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Make/Model:	Meter	Serial Number:	EQ Id: Fleet No:
JOHN DEERE HH60C	1	1T0HH60CHG0000154	HH60C

Service Reminders:
Gen1- Warranty

COMPLAINT:

Disassemble and inspect for damage and rebuild the breaker if necessary.

THIS WO IS THE REPAIR OF THE ATTACHMENT THAT CAUSED THE FAILURE ON THE MACHINE 1FF060GXCGJ287832. WO 179815. DALTON IS AWARE WE OPENED A NEW WORK ORDER FOR THE ATTACHMENT REPAIR. WO 179815, IS THE REPAIR FOR THE MACHINE. BEFORE SUBMITTING THIS WO NEED TO SEND A COPY TO DALTON.

CAUSE:

When breaker was brought in, there was suspicion that the breaker is what caused the 60G linked to this work order to fail. The Breaker was brought in the shop to begin disassembly. When parts were ordered for the breaker, all parts were ordered on October 22 2017, the seals, diaphragms and regulator assembly (spool, seals, shims ex.) arrived on November 18 2017. The cylinder and piston were shipped from over-seas and didn't arrive until December 5 2017. Once breaker was assembled and the accumulators ready to be charged, we asked for the accumulator charging kit JDG 11007 containing tools JDG 15049 & JDG 15051 within Murphy Tractor from the Park City store on December 13 2017, and the charge kit arrived at the Topeka store December 27 2017 (2 weeks later).

CORRECTION:

MASTER:Y
 KEYPART:T37011
 FAILURE CODE: LACK OF POWER
 FAILURE AREA: INTERNAL FAILURE IN THE BREAKER
 DOWNTIME: 50
 OWNED: SOLD
 PHASE OF WARR: BASIC
 DTAC CASE:

REPAIR: 15.59

- (.25) The mounting cap was first removed along with 10 cap screws
- (.10) The nitrogen charge was relieved from the breakers accumulators. To do this, the cap the covers the accumulator gas chamber plug was removed, then the plug was slowly backed off to relieve what nitrogen charge was left.
- (.10) Then the shell for the breaker was removed as well. After the shell cap screws were removed, the two shell covers were removed and set aside.
- (.05) Once shells were removed the breaker itself was placed on a work bench to be disassembled and shells were placed under my work bench where they were out of the way.
- (.10) To start with, the hydraulic hammer cover was removed.
- (.05) After the hammer cover cap screws were removed, there was still a bit of a seal on the head. To break this seal, a dead blow was used to tap the head loose. Once off, the head was set aside to be inspected.
- (.05) When the head was pulled off, the visible components of the breaker were inspected. There was a small amount of metal filings in the oil. This was the first indication that the breaker had failed internally.
- (.10) Once the head was off, the high pressure accumulator bottom that covers/contains the lower diaphragm was removed using M6 cap screws. This sleeve was also lightly tapped out with a dead blow because of the seal.

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Service Reminders:

- (.10) When the high pressure accumulator bottom's seal was broke and the two O-rings were removed as well, components were inspected and there was a little oil trapped behind the diaphragm. This oil had more metal mixed in then in the hydraulic head.
- (.30) After the accumulator bottom was removed, the lower diaphragm cover, plastic assembly ring and diaphragm and sealing O-Rings were removed as well. To remove the diaphragm, a strait pick was used to get under the diaphragm to then work the lip up and over the piston housing. Again, when the diaphragm seal was broke loose, there was even more metal that came out. Removing the lower, low pressure diaphragm took half an hour because the diaphragm has a tight seal and needed to be worked a bit to get it slipped over the cylinder.
- (.15) After the diaphragms were removed, the distributor cover and distributor were removed. To remove them, 2 M6 cap screws were use and screwed into the pusher holes to then pull the distributor cover out. This also took a while because the distributor wasn't coming out strait. After maneuvering the distributor back and forth to get it lined up with the bore, the distributor finally came out.
- (.10) Once out, the distributor sleeve was removed and both inspected. When the distributor cover and distributor cover were inspected, there weren't any signs of scoring or flaking on the components. They were both set aside to be cleaned up and reused.
- (.04) After the distributor and distributor sleeve was removed, the piston was then removed from the cylinder. A M12 cap screw was screwed into the threaded hole of the piston and the piston was then removed. When the piston was removed, the steering ring came out with the piston
- (.10) When piston and steering ring was removed from cylinder, the components were inspected. The steering ring was free of scoring and flaking, but the piston was severely scored. When a figure nail was rubbed over the piston surface, it was very rough and abrasive to the touch. Scoring was very deep and scoring lines went length ways from one end of the piston to the other. The piston should've been smooth and have no abrasion to the touch
- (.10) After inspecting the piston, the cylinder was then inspected. The metal sealing surfaces on the cylinder that seals to the piston were also severely flaked and scored. The surfaces were rough to the touch and were obviously worn down quite a bit. All surfaces in the cylinder should be machined smooth like the piston
- (.05) When the steering ring was removed from the piston, the seal was then removed using a strait pick. The plastic wear ring was removed first, then the rubber O-ring and backing ring was removed as well. After getting the seals out of the steering ring, the steering ring was then placed aside to be cleaned and reused.
- (.30) Next, the roll pins that retained the seal carrier and the bit retainer were removed. To remove these roll pins, the silicone had to be removed out of the roll pins first. The silicone is used to keep grease in and dirt out. Both roll pins were cleaned out with a strait pick and small screw driver. Once cleaned, the roll pins were removed with a punch and hammer.
- (.10) Referenced service advisor to see how bit retainer was to be removed, no specific instruction on how to remove retainer. Servicer advisor stated remove retainer.
- (.50) Half an hour was then spent looking for race drivers and pieces of pipe to shim up the inside of the carrier so the retainer could be pressed out.
- (.25) Installed 3 jaw puller to attempt to pull bit retainer out, but no result
- (.25) Referenced service advisor again to see how retainer was removed
- (.50) After referencing service advisor for instruction, attempted to remove retainer from top side of cylinder.
- (.10) Measured diameter of the piston to fit a 42mm socket to place infront of old piston
- (.25) Using dead blow, the piston was rapped, the retainer then came out enough to tap out with dead blow.
- (.10) Removed seal carrier for bit and piston
- (.20) using strait pick, seals were removed from seal carrier
- (.10) Seal carrier was then inspected, no signs of scoring or other damage. Seals will be replaced. Seal carrier was set aside to be cleaned and reused
- (2.00) Once breaker was completely disassembled, the parts that were to be reused were cleaned with solvent, break clean and then wiped down with red rags. Once cleaned, parts were set aside and covered with red rags to prevent contamination from dirt and other debris on the shop.
- (.50) New Cylinder was removed from the shipment packaging and cleaned of the Cosmoline oil from shipment since cylinder and piston were shipped from over-seas. Cylinder was cleaned of oil with break clean and red rags
- (.15) When parts came in, the new seals were lubed with Hitachi Hydraulic oil before instillation. New O-Rings were installed on the seal carrier

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- (.08) Seal carrier was coated with Hitachi Hydraulic oil and installed in the new cylinder.
- (.09) Roll pins were then reinstalled in the cylinder to retain the seal carrier
- (.08) Roll pins were then filled with clear silicon as instructed by Service Advisor
- (.45) Piston was then removed from shipment packaging and cleaned of Cosmoline oil with brake clean and red rags as well
- (.10) Piston was then lathered with Hitachi Hydraulic oil, a M12 cap screw was installed in top of the cylinder and cylinder was then installed as well. Piston was then, very lightly rapped in with a small dead blow to get piston past the seals and seated
- (.25) New seals were then installed on Steering ring for piston, steering ring was also lathered in Hitachi Hydraulic oil, then installed in cylinder. New seals were stiff and difficult to maneuver in the steering ring.
- (.10) Distributer was then installed. Distributer was coated in Hitachi Hydraulic oil then installed into the steering ring.
- (.25) Distributor cover was also coated in Hitachi Hydraulic oil, and then 2 M6 cap screws were installed into the distributor cover. Tolerances between cylinder and cover are tight, so installing cover took 15min to get cover maneuvered strait so it was installed strait.
- Distributor cover was installed so the top of the distributor was flush with the top of the cylinder
- (.25) Swivel coupling assembly was removed from hydraulic cover to be cleaned
- (.04) Swivel coupling was cleaned out with brake clean
- (.02) 2 new O-Rings were then coated with Hitachi Hydraulic oil and installed in the swivel coupling assembly to seal the hydraulic oil passages to the hammer cover.
- (.50) Spring housing was then disassembled to be inspected. No signs of metal contamination
- (.25) O-Rings were then removed from the spring housing cap, and installed with 2 new seals
- (.05) O-Rings and sealing rings were also removed and new O-Rings were coated with Hitachi Hydraulic oil before reinstalled into the spring housing.
- (.02) Spring housing end plug was reinstalled and torqued to 89 ft/lbs per Service Advisor instructions
- (.45) New shims and regulator spring and new spool were installed into the Hydraulic spring housing. Shims were installed to obtain a .080in gap between the spring housing cap and hammer cover.
- (.10) Once the .080in gap was obtained, spring housing cap was then removed again and silicon grease installed to hold shims and spring in place during installation, the spring housing cap was torqued to 148 ft/lbs per Service advisor instructions
- (.05) Swivel coupling assembly was then coated with Hitachi Hydraulic oil and then reinstalled to the Hammer Cover. Swivel Coupling cap screws were then torqued to 52 ft/lbs per Service advisor instructions
- (.10) Next, new lower seal for low pressure diaphragm was coated in Hitachi Hydraulic oil and then installed on cylinder
- (.25) New upper seal for low pressure diaphragm was coated in Hitachi Hydraulic oil as well, then installed. Seal was stiff and was worked to get over lip into seals groove
- (.10) New accumulator diaphragm membrane was coated with silicon grease per Service Advisor instructions.
- (.50) New accumulator diaphragm membrane was installed on new cylinder. Again, membrane was stiff and had to be worked over the cylinder to be installed into position.
- (.75) Accumulator diaphragm cover was also coated in Hitachi Hydraulic oil and outside of accumulator diaphragm membrane coated in silicon grease per service advisor instructions. Old diaphragm cover was reinstalled. Installing took 45 min because of new seals and tight tolerances. After working the cover, the cover was installed over accumulator diaphragm membrane.
- (.02) Plastic assembly ring was then installed on top of the Low pressure diaphragm cover.
- (.03) After getting the plastic installation ring installed, the 4 O-Rings that seal the oil passages between the hydraulic head and cylinder. Before the O-Rings were installed, they were coated with Hitachi Hydraulic oil.
- (.02) O-Rings were then installed in the hydraulic hammer cover for the High pressure Diaphragm. O-Ring was coated in Hitachi Hydraulic oil before installation.
- (.02) O-Rings and diaphragm were then coated with Hitachi Hydraulic oil and installed on the accumulator bottom.
- (.03) Accumulator bottom was then coated with Hitachi Hydraulic oil and installed into the Hydraulic hammer cover. Accumulator bottom was then pressed into the hammer cover to lock components together
- (.01) Once in, the sealing ring between the hydraulic hammer cover and the cylinder was coated with Hitachi Hydraulic oil, and then installed into the hammer cover and cylinder.
- (.25) Hammer cover was then lightly coated with Hitachi Hydraulic oil before being installed on the hammer cylinder. The 4 retaining cap

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Service Reminders:

screws were installed with locking washers and then torqued to 450 ft/lbs as instructed by service advisor

(.75) Once hammer cover was on and once the charge kit arrived for machine, the accumulators were charged with nitrogen. Low pressure accumulator charged to 218 psi. High pressure accumulator charged to 580 psi per Service Advisor instructions. Once charged, charging system was let set to stabilize of a couple minutes.

(.50) Once accumulators were charged, the shell for breaker was placed on the floor to place the breaker back into the shell. Once in, the shell cap screws ha copper anti-seize applied to the threads, and then tightened down.

(.50) The quick coupler mounting plate was then attached to the breaker shell. Cap screw had 242 medium strength locktite applied to the threads to help resist vibration during operation. The cap screws were then installed and tightened down as well

(.25) Hydraulic hoses were then reinstalled on the swivel coupling assembly.

(.10) Hammer bit was then greased before hooking up to machine for testing.

(.50) Breaker was then attached to a 60D mini excavator to check operation. Breaker operated smoothly without any issues.

(.25) Attachment was then looked over for any signs of leaks, no leaks were present.

(.25) Hydraulic hammer was then palatized for customer to pick up.

<u>PartNumber</u>	<u>Description</u>	<u>Quantity</u>	<u>Net Price</u>	<u>Extended Price</u>	<u>Taxed Ind</u>
AT264318	O-Ring	1.00			
AT460370	Cylinder	1.00			
HA-04-9	Hose Assy	1.00			
L101732	O-Ring	1.00			
L33070	O-Ring	1.00			
L53890	O-Ring	2.00			
M131866	HYDR. QUICK	1.00			
M131867	HYD. QUICK	1.00			
T370061	Shim	1.00			
T370062	Shim	1.00			
T370066	O-Ring	1.00			
T370068	Sealing Ring	2.00			
T370069	Spring	1.00			
T370083	Diaphragm	1.00			
T370089	Diaphragm	1.00			
T370102	Washer	1.00			
T370106	Spool	1.00			
T370111	Piston	1.00			
T370119	Seal	1.00			
T370177	Seal	1.00			
T370186	Seal	1.00			
T370198	O-Ring	2.00			
T370199	O-Ring	2.00			
T370200	Seal	1.00			

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Service Reminders:

T370201	Seal	1.00
T370208	Seal	1.00
T75462	O-RING	2.00
T80123	O-RING	1.00
Z29066	O-Ring	1.00
<u>Miscellaneous</u>	<u>Description</u>	<u>Quantity</u>
FREIGHT	SHIPPING & HANDLING	1.00
FREIGHT	SHIPPING & HANDLING	1.00

Miscellaneous Charges:

L

Sub-Total: \$10,737.06

Please remit payments to Murphy Tractor at the address shown on your monthly statement.

Customer PO No:

Tax Exempt No:

Advisor:

Labor:

Parts:

OL&M:

Misc:

Sales Tax:

Total:

\$10,737.06

TERMS AND CONDITIONS

Received by:

Date: