceleration us more fuel avoid these.

(6) Ensure use of snow tyres and /or tyre chain is recommended.

(7) Always use 4x4(4H) gear, while vehicle drive in snow, icy, sandy & muddy road.

(8) Maintain a safe distance between vehicle to avoid sudden braking and slow down by shifting down the gears.

(9) Ensure to reduce the tyre pressure marginally for additional grip on loose surface, through with a slight loss of ground clearance.

(10) While vehicle is driving in water, keep engine in fast idling and crawl the vehicle in low gear.

(11) While vehicle driving in rainy, check brakes, steering, window, wiper blade, tyre pressure and keep light on if visibility is poor.

Appx'D'

Lubricants, oils coolants, antirust sound deadening coats, wind screen sealant, adhesive & fuel additives

Ensure use only recommended grades/oil for good performance.

To prevent rust formation and freezing of coolant inside the passage of radiator, crank case and cylinder head use premixed coolant is recommended.

Entire cooling system should be drained and filled with fresh premixed coolant every two year or at every 30,000 Kms.

Items	Company	Brand	Qty/capacity
Engine oil	CASTROL HPCL	Castrol GTD 15W-40 HP Milcy power 15W-40	6.5 Ltrs/5.5 Ltrs ,0.5Ltr(In oil filter)
Gear box oil(G-76)	HPCL CASTROL	ATF Type A Castrol transpower TQ	1.6 Ltrs
Transfer case	HPCL CASTROL	HP-ATF Type A Castrol transpower TQ	1.2 Ltrs
Power steering oil	HPCL	HP-ATF	1.4 Ltrs
Rear axle, Front axle	HPCL	HP gear oil XP 85 W140 GL5 with 6% additive A99	2.2 Ltrs (Rear axle) 1.2 Ltrs Front axle)
Brake/clutch fluid	HPCL	Super duty brake fluid DOT-3	As required
Wheel bearing & chassis	HPCL	HP Multipurpose grease-2	As required
Coolant	Sunstar Henkel Teroson HPCL	Golden cruiser premium 1400 MFrostox SFD 12 HP Thanda Raja P	Approx 13 Ltrs
Anti rust treatment & sound Deadning	DINITROL WUERTH	Dinitrol Wuerth	- -
Wind screen sealant	ANCHEMCO	Terostat 8590 Kit form	-
Metal & plastic adhesive	ANCHEMCO	Terostat 930	310 ml Cartridge
Hub bearing grease		Lithium base multipurpose grease	92 gms/hub (Front axle 4x4) 47 gms/hub (Front axle 4x2) 25 gms/hub (Rear)
Spicer propeller shaft		lubricant slip joint with NLGI – 2 Grade grease	-

Appx 'E'

TECHNICAL SPECIFICATION TATA SAFARI (DICOR)

Model	Tata DICOR 07
Type	Water cooled, direct injection, common rail, turbocharged, inter cooled diesel engine with crank case breather and relief valve. Exhaust gas re-circulation system
No of cylinder	4 in –line
Bore/stroke	97 mm x 100 mm
Capacity	2956 cc
Max engine out put	84.5 kw at 3000 rpm as per 80/1269/EEC
Max torque	300 Nm at 1800-2000 rpm as per 80/1269/EEC
Compression ratio	17.5:1
Firing order	1-3-4-2
Air filter	Dry (paper) type
Oil filter	Spin on full flow paper type
Fuel filter	Single stage fuel filter
Fuel injection pump	High pressure pump
Governor	Not applicable
Weight of engine	280 Kg (dry)
Radiator frontal area	2360cm° minimum
CLUTCH	Single plate dry friction diaphragm type outside diameter of clutch lining : 240 mm
Friction area	503 sq. cm. (approx)
Clutch actuation	Hydraulic
GEAR BOX	GBS-76-5/3.87 with over drive, Synchromesh on all gears 5 forward 1 reverse
Gear ratio	Diesel
Ist	3.87
2nd	2.22
3rd	1.37
4th	1.00
5th	0.77
Rev	3.40
TRANSFER CASE	For 4x4 (configuration)
	M/s Borg Warner ECU control electrical shift shifting arrangement mounted on the gear box
4x2	High ratio 1:1
4x4	High ratio 1:1
4x4	High ratio 1:2.48
REAR AXLE	Single reduction Salisbury type rear axle with hypoid gear and semi floating axle shaft with limited slip differential for 4x4.
Ratio	3.36(37/11) for 4x4
FRONT AXLE	For 4x4 Independently suspended with automatic hub
Ratio	3.36(37/11)
For 4x2	Independently suspended
SREERING	Power steering
Ratio	18:2:1 (M/s ZF)
Steering wheel	380 mm dia with tilt mechanism for adjusting height& collapsible column.
Brakes	

Service brakes	Vacuum assisted independent hydraulic brakes on front and rear through tandem master cylinder. Camshaft driven vacuum pump.
Front brake	282 dia drum brake LCRV provided along with Ventilated disc brakes with twin pot caliper. Disc diameter : 281
Rear brake	282 dia drum brake with LCRV provided along with remote bypass valve. No LCRV for versions with “ABS” adjuster
Load conscious pressure reduction valve	Provided for rear brakes no “LCRV” and provided for rear brakes . “By pass valve” for versions with “ABS”.
Parking Brake	Liver type, floor mounted, cable operated mechanical linkages acting on rear wheels.
Frame	Ladder type cranked frame with box section members and welded cross members
Depth	110 mm (Max)
Width	60 mm
Suspension	
Front	Double wishbone type with torsion bar springs.
Rear	Coil spring type 5 link suspension
Shock absorber	Hydraulic double acting telescopic type at front and rear.
Anti-roll bar	At both front and rear
Wheels & Tyres	
Tyres	235/70 R16 Passenger radial with tube
Wheel rim	6.5Jx16 stylished steel rims
No. of wheels	Front 2, Rear2, Spare1
Fuel tank	65 liters Cap
Body	Normal control all steel shell with five doors.
Electrical System	12 volts negative earth
Alternator capacity	135 amps
Battery	12 Volts 80AH
Performance	
Max Speed at rated GVW	135 km/ph
Max Speed with 2 occupants 150 kg	140 km/ph
Max geared speed	160 km/ph
Max grade ability at rated GVW	60% (4x4 mode) 35% (4x2 mode)
Main chassis dimensions	
Wheel base	2650mm
Track front	1500 mm
Track rear	1470 mm
Front overhang	945 mm
Rear overhang	1055 mm over rear bumper
Overall length	4650 mm over rear bumper
Max width	1810, 1918 (with foot step)
Overall height	1925 (Unladen)
Min turning circle dia	12 M
Min turning clearance dia	13 M
Ground clearance	195 mm (laden)
Luggage space	Net inside space 1000 mm width x800mm long (with 4 passengers + driver)
Gross vehicle Weight	2780 (4x4), 2650 (4x2)

Appx 'F'

MAINTENANCE SCHDULE

Sr No	OPERATION	FREQUENCY IN KM
	GENERAL	
1	Wash the vehicle	5000
	ENGINE	
2	Clean air cleaner	5000
3	Replace air cleaner filter	40,000
4	Check coolant level frequently	Every 5000 km
5	Change coolant	50,000 km or 2 years
6	Check oil level	5000
7	Change engine oil & filter element	10,000
8	Change fuel filter	30,000
9	Change sedimenter	1,00,000
10	Drain water in sedimenter	When lamp is glow
11	Check all device belt/ adjust/ tensioner	10,000
12	Change all drive belt	40,000
13	Valve clearance check and adjust	10,000
	GEAR BOX	
14	Check oil level	5,000
15	Change oil	First 20,000 And there after every 40,000 km
16	Change oil in transmission	45,000
17	Clean breather on gear box	80,000
18	Check oil level in transfer case	10,000
	PROPELLER SHAFT	
19	Grease Propeller Shaft With Grease Gun	5,000
	FRONT AND REAR AXLE	
20.	Check oil level in axle	10,000
21.	Check oil in axle	First at 20,000 & there after every 40,000 km
	SUSPENTION & STEERING	
22.	Grease idler arm	10,000
23.	Check wheel alignment, chassis height & all adjustment	15,000
24.	Change grease in front hub &adjust bearing play	40,000
25.	Check and adjust steering wheel free play	30,000
26.	Check oil level in power steering tank & top up every	10,000
27.	Change oil in power steering system &filter element	80,000
28.	Check condition of rubber bushes in the following & replace it if necessary)Top wishbone, Lower wishbone, Anti roll bars, Rear links & Pan hard rod	30,000
29.	Check shock absorber, its bushes & steering damper bushes	15,000
	CLUTCH & BRAKES	
30.	Check level of clutch & brake fluid in containers, top up if necessary	10,000
31.	Check service & parking brakes, adjust if necessary	5,000

32.	Check front brake pads & rear brake linings	15,000
33.	Over haul the following brake components and change the brake fluid in the system) 1 tandem master cylinder 2 Front caliper 3 Rear wheel cylinders 4 Clutch master cylinder & slave cylinder	30,000
34.	Overhaul vacuum booster & change the felt and polyurethane filter along with rubber bellow	40,000
	ELECTRICALS	
35.	Check electrolyte level in battery, top up if necessary	15,000
36.	Check specific gravity of electrolyte and the charge of battery	30,000
37.	Check head lamp focusing and functioning of other electrical equipment	15,000
38.	Check water level in wind screen washer container & top up with cold region application	Weekly
39.	Apply grease on door latches, door lock striker, door check stop, bonnet opening lever and lock plate	10,000
40.	Oil tail gate hinges	30,000
41.	Tighten all fasteners of front grill, oil sump, oil & fuel filter & mounting bracket, exhaust manifold & pipe, air filter engine clutch housing, radiator mounting, propeller shaft, centre bearing bracket mounting bolts, joint of pitman arm, idler arm, centre link, upper ball joint of top wishbone, upper wishbone & lower wishbone, steering gear box and its mounting bracket, vacuum & hydraulic line connection, head lamp mtg, wheel mtg nuts, body mtg, axle shaft mtg, anti roll mtg, vacuum booster & tandem master cylinder mtg, rear anchor plate mtg, front disc brake mtg, fuel tank mtg, front suspension top rubber mtg nut	10,000
	AIR CONDITIONING SYSTEM	
42.	Check torque of bolts on brackets, and compressor	15,000
43.	Check for leak of gas/ oil from pipes, joints compressor shaft seal & cylinder head	10,000
44.	Clean condenser with high pressure water	5,000
45.	Check fan speed for proper air flow	30,000
46.	Check clutch operation	10,000
	WHEEL & TYRES	
47.	Check tyre rotation & tyre pressure	10,000