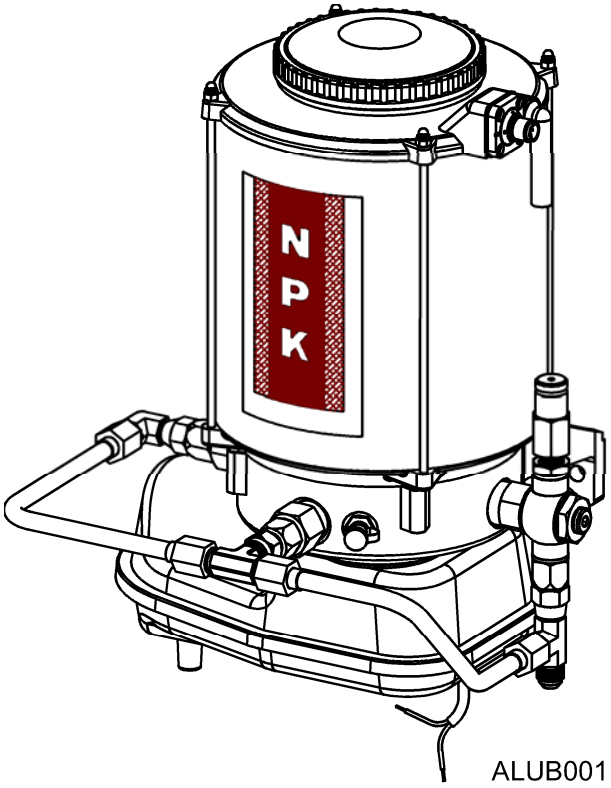
INSTRUCTION MANUAL
AUTOLUBE SYSTEM
for Hydraulic Hammers



ALUB001

"Use Genuine NPK Parts"

NPK ...attachments; designed, built and backed by NPK.

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Walton Hills, OH 44146-5541
Phone (440) 232-7900
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 www.npkce.com G111-9600D Autolube Instruction Manual 3-15

SAFETY

Safety notices in NPK Instruction Manuals follow ISO and ANSI standards for safety warnings:

DANGER (red) notices indicate an imminently hazardous situation which, if not avoided, **will result in death or serious injury**.

WARNING (orange) notices indicate a potentially hazardous situation which, if not avoided, **could result in death or serious injury.**

CAUTION (yellow) notices indicate a potentially hazardous situation, which, if not avoided, **may result in minor or moderate injury.**

ATTENTION (blue) notices in NPK Instruction Manuals are an NPK standard to alert the reader to situations which, if not avoided, **could result in equipment damage.**

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INTRODUCTION

The NPK AUTOLUBE System is designed to automatically provide a supply of grease to the hammer tool bushing - increasing tool bushing life by reducing tool bushing wear.

The AUTOLUBE system utilizes an electric motor-driven high pressure pump capable of pushing low viscosity EP2 grease in cold weather. The pump is activated to run whenever the hammer is operated. The pump cartridge is adjustable according to the requirements of the hammer model and to compensate for tool bushing wear.

The NPK AUTOLUBE system is comprised of the grease pump assembly, and adapter fittings at the pump and hammer. The grease line varies according to the carrier machine and is not furnished by NPK. Use 1/4" maximum I.D. line, 5000 psi minimum working pressure with 6 JIC hose ends.

All AUTOLUBE units with the letter "L" after the model features a low level switch that activates a warning light and buzzer in the cab and can be wired, on solenoid energized circuits, to shut the hammer off when insufficient grease levels are detected.

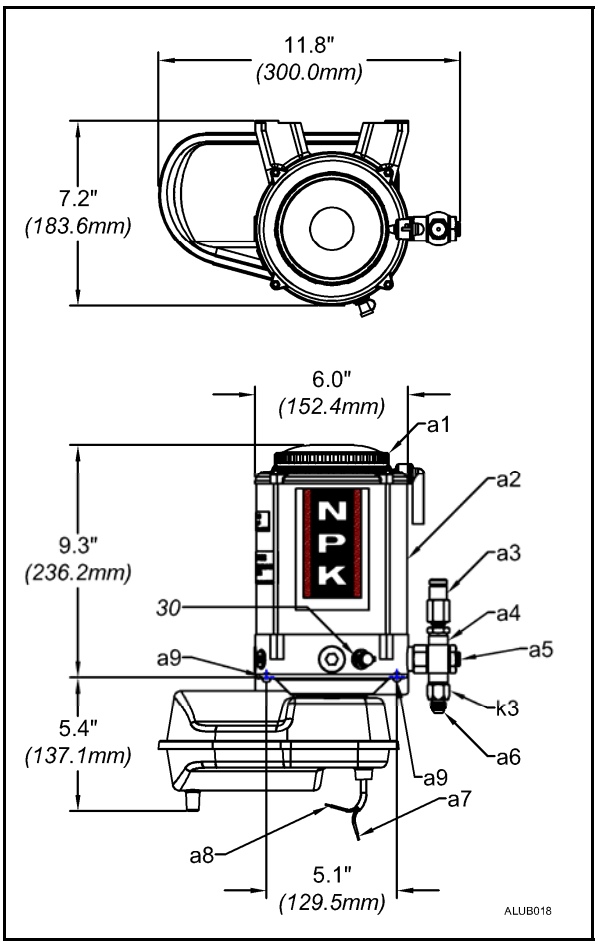
For help with any installation problem, or for additional information, call the NPK Service Department at 1-800-225-4379.

RECOMMENDED UNITS FOR NPK HAMMERS

AUTOLUBE MODEL	**PUMP CARTRIDGE**	**RESERVOIR CAPACITY**		**HAMMER MODELS**				
		lbs	***(kg)***					
G075, G075L	SINGLE	4.4	*(2)*	H3XA H4X/E/L H6XA H7X		E203 E204 E205 E207	GH2 GH3 GH4 GH6	PH2 PH3 PH4
G100, G100L	SINGLE	8.8	*(4)*	H7X H8X H10XB		E207 E208 E210A	GH6 GH7 GH9	
G150, G150L **G153, G153L**	DOUBLE DOUBLE	8.8 17.6	*(4)* *(8)*	H12X H16X H20X	E218A E224A	E213 E216 E220 E225	GH10 GH12 GH15 GH18	
G175, G175L **G186, G186L**	TRIPLE TRIPLE	8.8 17.6	*(4)* *(8)*	H30X	E235A	E240A E260A	GH23 GH30	

GREASE PUMP ASSEMBLY

G075/G075L Specifications



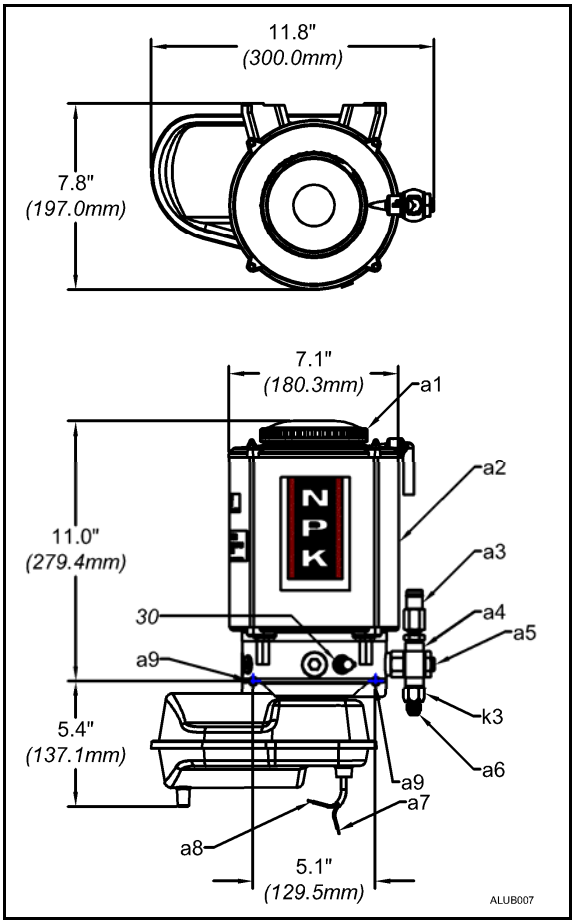
a1	FILL COVER
a2	RESERVOIR
a3	RELIEF VALVE
a4	PUMP CARTRIDGE (ADJUSTABLE)
a5	OUTPUT ADJUSTMENT
a6	OUTPUT CONNECTION (#6 JIC)
a7	ELECTRICAL CONNECTION (BLUE – POWER IN)
a8	ELECTRICAL CONNECTION (BROWN – GROUND)
a9	MOUNTING HOLE - .39 in. *(10 mm)*
k3	CHECK VALVE
30	GREASE FITTING

To adjust pump output, turn the output adjustment screw clockwise to decrease, and counterclockwise to increase, see page 72 for instructions.

MODEL	G075/G075L
OUTPUT	up to ½ lb. *(226.8g)* per hour
RESERVOIR SIZE	4.4 lbs. *(2 kg)*
VOLTAGE	12 – 24 VDC
AMPERAGE	2A

GREASE PUMP ASSEMBLY

G100/G100L Specifications



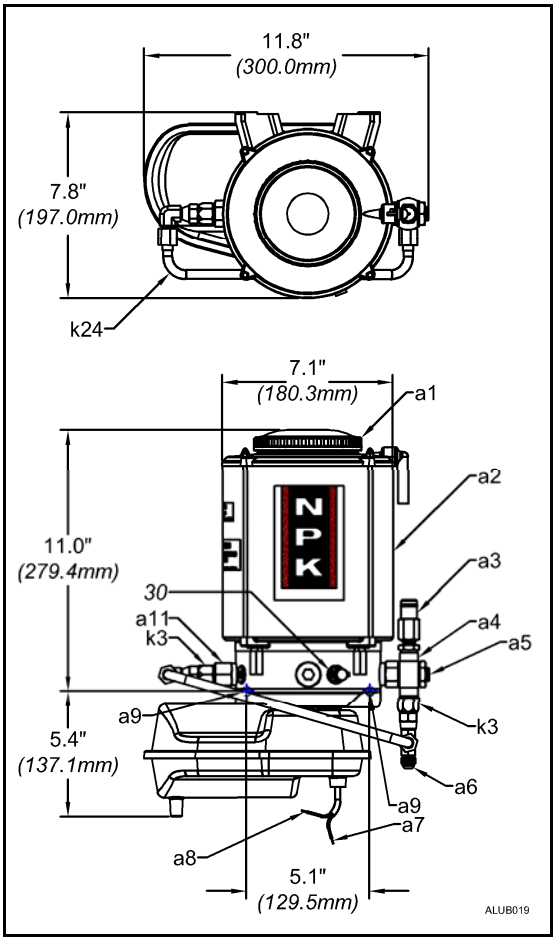
a1	FILL COVER
a2	RESERVOIR
a3	RELIEF VALVE
a4	PUMP CARTRIDGE (ADJUSTABLE)
a5	OUTPUT ADJUSTMENT
a6	OUTPUT CONNECTION (#6 JIC)
a7	ELECTRICAL CONNECTION (BLUE – POWER IN)
a8	ELECTRICAL CONNECTION (BROWN – GROUND)
a9	MOUNTING HOLE - .39 in. *(10 mm)*
k3	CHECK VALVE
30	GREASE FITTING

To adjust pump output, turn the output adjustment screw clockwise to decrease, and counterclockwise to increase, see page 72 for instructions.

MODEL	G100/G100L
OUTPUT	up to ½ lb. *(226.8g)* per hour
RESERVOIR SIZE	8.8 lbs. *(4 kg)*
VOLTAGE	12 – 24 VDC
AMPERAGE	2A

GREASE PUMP ASSEMBLY

G150/G150L Specifications



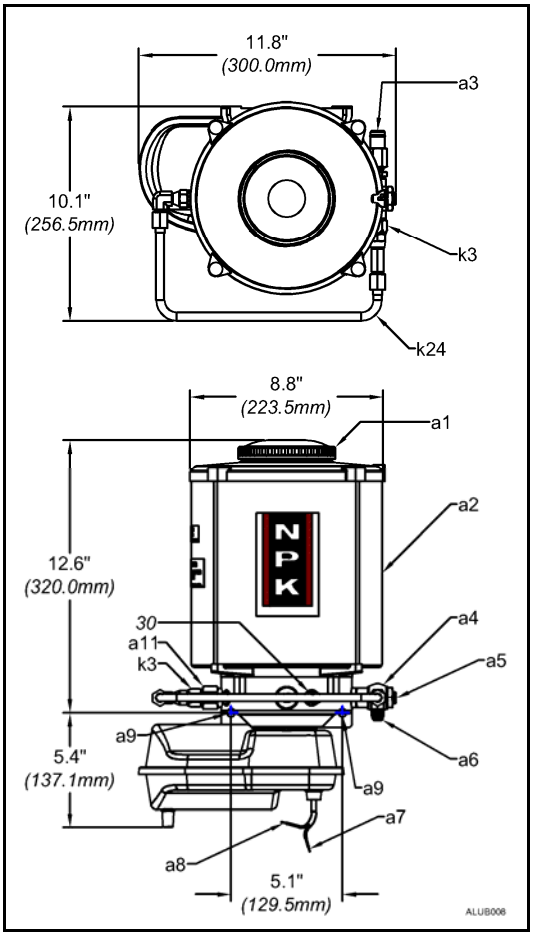
a1	FILL COVER
a2	RESERVOIR
a3	RELIEF VALVE
a4	PUMP CARTRIDGE (ADJUSTABLE)
a5	OUTPUT ADJUSTMENT
a6	OUTPUT CONNECTION (#6 JIC)
a7	ELECTRICAL CONNECTION (BLUE – POWER IN)
a8	ELECTRICAL CONNECTION (BROWN – GROUND)
a9	MOUNTING HOLE - .39 in. *(10 mm)*
a11	PUMP CARTRIDGE (NON-ADJUSTABLE)
k3	CHECK VALVE
k24	CROSSOVER TUBE
30	GREASE FITTING

To adjust pump output, turn the output adjustment screw clockwise to decrease, and counterclockwise to increase, see page 72 for instructions.

MODEL	G150/G150L
OUTPUT	up to 1 lb. *(453.6g)* per hour
RESERVOIR SIZE	8.8 lbs. *(4 kg)*
VOLTAGE	12 – 24 VDC
AMPERAGE	2A

GREASE PUMP ASSEMBLY

G153/G153L Specifications



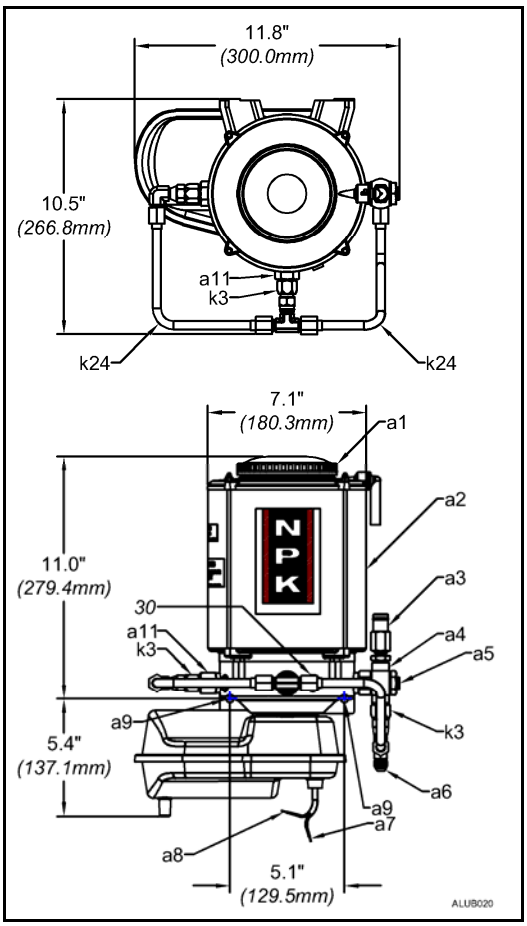
a1	FILL COVER
a2	RESERVOIR
a3	RELIEF VALVE
a4	PUMP CARTRIDGE (ADJUSTABLE)
a5	OUTPUT ADJUSTMENT
a6	OUTPUT CONNECTION (#6 JIC)
a7	ELECTRICAL CONNECTION (BLUE – POWER IN)
a8	ELECTRICAL CONNECTION (BROWN – GROUND)
a9	MOUNTING HOLE - .39 in. *(10 mm)*
a11	PUMP CARTRIDGE (NON-ADJUSTABLE)
k3	CHECK VALVE
k24	CROSSOVER TUBE
30	GREASE FITTING

To adjust pump output, turn the output adjustment screw clockwise to decrease, and counterclockwise to increase, see page 72 for instructions.

MODEL	G153/G153L
OUTPUT	up to 1-1/2 lb. *(680.4g)* per hour
RESERVOIR SIZE	17.6 lbs. *(8 kg)*
VOLTAGE	12 – 24 VDC
AMPERAGE	2A

GREASE PUMP ASSEMBLY

G175/G175L Specifications



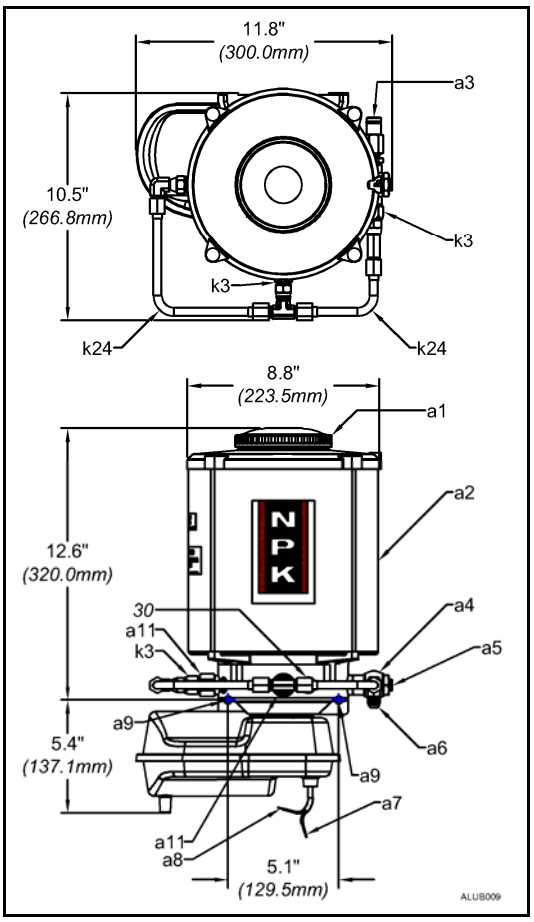
a1	FILL COVER
a2	RESERVOIR
a3	RELIEF VALVE
a4	PUMP CARTRIDGE (ADJUSTABLE)
a5	OUTPUT ADJUSTMENT
a6	OUTPUT CONNECTION (#6 JIC)
a7	ELECTRICAL CONNECTION (BLUE – POWER IN)
a8	ELECTRICAL CONNECTION (BROWN – GROUND)
a9	MOUNTING HOLE - .39 in *(10 mm)*
a11	PUMP CARTRIDGE (NON-ADJUSTABLE)
k3	CHECK VALVE
k24	CROSSOVER TUBE
30	GREASE FITTING

To adjust pump output, turn the output adjustment screw clockwise to decrease, and counterclockwise to increase, see page 72 for instructions.

MODEL	G175/G175L
OUTPUT	up to 1-1/2 lb. *(680.4g)* per hour
RESERVOIR SIZE	8.8 lbs. *(4 kg)*
VOLTAGE	12 – 24 VDC
AMPERAGE	2A

GREASE PUMP ASSEMBLY

G186/G186L Specifications



a1	FILL COVER
a2	RESERVOIR
a3	RELIEF VALVE
a4	PUMP CARTRIDGE (ADJUSTABLE)
a5	OUTPUT ADJUSTMENT
a6	OUTPUT CONNECTION (#6 JIC)
a7	ELECTRICAL CONNECTION (BLUE – POWER IN)
a8	ELECTRICAL CONNECTION (BROWN – GROUND)
a9	MOUNTING HOLE - .39 in *(10 mm)*
a11	PUMP CARTRIDGE (NON-ADJUSTABLE)
k3	CHECK VALVE
k24	CROSSOVER TUBE
30	GREASE FITTING

To adjust pump output, turn the output adjustment screw clockwise to decrease, and counterclockwise to increase, see page 72 for instructions.

MODEL	G186/G186L
OUTPUT	up to 1-1/2 lb. *(680.4g)* per hour
RESERVOIR SIZE	17.6 lbs. *(8 kg)*
VOLTAGE	12 – 24 VDC
AMPERAGE	2A

CORRECT GREASE

The type of grease used is very important. NPK recommends a lithium soap base EP (Extreme Pressure) NLGI #2 Grease, with Moly (Molybdenum Disulfide) or other surface protective additives. A high drop point 500°F *(260°C)* grease is desirable.

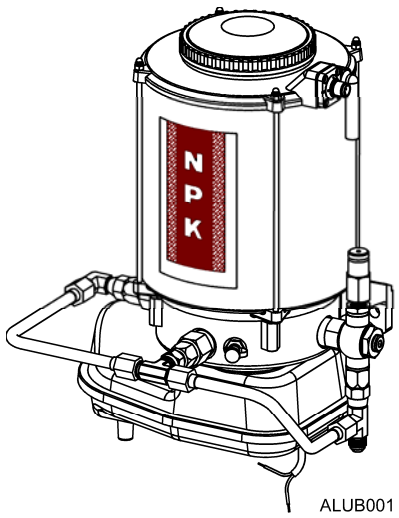
Below is a list of commonly available greases, by manufacturer and brand name that meet NPK's recommendations. NPK does not endorse any one brand as being superior to another. If you or your customers use a brand not listed, please call the NPK Service Department at 800-225-4379.

MANUFACTURER	***BRAND NAME***
Amalie Oil Co.	LI-2M
Amoco	Rykotac EP Grease Amolith Grease 94601 Rykon Premium Grease EP (Grade 94108) Rykon Premium Moly Grease (Grade 94114) Amoco Molylith Grease 92006
Amsoil, Inc.	GHD
BP Oil, Inc.	Bearing Gard-2
Caterpillar	Multipurpose Molydbenum Grease (MPGM)
Cato Oil and Grease Company	Moly Lithflex CX AS
CITGO	Citgo Extra Range Grease
Conoco, Inc.	Super Lube M EP #2
Dryden Oil Company	Moly EP 2
Exxon	Ronex Extra Duty Moly NLGI 2
Fiske Brothers Refining Co. (Lubriplate)	MO-LITH No. 2
John Deere	TY6333/TY6341 Moly High Temp
Kendall	L-424
Mobil	Moly 372
Muscle Products Corporation (MPC)	PL-10 Powerlift Grease LP-10 Lithium EP Plus
NPK	***Universal Plus Lithium EP Grease*** ***Super Duty EP Grease (water resistant)*** ***Chisel Paste***
Pennzoil	Adhezolith EP 2 Grease
Phillips 66 Company	Philube MW
Shell	Retinax ® AM Grease 71119
	Retinax ® HD Grease
Standard Oil Company	Bearing Gard-2
Sun Refining & Marketing Company	Prestige Moly 2 EP
Texaco, U.S.A.	Molytex EP 2
Union Oil Company	Unoba Moly HD #2
Unocal	Unoba Moly HD #2

NPK HAMMER GREASE

NPK offers hammer grease specially formulated to meet severe job requirements. The grease is available in three different temperature ranges - 350°, 500°, and 2000°. All are compatible with Autolube system.

Universal Plus and ***Super Duty*** are lithium soap based products that resist washout and contain NPK-10 additive for surface protection in friction affected areas.
Chisel Paste is an aluminum complex soap base with 12% graphite and copper additives for extreme operating conditions.



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UNIVERSAL PLUS 350°	***NPK PART NO.***
14 oz. *(397 g)* ***CARTRIDGE***	G000-1010
120 lb. *(54 kg)* ***KEG***	G000-1020
35 lb. *(15 kg)* ***PAIL***	G000-1030
400 lb. *(181 kg)* ***DRUM***	G000-1040

SUPER DUTY 500°	***NPK PART NO.***
14 oz. *(397 g)* ***CARTRIDGE***	G000-1011
120 lb. *(54 kg)* ***KEG***	G000-1021
35 lb. *(15 kg)* ***PAIL***	G000-1031
400 lb. *(181 kg)* ***DRUM***	G000-1041

CHISEL PASTE 2000°	***NPK PART NO.***
14 oz. *(397 g)* ***CARTRIDGE***	G000-1050

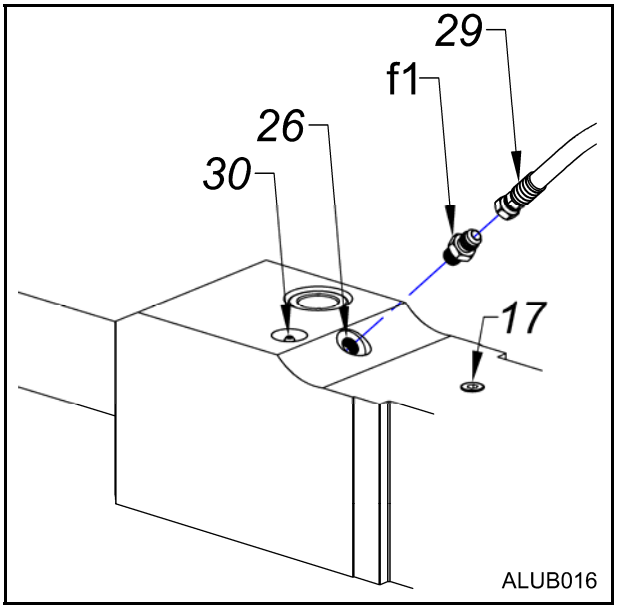
350°	500°	2000°
NPK UNIVERSAL PLUS LITHIUM PLUS EP2 GREASE	NPK SUPER DUTY EP2 GREASE WATER RESISTANT	NPK CHISEL PASTE EP2 GREASE EXTREME TEMP. WATER RESISTANT

HAMA00404

INSTALLING THE NPK AUTOLUBE SYSTEM

PH2, PH3, and PH4 Hammer connection port

Hammer models PH2, PH3, and PH4 have an autolube connection port *(26)* on the lower middle of the main body. Remove the pipe plug from the autolube port and install an adapter fitting (f1) part number K065-6620 into the port. **NOTE:** For manual greasing, use the grease fitting *(30)* provided.

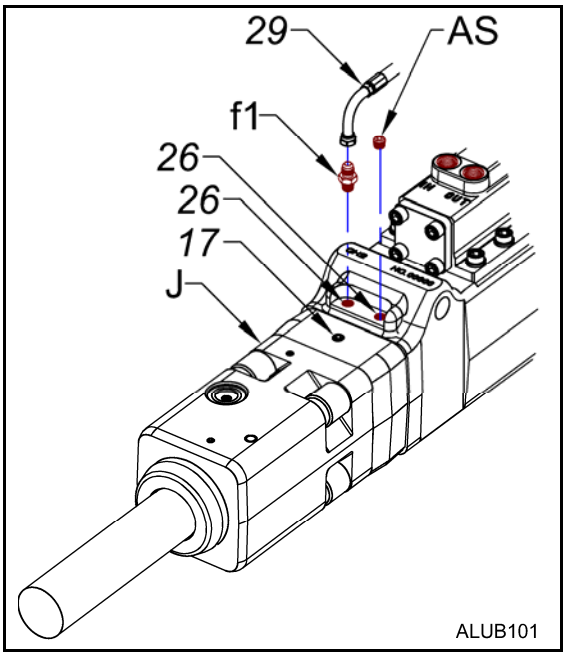


WARNING	**DO NOT** install the autolube grease line *(29)* into the port *(17)* that is located in line with the grease port going towards the gas end of the hammer. This port is an air connection port used for underwater applications. Pumping grease into this port will cause damage to the hammer.

INSTALLING THE NPK AUTOLUBE SYSTEM

GH2/GH2S/GH2TS Hammer connection port

GH2/GH2S/GH2TS hammer models have two autolube connection ports *(26)* on the lower top side of the main body. The autolube ports are 1/4" bspt and are not stamped. Remove both grease fittings and install adapter fitting (f1), part number L007-6610 and a plug (AS), part number 22002010 into the ports.

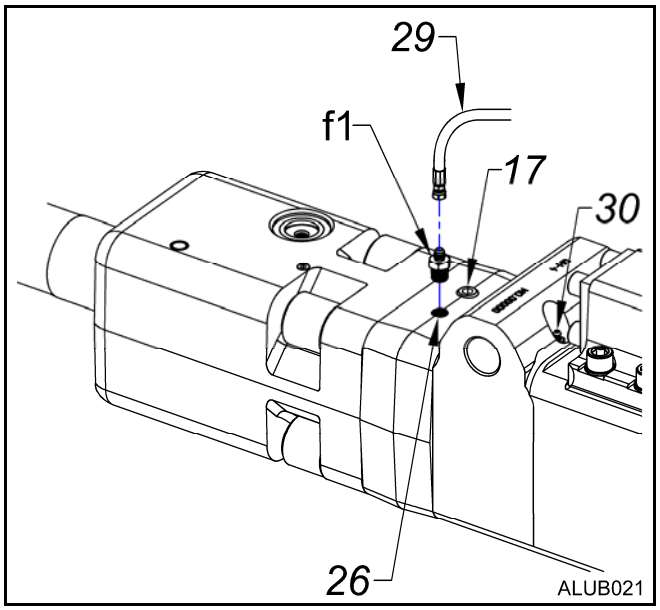


WARNING	**DO NOT** install the autolube grease line (*29*) into the 1/8” bspt port (*17*) that is located on the top surface of the impact ring (J). This port is an air line connection port used for underwater applications. Pumping grease into this port will cause damage to the hammer.

INSTALLING THE NPK AUTOLUBE SYSTEM

GH4, GH6 Hammer connection port

Hammer models **GH4** and **GH6** have an autolube connection port on the lower right side of the main body. The autolube port (*26*) is stamped with the letter “G”. Remove the pipe plug from the port and install an adapter fitting (f1) part number K065-6620 into the port. **NOTE:** For manual greasing, use the grease fitting (*30*) provided.

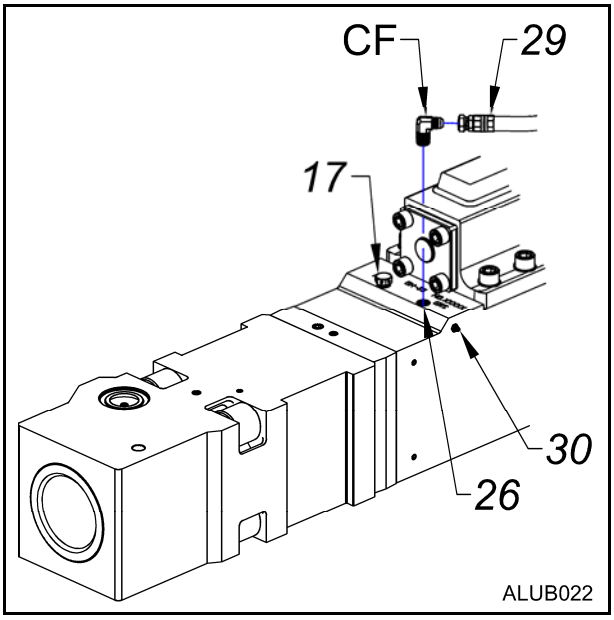


WARNING	**DO NOT** install the autolube grease line (*29*) into the port stamped “A” (*17*) that is located on the lower left side of the main body. This port is an air line connection port used for underwater applications. Pumping grease into this port will cause damage to the hammer.

INSTALLING THE NPK AUTOLUBE SYSTEM

GH7 through GH50 Hammer connection port

Hammer models GH7 through GH50 have an autolube connection port on the lower right side of the main body. The autolube port (*26*) is stamped with the letter “G”. Remove the pipe plug from the port and install an adapter elbow (CF) part number L515-6600 into the port. **NOTE:** For manual greasing, use the grease fitting (*30*) provided.



WARNING	**DO NOT** install the Autolube grease line (*29*) into the port stamped “A” (*17*) that is located on the lower left side of the main body. This port is an air line connection port used for underwater applications. Pumping grease into this port will cause damage to the hammer.

INSTALLING THE NPK AUTOLUBE SYSTEM

E203, E204 AND E205 HAMMER MODIFICATION

Later model production hammers have provisions for Autolube. Older hammers, see below, need the Impact Spacer modified by machining necessary porting.

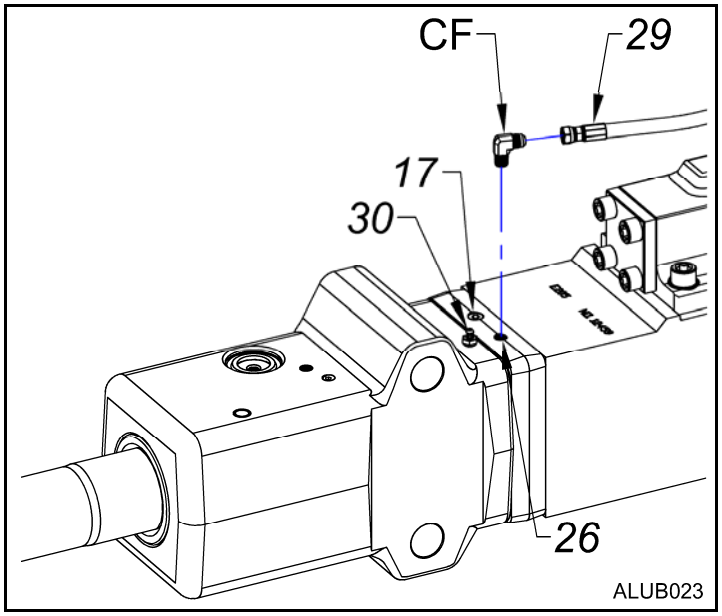
E203	(below serial number 72848)	Modification drawing E2030-5200
E204	(below serial number 70812)	Modification drawing E2040-5200
E205	(below serial number 71835)	Modification drawing E2050-5200

E203, E204 and E205 Hammer connection port

Later production hammer models E203, E204, and E205 have an Autolube connection port *(26)* on the Impact Spacer on the lower right side of the hammer assembly.

E203	(start serial number 72848)
E204	(start serial number 70812)
E205	(start serial number 71835)

Remove the pipe plug from the port *(26)* and install an adapter elbow (CF) part number K601-6600. **NOTE:** For manual greasing, use the grease fitting (*30*) provided.

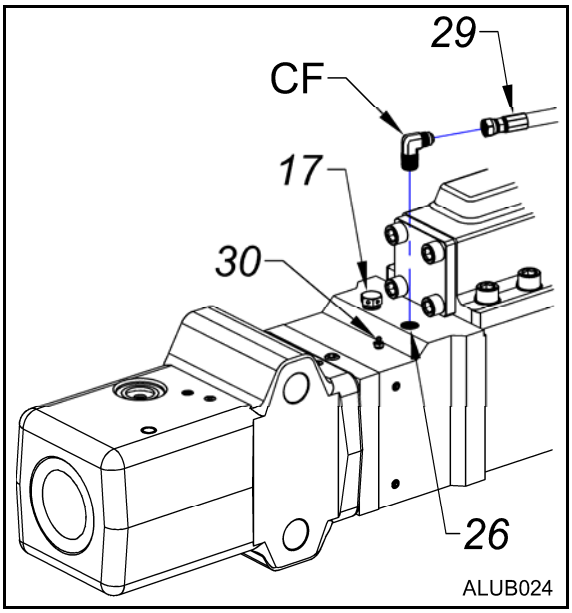


WARNING	**DO NOT** install the Autolube grease line *(29)* into the port stamped “A” *(17)* that is located on the lower left side of the main body. This port is an air line connection port used for underwater applications. Pumping grease into this port will cause damage to the hammer.

INSTALLING THE NPK AUTOLUBE SYSTEM

E207 Hammer connection port

Hammer model **E207** has an autolube connection port on the lower right side of the main body. The autolube port *(26)* is stamped with the letter “G”. Remove the pipe plug from the port and install an adapter elbow (CF) part number L515-6600 into the port. **NOTE:** For manual greasing, use the grease fitting *(30)* provided.

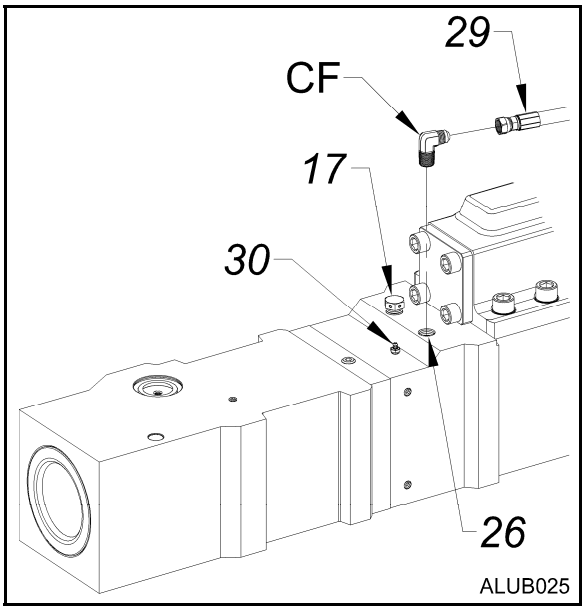


WARNING	**DO NOT** install the Autolube grease line *(29)* into the port stamped “A” *(17)* that is located on the lower left side of the main body. This port is an air line connection port used for underwater applications. Pumping grease into this port will cause damage to the hammer.

INSTALLING THE NPK AUTOLUBE SYSTEM

E208 Hammer connection port

Hammer model **E208** has an autolube connection port on the lower right side of the main body. The autolube port *(26)* is stamped with the letter “G”. Remove the pipe plug from the port and install an adapter elbow (CF) part number L515-6600 into the port. **NOTE:** For manual greasing, use the grease fitting *(30)* provided.

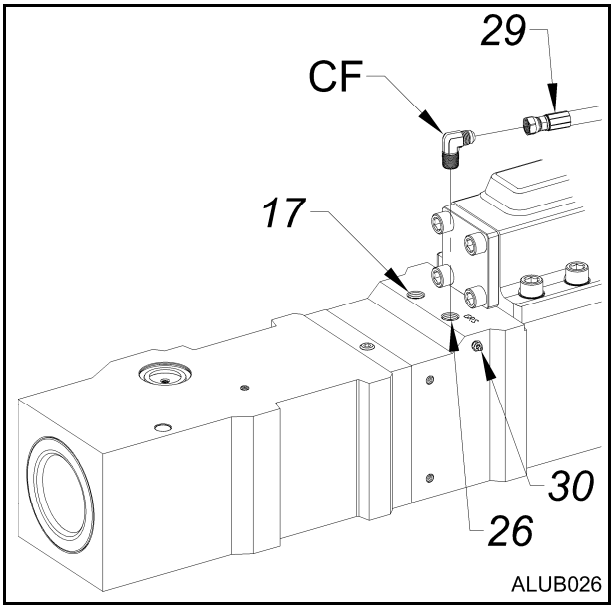


WARNING	**DO NOT** install the Autolube grease line *(29)* into the port stamped “A” *(17)* that is located on the lower left side of the main body. This port is an air line connection port used for underwater applications. Pumping grease into this port will cause damage to the hammer.

INSTALLING THE NPK AUTOLUBE SYSTEM

E210, E213, E216, E220, E225 Hammer connection port

Hammer models **E210**, **E213**, **E216**, **E220** and **E225** have an autolube connection port on the lower right side of the main body. The autolube port *(26)* is stamped with the letter “G”. Remove the pipe plug from the port and install an adapter elbow (CF) part number L515-6600 into the port. **NOTE:** For manual greasing, use the grease fitting *(30)* provided.



WARNING	**DO NOT** install the Autolube grease line *(29)* into the port stamped “A” *(17)* that is located on the lower left side of the main body. This port is an air line connection port used for underwater applications. Pumping grease into this port will cause damage to the hammer.

INSTALLING THE NPK AUTOLUBE SYSTEM

E218A (255) AND E224A (265) HAMMER MODIFICATION

Late model production hammers have provisions for autolube. Older hammers (see below) need the main body modified by machining necessary porting.

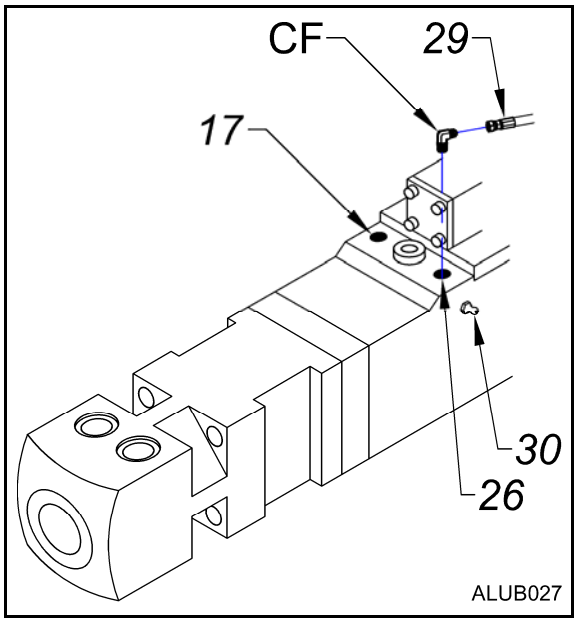
E218A (below serial number 35982) Modification drawing H255-9500
E224A (below serial number 40461) Modification drawing H265-9500

E218A (255) and E224A (265) Hammer connection port

Late production hammer models E218A (255) and E224A (265) have an autolube connection port *(26)* on the main body on the lower right side of the hammer assembly.

E218A (start serial number 35982)
E224A (start serial number 40461)

Remove the pipe plug from the autolube port *(26)* and install an adapter elbow (CF) part number L515-6600. **NOTE:** For manual greasing, use the grease fitting *(30)* provided.

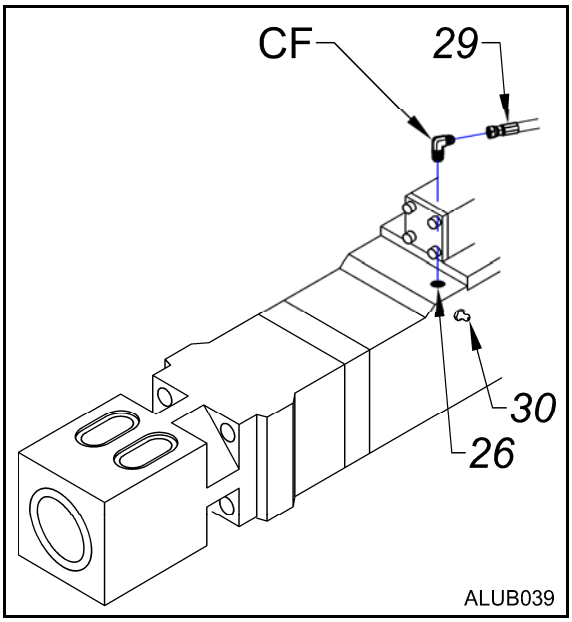


WARNING	**DO NOT** install the Autolube grease line *(29)* into the port stamped "A" *(17)* that is located on the lower left side of the main body. This port is an air line connection port used for underwater applications. Pumping grease into this port will cause damage to the hammer.

INSTALLING THE NPK AUTOLUBE SYSTEM

E235A Hammer connection port

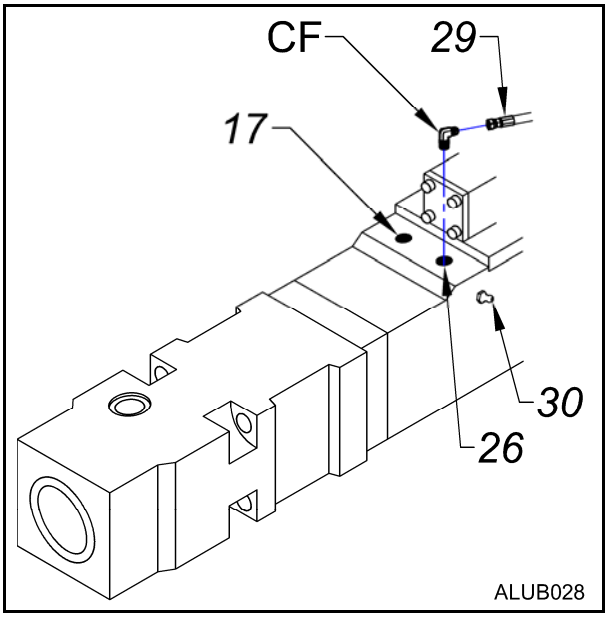
Hammer model **E235A** has an autolube connection port *(26)* on the lower right side of the main body. Remove the pipe plug from the port and install an adapter elbow (CB) part number L515-6600 into the port. Also connect the grease line *(29)*. **NOTE:** For manual greasing, use the grease fitting *(30)* provided.



INSTALLING THE NPK AUTOLUBE SYSTEM

E240A, E260A Hammer connection port

Hammer models **E240A** and **E260A** have an autolube connection port on the lower right side of the main body. The autolube port *(26)* is stamped with the letter “G”. Remove the pipe plug from the port and install an adapter elbow (CF) part number L515-6600 into the port. **NOTE:** For manual greasing, use the grease fitting *(30)* provided.



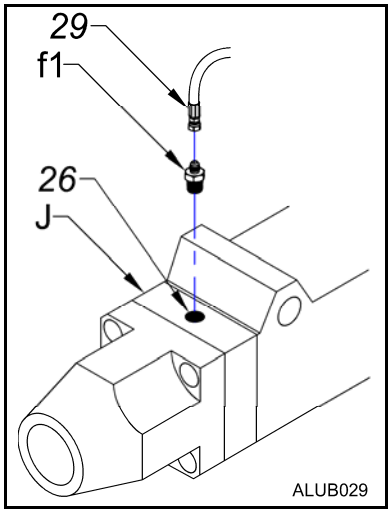
WARNING	**DO NOT** install the Autolube grease line *(29)* into the port stamped “A” *(17)* that is located on the lower left side of the main body. This port is an air line connection port used for underwater applications. Pumping grease into this port will cause damage to the hammer.

INSTALLING THE NPK AUTOLUBE SYSTEM

H3XA HAMMER MODIFICATION

Late model production hammers have provisions for autolube. Older hammers, see below, need the impact ring modified by machining necessary porting.
H3XA (below serial number 50503) Modification drawing H170-9500

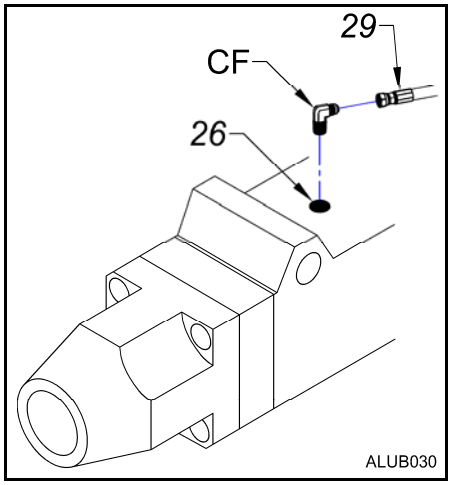
Replace the impact ring (J) with one that has been modified. (Modification drawing is available from NPK). Install adapter fitting (f1) part number K065-6610 into the port *(26)*, then install the grease line *(29)*.



H3XA Hammer connection port

Late production hammer models H3XA have an autolube port *(26)* on the main body on the lower middle of the hammer assembly.
H3XA (start serial number 50503)

Remove the existing grease fitting and adapter bushing from the autolube port *(26)* and install an adapter elbow (CF) part number L515-6600, then install the grease line *(29)*.



INSTALLING THE NPK AUTOLUBE SYSTEM

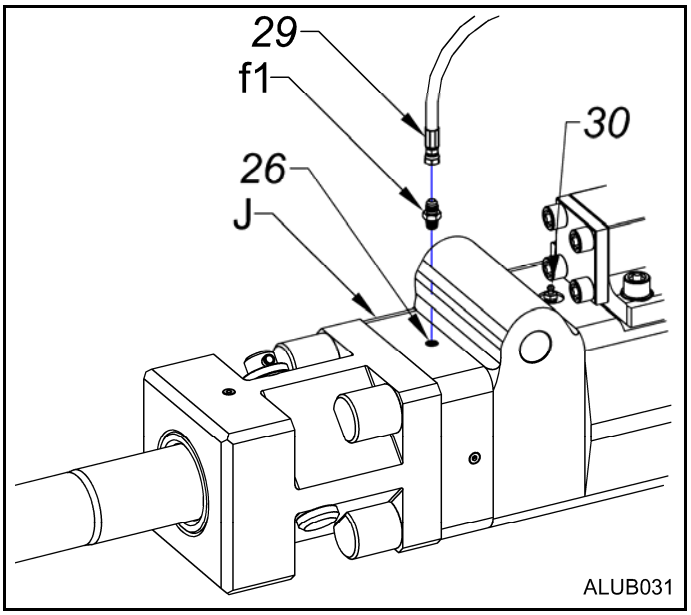
H4XA AND H4XE HAMMER MODIFICATION

H4XA and H4XE hammers below serial number 50400 have no provision for autolube and require the impact ring (J) to be modified.
H4XA and H4XE (below serial number 50400) Modification drawing H190-9500

All H4XL hammers have an autolube port on the impact ring and require no modification.

H4XA, H4XE and H4XL Hammer connection port

Replace the impact ring (J) on H4XA and H4XE hammers with one that has been modified. Install an adapter fitting (f1) part number K065-6620 into the autolube port *(26)*, then install the grease line *(29)*. **NOTE:** For manual greasing, use the grease fitting *(30)* provided.



INSTALLING THE NPK AUTOLUBE SYSTEM

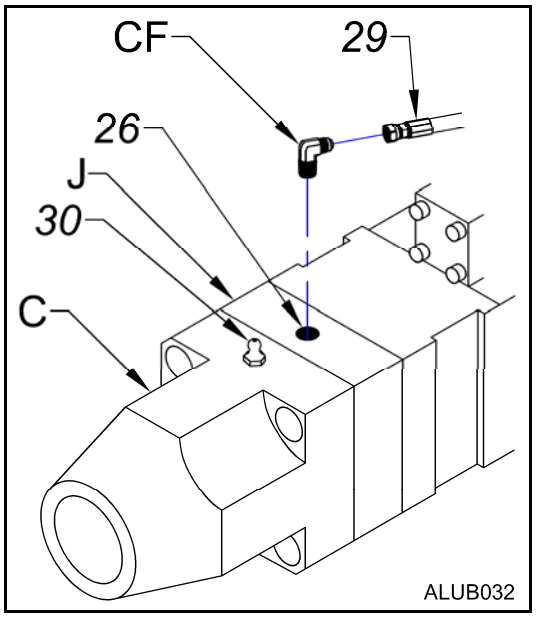
H6XA HAMMER MODIFICATION

H6XA hammers below serial number 52793 have no provision for autolube and require the impact ring (J) and tool holder (C) to be modified.

H6XA Impact Ring	Modification drawing H210-9510
H6XA Tool Holder	Modification drawing H210-9500

H6XA Hammer connection port

Replace the impact ring (J) and tool holder (C) with ones that have been modified. Install an adapter elbow (CF) part number K601-6600 into the autolube port *(26)*, then install the grease line *(29)*. **NOTE:** For manual greasing, use the grease fitting *(30)* provided.



INSTALLING THE NPK AUTOLUBE SYSTEM

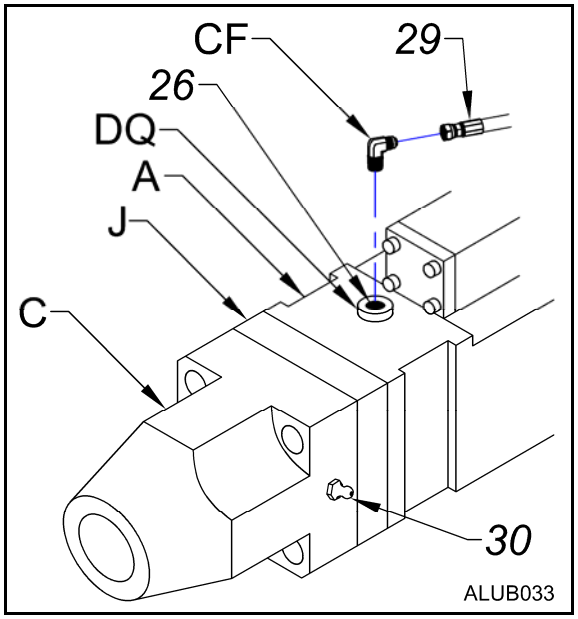
H7X (BELOW S/N 50332) HAMMER MODIFICATION

H7X hammers below serial number 50332 have no provision for autolube and require the main body (A), impact ring (J) and tool holder (C) to be modified.

H7X Main Body	Modification drawing H230-9510
H7X Impact Ring	Modification drawing H230-9520
H7X Tool Holder	Modification drawing H230-9530
H7X Hammer Assembly	Assembly drawing H230-9500

H7X Hammer connection port

Replace the Main Body (A), Impact Ring (J) and Tool Holder (C) with ones that have been modified. Align and reassemble the parts per assembly drawing H230-9500. Install an adapter elbow (CF) part number K601-6600 and adapter fitting (DQ) part number H265-6600 into the autolube port *(26)*, then install the grease line *(29)*. **NOTE:** For manual greasing, use the grease fitting *(30)* provided.

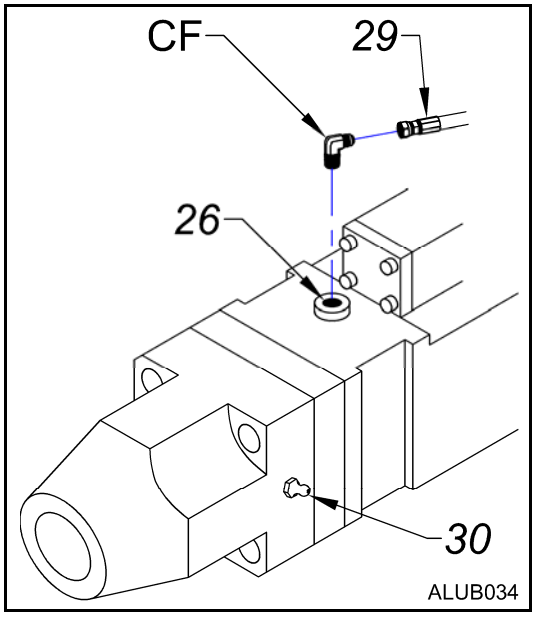


WARNING	**H7X HAMMERS CANNOT BE OPERATED UNDERWATER WITH THE AUTOLUBE SYSTEM.** If the hammer is to be used for underwater operation, the hammer must be further modified. See NPK Hammer Underwater Manual for details.

INSTALLING THE NPK AUTOLUBE SYSTEM

H7X (s/n 50332 and up) Hammer connection port

Install an adapter elbow (CF) part number K601-6600 into the autolube port *(26)*, then install the grease line *(29)*. **NOTE:** For manual greasing, use the grease fitting *(30)* provided.



WARNING	**H7X HAMMERS CANNOT BE OPERATED UNDERWATER WITH THE AUTOLUBE SYSTEM.** If the hammer is to be used for underwater operation, the hammer must be further modified. See NPK Hammer Underwater Manual for details.

INSTALLING THE NPK AUTOLUBE SYSTEM

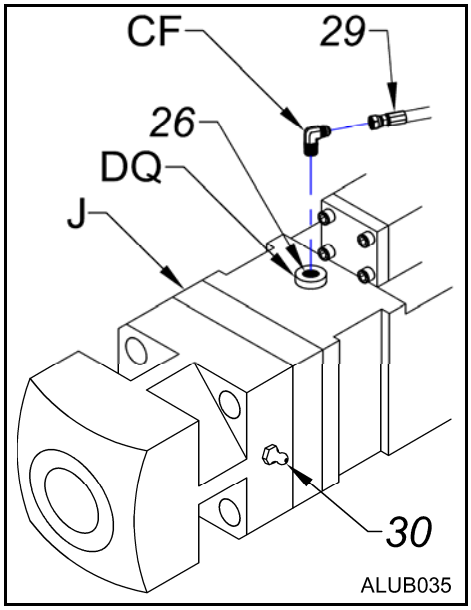
H8XA, H10XB, H12X, H16X AND H20X HAMMER MODIFICATION

Late model production hammers have provisions for autolube. Older hammers (see below) need to be modified.

H8XA	(below serial number 44486)	Modification drawing H250-9500
H10XB	(below serial number 44355)	Modification drawing H290-9500
H12X	(below serial number 41369)	Modification drawing H320-9500
H16X	(below serial number 44486)	Modification drawing H350-9500
H20X	(all serial numbers)	Modification drawing H370-9500

H8XA, H10XB, H12X, H16X and H20X Hammer connection port

Replace the standard impact ring (J) with one that has been modified for use with the autolube system. The impact ring must be assembled turned 180˚ from original position. The drilled hole modification in the impact ring must align with the 19/32" (15mm) hole in the hammer main body (main valve side), and the milled slot must connect with the grease passage in the side of the tool holder. Install an adapter elbow (CF) part number L515-6600 and adapter fitting (DQ) part number 11024312 into the autolube port *(26)*, then install the grease line *(29)*. **NOTE:** For manual greasing, use the grease fitting *(30)* provided.



⚠WARNING	**H8XA, H10XB, H12X, H16X and H20X HAMMERS CANNOT BE OPERATED UNDERWATER WITH THE AUTOLUBE SYSTEM.** If the hammer is to be used for underwater operation, the hammer must be further modified. See NPK Hammer Underwater Manual for details.

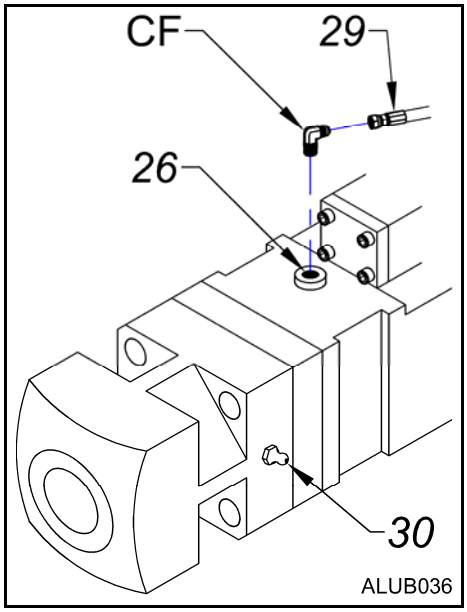
INSTALLING THE NPK AUTOLUBE SYSTEM

H8XA, H10XB, H12X and H16X Hammer connection port

Late model production hammers have a connection port for the autolube system, and need no modification.

H8XA (start serial number 44486)
H10XB (start serial number 44355)
H12X (start serial number 41369)
H16X (start serial number 41040)

Install an adapter elbow (CF) part number L515-6600 into the autolube port *(26)*, then install the grease line *(29)*. **NOTE:** For manual greasing, use the grease fitting *(30)* provided.



WARNING	**H8XA, H10XB, H12X and H16X HAMMERS CANNOT BE OPERATED UNDERWATER WITH THE AUTOLUBE SYSTEM.** If the hammer is to be used for underwater operation, the hammer must be further modified. See NPK Hammer Underwater Manual for details.

INSTALLING THE NPK AUTOLUBE SYSTEM

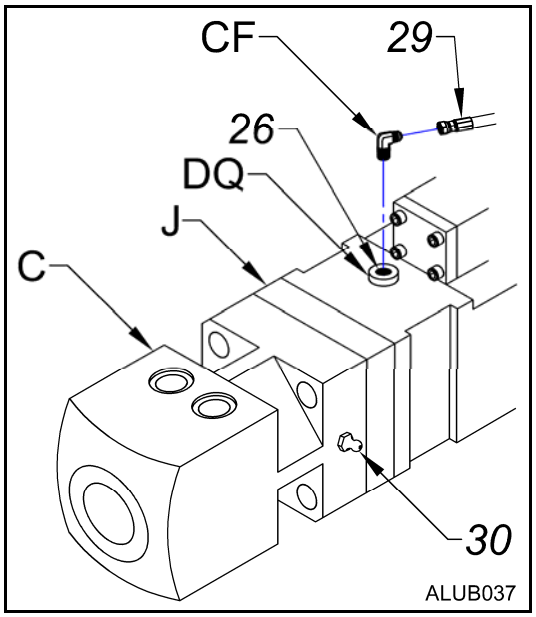
H30X HAMMER MODIFICATION

H30X hammers up to serial number 41060 have no provision for autolube and require the impact ring (J) and tool holder (C) to be modified.

Impact ring	Modification drawing H400-9500
Tool holder	Modification drawing H400-9510

H30X Hammer connection port

Replace the standard impact ring (J) and tool holder (C) with ones that have been modified for use with the autolube system. The impact ring must be assembled turned 180˚ from original position. The drilled hole modification in the impact ring must align with the 19/32" (15mm) hole in the hammer main body (main valve side), and the milled slot must connect with the grease passage in the side of the tool holder. Install an adapter elbow (CF) part number L515-6600 and adapter fitting (DQ) part number 11024312 into the autolube port *(26)*, then install the grease line *(29)*. **NOTE:** For manual greasing, use the grease fitting *(30)* provided.

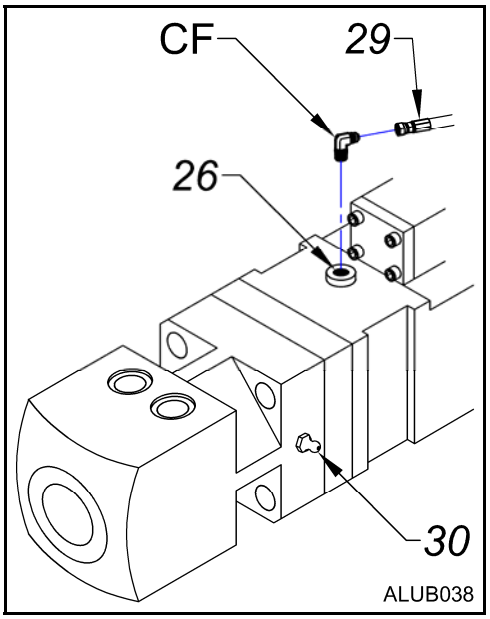


WARNING	**H30X HAMMERS CANNOT BE OPERATED UNDERWATER WITH THE AUTOLUBE SYSTEM.** If the hammer is to be used for underwater operation, the hammer must be further modified. See NPK Hammer Underwater Manual for details.

INSTALLING THE NPK AUTOLUBE SYSTEM

H30X Hammer connection port

H30X hammers starting with serial number 41060 have an autolube connection port on the lower end of the main body. Install an adapter elbow (CF) part number L515-6600 into the autolube port *(26)*, then install the grease line *(29)*. **NOTE:** For manual greasing, use the grease fitting *(30)* provided.

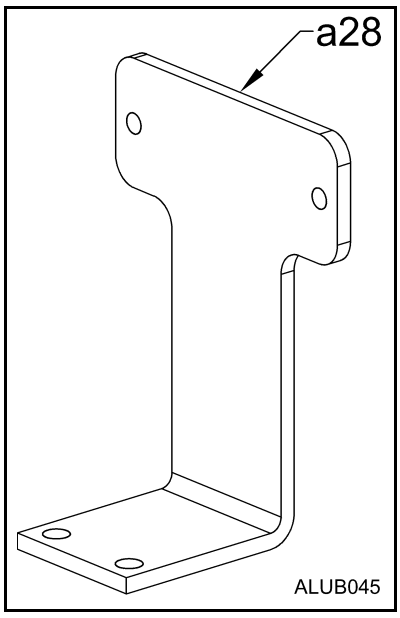


WARNING	**H30X HAMMERS CANNOT BE OPERATED UNDERWATER WITH THE AUTOLUBE SYSTEM.** If the hammer is to be used for underwater operation, the hammer must be further modified. See NPK Hammer Underwater Manual for details.

INSTALLING THE NPK AUTOLUBE SYSTEM

MOUNTING

Mount the autolube pump assembly in a protected location visible to the operator and accessible for refilling. A general purpose mounting bracket p/n G150-2000 (a28) is furnished with the Autolube pump.



ELECTRICAL

Wire the pump assembly into the hammer circuit, connected in parallel, so the pump operates only when the hammer is running.

For autolube units supplied with a low level switch, refer to the wiring diagram supplied with your unit.

There are three types of standard electrical circuits used by NPK for the autolube systems. One uses a solenoid valve to operate the hammer. The next one uses a lever actuated control valve and the last one uses power directly from the NPK joystick control package.

NPK Autolube Systems have been supplied with two types of electrical connectors (HIRSCHMAN and DIN).

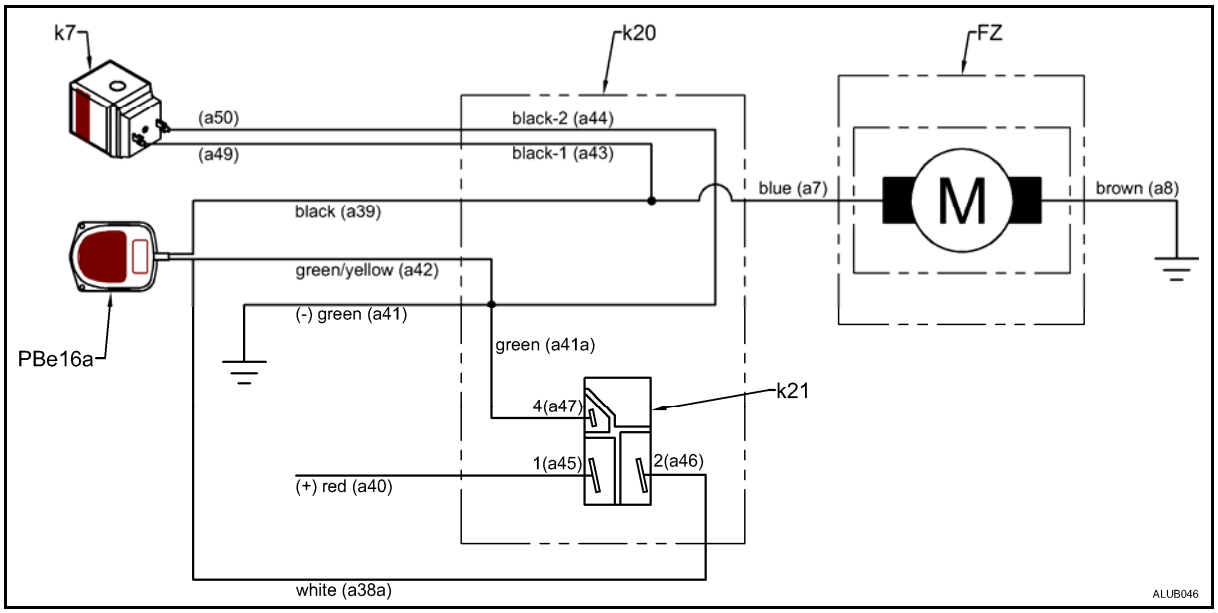
The following pages illustrate the different types of electrical circuits used by NPK for the Autolube Systems.

INSTALLING THE NPK AUTOLUBE SYSTEM

Electrical

Typical NPK Autolube electrical circuits for hammer installations

A. Autolube electrical circuit uses a solenoid valve and NPK's electrical control box.



BILL OF MATERIAL	
ITEM NO.	**DESCRIPTION**
FZ	AUTOLUBE PUMP ASSEMBLY
k7	SOLENOID VALVE
k20	ELECTRICAL CONTROL BOX NPK PART NO. K217-5502
k21	ON/OFF SWITCH NPK PART NO. K217-5510
PBe16a	FOOTSWITCH NPK PART NO. L541-5100

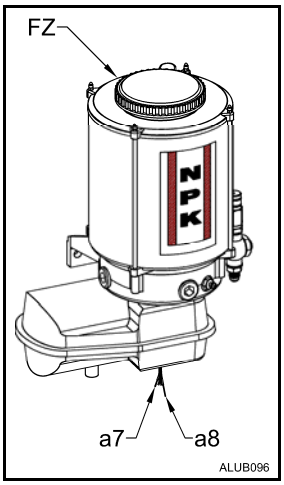
INSTALLING THE NPK AUTOLUBE SYSTEM

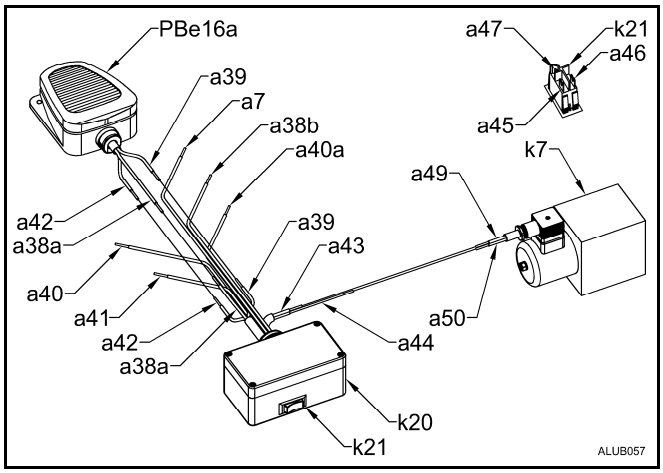
Electrical

Typical NPK Autolube electrical circuits for hammer installations

A. Autolube electrical circuit uses a solenoid valve and NPK's electrical control box.

WIRING KEY		
WIRE #	**COLOR**	**ORIGIN**
a7	blue	(FZ) autolube motor – power in (+)
a8	brown	(FZ) autolube motor – ground (-)
a38a	white	(PBe16a) foot switch
a39	black	(PBe16a) foot switch
a40	red	power in (+) electrical control box (k20)
a41	green	(k20) electrical control box – ground (-)
a41a	green	(k21) on/off switch – plug 4
a42	green/yellow	(PBe16a) foot switch
a43	black-1	(k20) electrical control box (gray cable)
a44	black-2	(k20) electrical control box (gray cable)
a49	*per valve mfg.*	(k7) control valve – solenoid wire 1
a50	*per valve mfg.*	(k7) control valve – solenoid wire 2



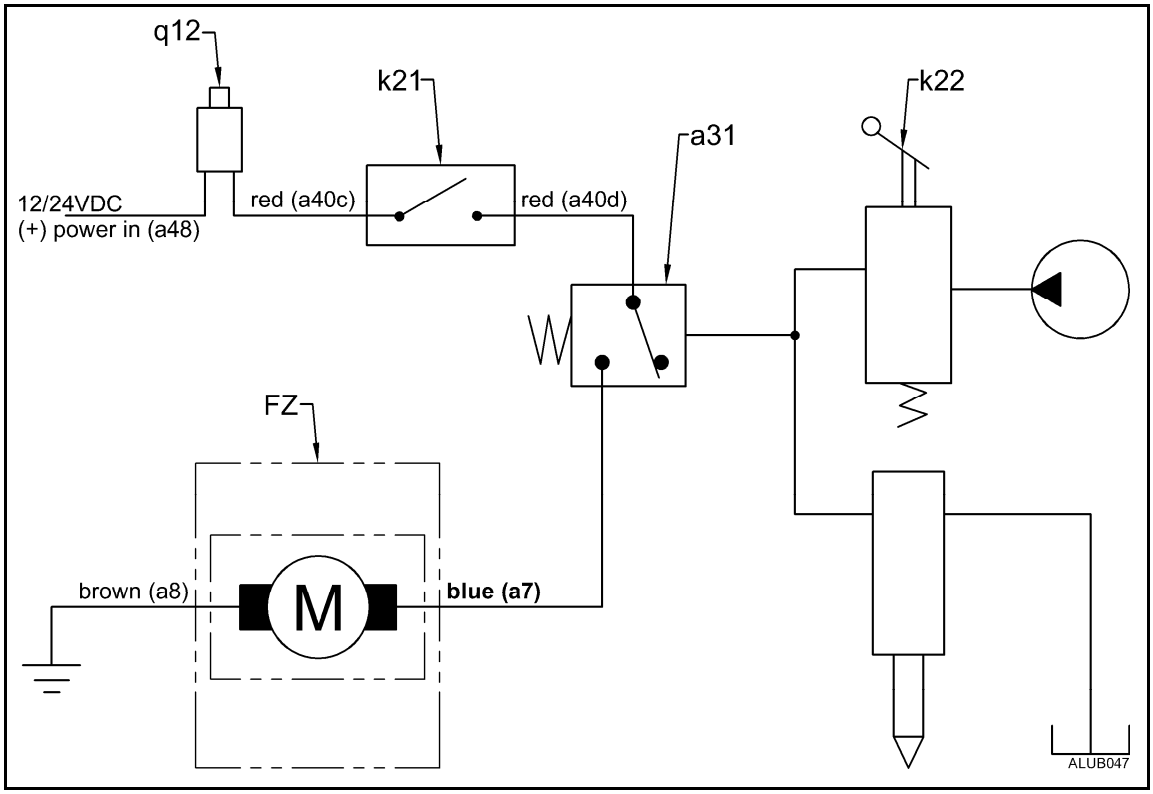


INSTALLING THE NPK AUTOLUBE SYSTEM

Electrical

Typical NPK Autolube electrical circuits for hammer installations

B. Autolube electrical circuit uses the carrier's lever actuated auxiliary control valve. *This type of circuit requires a hydraulically actuated pressure switch.*



BILL OF MATERIAL	
ITEM NO.	**DESCRIPTION**
a31	PRESSURE SWITCH NPK PART NO. L015-6500
FZ	AUTOLUBE PUMP ASSEMBLY
k21	ON/OFF SWITCH NPK PART NO. K217-5510
k22	LEVER CONTROL VALVE
q12	CIRCUIT BREAKER NPK PART NO. K217-5520

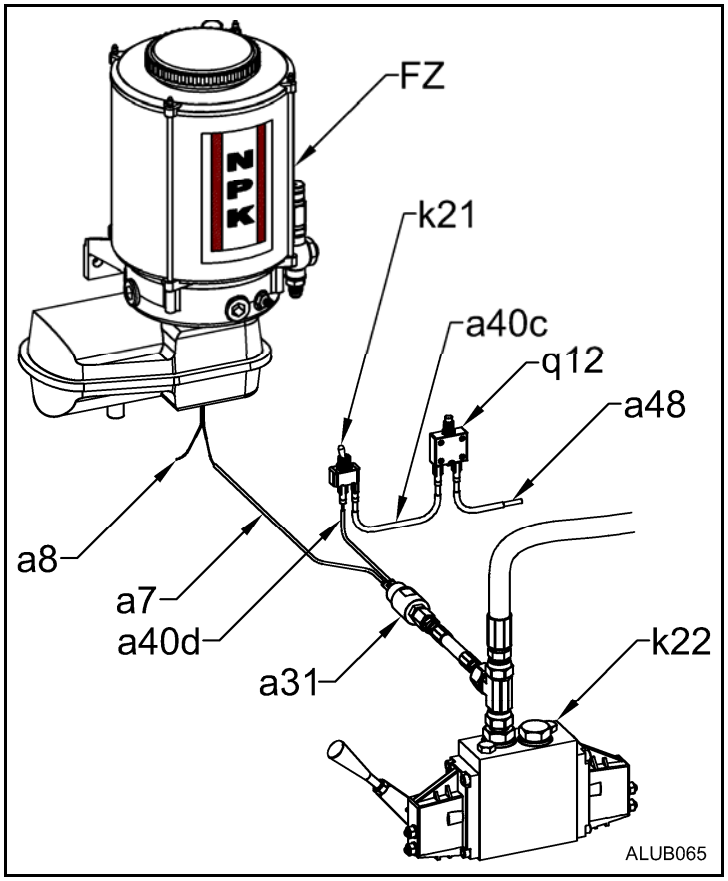
INSTALLING THE NPK AUTOLUBE SYSTEM

Electrical

Typical NPK Autolube electrical circuits for hammer installations

B. Autolube electrical circuit uses the carrier's lever actuated auxiliary control valve. *This type of circuit requires a hydraulically actuated pressure switch.*

WIRING KEY		
WIRE #	**COLOR**	**ORIGIN**
a7	blue	(FZ) autolube motor – power in (+)
a8	brown	(FZ) autolube motor – ground (-)
a40c	red	(q12) circuit breaker out
a40d	red	(k21) on/off switch – out
a48	per installer	power in

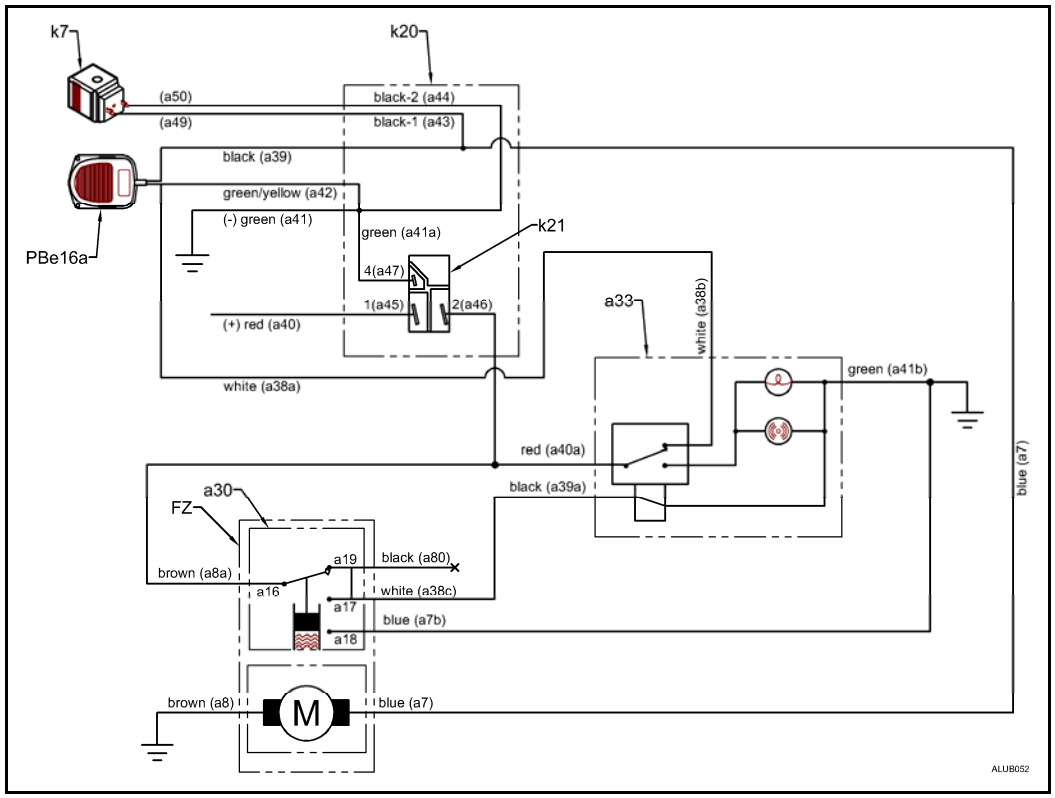


INSTALLING THE NPK AUTOLUBE SYSTEM

Electrical

Typical NPK Autolube electrical circuits for hammer installations

C. Autolube electrical circuit uses a solenoid valve and NPK's electrical control box. The Autolube Assembly includes a low level probe, NPK's low level control box and a DIN type connector.



BILL OF MATERIAL	
ITEM NO.	**DESCRIPTION**
a30	LOW LEVEL SWITCH
a33	LOW LEVEL CONTROL BOX NPK PART NO. G010-5500
a37	DIN CONNECTION CABLE NPK PART NO. G000-9000
a45	PLUG 1 – ON/OFF SWITCH
a46	PLUG 2 – ON/OFF SWITCH
a47	PLUG 3 – ON/OFF SWITCH
FZ	AUTOLUBE PUMP ASSEMBLY
k7	SOLENOID VALVE
k20	ELECTRICAL CONTROL BOX NPK PART NO. K217-5502
K21	ON/OFF SWITCH
PBe16a	FOOTSWITCH NPK PART NO. L541-5100

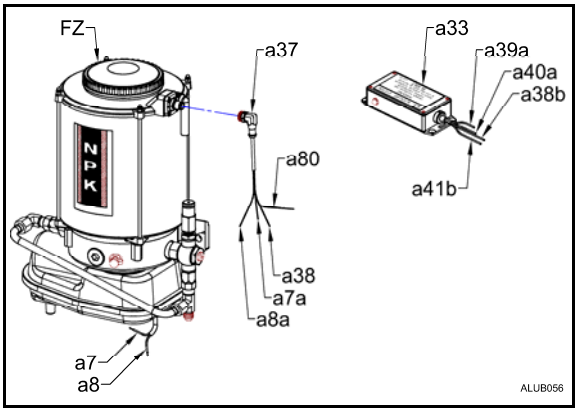
INSTALLING THE NPK AUTOLUBE SYSTEM

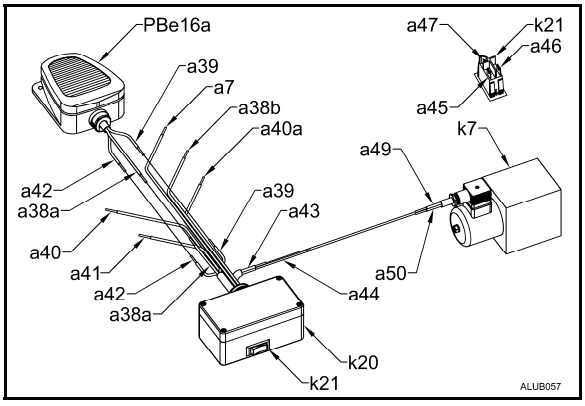
Electrical

Typical NPK Autolube electrical circuits for hammer installations

C. Autolube electrical circuit uses a solenoid valve and NPK's electrical control box. The Autolube Assembly includes a low level probe, NPK's low level control box and a DIN type connector.

WIRING KEY		
WIRE #	**COLOR**	**ORIGIN**
a7	blue	autolube assembly (FZ) motor
a7a	blue	low level switch – plug (a18)
a8	brown	autolube assembly (FZ) motor
a8a	brown	low level switch – plug (a16)
a38	white	low level switch – plug (a17)
a38a	white	footswitch (PBe16)
a38b	white	low level control box (a33)
a39	black	footswitch (PBe16)
a39a	black	low level control box (a33)
a40	red	electrical control box (k20)
a40a	red	low level control box (a33)
a41	green	electrical control box (k20)
a41b	green	low level control box (a33)
a42	green/yellow	footswitch (PBe16)
a43	black-1	electrical control box (k20)
a44	black-2	electrical control box (k20)
a49	*per carrier*	solenoid valve (k7)
a50	*per carrier*	solenoid valve (k7)
a80	black	unused wire



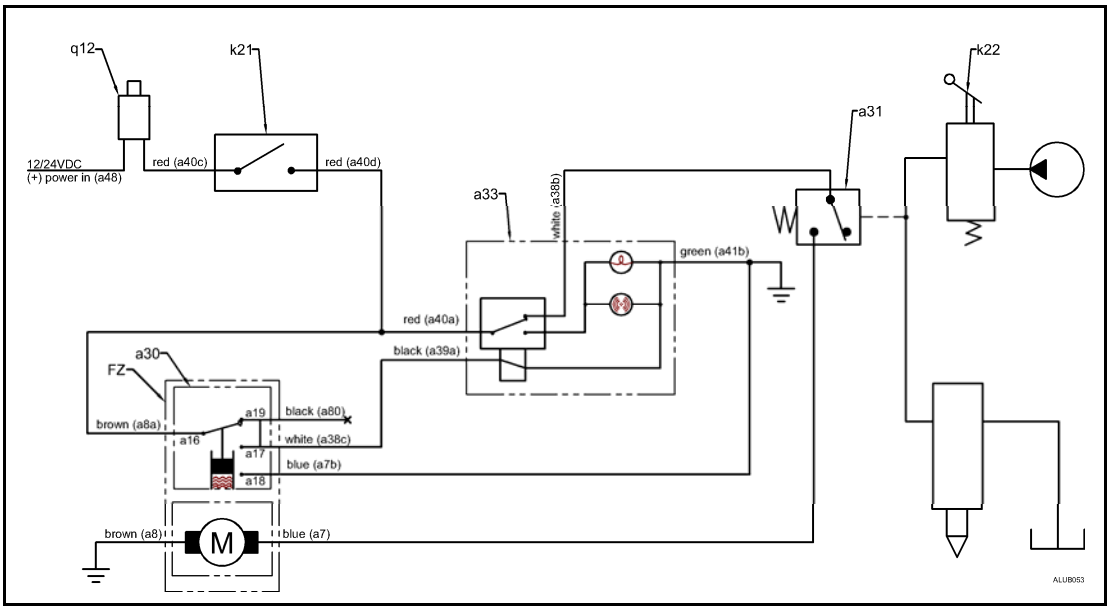


INSTALLING THE NPK AUTOLUBE SYSTEM

Electrical

Typical NPK Autolube electrical circuits for hammer installations

D. Autolube electrical circuit uses the carrier's lever actuated auxiliary control valve. *This type of circuit requires a hydraulically actuated pressure switch.* The Autolube Assembly includes a low level probe, NPK's low level control box and a DIN type connector.



BILL OF MATERIAL	
ITEM NO.	**DESCRIPTION**
a30	LOW LEVEL SWITCH
a31	PRESSURE SWITCH NPK PART NO. L015-6500
a33	LOW LEVEL CONTROL BOX NPK PART NO. G010-5500
a37	DIN CONNECTION CABLE NPK PART NO. G000-9000
FZ	AUTOLUBE PUMP ASSEMBLY
k21	ON/OFF SWITCH NPK PART NO. K217-5510
k22	LEVER CONTROL VALVE
q12	CIRCUIT BREAKER NPK PART NO. K217-5520

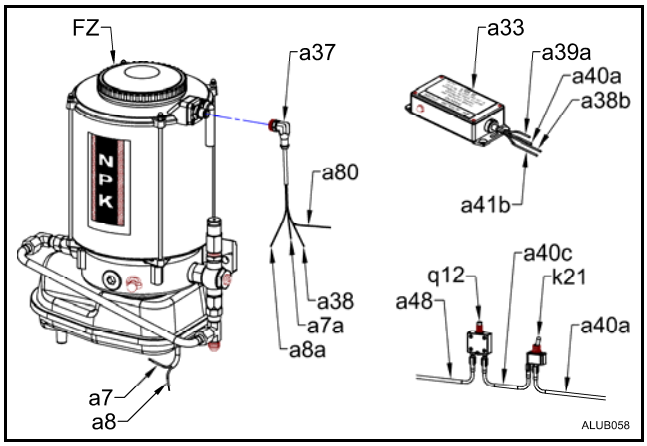
INSTALLING THE NPK AUTOLUBE SYSTEM

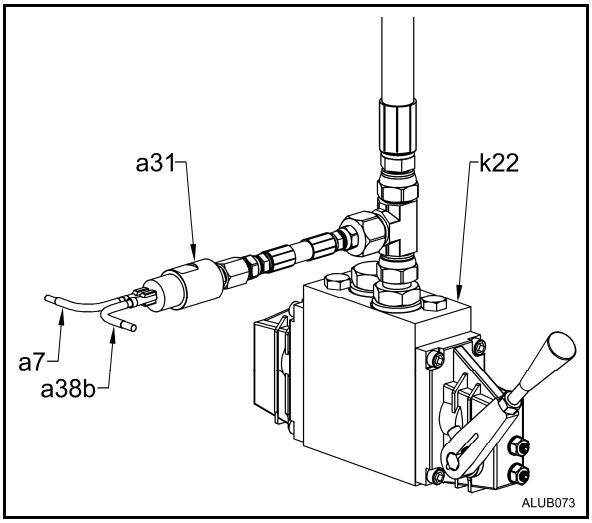
Electrical

Typical NPK Autolube electrical circuits for hammer installations

D. Autolube electrical circuit uses the carrier's lever actuated auxiliary control valve. *This type of circuit requires a hydraulically actuated pressure switch.* The Autolube Assembly includes a low level probe, NPK's low level control box and a DIN type connector.

WIRING KEY		
WIRE #	**COLOR**	**ORIGIN**
a7	blue	autolube assembly (FZ) motor
a7a	blue	low level switch – plug (a18)
a8	brown	autolube assembly (FZ) motor
a8a	brown	low level switch – plug (a16)
a38	white	low level switch – plug (a17)
a38b	white	low level control box (a33)
a39a	black	low level control box (a33)
a40a	red	low level control box (a33)
a40c	red	circuit breaker (q12)
a41b	green	low level control box (a33)
a48	*per installer*	power in
a80	black	unused wire



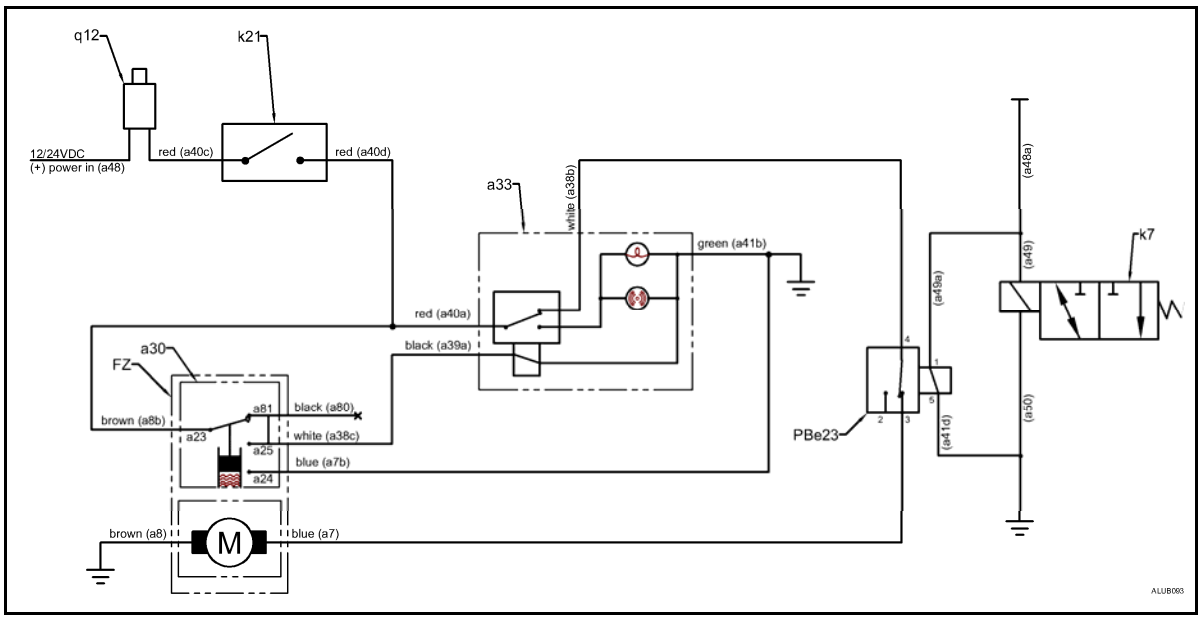


INSTALLING THE NPK AUTOLUBE SYSTEM

Electrical

Typical NPK Autolube electrical circuits for hammer installations

E. Autolube electrical circuit uses a solenoid valve and an electrical relay. The autolube assembly includes a low level probe, NPK's low level control box and a DIN type connector. This circuit is used on John Deere or Hitachi carriers.



BILL OF MATERIAL	
ITEM NO.	**DESCRIPTION**
a30	LOW LEVEL SWITCH
a33	LOW LEVEL CONTROL BOX NPK PART NO. G010-5500
a37	DIN CONNECTION CABLE NPK PART NO. G000-9000
FZ	AUTOLUBE PUMP ASSEMBLY
k7	SOLENOID VALVE
k21	ON/OFF SWITCH NPK PART NO. K217-5510
PBe23	RELAY
q12	CIRCUIT BREAKER NPK PART NO. K217-5520

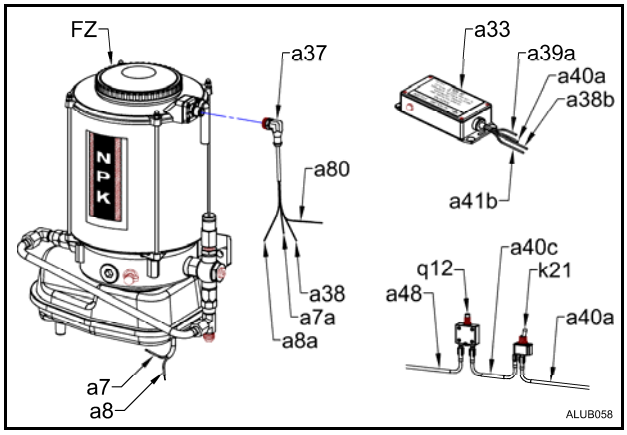
INSTALLING THE NPK AUTOLUBE SYSTEM

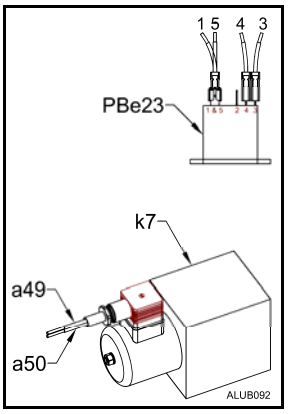
Electrical

Typical NPK Autolube electrical circuits for hammer installations

E. Autolube electrical circuit uses a solenoid valve and an electrical relay. The autolube assembly includes a low level probe, NPK's low level control box and a DIN type connector. This circuit is used on John Deere or Hitachi carriers.

WIRING KEY		
WIRE #	**COLOR**	**ORIGIN**
a7	blue	autolube assembly (FZ) motor
a7a	blue	low level switch – plug (a18)
a8	brown	autolube assembly (FZ) motor
a8a	brown	low level switch – plug (a16)
a38	white	low level switch – plug (a17)
a38b	white	low level control box (a33)
a39a	black	low level control box (a33)
a40a	red	low level control box (a33)
a40c	red	circuit breaker (q12)
a40d	red	on/off switch (k21)
a41b	green	low level control box (a33)
a41d	*per installer*	low level control box (a33)
a48	*per installer*	power in
a48a	*per installer*	power from existing footswitch
a49	*per carrier*	solenoid valve (k7)
a49a	*per installer*	power to relay
a50	*per carrier*	solenoid valve (k7)
a80	black	unused wire



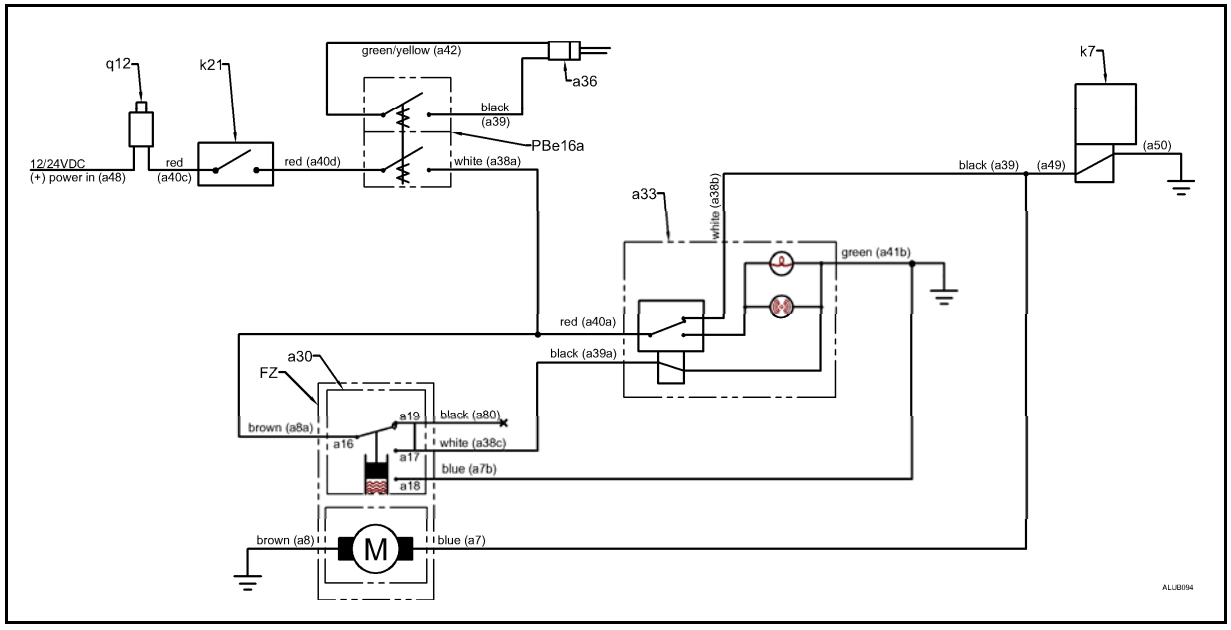


INSTALLING THE NPK AUTOLUBE SYSTEM

Electrical

Typical NPK Autolube electrical circuits for hammer installations

F. Autolube electrical circuit uses a solenoid valve and the carrier's automatic engine controls (AEC) controls. The autolube assembly includes a low level probe, NPK's low level control box and a DIN type connector. This circuit is used on Caterpillar or Komatsu carriers.



BILL OF MATERIAL	
ITEM NO.	**DESCRIPTION**
a30	LOW LEVEL SWITCH
a33	LOW LEVEL CONTROL BOX NPK PART NO. G010-5500
a36	AEC CONNECTOR
a37	DIN CONNECTION CABLE NPK PART NO. G000-9000
FZ	AUTOLUBE PUMP ASSEMBLY
k7	SOLENOID VALVE
k21	ON/OFF SWITCH NPK PART NO. K217-5510
PBe16a	FOOTSWITCH NPK PART NO. L541-5100
q12	CIRCUIT BREAKER NPK PART NO. K217-5520

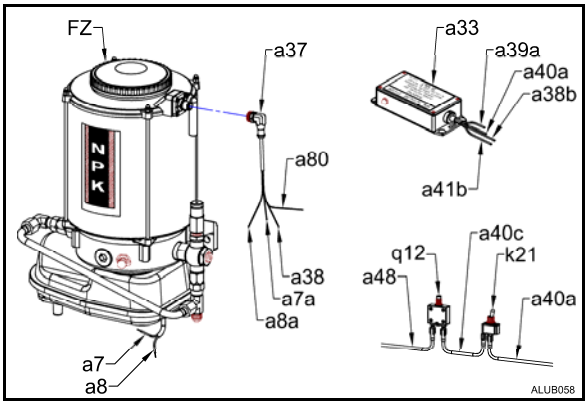
INSTALLING THE NPK AUTOLUBE SYSTEM

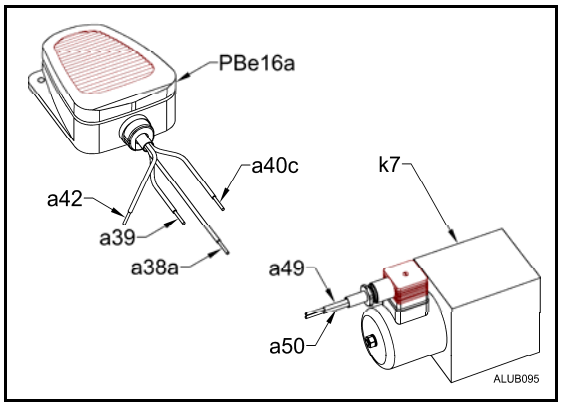
Electrical

Typical NPK Autolube electrical circuits for hammer installations

F. Autolube electrical circuit uses a solenoid valve and the carrier's automatic engine controls (AEC) controls. The autolube assembly includes a low level probe, NPK's low level control box and a DIN type connector. This circuit is used on Caterpillar or Komatsu carriers.

WIRING KEY		
WIRE #	**COLOR**	**ORIGIN**
a7	blue	autolube assembly (FZ) motor
a7a	blue	low level switch – plug (a18)
a8	brown	autolube assembly (FZ) motor
a8a	brown	low level switch – plug (a16)
a38	white	low level switch – plug (a17)
a38a	white	footswitch (PBe16a)
a38b	white	low level control box (a33)
a39	black	footswitch (PBe16a)
a40a	red	low level control box (a33)
a40c	red	circuit breaker (q12)
a40d	red	on/off switch (k21)
a41b	green	low level control box (a33)
a42	green/yellow	footswitch (PBe16a)
a48	*per installer*	power in
a49	*per carrier*	solenoid valve (k7)
a50	*per carrier*	solenoid valve (k7)
a80	black	unused wire



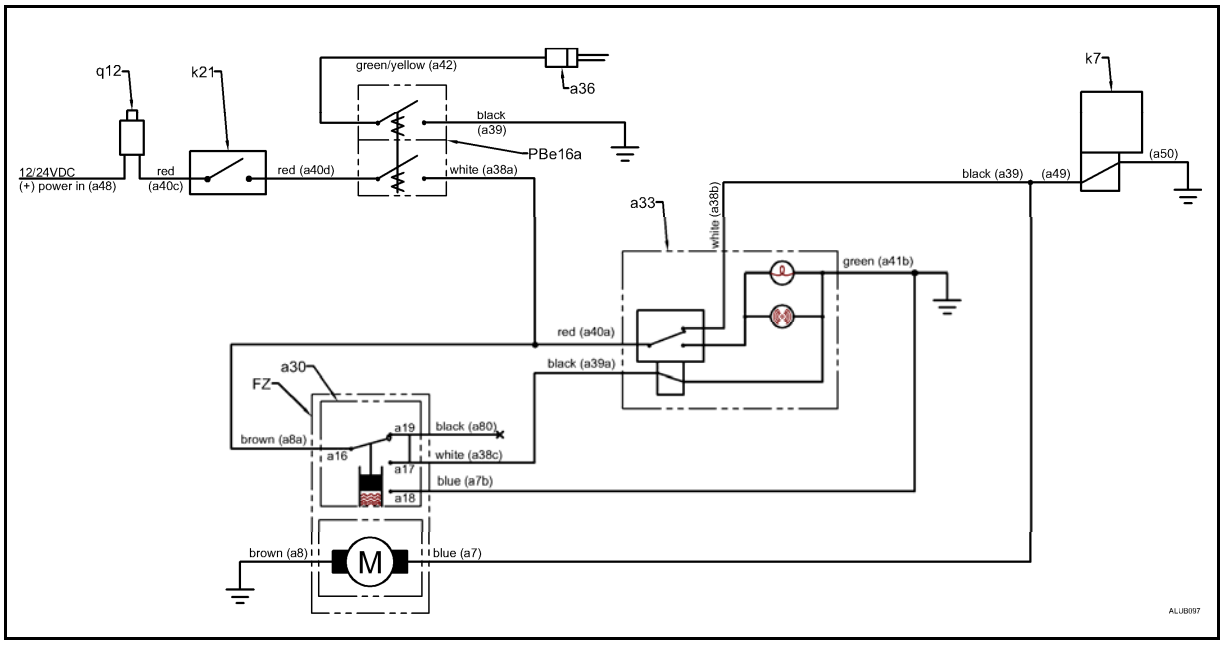


INSTALLING THE NPK AUTOLUBE SYSTEM

Electrical

Typical NPK Autolube electrical circuits for hammer installations

G. Autolube electrical circuit uses a solenoid valve and the carrier's automatic engine controls (AEC) controls. The autolube assembly includes a low level probe, NPK's low level control box and a DIN type connector. This circuit is used on Caterpillar 345C machines.



BILL OF MATERIAL	
ITEM NO.	**DESCRIPTION**
a30	LOW LEVEL SWITCH
a33	LOW LEVEL CONTROL BOX NPK PART NO. G010-5500
a36	AEC CONNECTOR
a37	DIN CONNECTION CABLE NPK PART NO. G000-9000
FZ	AUTOLUBE PUMP ASSEMBLY
k7	SOLENOID VALVE
k21	ON/OFF SWITCH NPK PART NO. K217-5510
PBe16a	FOOTSWITCH NPK PART NO. L541-5100
q12	CIRCUIT BREAKER NPK PART NO. K217-5520

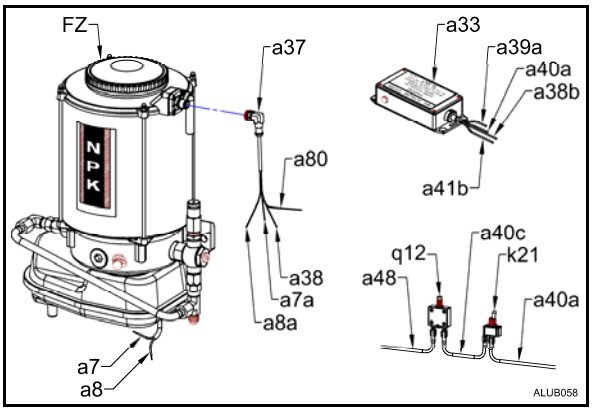
INSTALLING THE NPK AUTOLUBE SYSTEM

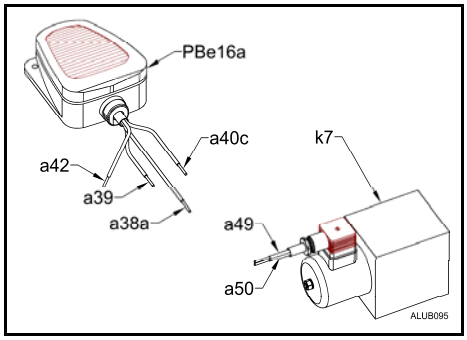
Electrical

Typical NPK Autolube electrical circuits for hammer installations

G. Autolube electrical circuit uses a solenoid valve and the carrier's automatic engine controls (AEC) controls. The autolube assembly includes a low level probe, NPK's low level control box and a DIN type connector. This circuit is used on Caterpillar 345C machines.

WIRING KEY		
WIRE #	**COLOR**	**ORIGIN**
a7	blue	autolube assembly (FZ) motor
a7a	blue	low level switch – plug (a18)
a8	brown	autolube assembly (FZ) motor
a8a	brown	low level switch – plug (a16)
a38	white	low level switch – plug (a17)
a38a	white	footswitch (PBe16a)
a38b	white	low level control box (a33)
a39	black	footswitch (PBe16a)
a40a	red	low level control box (a33)
a40c	red	circuit breaker (q12)
a40d	red	on/off switch (k21)
a41b	green	low level control box (a33)
a42	green/yellow	footswitch (PBe16a)
a48	*per installer*	power in
a49	*per carrier*	solenoid valve (k7)
a50	*per carrier*	solenoid valve (k7)
a80	black	unused wire



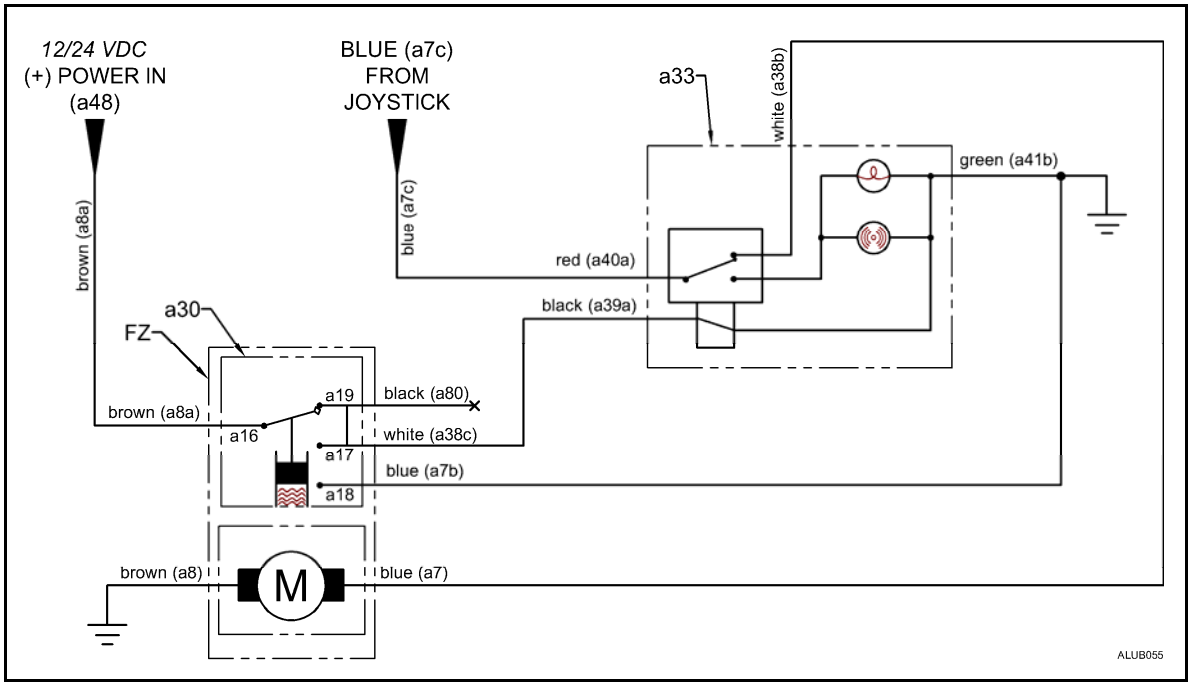


INSTALLING THE NPK AUTOLUBE SYSTEM

Electrical

Typical NPK Autolube electrical circuits for hammer installations

H. Autolube electrical circuit uses NPK's joystick. The autolube assembly includes a low level probe, NPK's low level control box and a DIN type connector.



BILL OF MATERIAL	
ITEM NO.	**DESCRIPTION**
a30	LOW LEVEL SWITCH
a33	LOW LEVEL CONTROL BOX NPK PART NO. G010-5500
a37	DIN CONNECTION CABLE NPK PART NO. G000-9000
FZ	AUTOLUBE PUMP ASSEMBLY
PBe29	NPK JOYSTICK CONSULT NPK FOR PART NO.

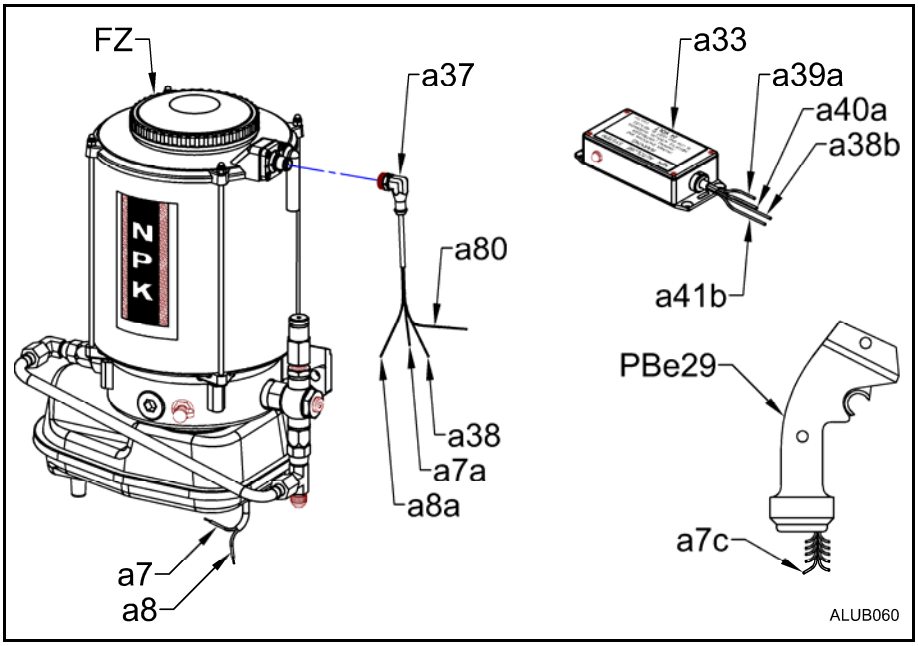
INSTALLING THE NPK AUTOLUBE SYSTEM

Electrical

Typical NPK Autolube electrical circuits for hammer installations

H. Autolube electrical circuit uses NPK's joystick. The autolube assembly includes a low level probe, NPK's low level control box and a DIN type connector.

WIRING KEY		
WIRE #	**COLOR**	**ORIGIN**
a7	blue	(FZ) autolube motor – power in (+)
a7a	blue	(a30) low level switch – pin 3 (a18)
a7c	blue	(PBe29) joystick
a8	brown	(FZ) autolube motor – ground (-)
a8a	brown	(a30) low level switch – pin 1 (a16)
a38	white	(a30) low level switch – pin 2 (a17)
a38b	white	(a33) low level control box
a39a	black	(a33) low level control box
a40a	red	(a33) low level control box
a41b	green	(a33) low level control box – ground (-)
a48	*per installer*	power in
a80	black	unused wire

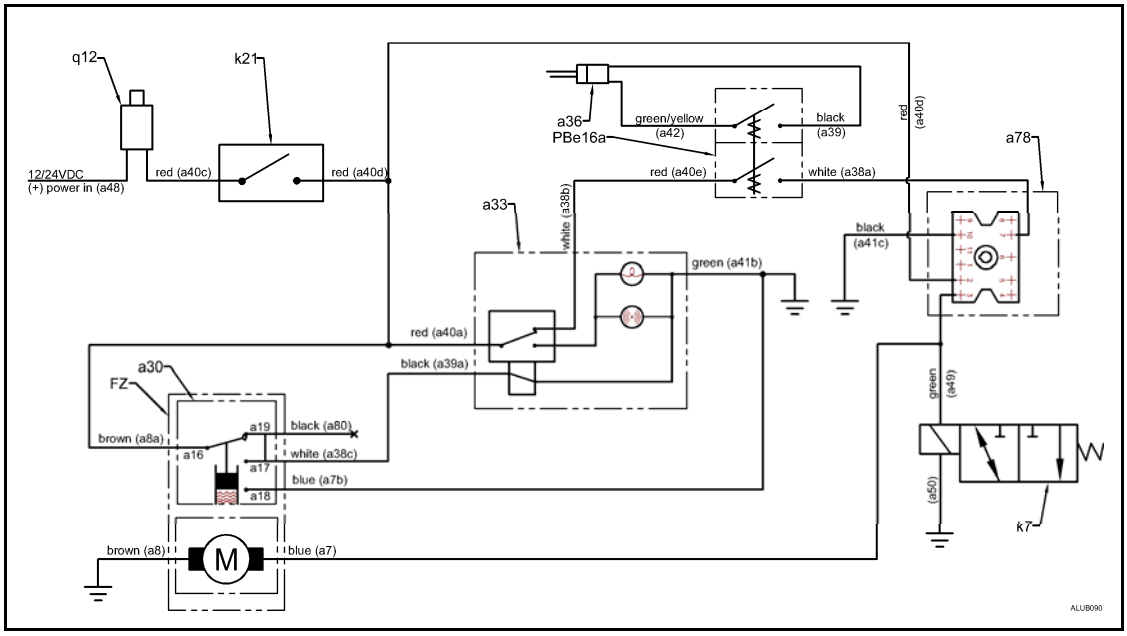


INSTALLING THE NPK AUTOLUBE SYSTEM

Electrical

Typical NPK Autolube electrical circuits for hammer installations

I. Autolube electrical circuit uses a solenoid valve, timer and the carrier's automatic engine controls (AEC) controls. The autolube assembly includes a low level probe, NPK's low level control box and a DIN type connector. This circuit is used on Caterpillar and Komatsu carriers.



BILL OF MATERIAL	
ITEM NO.	**DESCRIPTION**
a30	LOW LEVEL SWITCH
a33	LOW LEVEL CONTROL BOX NPK PART NO. G010-5500
a36	AEC CONNECTOR
a37	DIN CONNECTION CABLE NPK PART NO. G000-9000
a78	TIME DELAY RELAY NPK PART NO. L501-5600
FZ	AUTOLUBE PUMP ASSEMBLY
k7	SOLENOID VALVE
k21	ON/OFF SWITCH NPK PART NO. K217-5510
PBe16a	FOOTSWITCH NPK PART NO. L541-5100
q12	CIRCUIT BREAKER NPK PART NO. K217-5520

NOTE: For timer adjustment procedure, contact the NPK Service Department at 1-800-225-4379. Reference drawing L501-5600.

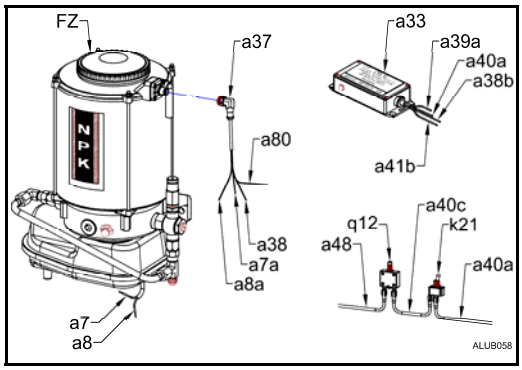
INSTALLING THE NPK AUTOLUBE SYSTEM

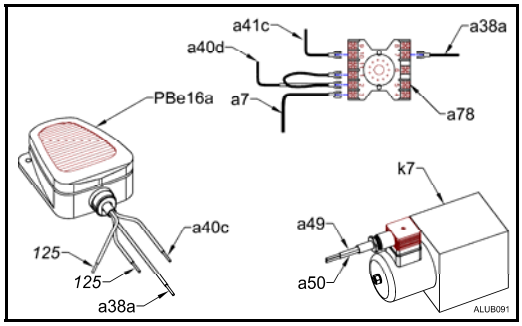
Electrical

Typical NPK Autolube electrical circuits for hammer installations

I. Autolube electrical circuit uses a solenoid valve, timer and the carrier's automatic engine controls (AEC) controls. The autolube assembly includes a low level probe, NPK's low level control box and a DIN type connector. This circuit is used on Caterpillar and Komatsu carriers.

WIRING KEY		
WIRE #	**COLOR**	**ORIGIN**
a7	blue	(FZ) autolube motor – power in (+)
a7a	blue	(a30) low level switch – pin 3 (a18)
a8	brown	(FZ) autolube motor – ground (-)
a8a	brown	(a30) low level switch – pin 1 (a16)
a38	white	(a30) low level switch – pin 2 (a17)
a38a	white	(PBe16a) foot switch
a38b	white	(a33) low level control box
a39	black	(PBe16a) foot switch
a39a	black	(a33) low level control box
a40a	red	(a33) low level control box
a40c	red	(q12) circuit breaker out
a40d	red	(k21) on/off switch – out
a40e	red	(PBe16a) foot switch
a41b	green	(a33) low level control box – ground (-)
a41c	*per installer*	(a78) timer
a42	green/yellow	(PBe16a) foot switch
a48	*per installer*	power in
a49	*per valve mfg.*	(k7) control valve – solenoid wire 1
a50	*per valve mfg.*	(k7) control valve – solenoid wire 2
a80	black	unused wire



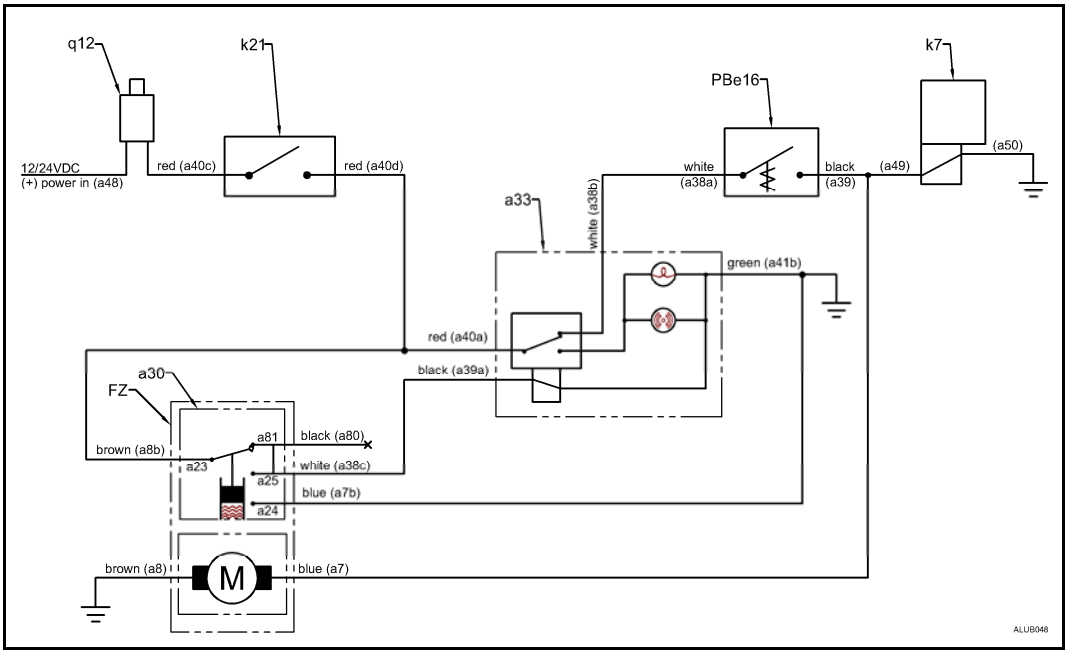


INSTALLING THE NPK AUTOLUBE SYSTEM

Electrical

Typical NPK Autolube electrical circuits for hammer installations

J. Autolube electrical circuit uses a solenoid valve. The autolube assembly includes a low level probe, NPK's low level control box and a Hirschman type connector.



BILL OF MATERIAL	
ITEM NO.	**DESCRIPTION**
a21	HIRSCHMAN CONNECTOR
a30	LOW LEVEL SWITCH
a33	LOW LEVEL CONTROL BOX NPK PART NO. G010-5500
FZ	AUTOLUBE PUMP ASSEMBLY
k7	SOLENOID VALVE
k21	ON/OFF SWITCH NPK PART NO. K217-5510
PBe16	FOOTSWITCH NPK PART NO. K005-5100
q12	CIRCUIT BREAKER NPK PART NO. K217-5520

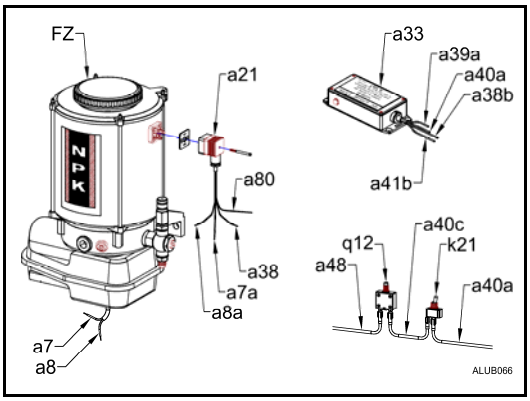
INSTALLING THE NPK AUTOLUBE SYSTEM

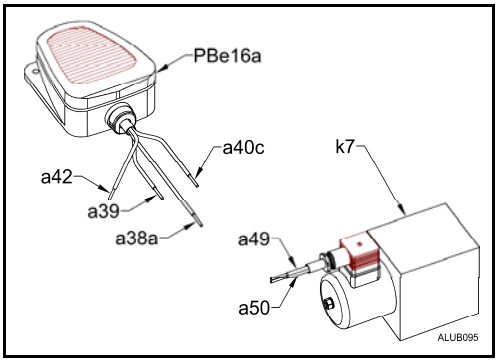
Electrical

Typical NPK Autolube electrical circuits for hammer installations

J. Autolube electrical circuit uses a solenoid valve. The autolube assembly includes a low level probe, NPK's low level control box and a Hirschman type connector.

WIRING KEY		
WIRE #	**COLOR**	**ORIGIN**
a7	blue	(FZ) autolube motor – power in (+)
a7a	blue	(a30) low level switch – post 2 (a24)
a8	brown	(FZ) autolube motor – ground (-)
a8a	brown	(a30) low level switch – post 1 (a23)
a38	white	(a30) low level switch – post 3 (a25)
a38a	white	(PBe16a) foot switch
a38b	white	(a33) low level control box
a39	black	(PBe16a) foot switch
a39a	black	(a33) low level control box
a40a	red	(a33) low level control box
a40c	red	(q12) circuit breaker out
a40d	red	(k21) on/off switch – out
a41b	green	(a33) low level control box – ground (-)
a48	*per installer*	power in
a49	*per valve mfg.*	(k7) control valve – solenoid wire 1
a50	*per valve mfg.*	(k7) control valve – solenoid wire 2
a80	black	unused wire



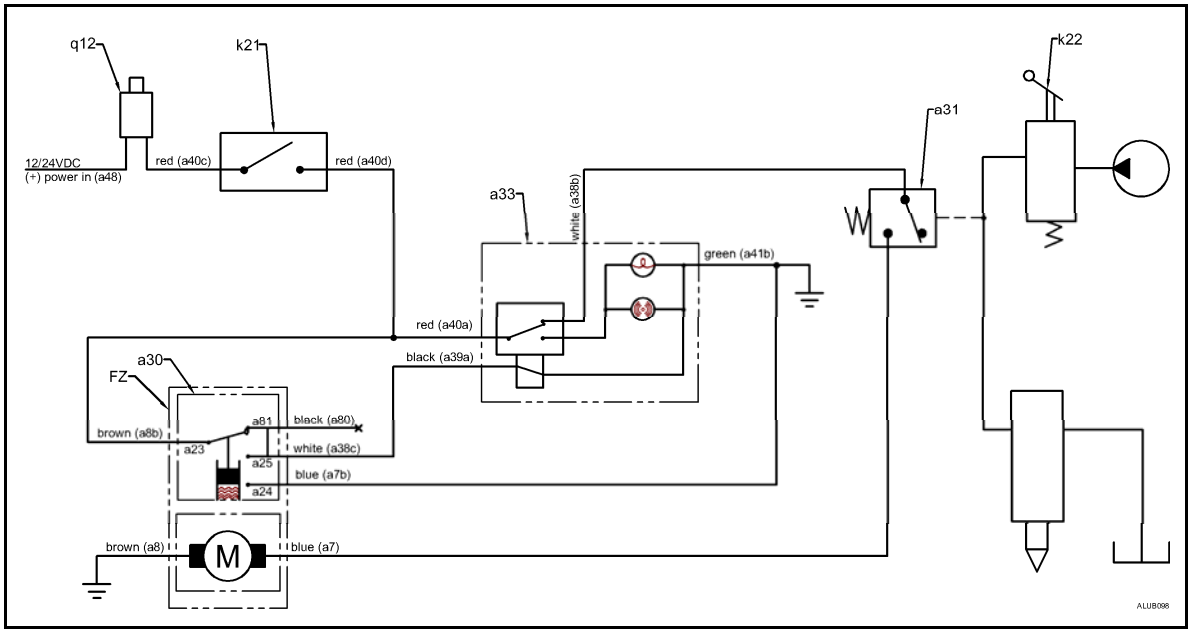


INSTALLING THE NPK AUTOLUBE SYSTEM

Electrical

Typical NPK Autolube electrical circuits for hammer installations

K. Autolube electrical circuit uses the carrier's lever actuated auxiliary control valve. *This type of circuit requires a hydraulically actuated pressure switch.* The autolube assembly includes a low level probe, NPK's low level control box and a Hirschman type connector.



BILL OF MATERIAL	
ITEM NO.	**DESCRIPTION**
a21	HIRSCHMAN CONNECTOR
a30	LOW LEVEL SWITCH
a31	PRESSURE SWITCH NPK PART NO. L015-6500
a33	LOW LEVEL CONTROL BOX NPK PART NO. G010-5500
FZ	AUTOLUBE PUMP ASSEMBLY
k21	ON/OFF SWITCH NPK PART NO. K217-5510
k22	LEVER CONTROL VALVE
q12	CIRCUIT BREAKER NPK PART NO. K217-5520

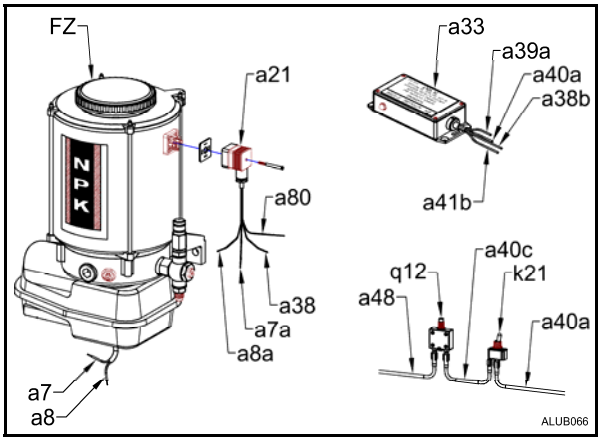
INSTALLING THE NPK AUTOLUBE SYSTEM

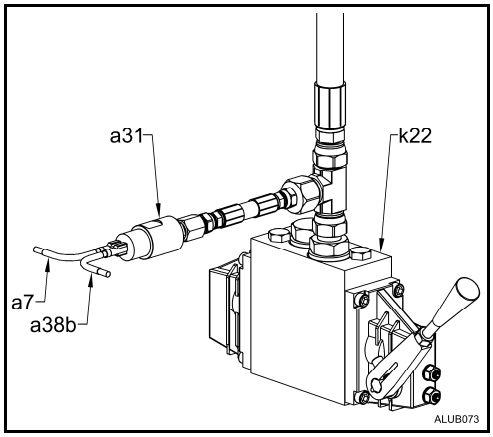
Electrical

Typical NPK Autolube electrical circuits for hammer installations

K. Autolube electrical circuit uses the carrier's lever actuated auxiliary control valve. *This type of circuit requires a hydraulically actuated pressure switch.* The autolube assembly includes a low level probe, NPK's low level control box and a Hirschman type connector.

WIRING KEY		
WIRE #	**COLOR**	**ORIGIN**
a7	blue	(FZ) autolube motor – power in (+)
a7a	blue	(a30) low level switch – post 2 (a24)
a8	brown	(FZ) autolube motor – ground (-)
a8a	brown	(a30) low level switch – post 1 (a23)
a38	white	(a30) low level switch – post 3 (a25)
a38b	white	(a33) low level control box
a39a	black	(a33) low level control box
a40a	red	(a33) low level control box
a40c	red	(q12) circuit breaker out
a40d	red	(k21) on/off switch – out
a41b	green	(a33) low level control box – ground (-)
a48	*per installer*	power in
a80	black	unused wire



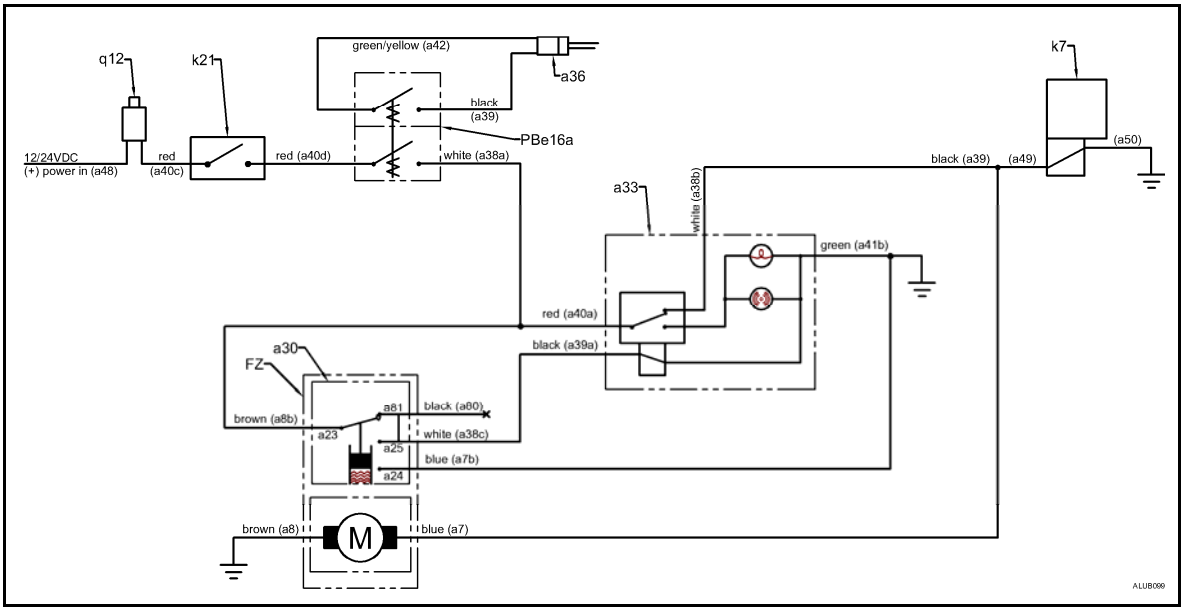


INSTALLING THE NPK AUTOLUBE SYSTEM

Electrical

Typical NPK Autolube electrical circuits for hammer installations

L. Autolube electrical circuit uses a solenoid valve and the carrier's automatic engine controls (AEC) controls. The autolube assembly includes a low level probe, NPK's low level control box and a Hirschman type connector. This circuit is used on Caterpillar and Komatsu carriers.



BILL OF MATERIAL	
ITEM NO.	**DESCRIPTION**
a21	HIRSCHMAN CONNECTOR
a30	LOW LEVEL SWITCH
a33	LOW LEVEL CONTROL BOX NPK PART NO. G010-5500
a36	AEC CONNECTOR
FZ	AUTOLUBE PUMP ASSEMBLY
k7	SOLENOID VALVE
k21	ON/OFF SWITCH NPK PART NO. K217-5510
PBe16a	FOOTSWITCH NPK PART NO. L541-5100
q12	CIRCUIT BREAKER NPK PART NO. K217-5520

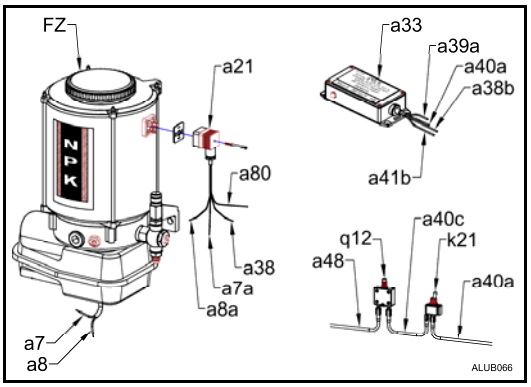
INSTALLING THE NPK AUTOLUBE SYSTEM

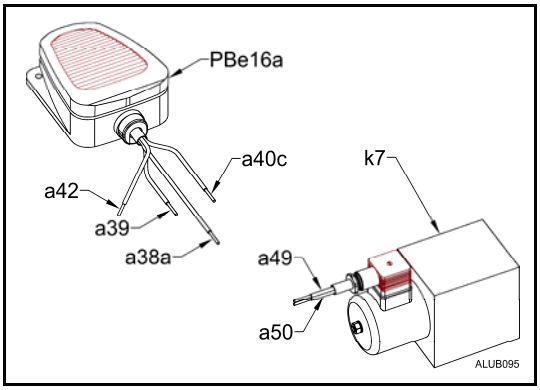
Electrical

Typical NPK Autolube electrical circuits for hammer installations

L. Autolube electrical circuit uses a solenoid valve and the carrier's automatic engine controls (AEC) controls. The autolube assembly includes a low level probe, NPK's low level control box and a Hirschman type connector. This circuit is used on Caterpillar and Komatsu carriers.

WIRING KEY		
WIRE #	**COLOR**	**ORIGIN**
a7	blue	(FZ) autolube motor – power in (+)
a7a	blue	(a30) low level switch – post 2 (a24)
a8	brown	(FZ) autolube motor – ground (-)
a8a	brown	(a30) low level switch – post 1 (a23)
a38	white	(a30) low level switch – post 3 (a25)
a38a	white	(PBe16a) foot switch
a38b	white	(a33) low level control box
a39	black	(PBe16a) foot switch
a39a	black	(a33) low level control box
a40a	red	(a33) low level control box
a40c	red	(q12) circuit breaker out
a40d	red	(k21) on/off switch – out
a41b	green	(a33) low level control box – ground (-)
a42	green/yellow	(PBe16a) foot switch
a48	*per installer*	power in
a49	*per valve mfg.*	(k7) control valve – solenoid wire 1
a50	*per valve mfg.*	(k7) control valve – solenoid wire 2
a80	black	unused wire



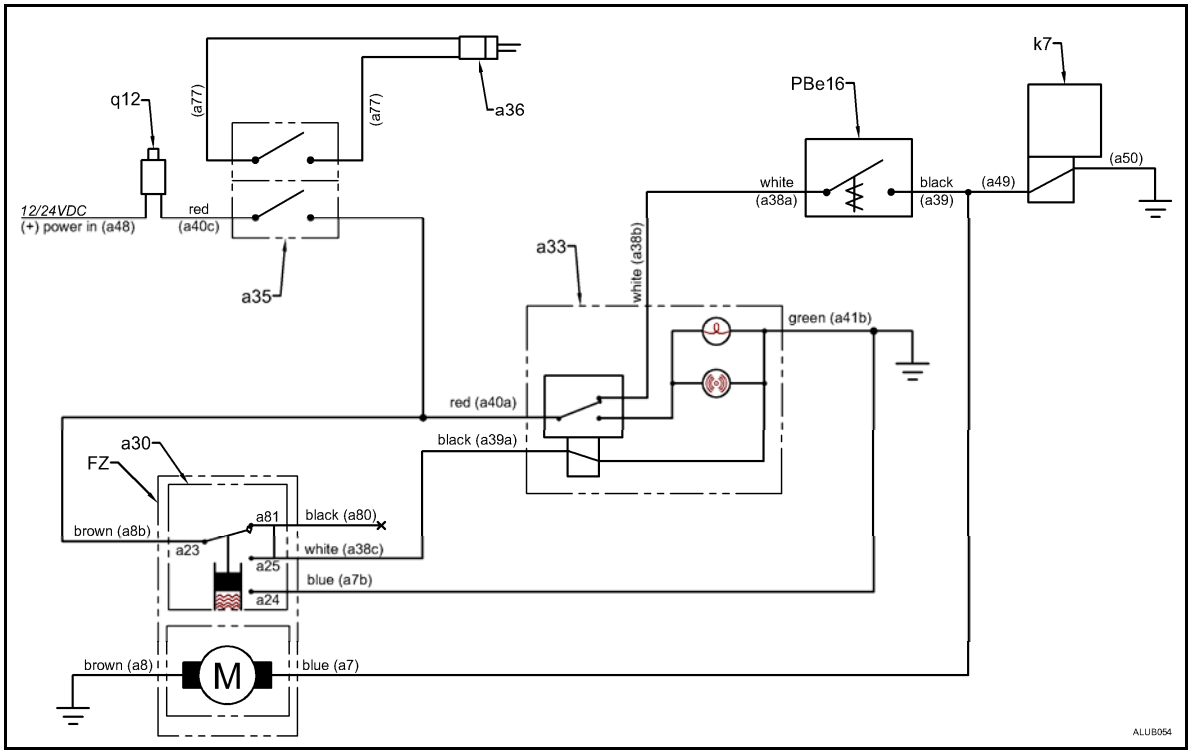


INSTALLING THE NPK AUTOLUBE SYSTEM

Electrical

Typical NPK Autolube electrical circuits for hammer installations

M. Autolube electrical circuit uses a solenoid valve and the carrier's automatic engine controls (AEC) controls. The autolube assembly includes a low level probe, NPK's low level control box and a Hirschman type connector. This circuit is used on Caterpillar or Komatsu carriers.



BILL OF MATERIAL	
ITEM NO.	**DESCRIPTION**
a21	HIRSCHMAN CONNECTOR
a30	LOW LEVEL SWITCH
a33	LOW LEVEL CONTROL BOX NPK PART NO. G010-5500
a35	TOGGLE SWITCH
a36	AEC CONNECTOR
FZ	AUTOLUBE PUMP ASSEMBLY
k7	SOLENOID VALVE
PBe16	FOOTSWITCH NPK PART NO. K005-5100
q12	CIRCUIT BREAKER NPK PART NO. K217-5520

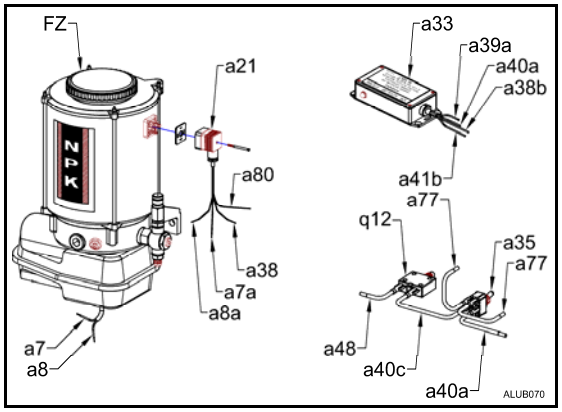
INSTALLING THE NPK AUTOLUBE SYSTEM

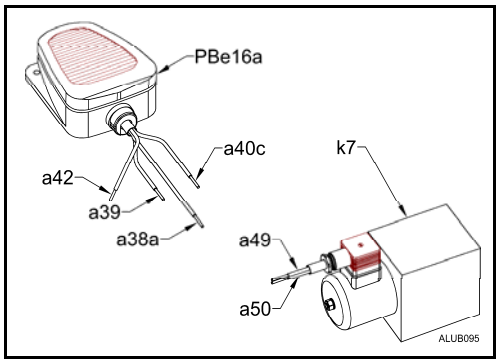
Electrical

Typical NPK Autolube electrical circuits for hammer installations

M. Autolube electrical circuit uses a solenoid valve and the carrier's automatic engine controls (AEC) controls. The autolube assembly includes a low level probe, NPK's low level control box and a Hirschman type connector. This circuit is used on Caterpillar or Komatsu carriers.

WIRING KEY		
WIRE #	**COLOR**	**ORIGIN**
a7	blue	(FZ) autolube motor – power in (+)
a7a	blue	(a30) low level switch – post 2 (a24)
a8	brown	(FZ) autolube motor – ground (-)
a8a	brown	(a30) low level switch – post 1 (a23)
a38	white	(a30) low level switch – post 3 (a25)
a38a	white	(PBe16a) foot switch
a38b	white	(a33) low level control box
a39	black	(PBe16a) foot switch
a39a	black	(a33) low level control box
a40a	red	(a33) low level control box
a40c	red	(q12) circuit breaker out
a41b	green	(a33) low level control box – ground (-)
a48	*per installer*	power in
a49	*per valve mfg.*	(k7) control valve – solenoid wire 1
a50	*per valve mfg.*	(k7) control valve – solenoid wire 2
a77	*per installer*	AEC control plug
a80	black	unused wire



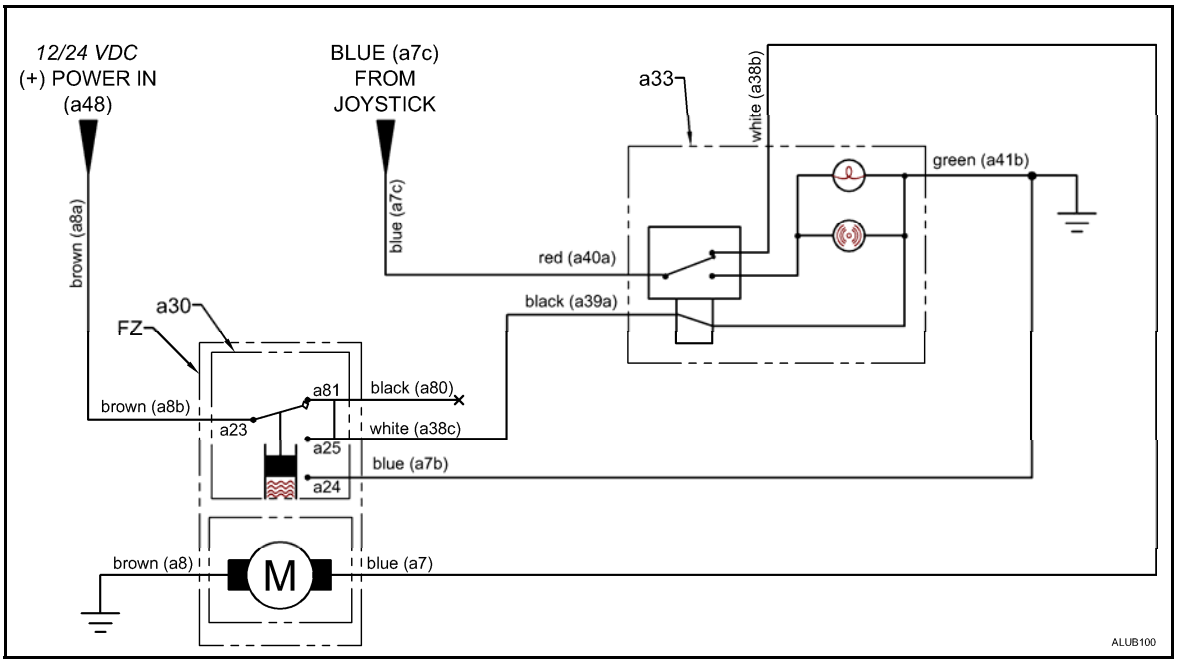


INSTALLING THE NPK AUTOLUBE SYSTEM

Electrical

Typical NPK Autolube electrical circuits for hammer installations

N. Autolube electrical circuit uses NPK's joystick. The autolube assembly includes a low level probe, NPK's low level control box and a Hirschman type connector.



BILL OF MATERIAL	
ITEM NO.	**DESCRIPTION**
a21	HIRSCHMAN CONNECTOR
a30	LOW LEVEL SWITCH
a33	LOW LEVEL CONTROL BOX NPK PART NO. G010-5500
FZ	AUTOLUBE PUMP ASSEMBLY
PBe29	NPK JOYSTICK CONSULT NPK FOR PART NO.

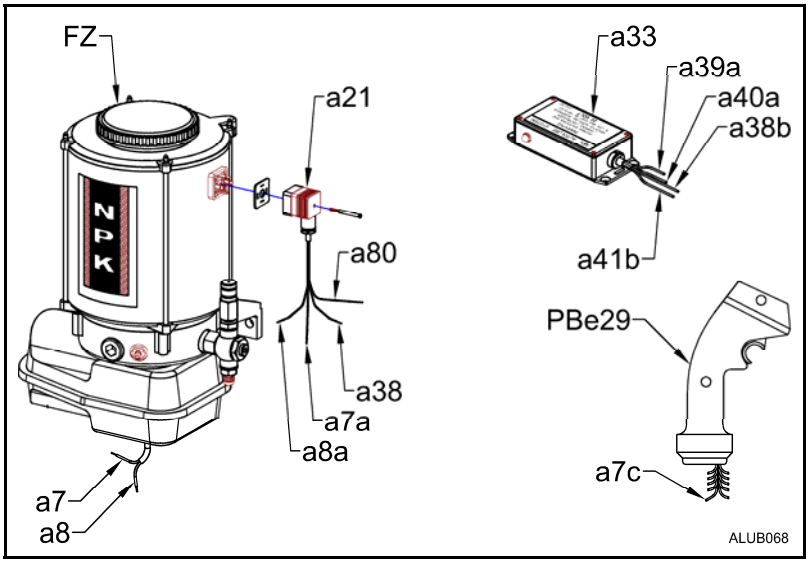
INSTALLING THE NPK AUTOLUBE SYSTEM

Electrical

Typical NPK Autolube electrical circuits for hammer installations

N. Autolube electrical circuit uses NPK's joystick. The autolube assembly includes a low level probe, NPK's low level control box and a Hirschman type connector.

WIRING KEY		
WIRE #	**COLOR**	**ORIGIN**
a7	blue	(FZ) autolube motor – power in (+)
a7a	blue	(a30) low level switch – post 2 (a24)
a8	brown	(FZ) autolube motor – ground (-)
a8a	brown	(a30) low level switch – post 1 (a23)
a38	white	(a30) low level switch – post 3 (a25)
a38b	white	(a33) low level control box
a39a	black	(a33) low level control box
a40a	red	(a33) low level control box
a41b	green	(a33) low level control box – ground (-)
a7c	blue	(PBe29) joystick
a80	black	unused wire



BEFORE START-UP

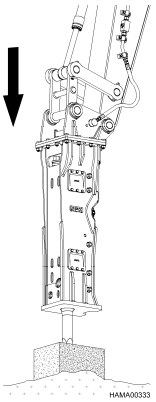
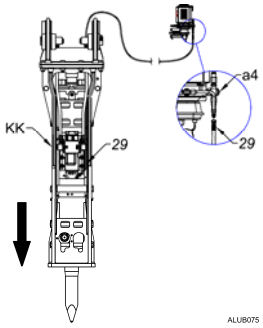
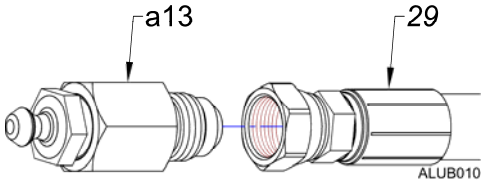
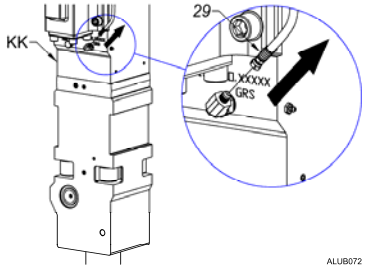
AUTOLUBE GREASE LINE PRE-FILLING

SUPPLY LINE

Use ¼" maximum I.D. hose, 5000 PSI minimum working pressure. Make sure the hose is well protected. Move the boom, stick, and bucket cylinders to their extreme positions (fully extended to fully retracted) and check for proper arrangement and hose movement. Before connecting the hose to the hammer, follow the pre-fill procedure.

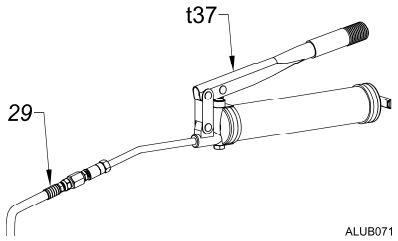
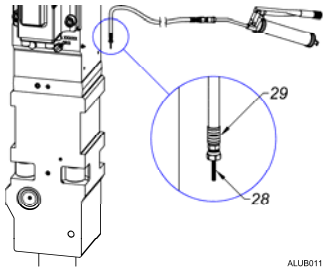
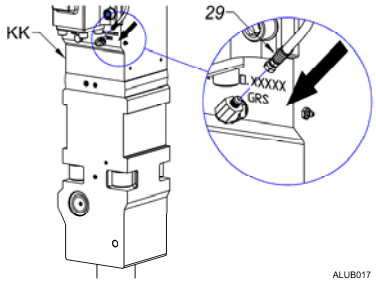
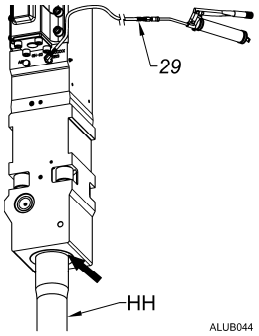
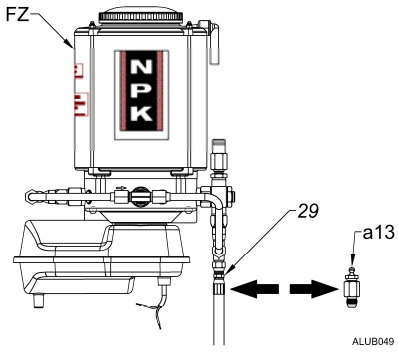
It is ***mandatory*** that the supply line from the Autolube main pump to the connection on the hammer is primed with grease before it is used. ***Failure*** to do this will result in no grease being administered to the hammer tool for ***two*** to ***three*** hours. This can and will result in severe galling of the tool and tool bushing.

PRIMING THE GREASE LINE

1. Place the hammer in a vertical position, applying enough down force to push the tool up into the hammer. 2. Turn off the carrier. 3. Fill the NPK Autolube Pump Assembly reservoir with a power greaser through the fill fitting on the side of the pump housing, or from the top by removing the fill cover. Use a premium quality grade EP-2, high temperature grease with wear inhibiting additive. See the **"CORRECT GREASE"** section of this manual.	
4. Disconnect the grease line *(29)* from the Autolube main pump cartridge (a4).	
5. Install the hose fill adapter (a13), NPK part number G100-8050, onto the #6 JIC end of the grease line *(29)* previously removed.	
6. Disconnect and remove the grease line *(29)* from the hammer (KK).	

BEFORE START-UP

Autolube Grease Line Pre-filling

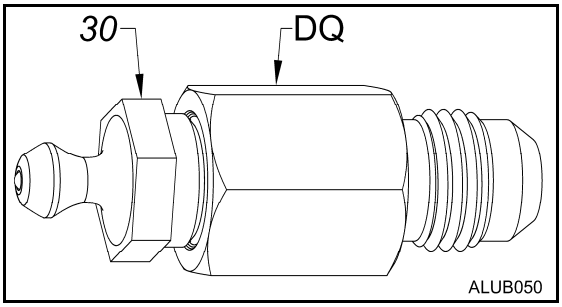
7. Attach a grease gun (t37) or power greaser to the grease line (*29*) leading to the hammer. This will be done at the end of the hose removed from the Autolube Pump Assembly.	
8. Pump grease through the grease line *(29)* until a steady stream of grease *(28)* is realized at the opposite *(hammer)* end.	
9. Re-connect the grease line *(29)* to the hammer (KK).	
10. Pump twenty more shots of grease into the grease line (*29*). This will prime the hammer tool holder cavity and pre-lube the tool. Look for grease coming out around the tool (HH) at the lower tool bushing *(see arrow)*.	
11. Remove the hose fill adapter (a13) and re-connect the grease line *(29)* to the Autolube Pump Assembly (FZ).	

NOTE: If the Autolube has run out of grease, the above procedure should be used to purge all the air out of the grease line before using the hammer. Failure to do this will result in an intermittent supply of grease to the hammer.

BEFORE START-UP

Autolube Grease Line Pre-filling

NPK G100-8050 Hose Fill Assembly



30	B160-4010	Grease Fitting – ¼" NPT male
DQ	K301-6620	Male x Female Adapter - #6 JIC male x ¼" NPT female

OPERATION

The Autolube pump cartridge output is variable by an adjustment screw to control the quantity of grease metered to the hammer. The cartridge is factory pre-set for maximum output.

To adjust the output, remove the adjusting screw plug with a 5mm hex key wrench, and with a screwdriver, turn the adjusting screw clockwise to decrease the output, and counterclockwise to increase. It is recommended to start with the setting at maximum, and decrease the grease supply if necessary to maintain an even film of grease around the hammer tool.
As the hammer tool bushings wear, the pump will have to be readjusted to maintain the correct output.
NOTE:
Should the Autolube pump become inoperative, the hammer can be greased manually in the conventional manner.

⚠ CAUTION

DO NOT OVER GREASE THE HAMMER
The AUTOLUBE System must be properly adjusted and wired to ONLY PUMP GREASE WHEN THE HAMMER IS RUNNING. If the cavity in the hammer between the tool and piston fills with grease, severe internal damage to the hammer may occur.

TROUBLESHOOTING

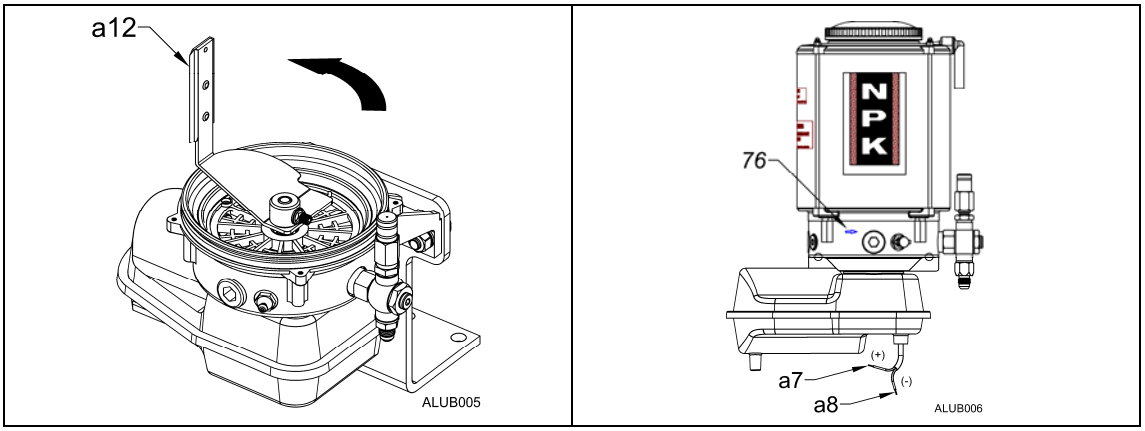
If the NPK Autolube Assembly is not pumping grease correctly, the following steps may be taken to diagnose and correct the problem:

NO OUTPUT – the wiper arm does not turn

1. Check to see that the wiper arm (a12) is turning in the reservoir. If the wiper arm is not turning, check to see that there is electricity to the unit from the operating switch.
2. If the wiper is not turning, but there is electricity to the unit, remove the pump cartridge (see **"PUMP CARTRIDGE REMOVAL"**). An improperly installed pump cartridge can jam the eccentric assembly. See **"PUMP CARTRIDGE INSTALLATION"** or call the NPK Service Department at 800-225-4379.
3. If the wiper arm still won't turn, check for contamination in the reservoir. Contamination between the wiper arm and the inside of the transparent reservoir can jam the arm.
4. If the wiper arm still won't turn, the problem is in the electric motor or gear drive. Please contact NPK for assistance.

NO OUTPUT – the wiper arm turns

1. Make sure the reservoir wiper arm turns counterclockwise when viewed from above. There is also an arrow *(76)* on the body of the unit, below the reservoir, showing the direction of rotation.



If the wiper arm is turning clockwise, the electrical leads are incorrectly installed and must be switched. The blue wire (a7) is positive (+) and the brown wire (a8) is negative (-). *The Autolube Assembly will not pump grease if the wiper arm is turning backward.*

2. Remove the output line from the pump cartridge, then operate the pump. There should be a slow but steady flow of grease from the cartridge, much like squeezing a tube of toothpaste. If all other checks have been made and the cartridge is not pumping out grease, the cartridge will have to be replaced, see the **"PUMP CARTRIDGE REMOVAL"** and **"PUMP CARTRIDGE INSTALLATION"** sections of this manual.

INTERMITTANT OUTPUT – the wiper arm turns

If grease is being intermittently pumped out of the grease line, there may be air in the line. Follow the pre-fill procedure to purge all air from the line, see the **"PRIMING THE GREASE LINE"** section of this manual.

TROUBLESHOOTING

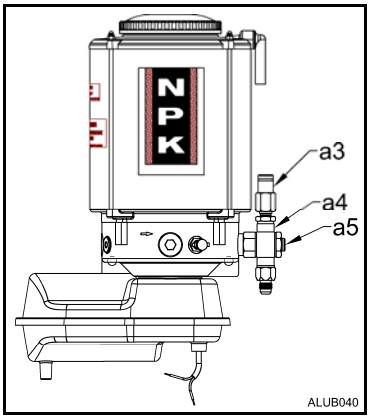
LOW OUTPUT

A low volume of grease may be caused by mis-adjustment of the Autolube pump cartridge. Grease output from the cartridge is adjustable and can be increased by removing the dust plug and turning the adjusting screw counterclockwise, see the **"PUMP CARTRIDGE ADJUSTMENT"** section of this manual.

NOTE: IF GREASE OUTPUT IS STILL TOO LOW FOR PROPER TOOL LUBRICATION, CONSULT THE NPK SERVICE DEPARTMENT FOR FURTHER ASSISTANCE.

RELIEF VALVE

If grease is coming out of the top of the relief valve (a3), the unit is going over relief. This could be the result of a mis-adjusted cartridge, a broken or weak spring or blockage in the supply line from the Autolube Pump Assembly to the hammer, see the **"RELIEF VALVE SETTING AND ADJUSTMENT"**.



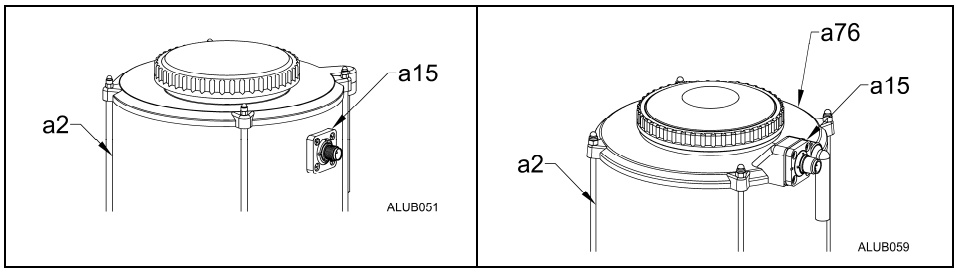
NOTE: ONLY THE CARTRIDGE (a4) WITH ADJUSTABLE (a5) OUTPUT HAS A RELIEF VALVE.

TROUBLESHOOTING

AUTOLUBE LOW LEVEL INDICATOR TEST

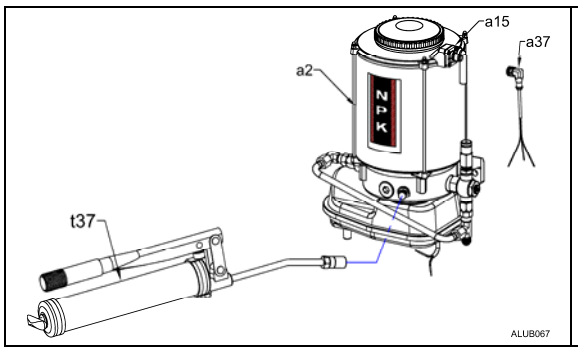
DIN (round) connector

The DIN style low level indicator probes (a15) can be found either in the side of the reservoir (a2) on older units or pump cover (a76) on newer units.



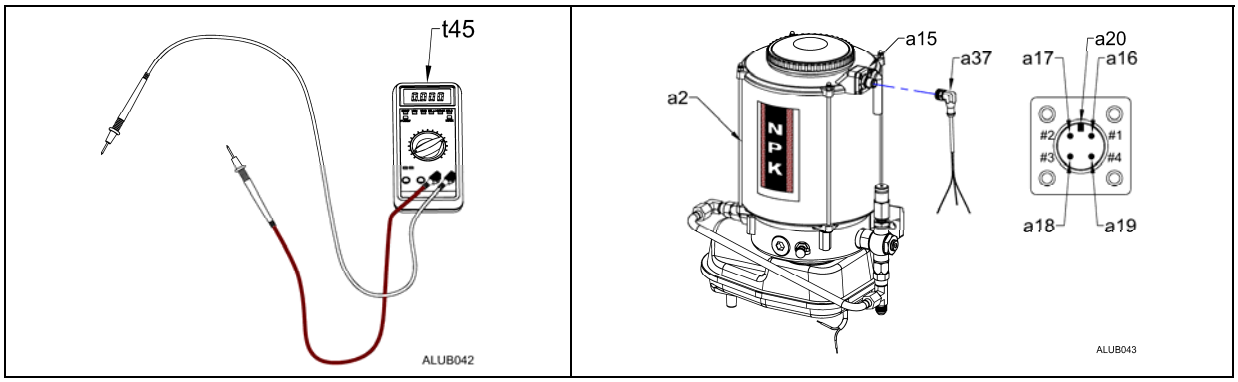
Both probe locations can be tested without removing the Autolube Pump Assembly from the carrier. You will need a 12VDC or 23VDC power source and a ground lead.

1. Remove the existing connector cable (a37) from the low level probe (a15).
2. Fill the reservoir (a2) with a grease gun until grease is touching the probe.



ITEM NO.	POST NO.	WIRE COLOR
a16	1	brown
a17	2	white
a18	3	blue
a19	4	black

3. Connect the power supply to post #1 (a16). Connect the ground wire to post #3 (a18).
4. Using a volt meter (t45), if the probe is good, post #2 (a17) will **NOT** have power. If power is detected on post #2, the probe must be replaced. *(If there is no grease on the probe, post #2 will be **HOT**.)*



5. **NOTE:** Post #4 (a19) is not used.
6. NPK has a test cable, part number G000-9010, available for testing purposes.

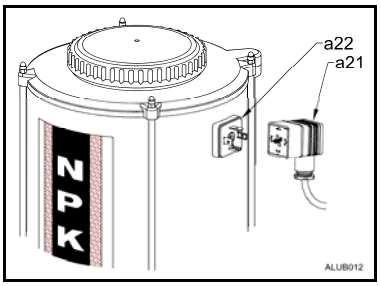
TROUBLESHOOTING

AUTOLUBE LOW LEVEL INDICATOR TEST

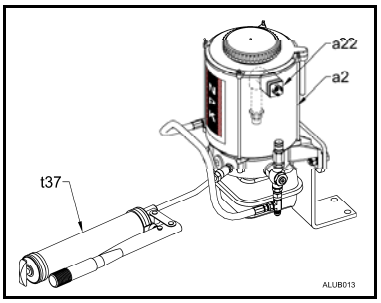
Hirschman (square) connector

The low level indicator probe located on the side of the Autolube Pump Assembly can be tested without removing the unit from the carrier. You will need a 12VDC or 24VDC power source and a ground lead.

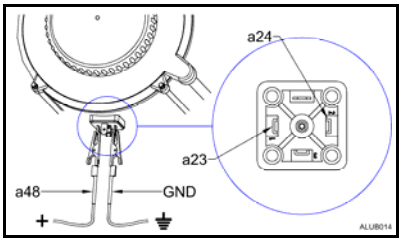
1. Remove the existing Hirschman connector (a21) from the low level probe (a22) mounted on the side of the reservoir.



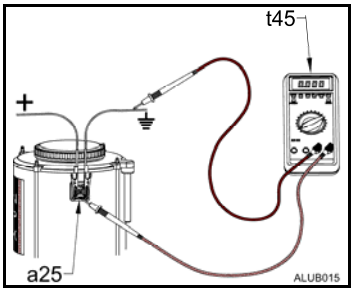
2. Fill the reservoir (a2) with a grease gun (t37) until grease is touching the probe (a22).



3. Connect the power supply (a48) to post #1 (a23). Connect the ground (GND) wire to post #2 (a24).



4. Using a volt meter (t45), if the probe is good, post #3 (a25) will **NOT** have power. If power is detected on post #3, the post must be replaced. *(If there is no grease on the probe, post #3 will be **HOT**.)*



PUMP CARTRIDGE REMOVAL

⚠ CAUTION

NOTE: INSTALL AND REMOVE ONLY WHILE THE PUMP UNIT IS NOT IN OPERATION.

1. Remove the hose or tube connected to the adjustable (a4) or non-adjustable (a11) pump cartridge.
2. Using a 24 mm wrench, remove pump cartridge (a4, a11) by turning counterclockwise until the cartridge is out of the bore. Before pulling the pump cartridge out of the Autolube Pump Assembly, angle (5-10°) the cartridge, piston end, upward (fig. A) to allow the piston (a27) lip to disengage the eccentric (a26) then pull the cartridge straight back from the Autolube.

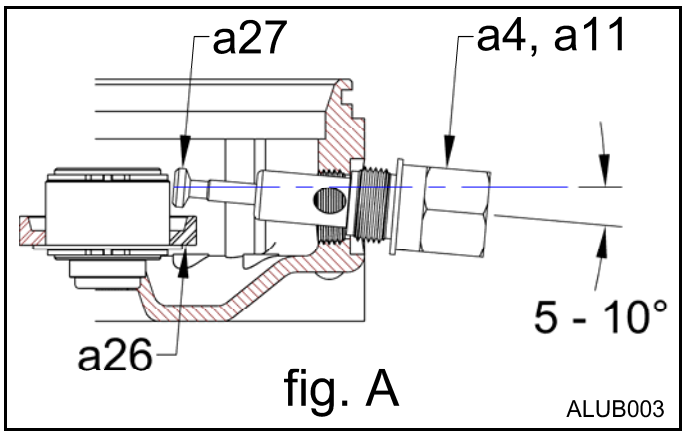
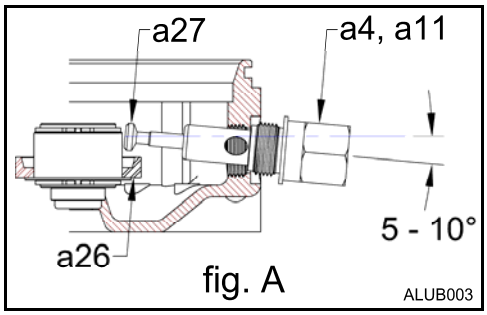


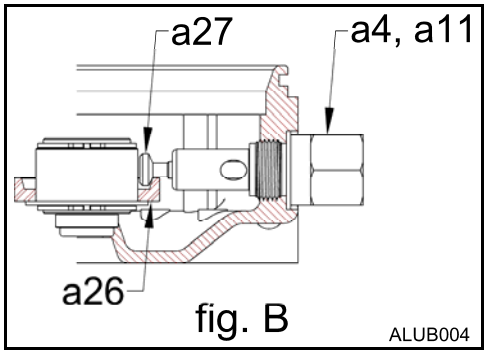
fig. A

3. When removing the pump cartridge, make sure that the piston does not remain in the pump housing. If the piston stays inside the Autolube, use a strong magnet to remove the piston.

PUMP CARTRIDGE INSTALLATION

1. Using a screwdriver, clear a path thru the grease. This will help prevent the piston (a27) from being pushed back into the cartridge before it engages the eccentric groove.





2. Install an adjustable (a4) or non-adjustable (a11) pump cartridge with the piston (a27) extended approximately 1".
3. Insert the cartridge into the housing while angling the piston end upwards (fig. A) to clear the lip on the eccentric (a26).
4. When the piston head contacts the eccentric (a26), tilt the cartridge horizontal over the lip of the eccentric (fig. B). The piston head must travel in the groove of the eccentric (fig. B). If the piston head is not engaged properly into the eccentric groove, the pump will not push grease and possible damage to the piston or eccentric may occur.
5. Tighten the pump cartridge (**DO NOT** over tighten).
6. After installation, run the Autolube unit for 1 minute. During this time, you should see grease being pushed out of the pump cartridge fittings.

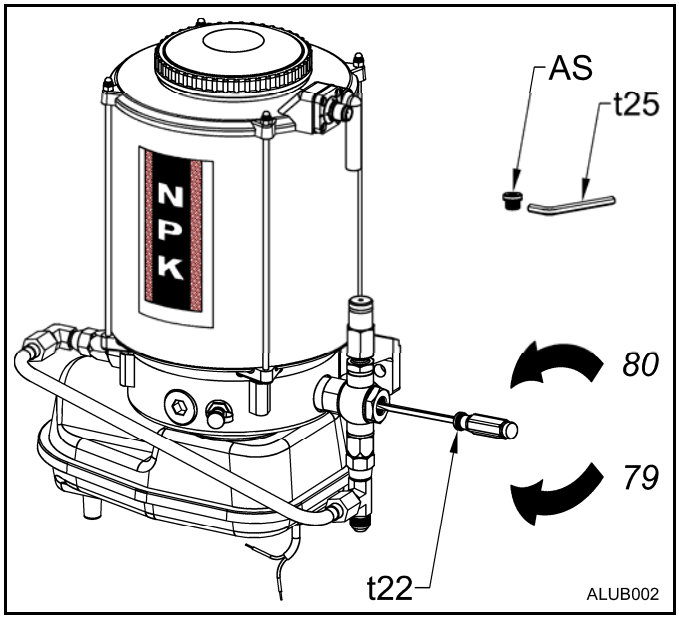
NOTE: If no grease is seen coming from the fitting, this could indicate that the pump cartridge is not properly installed.

NOTE: Check if Autolube paddle is turning in the direction of the arrow on the outside of the Autolube housing. If paddle is going the wrong way, it is necessary to switch the wires supplying power to the unit. Blue to positive (+) and Brown to negative (-).

PUMP CARTRIDGE ADJUSTMENT

FLOW ADJUSTMENT

1. Remove the adjusting screw plug (AS) with a 5 mm hex key wrench (t25).
2. With a small screwdriver (t22), turn the adjusting screw clockwise (*79*) to decrease the output, and counterclockwise (*80*) to increase. It is recommended to start with the setting at maximum, and decrease the grease supply if necessary, to maintain an even film of grease around the hammer tool.

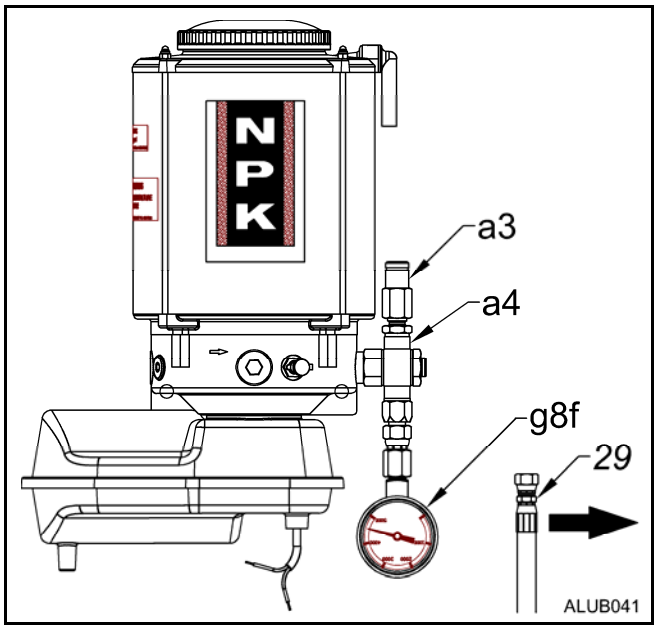


PUMP CARTRIDGE ADJUSTMENT

RELIEF VALVE SETTING AND ADJUSTMENT

To check the relief valve setting, remove the output hose *(29)* from the adjustable pump cartridge (a4) and install a 0-5000 psi *(0-350 bar)* gauge (g8f) in its place. The relief valve (a3) is factory set to 4500 psi *(315 bar)*. When your gauge reaches this point, the relief valve (a3) on the cartridge will let out a small spurt of grease. If the relief is set low, it can be adjusted to specifications.

To adjust the relief valve on the autolube unit, the relief valve cap must be turned clockwise in ¼ turn increments and the pressure checked after each adjustment. If the adjustment cannot be maintained, the relief valve pump cartridge must be replaced.



WARRANTY STATEMENTS

"Use Genuine NPK Parts" 6/08

NPK WARRANTY
AUTOLUBE SYSTEM

APPLICATION FOR WARRANTY MUST BE MADE WITHIN 30 WORKING DAYS OF FAILURE / REPAIR.

BASE WARRANTY (6 months)

NPK CONSTRUCTION EQUIPMENT, INC. ("NPK") warrants that new AUTOLUBE assemblies sold by NPK will be free from defects in material or workmanship for a period of six (6) months, starting from the date of delivery to the first user.

MAIN COMPONENT EXTENDED WARRANTY (12 months)

The MAIN COMPONENT EXTENDED WARRANTY covers failure of the MOTOR and DRIVE ASSEMBLY, resulting from defects in material or workmanship in those parts under normal use and service for the period starting with the expiration of the BASE WARRANTY and ends twelve (12) months from the date of delivery to the first user. NPK MAIN COMPONENT EXTENDED WARRANTY ***does not*** cover labor, travel expenses or the replacement or repair of any other part damaged due to MOTOR or DRIVE ASSEMBLY failure or repair thereof.

THIS WARRANTY DOES NOT APPLY TO:

- REPLACEMENT PARTS, which are covered by other NPK warranties, or hose assemblies and fittings which are not supplied by NPK.

NPK RESPONSIBILITY

NPK will, at its option, repair or replace with a new or reconditioned part, any warranted part that fails by reason of defective material or workmanship, free of charge delivered at a place of business of an NPK Dealer. Note: Parts replaced under warranty become the property of NPK.

During the six (6) month BASE WARRANTY period, NPK will pay the cost of labor at 75% of the posted shop rate that is necessary to install any repaired or replacement warranted part during normal working hours. Overtime rates and travel expenses will not be reimbursed.

USER RESPONSIBILITY

- ***Photos must accompany all warranties submitted to NPK. These photos can be 35mm, polaroid, or digital.***
- The installer, user, operator, repairer, assumes responsibility to read, understand and comply with NPK's written INSTRUCTION MANUAL.
- Returning Warranty Registration to NPK at the time of installation.
- All costs associated with shipping the AUTOLUBE unit to an authorized NPK Dealer or other authorized location. NPK is not responsible for any expense incurred in field repair.

THESE WARRANTIES DO NOT COVER FAILURES RESULTING FROM:

- Installation, alteration, operation, maintenance, repair or storage which NPK judges improper.
- Operation after discovery of defective or worn parts.
- Unreasonable delay in making a repair after being notified of a potential product problem.
- Use of grease containing abrasive compounds.
- Contamination.

THESE WARRANTIES SPECIFICALLY EXCLUDE:

- Installations not approved by NPK.
- Replacement due to normal wear.
- Repairs by other than an authorized NPK Dealer.
- Use of parts not sold by NPK. **THE USE OF "WILL FIT" PARTS WILL VOID ALL NPK WARRANTIES.**
- Labor charges that are deemed excessive by NPK.
- Parts shipping charges in excess of those which are usual and customary. (Air freight, unless pre-approved, will not be covered.)
- Duties, brokerage fees, and local taxes.

WARRANTY REPAIRS DO NOT EXTEND THE STANDARD WARRANTY PERIOD.

LIMITATIONS AND EXCLUSIONS

Violation of any federal, provincial, state or local laws, ordinances, rules or regulations, or removal or alteration of product serial numbers void NPK's written product warranties. ***Application for warranty must be made within 30 days of failure / repair.***

THIS PRODUCT MUST BE USED IN A SAFE AND LAWFUL MANNER IN COMPLIANCE WITH APPLICABLE OSHA REGULATIONS.

The written product warranties made by NPK set forth NPK's only obligations with respect to any claims of failure, defects or deficiencies in products sold by NPK. **NPK MAKES NO OTHER WARRANTIES OR REPRESENTATIONS WHATSOEVER, EXPRESS OR IMPLIED, OF THE QUALITY, PERFORMANCE, DURABILITY, MATERIALS, WORKMANSHIP, SUITABILITY, CONDITION, DESIGN OR UTILITY OF PRODUCTS SOLD BY NPK, INCLUDING, WITHOUT LIMITATION, IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS, ALL SUCH OTHER WARRANTIES AND REPRESENTATIONS BEING HEREBY EXPRESSLY EXCLUDED. NPK SHALL NOT BE LIABLE FOR SPECIAL, INCIDENTAL OR CONSEQUENTIAL DAMAGES, INCLUDING, WITHOUT LIMITATION, COSTS, LOSSES OR LIABILITIES ON ACCOUNT OF DELAY OR DOWNTIME.**

DISCLAIMER REGARDING OTHER REPRESENTATIONS OR WARRANTIES

No person is authorized to grant any other warranties or to assume any other liability on NPK's behalf unless made or assumed in writing by an officer of NPK. No person is authorized to grant any warranties or to assume any liabilities on the seller's behalf unless made or assumed in writing by the seller.

Internet: www.npkce.com

As used in this warranty the term NPK means NPK CONSTRUCTION EQUIPMENT, INC., WALTON HILLS, OHIO, U.S.A.

WARRANTY STATEMENTS

"Use Genuine NPK Parts" 6/08

NPK WARRANTY REPLACEMENT PARTS

APPLICATION FOR WARRANTY MUST BE MADE WITHIN 30 WORKING DAYS OF FAILURE / REPAIR.

REPLACEMENT PARTS WARRANTY (90 days)

NPK CONSTRUCTION EQUIPMENT, INC. ("NPK") warrants that new Replacement Parts sold by NPK will be free from defects in material or workmanship for a period of ninety (90) days, starting from the date of installation. NPK Replacement Parts Warranty ***does not*** cover labor or travel expenses. Note: Unexpired New Product Warranty has priority over Replacement Parts Warranty.

THIS WARRANTY DOES NOT APPLY TO:

- Wear items such as upper and lower tool bushings, impact ring, retaining bars and pins.
- Tools (covered under separate Tool Warranty).

NPK RESPONSIBILITY

NPK will, at its option, repair or replace with a new or reconditioned part, any warranted part that fails by reason of defective material or workmanship, free of charge delivered at a place of business of an NPK Dealer. Note: Parts replaced under warranty become the property of NPK.

USER RESPONSIBILITY

- ***Photos must accompany all warranties submitted to NPK. These photos can be 35mm, polaroid, or digital.***
- The installer, user, operator, repairer, assumes responsibility to read, understand and comply with NPK's written INSTALLATION, OPERATOR and SERVICE INSTRUCTIONS.
- All labor costs.
- Any expense incurred by field repair.
- Supplying a hydraulic oil sample from the carrier machine upon request by NPK.

THESE WARRANTIES DO NOT COVER FAILURES RESULTING FROM:

- Installation, alteration, operation, maintenance, repair or storage which NPK judges improper.
- Not performing DAILY VISUAL INSPECTIONS and/or RETIGHTENING of fasteners after initial 20 operating hours after repair.
- Exceeding the tool and/or tool bushing wear limit.
- Underwater operation.
- Operation after discovery of defective or worn parts.
- Unreasonable delay in making a repair after being notified of a potential product problem.

THESE WARRANTIES SPECIFICALLY EXCLUDE:

- Installations not approved by NPK.
- Replacement due to normal wear.
- Use of parts not sold by NPK. **THE USE OF "WILL FIT" PARTS WILL VOID ALL NPK WARRANTIES.**
- Parts shipping charges in excess of those which are usual and customary. (Air freight, unless pre-approved, will not be covered.)
- Duties, brokerage fees, and local taxes.

WARRANTY REPAIRS DO NOT EXTEND THE STANDARD WARRANTY PERIOD.

LIMITATIONS AND EXCLUSIONS

Violation of any federal, provincial, state or local laws, ordinances, rules or regulations, or removal or alteration of product serial numbers void NPK's written product warranties. ***Application for warranty must be made within 30 days of failure / repair.***

THIS PRODUCT MUST BE USED IN A SAFE AND LAWFUL MANNER IN COMPLIANCE WITH APPLICABLE OSHA REGULATIONS.

The written product warranties made by NPK set forth NPK's only obligations with respect to any claims of failure, defects or deficiencies in products sold by NPK. **NPK MAKES NO OTHER WARRANTIES OR REPRESENTATIONS WHATSOEVER, EXPRESS OR IMPLIED, OF THE QUALITY, PERFORMANCE, DURABILITY, MATERIALS, WORKMANSHIP, SUITABILITY, CONDITION, DESIGN OR UTILITY OF PRODUCTS SOLD BY NPK, INCLUDING, WITHOUT LIMITATION, IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS, ALL SUCH OTHER WARRANTIES AND REPRESENTATIONS BEING HEREBY EXPRESSLY EXCLUDED. NPK SHALL NOT BE LIABLE FOR SPECIAL, INCIDENTAL OR CONSEQUENTIAL DAMAGES, INCLUDING, WITHOUT LIMITATION, COSTS, LOSSES OR LIABILITIES ON ACCOUNT OF DELAY OR DOWNTIME.**

DISCLAIMER REGARDING OTHER REPRESENTATIONS OR WARRANTIES

No person is authorized to grant any other warranties or to assume any other liability on NPK's behalf unless made or assumed in writing by an officer of NPK. No person is authorized to grant any warranties or to assume any liabilities on the seller's behalf unless made or assumed in writing by the seller.

Internet: www.npkce.com

As used in this warranty the term NPK means NPK CONSTRUCTION EQUIPMENT, INC., WALTON HILLS, OHIO, U.S.A.

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