

HD372A DISASSEMBLY SLIDES

Each slide has a descriptive paragraph. Each paragraph has the main points outlined so reading the full text word for word is not necessary when presenting the slides.

This set consists of 31 slides.

#1 BLACKMER HD372A

The specific model used in this series is the HD372A. These pictures may also be used to describe two-stage models HDL372A, HD612A, HDL612A and single-stage models HD362A and HD602A. The other models will have some appearance differences, but assembly details are very similar.

#2 NAMEPLATE

- * **Model number**
- * **Serial number**
- * **I.D. number**
- * **Piston rod inspection**
- * **Have numbers handy when calling for assistance**

On the side of every Blackmer compressor is a nameplate which doubles as an access opening for piston rod inspection. The nameplate will show the compressor's model number and serial number. Also shown is the compressor's I. D. number, a coded number that fully describes the compressor's construction. When you call your Blackmer distributor or the factory for assistance, be sure to have these numbers handy.

#3 HD372A FLYWHEEL SIDE

- * **Suitable for many applications**
- * **Driven by 5 to 15 HP motor at 400 to 825 RPM**
- * **Air-cooled**

The HD372A is a two-stage, nonlubricated, reciprocating compressor designed to handle many different gasses. It is rated for up to 15 HP (11 kw) and is designed to run at 400 - 825 rpm. The HD372A is air-cooled and is normally fitted with an air-cooled intercooler. In normal service the intercooler is covered by a shroud which has been removed for these photos.

#4 HD372A OIL PUMP SIDE

- * **Liquid-cooled models available**
- * **Other sizes available**

#5 HEAD WITH SUCTION VALVE UNLOADERS

- * **Loadless starting**
- * **Constant speed operation**

#6 HEAD WITH STANDARD SUCTION VALVES

#7 REMOVING STANDARD VALVES

- * **Cap O-ring**
- * **REMOVE HOLD
DOWN SCREW FROM
VALVE CAP**

Blackmer also offers the model HDL372A with a water-cooled head, cylinder and intercooler. Larger two-stage models (HD612 & HDL612) and a smaller model (HD172) are available.

Optional suction valve unloaders may be fitted to allow the compressor to start in an unloaded state (loadless starting). They may also be used to unload the compressor while it is running (constant run or constant pressure operation). Both the first and second stage suction valves are fitted with an unloader.

The HD372A is a 2 cylinder compressor. Each cylinder is fitted with both a suction valve and a discharge valve.

Remove the valve caps to access the valves. Note the O-ring under each valve cap. The compressor I.D. number on the nameplate contains a code for the O-ring material used. After the valve caps have been removed, the valve hold down screws can be removed with a spanner wrench (such a Blackmer PN 790535). To prevent possible damage to the valves during reassembly, the hold down screws must be completely removed from the valve cover plates.

#8 VALVE COVER PLATES

- * **O-rings are not normally reusable**
- * **Reassemble covers first then the hold down screws.**

Once the valve caps and hold down screws have been removed, the cover plates can be removed. Note the O-Ring under the valve cover plate. Typically, O-Rings are not reusable and should be replaced any time the cover plates are removed. During reassembly the valve cover plates must be reinstalled first, then the hold down screws installed.

#9 VALVES

- * **Valve cages**
- * **Valves**
- * **Gaskets - usually iron**
- * **Always replace gaskets**

With the cover plates removed, the valve cage, valve and gasket may be taken out. Make sure the valve gaskets are removed with each valve. When they are left in the head, they may be very difficult to see. The valve gaskets are normally iron although other materials are occasionally used. Valve gaskets should be replaced anytime the valves are removed.

#10 REMOVING SUCTION VALVES WITH UNLOADERS

- * **O-ring**
- * **REMOVE HOLD
DOWN SCREW FROM
VALVE CAP**

Use a strap wrench to remove the unloader assembly and its O-ring. Alternately, a bar can be levered against a pair of unloader cap screws. Once the unloader assembly is removed, the valve hold down screw can be removed. When reassembling, make sure the cover plate is firmly secured before reinstalling the hold down screw.

#11 SUCTION VALVE REMOVAL

- * **Valve cage**
- * **Unloader plunger**
- * **Valve with actuator**
- * **Gasket - usually iron**
- * **Always replace gaskets**

Once the hold down screw is removed, the cover plate and its O-ring can be removed. Under the cover plate, you will find a cage, unloader plunger, suction valve with unloader actuator, and a valve gasket.

#12 SUCTION VALVE UNLOADERS

- * **PTFE unloader piston seals**

The unloader assembly consists of a cap, body with O-ring, and a piston with two spring loaded PTFE seals. The open side of the seals should face outward. The unloader actuator and spring are held to the valve with a snap ring.

#13 DISASSEMBLED VALVES

A disassembled suction valve is shown the left and a discharge valve is on the right. Each valve consists of a seat, bumper, springs, plate, threaded post, nut and lockwashers.

#14 INTERCOOLER

- * **Radiator & finned tube types**
- * **All steel**

Unbolt the intercooler assembly from the cylinder head. Note the intercooler flange O-rings, they are PTFE. Some models are fitted with a finned tube intercooler as shown on the right. Both styles are all steel construction.

#15 CYLINDER HEAD

- * **O-ring head-to-cylinder seals**

To remove cylinder head, unbolt the two center head bolts from the top of the head and eight head bolts from the bottom of the head. After the cylinder head bolts have been removed, the head may be lifted off the cylinder. Note the O-rings around each cylinder bore.

#16 PISTON REMOVAL

- * **Remove piston nut with spanner wrench**
- * **Spanner has ¼" pins**
- * **Piston nut has plastic insert**
- * **Unscrew piston with same spanner**
- * **Washer & shims are under piston**
- * **Shims adjust deck height**
- * **3 rings & expanders on each piston**

The piston nut is removed with an adjustable spanner. This spanner has two ¼" pins which fit into holes in the top of the piston nut. Note the nylon locking device on the piston nut. Once the piston nut has been removed, the same spanner can be used to unscrew the piston from the rod. Under each piston there is a thick washer and one or more adjustment shims used to adjust the height of the piston in the cylinder. This is called the deck height. Unless a major part like a piston, cylinder, or crosshead has been changed, the deck height should not need adjustment. Rotate the crankshaft to bring the other piston to top-dead-center for removal. Each piston is fitted with three piston rings. Each ring has a stainless steel expander behind it.

#17 PISTON & CYLINDER

- * **Ring gap is 180° from expander gap**
- * **Stagger ring gaps around the piston**
- * **Two O-rings**
- * **Passage between bores**

When reinstalling the piston rings and expanders, each piston ring should be installed with its gap 180° from the expander's gap. The gaps of the piston rings should be staggered equally around the piston. With the pistons removed, the cylinder can be unbolted and lifted off to allow access to the packing boxes. Two O-rings seal the bottom of the cylinder. Notice the passage in the bottom of the cylinder between the bores. This allows gas to move from one cylinder to the other under the pistons as the pistons move up and down.

#18 PACKING BOX REMOVAL

- * **Remove hold down screw with spanner**
- * **Hold down screw has plastic insert**
- * **Packing box O-rings**

The packing boxes are secured by a hold down screw which is removed with the same adjustable spanner that was used on the piston nut and piston. Notice that the hold down screw also has a plastic insert that keeps it in place. Next the packing boxes themselves may be lifted off the rod. O-Rings seal the top and bottom side of the packing boxes.

#19 PACKING BOX DISASSEMBLY

- * **Use screwdriver handle to depress spring while removing the retainer ring**

To remove the seals (packing) from the box, a pair of inside snap ring pliers is used to remove the top snap ring. The handle of a screwdriver can be used to slightly depress the spring to make this operation easier. Turn the packing box over to remove the bottom seal.

#20 ROD SEALS

- * **V-rings**
- * **Spring is next to the male seal ring**
- * **Oil deflector ring**

With the snap ring out, the top washer, the spring, the middle washer, the seal, the bottom washer and retainer ring can all be removed. The seal consists of three types of rings. One ring is a male ring, next is a series of V-rings, then a female ring. The upper and lower seals are the same. The seal orientation will depend on the operating pressures; however, the spring and washer always press against the male ring. The red oil deflector ring fits on the piston rod between the two seals. The holes in the side of the packing box allow the oil deflector ring to be guided onto the rod as the box is installed.

#21 PISTON ROD INSPECTION

With the nameplate removed, the piston rods and the top of the crossheads are visible.

#22 CRANKCASE AND CROSSHEAD

With the crosshead guide removed, the crosshead/piston rods are visible. The flat gasket that fits on top of the crankcase may need to be removed with a flat scraper.

- * **Gasket fits between crankcase & guide**

#23 OIL PRESSURE ADJUSTMENT & OIL STRAINER

The oil pressure adjustment complete with O-ring, locknut, spring and ball fits into the bearing carrier. Turning the screw inward (clockwise) increases the oil pressure setting. The oil pickup tube with washers, O-ring and strainer fits in the crankcase under the bearing carrier. If any foreign material is noted on the strainer, its source should be quickly identified to prevent reoccurrence of the problem. The pipe plug next to the oil pickup tube opening is the crankcase oil drain.

- * **Oil pressure adjustment screw & locknut**
- * **Oil strainer - clean when servicing**
- * **Oil drain plug**

#24 CROSSHEAD & CONNECTING ROD REMOVAL

The oil dipstick is located in the access cover which also includes a tag with the oil viscosity recommendations and capacity. Removal of the crankshaft access cover and gasket allows access to the connecting rods. After the bottom cap of the connecting rod has been removed, the piston rod/crosshead and the top half of the connecting rod may be lifted off from above.

- * **Access cover & gasket**
- * **Dipstick**
- * **Oil capacity tag**
- * **Connecting rod nuts are removed to take out crosshead & con rod**

#25 CONNECTING ROD AND CROSSHEAD

- * **Lubrication channels**
- * **Never remove piston rod from crosshead**
- * **Ductile iron rod**
- * **Press out wrist pin**
- * **Plastic retainer plugs**
- * **Bushing hole must align with the drilled port**
- * **Wrist pin bushing must be pressed in then honed**
- * **Split bearing on crank end**
- * **Tabs on bearings fit in slots in rod and cap**
- * **Keep rod caps on correct rod and note match marks**

#26 BEARING CARRIER REMOVAL

- * **Bearing carrier gasket**
- * **Oil pump drive slot and crankshaft drive pin**

The connecting rod and crosshead assembly are separated by removing the wrist pin in a bench press. Note that the wrist pin has a plastic retainer plug on each end. The piston rod is permanently secured to the crosshead at the factory and no attempt should be made to separate them. The grooves in the crosshead are lubrication channels.

The ductile iron connecting rod is rifle drilled to route oil to the wrist pin. An automotive type split bearing is on the crankshaft end and a bronze bushing is on the wrist pin end. When the wrist pin bushing is replaced, it must be honed to the final dimensions after being pressed into the connecting rod. The hole in the bushing must also align with the rifle drilled port. Tabs on the bearings fit into slots in the rod and cap. This keeps the bearing from spinning and lines up the hole with the rifle drilled port. Keep each connecting rod cap with its matching rod. Match marks are provided on the rod and cap to ensure proper orientation.

The entire bearing carrier / oil pump assembly with gasket can be removed as one to allow the crankshaft to be removed. Note the slot in the end of the oil pump drive shaft. When the bearing carrier is reinstalled, this slot must align with the drive pin in the end of the crankshaft.

#27 OIL PUMP

- * **Top, arrows indicate direction of rotation**
- * **Rotate pump cover to change direction of rotation**

Removal of the oil pump cover and its O-ring allows removal of the oil pump. Note the small O-ring on the oil pump shaft and the bronze bushing in the bearing carrier. The oil pump cover has the word "TOP" and an arrow cast on it in two places 180° apart. When reinstalling the cover, make sure that the arrow at the TOP of the cover indicates the proper rotation direction.

#28 CRANKSHAFT REMOVAL

- * **Lubrication holes in bearing journals**
- * **Spray nozzles**
- * **Crankcase breather**

Once the crosshead /connecting rods and the bearing carrier have been removed, the crankshaft is readily removed. Note the lubrication holes on the bearing journals. Also note the spray nozzles on the crankshaft. The spray nozzles lubricate the crosshead guide and main bearings. The top of the crankcase is fitted with a breather which prevents entry of foreign material into the crankcase but allows any excess pressure in the crankcase to be safely vented.

#29 BEARING COVER PLATE

- * **Shims adjust preload on main bearings**
- * **Oil seal**

The bearing cover plate is on the flywheel side of the crankcase. Behind this plate are shims which adjust the preload on the main bearings. These shims are normally reusable and the shim thickness will not have to be adjusted unless the crankshaft and/or main bearings are replaced. The bearing cover plate also contains a crankshaft oil seal.

#30 TOOLS

- * **Standard wrenches, etc.**
- * **Valve hold down screw wrench**
- * **Spanner wrench with ¼" pins**
- * **Snap ring pliers**
- * **Blackmer tool kit available**

In order to service Blackmer compressors, a suitable selection of tools must be available. You probably already have most of the standard wrenches and other tools that will be needed. Be sure you have a spanner wrench (such as Blackmer PN 790535) for the valve hold down screws, a pair of inside snap ring pliers, and an adjustable spanner wrench with ¼" pins (Blackmer PN 790316). Blackmer offers a complete tool kit for those who want to keep tools near the compressor.

#31 LITERATURE

- * **Parts list**
- * **Installation, operation, & maintenance manual**
- * **Other instructions with valves, packing**
- * **Call Blackmer distributor for literature**

Before starting work on your compressor be sure you have the appropriate literature handy. This should include the parts list and the installation operation and maintenance instructions. In addition you may have additional instruction sheets included with such items as valves and packing. If you do not have the proper literature, call your Blackmer distributor.