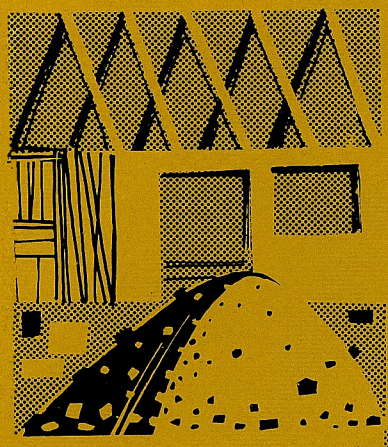
BAND TECHNICAL PUBLICATIONS



PREVENTIVE MAINTENANCE FOR
VEHICLES AND EQUIPMENT

June 1986

Indian and Northern Affairs Canada
Affaires indiennes et du Nord Canada
Canada

BTP-TR-3

Technical Services and Contracts | **Services techniques et marchés**

PREVENTIVE MAINTENANCE FOR VEHICLES AND EQUIPMENT

June 1986

QS-3433-000-EE-A1

Cette publication peut aussi être obtenue
en français sous le titre:

Entretien préventif des véhicules
et du matériel

PREVENTIVE MAINTENANCE FOR VEHICLES AND EQUIPMENT

Table of Contents

PREVENTIVE MAINTENANCE
FOR VEHICLES AND EQUIPMENT

1.0 INTRODUCTION

This publication is intended to provide information on preventive maintenance to increase vehicle safety, lower operation and maintenance costs, increase operator efficiency and production, and extend the life of the vehicle.

The procedures outlined are of necessity general in nature, since they apply to all types of band vehicle which may be operating under various climatic and other conditions.

Inspection intervals and schedules have been prepared and are designed to meet normal conditions. However due to local conditions, special utilization, geographical location etc., the fleet manager may need to increase the frequency or scope of any inspection.

Inspections conscientiously performed should increase serviceability and extend the life cycle of the vehicles and equipment. However, any preventive maintenance system is only as effective as the ability of the tradespeople who are performing the tasks. Therefore, this publication should not be considered as an end in itself but as a training program which will emphasize the importance of preventive maintenance and the need for qualified personnel in order for the system to succeed.

Preventive maintenance consists of systematic checks and/or inspections and correction of minor defects before they develop into major ones.

The advantages of a preventive maintenance program are as follows:

a. time is saved -- far fewer delays occur in the field because of a component failure;

b. accidents are minimized as safety requirements are met at all times;

c. the life-cycle is reached or even exceeded -- vehicles and equipment in top condition have a prolonged operational life; and

d. the operating cost is reduced over the life-cycle -- small malfunctions are not permitted to end up as a costly major repair or replacement.

2.0 ACTIVITIES & SCHEDULES

2.1 Preventive Maintenance Schedules

Preventive maintenance (PM) schedules for vehicles and equipment are normally based on several factors such as distance, hours of operation, a fixed time period or fuel consumption. Examples are shown on the following pages. A PM schedule based on a fixed time period has some advantage in that maintenance occurs at regular intervals, and is easy to remember, and work schedules can be planned, thus minimizing the loss of time. This is recommended for most small and medium size vehicles. For construction type vehicles a schedule based on hours of operation is more appropriate.

2.2 Daily Inspection

Drivers should take part in the PM program and be required to complete a daily inspection. A sample daily check sheet is shown in Figure 1.

2.3 Safety Inspection

Safety checks have become mandatory in many provinces, usually on an annual basis. The inspections can and should be incorporated into a PM schedule to eliminate

Figure 1

DAILY CHECK SHEET

CARS AND LIGHT TRUCKS

CHECKS BEFORE STARTING	OK	R
Engine, Radiator and Power Steering Fluid levels		
Tires and spare - pressure		
All drive belts - tension		
Leaks, oil or anti-freeze		
Window washer fluid - level		
Body damage		

CHECKS AFTER STARTING	OK	R
All gauges and warning lights		
Wipers and washers		
Seat adjustment		
All lights and horn		
Clutch adjustment		
Brakes service and park		
Automatic transmission fluid level		
Transmission - operation		
Steering - operation		
Seat belts		

FAULTS TO BE REPAIRED

OPERATOR'S NAME_____

extra cost and to ensure that they are not forgotten. Care must be exercised to ensure that these inspections are completed by an authorized technician and that the maintenance records indicate the completion of such inspections in accordance with the provincial or territorial regulations.

2.4 Preventive Maintenance Inspections

Appendix A is a guide to the inspection procedures based on distance and hours of operation for both diesel and gas powered engines. Appendices B-F describe additional procedures for specialized equipment.

The Distance/Hours of Operation Checklist (Appendix A) can be used as follows:

Oil Change Frequency: this section of the form may be used to schedule oil changes at intervals listed either by distance in kilometres or hours of operation. The oil filter is also changed at specified intervals, normally every second oil change.

TYPE 1/PART A: These sections are completed simultaneously after each oil change.

TYPE 2/PART B: These sections are completed in addition to the 1 & A inspection at the interval stated in block 2 & B.

ITEMS are checked as described and if:

a failure is noticed

or an apparent failure

is about to happen the component is:

repaired or

checked serviceable.

If for some reason, such as spare parts availability, the component is not repaired, then the required repairs should be logged.

If the safety of the vehicle is jeopardized or the apparent failure may result in a major failure, the vehicle should not be used until it has been repaired.

Inspection frequencies are described in Tables 1 and 2.

Table 1

INSPECTION FREQUENCY BASED ON FUEL CONSUMPTION

VEHICLE	FUEL CONSUMPTION	
	Litres	Gallons
Sedan	568	125
Suburban Vehicle	909	200
Light Truck 1/2 ton	568	125
Light Truck 3/4 ton	909	200
Bus	1363	300
Medium Size Truck (gas)	909	200
Medium Size Truck (diesel)	568	125
Heavy size truck (gas)	1363	300
Heavy size truck (diesel)	1136	250

Table 2

INSPECTION FREQUENCY BASED ON
HOURS OF OPERATION/TIME PERIOD

Construction or road maintenance equipment

50 hours of operation or every 3 months whichever occurs first, or following the manufacturer's recommended schedule.

For specialized types of equipment, supplementary inspections are needed in addition to the regular ones (see Table 3).

Table 3

SPECIAL INSPECTION AND SERVICE BASED ON MILES OR KILOMETRES

Every 1,000 Miles	5	10	15	20	25	30	35	40	45	50	55	60
Every 1,000 Kilometres	8	16	24	32	40	48	56	64	72	80	88	96
Oil and Filter Change	X	X	X	X	X	X	X	X	X	X	X	X
Chassis Lubrication	X	X	X	X	X	X	X	X	X	X	X	X
Inspect and Lub Wheel Bearings	X		X		X		X		X		X	
Inspect Brake Linings	X		X		X		X		X		X	
Tire Rotation and Balance	X		X		X		X		X		X	
Replace Gas Filter		X		X		X		X		X		
Emission Controls	Inspect, clean, repair and lubricate as required every 5000 miles or 8000 kilometres.											
Air Cleaner Element	Inspect at each oil change, replace as required.											

3.0 WARRANTY

3.1 General Remarks

New vehicles and equipment are purchased with a standard warranty. Personnel accepting new vehicles and equipment from a dealer should, as part of the acceptance check, ensure that:

a. the warranty registration document is properly completed; and

b. all applicable warranty certificates have been provided and explained by the supplier.

3.2 After-market Products

Many after-market products provide their own warranty, for example, rustproofing and undercoating materials, replacement tires and exhaust systems as well as most replacement parts such as diesel engines and Detroit diesel Allison automatic transmission.

For these products the owners must make sure they have in their possession and fully understand all the written warranties offered. Some of these after-market warranties are not transferable and the technical terms used can be ambiguous.

3.3 Repairs Under Warranty

The person responsible for vehicle maintenance and repair must have all warranty documentation available, and must be fully aware of what is covered by each warranty, what is not covered, and what actions are necessary to ensure they remain valid. In many instances prescribed maintenance actions are necessary.

Most warranties require that the vehicle or equipment be taken to an authorized dealer for warranty repair. An understanding of all the ramifications of the various warranties is necessary if a band is to receive full value from their purchase.

All invoices for maintenance and repair work should be reviewed prior to payment, to ensure that no charges are included for work which should be provided free under warranty.

4.0 ENGINE OPERATION IN COLD WEATHER

4.1 General Remarks

Satisfactory performance from a diesel or gas engine operating under low ambient temperatures requires modification of the engine and its surrounding components, and to the operating practices and maintenance procedures.

The following information is provided to assist equipment managers in modifying the engine to get satisfactory performance.

There are three basic objectives to be accomplished:

a. reasonable starting characteristics with a practical and dependable warm-up of the engine and equipment;

b. a unit of installation which is as independent as possible from other external influences; and

c. modifications which maintain satisfactory operating temperatures with a minimum increase in maintenance for the equipment and accessories.

If satisfactory engine temperature is not maintained, a higher maintenance cost will result due to increased engine wear and poor performance. Special provisions to overcome low temperatures are definitely necessary.

Most of the accessories should be designed so they can be disconnected so there is as little effect as possible on engine performance when they are not in use. In most cases, the following suggestions have been proven through previous commercial usage or from more recent arctic testing.

The two most commonly used terms associated with preparation of equipment for low temperature operation are "winterization" and "arctic specifications".

Winterization refers to temperatures ranging from -23°C (-10°F) to -31.8°C (-25°F). Arctic specifications refer to temperatures ranging from -31.8°C (-25°F) to -58.8°C (-65°F).

4.2 Suggested Practices

Winterization	Arctic Specifications
Use antifreeze 50% water.	Use antifreeze 60% water.
50% mixture	40% mixture
Use 10W-20, 10W-30 or 10W-40 oil, or synthetic base oil.	Use 10W-20 oil or synthetic base oil.
Fuel	Fuel
Diesel fuel to have maximum cloud and pour points 10° lower than ambient temperature in which engine operates.	Diesel fuel to have maximum cloud and pour points 10° lower than ambient temperature in which engine operates.
Shutters	Shutters
Radiator shutters sealed around edge and adjusted to close tight or shutters plus radiator cover.	Tight winter front cover for radiator, in front of shutters.
Starter	Starter
Install a winterized heavy duty 24 V starter system to provide a recommended 150 RPM minimum cranking speed at -31.8°C.	Install a winterized heavy duty 24 V starter system to provide a recommended 150 RPM minimum cranking speed at -29°C after preheat.

Starting aid - Use ether or manifold flame heater.	Starting aid - Use ether or manifold flame heater.
Engine	Engine
1. Provide for heated intake air with inter-cooler manifold, engine compartment or a jacket over the exhaust manifold and exhaust piping.	1. Provide for heated intake air with intercooler manifold, engine compartment or a jacket over the exhaust manifold and exhaust piping.
2. Do not remove dry type air cleaner.	2. Do not remove dry type air cleaner.
3. Shorten breather tube to at least 30 mm (12 ins.) above oil pan flange. All filters to be mounted in engine compartment.	3. Shorten breather tube to at least 30 mm (12 ins.) above oil pan flange. All filters to be mounted in engine compartment.
Air Compressor System for Brakes	Air Compressor System for Brakes
Provide alcohol vaporizer in air compressor system	Provide alcohol vaporizer in air compressor system
Ancillary Equipment	Ancillary Equipment
Coolant heaters Oil heater Thermatic fan Oil pan shield for highway units.	Coolant heaters Oil heater Thermatic fan Insulated cover for lower part of the engine compartment.
Batteries	Batteries
Heavy duty batteries.	Heavy duty arctic type batteries. Insulate the battery box - provide for warming the battery to -29°C. in conditions below this temperature.

Mechanical Controls and Instruments	Winterized Mechanical Controls and Instruments:
Standard controls and instruments are acceptable.	- tachometer - tachometer cable - starting aid control cable - pressure gauges - temperature gauges
Lubricants	Lubricants
Standard lubricants are acceptable for the electrical wiring, cooling system and engine.	Remove all regular lubricants and replace with arctic type lubricants, or leave dry, for the following: 1. Electrical wiring - use -53°C electrical equipment and wiring. 2. Cooling system- use -53°C hoses. 3. Engine - use -53°C rubber in the filler and dipstick expanders. Use -53°C belts.
Fuel	Fuel
Standard fuel supply tank vent acceptable.	Extend fuel supply tank vent to a warm area, such as to the engine compartment, to prevent frost getting into the tank.
Keep fuel tanks full to reduce moisture formation. Drain sediment daily.	Keep fuel tanks full to reduce moisture formation. Drain sediment daily.
Adhere to oil change schedule necessary to maintain clean oil.	Adhere to oil change schedule necessary to maintain clean oil.

Weekly check of temperature controls, thermostat and shutters.	Weekly check of temperature controls, thermostat and shutters.

APPENDIX A

VEHICLE AND EQUIPMENT PM DISTANCE AND HOURS OF OPERATION

DIESEL POWERED ENGINES

1.0	OIL CHANGE FREQUENCY
.1	☐ 200 Hours
.2	☐ 400 Hours, Change Oil Filter
.3	☐ 600 Hours
.4	☐ 800 Hours, Change Oil Filter
	Drain interval may be altered depending upon severity of service, used oil analysis or manufacturer's recommendations.
TYPE 1 - 6 MONTHS OR 100 HOURS	
2.1	CHASSIS LUBRICATION CHECK
.1	Complete lubrication (as per specifications).
3.0	ENGINE SECTION (AUX. ENGINE) CHECK
.1	Check operating temperature. Check shutter operation.
.2	Inspect all drive belts and brackets (adjust as required)
.3	Inspect for oil, coolant, fuel and exhaust leaks.
.4	Inspect for looseness and deterioration of linkages (hose/clamps), drive pulleys, etc.
.5	Inspect air intake system, air cleaner and pre cleaner (as required).
.6	Drain moisture from fuel traps (as applicable). Service fuel filters (as required).
.7	Check operation of governor, throttle and choke (as applicable).
.8	Inspect pump and injectors for leaks.
4.0	ELECTRICAL SECTION CHECK
.1	Clean battery cables. Check cable and carrier condition.
.2	Check battery electrolyte level. Check operation of starting and charging circuits.
.3	Check proper operation of all lights, flashers, beacons, heater and defroster.
.4	Inspect all wiring and connections (visual). Check operation of safety controls.
.5	Check block heater and pan heater wiring and plug-in connections.
.6	Check trailer hoses and electrical cord condition (as applicable).

5.0	STEERING SECTION CHECK
.1	Check for leaks and lubricant level of the power steering unit and steering box.
.2	Check condition of hydraulic hoses. Check steering column linkages for looseness.
.3	Inspect steering gear linkages, assists, tie rod ends, drag links, steering arms, king-pins & ball joints for wear.
6.0	TRANS., DIFF., ALL GEAR CASES, FINAL DRIVE CHECK
.1	Check for leaks and lubricant levels. Inspect and clean breather vents (as applicable).
.2	Check clutch pedal clearance and reservoir fluid level (as applicable).
.3	Check drive couplings, flages, "U" joints, splines and slip yokes for wear.
7.0	CHASSIS SECTION CHECK
.1	Inspect muffler, clamps, hanger, exhaust pipe connections and gaskets.
.2	Inspect fuel tank, fuel lines, and connections for leakage.
.3	Check condition of shocks, springs, shackles, "U" bolts rubber bushings, frame brackets & dust excluders.
8.0	BRAKE SECTION CHECK
.1	Inspect brake hydraulic and/or air system for leaks, loose connections, deterioration and corrosion.
.2	Check reservoir fluid level.
.3	Check for fluid leaks at wheel cylinders. (exterual visual).
.4	Inspect slack adjuster and clevis pins for seized condition (as applicable).
9.0	WHEELS, AXLES, HUB CHECK
.1	check tire pressure and deterioration.
10.0	MAIN HYDRAULIC SECTION CHECK
.1	Check for leaks and reservoir fluid level. Check and clean reservoir breather (as applicable).
.2	Check lines and fittings for deterioration and loose connections.
.3	Check hydraulic system operation and condition of pivots pins, mountings, etc.
.4	Check safety devices and overrides.
11.0	CHASSIS AIR SYSTEM CHECK (as applicable).
.1	Drain air tanks. Check operation of air dryer (as applicable).
.2	Check air compressor and mounting brackets.
.3	Check alcohol evaporator (top as required). Check air cylinders for proper operation.

Appendix A (cont'd)

DIESEL POWERED ENGINES (cont'd)

12.0	BUCKET BLADE CHECK
.1	Check attachments for wear.
.2	Check security of bolts, nuts, cotter pins and clevis pins.
13.0	CAB AND BODY SECTION CHECK
.1	Check operation of locks, windows, hinges, etc.
.2	Lubricate and inspect all hinges. Inspect all mirrors and mountings.
.3	Inspect condition of seats, mats, etc. Inspect interior cab for housekeeping.
.4	Check w/wiper/washer operation, inspect arms, blades, check reservoir fluid level.
.5	Inspect frame for cracks and breakage.
.6	Inspect tow device (eye and mounting) and safety chain for damage and cracks.
14.0	ROAD TEST INSPECTION
.1	Check steering for excessive backlash, effort or abnormal wear.
.2	Check warning devices (including low air and low vacuum).
.3	Check operation of instruments, lighting, indicator lamps and horn(s).
.4	Check parking brake operation (holding).
.5	Check air system build-up time with fully charged system (engine off). Record air pressure loss in one minute with brake applied PSI.
.6	Check braking action and operation (adjust as required).
.7	Check clutch for slippage (free travel). Check transmission controls for proper operation.
.8	Check multi-speed axle and final drive operation (as applicable).
.9	Check for unusual noise or vibration.
.10	Check hand throttle operation (as applicable).
.11	Check speedometer operation.
.12	Complete PM sticker, record METER READING for next PM inspection and install.

	TYPE 2 - ANNUAL OR 1,000 HOURS (Complete in addition to "Type 1" inspection)
15.0	ENGINE SECTION (AUX. ENGINE) CHECK
.1	Wash and steam clean (as required).
.2	Service crankcase ventilation system.
.3	Check engine governed RPM (as required). Check exhaust system for leaks.
.4	Tighten starter mounting and connections.
.5	Torque manifolds and adjust valve clearance (as required
.6	Clean and calibrate fuel injectors and pump.
.7	Change coolant filters (as required).
.8	Pressure test coolant system, flush and replace antifreeze (as required).
16.0	ELECTRICAL SECTION CHECK
.1	Perform battery capacity (load) test. Perform cranking motor test.
17.0	STEERING SECTION CHECK
.1	Adjust drag link and steering box (as required). Inspect pitman arm for looseness.
.2	Inspect articulating pivot bearings, pins and busings for wear.
18.0	TRANS., DIFF., ALL GEAR CASES, FINAL DRIVE CHECK
.1	Change filter (as applicable).
.2	Check chain drives for looseness and misalignment.
19.0	CHASSIS SECTION CHECK
.1	Tighten front and rear spring "U" bolts.
.2	Check cab, body and radiator mounting for looseness.
.3	Check fuel and air tanks, mountings and straps.
20.0	BRAKE SECTION CHECK
.1	Inspect linings and clean brake components. Inspect for leakage of wheel cylinders and/or calipers.
.2	Inspect drums and rotors for wear.
.3	Inspect foot valve, mounting bolts and pin for seized condition.
.4	Inspect brake chamber mounting brackets for loose bolts.
.5	Inspect flexible brake lines for cracks. Change brake fluid/bleed system (as required).
21.0	WHEELS, AXLES, HUB CHECK
.1	Repack wheel bearings.
.2	Check wheel end oil seals (replace as required).

Appendix A (cont'd)

22.0	MAIN HYDRAULIC SYSTEM CHECK
.1	Change filter (as applicable).
.2	Check cycle time. Pressure test system.
23.0	BUCKET BLADE CHECK
.1	Check articulated pivot pins and bearings for excessive wear.
.2	Check adjustments, circle draw bar ball sockets and mold board.
24.0	CAB AND BODY SECTION CHECK
.1	Wash and steam clean (as required).
.2	Check body condition, touch up paint and replace decals. Check equipment ID (as required).
25.0	ACCESSORIES CHECK (as applicable)
.1	Inspect hoist, frame (dump body-hinge pins, brackets, 5th wheel mounting bolts) (as required).
.2	Inspect auxillary equipment mounting, bolts, etc.
.3	Inspect auxillary fluid tanks for mounting security and leaks.
.4	Check proper operation of auxillary equipment controls.
.5	Check lubricant level in auxillary equipment, gear boxes and transmissions (change as required).
26.0	ADDITIONAL CHECK - BLOWERS/SWEEPERS/FORKLIFTS/ROLLERS/ TRACK EQUIPMENT
.1	Change lubricant and filters of chain drive cases and gear boxes (as required).
.2	Check chain drives for looseness and misalignment. Check propellor shafts, bearings and "U" joints.
.3	Inspect auger and impellor condition and bearings for wear.
.4	Check lift and turn mechanisms. Inspect housing and safety screens.
.5	Check/change broom bristles (as required).
.6	Check mast chain rollers, sprockets and guides for wear.
.7	Check overhead guard assembly for cracks.
.8	Check condition of track, rollers, sprockets, idlers and adjust (as required).
27.0	EMERGENCY EQUIPMENT CHECK
.1	Check flags, first aid kits, reflectors and wheel chocks

Appendix A (cont'd)

GASOLINE POWERED ENGINES

1.0	OIL CHANGE FREQUENCY
.1	☐ 8,000 km (5,000 mi) or 100 hours
.2	☐ 16,000 km (10,000 mi) or 200 hours Change Oil Filter.
.3	☐ 24,000 km (15,000 mi) or 300 hours
.4	☐ 32,000 km (20,000 mi) or 400 hours Change Oil Filter
	Drain interval may be altered depending upon severity of service, used oil analysis or manufacturer's recommendations.
	A - 6 MONTHS, 8,000 km (5,000 mi) or 100 HOURS
2.0	CHASSIS LUBRICATION CHECK
.1	Lubricate chassis including PTO, drive line "U" joints, dump body attachments & accessories
3.0	FRONT AXLE (STEERING SECTION) CHECK
.1	Check fluid level of steering box and power steering unit.
.2	Check condition of power steering hoses and clamps.
.3	Check steering column linkages, tie rod ends, ball joints and king-pins for looseness.
.4	Check front differential for leaks & lubricant level. Inspect & clean breather vent (as applicable)
.5	Check front differential input shaft for looseness (as applicable).
4.0	TRANSMISSION, TRANSFER CASE, DRIVE LINE CHECK
.1	Check for leaks and lubricant level. Inspect/clean breather vent.
.2	Check clutch pedal clearance and reservoir.
.3	Check drive shaft, "U" joints, spline section and centre bearings for wear.
5.0	REAR AXLE (Differential) CHECK
.1	Check for leaks and lubricant level. Inspect/clean breather vent.

6.0	CHASSIS SECTION CHECK
.1	Inspect muffler, clamps, hanger, exhaust pipe connections and gaskets.
.2	Inspect fuel tank, fuel lines and connections for leakage.
.3	Check condition of shocks, springs, shackles, "U" bolts, rubber bushings, frame brackets and dust excluders.
7.0	BRAKE SECTION CHECK
.1	Check brake reservoir fluid level.
.2	Inspect brake hydraulic system for leaks, deterioration of lines and connections.
.3	Check emergency brake, cables and lubricate pivots (as required).
.4	Inspect slack adjuster and clevis pins for seized condition.
8.0	WHEELS AND TIRE SECTION CHECK
.1	Check front wheel bearings for looseness.
.2	Visually check front wheel alignment for abnormal tire wear (align as required).
.3	Inflate tires (including spare) to correct pressure.
.4	Check for lubricant leaks (as applicable).
9.0	CHASSIS AIR SYSTEM CHECK (as applicable).
.1	Drain air tanks (as applicable). Check operation of air dryer (as applicable).
.2	Check air compressor and mounting brackets. Change filter (as required).
.3	Check all lines, valves and connections for leaks. Check governor for leaks and operation.
.4	Check alcohol evaporator (top as required).
10.0	ENGINE SECTION (AUX. ENGINE) CHECK
.1	Check operating temperature. Check shutter operation.
.2	Inspect all drive belts, and brackets (adjust as required).
.3	Inspect for oil, coolant, fuel and exhaust leaks.
.4	Inspect for looseness and deterioration of linkages, hoses, clamps, drive pulleys, etc.
.5	Service or replace air cleaner element.

Appendix A (cont'd)

GASOLINE POWERED ENGINES (cont'd)

11.0	ELECTRICAL SECTION CHECK
.1	Clean battery cables. Check cable and carrier condition.
.2	Check battery electrolyte level. Check operation of starting and charging circuits.
.3	Check proper operation of all lights, flashers, beacons heater and defroster.
.4	Inspect all wiring and connections (visual). Check operation of safety controls.
.5	Check block heater, pan heater wiring and plug-in connections.
12.0	VEHICLE GENERAL CHECK
.1	Check proper operation of locks, windows, safety belts, etc.
.2	Check condition of seats, head rests, mats and sunvisor(s).
.3	Lubricate hinges on doors, trunk, hood and tailgate (as applicable).
.4	Check mirrors and mounting (as applicable). Check safety chains (as applicable).
.5	Check w/wiper/washer operation and inspect arms/blades. Check reservoir fluid level.
13.0	ROAD TEST INSPECTION
.1	Check steering for excessive backlash, effort or abnormal wear.
.2	Check warning devices (including low air and low vacuum).
.3	Check operation of instruments, lighting, indicator lamps and horn(s).
.4	Check parking brake operation (holding).
.5	Check air system build-up time with fully charged system (engine off). Record air pressure loss in one minute with brake applied. PSI.
.6	Check braking action and operation (adjust as required).
.7	Check clutch for slippage (free travel). Check transmission controls for proper operation.
.8	Check multi-speed axle and final drive operation (as applicable).
.9	Check for unusual noise or vibration.
.10	Check hand throttle operation (as applicable).
.11	Check speedometer operation.
.12	Complete PM sticker, record METER READING for next PM inspection and install.
B - ANNUAL, 40,000 km (25,000 mi) or 1,000 HOURS (Complete in addition to "A" Inspection)	
14.0	FRONT AXLE (STEERING SYSTEM) CHECK
.1	Adjust drag link and steering box (as required). Inspect pitman arm for looseness.
.2	Check steering stops for proper adjustment.
15.0	TRANSMISSION, TRANSFER CASE, DRIVE LINE CHECK
.1	Change filter (as applicable).
.2	Adjust automatic transmission bands/linkages. Change oil (as required, every 60,000 km).
16.0	REAR AXLE (DIFFERENTIAL) CHECK
.1	Check pinion flange for looseness.
.2	Check mounting bolts for looseness.
17.0	CHASSIS SECTION CHECK
.1	Tighten front and rear spring "U" bolts.
.2	Check cab, body and radiator mounting for looseness.
.3	Check fuel and air tanks, mountings and straps.
18.0	BRAKE SECTION CHECK
.1	Inspect linings and clean brake components. Inspect for leakage of wheel cylinders and/or calipers.
.2	Inspect drums and rotors for wear.
.3	Inspect foot valve, mounting bolts and pin for seized condition.
.4	Inspect brake chamber mounting brackets for loose bolts.
.5	Check flexible brake lines for cracks. Change brake fluid/bleed system (as required).
19.0	WHEELS AND TIRE SECTION CHECK
.1	Repack wheel bearings with proper type grease.
.2	Check tire matching and rotate (as applicable).
20.0	ENGINE SECTION (AUX. ENGINE) CHECK
.1	Wash/steam clean as required.
.2	Test compression.
.3	Replace fuel filter (as applicable).
.4	Check operation of pollution control equipment (PCV valve).
.5	Check spark plugs, ignition points and condensor (replace if necessary).
.6	Inspect distributor cap, rotor and coil.
.7	Inspect electrical wiring for proper routing, clamping and signs of deterioration.
.8	Check dwell, timing, advance and adjust carburetor.
.9	Check engine governed RPM (as required).
.10	Tighten starter mounting and connection. Inspect and tighten motor mounts.
.11	Pressure test coolant system (replace antifreeze as required).
21.0	ELECTRICAL SECTION CHECK
.1	Perform battery capacity (load) test. Perform cranking motor test.

Appendix A (cont'd)

GASOLINE POWERED ENGINES (cont'd)

22.0	VEHICLE GENERAL CHECK
.1	Inspect interior cab condition for housekeeping.
.2	Check general body condition, touch-up paint, replace decals (as required) and check equipment ID.
23.0	MAIN HYDRAULIC SYSTEM CHECK
.1	Change filter (as applicable).
.2	Inspect hydraulic system for loose connections, mountings cylinders and pump.
24.0	ACCESSORIES CHECK (as applicable).
.1	Inspect hoist, frame, dump body hinge pins, brackets, 5th wheel mounting bolts (as required).
.2	Inspect auxillery equipment mounting, welds, bolts, clamps, etc.
.3	Inspect auxillery fluid tanks for mounting security and leaks.
.4	Check proper operation of auxillery equipment controls.
.5	Check lubricant level in auxillery equipment, gear boxes and transmissions (change as required)
25.0	ADDITIONAL CHECK FOR BLOWERS/SWEEPERS/FORK LIFTS/ROLLERS. TRACK EQUIPMENT
.1	Change lubricant and filters of chain drive cases and gear boxes (as required).
.2	Check chain drives for looseness and misallignment. Check propellor shafts, bearings and "U" joints.
.3	Inspect auger and impellor condition and bearings for wear.
.4	Check lift and turn mechanisms. Inspect housing and safety screens.
.5	Check/change broom bristles (as required).
.6	Check mast chain rollers, sprockets and guides for wear.
.7	Check overhead guard assembly for cracks.
.8	Check roller sprinkler system, spray nozzles and clean screens (as required).
.9	Check condition of track, rollers, sprockets, idlers and adjust (as required).
26.0	EMERGENCY EQUIPMENT CHECK
.1	Check flags, first aid kits, reflectors and wheel chocks

APPENDIX B

TRACKED VEHICLES, CRANES, EXCAVATORS AND FORKLIFTS

ITEM #	DETAILS OF INSPECTION	REPAIRS REQUIRED	SERVICEABILITY
1.	TRACKS, RAILS AND ROLLERS		
	a. Tracks for security and condition.		
	b. Track shoe mounting bolts for security.		
	c. Master pin for security.		
	d. Inspect track rail, pins, bushings for wear.		
	e. Inspect track roller brackets and bearings.		
	f. Inspect shafts and seals for general condition.		
2.	DRAWBARS AND BRACES		
	a. Condition and security of drawbar and braces.		
3.	ANGLE DOZERS		
	a. Angle dozer blade for condition and security.		
	b. Arm and A frame for condition and security.		
	c. Inspect all pivot pins for wear.		
4.	STEERING CLUTCHES AND BRAKES		
	a. Operation and adjustment of steering clutches.		
	b. Operation and adjustment of steering brake.		
	c. Remove plug and drain connection.		

Appendix B (cont'd)

ITEM #	DETAILS OF INSPECTION	REPAIRS REQUIRED	SERVICEABILITY
5.	CONTROLS AND LEVERS		
	a. Operation and security of all controls and levers.		
6.	TURNTABLES		
	a. Condition, operation and security of turntables. b. Turntable gears for wear and condition.		
7.	BOOMS AND BOOM HOISTS		
	a. Boom and boom hoist for security and condition. b. Check for cracks, bends, loose rivets, bolts, etc. c. Inspect boom foot pins for wear.		
8.	OUTRIGGERS AND FEET		
	a. General condition and security outrigger and feet.		
9.	EXPOSED GEARS, CLUTCHES, BRAKES, SHAFTS, CHAIN AND PULLEYS		
	a. Exposed gears for general condition. b. Security and tightness on splines and shafts. c. Operation of exposed clutches and brakes.		

Appendix B (cont'd)

ITEM #	DETAILS OF INSPECTION	REPAIRS REQUIRED	SERVICEABILITY
	d. Condition of clutch facings and brake linings.		
	e. Check shafts for security and wear.		
	f. Condition and adjustment of all chains.		
	g. Pulleys for condition, worn bushings and security.		
10.	CRANE ATTACHMENTS		
	a. Condition of backhoes, shovels, clams, etc.		
11.	SKIS		
	a. Security, mounting, general condition.		
12.	FORKS AND GUARDS		
	a. Condition of forks.		
	b. Security and condition of over-head guards.		
13.	SAFETY FEATURES		
	a. Ensure all exposed gears, chains, are covered.		
14.	MOTORS - ELECTRIC FORKLIFTS		
	a. Exterior cleanliness of motor and condition.		
	b. Brushes for wear and condition.		

Appendix B (cont'd)

ITEM #	DETAILS OF INSPECTION	REPAIRS REQUIRED	SERVICEABILITY
	c. Brush holders for wear and condition. d. Leads and connections for condition and security. e. Commutator - for cleanliness and condition.		

APPENDIX C

FUELLERS, FIRE, AND WATER HAULING VEHICLES

ITEM #	DETAILS OF INSPECTION	REPAIRS REQUIRED	SERVICEABILITY
	When inspections or repairs are being completed on refuelling tenders, the tender will be grounded to a suitable ground point, such as a post or hoist, by means of the grounding cable. When inspecting or repairing the commodity tank, filters, filter/water separator meters, piping etc., on the truck's fueller refer to manufacturer's procedures.		
1.	TANKS		
	a. Check fuel, foam, water tanks for security, mounting and condition.		
	b. Inspect tank filler covers, gaskets and fastening devices.		
	c. Check operation of compartment doors.		
	d. Check deck drains to ensure free liquid run off.		
	e. Check tank for scale, rust etc.		
	f. Inspect welded seams for leaks.		
	g. Inspect tank for shifting on frame.		

Appendix C (cont'd)

ITEM #	DETAILS OF INSPECTION	REPAIRS REQUIRED	SERVICEABILITY
2.	HOSE NOZZLES AND REELS		
	a. All hoses for security, conditions and leaks. b. Hose bonding for condition breaks, etc. c. Condition of hose nozzles. d. Condition of hose nozzle grounding cable, clip, plug. e. Condition, operation and security of hose, reels. f. Condition, operation and continuity of static reels and grounding cables.		
3.	PUMPS		
	a. Condition, security, operation of pump. b. Check pump for unusual noises and leaks. c. Check oil level in pump. d. Check oil level in chain guard box.		
4.	CAB TILT MECHANISM		
	a. Operation of cab tilt mechanism.		
5.	METERS		
	a. Operation, condition and security of meters. b. Inspect meter for leaks.		

Appendix C (cont'd)

ITEM #	DETAILS OF INSPECTION	REPAIRS REQUIRED	SERVICEABILITY
6.	FILTERS, SCREENS, TRAPS AND STRAINERS a. Drain and clean all filters, screens, traps and strainers. b. Replace filter elements if necessary. c. Check all filters and traps for security and leaks.		
7.	VALVES AND CONTROLS a. Condition and operation of all valves. b. Inspect valves for leaks. c. Operation of all controls.		
8.	PIPES AND COUPLINGS a. Condition and security of all piping and victaulic couplings. b. Victaulic and threaded couplings for leaks.		
9.	VENTS AND FUSIBLE PLUGS a. Operation of all vents to ensure they are free from dirt, ice, etc. b. Fusible plugs for correct installation.		

Appendix C (cont'd)

ITEM #	DETAILS OF INSPECTION	REPAIRS REQUIRED	SERVICEABILITY
10.	CABLES		
	a. Condition, security and continuity of grounding cables and clamps.		

APPENDIX D

ASPHALT, PAVING CRUSHERS AND CONVEYORS

ITEM #	DETAILS OF INSPECTION	REPAIRS REQUIRED	SERVICEABILITY
1.	BELTS, CONVEYORS AND CHAINS		
	a. Belts, conveyors and chains for wear and adjustment.		
	b. Belts, conveyors and chains for alignment.		
	c. Connections and splices for security.		
2.	PUMPS		
	a. Bitumen pump for operation and leaks.		
3.	CLUTCHES		
	a. Operation and adjustment of pan feeder clutch.		
	b. Operation and adjustment of master clutch.		
4.	HOPPERS		
	a. Operation and condition of hopper and flashing.		
	b. Adjustment of hopper flashing.		
5.	GEAR BOXES		
	a. Condition and operation of all gear boxes.		
6.	FEEDERS		
	a. Condition, operation, security of all feeders.		

Appendix D (cont'd)

ITEM #	DETAILS OF INSPECTION	REPAIRS REQUIRED	SERVICEABILITY
7.	BURNERS AND NOZZLES		
	a. Condition of burner nozzle and jets.		
	b. Burner cone for cracks etc.		
8.	COMBUSTION CHAMBER		
	a. Combustion chamber for loose or damaged bricks.		
9.	BLADES, TIPS AND FLASHING		
	a. Check all replaceable blades for wear and adjustment.		
	b. Check all tips and flashings for wear and adjustment.		
10.	CONTROLS AND VALVES		
	a. Operation and condition of all controls and valves.		
11.	PYROMETER		
	a. Check pryometer for accuracy.		
12.	SAFETY FEATURES		
	a. Security of all safety guards over chain drives, etc.		
	b. Installation of safety guards over chain drives, etc.		

APPENDIX E

SNOWFIGHTING EQUIPMENT

ITEM #	DETAILS OF INSPECTION	REPAIRS REQUIRED	SERVICEABILITY
1.	BLOWERS AND AUGERS		
	a. Operation, condition of blower and auger assembly.		
	b. Ensure augers are correctly synchronized.		
	c. Check augers for bends and twists.		
2.	PLOWS, LEVELLING WINGS AND CASTERS		
	a. Condition of plow assembly.		
	b. Condition of push frame.		
	c. Condition of cutting edges, nose pieces, shoes, etc.		
	d. Condition and operation of casters or skates.		
	e. Condition and operation of levelling wing.		
3.	IMPELLERS AND LOADING CHUTE		
	a. Operation and security of impeller.		
	b. Condition of impeller blades.		
	c. Condition of loading chute.		
	d. Condition of loading chute in all positions.		

Appendix E (cont'd)

ITEM #	DETAILS OF INSPECTION	REPAIRS REQUIRED	SERVICEABILITY
4.	SHEAR BOLTS		
	a. Ensure shear bolts have not been replaced with hardened cap screws.		
5.	CONTROLS AND LEVERS		
	a. Operation and security of all levers and controls.		

APPENDIX F

GRADERS, ROADROLLERS AND LOADERS

ITEM #	DETAILS OF INSPECTION	REPAIRS REQUIRED	SERVICEABILITY
1.	MOLDBOARD		
	a. Moldboard for wear, security and general condition.		
2.	CIRCLE LOCK		
	a. Circle lock and circle pin for wear and general condition.		
	b. King pins and rivets for wear and general condition.		
	c. Sockets and balls for wear and general condition.		
3.	SCARIFIER		
	a. Scarifier teeth and block for loose mounting.		
	b. Lift mechanism for loose mounting.		
	c. Inspect for bolts cracks, break and worn teeth.		
4.	CONTROLS AND LEVERS		
	a. Operation and security of all controls and levers.		
5.	BLADE		
	a. Check condition of blade and cutting edges.		

Appendix F (cont'd)

ITEM #	DETAILS OF INSPECTION	REPAIRS REQUIRED	SERVICEABILITY
6.	FRONT ROLL		
	a. Check condition and operation of front roll.		
7.	BUCKET		
	a. Check condition and operation of bucket.		
8.	LIFT ARMS AND SIDE ARMS		
	a. Lift and side arm mounting pins and sockets. b. Check arms and blade for proper alignment.		
	This section details specialized items which must be inspected. Included are such items as brushes, sanders, special heating systems (electronic vehicles and certain oil dispensing vehicles), refrigerated vans and concrete cement mixers.		
9.	BRUSHES		
	Security, operation and condition of brushes.		
10.	SANDERS		
	Condition, security and operation of sander.		

Appendix F (cont'd)

ITEM #	DETAILS OF INSPECTION	REPAIRS REQUIRED	SERVICEABILITY
11.	SPECIAL HEATING SYSTEMS Inspect system for operation and fire hazards.		
12.	REFRIGERATED VANS The operator of these vehicles must be capable of performing a daily visual check of gauges. Glasses and gauges to ascertain the unit is functioning properly. Monthly inspections and repair must be done by a qualified refrigeration technician.		
13.	CONCRETE MIXER General condition of mixer and components.		