General Manual

Lubecore_GM_001

Parallel Automated Lubrication System

210 Pneumatic Pump

Document Information

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development and improvement Lubecore reserves the right to update parts at any time, the contents of this manual may also be changed without prior notice. This manual applies to the standard version of the product. Lubecore cannot accept liability for any damage arising from the use of this publication. Please contact Lubecore in case of any questions related to the revision of, required service, repairs and or maintenance as described in this publication

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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.

Disclaimer:

Lubecore International reserves the right to modify, correct, update, expand or delete items, descriptions, directions, explanations from this document without prior or direct notification of distributors, customers, dealers, end users or persons whether spoken or written.

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 system 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 and operator.
- 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.

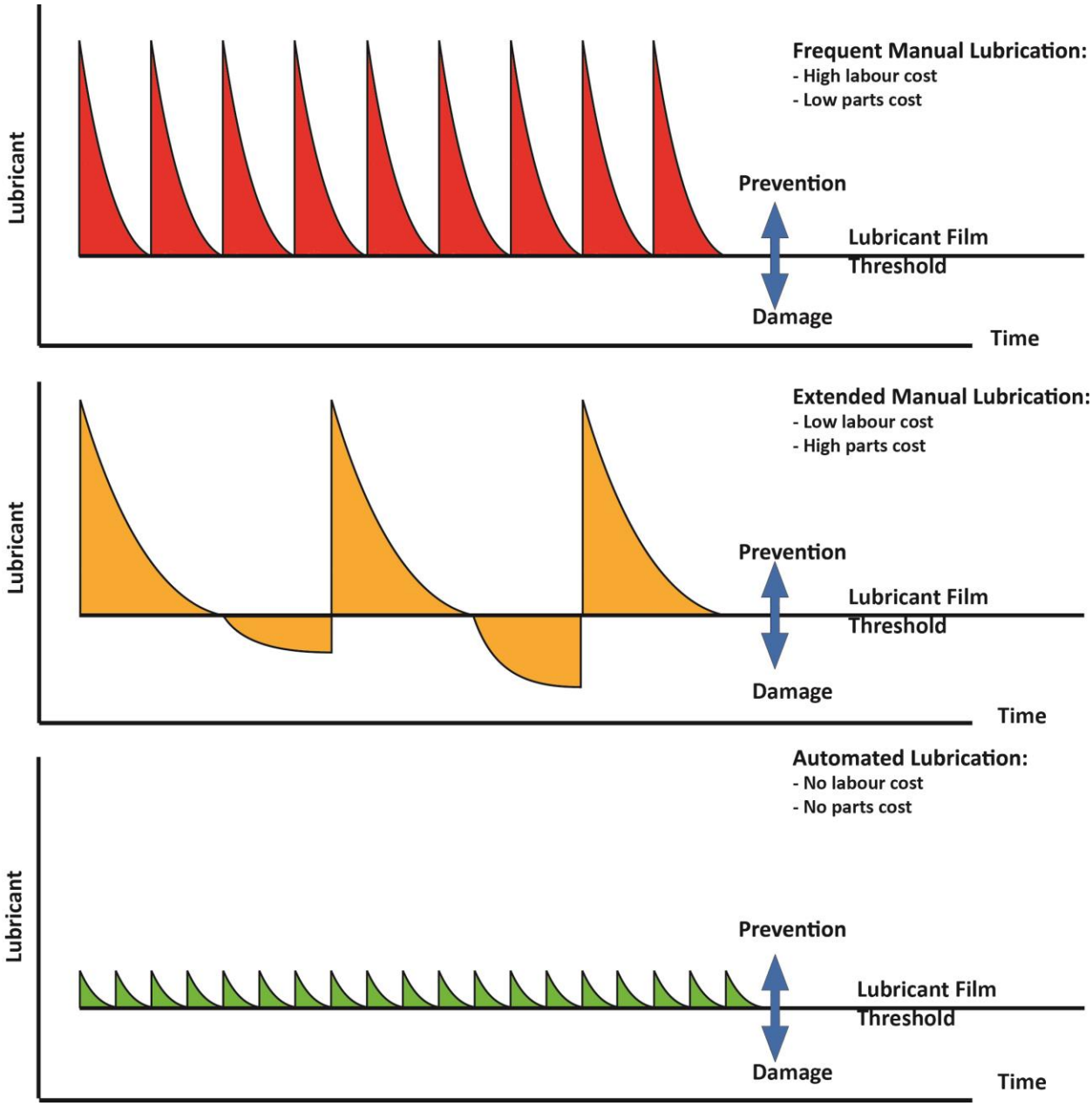


Figure 1 - Manual Versus Automatic Lubrication, Representation of Concept.

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 dispense a predetermined and consistent amount of lubricant through the secondary tubing ⑥ and fittings ⑨ and into the lubrication points ⑩. Once 40 Bar/580 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.

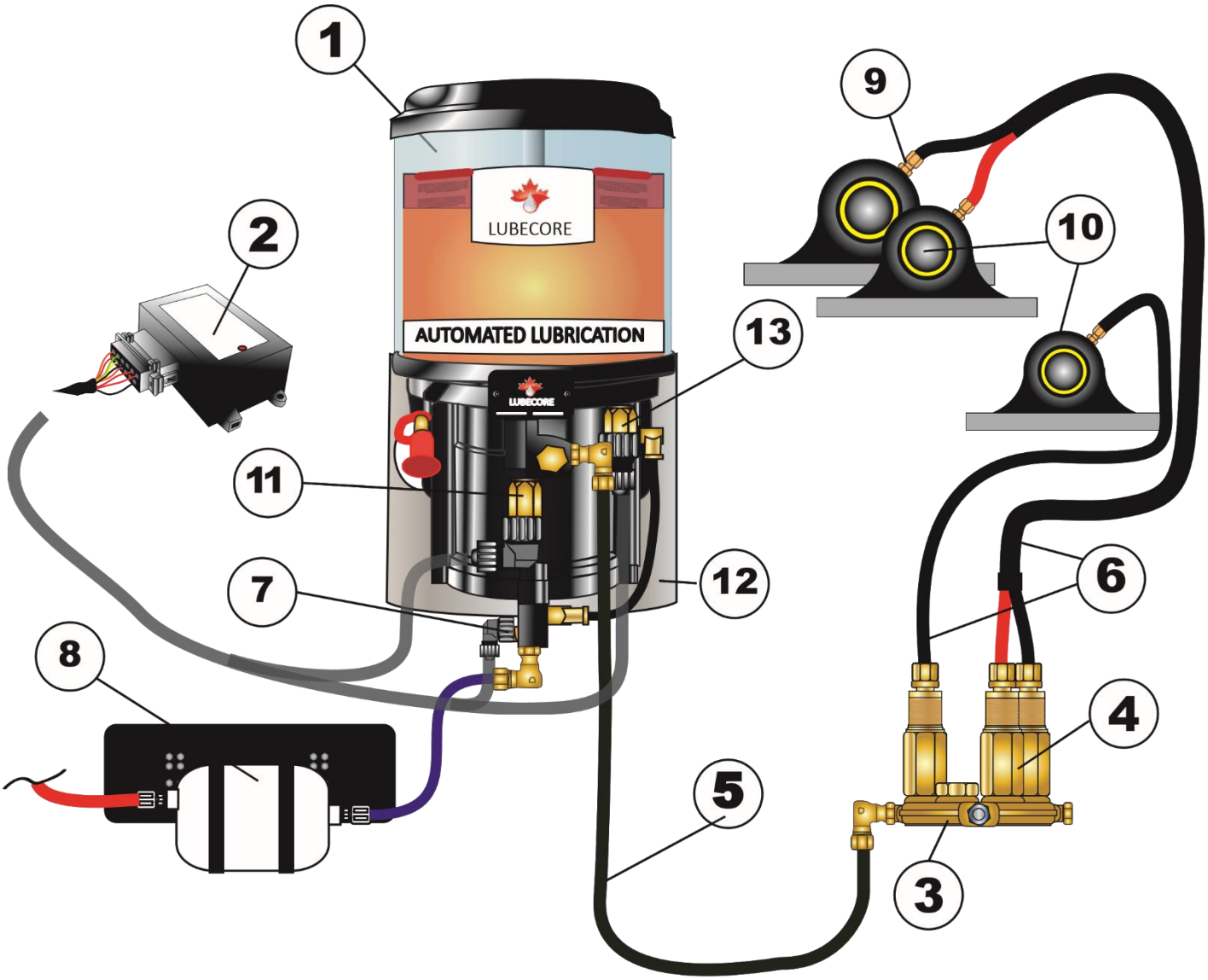


Figure 2 – Standard Lubecore Automated Lubrication System Layout on a Truck

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 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 pause 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 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 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.

Figure 34
Lubecore Pneumatic Pump with 6kg Reservoir and Pressure Switch

Standard 4kg Truck 52.053
Standard 6kg Truck 52.063
Standard 4kg Trailer 54.737
Standard 6kg Trailer 54.736

- 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 of a pump that has been run empty.

  - o Anodized and coated 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.

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 reduction 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 camber (D) by way of internal pump galleries to the mainline tubing, over the return valve (F) and non-return valve (G).
- Return valve (F) prevents the lubricant from flowing to the reservoir. This route is blocked as long as the grease pressuring from piston (B) is pushing against the return valve assembly.

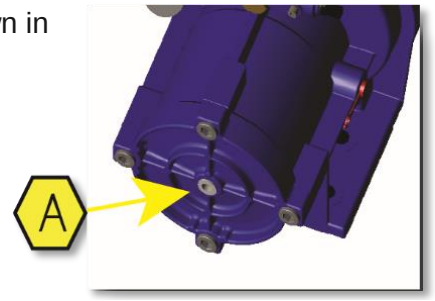


Figure ~~4~~5
Air Entry Opening (A) in Bottom of Pump

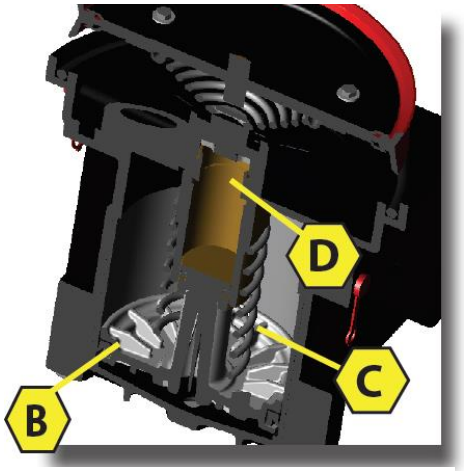


Figure ~~5~~6
Cross Sectional View of the Grease Piston and Return Spring inside the Pneumatic Pump.

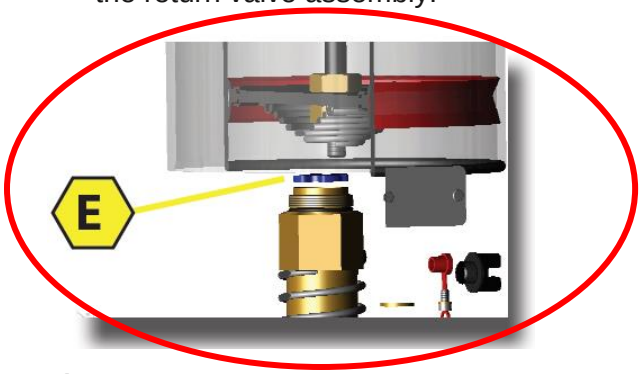


Figure 6
Placement of Flapper Valve (E) above Piston (B).

- Non-return valve (G) allows lubricant to flow out from the return valve (F) to the mainline outlet of the pump.
- After the completion of the lubrication cycle, air pressure from under piston (B) is released and grease pressure drops to zero. Lubricant pressure is released from the return valve (F), allowing grease to return to the reservoir via the internal galleries.

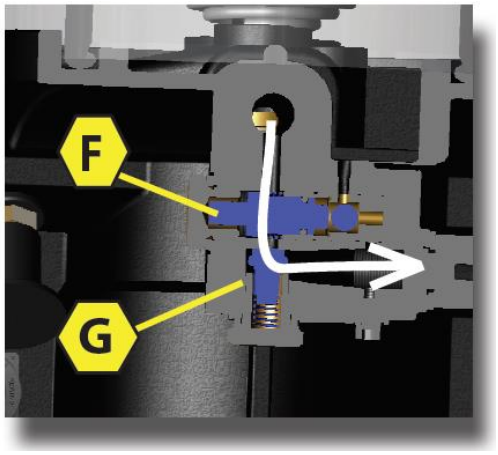


Figure ~~7~~8
System delivering lubricant

- Non-return valve (G) then blocks the lubricant return from the mainline and directs the pressure to the reservoir through the opening in 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, the buildup of grease solids and the chances of air pockets developing inside the pump are prevented.
- After the lubrication cycle is complete, the air pressure 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.

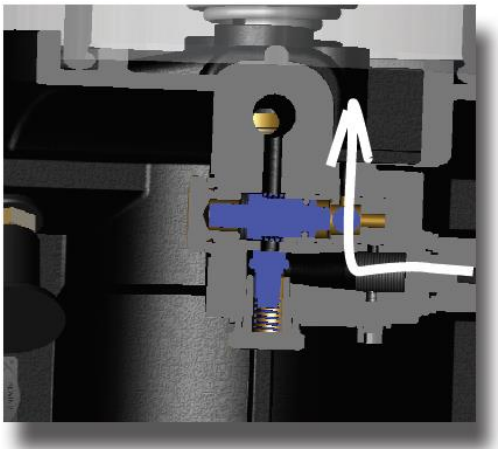


Figure 89
System off (Lubricant Return)

Figure 910
Air recirculation at the end of a lubrication cycle

The pump cycle is complete when the system pressure drops below 30bar in the primary tubing and the excess lubricant has returned to the reservoir. The pump is now ready to begin its next cycle.

Reservoir Follower Plate and Guide Rod

Figure 1011
Cross section of the reservoir follower plate and guide rod with over flow openings highlighted

The Lubecore ALS pneumatic pump is equipped with a 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.

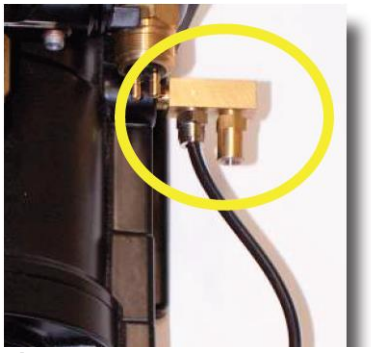


Figure 1113
Right side view of pneumatic pump showing the vent valve assembly (54.912).

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. The top of the guide rod is cross drilled to provide an escape for both air trapped underneath the follower plate and for excess lubricant. Internal galleries guide air down the guide rod and out of the pump. The highlighted area on the right is the location lubricant exits the over-flow. It is important to refill the reservoir past the cross-drilled holes on the guide rod when air is trapped under the follower plate.

Figure 12~~14~~
Left side view of pneumatic pump with overflow circled

Pump Mounting Gasket

When the 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 remain as a result of the casting process.

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.

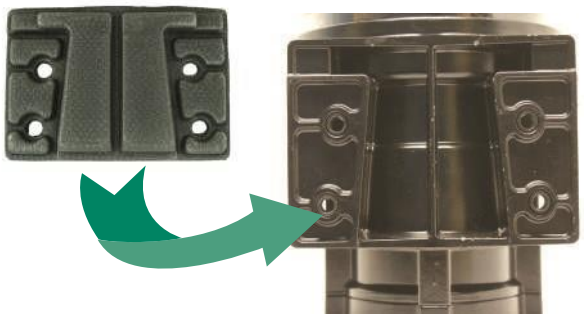


Figure 13~~15~~
Pneumatic Pump Mounting Gasket foam insert. (10.063)

The Lubecore™ pneumatic pump is equipped with nylon bushings, washers and a foam insert to prevent damage caused by the buildup 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

Figure 14~~16~~
Lubecore 10-30 VDC Digital MKII Timer for ALS (12.016)

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.

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. Choose the appropriate harness assembly to adapt to specific applications.

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 a Lubecore Smart Switch, 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 mainline section, the pressure switch closes to ensure correct lubrication and the light in the Smart 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 both when it occurred and was 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. A low-level condition triggers a15 second audible alarm and a blinking light commence at the initial turn of the ignition. The light will only blink for every proceeding alarm with the same constant supply of ignition power.

As long as the reservoir is below minimum level, the timer will count pause times and cycles, but will NOT perform a lubrication cycle. The alarm light will indicate to the operator that the reservoir is below minimum level during the cycle phase.

> Note: 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 timer memory with a date and time stamp from the real-time clock. ***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 two ways to initiate a test cycle.

1) The truck timer has been equipped with a red test cycle switch in the timer cover.
2) A Smart Switch can be installed in the dashboard.

Note: On older 50.005 solenoids there is a manual-cycle bypass integrated into the solenoid body that can be turned ¼ turn to initiate a single cycle as long as there is sufficient pressure in the air tank connected to the solenoid.

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

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.

Figure 15~~17~~
Location and Method to push Test Button on Timer.

Accelerated Test Cycles

Depressing the red test button on the timer or depression the dash mounted smart 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 seconds. This accelerated cycle of 15’s on and 15’s off, will be repeated until the ignition is turned off.

Figure 16~~18~~
Manual Cycle Switch on the Solenoid. (50.005)

Smart 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 Smart 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.

Figure 17~~19~~
Smart Switch

The timer will perform a single lubrication cycle as programmed.

The Smart Switch also allows the user to completed accelerated tests with a 10 second press and hold.

Communication Light and Audible Signals

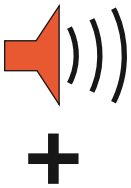
The following is an overview of possible visual and audible warning signals. Depending on installed system features, the low-level indication by the timer and light may or may not occur. Refer to the installed features to check if a low-level switch or pressure switch are present in the system.

The Smart 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 sounds for 15 seconds this is a reminder of low grease level at startup.

SYSTEM WILL NOT OPERATE: REFILL RESERVOIR

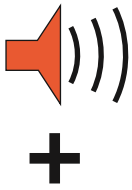
Low Grease Level Reminder Alarm

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 1/3of a cycle until rectified.

At the earliest opportunity inspect the ALS for leaks, air pockets or consult the 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 only 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 minutes.)
- 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.

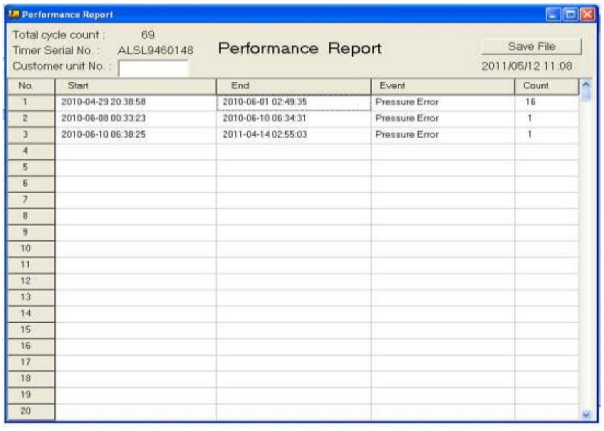


Figure 18 ***Timer Performance Report***

Programming the MkII 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 Smart Switch, if present, with the ignition in the auxiliary position.

The timer is now programmed and ready for use.

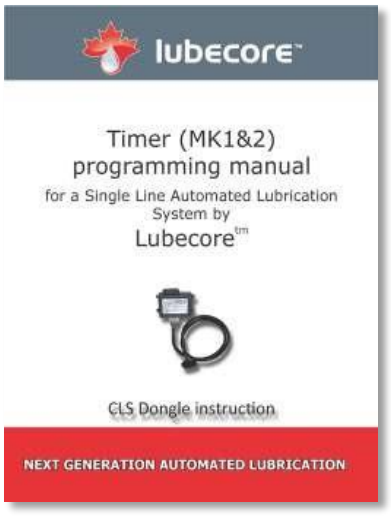


Figure 1921
Timer Programming Manual

Quick Install Guide for Lubecore Timer Interface Dongle (for Windows™ 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 7,8, and 10.

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)

      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


lubecore
Timer (MK1&2)
programming manual
for a Single Line Automated Lubrication
System by
Lubecore
CLS Dongle instruction
NEXT GENERATION AUTOMATED LUBRICATION

Electrical Connections Before September 2019

A standard electrical schematic is shown below. This schematic is typical of installations from September 2019 or earlier. 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.

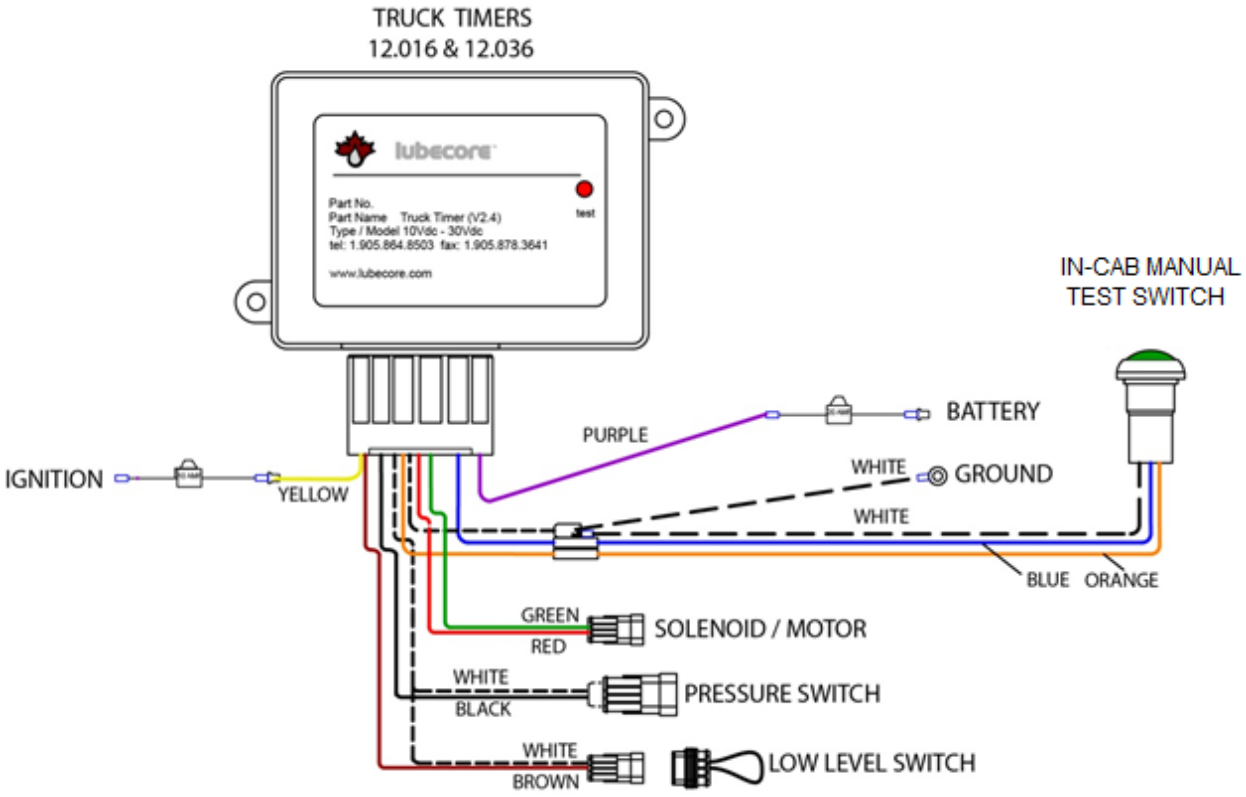
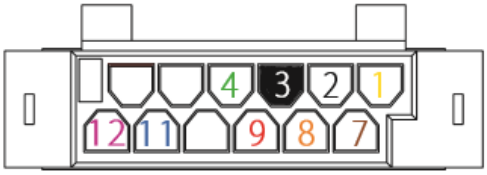
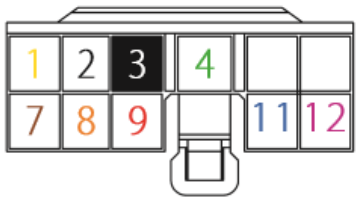


Figure 2022 Common Electrical Schematic for a Lubecore Truck Timer September 2019 and earlier.

Truck Timer Terminal & Wiring Identification Before September 2019

Table 1 – Terminal and Wire Identification Table September 2019 and Earlier

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 to September 2019
#8	Cab Light	
#9	Solenoid/Motor -	
#10	N/A	
#11	Test Button	
#12	Battery Live	

Electrical Connections After September 2019

A standard electrical schematic is shown below. This schematic is typical of installations from September 2019 and onward. The physical indication that shows the difference between this connection arrangement and earlier assemblies, is the red sheathing on the truck timer harness. For schematics related to the exchange of timers in other systems, please visit www.lubecore.com or contact Lubecore directly.

As in previous systems 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.

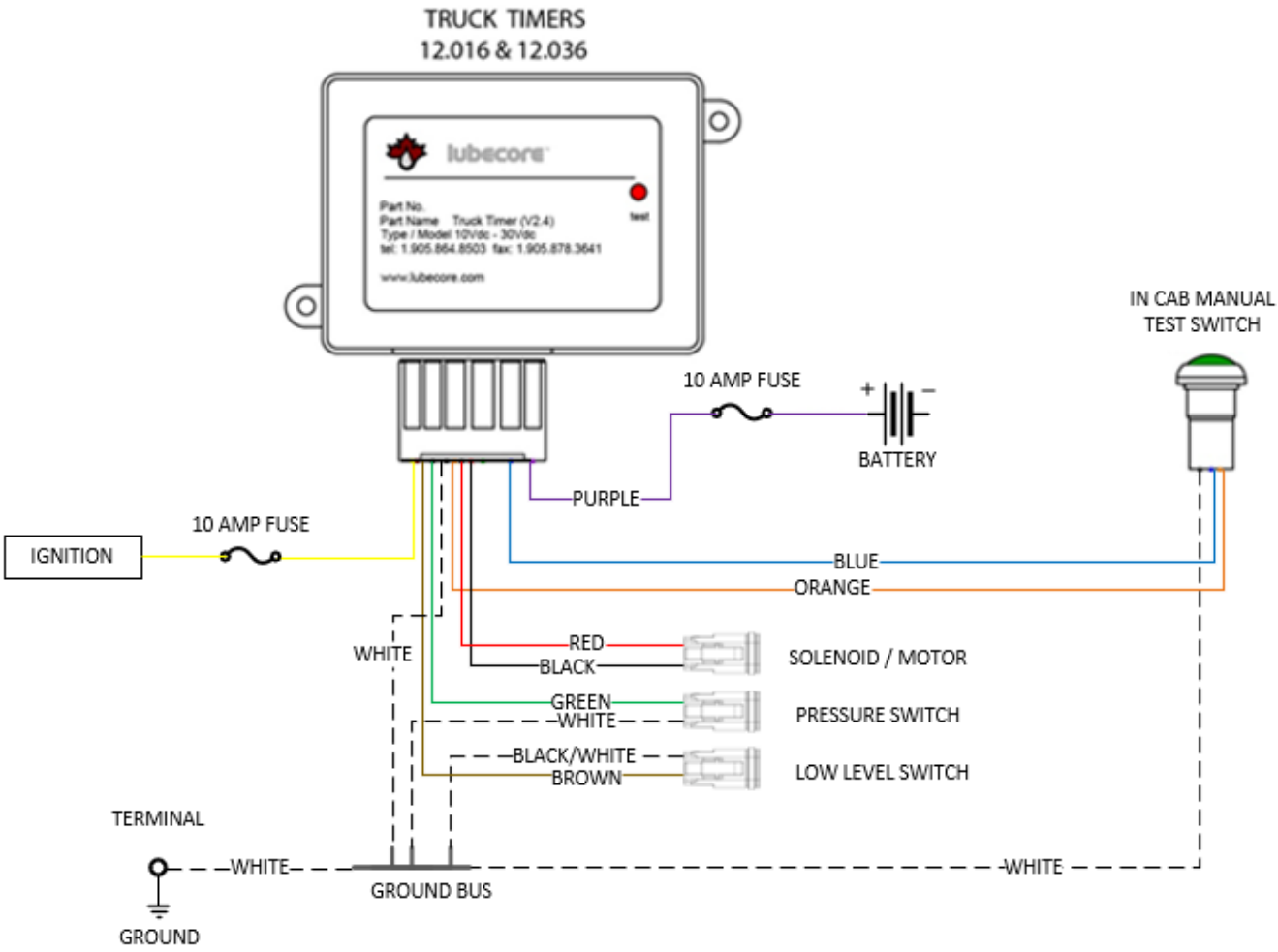


Figure 21 Common Electrical Timer for a Lubecore Truck Timer September 2019 and onward

Truck Timer Terminal & Wiring Identification After September 2019

Table 2 Terminal and Wire Identification Table September 2019 and Later

Timer Pin	Function	Mark II Timer Plug (Used from September 2019 - Present
#1	Ignition	
#2	Pressure Switch	
#3	Ground	
#4	Solenoid/Motor +	
#5	N/A	
#6	N/A	
#7	Low Level	
#8	Cab Light	
#9	Solenoid/Motor -	
#10	N/A	
#11	Test Button	
#12	Battery Live	

Table 3 – *Timer 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

Basic Timer Operation

General Operation of the Lubecore™ Basic Timer

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 forego enhanced features such as low level and pressure alarms to reduce the cost of their systems.

To meet this market need, Lubecore™ has developed this basic timer part # 12.015

Figure 2224
Lubecore 10-30 VDC Timer 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.

After the conclusion of the pause phase, 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 circuit 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.

Figure 2325
Jumper Peg Wiring Chart Located on the Bottom of the Timer.

Programming the timer

The 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 timer. This schematic shows the timing options, factory defaults and wiring connections.

Figure 2426
Jumper-Peg Locations for Timer Pause and Working Phase Adjustments.

Performing a test cycle

The basic timer has a red test cycle switch in the timer cover, similar as to the MKII truck timer. This red button can be used to initiate a single lubrication cycle. 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) Ensure 100 psi in onboard air tank
2) Set ignition to auxiliary position.
3) Using a small instrument (e.g. pencil) and press the red test button located in the timer cover.

The timer will perform a single lubrication cycle as programmed.

Figure 2527
Location and Method to Push Test Button on Timer.

Table 4 – *Timer Technical Specs*

Basic timer specification Based on Model 12.015		Remarks
Voltage Range	10-30	VDC
Audible Alarm	N.A.	-
Output Current Max	40 / 500	Amp / Watt
Alarm Light Output Current Max	N.A.	-

Electrical Connections Basic Timer

A standard electrical schematic is shown below. For schematics related to the exchange of timers in other systems, please visit www.lubecore.com or contact Lubecore directly.

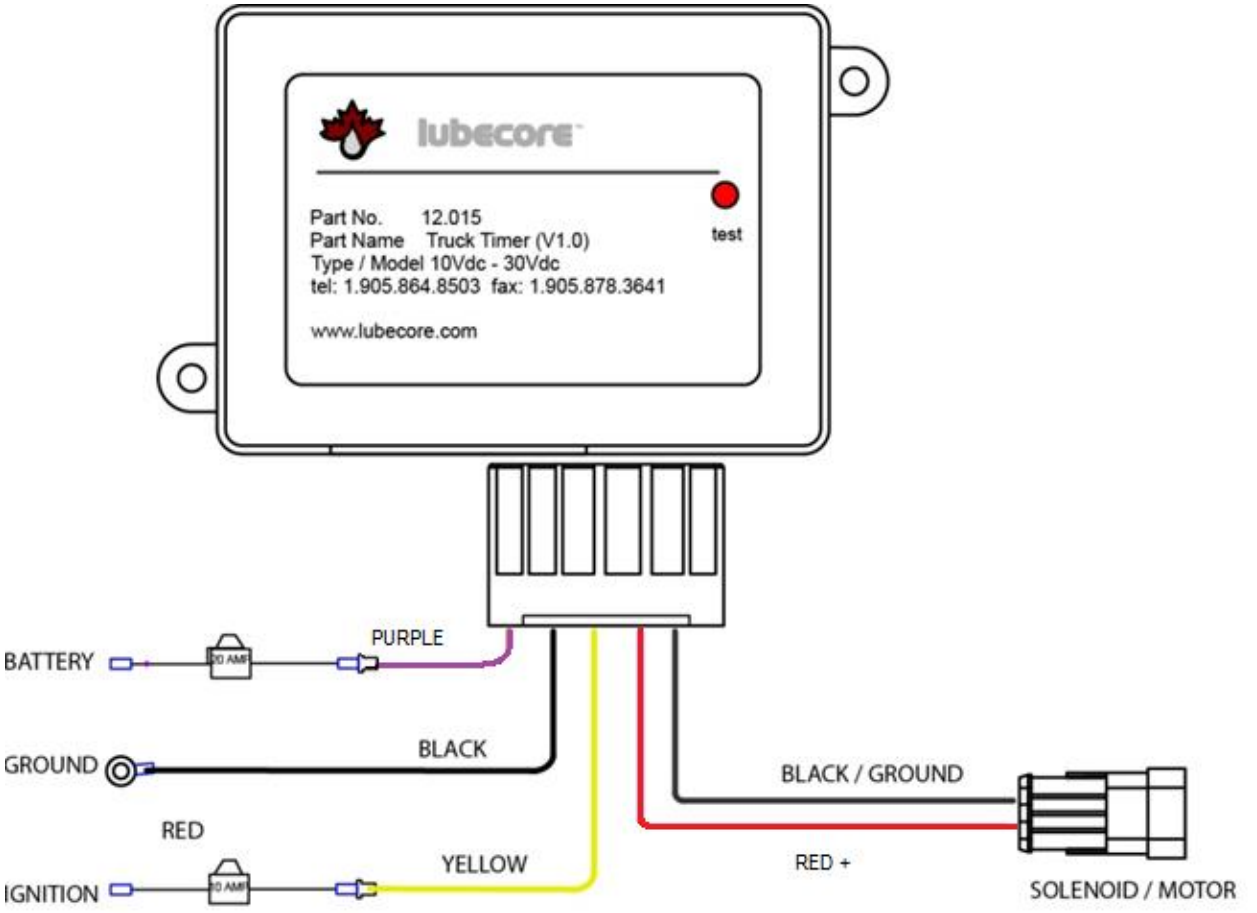


Figure 2628 – *12.015 Timer Schematic*

Table 5 – T*imer electrical connections*

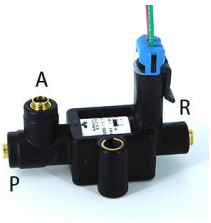
Pin	Description	Standard wiring color
1	Battery	Purple
2	Ground	Black
3	Ignition	Yellow
4	+ Solenoid / Motor	Red
5	- Solenoid / Motor	Black

Solenoid Operation

The solenoid is normally located on the bottom of a pneumatically operated pump for truck applications.

In the non-activated state, the connection between the air tank and the pump is closed. When activated, air flows from connection (P) of the solenoid to the pump, through opening (A). At the end of the lubrication cycle, the solenoid valve returns to its original position closing the connection between air tank (P) and pump (A). In this neutral position, the solenoid opens port (A) to port (R) allowing air to flow from below to above the grease piston. Replenishing the vacuum above the piston with air from below, held to a constant 5 psi via the air vent check valve, prevents contaminants and moisture from entering the pump.

Before Sept 2019



After Sept 2019

Figure ~~28~~30
Lubecore air solenoid

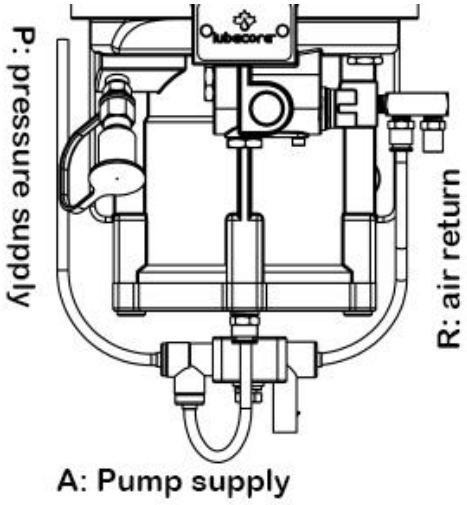


Figure ~~27~~29
Air solenoid Schematic

Pressure Switch

A standard Lubecore automated lubrication system is equipped with a pressure switch. Once the lubrication system has reached nominal operating pressure, the pressure switch provides feedback to the timer. The pressure switch is, for a pneumatically operated pump usually located in the front- center of the pump. Pressure switches can also be located in manifold assemblies.

Figure ~~29~~31
Pneumatic pump pressure switch location

When a pressure alarm occurs, the operator is informed by an audible alarm from the timer and when installed, a visual alarm. This visual alarm is usually a green dash mounted LED identified by a Lubecore label.

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. 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 engaged, 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 dongle timer interface. This function is only available on the 12.016 and 12.036 model timers.

Figure 3033
Lubecore low level switch and sensors

The operator is informed of a reservoir low level by an intermittent (2 seconds on / 2 seconds off) green LED light in the Smart Switch. This alarm lasts for the full duration of the programmed interval time (working phase).

Note 1: **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.)**

Note 2: Depending on the size of reservoir, model of follower plate and type of timer installed, model and type of low-level switch sensor may vary.

Note 3: Do NOT use a sensor type low level with the 12.016 and 12.036 timers.

Note 4: Do NOT use a mechanical type low level switch with a trailer timer.

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.

Table 6 -Truck Timer Trouble Shooting Guide

Problem	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 and complete automated (non-test) cycle. 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 than 10-20 Bar: Pressure problem is not in the electrical system. Proceed with general troubleshooting. If pressure gauge indicates more than 40 bar / 580 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.

General Operation: Automated Lubrication System (ALS) – Pump Mounted Timer

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 pump mounted timer which may be used on any equipment but is particularly useful for trailer applications. 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 **Error! Reference source not found.**.

- ① Pneumatically operated pump.
- ② Pump Mounted Timer connected to pump solenoid.
- ③ Manifold and ④ injector assemblies.
- ⑤ Primary and ⑥ secondary tubing with ⑨ 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 pump mounted timer ② has been designed to operate using a minimal amount of current and still provide the full option functionality of performance and low-level monitoring ⑦. When mounted on a trailer, the timer could use 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.
3) Rechargeable power supply module.

As long as the trailer is in use, the timer ② will perform its programmed function. Once it reaches the end of the interval, the timer engages the 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 ① with air pressure from the air tank ⑧.

In turn the pump ① pumps the maximum allowable amount of grease, under pressure, into the mainline tubing ⑤ that connects the pump front the mainline fitting ⑪ to either one or more manifolds ③, which are located at centralized points along the trailer.

The moment maximum pressure is reached in the mainline tubing ⑤, injectors ④ located in the manifolds begin to measure and dispense a predetermined and consistent amount of lubricant through the secondary tubing ⑥ and fittings ⑨ and into the lubrication points ⑩.

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.

With the air pressure removed, lubricant pressure in the primary tubing returns below 30bar and excess lubricant is recycled back into the pump. Once grease pressure has dropped below 30bar, the re-loading process within the injectors begins.

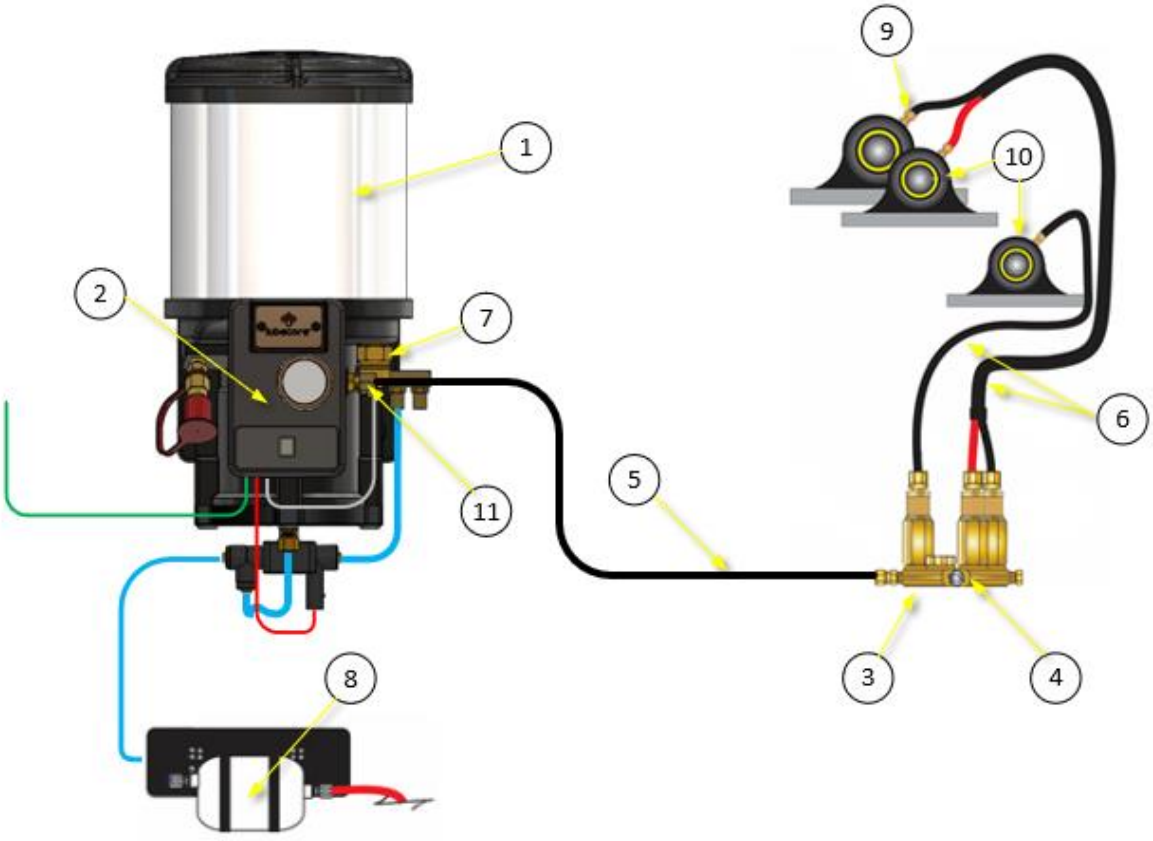


Figure 31 – Standard Lubecore Automated Lubrication System Layout for a Trailer with Pump Mounted Timer

MKII Progressive Pump Mounted Timer

General Operation of the Lubecore™ Trailer Timer

Following is a functional description of the Lubecore™ pump mounted timer which was designed to replace trailer timer applications but may be used on any system. This information pertains to model 12.079.

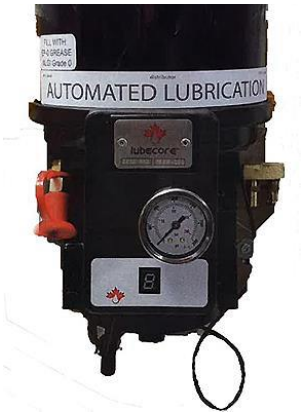


Figure 32~~36~~ Lubecore 12 VDC Electrically Operated Pump Mount Timer for ALS (12.079)

The 12V (12.079) timer has been designed with the capability to operate a variety of Lubecore lubrication pump models. The timer's purpose is to operate the pneumatic pump electronically with the lowest current possible.

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

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

Pump Mounted 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.

Figure ~~33~~37
MKII Progressive Pump Mount Timer (12.079)

- **Electrical wiring connections**

The pump mount timer can be connected to either one of three power sources in a trailer application: 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.

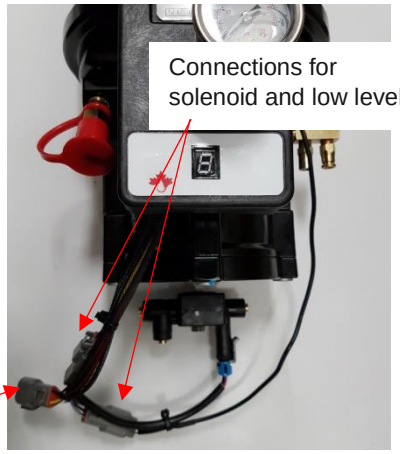


Figure ~~34~~38
MKII Progressive Pump Mount Timer with Deutsch™ DT & DTM Connector

Performing a test cycle - electrically operated

A single “test cycle” can also be performed with the timer connected to power. The timer can be tested by means of a magnet.

See detailed operational functions and programming on pages 31-34

Figure 3539
Test Magnet Location on Logo

Electrical Connections

A schematic of the 10-30 VDC trailer timer is shown below. The timer itself is permanently sealed (potted) with the trailer timer enclosure.

Power and ground are connected via Deutsch DT sealed connectors.

A second connection is available for an optional low-level sensor. The 3 wires provide a sensor with power, ground, and a return signal contact for the timer. The 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 68.

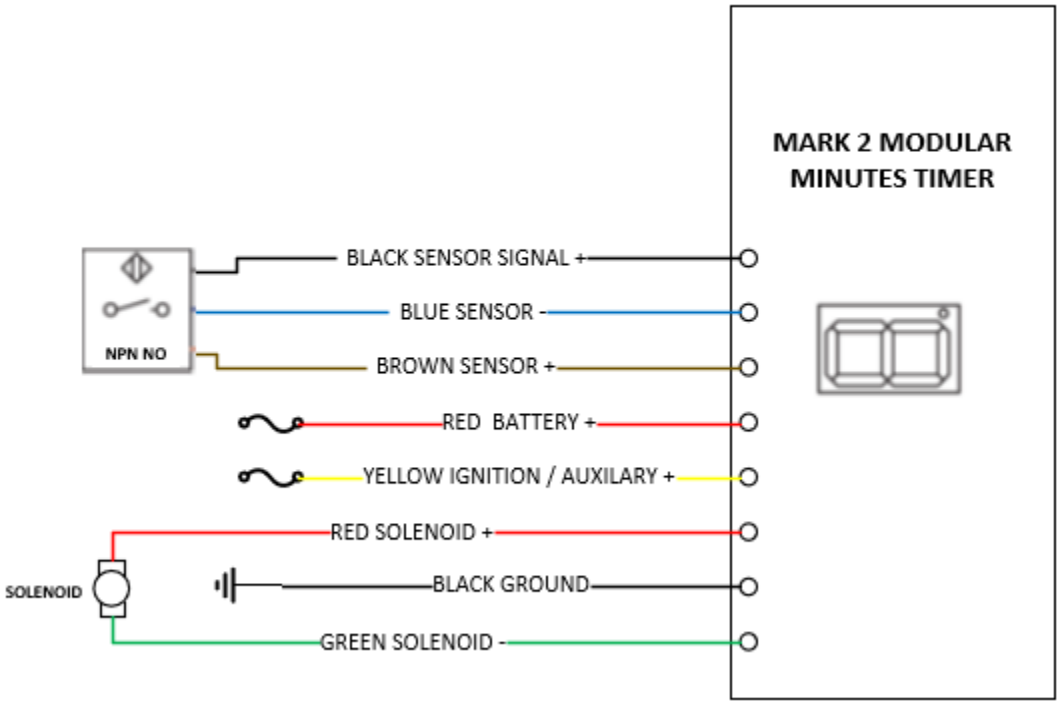


Figure 36 – Electrical Connections for the 12.079 Trailer Timer

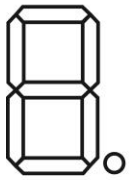
Figure 37 – Weatherproof with Deutsch® DT Series Connectors

Timer Setting and Display Operation

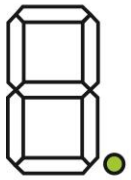
The trailer timer is equipped with a 7-segment digital display. This display indicates power, operation and errors. It is also used to facilitate timer setting.

Following is an overview of possible display codes:

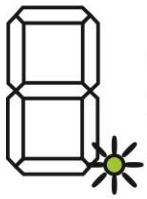
- No segments lit. Power is “Off”.



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

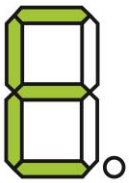


- Solitary LED starts blinking,
  - 1 x per second: seconds timer active
  - 2 x per second: minute timer active

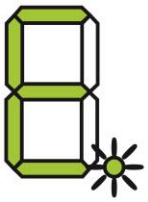


Pump ON (T2) is started and a segment rotates. The bar rotates clockwise for the entire lubrication cycle.

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



- 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.

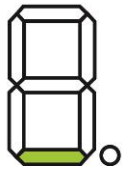


Testing and Programming

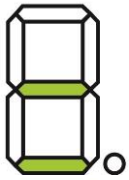
For correct operation of the pump (T1) the “Pause”, and (T2) “Work” times must be set using the magnet. Follow enclosed instructions to program the timer.

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:

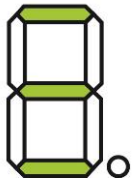
1) To start a single test cycle, place the magnet on the Lubecore logo. When the bottom horizontal bar lights up, remove the magnet from the logo to initiate a single test cycle. The pump will run for the programmed period of “on time”.

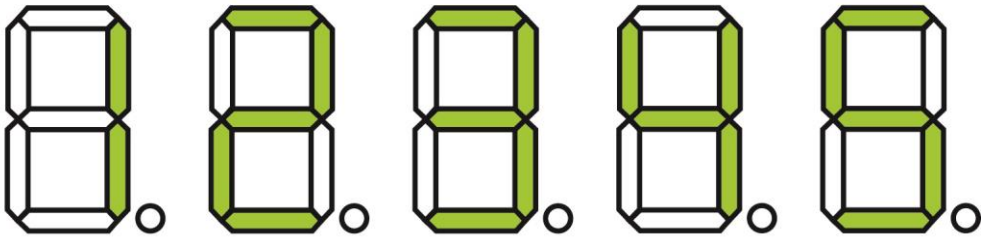


2) To start a continuous cycle, place the magnet on the Lubecore logo. When the bottom and center horizontal bars lights up, remove the magnet from the logo and a continuous cycle will start. Swipe the magnet over the Lubecore logo or remove power t0 stop the cycle.



3) To change the pump running/working time (T2), 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. A one second touch or slow swipe with the magnet, at the Lubecore logo, will change the selection



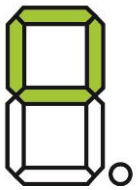


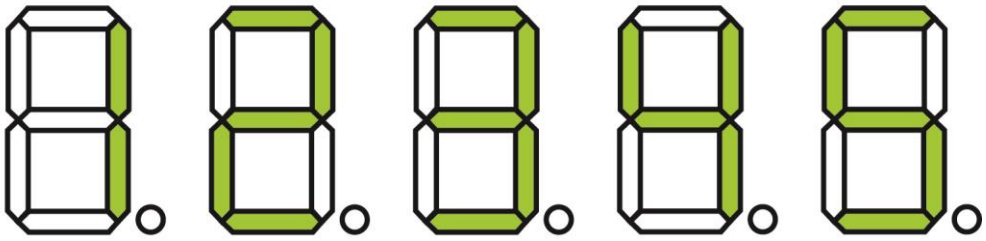
Minute timer: 2 min. 4 min. 6 min. 8 min. 10 min.

- When the sensor is not operated and no changes are made after 20 seconds it will return to the start.

- If a change is made the display will show an “A” for accept after 20 seconds have passed. Or place the magnet on the logo for 5 seconds to accept changes.

4) To change the pump interval / pause time (T1), place the magnet on the Lubecore logo until 4 bars light up. When the display shows 4 bars, remove the magnet to go into time selection mode. A one second touch or slow swipe with the magnet, at the Lubecore logo, will change the selection





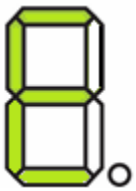
Minute timer: 15 min. 30 min. 60 min. 120 min. 240 min.

- When the sensor is not operated and no changes are made after 20 seconds it will return to the start.

- If a change is made the display will show an “A” for accept after 20 seconds have passed. Or place the magnet on the logo for 5 seconds to accept changes.

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.

When the display indicates an “E” for error, the following could be the problem:



- Low Grease Level Detected.

  When installed and active by the follower plate, the low-level switch signal stops the pump from pumping; fill the 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 is 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:

- Filling the reservoir without bleeding the filler hose
- 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 follower plate reaches the minimum level mark, in a truck application, the green LED of the Smart Switch will begin to blink (2 seconds on, 2 seconds off) throughout 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 resume. 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)

Injectors

The Lubecore™ 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 dispense 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 11 different metering sizes. Lubecore ALS injectors use a shuttling spool, a plunger, and two springs to accurately measure the lubricant, creating a highly reliable, and highly accurate injector. The springs are arranged to allow for high reload pressures which gives exceptional cold weather performance to the injectors. It is important to note that the injectors deliver grease and then reload at a pressure of 30bar. If system pressure of 30 bar is not achieved or the system pressure hovers at or near 30 bar the injectors will not function properly.

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

Injector Sizes

Injectors are available in 11 different sizes, with varying output volumes. Selecting the appropriate injector size for each point on the platform to be greased ensures that each lubrication point is receiving the optimum amount of grease per lubrication cycle.

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

All components within the injector are interchangeable except the metering volume shim. Therefore, all injectors are the same size. Injectors are identified by the injector size marked on the injector and the part number which is also marked on the injector.

Figure 38~~42~~
Lubecore injector with identification shown

Table 7 – *Available Injector Sizes*

Description	Part Number	Output Size (cc/Stroke)
Injector #0	11.800	0.025
Injector #1	11801	0.050
Injector #2	11.802	0.100
Injector #3	11.803	0.150
Injector #4	11.804	0.200
Injector #5	11.805	0.250
Injector #6	11.806	0.300
Injector #7	11.807	0.350
Injector #8	11.808	0.400
Injector #8.5	11.885	0.700
Injector #9	11.809	1.000

APPLICATION OF LUBRICANT

LUBECORE MKII PARALLEL METERING UNITS (PMU) ARE NOT LIMITED FOR USE WITH A SINGLE TYPE OF LUBRICANT. DEPENDING ON ENVIRONMENTAL CONDITIONS AND OTHER SYSTEM COMPONENTS, PMU'S COULD BE USED

Manifold Blocks

Parallel metering units are centrally located near a cluster of lubrication points and are connected to the system in manifolds. Manifolds are manufactured out of corrosion resistant brass.

Figure 4044
Manifold with injectors installed into it

Figure 3943
Brass Manifold Block

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 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:

- 1500 PSI / 100 Bar pressure gauge with ¼”-stem
- 17mm / 11/16” wrench / socket
- 9/16” Wrench

1. Ensure that the equipment air tanks are at maximum.
2. Review the total layout of the ALS and locate the system manifolds.
3. Locate the ALS timer and ensure access to the red test button on the front cover of the timer, the Smart Switch or the magnetic pick up zone on the front label of the trailer timer enclosure.
4. Remove the plug located below the serial number tag on the pump; install a 1500 PSI /100 Bar pressure gauge.
5. Remove the manifold end plug that is furthest away from the pump and prepare the port to collect escaping lubricant.
6. Initiate a single cycle and observe the grease flow from the open port, 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.
7. When all air has been purged from that particular section of mainline; With the pump under air-pressure, reinstall the manifold end plug,
8. Repeat procedures 5 through 7 with the next manifold. *(Note: cycle pneumatic pump 4 times for every 10 meters, (30 feet) of mainline length.)*

System has now been bled of air-pockets and all plugs have been reinstalled and tight,

Lastly initiate a manual test cycle. Pressure should hold between 900-1100 PSI / 60-76 Bar and not drop. After holding pressure for a few minutes, the system will deactivate and depressurize.

If pressure is not reached, please check equipment air tank pressure; numerous test cycles could have depleted air pressure to below the required 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. The manifolds, timer, and pump must be found and the system must be able to be activated to purge 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.

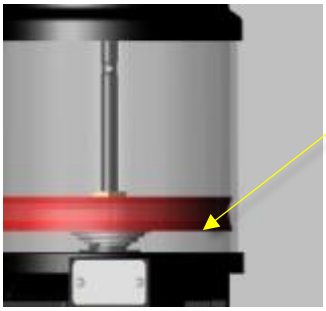


Figure 4145
Min Reservoir Level

Step 1: Remove the dust cap and clean any remaining dirt from the male filler coupler, located on the pump.

Figure 4246
Step 1: Filler Cap and Clean

Step 2: 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 grease. This is especially important when exchanging buckets of grease

Figure 4347
Step 2: Circulating Grease

Step 3: Inspect the filler pumps female coupler for dirt and clean if required. Then secure it to the male coupler on the pump, until it latches.

Step 4: Fill the reservoir with grease until the top of the follower plate has reached the maximum level mark on the reservoir. This mark 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)

Figure 4448
Steps 3 and 4: Filling the reservoir

Note Make slow and full lever strokes when using a manual filler pump: Depending on ambient temperature and lubricant type, lubricant may be of higher than normal viscosity and will flow slowly. The grease also will need to flow through a fine filter. Rushing the filling process may introduce air pockets into the grease pump or damage filler pump.

Figure 4650 Overflow opening in center of guide rod

During filling of the reservoir or immediately after the maximum level has been reached, some lubricant may be expelled at the overflow opening. The overflow is located on the left side of the pump where the pump base meets the reservoir. Air possibly trapped under the follower plate and excess lubricant shall come out at this opening.

Figure 4549 Location of overflow opening

Note: DO NOT OVERFILL: Although the automated lubrication pump is equipped with an overflow opening; continuing to add lubricant to a reservoir which has reached its maximum fill mark may experience some pressure build up inside the reservoir.

Note: Every automated 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 automated lubrication pump and place the female filler-pump coupler on the male coupler on the lid of the filler pump.

Figure 4751 Dust Cap back on pump

Figure 4852 Pail hose quick disconnect returned to mating lid fitting

Heavy Duty Filter

The pump may optionally be equipped with an inline 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.

Figure 4953 Heavy Duty Filter Assembly (50.321)

Technical Specifications

Table 8 – Pneumatic Pump Technical Specs

Part Number	50.050	50.060
Reservoir Capacity	4kg / 8.8lbs	6kg / 13.2lbs
Main Piston Air Grease Pressure Ratio	10:1	
Maximum Grease Pressure	1600psi / 110bar	
Pump Grease Output	40cc / stroke	
Operated Temperature Range	-25°C to 80°C (-13°F to 160°F)	
Lubricant Grade	NLGI-0	
Dry Weight	12kg / 26.4lbs	13kg / 28.6lbs
Wet Weight	16kg / 35.2lbs	19kg / 41.8lbs
Follower Plate	Standard	
Pressure Switch	Standard	
Pressure Switch Rating	40bar / 580psi Standard	
Low Level Switch / Sensor	Optional	
Filler Coupling Size	¼”	
Solenoid Voltage	12 or 24 VDC	
Solenoid Wattage	3.6Watt	

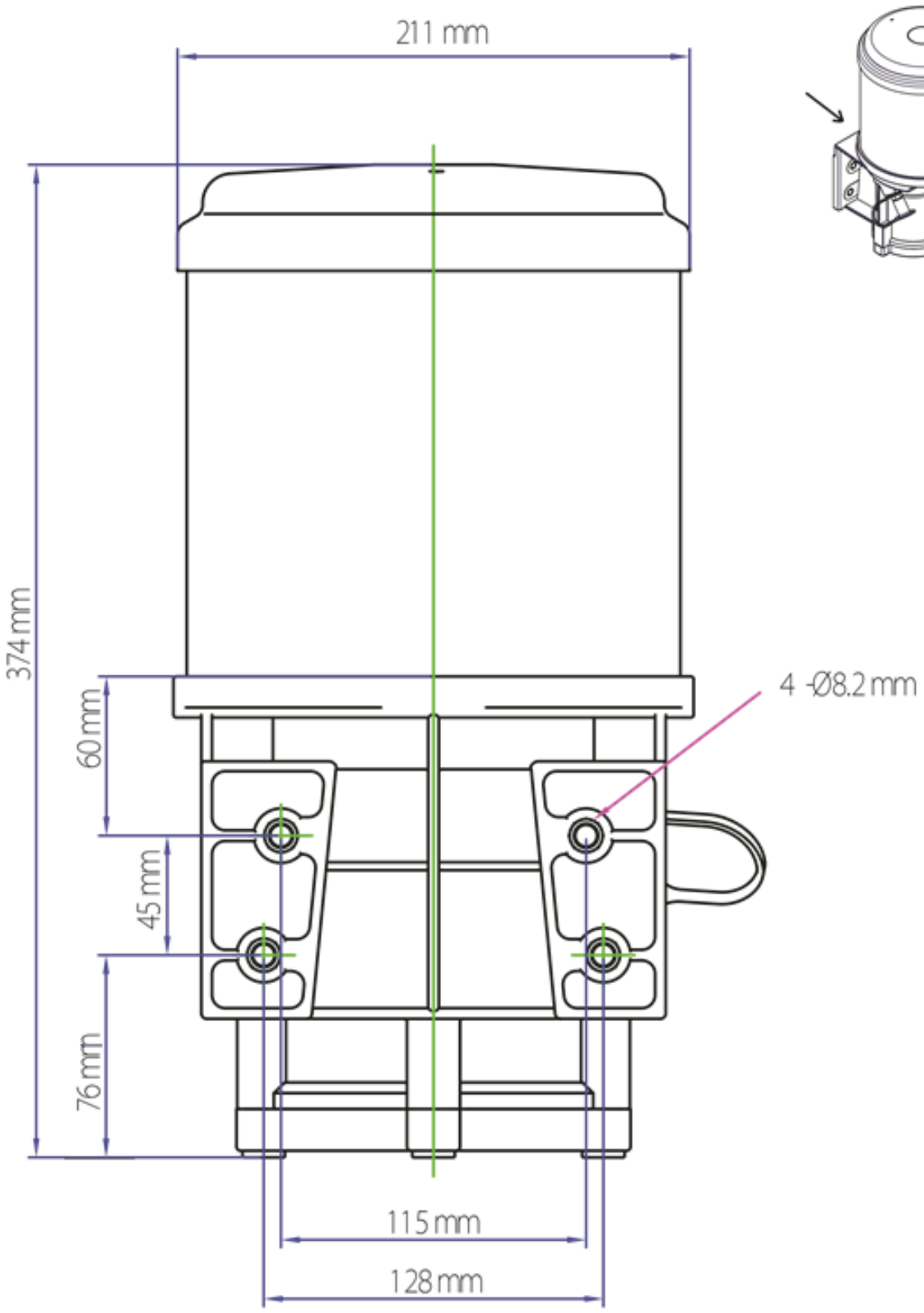


Figure 50 – ***General Dimensions of a 4kg Pump***

Lubrication Point Maps, Samples & General Parts

Injector and Point Identification of a Tandem Axle Tractor

Lube Point	Injector Size the/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 the/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 (Automa c)
40	1	Left Cross Sha (Automac)
41	1	Right Cross Sha
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

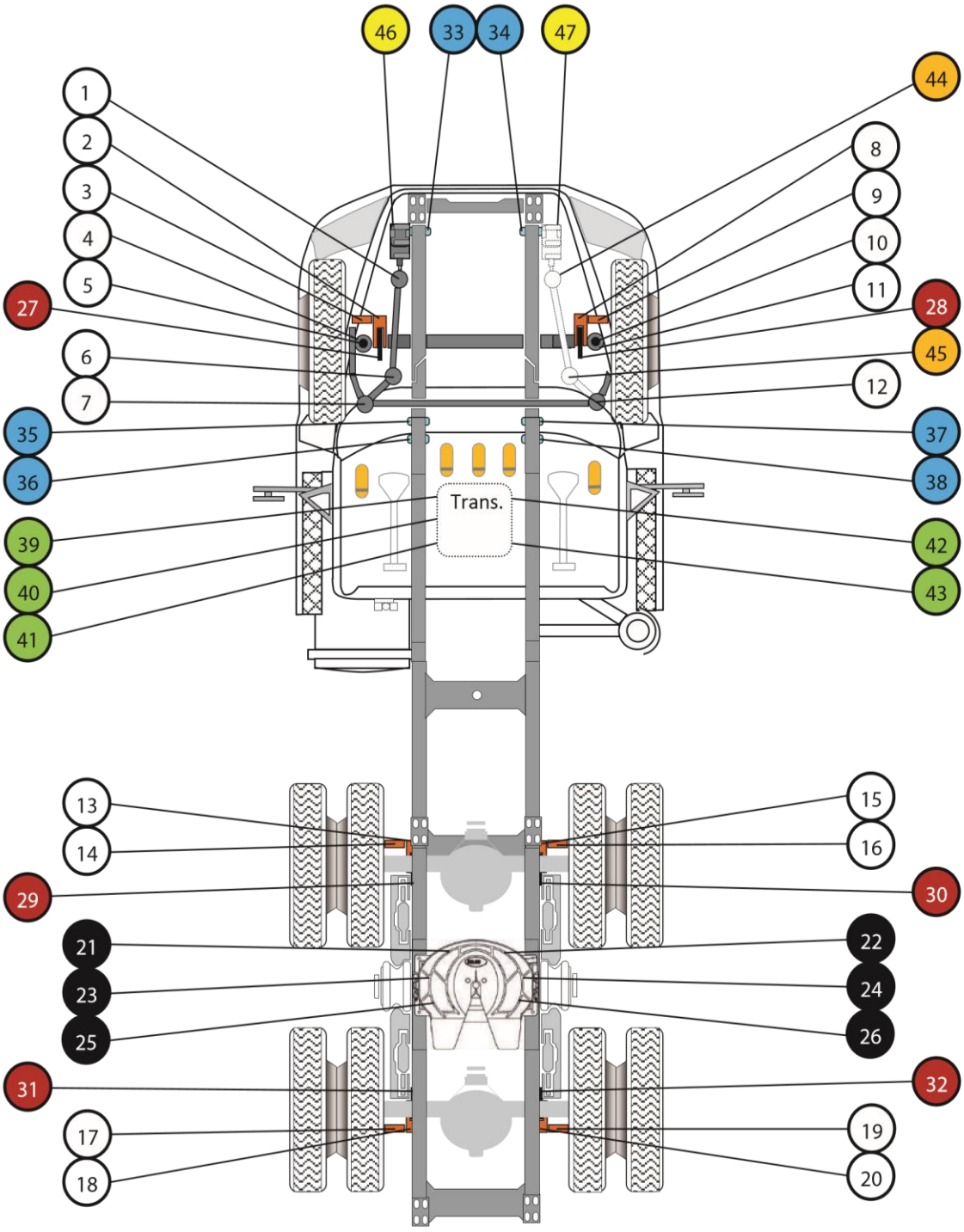


Figure 51 – Possible Number of Grease Points on a *Tandem Axle Tractor*

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

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 (Op onal)
26	1	Clevis Pin (Op onal)
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

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

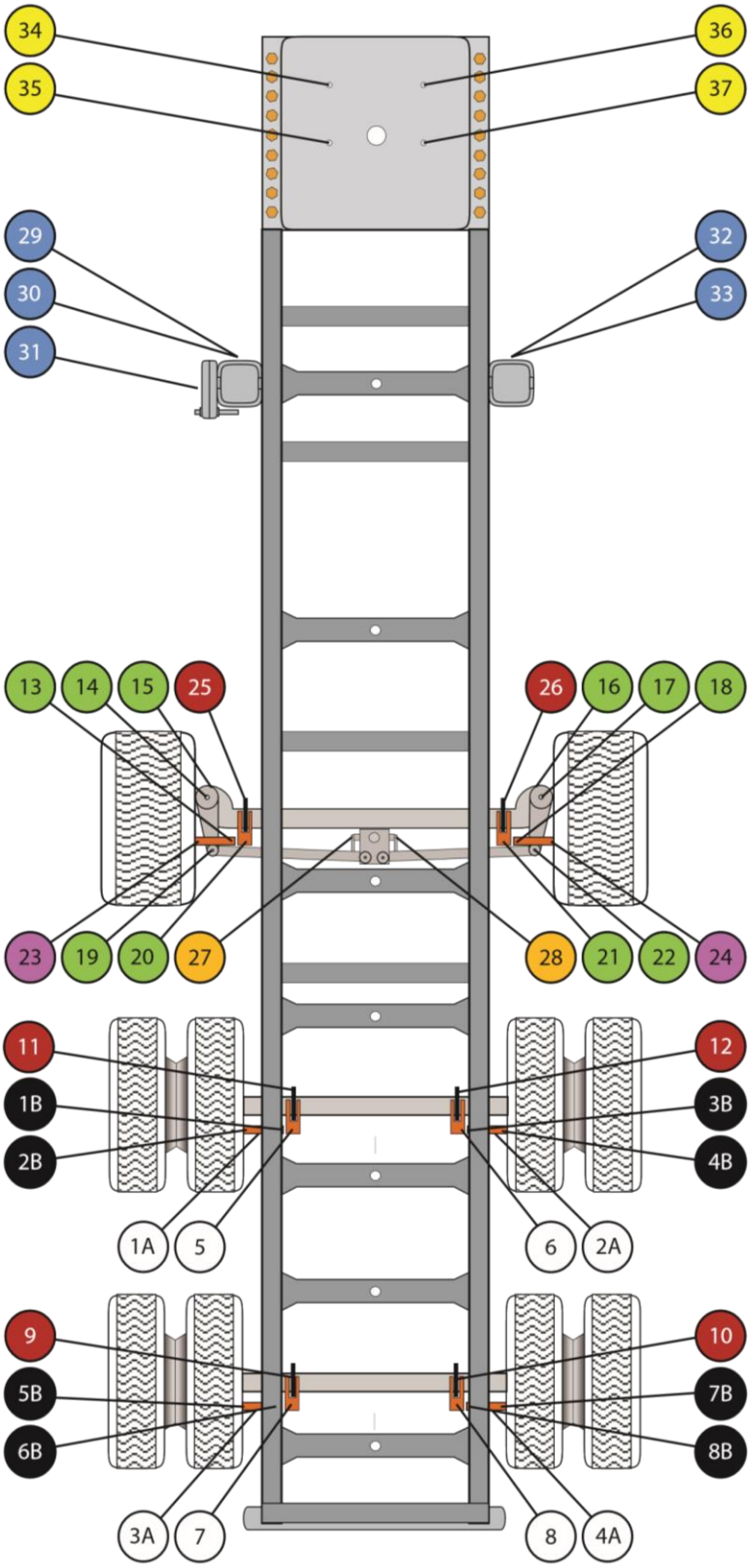


Figure 52 – Possible Lubrication Points and Identification of a Tandem Axle Trailer with Lift Steer Axle.

Parallel - Single Line common parts list

Category	Part#	Part Description
Injectors		
	11.800	Injector #0
	11.801	Injector #1
	11.802	Injector #2
	11.803	Injector #3
	11.804	Injector #4
	11.805	Injector #5
	11.806	Injector #6
	11.807	Injector #7
	11.808	Injector #8
	11.885	Injector #8.5
	11.809	Injector #9
Manifold		
	11.004	Manifold 4 Port - Brass
	11.007	Manifold 7 Port – Brass
	11.005	Manifold 8 Port Brass – Transport (4+4)
	11.009	Manifold 9 Port - Brass
	11.012	Manifold 12 Port - Brass
	11.014	Manifold 14 Port – Brass
	11.011	Manifold 18 Port Brass – Transport (9+9)
	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
	20.006	Straight Adapter 1/4 - 28 (M) UNF x 1/8 (F) BSPP - 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
	20.060	Cube Connector 1/8 (M) BSPT X 1/8 (F) BSPT - 25.5 Long
	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
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

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 10V - 30V
	54.213	MKII Progressive Trailer Timer - 12v
	50.453	In Cab Manual Test Switch 12/24VDC - Green - Deutsch & Tyco
	54.911	Solenoid 12V
	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

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