Fireweed Heavy Truck & Equipment Repairs Ltd.
9220 60 Avenue Northwest
Edmonton, AB T6E 0C1, CA
shop@fireweedheavy.ca
587-469-8202

FIREWEED
HEAVY TRUCK & EQUIPMENT REPAIRS

Invoice: INV-FW-20281
Date: 7/26/2023

Bill To
K.R.Nott Holdings Limited

Remit Payment To
Fireweed Heavy Truck & Equipment Repairs Ltd.
9220 60 Avenue Northwest
Edmonton, AB T6E 0C1, CA

Service Order	Terms	Due Date	Authorizer	Customer PO	Service Writer	Unit #
SO-FW-11772	COD	7/26/2023			Hames, Carrie	4

Item	Description	Quantity	Rate	Amount
	Complaint: Coolant in fuel			
	Cause: #1, 4 & 6 injector cups leaking			
Labor	**Correction:** Engine / Cooling / Inspected fuel/water separator, confirmed there is coolant in the bottom of the fuel/water separator. This contamination would be happening likely due to failed injector sleeve o rings, there is also a chance the head is cracked. Will need to pull injectors, inspect bores & pressure test. Blew off valve cover & fuel lines. Removed air intake piping from across the valve cover. Removed valve cover. Removed all high pressure fuel lines & labelled. Removed fuel line connector nuts. Removed fuel line connectors & labelled. Vacuumed excess oil out of top end & leaked fuel out of fuel line connector bores. Removed injector hold down bolts & hold downs & removed all 6 injectors. Upon removal looks like there is signs of coolant in #1 bore, the others appear ok except #6, #6 has a significant coolant leak, coolant is leaking into bore with just head pressure in reservoir, (see pics). Drained coolant below cyl head lvl to relieve head pressure, leak on #6 stopped. Pressure tested system, at 8 PSI #1, 4 & 6 cylinders all leaking coolant, see pics. Left coolant in pail overnight, inspected in morning, no fuel has separated to top of coolant, no fuel smell. Coolant system should be ok. Will need to drain out bottom of each fuel tank to check for coolant, drain until coolant stops & clean fuel flows out. Removed fuel transfer hose. Drained each tank, drained about 6 litres + of coolant out of LH tank before clean diesel started draining out, drained maybe 1 litre out of RH side before diesel started flowing.	6.50000	$143.37	$931.91

Item	Description	Quantity	Rate	Amount
	Will let sit & drain again. These injector cups are press fit from factory & not replaceable without a machine shop. There are 3 options for the customer: 1- The option cummins gives is to install retaining rings above the injector cups to eliminate the leak, then pressure test to confirm repair, **this is not a long term solution, eventually the leak will return, #6 is bad enough it may not even seal with the ring.** 2- The other option is to purchase an aftermarket kit where we can remove the current cups, tap threads into the cylinder head, thread new cups into head as a long term fix 3- Is for us to remove the head & send it out to be tested in machine shop to see if cups can be replaced or if head is too worn, in which case a new head will be required Customer advised that he has warranty for this repair. Contacted his warranty company & started the claim process. All further repairs/actions on act 3. - Completed: 7/25/2023			
Parts	valve cover gasket	1.00000	$151.33409	$151.33
Parts	COOLANT RED 50/50	2.00000	$14.62512	$29.25
Parts	injector sealing ring kit (ORING & COPPER WASHER)	6.00000	$19.936	$119.62
Parts	Injector o-rings	6.00000	$14.176	$85.06
			Subtotal	$1,317.17

Complaint: #1, 4 & 6 injector cups leaking - cylinder head needs replacement

Cause: #1, 4 & 6 injector cups leaking - cylinder head needs replacement

(Inspection)

Labor	**Correction:** Engine / Top End / Pull cylinder head & replace as required by cummins & agreed upon warranty quote. Pulled up ECM image & sent off to warranty company. Continued corresponding with warranty company as necessary for claim approval. Drained remaining coolant from unit. Removed air intake piping on both sides as well as positive air shut off. Removed turbo downpipe, all lines (oil/coolant/electrical) & pulled turbo. Removed exhaust manifold. Removed thermostat housing. Removed EGR mixer tube & bracket. Recovered AC system. Removed fan belt & AC belt. Removed AC condenser lines. *Upon removal of lower condenser line both body clamp bolts broke due to being seized, more time added to drill new hole.* Removed compressor to evaporator line & capped, pulled AC compressor & capped lines. Removed wiring to alternator & removed. Removed accessory mount bracket. Removed fan belt tensioner. Removed OEM & cummins wiring harnesses from engine & secured out of the way.	31.00000	$143.37	$4,444.47

Item	Description	Quantity	Rate	Amount
	Removed fuel common rail & mount bracket. Covered all open fuel connections. Removed crankcase breathe filter housing & bracket. Removed shroud from in front of rad/air cooler/condenser *both upper bolts broke off on LH upper side of shroud due to being seized, more time added to drill new holes to secure.* Removed AC condenser & air to air cooler from rad. Removed upper/lower rad hoses. Leaned rad ahead & removed fan hub/fan assembly. Removed PS cooler. Removed rad. Pressure washed rad out as per customer, also noticed AC condenser quite dirty/plugging, pressure washed out as well *extra time added for this*. Went to remove upper gear cover to access camshaft, vibration damper must be pulled to access all bolts. Removed all bolts & went to remove, vib damper & pulley seized onto crank nose. Buffed nose as well as possible, used air hammer on face of pulley & puller & chisel to free it all up, had to work back & forth to remove *more time added for this.* Buffed nose of crank. Removed upper gear cover & gasket. Turned engine over to base timing position. Unloaded lower idler scissor gear. Removed camshaft idler gear assembly. Set up puller & removed camshaft gear. Backed off any tight rocker arms & pulled both rocker arm assemblies. Removed all valve bridges & labelled. Removed injector harness. Removed camshaft from cyl head. Removed all head bolts. Set up forklift & pulled cyl head. Plugged oil galleries & buffed/cleaned cylinder block surface until all old head gasket material cleaned off. Turned engine over & inspected pistons/liners/engine block deck surface visually, all look ok, crosshatch still present on cylinder walls, no damage or scratching on cyl walls. Clamped cyl liners down & measured cylinder liner protrusion & found all within spec, an average present of about .009", spec is 007"-012". When head arrives will need to install all removed components, perform valve set, run/take unit for test drive. Shut off both ball valves on bottom of fuel tanks, removed fuel crossover line. Cracked ball valves & drained coolant out that has separated to bottom of tanks until clean stream of diesel came out. Got probably 6 litres out of the LH tank. Will let separate again & drain at end of repair. Buffed/cleaned/inspected all removed parts/sealing surfaces (intake/exh manifolds, thermostat housing, valve bridges, camshaft, rocker arms/shafts, valve cover, gear cover, gears, fuel lines). All parts look ok & in good condition for reuse. Cleaned all built up carbon out of intake manifold. Removed copper sleeves & o rings from all injectors & cleaned, all look ok for reuse. With clean block deck surface placed new head gasket on, lifted & set new cyl head in place squarely. Lubed all new head bolts & installed all. Torqued in 3 stages to spec as per cummins. Lubed all camshaft bearings & reinstalled camshaft. With engine in base timing location (timing pin & camshaft wedge installed) reinstalled camshaft idler gear & cam gear & set geartrain backlash as per cummins, torqued both gears up in stages as per cummins.			

Item	Description	Quantity	Rate	Amount
	Reinstalled all valve bridges with clean eng oil. Reinstalled all rocker arms & both rocker shafts. Turned engine over until both rocker shafts fully seated & torqued to spec. Turned engine over as required & performed valve set. Installed new cooper sleeves on all injectors & new lubed orings & reinstalled all in correct bore, reinstalled fuel connectors in correct bores with new lubed orings & torqued all to spec in stages as per cummins. Reinstalled injector harness with new oring, tightened down all mounts & reinstalled all injector/jake brake connectors. Turned engine over, engine turned over as it should. Reinstalled all other removed components with new gaskets/seals as required (upper gear cover, valve cover, thermostat housing, intake/exh manifolds, turbo, down pipe, fuel lines, coolant lines, egr mixer tube, rad, PS cooler, air to air cooler, AC condenser, AC lines, fan hub, fan shroud, accessory bracket, AC compressor/alternator, AC & fan belts, OEM & Cummins wiring harnesses, crankcase filter bracket/housing torqued down where required (turbo, intake/exh manifolds, fuel lines, coolant lines, gear cover & valve cover). Vacuumed down coolant system & filled with new coolant. Left coolant jug in cab. Pressure tested unit, inspected for leaks, no coolant leaks found from any of the removed coolant lines, no other leaks found. Tied up all wiring so none would rub. Cycled key switch multiple times to prime fuel system. Cracked ball valves on bottom of fuel tanks again & drained what coolant had separated again, almost none came from RH tank, drained some from LH tank. Reinstalled & tightened crossover fuel line. Opened ball valves. Pressure washed engine bay area. Filled PS reservoir Cranked unit over, unit fired up & ran well, ran on high idle for a few minutes to check for leaks, none seen. Bled PS system & topped off. CEL came on. Read code, found an open for the crankcase filter heater circuit. Inspected wiring & found it has corroded out in the female deutsch connector, broke apart when removed. Spliced new connector into female side of wiring, *more time added for this repair,* reinstalled & ran unit, code cleared. No other codes present. Took unit for lengthy test drive. Unit ran well, jake brake working as it should, temperatures within spec, no leaks or codes present. Coolant level stayed up where it should. Released unit. - Completed: 7/25/2023			
Parts	head gasket	1.00000	$780.08713	$780.09
Parts	head bolts	22.00000	$43.65871	$960.49
Parts	cam cover o rings	1.00000	$27.375	$27.38
Parts	gear cover gasket	1.00000	$106.84564	$106.85
Parts	exhaust manifold gasket	6.00000	$56.74068	$340.44
Parts	intake manifold gasket	1.00000	$144.46956	$144.47
Parts	turbo mount gasket	1.00000	$50.65	$50.65
Parts	thermostat	1.00000	$174.94381	$174.94
Parts	thermostat housing gaskets	2.00000	$56.19042	$112.38
Parts	cylinder head bolts long	4.00000	$51.45	$205.80
Parts	sealing o-ring	1.00000	$36.15	$36.15

Item	Description	Quantity	Rate	Amount
Parts	O-ring for small plate-Inner-Possibly	1.00000	$55.85	$55.85
Parts	GASKET,EXHAUST MANIFOLD	4.00000	$53.31212	$213.25
Parts	Thermostat Housing gasket	1.00000	$72.55019	$72.55
Parts	thermostat housing gasket	1.00000	$75.83061	$75.83
Parts	COOLANT RED 50/50	16.00000	$14.62512	$234.00
Parts	exhaust manifold mount studs	12.00000	$31.424	$377.09
Parts	high pressure common rail fuel line sealing washers	2.00000	$30.525	$61.05
Parts	gasket for coolant manifold at rear right corner of head	1.00000	$74.15866	$74.16
Parts	cylinder head	1.00000	$10,619.73713	$10,619.74
Parts	Oring	1.00000	$40.875	$40.88
Parts	Oring	1.00000	$42.25	$42.25
Parts	Cam position Sensor	1.00000	$94.09514	$94.10
Parts	Dirty Core for Cam position Sensor	-1.00000	$33.00	**-$33.00**
Parts	Inherent Core for Cam position Sensor	1.00000	$33.00	$33.00
Parts	DELO SYN ATF HD	2.00000	$9.02849	$18.06
Parts	SEAL O-RING	6.00000	$11.296	$67.78
Parts	GASKET,OIL DRAIN	1.00000	$13.184	$13.18
Parts	GASKET, EXH OUT CONN	1.00000	$46.60	$46.60
Parts	A/C O-RING KIT	3.00000	$8.064	$24.19
Parts	7/8 GR8 PLATED WASHER	2.00000	$0.72881	$1.46
Parts	Dirty Core for cylinder head	-1.00000	$1,063.74	**-$1,063.74**
Parts	Inherent Core for cylinder head	1.00000	$1,063.74	$1,063.74
			Subtotal	$19,516.13
Inspection				
Labor	Quality Control: Quality control check list to be completed before the unit leaves the shop and the job can be called complete.	0.10000	$0.00	$0.00
			Subtotal	$0.00

Unit: 4 **VIN:** 1XKWD49X9EJ968481
License Plate: (AB) a30460
2014 Kenworth W9 Series
Chassis: 614,443 Kilometers
Engine: 13,280 Hours

Labor	$5,376.38
Parts	$15,456.92
Shop Supplies	$500.00
Pre-Charge Subtotal	$21,333.30
GST (5% of $21,333.30)	$1,066.67
Total	$22,399.97
Payments & Credits	$22,399.97
Balance Due	$0.00

Payment Information

Date Created	Date Applied	Payment #	Method	Reference #	Amount
7/18/2023	8/18/2023	4766057	EFT	EFT 2023-07-18	$2,899.97
8/23/2023	8/23/2023	4787266	EFT	EFT 2023-08-23	$19,500.00

GST#82594 9613 RT0001

The prices, quantities and estimated labour times stated in any estimate are not binding to Fireweed Heavy Truck & Equipment Repairs Ltd. They are estimates only, which Fireweed Heavy Truck & Equipment Repairs Ltd. will make reasonable efforts to achieve.

By authorizing this service order/estimate, you hereby declare that you have the legal right to authorize repairs for the above listed vehicle, either through legal ownership, lease rights, or authorization fro Fireweed Heavy Truck & Equipment Repairs Ltd. has the legal right to place a garage keeper's lien on your vehicle. If the payment arrangements are not met, Fireweed Heavy Truck & Equipment Repairs payment plans or installments will not be accepted. If full payment is not made, actions can be taken further to collect funds as stated in the Garage Keeper's lien Act.

Fireweed Heavy Truck & Equipment Repairs Ltd. has the right to retain possession of your vehicle until balance is paid in full.

FIREWEED
HEAVY TRUCK & EQUIPMENT REPAIRS

K.R.Nott Holdings Limited

Quality Control
Completed Date: 7/18/2023
Unit: 4 **VIN:** 1XKWD49X9EJ968481
Year/Make/Model: 2014 Kenworth W9 Series
Chassis Kilometers: 614,443 Kilometers (6/26/2023)
Engine Hours: 13,280 Hours (6/26/2023)
Service Order: SO-FW-11772

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Complimentary:

Procedure	Result	Procedure	Result	Procedure	Result
1. Has the V.I.N.been entered in the SO? Is the V.I.N. correct?	Satisfactory	2. Confirm unit number is correct.	Satisfactory	3. CVIP Expiry Date. Month/Year	Satisfactory (4/24)
4. Grease prints	Satisfactory	5. Check for excess grease/dirt on floor/pedals	Satisfactory	6. Torque tag on signal stalk (if required)	N/A
7. Tools left on, under or around vehicle	Satisfactory	8. Oil/fluid spills on vehicle components	Satisfactory	9. Check for jack stands	N/A
10. Remove floor mats	Satisfactory	11. Remove seat cover	Satisfactory	12. New C.V.I.P. certificate on vehicle (if required)	N/A (na)
13. Fluid levels (if applicable)	Satisfactory	14. Air leaks	Defective	15. Wheels and Fasteners	Satisfactory
16. Components loose/hanging?	Satisfactory	17. Fluid Leaks	Satisfactory	18. Noise, grinding, knocking	Satisfactory
19. Vehicle mileage checked and recorded on service order	Satisfactory (614460)	20. Engine hours checked and recorded on sevice order	Satisfactory (13281)	21. Service due sticker placed in a conspicuous location	Satisfactory
22. Hood latched	Completed				

Technician: Sawyer Roth **Digital Signature:** Sawyer Roth **Date:** 7/18/2023