14/18 BS
14/18 BV
SERIES

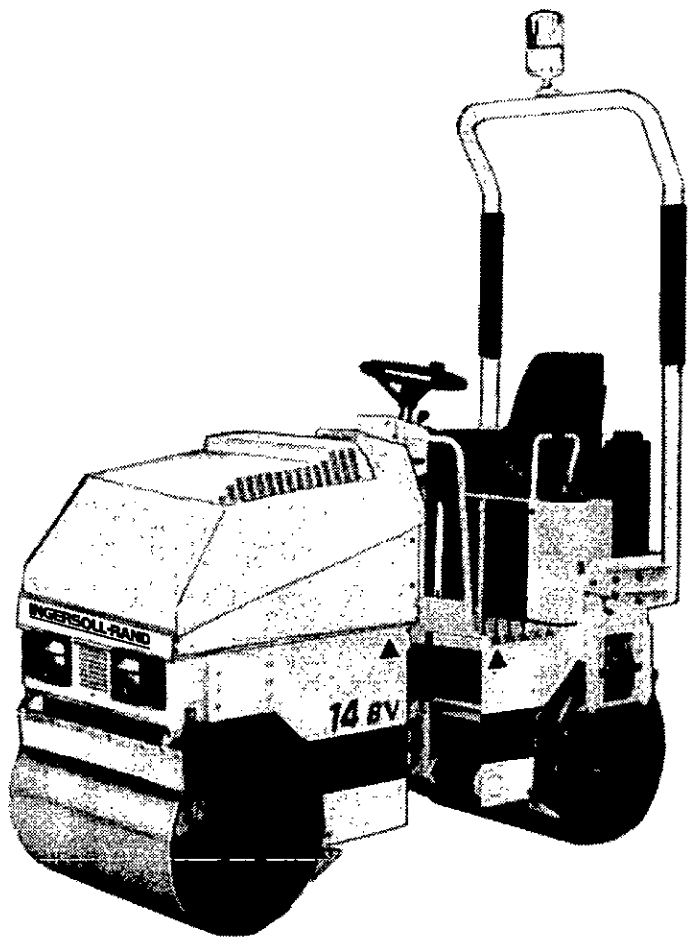
INGERSOLL-RAND

OPERATING & MAINTENANCE INSTRUCTIONS

Double Drum
Vibratory Compactor

Effective S/N.

14245, 14247, 14248
14251 - 14254
14255 upwards



Do not remove operation manual from machine. Replace manual if damaged

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United Kingdom

14/18 BS/BV ENGLISH COMM.NO. 10574309
Revised (01-13)

14/18 BS & 14/18 BV SERIES
OPERATION AND
MAINTENANCE INSTRUCTION MANUAL
Communication Part No. 10574309

To easily locate the major section in this manual, the first page of each major section is imprinted with a black square in a position corresponding to the section position listed on this page. To use the rapid index, hold the manual and spread the edges of the pages with the right thumb untiel the square is located which corresponds to the index position of the desired section. Then open the book. The contents of these sections are listed on the first page of each section.

SECTION

The purpose of this instruction manual is to provide the operator and site maintenance personnel with knowledge of the fundamental rules and criteria to be followed for the on-site use and maintenance of this double-drum vibratory roller compactor.

This instruction manual must have been read and fully understood by the operator before operating the machine.

This instruction manual consists of:

Introduction describing the machine

General safety rules

Identification of control and safety symbols.

- Operator controls and instrumentation.
- Operation and use
- Maintenance instructions
- Troubleshooting, control / instrument problems.
- Technical Specifications
- Fuel and Lubrication Instructions
- Torque specifications
- Electrical/Hydraulic Schematics

Always keep the "Operation and Maintenance Instruction Manual" on the machine and within reach of the operating position.

If any part of this manual cannot be understood, contact your supervisor or local Ingersoll-Rand Distributor. This is an essential condition for working safely with this machine.

The correct machine operation, use and regular maintenance are also essential elements to provide the highest performance and safety.

NOTE:

The present manual is accompanied with an engine instruction manual. You are therefore advised to follow the operation and maintenance instructions as specified in both the engine and the machine instruction manuals.

These symbols call your attention to a safety precaution:

They mean:

CAUTION!
BE CAREFUL
IT CONCERNS YOUR SAFETY!

PROCEDURE WHEN RECEIVING THE MACHINE

Your machine has been tested, accurately checked, and prepared for shipment. Every part of the machine, including the detached parts, have been accurately checked before being shipped from the factory.

When you receive the machine, and before unpacking the equipment, check if damage has occurred during transport and if any parts are missing.

Check the equipment by consulting the shipment document

If the goods are damaged, or if parts are missing, inform the freight agent as soon as possible. He will inform you regarding how to proceed in order to make a complaint.

IDENTIFICATION DATA

An exact description of the model type and its serial number of your machine will facilitate fast and efficient response from our parts and service support operations.

Always provide the model of your machine and it's serial number when you contact the local Ingersoll-Rand service parts office.

We advise you to enter your machine data in the following lines to maintain machine and engine information:

Model.....

Serial no.....

Year of manufacture.....

Engine Serial no. and type of engine.....

MACHINE IDENTIFICATION

Machine identification plate location (Figure 1).

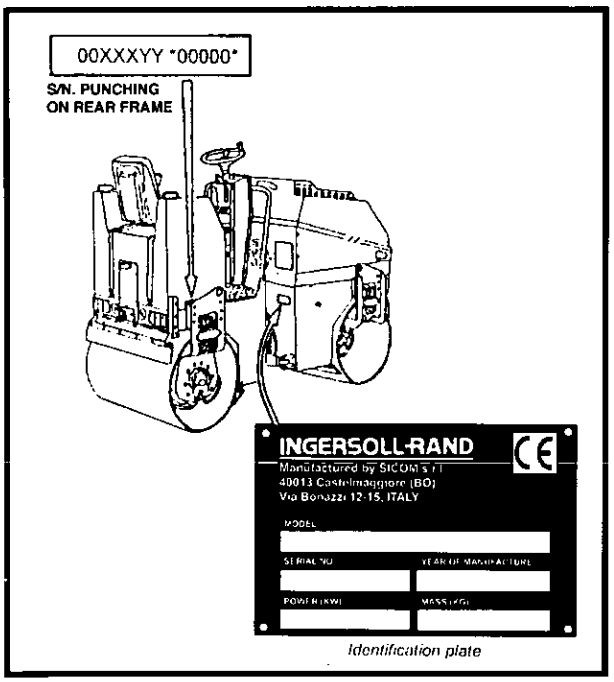


Figure 1

ENGINE IDENTIFICATION

The engine number can be found on the engine identification plate, located on the crankcase (Figure 2)

Figure 2

INSTRUCTION MANUAL STORAGE

A manual pouch (Figure 3), located in the engine compartment, provides space for all manuals. This pouch is located within easy reach of the operator's station.

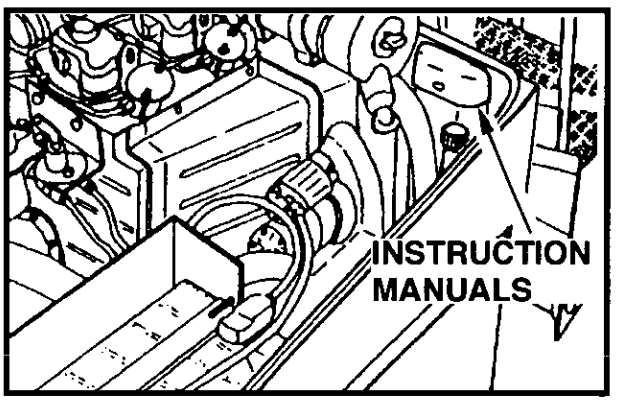


Figure 3

GENERAL INFORMATION

All safety rules in Section I must be observed.

If further information is required concerning the recommended use on soil and asphalt applications, contact your local Ingersoll-Rand Distributor.

Ingersoll-Rand Company
Customer Service
Horwich

Tel.: 01204-690690
Fax: 01204-690388 (Service and Warranty)
01204-690388 (Customer Service Parts)

Ingersoll-Rand reserves the right to make any changes or modifications without prior notice and without incurring any liability to retrofit machines previously shipped from the factory.

MACHINE DESCRIPTION

Each of these compactor models offers the ideal combination of weight, drum width, frequency, centrifugal force and amplitude. The combination of these specifications result in the most efficient compaction of hot mix asphalt (H.M.A...). Each model has a specific drum width which allows you to select the best model to match the job requirement. All models feature the air-cooled, Lombardini 12LD 475-2 Diesel engine, hydrostatic propulsion, double drum vibration, drum offset and centre point articulation steering systems.

On BS Series the rear drum features single vibration frequency of 2800 vpm (47 Hz). On BV Series both drums feature single vibration frequency of 2800 vpm (47 Hz). For further details refer Section 7, "Technical Specifications"

The propulsion system provides drive to both drums and permits smooth hydrostatic control of travel speed and maximum gradeability. For further details refer Section 7, "Technical Specifications"

ENGINE

The machines use 0.954 liter displacement, 2 cylinder air cooled, diesel engines.

Electric starting and alternator battery charging is standard on all machine models.

A dry type, single-stage air cleaner provides clean air to the engine. A dust discharging vacuator valve is provided on the air cleaner.

Fuel is pumped from the fuel tank to the fuel filter. After filtration, fuel passes to the injection pump and on to the injectors.

The engine power/rpm is controlled by the engine speed (throttle) control lever. The engine is shutdown either by the ignition switch or the emergency stop switch.

MAIN FRAME

The machine consists of a front frame and rear frame which are connected by a swivel joint providing both articulated steering and drum oscillation. The front frame includes the fuel and hydraulic fluid tanks, engine, hydraulic pumps and battery mounting. The rear frame includes the water tank, operator station comprising sprung seat and all operating controls within easy reach of the operator's station.

CONTROLS

All of the controls are positioned for operator convenience The combined Propulsion and Vibration Control Lever is positioned to left hand side of the operator's seat. Drum vibration is manually controlled by a thumb operated switch on the propulsion lever. Both pressurised and gravity feed water systems are standard equipment. Engine speed control lever is located on the Steering console.

DRUM WATER SYSTEM

A 90 liter capacity, pressurized water spray system consists of a pump and a spray bar for each drum, with facility to change over to gravity feed system. Water filtration is standard.

BRAKES

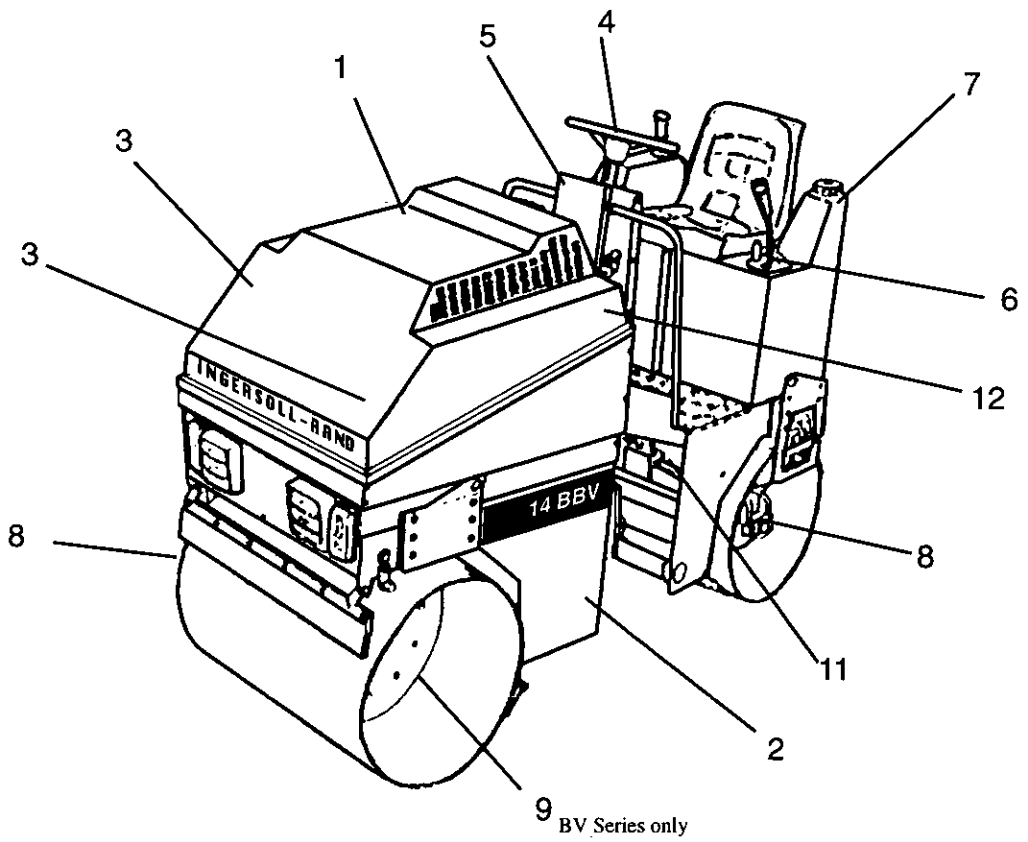
Spring-applied, hydraulically released brakes are incorporated on both drums for safety, reliability and maintenance-free operation. Brakes actuate automatically in the event of power loss or can be activated by the operator.

SERVICEABILITY

A lightweight hood lifts and permits complete access to the engine, filters and hydraulic components: Spray bars are easily cleaned, and spring loaded, self adjusting drum wipers require little maintenance.

ROPS

Ingersoll-Rand provides ROPS (rollover protection structures) and seat belts as standard equipment on all compactors. ROPS used in conjunction with seat belts will lessen the possibility of death or serious injury in the event of a rollover.



BV Series only

Description and Identification of Major Components

1. Fuel Tank and Filler
2. Hydraulic Tank and Filler
3. Engine Compartment
4. Steering Console
5. Instrument and Controls Panel
6. Propulsion and Vibration Control Lever
7. Water Tank
8. Propulsion Motor/Brake (Both Drums)
9. Vibration Motor
   (Rear Right side drum only BS Series)
   (Front Left and Rear Right side drum BV Series).
10. Battery Compartment
11. Water Pump and Filter Location
12. Instruction Manual Storage

NOTE: BS Series unit illustrated.

SECTION 1 - SAFETY PRECAUTIONS AND GUIDELINES

1.1 OVERVIEW

BEFORE YOU OPERATE, MAINTAIN, OR IN ANY OTHER WAY USE THIS COMPACTOR:

READ and STUDY this manual. KNOW how to safely use the compactor's controls and what you must do for safe maintenance.

ALWAYS wear or use the proper safety items required for your personal protection.

If you have ANY QUESTIONS about the safe use or maintenance of this compactor, ASK YOUR SUPERVISOR OR CONTACT ANY INGERSOLL-RAND DISTRIBUTOR. NEVER GUESS-ALWAYS CHECK!

1.2 WARNINGS

The following conventions are used in this manual to designate instructions of particular importance.

NOTE: Refers to special information on the efficient use of the machine.

NOTICE: Denotes special nonhazardous related information.

CAUTION: Refers to orders and prohibitions directed towards preventing minor personal injury or product/ property damage.

WARNING: Refers to orders and prohibitions designed to prevent severe personal injury, death or extensive damage.

DANGER: Refers to orders and prohibitions designed to prevent severe personal injury or death.

1.3 GENERAL

The machine was built in accordance with state-of-the-art standards and recognized safety rules. Nevertheless, its misuse may constitute a risk to life and limb of the user or of third parties, and may cause damage to the machine or other material property.

The machine must be used in accordance with its designated use as described in the operating manual. The machine must only be operated by safety-conscious persons who are fully aware of the risks involved in operating the machine. Any functional disorders, especially those affecting the safety of the machine, must be corrected immediately.

The machine is designed exclusively for the compaction of asphaltic road construction materials. Use of the machine for purposes other than that mentioned (such as for towing other vehicles/equipment) is considered contrary to its designated use. The manufacturer/supplier cannot be held liable for any damage resulting from such use. The risk of such misuse lies entirely with the user.

Operating the machine within the limits of its designated use also involves compliance with the inspection and maintenance directives contained in the operating manual.

1.4 SELECTION AND QUALIFICATION OF PERSONNEL

Work on and with the machine must be performed by qualified personnel only. Statutory minimum age limits must be observed.

Individual responsibilities of the personnel responsible for operation, setup, maintenance and repair of the machine should be stated clearly.

Define the machine operator's responsibilities - also with regard to observing traffic regulations - the operator should have the authority to refuse instructions by third parties that are contrary to safety.

Do not allow persons being trained or instructed in the operation or maintenance of the machine to work without permanent supervision by an experienced person.

Work on the electrical system and equipment of the machine must be done only by a skilled electrician or by instructed persons under the supervision and guidance of a skilled electrician and must be in accordance with electrical engineering rules and regulations.

Work on the chassis, brake, hydraulic and steering systems must be performed by skilled personnel with special knowledge and training for such work.

1.5 ORGANIZATIONAL MEASURES

STOW manuals in the manual pouch provided on the machine. Manuals must always be available at the site where the machine is used.

OBSERVE AND INSTRUCT the user in all other generally applicable legal and mandatory regulations relevant to accident prevention and environmental protection. These compulsory regulations may also deal with the handling of hazardous substances, issuing and/or wearing of personal protective equipment, and traffic regulations.

SUPPLEMENT operating instructions with detailed working instructions covering the methodology of working sequences, individual job responsibilities, and overall supervisory responsibility.

ALWAYS be sure that persons entrusted with work on the machine have read the operating instructions and in particular the chapter on safety before beginning work. Reading the instructions after work has begun is too late. This is especially important for persons who work only occasionally on the machine, e.g. during set up or maintenance.

MAKE CERTAIN personnel are working in compliance with the operating instructions and are alert to risks and safety factors.

ALWAYS tie back or otherwise secure long hair, wear close-fitting garments and avoid wearing jewelry such as rings. Injury may result from clothing, hair, or jewelry being caught up in the machinery.

USE protective equipment wherever required by the circumstances or by law.

OBSERVE all safety instructions and warnings attached to the machine.

BE SURE all safety instructions and warnings attached to the machine are complete and perfectly legible.

STOP the machine immediately in the event of safety relevant malfunction or change in machine behavior during operation. REPORT the malfunction to the proper authority/ person.

NEVER provide service or maintenance to the machine unless the drums are adequately chocked, articulation lock bar/pin is in locked position, and parking brake is applied.

NEVER make any modifications to the machine which might affect safety without the manufacturer's approval. This applies to the installation and adjustment of safety devices and valves as well as to welding work on load bearing elements.

ALWAYS ADHERE to prescribed intervals or those specified in the operating instructions for routine checks and inspections.

1.6 PRE-START INSPECTION

INSPECT your compactor daily. Ensure that the routine maintenance and lubrication are being dutifully performed. Have any malfunctioning, broken, or missing parts repaired or replaced before use.

VERIFY that all instruction and safety labels are in place and readable. These are as important as any other equipment on the compactor.

NEVER fill the fuel tank with the engine running, while near an open flame, or while smoking. ALWAYS wipe up any spilled fuel.

CHECK for WARNING tags placed on the compactor. DO NOT operate the compactor until repairs have been made and the WARNING tags have been removed by authorized personnel.

CLEAN any foreign material from the operator's platform to reduce the danger of slipping.

KNOW the location of the Emergency Shut-Down Control if compactor is so equipped.

ALWAYS know the capabilities and limitations of your equipment–speed, gradability, steering, and braking.

BE AWARE of the dimensions of your compactor–height and weight–as well as your transporter dimensions and weight.

CHECK for any conditions that could be dangerous–holes, banks, underground culverts, manhole covers, water meter pits, curb and/or street boxes.

1.7 SAFETY INSTRUCTIONS GOVERNING OPERATION

AVOID any operational mode that might sacrifice safety.

TAKE all necessary precautions to ensure that the machine is used only when in a safe and reliable condition.

OPERATE the machine only if all protective and safety oriented devices, such as removable safety devices,

emergency shut off equipment, soundproofing elements and exhausts, are in place and fully functional.

START the machine from the driver's seat only and always wear the seat belt.

WATCH the indicators during start up and shutdown procedures in accordance with the operating instructions.

MAKE SURE no one is at danger or risk before starting up or setting the machine in motion.

CHECK that braking, steering, signalling and lighting systems are fully functional before starting work or travelling with the machine.

CHECK that accessories have been safely stowed away before setting the machine in motion.

OBSERVE the valid traffic regulations when traveling on public roads and ways and MAKE SURE the machine is in a condition compatible with these regulations.

ALWAYS SWITCH ON the lighting system in conditions of poor visibility and after dark.

MAKE SURE there is sufficient clearance when crossing underpasses, bridges and tunnels or when passing under overhead lines.

ALWAYS KEEP at a distance from the edges of building pits and slopes.

AVOID any operation that might be a risk to machine stability.

NEVER CHANGE to a lower gear on a slope always change before reaching it. On sloping terrain, always adapt your travelling speed to the prevailing ground conditions.

ALWAYS SECURE the machine against inadvertent movement and unauthorized use before leaving the driver's seat.

I. STARTING

ALWAYS USE hand rails and steps (if equipped) to get on and off the compactor. ALWAYS MAINTAIN a three-point contact when climbing onto or off of compactor.

READ and FOLLOW ALL instruction decals.

ALWAYS be seated with the seat belt on when operating the machine.

BEFORE starting the engine, ENSURE that the propulsion (travel) control is in the "STOP" position.

BEFORE starting the engine, ENSURE that the parking brake control is in the "Applied" position.

START the engine from the operator's position only.

ALWAYS USE EXTREME CAUTION if you have to jump-start the engine.

II. OPERATING

ALWAYS make sure that no person or obstruction is in your line of travel before starting the compactor in motion.

NEVER CLIMB on or off the compactor while it is in motion.

ALWAYS remain seated with the seat belt on when operating the compactor whether compacting, traveling, or loading/ unloading.

USE EXTREME CAUTION and be very observant when operating in close quarters or congested areas.

NEVER carry passengers.

CLOSE all sound baffles during operation.

KNOW the area in which you are working. Familiarize yourself with work site obstructions and any other potential hazards in the area.

KNOW and USE the hand signals required for particular jobs and know who has the responsibility for signaling.

DO NOT work in the vicinity of overhanging banks or on grades that could cause the compactor to slide or roll over.

AVOID side hill travel. ALWAYS operate up and down slopes. ALWAYS keep the propulsion (travel) control lever in low speed range close to the "STOP" position when climbing or descending hills.

NEVER allow anyone to stand within the compactor's articulation area when the engine is running.

ALWAYS LOOK in all directions BEFORE changing your direction of travel.

DO NOT attempt to control compactor travel speed with the throttle control. When operating the compactor maintain the engine speed at full "Operating rpm."

DO NOT tow or push the compactor except as explained in SECTION 4 of this manual.

DO NOT run the engine in a closed building for an extended length of time. EXHAUST FUMES CAN KILL.

III. STOPPING

ALWAYS park the compactor off the asphalt and on solid level ground. If this is not possible, always park the compactor at a right angle to the slope and chock the wheels and/or drums.

AVOID leaving the operator's platform with the engine running. ALWAYS move the propulsion (travel) control to "STOP", apply the parking brake, install the articulation lock bar/lock pin, position the throttle control to "idle rpm", pull the fuel shut-off control (if so equipped), turn ignition switch to OFF, and lock all lockable compartments.

USE proper flags, barriers, and warning devices, especially when parking in areas of heavy traffic.

IV. MAINTENANCE

In any work concerning the operation, conversion or adjustment of the machine and its safety oriented devices or any work related to maintenance, inspection and repair, always observe the start up and shutdown procedures set out in the operating instructions and the information on maintenance work.

Ensure that the maintenance area is adequately secured.

If the machine is completely shut down for maintenance and repair work, it must be secured against inadvertent starting by:

- locking the principal control elements and removing the ignition key and/or
- attaching a warning sign to the main switch

Carry out maintenance and repair work only if the machine is positioned on stable and level ground and has been secured against inadvertent movement and buckling.

USE CARE when attaching and securing lifting tackle to individual parts and large assemblies being moved for replacement purposes to avoid the risk of accidents. USE lifting gear that is in perfect condition and with adequate lifting capacity. NEVER work or stand under suspended loads.

ALWAYS USE the correct tools and workshop equipment when performing maintenance to the machine.

ALWAYS USE specially designed or otherwise safety oriented ladders and working platforms when doing overhead assembly work. Never use machine parts as a climbing aid.

KEEP all handles, steps, handrails, platforms, landings and ladders free from mud, dirt, snow and ice.

CLEAN the machine, especially connections and threaded unions, of any traces of oil, fuel or preservatives before carrying out maintenance/repair. NEVER use aggressive detergents. Use lint free cleaning rags.

Before cleaning the machine with water, steam jet (high pressure cleaning) or detergents, COVER OR TAPE up all openings which - for safety and functional reasons - must be protected against water, steam or detergent penetration. Special care must be taken with electric motors and switch gear cabinets.

ENSURE during cleaning of the machine that temperature sensors do not come into contact with hot cleaning agents.

REMOVE all covers and tapes applied for that purpose after cleaning machine.

After cleaning, EXAMINE all fuel, lubricant and hydraulic fluid lines for leaks, loose connections, chafe marks and damage. REPAIR or REPLACE defective parts immediately.

Always TIGHTEN any screwed connections that have been loosened during maintenance and repair.

Any safety devices removed for setup, maintenance or repair purposes must be refitted and checked immediately upon completion of the maintenance and repair work.

ENSURE that all consumables and replaced parts are disposed of safely and with minimum environmental impact.

AVOID, whenever possible, servicing, cleaning or examining the compactor with the engine running.

AVOID, whenever possible, servicing or providing maintenance to the compactor unless the wheels and/or drums are adequately chocked, the articulation lock bar/ lock pin is in the locked position and parking brake is applied.

NEVER fill the fuel tank with the engine running, while near an open flame or while smoking. ALWAYS wipe up any spilled fuel.

DO NOT alter the engine governor settings from those indicated in the engine manual and the engine option plate.

ALWAYS replace damaged or lost decals. Refer to the parts manual for the proper location and part number for all decals.

DISCONNECT the battery cables when working on the electrical system or when welding on the compactor.

BE SURE the battery area is well ventilated (clear of fumes) should it be necessary to connect a jump battery or battery charger. Fumes from the battery can ignite by a spark and explode.

BE SURE the battery charger is "Off" when making the connections if battery charging is required.

Use only original fuses with the specified current rating. Switch off the machine immediately if trouble occurs in the electrical system.

Work on the electrical system or equipment may only be carried out by a skilled electrician or by specially instructed personnel under the control and supervision of an electrician and in accordance with the applicable electrical engineering.

If provided for in the regulations, the power supply to parts of machines, on which inspection, maintenance and repair work is to be carried out, must be cut off.

Before starting any work, check the de-energized parts for the presence of power and ground or short circuit them in addition to insulating adjacent live parts and elements.

The electrical equipment of machines is to be inspected and checked at regular intervals. Defects such as loose connections or scorched cables must be rectified immediately.

Welding, flame cutting and grinding work on the machine should only be done if expressly authorized, as there may be a risk of explosion and fire.

Before beginning welding, flame cutting and grinding operations, clean the machine and its surroundings from dust and other flammable substances and make sure that the premises are adequately ventilated (risk of explosion check all lines, hoses and screwed connections regularly for leaks and obvious damage. Repair damage immediately. Splashed oil may cause injury and fire.

Depressurize all system sections and pressure pipes (hydraulic system, compressed air system) to be removed in accordance with the specific instructions for the unit concerned before carrying out any repair work.

Hydraulic lines must be laid and fitted properly. Ensure that no connections are interchanged. The fittings, lengths and quality of the hoses must comply with the technical requirements.

When handling oil, grease and other chemical substances, observe the product related safety regulations.

Be careful when handling hot consumables (risk of burning or scalding).

1.8 WARNING OF SPECIAL DANGERS

When working with the machine, maintain a safe distance from overhead electric lines. If work is to be carried out close to overhead lines, the working equipment must be kept well away from them. **CAUTION! DANGER!** Check out the prescribed safety distances.

⚠DANGER

If your machine comes into contact with a live wire:

- **Do not leave the machine.**
- **Drive the machine out of the hazard zone.**
- **Warn others against approaching and touching the machine.**
- **Have the live wire de energized.**
- **Do not leave the machine until the damaged line has been safely de-energized.**

Operate internal combustion engines and fuel operated heating systems only in adequately ventilated premises. Before starting the machine in enclosed premises, make sure that there is sufficient ventilation.

1.9 TRANSPORTING AND TOWING - RECOMMISSIONING

The machine must be towed, loaded and transported only in accordance with the operating instructions.

For towing the machine, observe the prescribed transport position, admissible speed and itinerary.

Use only appropriate means of transport and lifting gear of adequate capacity.

The fastening of loads and the instructing of crane operators should be entrusted to experienced persons only. The personnel giving the instructions must be within sight or sound of the operator.

DO NOT attempt to load the compactor on the transporters without knowledge and experience with the operation of the compactor.

Always use a ramp when loading the compactor on the transporter. Be sure ramps are of adequate strength, low angle, and proper height.

Use proper chock blocks in front and rear of the wheels of the transporter when loading the compactor.

Be sure the trailer is on level ground and approach the transporter loading ramps squarely to make sure the compactor does not drop off the side of the ramp.

Keep the transporter deck clean of clay, oil, mud, ice, frost and other material that can become slippery.

Use proper chock blocks in front and rear of the compactor drums/wheels once loaded on the transporter.

Shut the engine OFF, apply the parking brake, and lock all lockable compartments.

Always be sure the articulation lock bar/lock pin is secured in the locked position before transporting the compactor.

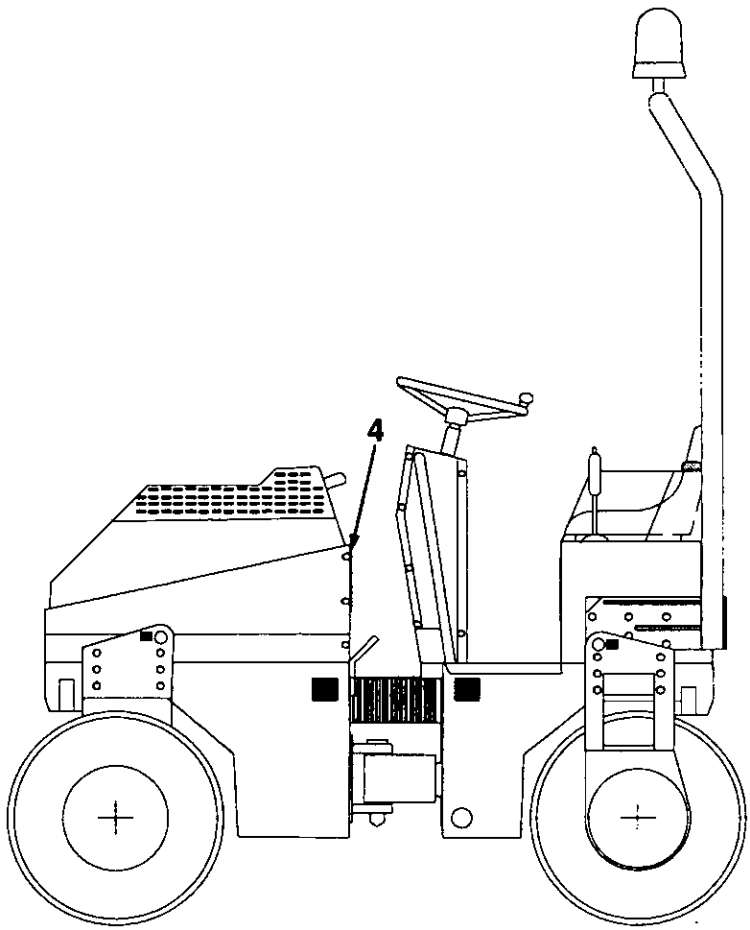
Always know the overall height of the compactor and hauling vehicle. Observe height and weight regulations and at overhead objects be sure you can safely pass beneath them.

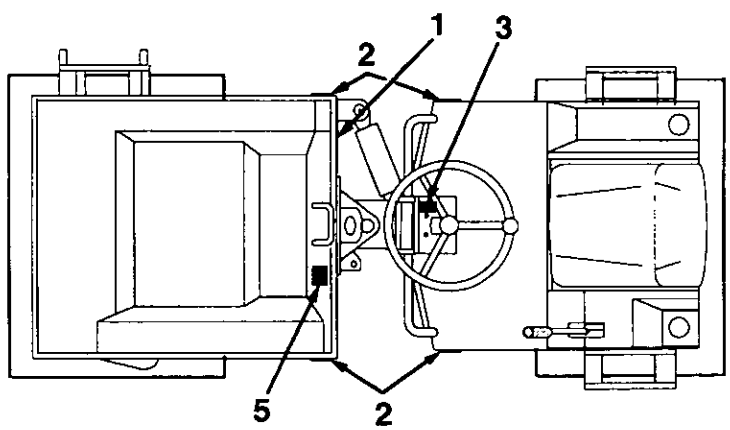
When moving the compactor on public access roads, obey all traffic regulations and be sure that the proper clearance flags, lights, and warning signs, including the "Slow Moving Vehicle" emblem, are properly displayed. Know your approximate stopping distance at any given speed. Never turn corners at excessive speeds. Look in all directions before reversing your direction of travel.

Position the compactor on the transporter or hauling vehicle centered from side to side and apply the brake.

Secure the compactor to the deck of the hauling vehicle or transporter with adequate chains or cables and blocks to meet local regulations.

1.10 SAFETY RELATED DECALS





REF. NO.	DECAL	NO. REQ'D	LOCATION
1	Checklist	1	Engine Canopy
2	DANGER: Crushing Hazard	4	Right & Left Side
3	WARNING: Misoperation	1	Console
4	WARNING: Improper Maintenance	1	Engine Canopy
5	DANGER: Rollover	1	Engine Canopy

1. Checklist

PRE-STARTING

Hoses, Safety Shrouds,
Muffler, Engine
Railings, Fittings - **INSPECT FOR DAMAGE**

Fluid Levels - **CHECK**

DO NOT OPERATE FAULTY EQUIPMENT

STARTING

CONSULT OPERATOR'S MANUAL - SEE YOUR SUPERVISOR

Propulsion Control Lever - **CHECK IN STOP POSITION**

Engine Speed - **LOW IDLE**

Parking Brake - **APPLY** = → = (P)

Emergency Stop Switch - **RESET** =

Work Area - **CLEAR**

Ignition Switch - **ON** =
- **BRAKE LIGHT - VERIFY ON**
- **ENGINE OIL LIGHT - VERIFY ON**

- **START** = (30 seconds MAX.)

Note: ***Operator must be seated to permit engine start.***

SHUTDOWN

Machine - **ON LEVEL SURFACE**

Water Spray Switch - **OFF** = O

Vibration ON/Off Switch - **OFF** = O

Parking Brake - **APPLY** = → = (P)

Engine Speed - **LOW IDLE (For 3-4 mins.)**

Ignition Switch - **OFF** =

OPERATING

Articulation Lock Bar - **RELEASE AND STOW**

Seat Belt - **FASTEN**

Engine Speed - **HIGH (Operating) IDLE**

Parking Brake - **RELEASE** = ← = (P)

Water Spray Switch - **ON** = |

Propulsion Control Lever
- **Move SLOWLY :** ← (F) (R) →

- **Move to STOP for NORMAL BRAKING**

Vibration Control - **ENGAGE ONLY WHEN IN MOTION**

Operation:
Operating - **STAY SEATED**
- **ALLOW NO PASSENGERS**
- **ALLOW NO BYSTANDERS**

Up and downhill Travel - **GO SLOW**

TRANSPORT

Hauling :
Articulation Lock Bar - **LOCK**

Machine - **CHOCK**
- **TIE DOWN SECURELY TO TRAILER**

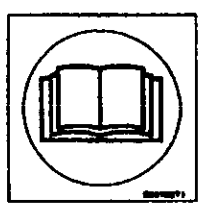
Towing:
DO NOT TOW UNTIL YOU REFER TO OPERATOR'S INSTRUCTION MANUAL

2. Crush Area

Crush area. Can cause severe injury or death. Stay clear. Install lock pin before servicing.

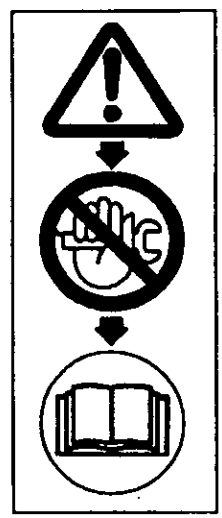
3. Misoperation

Improper operation of this equipment can cause severe injury or death. Read and understand the operator's manual and safety instructions before operating or servicing.



4. Maintenance

Improper maintenance can be hazardous. Understand maintenance safety prior to working. Consult machine manual or Ingersoll-Rand distributor.



5. Rollover

Rollover of this machine can cause severe injury or death. Do not operate this machine near or on an inclined surface. A rollover can occur. If this machine has a Rollover Protective Structure (ROPS), seat belts must be worn to avoid severe injury or death from being thrown out.

The following information is provided to assist the owners and operators of Ingersoll-Rand Road Machinery Equipment. Further information may be obtained by contacting your Ingersoll-Rand Road Machinery Equipment Distributor.

The following substances are used in the manufacture of this machine and may be hazardous to health if used incorrectly.

SUBSTANCE	PRECAUTION
Antifreeze (Water-cooled engine)	Avoid ingestion, skin contact and breathing fumes.
Hydraulic Oil	Avoid ingestion, skin contact and breathing fumes.
Engine Lubricating Oil	Avoid ingestion, skin contact and breathing fumes.
Preservative Grease	Avoid ingestion, skin contact and breathing fumes.
Rust Preventative	Avoid ingestion, skin contact and breathing fumes.
Engine Fuel	Avoid ingestion, skin contact and breathing fumes.
Battery Electrolyte	Avoid ingestion, skin contact and breathing fumes.
SAE Gear Oil	Avoid ingestion, skin contact and breathing fumes.

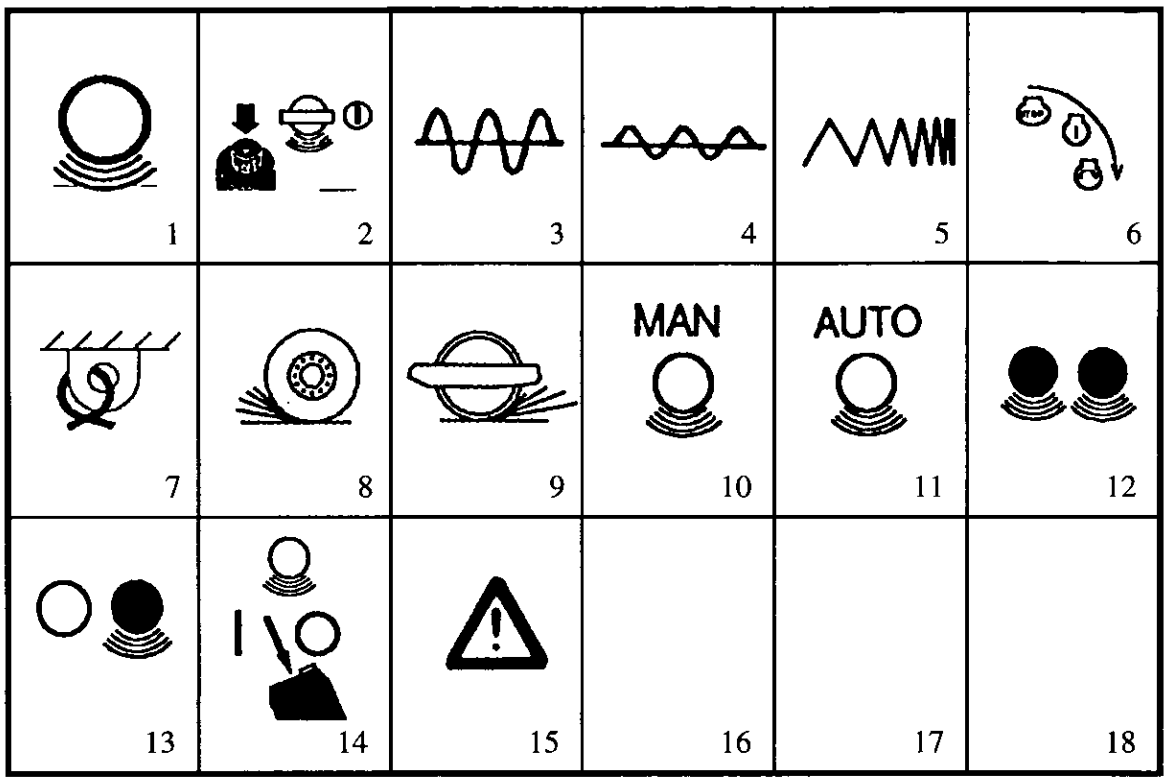
The following substances may be produced during the operation of this machine and may be hazardous to health.

SUBSTANCE	PRECAUTION
Engine Exhaust Fumes	Avoid breathing.
Engine Exhaust Fumes	Avoid buildup of fumes in confined spaces.
Electric Motor Dust (Brushes/Insulation)	Avoid breathing during maintenance.
Brake Lining Dust *	Avoid breathing during maintenance.

* Only on machines with dry brakes.

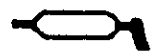
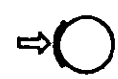
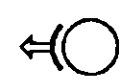
SECTION 2 - SYMBOL IDENTIFICATION

2.1 INGERSOLL-RAND MACHINE SYMBOLS



1. Drum Vibration
2. Drum Vibration Control (ON/OFF)
3. High Amplitude
4. Low Amplitude
5. Frequency (Vibration)
6. Ignition Switch
7. Tiedown Point
8. Anti-Wheel Spin
9. Anti-Drum Spin
10. Manual Vibration Control
11. Automatic Vibration Control
12. Double Drum Vibration Mode
13. Single Front Drum Vibration Mode
14. Vibration Control Mode
15. Caution

2.2 INTERNATIONAL SYMBOLS

1	 2	 3	 4	5	 6
 7	 8	 9	 10	 11	 12
 13	 14	 15	 16	 17	 18
 19	 20	 21	 22	 23	 24
 25	 26	 27	 28	 29	 n/min 30
 31	 32	 33	 34	 STOP 35	 36
 37	 38	 39	 40	 H 41	 L 42
 F 43	 R 44	 P 45	 46	 47	 48
 49	 50	 51	 52	 53	 D 54
 55	 56	 57	 58	59	 60
 61	 62				

1. On Start
2. Off/Stop
3. On/Off
4. Plus/Positive
5. Minus/Negative
6. Horn
7. Battery Condition
8. Hourmeter
9. Seat (Lap) Belt
10. Linear Movement
11. Rotational
12. Volume Empty
13. Volume Half-Full
14. Volume Full
15. Grease
16. Oil Lubrication Point
17. Lift Point
18. Jack or Support Point
19. Filling/Emptying
20. Read Operator's Manual
21. Engine Oil
22. Engine Oil Pressure
23. Engine Oil Pressure - Failure
24. Engine Oil Level
25. Engine Oil Filter
26. Engine Oil Temperature
27. Engine Coolant
28. Engine Coolant Level
29. Coolant Temperature
30. Engine Rotations (RPM)
31. Gas Inject (Cold Start)
32. Engine Air Filter
33. Engine Air Filter - Fault
34. Fan Belt - Fault
35. Emergency Engine Stop
36. Engine Start
37. Engine On/Run
38. Start Switch
39. Transmission
40. Transmission Oil Level
41. High Gear
42. Low Gear
43. Forward Direction
44. Reverse Direction
45. Parking Brake
46. Brake On
47. Brake Off
48. Primer (Start Aid)
49. Hydraulic Oil
50. Hydraulic Oil Pressure
51. Hydraulic Oil Level
52. Hydraulic Oil Filter
53. Hydraulic Oil Temperature
54. Fuel (Diesel)
55. Fuel Level
56. Fuel Filter
57. Work Light
58. Flashing Beacon
59. Control Lever - Dual Direction
60. Control Lever - Multi Direction
61. Clockwise Rotation
62. Counterclockwise Rotation

SECTION 3 - OPERATING CONTROLS AND INSTRUMENTS

⚠ WARNING

For your own safety and the safety of others, please ensure you thoroughly read and understand this section before operating the machine.

3.1 ARTICULATION LOCK BAR.

⚠ WARNING

During shipment and before performing any checks or service operations, place the articulation lock bar into its locked position.

For compaction operation the lock bar is to be removed from its locked position and placed in its stowed position.

The articulation lock bar is located on the left side of the swivel joint. It is used to prevent accidental articulation of the compactor.
Prior to shipment and before performing any checks or service operations, place the lock bar in its locked position 'C', refer Figure 3-1.

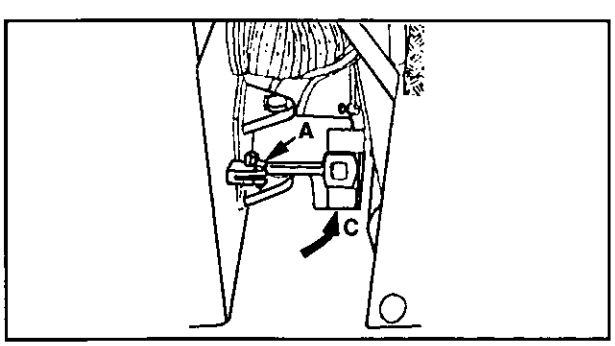


Figure 3-1 Lock bar in locked position

For compactor operation, the lock bar is to be placed into its stowed position 'B', refer Figure 3-2.

After repositioning the lock bar, secure in the required position by inserting the screw 'A'.

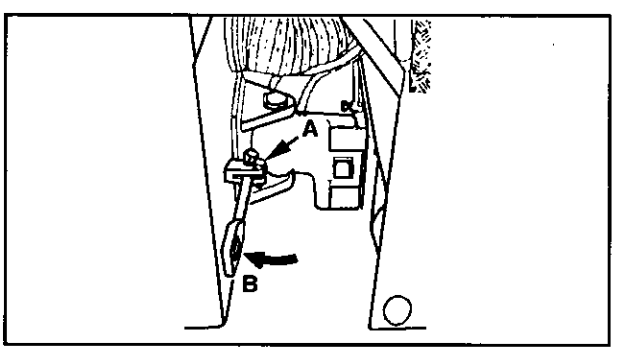


Figure 3-2 Lock bar in stowed position

3.2 VANDALISM PROTECTION.

The compactor may be equipped with an optional vandalism protection equipment. When leaving the compactor unattended, lock all lockable compartments.
• To provide further security a removable key, battery isolator switch is provided in the engine compartment, refer Figure 3-3.

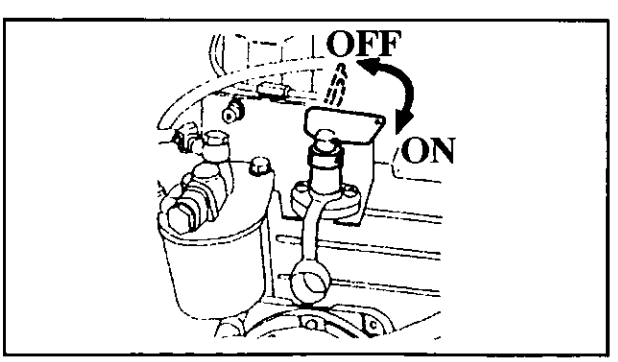


Figure 3-3 Battery Isolator Switch

• The engine canopy is provided with a lockable bonnet lock which can be secured by a padlock.

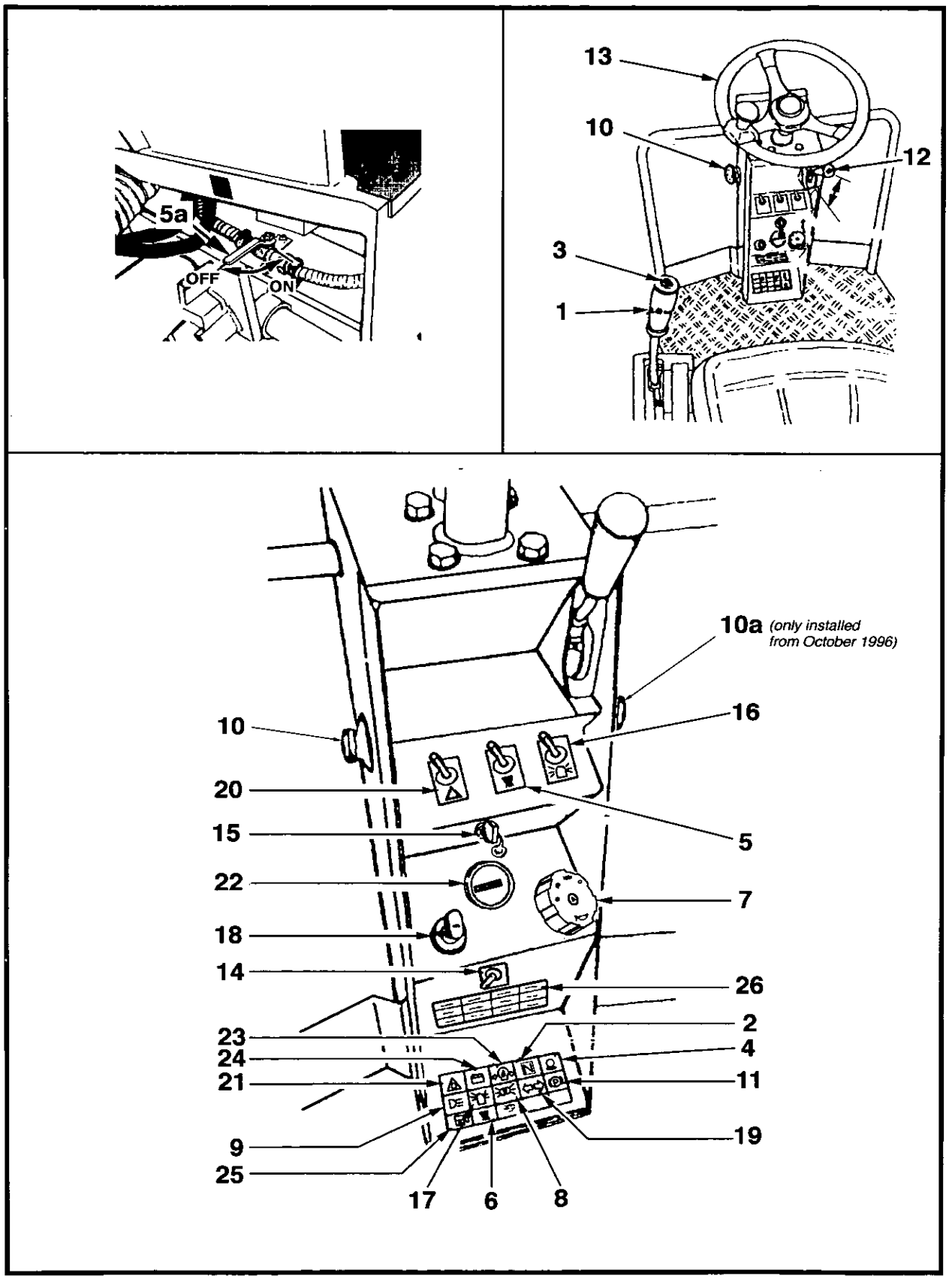


Figure 3-4 Operating Controls and Instruments - (Sheet 1 of 2)

1. Propulsion Control Lever
2. Engine Starting Indicator Light (GREEN)
3. Vibration Control ON/OFF Switch
4. Vibration ON Indicator Light (RED)
5. Water Spray ON/OFF Control Switch
5a. Water Flow ON/OFF Valve
6. Water Spray Pump Indicator Light (ORANGE)
7. Horn and Driving Lights Control Switch
8. Parking and Driving Lights Indicator Light (GREEN)
9. High Beam Indicator Light (BLUE)
10. RED Emergency Stop Switch
10a. BLACK Parking Brake Switch
11. Parking Brake ON Indicator Light (RED)
12. Engine Speed Control Lever
13. Steering Wheel
14. Drum Offset Control Switch
15. Ignition Switch and removable key
16. Flashing Beacon Switch
17. Flashing Beacon Indicator Light (YELLOW)
18. Direction Turning Lights Selector Switch
19. Direction Turning Lights Indicator Light (GREEN)
20. Hazard Lights Indicator Light Switch
21. Hazard Lights Indicator Light (RED)
22. Hourmeter
23. Low Engine Oil Pressure Indicator Light (RED)
24. Alternator Discharge Indicator Light (RED)
25. Low Fuel Level Indicator Light (RED)
26. Fuse Box
27. Excess Fuel Cold Start Control Cable (not illustrated)

Note:
*On units **not** equipped with item 10a, the Parking Brake is applied by depressing the Emergency Stop/Brake Switch item 10.*

Figure 3-4 Operating Controls and Instruments - (Sheet 2 of 2)

The following controls and instruments are indexed to Figure 3-4.

3.3 PROPULSION CONTROL

⚠ WARNING

Loss of machine control

Moving the propulsion control quickly may cause loss of machine control, lurching or serious injury.

Move the propulsion control slowly.

The propulsion control lever (1. Figure 3-5) is used to select the compactor's direction and travel speed. It also controls service braking. The control has three (3) positions: Forward, STOP, and Reverse, with variable speed ranges in either direction

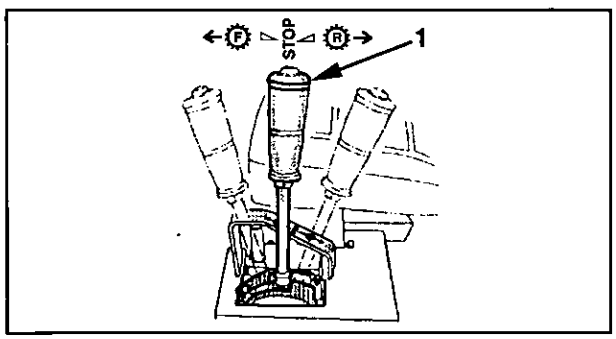


Figure 3-5 Propulsion Control Lever

To propel the machine in either direction, gradually move the propulsion control lever out of the STOP position in the desired direction of travel.

To stop travel of the compactor, gradually move the control toward the STOP position, arriving at the STOP position for a complete halt.

NOTE:
Starting of the engine with the propulsion control in any other position other than STOP is not possible.

3.4 ENGINE STARTING INDICATOR LIGHT - (GREEN)

The engine starting indicator light (2, Figure 3-4), illuminates when the propulsion control lever is in the STOP (Neutral) position. The engine can only be started when the green light is illuminated.

3.5 VIBRATION CONTROL SWITCH

The vibration ON/OFF control switch (3, Figure 3-6) turns drum vibration ON or OFF depending on switch position.

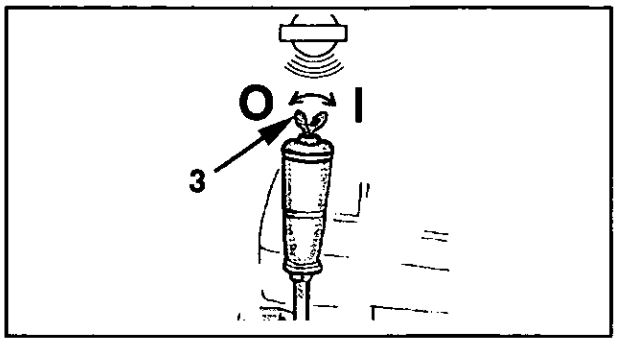


Figure 3-6 Vibration ON/OFF Switch

To engage vibration press the switch into position '|'. To disengage vibration press the switch into position '**O**'.

3.6 VIBRATION 'ON' INDICATOR LIGHT - (RED)

The vibration on indicator light (4, Figure 3-4), illuminates when the vibration switches on the vibration system.

3.7 WATER CONTROL SWITCH

The water control switch (5, Figure 3-7), a two position toggle switch, controls the flow of water to the drum spray bars.

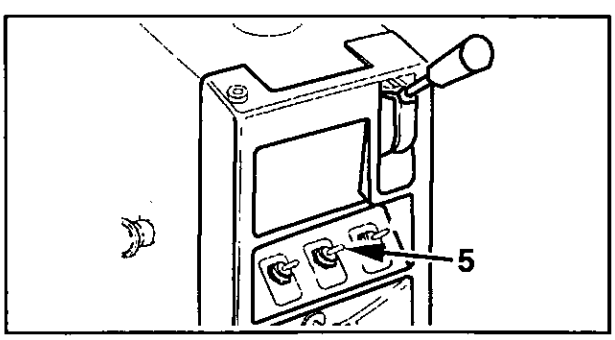


Figure 3-7 Water Spray ON/OFF Switch

Ensure the water flow control valve (5a, Figure 3-8) is in the ON position before switching on the water pump..

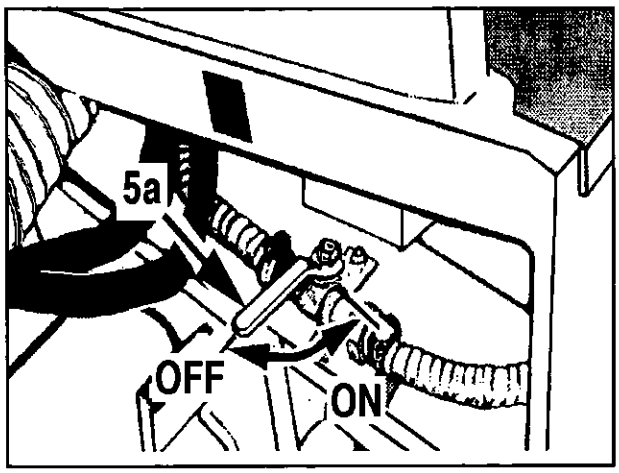
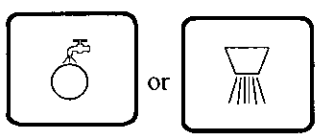


Figure 3-8 Water ON/OFF Control Valve

Note:
In the event that a fault develops on the pump provision is made to permit gravity flow to the spray bars by removing the gear set from the water pump. Refer to Section 5, page 5-14, for further details.

3.8 WATER SPRAY PUMP INDICATOR LIGHT - (ORANGE)



The water pump ON indicator light (6, Figure 3-4), illuminates when the water pump is switched ON.

3.9 HORN AND DRIVING LIGHTS CONTROL SWITCH

The horn is sounded by pressing in the combined horn and driving lights control switch (7, Figure 3-9).

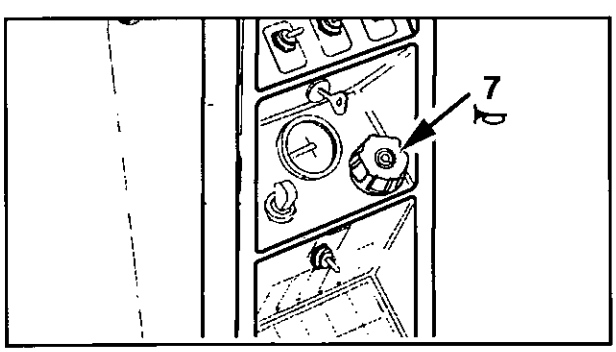


Figure 3-9 Horn Switch

The respective Parking and Driving Lights are selected by rotating this 4-position rotary switch into required position, refer Figure 3-10

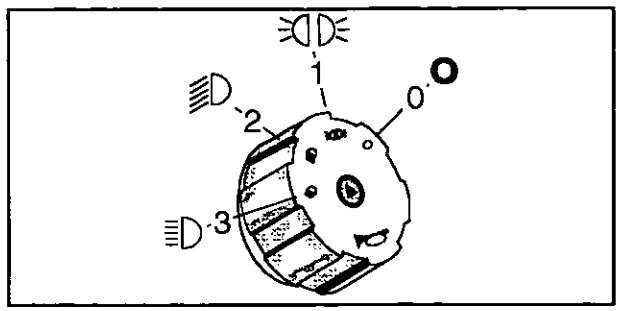
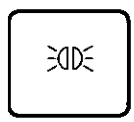


Figure 3-10 Lights Control Switch

Position 0 = All lights OFF
Position 1 = Parking lights ON
Position 2 = Driving Headlights in Low Beam Position ON
Position 3 = Driving Headlights in High Beam Position ON

3.10 PARKING AND DRIVING LIGHTS INDICATOR LIGHT - (GREEN)



The Driving lights indicator light (8, Figure 3-4), illuminates when the parking or low beam driving lights are ON.

3.11 HIGH BEAM INDICATOR LIGHT - (BLUE)

The high beam indicator light (9, Figure 3-4), illuminates when the High Beam is selected.

3.12 EMERGENCY STOP SWITCH

The red engine emergency stop button switch (10 Figure 3-11) may be used to stop all functions in the event of any emergency.

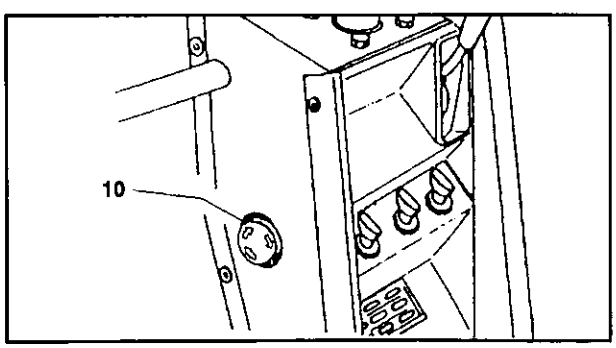


Figure 3-11 Emergency Stop

Before the engine can be restarted, reset the switch by rotating the red knob until it pops out.

(Continued)

3.12 EMERGENCY STOP SWITCH - Continued

On late 1996 units pressing in this switch, (10, Figure 3-4), will shut down the engine resulting in automatic application of the disc brakes and bringing the machine to a smooth stop.

On earlier units pressing in this switch, (10, Figure 3-4), will result in automatic application of the disc brakes and bringing the machine to a smooth stop without stopping the engine..

3.13 PARKING BRAKE CONTROL

The parking brake is of the hydraulic released, spring applied fail safe, multi-disc type. All units have brakes on both front and rear drums.
The parking brake(s) is (are) automatically applied if:

- Operator is no longer seated when the relaxed seat switch will apply the brakes.
- The RED Emergency Stop Switch (10, Figure 3-4), is depressed
- The BLACK Parking Brake Switch* (10a, Figure 3-4),is depressed
- The Ignition Switched is turned to the STOP position.
- The engine stops for some reason
- A brake hose leaks pressure.

** only fitted on later units post Oct. 96 manufacture.*

3.14 BRAKE ON INDICATOR LIGHT - (RED)

The brake on indicator (11, Figure 3-4) illuminates when the parking brake is engaged. The parking brake must be released before the compactor can be moved.

3.15 ENGINE SPEED CONTROL

⚠ WARNING

Run away machine.

Do not attempt to control machine travel speed with the engine speed control.

Use propulsion control to control travel speed. Maintain engine speed at operating rpm for all machine operations.

The engine speed control (12, Figure 3-13), is used to govern engine speed (rpm).

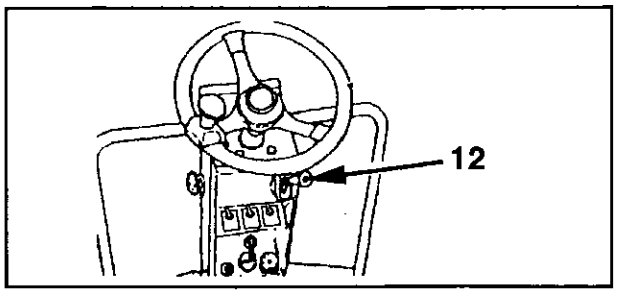


Figure 3-13 Engine Speed Control

Pull the control lever upward to decrease engine rpm. Push the lever downward to increase engine rpm.

NOTE:
Do not allow the engine to idle for more than 10 minutes

Always ensure engine speed is at Operating rpm to obtain the proper component operation and maximum vpm for greatest efficiency

3.16 STEERING WHEEL

The steering wheel (13. Figure 3-14) is used to change the direction of the machine during operation.

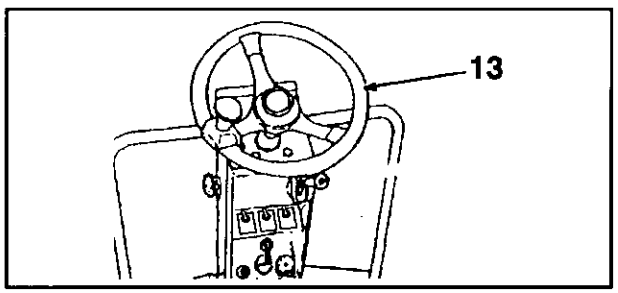


Figure 3-14 Steering Control

3.17 SEAT ADJUSTMENT

The operator's seat can be adjusted forward and backward by pulling out the stop pin (A, Figure 3-15).

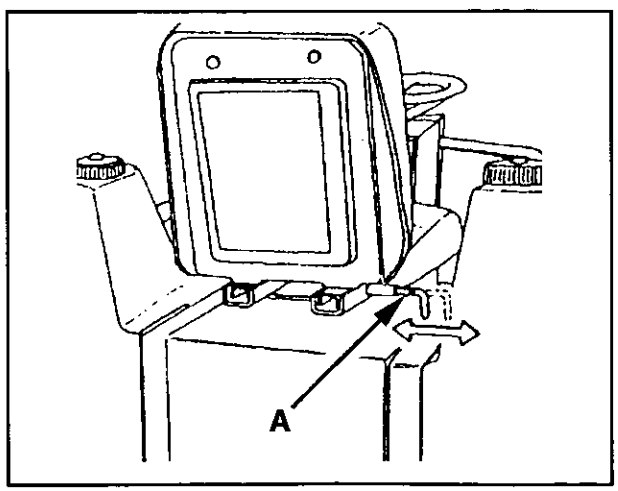


Figure 3-15 Seat Adjustment

When the required seal adjustment has been made, ensure the stop pin is fully engaged again.

3.18 DRUM OFFSET CONTROL SWITCH

The Drum offset control switch (14, Figure 3-16), a spring centering 3 position toggle switch controls the drum offset.

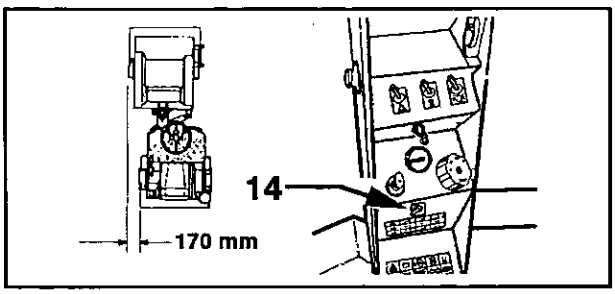


Figure 3-16 Drum Offset Control

- Pressing the switch to the left position, offsets the front drum upto 170 mm the left side of the rear drum path.
- Releasing the switch allows the offset to be hydraulically locked.
- Pressing the switch to the right position similarly offsets the front drum upto 170 mm the right side of the rear drum path.

3.18 IGNITION SWITCH

The key operated ignition switch (15, Figure 3-17), is a four position (Preheater/Stop/On/Start) switch.

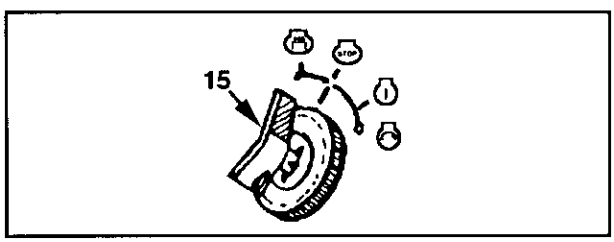


Figure 3-17 Ignition Switch

- **Turning the key to the left (anticlockwise) to position energises the engine cold start glow plug preheaters.**
- **Turning the key (clockwise), to position energises the machines electrical system and permits check of the control console warning indicator lights.**
- **Turning the key fully to the right to position will engage the starter motor and start the engine.**
- **Release the key as soon as the engine starts and the key will go to the ON = position automatically.**

If the engine does not start, turn the key to STOP position before attempting to start the engine again.

Turning the key to the Stop position , de-energises the electrical system and stops the engine. The key may be removed in the Stop position.

NOTE:
The propulsion control lever must be in the "STOP" position (Figure 3-5) before the engine will start.
The GREEN 'N = NEUTRAL' Warning Indicator Light (13, Figure 3-4) will illuminate only when the propulsion control lever is in the "STOP" position.

Always remove the ignition switch key when leaving the machine unattended to prevent unauthorised persons from starting or operating the machine.

3.19 FLASHING BEACON LIGHTS SWITCH

The flashing beacon light switch (16, Figure 3-18), a two position toggle switch:
Position 0 = Beacon light OFF
Position I = Beacon light ON

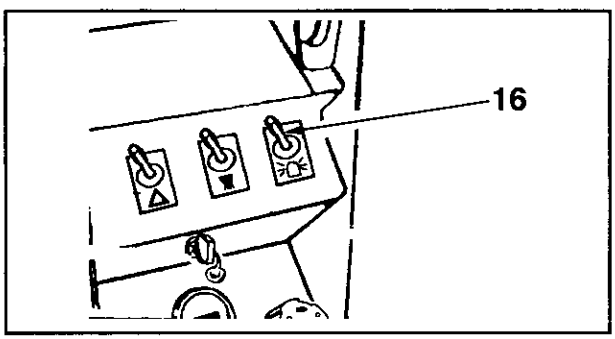
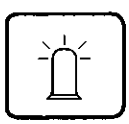


Figure 3-18 Flashing Beacon Light Switch

3.20 FLASHING BEACON INDICATOR LIGHT - (YELLOW)



The warning beacon indicator light (17, Figure 3-4), illuminates when the beacon light is switched ON.

3.21 DIRECTION TURNING LIGHTS SELECTOR SWITCH

The direction indicator light switch (18, Figure 3-18), a three position toggle switch:

Position "0" = Indicator lights OFF
Position "L" = Left turn light ON
Position "R" = Right turn light ON

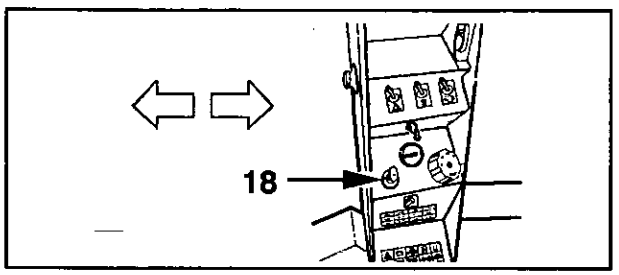
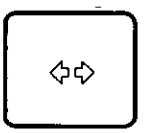


Figure 3-18 Direction Turning Indicator Lights Switch

3.23 DIRECTION TURNING LIGHT - (GREEN)



The Direction Turning Lights indicator light (19, Figure 3-4), illuminates when the lights are switch to either Right or Left turn ON position.

3.24 HAZARD LIGHTS INDICATOR LIGHT SWITCH

The Hazard Lights Switch (20, Figure 3-19), illuminates when the lights are switch to either Right

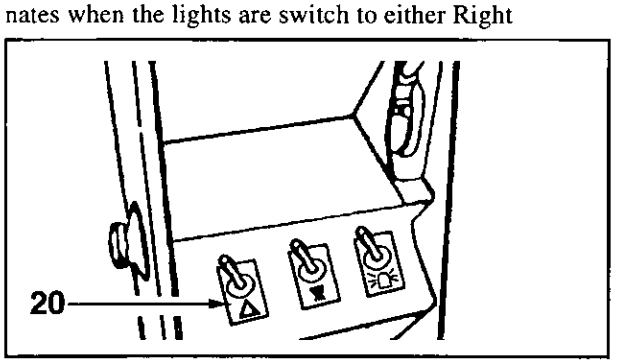


Figure 3-19 Hazard Lights Switch

3.25 HAZARD LIGHTS INDICATOR LIGHT - (RED)

The hazard lights indicator (21, Figure 3-4), illuminates when the hazard warning light are switched on.

3.26 HOURMETER

The hourmeter (22, Figure 3-19) records the accumulated engine operating hours.

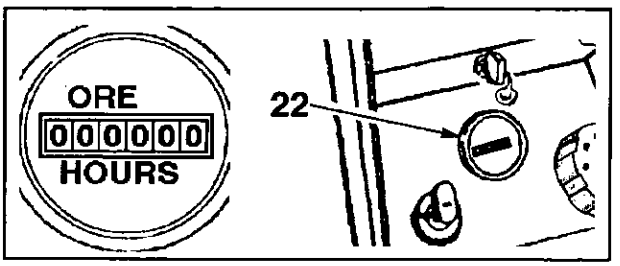
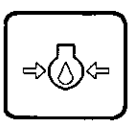


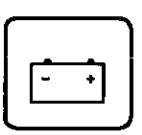
Figure 3-20 Hourmeter

3.27 LOW ENGINE OIL PRESSURE INDICATOR LIGHT - (RED)



The low oil pressure indicator (23, Figure 3-4) will illuminate when engine oil pressure is too low for safe operation of the engine, or when ignition switch is turned to ON position ⏻ (Figure 3-17). If this indicator illuminates during machine operation, immediately shutdown engine and correct the problem before resuming operation.

3.28 ALTERNATOR DISCHARGE INDICATOR LIGHT - (RED)



The alternator discharge indicator (24, Figure 3-4) illuminates when alternator is not providing sufficient charge to the battery. The indicator should illuminate when ignition switch is turned to ON position ⏻ (Figure 3-17). The indicator light should go out soon after engine starts. If the indicator illuminates during operation, shut down the machine immediately and correct problem before continuing operation.

3.29 LOW FUEL LEVEL INDICATOR LIGHT - (RED)

The low fuel level indicator light (25, Figure 3-4), illuminates when the LOW fuel level is occurs.

3.30 FUSE BOX

The replaceable fuses protecting the various circuits are located in the main fusebox (26, Figure 3-21).

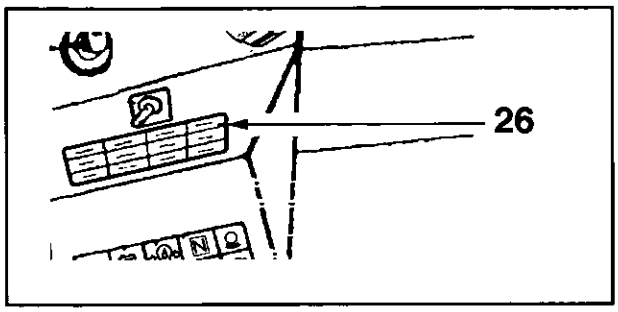


Figure 3-21 Fusebox

3.31 FUSE IDENTIFICATION

Each circuit fuse value can be read from the fusebox detail, Figure 3-22). It is important not to exceed the values illustrated.

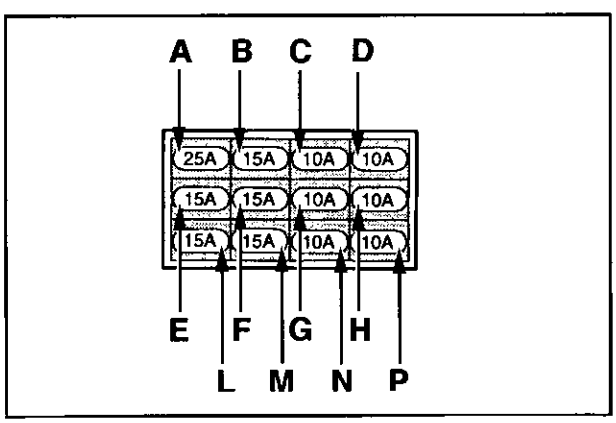


Figure 3-22 Fusebox Detail

The fuse box contains fuses to protect the following circuits:

A = Water Pump
B = Warning Horn
C = Right side Driving Light
D = Left side Driving Light
E = Ignition Switch (Engine Start)
F = Beacon Light
G = Right side Low Beam Light
H = Left side Low Beam Light
L = Direction Turning Indicator Switch/Seat Switch/Vibration /Steering Flowdivider Valve/ Engine Shutdown system/Emergency Shutdown/Parking Brake
M = Vibration/Drum offset
N = Parking lights: Front Left and Rear Right sides
P = Parking lights: Front Left and Rear Right sides + Registration Plate Light

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If you are not experienced with the machine's operation and control, before operating the machine, read Section 3 - Operating Controls and Instruments.

⚠WARNING

Unexpected machine motion or moving parts can cut or crush.

Install the articulation lock bar/lock pin, apply the parking brake and shut down the engine before working on the machine.

⚠WARNING

Improper maintenance can cause severe injury or death.

Read and understand SECTION 1 - SAFETY PRECAUTIONS AND GUIDELINES before you perform any maintenance, service or repairs.

4.1 GENERAL INFORMATION

The following operational hints should be observed:

- Do not speed engine when it is cold.
- Always chock the drums/wheels. There is a possibility of uncontrolled movement.
- Do not grease the machine while the engine is running.
- Always perform safety checks prior to starting/ using the machine.
- Do not control travel speed using the engine speed control lever (throttle).
- Always operate the machine at full engine power when compacting or traveling the unit.
- Never stop the machine on a slope that is liable to collapse or cause a roll-over risk.
- Always secure the seat belt if one is provided. Note machine equipped with ROPS must utilize a seat belt.
- Before starting engine, always check that propulsion and vibration controls are in Off position and the parking brake is On.
- Always sound the horn before moving the machine in either direction to alert personnel, and to allow sufficient time before putting the machine into motion.
- Always use protective clothing such as gloves, goggles and safety helmet when performing service maintenance. Do not wear oil stained or damaged garments.

4.2 PRE-START CHECKS/VERIFICATIONS

I. Checks and verifications of overall machine performed prior to starting. These are in addition to the 10 hour daily routine maintenance.

1. Fuel tank and fuel lines for any leaks.
2. Condition of engine and machine.
3. Bolted assemblies for tightness.
4. Inspect entire machine for any loose, worn and missing parts. Replace as needed.

5. Fluid lines, hoses, fittings, filler openings, drain plugs, pressure cap, drums, muffler, engine, safety shrouds and area underneath the machine for signs of leakage.

6. Check fuel tank (1, Figure 4-1) to determine fuel level. If required, add clean, filtered fuel through the fill area marked ⊳⛽. Refer to Section 8 - Fuel and Lubricant Specifications.

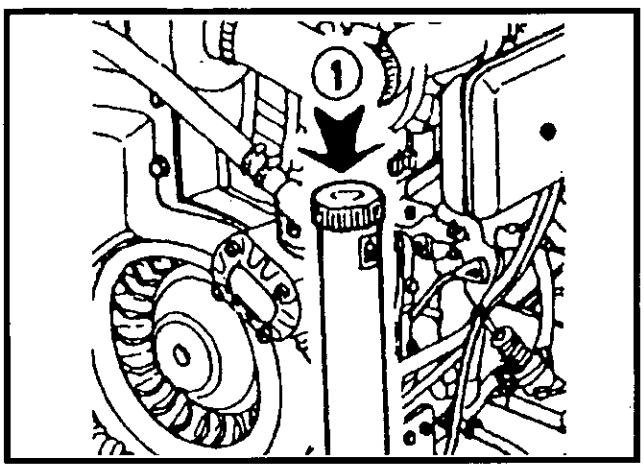


Figure 4-1 Fuel Filler

7. Check engine oil level on dipstick ('A', Figure 4-2). If required, add motor oil through filler ('B', Figure 4-2) to bring to Full level on dipstick. Refer to Section 8 - Fuel and Lubricant Specifications. If no oil is showing on the dipstick, call for service assistance to investigate the cause of oil loss.

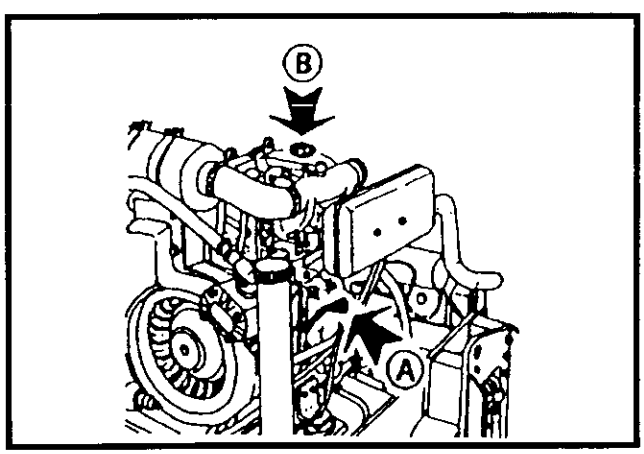


Figure 4-2 Engine Oil Dipstick and Filler

8. Check hydraulic oil tank for oil level using the dipstick ('B', Figure 4-3). The oil level should be between the MAX. and MIN. marks. If necessary, add fresh, clean, anti-wear hydraulic oil through the oil filler tube 🛢 ('C', Figure 4-3). Refer to Section 8 - Fuel and Lubricant Specifications.

9. Check water tank and the in-line filter, fill and clean as required..

(To avoid damage to the water pump, do not operate water spray pump without adequate water level in the tank).

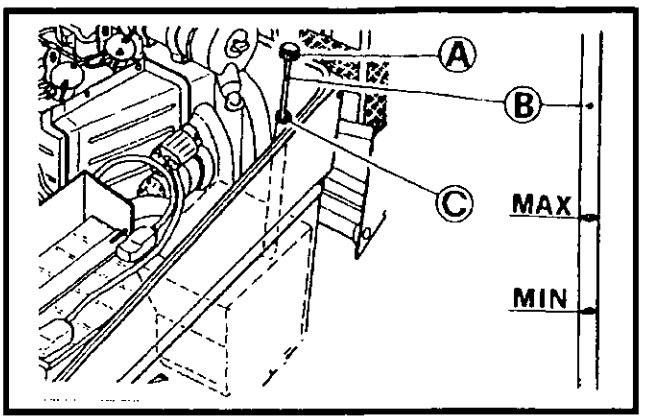


Figure 4-3 Hydraulic Oil Dipstick

⚠CAUTION

Any machine defects should be reported to the proper personnel.

Defects must be corrected before operating the machine.

II. Checks and verifications of machine controls performed prior to operating the machine.

1. Mount the compactor maintaining a three-point contact.

2. Adjust the seat to a comfortable position ('A', Figure 4-4).

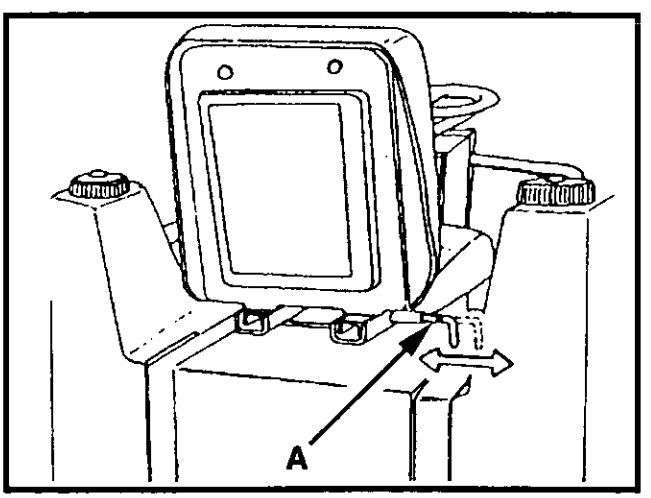


Figure 4-4 Seat Adjustment

NOTE:

The seat contains a switch that will only allow machine to start provided a seated operator is at the controls. In the event of the operator standing up, the seat switch will automatically bring the machine to a halt by applying the brakes.

3. If machine has a ROPS, then securely fasten seat belt provided.

4. Position propulsion control lever to the **STOP** position (1, Figure 4-5).

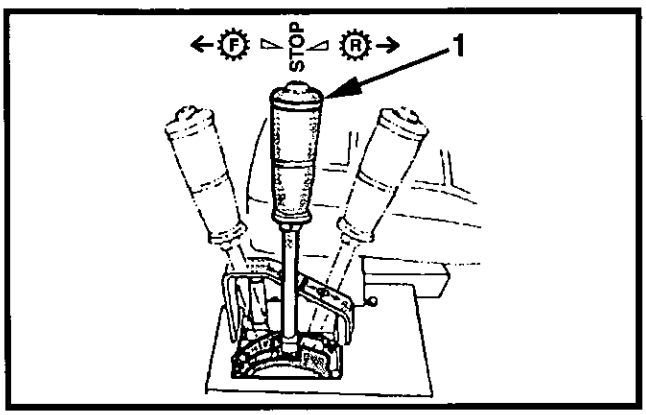


Figure 4-5 Propulsion Lever STOP Position

5. Position engine speed control lever to Low **IDLE** position (12, Figure 4-6).

6. Apply parking brake control (Ⓟ) by pulling outward on the knob (10, Figure 4-6).

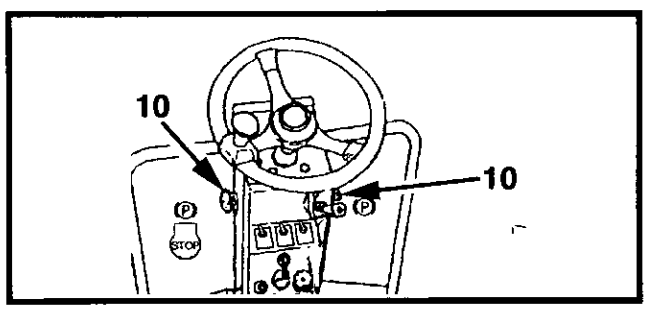


Figure 4-6 Engine Speed Control and Parking Brake Switch

NOTE:

The red brake on indicator, (4, Figure 4-7), will illuminate when the brake is applied.

7. Turn ignition switch key (15, Figure 4-8) to (I) position, and verify that the following RED indicator lights (Figure 4-7) are all illuminated.

   (1). Vibration ON Indicator (4)

   (2) Brake on indicator (11) (Ⓟ)

   (3). Hazard Lights Indicator (21)

   (4) Low oil pressure indicator (23)

   (5). Alternator discharge indicator (3)

   (6) Low Fuel Level Indicator (25)

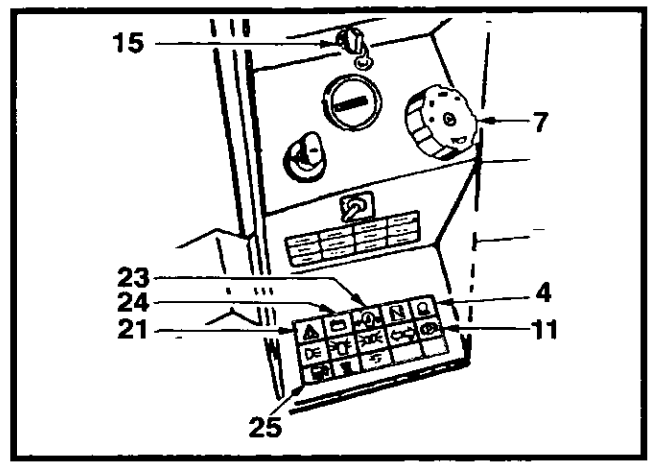


Figure 4-7 Indicator Lights

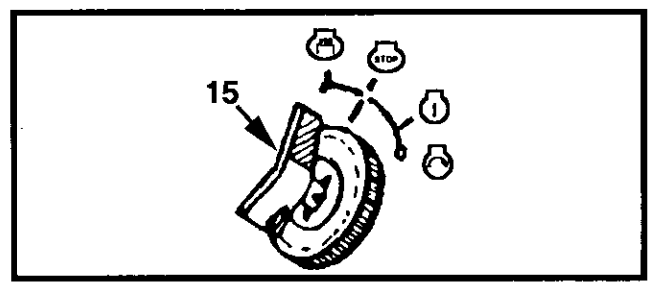


Figure 4-8 Ignition Switch

8. Press to check the operation of the horn button (7, Figure 4-9) to verify that horn does operate.

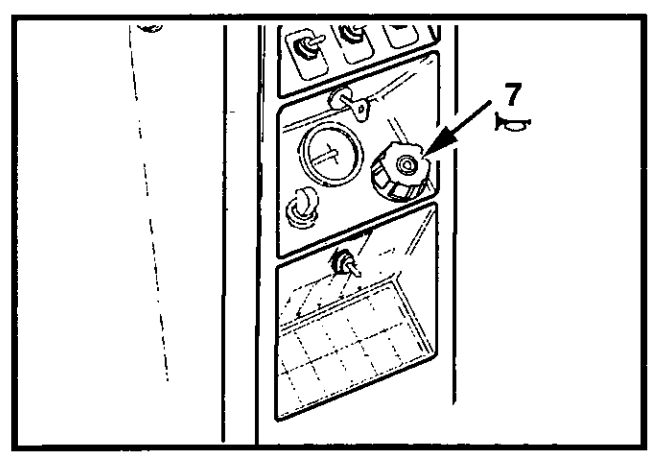


Figure 4-9 Horn Switch

9. To confirm engine will only start with propulsion control lever (1, Figure 4-5) in the **STOP** position, move lever from the **STOP** position in any direction.

10. With brake applied, turn ignition switch key to position (Figure 4-10).

    (1). The engine starter motor should NOT engage, confirming the engine will only start with propulsion control in **STOP** position.

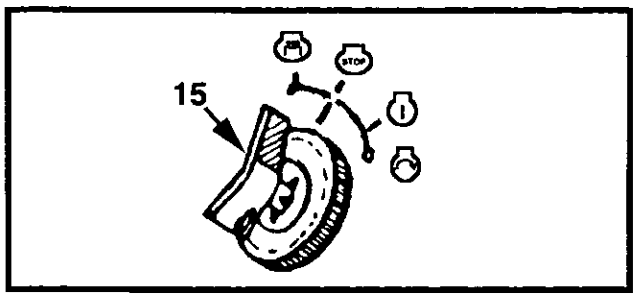


Figure 4-10 Ignition Switch

11. Return ignition switch key to (STOP) position (Figure 4-10).

12. Return propulsion control lever to **STOP** position (1, Figure 4-11).

4.3 STARTING MACHINE AND OTHER CHECKS/ VERIFICATIONS

I. Starting Procedure and checks and verifications while engine running.

NOTE:
If any controls or devices do not function correctly, refer to Section 6 - Troubleshooting for further instructions.

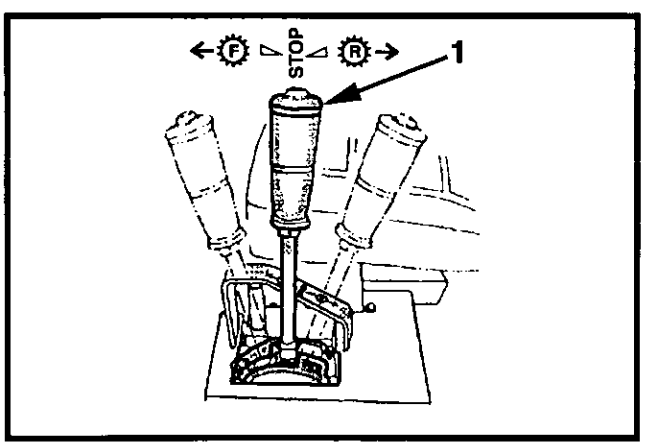


Figure 4-11 Propulsion Control Lever STOP Position

1. Position propulsion control lever (1, Figure 4-11) to the STOP position.

2. Position the water control switch (5, Figure 4-12) to the O = OFF position.

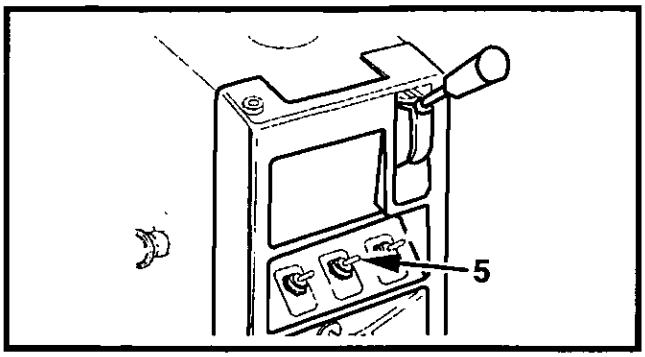


Figure 4-12 Water Control Switch

3. Position the engine speed control lever 12 to Low IDLE position 'A', (Figure 4-13).

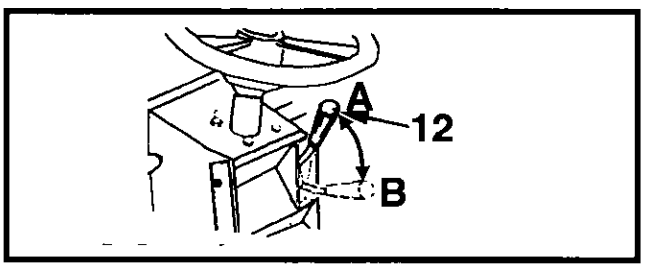


Figure 4-13 Engine Speed Control - Low Idle

4. If applied, reset the RED emergency stop switch marked (STOP) (10, Figure 4-14), by pushing downward on the red knob and twisting clockwise until it releases upward.

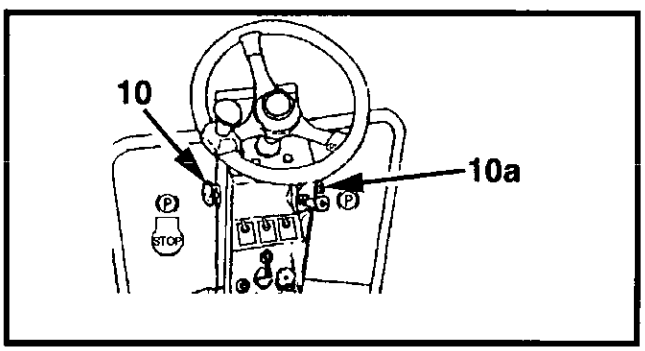


Figure 4-14 Emergency Stop/Parking Brake

5. The engine starting procedure depends on the engine temperature.

5a. When starting in very cold temperature conditions, initially turn the ignition key to Preheat position (PRE) (Figure 4-10), for 20 seconds, then turn to the engine start position

5b. When normally starting a cold engine, use the excess fuel control by pulling out the control knob located on the right face of the engine canopy, Start engine by turning ignition switch key to position (Figure 4-10). Once engine starts, release switch immediately, and it will return to position (Figure 4-10).

NOTICE

Starter may overheat if operated longer than 30 seconds.

If the engine fails to start, allow the starter to cool 2 to 3 minutes before trying again.

NOTE:
Once engine is running, with ignition switch in On position , the red indicator lights should only illuminate to indicate a warning of a fault. If any light does illuminate, contact appropriate personnel.

NOTE:
Run engine for short time to warm up the engine and hydraulic systems, but do not run engine at idling speed in excess of 10 minutes.

6. Check for correct operation of steering system with engine running by turning steering wheel fully to left and then to right. The movement of the steering should be smooth and without hesitation. If not, notify appropriate personnel.

7. Check wear conditions on the steering cylinder mounting pins and bushings (A, B, Figure 4-15). Any wear in the pins and bushings should be noted and proper personnel notified.

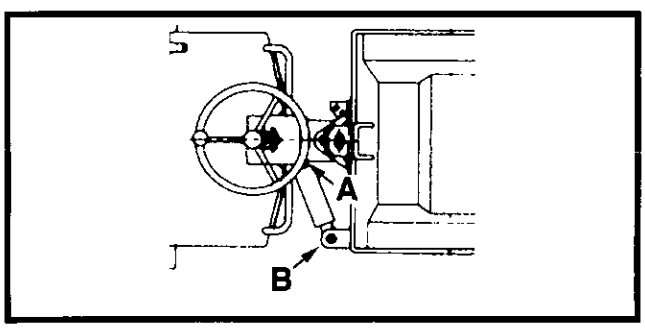


Figure 4-15 Steering Cylinder Pins and Bushings

8. Release parking brake control* (10, Figure 4-14). Observe area around machine for personnel/ obstructions. Move propulsion control lever (1, Figure 4-11) in reverse direction to check that the back-up alarm is operational. Return control to STOP position. If alarm is not operational, contact appropriate personnel.

   * Later units are fitted with a BLACK Parking Brake Switch (10a, Figure 4-14) which should used to control packing brake when engine is running. *(On these units the emergency stop will shut down the engine.)*

9. Check for correct operation of brake systems by driving machine in forward and reverse directions using propulsion control to alternately accelerate and brake machine movement. If braking system is suspect, contact appropriate personnel.

NOTE:
Braking should be smooth and capable of bringing machine to a complete stop when propulsion control is in STOP position.

10. Apply parking brake control when the parking brake light (4, Figure 4-7), should illuminate. Release the parking brake when the parking brake light should extinguish.

11. Check for correct operation of the emergency stop while propulsion control is in the STOP position, and depress the red emergency stop button .

NOTE:
The engine should immediately shut down and the parking brake light should illuminate, indicating the brakes are applied.

NOTE:
A restart of the machine will be required after performing step 11 above. Also, the emergency stop button must be reset by rotating the knob and releasing.

4.4 OPERATING THE MACHINE

I. Operating suggestions and checks while operating machine.

1. Always sound horn before moving the machine in either direction to alert persons. Allow sufficient time before putting the machine into motion.

2. Monitor all instruments and warning lights. If instruments or lights indicate a fault or problem, contact appropriate personnel.

3. Monitor and ensure horn and back-up alarm function and that optional working lights give good illumination of the working area.

4. Monitor working area for obstacles and persons.

5. Always remove the ignition switch key and check that the parking brake is applied when leaving the operator station.

6. Always move the steering wheel slowly and monitor the steering action.

II. Moving The Machine (Propulsion Control)

1. Check travel and work areas for personnel and obstructions.

2. Relocate the articulation lock bar in its stowed position, Refer Figure 3-2.

3. Position engine speed control to MAXIMUM OPERATING position 'B' (Figure 4-16).

NOTE:
Never use engine speed control to control the speed of travel.

ALWAYS OPERATE WITH ENGINE AT FULL POWER WHEN COMPACTING. Running at lower engine speed may result in premature shockmount failure.

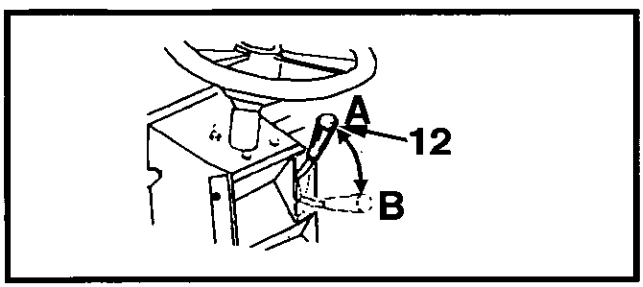


Figure 4-16 Engine Speed Control - B = HIGH IDLE

4. Release parking brake control.

5. Slowly move propulsion control (1, Figure 4-17) to achieve desired direction and safe speed of travel as determined by the conditions. The further the control is moved from STOP position the greater the speed in that direction.

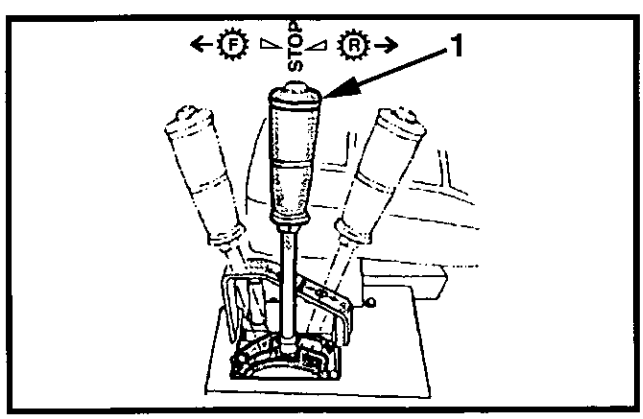


Figure 4-17 Propulsion Control Lever

III. Using Vibration (Vibration Control)

Ensure engine is running at high idle before using vibration.

NOTE:
Only switch on vibration when machine is moving. Always switch off vibration before machine comes to a halt. Never allow machine to vibrate when machine is stationary.

The following controls on the machine control drum vibration:

1. Vibration ON/OFF control (3, Figure 4-18).

   Press toggle switch to O = drum vibration ON.

   Press toggle switch to | = drum vibration OFF.

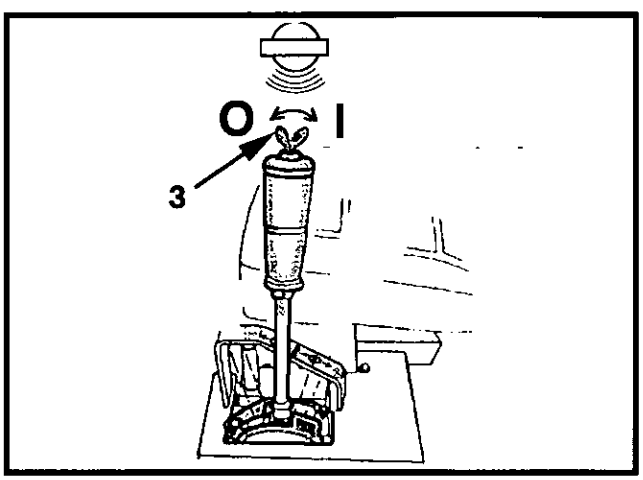


Figure 4-18 Vibration ON/OFF Control Switch

IV. Adjusting Drum Offset.

The machine is provided with drum offset which permits the operator to offset the front drum by upto 170 mm to either the left or right relative to the rear drum position.

1. To adjust the drum offset, it is recommended to move the machine slowly while operating the Offset control switch (14, Figure 4-19).

   • Press the switch 'Left' will offset the Front drum to the left of the rear drum.
   • Press the switch 'Right' will offset the Front drum to the right of the rear drum.
   • Release the switch when the desired offset has been acheived. The switch will automatically center to maintain the required position.

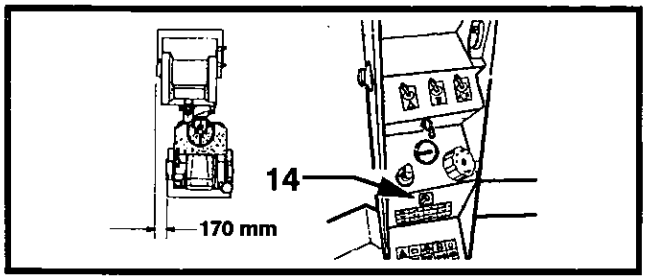


Figure 4-19 Drum Offset Adjustment Control Switch

2. To adjusting the drum offset offers the following advantages:
   • Possible to work closer to obstacles, while maintaining productivity.
   • Offers increased rolling width.
   • Possible to work nearer to edge of embankments while keeping the rear part far away from the slope edge.

4.5 PARKING, STOPPING AND SHUTTING DOWN THE MACHINE

I. Parking the machine

To park the machine, move to firm, level ground. If circumstances require parking the machine on other than level ground, chock the drums.

To stop the machine upon reaching destination, use the following procedure.

II. Stopping the machine

1. Switch OFF vibration control switch (3, Figure 4-18) .

2. For normal stopping, move propulsion control lever slowly to the STOP position (Figure 4-17).

3. To ensure no machine movement after stopping, apply the parking brake switch (Ⓟ), (10, Figure 4-20).

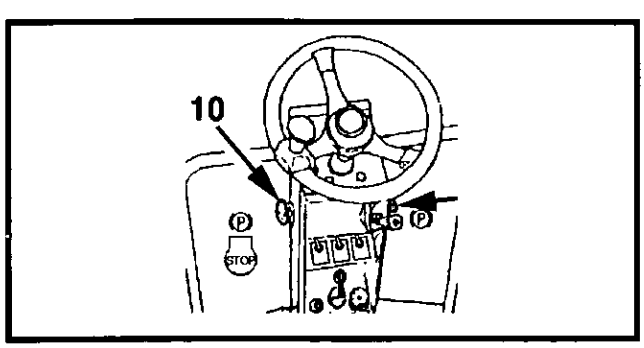


Figure 4-20 Parking Brake Switch

III. Shutting down the machine

1. If ON, stop the water flow by turning the water control switch to O = OFF position (5, Figure 4-21).

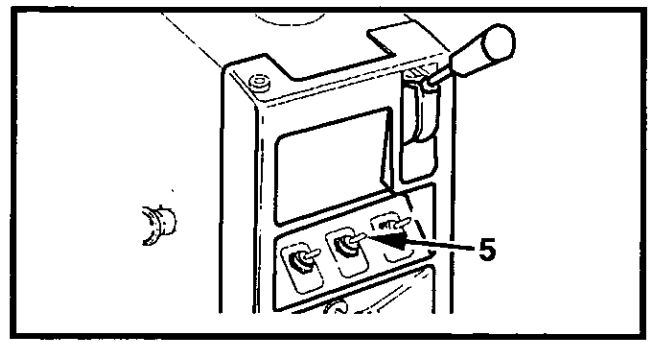


Figure 4-21 Water Control Switch

2. Position the articulation locking bar (Figure 4-22) into the locked position 'C' and insert locking pin 'A'.

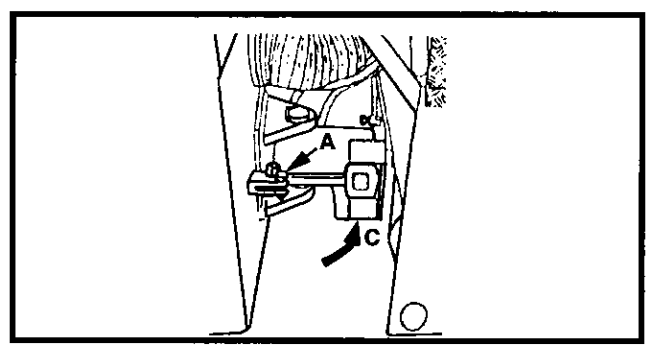


Figure 4-22 Articulation Locking Bar - Locked Position

3. Allow machine to idle for a few minutes before turning ignition switch key (15, Figure 4-23) to (STOP) position. Remove ignition key.

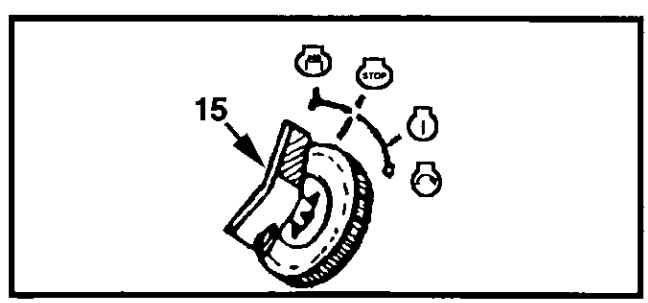


Figure 4-23 Ignition Switch

4.6 DAILY PRECAUTIONS AFTER WORK

Perform the following precautions each day after work in addition to the daily routine maintenance on the lubrication chart.

- Fill fuel tank to prevent condensation problems.
- Clean drum scrapers of accumulated material.
- Lock all vandal protection devices on the machine.

4.7 MOUNTING AND DISMOUNTING OF ATTACHMENTS

NOTE:

All optional equipment mounting and dismounting on this machine must be only undertaken by trained service personnel.

4.8 MOVEMENT OF MACHINE BETWEEN WORK SITES

Before driving machine on public roads, check with your supervisor for instructions and information in respect to traffic regulations regarding construction machinery.

NOTE:

For more information on transporting, refer to Section 1 - Safety Precautions and Guidelines.

I. Loading the machine under its own power (drive on) for transporting.

1. Choose level ground which will solidly support the vehicle.
2. Clean the trailer surface and loading ramps.
3. Before loading machine, chock the wheels of the trailer.
4. A signalman must assist the operator with any necessary warnings.
5. Approach the transporter loading ramps squarely to make sure machine does not drop off side of ramp.
6. Drive machine onto transporter.
7. Shut engine off, apply parking brake and lock all lockable compartments.

II. Loading the machine by lifting the equipment for transporting.

1. Always use special single lift point indicated by symbol and proper appropriate lifting tackle. Refer to weight distribution in Section 7 - Technical Specifications. The total weight is indicated on the machine identification plate located on the machine.
2. Insert the articulation lock bar/pin into the locked position..
3. Connect appropriate lifting tackle to the speical lift point marked with the symbol , (Figure 4-24).
4. Ensure appropriate lifting equipment is rated to the machine before lifting.

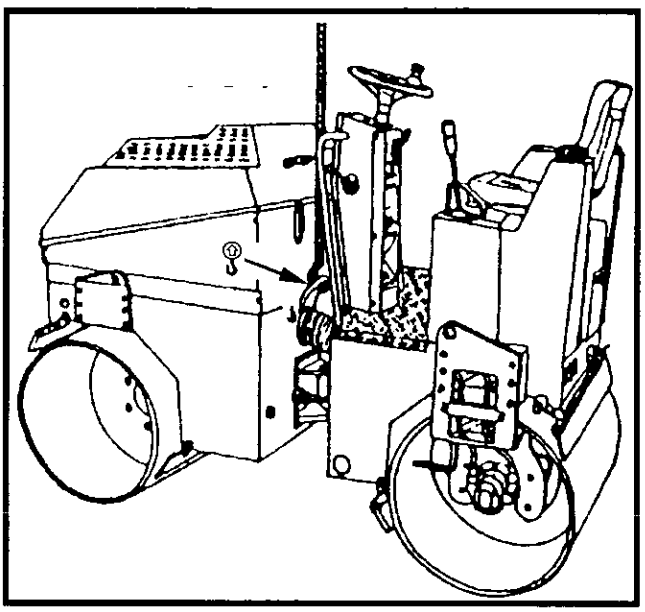


Figure 4-24 Recommended Lift Point

III. Securing the machine to the transporter (Tie down).

1. After loading the machine to the transporter, install the articulation lock bar/pin to the locked position.
2. Shut down the engine and remove the ignition switch key.
3. Chock the drums.
4. Attach tie down chains or other appropriate equipment to tie down points marked with symbol , refer Figure 4-25.

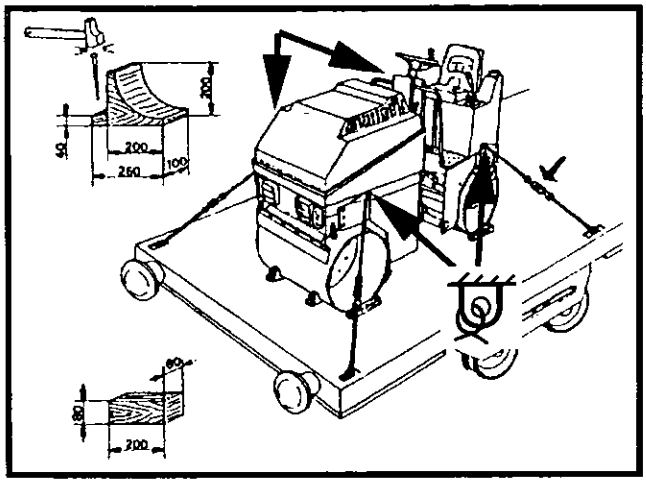


Figure 4-25 Tie Down Points

5. The driver of the transport must be aware of its total weight, load on the axles, and the overall dimensions of the machine. For dimensions, refer to Section 7 -Technical Specifications.

4.9 TOWING THE MACHINE

Do not attempt to tow this machine in the event of an onsite mechanical problem. There is no provision for releasing the brakes and by-pass of the propulsion system.

In the event of a breakdown requiring removal from the site, please follow instructions for hoisting onto a trailer as outlined in paragraph 4.8 item II.

NOTE:
For more information on transporting, refer to Section 1 - Safety Precautions and Guidelines.

4.10 SPECIAL CONDITIONS OF USE

I. Precautions to be taken for various conditions.

1. Precautions to be taken during cold weather.

- Refer to lubrication instructions in Section 8 - Fuel and Lubricant Specifications regarding lubricants, hydraulic fluids, coolants etc.
- At temperatures below -20 degrees C (-4 degrees F), lubricate the engine flywheel ring gear with low temperature grease from time to time through pinion hole.
- Use winter-grade diesel fuel for operation at sub-zero temperatures.
- Be extremely careful when using cold starting aids. Starting aids are very flammable and should only be used if needed.
- Remove battery and store battery in a warm area to about +20 degrees C (+68 degrees F).

2. Precautions to be taken during hot weather.

- Monitor temperature gauges.
- Keep cooling fins on radiator and oil cooler clean and free of accumulated dirt.

3. Precautions to be taken for use in water and muddy conditions.

- Clean machine of accumulated material and thoroughly grease all grease points. Refer to Lubrication Chart on machine.

4. Precautions to be taken for use in dusty atmospheres.

- Keep air cleaner elements clean and free of accumulation dirt.
- Wear protective mask.

5. Precautions to be taken for high altitude operation.

- Be aware that engine power will be reduced.
- Keep cooling fins on radiator and oil cooler clean and free of accumulated dirt.

4.11 PRESERVATION AND STORAGE

I. Storage for short periods.

The following should be observed when storing the machine for short periods of time.

1. Replace and secure all weatherproof covers.
2. Change all lubricants and fluids that may have deterioration with use. Refer to lubrication chart in Section 8 - Fuel and Lubricant Specifications.
3. Check that storage site is not subject to flooding or other natural hazards.
4. Wherever practical, run engine and operate all machine motions at regular intervals.

II. Storage in excess of 1 month.

The following should be observed to protect the engine from corrosion and damage.

1. Drain the oil from the engine sump and refill it with a specific oil, e.g. RIMUL X 10W (SHELL). Refer

to lubrication chart in Section 8 - Fuel and Lubricant Specifications

2. Allow engine to run for 15 min. at 500 - 800 rpm; stop the engine and drain the oil

3. Drain the oil from the in-line injection pump.

4. Fill the engine sump with Protection oil up to the level "MIN" marked on the dipstick. Use oil according to the specifications ENSIS N SHELL.

5. Fill the in-line injection pump with protection oil.

6. After emptying the fuel filters, disconnect pipe from injection system supply and connect it to an appropriate container filled with oil to specification S9365 SHELL ISO 4113.

7. Allow engine to run for 15 min. at 500 - 800 rpm; then using a syringe, slowly (1 min.) injet , 120 gm. of protection oil into the air inlet manifold.

8. With hot engine, drain the protection oil from the engine sump and store for re-use (2-3 times), in clean sealed containers.

9. Disconnect the pipe from injections system container filled with CFB oil and reconnect to the fuel tank.

10. Seal, using adhesive tape, all ports of access, induction and breather on the engine and exhaust manifold.

11. Attach to the engine a clearly visible card marked "ENGINE WITHOUT OIL"

12. Disconnect battery and store in a dry location, keeping the battery always in a charged condition.

IMPORTANT - This treatment must be repeated every 6 months.

SECTION 5 - MAINTENANCE INSTRUCTIONS

5

⚠WARNING

Unexpected machine motion or moving parts can cut or crush.

Install the articulation lock bar/pin, apply the parking brake and shut down the engine before working on the machine.

⚠WARNING

Improper maintenance can be hazardous.

Read and understand SECTION 1 - SAFETY PRECAUTIONS AND GUIDELINES before you perform any maintenance, service or repairs.

5.1 GENERAL MAINTENANCE INFORMATION

To prevent minor irregularities from developing into serious conditions, several other services or checks are recommended for the same intervals as the periodic lubrication. The purpose of these services or checks are to ensure the uninterrupted and safe operation of the unit by revealing the need for adjustment caused by normal wear.

I. Prior to conducting any maintenance work, ensure that the following instructions are observed:

1. The machine should be parked on firm level ground.
2. Ensure engine is shut down and allowed to cool.
3. Disconnect battery and cover exposed terminals before working on the machine's electrical system.
4. Stop engine and allow hydraulic oil pressures to fall before working on the hydraulic hose installations.
5. Thoroughly wash all fittings, caps, plugs, etc. with non-flammable, non-toxic cleaning solution before servicing, to prevent dirt from entering while performing the service.

II. Handling fluids and oil/fuel filters

1. When draining fluids, ensure that adequate sealable containers are available and that every care is taken to prevent spillage.
2. Always ensure waste fluids are disposed of in an environmentally safe manner.
3. Always ensure that used filters are stored in secure containers and disposed of in an environmentally safe manner.

The maintenance chart in this section shows those items requiring regular service and the interval at which they should be performed. A regular service program should be geared to the items listed under each interval. These intervals are based on average operating conditions. In the event of extremely severe, dusty or wet operating condition, more frequent maintenance than specified may be necessary.

5.2 MAINTENANCE SCHEDULE

MAINTENANCE SCHEDULE

Function	Specification	As Req.	10 Hour	50 Hour	100 Hour	200 Hour	500 Hour	1000 Hour	Page Ref.
Check air cleaner connections and ducts for leaks		X	X	X			X		5-3
Clean the machine		X							5-4
Torque up any loose bolted connections	refer to section 10	X							5-5
Check/replace shock mounts torn or severely cracked		X					X		5-5
Check engine oil level	dipstick marks		X						5-5
Check fuel level	level gauge		X						5-6
Check water tank level	fill		X						5-6
Check/Clean in-line water filter	clean		X						5-6
Check water pump and spray bars	test		X						5-6
Check parking brake	test		X						5-7
Check condition of drums and drum scraper bars	clean		X						5-7
Check/clean cooling fins of cylinders and oil cooler	refer engine manual			X					5-8
Grease drum offset guides	high pressure grease			X					5-8
Check batteries and cables, clean and grease terminals	clean and grease				X				5-8
Check hydraulic oil level	dipstick marks				X				5-9
Check eccentric oil level	level to bottom port				X				5-9
Check Drum Drive Gearbox (Brevini)	level to bottom port				X				5-10
Change engine oil	refer to section 8					X			5-10
Clean / Change engine oil filter strainer	refer engine manual					X			5-11
Change hydraulic filter						X			5-11
Hydraulic Return Filter	Clean					X			5-13
Change engine fuel filters	refer engine manual						X		5-12
Check engine exhaust manifold	refer engine manual						X		5-12
Check hosing and other components of the hydraulic system							X		5-12
Change hydraulic oil/clean hydraulic oil tank/strainer	refer to section 8						X		5-12
Change eccentric housing oil	refer to section 8							X	5-13
Change Drum Drive Gearbox (Brevini) Oil	refer to section 8							X	5-14
Check engine valve clearance	refer engine manual							X	5-14
Drain and flush water tank/spray bars	fill tank							X	5-14

5.3 INITIAL BREAK-IN MAINTENANCE

New equipment requires the following initial one time break-in maintenance after 50 to 100 hours of operation. After this initial phase, the regular intervals listed in the maintenance schedule, on the previous page, should be followed.

I. The following maintenance must be carried out after 50 - 100 hours:

1. Change the engine oil and filter , refer to page 5-10, for procedure.
2. Change the oil in the eccentrics, refer to page 5-12, for procedure.
3. Change the oil in the drum drive gearboxes, refer to page 5-12, for procedure.
4. Change the engine main fuel filter, refer to page 5-11, for procedure.
5. Check the engine valve clearance, refer to engine operation manual for information.

5.4 ROUTINE MAINTENANCE - AS REQUIRED

I. Check Air Cleaner Connections And Ducts For Leaks

1. Ensure all connections (1, Figure 5-1) between the air cleaner and engine inlet manifold are tight and sealed.
2. Ensure the crankcase breather hose (2, Figure 5-1) is free of defects which could result in dust leaking into the engine intake.
3. Ensure the air duct 3, Figure 5-1) is free of defects which could result in dust leaking into the engine intake.

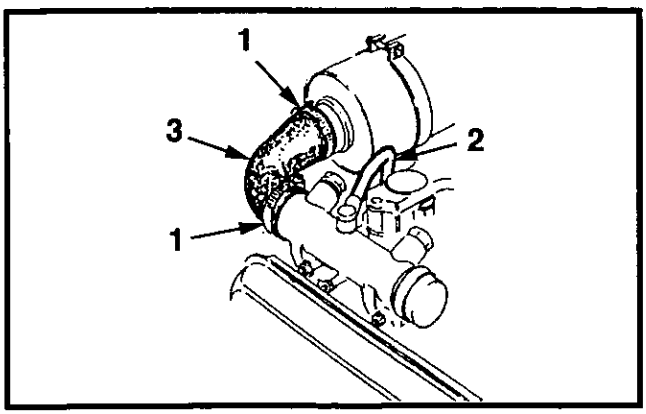


Figure 5-1 Air Cleaner - Engine Inlet Manifold Duct

II. Checking And Removing The Air Cleaner Element

Maintenance of the air cleaner is due when the engine indicates loss of power or emits black smoke. This indicates that the air cleaner element may be choked and needs to be cleaned/replaced Frequency of cleaning depends on the site conditions and will increase in very dusty conditions.

The air cleaner is the dry-type with a single element that is replaceable, or can be cleaned.

NOTE:
Dust passing the air cleaner system can often be detected by looking for dust streaks on the air transfer tubing or just inside the intake manifold inlet.

⚠CAUTION

Engine damage.

Raw, unfiltered air can cause engine damage.

Never service the air cleaner while the engine is running.

1. Loosen the wing nut (1, Figure 5-2) and remove the dust cover (2, Figure 5-2). Perform a quick check to see that vacuator valve (6, Figure 5-2) is not inverted, damaged or plugged.

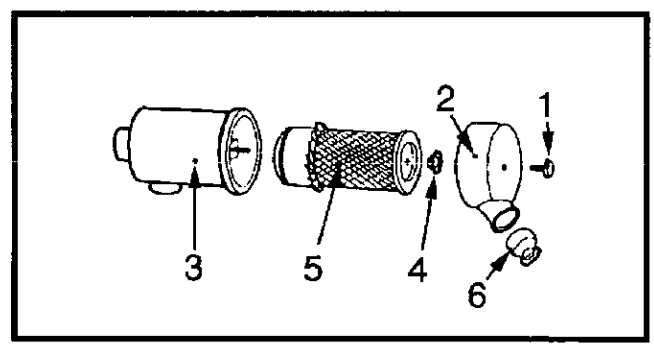


Figure 5-2 Air Cleaner Internal Breakdown

2. Remove wing nut (4, Figure 5-2) and gently withdraw element (5, Figure 5-2).
3. Clean the inside of the cover (2, Figure 5-2) and housing (3, Figure 5-2) with a clean, damp cloth to remove any dirt accumulation.
4. Check that vacuator valve (6, Figure 5-2) on air cleaner is clean and that rubber is not cracked.

II. Cleaning The Air Cleaner Element

⚠WARNING

When using compressed air, water jets, or steam cleaning methods, ensure that appropriate protective clothing is worn to protect eyes and exposed parts of the body

⚠CAUTION

Excessive air pressure can damage the element.

Pressure at the air nozzle should not exceed 40 psi (2.76 bar).

1. To clean the air cleaner element using the dry method, perform the following:

   - Carefully direct the compressed air at an angle onto the inside surface of the element, (Figure 5-3).

   - Move air jet up and down pleats until no more dust is being removed. Be careful not to rupture the element with the air nozzle.

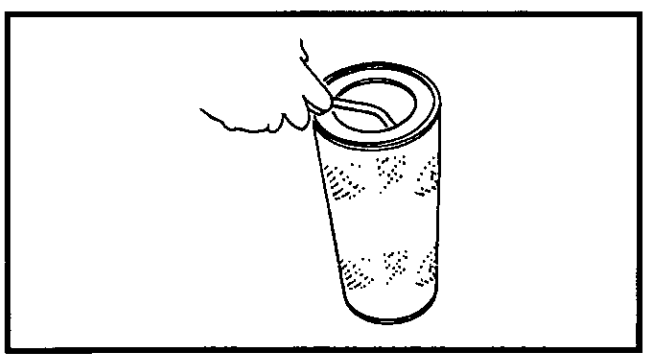


Figure 5-3 Dry Cleaning with Air Jet

2. To clean the air cleaner element using the wet method, perform the following:

⚠WARNING

Gasoline or solvents are extremely flammable.

May cause serious injury or death.

Never use gasoline or solvents to clean the elements.

   - Wet cleaning the element requires lukewarm water mixed with commercially available detergent.

   - After cleaning the element, be sure it is thoroughly dry before installing.

III. Replacing The Air Cleaner Element

1. Examine the new or cleaned element for torn or damaged pleats, bent end covers or liners and gaskets. It is recommended to use an appropriate light to check the condition of the element (Figure 5-4).

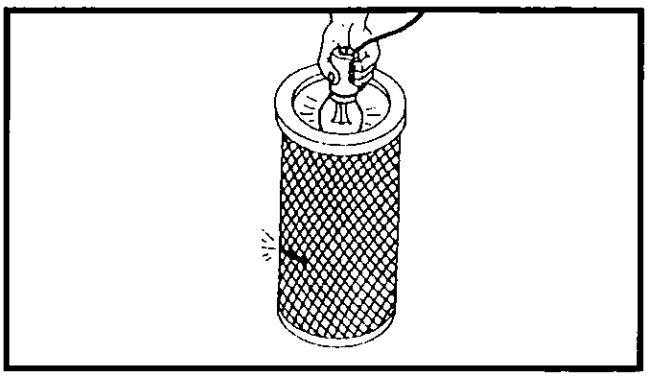


Figure 5-4 Inspecting Element for holes/tears

2. Ensure wing nut (4, Figure 5-2) is not cracked or damaged. Replace if required.

3. Carefully install the replacement element and secure with wing nut.

4. Install the dust cover and wing nut (1, 2, Figure 5-2).

5. Inspect all air intake piping and joints between air filter and engine air intake to ensure no gaps exist where dust could enter. Visible signs of dust around a joint is a sure sign that there is leakage.

IV. Cleaning The Machine

NOTICE

Do not use harsh or abrasive cleaners that can damage the painted surfaces on the machine.

The complete machine must be given a weekly cleaning. Daily cleaning will be required if material is adhering to the drums.

1. Check that no material is jammed between the drum and its scraper.

2. Check that vacuator valve (6, Figure 5-2) on air cleaner is clean and that rubber is not cracked.

3. Lubricate the drum offset guides after each washdown, Refer Figure 5-15.

4. After cleaning, check for defects in the air cleaner ducts.

   - Check intake for accumulation of debris that could restrict air flow.
   - Check air cleaner mounting hardware for security.
   - Check all hoses for cracks, chafing, or deterioration, and replace at the first sign of probable failure.

NOTE:
Protect all electric components and control panels against entry of water or steam when using high pressure cleaning methods. Cover the fuel and hydraulic oil fill cap breathers located on each of the tanks.

V. Torque Any Loose Bolted Connections

1. If any loose nuts or bolts are found during daily inspections, ensure they are properly torqued. Refer to Section 9 - Torque Specifications for required torque against bolts size and grade.
2. Always replace self locking nuts if they have been loosened.

VI. Check All Shock Mounts

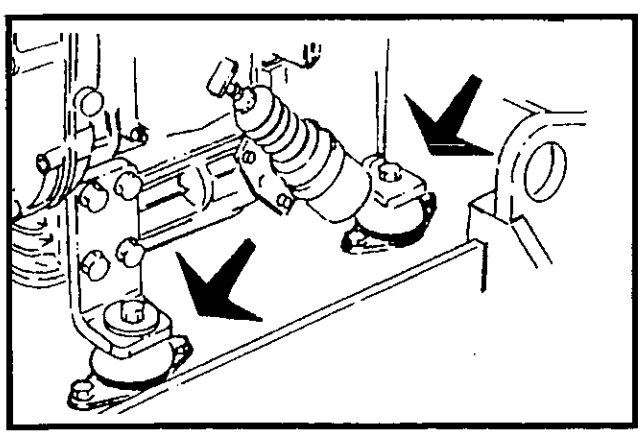


Figure 5-5 Engine Shock Mounts

1. Check all engine shock mounts (Figure 5-5) and drum shock mounts (Figure 5-6), periodically for looseness or deterioration.
2. Tighten all capscrews and nuts as necessary, and replace shock mounts that have torn or excessively cracked rubber.
3. Always replace self locking nuts if they are loosened.

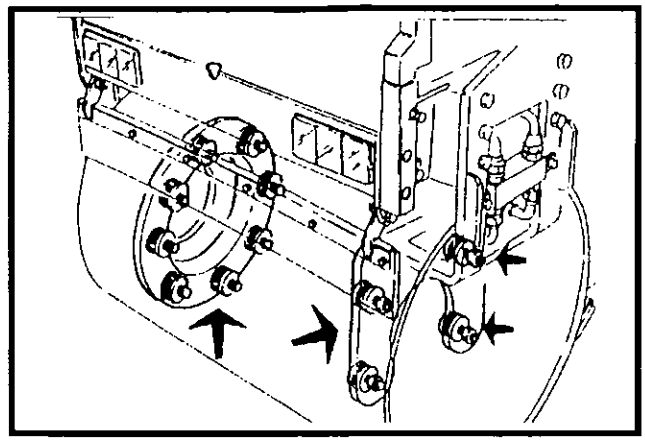


Figure 5-6 Drum Shock Mounts

5.5 10 HOUR OR DAILY ROUTINE MAINTENANCE

I. Check Engine Oil Level

1. Park machine on level ground and shut down engine.
2. Pull out dipstick (A, Figure 5-7) and wipe clean with a lint-free, dry cloth. Push dipstick back into engine.

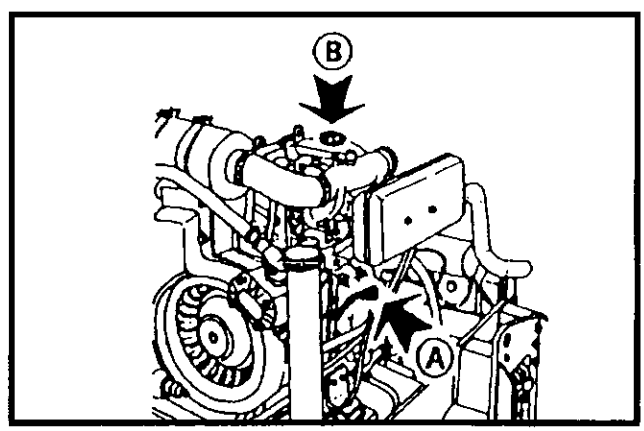


Figure 5-7 Engine Oil Dipstick and Filler

3. Pull out the dipstick again. The oil level must be between the full - top mark and low mark.
4. If oil level is low, add oil through the filler (B, Figure 5-7) as specified in Section 8 - Fuel And Lubricant Instructions.
5. Check oil level again after engine has run for about 1 minute.

II Check Fuel Level

1. Check fuel level at filler cap on fuel tank (1, Figure 5-8).

NOTE:

The Low Fuel warning light (25, Figure 3-4), will illuminate to advise that the fuel tank requires filling.

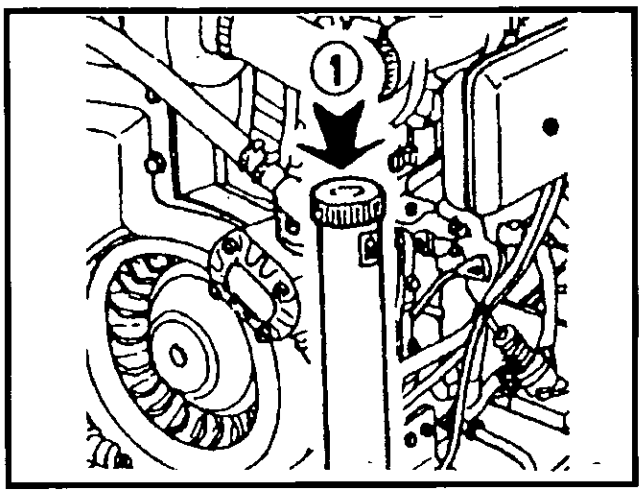


Figure 5-8 Fuel Tank Filler

2. Never allow tank to completely empty, otherwise, the entire fuel system will require bleeding.

3. If required, add fuel through the filler tube (1, Figure 5-8).

⚠WARNING

Fuel is flammable. May cause severe injury or death.

Shut down the engine, extinguish all open flames and do not smoke while filling the tank.

Always wipe up any spilled fuel.

4. Fill tank with correct grade of fuel. Refer to Section 8 - Fuel And Lubricant Instructions for fuel information.

IV. Check Water Tank Level

The water supply for the water spray system is held in a tank (1, Figure 5-9).

1. Maintain a full tank of clean water at all times. NEVER allow the tank to become empty for any reason other than for cleaning.

   DO NOT OPERATE THE WATER PUMP WITHOUT WATER IN THE TANK.

2. If water level is low, remove the fill caps (2, Figure 5-9) located on the tank, and add clean water to the full level. Ensure the vent (Figure 5-9) is clear.

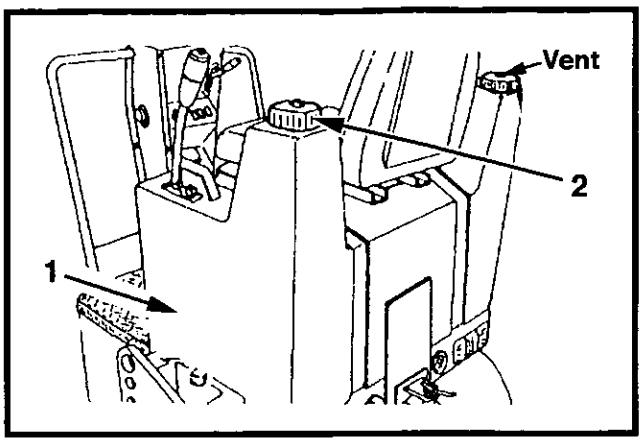


Figure 5-9 Water Tank and Fill Caps

NOTE

In freezing conditions take care to drain the water tank and hoses installation at the end of the working day.

V. Check In-line Water Filter

The in-line filter (4, Figure 5-10), located at the pump inlet, filters the water before it enters the pump and spray bars.

1. Unscrew plastic container and lift out strainer.

2. Check strainer for any impurities that may build up.

3. If necessary, clean the strainer with a stiff fiber brush and re-install. Replace strainer, if needed.

VI. Check Water Pump and Drum Spray Bar.

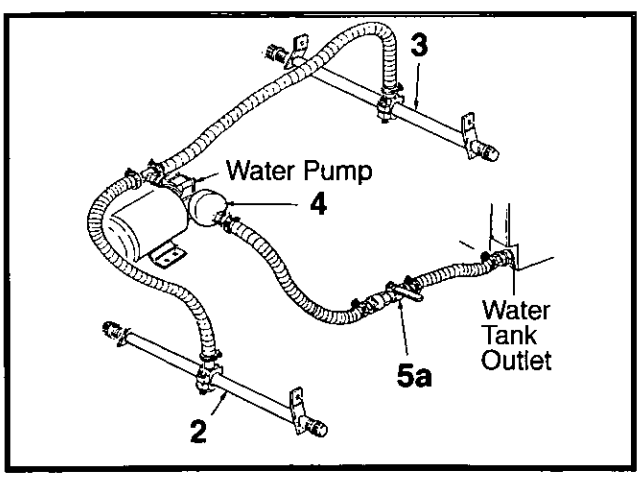


Figure 5-10 Water Spray System.

1. Turn on the main water control valve (5a, Figure 5-10).

2. Switch on the water control switch (5, Figure 5-11) to start the electric water pump.

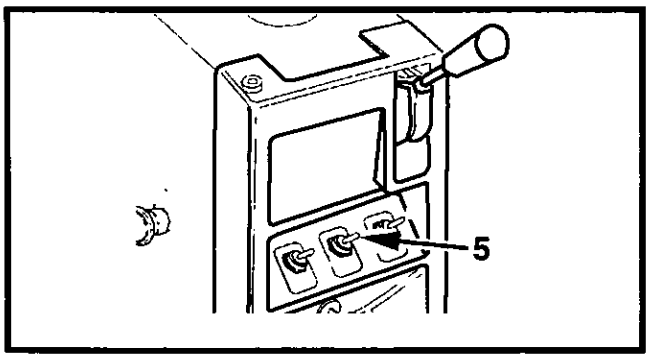


Figure 5-11 Water Control Switch

3. Check that both drum spray bars (2 and 3, Figure 5-10), are correctly functioning. Clean any jets that are blocked.

NOTE

NEVER operate the water pump without water in the water tank or with the main water control valve closed. Damage to the water pump impeller will result from running a dry pump.

NOTE

In the event of a water pump internal failure, gravity feed to the spray bars can be effected as follows:

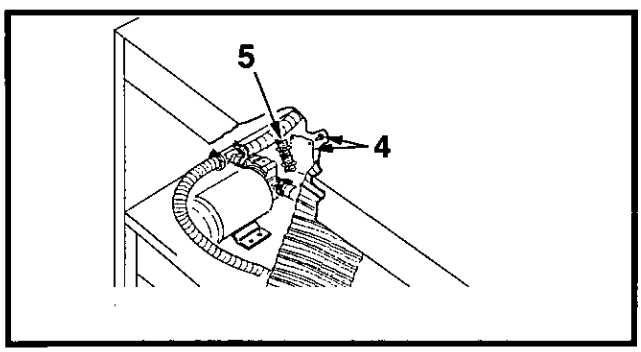


Figure 5-12 Water Pump by-pass

1. Close the water control valve (5a, Figure 5-10).
2. Remove pump end cap (4, Figure 5-12)
3. Remove the gear set (5, Figure 5.12).
4. Reinstall the end cap. The water will now by-pass the water pump and flow under gravity from the water tank when the Water Control ON/OFF Valve (3, Figure 5-10) is ON.

VII. Check Parking Brake

1. With the engine running, press in the parking brake control switch (10, Figure 5-13) to apply brakes.

NOTE

On earlier models the parking brake is applied by pressing in the Emergency Stop (Brake). Later models have seperate Emergency Stop and Parking Brake switchs.

2. When the brakes are applied, the parking brake ON indicator will illuminate.

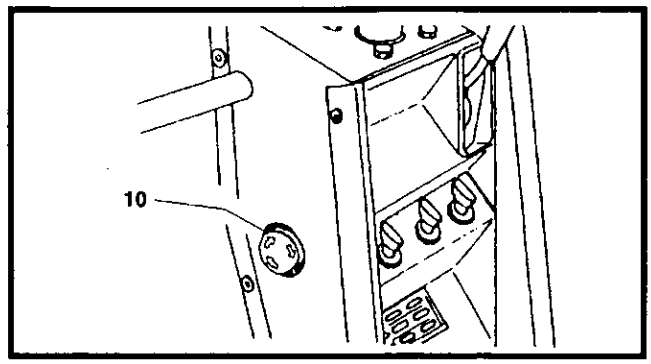


Figure 5-13 Parking Brake Switch

3. Move propulsion control towards Forward position to attempt machine movement. If the parking brake system is functioning, the machine will not move. If machine does move, contact service personnel and do not operate machine.

VIII. Check Conditions Of Drums And Scrapers

1. Perform a visual inspection of the drums (1, Figure 5-14) and remove any material adhering to them.

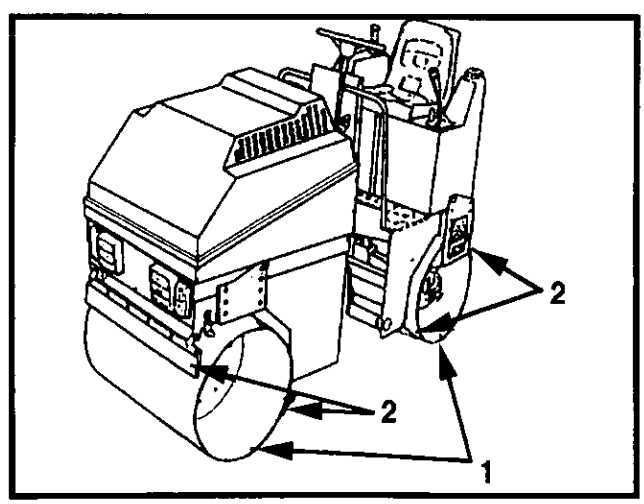


Figure 5-14 Drums and Drum Scrapers

2. Check the drum scrapers (2, Figure 5-14) to ensure they are not damaged Replace any damaged drum scrapers that require attention.

5.6 50 HOUR OR WEEKLY ROUTINE MAINTENANCE

I. Check and Clean Engine Cooling Fins

If the machine has suffered leaks of oil or fuel, dirt will tend to adhere to the cooling fins of air cooled engines (Figure 5-15). This accumulation of dirt will reduce the cooling efficiency. Therefore, any leaks of oil or fuel should be immediately repaired and cooling surfaces given a through cleaning.

To clean fins, use compressed air or a steam jet. Steam cleaning is preferred. To clean with compressed air, perform the following:

1. Remove any covers to gain access.
2. Use a suitable brush to remove dried on dirt.

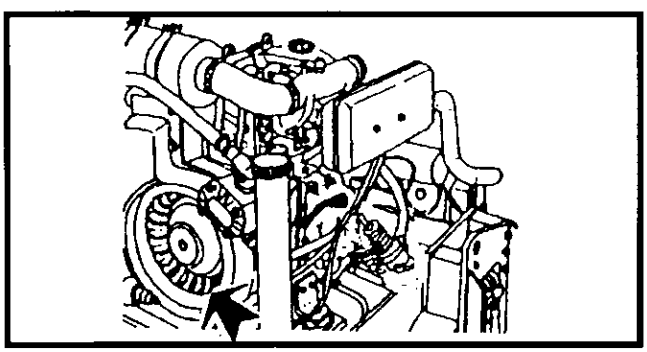


Figure 5-15 Engine Cooling Fins/Fan

⚠WARNING

When using compressed air, water jets, or steam cleaning methods, ensure that appropriate protective clothing is worn to protect eyes, and exposed parts of the body.

3. Use a compressed air jet to remove loosened dirt.
4. In case of severe clogging due to fluid leaks, apply a commercial cleaning detergent. Let it soak in and then wash off with water jet. Dispose of detergent in accordance with local regulations.

NOTE:
Refer to engine manufacturer's instruction manual for more detailed information

II. Grease Drum Offset Guides

1. Clean the grease fitting ('C', Figure 5-16).
2. Apply three shots of MPG-EP2 grease with a grease gun.

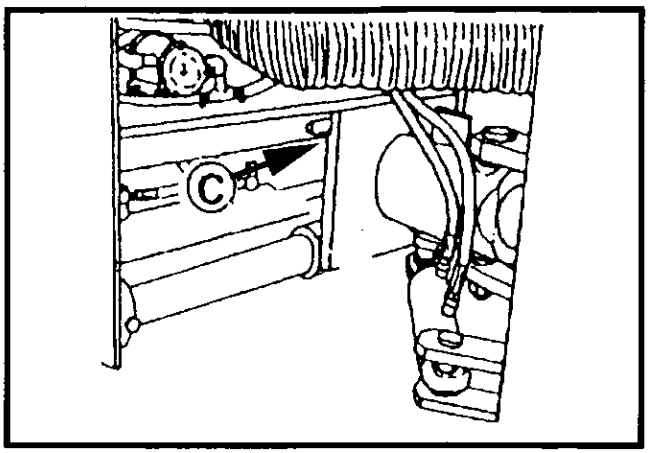


Figure 5-16 Drum Offset Guide Grease Point

5.7 100 HOUR ROUTINE MAINTENANCE

⚠WARNING

Batteries contain an acid and can cause injury.

Battery fumes can ignite and explode. Skin and eye contact with the battery fluid can cause injury.

Do not smoke when observing battery fluid level. Avoid skin and eye contact with the battery fluid. If contact occurs, flush area immediately with water.

I. Check Battery

(a). Maintenance-Free Battery (Figure 5-17).

1. Clean terminals.
2. Keep battery connections tight.
3. Apply a small amount of grease to the terminals to prevent corrosion.

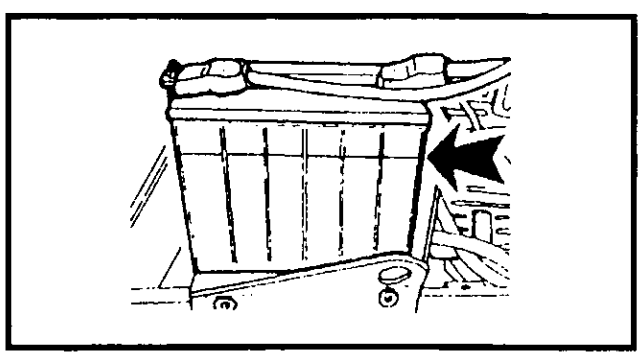


Figure 5-17 Battery

(b). Traditional Battery.

1. Clean the battery upper surface before removing any caps to prevent dirst entering the battery.

2. When the battery is still and cool, open the caps.

3. Top up each element cell with distilled water until the seperators are covered 1 cm deep.

4. Clean terminals.

5. Keep battery connections tight.

6. Apply a small amount of grease to the terminals to prevent corrosion.

II Check Hydraulic Oil Level

NOTICE

Dirt in the hydraulic system will lead to premature component failure.

A clean, contaminant-free system is extremely important to the machine's proper function.

Take extra care when working around or on the hydraulic system to ensure its complete cleanliness.

1. Check hydraulic oil level by viewing dipstick ('B', Figure 5-16) located on the hydraulic tank. The fill cap ('A', Figure 5-18) includes a dipstick to check the oil level.

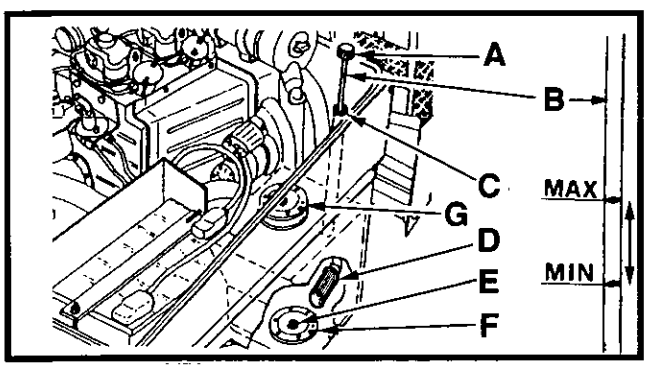


Figure 5-18 Hydraulic Oil Tank, Dipstick

2. The hydraulic oil level should be between the full mark MAX and the minimum mark MIN on the dipstick.

NOTE

If no oil is showing on the dipstick, call for service assistance to investigate cause of oil loss.

3. If necessary, add fresh, clean (filtered through 10 micron filter) anti-wear hydraulic oil through the filler ('C', Figure 5-18). Bring to a full level. It is important to maintain the tank at a full level at all times. Refer to Section 8 - Fuel and Lubricant Instructions for details on hydraulic oil specifications.

NOTE

In the event that there is indication of contamination of the hydraulic system due to part failure or ingress of dirt into the hydraulic tank, then remove drain plug ('E', Figure 5-18) and the access cover ('F', Figure 5-18) and thoroughly clean out the tank interior. On later models fitted with the suction strainer/filter ('F', Figure 5-18), clean or replace this filter. Follow refill as above.

III. Check Eccentric Oil Level

1. Ensure machine is positioned on level ground with the plug (1, Figure 5-19) in 3 or 9 o'clock position, parking brake applied, and drums chocked.

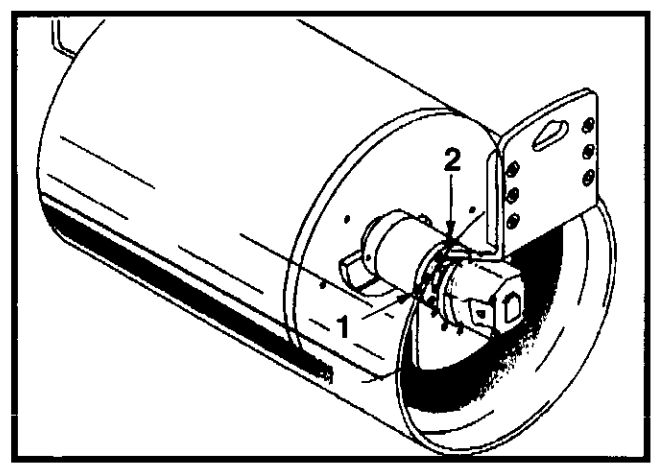


Figure 5-19 Eccentric Oil Fill/Level Plugs

2. Allow eccentric housing to cool before proceeding.

3. Remove the level plug (1, Figure 5-19).

4. The oil should be level with bottom of hole. If required, use appropriate fill equipment to add oil through the breather port 2 until oil appears at the level plug hole.

NOTE

Take care not to over fill as this may cause overheating of the eccentric oil resulting in leakage.

Refer to Section 8 - Fuel And Lubricant Instructions for details on eccentric housing oil.

5. Allow oil to stop flowing from the level plug hole (1, Figure 5-19)

6. Clean, install and tighten the plug.

(Continued)

7. Remove the eccentric housing breather (2, Figure 19), for checking and cleaning. Reinstall and secure.

8. Repeat same procedure for the other eccentric housing.

9. Operate the machine and check for any leaks.

IV. Check Drum Drive Gearbox Oil Level

On units equipped with Brevini drum drive gearbox follow the following procedures:

1. Ensure machine is positioned on level ground with the plug (3, Figure 5-20) in 3 or 9 o'clock position, parking brake applied, and drums chocked.

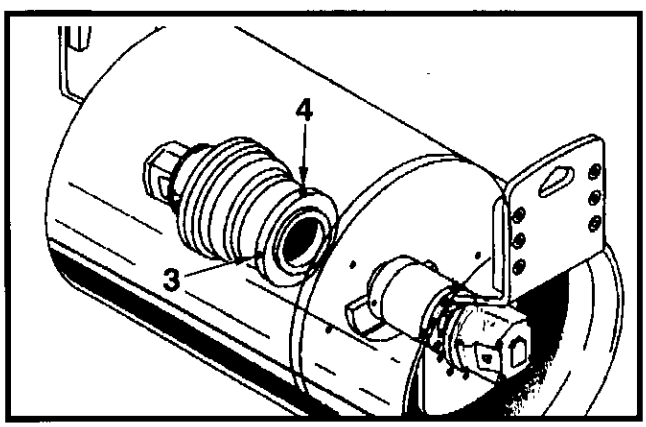


Figure 5-20 Drum Drive Gearbox Oil Level/Fill Plug

2. Allow gearbox housing to cool before proceeding.

3. Remove the level plug (3, Figure 5-20).

4. The oil should be level with bottom of hole. If required, use appropriate fill equipment to add oil through the port 4 until oil apprears at the level plug hole.

NOTE

Take care not to over fill as this may cause overheating of the gear oil resulting in leakage.

5. Allow oil to stop flowing from the level plug hole (1, Figure 5-20)

6. Clean, install and tighten both plugs.

7. Repeat same procedure for the other gearbox housing.

9. Operate the machine and check for any leaks.

5.8 200 HOUR ROUTINE MAINTENANCE

⚠WARNING

Hot oil or components can burn.

Oil must be at normal operating temperature when draining.

Avoid contact with hot oil or components.

Do not allow oil to drain into the ground.

I. Change Engine Oil and Filter

Refer to Lombardini Engine instruction manual for further details. (Unit is equipped with internal engine oil filter).

1. Position machine on level ground.

2. Warm engine up until engine oil temperature is 176 degrees F. (80 degrees C.), then shut down engine.

3. Place container with capacity of at least 7.6 liter (2, Figure 5-21), under drain point of engine and remove drain plug (1, Figure 5-21).

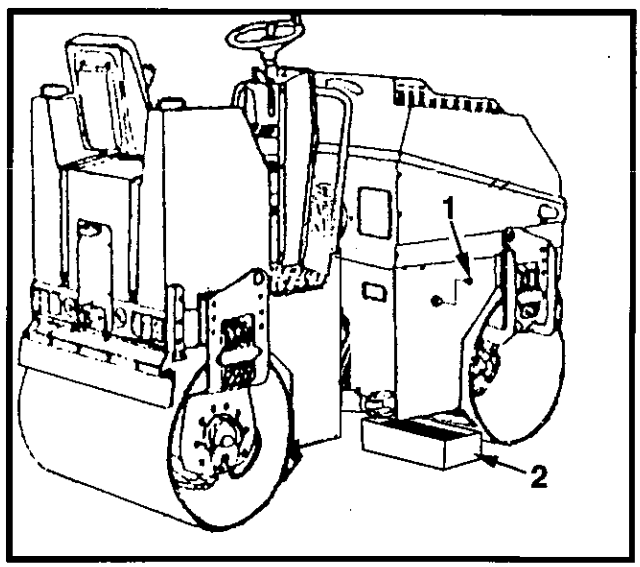


Figure 5-21 Engine Oil Drain Point

4. Clean and remove filter cover and remove used filter (1, Figure 5-22) catching any escaping oil in the container. Dispose of oil and filter in accordance with local regulations.

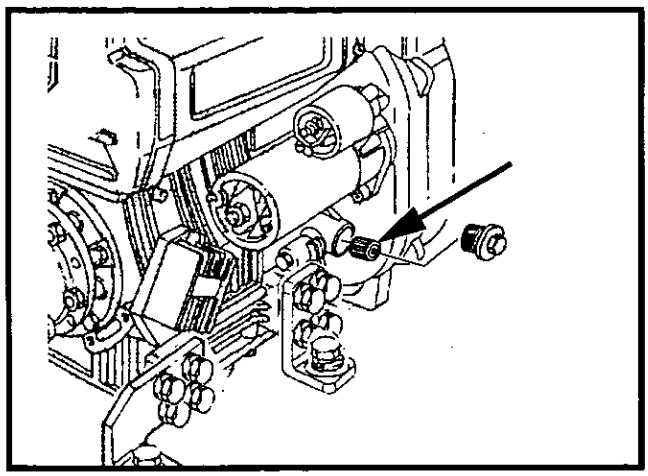


Figure 5-22 Engine Oil Filter

5. Insert the new filter and clean the filter cover .

6. Screw the filter cover into place by hand until seal is evenly seated.

7. Tighten filter cover firmly by giving a final half-turn.

8. Clean the drain plug (1, Figure 5-21) and install with a new seal ring Torque drain plug to 41 pounds-foot (55 Nm).

9. Refill crankcase with motor oil through the filler ('B', Figure 5-23). Fill to the full mark on the dipstick ('A', Figure 5-23). Refer to Section 8 - Fuel And Lubricant Instructions for oil details.

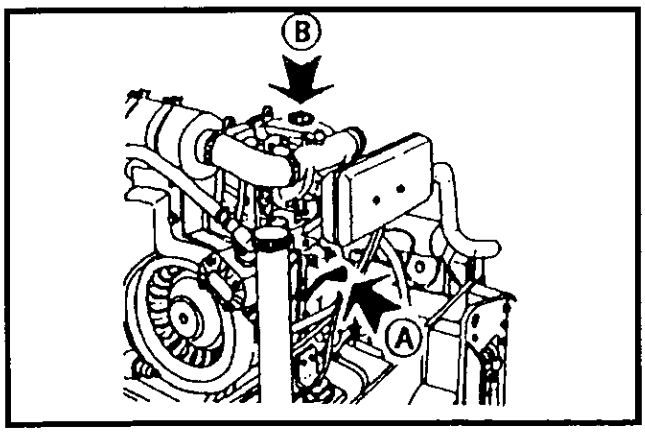


Figure 5-23 Engine Oil Fill Port

10. Start engine and check engine oil pressure (engine oil pressure indicator light should extinguish after several seconds running).

NOTE

If the RED indicator light remains illuminated, stop the engine immediately and call for service assistance.

11. Check engine area for leaks.

II. Change Hydraulic Oil Filter

⚠WARNING

Hot oil or components can burn.

Oil must be at normal operating temperature when draining.

Avoid contact with hot oil or components.

Do not allow oil to drain into the ground.

There is a spin-on type hydraulic filter located at the right front side of the machine (Figure 5-24). The filter is accessible by lifting up the engine hood.

Use the following procedure to remove the filter. Keep dirt from entering the hydraulic system and causing premature component failure and improper machine function.

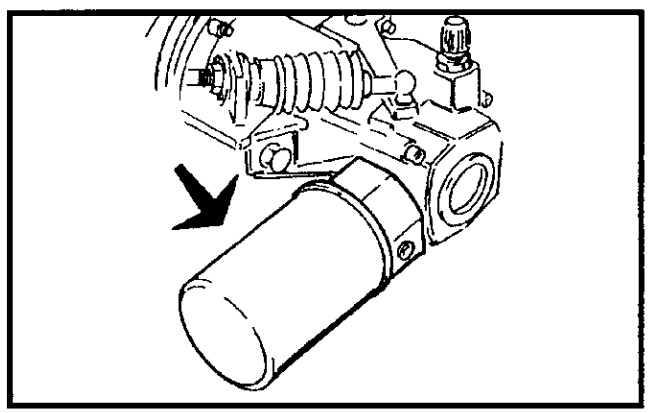


Figure 5-24 Hydraulic Filter - Propulsion System

1. Clean head of filter and remove used filter catching any escaping oil in a container. Appropriately discard the used filter. Dispose of used filter in accordance with local regulations.

2. Fill the new replacement filter with clean, hydraulic oil.

3. Apply a film of clean oil to the seal gasket of the new filter before installing.

4. Screw new filter into place and tighten one quarter (1/4) turn beyond gasket contact.

5. Start engine and check for proper operation.

6. Check machine for any leaks.

III. Clean Hydraulic Oil Return Strainer (G, Figure 5-26)

The hydraulic return strainer filter should be also checked and cleaned as necessary. Any debris found indicates part failure and should be reported to your supervisor

5.9 500 HOUR ROUTINE MAINTENANCE

I. Change Engine Fuel Filters

⚠WARNING

Fuel is flammable. May cause severe injury or death.

Shut down the engine, extinguish all open flames and do not smoke while filling the tank.

Always wipe up any spilled fuel.

Use the following procedure to replace the main fuel filter (1, Figure 5-25)

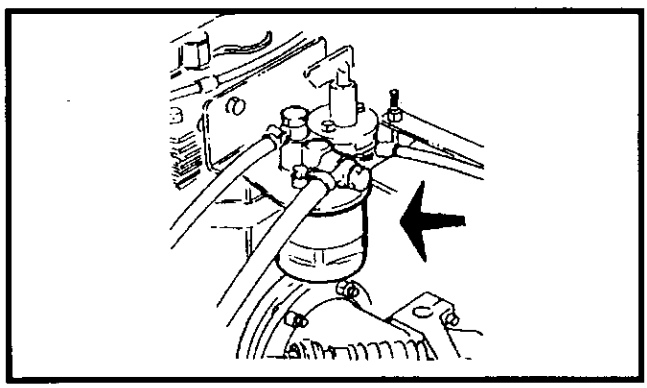


Figure 5-25 Engine Fuel Filter

1. Clean around head of main filter and remove filter catching any escaping fuel in a container. Dispose of used filter and fuel in accordance with local regulations.
2. Apply light coat of oil or diesel fuel to the rubber gasket of replacement fuel filter.
3. Screw the new main filter into place by hand until seal is evenly seated.
4. Tighten filter firmly by giving a final half-turn.
5. Uncrimp or unplug the fuel line for the in-line filter.
6. Bleed the fuel system. Because of some variables that affect bleeding the system, refer to the engine operation manual.
7. Check machine for any leaks.

II. Check engine exhaust manifold

1. Check exhaust manifold for leaks, loose nuts and fittings .
2. Any defects should be reported to your supervisor.

III. Check Hosing and other components of the Hydraulic Systems

1. Check the flexible hoses, fittings and all other components of the hydraulic system for leaks or other defects..
2. Any defects should be reported to your supervisor.

IV. Change Hydraulic Oil and Clean Hydraulic Oil Tank / Suction Strainer

NOTE

The oil and strainer must also be changed after major hydraulic system repairs in addition to the 500 hour routine maintenance.

NOTICE

Dirt in the hydraulic system will lead to premature component failure.

A clean, contaminant-free system is extremely important to the machine's proper function.

NOTE

The Vibration/Steering System suction strainer ('D', Figure 5-25) is screwed onto the suction pipe on:

BS/BV 14 units effective S/N.14328 and
BS/BV 18 units effective S/N. 18204 .

Use the following procedure to change the hydraulic oil and suction strainer.

⚠WARNING

Hot oil or components can burn.

Oil must be at operating temperature when draining.

Avoid contact with hot oil or components.

Do not allow oil to drain into ground.

1. Place a container capable of holding at least 22 gallons (84 liters) under the drain plug (E, Figure 5-26).

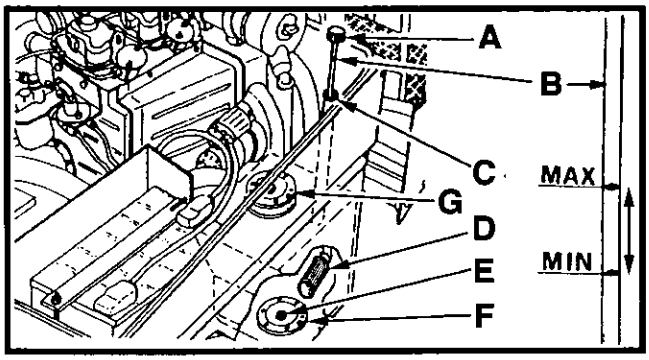


Figure 5-26 Hydraulic Tank

2. Remove the drain plug ('E', Figure 5-26), and drain the hydraulic tank. Dispose of oil in accordance with local regulations.

3. Remove the cover plate ('F', Figure 5-26) located in the base of the hydraulic tank.

4. The Vibration/Steering System return strainer ('G', Figure 5-26), is located on the upper surface of the tank. Remove the filter cover to clean the inside strainer gauze..

4a. On units effective S/N. 14328 BS/BV 14 and 18204 BS/BV 18, the Vibration/Steering System suction strainer is near the bottom inside of the tank. Reach inside tank and remove it.

5. Clean strainer in a solvent using a stiff fiber brush to help remove embedded impurities. If impurities cannot be removed, replace the strainer.

NOTICE

A partially plugged strainer will lead to cavitation, contamination and a sluggish operating machine.

Ensure that strainer is cleaned or replaced.

NOTICE

Excessive air pressure can damage the strainer.

Pressure at the air nozzle must not exceed 40 psi. (2.8 bar).

6. Air-blow suction strainer dry from inside out.

7. Install new or cleaned suction strainer back inside the tank.

8. Install the cover plate and gasket. Replace gasket if needed.

9. Clean the drain plug and install it securely.

10. Fill the tank with clean, hydraulic oil from unopened containers. When adding oil, be sure to filter it through a 10 micron filter. For quantity and oil specifications, refer to Section 8 - Fuel And Lubricant Instructions.

11. Ensure oil is at proper level and that all fittings are tight and secure.

12. Operate machine and check for any leaks.

5.10 1000 HOUR OR ANNUAL ROUTINE MAINTENANCE

I. Change Eccentric Housing Oil

To change eccentric housing oil, use the following procedure.

1. Position the machine on level ground.

2. Position the drum with eccentric plug (1, Figure 5-27) in 6 o'clock position.

3. Apply parking brake and make sure drums are properly chocked.

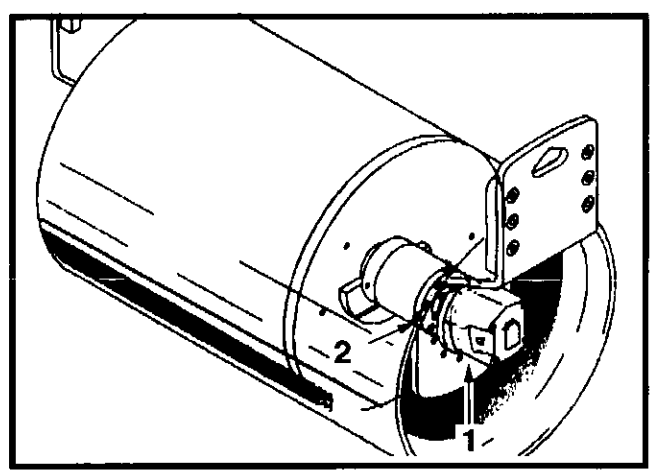


Figure 5-27 Eccentric Oil Fill, Level, Drain ports

4. Ensure oil is at operating temperature before draining.

⚠WARNING

Hot oil or components can burn.

Oil must be at normal operating temperature when draining.

Avoid contact with hot oil or components.

Do not allow oil to drain into ground.

5. Remove plug (1, Figure 5-27) and allow oil to completely drain from the housing into a container. Dispose of oil in accordance with local regulations.

6. Clean, install and tighten the drain plug.

7. To check or refill, ensure the fill port (1, Figure 5-27) is in the 3 or 9 o'clock position.

8. Using appropriate filling device, slowly add gear oil through the port (1) until oil overflows. Refer to Section 8 - Fuel And Lubricant Instructions for oil specifications and quantities.

9. Allow oil to stop flowing from the port.

10. Clean, install and tighten the plug.

11. Repeat above procedure for the other drum eccentric.

II. Change Drum Drive Gearbox Oil (Brevini)

NOTE:
On units equipped with Brevini drum drive gearbox please follow the procedure below:

To change gearbox housing oil, use the following procedure.

1. Position the machine on level ground.

2. Position the drum with drain plug (3, Figure 5-27) in 6 o'clock position.

3. Apply parking brake and make sure drums are properly chocked.

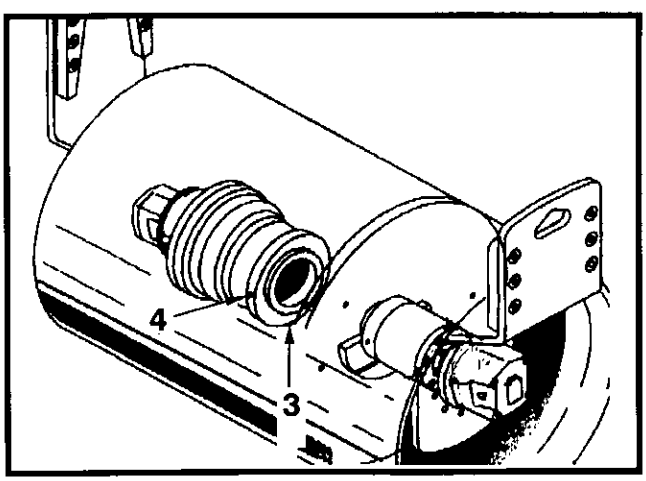


Figure 5-28 Drum Drive Gearbox Oil Fill, Level, Drain ports

4. Ensure oil is at operating temperature before draining.

5. Remove both plugs (3 and 4, Figure 5-28) and allow oil to completely drain from the housing into a container. Dispose of oil in accordance with local regulations.

6. Reposition drum with port 4 in fill position (12 o'clock) and port 3 in oil level position (3 or 9 o'clock).

7. Using appropriate filling device, slowly add gear oil through the upper port (4) until oil overflows at level port (3). Refer to Section 8 - Fuel And Lubricant Instructions for oil specifications and quantities.

9. Allow oil to stop flowing from the level port.

10. Clean, install and tighten both plugs.

11. Repeat above procedure for the other drum drive gearbox

12. Operate and check for leaks..

NOTE

Take care not to over fill as this may cause overheating of the gearbox oil resulting in leakage.

III. Check Engine Valve Clearance

NOTE:
Please refer to engine operator manual for maintenance instructions. This operation requires a trained service engineer.

IV. Service Water Pump, Drain And Clean Water Tank And Spray Bars

At least once a year, more often if conditions warrant, service the water pump , drain and clean the water tank and spray bars.

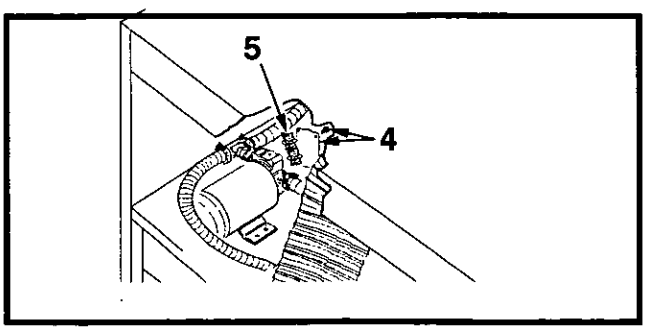


Figure 5-29 Water Pump Service

1. Close Water ON/OFF valve (1, Figure 5-30)

2. Remove pump end cap (4, Figure 5-29) .

3. Remove gear set (5), Figure 5-29) . If defective fit new parts during reassembly of the water system.

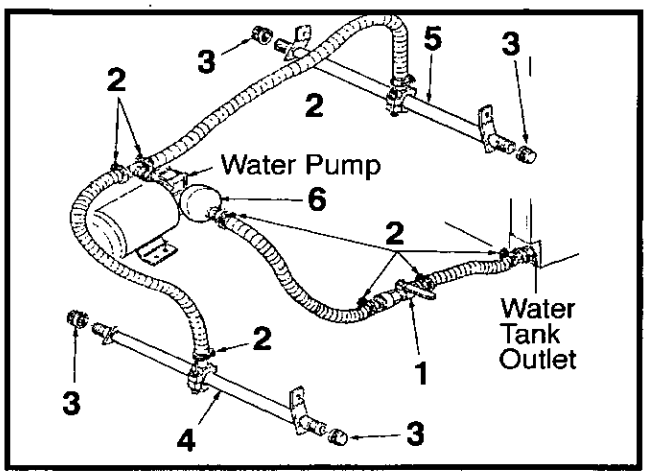


Figure 5-30 Water Spray Bars and Hosing

5. Clear each spray bar jet.

6. Remove each water tubing as necessary by releasing hose clamps (2, Figure 5-30), clean/flush out any sediment buildup.

7. Clean/replace the inline water filter (6, Figure 5-30).

8. Reinstall all hosing components securely.

9. Refit the Water pump end cap, (but do not fit the impeller, cam)

10. Fill water tank with clean water.

11. Open water control valve (1, Figure 5-30) and check water flows from all spray bar jets to effectively wet the drum width.

12. If gravity flow is satisfactory, close the water control valve and reinstall the pump impeller components.

13. Open the water control valve and switch on the water spray pump, check for satisfactory spray effect at all spray jets..

14. Close the water control valve.

NOTE:

The water tank should never be allowed to become empty for any reason other than cleaning or storage.

NOTE:

In freezing conditions ensure that water is completely drained from the tank, hoses, spray bars and pump.

SECTION 6 - TROUBLESHOOTING

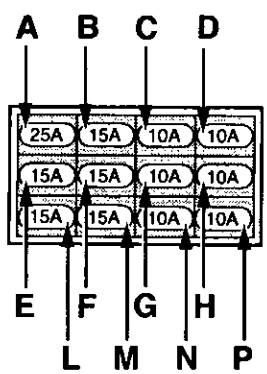
⚠WARNING

When carrying out trouble shooting procedures, it is important to strictly observe the safety precautions and guidelines in Section 1 of this manual.

Improper operation and maintenance is the most frequent cause of machinery failures and problems. In the event of a failure, it is recommended to read through this manual.

If you are unable to determine the cause of the problem or are unable to find a solution when following the troubleshooting chart below, contact your local Ingersoll-Rand service office.

The troubleshooting chart is limited to machine control operational problems which will guide the operator to rectifying the cause of the failure.



The fuse box contains fuses to protect the following circuits:

- A = Water Pump
- B = Warming Horn
- C = Right side Driving Light
- D = Left side Driving Light
- E = Ignition Switch (Engine Start)
- F = Beacon Light
- G = Right side Low Beam Light
- H = Left side Low Beam Light
- L = Direction Turning Indicator Switch/Seat Switch/Vibration / Steering Flowdivider Valve/Engine Shutdown system/ Emergency Shutdown/Parking Brake
- M = Vibration/Drum offset
- N = Parking lights: Front Left and Rear Right sides
- P = Parking lights: Front Left and Rear Right sides + Registration Plate Light

Figure 6-1 Fuse Identification

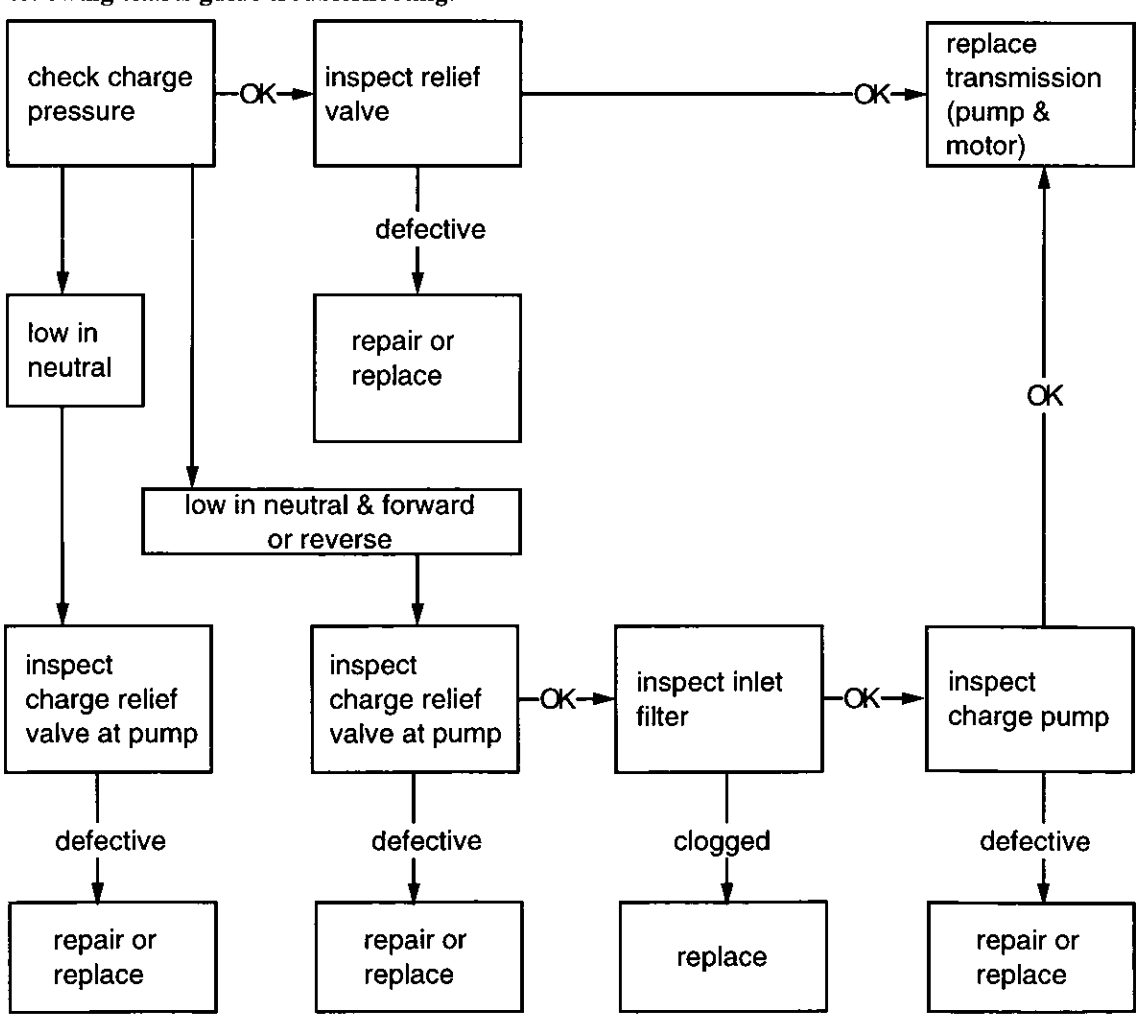
PROBLEM	CAUSE	CORRECTION
6.1 ENGINE WILL NOT START		
Starter does not rotate	• Fuse E defective	• Check console fuse and replace.
	• Emergency Stop switch requires resetting.	• Check Emergency Stop switch and reset if required.
	• Propulsion control lever not in STOP position	• Move to STOP position.
	• Batteries discharged	• Check battery, charge if necessary.
	• Battery cable connections loose or disconnected.	• Clean and tighten terminal connections.
	• In-line fuse to starter fused	• Call for service to correct fault.
	• Starter relay fault	• Call for service to correct fault.
	• Ignition switch defective	• Call for service to replace.
	• Starter solenoid or starter defective	• Call for service to replace.

PROBLEM	CAUSE	CORRECTION
6.1 ENGINE WILL NOT START (Continued)		
Starter does rotate	• Empty fuel tank	• Fill
	• Fuel solenoid at fuel pump defective	• Call for service to test/replace.
	• Defective wiring	• Check with test lamp .
6.2 ENGINE DIFFICULT TO START AND HAS POOR AND IRREGULAR PERFORMANCE	• Low battery power	• Check battery.
	• Batteries discharged	• Charge battery if necessary.
	• Battery cable connections loose or corroded causing the starter to turn too slowly.	• Clean and tighten terminal connections, cover with acid free grease.
	• Low ambient temperature, using to high a viscosity oil	• Use appropriate oil grade for the ambient temperature conditions.
	• Fuel line blockage due to: wax seperation in winter	• Change fuel filters, and bleed fuel system, check for fuel line leaks and loose connections. Always use winter grade fuel in winter.
	• Incorrect valve clearances	• Call for service to adjust.
	• Defective fuel injectors	• Call for specialist service.
	• Blocked air cleaner element.	• Clean or replace element.
	• Loose or badly adjusted throttle cable	• Adjust or replace control cable.
6.3 ENGINE MAKING EXCESSIVE FUMES	• Engine oil level too high	• Drain engine oil to correct level on the dip stick.
	• Blocked air cleaner element.	• Clean or replace element.
	• Low compression due to poor condition of the valves or incorrect valve clearance	• Call for specialist service.
6.4 ENGINE OVERHEATS - STOP ENGINE IMMEDIATELY	• Excessive dirt on cooling system	• Clean the cooling fins, particularly vertical fins on Lombardini engine cylinder heads.
	• Defective injector nozzles	• Call for service to correct fault.
	• Incorrect fuel pump calibration	• Call for service to correct fault.
	• Blocked cooling air flow	• Clear blockage.
6.5 LOW ENGINE OIL PRESSURE *(Red warning light on steer console illuminates)*	• Low engine oil level (low engine oil pressure warning light should illuminate)	• Top up oil level to dipstick mark
	• Defective relief valve	• Call for service to correct fault
	• Worn oil pump	• Call for service to correct fault
	• Leaks from lubrication system	• Stop engine and check for, and tighten any loose fittings on the oil lines
6.6 BATTERY WARNING LIGHT IS "ON"	• Not charging due to defective alternator or regulator	• Call for service to correct fault.

PROBLEM	CAUSE	CORRECTION
6.7 CONTROLS NOT FUNCTIONING		
Horn does not sound	• Fuse B defective	• Check console fuse and replace.
+	• Defective wiring / parts	• Call for service to correct fault.
Vibration controls not functioning	• Fuse L defective	• Check console fuse and replace. • Call for service to correct fault.
+		
Warning indicator lights not functioning	• Fuse L defective	• Check console fuse and replace. • Call for service to correct fault.
+		
Fuel Solenoid not functioning	• No power to fuel solenoid	• Call for service to correct fault.
+		
Brake indicator lights not functioning	• Fuse L defective • Defective wiring / parts	• Check console fuse and replace. • Call for service to correct fault.
+		
Gauges not functioning		
+		
Working lights not functioning	• Fuse C and D defective • Defective wiring / parts	• Check console fuse and replace. • Call for service to correct fault.
+		
Flashing Beacon not functioning	• Fuse F and D defective	• Check console fuse and replace

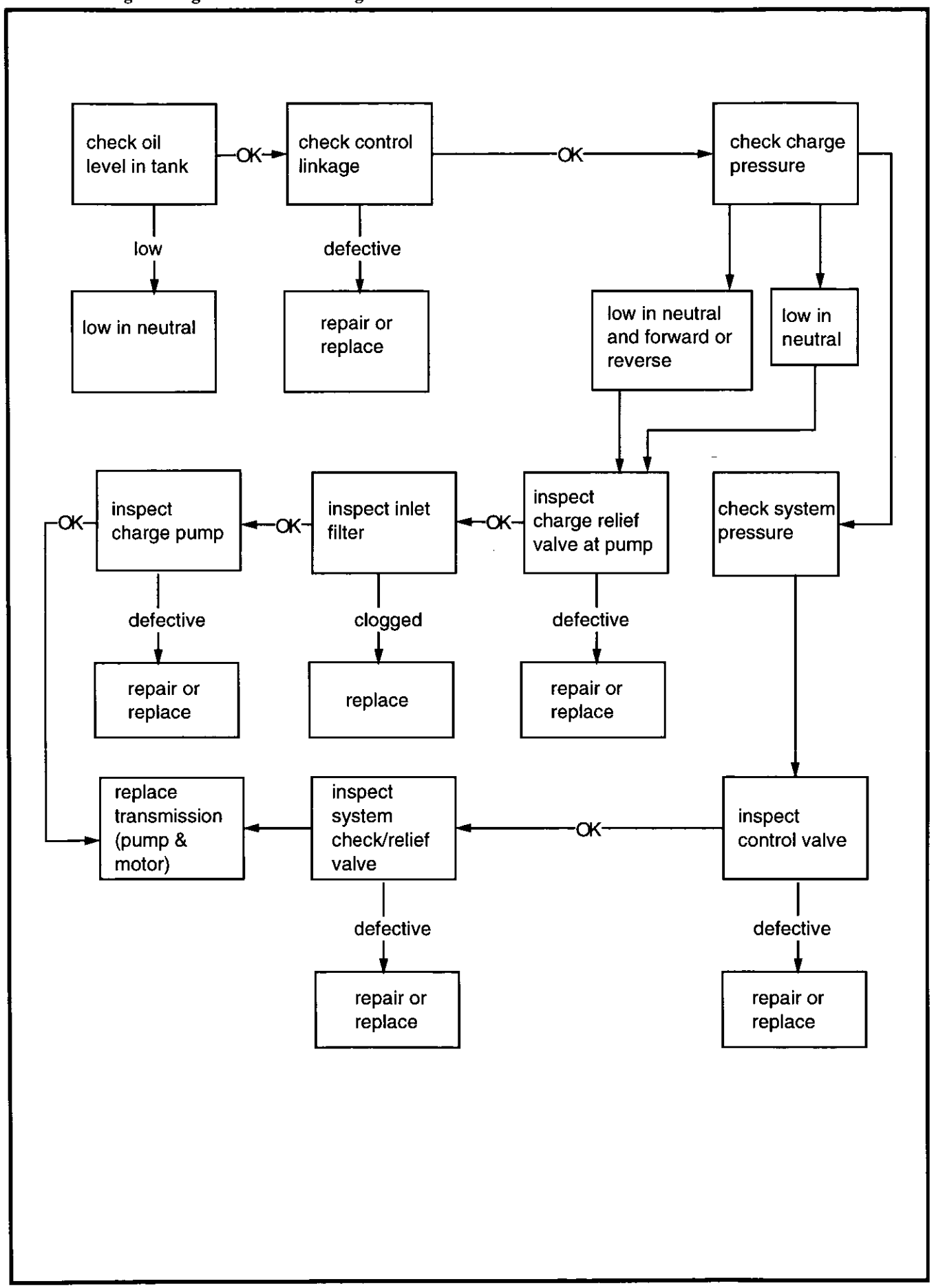
6.8 SLUGGISH PROPULSION SYSTEM OPERATION

The following charts guide troubleshooting:



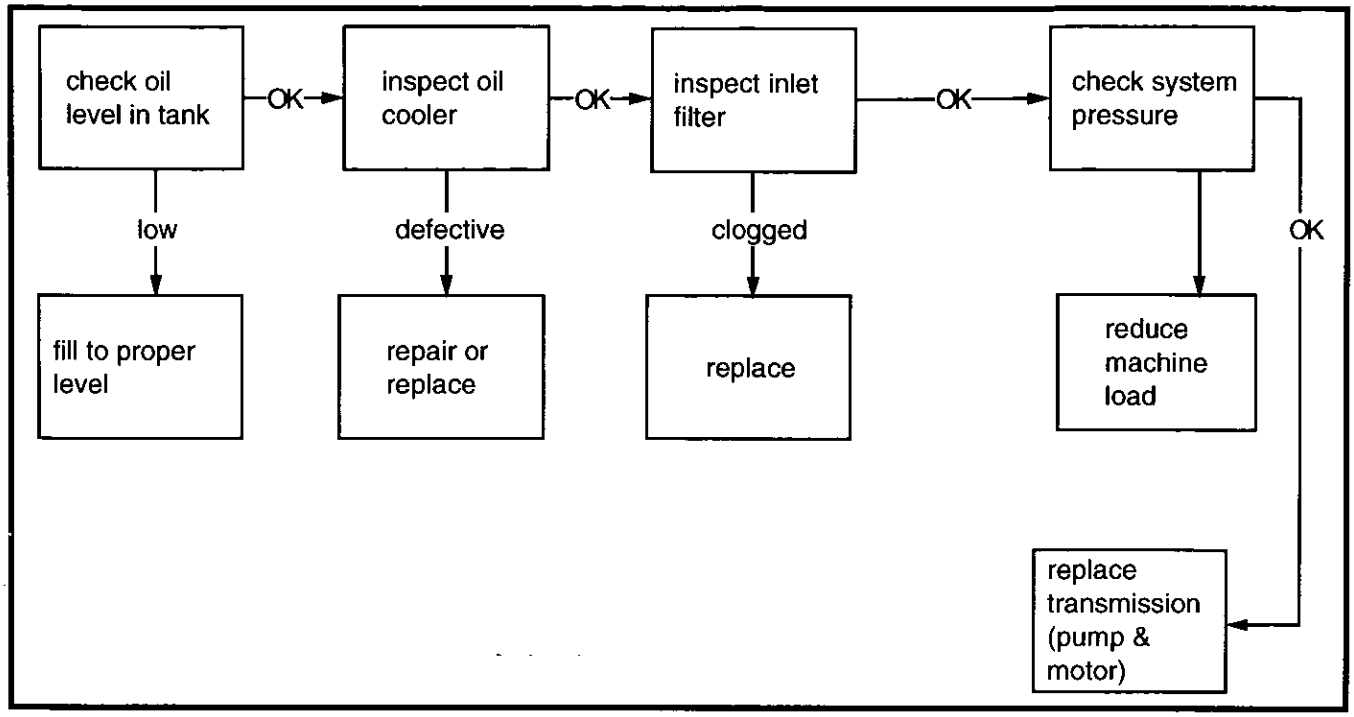
6.9 PROPULSION SYSTEM DOES NOT OPERATE IN ANY DIRECTION.

The following charts guide troubleshooting:



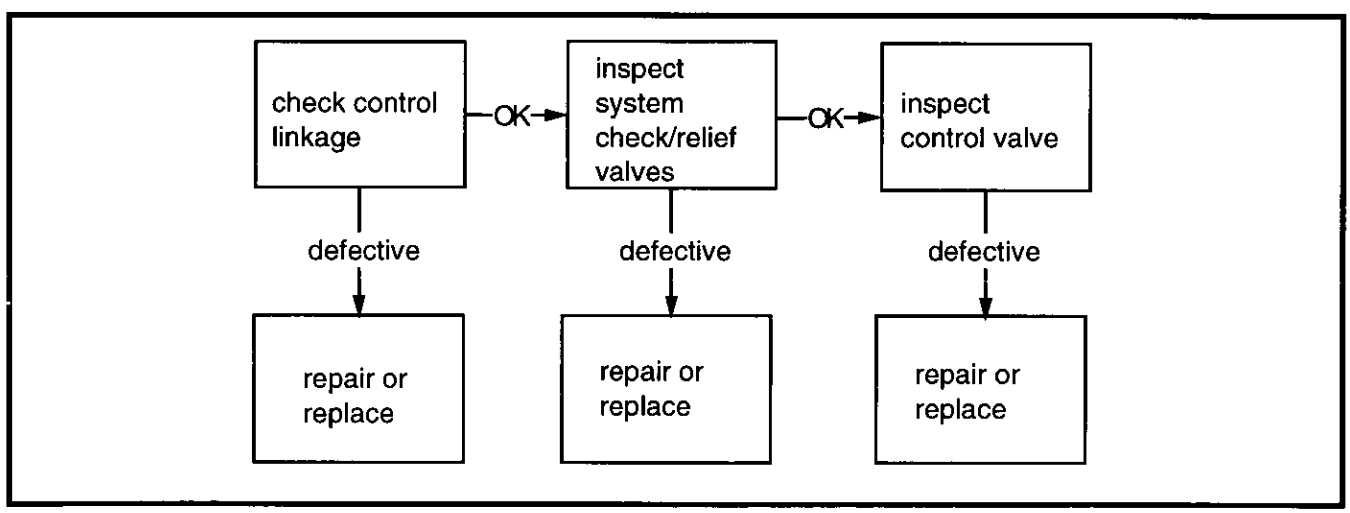
6.10 HOT OPERATING SYSTEM.

The following charts guide troubleshooting:



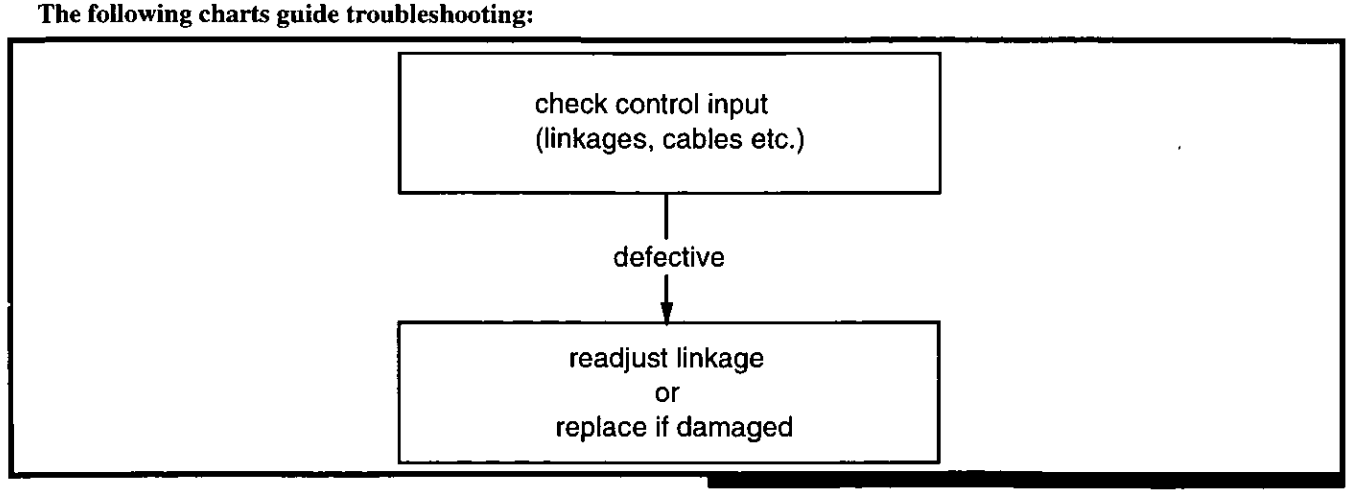
6.11 PROPULSION OPERATES IN ONLY ONE DIRECTION.

The following charts guide troubleshooting:



6.12 DIFFICULT OR IMPOSSIBLE TO FIND NEUTRAL (STOP) POSITION AT CONTROL LEVER.

The following charts guide troubleshooting:



SECTION 7 - TECHNICAL SPECIFICATIONS

7.1 GENERAL IDENTIFICATION

Name of machine: BV 14 Series and BV 18 Series
Type of machine: Double drum vibratory compactor
Serial number and product range: serial number 14245 and above
Name and address of manufacturer: SICOM s.r.l.
40013 Castelmaggiore (BO)
Via Bonazzi 12-15,

7.2 ENVIRONMENTAL INFORMATION

Noise emission - 14 BV: At the operators station = L(PA)S = 84.8 dBA
L(WA) = 102 dBA

The above machine has been tested at a normal operating engine speed of 2612 rpm. The machine was supported by an asphalt base.

Vibration emission - 14 BV

Weighted root mean square acceleration value to which arms are subjected does not exceed m/s². Weighted root mean square acceleration value to which body (feet and posterior) is subjected does exceed m/s².

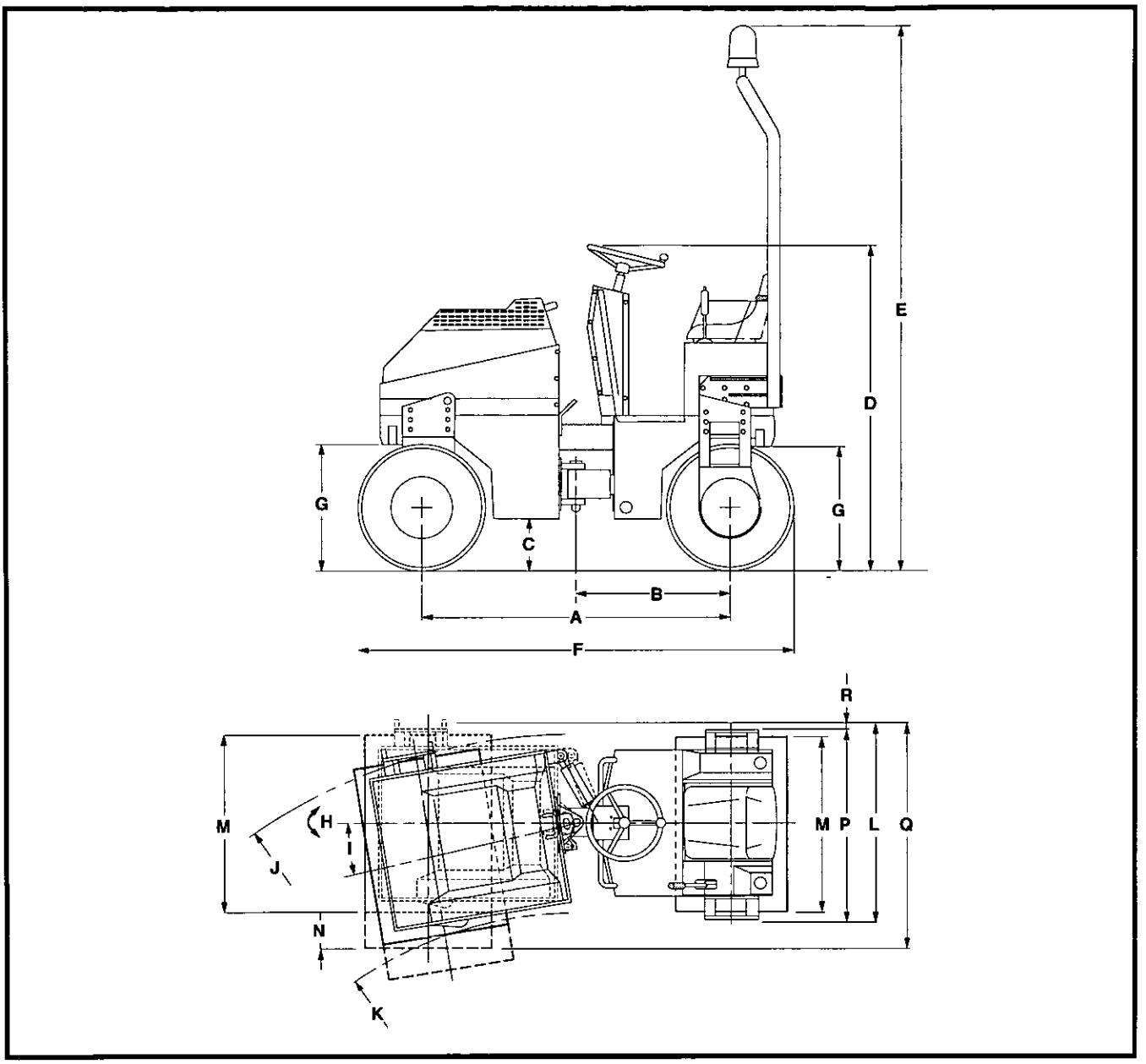
Noise emission - 18 BV: At the operators station = L(PA)S = 84.8 dBA
L(WA) = 102 dBA

The above machine has been tested at a normal operating engine speed of 2612 rpm. The machine was supported by an asphalt base.

Vibration emission - 18 BV

Weighted root mean square acceleration value to which arms are subjected does not exceed m/s². Weighted root mean square acceleration value to which body (feet and posterior) is subjected does exceed m/s².

7.3 MACHINE DIMENSIONS



BV 14 SERIES											
Units	A	B	C	D	E	F	G	H	I	J	K
mm	1416	708	180	1490	2535	1946	530	RH=17° LH=24°	± 15°	2800	1850
Units	L	M	N	P	Q	R					
mm	845	760	170	830	1000	15					

BV 18 SERIES											
Units	A	B	C	D	E	F	G	H	I	J	K
mm	1482	741	250	1560	2605	2082	600	RH=17° LH=24°	± 15°	2800	1850
Units	L	M	N	P	Q	R					
mm	950	850	170	910	1090	40					

7.4 MACHINE WEIGHTS AND FIGURES

		14 BS	14BV	18 BS	18BV
WEIGHTS WITH ROPS AND NO CAB					
Operating Weight (CECE)	kg	1416	1460	1668	1710
Static Weight at Front Drum	kg	708	730	834	855
Static Weight at Rear Drum	kg	708	730	834	855
Shipping Weight	kg				
Static Linear Load (Front Drum)	kg/cm	9.3	9.6	9.8	10
Static Linear Load (Rear Drum)	kg/cm	9.3	9.6	9.8	10
PROPULSION (TRANSMISSION)					
Type of System		Hydrostatic			
Driven Axles		2			
Travel Speed	km/h	0 - 8	0 - 8	0 - 9	0 - 9
Gradeability (Theoretical)	percent	40			
BRAKES					
Service		Hydrostatic			
Secondary/Parking Brake		S.A.H.R.			
STEERING					
Type		Articulated			
Control System		Hydraulic			
Cylinders		1			
Articulation Angle		RH=17° LH=24°			
Drum Oscillation Angle		+-15 degrees			
VIBRATION					
Vibrating Drums		1	2	1	2
Drive System		Hydraulic/Fixed Frequency			
Frequency	hz/(vpm)	50 (3000)	46.7 (2800)	50 (3000)	46.7 (2800)
Nominal Amplitude	mm	0.45	0.45	0.5	0.5
Centrifugal Force/ vibrating drum	KN	9.3	9.3	10.5	10.5
ENGINE					
Standard		Lombardini Diesel 12LD 475-2			
Cylinders		2			
Displacement	cc	954			
Bore	mm	90			
Stroke	mm	75			
Rated Power at 2600 r.p.m. DIN 7020	kW	20.5			
Engine Oil Capacity	Liter	2.5			
Oil Filtration		Strainer			
Fuel Filtration		Cartridge			
Fuel System Type		Bosch			
Type Air Cleaner		Dry -1 Stage			
Electrical and Starting System		12 Volt			
Cooling System		Air-Cooled			
MISCELLANEOUS					
Drum Sprinkler System		Pressurized / Gravity to both drums			
Water Tank Capacity	Liter	90			

SECTION 8 - FUEL AND LUBRICANT INSTRUCTIONS

8.1 GENERAL INFORMATION

Lubrication is an essential part of preventive maintenance, affecting to a great extent the useful life of the unit. Periodic lubrication of the moving parts reduces to a minimum the possibility of mechanical failures.

Different lubricants are needed and some components in the unit require more frequent lubricant than others. Therefore, it is important that the instructions regarding types of frequency of the application be explicitly followed.

The Lubrication Chart that follows in this section shows those items requiring regular service and the interval at which they should be performed. Details concerning fuel, oil and other lubricants follow the lubrication chart. A regular service program should be geared to the items listed under each interval. These intervals are based on average operating conditions. In the event of extremely severe, dusty or wet operating conditions, more frequent lubrication than specified may be necessary.

Specific recommendations of brand and grade of lubricants are not made here due to regional availability, operating conditions, and the continual development of improved products. Where questions arise, refer to the component manufacturer's manual and a reliable supplier.

All oil levels are to be checked with the machine parked on a level surface and while the oil is cold, unless otherwise specified.

On plug type check points, the oil levels are to be at the bottom edge of the check port.

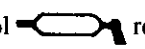
All grease fittings are SAE STANDARD unless otherwise indicated. Grease non-sealed fittings until grease is seen extruding from the fitting. 28 grams of EP-MPG equals one pump on a standard 0.45 kg grease gun.

Over lubrication on non-sealed fittings will not harm the fittings or components, but under lubrication will definitely lead to a shorter lifetime.

Unless otherwise indicated, items not equipped with grease fittings (linkages, pins, levers, etc.) should be lubricated with oil once a week. Motor oil, applied sparingly, will provide the necessary lubrication and help prevent the formation of rust. An anti-seeze compound may be used if rust has not formed. Otherwise, the component must be cleaned first.

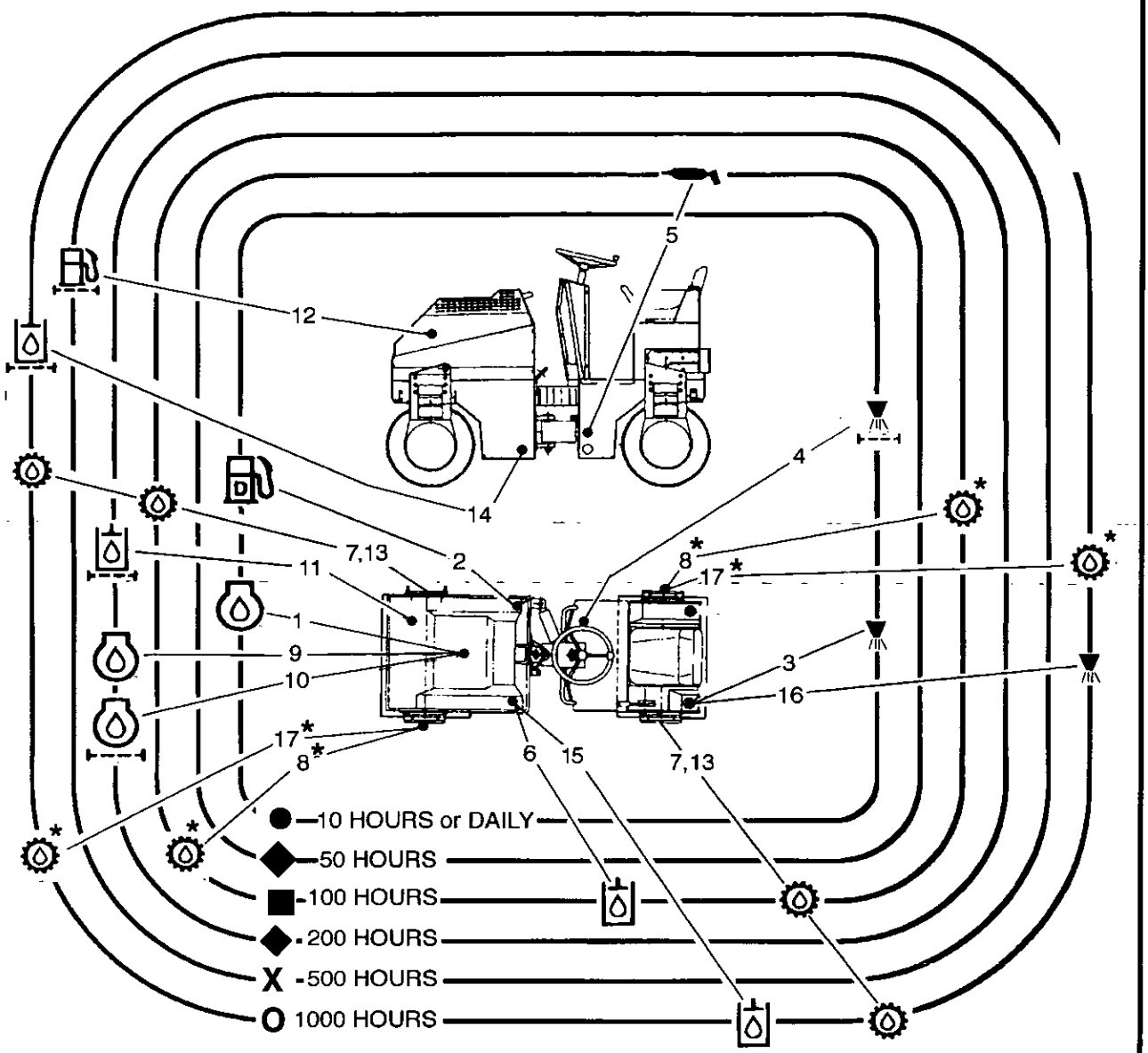
Grease fittings that are worn and will not hold the grease gun, or those that have a stuck check ball, must be replaced.

I. To prevent minor irregularities from developing into serious conditions several other services or checks are recommended for the same intervals as the periodic lubrication.

1. Thoroughly wash all fittings, caps, plugs, etc. with non-flammable, non-toxic cleaning solution before servicing, to prevent dirt from entering while performing the service.
2. Lubricants must be operating temperature when draining.
3. During regular lubrication service, visually check the entire unit in regard to capscrews, nuts and pins being properly secured.
4. Spot check several capscrews and nuts for proper torque. If any are found loose, a more thorough investigation must be made.
5. If a defect is detected which requires special maintenance service, stop the machine operation until the defect has been corrected. If necessary, contact the local Ingersoll-Rand distributor for assistance.
6. This symbol  represents an area where lubrication is required. Periodic lubrication requirements are listed in the following Lubrication Chart. These requirements include lubricant checks and greasing designated areas of the machine.

Periodic lubrication requirements are listed in the following Lubrication Chart. These requirements include lubricant checks and greasing designated areas of the machine.

8.2 LUBRICATION CHART



*** Effective S/N. BS/BV 14 - 14329, BS/BV 18 - 18209**

LUBRICATION SCHEDULE CHART

	Grease		Hydraulic Oil Filter
	Engine Oil		Transmission Oil
	Engine Oil Filter		Fuel Filter
	Hydraulic Oil		Water *(Drum Spray Bar)*

Refer to Page 8-4 for specific oil grades.

This lubrication schedule is supported by the Maintenance Schedule Chart found in Section 5 of this manual

LUBRICATION CHART

SERVICE FUNCTION:

S-CHECK A-ADD G-GREASE AR-AS REQUIRED C-CHANGE

D-DRAIN F-FILL CL-CLEAN FTLH-FILL TO LEVEL HOLE

SERVICE INTERVAL	ITEM REF.	DESCRIPTION	SERVICE	REMARKS	QUANTITY
●	1	ENGINE OIL	S A	SAE 15W/40	FILL TO DIPSTICK FULL
10 HOURS	2	FUEL TANK	S A	#2 DIESEL FUEL	25 LITER
OR	3	WATER TANK	S A	WATER	FILL TO NECK
DAILY	4	INLINE WATER STRAINER	S CL	SEE OP./PARTS MAN.	
◆					
50 HOURS	5	DRUM OFFSET GUIDES	G	MPG-EP2 GREASE	AR
■	6	HYDRAULIC OIL	G	SAE 10	FILL TO DIPSTICK FULL
100 HOURS	7	ECCENTRIC OIL	S A	HD SAE 80W/90	FTLH
	8*	DRUM DRIVE GEARBOX OIL	S A	HD SAE 80W/90	FTLH
◆	9	ENGINE OIL	D F	SAE 15W/40	2.5 LITER
200 HOURS	10	ENGINE OIL FILTER	C	SEE OP./PARTS MAN.	1
	11	HYDRAULIC FILTERS	C	SEE OP./PARTS MAN.	2
X					
500 HOURS	12	ENGINE FUEL FILTER	C	SEE OP./PARTS MAN.	1
O	13	ECCENTRIC OIL	D F	HD SAE 80W/90	0.3 LITER
1000	14*	DRUM DRIVE GEARBOX OIL	D F	HD SAE 80W/90	0.4 LITER
HOURS	15	HYDRAULIC OIL	D F	SAE 10	25 LITER
OR	16	HYDRAULIC OIL STRAINER	CL	SEE OP./PARTS MAN.	FTLH
ANNUALLY	17	WATER TANK	D CL F	WATER	90 LITER

* Effective S/N. BS/BV 14 14209, BS/BV 18 18329,

8.3 FLUID CAPACITIES

The following fluid capacities are provided for servicing personnel who must perform machine maintenance in remote locations where complete shop facilities and resources are not available. These capacities will give the servicing personnel an approximation of the fluid capacities of the components to be serviced. Always ensure that the specified method of checking for accurate fluid levels is used.

FLUID/OIL	APPROXIMATE CAPACITY
Diesel Fuel - #2 ASTM no. 2TT Diesel	25 Liter
Hydraulic Oil Tank (SAE 10W)	25 Liter
Engine Oil (SAE 15W/40) Lombardini Diesel 12LD 4754 - 2	2.5 Liter
Water Tank	90 Liter
Eccentric Oil (HD SAE 80W/90)	0.3 Liter (each each housing)
Planetary Gearbox (HD SAE 80W/90)	0.4 Liter (each each gearbox)

8.4 HYDRAULIC OIL REQUIREMENTS AND SPECIFICATIONS

The quality of the hydraulic oil is important to the satisfactory performance of any hydraulic system. The oil serves as the power transmission medium, system coolant, and lubricant. Selection of the proper oil is essential to ensure proper system performance and life.

Note:

As a general guideline the Lubrication Chart on page 8-2 indicates a SAE 10 weight oil may be used in the hydraulic system on this machine.

For the specifications and requirements that hydraulic oil used in this machine should meet, refer to information below.

Viscosity:	60 SUS minimum at operating temperature 7500 SUS maximum at starting temperature 150 to 225 SUS at 100°F (generally) 44 to 48 SUS at 210°F (generally)
Viscoity Index:	90 minimum
Aniline Point:	-175 minimum
API Gravity:	28 minimum Parafinic oils: 28 or more; Mixed base: 24 to 28; Napthanic or asphaltic base: 24 or less
Recommended Additives:	Rust and oxidation inhibitors Foam depressant
Desirable Characteristics:	Stability of physical and chemical characteristics High demulsibility (low emulsibility) for seperatrion of water, air and contaminants. Resistance to the formation of gums, sludges, acids, tars and varnishes High lubricity and film strength

he following are only a few examples of the commercial brand oils meeting specifications for use at temperatures above 10 degrees F (–12 degrees C).

Mobil Oil Company _____ Mobil DTE 25
Sun Oil Company _____ Sun Oil 2105
Shell Oil Company _____ Rimula X SAE 10 W
CCMC D4

For temperatures below 10°F (–12°C), the following examples meet specifications.

Auto Transmission Fluid _____ Type F
Mobil Oil Company _____ Mobil DTE 13
Shell Oil Company _____ Tellus T-27

8.5 LUBRICATING OIL/GREASE SPECIFICATIONS (EXCEPT ENGINE)

I. Extreme Pressure Multi-Purpose Grease

This is a lithium calcium base grease with a high load carrying capacity. The following properties are recommended:

Timken OK Load	40 Lb. Minimum
Dropping Point Minimum	350°F (177°C)
Oil Viscosity	75 SUS Minimum at 210°F (99°C)
Water Resistance	Excellent

Under normal operating conditions, the following consistency grades are recommended:

NLGI No. 0 for subzero Fahrenheit temperatures.
NLGI No. 1 or No. 2 for normal ambient temperatures.
NLGI No. 2 or No. 3 for temperatures over 100 degrees F. (38 degrees C).

8.6 ENGINE LUBRICATING OIL SPECIFICATIONS

NOTE

For latest applicable engine lubricating oil specifications, contact engine manufacturer/distributor or your Ingersoll-Rand Distributor.

8.7 LOMBARDINI FUEL OIL SPECIFICATIONS

Always use a reputable branded grade of fuel (gas oil), the sulfur content of which should be below 0.5 percent and observe strict cleanliness when filling. At low ambient temperature, use only winter grade fuel. The fuel must be replenished promptly to prevent the tank from running dry; otherwise the injection pump, fuel filters, and injection lines will need air-venting.

Use winter-grade diesel fuel only during the cold season, because with ordinary fuel, paraffin deposits may form at low temperatures and clog the fuel filter. At excessively low temperatures, even winter-grade fuel will tend to cloud. If only summer-grade fuel is available, or if winter-grade fuel is used at very low temperatures, we recommend the following values for the admixture of kerosene or tractor fuel. **The admixture is to be considered as a substitute which must not be used for more than one tank filling.** Refer to the following chart "FUEL SPECIFICATIONS" for information.

8.8 TRANSMISSION OIL SPECIFICATIONS

Transmission oil to HD SAE 80W/90 specification is recommended for use in:

- eccentric bearing housings
- drum drive gearboxes installed on units effective S/N. 14 BS/BV 14329, and 18 BS/BV 18209).

e.g. Shell Spirax HD SAE 80W/90 is an example of one oil meeting this recommendation.

FUEL SPECIFICATIONS

Ambient Temperature	Summer Diesel Fuel %	Admixture %	Diesel Fuel %	Admixture %
down to +14°F (–10°C)	90	10	100	—
down to +7°F (–14°C)	70	30	100	—
down to –4°F (–20°C)	50	50	80	20
down to –22°F (–30°C)	—	—	50	50

Here is a simple method for testing the suitability of diesel fuel at low temperatures: Pour some fuel into a small bottle and expose to the cold. Any clouding would mean that the fuel can be used only in summer.

8.9 HAZARDOUS SUBSTANCE PRECAUTION

⚠ HAZARDOUS SUBSTANCE PRECAUTION

The following information is provided to assist the owners and operators of Ingersoll-Rand Road Machinery Equipment. Further information may be obtained by contacting your Ingersoll-Rand Road Machinery Equipment Distributor.

The following substances may be produced during the operation of this machine and may be hazardous to health

SUBSTANCE	PRECAUTION
Engine Exhaust Fumes	Avoid breathing in
Engine Exhaust Fumes	Avoid buildup of fumes in confined spaces.
Electric Motor Dust (Brushes/Insulation)	Avoid breathing in during maintenance
Brake Lining Dust*	Avoid breathing during maintenance

* Only on machines with dry axle brakes.

The following substances are used in the manufacturing of this machine and may be hazardous to health if used incorrectly.

SUBSTANCE	PRECAUTION
Antifreeze (Water cooled engines)	Avoid ingestion, skin contact and breathing in fumes
Hydraulic Oil	Avoid ingestion, skin contact and breathing in fumes
Engine Lubricating Oil	Avoid ingestion, skin contact and breathing in fumes
Preservative Grease	Avoid ingestion, skin contact and breathing in fumes
Engine Fuel	Avoid ingestion, skin contact and breathing in fumes
Battery	Avoid ingestion, skin contact and breathing in fumes
SAE Gear Oil	Avoid ingestion, skin contact and breathing in fumes

SECTION 9 - TORQUE SPECIFICATIONS

9.1 SAE TORQUE CHART

Use the following Recommended Torque Chart for bolts and nuts of SAE Grade 5 or better quality. If other torques are required they will be indicated in the text.

NOTE:
Torque values are based on plated, yellow zinc, dichromate bolts.

BOLT (COURSE)	TORQUE	
	lbs.-ft.	Nm.
1/4 - 20	9	12
5/16 - 18	19	26
3/8 - 16	37	50
7/16 - 14	59	80
1/2 - 13	90	122
9/16 - 12	130	176
5/8 - 11	180	244
3/4 - 10	320	434
7/8 - 9	515	698
1 - 8	775	1051
1 1/8 - 7	1100	1492
1 1/4 - 7	1540	2088
1 3/8 - 6	2020	2739
1 1/2 - 6	2690	3648

BOLT (COURSE)	TORQUE	
	lbs.-ft.	Nm.
1/4 - 28	11	15
5/16 - 24	21	28
3/8 - 24	42	57
7/16 - 20	66	89
1/2 - 20	100	136
9/16 - 18	145	197
5/8 - 18	205	278
3/4 - 16	355	481
7/8 - 14	570	773
1 - 12	845	1146
1 1/8 - 12	1230	1668
1 1/4 - 12	1710	2319
1 3/8 - 12	2300	3119
1 1/2 - 12	3020	4095

NOTE:
Use Loctite 271 on all bolts larger than 5/16. Use Loctite 242 on bolts 5/16 and smaller. Apply enough Loctite to fill all gaps between the engaged bolt and nut threads.

All thread fasteners will be Loctited except the following:

1. *Nylon insert nuts.*
2. *Whizlock bolts and nuts.*
3. *Fasteners less than 1/4 inch diameter.*
4. *If instructed not to apply Loctite.*

9.2 ISO METRIC TORQUE CHART

Use the following Recommended Torque Chart for bolts and nuts of ISO Metric strength Class 8.8 and 10.9. If other torques are required, they will be indicated in the text.

NOTE:
Torque values are based on plated, yellow zinc, dichromate bolts. Values will be approximately 30% less if lubricated bolts are used.

BOLT (COURSE)	TORQUE	
	lbs.-ft.	Nm.
M6 x 1,0	9	12
M8 x 1,25	21	28
M10 x 1,5	45	61
M12 x 1,75	79	105
M14 x 2,0	125	170
M16 x 2,0	195	265
M20 x 2,5	380	515
M24 x 3,0	660	895
M3- x 3,5	1310	1780
M36 x 4,0	2290	310

NOTE:
Use Loctite 271 on all bolts larger than M8. Use Loctite 242 on bolts M8 and smaller. Apply enough Loctite to fill all gaps between the engaged bolt and nut threads.

All thread fasteners will be Loctited except the following:

1. *Nylon insert nuts.*
2. *Whizlock bolts and nuts.*
3. *Fasteners less than 1/4 inch diameter.*
4. *If instructed not to apply Loctite.*

9.3 SPECIAL TORQUE VALUES FOR BS/BV 14/18 SERIES VIBRATORY COMPACTOR

The following are special torque values for specific fasteners that are different from those listed on the Torque Charts on the preceding pages .

Engine Area

FUNCTION OF FASTENER	FASTNER SIZE	TORQUE		USE OF LOCTITE #
		lbs-.ft	Nm	
Pump Coupling to Flywheel	M8	20	27	271
Pump Flange to Propulsion Pump	M8	40	54	271
Vibration/Steer Pump to Engine	M8	23	31	271
Propulsion Pump to Engine Flywheel	M14.5x1.5	75	102	271
Side Shock Mounts	M8	55	75	None
ROPS	M12	455	617	None

Drum Area

FUNCTION OF FASTENER	FASTNER SIZE	TORQUE		LOCTITE # (if used)
		lbs-.ft	Nm	
Vibration Motor to Drive Bracket	M12	45	61	NO
Shock Mounts to Vibration Leg/Drive Bracket	M12	110	149	NO
Shock Mount to Propulsion Drive Bracket	M12	110	149	NO
Shock Mount to Propulsion Side of Drum	M12	80	108	NO
Propulsion Motor (Sai) to Propulsion Leg	M12	220	298	271
Vibration Leg to Spacer	M12	220	298	271
Propulsion Leg to Spacer	M12	220	298	271
Shock Mounts to Drum	M12	80	108	271
Propulsion Motor (Brevini) to Propulsion Leg	M14 x 1.5	90	122	271

Articulation Area

FUNCTION OF FASTENER	FASTNER SIZE	TORQUE		LOCTITE # (if used)
		lbs-.ft	Nm	
Nut on Shaft through Frame Swivel Bracket	M22	260	353	271
Frame Rear Plate through Oscillation Swivel Pin	M20	260	353	271

SECTION 10 - ELECTRICAL/HYDRAULIC SCHEMATICS

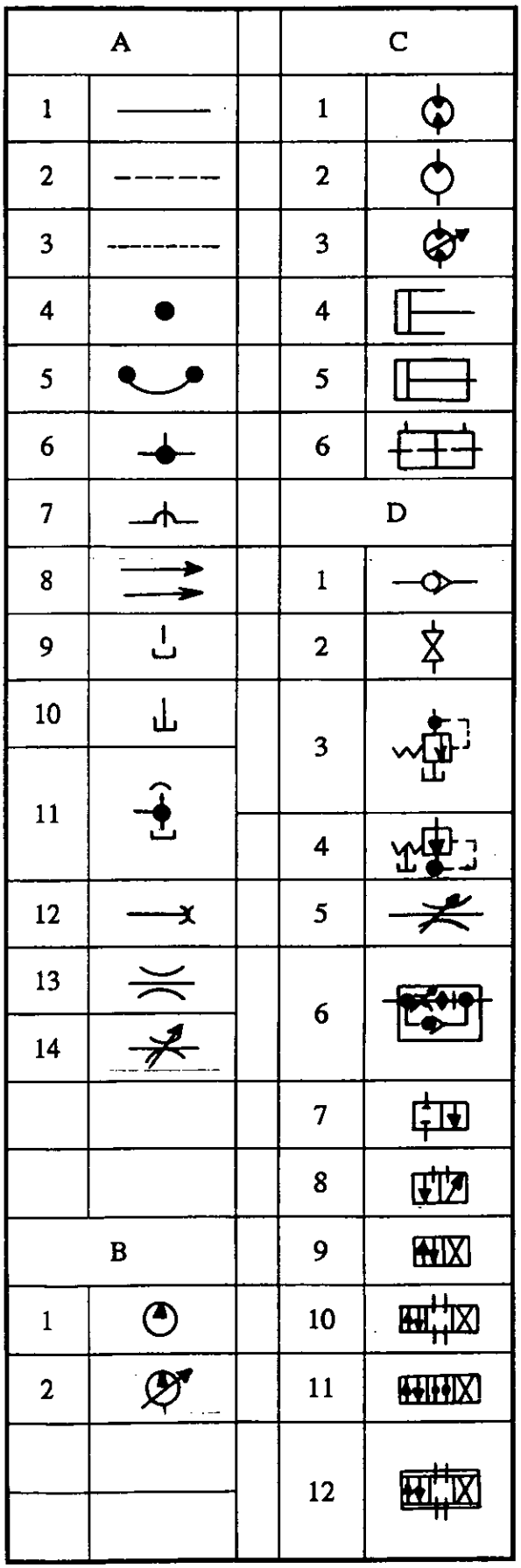
10.1 SCHEMATICS

All electrical and hydraulic schematics for the machine are provided here. On page 2 of this section, there is a copy of A.N.S.I. Graphical Symbols to explain the symbols used on the hydraulic schematic.

NOTE:
All schematics are current as of the date of printing and are subject to change without notice.

10

10.2 A.N.S.I. GRAPHICAL SYMBOLS



A - LINES AND LINE FUNCTIONS

1. Working Line
2. Pilot Line
3. Drain Line
4. Connector
5. Flexible Line
6. Joining Lines
7. Passing Lines
8. Direction Of Flow
9. Line To Reservoir Above Fluid Level
10. Line To Reservoir Below Fluid Level
11. Line To Vented Manifold
12. Plug Or Plugged Connection
13. Fixed Restriction
14. Variable Restriction

B - PUMPS

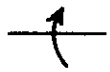
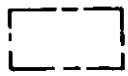
1. Single, Fixed Displacement
2. Single, Variable Displacement

C - ACTUATORS

1. Fixed Displacement Reversible Motor
2. Fixed Displacement Non-Reversible Motor
3. Variable Displacement Reversible motor
4. Single Acting Cylinder
5. Double Acting Cylinder - Differential
6. Double Acting Cylinder - Non-Differential

D - VALVES

1. Check
2. On/Off (Manual Shutoff)
3. Pressure Relief
4. Pressure Reducing
5. Flow Control, Adjustable, Non-Compensated
6. Flow Control Adjustable (Temperature and Pressure Compensated)
7. Two Position - Two Connection
8. Two Position - Three Connection
9. Two Position - Four Connection
10. Three Position - Four Connection
11. Two Position - In Transition
12. Valves Capable Of Infinite Positioning

A		B	
1		1	
2		2	
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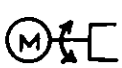
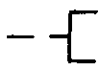
4		4	
5		5	
6		6	
7		7	
8		8	
9		9	
10		10	
11		11	
12		12	

A - METHODS OF OPERATION

1. Spring
2. Manual
3. Push Button
4. Push-Pull Lever
5. Pedal On Treadle
6. Mechanical
7. Detent
8. Pressure Compensated
9. Single, Winding Solenoid
10. Reversing Motor
11. Pilot Pressure Remote Supply
12. Internal Supply

B - MISCELLANEOUS

1. Rotating Shaft
2. Enclosure
3. Vented Reservoir
4. Pressurized
5. Pressure Gauge
6. Electric Motor
7. Spring Loaded Accumulator
8. Gas Charged Accumulator
9. Heater
10. Cooler
11. Temperature Controller
12. Strainer Filter

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10.3 ELECTRICAL SCHEMATIC

LEGEND FOR ELECTRICAL SCHEMATIC

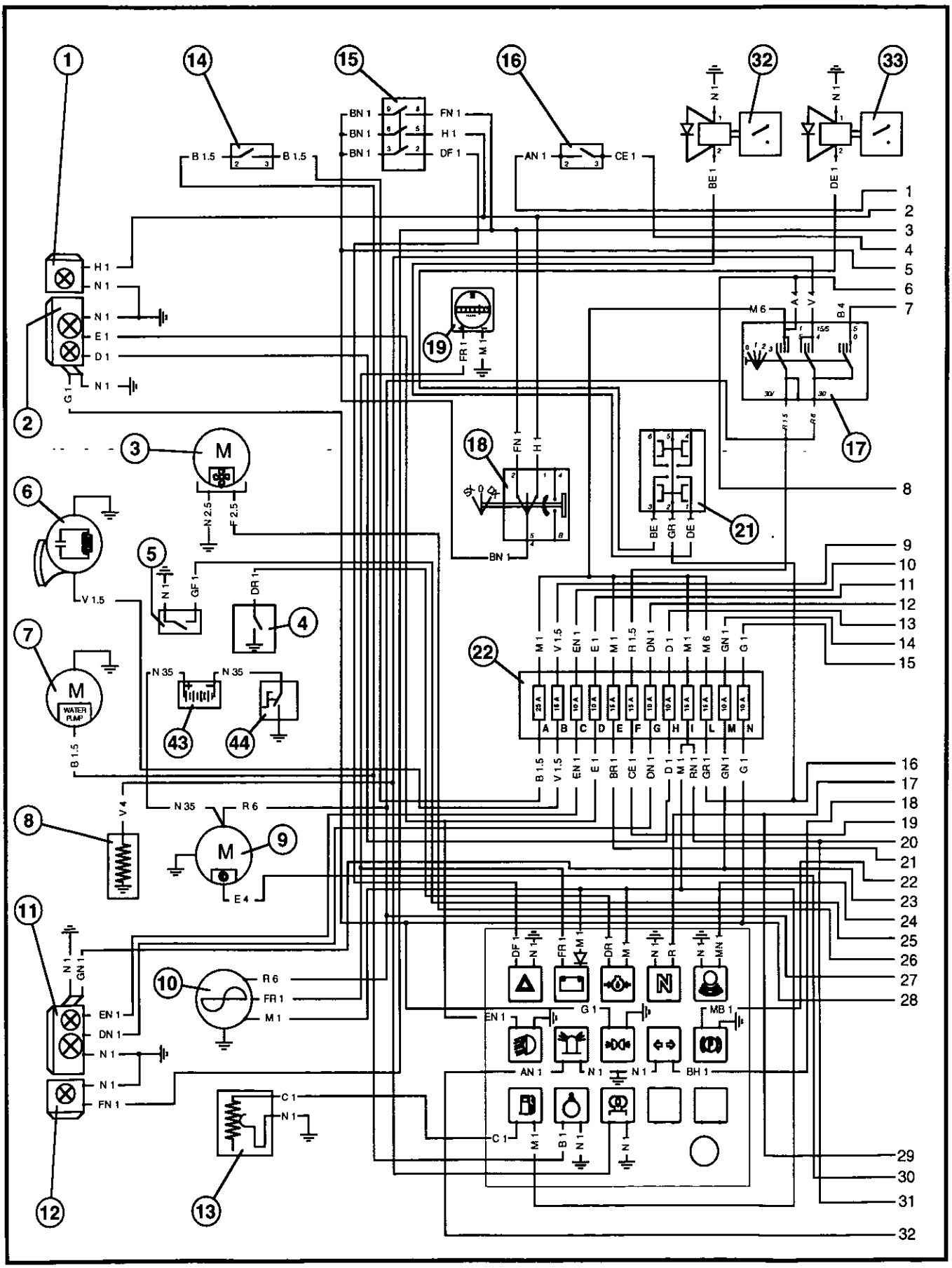
Item Ref	Description	Item Ref	Description
1	Right Turn - Direction Indicator Light	23	Warning Indicator Lights Panel
2	Right side Headlight/Marker Light	24	In-line Fuse, Electric Fan
3	Electric Fan	25	Relay - Starter Motor
4	Engine Oil Pressure Sensor Switch	26	Relay - Seat Switch
5	Electric Fan Sensor Switch	27	Relay - Electric Fan
6	Horn	28	Relay - Flashing Beacon
7	Water Pump	29	Seat Switch
8	Temperature Sensor	30	Neutral Start Switch, Propulsion Lever
9	Starter Motor	31	Emergency Stop Switch
10	Alternator	32	Solenoid Valve, Drum Offset - Left
11	Left side Headlight/Marker Light	33	Solenoid Valve, Drum Offset - Right
12	Left Turn - Direction Indicator Light	34	Engine Shutdown Solenoid
13	Fuel Level Sensor	35	Solenoid Valve, Vibration
14	Water Pump ON/OFF Switch	36	Solenoid Valve, Emergency Brake
15	Hazard Warning Light Switch	37	Solenoid Valve, Seat Switch
16	Flashing Beacon Switch	38	Rear Lights Cluster -Right Side
17	Ignition/Starter Switch	39	Flashing Beacon
18	Direction Turn Switch	40	Light, Number Plate
19	Hourmeter	41	Vibration Switch
20	Horn / Lights Switch	42	Rear Lights Cluster -Left Side
21	Drum Offset Switch	43	Battery
22	Fusebox	44	Battery Isolator Switch
23	Warning Indicator Lights Panel		

FUSE IDENTIFICATION TABLE

Fuse Ref.	Ampere Rating	Circuit
A	25A	Water Pump
B	15A	Horn
C	10A	Hi Beam Light -Left side
D	10A	Hi Beam Light -Right side
E	15A	Braking and Starter Relay
F	15A	Flashing Beacon and Relay
G	10A	Low Beam Light -Left side
H	10A	Low Beam Light -Right side
I	15A	Warning Indicator Light Panel, Seat Switch, Electric Fan, Engine Stop and Emergency Brake Switch
L	15A	Vibration and Drum Offset
M	10A	Front Left and Rear Right Marker Light
N	10A	Front Right and Rear Left Marker Light, and Registration Plate Light

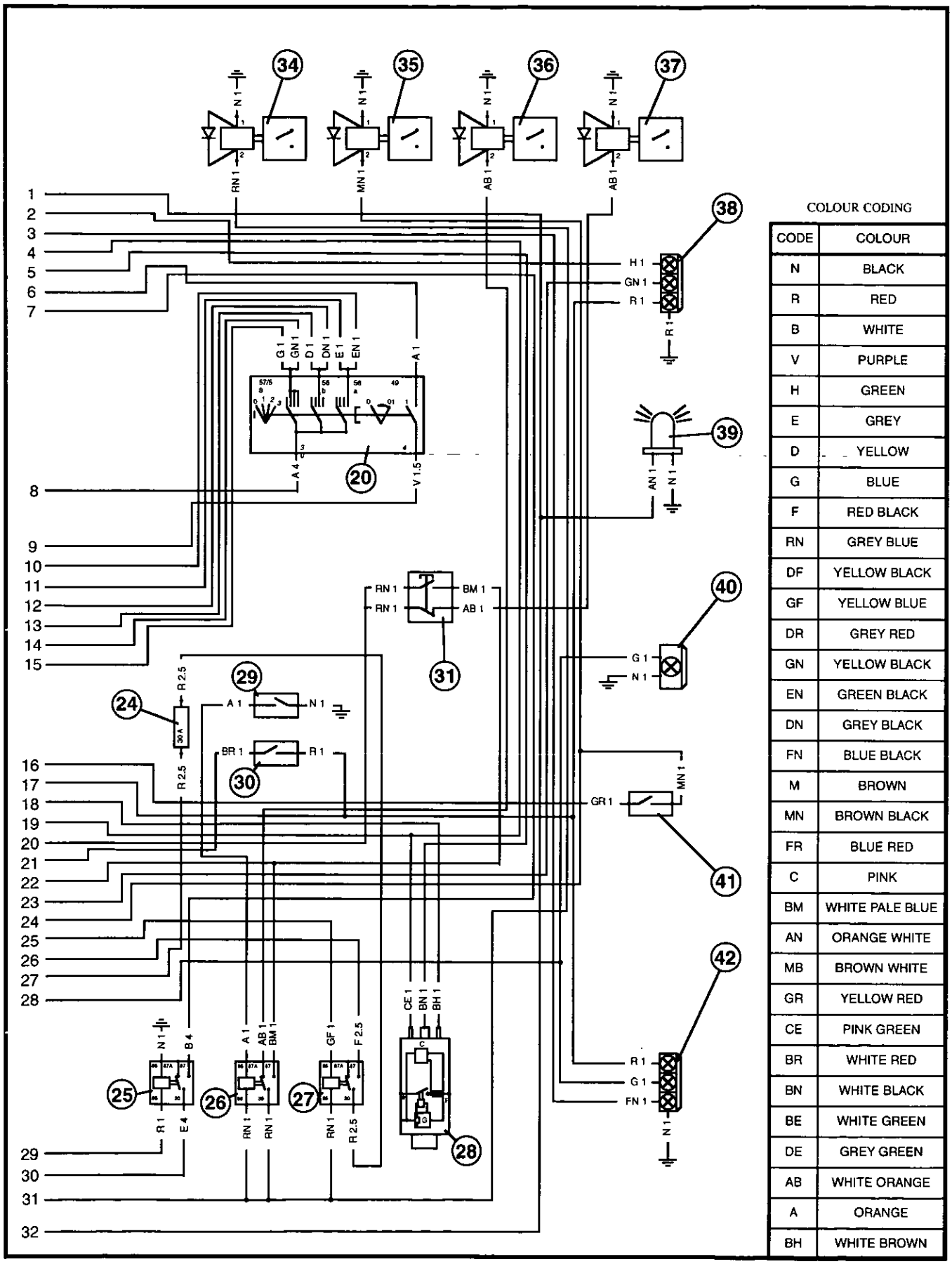
Electrical Schematic - BS/BV 14 Series and BS/BV 18 Series

(Sheet 1 of 3)



Electrical Schematic - BS/BV 14 Series and BS/BV 18 Series

(Sheet 2 of 3)



COLOUR CODING

CODE	COLOUR
N	BLACK
R	RED
B	WHITE
V	PURPLE
H	GREEN
E	GREY
D	YELLOW
G	BLUE
F	RED BLACK
RN	GREY BLUE
DF	YELLOW BLACK
GF	YELLOW BLUE
DR	GREY RED
GN	YELLOW BLACK
EN	GREEN BLACK
DN	GREY BLACK
FN	BLUE BLACK
M	BROWN
MN	BROWN BLACK
FR	BLUE RED
C	PINK
BM	WHITE PALE BLUE
AN	ORANGE WHITE
MB	BROWN WHITE
GR	YELLOW RED
CE	PINK GREEN
BR	WHITE RED
BN	WHITE BLACK
BE	WHITE GREEN
DE	GREY GREEN
AB	WHITE ORANGE
A	ORANGE
BH	WHITE BROWN

Electrical Schematic - BS/BV 14 Series and BS/BV 18 Series

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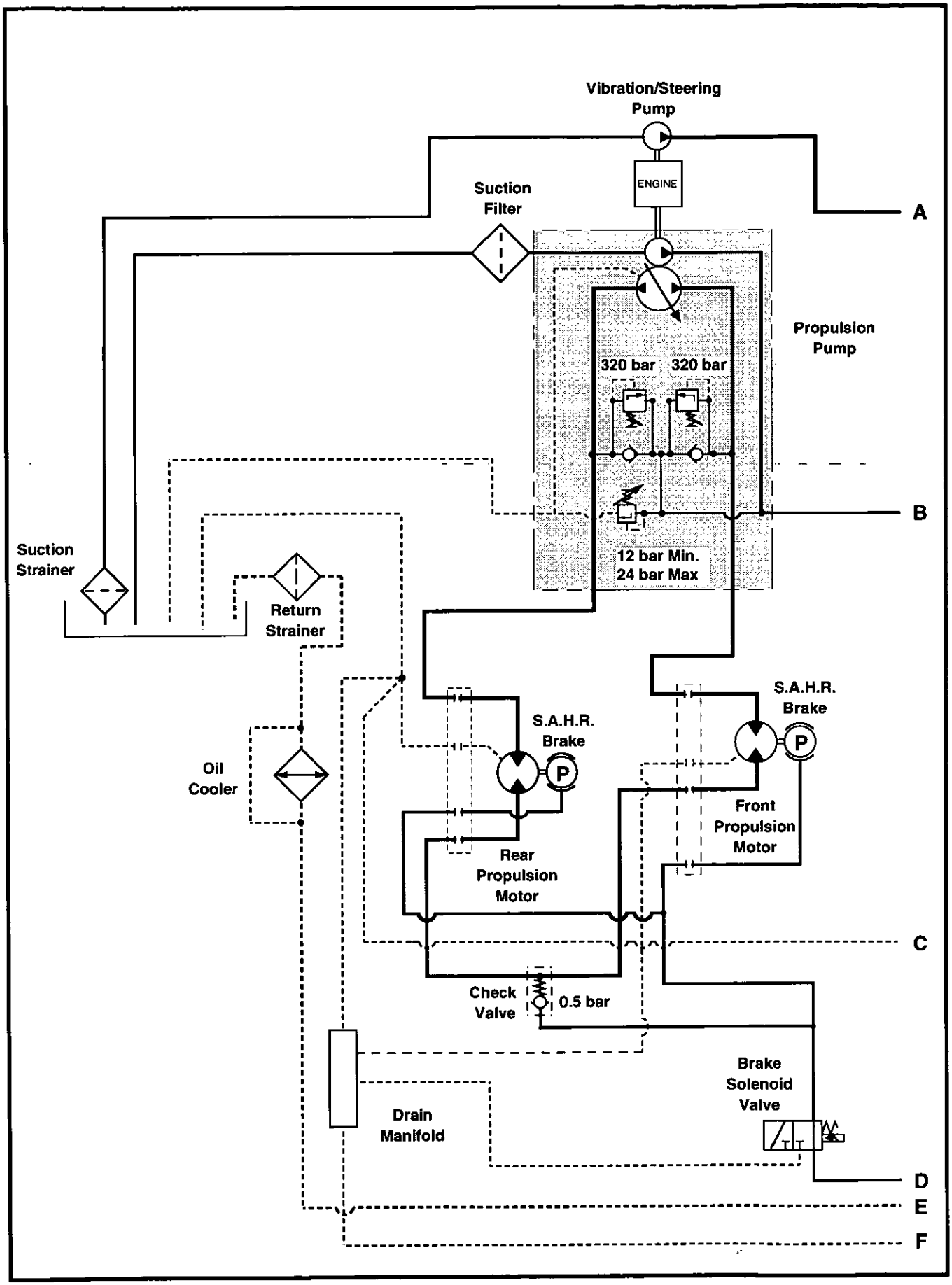
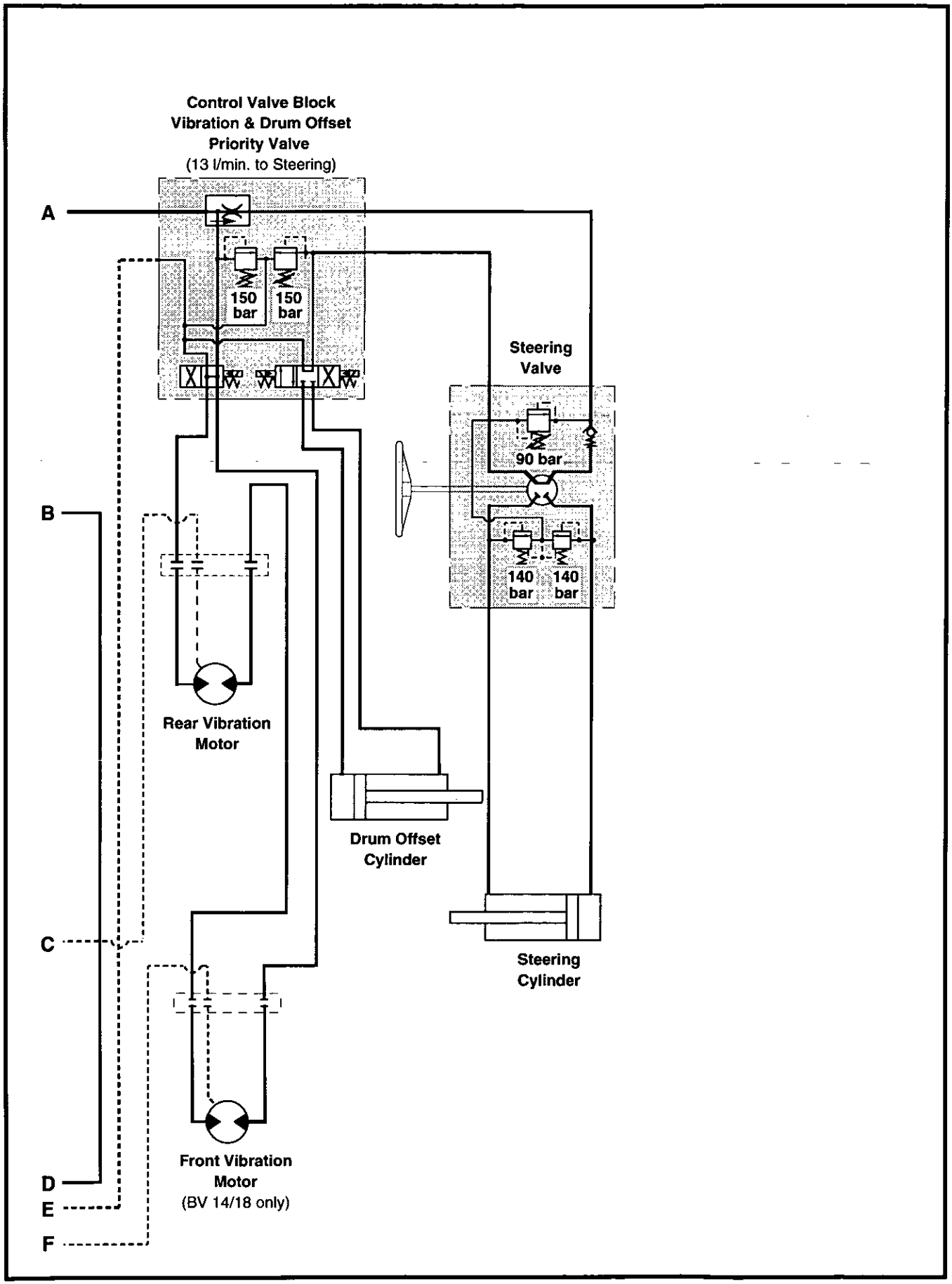
10.4 HYDRAULIC SCHEMATICS



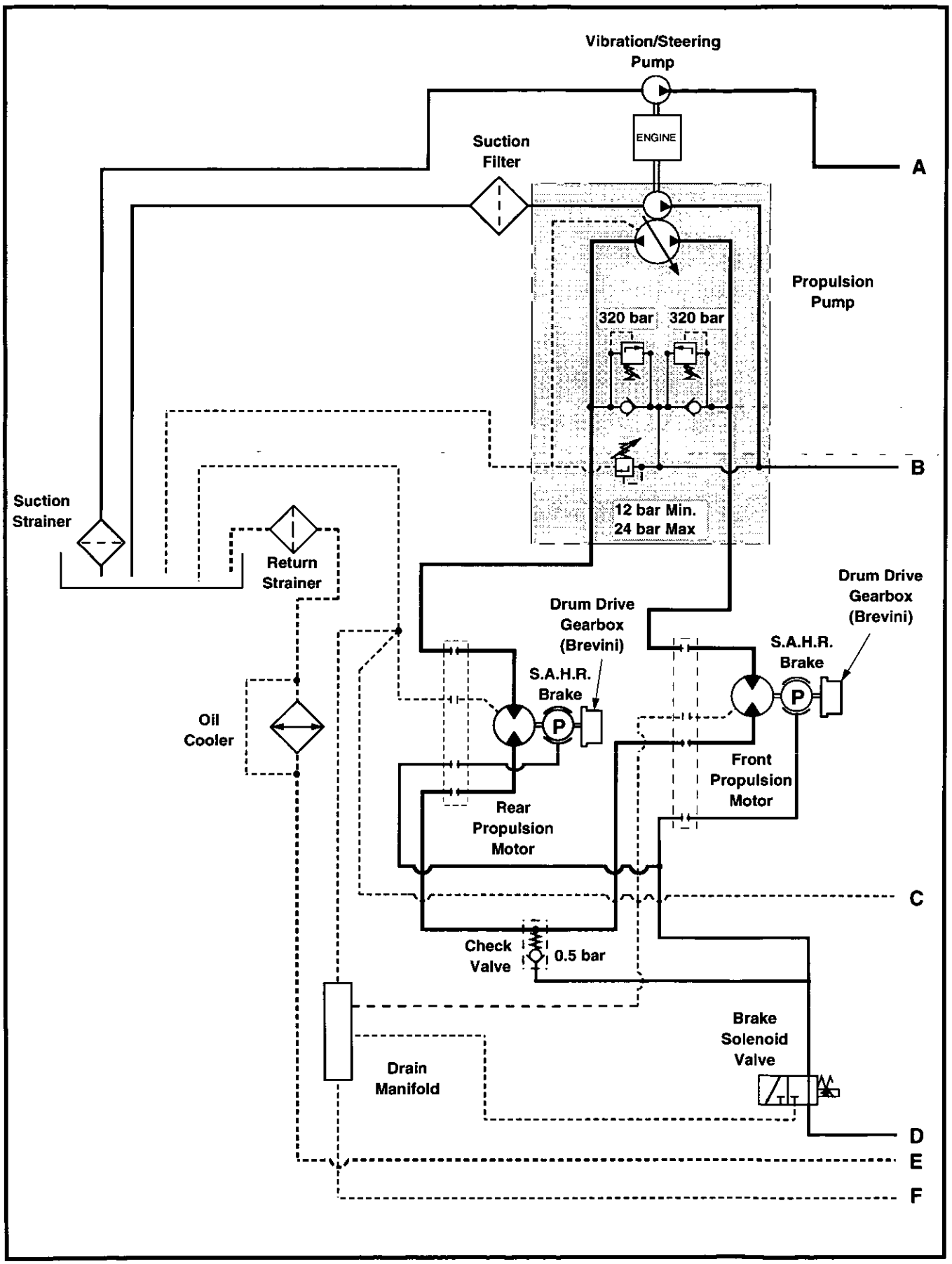
Hydraulic Schematic - BS/BV 14 Series *(Prior to S/N. 14329)* and BS/BV 18 Series *(Prior to S/N. 18209)*

(Sheet 1 of 2)



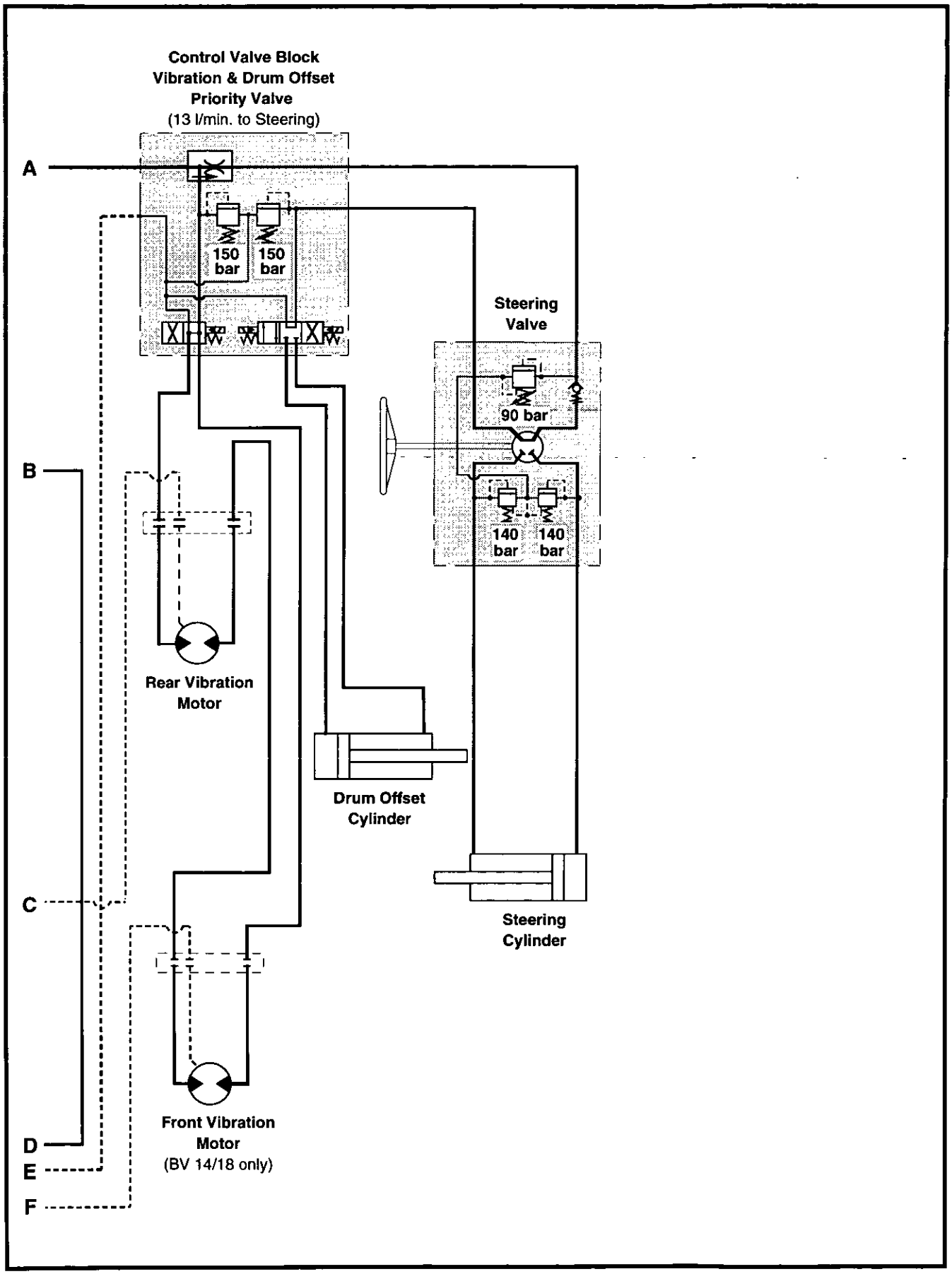
Hydraulic Schematic - BS/BV 14 Series *(Prior to S/N. 14329)* and BS/BV 18 Series *(Prior to S/N. 18209)*

(Sheet 2 of 2)



Hydraulic Schematic - BS/BV 14 Series *(Effective S/N. 14329)* and BS/BV 18 Series *(Effective S/N. 18209)*

(Sheet 1 of 2)



Hydraulic Schematic - BS/BV 14 Series *(Effective S/N. 14329)* and BS/BV 18 Series *(Effective S/N. 18209)*

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