



ROCKY MOUNTAIN EQUIPMENT

Rocky Mountain Equipment LP o/a Rocky Mountain Equipment

BALZAC
260180 Writing Creek Crescent
Rocky View County, AB T4A 0M9
Tel: (403) 513-7000
Fax: (403) 532-4706
Toll Free: 1-855-763-1427

INVOICE

Ship to: LZAC

Invoice to:

Branch		
Date	Time	Page
06/17/22	22:02:22 (B)	02
Account No.	Phone No.	Reference No.
HALWA014	7804458323	W54868
Ship Via	Purchase Order	
EST# 014799	EST# 014558	
	G.S.T. No.	
	79759 4660 RT0001	
Credit Card No.	Salesperson	
	305	

Description of Work and Parts

STK#/FLEET#	HRS	PIN/EIN	WARRANTY DATE	HRS	Fold - - - -
159557					

STEIGER TRACTOR 2224 ZBF125644
ST450

- Attach the crane to the engine and lift the engine assembly out. Secure the engine on stands.
 - Dispose of old coolant and oil.
 - Clean up the work area and put tooling away.
- May 6, 2022 (00861)
- Remove valve cover.
 - Set engine to TDC on #1 cyl. Loosen all rocker arms and remove the rocker arm/shaft assembly.
 - Disconnect and remove the injector harness.
 - Remove the valve bridges.
 - Remove the camshaft.
 - Remove all wiring and hoses that attach to the cyl head.
 - Loosen and remove the head bolts. Lift the cylinder head assembly off of the engine.
 - Remove the fuel pump and fuel hoses.
 - Remove the engine flywheel.
 - Remove all front acc drive components. A/C compressor, alternator, front dampener, And idler pulleys.
 - Remove engine wiring harness and ecu.
 - Attach lifting eyes to the front of the block. Lift engine and place upright.
 - Remove the oil pickup tubes.
 - Remove #2 rod and piston assembly.
 - Pull out the #2 cylinder sleeve. Found that the orings are deteriorated and the sleeve has damage around the oring lands.
 - Inspect the cylinder block. Found that the block has grooving/pits where the liner orings sit.
 - Remove the #1 piston/rod and sleeve. #1 is hole also has damage.

CONTINUED ON PAGE 03

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	ST450					

- Look up pricing and availability on a short block and long block option for the customer.
- Clean up the work area and put tooling away.
- May 9, 2022 (00861)
- Strip down cylinder head to be sent away to the machine shop. Remove the exhaust manifold and turbo charger assembly. Remove fuel fittings. Remove 6 injectors. Clean injectors and record QR codes. Package injectors to be sent for testing.
- Wrap cylinder head and place on a pallet.
- Remove Air seeder monitors and harness for the customer.
- May 10, 2022 (00861)
- Sit with parts and prepare a parts estimate for all needed parts to complete the repair.
- June 3, 2022 (00861)
- Install # 1&2 sleeves into the old block.
- Install 1&2 piston and connecting rod assembly's.
- Attach lifting chains and flip the engine block.
- Remove oil pump.
- Remove the lower idler gear
- Remove the aux drive gear and housing assembly.
- Remove the flywheel/timing gear housing. Take to the wash bay and power wash.
- Clean and cover all parts.
- June 6, 2022 (00861)
- Lift the new short block out of the shipping crate. Place the engine on stands.
- Install the oil pump onto the new short block using new gasket. Torque hardware.
- Install the lower idler gear and torque hardware

CONTINUED ON PAGE 04

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- Install the aux drive housing with new orings and gaskets. Install the aux drive gear and torque hardware. June 8, 2022 (00861)
- Swap the block heater assembly.
- Swap the oil cooler assembly using new orings and gaskets. Torque hardware to spec.
- Swap all plugs and fittings from the old block to the new one.
- Swap the oil fill tube using a new gasket.
- Swap the dipstick tube.
- Swap the front crank pulley
- Install lifting hooks on the cyl head
- Lift the cylinder head onto a work bench. June 9, 2022 (00861)
- Install all sensors, plugs and fittings on the cyl head.
- Install engine brake adapter shanks.
- Clean the sealing surfaces on the head and the engine deck.
- Install new guide dowels on the deck and install a new head gasket.
- Crane the cylinder head and position into place on the block.
- Lubricate and install the head bolts.
- Follow the tightening procedure and torque all head bolts in a 4 step process.
- Clean all 6 fuel injectors. Reseal and install injectors. Torque the hold down clamps to specification.
- Clean the camshaft. Lubricate cam bearings and install camshaft.
- Clean all valve bridges and install.

CONTINUED ON PAGE 05

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- Clean the rocker arm assembly. Found that the valve adjuster keeper rings are worn on all the exhaust valve adjusters. Have parts dept prepare a quote to replace.
 - Install the fuel filter head assembly.
 - Install the grid heater and intake housing using new gaskets.
 - Reseal and install the water pump.
 - Clean the valve cover and install to keep debris out of the engine.
 - Clean up the work area and put tooling away.
- June 13, 2022 (00861)
- Install new exhaust rocker arms and adjusters onto the rocker shaft. Attach rocker shaft lifting tool. Install the rocker arm shaft. Install and torque retaining hardware to specification.
 - Clean the sealing surfaces on the flywheel/timing housing. Apply sealant and lift the housing into place. Torque hardware to spec.
 - Install the intermediate idler gear and torque hardware.
 - Install the camshaft gear. Check backlash on the cam gear and adjust to spec.
 - Install the Flywheel and snug bolts.
 - Install dial indicator on #1 injector lobe and preform the timing procedure. Adjust timing to .210" as per instructions. Torque the camshaft gear.
 - Adjust the timing tone wheel to 54deg BTDC. Torque hardware.
 - Preform valve lash adjustment. Set all intake, exhaust and injectors to specification.
 - Install the injector harness.

CONTINUED ON PAGE 06

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STEIGER TRACTOR
ST450

2224 ZBF125644

- Install a new gasket on the valve cover and install. Torque hardware to spec.
- Lift the engine assembly. Install the oil pickup and return tubes with new gaskets.
- Clean the oil pan. Install a new gasket. Install the pan and torque hardware.
- Install the front engine mount.
- Place the engine assembly on stands and blocks.
- Clean up the work area.
- June 14, 2022 (00861)
- Clean the crankcase breather assembly. Install the main cover and torque hardware. Install new seals for the filter cover. Install new breather filter and cover.
- Clean sealing surfaces on the exhaust manifold. Install the manifold with new gaskets and torque bolts.
- Install new studs for the turbo charger. install new turbo with gaskets.
- Install the turbo oil supply and return tubes with new gaskets.
- Install the turbo heat shield.
- Install the thermostat housing assembly.
- Install the lower coolant water neck with a new gasket.
- Install coolant tubes.
- Install a new engine oil filter.
- Install the fuel pump.
- Install and tighten all external fuel lines.
- Install a new fuel filter.
- Remove the flywheel. Press in a new rear main seal. Install flywheel and torque hardware.
- Install all engine sensors.

CONTINUED ON PAGE 07

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	ST450					

- Install the engine ECU and wiring harness. Route the harness and plug in. Secure with clamps and cable ties.
 - Install all front drive acc, idler pulleys and tensioner pulleys. Install alt, a/c compressor. Install the drive belt.
 - Install the starter.
 - Paint the engine assembly.
- June 15, 2022 (00861)
- Crane the engine assembly back into the machine. Install and tighten front/rear engine mounting hardware.
 - Install the rear driveshaft.
 - Install the viscous fan assembly.
 - Install power/ground cables.
 - Plug in all electrical connections and secure harness.
 - Install heater hoses.
 - Plug in the DEF bundle.
 - Install fuel hoses.
 - Install upper/lower rad hoses.
 - Install air to air tubes.
 - Attach a/c hoses
 - Install exhaust tubes.
 - Lift the hood mounting frame into place and tighten hardware.
 - Install hoses to the coolant surge tank.
 - Install the air intake tube.
 - Add new coolant
 - Add new engine oil
 - Replace the primary engine air filter
 - Bleed the fuel system. Start the machine and check over for leaks. Looks good.

CONTINUED ON PAGE 08

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- Verify all fluid levels and top up.
- June 16, 2022 (00861)
- Take machine out and test in the yard to verify the repair. Run for a couple hours. Bring unit back in. Double check for leaks.
- Install rear safety/heat panels.
- Lift the hood on. Tighten hardware and attach hood struts.
- Charge the air conditioning system to specification.
- Install both engine side panels.
- Clean up the work area and put all tooling away.
- Return cores to parts dept.

ADDITIONAL DESCRIPTION: _____

** KEY LEFT IN TRACTOR **

ANT1	ENVIRO ANTIFRZ	60	.16	9.60
B96104	CASE IH DRK GRE	1	19.64	19.64
FIL2	ENVIR FILT>8"	2	1.00	2.00
FREIGHT	FREIGHT	3	21.67	65.00
OIL1	ENVIRO OIL LTR	29	.10	2.90
17275510	DOWEL	2 N	69.56	139.12
17277981	O-RING	1	.99	.99
17281381	O-RING	1	1.93	1.93
17283181	O-RING	1 N	2.63	2.63
17283581	O-RING	2 N	6.65	13.30
17290781	ORING	1	9.35	9.35
17291281	GASKET	1	12.38	12.38
17292281	O-RING	2 S	20.90	41.80
2996234	GASKET	2	29.93	59.86
4897111	O-RING	1	18.43	18.43
500054690	GASKET, CY	1 N	682.65	682.65

CONTINUED ON PAGE 09

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500086331	FILTER ELEMENT			1	106.36		106.36
500309014	GASKET			1	80.80		80.80
500343518	GASKET			1	9.13		9.13
500362150	GASKET			1	34.91		34.91
500368916	DOWEL			1 N	7.95		7.95
500387958	GASKET			1 N	25.30		25.30
500388968	SEAL			1 N	16.23		16.23
504042516	O-RING			1 N	32.81		32.81
504045787	SEAL			1 N	13.48		13.48
504045796	SEAL			1 N	45.94		45.94
504110736	KIT, REPAI			6 N	61.43		368.58
504153481	FILTER, AI			1	123.62		123.62
504154280	GASKET			6	12.93		77.58
504375264	GASKET			1	17.60		17.60
504382741	ROCKER ARM			6 N	423.30		2539.80
5801385950	STUD			2	12.93		25.86
5801419739	TUBE			1 N	712.05		712.05
5801464913	GASKET			1	293.55		293.55
5801491036	NUT			2	19.75		39.50
5801560870	WASHER			8	5.10		40.80
5801604942C	CORE-TURBO			1-	382.50		382.50-
5801604942R	REMAN-TURB			1 N	3075.73		3075.73
5801604942C	CORE-TURBO				382.50		382.50
5801625924	O-RING			1	92.14		92.14
5801663526	SEAL, OIL			24 O	7.53		180.72
59913	ULTRA GREY			1	34.73		34.73
73344233	15W40 NO.1 2.5G			1	68.60		68.60
73344234	15W40 NO.1EN 5G			1	126.95		126.95
73344304	OT 50/50, 2.5G			6	53.35		320.10
8094252C	CORE-SHORT ENGI			1-	1530.00		1530.00-

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8094252R	REMAN-SHORT ENG			1 N 26925.00		26925.00
8094252C	CORE-SHORT ENGI			1530.00		1530.00
84174189	HOSE, INTA			1 N 102.01		102.01
84349222	GASKET			2 15.68		31.36
84349224	GASKET			1 45.41		45.41
84597068	FILTER, FU			1 81.60		81.60
87356545	FILTER, AIR			1 205.28		205.28
9827059	O-RING			3 3.80		11.40
99448739	GASKET			1 12.10		12.10
99452273	GASKET			1 N 13.20		13.20
99453959	SCREW			2 N 42.26		84.52
99466940	GASKET			1 N 10.81		10.81
99475979	GASKET			1 5.55		5.55
	PARTS					37120.64
	LABOR					10500.80
13500007	SEGMENT TOTAL==>					47621.44

***** WORK ORDER TOTALS *****

PARTS	37120.64
LABOR	10500.80
DISPOSAL FEE	210.01
SHOP SUPPLIES	300.00
SUB TOTAL==>	48131.45
GST 797594660	2406.62
VISA	50538.07

08835I

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