

Lincoln Industrial Quicklub[®] Automated Lubrication System Reference Guide

Application: Construction Sized Excavators



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GENERAL PRECAUTIONS

- Read reference guide prior to installing lube system.
- Lower arm or bucket to ground or support on safety platform.
- Do not work under raised arm or bucket without proper support.

WELDING

- Do not weld on or near stress points of machine (check with authorized dealer or manufacturer if you are not sure of safe weld areas). Improper welding could void manufacturer's warranty.
- Disconnect battery terminals before welding on the machine to avoid any damage to electronic system.
- Follow accepted welding procedures when attaching ground lead to machine (do not ground across pins).
- Shield exposed cylinder rods and hydraulic hoses from welding splatter when welding in close proximity of these components to avoid damage.

INTRODUCTION

This guide was developed as a reference tool to provide basic information for equipping a broad range of construction sized excavators with the Lincoln Quicklub Automated Lubrication System.

Common features and characteristics shared by most popular models of construction sized excavators usually allow for consistent lube system design. The basic system design in this reference can be individually customized for a majority of the popular models of construction sized excavators operating today.

The purpose of this reference guide is to provide enough basic information to simplify and expedite the process of equipping popular models of excavators with the quicklub automated lubrication system.

This guide includes basic Lincoln Industrial components required, diagrams of metering valve configurations, photographs to illustrate mounting locations and suggested supply/feedline routings for system components and other useful information to facilitate a quality installation. The installation system check-out and daily system check-out steps will ensure proper installation and continued performance of the lube system.

By following the steps suggested in this guide, the installer can perform a quality installation resulting in exceptional system performance that will extend the component life of all pins and bushings connected to the automated lubrication system.

Installation can typically be completed within 10 hours or less. The first couple of machines may take a little longer due to the initial learning curve, however, our experience has proven this time frame is achievable.

Additional information or questions not addressed in this guide can be directed to your Lincoln Chassis Distributor or Lincoln Industrial Technical Services.

Additional automated lubrication information for other types of equipment is available on the internet at

www.lincolnindustrial.com.

Auto-Lube System Overview:

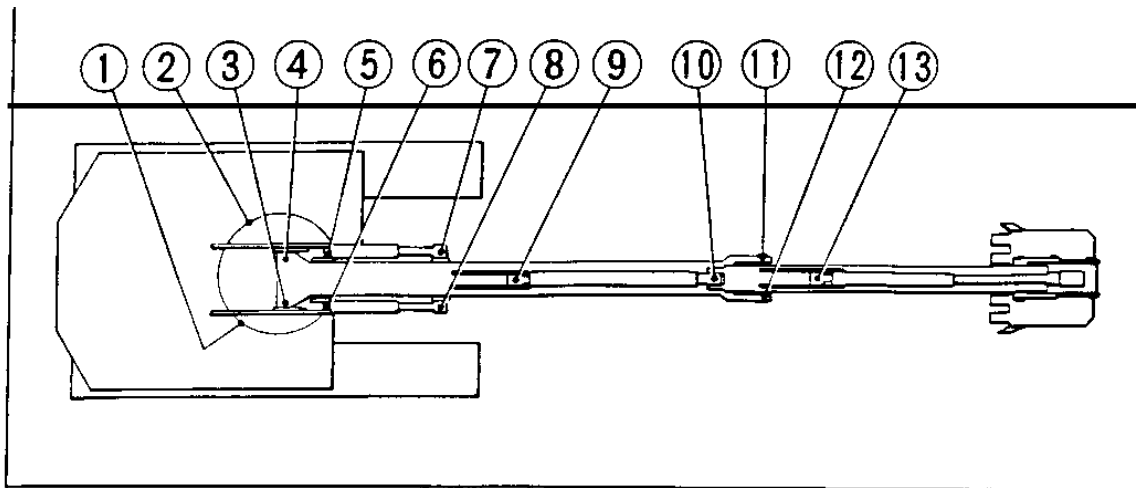
Application: Construction Sized Excavators

System Type: Fully Automated Quicklub

Lube Points: 13 - 16 lube points normally connected to lube system on small to mid-size excavators.

Lube Points Connected to Lube System:

- Swing Circle
- Boom Foot Bearings
- Boom Lift Cylinders
- Boom/Arm Joints
- Arm/Bucket
- Arm/Cylinder
- Arm/Tilt Cylinder



- | | |
|--|--|
| 1. Swing Bearing | 8. Boom Cylinder Rod End (Right) |
| 2. Swing Bearing | 9. Stick Cylinder Head End |
| 3. Lower Boom Bearing (Right) | 10. Stick Cylinder Rod End |
| 4. Lower Boom Bearing (Left) | 11. Stick To Boom Linkage (Left) |
| 5. Boom Cylinder Head End (Left) | 12. Stick To Boom Linkage (Right) |
| 6. Boom Cylinder Head End (Right) | 13. Bucket Cylinder Head End |

Basic System Operations and Features

- Fully automated lubrication system utilizing 24 VDC heavy duty electric pump with integrated timer that dispenses lubricant to progressive metering valves at timed intervals.
- Pumps NLGI #2 grade grease to -13° F.
- Primary metering valve distributes lubricant to secondary metering valves located in specific zones of service.
- Secondary metering valves deliver measured amounts of lubricant to each lube point in its zone.
- Visual monitoring through cycle indicator pins on metering valves.
- Grease fittings on all valve inlets for easy troubleshooting of system.
- Pre-filled supply line and feedline hose and tubing.

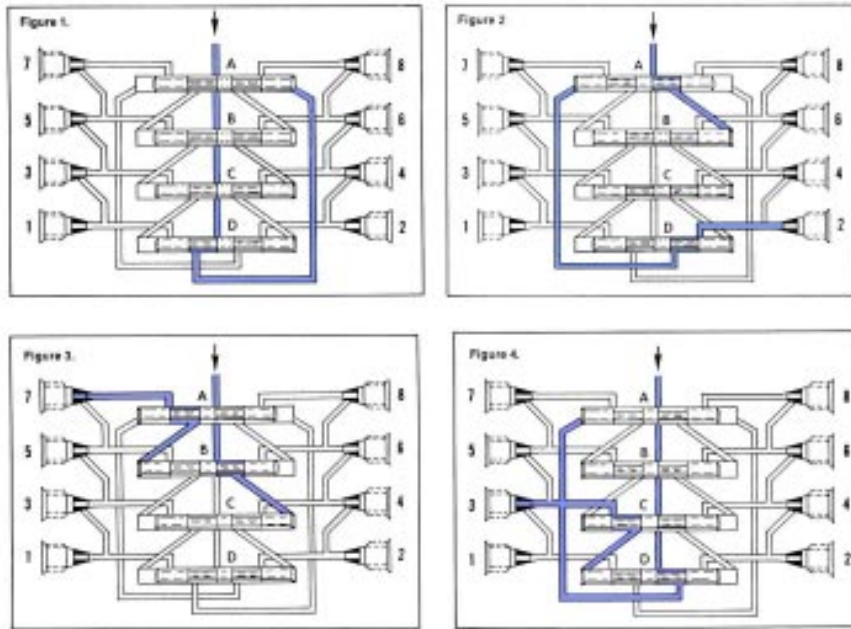
Basic System Layout Guides and Tips

- **Pump and Valve Mounting Locations:** Pump is mounted in vertical position on a mounting bracket or can be mounted directly to machine. Space permitting, pump can be mounted in any available compartment of the machine.
- Pump is typically installed in a protected area of the machine that allows easy access for filling and periodic monitoring by operator or mechanic.
- Metering valves can be positioned and oriented in any manner required for unobstructed function.
- Supply/feedlines are routed and attached employing industry accepted hydraulic hose/tubing routing practices.
- Adequate guarding for specific application highly recommended.

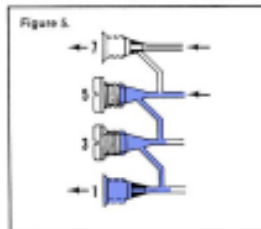
SPECIAL NOTE: The pump, metering valves and feed/supply line locations illustrated in this guide are examples that have proven very functional and practical; however, certain applications, working environments and equipment add-on attachments may necessitate alternate placement of some components. Most critically and of significant importance is to attach components in protected areas of machine and whenever possible, be particularly aware of the operating conditions machine will be working in.

The Heart of the Quicklub System

At the heart of every Quicklub System is the metering valve or progressive distributor block, designed to positively meter the input of lubricant (oil up to NLGI #2 greases) out to the connected number of lubrication points irrespective of distance and backpressure.



The inlet passageway is connected to all piston chambers at all times with only one piston free to move at any one time. With all pistons at the far right, lubricant from the inlet flows against the right end of piston A (fig. 1).



Lubricant flow shifts piston A from right to left, dispensing piston A output through connecting passages to outlet 2. Piston A shift directs flow against right side of piston B (fig. 2).

Lubricant flow shifts piston B from right to left, dispensing piston B output through valve ports of piston A and through outlet 7.

Lubricant flow shifts piston C from right to left dispensing piston C output through valve ports of piston B and through outlet 5. Piston C shift directs lubricant flow against right side of piston D (not illustrated).

Lubricant flow shifts piston D from right to left, dispensing piston D output through valve ports of piston C and through outlet 3. Piston D shift directs lubricant through connecting passage to the left side of piston A (fig. 4).

Lubricant flow against left side of piston A begins the second half cycle which shifts pistons from left to right, dispensing lubricant through outlets 1, 8, 6 and 4 of the divider valve.

Crossporting (Divider Valve)

Outputs from adjacent outlets may be combined by installing a closure plug in one or more outlets. Lubricant from a plugged outlet is redirected to the next adjacent outlet in descending numerical order. **Outlets 1 and 2 must not be plugged since they have no crossport passage to the next adjacent outlet.**

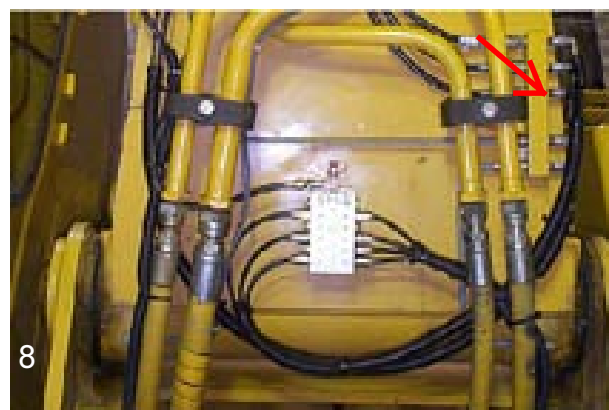
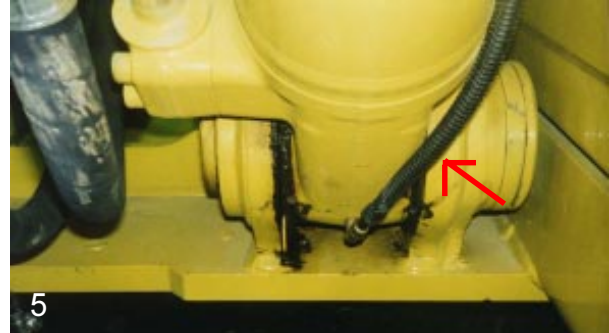
In figure 5 outlets 5 and 3 are crossported and directed through outlet 1. In this example, outlet 1 will dispense three times as much lubricants as outlet 7. The tube ferrules in outlets 1 and 7 block the crossport passage so that lubricant flow is directed through the outlets.

APPLICATION PHOTOS

The application photos illustrate examples of installed systems on excavators in the construction sized range. Photos show various options that have proven to be effective for these applications.

1. John Deere 200LC excavator with installed Quicklub system. Pump located behind operator's compartment. This location is favored because it affords protection for pump and can be periodically monitored by operator.
2. Close-up of four liter pump mounted behind operators compartment.
3. Eight outlet primary or (Master) metering valve positioned on left edge of lower boom. This valve serves the two secondary metering valves located in the respective zones they serve. The valve is positioned so cycle indicator pin can be periodically viewed by operator.
4. Twelve outlet secondary metering valve serving lube points located in the boom base area.
5. Close-up of connection to boom cylinder (closed end).
6. Close-up of connection to bucket cylinder pin (closed end). This lube point is plumbed from metering valve #2. Hose is used as feedline to all lube points from valve #2.
7. Pump, primary and valve positioned in view of operator.
8. Line routing from valve #1. Note bundled tubing plumbed to anchor block on right edge of lower boom.

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LUBRICATION SYSTEM
REFERENCE GUIDE



APPLICATION PHOTOS

9. 1/4" supply line from primary is run the length of the boom following the hydraulic hard-line and large flexible hydraulic line at boom arm connection. Supply line is then attached to valve #2.
10. Front swing circle and boom cylinders (head end) feedline routing.
11. Rear swing circle. Suggest guarding this lube feedline due to its exposed location.
12. Top view of feedline routing from valve #1.
13. Valve #2 located on underside of arm near the boom arm connection.
14. View of valve #2 with arm in tucked position.
15. Boom arm connection. This pin has lube point on each side. (Note: some excavators have a single point for this pin.) Note the "fresh" grease look.
16. Line routing to left right side link arm bucket connection. Note: in some operating environments, extra protection of the lube points in this area may be required.



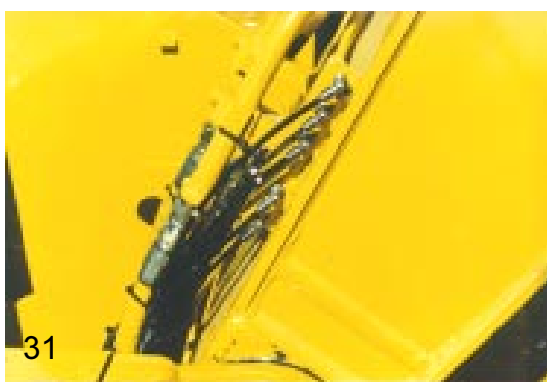
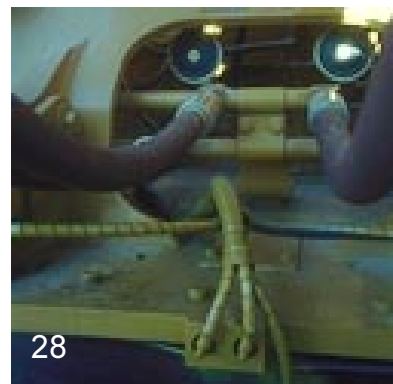
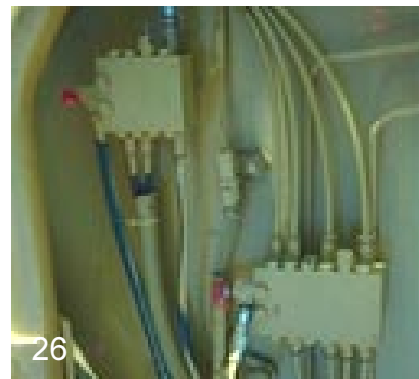
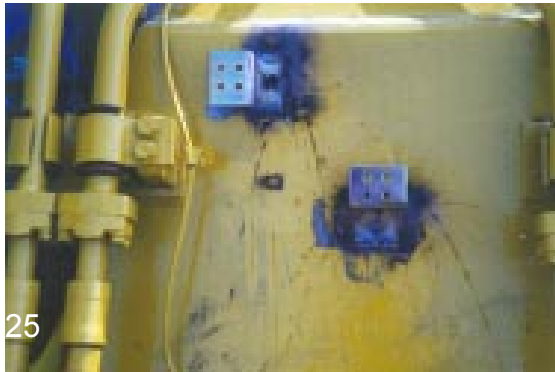
APPLICATION PHOTOS

17. Left side arm bucket pin. Live swivel used at this lube point to minimize line movement and achieve a lower profile.
18. Boom arm cylinder (open end). Allow slight loop for movement at rod end.
19. Lube point has dry looking appearance before installation of automated lube system.
20. Lube point has “fresh” grease appearance after installation of automated lube system.
21. 8-amp in-line fuse installed on the blue and red wire of the pump’s power cord.
22. Access plug to rotary dial controls in base of pump.
23. Blue rotary dial (pause/off time), red (run/on time), white push button beneath rotary dials is override/manual button.
24. Operator/mechanic observing pump operation.



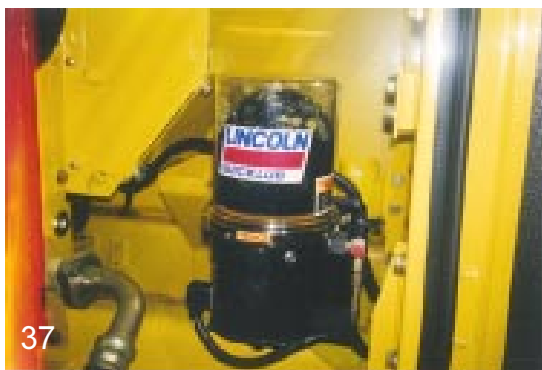
APPLICATION PHOTOS

- 25. Valve mounting brackets welded in lower boom area.
- 26. Primary and valve #1 attached valve mounting brackets.
- 27. Feedline to boom cylinder.
- 28. Feedlines to swing circle.
- 29. 8-Liter in protected location.
- 30. Channel iron guarding.
- 31. Feedlines plumbed to existing 5 station anchor block.
- 32. Nylon sleeve protected feedline.



APPLICATION PHOTOS

- 33. Valve #2 positioned on arm.
- 34. Optional location for valve #2.
- 35. Lube point preparation.
- 36. Studs welded for securing feedlines.
- 37. Pump located in compartment.
- 38. Round pipe guarding.
- 39. Channel iron guarding.
- 40. Angle iron guarding.



Suggested Bill of Materials

Application: Construction Sized Excavators

<u>Qty.</u>	<u>Part Number</u>	<u>Description</u>
Pump: (2, 4, 8 liter option for 203 electric pump)		
1	94024	24V 203 2-Liter Pump
1	94424	24V 203 4-Liter Pump
1	94824	24V 203 8-Liter Pump
Metering Valves		
1	61966462	SSV 8-K Metering Valve
2	619266482	SSV 12-K Metering Valve
Fittings/Adapters/Misc. Lincoln Components		
3	246416	SSV Valve Mounting Bracket
9*	244883	Outlet Adapters
9*	239857	Outlet Adapters
14*	209121582	Closure Plug Gaskets
14*	303174982	Closure Plugs
9*	404225812	Clamping Ring
6	247023	Mounting Bolt
6	51304	Locknut
3	242125	Grease Fitting Cap
3	67448	Male Run Tee
3	5045	Leak Proof Grease Fitting
5	10182	Adapters
2	14570	Anchor Block
4	20024	Adapters
4	20026	Adapters
4	20028	Adapters
6	20029	Adapters
12	244048	Quicklinc Fitting (Elbow)
20	66649**	Swivel Adapter
20	246002**	Reusable Hose End
20	241289**	Hose End
2	247055	Nylon Ties
10	243699	1/4" Tube Quicklinc 90° Swivel
6	244048	1/4" Tube Quicklinc 90° Straight
6	244047	1/4" Tube Quicklinc Straight
2	241052	Fuse
2	241053	Fuse Holder

Hose and Tubing/Hose Ends

2	242050	1/4" Nylon Tubing (50') Note: Used as feedline
3	241288	1/8" Nylon Hose (40') Note: Used for all supplylines as feedlines from metering valve located on arm.

**** Hose and options:** **If using the swedge - on #241289 hose end (#241338 swedging tool is required) #66649 swivel adapters will also be required.**

If using the reuseable hose end, 246002, the 66649 swivel adapters will not be required.

Lube System Guarding

It is highly recommended that careful consideration be given to guarding exposed feed and supply lines and other lube system components located in areas where they are susceptible to damage. These considerations include the selective positioning and guarding of metering valves, electric pump and supply/feedlines.

Suggested Guarding Materials:

Angle iron, channel iron, and round pipe cut to desired lengths has been successfully used for protecting exposed feedlines and lube point fittings.

Note: If angle iron or suitable substitutes are not available, this material can usually be obtained at most metal fabricating shops.

Spiral Wrap, Convuluted Loom, Spring Coil, Nylon Sleeve and Heater Hose:

Used to guard and protect supply/feedlines from rubbing, chafing and abrasive loose materials. Spring coil, nylon sleeve and heater hose is used in critical areas where more protection is required. These items are available at automotive parts stores and local hydraulic hose suppliers.

Misc. Non-Lincoln Items:

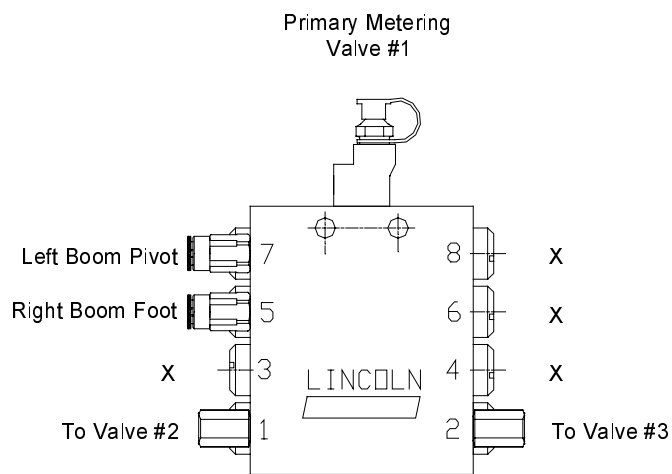
Insulated Clamps, Weld Studs: A quantity of 3/8" and 3/4" grade 8 bolts, 3/8 grade 8 lock nuts and insulated clamps with 3/4" clamping diameter are used for securing supply/feedlines. The hex of the 3/8" bolt can be welded to machine and used as stud for securing the clamp.

(Application and operating environment may require additional guarding.)

Typical Metering Valve Configuration

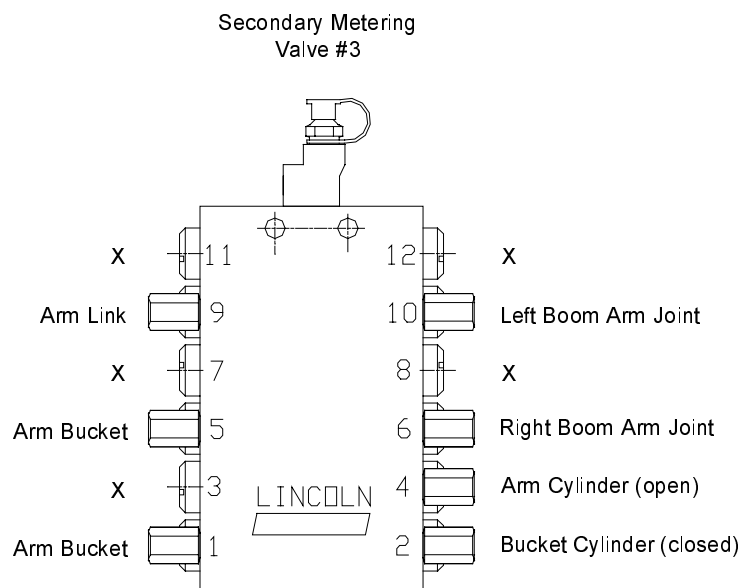
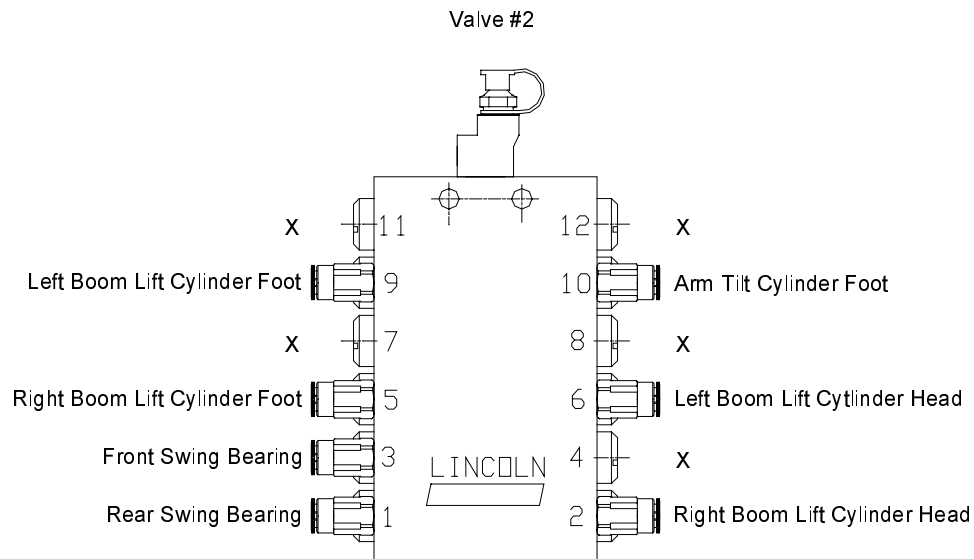
Application: Construction size Excavators

(X=Plugged Outlet)



Typical Metering Valve Configuration

Application: Construction size Excavators



Pre-installation preparations:

- Prior to installation of the lube system, the machine should be thoroughly cleaned with a high pressure sprayer or steam cleaner. Critical areas to be cleaned before removing grease fittings include lube point recesses and the surrounding areas of all lube point fittings that will be connected to lube system.
- Apply hand grease gun, or power gun to each lube point that will be serviced by the lube system. This will verify that all points connected to the lube system are taking grease.

Installation Tips:

- Installation site should be clean and well lit.
- Allow ample work space that will safely permit maximum articulation and full operating ranges of boom/arm/bucket motions. If necessary, remove any panels and covers to allow for easier access.

SAFETY NOTE: If bucket is suspended off ground, be sure to support with suitable safety stands.

Tools required: Standard mechanics shop tools, welder, 24V test light or multi-tester, and tube cutters.

Installation Steps:

The following steps will assist the installer with a systematic approach for installing the Quicklub automated lube system on construction sized excavators. By following the steps outlined, a successful installation will be realized which will increase the service life of all pins and bearings connected to the lube system.

- Configure metering valve with appropriate fitting/adapters using valve configuration layout.
- Remove all grease fittings from lube points that will be connected to lube system.
- Install appropriate adapters and tube fittings in lube points.
- Position and weld valve mounting brackets/blocks and weld studs to machine.
- Attach metering valves to previously mounted brackets or blocks.
- Using tubing cutters, cut to length individual tubing/hose feedlines from secondary valves to lube points and make connections.
- Neatly bundle, loom and tie strap bundled feedlines wherever possible to protect from abrasions. Size, cut and attach appropriate hose ends to all supply lines.

1/8" I.D. Hose/Feedlines/Supply Line Assembly Instructions

Special Note: The 1/8" high pressure hose is recommended for use as feedline to lube points located in exposed areas to frequently moving points. The high pressure hose is also used as supply lines from the pump to the primary valve and from the primary valve to the secondary valves.

It is recommended that the supply line hose be routed and cut after all valves and electric pump have been attached to machine. This allows for the supply/feedlines to be cut to proper lengths to assure unrestricted movement of feed/supplylines while machine is in motion.

NOTE: If using the swedge - on #241289 hose end (#241328 swedging tool is required) #66649 swivels will also be required. If using the reusable hose end, #246002, #66649 swivel will not be required as they are part of the fitting.

- Route supply lines from pump to primary valve and from primary valve to secondary valves and make connections.
- Secure supply/feedlines to weld studs with insulated clamps.
- Mount pump and make electrical connections (electrical diagram included with pump).

Note: For normal operating conditions, it is recommended that timer be set to cycle 10 minutes every hour while machine is in operation. (Blue rotary dial set on 1 and red rotary dial set on 5.) Perform system check-out using check-out list included in this guide.

Automated Lubrication System Check-Out

After installing the Automated Lubrication System (ALS), this checkout routine will provide you with the assurance of a quality installation. By following these basic procedures, the maximum service life of pins, and bushings can be fully realized.

- Inspect all fitting connections, ensuring there are no loose connections.
- Inspect all supply/feedlines, ensuring they are protected from rubbing, chaffing and that adequate slack has been allowed at all articulating and moving points.
- Set timer to recommended or desired operating intervals (see chart in pump service sheet).
- Fill pump reservoir to max line of reservoir.
- Turn power on, pump stirring paddle should turn clockwise. Note length of time that pump runs and that "run" time is consistent with timer setting. Cycle system several times by pushing override button in base of pump until you have observed indicator pin movement from each metering valve.
- Inspect all supply/feedline connections, pump to primary connection, and all metering valve outlet and inlet connections to verify no leakage.
- Inspect to verify fresh grease at all points connected to the lube system.
- Carefully operate machine through its full range of motions to ensure free and unrestricted movement of all supply/feedlines. Adjust and correct any supply/feedlines that are too tight, loose or may require additional protection.
- Replace any skirting and panels that may have been removed to install the system.

Daily Walk-around Inspection

The Lincoln Industrial Quicklub automated lube system components are designed, engineered, manufactured and assembled to the highest of quality standards. This lube system requires little or no maintenance, however, to ensure maximum reliability and to realize maximum service life of all components, it is highly recommended that a **daily walk-around inspection** be performed.

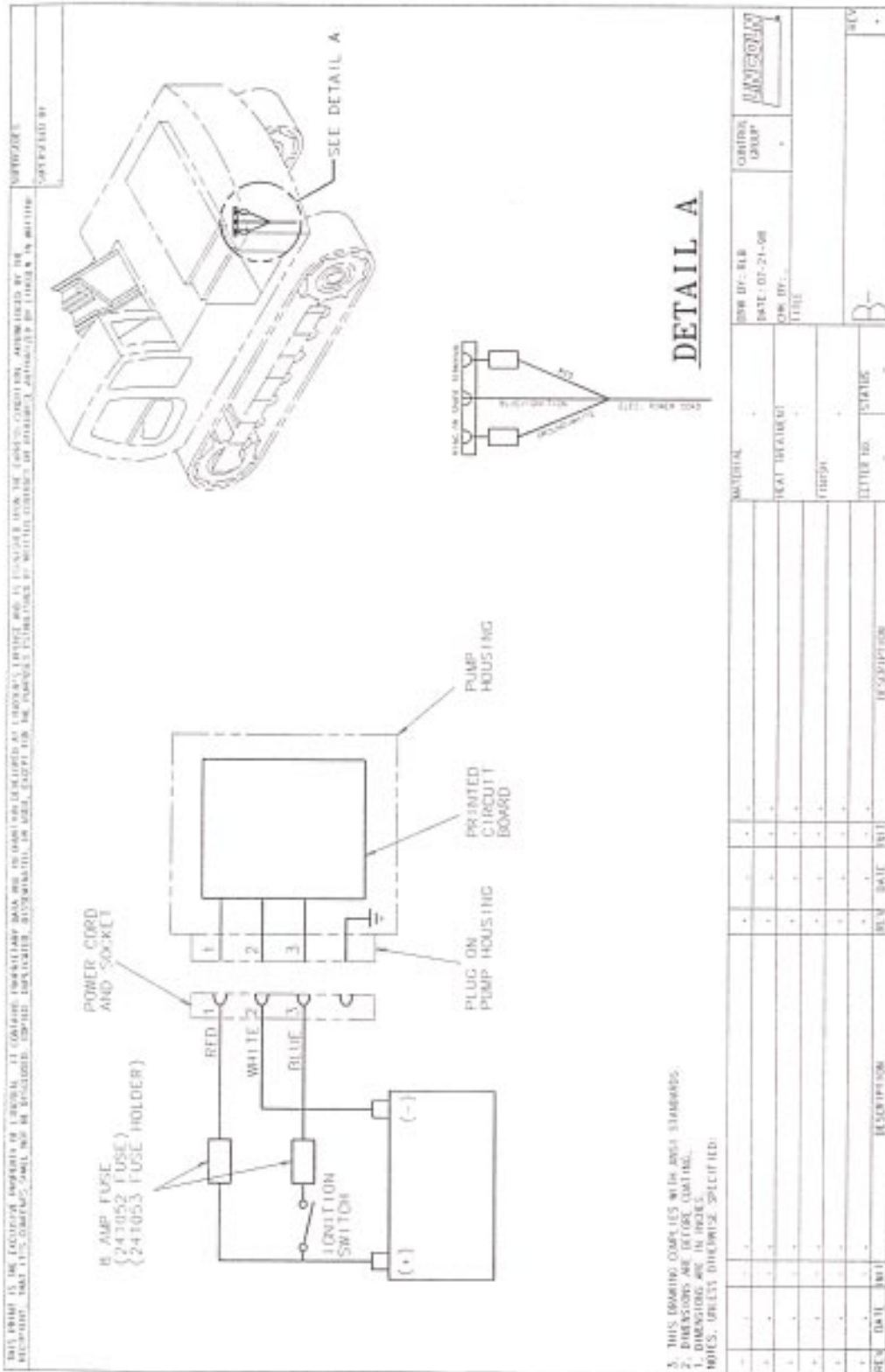
The daily walk-around inspection should include the following:

- Observe lubricant level in reservoir. Fill reservoir if it is low.
- Inspect high pressure relief at pump element, noting any lubricant buildup. If buildup is observed, correct this problem by determining cause of blockage.
- Inspect all valve and lube point connections to verify that no leaks are occurring.
- Inspect supply/feedlines to insure that no breaks or leaks have occurred.
- Inspect lube points to insure that all lube points have a **“fresh grease appearance.”**
- Check pump operation by depressing push-button located in base of pump for 2 seconds to initiate a manual lube event. This will verify that pump is working (ignition switch must be on).
- Report or repair any problems found in this walk-around inspection immediately.

NOTE: Operator to confirm operation of electric pump while machine is in service.

NOTE: Report or repair any problem detected from daily inspection.

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