lubecore™

General Manual

Lubecore_GM_001

Parallel Automated Lubrication System
Pneumatic Pump.

NEXT GENERATION AUTOMATED LUBRICATION

Document Information

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Contents Manual

Preface to the Manual

The operation instructions contain important information for the safe and proper operation of an automated lubrication system. It is recommended that a user read the instructions carefully prior to operation, Lubecore will not be held liable for damages and failures resulting from non-observance of these instructions. All instructions must be completed respective to national regulations pertaining to accident and environmental protection.

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Responsibility to ensure the safe operation of the automated lubrication system, the end user is responsible for the following:

1). The automated lubrication system shall be operated only for the intended use and its design shall neither be modified nor transformed.

2). The automated lubrication system shall be operated properly only if it is in a proper functioning condition and if it is operated in accordance with the maintenance requirements.

3). Personnel must be familiar with this operation manual and the safety instructions mentioned herein and observe these carefully.

4). Wastes (e.g. used oil, detergents, lubricant) must be disposed in accordance with relevant federal, state, provincial and territorial environmental regulations.

Service

Lubecore offers users full service in the form of advice, on-site installation assistance, training, etc if requested. In case of inquiries pertaining to maintenance, repairs and parts, Lubecore requires model specific data to enable us to identify the components of the automated lubrication system. Lubecore will not accept any liability for damages caused by the misuse of the designed automated lubrication system and/or the repair of said system by using any other parts other that Lubecore International original (OEM) parts.

Safety Precautions

1). Comply with all safety regulations applicable within the locality where all work is performed.

2). Always take the necessary precautions to prevent potentially dangerous situations from occurring during installation, inspection and maintenance. Always apply or use adequate safety measures to prevent personal injury and material damage, before starting work on any piece of the equipment.

3). The electrical system of the equipment must be disconnected before any work is performed.

4). The pressurized air system of the equipment must be drained of all air and pressure.

5). Inquire with the facilities management to the prescribed procedure to immobilize equipment and prevent operation of equipment. When these are not prescribed, remove any means that can start the equipment (ignition key / main power switch) and place indicator tags to show others not to start the equipment.

6). Never work underneath a machine, vehicle or any other piece of equipment, which is raised by a jack only. Always use a jack stand and check that the ground is firm and sufficiently flat.

7). Keep in mind that a vehicle with air suspension may drop of its own accord.

8). Only work underneath a cab if it is fully tilted and latched, or otherwise secured preventing accidental return-tilt.

9). Disconnect the ground battery lead from the vehicle's battery. This prevents electrical equipment from being inadvertently activated or otherwise electrically damaged.

10). Avoid working on a machine, vehicle or other equipment that recently was in use. Give time to allow components to cool (coolant, exhaust, turbo, etc).

11). A vehicle, machine or other equipment may only be operated by those who are trained and licensed to do so and are aware of all possible dangers.

12). Only use tools that fit and are designed for the specific task.

13). Adhere to all regulations, specifications and limitations as specified by the manufacturer of the machine, vehicle, equipment and /or engine.

Keep the environment in which you work clean for you and others.

Introduction

Lubecore™ Automated Lubrication Systems take care of daily regular and preventive maintenance for components requiring lubrication.

An automated lubrication systems prevents unnecessary wear and downtime, thus reducing operating costs and preventing unforeseen expenses.

Automated lubrication systems not only assist with extending maintenance intervals, they also prolong the useful technical and economic life of the equipment thus providing a higher residual value.

Lubecore automated lubrication systems are environmentally friendly; they are suitable for biodegradable lubricants, and prevent manual over-lubrication, and grease waste. The reduced need for replacement components also has a positive impact on the environment reducing the need for raw materials and energy to produce these replacement components.

The most important advantages:

- Extension of maintenance intervals.
- Reduced wear on components.
- Lower repair and replacement costs.
- Prevents downtime.
- More effective use of lubricant.
- Less time spent by technicians servicing equipment.
- Less expensive lubricant required, as expensive additives can be avoided.
- Reduces strain on equipment.
- Improved fifth wheel performance; avoid trailer-steer and improves safety.
- Promotes the use of a single type of lubricant. Preventing compatibility problems and the accidental application of the incorrect type of grease.

A Lubecore automated lubrication system ensures that all connected lubrication points on a vehicle or equipment are lubricated with a predetermined amount of grease at the correct interval. As lubrication takes place while the vehicle is in use, the lubricant is dispensed to all the connected lubrication points during movement of those components that are connected, ensuring an improved distribution of the lubricant over the surface area.

Apart from refilling the grease reservoir and performing a periodic quick system inspection, the Lubecore automated lubrication system does not require anything else to get the job done.

Lubecore's automated lubrication systems are designed with the utmost care and tested rigorously. This ensures an extended operational life and trouble-free operation, even under extreme operating conditions.

High Lubecore installation standards along with the use of the correct type of grease and periodic inspections ensures years of trouble-free system operation. Periodic inspections, which take little time and effort, can be performed during the regular daily circle check by the operator as well as monthly by the maintenance staff..

The Concept of Automated Lubrication

Greases are used where a mechanism can only be lubricated infrequently and where a lubricating oil would not stay in position. They also act as valuable sealants to prevent ingress of water and dust.

Equipment requires lubrication for the following reasons:

1). Keep moving components separated.

Lubricants are typically used to separate moving components, reducing friction, surface fatigue, heat generation, operating noise and vibrations. The most common way lubricants achieve this is by creating a physical barrier. In cases of high surface pressure (EP) or temperatures the fluid film is thin and some of the forces are transmitted between the surfaces through the lubricant. This is termed elastohydrodynamic lubrication.

2). Carry away contaminants and debris ("Wash Out" or "Purge").

Any accidental metal-to-metal contact created by debris or externally introduced contaminants like dirt or water, need to be removed to reduce the risk of damage and prevent corrosion.

3). Protect against wear.

Lubricants do not just prevent wear by keeping the moving parts apart. Lubricants may also contain anti wear or extreme pressure additives to boost their performance against wear and fatigue.

4). Prevent corrosion.

Quality lubricants are typically formulated with additives that form chemical bonds with surfaces to prevent corrosion and rust.

Under normal circumstances, lubricants / greases are applied to moving parts using a manual grease gun during regular maintenance intervals. These maintenance intervals could coincide with other service requirements like engine oil changes or can be determined based on hours of operation.

Proper equipment maintenance incorporates OEM recommended lubricant application at regular intervals. The goal is to ensure that the protective grease film is preserved between moving surfaces. The required interval (hours of operation or mileage) is determined by user operating information, equipment type, and environmental conditions. The equipment owner/operator is responsible to review the equipment and the lubricant application interval and adjust as needed to refresh the lubricant and prevent premature wear.

The manual application of lubricant relies on flush out of old lubricant in one instance during a service interval, while the equipment is idle. The goal is to prevent the failure of the lubricant film, as mentioned earlier, to prevent metal to metal contact.

Benefits

Automated lubrication Systems by Lubecore™ are designed to ensure the proper quantity of lubricant is applied during equipment operation ensuring:

The better distribution of lubricant to moving parts, increases the longevity and reliability of the equipment being lubricated. Automated lubrication systems (ALS) provides higher frequency of lubricant application with nominal quantities of lubricant to sustain the lubrication film while the equipment is in operation. This ensures proper protection without over greasing and unnecessary waste.

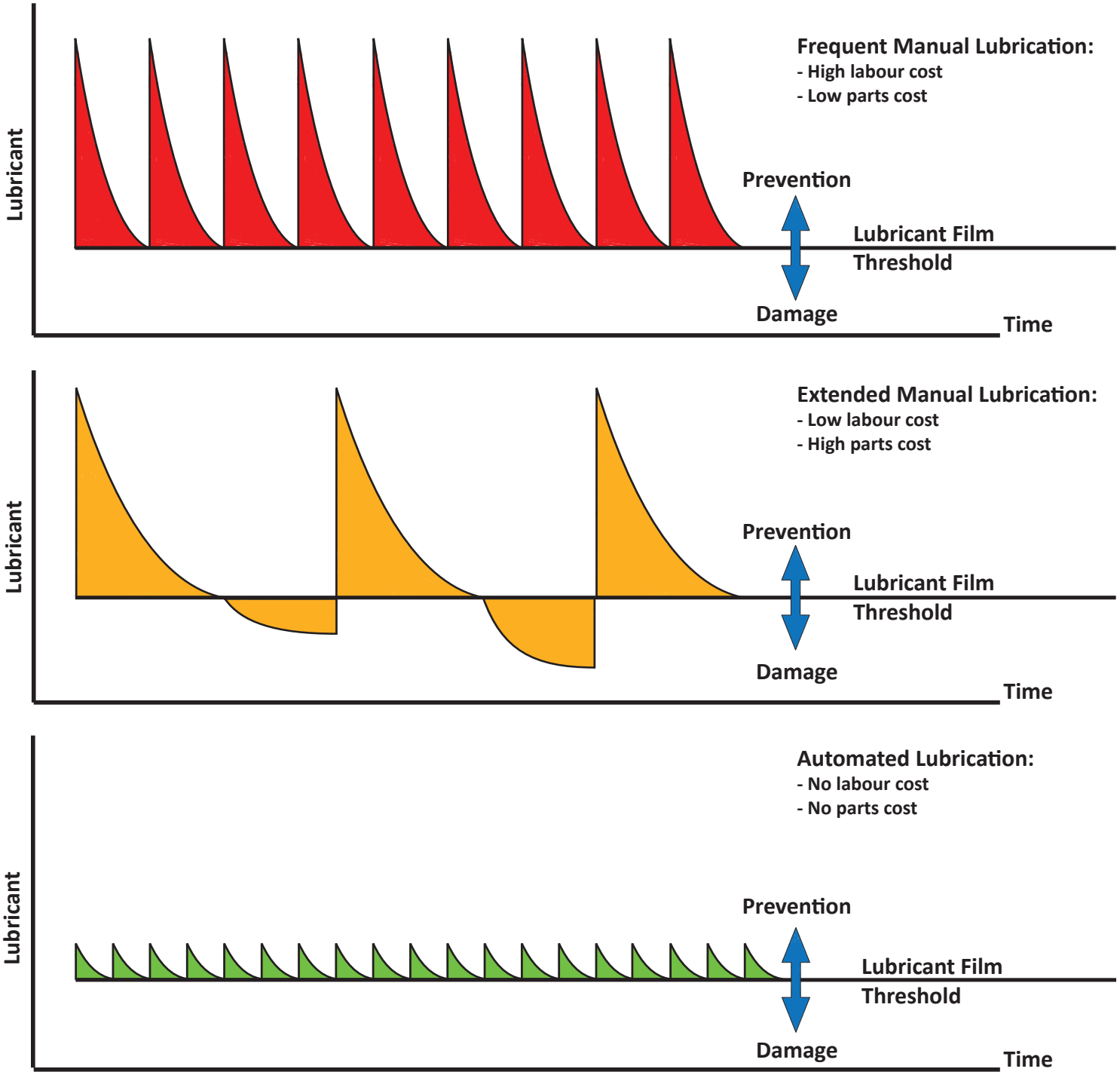


Illustration 1. **Manual Versus Automatic Lubrication, Representation of Concept.**

General Operation - Automated Lubrication System (ALS) - Truck

The Lubecore™ Automated Lubrication System (ALS) can be equipped with several options and a variety of pump styles. This section describes the general operation of a standard pneumatic lubrication pump with standard components. For details regarding the operation of our other pumps and components, please refer to the appropriate Lubecore manual or contact Lubecore directly. A Lubecore parallel automated lubrication system consists of the following main components.
Note: The ① are identification markers referring to items in the illustration on the next page.

- ① Pneumatically operated pump.
- ② Electronic timer.
- ③ Manifold and ④ injector assemblies.
- ⑤ Primary and ⑥ secondary tubing with fittings.

A Lubecore automated lubrication system will be designed and assembled according to the specific type of equipment and the associated operating conditions. Starting with the manufacturer specifications regarding the lubrication requirement, the system layout will be designed and the appropriate components will be selected.

The standard automated lubrication system is designed to function as follows:

While the equipment is in operation, the ignition switch provides the power for timer operation ② with battery power to perform its program. The timer's internal memory retains the last status prior to shut down. At start-up, the program resumes and counts down the time that remains in the predetermined interval.

After reaching the end of the pause interval, the timer engages a solenoid located on the bottom of the pneumatic lubrication pump ①. The activation of the solenoid provides the pump with air pressure (100 psi minimum) from the on-board air tank ⑧.

In turn, the pump, pumps the maximum allowable amount of grease, under pressure, into the mainline tubing ⑤ that connects the pump to either one or more manifolds, which are located at centralized point on the equipment.

The moment maximum pressure is reached in the mainline tubing, injectors ④ located in the manifolds ③ begin to measure and disperse a predetermined and consistent amount of lubricant through the secondary tubing ⑥ and fittings ⑨ and into the lubrication points ⑩. Once 25 Bar/362 PSI is reached, the pressure switch ⑪ closes and makes a connection to ground. This indicates to the timer that the system operating pressure has been obtained. The pressure switch then signals to the ALS that the lubrication cycle has been completed successfully.

At the completion of the lubrication cycle, the solenoid is deactivated by the timer. Air pressure from inside the pump is then directed to a pressure relief valve on the right side of the pump ⑫. The relief valve contains a spring set to keep a maximum of 5 psi / 0.3 bar pressure over the outside air within the pump. The purpose of this design is to prevent corrosion and other damage caused by dirt, road salt, and other debris that may enter the pump. Please refer to the Pump Operation section for more information.

With the air pressure removed, lubricant pressure in the primary tubing returns to zero and excess

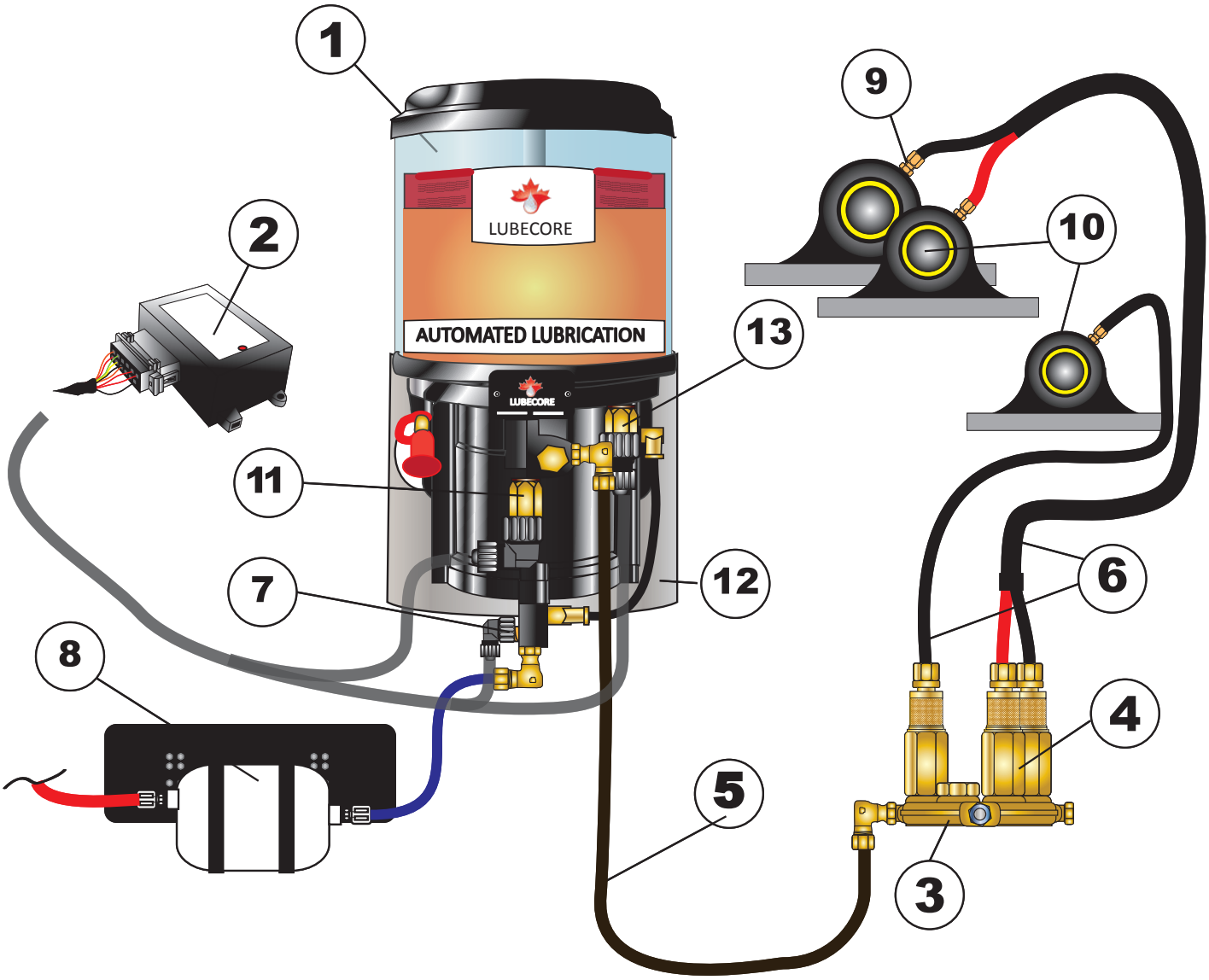


Illustration 2. **Standard Lubecore Automated Lubrication System Layout on a Truck.**

lubricant is recycled back into the pump. Once all the grease pressure has been removed, the reloading process within the injectors begins. Please refer to the injector operation section for more information.

After the timer deactivates the solenoid, the system program sets the time interval back to the start of the pre-set value and initiates another countdown (as long as the timer is supplied with power).

Lubecore highly recommends using an automated lubrication system that is equipped with a low-level switch/sensor. The low-level switch/sensor (13) helps prevent air from entering the automated lubrication system when the reservoir is not replenished in time. Any lubrication system, independent of brand or operating principle, may be negatively and severely affected by the ingress of air into the distribution side of the system.

Pneumatic Pump

The Lubecore™ pneumatic pump is the heart of the automated lubrication system (ALS). A clear, impact-resistant reservoir holds between 4 to 6 Kg of lubricant, protected by a follower plate. The follower plate ensures that the lubricant remains separated from moisture—preventing a funnel effect—and provides a clear indication of the level of lubricant.

- Additional pump features:
    - o Air recirculation: After pressurizing the grease upon the downstroke of the grease piston, the air pressure is recycled within the pump and kept at a pressure of 5 psi / 0.3 bar over atmospheric pressure. This prevents moisture build-up and other contaminants from entering the pump, and reduces seizures, corrosion, and premature wear.
    - o Lubricant low level switch/sensor: The pneumatic pump can be equipped with a lubricant level switch/sensor that is triggered by the follower plate. This switch alerts the user to re-fill the reservoir to prevent air pockets from entering the system, causing system malfunction. When a level switch/sensor is not installed, bleeding the ALS will be required when refilling the reservoir.
    - o Dichromate material surface treatment: Components within the pump are treated with an environmentally friendly and corrosion-resistant material. This treatment prevents premature wear of the components and increases system durability.

Illustration 3.
Lubecore Pneumatic Pump with 6Kg Reservoir and Pressure Switch.

Standard 4kg Truck 50.053
Standard 6kg Truck 50.063
Standard 4kg Trailer 54.737
Standard 6kg Trailer 54.736

Pump Operation

- Air pressure enters the pump via opening (**A**), as shown in the illustration on the right, in the bottom of the pneumatic pump.
    - o Air pressure requirement; for the pump to generate a sufficient amount of pressure, is a minimum of 6 bar (100 psi).
- Air pressure moves piston (**B**) upward against spring pressure (**C**), pushing lubricant into chamber (**D**). The flapper valve (**E**), placed above piston (**B**), prevents lubricant displaced by the upward motion of piston (**B**), from returning to the lubricant reservoir.
- Piston (**B**) can create maximum lubricant pressure at a surface

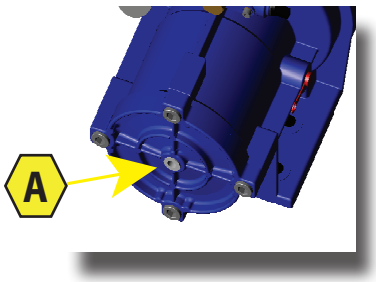


Illustration 4.
Air Entry Opening (A) in Bottom of Pump.

reduction ratio of 10:1 . For example, an air pressure of 100 psi will result in a lubricant pressure of 1000 psi.

- Pressurized lubricant flows from grease chamber (**D**) by way of internal pump galleries to the mainline tubing, over the non-return valve (**F**) and return valve (**G**).
- Non-return valve (**F**) prevents the lubricant from flowing to the reservoir. This route is blocked as long as the grease pressure from piston (B) is pushing against the non-return valve assembly.
- Return valve (**G**) allows lubricant to flow out from the non-return valve (**F**) to the mainline outlet of the pump.
- After the completion of the lubrication cycle, the air pressure from under piston (**B**) is released and grease pressure drops to zero. Lubricant pressure is released from the non-return valve (**F**), allowing grease to return to the reservoir via the internal galleries.
- Return valve (**G**) then blocks the lubricant return from the mainline and directs the pressure to the reservoir through the opening non-return valve (**F**).
- As piston (**B**) is moving down, it creates a vacuum that opens the flapper valve (**E**) and draws grease down into the grease chamber (**D**) for the next lubrication cycle
- Valve E, F, and G, in conjunction with the internal galleries we effectively prevent the build up of grease solids and reduce the chances of air pockets from developing inside the pump.
- After the lubrication cycle is complete, the air pressure

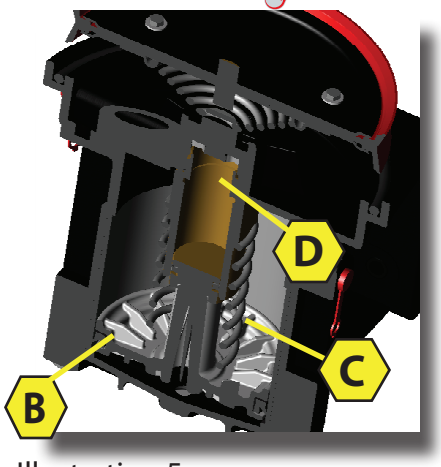


Illustration 5.
Cross Sectional View of the Grease Piston and Return Spring inside the Pneumatic Pump.

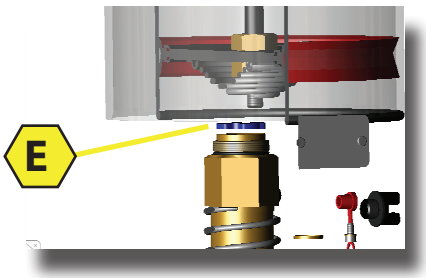


Illustration 7.
Placement of Flapper Valve (E) above Piston (B).

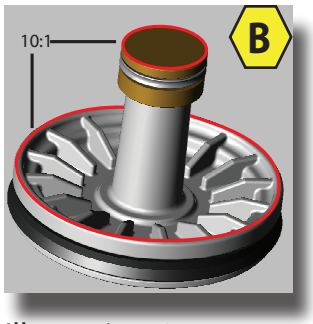
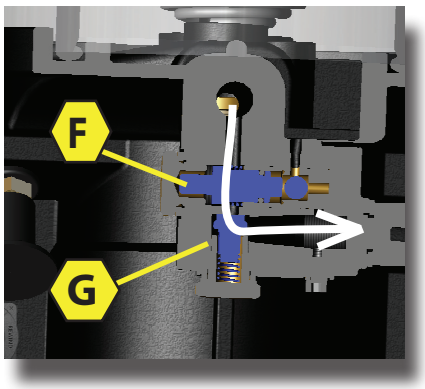
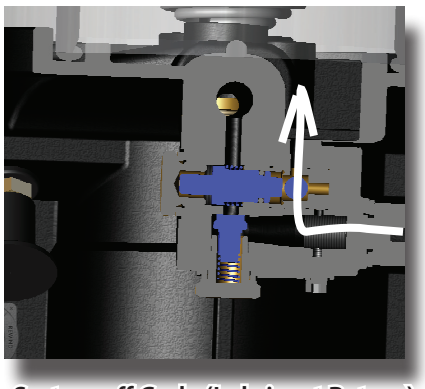


Illustration 6.
Grease Piston Air-to-Grease Pressure Ratio is 10:1



System on Cycle (Lubricant Delivery)



System off Cycle (Lubricant Return)

Illustration 8.
Direction of Flow During and After Lubrication Cycle

is released from below piston (**B**). The connected solenoid, which is a 2-way valve, closes the connection to the air tank and directs the air pressure to connection (**H**). Connection (**H**), located on the right side of the pump, contains a check valve that is calibrated to leave an air pressure of 5 psi inside the pump.

- As piston (**B**) moves down to receive a fresh charge of grease for the next lubrication cycle, the area above the piston needs to be replenished with air. This air is supplied through the pump vent valve assembly and is maintained by the check valve (H). Pressure is kept at 5 psi to prevent moisture and other pollutants from entering the pump's inner workings. Any excess air pressure is released to the atmosphere

The pump cycle is complete when all pressure has been removed from the primary tubing and the excess lubricant has returned to the reservoir. The pump is now ready to begin its next cycle.

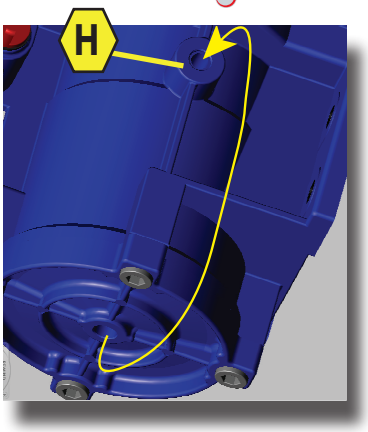


Illustration 9.
Air Recirculation at the End of a Lubrication Cycle.

Reservoir Follower Plate and Guide Rod

The Lubecore ALS pneumatic pump is equipped with a silicone based rubber wiper seal and stainless steel follower plate that are being guided and secured by a Dichromate center reservoir guide rod. These parts ensure that the lubricant in the reservoir is efficiently used and protected from moisture, air and foreign materials.

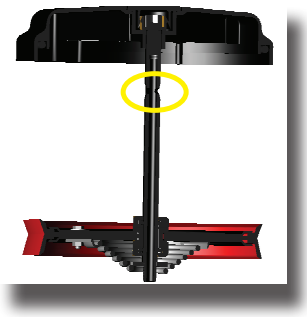


Illustration 11. Cross section of the pneumatic pump reservoir follower plate and guide rod. Highlighted are the over-flow openings.

The primary function of the follower plate is to prevent the funneling effect that may occur during the replenishment of the grease piston in the bottom of the pump. The follower plate is being held in place over a retention spring, by the guide rod.

The guide rod guides the follower plate up and down during use and provides an escape for lubricant and air during the filling process. There are several cross-drilled holes in the top of the guide rod that provide an escape for both air trapped underneath the follower plate and for excess lubricant. Internal galleries guide air and lubricant out through an opening on the left hand side of the pump. It is important to refill the reservoir past the cross-drilled holes on the guide rod when air is trapped under the follower plate.

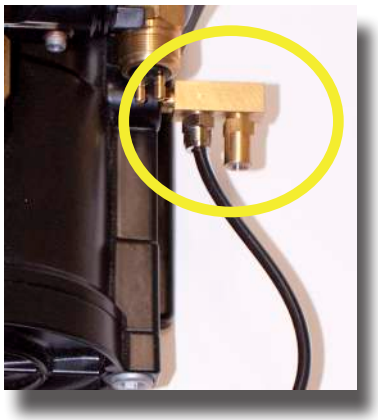


Illustration 10.
Right Side view of Pneumatic Pump showing the Vent Valve Assembly (50.044). The outer fitting is the "Lee" Valve.

Illustration 12.
Left Side view of Pneumatic Pump with Overflow circled.

Pump Mounting Gasket

When the pneumatic pump is mounted against a flat surface, like a truck chassis, pockets of air remain between the mounting surface and back of the pump. These pockets (open spaces) remain as a result of the casting process.

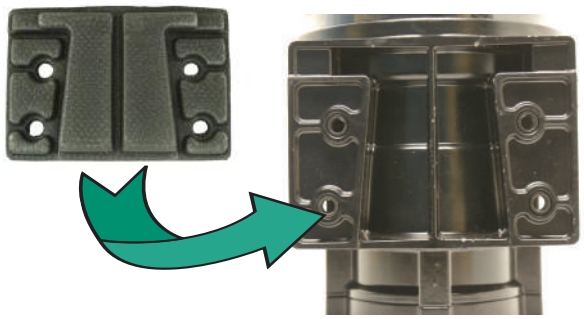


Illustration 13.
Pneumatic Pump Mounting Gasket foam insert. (10.063)

During normal operating conditions, moisture, dirt, and other road debris may accumulate over time, filling these open spaces. The expansion and contraction due to the freezing and thawing of moisture in these pockets may cause damage.

The Lubecore™ pneumatic pump is equipped with nylon bushings, washers and a foam insert to prevent damage caused by the build up of moisture, and to isolate the pump from the mounting surface. The isolation of the pump from the mounting surface eliminates metal-to-metal contact and prevents corrosion.

Timer Operation

General Operation of the Lubecore™ Truck Timer

The following is a functional description of the Lubecore™ ALS truck timer. This information pertains to model 12.016 and 12.036.
For a description of the Lubecore ALS for trailer application please see the appropriate documentation.

Illustration 14.
Lubecore™ 10-30 VDC Digital MKII Timer for Automated Lubrication Systems (12.016)

The 10-30 VDC Truck Timer has been designed with the capability to operate a variety of the Lubecore and competitor lubrication systems, pneumatic and electric. There are minor changes to the harness assembly that need to be performed to adapt the timer to those specific applications.

Each automated lubrication system requires a timer to control the operation. Depending on the model of pump connected (pneumatic or electric), the operation of the system may be slightly different, but the operation of the timer program remains the same.

Upon ignition, a programmed interval is initiated ("pause phase"). Each time the ignition is switched on or off, the timer stores the current status and resumes that status after the ignition is turned on again. After the pause phase is concluded, the timer engages either a solenoid or an electric motor, starting the "working phase". If the system has been equipped with an In Cab Manual Test Switch 12/24 VDC - Green (50.453), the light will be illuminated during working phase until the pressure switch is closed. Depending on the size of the lubrication system, this may take a few seconds. The working phase will last for a programmed period of time. After 2/3 of the working phase has been completed, the program checks for feedback from the pressure switch.

After a sufficient lubricant pressure has been reached within the ALS main line section, the pressure switch closes to ensure correct lubrication and the, "*In Cab Manual Test Switch*" will turn off. If the switch does not close, an audible and visual alarm is activated for the remainder of the working phase. The alarm will continue through subsequent lubrication cycles until the problem has been corrected.

The timer is equipped with real time clock. This clock, synchronized during programming with a computer, registers all completed cycles, total running time, errors and more. See the timer report section for more details. Any pressure failures are recorded with a date and time stamp from when it occurred and is resolved.

To prevent air from entering the lubrication system, Lubecore automated lubrication systems can be equipped with a low-level switch. Once the follower plate triggers the low-level switch in the reservoir the timer will prevent the pump from cycling and activate the externally mounted light which will illuminate and blink (2 seconds on, 2 seconds off) until the lubrication cycle is complete. An audible alarm will also be heard in conjunction with the blinking light from the initial turn of the ignition, the light will only blink for every proceeding alarm.

As long as the reservoir is below minimum level, the timer will count pause times and cycles, but will NOT perform a lubrication cycle (12.016, 12.036). The alarm light will indicate to the operator that the reservoir is below minimum level during the cycle phase. Once the reservoir has been refilled, the timer will continue to flash a warning until the timer completes one fully automated cycle. It will then return to its normal programmed operations.

Low level events are permanently stored in the timers memory with a date and time stamp by the real time clock, (12.016, 12.036) timers. ***This function is not available on the (12.057, 12.058 & 12.059) timers.***

Performing a Test Cycle

A single manual "test cycle" can be performed on the timer without connecting to a computer. There are three ways to initiate a test cycle.

1). The truck timer has been equipped with a red test cycle switch in the timer cover.

2). An Cab Manual Test Switch 12/24VDC - Green (50.453), can be installed in the dashboard.

3). A manual-cycle bypass integrated into the solenoid body.

For further details about the operation of the manual-cycle switch on the solenoid, please refer to the following section. (Pg. 22)

Illustration 15.
Manual Cycle Switch on the Solenoid. (50.005)

Accelerated Test Cycles

Depressing the red test button on the timer or depression the dash mounted switch for a duration of 10 seconds initiates a continuous "accelerated" test cycle.

The timer will engage the solenoid for 15 seconds (working time) and subsequently disengage the solenoid for 15 secondes. This accelerated cycle of 15's on and 15's off, will be repeated until the ignition is turned off.

Red Test Button

To prevent accidental operation of the ALS, the red button has been set below the top cover of the timer enclosure.

To engage a test cycle:

1). Set ignition to auxiliary position and ensure that there is a minimum of 100 psi of pressure in the onboard air tank.

2). Using a small instrument (pencil), press the red test button located in the timer cover and hold for 3 seconds before releasing.

The timer will perform a single lubrication cycle as programmed.

Illustration 16.
Location and Method to push Test Button on Timer.

In Cab Manual Test Switch Option

To engage a test cycle with the external switch:

1). Set ignition to auxiliary position and ensure that there is a minimum of 100 Psi of pressure in the onboard air tank.

2). Press the In Cab Manual Test Switch and hold for 3 seconds. While depressed, the light will momentarily illuminate, until the pressure switch closes, this communicates to the operator that a test cycle has been initiated.

Illustration 17.
In Cab Manual Test Switch (50.453)

The timer will perform a single lubrication cycle as programmed.

Communication Light and Audible Signals

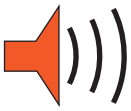
The following is an overview of possible visual and audible warning signals. Depending on installed system features, the low level indication by the timer and light may or may not occur. Refer to the installed features to check if a low level switch or pressure switch are present in the system.

The *In Cab Manual Test Switch*, when installed, is normally located on the dashboard. A label surrounding the switch indicates the relationship to the Lubecore™ automated lubrication system.

Light illuminates for 3 seconds when ignition is turned on. Indicates a self check –SYSTEM OK.

3 Sec.

Low Grease Level Alarm



When ignition is turned on, light flashes and audible alarm for 15 seconds this is a reminder of low grease level at startup.

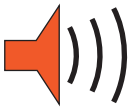
SYSTEM WILL NOT OPERATE:
REFILL RESERVOIR

Low Grease Level Reminder Alarm

At the beginning of a lubrication cycle the light flashes for 1 minute at regular intervals. This indicates low grease level.
SYSTEM WILL NOT OPERATE, REFILL RESERVOIR

Pressure Alarm

At the beginning of each lubrication cycle the light will momentarily come on , indicating a lubrication cycle is in progress. Once sufficient system pressure has been detected by the pressure switch, the light will go out.



When a pressure failure is detected, an audible alarm will sound, the light will flash at the same frequency as the audible alarm. This alarm will be activated for the last 1/3 or about 1 minute of a typical lubrication cycle.

Unlike the Low level alarm which is audible only when the ignition is turned on. The Low pressure alarm will sound during every last 1/3 of a cycle until rectified.

At earliest opportunity inspect the automated lubrication system for leaks, air pockets or consult troubleshooting guide for further assistance.

Note: In case of low lubricant level, filling the reservoir will automatically resolve the error and normal operation continues. However, after filling the reservoir the LED will switch off after completing a normal automated lubrication cycle. (A test cycle will not reset the LED or alarm.)

Timer Service Report

The timer is equipped with a real-time clock (RTC), which enables more accurate record keeping. With the use of a pressure switch and low level switch, the following is stored in the memory in each timer:

- Date of installation This is automatically stored in system memory once the timer is activated for longer than 30 minuets..
- Total running time: hours from first date of installation
- Total number of lubrication cycles performed.
- Number of low pressure alarms.
- Number of low level alarms.
- Real-time clock synchronization will be recorded when performed.
- Timer serial number: a unique number preprogramming and not erasable.
- Last Connected ID: Serial number of the last dongle connected to the timer
- Last Connected Time: date and time of last dongle connected to the timer
- Last Defect: last featured in a grease cycle failure A or B to make troubleshooting easier.

With the use of the CLS dongle, the operator can push the report button in the reports tab in the software program and produce a report which is displayed on screen. In the report you can identify and add customer information. For example, fleet or VIN number. Select the save button for future retrieval.

The errors recorded for low level and insufficient pressure (in reports identified as no-pressure) are stored with a date and time stamp from the real-time clock. This will allow for more accurate performance review of the automated lubrication system.

When an error has been corrected, such as an empty reservoir is refilled, the timer will save a new date stamp indicating that the error has been resolved.

Illustration 18. **Timer Performance Report.**

Programming the Mk2 Truck Timer

The timer can be programmed using a CLS Dongle Timer Interface Unit and a computer running Microsoft™ Windows™ with USB capability. For a more in-depth explanation on how to use the Dongle, please see the Timer Programming manual.

Using the CLS Dongle Timer Interface Unit, the timer can both be programmed and reviewed for lubrication system performance. The primary goal of programming the timer is to set the values for the "pause" and "working" phases, as described in the General Operation section.

To program the timer:

1). Connect the timer to the Dongle Timer Interface Unit.

2). Ensure the timer has power by turning the ignition switch to the auxiliary position.

3). Start the timer programming software and plug in the USB cable to the computer.

4). In the menu bar, select "open connection" from the drop-down menu.

5). In the report tab of the program, click "refresh" to display current timer values.

6). Go to tab 3, "Parameters".

7). In the left screen under "pause time", use the up and down arrows to set the desired values for hours and minutes.

8). In the left screen under "working time", use the up and down arrows to set the desired value for minutes.

9). In the bottom of the left screen, click "set" to send and save the values to the timer. Go to the "report" tab, click "refresh", and return to tab 3 to verify that the values are set correctly.

10). Turn off the ignition switch and computer, and remove the Dongle device.

11). Verify the functionality of the ALS system by performing a test cycle. Do this either by pressing the red test switch in the timer cover or pressing the In Cab Test Switch, if present, with the ignition in the auxiliary position.

The timer is now programmed and ready for use.

Illustration 19.
Timer Programming Manual

Quick Install Guide for Lubecore Timer Interface Dongle (for Window™ Operating Systems only):

1. Load the CD into the CD drive

    a. In My Computer, double-click the CD drive location to open the CD file.
    b. In the CD folder, select the folder that matches the version of Windows installed on your computer.
        i. Use Windows Vista folder for Windows 7 and 8.

2. Connecting the Dongle to the computer

    a. Connect the USB cable to the port labelled "From PC" on the Dongle, and connect the other end of that cable to an available USB port on the computer.

    b. Immediately double-click the file called CDM 2.04.16.exe 

        ii. This will open a small window and will install a driver. Once installation is complete, it will automatically close the window.
    c. Double-click on the Timer Software program Ttimer_MK2.exe 

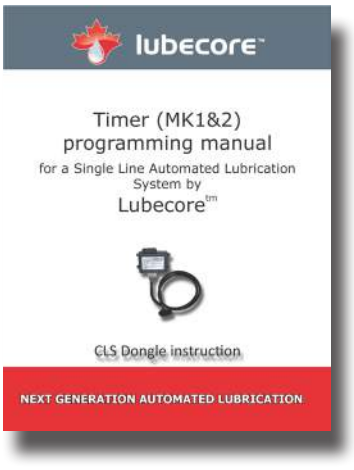
        iii. In some cases, there may be a Windows warning. If this shows up, click YES to proceed.
    d. To verify that the installation has taken place properly, check at the top of the C.L.S.

Timer program window for the text "USB Device". This should say "Device Found" in green font, and have a flashing green circle next to it. If you don't see the flashing green circle, contact Lubecore International for assistance.

3. Daily use of the Timer Software

    a. It is helpful to save a copy of the Timer Software onto the computer hard drive so that the CD doesn't need to be kept with the computer.
        i. Right-click on the Ttimer_MK2.exe file and select Copy from the list
        ii. On the Desktop, right-click and select Paste from the list (don't select Paste Shortcut)
            1. The software is now accessible from the Desktop.

4. For further detailed instructions on connection and read-outs of the timers, please refer to the Timer Manual.



Electrical Connections

The Lubecore truck timer is a multi-functional unit that can be connected to a variety of automated lubrication systems or ALS. For this and other service purposes, we have included a standard electrical schematic below. For schematics related to the exchange of timers in other systems, please visit www.lubecore.com or contact Lubecore directly.

The truck timer schematic below includes the low-level switch operation. For lubrication systems that do not have the low-level switch operation, a separate connection is required for input into the timer. To ensure proper timer operation without a low-level switch, a jumper wire must be installed between pin #7 and pin #3 at the timer plug end.

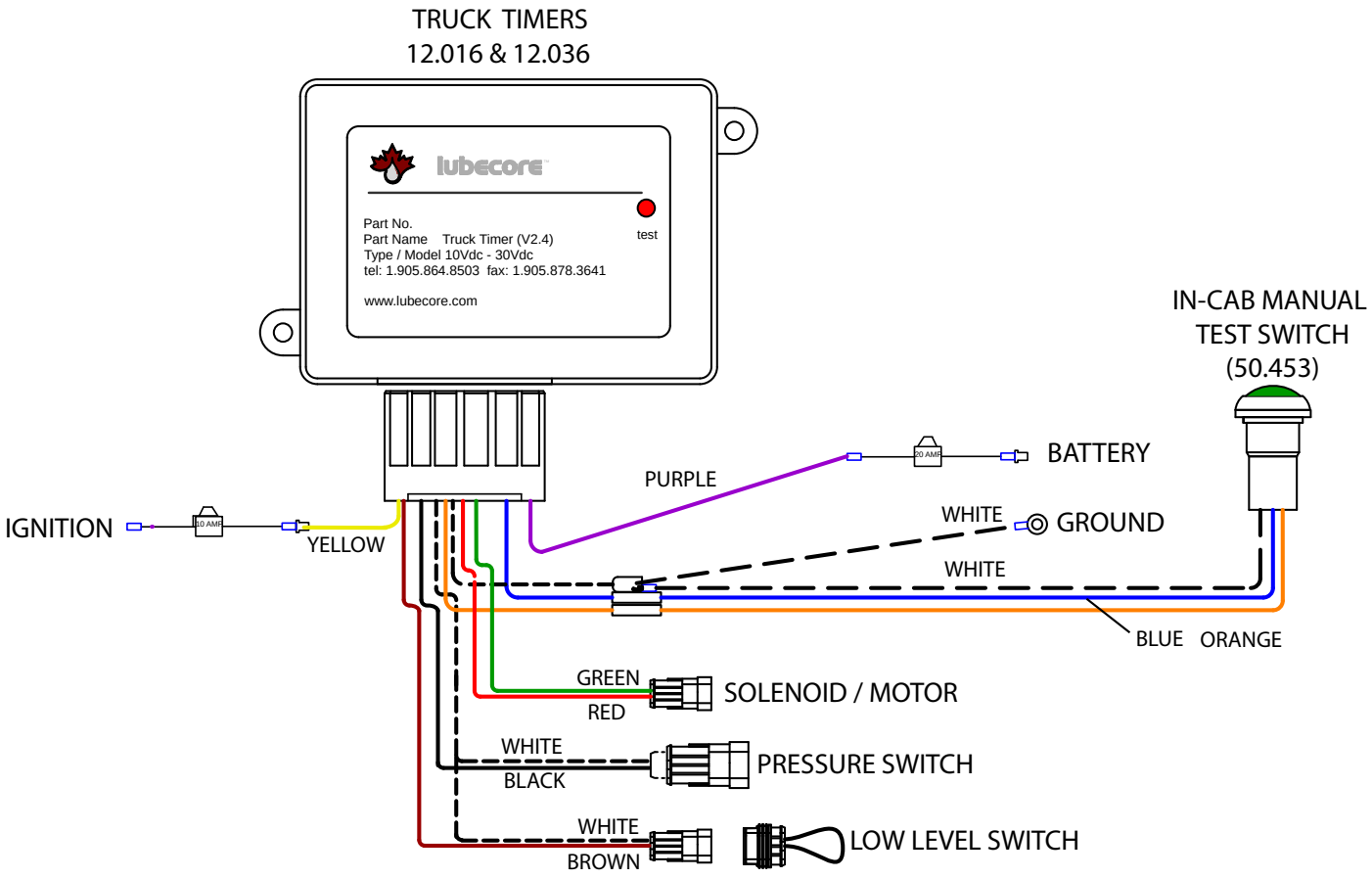
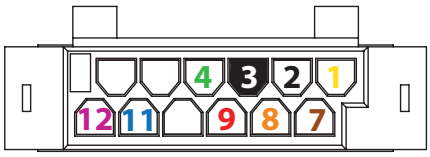
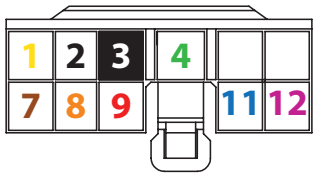


Illustration 20. **Common Electrical Schematic for a Lubecore Truck Timer.**

Truck Timer Terminal & Wiring Identification

Timer Pin	Function	Mark I Timer Plug (Used from 2008 - 2010)
#1	Ignition	
#2	Pressure Switch	
#3	Ground	
#4	Solenoid/Motor +	
#5	N/A	
#6	N/A	
#7	Low Level	Mark II Timer Plug (Used from 2010 - Present)
#8	Cab Light	
#9	Solenoid/Motor -	
#10	N/A	
#11	Test Button	
#12	Battery Live	

Technical Specifications

Timer Specification Based on Model (12.016 & 12.036)		Remarks
Voltage Range	10-30	VDC
Audible Alarm	87	DbA
Output Current Max	40 / 500	Amp / Watt
Alarm Light Output Current Max	5 / 75	Amp / Watt

Table 21. Truck Timer Specifications.

LCT Timer Operation

General Operation of the Lubecore™ LCT (Low Cost) Timer

Illustration 22.
Lubecore 10-30 VDC LCT Timer 12.015.

Lubecore™ recognized that in today's market price is a major concern. In the world of automated lubrication systems, this means that some customers may choose to sacrifice enhanced features such as low level and pressure alarms to reduce the cost of their systems.

To meet this market need, Lubecore™ has developed the LCT Timer (low cost timer) Part # 12.015

Each automated lubrication system requires a timer to control a pump. Upon ignition, a set interval is counted down ("pause-phase"). This interval is set by moving jumper pegs located on the circuit board.

The LCT timer does not retain any memory. Once the battery connection with the timer is interrupted the memory is lost. Once reconnected, the timer resumes by counting down from zero to perform its next cycle..

After the pause phase is concluded, the timer engages either a solenoid or electric motor starting the "working phase". Same as for the pause-phase, the working-phase is set on the timer-board using jumper pegs.
At the completion of the working-phase a new pause-phase is started. This cycle continues as long as there is ignition power.

Programming the LCT-timer

The LCT timer working and pause times are set by adjusting the jumpers on the circuit board. There is 1 bank with 5 selections for pause time and 1 bank with 3 selections for working time.

Bank 1 options: 37.5, 75, 150, 300 or 600 minutes

Bank 2 options; 45, 90 or 180 seconds

A diagram is located on the reverse side of the LCT timer. Which shows the setting options factory default settings and wiring connections.

Illustration 23.
Jumper Peg Wiring Chart Located on the Bottom of the LCT Timer.

Illustration 24.
Jumper-Peg Locations for Timer Pause and Working Phase Adjustments.

Performing a test cycle

A single manual "test cycle" can be performed with the timer

The LCT timer has been equipped with a red test cycle switch in the timer cover.

An accelerated test cycle is not available.

Red Test Button

To prevent accidental operation of the ALS, the red button has been set flush with the cover.

To engage a test cycle:

1). Set ignition to auxiliary position.

2). Using a small instrument (pencil), press the red test button located in the timer cover.

The timer will perform a single lubrication cycle as programmed.

Illustration 26.
Location & Method to Push Test Button On Timer.

Technical Specifications

Timer Specification Based On 12.015		Remarks
Voltage Range	10-30	Vdc
Audible Alarm	N.A.	DbA
Output Current Max	40 / 500	Amp / Watt
Alarm Light Output Current Max	N.A.	Amp / Watt

Table 25. **LCT Timer Technical Specifications.**

Electrical Connections

The Lubecore LCT timer can be connected to all pneumatic (parallel and progressive) and electric pumps (parallel) lubrication systems. For this and other service purposes, we have included a standard electrical schematic below. For schematics related to the exchange of timers in other systems, please visit www.lubecore.com or contact Lubecore directly.

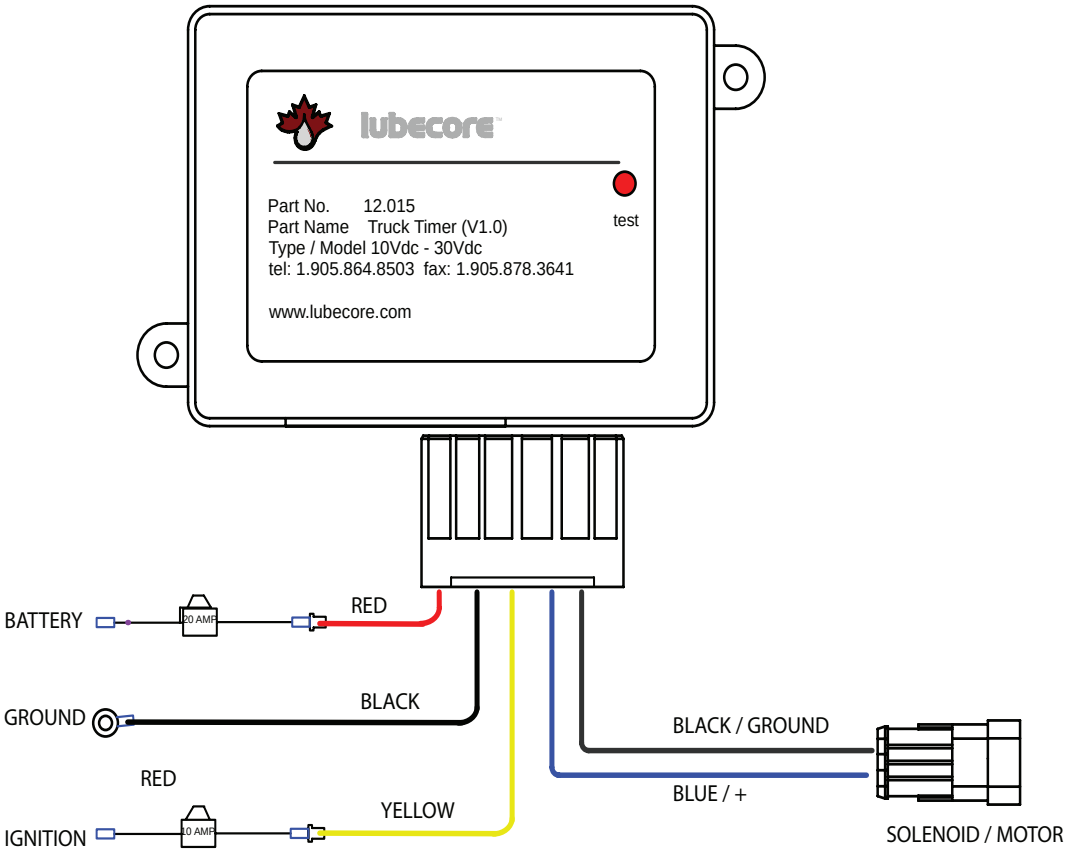


Illustration 28. **12.015 LCT Timer Schematic.**

Pin	Connection	Wire Color Coding
1	Battery	Red
2	Ground	Black
3	Ignition	Yellow
4	+ Solenoid / Motor	Blue
5	- Solenoid / Motor	Black

Table 27. **LCT Timer Pin Allocations.**

Solenoid Operation

The solenoid is normally located on the bottom of a pneumatically operated pump for truck applications. Depending on the system voltage (12 or 24V), it has a nominal operating current of 3 Amp, and is equipped with a manual cycle switch.

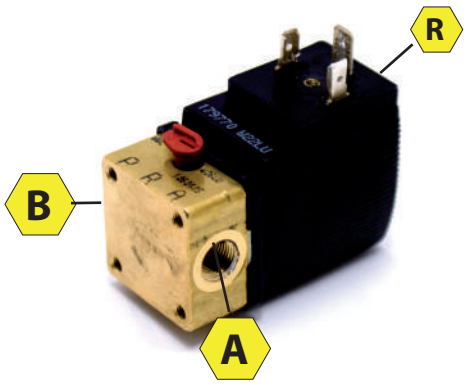


Illustration 30.
12 VDC Solenoid with integrated Manual Cycle Switch. (50.005)

In the non-activated state, the connection between the air tank and the pump is closed. When activated, air flows from connection **(B)** of the solenoid to the pump, through opening **(A)**.

At the end of the lubrication cycle, the solenoid valve returns to its original position, opening port **(R)** to the top of the solenoid to let the air escape from below the grease piston to replenish the vacuum above. This prevents contaminants and moisture from entering the pump. A check valve mounted on the right side of the pump maintains a 5 psi over-pressure to aid this process.

Integrated in the solenoid is a manual cycle switch. As long as there is sufficient air pressure from the onboard air tank, you can engage and disengage the pump by rotating the screw in the body of the solenoid slowly in a clockwise direction. Each time a cycle is performed, lubricant flows and pressurizes the mainline.

Note: ***To prevent over lubrication, damage, or spillage, do not manually cycle the lubrication system excessively. Forcing the bypass valve on the solenoid can damage it and prevent the solenoid from operating according to specifications.***

Note: ***After use, ensure that the manual cycle switch is returned to the "off" position. Leaving the switch in the "ON" position prevents the timer from operating the solenoid.***

Illustration 29.
25 Bar Pressure Switch for Pump Assembly. (10.204)

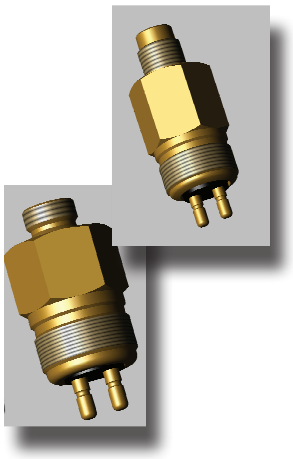


Illustration 31.
25 Bar Pressure Switch for Manifold Assembly. (10.215)

Pressure Switch

A standard Lubecore automated lubrication system is equipped with a pressure switch that maintains 25 Bar / 363 Psi. The pressure switch can either be located in the front of the pump, just below the serial / model number tag, or in one of the manifolds within the lubrication system.

Once it ensures that the lubrication system has reached nominal operating pressure, the pressure switch provides feedback to the timer by closing a ground connection.

The pressure switch is mounted in the front of the pump and is equipped with a non-return valve. Pressure switches located in manifold assemblies do not require a non-return valve. (Please refer to illustration 25) Under normal conditions, the pressure switch remains open. When the system reaches 25 bar / 363 Psi of pressure, the switch closes the connection between the timer and ground.

When a pressure alarm occurs, the operator is informed by an audible alarm from the timer and when installed, a visual alarm from the green LED mounted internally in the In Cab Test Switch. This alarm lasts for the remaining 1/3 of the programmed lubrication cycle interval (working phase).

Low Level Switch & Sensor

The Lubecore ALS pneumatic pump can be equipped with a low level switch/sensor. The low level switch/sensor can be found on the right side of the pneumatic pump, just below the reservoir. To prevent air from entering the ALS when the reservoir is empty, Lubecore highly recommends that you equip your pump with a low-level switch/sensor. Once the follower plate reaches the minimum reservoir grease level, the low level switch/sensor opens. The timer then alerts the operator that the reservoir is empty and requires refilling. As long as the low level switch is activated, the lubrication system will NOT be activated by the timer. The timer does however keep a record of how many grease cycles have been missed. This information is accessible via the CLS Dongle timer interface. This function is only available on the 12.016 and 12.036 Truck timers.

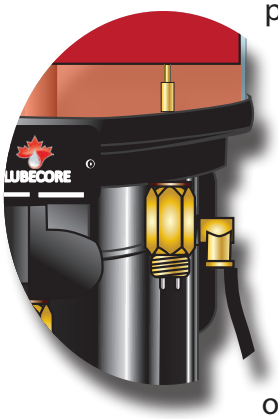


Illustration 32.
Low Level Switch Mounting Location in Pneumatic Pump

Illustration 33.
Low Level Switch.
4kg LLS 50.071
6Kg LLS 50.072

Under normal conditions, the low level switch remains closed. When the follower plate falls below the minimum level marking on the reservoir it opens and/or breaks the electrical connection between the timer and ground. The operator is informed of a reservoir low level by an intermittent (2 seconds on / 2 seconds off) green LED constructed into the *In Cab Manual Test Switch* (50.453). This alarm lasts for the full duration of the programmed internal time (working phase).

Note: ***In case of low lubricant level, filling the reservoir will automatically resolve the error and normal operation continues. However, after filling the reservoir the led will switch off after completing a normal lubrication cycle. (Test cycle will not reset the LED.)***

12.062 **12.063**

Illustration 28.
Showing Two Low Level Proximity Sensors.

12.062 & 12.063 Low Level Proximity Sensors (LLPS) are used with the Mk2 Progressive Trailer Timer and Mk2 Progressive External Timer.

12.062 - LLPS is used in conjunction with the 4kg bottom spring pneumatic lubrication pump.

12.063 - LLPS is used with the 6kg bottom spring pneumatic lubrication pump

Trouble Shooting - Truck Timer 12.016 & 12.036

For certain sections in this trouble shooting overview for the truck timer, the following tools might be required: Multi meter / Test-light, Pressure gauge, 10cm / 5 inch long loop wire or metal paperclip.

Defect Description	Diagnosis / Check Item	Solution
Timer does not engage solenoid when test button is pressed.	Check for broken fuse.	Replace fuse if broken. Perform cycle test with timer to determine why fuse protected the electrical system.
	Check ground connection. Measure resistance with multi meter between pin 3, and again with pin 7 to ground location. (When ALS is **not** equipped with a low level switch, pin 7 must be connected directly to ground.)	*Measured resistance in range of 0-10Ω:* *Go to next step, connection OK.* *Measured resistance in range of 100-∞Ω:* *Connection interrupted or broken lead wire, repair connection.*
	Check Solenoid connection. Remove solenoid connector. Start timer test cycle. Measure voltage over solenoid connector with voltmeter.	*Measured value is in range of 10-13V:* *No voltage measured:* *Solenoid defective, replace solenoid.* *Broken lead in pump harness, replace pump harness.* *If all tests fail, this may indicate a timer defect; replace the timer.*
Intermittent visual alarm from timer. (2 seconds on - 2 seconds off, no audible alarm)	*Refill reservoir.* *If reservoir is full:* *Remove connector from low-level switch.* *Check connectivity over the low-level switch with multi meter.*	*Measured resistance in range of 100-∞ Ω:* *Low-level switch is defective replace low level switch.* *Measured resistance in range of 0-10Ω:* *Check for broken wire lead in harness.* *Remove 12-pin connector from timer and insert wire loop between pin 7 and pin 3. Measure resistance at low-level connector to determine if there's a defect in the harness and repair.* *If all tests fail, this may indicate a timer defect; replace the timer.*
Visual and audible alarms from timer have activated. (Alarm light and buzzer are uniform in frequency)	Pressure failure. Insert pressure gauge in front location of the pump. Remove pressure switch connector. Start timer test cycle. If pressure in gauge is less then 10-20 Bar: Pressure problem is not in the electrical system. Proceed with general troubleshooting. If pressure gauge indicates more then 25 bar / 363 Psi: Measure the resistance over the two pins of the pressure switch during the test cycle.	*Measured resistance in range of 100- ∞Ω:* *Defective pressure switch replace pressure switch.* *Measured resistance in range of 0-10Ω:* *Check for broken wire lead in harness.* *Remove 12-pin connector from timer and insert wire loop between pin 2 and pin 3. Measure resistance at pressure switch connector to determine if there's a defect in the harness and repair.* *If all test fail, this may indicate a timer defect; replace the timer.*

Table 34. **Troubleshooting Pneumatic ALS**

General Operation - Automated Lubrication System (ALS) - Trailer

The Lubecore™ Automated Lubrication System (ALS) can be equipped with several options and a variety of pump styles. This section describes the general operation of a standard pneumatic lubrication pump with standard components and a trailer timer. For details regarding the operation of our other pumps and components, please refer to the appropriate Lubecore manual or contact Lubecore directly. A Lubecore automated lubrication system consists of the following main components.

Note: The ① are identification markers referring to items in the illustration on the next page.

- ① Pneumatically operated pump.
- ② Trailer Timer.
- ③ Manifold and ④ injector assemblies.
- ⑤ Primary and ⑥ secondary tubing with fittings.

A Lubecore parallel automated lubrication system will be designed and assembled according to the specific type of equipment and the associated operating conditions. Starting with the manufacturer specifications regarding the lubrication requirement, the system layout will be designed and the appropriate components will be selected.

The trailer timer has been designed to operate using a minimal amount of current and still provide the full option functionality of performance and low level monitoring. The trailer timer uses the following power sources:

1). Constant power: ABS (Anti-lock Braking System)

2). Junction box/nose plug: Brake, indicator and running lights using a diode bridge (54.238).

3). Rechargeable power supply module.

As long as the trailer is in use, the timer will perform it's programmed function ②. Once it reaches the end of the interval, the timer engages an integrated solenoid and the green sequential LED mounted in the timer enclosure starts a chase pattern indicating the pump is in cycle. The activation of the solenoid provides the pump with air pressure (100 psi minimum) from the air tank ⑧.

In turn the pump, pumps the maximum allowable amount of grease, under pressure, into the mainline tubing that connects the pump to either one or more manifolds, which are located at centralized points along the trailer's chassis.

The moment maximum pressure is reached in the mainline tubing, injectors④ located in the manifolds③ begin to measure and dispense a predetermined and consistent amount of lubricant through the secondary tubing⑥ and fittings⑨ and into the lubrication points⑩.

At completion of the lubrication cycle, the solenoid is deactivated by the timer, air in the pump is released, grease chamber is replenished with grease and the timer begins counting down toward its next lubrication cycle. The air pressure that has been released from inside the pump is then directed to a vent assembly on the right side of the pump⑪. The the vent assembly contains a Lee valve set at a minimum of 5 psi / 0.3 bar. Which maintains a pressure within the pump. The purpose of this design is to prevent corrosion and other damage caused by dirt, road salt, and other debris that may enter the pump through this vent. Please refer to the Pump Operation section for more information.

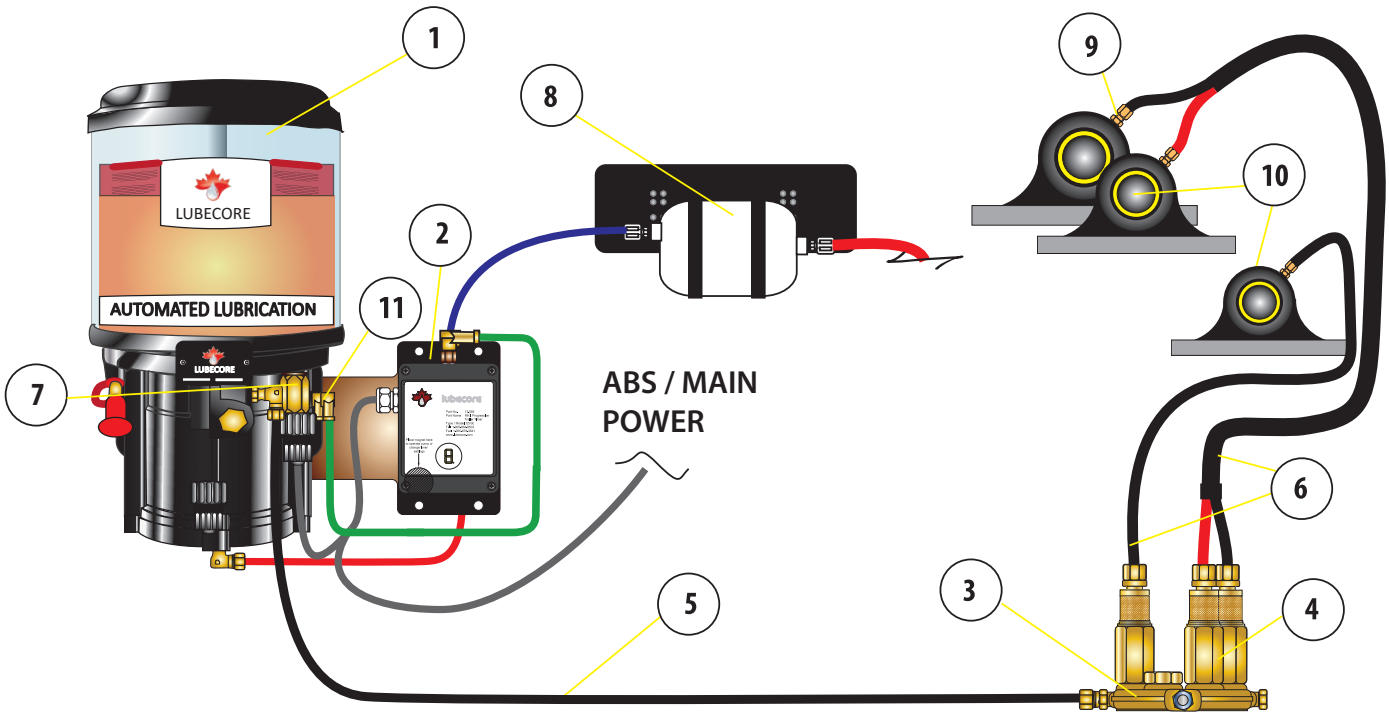


Illustration 35. **Standard Lubecore Automated Lubrication System Layout of a Trailer**

With the air pressure removed, lubricant pressure in the primary tubing returns to zero and excess lubricant is recycled back into the pump. Once all the grease pressure has been removed, the re-loading process within the injectors begins. Please refer to the Metering unit operation section for more information.

MKII Progressive Trailer Timer

General Operation of the Lubecore™ Trailer Timer

Following is a functional description of the Lubecore™ ALS trailer timer. This information pertains to model 12.058 and 12.059. For a description of the Lubecore ALS truck timer or others, please see the appropriate documentation.

The 12V (12.058) or 24V (12.059) trailer timer has been designed with the capability to operate a variety of Lubecore lubrication pump models. The trailer timer has been designed to operate the pneumatic pump electronically with the lowest current consumption possible.

Electrical current provided to the timer by either a connection to the trailers anti-lock braking system (ABS), equipment lighting system or rechargeable power supply.

Illustration 36.
Lubecore 12 VDC Electrically Operated Progressive Trailer Timer for ALS (12.058)

To prevent air from entering the lubrication pump, Lubecore automated lubrication systems can also be equipped with a low-level sensor. Once the follower plate triggers the low-level sensor in the reservoir, the pump will not cycle. The sequential LED located on the front of the timer enclosure will show an "E" indicating an error has occurred. The pump will not initiate a cycle again, as long as the reservoir is below minimum level.

Once the reservoir has been refilled, the timer will resume normal operation. Upon filling the reservoir a low level error or "E" may still be seen in the view port until completion of a full lubrication cycle.

WARNING!!!

DO NOT ATTEMPT TO CONNECT THIS TIMER TO A MECHANICAL CONTACT TYPE LOW LEVEL SWITCH. USING OR ATTEMPTING TO USE THIS TYPE OF LOW LEVEL WILL DESTROY THE TIMER

Trailer Timer Connections

→ Sequential Communication LED & Indicator

The timer has been equipped with a set of LED's.

1). A green LED, "dot" mounted at the bottom right of the viewing port will illuminate when power is provided to the timer.

2). The LED, "dot" will start flashing signifying that the timer is counting down till cycle application takes place.

Illustration 37.
MKII Progressive Trailer Timer (12.058)

→ Exhaust port

At the top of the trailer timer the connection is made with the air-recirculation port of the pneumatic pump. From this opening, when the solenoid is deactivated, pressurized air will flow from under the pump piston through the solenoid to the right side of the pump. This replenishes the vacuum that exists on the downstroke of the pump piston with dry air. Excess air pressure escapes during this process at the connection on the right side of the pump.

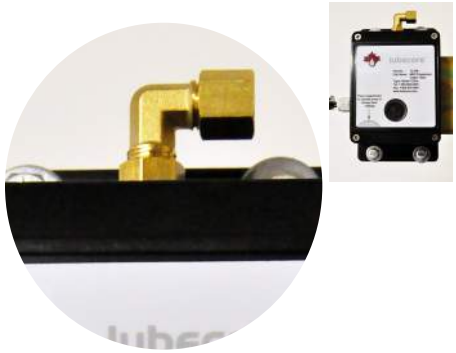


Illustration 38.
MKII Progressive Trailer Timer Exhaust Port

→ Electrical wiring connections

The trailer timer can be connected to either one of three power sources: the power feed to the Anti-lock Braking System (ABS), to the nose or junction box of a trailer or to a rechargeable power supply.

Depending on connections a variety of harnesses and wiring are available, please contact Lubecore for further details.

Illustration 39.
MKII Progressive Trailer Timer with Deutsch™ DT & DTM Connectors

→ Air connections (In port 1 and Out port 2)

The trailer timer switches an electrically operated air solenoid. Air tank pressure is connected to Input port 1 at the top. (Air Input)

Once the solenoid is activated, air pressure will flow from the solenoid through Output port 2 to the pump (Air Delivery).

Illustration 40.
MKII Progressive Trailer Timer Air Connections.

→ Identification marks

The part and serial identification number can both be found on a sticker located on the back of the timer enclosure, mounting plate and on the backside of the front cover.

Wiring instructions and connectors are delivered with each timer.

Illustration 41.
MKII Progressive Trailer Timer Serial Number

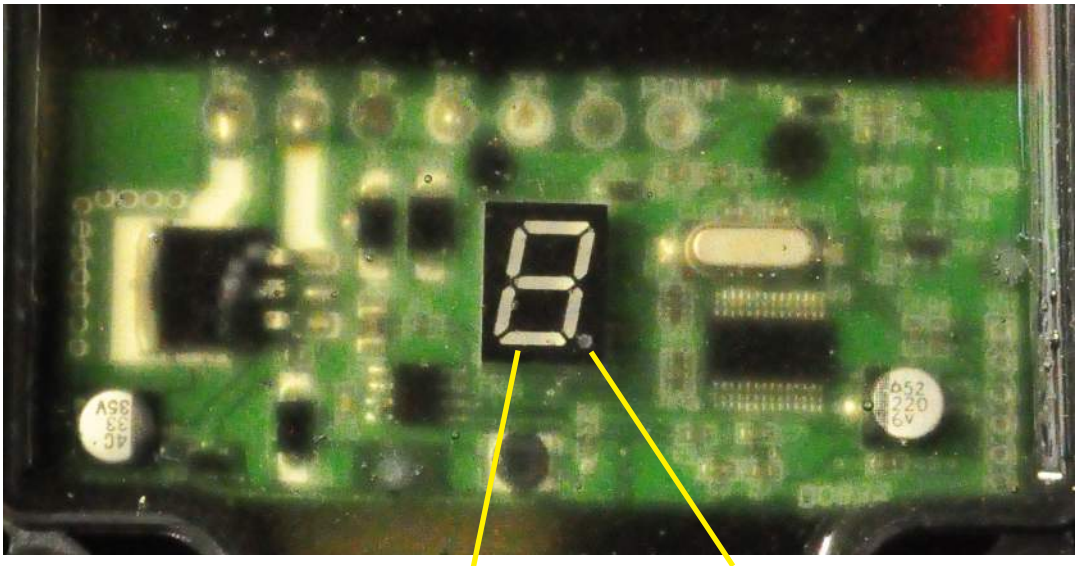


Illustration 37. **Sequential LED with LED Dot Shown**

Performing a test cycle - air operated

A single manual "test cycle" can be performed with the trailer timer. The trailer timer has been equipped with a test cycle screw on the solenoid.

To perform a test cycle;

1). Remove the timer cover

2). Ensure that there is a minimum of 100 psi of pressure in the on board air tank.

3). Using a screw driver, turn the test-cycle screw slowly clockwise for only 90º (quarter) turn. The screw is located in the center of the solenoid inside the timer. **DO NOT FORCE A TURN!**

4). Slowly return the screw to it's original position until the pump is disengaged. Air can be heard being released from the vent valve assembly on the right hand side of the pump. The screw should be in-line with the solenoid body.

5). The timer has now performed a single lubrication cycle. Wait a minute or two prior to engaging another cycle.

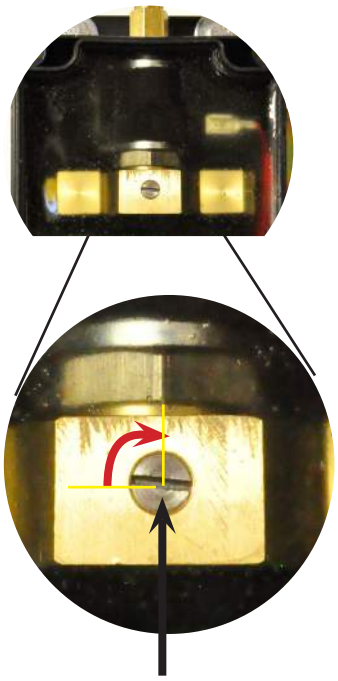


Illustration 43.
Solenoid Manual Switch

Note: Failure to return the screw to its original starting position will prevent the timer from automatically initiating a lubrication cycle.

Performing a test cycle - electrically operated

A single "test cycle" can also be performed with the trailer timer when connected to power. The trailer timer can be tested by means of a magnet, without removing the timer cover.

See detailed operational functions and programming on pages 31-34

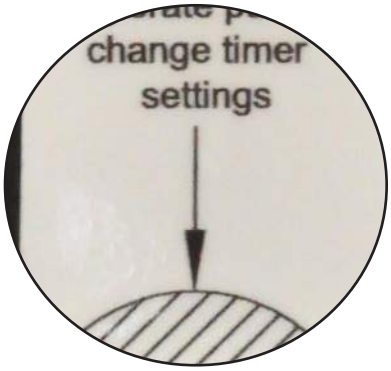


Illustration 42.
Test Magnet Location

Electrical Connections

The 10-30 VDC timer for the automated operation of the lubrication system is located inside the motor housing. The motor housing is slotted on the bottom to allow moisture to dissipate while the timer itself is permanently sealed (potted).

The pump comes pre-wired with a 2 core SAE approved cable connected to a Deutsch® DT weather proof connector. The DT connector is wired: Ignition (Red) +15 / Ground (Black) -31. When connecting ignition it is recommended to use a 5 Amp fuse.

A second connection is available for an optional low level sensor. That 3 - core wire provides a proximity sensor with a power source, ground and signal contact. The proximity sensor may be ordered separately and can be connected to the pump with no need for programming. When installing a proximity sensor adhere to the safety precautions as previously listed on page 14.

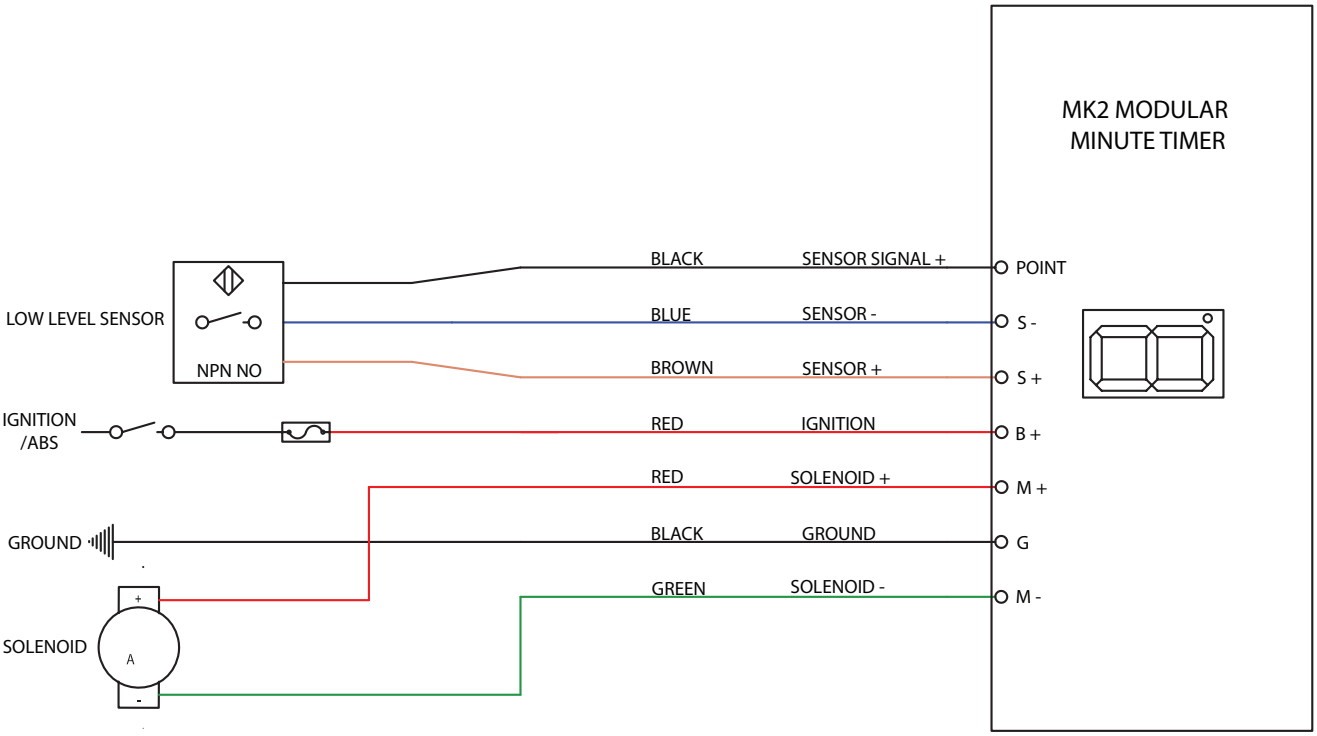


Illustration 44. **Electrical Connections for the Modular Progressive Pump**

Illustration 45.
Weatherproof with Deutsch® Electrical Connectors

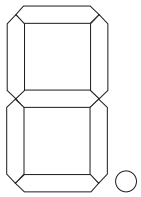
Timer Setting and Display Operation

The Modular Progressive pump is equipped with a 7 segment digital display.
This display indicates power, operation, error and is used for timer setting.

Following is an overview of possible display codes:

- No segments lit. Power is "Off".

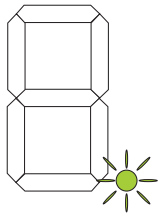
Power "Off"



No segments lit.

- Solitary LED (Bottom right corner of the Segmented display) momentarily stays on (5 Seconds) performing a self check.

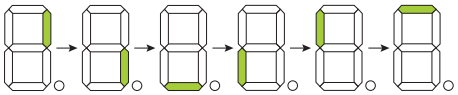
Power "On"
Battery and Ignition



Solitary LED

- Solitary LED starts blinking, 2 blinks per second indicating that the timer is active

- Pump ON (T2) is started the segmented LED 'Chases'. The bar rotates clockwise for the entire pump cycle.

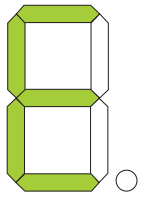


Motor Running

Rotating segments.

- If during a pump cycle (T2) an error occurs, the display shows "E". The error can be low level or over-current draw. The "ERROR" status is displayed throughout the entire T2 pump cycle time.

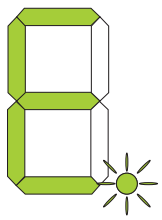
Error During
Pump Cycle



An error is present
during pump cycle.

- After the pump cycle (T2) the display will show "E" and a blinking solitary LED during the T1, pause time. The "E" status will return to normal after the error is resolved (example: pump filled) and a new cycle is started.

Error at Pause
Time.



An error is present when
power is on. Blinking point

Testing and Programming

For correct operation of the pump (T1) the "Pause", and (T2) "Work" times must be set using the magnet. The following menu choices are available.

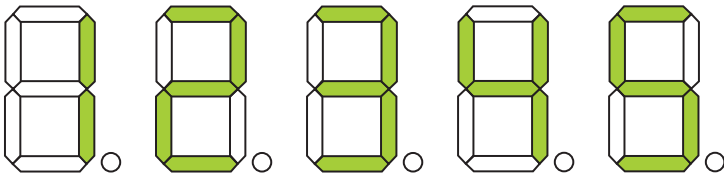
With power on (ignition) hold the magnet against the Lubecore logo on the timer enclosure near the segment display. After 3 seconds and with about 3 second steps thereafter, the segment display will change as follows:

7 Segment Display Mode Selection

1). To start a single test cycle, place the magnet on the Lubecore logo. When the bottom horizontal bar lights up, remove the magnet from the logo to initiate a single test cycle. The pump will run for the programmed period of "on time".

2). To change the pump running/working time (T2) setting. Place the magnet on the Lubecore logo until 3 horizontal bars light up.

When the display shows 3 horizontal bars, remove the magnet to go into time selection mode.
- When the sensor is not operated for 20 seconds it will return to the start.
- After a change the display will show an **"A"** for accept after 20 seconds or if the magnet is placed on the sensor for 5 seconds.
The display will show your current choice of one of the following 5 settings:



2 minutes 4 minutes 6 minutes 8 minutes 10 minutes

A one second touch or slow swipe with the magnet, at the Lubecore logo, will change the time selection.

3). To set the "Off time" (cycle interval), place the magnet on the Lubecore logo until the top 4 bars light up in the shape of a square. This indicates that the "off time" change mode is selected. The function is the same as in the "on time" programming mode. When the sensor is not operated for 20 seconds or the magnet is placed on the sensor for longer than 5 seconds the timer returns to normal start mode. If a change has been made the display will indicate this with an **"A"** for accept.

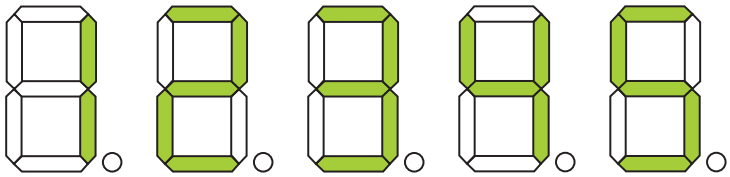
7 Segment Display Mode Selection

The display will show your current choice of one of the following 5 settings:

A one second touch or slow swipe with the magnet, at the maple leaf logo, will change the selection.

After changing settings or testing, switch off the ignition and verify that the timer accepted the new values. The timer can at any point be returned to 'normal' by switching off the ignition.

Error reporting by the display



15 min. 30 min. 60 min. 120 min. 240 min.

When the display indicates an **"E"** for error, the following could be the problem:

- Low Grease Level Detected.

  When installed and activated by the follower plate, the low level switch signal stops the pump from pumping, fill pump.

- Over-Load / Short Circuit.

Problem Prevention

The Lubecore™ automated lubrication systems are designed to be the best lubrication system on the market today. Our team of engineers are continually working to improve the system to ensure that the Lubecore ALS remains the best system available.

To extend the life of your Lubecore ALS and to prevent any potential service issues, please review the following:

Air Pockets:

Air pockets can be introduced into the system by:

a) filling the reservoir without bleeding the filler hose

b) continued use of the lubrication system after the reservoir has reached minimum grease level.

An air pocket in the lubrication system does not cause direct harm to the lubrication equipment, but it does prevent the system from functioning correctly. The equipment components will be damaged if they are not receiving the appropriate amount of lubrication.

Low Level Switch/Sensor:

Lubecore strongly recommends the use of the low level shut-off switch/sensor. When the reservoir is empty and not refilled in time, the low level switch/sensor shuts down the lubrication system to prevent damage. The follower plate triggers the low level switch/sensor when it reaches the minimum level mark on the reservoir.

The low level switch/sensor when installed provides feedback to the timer when the electrical circuit is interrupted. If the electrical circuit is interrupted because of a low level event, a low level alarm is triggered.

When the follower plate reaches the minimum level mark, in a truck application, a green LED constructed into the body of the In Cab Manual Test Button will begin to blink (2 seconds on, 2 seconds off) through out the duration of the lubrication cycle. The lubrication system also registers within the timer how many lubrication cycles have been omitted until the reservoir is refilled.

Once the reservoir is re-filled, the ALS will continue its normal operation automatically.

Note: In case of a low level event, filling the reservoir will automatically resolve the error and normal operation will continue.
However, after filling the reservoir the system timer will still signal a low level event, both audible and visual warnings, will initiate until the system does one complete automatic cycle, after which the timer will reset itself. (Pressing the test button will not reset the timer)

Metering Unit Function

The Lubecore™ metering unit (*Injector*) is the core component and forms the basis of the principle on which the operation of the automated lubrication system is based. Lubecore automated lubrication system injectors operate parallel to each other; all injectors disperse lubricant simultaneously.

The injector meters and dispenses the appropriate amount of lubricant to the connected lubrication point in the Lubecore automated lubrication system or ALS, this occurs under full pump pressure.

Lubecore has designed corrosion-resistant brass injectors, available in 7 different output sizes. Lubecore ALS injectors use only one piston and one spring to accurately measure the lubricant, creating a highly reliable trouble-free metering unit that is virtually indestructible.

In an automated lubrication system, injectors are installed on manifolds that are strategically placed on the equipment chassis.

The Injector Operation:

The below description assumes that the injector is being operated for the first time and is not filled with lubricant.

1). Lubricant, being forced under pressure by the pump, enters the injector from the bottom, through opening (**A**).

2). Passing by on the outside of a double acting cap seal (**B**), lubricant continues to flow through the outer openings of the inner injector, cylinder (**C**), pushing against piston (**D**). Which seals against the cup seal (**E**).

3). The piston is held in place by spring (**F**). Until enough pressure is provided to overcome the spring tension, the piston will move upward until it reaches end-point (**G**).

4). The volume of displacement by piston (**D**) is the measure of lubricant that the injector will provide to the lubrication point.

5). Once the piston has reached its top most point against the spring pressure, it remains there until the lubricant pressure is removed at the end of a cycle.

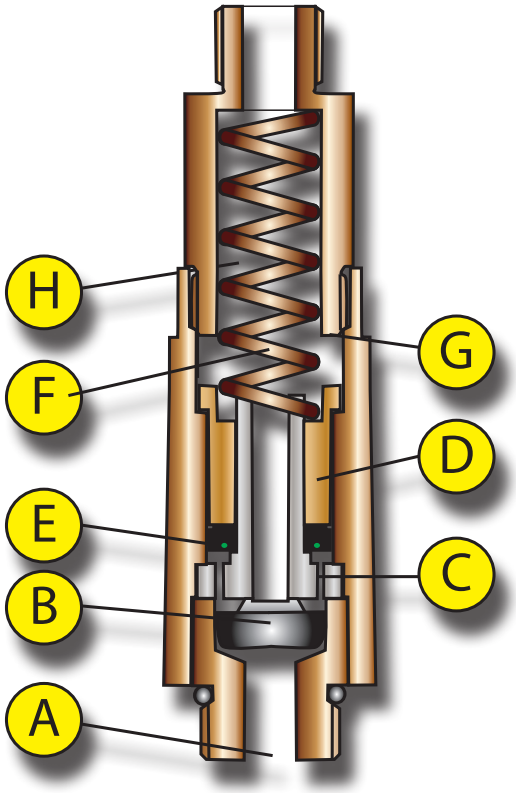


Illustration 46.
Cross Sectional Representation of a Lubecore Single Line Injector

After removal of lubricant pressure:

1). The loaded spring tension pushes the piston back down. Seal (**B**) then blocks the route back to the main channel and opens a grease channel in the center of the injector, cylinder (**C**). The measured amount of lubricant is now moved to chamber (**G**).

NOTE: Depending on the injector size, previous steps are repeated several times until the injector is clear of air pockets. These steps are already performed at the factory. The injector is delivered completely filled with lubricant, ready for use.

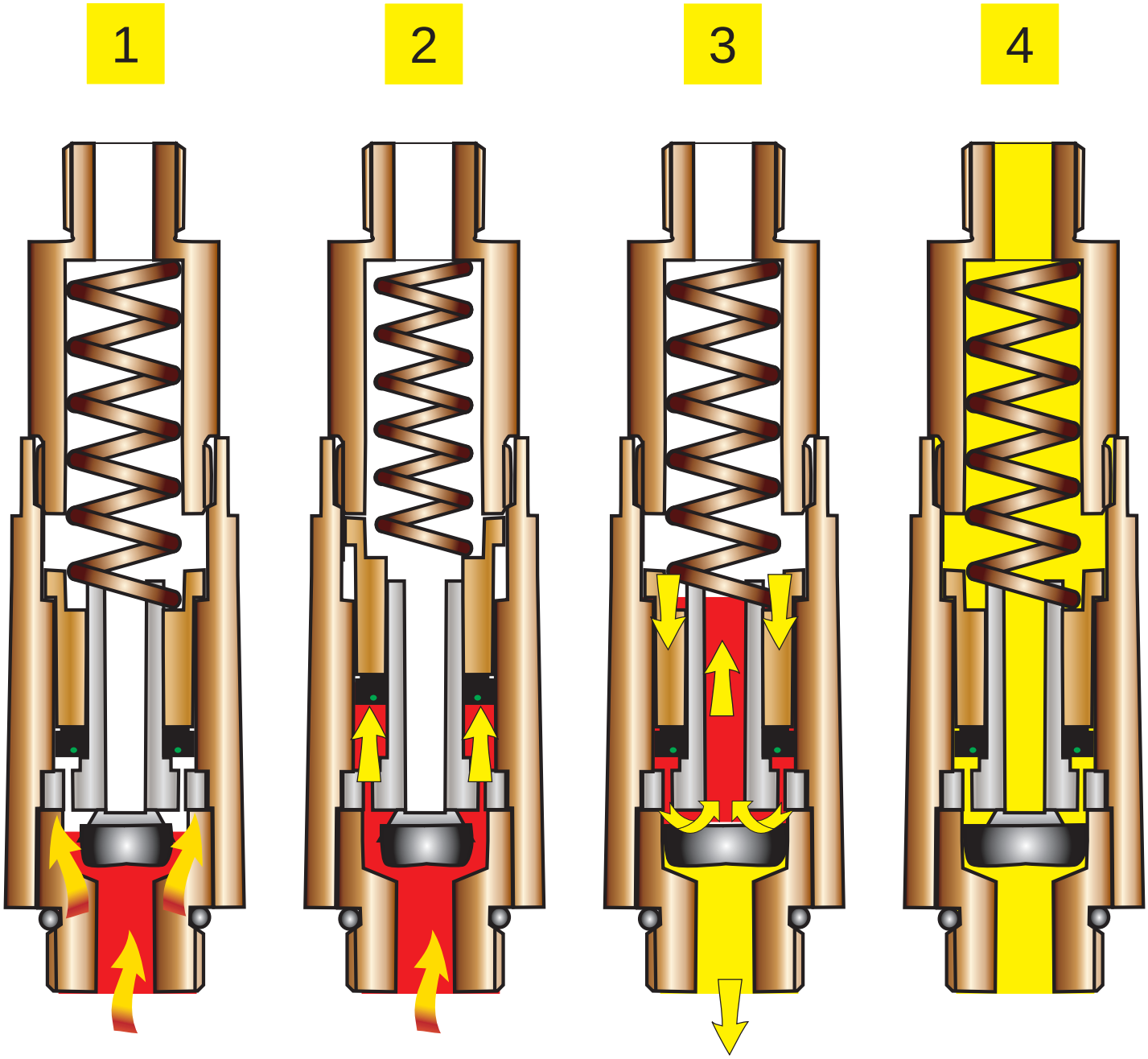


Illustration 47. **Step by Step Overview of the Injector Operation (Bleeding).**

The injector has now returned to its original position. As pressure increases, lubricant flows past the outside of the cap seal (**B)** and pushes piston (**D)** upward against the spring tension (**F)** and seals against the cup seal (**E)** Simultaneously, displacing the volume of lubricant above piston (**D)** pushing it through channel (**G)** to the lubrication point. Piston (**D)** is now active in lubricating the connected grease point, using full pump pressure, while it is measuring the lubricant for the next cycle.

Once the pressure is removed, piston (**D)** returns to its starting point under tension of spring (**F)**. The measured amount of lubricant is then positioned into the center of the injector cylinder for the next cycle.

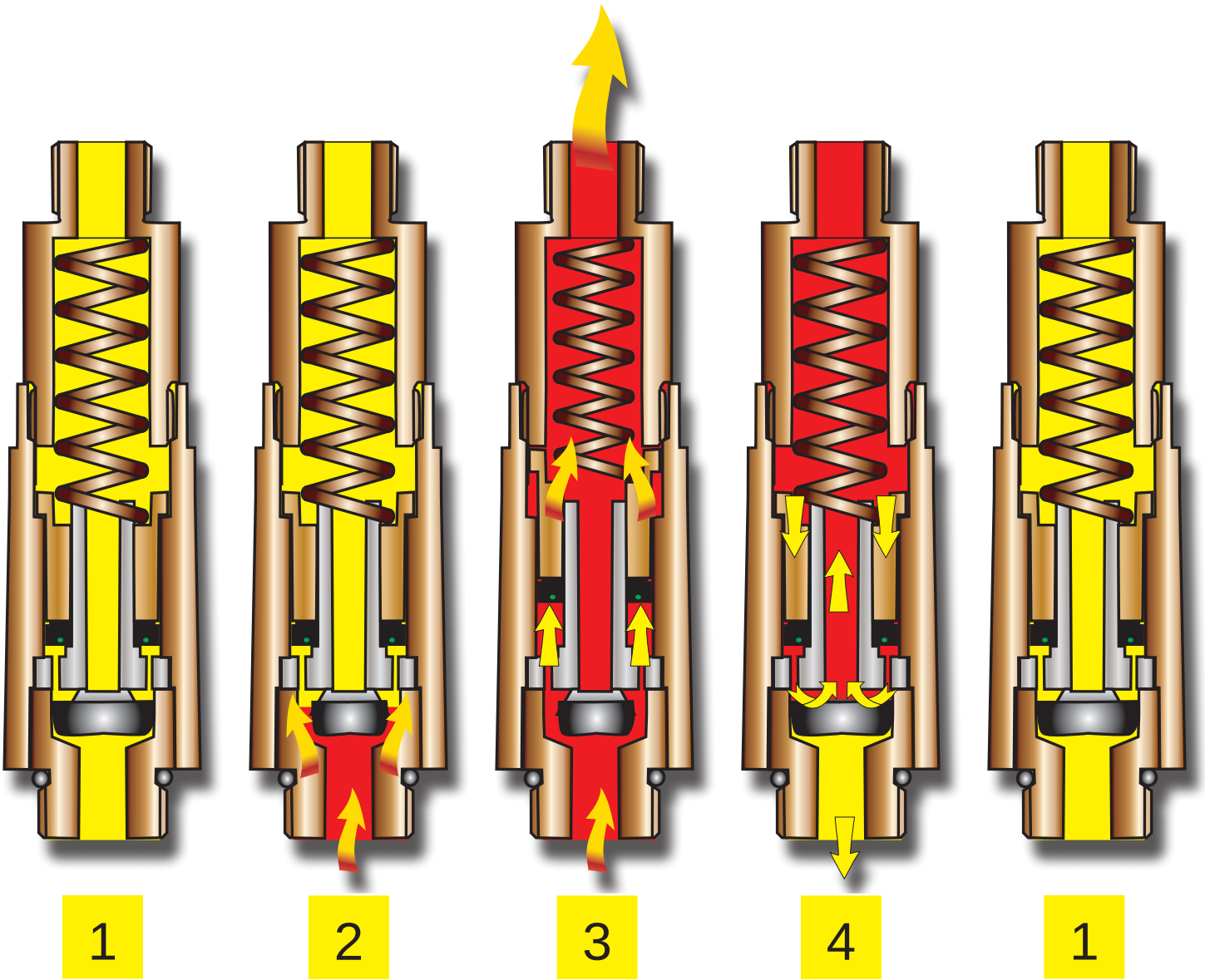


Illustration 48. **Step by Step Overview of the Injector Operation, Lubricating a Grease Point.**

Injector Sizes

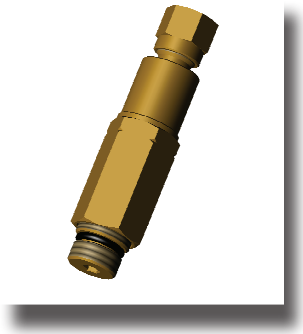


Illustration 49.
Standard Brass Single Line Injector.

Injectors are available in 7 different sizes, with varying output volumes.

By selecting the appropriate injector size, you ensure that each lubrication point is receiving the optimum amount of grease per lubrication cycle.

Using injectors that vary in output sizes on a ALS can allow tailoring of the system to the specific needs of the equipment manufactures requirements for lubrication.

With the exception of the compression sleeve and nut, injector components are not interchangeable (i.e. it is not possible to adjust the metering unit output by exchanging components).

The different injector sizes can be identified by the following characteristics:

- → Overall length (height) of the injector. The longer the injector, the greater the output.
- → Total number of notches or rings injector on the body.

Illustration 50. **Available Injector Sizes, Smallest to Largest. Notches and Rings Identified**

Description	Part Number	Output Size [cc/Stroke]	Identification
Injector # 0.	11.100	0.025	Notches
Injector # 1.	11.101	0.050	No Notches, No Ring
Injector # 2.	11.102	0.100	1 Ring
Injector # 3.	11.103	0.150	2 Ring
Injector # 4.	11.104	0.200	1 Wide Ring
Injector # 8.	11.108	0.400	2 Wide Rings
Injector # 9.	11.109	1.000	Overall Length

Table 51. **Available Injectors**

Manifold Blocks

Injectors are centrally located near a cluster of lubrication points and are connected to the system by manifolds.
Manifolds are manufactured out of corrosion resistant brass and are mounted by using a stainless steel studs, external locking star washers and nuts.
Currently available manifolds are: 4, 6, 7, 8, 9 and 14 port.

Illustration 52.
Front View of a 9 Port Manifold Assembly.

Removing Air Pockets - ALS

As described in the Problem Prevention section, air pockets may disable the lubrication system and possibly cause serious damage to equipment components. To prevent damage to your system, Lubecore™ strongly recommends the use of a Low Level Switch/Sensor. (LLS)

When air pockets are introduced into the ALS accidentally, it is crucial that they are removed as soon as possible.

Follow the steps below to ensure that all air pockets are removed.

Tool Required:
1) 1500 PSI / 100 Bar pressure gauge with ¼" NPT stem
2) 17mm / 11/16th Wrench / Socket
3) 9/16 Wrench

Step 1). Ensure that the equipment air tanks are at maximum.
Step 2). Review the total layout of the ALS and locate the system manifolds.
Step 3). Locate the ALS timer and ensure access to the red test button on the front cover of the timer, the In Cab Manual Test Button or the magnetic pick up zone on the front label of the trailer timer enclosure.
Step 4). Remove the plug located below the serial number tag on the pump; install a 1500 PSI /100 Bar pressure gauge.
Step 5). Remove the manifold end plugs. One at a time, starting with the furthest plug and collect escaping lubricant.
Step 6). Using the manual bypass lever located on the solenoid, initiate a cycle and observe the pressure gauge (900-1100 PSI / 60-76 Bar) falling till zero, repeat until no air bubbles, spurting or spraying is being observed at the manifold that is open. Grease should be seen flowing in a consistent release from the manifold, when all air has been purged from that particular section of mainline and manifold.
Step 7). With the manual bypass lever in the open position (Horizontal to the solenoid body a 1/4 turn to the left) and the pump under pressure, reinstall the manifold plug, repeat procedures 5 - 7 with the next manifold. ***(Recommendation: 4 times for every 10 meters, per 30 feet of mainline length.)***
Step 8). System has now been bled of air, all plugs have been reinstalled and tight, initiate a manual test cycle (Step 6). Pressure should hold between 900-1100 PSI / 60-76 Bar and not drop. Return manual bypass lever to vertical/parallel to the solenoid body (1/4 turn to the right) after holding pressure for 5 minutes).
Step 9). Air up equipment. Turn ignition key to "auxiliary" position.
Step 10). Press red test button on the timer or the In Cab Mounted Test Button or use a magnet to activate and initiate a test cycle; observe gauge is presenting 900-1100 PSI / 60-76 Bar

If pressure is not reached, please check equipment air tank pressure; numerous test cycles could have depleted air pressure to below the required 120-130 psi level for the equipment. If pressure is not reached review error recovery section of this manual or contact Lubecore for assistance.

Note. Principles for purging air from an automated lubrication system are the same whether the ALS is pneumatic, electric, hydraulic or hybrid. You must find the farthest manifolds, timer, solenoid, pump and be able to activate the system to purge the air from the ALS.

Filling The Reservoir

When either the timer indicates that the level switch has been triggered or during a system inspection it's visible that the follower plate has reached minimum level, the pumps reservoir needs to be refilled with an appropriate NLGI / EP lubricant.

For refilling the reservoir, please follow the steps as described below to ensure that no contaminants and/or air enter the lubrication system.

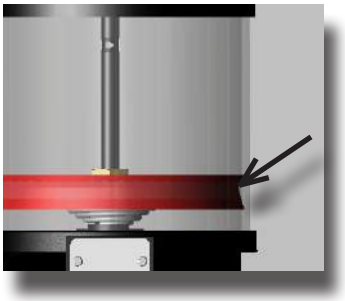


Illustration 53.
Reservoir Level Minimum Level.

Illustration 58.
Step 1, Remove Dust Cap and Clean Coupler.

Step 1: Remove the dust cap from the male filler coupler located on the pump.

Step 2: Clean the male filler coupler located on the pump.

Step 3: With the female coupler of the filler pump, still mounted on the lid to the male coupler, ensure there are no air pockets in the filler hose, by making at least 3 strokes, circulating the grease. This is especially important when exchanging buckets of grease

Illustration 54.
Circulate Grease to Remove Air Pockets.

Step 4: Inspect the female coupler for dirt and clean when required. Then secure it to the male coupler on the pump, until it latches.

Illustration 55.
Fill the Reservoir Until Maximum Level.

Step 5: Fill the reservoir with grease until the top of the follower plate has reached the maximum level mark on the reservoir. (This is located 1 inch / 3cm below the black reservoir cap.) The bottom of the follower plate should have passed the vent-opening in the follower plate guide rod. (See illustration 41)

Illustration 57.
Overflow Opening in the Center Guide Rod.

During filling of the reservoir or immediately after the maximum level has been reached, some lubricant may be expelled from the pump at the side vent opening on the left hand side of the pump. Air possibly trapped underneath the follower plate and excess lubricant shall come out at this opening.

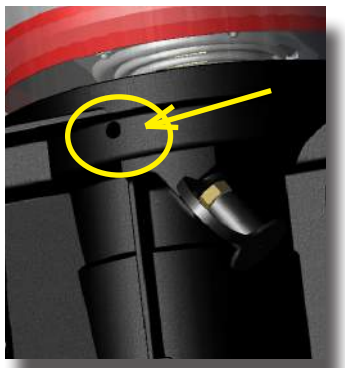


Illustration 56.
Overflow Opening on the Left Side of the Pump.

The opening corresponds to the vent opening as located in the center guide rod as described under step 5.

Note: the lubrication pump male filler connector is equipped with an internal filter. When filling of the reservoir is difficult, inspect the filter, clean or replace when necessary.

Step 6: Place the dust cap back on the male coupler on the pump and the female filler pump coupler on the male coupling on the lid of the filler pump.

Illustration 60.
Place Dust Cap Back on the Male Filler Coupler.

Illustration 59.
Return Female Coupler to the Male Coupler on the Lid.

Illustration 61.
Grease Filter Located Inside Pump.

Heavy Duty Filter

The pump may optionally be equipped with an in-line heavy duty grease filter. This filter, directly mounted behind the male quick disconnect prevents dirt and debris from being pumped into the reservoir. Small particles of dirt like sand, when introduced into the lubrication system, may accumulate in manifolds, injectors and distributors; causing blockages or they may end up causing damage to the equipment.

It is highly recommended that a Heavy Duty in-line filter be installed on equipment working in severe environmental conditions.

Male Quick Disconnect Coupling with Filter.

Illustration 62.
Heavy Duty Filter Assembly. (50.321)

Technical Specifications

Pneumatic Pump

Part Number	50.050	50.060
Reservoir Capacity	4 Kg / 8.8 Lbs	6 Kg / 13.2 Lbs
Main Piston Air-Grease Pressure Ratio	10:1	10:1
Grease Pressure @ 110 PSI / 7 BAR	1100 PSI / 70 Bar	1100 PSI / 70 Bar
Maximum Grease Pressure	1600 PSI / 110 Bar	1600 PSI / 110 Bar
Pump Grease Output	40 CCs / Stroke	40 CC / Stroke
Operating / Ambient Temperature	-25 C / 80 C | -13 F / +160 F	-25 C / 80 C | -13 F /+160 F
Lubricant Grade:	NLGI-0	NLGI-0
Pump Weight With Grease / Without Grease	15 / 12 Kg	18 / 13 Kg
Follower Plate:	Standard	
Pressure Switch	Standard	
Pressure Switch Rating	25 bar / 355 PSI Standard	
Low Level Switch / Sensor	Optional	
Filler Coupling Size:	1/4"	
Solenoid Voltage / Watt	12 or 24 VDC / 40 Watt	

Tableau 63. **Overview: Pneumatic Pump Technical Specifications.**

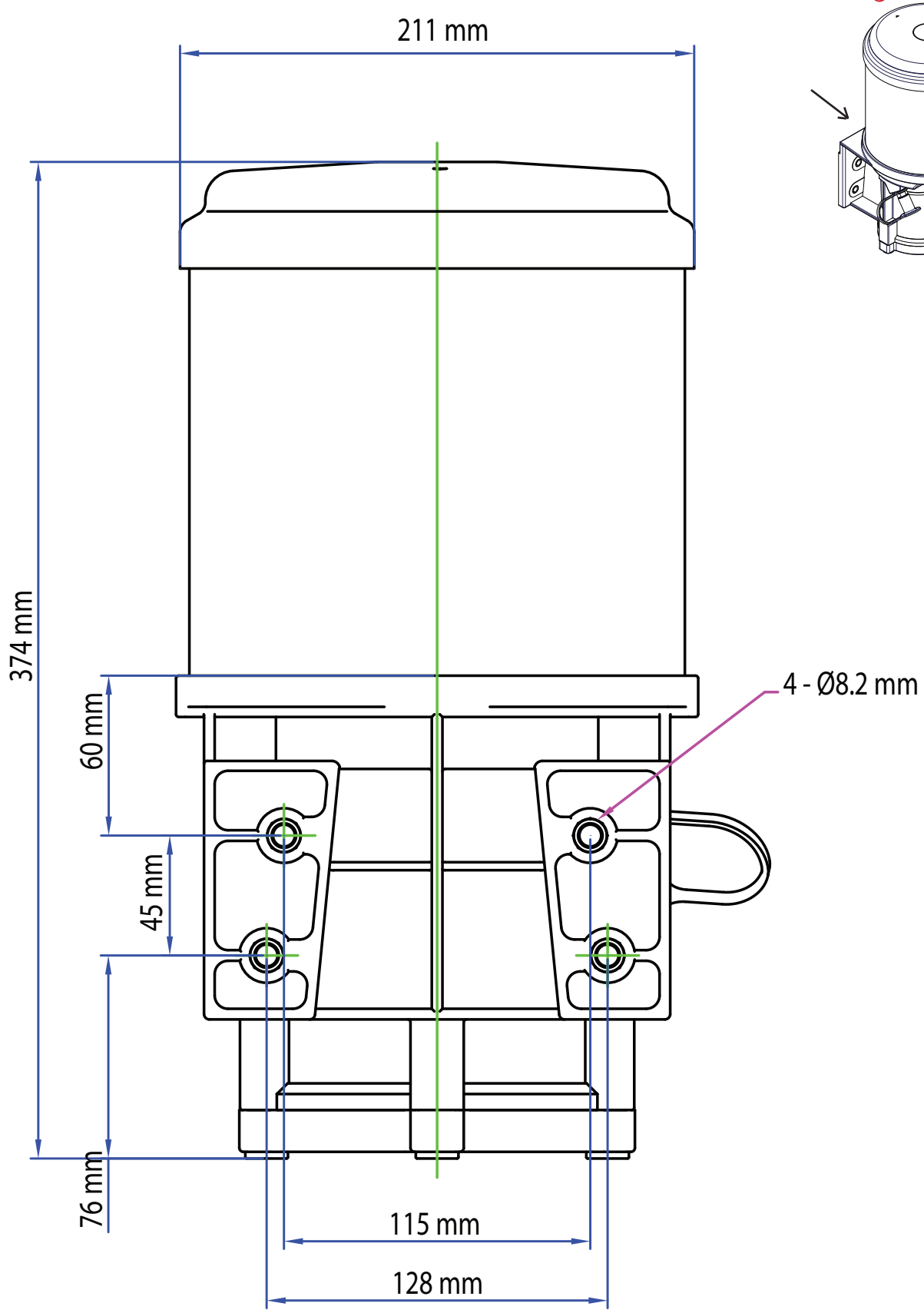


Illustration 64.
General Dimensions of the Pneumatic 4Kg Reservoir Pump.

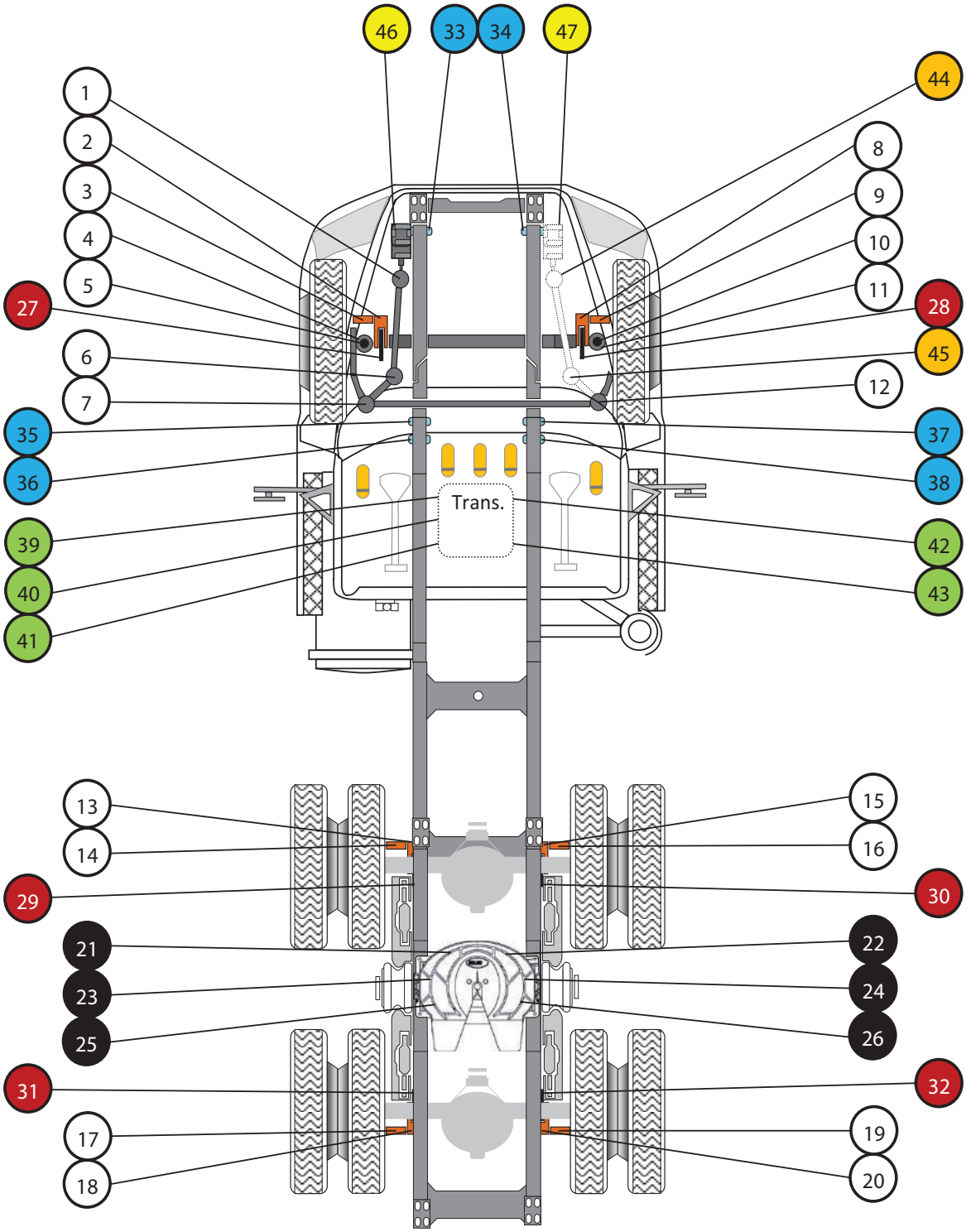
Lubrication Point Maps, Samples & General Parts

Injector and Point Identification of a Tandem Axle Tractor

Lube Point	Injector Size 1hr/3min	Lubrication Point Description
Standard Tandem Axle Tractor		
1	2	Left Forward Drag Link
2	2	Left Front Slack Adjuster
3	2	Left Front Cam Tube
4	4	Left Front King Pin
5	4	Left Lower King Pin
6	2	Left Rear Drag Link
7	2	Left Tie Rod End
8	2	Right Front Slack Adjuster
9	2	Right Front Cam Tube
10	4	Right Upper King Pin
11	4	Right Lower King Pin
12	2	Right Tie Rod End
13	2	Left Front Drive Axle Slack Adjuster
14	2	Left Front Drive Axle Cam Tube
15	2	Right Front Drive Axle Slack Adjuster
16	2	Right Front Drive Axle Cam Tube
17	2	Left Rear Drive Axle Cam Tube
18	2	Left Rear Drive Axle Slack Adjuster
19	2	Right Rear Drive Axle Cam Tube
20	2	Right Rear Drive Axle Slack Adjuster
Optional Fifth Wheel Points		
21	8	Front Left 5th Wheel Plate
22	8	Front Right 5th Wheel Plate
23	9	Middle Left 5th Wheel Plate
24	9	Middle Right 5th Wheel Plate
25	9/2	Rear Left 5th Wheel Plate/Saddle Pin
26	9/2	Rear Right 5th Wheel Plate/Saddle Pin

Lube Point	Injector Size 1hr/3min	Lubrication Point Description
Optional Clevis Pins		
27	1	Front Left Clevis Pin
28	1	Front Right Clevis Pin
29	1	Front Left Drive Axle Clevis Pin
30	1	Front Right Drive Axle Clevis Pin
31	1	Rear Left Drive Axle Clevis Pin
32	1	Rear Right Drive Axle Clevis Pin
Optional Spring Pins		
33	3	Front Left Spring Pin
34	3	Front Right Spring Pin
35	3	Front Left Upper Spring Shackle
36	3	Front Left Lower Spring Shackle
37	3	Front Right Upper Spring Shackle
38	3	Front Right Lower Spring Shackle
Optional Transmission Points		
39	0	Release Bearing (Automatic)
40	1	Left Cross Shaft (Automatic)
41	1	Right Cross Shaft
42	1	Clutch Linkage
43	1	Clutch Linkage
Optional Double Drag Link		
44	2	Right Forward Drag Link
45	2	Right Rear Drag Link
Optional Steering Box		
46	1	Left Steering Box
47	1	Right Steering Box

Example - Possible Number of Grease Points on a Tandem Axle Tractor



Lubrication Injector and Point Identification of a Tandem Axle Trailer with Steer Lift

Lube Point	Injector Size 1hr/3min	Lubrication Point Description
Tandem Axle Trailer		
1A	2	Left Front Cam Tube
2A	2	Right Front Cam Tube
3A	2	Left Rear Cam Tube
4A	2	Right Rear Cam Tube
1B	2	Left Front Inner Cam Bushing
2B	1	Left Front Outer Cam Bushing
3B	2	Right Front Inner Cam Bushing
4B	1	Right Front Outer Cam Bushing
5B	2	Left Rear Inner Cam Bushing
6B	1	Left Rear Outer Cam Bushing
7B	2	Right Rear Inner Cam Bushing
8B	1	Right Rear Outer Cam Bushing
5	2	Left Front Slack Adjuster
6	2	Right Front Slack Adjuster
7	2	Left Rear Slack Adjuster
8	2	Right Rear Slack Adjuster
Optional Tandem Axle Clevis		
9	1	Clevis Pin
10	1	Clevis Pin
11	1	Clevis Pin
12	1	Clevis Pin

Trailer Axle Configuration - Lubrication Point Count:

1)	Disc Brake	None
2)	"S" Cam Inner & Outer	4
3)	"S" Cam Tube	2
4)	"S" Cam Tube	4

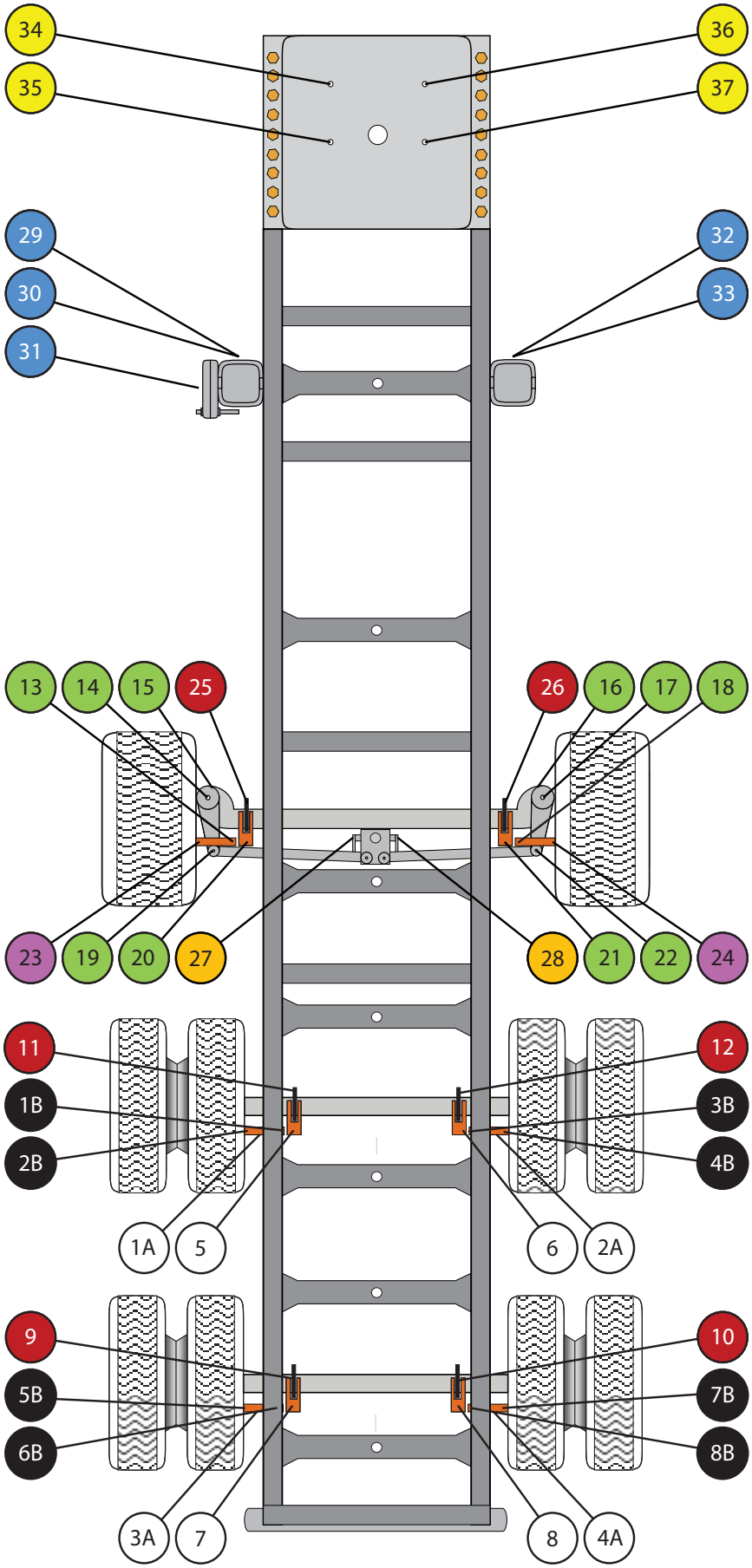
Trailer Steer Axle Configuration - Lubrication Point Count:

1)	Disc Brake	None
2)	Mod 1 "S" Cam Tube	10
3)	Mod 2 "S" Cam Tube & Locks	12
3)	Mod 3 "S" Cam Tube & Spider Bushing	12
4)	Mod 4 "S" Cam Tube, Locks & Spider Bushings	14

NOTE: THESE MODS DO NOT INCLUDE CLEVIS PINS

Lube Point	Injector Size 1hr/3min	Lubrication Point Description
Lift Steer 10/12/14/16 Point		
13	2	Left Steer Axle Cam Tube
14	3	Left Upper King Pin
15	3	Left Lower King Pin
16	3	Right Lower King Pin
17	3	Right Upper King Pin
18	2	Right Steer Axle Cam Tube
19	2	Left Tie Rod End
20	2	Left Steer Axle Slack Adjuster
21	2	Right Steer Axle Slack Adjuster
22	2	Right Tie Rod End
23	1	Left Steer Axle Spider Bushing (Select Models)
24	1	Right Steer Axle Spider Bushing (Select Models)
25	1	Clevis Pin (Optional)
26	1	Clevis Pin (Optional)
27	2	Steer Axle Lock (Select Models)
28	2	Steer Axle Lock (Select Models)
Optional Dolly Legs		
29	4	Left Lower Dolly Leg
30	4	Left Upper Dolly Leg
31	4	Gear Box
32	4	Right Lower Dolly Leg
33	4	Right Upper Dolly Leg
Special Application - Upper Coupler		
34	9	Front Upper Coupler/Pickup Plate
35	9	Rear Upper Coupler/Pickup Plate
36	9	Front Upper Coupler/Pickup Plate
37	9	Rear Upper Coupler/Pickup Plate

Possible Lubrication Points and Identification of a Tandem Axle Trailer with Lift Steer



Sample -
Standard Kit - Tandem Axle Tractor 30 Lubrication Points

Part#	Part Description	Quantity	
50.063	Pneumatic Pump EP0 - 6kg + P/S + LL + EP0 Grease	1.00	ea
54.624	kit, 2x2 Post Pump Mount	1.00	ea
50.070	Pump & Bracket Hardware Mounting Kit (Pur)	1.00	ea
50.188	BK 12V Solenoid Kit	1.00	ea
50.529	Power Harness 25' 12V MK 2 Timer Pneu. Pump SOL/PS & LL 2013	1.00	ea
50.587	In Cab Manual Test Switch 12/24VDC - Green - Deutsch & Tyco	1.00	ea
12.016	Timer - Truck Mark II - Std Software 10V - 30V	1.00	ea
50.742	kit, 8pt Front Left Manifold	1.00	ea
50.743	kit, 6pt Front Right Manifold	1.00	ea
50.744	kit, 12pt Rear Manifold	1.00	ea
50.745	kit, 4pt 5th Wheel Manifold - 9's	1.00	ea
21.006	Plug G 1/4 (M) BSPT For Manifold End (Blanking) - Brass	2.00	ea
21.002	Tee 8mm Mainline - Brass	1.00	ea
21.004	Elbow Compression 8mm Mainline X 1/4 (M) BSPT - Brass	7.00	ea
21.005	Straight Compression 8mm X 1/4 (M) BSPT - Brass	2.00	ea
20.022	Straight Compression 1/8 BSPT X 5mm	10.00	ea
20.056	Fitting, 5mm - M6x1 Conical Male	6.00	ea
20.024	Elbow Compression 1/8 BSPT X 5mm - Brass	22.00	ea
20.001	Cube Connector 1/4 -28 (M) UNF X 1/8 (F) BSPT - 21 Long	6.00	ea
20.006	Straight Connector 1/4 - 28 (M) UNF X 1/8 (F) BSPP	4.00	ea
22.000	Tubing AIR 1/4 DOT - Black	15.00	feet
22.017	Elbow Compression 1/4 DOT X 1/4 (M) NPT - Brass	1.00	ea
22.033	Tee Union 3/8 DOT X 1/4 DOT	1.00	ea
41.022	Clevis Pin 1/2" Greasable (truck) + Cotter Pin + Yellow Hat	6.00	ea
41.000	Ty-Rap Large (13UV) - Black	150.00	ea
41.001	Ty-Rap Small (7UV) - Black	150.00	ea
41.002	Spiral Wrap Large 1/2"	20.00	feet
41.003	Spiral Wrap Small 3/8"	20.00	feet
30.005	Tubing Mainline 8mm OD X 5mm ID - Black	40.00	feet
10.159	Label - Frame Rail Sticker	1.00	ea
75.007	Driver Instruction Card Parallel Pneumatic EP0	1.00	ea

NOTE:

THESE ARE GENERIC KITS GIVEN AS A SAMPLE -
PLEASE CONTACT LUBECORE INTERNATIONAL AND PROVIDE A REQUIREMENT SHEET DETAILING THE PARTICULAR SYSTEM REQUIREMENTS

Sample -
50.xxx Standard Kit - Tandem Axle Trailer + Steer Lift 28 Lubrication Points

Part#	Part Description	Quantity	
54.737	Pump/PN/EP0/4kg/GR/LLSE/BS	1.00	ea
40.001	Bracket for pump 4kg	1.00	ea
50.070	Pump & Bracket Hardware Mounting Kit (Pur)	1.00	ea
54.213	Kit Mk2 Progressive TT – 2 Pin ABS/MK/FK/LL	1.00	ea
22.000	Tubing ¼ DOT	15.00	feet
22.017	Elbow Compression ¼ DOT x ¼ (M) NPT – Brass	1.00	ea
22.033	Tee Union 3/8 DOT x ¼ DOT	1.00	ea
22.050	Air Protection Valve 60PSI	1.00	ea
22.016	Straight Compression ¼ DOT x ¼ NPT	2.00	ea
13.238	Power Harness for Trailer – ABS Power Tee Jumper – Deutsch	1.00	ea
13.239	Power Harness for Trailer – Power Jumper 1-' Deutsch	1.00	ea
30.005	8mm Mainline	40.00	feet
21.004	Elbow Compression 8mm Mainline X 1/4 (M) BSPT - Brass	3.00	ea
50.982	MASAHD 12Pt	1.00	ea
51.044	TAB-0S8WC 8 Pt 5" Trailer Man	2.00	ea
20.022	Straight Compression 1/8 BSPT X 5mm	6.00	ea
20.024	5mm Elbow Compression x 1/8 BSPT (M)	6.00	ea
20.024	Elbow Compression 1/8 BSPT X 5mm - Brass	22.00	ea
20.001	Cube Connector 1/4 -28 (M) UNF X 1/8 (F) BSPT - 21 Long	2.00	ea
20.003	Cube Connector 1/8 (M) NPT x 1/8 BSPT (F) 25.5 Long	4.00	ea
53.001	SUB – Wraps and Straps Kit MED -21 -36pt	1.00	ea

NOTE:

THESE ARE GENERIC KITS GIVEN AS A SAMPLE -
PLEASE CONTACT LUBECORE INTERNATIONAL AND PROVIDE A REQUIREMENT SHEET DETAILING THE PARTICULAR SYSTEM REQUIREMENTS

EP0 Parts List

Category	Part#	Part Description
Injectors		
	11.100	Injector #0 - EP0
	11.101	Injector #1 - EP0
	11.102	Injector #2 - EP0
	11.103	Injector #3 - EP0
	11.104	Injector #4 - EP0
	11.108	Injector #8 - EP0
	11.109	Injector #9 - EP0
Manifold		
	11.004	Manifold 4 Port - Brass
	11.007	Manifold 7 Port - Brass
	11.009	Manifold 9 Port - Brass
	11.012	Manifold 12 Port - Brass
	11.014	Manifold 14 Port - Brass
	11.006	Manifold 6 Port - Brass - Fifth Wheel
	11.008	Manifold 8 Port - Brass - Fifth Wheel
	50.031	8 Port 5" Axle Block, Clamp & Hardware
	50.552	8 Port 5.75" Axle Block, Clamp & Hardware
	50.553	8 Port 6" Axle Block, Clamp & Hardware
Plugs		
	11.110	Injector Plug Manifold - Brass
	21.006	1/4 (M) BSPT Manifold End Plug - Brass
	21.066	1/8 (M) NPT Hex Plug
Lubrication Point Adapter Fittings (In Conjunction With Compression Fittings)		
	20.001	Cube 1/4 - 28 (M) UNF x 1/8 (F) BSPT - 21.0 Long - Steel
	20.002	Cube 1/4 - 28 (M) UNF x 1/8 (F) BSPT - 33.0 Long - Steel
	20.003	Cube 1/8 - 27 (M) NPT x 1/8 (F) BSPT - 25.5 Long - Steel
	20.004	Cube 1/8 - 27 (M) NPT x 1/8 (F) BSPT - 38.3 Long - Steel
	20.005	Cube 1/8 - 27 (M) NPT x 1/8 (F) BSPT - 51.0 Long - Steel
	20.028	Cube M8 x 1 (M) x 1/8 (F) BSPP - Steel
	20.059	Cube 1/8 (M) BSPT x 1/8 (F) BSPT - 25.5 Long - Steel
	20.061	Cube 1/8 (M) BSPT x 1/8 (F) BSPT - 38.3 Long - Steel
	20.062	Cube 1/8 (M) BSPT x 1/8 (F) BSPT - 51.0 Long - Steel
	20.006	Straight Adapter 1/4 - 28 (M) UNF x 1/8 (F) BSPP - Steel
	20.060	Cube Connector 1/8 (M) BSPT X 1/8 (F) BSPT - 25.5 Long
Lubrication Point Compression Fittings		
	20.020	5mm Compression Olive - Brass
	20.030	5mm Compression Nut - Brass
	20.022	5mm x 1/8 (M) BSPT Compression Straight - Brass

EP0 Parts List

Category	Part#	Part Description
Lubrication Point Compression Fittings Continued		
	20.024	5mm x 1/8 (M) BSPT Compression 90° Elbow - Brass
	20.025	5mm x 5mm Compression Union - Brass
	20.056	5mm x M6 x 1 (M) Compression Conical - Brass
Lubrication Point Secondary Tubing		
	30.003	5mm Single Secondary Lining - Black
	30.004	5mm Double Secondary Lining - Black/Red
	30.013	5mm Triple Secondary Lining - Black/Red/Blue
Lubrication System Mainline Fittings		
	21.001	8mm x 8mm Compression Union - Brass
	21.002	8mm Mainline Compression Tee - Brass
	21.003	8mm Mainline Compression Olive - Brass
	21.004	8mm x 1/4 (M) BSPT Mainline Compression 90° Elbow - Brass
	21.005	8mm x 1/4 (M) BSPT Mainline Compression Straight - Brass
Lubrication System Mainline		
	30.005	8mm Mainline
System Mounting Hardware, Brackets & Protection		
	40.000	6Kg Bracket
	40.001	4kg Bracket
	40.004	Universal Bracket
	40.027	Backing Plate
	40.043	Deck Bracket
	50.070	Pump Mounting Hardware Kit
	41.000	Ty-Rap - Large (13UV) Black
	41.001	Ty-Rap - Small (7uv) Black
	41.002	1/2" Large Spiral Wrap
	41.003	3/8" Small Spiral Wrap
Electrical		
	12.016	Timer - Truck Mark II - Std Software 10V - 30V
	12.058	MKII Progressive Trailer Timer - 12v
	50.453	In Cab Manual Test Switch 12/24VDC - Green - Deutsch & Tyco
	50.005	Solenoid
	10.204	25 Bar Pump Pressure Switch
	10.215	25 Bar Manifold Pressure Switch
	12.062	LLPS 4Kg Low Level Sensor
	12.063	LLPS 6Kg Low Level Sensor
	50.071	LLS 4kg Low Level Switch
	50.072	LLS 6Kg Low Level Switch

Lubecore™ Limited Warranty

Lubecore™ warrants the product manufactured and supplied by Lubecore and its authorized distributors to be free from defects in material and workmanship for a term as defined in the enclosed table, following the date of purchase, excluding any special, extended, or limited warranty published by Lubecore.

If product is determined to be defective during this warranty period, it will be repaired or replaced, within Lubecore sole discretion, without charge. This warranty is conditional upon the determination by Lubecore or authorized representative that the product is defective. For a complete list of Lubecore and authorized representative locations call 1-905-864-3110 or visit www.lubecore.com.

This warranty is non-transferable and applies to the original retail purchaser only. This warranty does not apply to product damaged from accident, overload, abuse, misuse, negligence, faulty installation or abrasive or corrosive material, equipment that has been altered, or equipment repaired by anyone not authorized by Lubecore.

This warranty applies only to product installed, operated and maintained in strict accordance with the written specifications and recommendations provided by Lubecore or authorized representative.

This warranty is exclusive of any other warranties, expressed or implied, including, but not limited to, the warranty of merchantability or warranty of fitness for a particular purpose.

In no event shall Lubecore or authorized representative be liable for incidental or consequential damages. Lubecore or authorized representative's liability for any claim for loss or damages arising out of the sale, resale or use of any Lubecore equipment shall in no event exceed the purchase price. Some jurisdictions do not allow the exclusion or limitation of incidental or consequential damages, therefore the above limitation or exclusion may not apply. Warranty shall not exceed original purchase price.

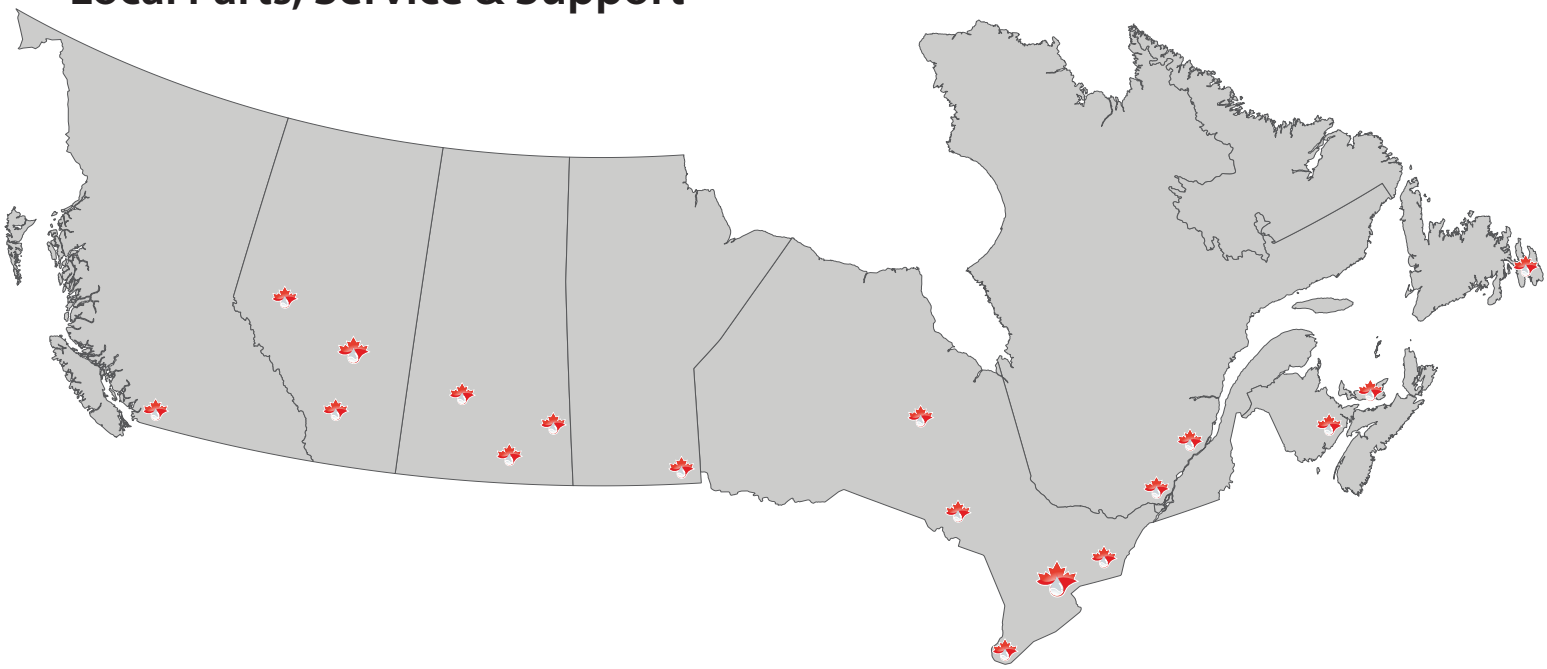
Product	Limited Product Warranty	Limited Steadylube Extended Warranty	
		On-Road / Transport	Off-Road
Parallel Pneumatic* EP0	1- year	5 -years	2 -years
Parallel Electric* Gear EP0		2 years	1 -year
Parallel High Pressure Electric* - Hydraulic		-	1 -year
Series Progressive Electric*		-	1 -year
Series Progressive Pneumatic*		5 -years	2 -year
MLP/Multiline - Including Modular		1 -years	1 -year

Table 65. **Limited Warranty Terms / Period. * Defines the Method of Pump Operation.**

Both the Regular and the Extended Warranty are void in case of the following:

- Damage from grease contamination or using alternate grease. - Service from an unauthorized dealer - Cut wires or missing parts - Water above the follower plate from pressure washing - Damage caused by negligence, theft, or accident.
- Contact Lubecore International or your local distributor for further details pertaining to the extended warranty provided with the use of Lubecore lubrication products.

Lubecore International - Canadian Local Parts, Service & Support



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1 800 561 7900 FREE
(506) 857-9788
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National Tank Services Mount Pearl
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jcd@lubecorequebec.com

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jcd@lubecore.com

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ncitrucks.com

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ncitrucks.com

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ncitrucks.com

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National Tank Services Regina
705 Henderson Dr. Regina, SK Canada
S4N 6A8
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nationaltankservices.com

National Tank Services Yorkton
315 Ball Rd. Yorkton SK Canada
S0A 3N0
Service Location
(306) 782-0555
nationaltankservices.co

Lubecore Saskatchewan/Ernie's Trailer
863 60 St. East, Saskatoon, SK Canada
S7K 8G8
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ets@sasktel.net

National Tank Services Fort McMurray
425 Gregoire Dr. Fort McMurray, AB Canada
T9H 3R2
Service Location
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nationaltankservices.com

National Tank Services Dawson Creek
2700 92 Ave. Dawson Creek, BC Canada
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Service Location
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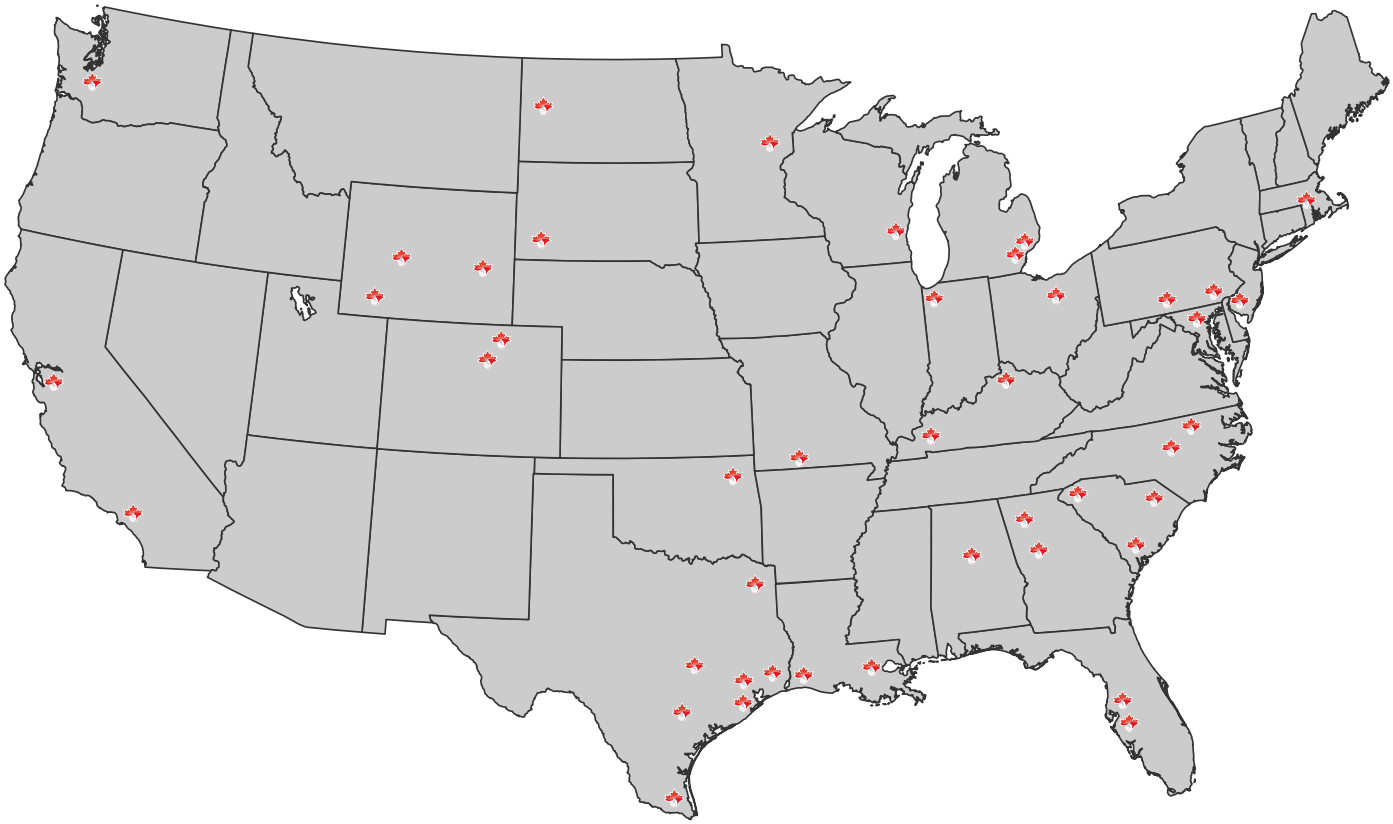
Lubecore International - United States
Local Parts, Service & Support



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National Tank Services Holly Hill
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National Tank Services Charlotte
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28216
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National Tank Services Winston-Salem
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Truck Crane Solutions
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1 (904) 342-0395
danielh@truckcranesolutions.com
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Pioneer Truck Sales
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08080
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Sales@autolubeparts.com
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National Tank Services Portage
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Rapid Repair Inc.
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48207
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313-267-9800
perry@rrepair.biz

National Tank Services Taylor
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nationaltankservices.com

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National Tank Services Louisville
3710 Cane Run Rd. Louisville, KY USA
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nationaltankservices.com

National Tank Services Geismar
35072 Louisiana 30, Geismar, LA USA
70734
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(225) 673-2687
nationaltankservices.com

National Tank Services Sulphur
1501 E. Burton St. Sulphur, LA USA
70663
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Truck Components TCS
403 E. Evergreen Rd. Strafford, MO USA
65757
Sales Location Service Location
417-829-6700
417-736-9218
truckcs.com

Fuel Systems
12730 W. Robin Ln. Brookfield, WI USA
53005
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(262) 781-4353
bkfsi@fuelsys.com

Hardline North LLC
220 4th St. Albany MN USA
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(320) 761-6532
jim@hardlinenorth.com
hardlinenorth.com

National Tank Services Beaumont
5055 Washington Blvd. Beaumont, TX USA
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National Tank Services Brownsville
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78521
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National Tank Services La Porte
2401 Independence Pkwy La Porte, TX USA
77571
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National Tank Services Marble Falls
100 Farm to Market Rd. 2147, Marble Falls, TX USA
78654
Service Location
(830) 693-7705
nationaltankservices.com

National Tank Services San Antonio
13550 Toepperwein Rd. San Antonio, TX USA
78233
Service Location
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Lubecore Production Services of Texas
1300 Farm-to-Market 449, Longview, TX USA
75605
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sterrexindustries@gmail.com

National Tank Services Pasadena
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77507
Service Location
(281) 474-5674
nationaltankservices.com

National Tank Services Tulsa
2120 N. 161st E. Ave. Tulsa, OK USA
74116
Service Location
(800) 375-8859
nationaltankservices.com

National Tank Services Rapid City
3600 Universal Dr. Rapid City, SD USA
57702
Service Location
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nationaltankservices.com

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National Tank Services Rock Springs
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(307) 332-4025
307atec.com

Ameri-Tech Equipment Company
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P.O. Box 2888 82602
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(307) 234-3432
307atec.com

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(661) 263-0560
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94545
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(701) 425-4050
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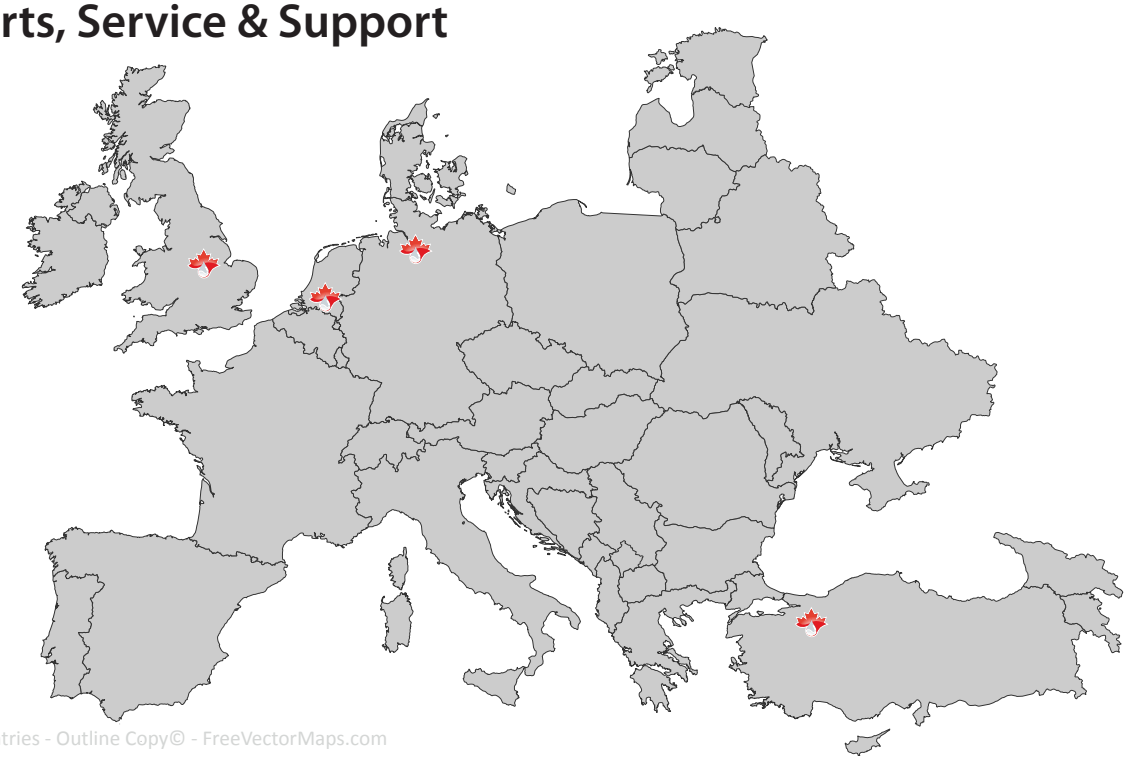
Lubecore International - Europe
Local Parts, Service & Support



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