

DIRECTOR GENERAL BORDER ROADS

GENERAL MAINTENANCE INSTRUCTION NO. 239

ON OPERATION AND MAINTENANCE OF

AMW (ASIA MOTOR WORKS) DUMPER 2523 TP (6X4) CAPACITY 16 CUM

INTRODUCTION:-

(a) AMW (Asia Motor Works) Dumper model 2523 TP (6x4) of loading capacity 16 cum, 25 Ton having wheel base 4300 mm fitted with Cummins 6BTAA 5.9 235 A Turbo Charged BS-II engine developing 232 BHP at 2500 RPM' HYVA box Body heavy duty, Cabin tilting mechanism, 9 speed Synchronesh gear box and Power steering.

(b) This GMI gives the technical specification and know how on the operation, maintenance and repair procedure of aggregates of model vehicles to ensure maximum performance and safe/satisfactory operation. Assuming that the technicians in the workshop are fully conversant with the repair and maintenance practices of commercial vehicles in general the repair procedures out lined in this GMI emphasizes the special features of this product. Compliance with procedures given in this GMI will enable to desire the maximum service from the Asia Motor Works diesel vehicles.

(c) To prolong the life of AMW Tippers, to prevent frequent brake downs and to reduce maintenance cost, the periodic maintenance must be carried out according to the '**Periodic Maintenance Schedule**' described in this GMI. Periodic Maintenance is essential for preventing troubles and accidents to ensure satisfaction and safety. Daily care and inspection is also essential for prolonging the operating life of the vehicle and for safe driving. It also reduces the wear and tear on the vehicle prolongs its life, give more mileage, failure of the guide lines below can result in personal injury or serious damage to the vehicle. All information and instruction in the GMI is based on the latest owner's manual and service booklet.

AIM:-

The instructions are issued as guidelines for schedule of preventive maintenance, lubrication of Asia Motor Works Tipper 2523 (6X4) capacity 16 Cum 25 Ton manufactured by Asia Motor Works Ltd for regular attention to keep the vehicle in good mechanical condition which must be strictly followed.

ACTION BY:-

(a) User unit: To carryout periodic inspection and monitor regular/periodical maintenance as laid down in this instruction and record the tasks done in log book..

(b) Field Workshop :

(i) To carryout and monitor maintenance schedule and oil changes as per periodical maintenance laid down in the maintenance instruction and to check the record of maintenance including lubrication.

(ii) To advise the user unit in respect of any lapse noticed.

- (c) Mobile Maintenance Team: To ensure that proper maintenance is carried out and submit report accordingly to Task Force Commander and OC Wksp for their necessary action.

DETAILS:-

This instruction includes the following aspects:-

- | | | |
|----|---|----------------|
| a) | Operating Procedure – DO's and Don'ts | - Appendix 'A' |
| b) | Periodic Maintenance schedule | - Appendix 'B' |
| c) | Technical Specification | - Appendix 'C' |
| d) | Recommended Lubricants/Filling Capacities/Tyre Pressure chart | - Appendix 'D' |

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OPERATING PROCEDURE:-

Do's

1. Check for engine oil pressure at engine idling condition minimum oil pressure should be 0.5 kg/Cm²
2. Idle the engine for 2 minutes after starting the engine.
3. Idle the engine for 2 minutes before switching off the engine.
4. Periodic cleaning of crank case breather is necessary to allow free flow of oil from turbo charger out let.
5. Close the entire turbo charge opening with protective plugs when it is not in use.
6. Before applying the exhaust brake, change to appropriate gears suitable to the vehicle speed and road condition.
7. While exhaust brake is in use remove the leg from the accelerator pedal for reducing the fuel supply and engine speed.
8. Service brake can be used in conjunction with the exhaust brake. Check for their and exhaust leaks and arrest suitably for ensuring efficient operation.
9. Exhaust brake to be used only during down hill operation.
10. Body must be uniformly loaded.
11. Load as per the specification chart provided in order to ensure longer life and safer.
12. Pause a few seconds after depressing the clutch pedal before shifting PTO into mesh.
13. When ever PTO has been installed and lubricant has been replaced run the PTO for 5-10 minutes.
14. Check for leaks and noises as the PTO is shifted both in and out of mesh.
15. If the PTO units are operated pneumatically, care to be taken that the PTO drive is disconnected when vehicle is standing idle for a prolonged period.
16. Before operating the Hydraulic tipping gear, it is necessary to check the oil level approximately 5 cm below top of the tank with tipping gear in down position
17. Start the engine and wait until pressure in the air system reaches 6 bar (87 PSI)
18. Never drive the truck with the PTO engaged.
19. Always use approved lubricants as recommended

Do not's

1. Do not run the engine with low oil pressure and low oil level.
2. Do not put the engine under full load immediately after starting
3. Do not switch off the engine under full load.
4. Do not run the engine with blocked, punctured, aged, deformed hose/pipe connections from the air cleaner to the turbo charger and turbo charger to the inlet manifold.
5. Do not repair the turbo charger, contact AMW dealer/authorized service centre.
6. Do not start the engine when the air cleaner indicator shows 'RED BAND'. Clean air cleaner and start.
7. Do not depress the clutch as this will make the exhaust brake ineffective.
8. Do not press the accelerator pedal.
9. Do not allow exceeding the recommended speeds for respective gears. (Never raise engine speed with exhaust brake applied during actual driving)
10. Do not over load the vehicle.
11. Do not drive veh with uneven load.
12. Do not tip on uneven or weak ground.
13. Do not stay and work under a raised body/unsupported body of veh.
14. Do not change anything in the Hydraulic system.
15. Do not change pressure setting in the Hydraulic system.
16. Do not repair by welding on any steering component.
17. Never mix power steering fluids.
18. Never make any modification or interchange to steering system components.
19. Do not drive veh with raised body

PERIODIC MAINTENANCE SCHEDULE

Daily Maintenance

1. Check the vehicle pulling LH/RH wobbling.
2. Check abnormal noise in engine.
3. Check the engine oil level, top up if necessary.
4. Check for any leakage from engine side.
5. Check the all hose pipe.
6. Check engine oil pressure.
7. Check restriction indicator red band of Air intake and exhaust.
8. Check and adjust clutch pedal free play.
9. Check clutch fluid level top up if necessary.
10. Check pneumatic hand brake operation.
11. Check service brake operation and check for any air leakage.
12. Check compressed air build up on air pressure gauge.
13. Check for leak through lub oil connection.
14. Check for correct air pressure setting in Air Dryer.
15. Drain condensate from Air Reservoir.
16. Check all electrical system and rectify defect if necessary.
17. Check tipping eqpt for all leakage and rectify, if any.
18. Lubricate all greasing points.
19. Check oil level in Hyd Tank, top up if necessary.
20. Make visual inspection of all items/assys of Hyd system.
21. Check all pneumatic and hydraulic connections for slackness.
22. Check tyre pressure and inflate as recommended.

Weekly Maintenance

1. Check and top up engine oil.
2. Check fan belt tension.
3. Check coolant level and top up if necessary.
4. Check radiator hoses and clamps for leakages and tightness. Replace as necessary.
5. Check fuel pipes on suction, pressure and over flow line for leakages and tighten if necessary.
6. Check and drain water separator.
7. Check and lubricate clutch pedal shaft.
8. Lubricate clutch withdrawal bearing sleeve.
9. Lubricate clutch linkages.
10. Lubrication gear shift ball joints of synchromesh gear box..
11. Check for correct operation of gear shift linkage and setting.
12. Check tightness of clutch housing mounting bolts.
13. Lubricate propeller shaft of UJ cross.
14. Lubricate propeller shaft splines.
15. Check and tighten propeller shaft bolts.
16. Check Rear axle 1 & 2 oil level and top up.
17. Check the tightness of driving head nuts and axle shaft nuts.
18. Lubricate track rods/drag link ball joints in Front axle.
19. Lubricate king pins.
20. Check brake pedal clearance over brake valve.
21. Clean Air compressor fins from oil sludge and dust.

22. Check at regular intervals for air pressure leak in the pipe lines and adapter joints in Air Dryer.
23. Check for performance of Air Dryer. Pressure differential should not exceed 1.3 bar.
24. Check for all electrical connection including stop light switch and low pressure warning switch.
25. Check stop light switch for correct operation by applying brakes. Replace if found defective.
26. Check the travel of push rod and ensure that it is at its minimum without brake dragging in Brake chamber. Adjust if required.
27. Lubricate the slack adjuster/ S cam shaft.
28. Check worn shaft lock is functioning properly in Slack Adjuster.
29. Check hose assy for abrasion, bending and proper routing.
30. Check all electrical conditions.
31. Check rubber gaiter in quadruple system protection valve & graduated flick valve is in good condition.
32. Drain sensing reservoir and watch for any pressure drop in the gauge to detect Non Return Valve leak. If pressure drop is noticed, clean and reassemble the Non Return Valve of respective element. Check for joint.
33. Check steering gear box/hose connections for oil leaks and level, top up if necessary.
34. Check I-Bolts/U-Bolts tightness and spring clip fitment and shackles in suspension system.
35. Lubricate shackle pins of Suspension system.
36. Wash and clean the veh thoroughly.
37. Check the battery electrolyte level, top up if necessary with distilled water only.
38. Check battery terminals and apply petroleum jelly.
39. Check & tighten of fasteners on sub frame of Tipping eqpt.
40. Check hose nuts and hydraulic fittings of Tipping eqpt.

Maintenance based on Kms run/regular intervals

S/No	Description	Frequency in Kms
	<u>ENGINE</u>	
1.	Check and adjust valve clearance on cold engine	Every 18,000 Kms
2.	Check and tighten cylinder head bolts for correct torque in correct sequence	Every 18,000 Kms
	<u>Lubrication system</u>	
1.	Change initial engine oil and Full flow oil filter element	At 2500-3500 Kms
2.	Second engine oil change	At 8500-9500 Kms
3.	Periodic engine oil change	Every 9000 Kms
	<u>Cooling system</u>	
1.	Replace coolant	Every 45,000 Kms
	<u>Fuel System</u>	
1.	Clean fuel tank and suction strainer	Every 90,000 Kms
2.	Check injector for correct opening pressure and spray characteristics, adjust if necessary	Every 45,000 Kms
1.	Fuel filter change (Initial)	At 8500-9500 Kms

2.	Periodic fuel filter change	Every 18,000 Kms
	<u>Air Intake and Exhaust</u>	
1.	Check and clean air cleaner primary element	Every 8000 Kms
2.	Replace air cleaner primary element	Every 18,000 Kms (Filter may require change depending on operation condition).
3.	Replace air cleaner safety element	Every 18,000 Kms (At the time of third replacement of primary element or once in a year whichever earlier.
	<u>CLUTCH</u>	
1.	Replace Clutch fluid	Every 36,000 Kms
	<u>SYNCHROMESH GEAR BOX</u>	
1.	Check oil level and top up	Every 8000 Kms
2.	Transmission Oil Replacement	Every 36,000 Kms
3.	For heavy duty application (Tipper)	Every 45,000 Kms
	<u>REAR AXLE</u>	
1.	For hypoid gear drive head Oil change (Rear Axle)	Every 36,000 Kms (Minimum oil change two times per year)
2.	Repack the hubs with recommended grease	Every 36,000 Kms
3.	Check & adjust the hub end play	Every 36,000 Kms
4.	Check thrust screw clearance and adjust	Every 36,000 Kms
	<u>FRONT AXLE</u>	
1.	Repack the hubs with recommended greast	Every 36,000 Kms
2.	Check king pin vertical play and adjust if necessary	Every 36,000 Kms
3.	Check wheel alignment and adjust if necessary	Every 36,000 Kms
	Check and adjust hub end play. Check the condition of hub bearing, change if necessary	Every 36,000 Kms (at the time of hub greasing)
	<u>BRAKE SYSTEM</u>	
	<u>Unloader valve with tyre inflator</u>	
1.	Remove inlet filter, clean and refit	Every 45,000 Kms
2.	Overhaul the assembly if necessary	Every 90,000 Kms (As necessary)

	<u>Air Dryer</u>	
1.	Remove inlet filter, clean and refit.	Every 90,000 Kms
2.	Overhaul the assembly	Once in 2 years
	<u>Air Reservoir</u>	
1.	Check drain valve and replace if required	Every 45,000 Kms
	<u>Air Filter</u>	
1.	Remove serviceable filter element, clean and refit	Every 45,000 Kms
	<u>Dual brake valve</u>	
1.	Check boot for deterioration and change if required	Every 45,000 Kms
	<u>Hose assembly</u>	
1.	Change hose assembly	Every 90,000 Kms
	<u>Spring Brake chamber</u>	
1.	Check the travel of push rod and ensure that it is at its minimum without brake dragging. Adjust if required	Every 45,000 Kms
	<u>Graduated Flick Valve</u>	
1.	Remove the exhaust filter, clean and refit	Every 8000 Kms
	<u>Brake Shoe</u>	
1.	Check brake shoe clearance (0.010") adjust slack adjuster if necessary	Every 15,000 Kms
2.	Check brake carrier mounting bolts tightness	Every 30,000 Kms
	<u>Exhaust Brake</u>	
1.	Check pipe connections & and tighten if necessary	Every 15,000 Kms
2.	Check pressure setting and adjust if necessary	Every 45,000 Kms
	<u>Relay Valve</u>	
1.	Check the exhaust and replace if required	Every 15,000 Kms
2.	Check for proper function, remove and clean filter	Every 45,000 Kms
	<u>Shut off cock</u>	
1.	Check for proper function	Every 45,000 Kms
	<u>POWER STEERING</u>	
1.	Check UJ fastener tightness	Every 30,000 Kms
2.	Change oil filter	Every 72,000 Kms (at

		time of O/H0
4.	Check power steering hydraulic limiter valve setting and peak pressure	Every 60,000 Kms
5.	Check for wear and tighten steering drop arm, drag link and track rod ends.	Every 15,000 Kms
6.	Check tightness of steering box mounting fasteners	Every 15,000 Kms
7.	Check steering wheel free play and adjust if necessary. Ensure zero free play	Every 72,000 Kms
8.	Initial steering gear box oil change	Every 9000 Kms
9.	Periodic steering gear box oil change	Every 9000 Kms
	<u>CHASSIS FRAME</u>	
1.	Check all joints and unions for oils, fuel, water or air leaks, Rectify the defect noticed.	Every 15,000 Kms
2.	Check the tightness of cross members to frame side members mounting bolts	Every 15,000 Kms
	<u>SUSPENSION</u>	
1.	Check shock absorber, rubber pads, mounting bracket bolts	Every 15,000 Kms
	<u>WHEEL AND TYRES</u>	
1.	Check for wheel nut tightness	As required
	<u>INSTRUMENTS</u>	
1.	Check fuel tank and fuel and oil pressure gauge connecting union for tightness	15,000 Kms
2.	Check Speedo meter cable, air and oil pressure gauge connecting union for tightness	Every 15,000 Kms
3.	Check All Electrical connection, Gauges and Instrument	Every 15,000 Kms
	<u>CAB & BODY</u>	
1.	Lubricate Door hinges, Driver seat, Wiper arm linkages and other moving components	Every 15,000 Kms
2.	Check condition of body mounting rubber pad, replace if necessary	Every 15, 000 Kms
3.	Check condition of gaiters at gear lever and steering column	Every 15,000 Kms
	<u>TIPPING EQUIPMENT</u>	
1.	Replace Air Breather Filter Element	
	For Normal Working condition	Once in every 4 months

	For Dusty working condition	Once in every 2 months
2.	Replace Return line filter Element	
	For Normal Working condition	Once in every 4 months
	For Dusty working condition	Once in every 2 months
3.	Drain oil from the system in clean contained and allow the insolubles to settle down, filter the oil through 25 micron filter, Clean the tank inside and refill the filtered oil. Replace the oil, if necessary.	First change after 4 months and later twice in every year, 1200 hrs or 6 months or 75000 kms.

TECHNICAL SPECIFICATION:

Description	Tipper (2523)
Chassis Frame	HSLA Steel, Ladder Typebolted cross members
Cross Member thickness	6 mm
Frame Dimension	270 x 82 x 8 mm
Wheels and Tyres	
Rim	B 7.5 x 20 – 10 Bolts spigotted
Front Tyre	11.00 x 20 – 16 PR - 02 Nos
Rear Tyre	11.00 x 20 – 16 PR - 08 Nos
Spare	11.00 x 20 – 16 PR - 01 No
Cab details	
Overall height	2700 mm
Overall Width	2475 mm
Body	
Cubic capacity	16 cum
Performance data	
Maximum speed	80 Km/hour
Maximum gradeability (%)	Crawler : 54, First gear : 32
Unladen weights	
Front Axle	3470 kg
Rear Axle	4210 kg
Total	7680 kg
Laden weight	
Front Axle	6000 kg
Rear Axle	19000 kg
Total	25000 kg
* when coupled with the suitable three axle semi trailer	
Major dimensions	
Wheel base	4300 mm
Front overhang	1350 mm
Rear overhang	1435 mm
Overall length	7085 mm
Overall width	2475 mm
Front Track	2020 mm
Rear Track	1856 mm
Frame width	864 mm
Laden height	1033 mm
Minimum ground clearance	270 mm
Turning Circle radius	8810 mm
Engine	
Type	Cummins 6BTAA 5.9 235 A
Bore x Stroke (mm)	102 x 120
Displacement (litre)	5.9

Compression ratio	17.3:1
Max output	232 BHP @ 2500 rpm
Max torque	800 Nm @ 1500 rpm
Firing order	1-5-3-6-2-4
Engine Dry Weight	410 – 440 kgs
Emission standard	Bharat Stage II
Cooling system	
Drive and Drive ratio	Water pump driven by Engine, Water pump drive ratio: 1.982, Fan V-Belt drive, Fan drive ratio : 1.1
Fan	Sucker Type with viscous drive
Fan belt max deflection (mm)	9.5 – 12.7
Thermostat type	Progressively lifting type
Deaeration tank coolant capacity (litre)	6 (8 Litres Total)
Lubrication System	
Oil pump type and Drive	Gear type and Drive from Engine
Oil filter	Spin on, full flow paper type
Oil Cooler	Plate type
Fuel System	
Injection pump	BOSCH P-type Inline with LDA unit
Governor	RQV K type
Injector	MICO KDAL 59 P6 holder
Feed pump	Plunger type without spring loading
Fuel filter	Single, Spin on type, 0.5 Liter
Service Data	
Nozzle opening pressure	260 + 14 Bar
Fuel injection timing	$10^0 \pm 1^0$ BTDC
Tappet clearance	
Intake	0.25 mm at cold condition (0.010 inch)
Exhaust	0.5 mm at cold condition (0.020 inch)
Air filter	Dry type, remote mounted
Air compressor	Reciprocating Type
Clutch	
Type	Valeo, single dry plate diaphragm type
Actuation	Hydro pneumatically operated
Facing dia (mm)	380
Thickness (mm)	10
Gear Box	
Type	Synchromesh type
Gear Ratio	
Crawler	13.16
1 st	8.91
2 nd	6.5
3 rd	4.67

4 th	3.5
5 th	2.55
6 th	1.86
7 th	1.33
8 th	1
Reverse	11.74
Propeller Shaft Series	
Gear Box to rear axle	1810 Series
Inter axle	DIN 165 Series
Rear Axle	
Type	Fully floating Tandem Rear Axles-both driven, Hypoid bevel gears with inter axle differential lock-air operated R-1495
Axle capacity	19 Ton
Oil Capacity (Litre)	First Rear – 21 Litres Second Rear – 18 Litres
Axle ratio	6.17
Front Axle	
Type	Forged section – Reverse Elliot type
Axle capacity (kg)	6 Ton
Suspension	
Front	Semi elliptical leaf springs with shock absorber. Span : 1650 mm
Rear	Fully articulated Semi elliptical leaf springs on tandem Bogie Trunnion and with torque rods. Span : 1350 mm
Leaf width	Front – 90 mm & Rear 100 mm
Shock absorber	Heavy duty, double acting hydraulic shock absorbers on front suspension
Steering	
Type	Internal Power Steering, with double UJ adjustable
Electrical system	
Alternator (Max. output)	75 Amps, 24V
Starter Motor	24 Volts
Brakes	
Service brakes	Dual circuit full air, parking brake, spring actuated on rear axles
Eng exhaust Brake	Butterfly type
Tipping	
Type	Single Ram, Front end tipping
Tipping Angle	48 degree
Loading Capacity	16 Cum
Battery	12Volt qty 02 Nos

RECOMMENDED LUBRICANTS (IOC GRADE)

a)	Engine oil	Servp Pride TC 15W 40 or Servo Pride XL 15W 40
b)	Eng Coolant	Servokool ST or Servokool Plus
c)	ZF 9575 Gear box	Servo Gear HP 90 (T) or Servo Gear Super 80W 90
d)	Rane Power steering	Servo Trans Fluid 'A'
e)	Merritor R 1495 forward Rear QX axle	Servo Gear Super 140
f)	Merritor R 1495 rear Rear QX axle	Servo Gear Super 140/Servo Gear Super 85W 140 (T) or Servo Gear Axle 85W 140
g)	King pin, propeller shaft, wheel bearing front & Rear and other greasing points	Servo Grease MP or Servo Gem RR3
h)	Tipping unit	Servo System 68 or Servo System HLP 68
j)	Cab hydraulic tilting	Servo System 68 or Servo System HLP 68
k)	Hydraulic Clutch	Servo Brake fluid super HD

FILLING CAPACITIES

Engine (with Oil filter)	16.4 ltrs
Engine Coolant	23 ltrs
Gear box / Transmission	9.5 ltrs
Rear Axle	Axle – 1 : 21 ltrs (forward rear axle) Axle – 2 : 18 ltrs (rear rear axle)
Steering	5 ltrs
Clutch Master Cylinder	1 ltr
Hyd tank/Tipping tank	60 ltr
Cab lifting hydraulic mechanism	300 ml

TYRE PRESSURE CHART

Tyre size	Ply Rating	Position	Qty	Tyre Pressure
11.00 x 20	16	Front Axle	2	7.25 bar
11.00 x 20	16	Rear Axle 1	4	7.75 bar
11.00 x 20	16	Rear Axle 2	4	7.75 bar
11.00 x 20	16	Spare	1	