



QUICK COUPLER

OPERATOR MANUAL

===== MANUAL v3 =====



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SAS™ QUICK COUPLER

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Note-This manual may be printed with only one last page, matching interface of unit shipped. Comprehensive manual will have all interface parts lists.

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LIMITED INTENDED USE OF THIS EQUIPMENT:

SAS QUICK COUPLER is an interface device that allows matching interface wheel loader attachments, such as a bucket, forks, grapple, plow or other tool to connect and secure such tool to front of wheel loader, when properly installed and used by the operator. The SAS QUICK COUPLER is not intended to lift any people and is not intended to be used with any device or object for that purpose. The SAS QUICK COUPLER is not intended to lift any object overhead of any people. This attachment is considered a non-OEM attachment and has not been approved by any specific wheel loader manufacturer. Customer is responsible to read the wheel loader's manual and warranty documents, if any, and identify any impact installation and use of this attachment may have on the wheel loader's warranty. Read this manual completely before installation or use.



INTRODUCTION LETTER (PAGE 3) SAFETY

TO THE OWNERS, MANAGERS, AND OPERATORS OF LOADERS EQUIPPED WITH SAS™ FORKS ATTACHMENTS

Safety is the most important issue in the workplace. Observing safety guidelines, equipment capacities and using common sense will provide a work environment that is safe and efficient for employees, management and customers. It is important that you and your operators read and understand the information included in this manual prior to use of this equipment.

Safety warnings are highlighted through out this manual. Understanding the significance of these symbols is important. The following is a definition of each symbol you will encounter in this manual:



Caution Symbol is intended to draw your attention to important safety information, hazard or precaution.



Danger Symbol indicates a hazardous situation that if not avoided will result in serious injury or death.



Warning Symbol indicates a hazardous situation that if not avoided could result in serious injury or death.



Caution Symbol indicates a hazardous situation that if not avoided could result in minor injury or potential property damage.



Notice Symbol indicates worst credible severity of harm is property damage.

The following information presented in this Operator Manual for SAS FORKS™ is intended to be a guide only, and is not meant to encompass all issues that may need to be addressed for your particular type of business operation.

If you encounter any additional information that would be helpful to us, or others, please contact us.

Thank you for your business,

SAS LLC

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LUXEMBURG, WI 54217 U.S.A.

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GENERAL SAFETY GUIDELINES (PAGE 4)

Operation of equipment should only be performed by qualified and trained individuals. All persons operating or working in the area of operation should read this manual and a copy of this manual should be kept with the equipment. To be considered qualified you must:

- Understand the written instructions supplied by the manufacturer of the device (within this manual), the manufacturer of the wheel loader, all company rules and any applicable OSHA regulations.
- Completed training including actual operation, demonstrating competence and safe operation.
- Know and follow the safety rules and regulations of the jobsite.



Operation of equipment by un-qualified or un-trained individuals can result in serious injury or death. Verify all operators have received proper training on this equipment.



Not designed to be operated in an explosive environment. Only use this equipment in well ventilated areas, a sufficient distance away from flammable or explosive gases, liquids or other hazards to avoid risk of ignition. Operating this equipment in an explosive environment may cause an explosion and fire resulting in injury, death, and substantial property damage.



Operation of equipment under the influence of illegal, prescribed or over the counter drugs can result in potential injury or property damage. Consult your physician be-



Inspect the device and perform all preventative maintenance before operation at the start of every shift. Failure to perform inspections or proper maintenance can result in equipment failure resulting in serious injury or property damage.



Read operators manual and follow all safety procedures for the equipment this device is attached to. Failure to follow Manufacturers recommendations can result in serious injury and property damage.



This equipment is operated by high pressure hydraulics. Hydraulics are a stored power source and as such must be treated as energized at all times. Be certain pressure has been relieved prior to handling, inspecting or performing maintenance on this unit. Follow lockout tag out procedures and release all stored energy before servicing equipment. Failure to release energy or disable hydraulic energy can result in serious injury or death. High pressure fluids can also discharge at great velocity. Be certain to wear safety glasses while inspecting, operating and maintaining equipment.



This device has numerous moving components. Do not wear loose fitting clothing, rings, jewelry or other items that may become entangled in device. Be aware of resulting pinch points and keep clear during operation, inspection and maintenance. Pinch points exist between moving parts on the device, between device and vehicle, device and wheel loader, failure to keep clear while in operation can result in serious injury or death.



Do not exceed posted weight limits on equipment or loader. Exceeding rated load limits will result in equipment damage, loss of steering control, serious injury or death.



Installation of this device may reduce wheel loader Original Equipment Manufacturer (OEM) load ratings provided in OEM manual, id plate or placards affixed to wheel loader. Carefully test lift capability after installation to determine safe operating parameters or seek formal rating advice as may be required for your specific application.

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CE SPECIFIC NOTICES



EMERGENCY STOP FUNCTION

To immediately stop the motion of this equipment:

1. Operator is to release joystick button(s).

Additional secondary alternative measures to immediately stop the motion include:

2. Moving wheel loader's auxiliary hydraulic 3rd spool lever to neutral position
3. And/or turning off the ignition key of the wheel loader to shut off the engine

All three emergency stop options above ultimately stop the flow of hydraulic fluid.

Notice: Even after emergency stop function is followed, there is residual stored hydraulic pressure in the system. See following:



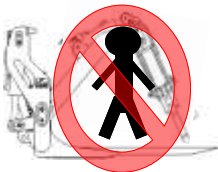
THIS EQUIPMENT IS OPERATED BY HIGH PRESSURE HYDRAULICS

Hydraulics are a stored power source and as such must be treated as energized at all times. Be certain pressure has been relieved prior to handling, inspecting or performing maintenance on this unit. Follow lockout tag out procedures and release all stored energy before servicing equipment. Failure to release energy or disable hydraulic energy can result in serious injury or death. High pressure fluids can also discharge at great velocity. Be certain to wear safety glasses while inspecting, operating and maintaining equipment.



STAY CLEAR

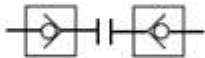
- Do not lift persons with this equipment.
- People should always stand a safe distance away from this equipment.
- Do not go near or under this equipment or any object lifted by this equipment.



ENERGY ISOLATION

Follow Refer to "DISCONNECTION" information within this manual and the machine's OEM manual. Stored energy, such as gravity, hydraulics or other sources pose a risk to anyone near or servicing this equipment. Be sure release and remove all stored energy sources before servicing.

The symbol at the left indicates hydraulic hose coupling quick release self sealing. It is recommended to be installed by the customer at the time this equipment is initially attached to the wheel loader.



POWER FAILURE

Section not applicable to quick coupler.



SOUND

This equipment does not emit more than 70dba.



VIBRATIONS

This equipment does not transfer vibrations in excess of 2.5m/s².



OPERATING TEMPERATURE

This equipment is best suited to operate in temperatures between 30°F to 90°F with minimum allowable temperature -25°F and maximum temperature 150°F



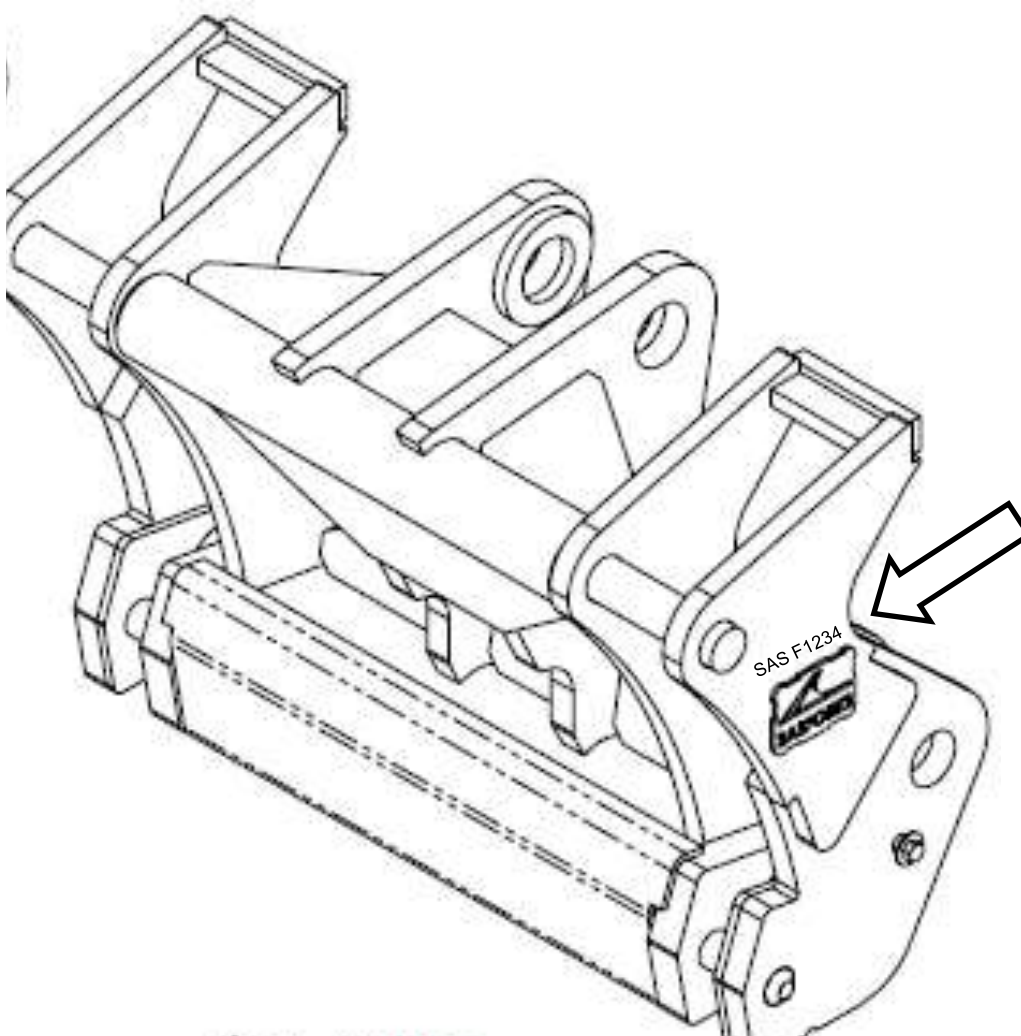
SERIAL NUMBER (PAGE 6) **SAS™ QUICK COUPLER**

Serial Number Location:

Stamped in steel on left side (as from driver seat of wheel loader), immediately above the SAS FORKS welded logo plate

Serial Number Format:

SAS Fxxxx



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INSTALLATION (PAGE 7)

SAS™ QUICK COUPLER

WARNING

- ▶ Installation of QUICK COUPLER on wheel loader requires interfacing with high pressure hydraulic system. Installation should only be performed by qualified individuals, such as an experienced Heavy Equipment Service Technician. Failure to follow these instructions and precautions in wheel loader manufacturer's service manual can result in serious damage to equipment and/or result in injury or death.
- ▶ Failure of hydraulic system or high pressure fluid leaks can result in serious injury
- ▶ Use caution while installing, testing & operating this unit. Be aware of and avoid:
 - Pinch Points, -High Pressure hydraulic fluids or stored energy, -People in the area.

NOTICE

Installation of purchased attachment may void machine manufacturer warranty, if any.

STEP 1 - PREPARATION:

- Establish a safe work area. A flat surface clean work area without trip hazards.
- Park wheel loader on firm level ground.
 - Lower existing attachment (ie: bucket) to rest on ground.
 - Set parking brake and turn engine off.
- Follow wheel loader manufacturer's instructions to depressurize hydraulic system.
- Do not work under a lifted object, loader arms or Quick Coupler. Avoid pinch & crush hazards.
- Remove existing pinned on attachment.
- Inspect pins & bushings in machine arms, replace as necessary.

STEP 2 - INSTALLATION:

- Apply grease to pins, bushings and pin holes on Quick Coupler.
- Align pin holes, insert pins and secure pins properly.
- Grease all pin zerk points.

STEP 3 - HYDRAULIC CONNECTION:

- Option #1: Electric pump kit from SAS Forks (diagram on next page)
- Option #2: Bucket roll back hydraulics with solenoid valve/switch.
- Option #3: Use 3rd spool auxiliary hydraulics on loader.
- Reference matching parts page within this manual to determine maximum psi. (either 3,500; 5,000; 6,000). Have hydraulic pressure set below maximum.
- Determine hose length to avoid creating tension in all positions.
- Avoid excessive length that hoses would hang down to ground.
- Install high pressure hydraulic hoses. Recommend hose psi. to exceed cylinder requirements.



STEP 4 - TEST ROLL FORWARD AND ROLL BACK:

- During this test of motion, ensure smooth lifting & tilting of Quick Coupler. Watch for undesirable contact between wheel loader lift arms and Quick Coupler. Also watch for hose pinch points.
- Begin testing by moving control levers slowly:
 - A. With Quick Coupler near ground level, fully roll back.
 - B. With Quick Coupler lifted high, fully rotate to dump position.
- If interference is experienced, installation of Quick Coupler roll back or dump stops may be required.
- Contact SAS FORKS™ if you experience interference issues to discuss stop options.

STEP 5 - TEST CYLINDER AND LOCKING PIN ENGAGEMENT:

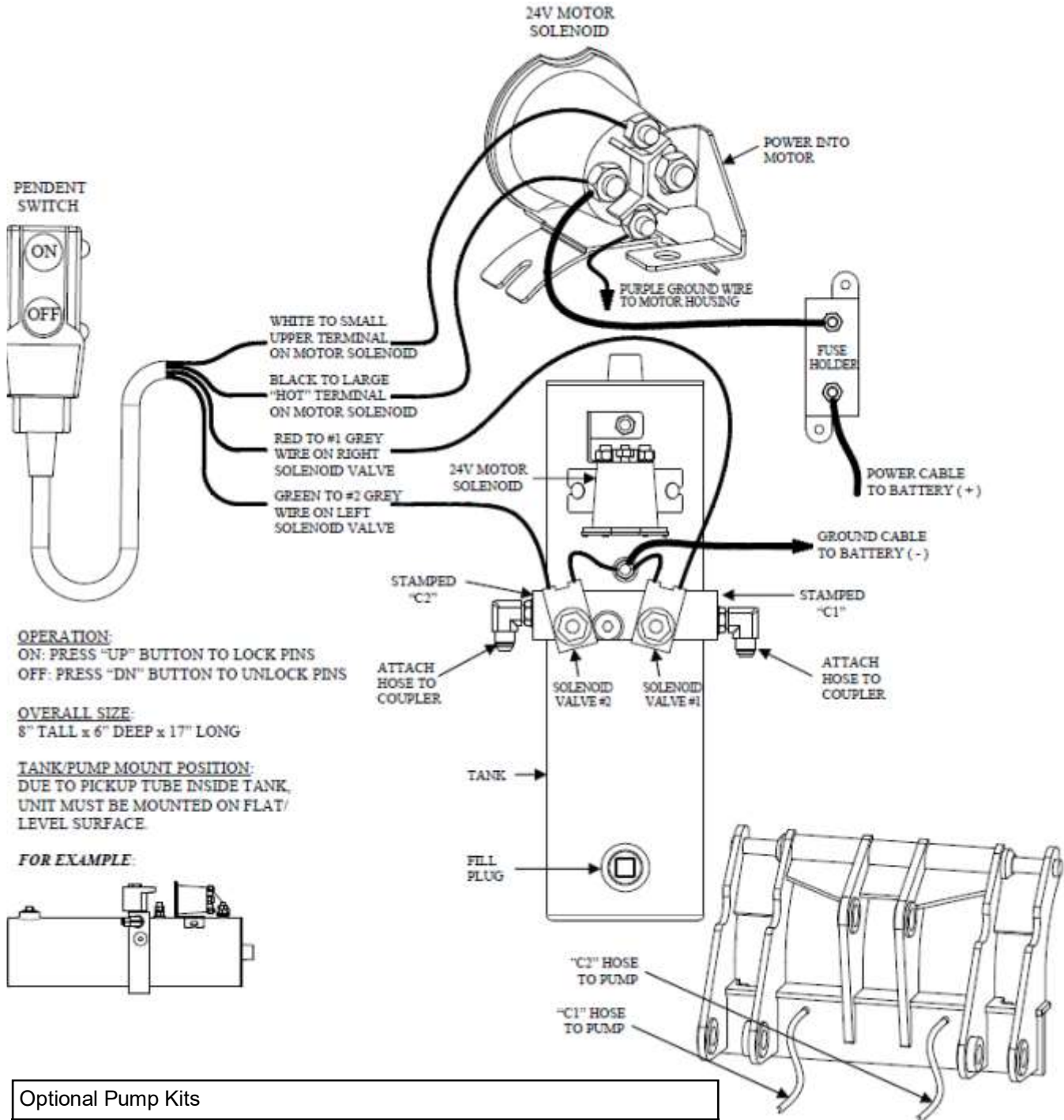
- Engage hydraulics to actuate cylinder within Quick Coupler to extend Locking Pins.
- Visually verify Locking Pins are extended fulling into the exterior pin holes on the Quick Coupler.
- A few cycles of extend and retract maybe required to remove air from lines.

STEP 6 - CHECK & FILL HYDRAULIC FLUID:

- After installation test, check wheel loader hydraulic fluid level and fill as needed.

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INSTALLATION (PAGE 8) OPTIONAL: 24 VOLT PUMP KIT



Optional Pump Kits

	Volts	Control	Part Number
Standard: shown above	24	Pendent switch	0-MM-0-PMP KIT P 24V
Option	24	Lever on tank	0-MM-0-PMP KIT L 24V
Option	12	Pendent switch	0-MM-0-PMP KIT P 12V

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DAILY PRE-OPERATION INSPECTION (PAGE 9) GUIDELINES

Daily pre-operation inspection is recommended for safe use of SAS™ Quick Coupler. List below is a summary related to the Quick Coupler. This is not an exhaustive list of items to inspect. Refer to machine manufacturer's operator manual for additional items that need to be inspected prior to machine operation. It is responsibility of Owners and Operators to ensure safe operation of equipment in the field. Any unsafe items should be professionally repaired prior to operation of machine. Equipment with unsafe conditions must be immediately tagged and locked out of service.

1) SECURE MACHINE (WHEEL LOADER).

- Park wheel loader on firm level ground. Lower attachment & Quick Coupler to ground.
- If equipped with grapple attachment, lower grapple arm to lowest resting position.
- Set wheel loader parking brake and/or block wheels.
- Turn off engine.
- Move hydraulic control levers back and fourth to relieve built up pressure in system. Refer to wheel loader manufacturer manual for best practice.

2) ENSURE PERSONAL SAFETY

- Wear appropriate Personal Protective Equipment (PPE). At a minimum wear safety glasses. Recognize and follow worksite specific additional PPE, such as safety toe boots, hard hat, leather gloves, etc.



- Do not attempt to grease pins when machine is running, as you could be crushed in operating linkage, resulting in serious injury or death.



- Do not use a hand to attempt to locate or diagnose a high pressure hydraulic leak, only use a board (or cardboard), as high pressure fluid can instantly cut and penetrate skin, which would require immediate professional surgical medical attention. Any delay in medical treatment may result in amputation of impacted skin and personal limb, serious injury or death.

3) QUICK COUPLER HYDRAULIC FITTINGS AND HOSES.

- Inspect hydraulic fittings and hoses for wear, kinked, cracked, swelling, or leaking.
- Tighten as needed, replace damaged parts immediately. Do not operate if deficiencies.

4) QUICK COUPLER LINKAGE PINS.

- Inspect linkage pins (connecting quick coupler to loader arms) to ensure properly fastened.
- Inspect Locking Pins, fastening hardware. Tighten or replace as needed.
- Inspect Engagement Holes to be sure hole & pocket are clean from dirt, gravel and stones, as this will prevent attachment engagement with Locking Pins.
- Grease Locking Pins, linkage pins and joint to ensure smooth operation and to reduce wear.
- Do not operate machine if linkage pin or retaining plate of bolt is worn, loose or missing.

5) QUICK COUPLER FRAMEWORK CRACKS.

- Inspect framework of Quick Coupler for signs of cracking and damage.
- Do not operate machine if any cracks. Contact SAS Forks & submit photos for repair advice

6) CONTINUE WITH OTHER ATTACHMENT & WHEEL LOADER INSPECTION DETAILS.

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DAILY PRE-OPERATION INSPECTION (PAGE 10) (SUGGESTED MINIMUM INSPECTION GUIDELINES)

Pre-Operation Inspection Sample Checklist

- > Inspection Required at start of each shift.
- > Responsible Person: First employee to use machine on each shift, each day.
- > Fix safety problems immediately or tag and lock out this unit so no one uses it.
- > Notify your supervisor about any problems and arrange for immediate service.
- > Notes repairs completed on this sheet or attach proof of safe operating condition.
- > Park in area not obstruct building exit. set parking brake, lower forks tips on ground, shut off lights.
- > When this page is full, turn page into office for filing request a blank form.
- > Office / Supervisor: Keep completed sheet and associated records of repairs on file



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Check mark or X=item OK S=needs Service

Machine (unit#) Model:							
Inspection Date:							
Performed by who:							
Hour meter:							
Engine Off & Keys Out							
Parking Brake Set							
Engine Oil Level							
Hydraulic Fluid Level							
Antifreeze Level							
Fan / Alternator Belts							
Fuel System Leaks							
Tire Condition							
Tire Pressure							
Tire Lug Bolts Tight							
Lift Arms / Chains							
Lift & Pivot Arm Pins Secure							
Grease Pins							
Hydraulic Hoses No Damage							
Quick Coupler Hoses No Leak							
Quick Coupler Pins Secure							
Quick Coupler Free of cracks							
Attachment (forks/bucket/etc)							
Locking Pins Engaged							
Attachment Free of cracks							
Fork tip & carriage skid plates							
Seat Belt Operation							
Fire Ext. Charged							
Parking Brake							
Dash Warning Lights							
Fuel Level							
Engine start- No Noises							
Horn							
Lift operation							
Steering System							
Brake System							
Reverse Warning							
Special Note:							

O: PROCEDURES Forks OPERATOR MANUALS for SAS PRODUCTS we sell Quick Coupler MM Operator Manual Wheel Loader Daily Inspection New 5-2-06 rev 3-15-2021 PS.xls Page 1



CONNECTING / DISCONNECTING (PAGE 11) ATTACH TOOLS TO QUICK COUPLER

OVERVIEW OF COMPONENTS

Solid Upper Shaft

Engagement Pocket

Cylinder (under cover)

Locking Pins.....

Bump stops

Engagement Holes

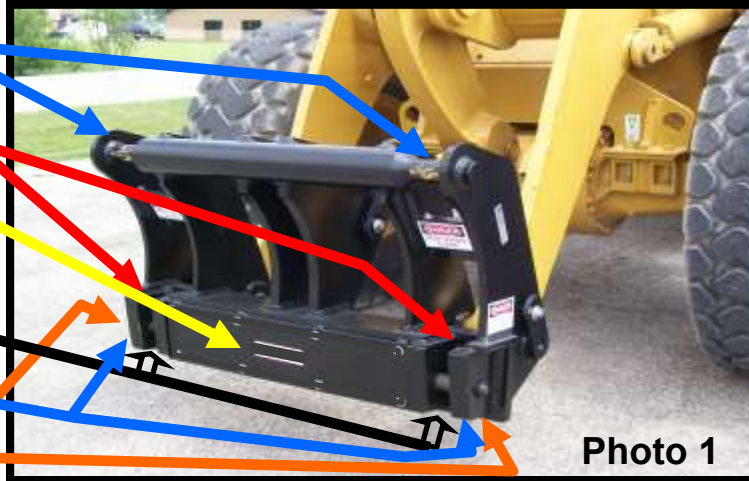


Photo 1

WARNING

Solid Upper Shaft & Locking Pins must be fully engaged to hold to forks/ bucket/ tool. Failing to properly engage and verify may result in forks/ bucket/ tool falling off causing property damage, injury or death.

Photo 1: Locking Pins extended, in locked position into Engagement Hole.

Photo 2: Locking Pins retracted, in open released position, ready to engage tool.

Photo 3: Locking Pins extended fully through tool and into Engagement Hole

CONNECTING

- Engagement Pocket & Engagement Holes must be free from dirt & gravel.
- Actuate hydraulic control to retract Locking Pins.
- Align wheel loader quick coupler straight to tool which has compatible coupler interface brackets.
- Slightly tilt quick coupler forward allowing both sides of Solid Upper Shaft to align under and engage with the hooks on forks/bucket/tool/etc.
- Slowly roll back quick coupler to allow lower portion of quick coupler Bump stops to contact adjoining stops on the forks/bucket/tool. Bump stops are a guide to assist in alignment of holes.
- Actuate hydraulic control in cab to extend Locking Pins fully and shown in the Engagement holes on quick coupler. If Locking Pins don't initially engage, simply make a small slow movement either tipping the fork/bucket/tool either forward or back. Often times this will relieve tension or misalignment of Main Locking Pins with tool holes.
- Lower forks/bucket/tool to ground, set parking brake, turn off loader, visually verify quick coupler Locking Pins are fully engaged.
- During use of loader with tool, periodically monitor Locking Pins to ensure safe engagement.



Photo 2

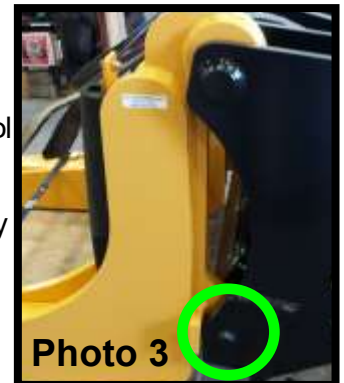


Photo 3

DISCONNECTING

- Park wheel loader with forks/bucket/tool on flat level ground. Lower forks/bucket/tool to ground.
- Actuate hydraulic control in cab to retract Locking Pins, fully disengage from forks/bucket/tool.
- Slowly tip quick coupler forward about 20 degrees, this should be smooth with no resistance. If there is resistance, immediately stop, remove tension by small roll back, retract Locking Pins a second time to be sure they are free. Disengage the quick coupler and drive away.

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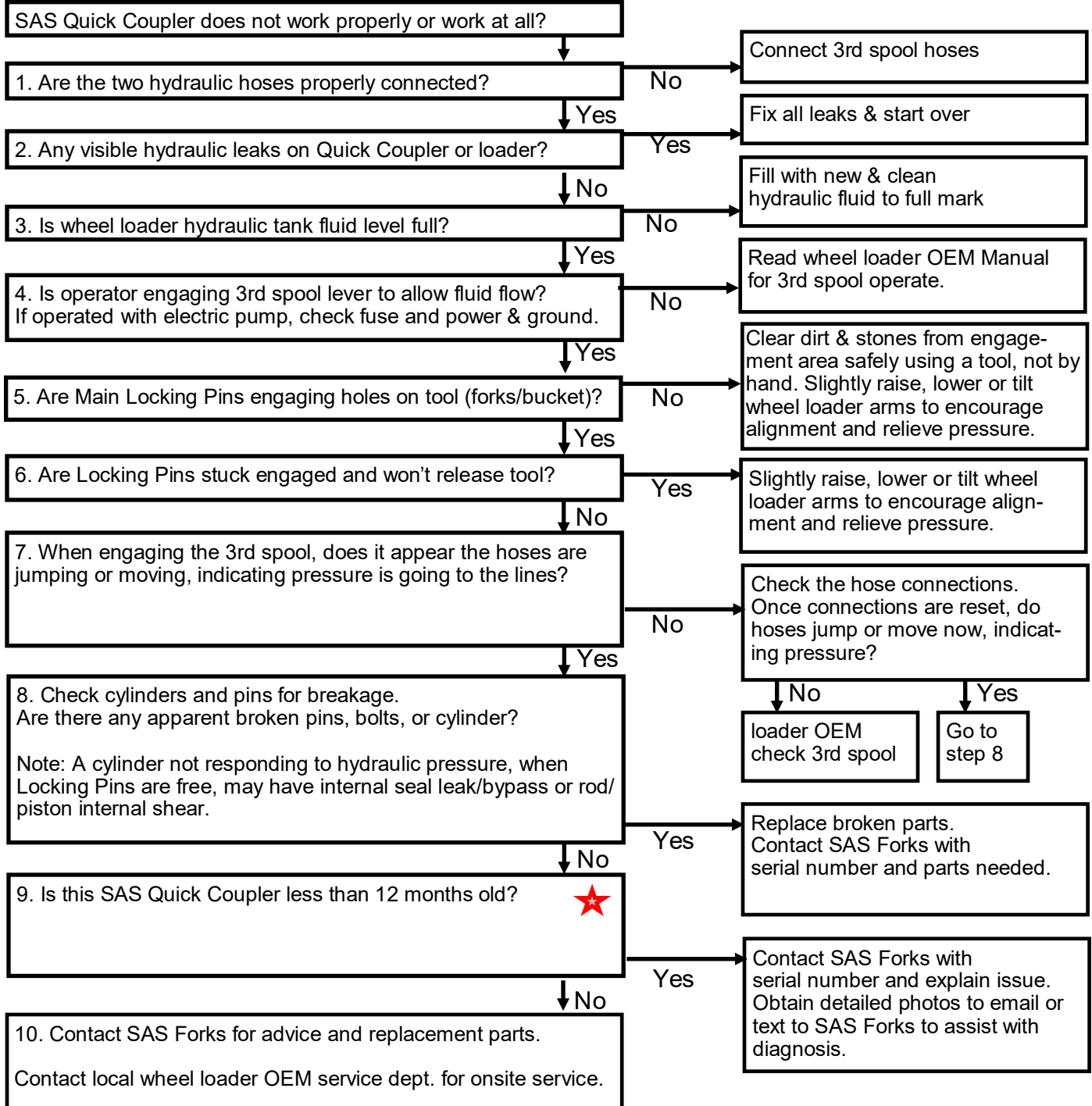


REPAIR FLOW CHART (PAGE 12)

SAS™ QUICK COUPLER



Hydraulic system may have stored energy. Electrical system is hazardous. Be certain to follow all safety procedures and guidelines while trouble shooting. Only qualified heavy equipment technicians should service this equipment. Malfunctions of equipment can result in un-expected movements from stored energy. Failure to follow safe practices can result in property damage, injury or death.



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WELD NOTICE (PAGE 13)

SAS™ QUICK COUPLER

DO NOT MAKE UNAUTHORIZED WELDS TO SAS™ QUICK COUPLERS

To prolong the life of the SAS QUICK COUPLER assembly, as part of the daily pre-operation inspection, be sure to closely inspect the structural framework and welds.

If cracks or rust streaks, which could indicate a beginning of a crack, immediately take unit out of service and do not operate.

Have a professional heavy equipment service technician carefully inspect to determine if crack is present.



Do not weld on SAS QUICK COUPLER without explicit written advice from SAS Forks. Improper welding repairs can result in equipment failure resulting in injury or death.

If repairs are needed contact SAS Forks to discuss the situation.
Providing the SAS QUICK COUPLER serial number and multiple photos (send via email or text) directly to the contact person at SAS Forks.

NOTICE

IF WELDING IS AUTHORIZED:

RECOMMENDED PRECAUTIONS TO TAKE PRIOR TO WELDING:

- Weld repairs should only be performed by qualified individuals.
- Authorization of weld repair must be explicitly in writing from SAS Forks.
- Best practice is disconnect and remove SAS QUICK COUPLER from wheel loader before welding.
- Do not weld if connected to wheel loader due to the risk of damage to the loader's electrical system or on board electronics.
- Connect the welder ground directly to the part being welded. Avoid attaching ground across any pivot points; this may cause an arc to form damaging the pivot point.

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LIMITED WARRANTY (PAGE 14)

SAS™ QUICK COUPLER

SAFETY

Buyer accepts responsibility to; (1) Ensure that all personnel that will use and/or work in area of purchased product will read safety ID plate and Operators Manual For SAS (product) FORKS™ and the Machine Manufacturer's Operators Manual, prior to use; and (2) Ensure that all personnel follow the safety guidelines outlined on these materials. (3) To determine and compare the weight of the original machine's attachment, to the new SAS FORKS™ or other attachment purchased herein, and reduce the lift capacity as needed to accommodate the increase in the attachment weight if any. (4) Observe the most restrictive weight capacity specified on any machine and/or attachment. (5) Buyer has duty to inspect equipment & attachment regularly. S.A.S. OF LUXEMBURG, LLC. IS NOT RESPONSIBLE FOR SAFETY IN THE FIELD.

GOALS OF THE S.A.S. OF LUXEMBURG, LLC. LIMITED WARRANTY PROCEDURE

- ASSURE MINIMUM CUSTOMER DOWNTIME by resolving the problem correctly on a timely basis.
- ASSURE END-USER CONFIDENCE while maintaining an equitable Warranty expense for both your company and SAS.
- PRODUCT IMPROVEMENT. We have an engineering staff ready to assist you. Call us at 1-877-SAS-FORK (1-877-727-3675)

Contact SAS before attempting any repair, modification, or questionable job applications.

LIMITED WARRANTY FOR SAS FORKS™

For products that S.A.S. of Luxembourg, LLC. (SAS) (SAS Forks) manufactures, SAS warrants that such products conform to all specifications for materials and workmanship for the period of time indicated below, after delivery, when used in compliance with the SAS FORKS™ Operator Manual.

PRODUCT	LIMITED WARRANTY PERIOD	ITEM	COVERED
Quick Coupler	1 year from original ship date	FRAME WELDMENT	DEFECTS IN MATERIALS & WORKMANSHIP
Quick Coupler	1 year from original ship date	Hydraulic cylinder, Locking Pins	DEFECTS IN MATERIALS

No warranty on other products not listed above, unless specified on the face of the original invoice.

No warranty against abrasion wear, claw chip wear, fork tip damage, blade bending, fusible link separation, bent fork mounting shafts, hoses, cables, or wires. No warranty on used equipment of any type.

SAS does not warrant the products that it does not manufacture. Rather, all warranties, if any, for these products are supplied by the manufacture. SELLER EXPRESSLY DISCLAIMS ALL OTHER WARRANTIES, WHETHER EXPRESSED OR IMPLIED, INCLUDING THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE.

CALL FOR WARRANTY CONSIDERATION: To be considered for warranty repairs or replacement **buyer must notify SAS** of any warranty claim within 10 days after such claim arises, and prior to expiration of the warranty period and **prior to the performance of any repairs being done**, otherwise buyer waives all rights to such claim.

- Obtain SAS Fork serial number & call SAS at 920-845-2198. Clearly describe problem and operation that was taking place when it occurred.
- Buyer is to return defective assembly, freight prepaid, or photographic evidence clearly showing the problem area and details of failure to SAS for review. When necessary, a factory representative may evaluate the problem in the field.

WHAT SAS WILL DO: SAS will examine the defective product, and the details of the failure. If SAS determines that the failure of materials or workmanship was proven to be within the terms of this limited warranty, SAS will, at its option, repair or replace, FOB the factory, in Luxembourg, WI, USA, the defective product. If the product cannot be returned to the factory, SAS may approve field repair of defective product. SAS will approve an appropriate amount of hours and cost for the repair before authorizing repairs to begin. No provisions will be made for incidental damages, mileage, travel time, overtime, downtime, or special freight charges.

CONDITIONS THAT WILL VOID YOUR WARRANTY: Failures, which in our determination were the result of:

- Improper installation.
- Misapplication - See SAS FORKS™ Operator Manual.
- Misuse or Improper operation - See SAS FORKS™ Operator Manual.
- Exceeding the weight and/or lift limitation, lower or either any Identification Plate attached SAS Quick Coupler or wheel loader OEM capacity ratings.
- Negligence or Failure to perform routine inspection and/or maintenance as outlined in the SAS FORKS™ Operator Manual.
- Unauthorized modification, welding, burning, grinding, installation of non-factory skid plates, etc. (unless otherwise specified in the SAS FORKS™ Operator Manual or as provided in a written authorization directly from SAS factory Engineers.).
- Continued use after a malfunction of the hydraulic system in the forklift or loader.
- Accidental damage.

LIMITED WARRANTY REMEDIES: Buyer must notify SAS of any warranty claim within 10 days after such claim arises; otherwise buyer waves all rights to such claim. Unless agreed otherwise in writing. Buyer's sole remedy for breach of warranty is, at seller's option, the repair of the defect, or the providing of a replacement part F.O.B. seller's office. **Seller will not be responsible for costs of shipping, travel time, travel expense, dismantling or reassembling the product.** Further, seller will not be liable for any direct, indirect, consequential, incidental, or special damages arising out of a breach of warranty. These remedies are exclusive, and all other warranty remedies are excluded.

PROPRIETARY RIGHTS: All designs and other proprietary rights provided by SAS to Buyer are to remain the property of S.A.S., and Buyer shall honor all proprietary legends. Buyer agrees not to copy the design of S.A.S.™ Forks & SAS Scorpion or hire a third party to copy. S.A.S. may use product modification ideas suggested by user, without any obligation to originator of modification suggestion. If S.A.S. chooses to implement such product modification such becomes property of S.A.S. of Luxembourg, LLC.

LIMITATION OF LIABILITY: The seller's price is based on the enforceability of this limitation of liability, and the buyer understands that the price would be substantially higher without this limitation. Seller shall have no liability to buyer for lost profits or for special, consequential, exemplary, or incidental damages of any kind, whether arising in contract, tort, product-liability, or otherwise, even if advised of the potential damages in advance.

- In no event shall seller be liable to buyer for any damages whatsoever in excess of the contract price.
- In the event that any warranty or warranty remedy fails of its essential purpose, or is held to be invalid or unenforceable for any reason, in consideration of the other provisions of this agreement, the parties understand and agree that all limitations of liability under this provision will nevertheless remain in effect.

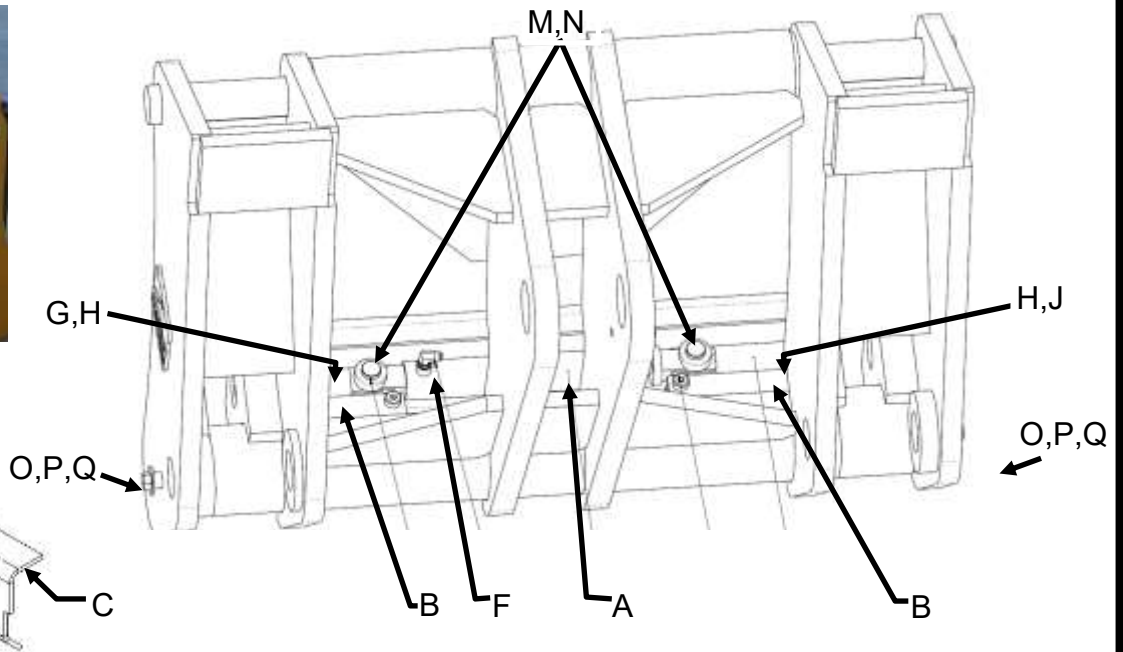
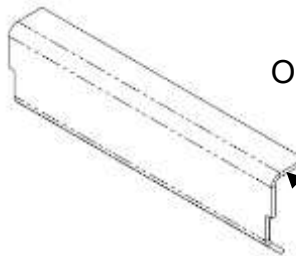
SEVERABILITY: Any legally unenforceable provision may be severed from this agreement, and the remaining terms and conditions will be enforced as a whole.

SALES TERMS: SAS FORKS SALES TERMS document is included as part of this document. See www.sasforks.com/SalesTerms.pdf



PARTS GUIDE: SERIAL #F5551 & NEWER (PAGE 15) STANDARD SAS EURO ISO VOLVO INTERFACE

For Parts Contact: SAS FORKS Phone: 920-845-2307 Ext. 101 Email: parts@sasforks.com



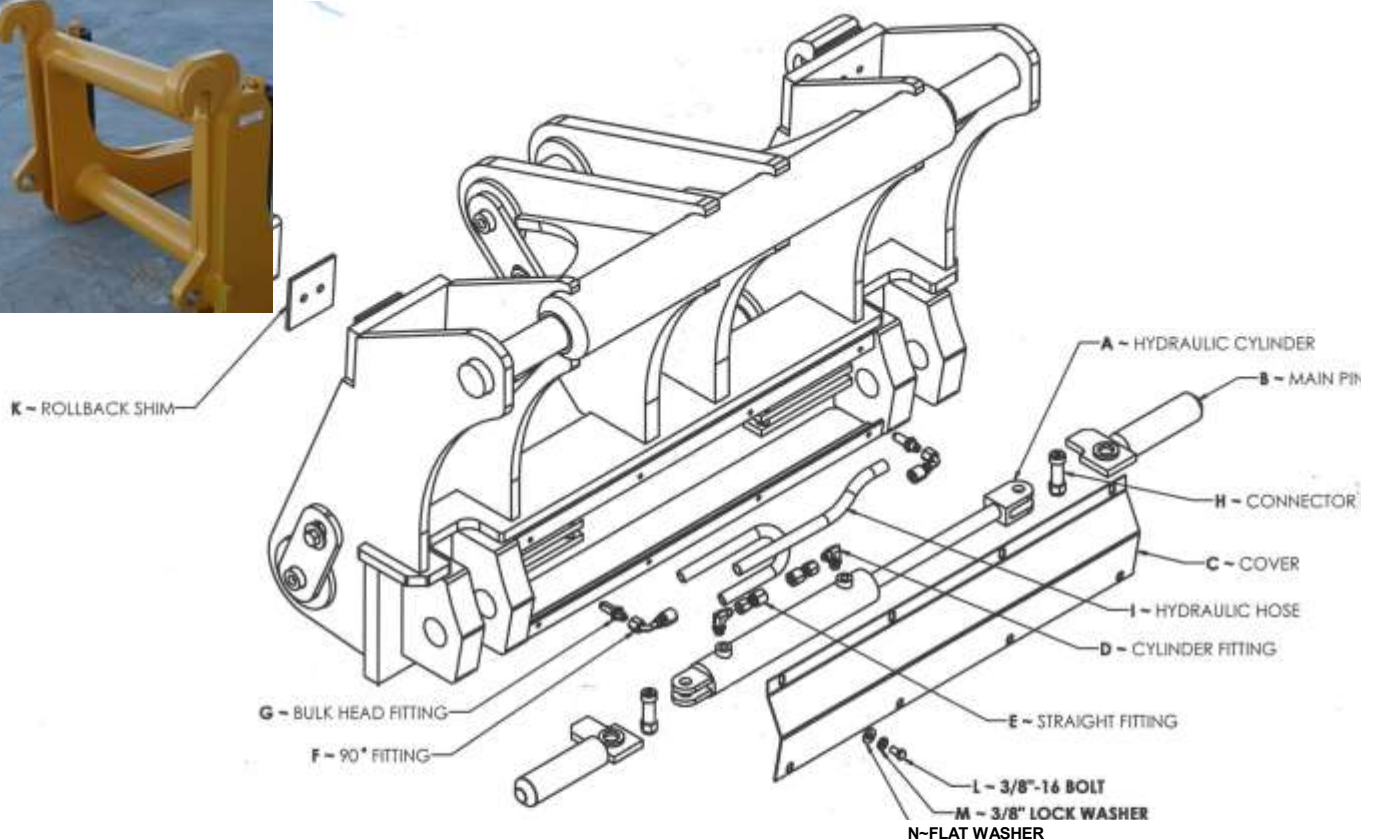
SAS EURO VOLVO Interface = Reference s/n SAS F6100

ITEM NUMBER	DESCRIPTION	TOOL INTERFACE	SERIAL NO. (AT TIME OF PUBLICATION)	PART #	QTY
A	HYDRAULIC CYLINDER 5,000 PSI MAX	SAS EURO	F5551 & NEWER	HY-CYL-02X10.25-5000	1
A.1	CYLINDER SEAL KIT (N/A)			N/A	
B	LOCKING PIN	SAS EURO		0400MM-PIN ASSEMBLY	2
C	COVER (WELDED IN)	SAS EURO		0400MM-FORMEDCOVER	1
D	N/A				
E	N/A				
F	90 FITTING	SAS EURO	F5551 & NEWER	HY-849-FSO-06X06	2
G	LOCKING PN COTTER PIN	SAS EURO	F5551 & NEWER	WPIN .1875X1.75	2
H	LOCKING PN CLEVIS PIN	SAS EURO	F5551 & NEWER	PIN-97245A512	2
I	HYDRAULIC HOSE				
J	N/A				
K	N/A				
L	N/A				
M	GUIDE SHOULDER BOLT	SAS EURO	F5551 & NEWER	WBOLT 0.750X1.75 SLD	2
N	GUIDE NYLON LOCK NUT	SAS EURO	F5551 & NEWER	WNUT 0.625-11-NY	2
O	PIN RETENTION SPACER	SAS EURO		SPACER-0625-0000	3
P	PIN RETENTION BOLTS	SAS EURO		WBOLT 0.625X1.50 GR8	3
Q	PIN RETENTION WASHER	SAS EURO		WASHER-F 0.625 GR8	3



PARTS GUIDE: SERIAL # F5474 & down (PAGE 16) STANDARD SAS EURO ISO VOLVO INTERFACE

For Parts Contact: SAS FORKS Phone: 920-845-2307 Ext. 101 Email: parts@sasforks.com

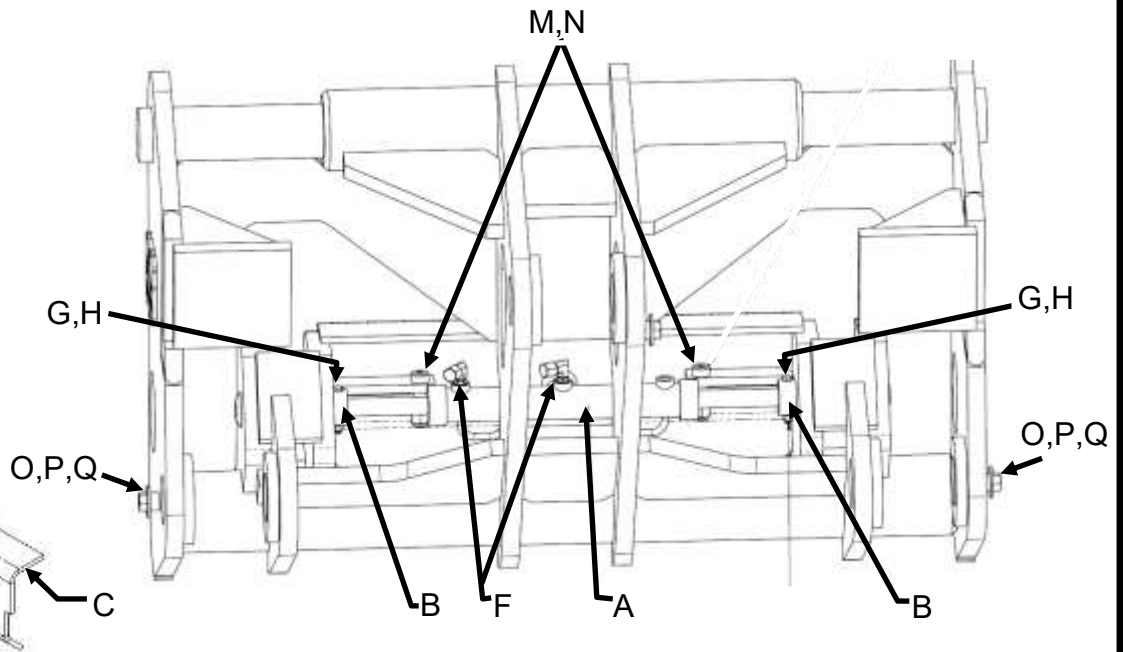
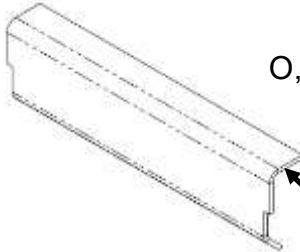


ITEM NUMBER	DESCRIPTION	PART # F3079 & EARLIER	PART # F3081-F4321	PART # F4332-F5474	QTY.
A	HYDRAULIC CYLINDER	HY-CYL-02X10.6	HY-CYL-02X10.25	HY-CYL-02X10.25-5000	1
B	LOCKING PIN	90BCASE621D	400MM-PIN ASSEMBLY	0400MM-PIN ASY	2
C	COVER	910CASE621B	400MM-COVER	0400-COVER PLATE	1
D	CYLINDER FITTING	HY-849-FSO-06X06	HY-849-FSO-06X06	HY-849-FSO-06X06	2
E	STRAIGHT FITTING	HY-06-6FJX	HY-06-6FJX	HY-06-6FJX	2
F	90° FITING	HY-6G-6FJX90S	HY-6G-6FJX90S	HY-6G-6FJX90S	2
G	BULK HEAD FITTING	HY-832-FS-06	HY-832-FS-06	HY-832-FS-06	2
H	CONNECTOR PIN	PIN-98306A499	WBOLT 0.750X1.750 GR8	PIN-97245A512	2
I	HYDRAULIC HOSE	HY-HOSE-6M3K	HY-HOSE-6M3K	HY-HOSE-6M5K	2
J	ROLLBACK STOP	SM-ROLLBACK STOP-4IN	SM-ROLLBACK STOP-4IN	N/A	2
K	ROLLBACK SHIM	SM-ROLLBACK SHIM	SM-ROLLBACK SHIM	N/A	4
L	3/8"-16 X 3/4" HEX BOLT	WBOLT 0.375X0.750	WBOLT 0.375X0.750	WBOLT 0.375X0.750	8
M	3/8" LOCK WASHER	WASHER-L .375 GR8	WASHER-L .375 GR8	WASHER-L .375 GR8	8
N	3/8" FLAT WASHER	WASHER-F .375 GR8	WASHER-F .375 GR8	WASHER-F .375 GR8	8



PARTS GUIDE: SERIAL # F6046 (PAGE 17) SPECIAL JRB 416 INTERFACE

For Parts Contact: SAS FORKS Phone: 920-845-2307 Ext. 101 Email: parts@sasforks.com



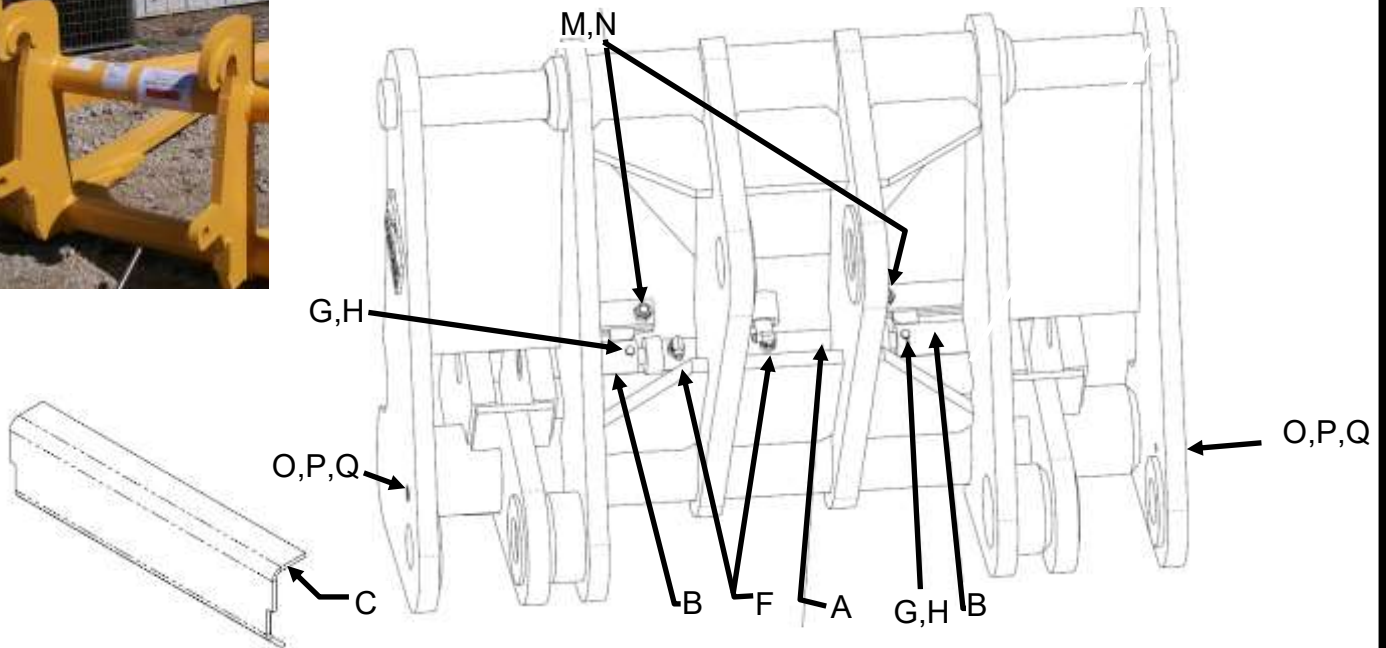
JRB416 Interface = Reference s/n SAS F6046

ITEM NUMBER	DESCRIPTION	TOOL INTERFACE	SERIAL NO. (AT TIME OF PUBLICATION)	PART #	QTY
A	HYDRAULIC CYLINDER 6,000 PSI MAX	JRB416	F5482, F5539, F6046	HY-CYL-1.25X08.00	1
A.1	CYLINDER SEAL KIT (N/A)			N/A	
B	LOCKING PIN	JRB416	F5482, F5539, F6046	0419CAS821E-5210 ASY	2
C	COVER (WELDED IN)			CUSTOM	1
D	N/A				
E	N/A				
F	90 FITTING	JRB416	F5482, F5539, F6046	HY-849-FSO-06X06	2
G	LOCKING PIN NUT	JRB416	F5482, F5539, F6046	WNUT 0.312-18-GR8-NY	2
H	LOCKING PIN BOLT	JRB416	F5482, F5539, F6046	WBOLT 0.3125X2.50GR8	2
I	HYDRAULIC HOSE	JRB416			
J	N/A				
K	N/A				
L	N/A				
M	GUIDE SHOULDER BOLT	JRB416	F5482, F5539, F6046	WBOLT 0.750X1.75 SLD	2
N	GUIDE NYLON LOCK NUT	JRB416	F5482, F5539, F6046	WNUT 0.625-11-NY	2
O	PIN RETENTION SPACER		F5482, F5539, F6046	SPACER-0625-0000	3
P	PIN RETENTION BOLTS		F5482, F5539, F6046	WBOLT 0.625X1.50 GR8	3
Q	PIN RETENTION WASHER		F5482, F5539, F6046	WASHER-F 0.625 GR8	3



PARTS GUIDE: SERIAL # F5576 (PAGE 18) SPECIAL JRB 418 INTERFACE

For Parts Contact: SAS FORKS Phone: 920-845-2307 Ext. 101 Email: parts@sasforks.com



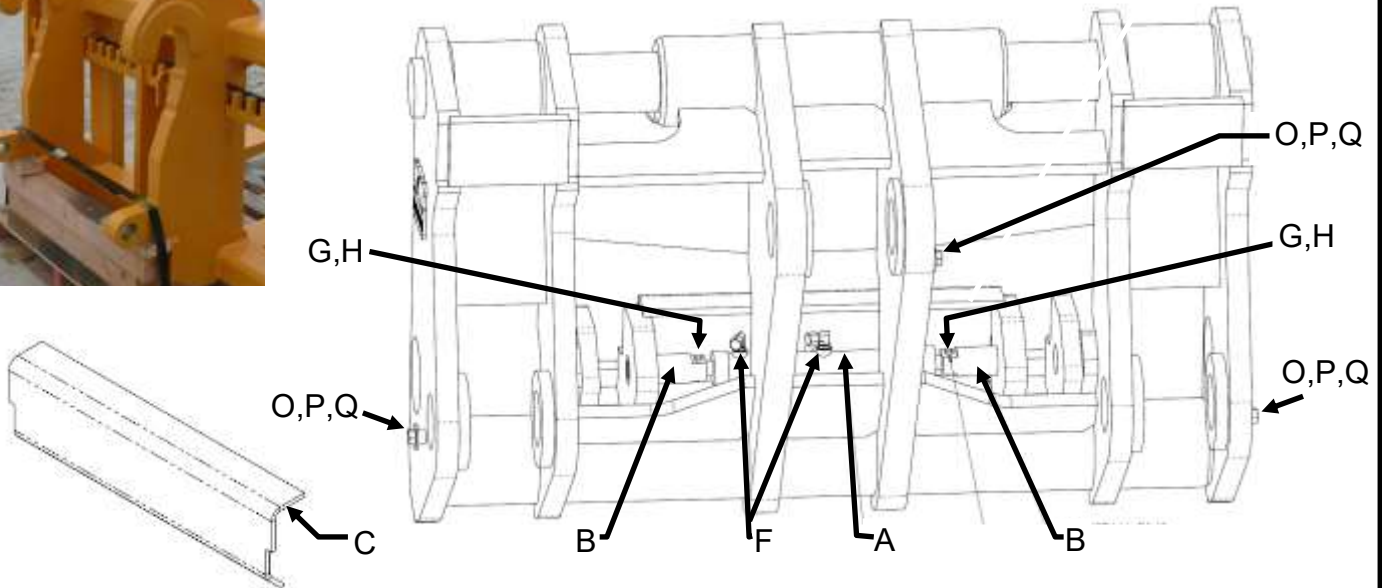
JRB418 Interface = Reference s/n SAS F5576

ITEM NUMBER	DESCRIPTION	TOOL INTERFACE	SERIAL NO. (AT TIME OF PUBLICATION)	PART #	QTY
A	HYDRAULIC CYLINDER 6,000 PSI MAX	JRB418	F5576:BOM#33	HY-CYL-1.25X08.00	1
A.1	CYLINDER SEAL KIT (N/A)			N/A	
B	LOCKING PIN	JRB418	F5576: BOM#24	0419KOM380-5146 ASY	2
C	COVER (WELDED IN)	JRB418	F5576: BOM#11	0402VOLL90-5576	1
D	N/A				
E	N/A				
F	90 FITTING	JRB418	F5576: BOM#34	HY-849-FSO-06X06	2
G	LOCKING PIN NUT	JRB418	F5576: BOM#31	WNUT 0.312-18-GR8-NY	2
H	LOCKING PIN BOLT	JRB418	F5576: BOM#29	WBOLT 0.3125X2.50GR8	2
I	HYDRAULIC HOSE	JRB418			
J	N/A				
K	N/A				
L	N/A				
M	GUIDE SHOULDER BOLT	JRB418	F5576: BOM#27	WBOLT 0.750X1.75 SLD	2
N	GUIDE NYLON LOCK NUT	JRB418	F5576: BOM#30	WNUT 0.625-11-NY	2
O	PIN RETENTION SPACER		F5576: BOM#35	SPACER-0625-0000	3
P	PIN RETENTION BOLTS		F5576: BOM#28	WBOLT 0.625X1.50 GR8	3
Q	PIN RETENTION WASHER		F5576:BOM#32	WASHER-F 0.625 GR8	3



PARTS GUIDE: SERIAL # F6040 (PAGE 19) SPECIAL JRB 420 INTERFACE

For Parts Contact: SAS FORKS Phone: 920-845-2307 Ext. 101 Email: parts@sasforks.com



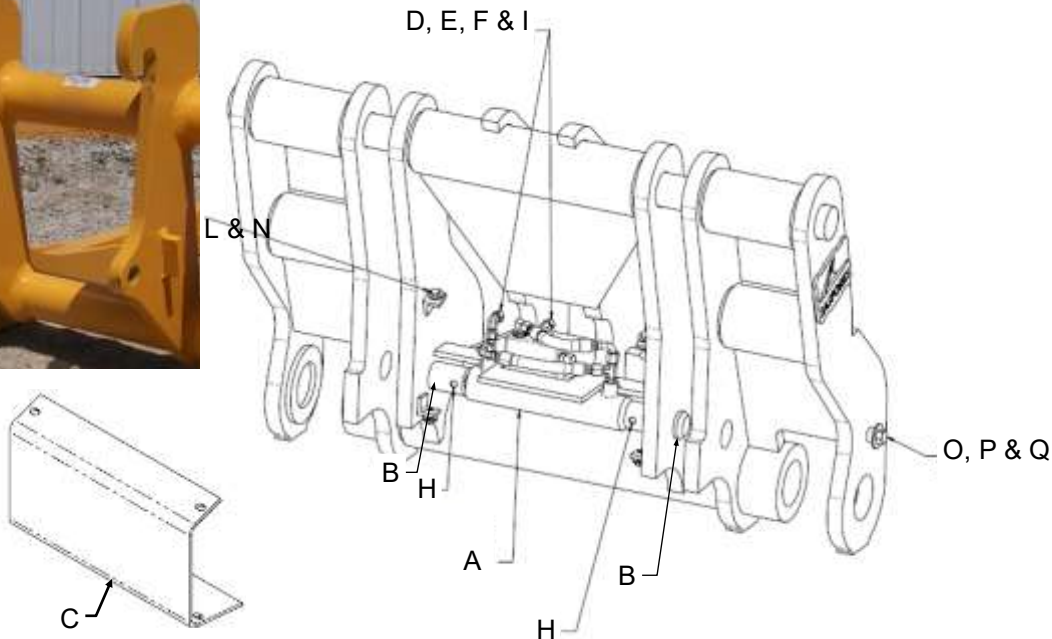
JRB420 Interface = Reference s/n SAS F6040

ITEM NUMBER	DESCRIPTION	TOOL INTERFACE	SERIAL NO. (AT TIME OF PUBLICATION)	PART #	QTY
A	HYDRAULIC CYLINDER 6,000 PSI MAX	JRB420	F6040	HY-CYL-1.25X08.00	1
A.1	CYLINDER SEAL KIT (N/A)			N/A	
B	LOCKING PIN	JRB420	F6040	0419DOO500-5934	2
C	COVER (WELDED IN)	JRB420	F6040	0416DOO500-5934	1
D	N/A				
E	N/A				
F	90 FITTING	JRB420	F6040	HY-849-FSO-06X06	2
G	LOCKING PIN NUT	JRB420	F6040	WNUT 0.312-18-GR8-NY	2
H	LOCKING PIN BOLT	JRB420	F6040	WBOLT 0.3125X1.50GR8	2
I	HYDRAULIC HOSE	JRB420			
J	N/A				
K	N/A				
L	N/A				
M	N/A				
N	N/A				
O	PIN RETENTION SPACER		F6040	SPACER-0625-0000	3
P	PIN RETENTION BOLTS		F6040	WBOLT 0.625X1.50 GR8	3
Q	PIN RETENTION WASHER		F6040	WASHER-F 0.625 GR8	3



PARTS GUIDE: SERIAL # F6074 (PAGE 20) SPECIAL CAT IT28 INTERFACE

For Parts Contact: SAS FORKS Phone: 920-845-2307 Ext. 101 Email: parts@sasforks.com



IT28 Interface = Reference s/n SAS F6074

ITEM NUMBER	DESCRIPTION	TOOL INTERFACE	SERIAL NO. (AT TIME OF PUBLICATION)	PART #	QTY
A	HYDRAULIC CYLINDER 3,500 PSI MAX	IT28	F6074	HY-CYL-2.00X6.22	1
A.1	CYLINDER SEAL KIT	IT28	F6074	HK-2.00-1809872	1
B	LOCKING PIN	IT28	F6074	0415CAS721IT28-6074	2
C	COVER	IT28	F6074	0412CAS721IT28-6074	1
D	CYLINDER FITTING	IT28	F6074	HY-849-FSO-06X06	2
E	T FITTING	IT28	F6074	HY-851-FSO-06X06	2
F	90 FITTING	IT28	F6074	HY-879-FS-06	1
G	N/A				
H	CONNECTOR DOWEL	IT28	F6074	0416CAS721IT28-6074	2
I	HYDRAULIC HOSE				
J	N/A				
K	N/A				
L	COVER BOLTS	IT28	F6074	WBOLT 0.375X0.75 GR8	4
M	N/A				
N	COVER WASHERS	IT28	F6074	WASHER-F 0.375-GR8	4
O	PIN RETENTION SPACER		F6074	SPACER-0625-0000	3
P	PIN RETENTION BOLTS		F6074	WBOLT 0.625X1.50 GR8	3
Q	PIN RETENTION WASHER		F6074	WASHER-F 0.625 GR8	3

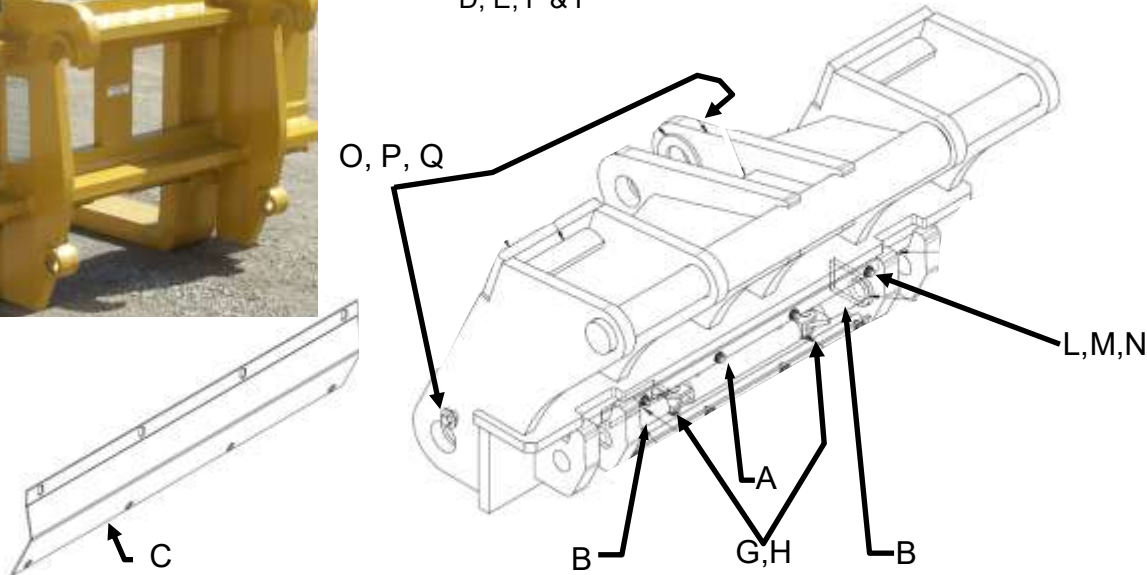


PARTS GUIDE: SERIAL # F5469 (PAGE 21) SPECIAL CAT IT38 INTERFACE

For Parts Contact: SAS FORKS Phone: 920-845-2307 Ext. 101 Email: parts@sasforks.com



D, E, F & I



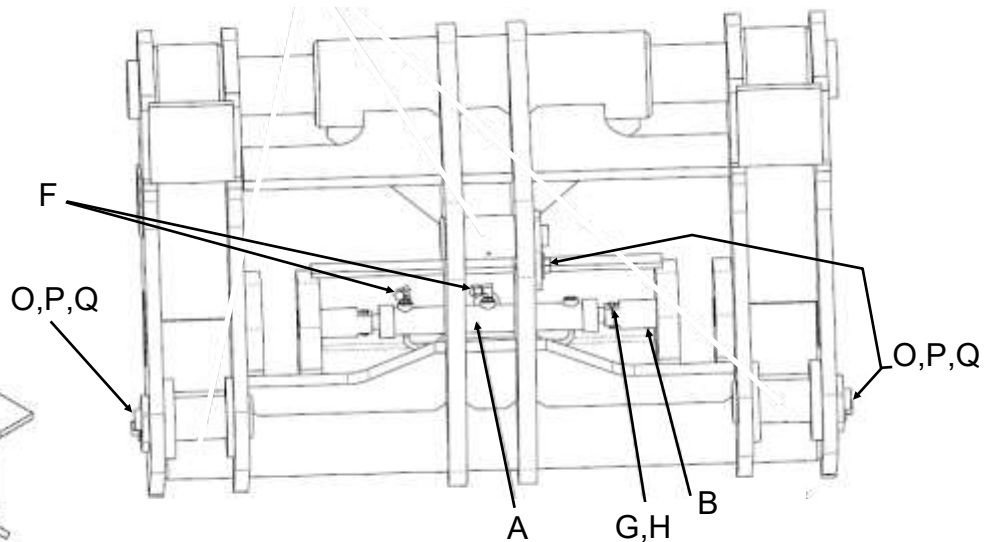
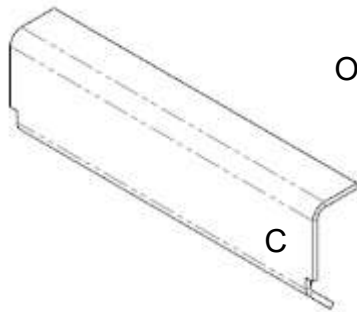
IT38 Interface = Reference s/n SAS F5469

ITEM NUMBER	DESCRIPTION	TOOL INTERFACE	SERIAL NO. (AT TIME OF PUBLICATION)	PART #	QTY
A	HYDRAULIC CYLINDER 3,500 PSI MAX	IT38	F5469	0400CATIT38-CYL	1
A.1	CYLINDER SEAL KIT (N/A)			N/A	1
B	LOCKING PIN	IT38	F5469	0400CATIT38-PINS	2
C	COVER	IT38	F5469	0422KOMWA380-4227	1
D	N/A			N/A	
E	STRT BULKHEAD FITTING	IT38	F5469	HY-832-FS-06	2
F	90 FITTING	IT38	F5469	HY-849-FSO-06X06	4
G	LOCKING PIN NUT	IT38	F5469	WNUT 0.625-11-NY	4
H	LOCKING PIN BOLT	IT38	F5469	WBOLT 0.750X1.75 SLD	2
I	HYDRAULIC HOSE	IT38	F5469	HY-HOSE-6M5K	2
J	N/A				
K	N/A				
L	COVER BOLTS	IT38	F5469	WBOLT 0.375X0.75 GR8	8
M	COVER LOCK WASHERS	IT38	F5469	WASHER-L .375-GR8	8
N	COVER WASHERS	IT38	F5469	WASHER-F 0.375-GR8	8
O	PIN RETENTION SPACER		F5469	SPACER-0625-0000	3
P	PIN RETENTION BOLTS		F5469	WBOLT 0.625X1.50 GR8	3
Q	PIN RETENTION WASHER		F5469	WASHER-F 0.625 GR8	3



PARTS GUIDE: SERIAL # F6094 (PAGE 22) SPECIAL CUSTOM INTERFACE

For Parts Contact: SAS FORKS Phone: 920-845-2307 Ext. 101 Email: parts@sasforks.com



Custom-F6094 Interface Reference: s/n SAS F6094

ITEM NUM- BER	DESCRIPTION	TOOL INTERFACE	SERIAL NO. (AT TIME OF PUBLICATION)	PART #	QTY
A	HYDRAULIC CYLINDER 6.000 PSI MAX	CUSTOM	F6094	HY-CYL-1.25X08.00	1
A.1	CYLINDER SEAL KIT	CUSTOM	F6094	N/A	1
B	LOCKING PIN	CUSTOM	F6094	0417KOM2505CSTM-6094	2
C	COVER (WELDED IN)	CUSTOM	F6094	0416KOM2505CSTM-6094	1
D	N/A				
E	N/A				
F	90 FITTING	CUSTOM	F6094	HY-849-FSO-06X06	2
G	CONNECTOR NUT	CUSTOM	F6094	WNUT 0.312-18-TN8-NY	2
H	CONNECTOR BOLT	CUSTOM	F6094	WBOLT 0.3125X1.50 GR8	2
I	HYDRAULIC HOSE				
J	N/A				
K	N/A				
L	N/A				
M	N/A				
N	N/A				
O	PIN RETENTION SPACER			SPACER-0625-0000	3
P	PIN RETENTION BOLTS			WBOLT 0.625X1.50 GR8	3
Q	PIN RETENTION WASHER			WASHER-F 0.625 GR8	3