



TECHNICAL PUBLICATIONS

Parts Manual

HB4500





HB4500

For replacement copy order P/N 960-1024
Updated: 11/21/2019



Descriptions and specifications were current at the time of publication. However, Earth Tool Company LLC (HammerHead Trenchless) reserves the right to make changes in engineering, design and specifications; add improvements; or discontinue manufacturing at any time without notice or obligation. This manual may not reflect the most current version of your machine. Please visit www.hammerheadtrenchless.com for the most recent and up to date version.



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INTRODUCTION

HOW TO USE THIS MANUAL

This manual contains illustrations and parts list of components and assemblies which make up various HammerHead® models. Each page consists of the name of the assembly or component, a figure number, reference numbers, part numbers, part names, and the quantities of the parts used.

Assembly or component names help identify the illustration and parts for each figure. This name also helps locate the general area of the machine where the assembly or component can be located.

Figure numbers are used to identify each assembly or component and to group these assemblies or components into major categories.

Reference numbers shown in a column refers to the numbered parts in the illustration. This ties the part in the illustration to the part number and description in the parts list. Part numbers are used to identify individual parts or part assemblies.

Part descriptions provide the name of the part, plus additional information such as dimensional specifications and what parts are grouped together to form part assemblies, which helps you identify the part(s).

Quantities listed for each figure are only for that assembly or component and not the total used per machine unless stated so in the "Remarks" column.

This parts manual is not intended to be a complete guide for machine service or repairs. Contact your HammerHead dealer for any of your service or technical requirements.

ORDERING PARTS

Parts for repair or replacement are available through the worldwide network of authorized HammerHead dealers. The use of aftermarket replacement parts in your HammerHead equipment reduces performance and overall equipment life and may also void or interfere with the factory warranty.

Use only genuine HammerHead parts from your authorized dealer for repair or replacement.

Always give the serial number and model number of the machine for which parts are being ordered. When ordering parts for component(s), which are not manufactured by HammerHead Trenchless Equipment, also give the serial number of that component(s).

Order all parts by part number, part name, and quantity needed. Do not order parts by illustration reference numbers.

INTRODUCTION

UPDATING AND REORDERING MANUALS

The parts lists, illustrations, and specifications in this manual are based on the latest information available at the time of publication. Your machine may have product improvements and options not yet contained in this manual. Please check the web site at

www.hammerheadtrenchless.com for any updates.

Earth Tool Company LLC reserves the right to make changes at any time without notice or obligation to you. Your dealer will receive notice of these changes and can assist you with accurate parts identification when ordering.

A copy of this manual is supplied with each machine. Additional copies are available through your dealer. When ordering additional manuals, use the reorder number listed on the front cover and the quantity needed. Electronic copies of this manual are also available on the web at

www.hammerheadtrenchless.com.

OPERATIONS INSTRUCTIONS

Instructions on recommended equipment use and maintenance can be found in the Operator's Manual shipped with your equipment. Operator's Manuals are also available on the web at:

www.hammerheadtrenchless.com.

Thank you for buying and using Genuine HammerHead® Trenchless Equipment, parts and accessories.



A CHARLES MACHINE WORKS COMPANY

WARRANTY

Limited Warranty Policy

Earth Tool Company, LLC, dba HammerHead Trenchless (“HammerHead”) warrants each new industrial product of its own manufacture to be free from defects in material and workmanship, under normal use and service for one full year after delivery to the owner. During the warranty period, HammerHead shall furnish parts without charge for any HammerHead product that fails because of defects in material and workmanship. This warranty and any possible liability of HammerHead Trenchless here under is in lieu of all other warranties, express, implied, or statutory, including, but not limited to any warranties of merchantability or fitness for a particular purpose.

The parties agree that the Buyer’s SOLE AND EXCLUSIVE REMEDY against HammerHead, whether in contract or arising out of warranties, representations, or defects shall be for the replacement or repair of defective parts as provided herein. In no event shall HammerHead’s liability exceed the purchase price of the product. The Buyer agrees that no other remedy (including, but not limited to, incidental or consequential loss) shall be available to him. If, during the warranty period, any product becomes defective by reason of material or workmanship and Buyer immediately notifies HammerHead of such defect, HammerHead shall, at its option, supply a replacement part or request the return of the product to its plant in Lake Mills, Wisconsin. No part shall be returned without prior written authorization from HammerHead, and this warranty does not obligate HammerHead to bear any transpiration charges in connection with the repair or replacement of defective parts. HammerHead Trenchless will not accept any charges for labor and/or parts incidental to the removal or remounting of parts repaired or replaced under this Warranty.

This Warranty shall not apply to any part or product which shall have been installed or operated in a manner not recommended by HammerHead nor to any part or product which shall have been neglected, or used in any way which, in HammerHead’s opinion, adversely affects its performance; nor negligence of proper maintenance or other negligence, fire or other accident; nor with respect to wear items; nor if the unit has been repaired or altered outside of an HammerHead authorized dealership in a manner of which, in the sole judgment of HammerHead affects its performance, stability or reliability; nor with respect to batteries which are covered under a separate adjustment warranty; nor to any product in which parts not manufactured or approved by HammerHead have been used; nor to normal maintenance services or replacement of normal service items. Equipment and accessories not of our manufacture are warranted only to the extent of the original Manufacturer’s Warranty and subject to their allowance to us, if found defective by them. HammerHead reserves the right to modify, alter, and improve any product or parts without incurring any obligation to replace any product or parts previously sold with such modified, altered, or improved product or part. No person is authorized to give any other Warranty, or to assume any additional obligation on HammerHead’s behalf unless made in writing, and signed by an officer of HammerHead.

**HAMMERHEAD TRENCHLESS
LAKE MILLS, WISCONSIN**

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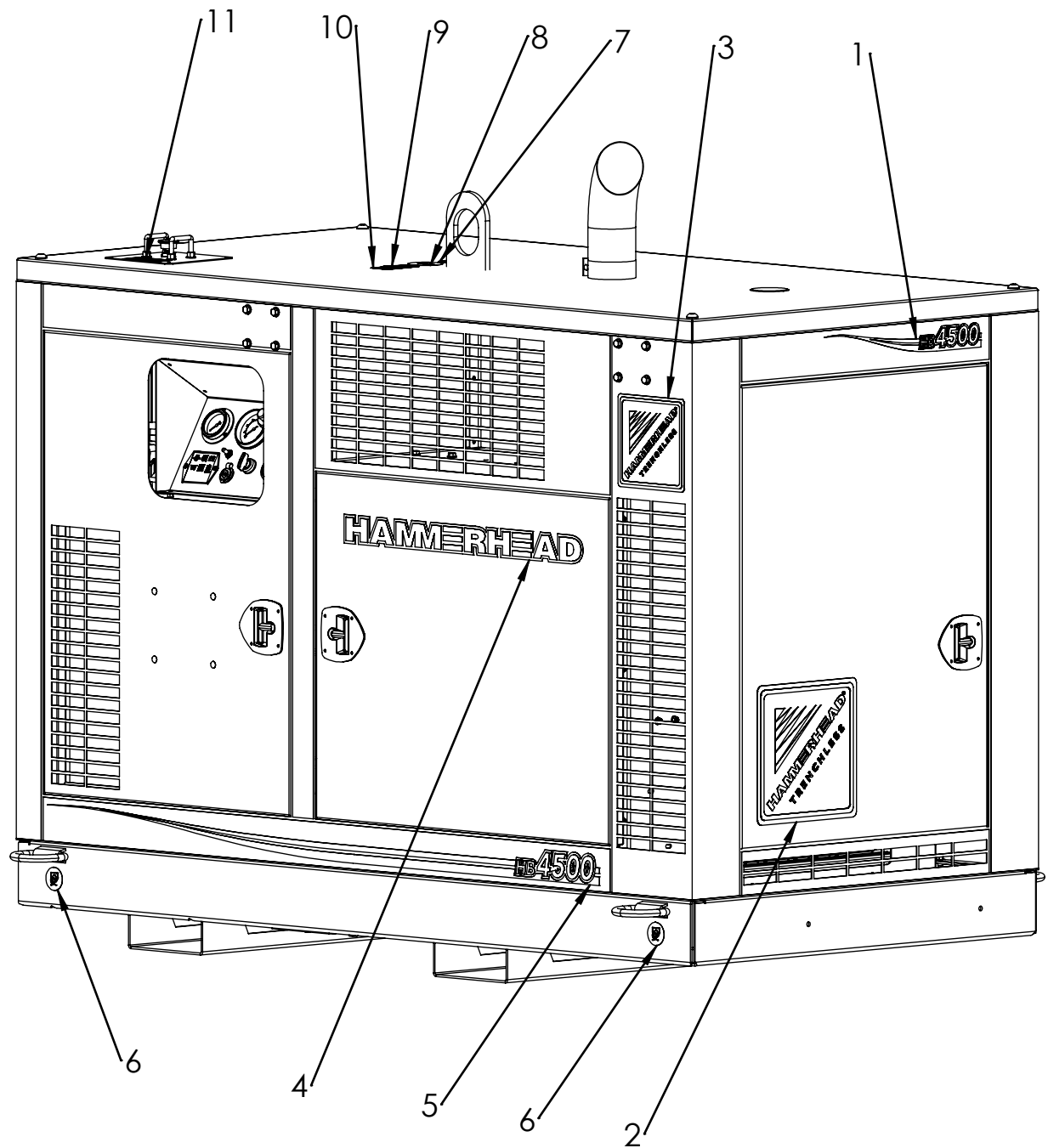
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DECALS

Exterior Decals

HB4500



Exterior Decals

HB4500

Bom ID	Part No	Description	Qty	Remarks
1	933-6032	DECAL, HB4500 SIDES	1	
2	912-4976	DECAL, HH MOUNTAIN SQ - 12X12	1	
3	912-4975	DECAL, HH MOUNTAIN SQ - 8X8	1	
4	912-4971	DECAL, HAMMERHEAD - 29"	1	
5	933-6033	DECAL, HB4500 FRONT & BACK	1	
6	909-8195	DECAL, TIE DOWN (SMALL)	2	
7	913-7311	DECAL, STAY CLEAR	1	
8	912-1130	DECAL, LIFT POINT	1	
9	913-7310	DECAL, BODY CRUSH	1	
10	923-2209	DECAL, FALLING LOAD (INT)	1	
11	933-6000	DECAL, REMOTE STOP	1	

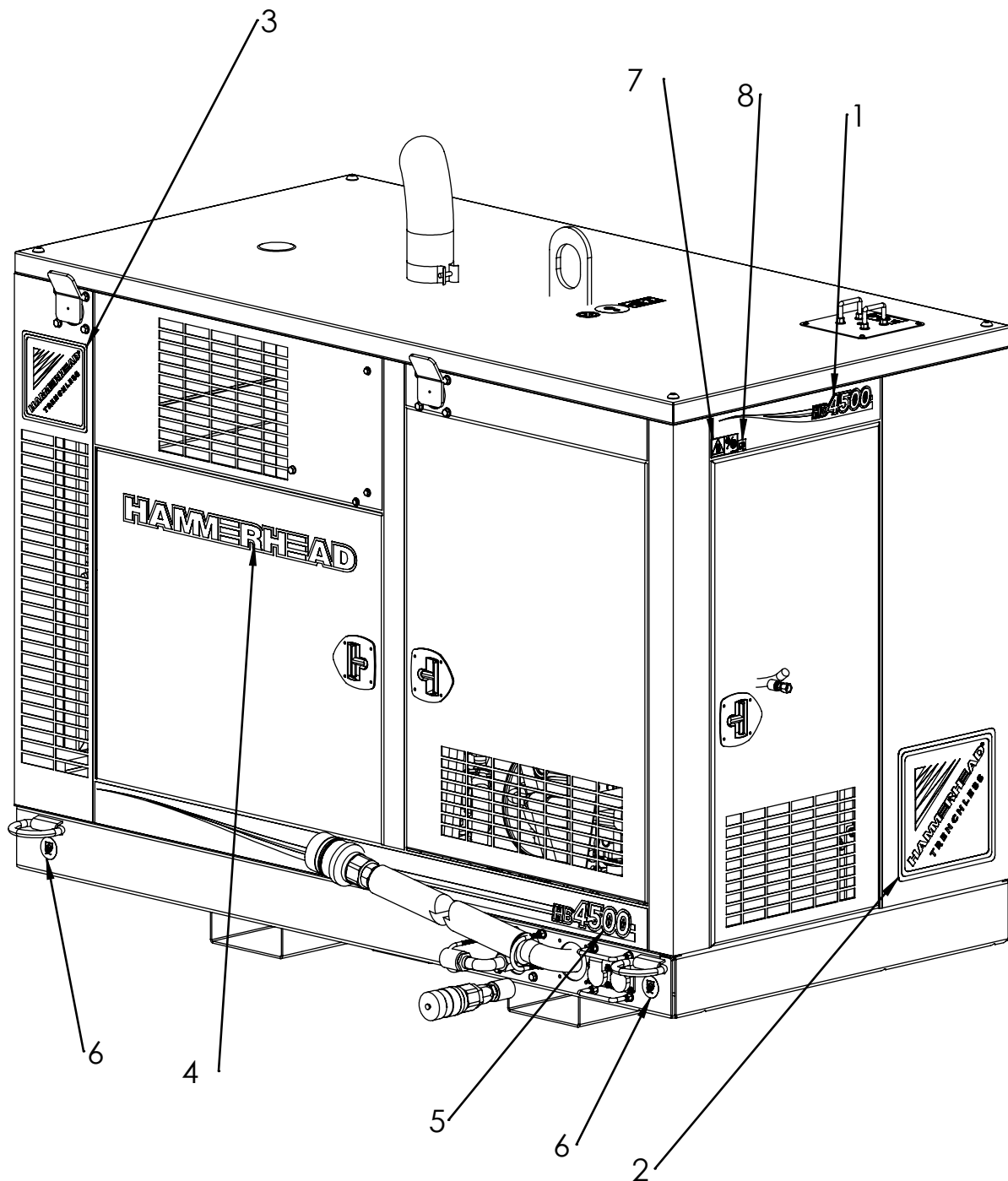
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Exterior Decals

HB4500



Exterior Decals

HB4500

Bom ID	Part No	Description	Qty	Remarks
1	933-6032	DECAL, HB4500 SIDES	1	
2	912-4976	DECAL, HH MOUNTAIN SQ - 12X12	1	
3	912-4975	DECAL, HH MOUNTAIN SQ - 8X8	1	
4	912-4971	DECAL, HAMMERHEAD - 29"	1	
5	933-6033	DECAL, HB4500 FRONT & BACK	1	
6	909-8195	DECAL, TIE DOWN (SMALL)	2	
7	913-0195	DECAL, REFUELING WARNING	1	
8	913-0198	DECAL, DIESEL FUEL	1	

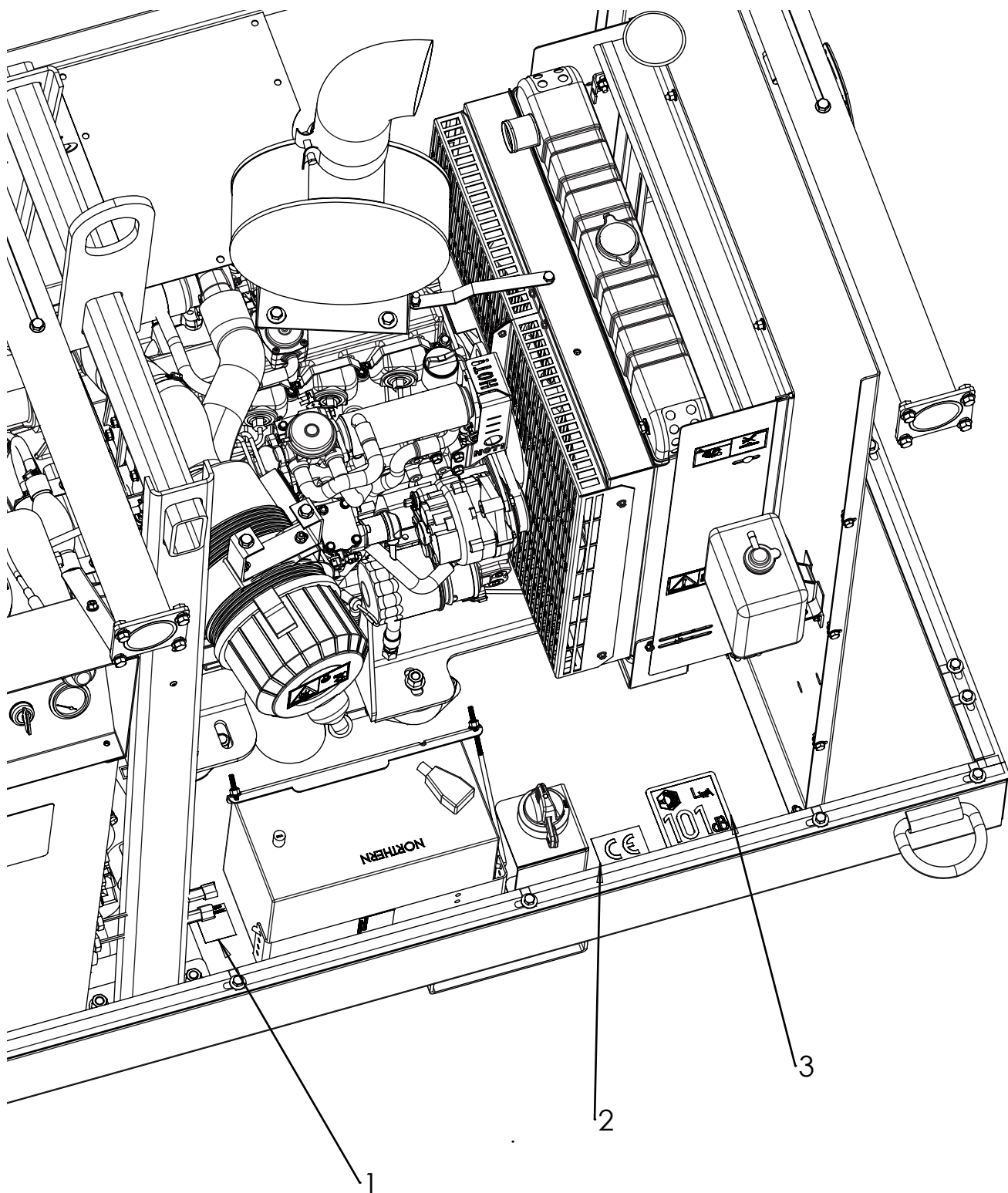
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Interior Decals

HB4500



Interior Decals

HB4500

Bom ID	Part No	Description	Qty	Remarks
1	933-6031	DECAL, SERIAL NO TAG HB4500	1	
2	274-364	EC MARK	1	
3	274-291	SOUND POWER	1	

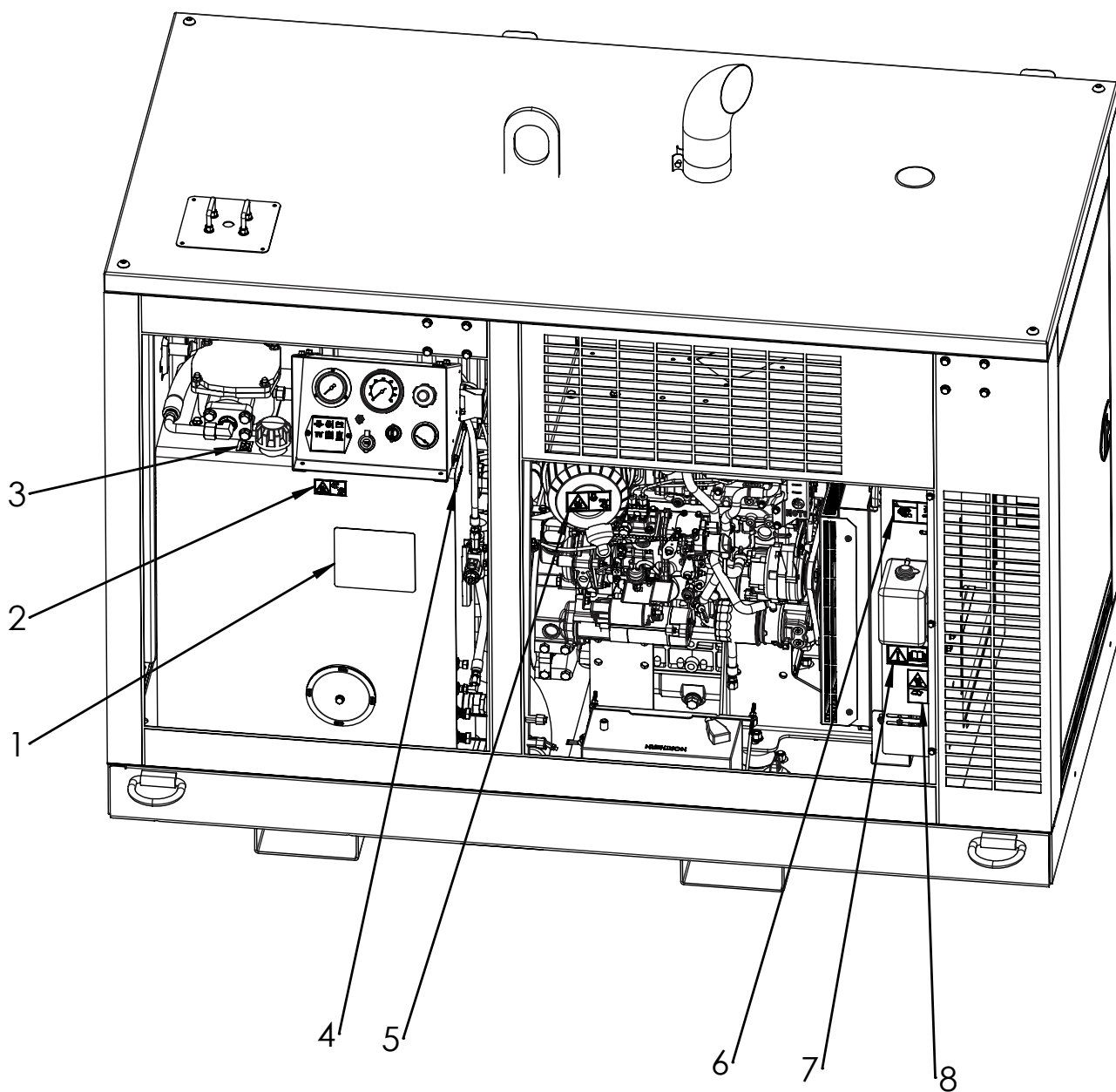
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Notes:

Interior Decals

HB4500



Interior Decals

HB4500

Bom ID	Part No	Description	Qty	Remarks
1	933-6054	DECAL, CU SERVICE INTERVALS	1	
2	923-2232	DECAL, ONE CALL (INT)	1	
3	912-1131	DECAL, HYDRAULIC OIL (INT)	1	
4	933-6023	DECAL, FUSE HB4500	1	
5	270-5742	WARNING NO ETHER/STARTER FLUID ISO	1	
6	913-0196	DECAL, COOLANT WARNING	1	
7	700-143	WARNING READ MANUAL ISO	1	
8	913-0194	DECAL, BATTERY WARNING	1	

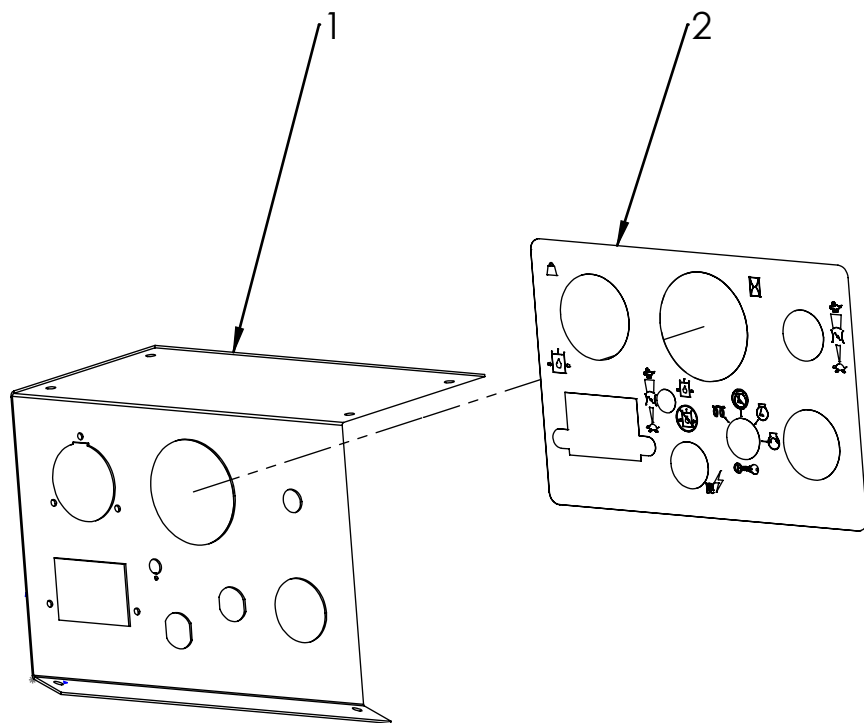
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Notes:

Control Panel Decal

HB4500



Control Panel Decal

HB4500

Bom ID	Part No	Description	Qty	Remarks
1	933-5589	CONTROL PANEL	1	
2	933-6001	DECAL, HB4500 CONTROL PANEL	1	

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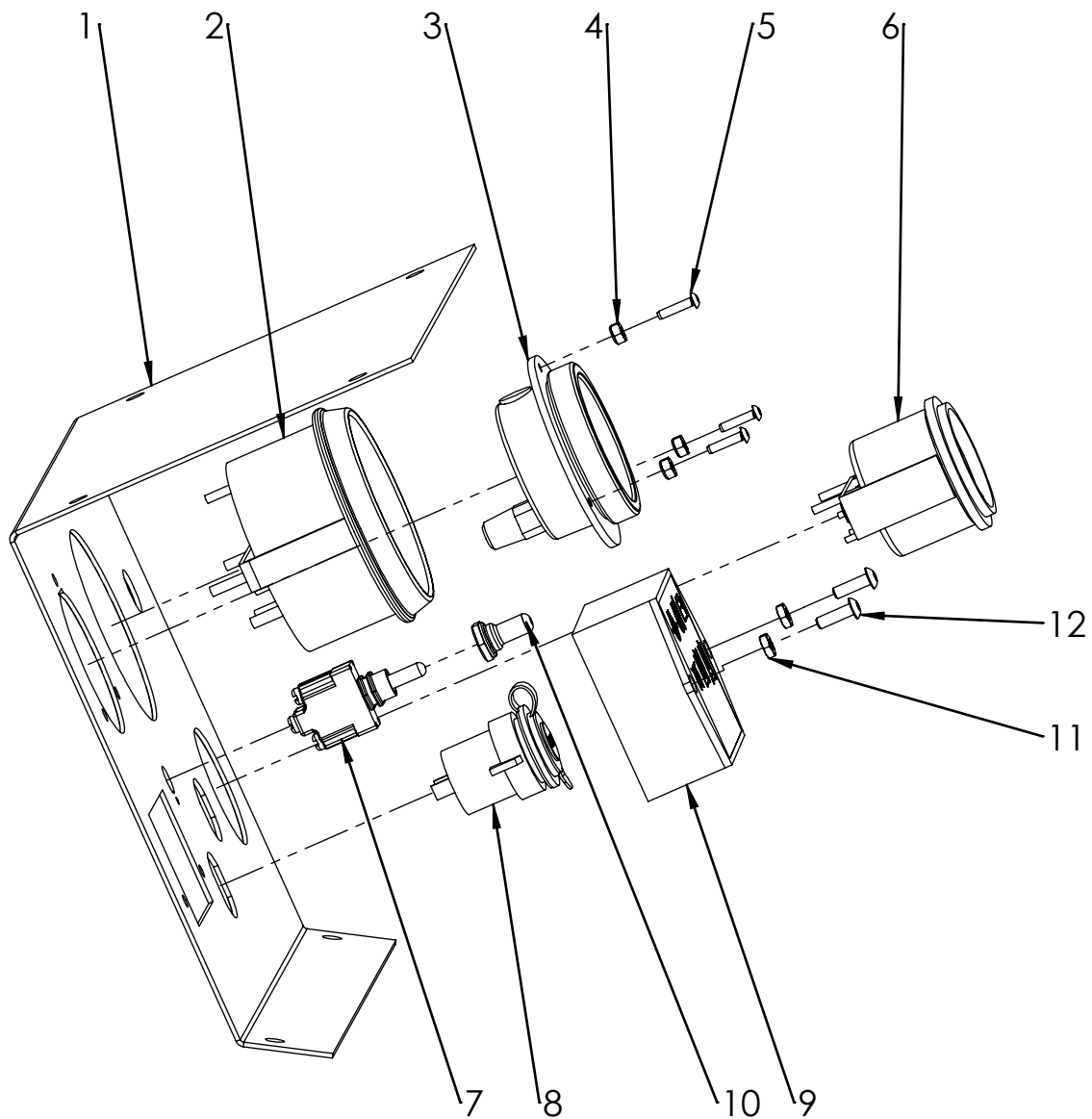
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Notes

CONTROL COMPONENTS

Control Panel

HB4500



Control Panel

HB4500

Bom ID	Part No	Description	Qty	Remarks
1	933-5589	PANEL, CONTROL	1	
2	913-7214	TACH/HOUR METER	1	
3	930-2059	PRESSURE GAUGE, 5000 PSI	1	
4	6TLN	NUT, #6-32 NYLON INSERT LOCK	3	
5	6BH10	SCREW, #6-32 X .625 BHSC	3	
6	913-7199	FUEL GAUGE	1	
7	912-3617	SWITCH, TOGGLE SPST	1	
8	912-0939	RECEPTACLE 12VDC	1	
9	912-3609	MODULE-WARNING LIGHT	1	
10	912-3618	TOGGLE BOOT	1	
11	10TLN	NUT, #10-24 TOP LOCK	2	
12	10BH10	SCREW, #10-24 X 0.625 BHSC	2	

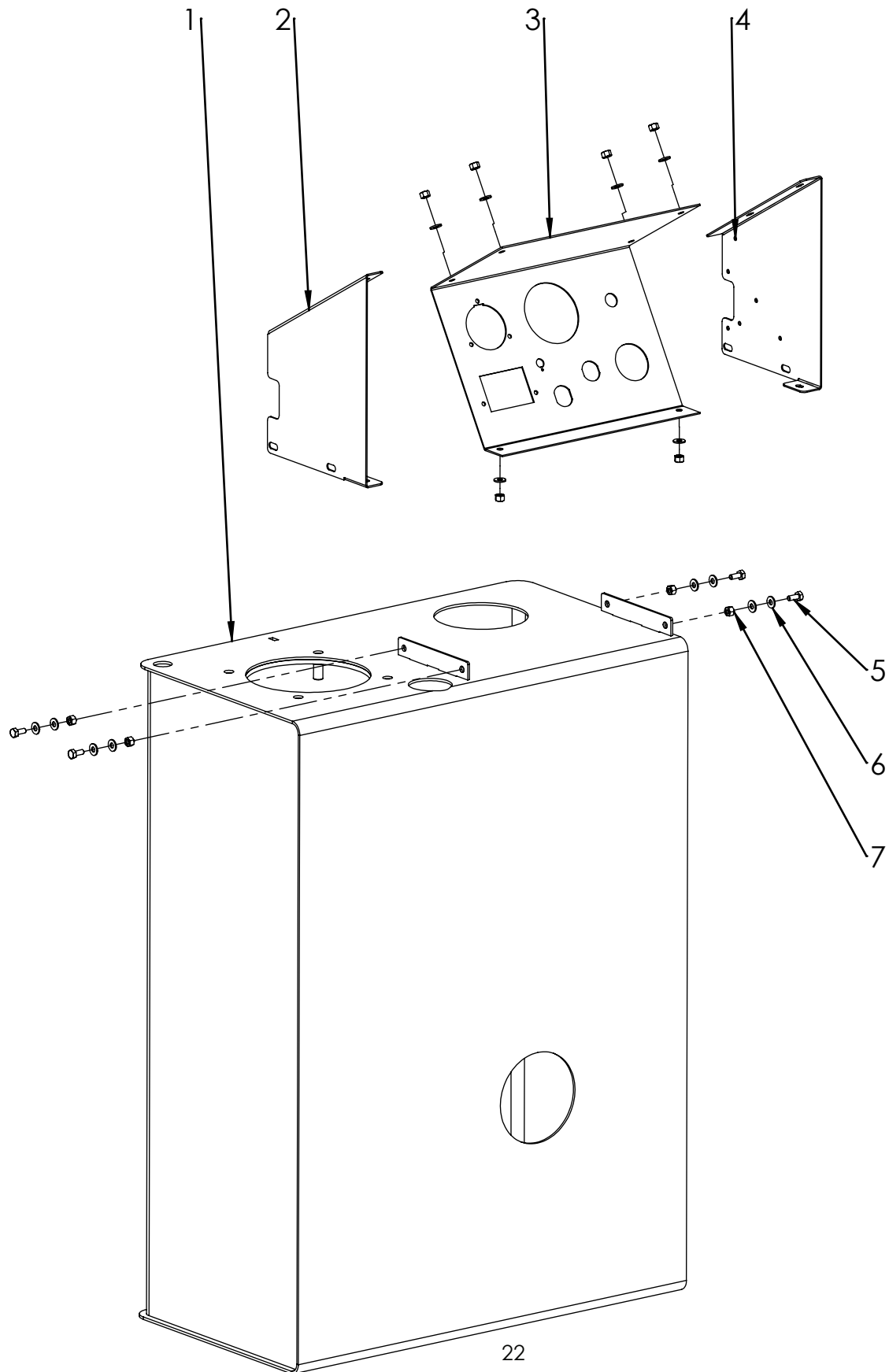
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Notes:

Control Panel Mounting

HB4500



Control Panel Mounting

HB4500

Bom ID	Part No	Description	Qty	Remarks
1	933-3002	HYDRAULIC TANK - HB4500	1	
2	933-5539	PANEL SIDE, LEFT	1	
3	933-5589	PANEL, CONTROL	1	
4	933-5538	PANEL, RIGHT SIDE	1	
5	04HH10	SCREW, 1/4-20 X .625 HHC - GR8	4	
6	04FW-SAE	WASHER, 1/4"	14	
7	04TLN	NUT, 1/4-20 TOP LOCK	10	

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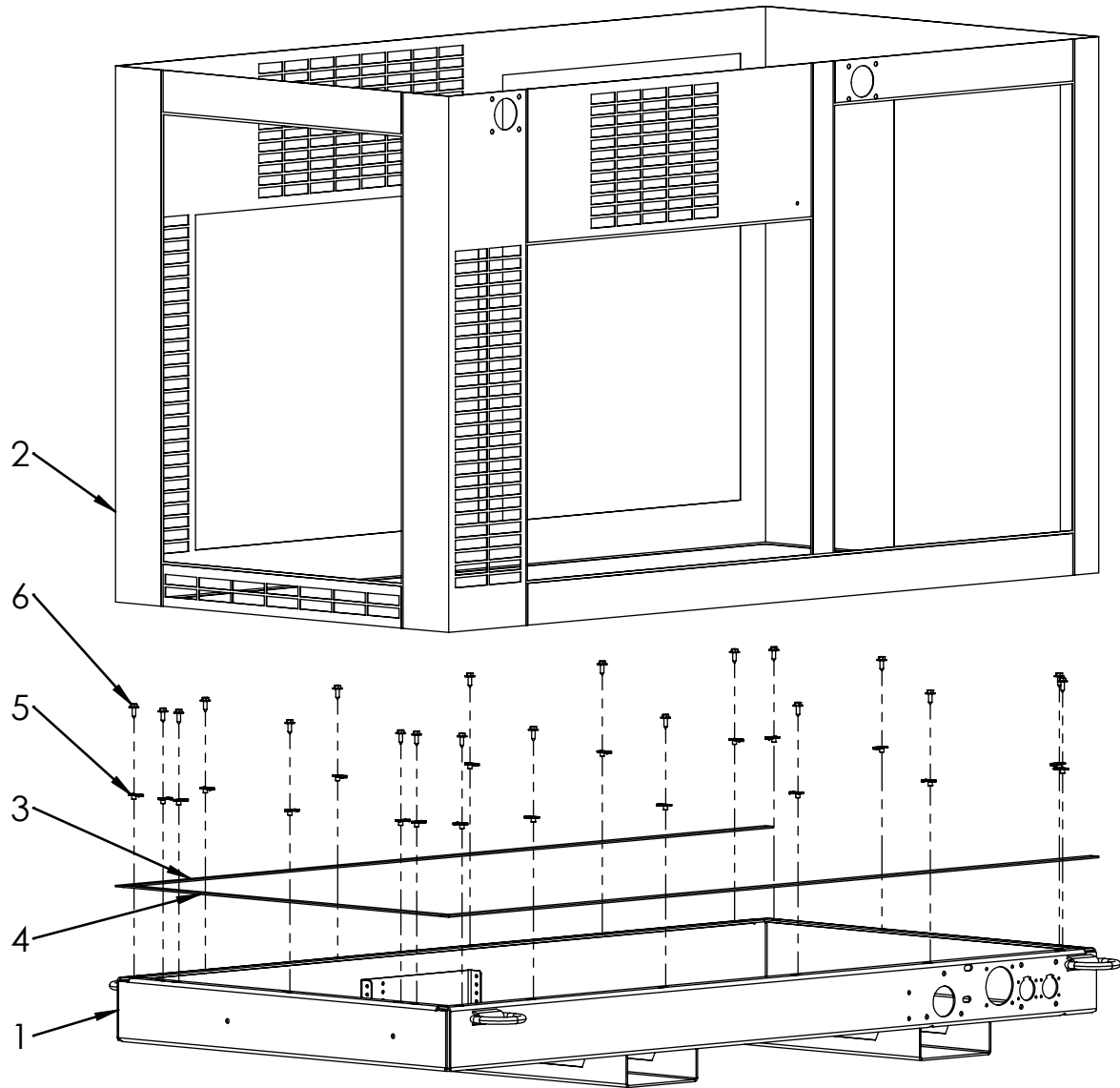
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Notes

FRAME COMPONENTS

Base to Enclosure

HB4500



Base to Enclosure

HB4500

Bom ID	Part No	Description	Qty	Remarks
1	933-5543	BASE FRAME WELDMENT	1	
2	933-5616	FRAME ASSEMBLY, HOUSING	1	
3	933-5568	CUSHION, 82"	2	
4	933-5569	CUSHION, 40"	1	
5	933-5573	NUT, TAPPED - HOLE U-STYLE	20	
6	05BB16	BOLT, 5/16-18 X 1 SEMS BODY	20	

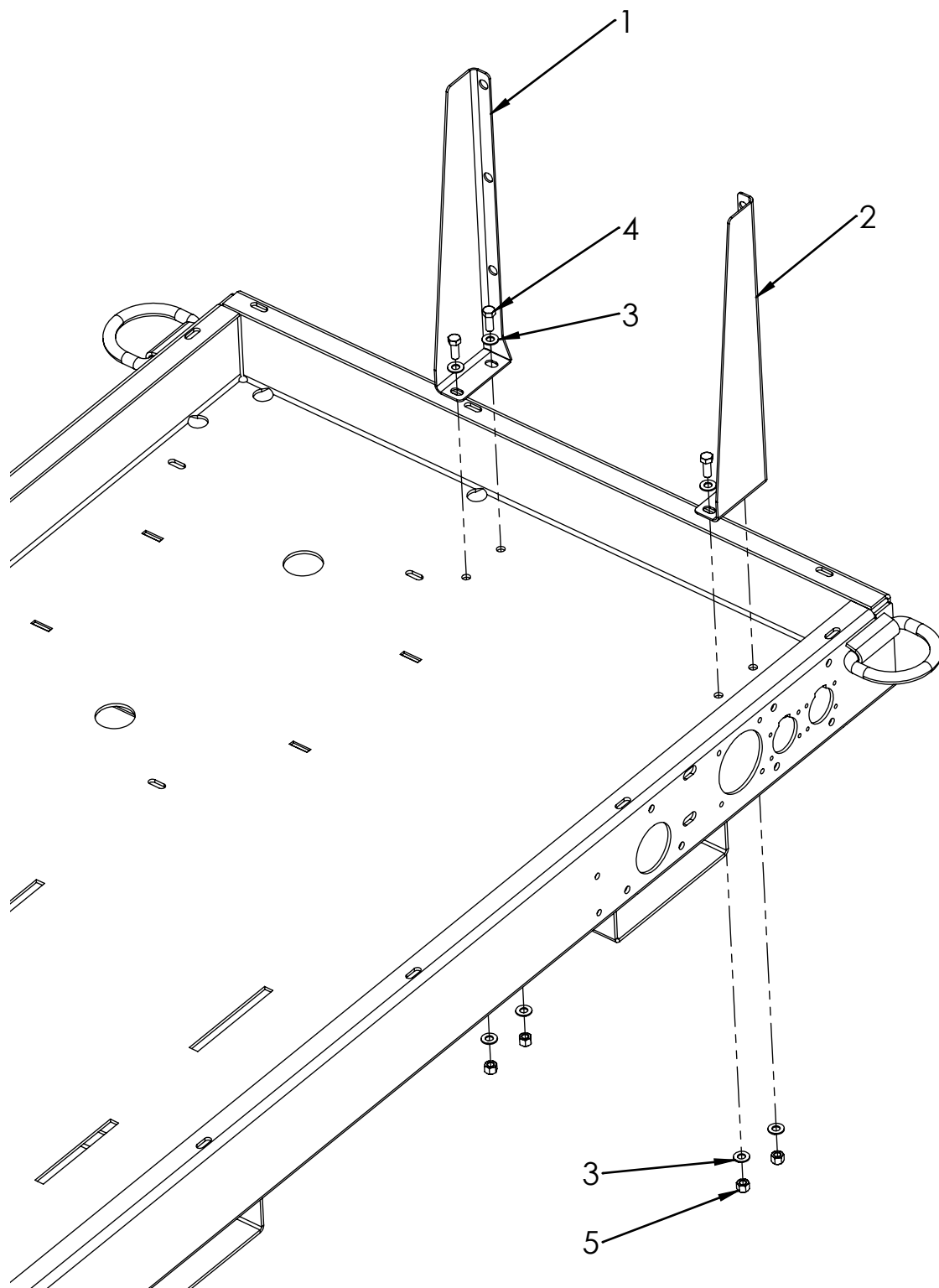
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Notes:

Bracket Weldments to Base Pan

HB4500



Bracket Weldments to Base Pan

HB4500

Bom ID	Part No	Description	Qty	Remarks
1	933-2508	BRACKET WELDMENT, OP SIDE	1	
2	933-2509	BRACKET WELDMENT, RH SIDE	1	
3	06FW-SAE	WASHER, 3/8"	8	
4	06HH16	SCREW, 3/8-16 X 1.00 HHC - GR8	4	
5	06TLN	NUT, 3/8-16 TOP LOCK	4	

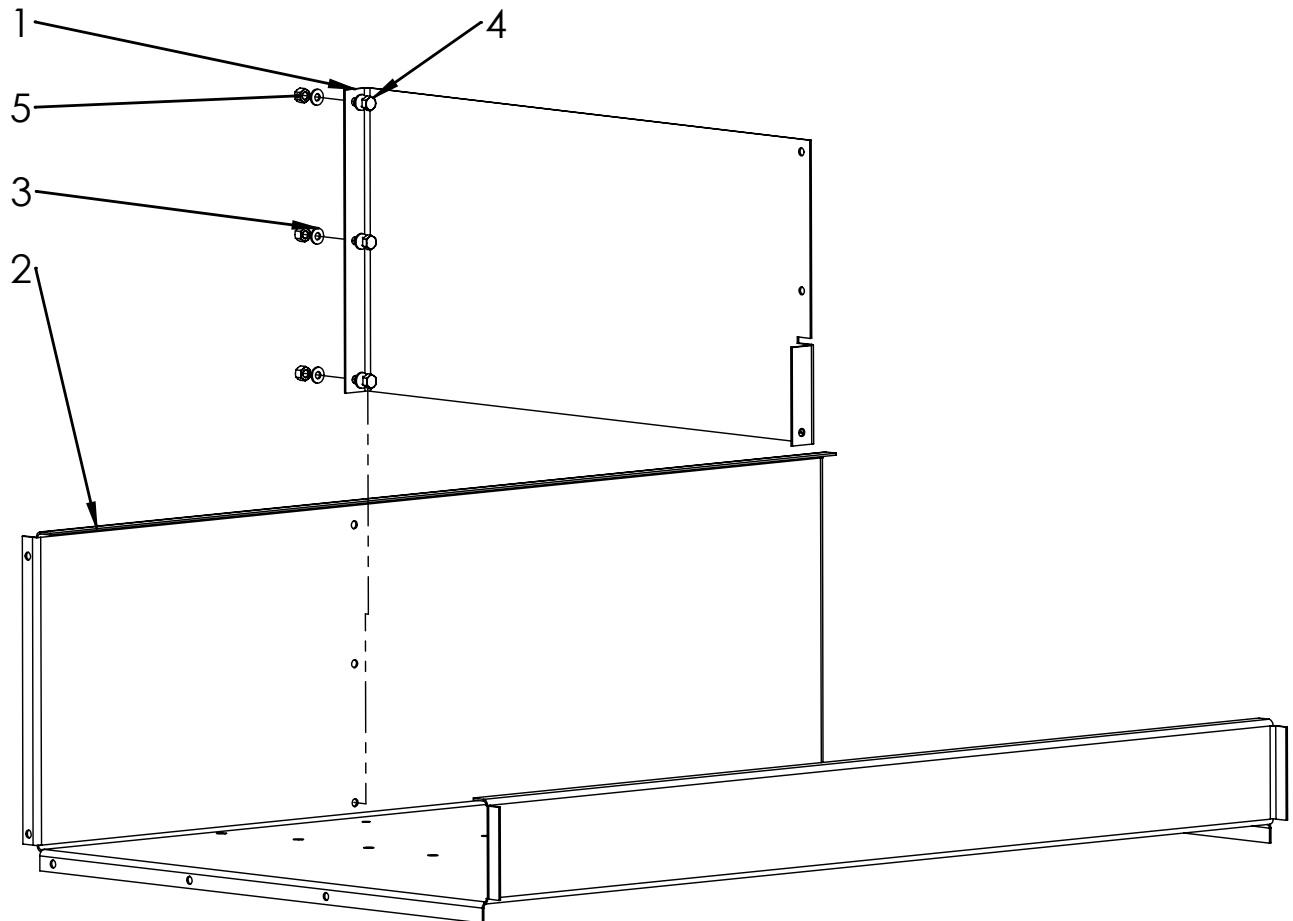
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Notes:

Center Panel to Duct Panel

HB4500



Center Panel to Duct Panel

HB4500

Bom ID	Part No	Description	Qty	Remarks
1	933-5622	PANEL, CENTER	1	
2	933-5621	PANEL, DUCT	1	
3	04FW-SAW	WASHER, 1/2"	6	
4	04HH10	HBOLT, .25" -24 X .0625	3	
5	04HTN	HTNUT .025-24	3	

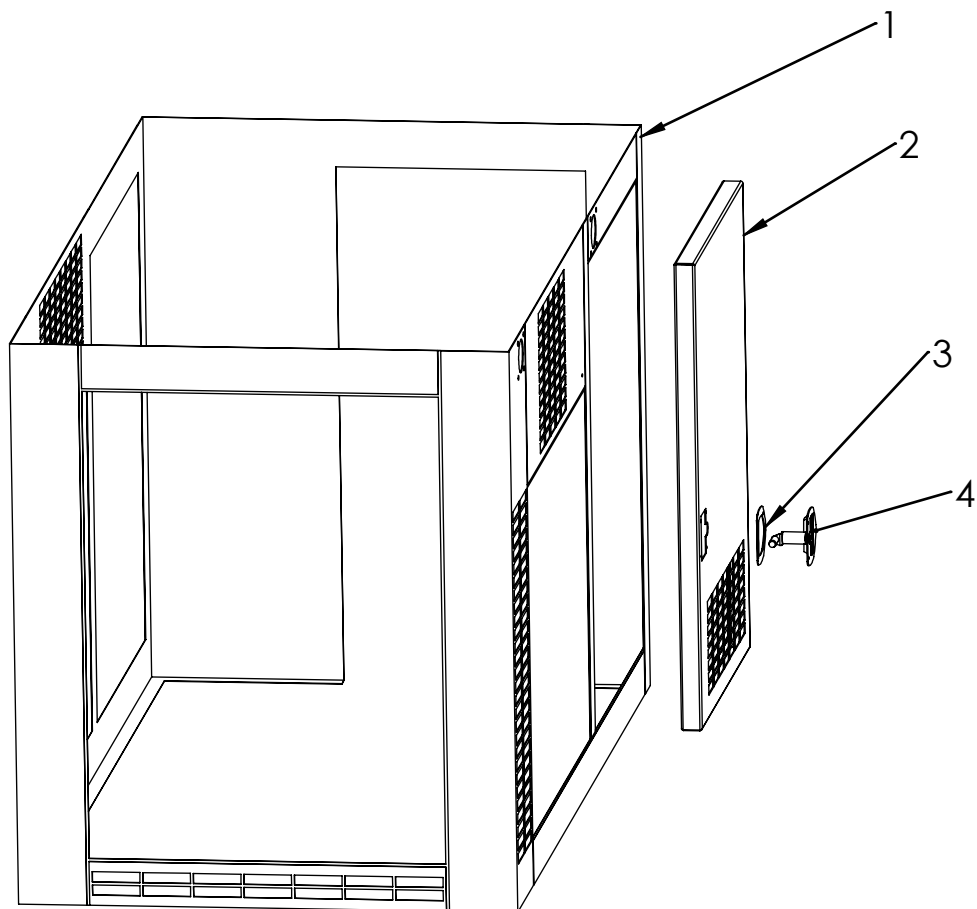
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Notes:

Cooler Outlet Door to Frame

HB4500



Cooler Outlet Door to Frame

HB4500

Bom ID	Part No	Description	Qty	Remarks
1	933-5616	FRAME ASSEMBLY, HOUSING	1	
2	933-5627	DOOR, COOLER OUTLET	1	
3	933-5531	GASKET, LATCH	1	
4	933-5530	DOOR LATCH, QUARTER TURN	1	

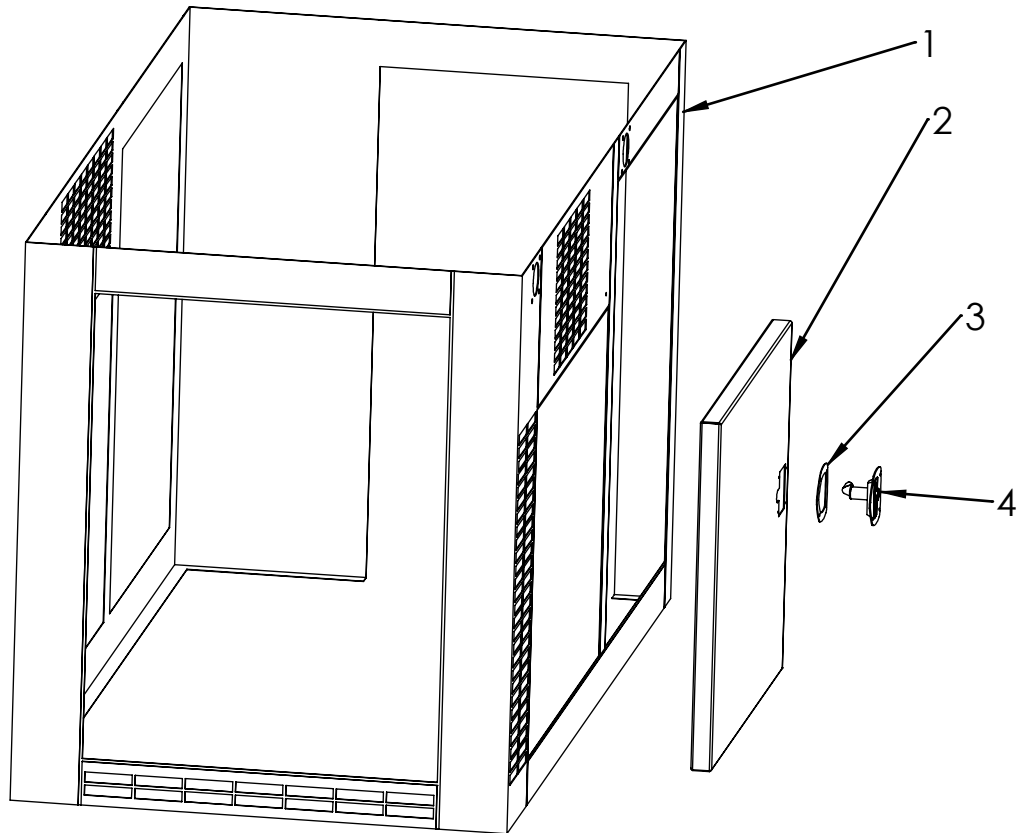
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Notes:

Right Engine Door to Frame

HB4500



Right Engine Door to Frame

HB4500

Bom ID	Part No	Description	Qty	Remarks
1	933-5616	FRAME ASSEMBLY, HOUSING	1	
2	933-5628	DOOR, RIGHT ENGINE	1	
3	933-5531	GASKET LATCH	1	
4	933-5530	DOOR LATCH, QUARTER TURN	1	

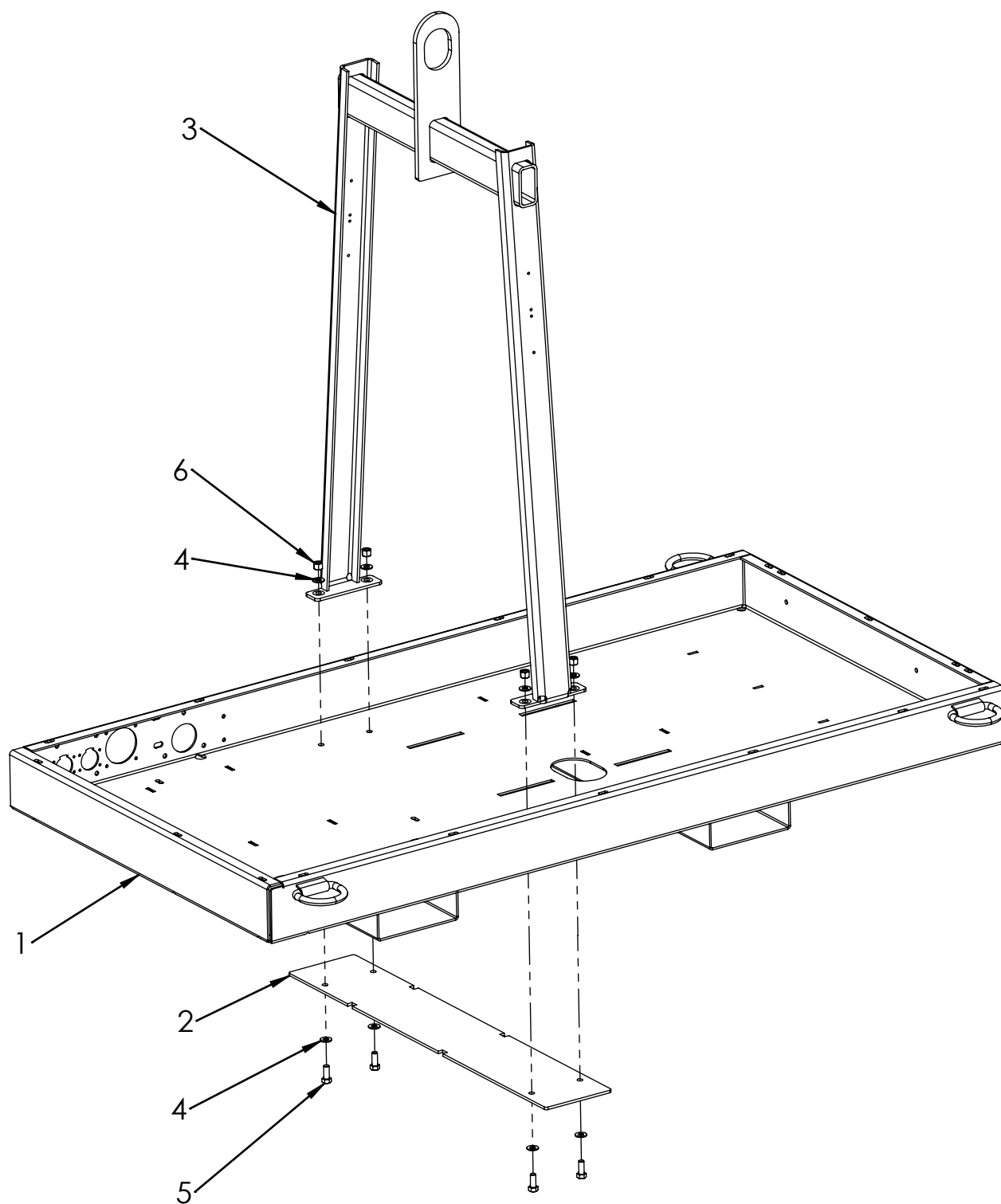
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Notes:

Lift Eye to Base Pan

HB4500



Lift Eye to Base Pan

HB4500

Bom ID	Part No	Description	Qty	Remarks
1	933-5543	BASE FRAME WELDMENT	1	
2	933-5536	PANEL, BACK	1	
3	933-5532	LIFE EYE ASSEMBLY	1	
4	08FW-SAE	WASHER, 1/2"	8	
5	08HH20	SCREW, 1/2-13 X 1.25 HHC - GR8	4	
6	08TLN	NUT, 1/2-13 TOP LOCK	4	

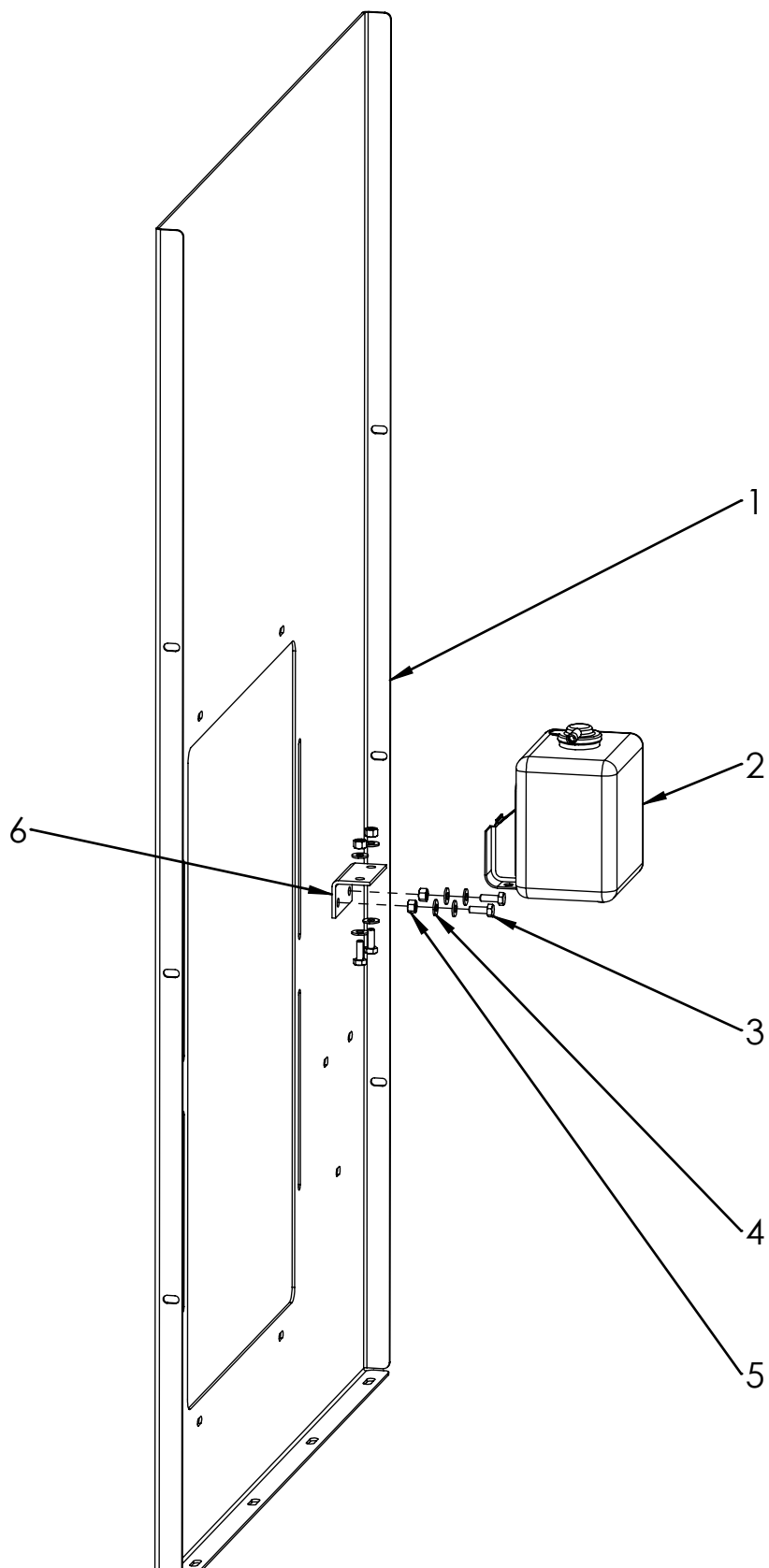
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Notes:

Reservoir to Radiator Panel

HB4500



Reservoir to Radiator Panel

HB4500

Bom ID	Part No	Description	Qty	Remarks
1	933-5636	PANEL, RADIATOR	1	
2	933-4543	TANK OVER FLOW	1	
3	04HH12	SCREW, 1/4-20 X .75 HHC - GR8	4	
4	04FW-SAE	WASHER, 1/4"	8	
5	04TLN	NUT, 1/4-20 TOP LOCK	4	
6	913-7215	BRACKET, WATER TANK	1	

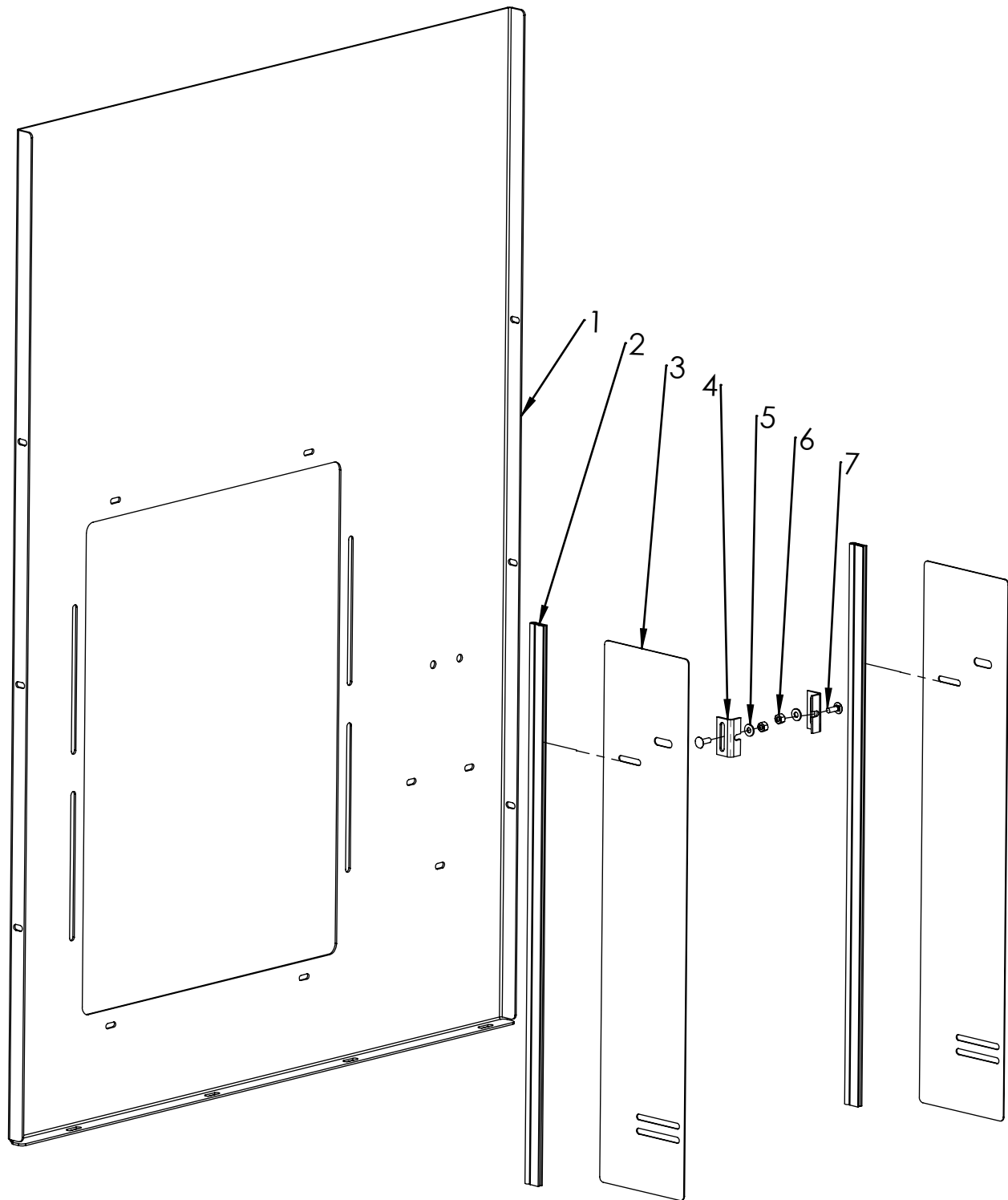
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Footnotes:

Notes:

Radiator Panel Left Side

HB4500



Radiator Panel Left Side

HB4500

Bom ID	Part No	Description	Qty	Remarks
1	933-5636	PANEL, RADIATOR	1	
2	933-5553	SEAL, BULB - 30.0"	2	
3	913-8648	PANEL, RADIATOR LEFT	2	
4	933-5632	BRACKET, RADIATOR	2	
5	04FW-SAE	WASHER, 1/4"	2	
6	04TLN	NUT, 1/4-20 TOP LOCK	2	
7	04CB12	BOLT, 1/4-20 x .75 CARRIAGE	2	

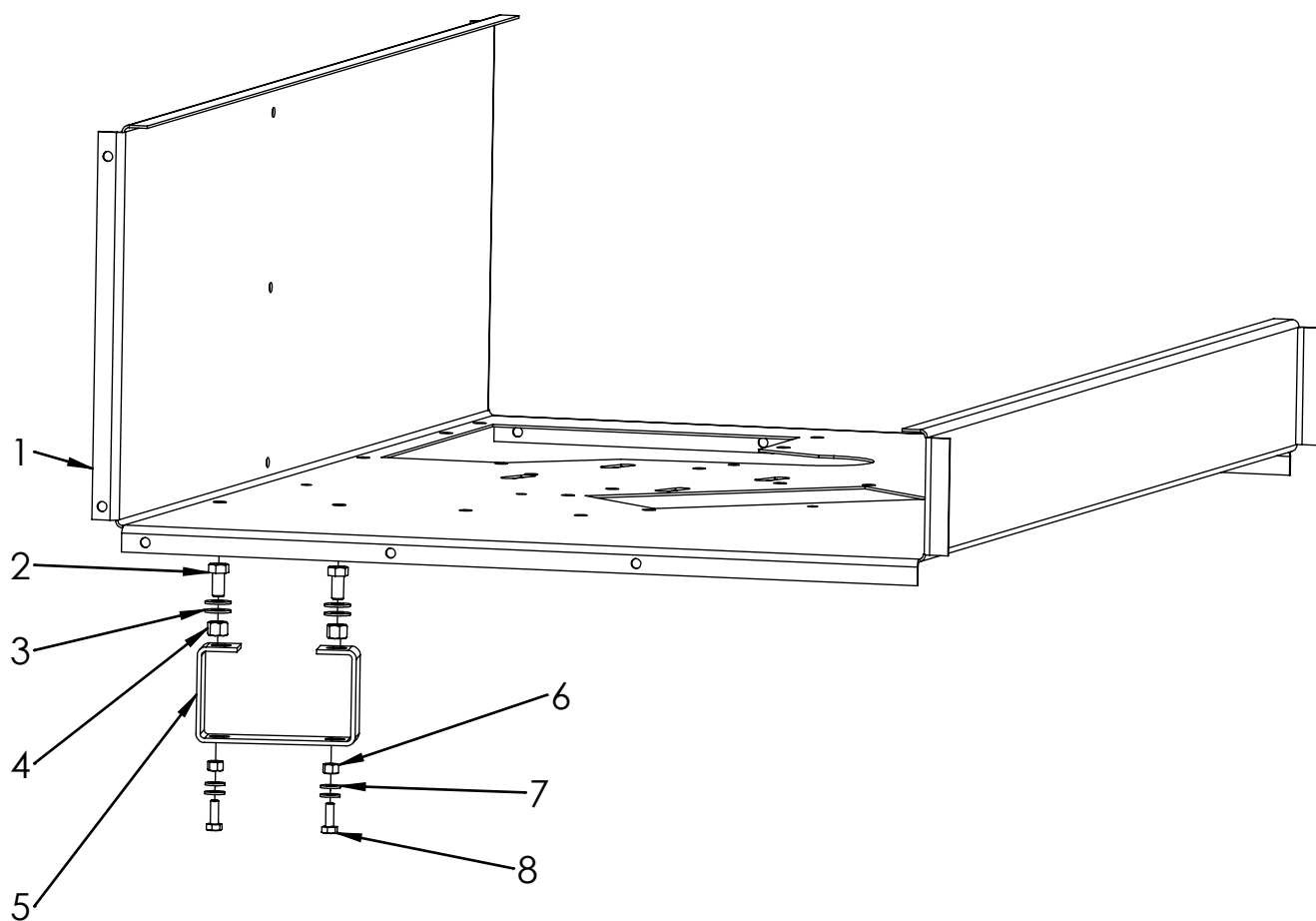
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Notes:

Air Cleaner Bracket to Duct Panel

HB4500



Air Cleaner Bracket to Duct Panel

HB4500

Bom ID	Part No	Description	Qty	Remarks
1	933-5621	PANEL, DUCT	1	
2	06HH12	SCREW, 3/8-16 X .75 HHC - GR8	2	
3	06FW-SAE	WASHER, 3/8"	4	
4	06TLN	NUT, 3/8-16 TOP LOCK	2	
5	913-7245	AIR CLEANER SPACER BRACKET	1	
6	04TLN	NUT, 1/4-20 TOP LOCK	2	
7	04FW-SAE	WASHER, 1/4"	4	
8	04HH12	SCREW, 1/4-20 X .75 HHC - GR8	2	

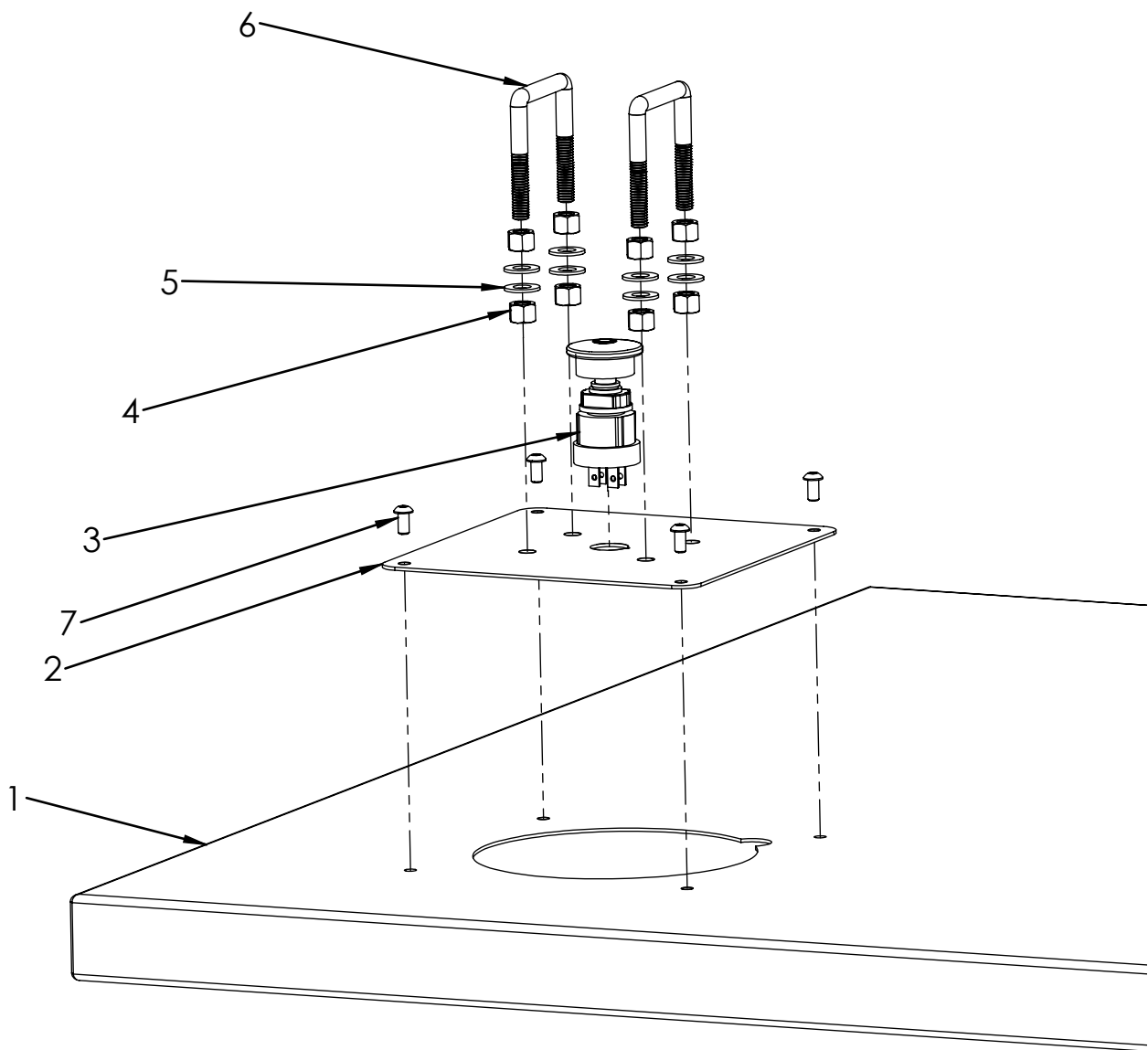
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Footnotes:

Notes:

E-Stop to Panel

HB4500



E-Stop to Panel

HB4500

Bom ID	Part No	Description	Qty	Remarks
1	933-5618	PANEL, ROOF	1	
2	933-5629	PANEL, FILTER ACCESS	1	
3	912-3608	SWITCH, EMERGENCY STOP	1	
4	06TLN	NUT, 3/8-16 TOP LOCK	8	
5	06FW-SAE	WASHER, 3/8"	8	
6	914-0255	U-BOLT, 3/8-16 X 2" W X 3" T SQ.	2	
7	04SCS08	SBHCSCREW 0.25-20x0.5-HX-N	4	

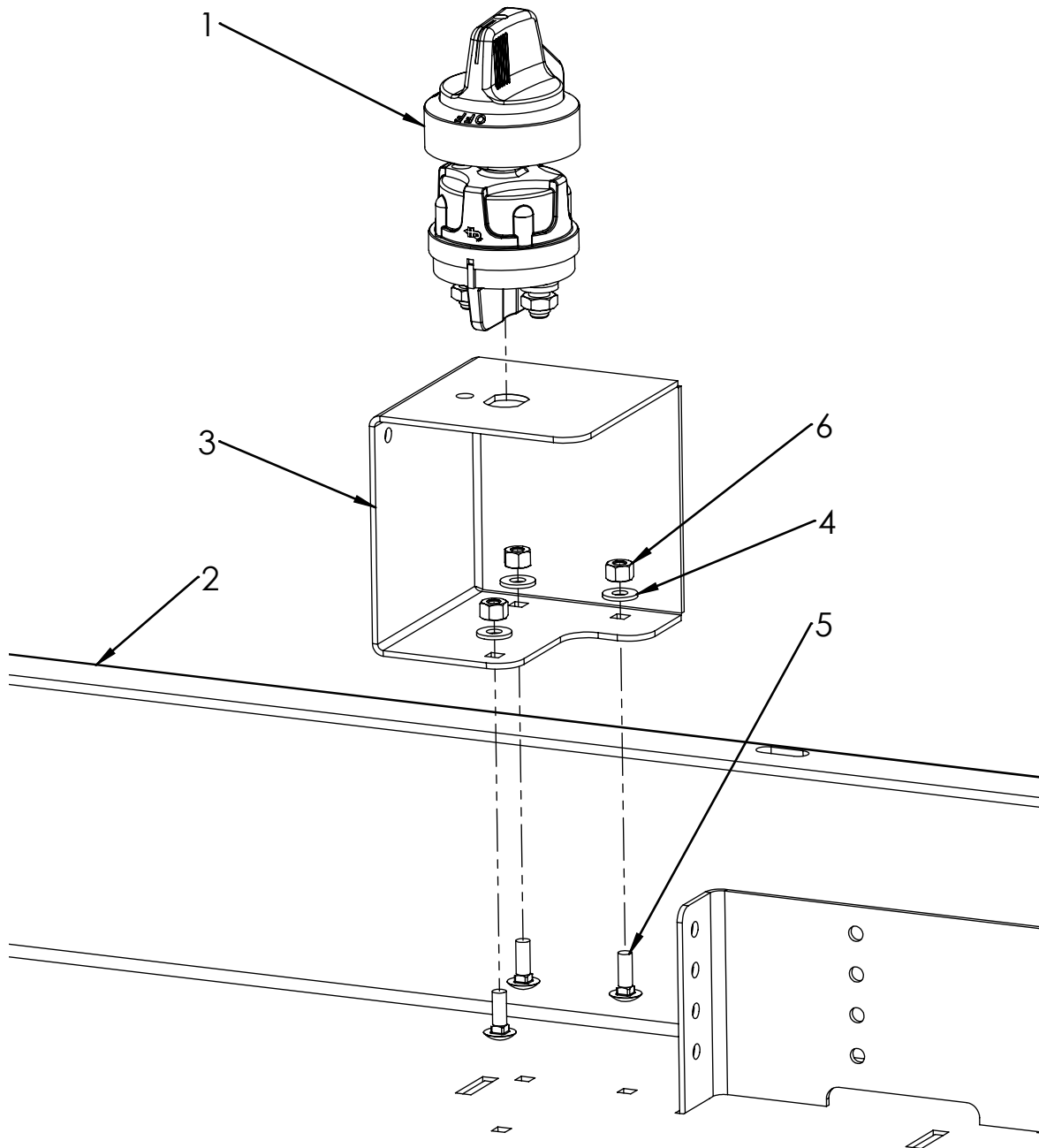
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Notes:

Battery Disconnect to Base Pan

HB4500



Battery Disconnect to Base Pan

HB4500

Bom ID	Part No	Description	Qty	Remarks
1	215-0025	MASTER DISCONNECT SWITCH (300A)	1	
2	933-5543	BASE FRAME WELDMENT	1	
3	941-7496	HOUSING, BATTERY DISCONNECT	1	
4	04FW-SAE	WASHER, 1/4"	3	
5	04CB12	BOLT, 1/4-20 X .75 CARRIAGE	3	
6	04TLN	NUT, 1/4-20 TOP LOCK	3	

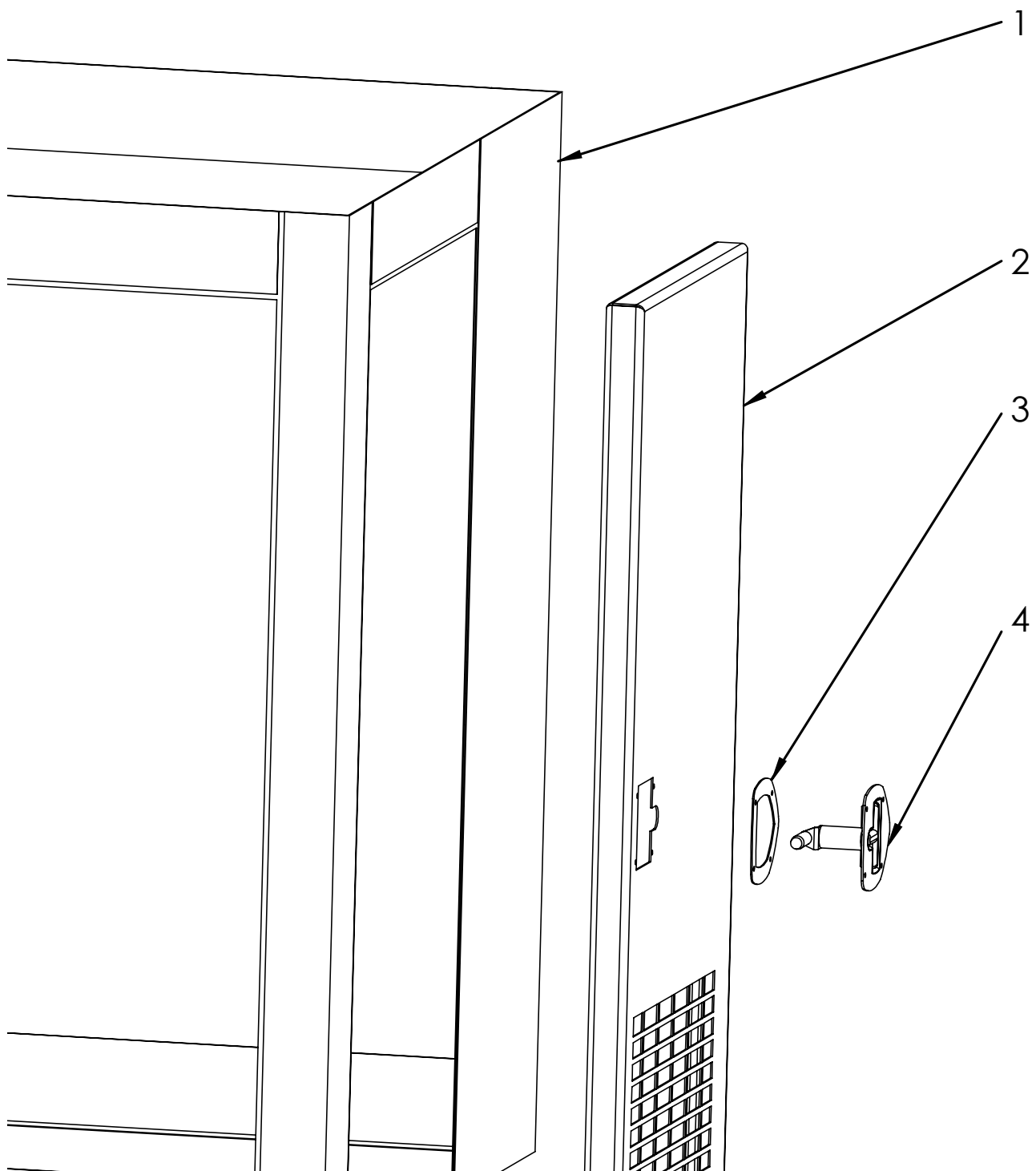
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Notes:

Cooler Inlet Door to Frame

HB4500



Cooler Inlet Door to Frame

HB4500

Bom ID	Part No	Description	Qty	Remarks
1	933-5616	FRAME ASSEMBLY, HOUSING	1	
2	933-5625	DOOR, COOLER INLET	1	
3	933-5531	GASKET, LATCH	1	
4	933-5530	DOOR LATCH, QUARTER TURN	1	

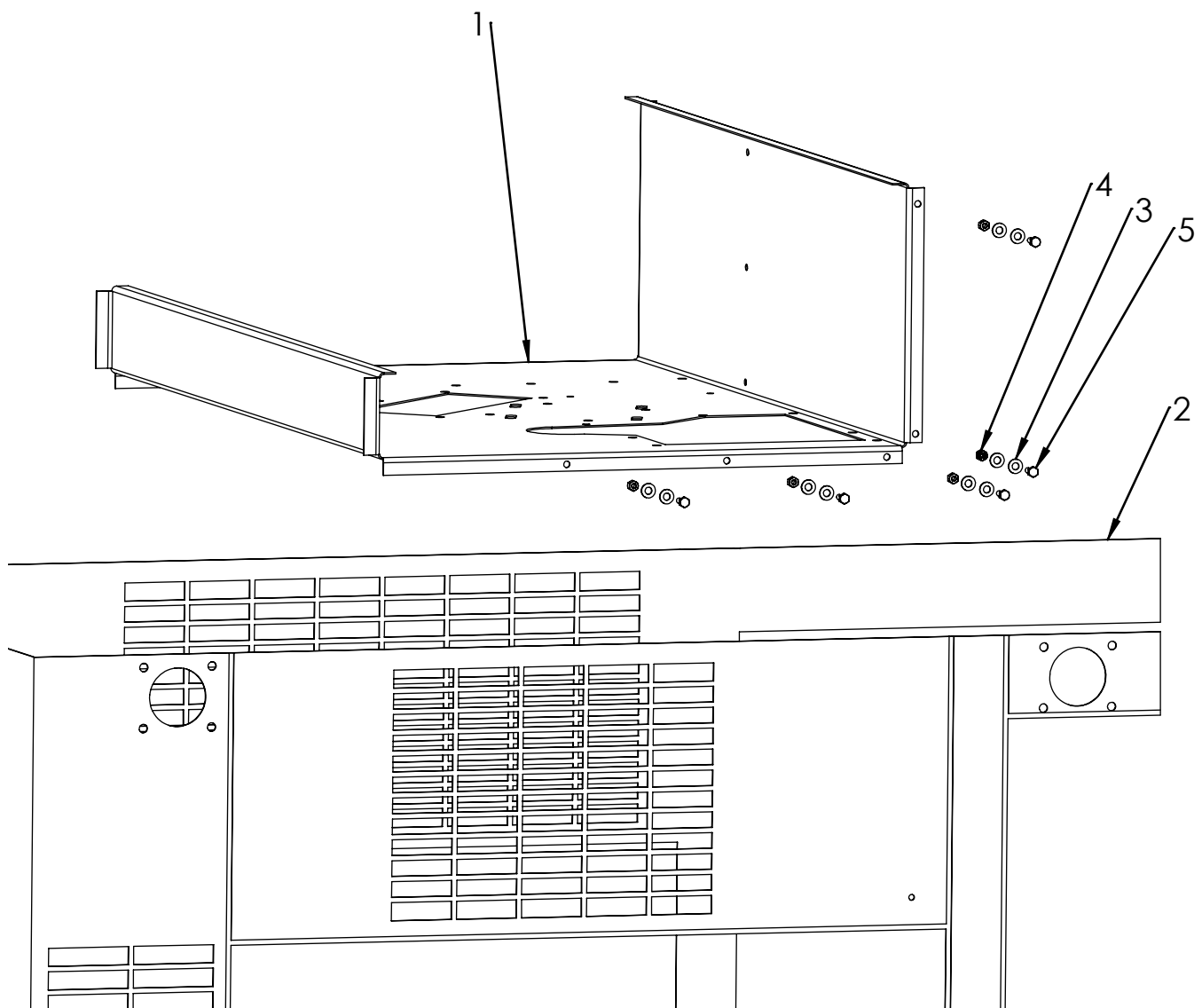
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Notes:

Duct Panel to Frame

HB4500



Duct Panel to Frame

HB4500

Bom ID	Part No	Description	Qty	Remarks
1	933-5621	PANEL, DUCT	1	
2	933-5616	FRAME ASSEMBLY, HOUSING	1	
3	04FW-SAE	WASHER, .25	20	
4	04HTN	HTNUT, .25"	10	
5	04HH12	SCREW, 1/4-20 X .750 HHC	10	

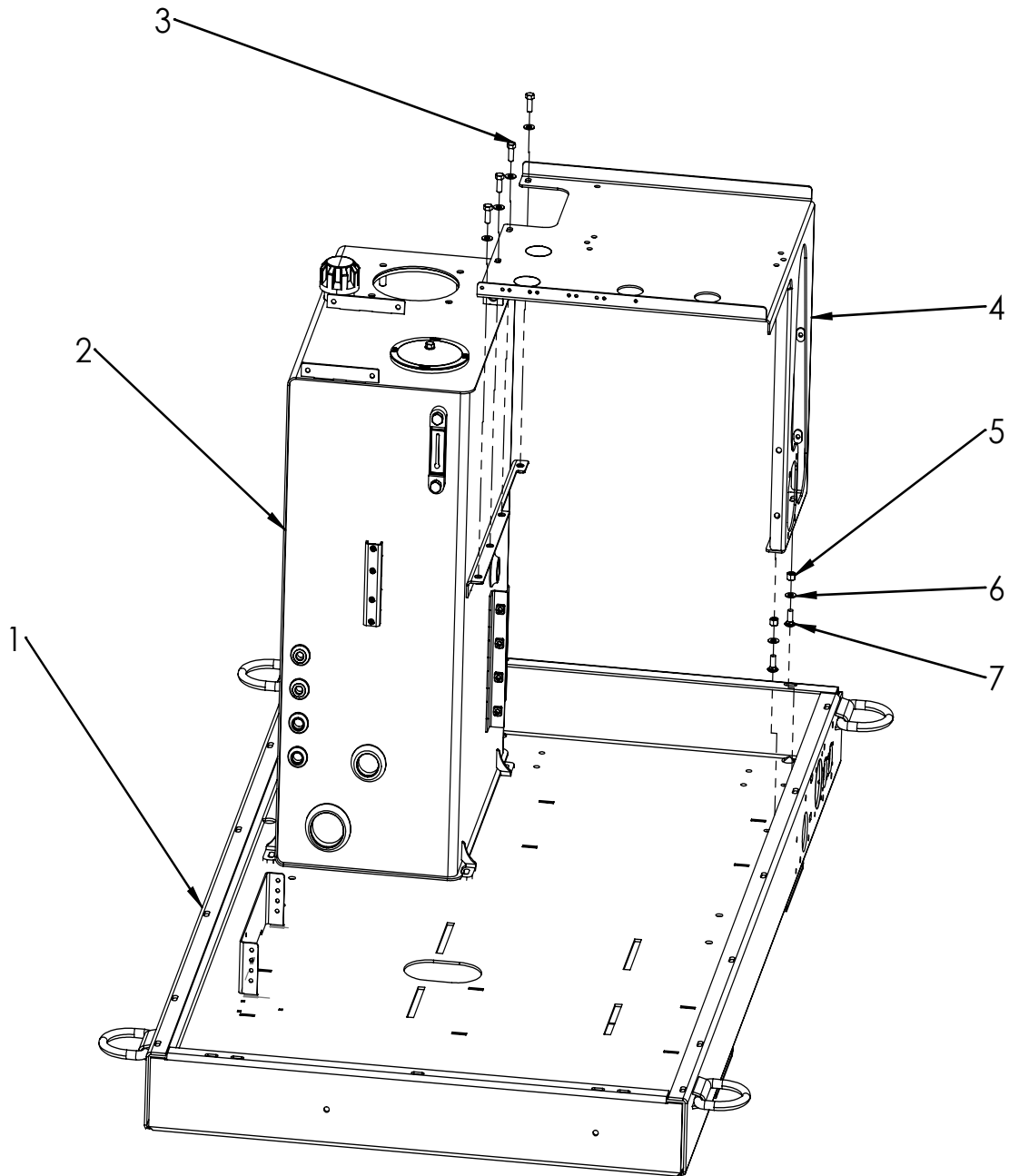
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Notes:

Fuel Tank Support to Base Pan

HB4500



Fuel Tank Support to Base Pan

HB4500

Bom ID	Part No	Description	Qty	Remarks
1	933-5543	BASE FRAME WELDMENT	1	
2	933-3002	HYDRAULIC TANK - HB4500	1	
3	06HH16	SCREW, 3/8-16 X 1.00 HHC - GR8	4	
4	933-5603	FUEL TANK SUPPORT	1	
5	06TLN	NUT, 3/8-16 TOP LOCK	2	
6	06FW-SAE	WASHER, 3/8"	6	
7	06CB16	BOLT, 3/8-16 X 1 CARRIAGE	2	

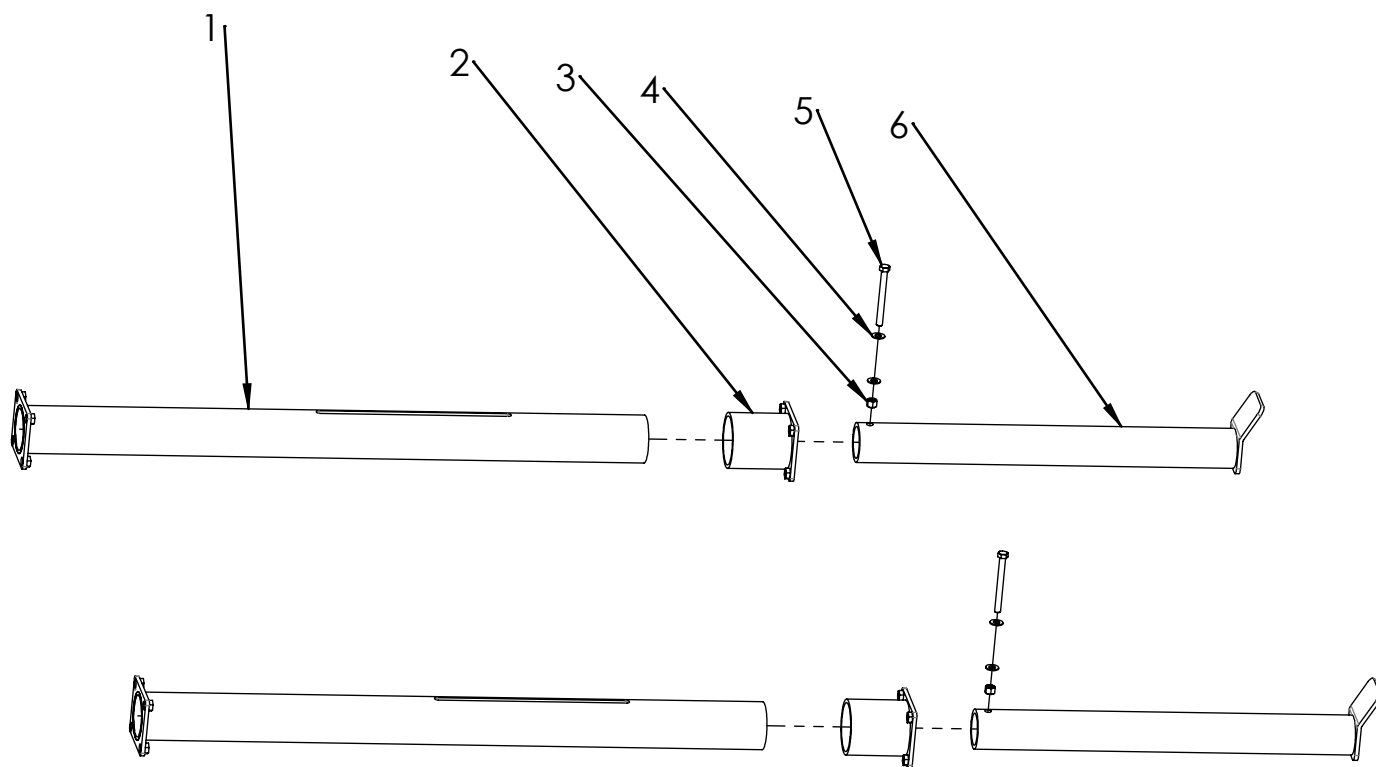
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Notes:

Hose Holders

HB4500



Hose Holders

HB4500

Bom ID	Part No	Description	Qty	Remarks
1	933-5501	HOLDER, OUTSIDE HOSE	2	
2	933-5519	SOCKET, HOSE HOLDER	2	
3	06TLN	NUT, 3/8-16 TOP LOCK	2	
4	06FW-SAE	WASHER, 3/8"	4	
5	06HH60	SCREW, 3/8-16 X 3.75 HHC - GR8	2	
6	933-5517	HOLDER, INSIDE HOSE	2	

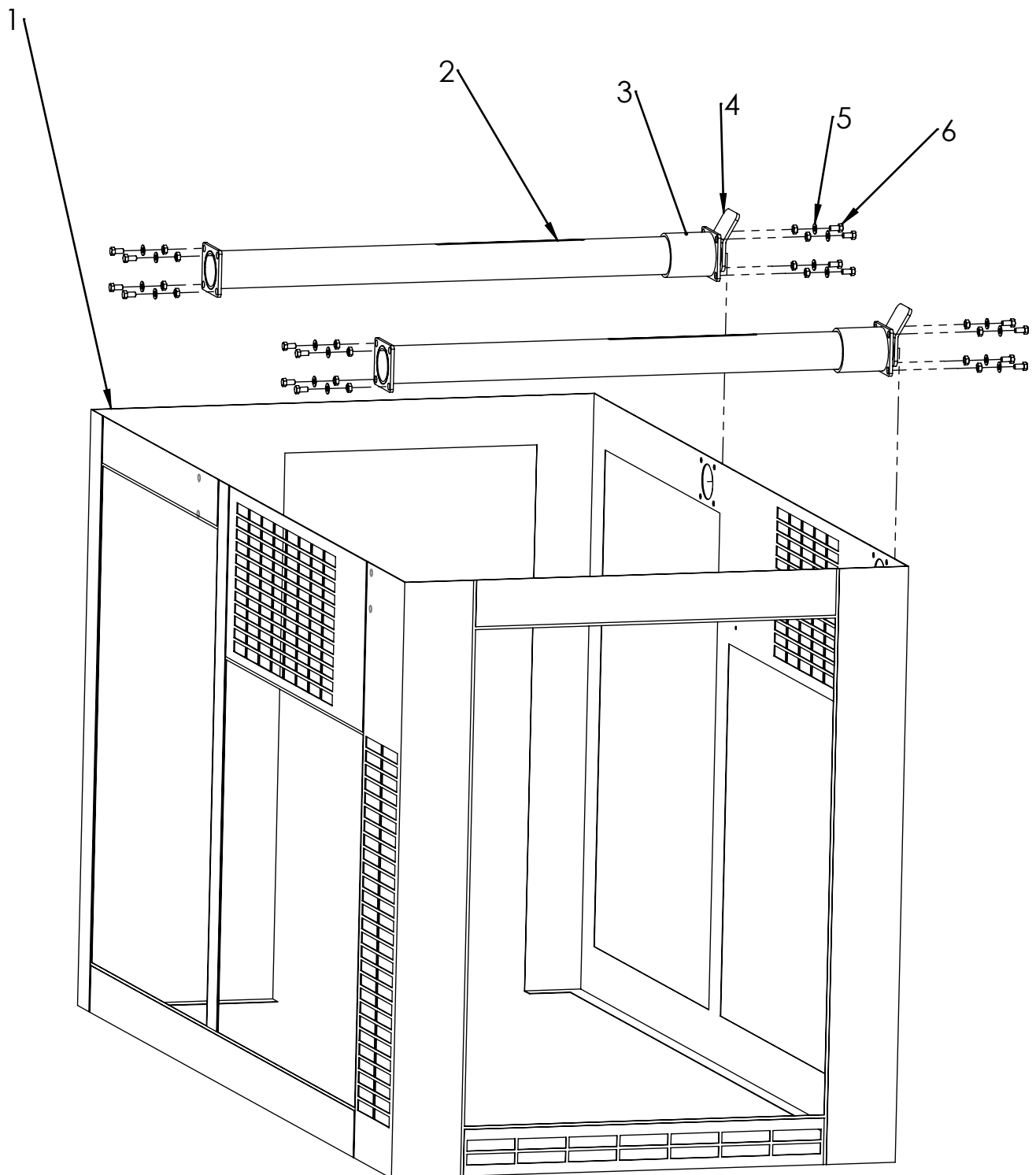
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Footnotes:

Notes:

Hose Holders to Frame

HB4500



Hose Holders to Frame

HB4500

Bom ID	Part No	Description	Qty	Remarks
1	933-5616	FRAME ASSEMBLY, HOUSING	1	
2	933-5501	HOLDER, OUTSIDE HOSE	2	
3	933-5519	SOCKET, HOSE HOLDER	2	
4	933-5517	HOLDER, INSIDE HOSE	2	
5	06FW-SAE	WASHER, 3/8"	16	
6	06HH12	SCREW, 3/8-16 X .75 HHC - GR8	16	

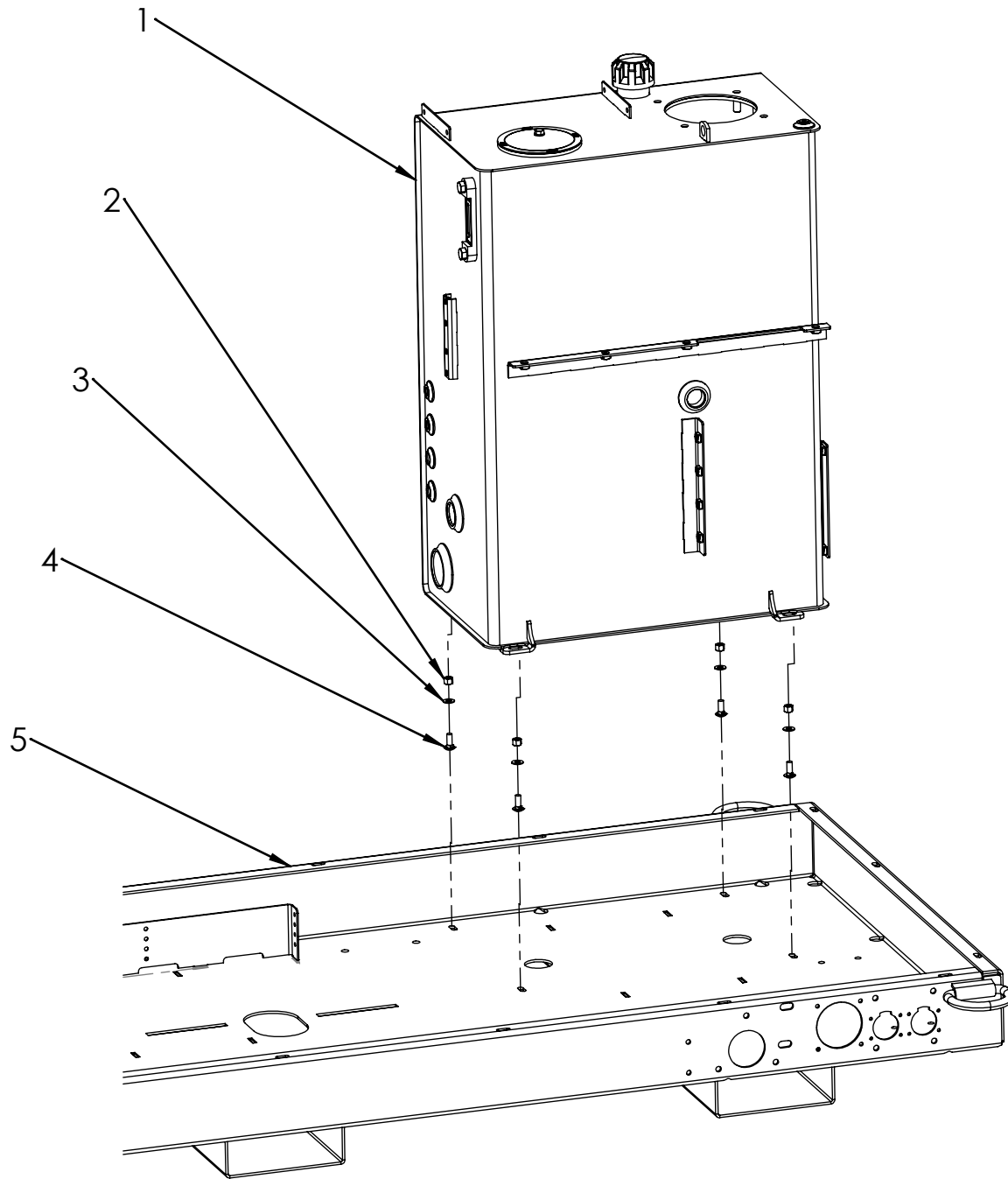
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Footnotes:

Notes:

Hydraulic Tank to Base Pan

HB4500



Hydraulic Tank to Base Pan

HB4500

Bom ID	Part No	Description	Qty	Remarks
1	933-3002	HYDRAULIC TANK - HB4500	1	
2	06TLN	NUT, 3/8-16 TOP LOCK	4	
3	06FW-SAE	WASHER, 3/8"	4	
4	06CB16	BOLT, 3/8-16 X 1 CARRIAGE	4	
5	933-5543	BASE FRAME WELDMENT	1	

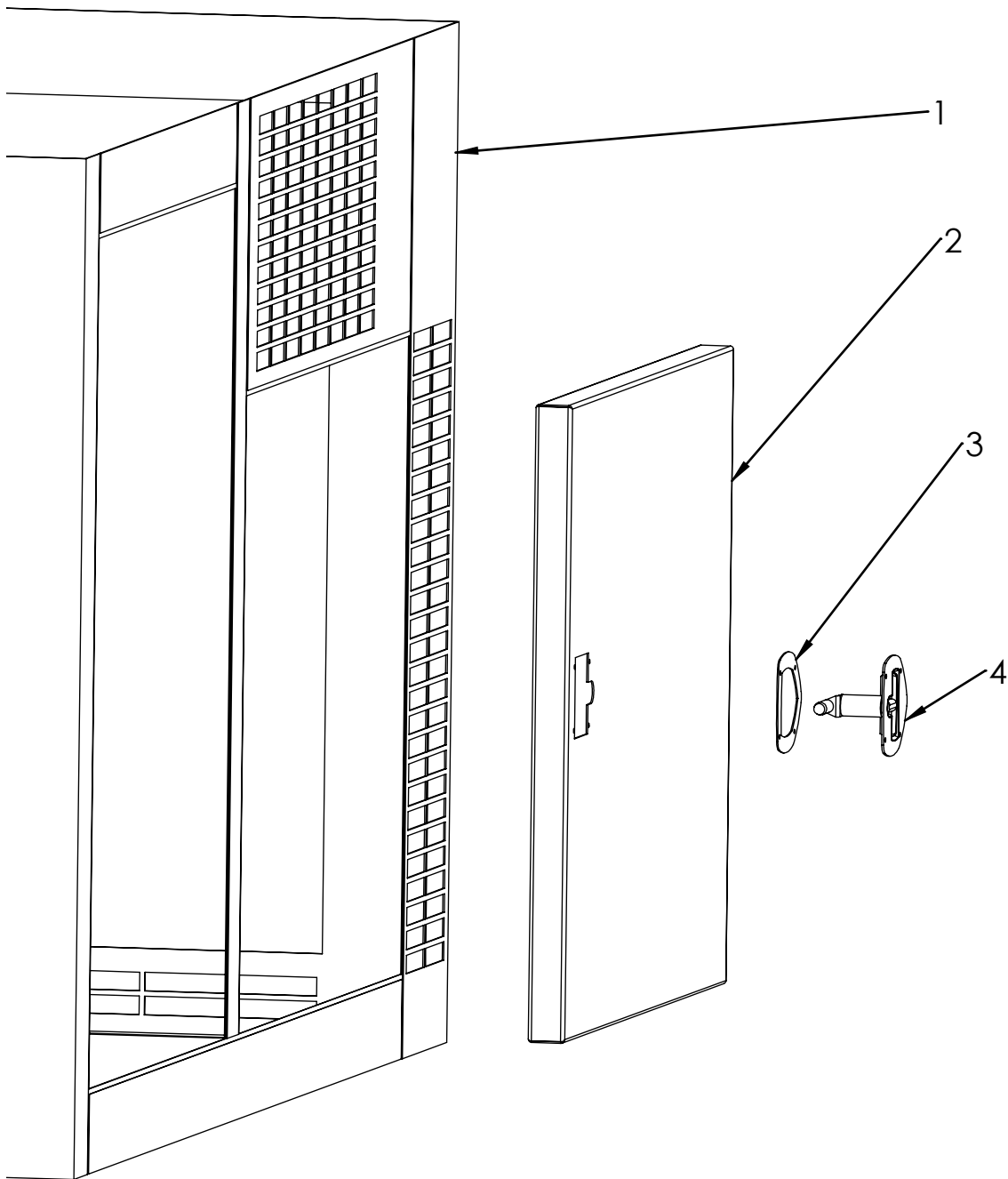
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Footnotes:

Notes:

Left Engine Door to Frame

HB4500



Left Engine Door to Frame

HB4500

Bom ID	Part No	Description	Qty	Remarks
1	933-5616	FRAME ASSEMBLY, HOUSING	1	
2	933-5624	DOOR, LEFT ENGINE	1	
3	933-5531	GASKET, LATCH	1	
4	933-5530	DOOR LATCH, QUARTER TURN	1	

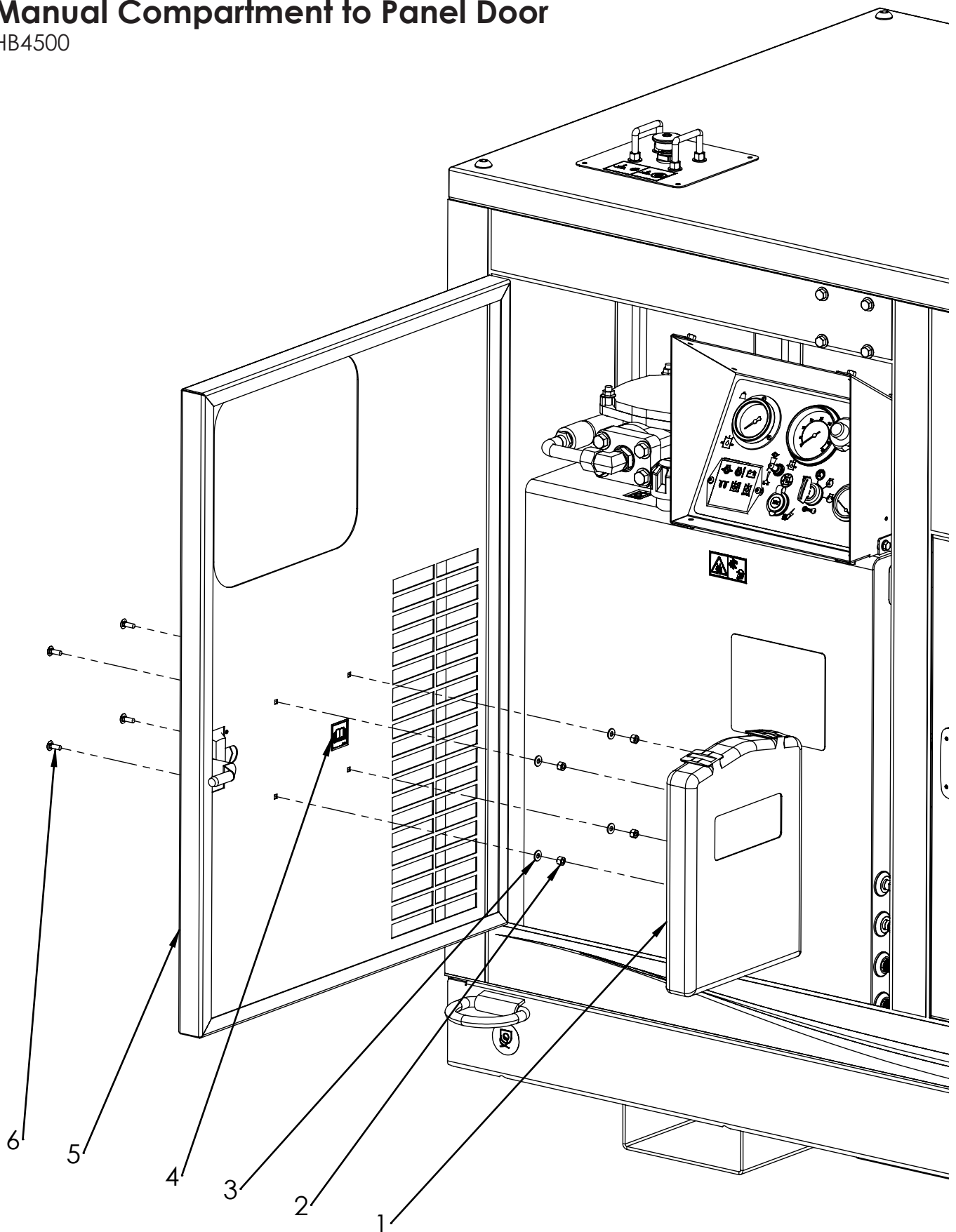
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Footnotes:

Notes:

Manual Compartment to Panel Door

HB4500



Manual Compartment to Panel Door

HB4500

Bom ID	Part No	Description	Qty	Remarks
1	318-588	MANUAL COMPARTMENT	1	
2	04TLN	NUT, 1/4-20 TOP LOCK	4	
3	0FW-SAE	WASHER, 1/4"	4	
4	270-2040	DECAL, OPERATORS MANUAL	1	
5	933-5617	DOOR, OPERATOR CONTROLS	1	
6	04CB12	BOLT, 1/4-20 X .75 CARRIAGE	4	

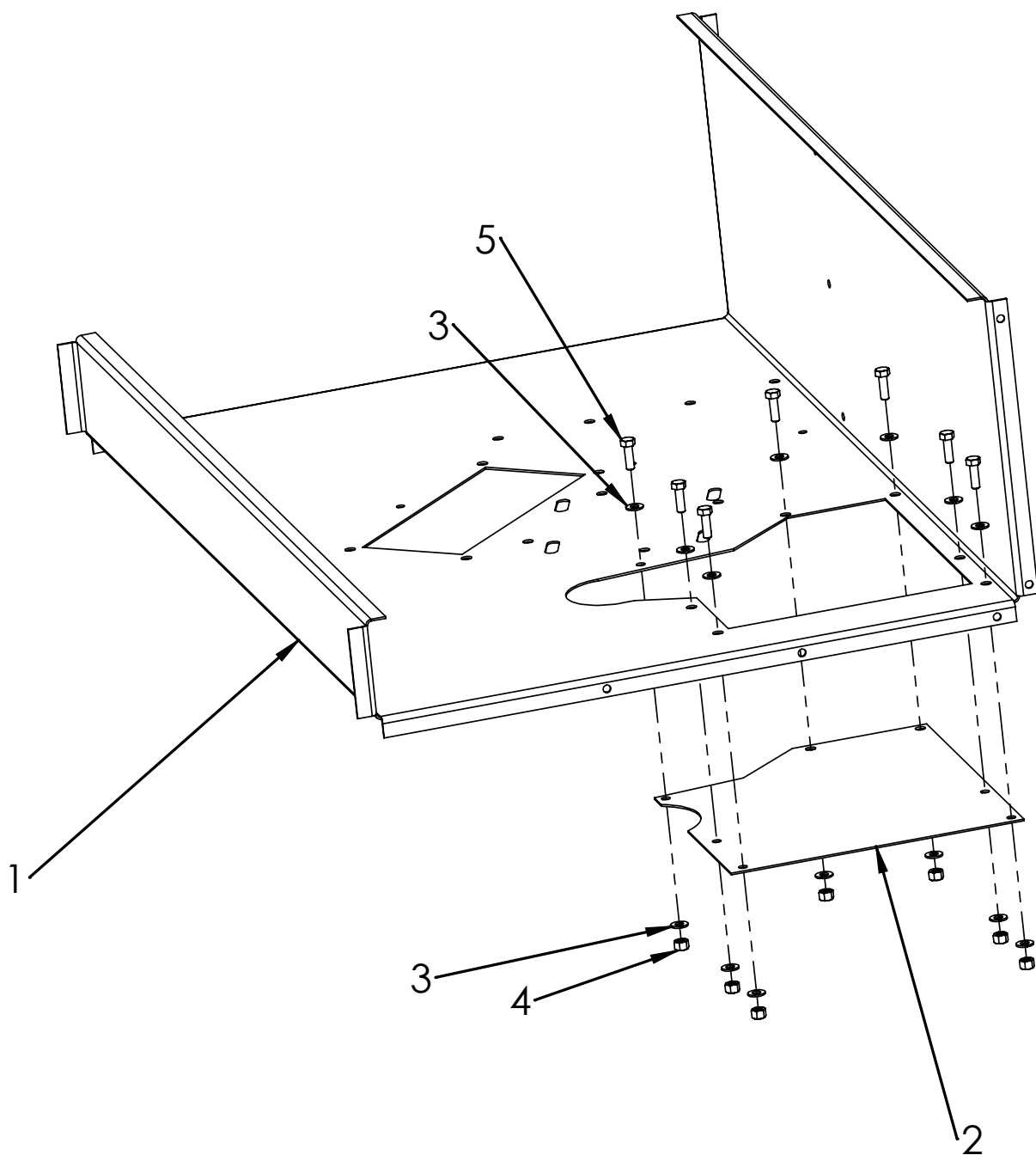
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Footnotes:

Notes:

Muffler Access to Duct Panel

HB4500



Muffler Access to Duct Panel

HB4500

Bom ID	Part No	Description	Qty	Remarks
1	933-5621	PANEL, DUCT	1	
2	933-5630	PANEL, MUFFLER ACCESS	1	
3	04FW-SAW	WASHER	14	
4	04HTN	HTNUT, .25"	7	
5	04HH12	SCREW, 1/4-20 X .750 HHC	7	

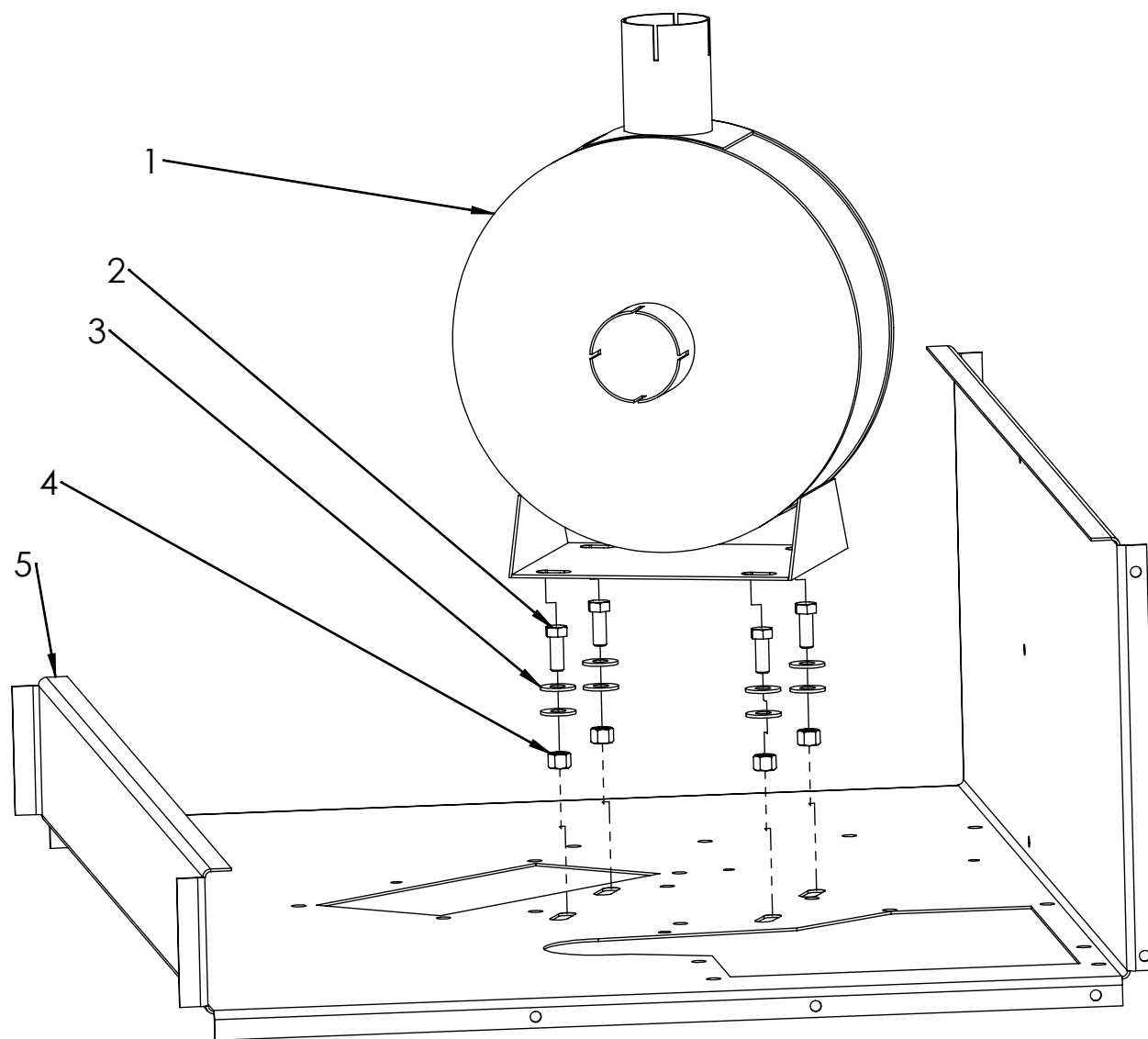
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Footnotes:

Notes:

Muffler Cowl to Duct Panel

HB4500



Muffler Cowl to Duct Panel

HB4500

Bom ID	Part No	Description	Qty	Remarks
1	933-4013	MUFFLER, - 2.5" COWL"	1	
2	06HH16	SCREW, 3/8-16 X 1.00 HHC - GR8	4	
3	06FW-USS	WASHER, 3/8" - USS	8	
4	06TLN	NUT, 3/8-16 TOP LOCK	4	
5	933-5621	PANEL, DUCT	1	

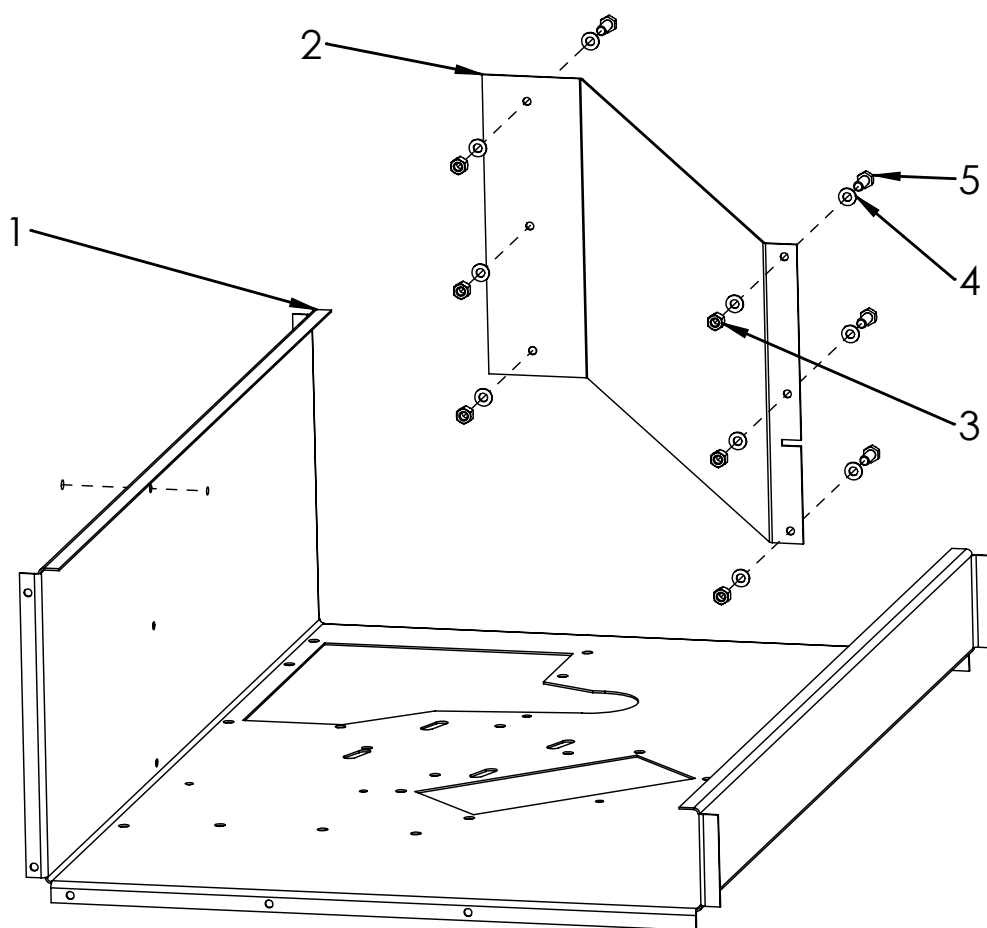
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Footnotes:

Notes:

Muffler Panel

HB4500



Muffler Panel

HB4500

Bom ID	Part No	Description	Qty	Remarks
1	933-5621	PANEL, DUCT	1	
2	933-5623	PANEL, MUFFLER	1	
3	04HTN	HTNUT .25	6	
4	04FW-SAE	WASHER,.25	12	
5	04HH12	SCREW, 1/4-20 X .75 HHC	6	

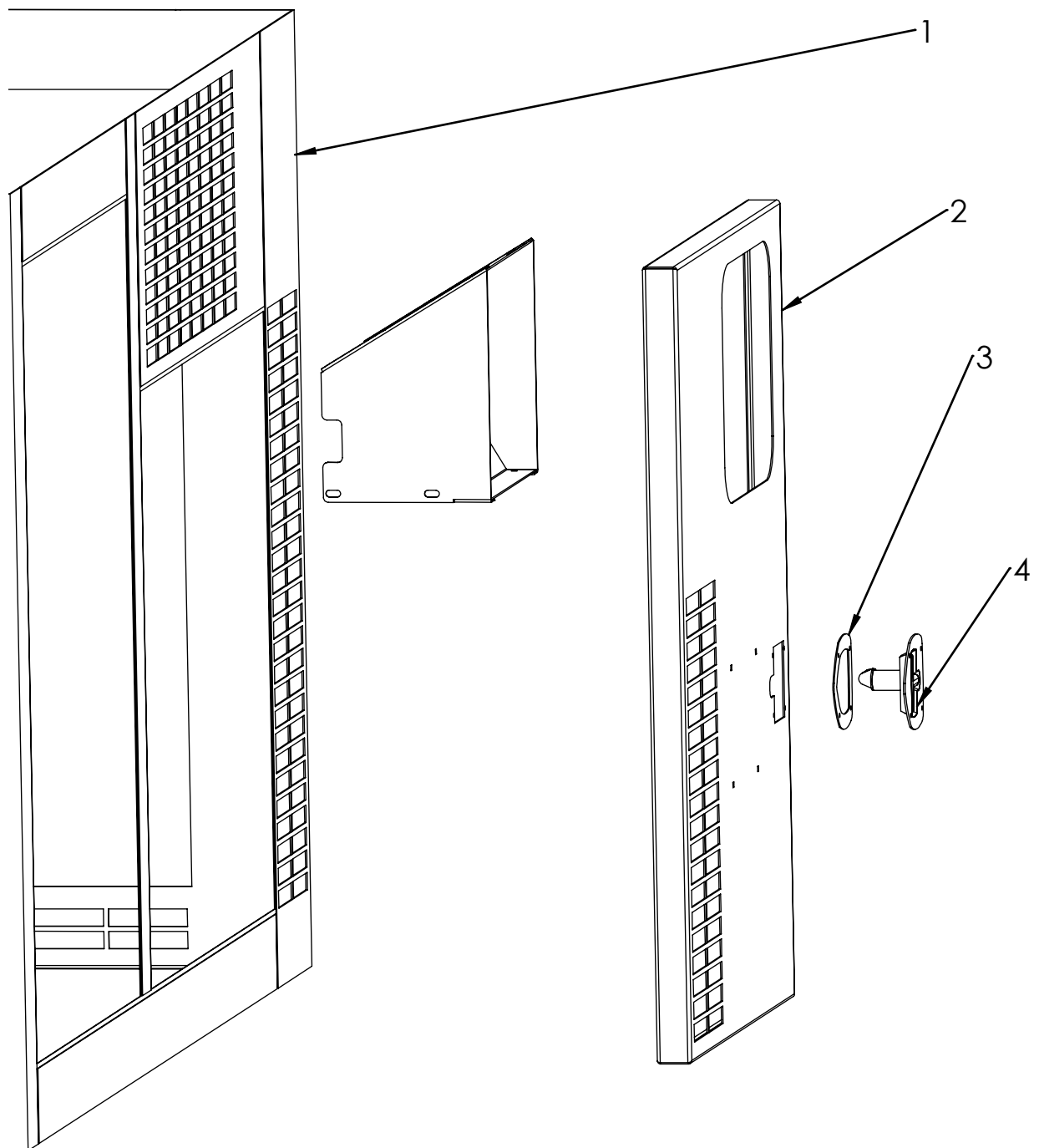
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Footnotes:

Notes:

Operator Controls to Frame

HB4500



Operator Controls to Frame

HB4500

Bom ID	Part No	Description	Qty	Remarks
1	933-5616	FRAME ASSEMBLY, HOUSING	1	
2	933-5617	DOOR, OPERATOR CONTROLS	1	
3	933-5531	GASKET, LATCH	1	
4	933-5530	DOOR LATCH, QUARTER TURN	1	

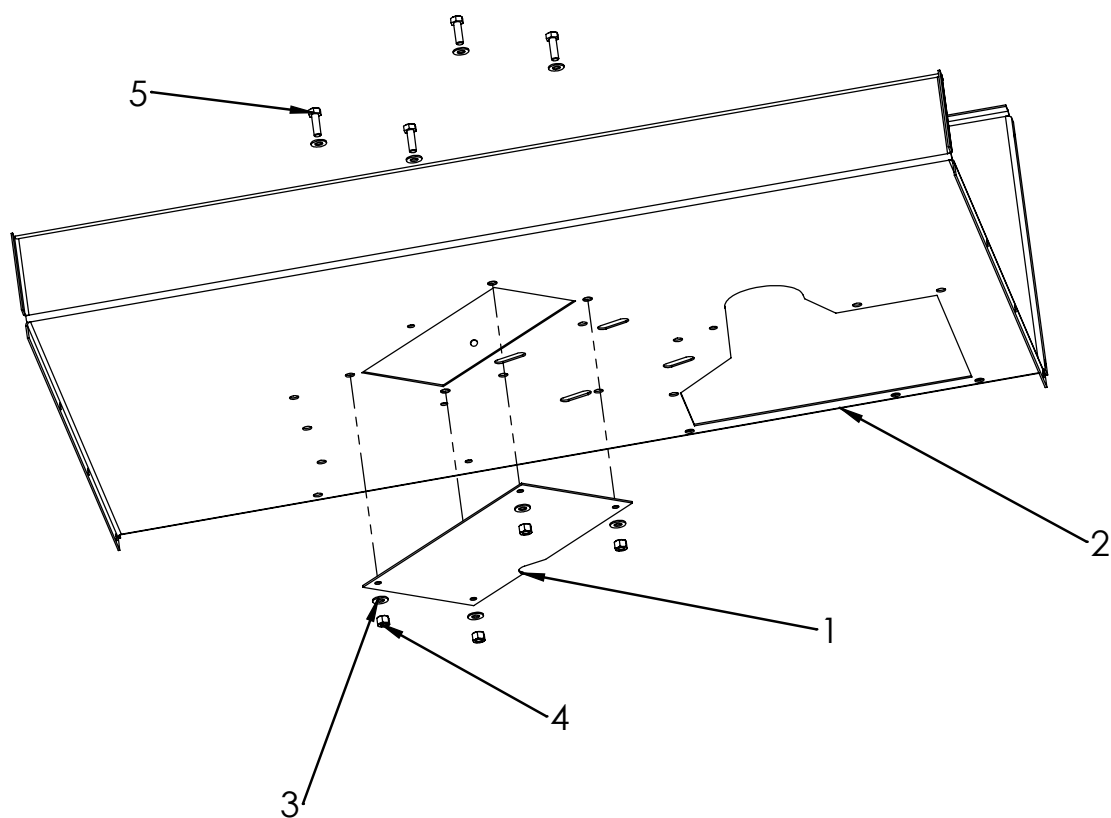
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Footnotes:

Notes:

Bolt Access Panel

HB4500



Bolt Access Panel

HB4500

Bom ID	Part No	Description	Qty	Remarks
1	933-5631	PANEL, BOLT ACCESS	1	
2	933-5621	PANEL, DUCT	1	
3	04FW-SAE	WASHER .25	8	
4	04HTN	HTNUT .25 - 18	4	
5	04HH12	SCREW, 1/4-20 X .75 HHC	4	

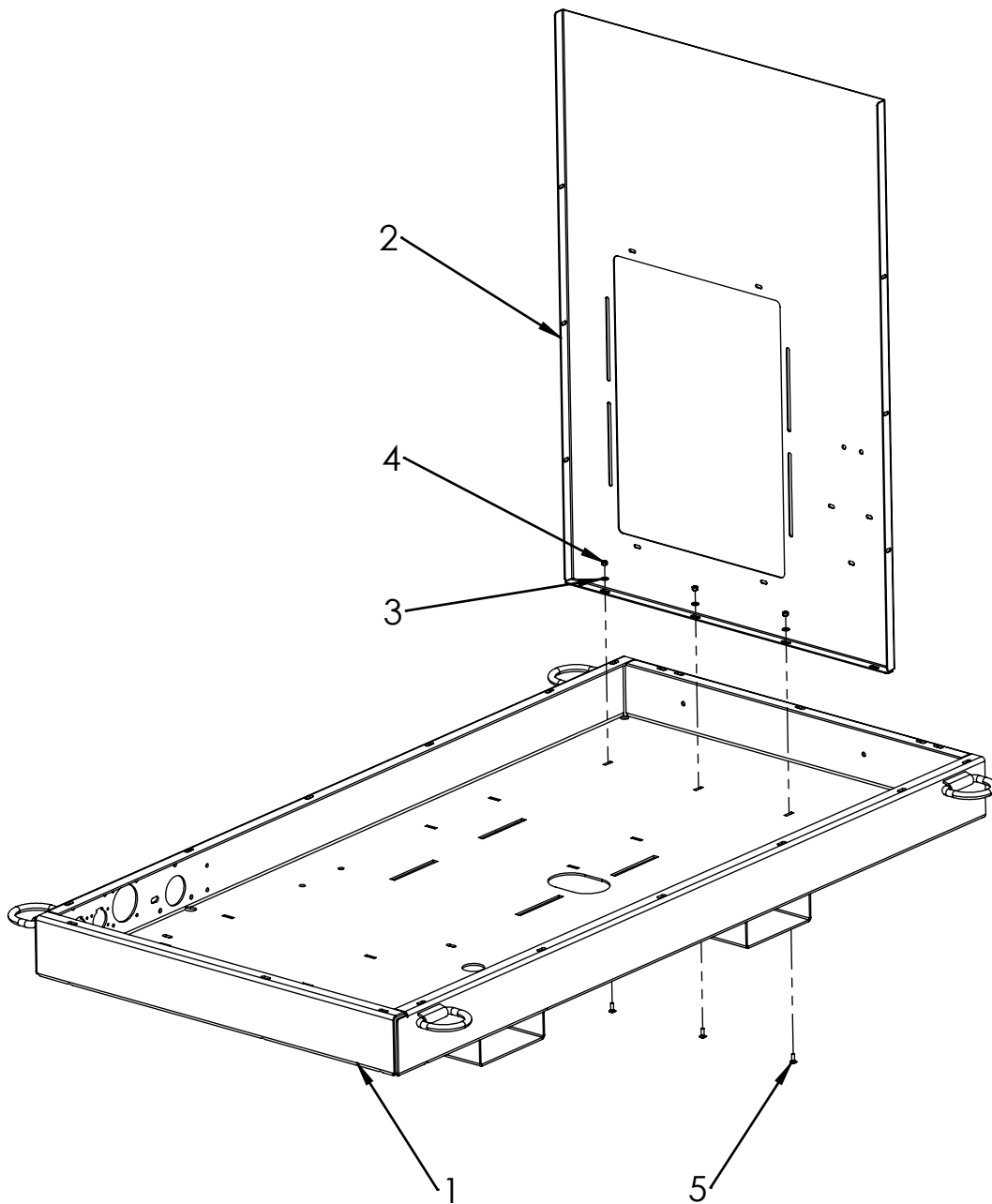
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Footnotes:

Notes:

Radiator Panel to Base Pan

HB4500



Radiator Panel to Base Pan

HB4500

Bom ID	Part No	Description	Qty	Remarks
1	933-5543	BASE FRAME WELDMENT	1	
2	933-5636	PANEL, RADIATOR	1	
3	04FW-SAE	WASHER, 1/4"	3	
4	04TLN	NUT, 1/4-20 TOP LOCK	3	
5	04CB12	BOLT, 1/4-20 X .75 CARRIAGE	3	

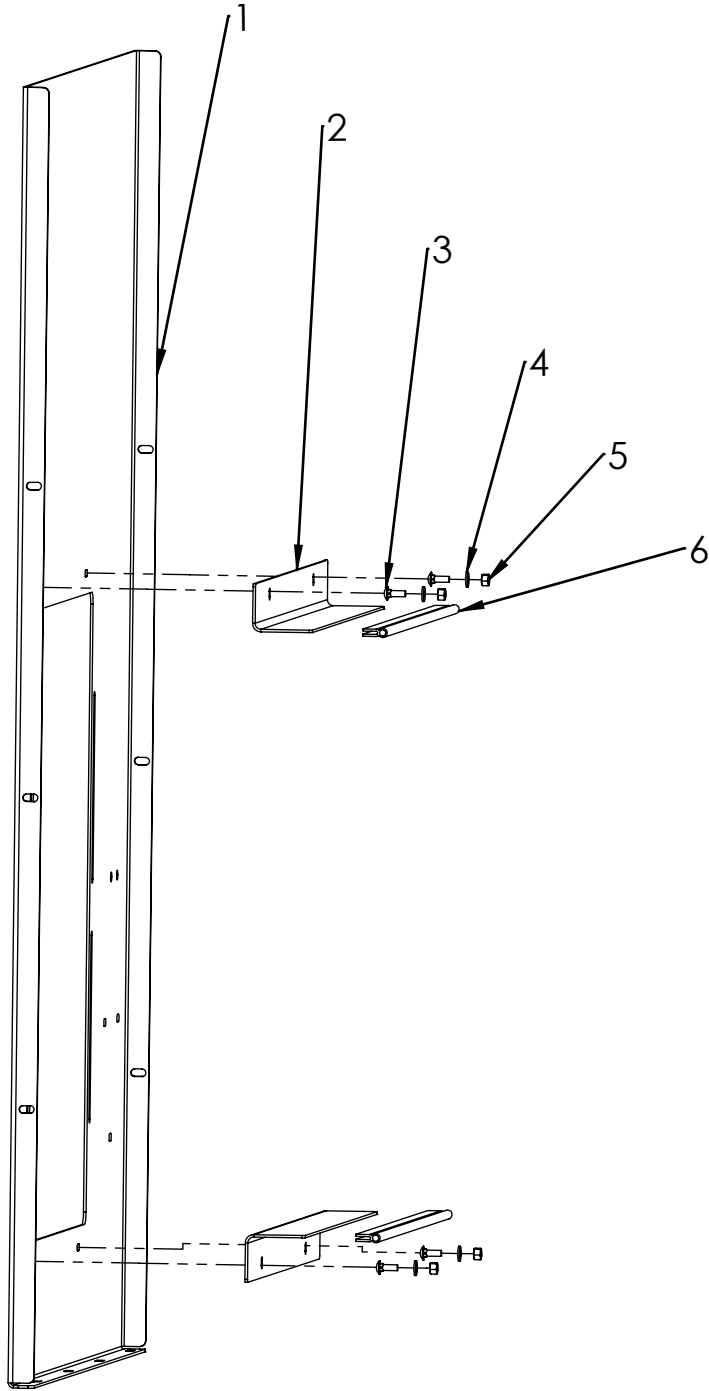
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Footnotes:

Notes:

Radiator Baffle Mount

HB4500



Radiator Baffle Mount

HB4500

Bom ID	Part No	Description	Qty	Remarks
1	933-5636	PANEL, RADIATOR	1	
2	913-8647	BAFFLE, RADIATOR	2	
3	04CB12	BOLT, 1/4-20 X .75 CARRIAGE	4	
4	04FW-SAE	WASHER, 1/4"	4	
5	04TLN	NUT, 1/4-20 TOP LOCK	4	
6	933-5565	SEAL, RUBBER BULB 24.25"	2	

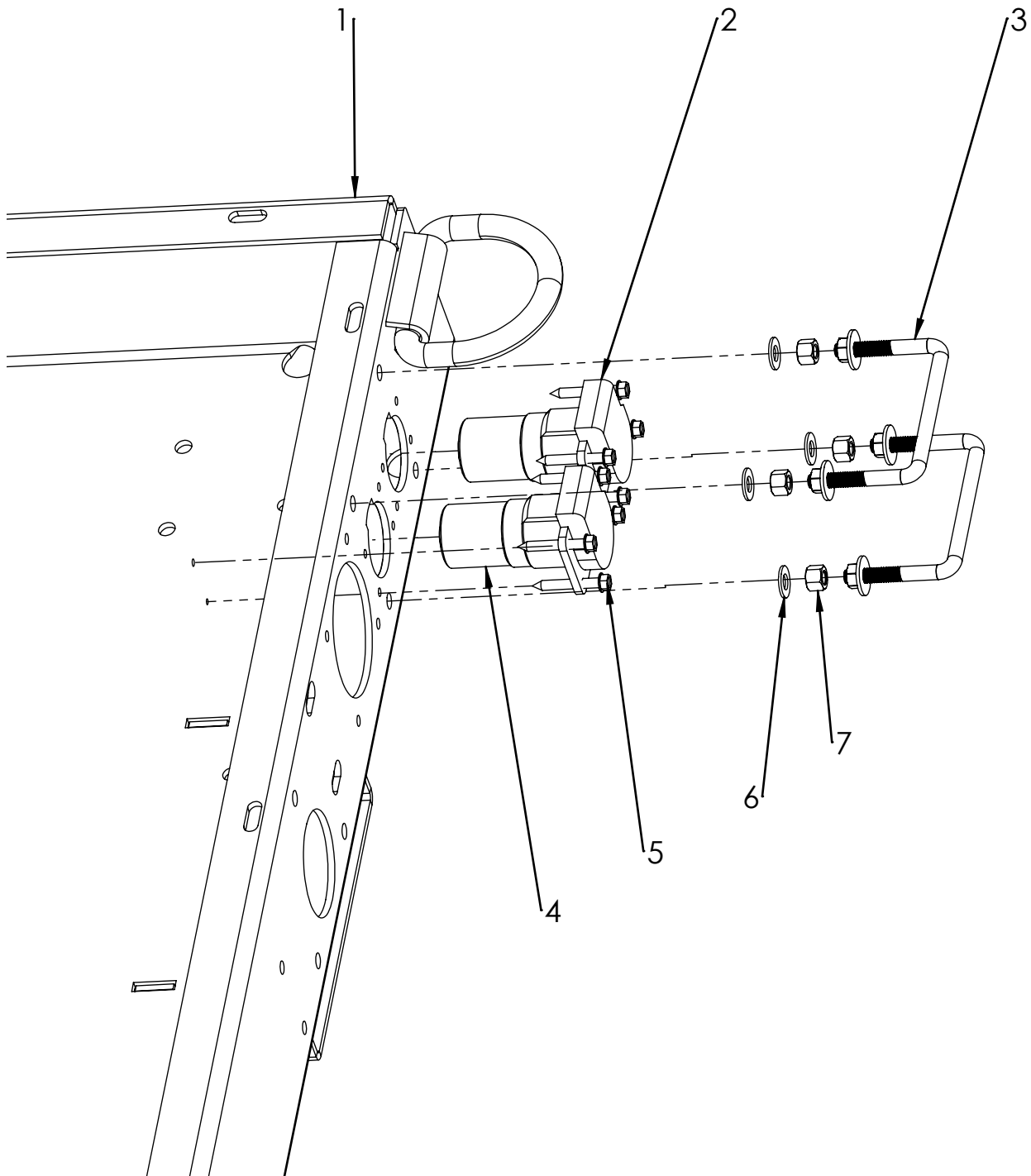
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Footnotes:

Notes:

RV Receptacles

HB4500



RV Receptacles

HB4500

Bom ID	Part No	Description	Qty	Remarks
1	933-5543	BASE FRAME WELDMENT	1	
2	933-5027	SOCKET, RV 9-WAY	1	
3	930-1077	U-BOLT, 3/8-16 X 2 5/8" L X 4" W	2	
4	933-5005	SOCKET, RV 7-WAY	1	
5	04ST12	FHTS .25-14 -1.813	8	
6	06FW-SAE	WASHER, 3/8"	4	
7	06TLN	NUT, 3/8-16 TOP LOCK	4	

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Footnotes:

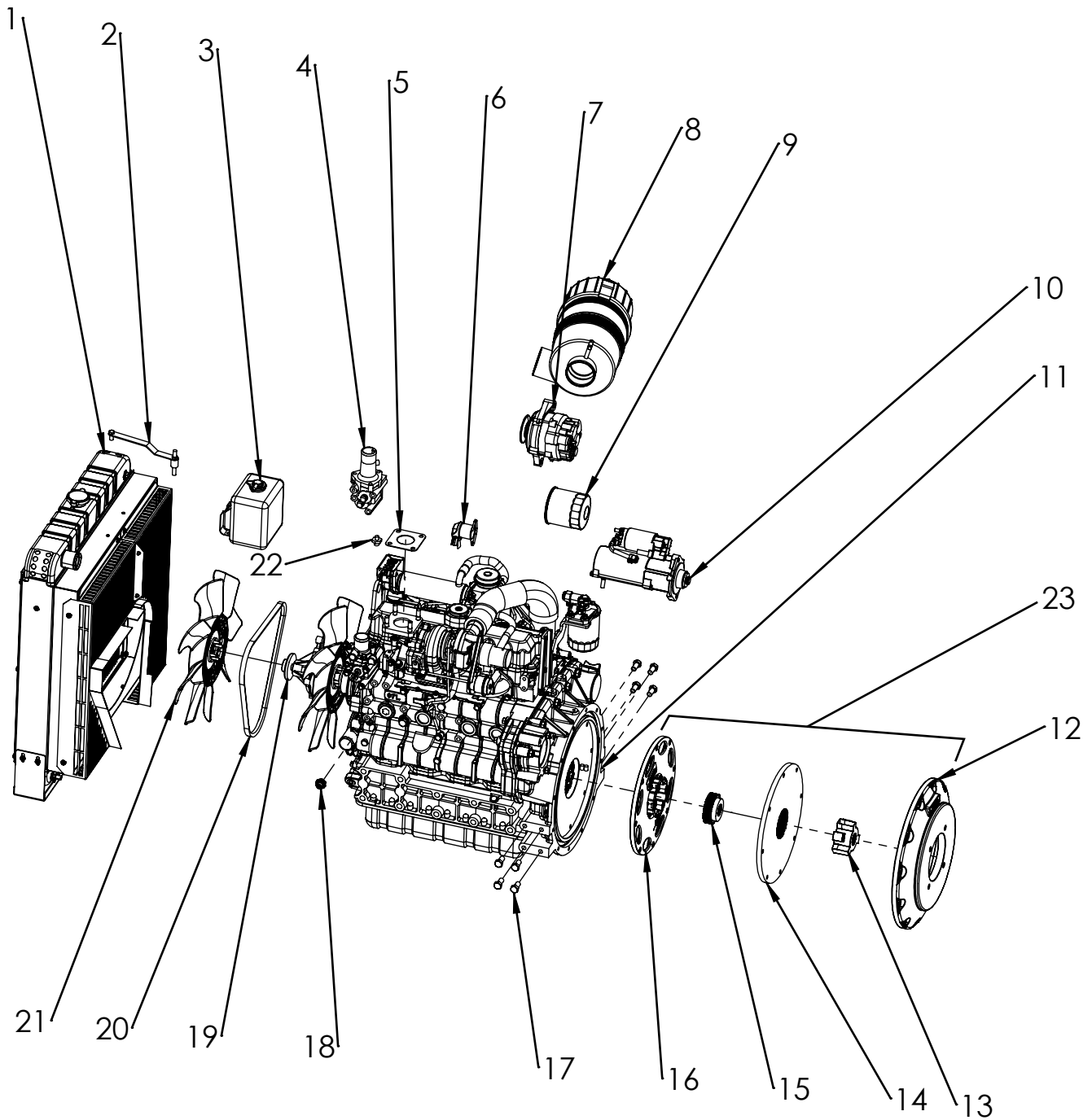
Notes:

Notes

ENGINE COMPONENTS

Engine Assembly

HB4500



Engine Assembly

HB4500

Bom ID	Part No	Description	Qty	Remarks
1	933-4505	RADIATOR	1	
2	933-4550	RADIATOR STAY BRACKET	1	
3	933-4543	TANK OVER FLOW	1	
4	933-4539	THERMOSTAT	2	
5	913-7739	GASKET, MUFFLER	1	
6	933-4564	SOLENOID, STOP	1	
7	913-7731	ALTERNATOR	1	
8	913-7713	AIR CLEANER	1	
9	913-7701	FILTER, OIL	1	
10	913-7733	STARTER ASSEMBLY	1	
11	933-4541	ENGINE, KUBOTA - V3307T SERVICE	1	
12	993-4572	HOUSING, SAE "C" 4 BOLT	1	
13	933-4570	HUB HEX FLEX	1	
14	933-4558	DRIVE PLATE - 10"	1	
15	933-4559	HUB PUMP	1	
16	933-4571	DRIVE PLATE HEX FLEX	1	
17	M12HH25F	SCREW, M12-1.25 X 25MM HHC	8	
18	933-4561	SWITCH, OIL	1	
19	933-4554	WATER PUMP	1	
20	933-4565	BELT, V	1	
21	933-4567	FAN, PUSHER - V3307T	1	
22	933-4566	SWITCH, TEMPERATURE	1	
23	933-4560	HOUSING KIT, SAE "C" 4 BOLT	1	

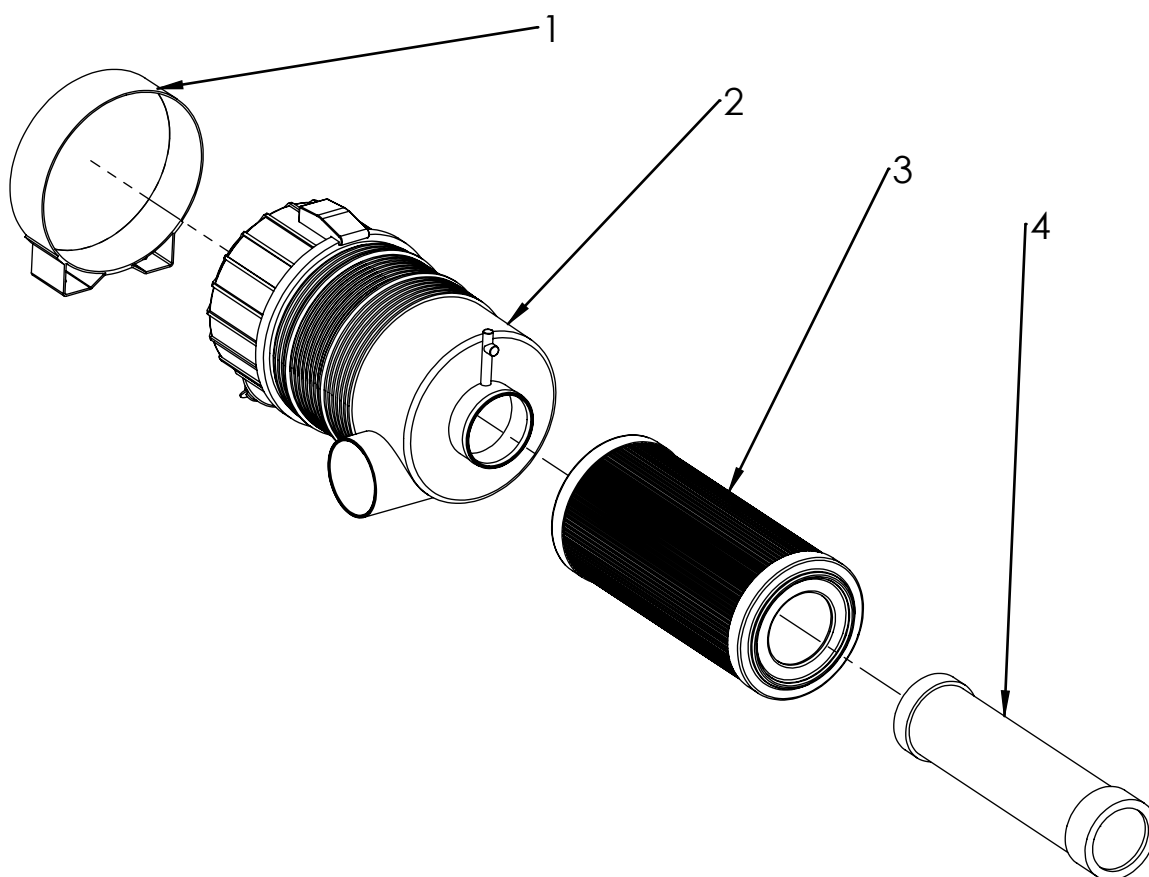
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Footnotes:

Notes:

Air Cleaner

HB4500



Air Cleaner

HB4500

Bom ID	Part No	Description	Qty	Remarks
1	913-7719	AIR CLEANER SUPPORT	1	
2	933-4542	AIR CLEANER ASSY. HOUSING	1	
3	913-7703	FILTER, AIR (MAIN)	1	
4	913-7704	FILTER, AIR (SAFETY)	1	

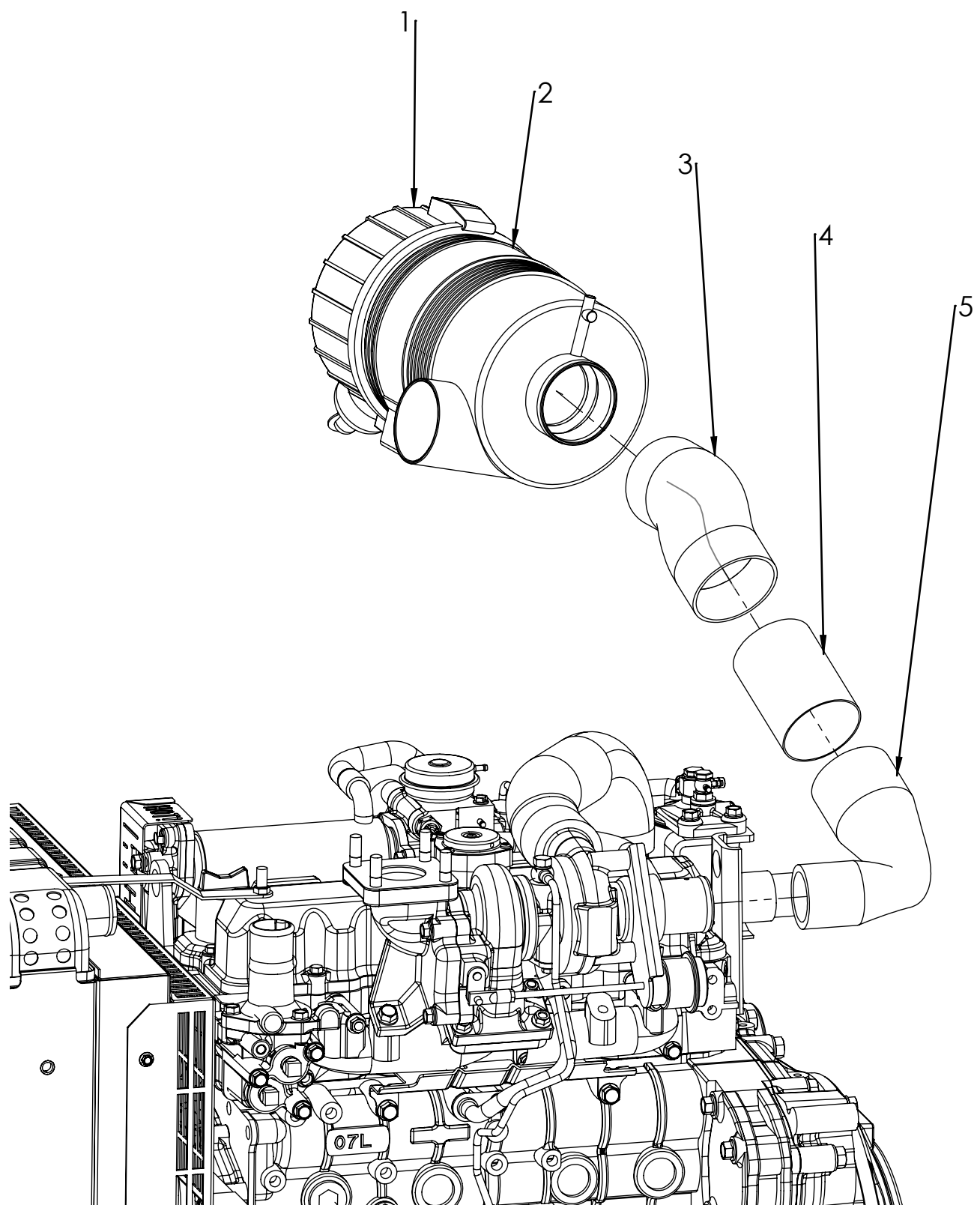
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Footnotes:

Notes:

Air Cleaner to Engine

HB4500



Air Cleaner to Engine

HB4500

Bom ID	Part No	Description	Qty	Remarks
1	933-4542	AIR CLEANER ASSEMBLY	1	
2	913-7719	AIR CLEANER SUPPORT	1	
3	933-4531	HOSE, TURBO INLET 3" X 8"	1	
4	933-4525	AIR HOSE ADAPTER, 3" OD X 4"	1	
5	933-4513	HOSE 1.75 X 2.5 AIR	1	

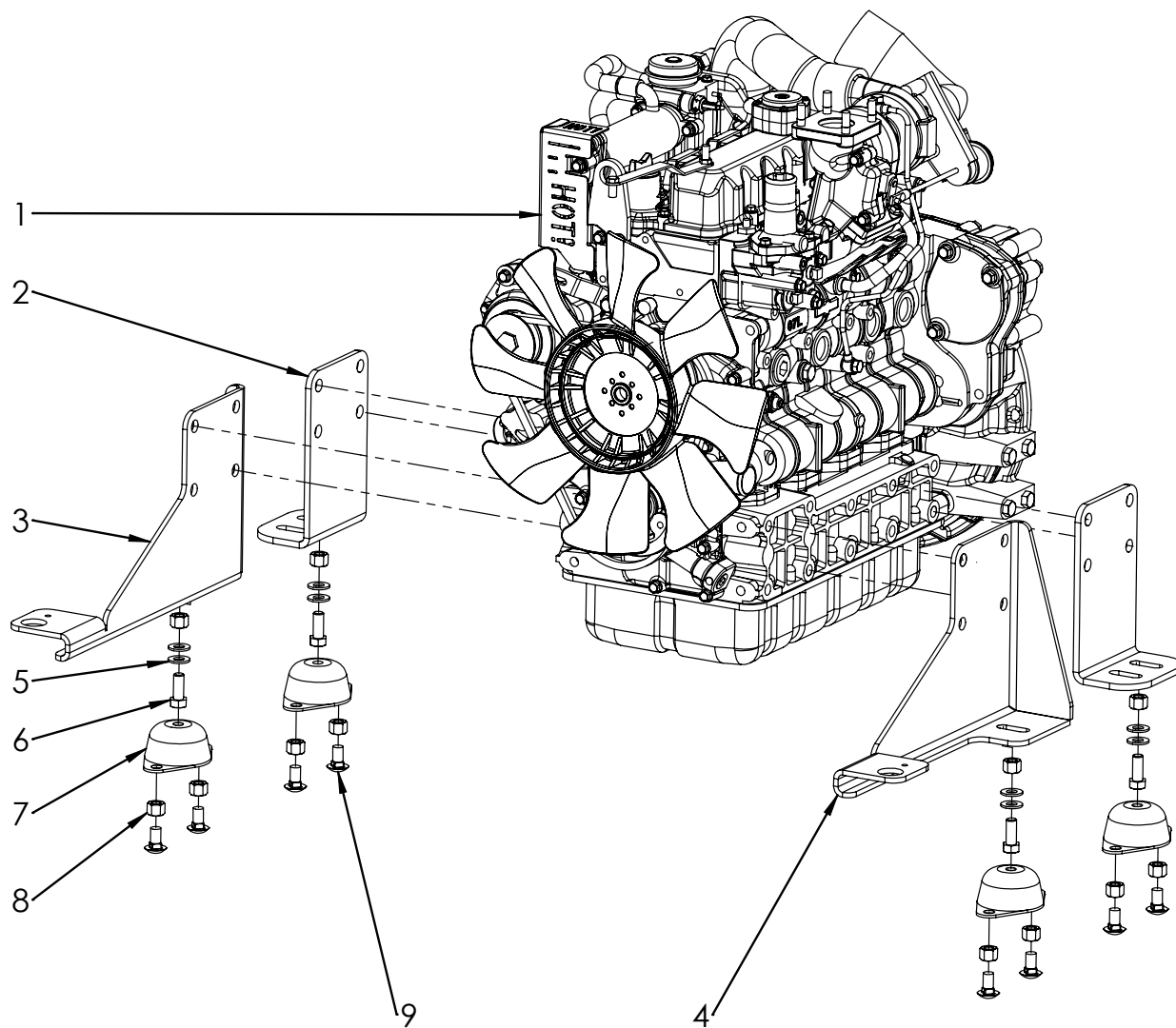
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Footnotes:

Notes:

Engine Mounts

HB4500



Engine Mounts

HB4500

Bom ID	Part No	Description	Qty	Remarks
1	933-4541	ENGINE, KUBOTA V3307T	1	
2	933-5610	ENGINE MOUNT, REAR	2	
3	933-5582	BRACKET, RIGHT ENGINE	1	
4	955-5581	BRACKET, LEFT ENGINE	1	
5	08FW-SAE	WASHER, 1/2"	8	
6	08HH20	SCREW, 1/2-13 X 1.25 HHC - GR8	4	
7	913-7301	MOUNT, ENGINE	4	
8	08TLN	NUT, 1/2-13 TOP LOCK	12	
9	08CB16	BOLT, 1/2-13 X 1 CARRIAGE	8	

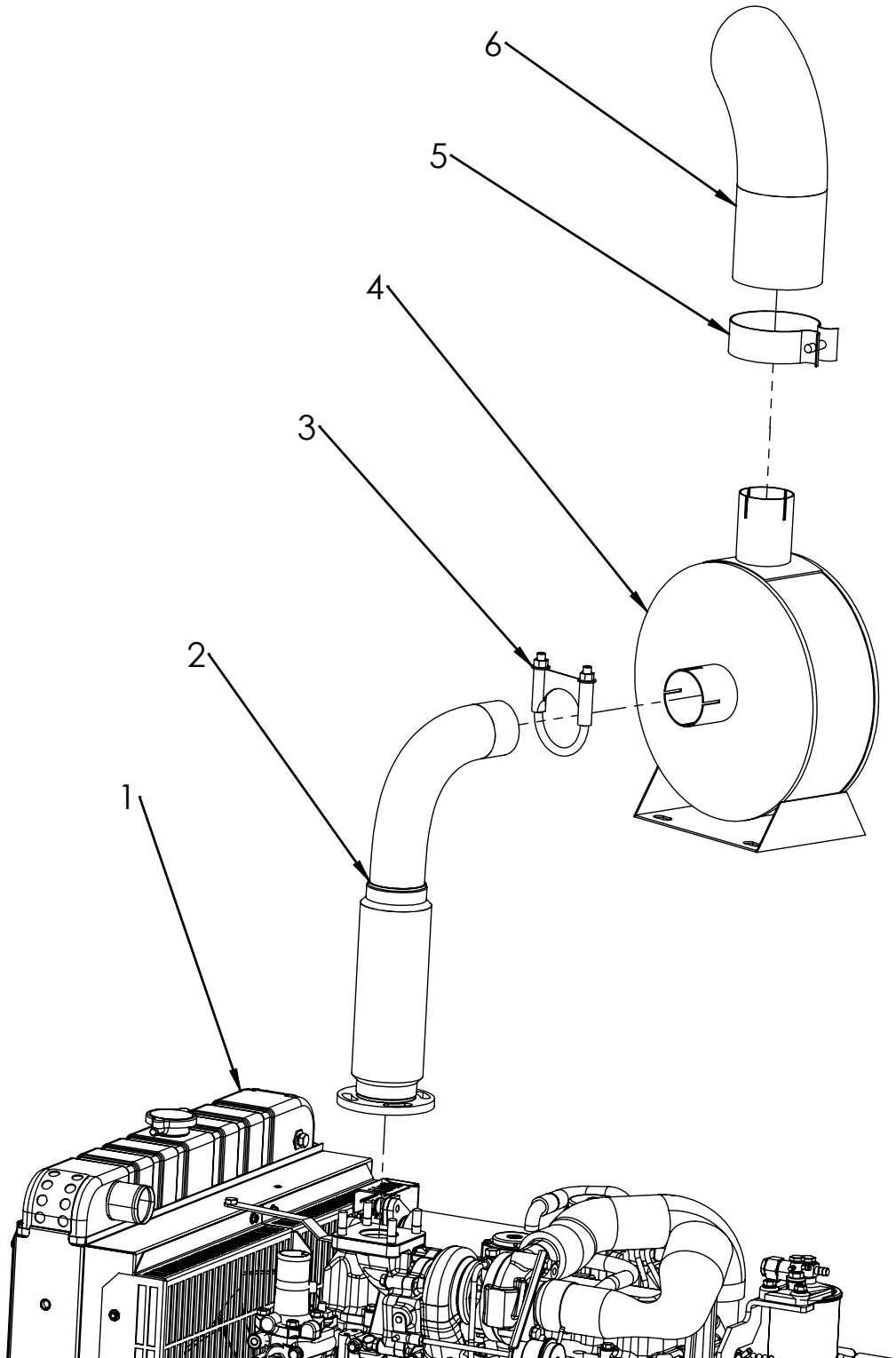
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Footnotes:

Notes:

Exhaust System

HB4500



Exhaust System

HB4500

Bom ID	Part No	Description	Qty	Remarks
1	933-4541	ENGINE, KUBOTA V3307T	1	
2	933-4520	FLEX PIPE WELDMENT	1	
3	933-4003	CLAMP, 2.5" EXHAUST"	1	
4	933-4013	MUFFLER, -2.5" COWL"	1	
5	933-4023	4" MOUNTING CLAMP, EXHAUST	1	
6	933-4022	PIPE, MUFFLER OUTLET	1	

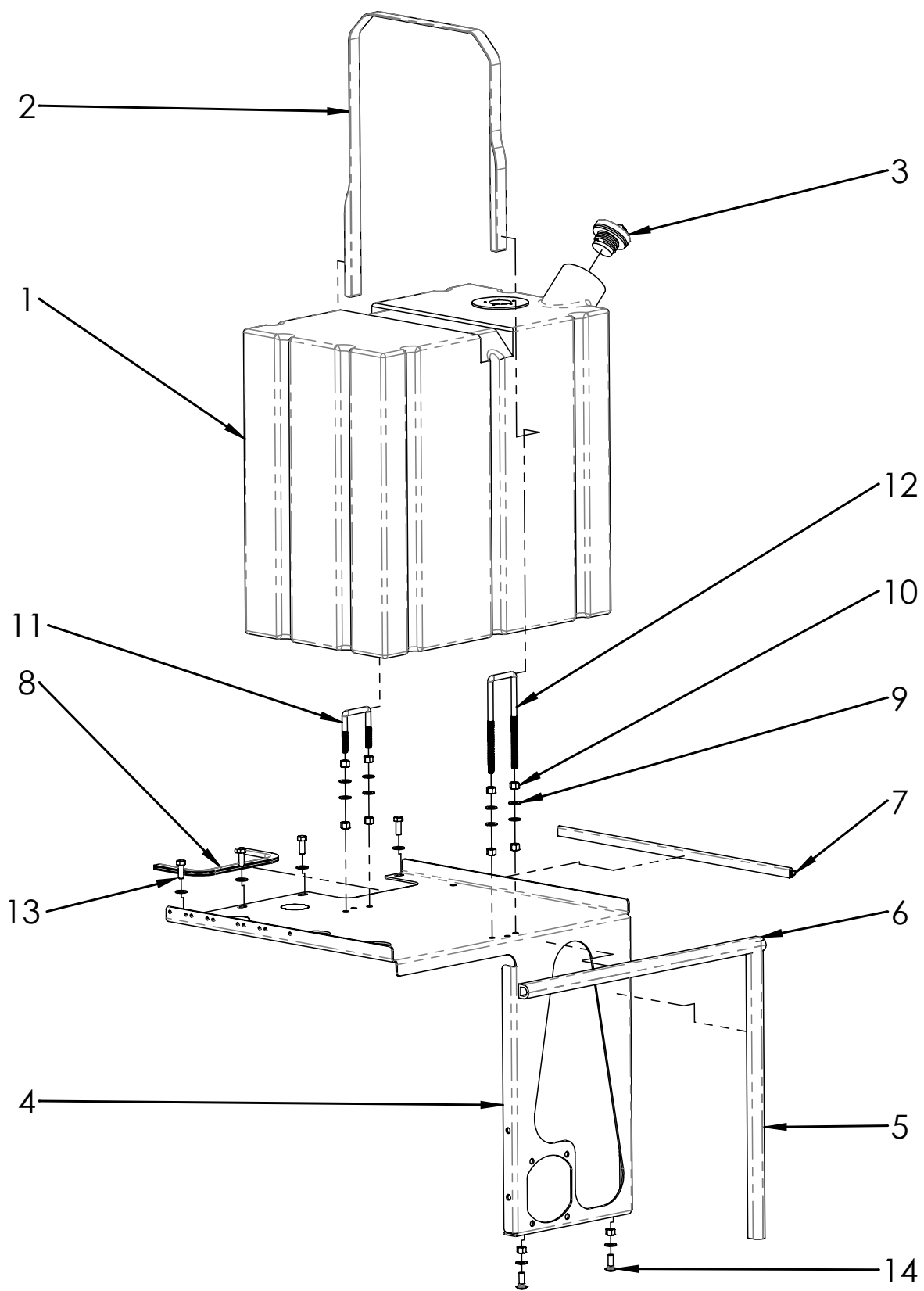
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Footnotes:

Notes:

Fuel Tank Assembly

HB4500



Fuel Tank Assembly

HB4500

Bom ID	Part No	Description	Qty	Remarks
1	913-7254	TANK - 25 GALLON FUEL	1	
2	933-4004	SLING - TANK	1	
3	912-0922	CAP FUEL	1	
4	933-5603	FUEL TANK SUPPORT	1	
5	933-5562	SEAL, RUBBER BULB, 21.5"	1	
6	933-5561	SEAL, RUBBER BULB, 24"	1	
7	933-5570	SEAL, BULB 90 DEG, 23"	1	
8	933-5549	EDGE GUARD, 20.25"	1	
9	06FW-SAE	WASHER, 3/8"	14	
10	06TLN	NUT, 3/8-16 TOP LOCK	10	
11	914-0255	U-BOLT, 3/8-16 X 2"W X 3" T SQ.	1	
12	933-1011	U-BOLT, 3/8-16 X 2" W X 7" T SQ.	1	
13	06HH16	SCREW, 3/8-16 X 1.00 HHC - GR8	4	
14	06CB16	BOLT, 3/8-16 X 1 CARRIAGE	2	

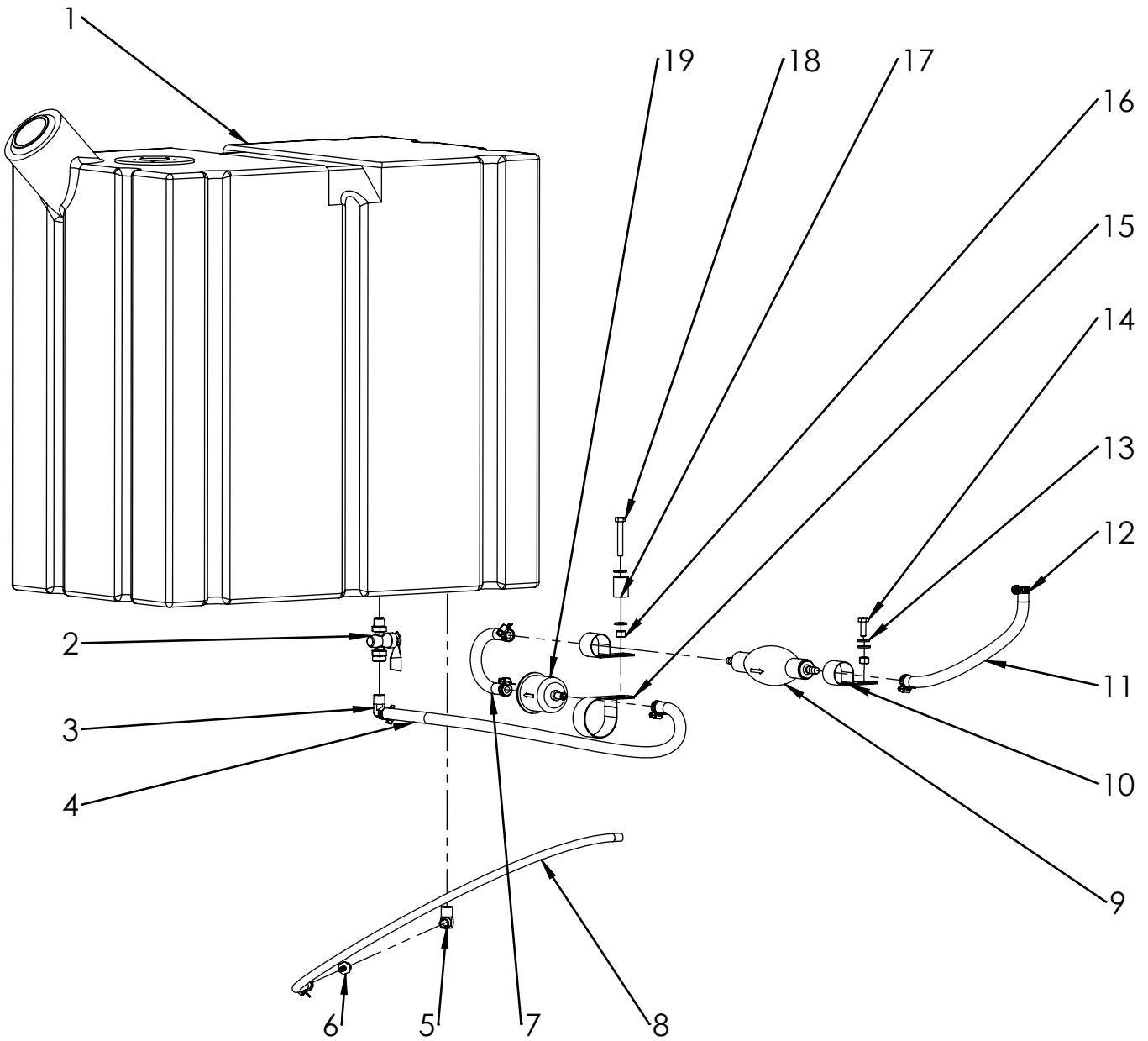
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Footnotes:

Notes:

Fuel System

HB4500



Fuel System

HB4500

Bom ID	Part No	Description	Qty	Remarks
1	913-7254	TANK - 25 GALLON FUEL	1	
2	913-7130	FUEL SHUT-OFF PLUG VALVE	1	
3	912-3705	ELBOW-1/4"NPT X 5/16 BARB	1	
4	912-3706	HOSE-5/16" FUEL 26" LG	1	
5	909-8163	ELBOW, 4MP-4FP 90 DEGREE	1	
6	912-1040	FITTING, 3-4 MP	1	
7	933-4537	HOSE, FUEL 5/16" X 7.5"	1	
8	933-4538	HOSE, FUEL 3/16" X 28.5"	1	
9	913-7331	BULB, FUEL PRIMER	1	
10	912-3601	CLAMP, 1" CUSHION	2	
11	933-4535	HOSE, FUEL 5/16" X 10.5"	1	
12	912-1038	CLAMP, HOSE 1/4"	7	
13	04FW-SAE	WASHER, 1/4"	4	
14	04HH12	SCREW, 1/4-20 X .75 HHC - GR8	1	
15	912-3621	CLAMP 2"	1	
16	04TLN	NUT, 1/4-20 TOP LOCK	2	
17	112-4017	SPACER, 3/8 X 3/4 X 1	1	
18	04HH28	SCREW, 1/4-20 X 1.75 HHC - GR8	1	
19	912-3707	FILTER, FUEL	1	

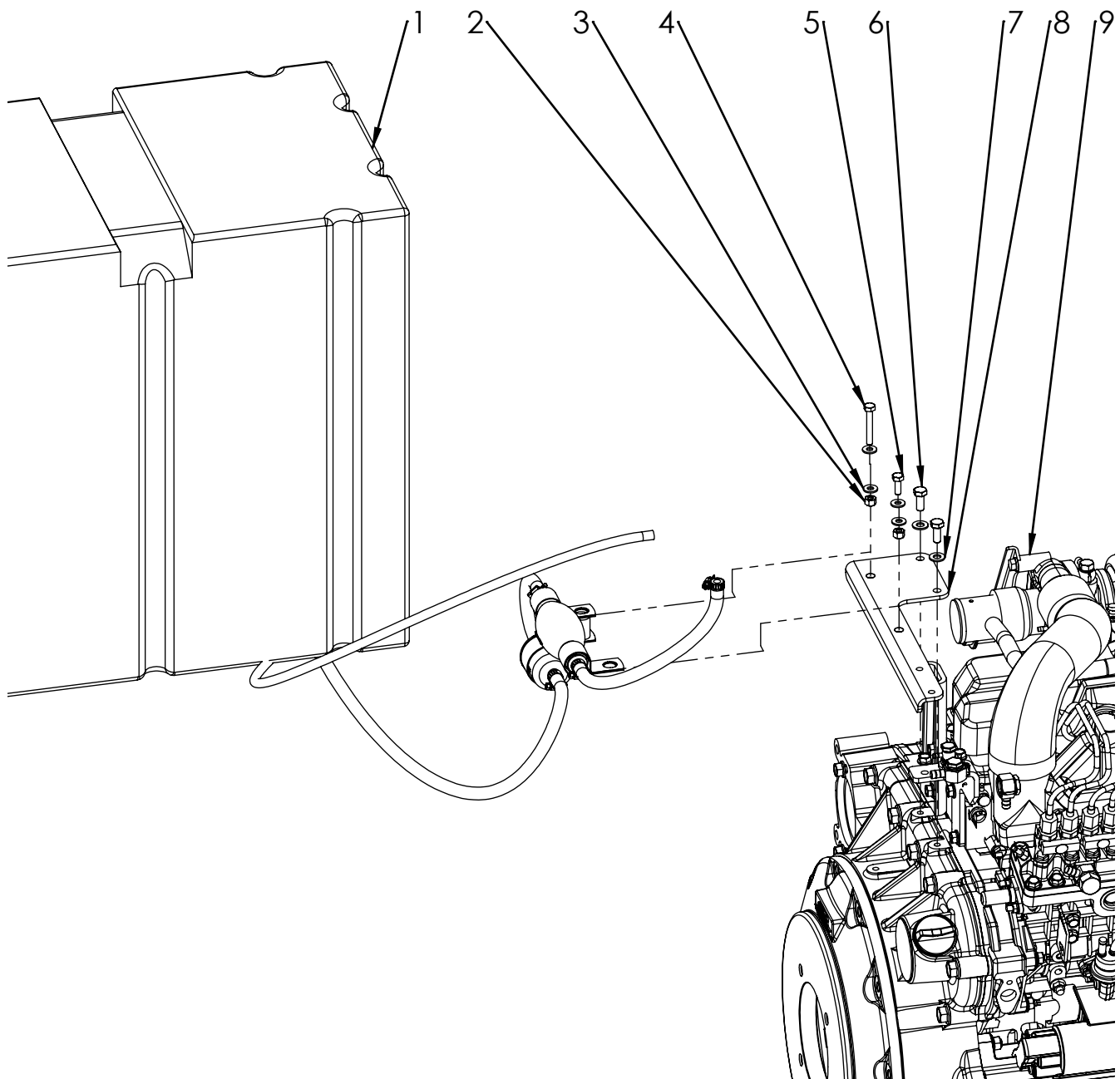
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Footnotes:

Notes:

Fuel Tank to Engine

HB4500



Fuel Tank to Engine

HB4500

Bom ID	Part No	Description	Qty	Remarks
1	913-7254	TANK - 25 GALLON FUEL	1	
2	04TLN	NUT, 1/4-20 TOP LOCK	2	
3	04FW-SAE	WASHER, 1/4"	4	
4	04HH28	SCREW, 1/4-20 X 1.75 HHC - GR8	1	
5	04HH12	SCREW, 1/4-20 X .75 HHC - GR8	1	
6	M08HH20	SCREW, M8-1.25MM X 20MM HHC	2	
7	05FW-SAE	WASHER, 5/16"	2	
8	933-5583	BRACKET, THROTTLE SOLENOID	1	
9	933-4541	ENGINE, KUBOTA V3307T	1	

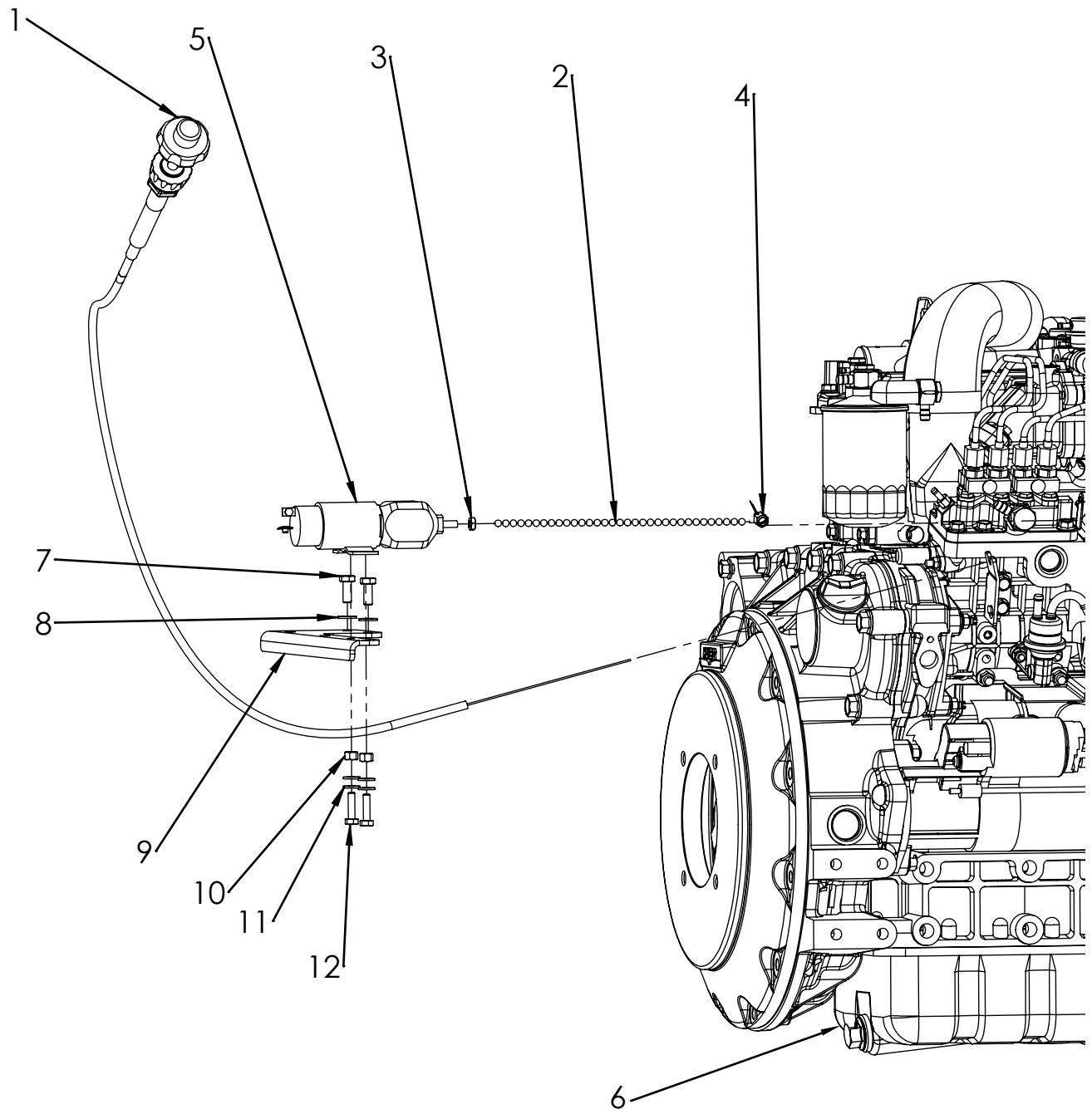
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Footnotes:

Notes:

Throttle Assembly

HB4500



Throttle Assembly

HB4500

Bom ID	Part No	Description	Qty	Remarks
1	933-4545	THROTTLE CABLE	1	
2	913-7723	THROTTLE LINKAGE BEADED	1	
3	04HJNF	NUT, 1/4-28 HEX JAM	1	
4	913-7741	PIVOT CABLE	1	
5	913-7724	THROTTLE SOLENOID	1	
6	933-4541	ENGINE, KUBOTA V3307T	1	
7	M08HH20	SCREW, M8-1.25MM X 20MM HHC	2	
8	05FW-SAE	WASHER, 5/16"	2	
9	933-5583	BRACKET, THROTTLE SOLENOID	1	
10	04TLN	NUT, 1/4-20 TOP LOCK	2	
11	04FW-SAE	WASHER, 1/4"	4	
12	04HH16	SCREW, 1/4-20 x 1.0 HHC - GR8	2	

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Footnotes:

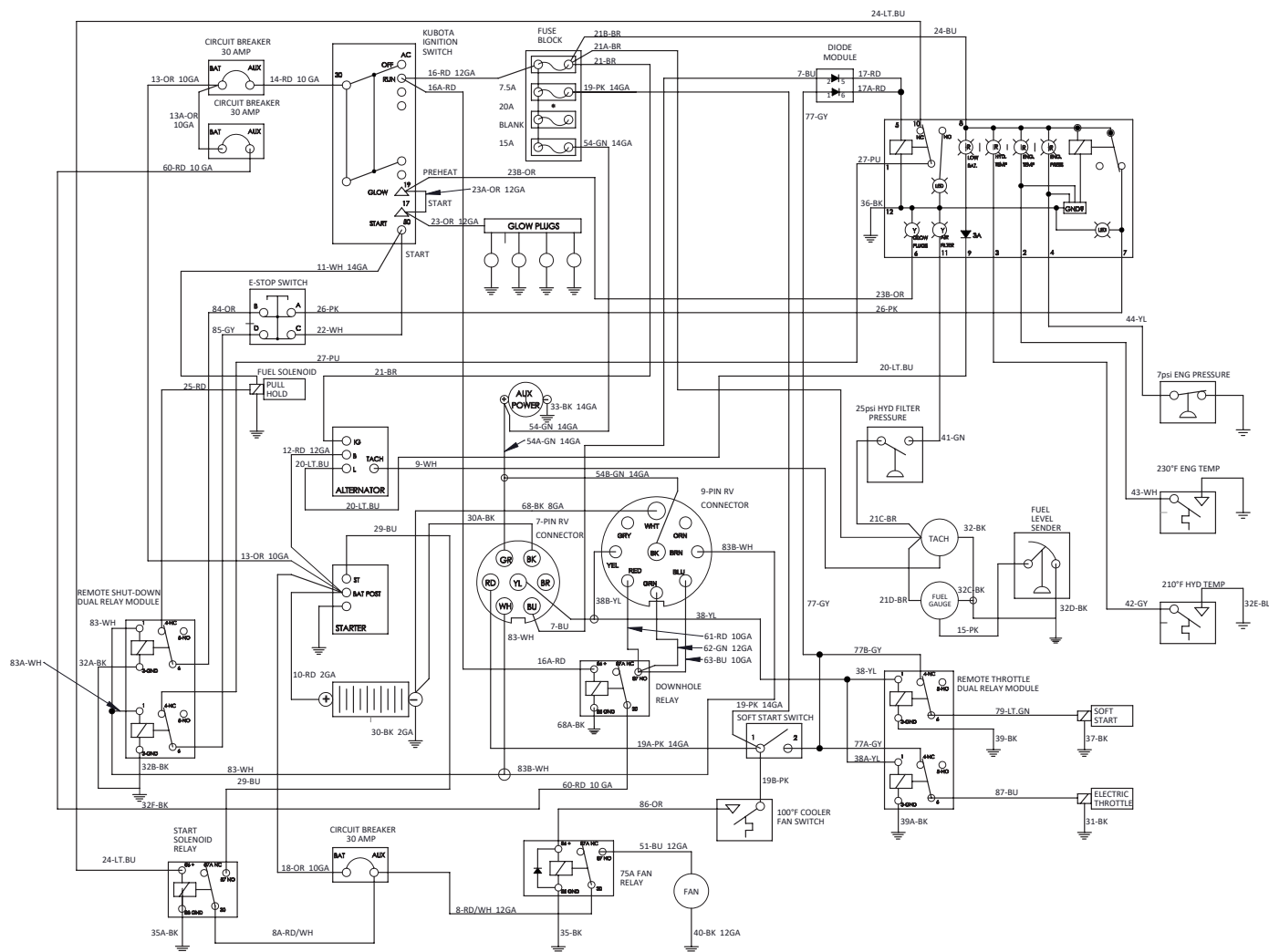
Notes:

Notes

ELECTRICAL

Electrical Schematic

HB45000



SCHEMATIC CORRESPONDS TO WIRE HARNESS 933-5025

Electrical Schematic

HB45000

NO.	COLOR	GAGE	FROM	TO
7	BLUE	16	RV CONNECTOR "BLUE" TERM	DIODE MODULE TERMINAL 1
8	RED/WHITE	12	30 AMP CIRCUIT BREAKER "AUX" TERM.	FAN RELAY TERM 30
8A	RED/WHITE	16	30 AMP CIRCUIT BREAKER "AUX" TERM.	STARTER SOLENOID RELAY TERM 30
9	WHITE	16	SPEED SENSOR "SIGNAL" TERMINAL	TACH GAUGE "SIG" TERM
10	RED	2	POSITIVE BATTERY TERMINAL	STARTER POST
11	WHITE	14	IGNITION SWITCH TERMINAL	FUEL SOLENOID "PULL" TERM
12	RED	12	STARTER POST	ALTERNATOR TERM B
13	ORANGE	10	STARTER POST	30 AMP CIRCUIT BREAKER "BAT" TERM.
13A	ORANGE	10	30 AMP CIRCUIT BREAKER "BAT" TERM.	30 AMP CIRCUIT BREAKER "BAT" TERM.
14	RED	10	30 AMP CIRCUIT BREAKER "AUX" TERM.	IGNITION SWITCH TERMINAL 30
15	PINK	16	FUEL LEVEL SENDER	FUEL GAUGE TERMINAL S
16	RED	12	IGNITION SWITCH TERMINAL AC	FUSE BLOCK "FEED" TERMINAL
16A	RED	16	IGNITION SWITCH TERMINAL AC	DOWNHOLE RELAY, TERM 86 "+"
17	RED	16	DIODE MODULE TERMINAL 5	LIGHT MODULE TERMINAL 5
17A	RED	16	DIODE MODULE TERMINAL 6	SPLICE TO 17
18	ORANGE	10	STARTER POST	30 AMP CIRCUIT BREAKER "BAT" TERM.
19	PINK	12	7.5 AMP START/THROTTLE FUSE	SOFT START SWITCH TERMINAL 1
19A	PINK	14	SOFT START SWITCH TERMINAL 1	RV CONNECTOR "RED" TERM
19B	PINK	14	SOFT START SWITCH TERMINAL 1	OIL COOLER TEMP SWITCH
20	LT. BLUE	16	LIGHT MODULE TERMINAL 9	ALTERNATOR TERM L
21	BROWN	16	7.5 AMP WARNING LIGHT FUSE	ALTERNATOR TERM IG
21A	BROWN	16	7.5 AMP WARNING LIGHT FUSE	TACH TERMINAL "+"
21B	BROWN	16	7.5 AMP WARNING LIGHT FUSE	LIGHT MODULE TERMINAL 8
21C	BROWN	16	TACH TERMINAL "+"	HYDRAULIC FILTER PRESSURE SWITCH
21D	WHITE	16	TACH TERMINAL "+"	FUEL GAUGE TERMINAL 1
22	ORANGE	16	IGNITION SWITCH TERMINAL 50	EMERGENCY STOP SWITCH TERMINAL C
23	ORANGE	12	IGNITION SWITCH TERMINAL 17	GLOW PLUGS
23A	ORANGE	12	IGNITION SWITCH TERMINAL 17	IGNITION SWITCH TERMINAL 19
23B	LT. BLUE	16	IGNITION SWITCH TERMINAL 19	LIGHT MODULE TERMINAL 6
24	RED	16	LIGHT MODULE TERMINAL 10	STARTER SOLENOID RELAY TERM 86
25	PINK	16	FUEL SHUT-OFF RELAY TERM 4	FUEL SOLENOID "HOLD" TERM
26	PURPLE	16	LIGHT MODULE TERMINAL 7	EMERGENCY STOP SWITCH TERMINAL A
27	BLUE	16	STARTER RELAY TERM 4	LIGHT MODULE TERMINAL 1
29	BLACK	16	STARTER SOLENOID RELAY TERM 87	STARTER "ST" TERM
30	BLACK	2	NEGATIVE BATTERY POST	ENGINE BLCK
30A	BLACK	16	RV CONNECTOR "BLACK" TERM	GROUND

Electrical Schematic

HB45000

NO.	COLOR	GAGE	FROM	TO
31	BLACK	16	ELECTRIC THROTTLE SOLENOID	GROUND
32	BLACK	16	TACH TERMINAL "-"	GROUND
32A	BLACK	16	FUEL SHUT-OFF RELAY TERM 3	GROUND BUSS A, TERM A
32B	BLACK	16	STARTER RELAY TERM 3	GROUND BUSS A, TERM B
32C	BLACK	16	FUEL GAUGE "-"	GROUND BUSS A, TERM C
32D	BLACK	16	FUEL GAUGE SENDER	GROUND BUSS A, TERM D
32E	BLACK	16	HYDRAULIC OIL TEMP SWITCH	GROUND BUSS A, TERM E
32F	BLACK	16	GROUND BUSS A, TERM F	GROUND BUSS A, TERM F
33	BLACK	14	AUXILIARY OUTLET TERMINAL "-"	GROUND
35	BLACK	16	FAN RELAY TERM 85	GROUND BUSS B, TERM A
35A	BLACK	16	STARTER SOLENOID RELAY TERM 85	GROUND BUSS B, TERM B
36	BLACK	16	LIGHT MODULE TERMINAL 12	GROUND
37	BLACK	16	SOFT START (PWM) VALVE TERMINAL 2	GROUND
38	YELLOW	16	RV CONNECTOR "YELLOW" TERM	SOFT START RELAY TERM 1
38A	YELLOW	16	THROTTLE RELAY TERM 1	SPLICE TO 38
38B	YELLOW	16	SPLICE TO 38	9 PIN RV "YELLOW" TERMINAL
39	BLACK	16	SOFT START RELAY TERM 3	GROUND BUSS B, TERM C
39A	BLACK	16	THROTTLE RELAY TERM 3	GROUND BUSS B, TERM D
39B	BLACK	16	TACH TERMINAL "-"	GROUND BUSS B, TERM AE
40	BLACK	12	OIL COOLER FAN MOTOR	GROUND
41	GREEN	16	LIGHT MODULE TERMINAL 11	HYD FILTER PRESSURE SW, TERMINAL A
42	GREY	16	LIGHT MODULE TERMINAL 3	HYD OIL TEM SWITCH TERMINAL 1
43	WHITE	16	LIGHT MODULE TERMINAL 2	ENGINE TEMPERATURE SWITCH
44	YELLOW	16	LIGHT MODULE TERMINAL 4	ENGINE PRESSURE SWITCH
51	BLUE	12	FAN RELAY TERM 87	OIL COOLER FAN MOTOR
54	GREEN	14	15 AMP AUXILIARY OUTLET FUSE	AUXILIARY OUTLET TERMINAL "+"
54A	GREEN	14	15 AMP AUXILIARY OUTLET FUSE	RV CONNECTOR "GREEN" TERM
54B	GREEN	14	SPLICE TO 54A	9 PIN RV "BLACK" TERMINAL
60	RED	10	30 AMP CIRCUIT BREAKER "AUX" TERM.	DOWNHOLE RELAY, TERM 30
61	RED	10	DOWNHOLE RELAY, TERM 87	9 PIN RV "RED" TERMINAL
62	BLUE	10	DOWNHOLE RELAY, TERM 87	9 PIN RV "BLUE" TERMINAL
63	GREEN	12	DOWNHOLE RELAY, TERM 87	9 PIN RV "GREEN" TERMINAL
68	BLACK	8	9 PIN RV "WHITE" TERMINAL	GROUND
68A	BLACK	16	DOWNHOLE RELAY, TERM 85 "-"	GROUND
77	GREY	16	SOFT START SWITCH TERMINAL 2	DIODE MODULE TERMINAL 2
77A	GREY	16	SOFT START SWITCH TERMINAL 2	THROTTLE RELAY TERM 4

Electrical Schematic

HB45000

NO.	COLOR	GAGE	FROM	TO
77B	GREY	16	SPLICE TO 77A	SOFT START RELAY TERM 4
79	LT. GREEN	16	SOFT START RELAY TERM 6	SOFT START VALVE
83	WHITE	14	9 PIN RV "WHITE" TERMINAL	FUEL SHUT-OFF RELAY TERM 1
83A	WHITE	16	SPLICE TO 83	STARTER RELAY TERM 1
83B	WHITE	16	SPLICE TO 83	9 PIN RV "BROWN" TERMINAL
84	ORANGE	16	EMERGENCY STOP SWITCH TERMINAL B	FUEL SHUT-OFF RELAY TERM 6
85	GREY	16	EMERGENCY STOP SWITCH TERMINAL B	STARTER RELAY TERM 6
86	ORANGE	16	OIL COOLER TEMP SWITCH	FAN RELAY TERM 86
87	BLUE	14	THROTTLE RELAY TERM 6	ELECTRIC THROTTLE

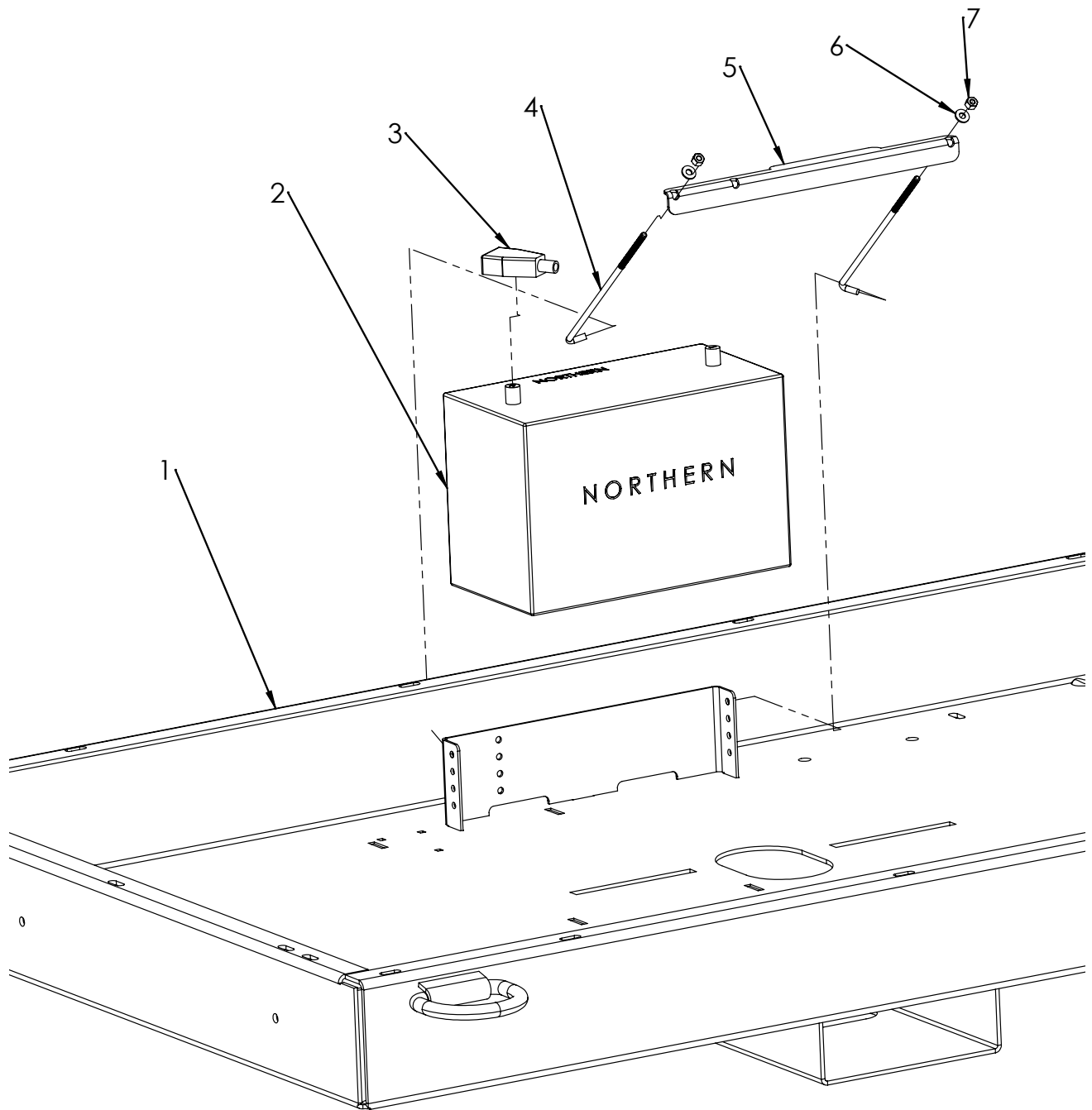
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Footnotes:

Notes:

Battery

HB45000



Battery

HB45000

Bom ID	Part No	Description	Qty	Remarks
1	933-5543	BASE FRAME WELDMENT	1	
2	913-7303	BATTERY	1	
3	912-3968	BOOT, STRAIGHT CLAMP	1	
4	913-0045	BOLT, J 1/4-20 X 9"	2	
5	913-7057	BRACKET, BATTERY	1	
6	04FW-SAE	WASHER, 1/4"	2	
7	04TLN	NUT, 1/4-20 TOP LOCK	2	

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Footnotes:

Notes:

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HYDRAULICS

HB4500



Hydraulic Schematic

HB4500

Bom ID	Part No	Description	Qty	Remarks
1	933-3002	HYDRAULIC TANK - PP4000/4500	1	
2	933-3043	GEAR PUMP, CASAPPA	1	
3	913-7349	FILTER HOUSING ASSEMBLY	1	
4	933-3049	OIL COOLER, ELD4	1	
5	933-2501	PUMP, HYDRAULIC P2-075	1	
6	930-2059	PRESSURE GAUGE, 5000 PSI	1	
7	913-7037	VALVE POPPET	1	
8	932-2011	COUPLER, MALE, 1 1/2" ORB	1	
9	930-2006	COUPLER, MALE, 1 1/4" ORB	1	

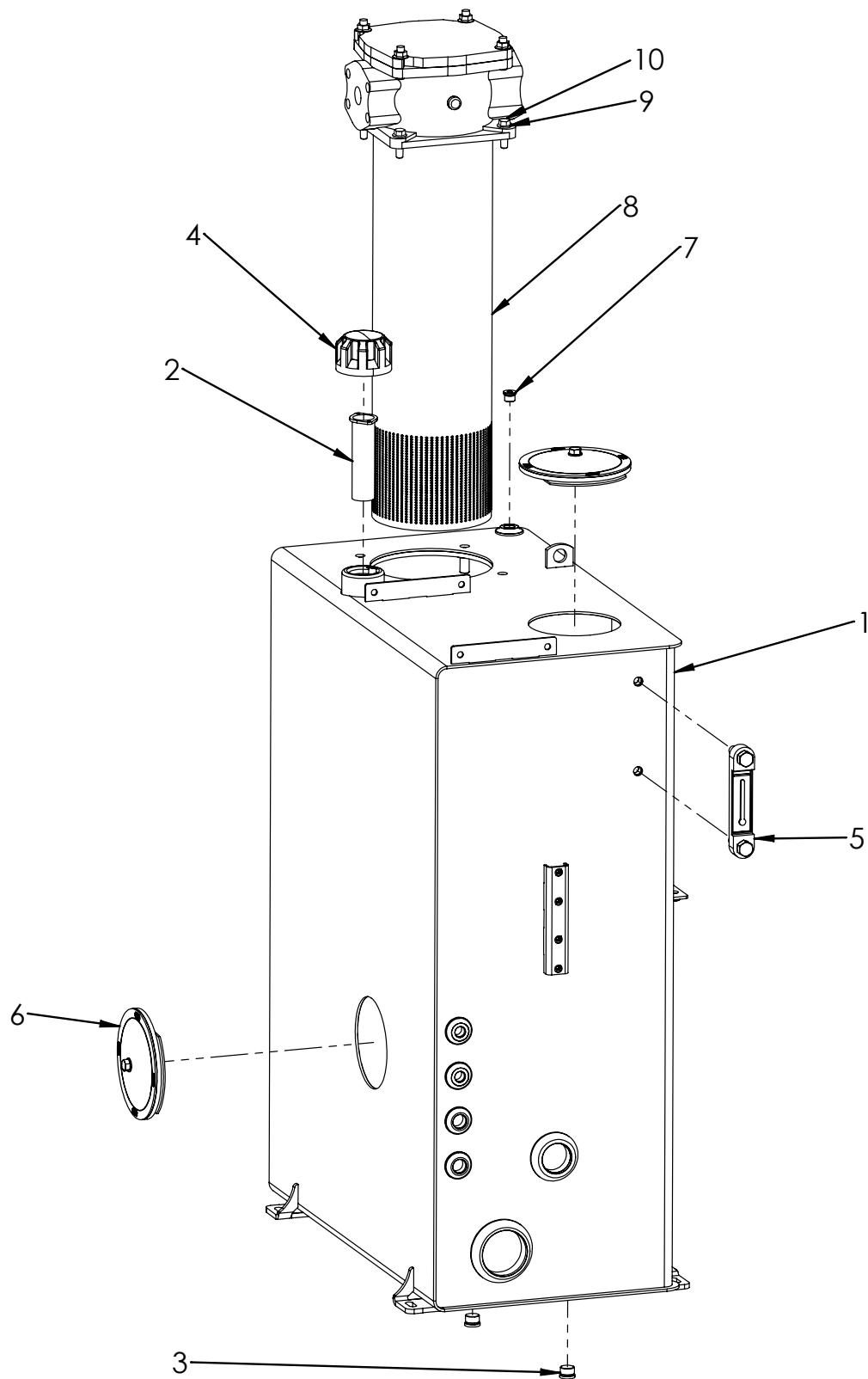
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Footnotes:

Notes:

Hydraulic Tank

HB4500



Hydraulic Tank

HB4500

Bom ID	Part No	Description	Qty	Remarks
1	933-2066	TANK WELDMENT ASSY	1	
2	933-2099	STRAINER, OIL FILL	1	
3	933-2064	PLUG, ORB-8 HX SC MAGNETIC	2	
4	933-2098	FILL CAP, MOBIL-GATE	1	
5	933-2079	GAUGE, OIL LEVEL W/TEMP	1	
6	933-2080	COVER, HYDRAULIC CLEAN OUT	2	
7	912-4536	PLUG, ORB -6 HX SC	1	
8	913-7349	FILTER HOUSING ASSY	1	
9	06FW-SAE	WASHER, 3/8"	4	
10	06HH26	SCREW, 3/8-16 x 1.63 HHC - GR8	4	

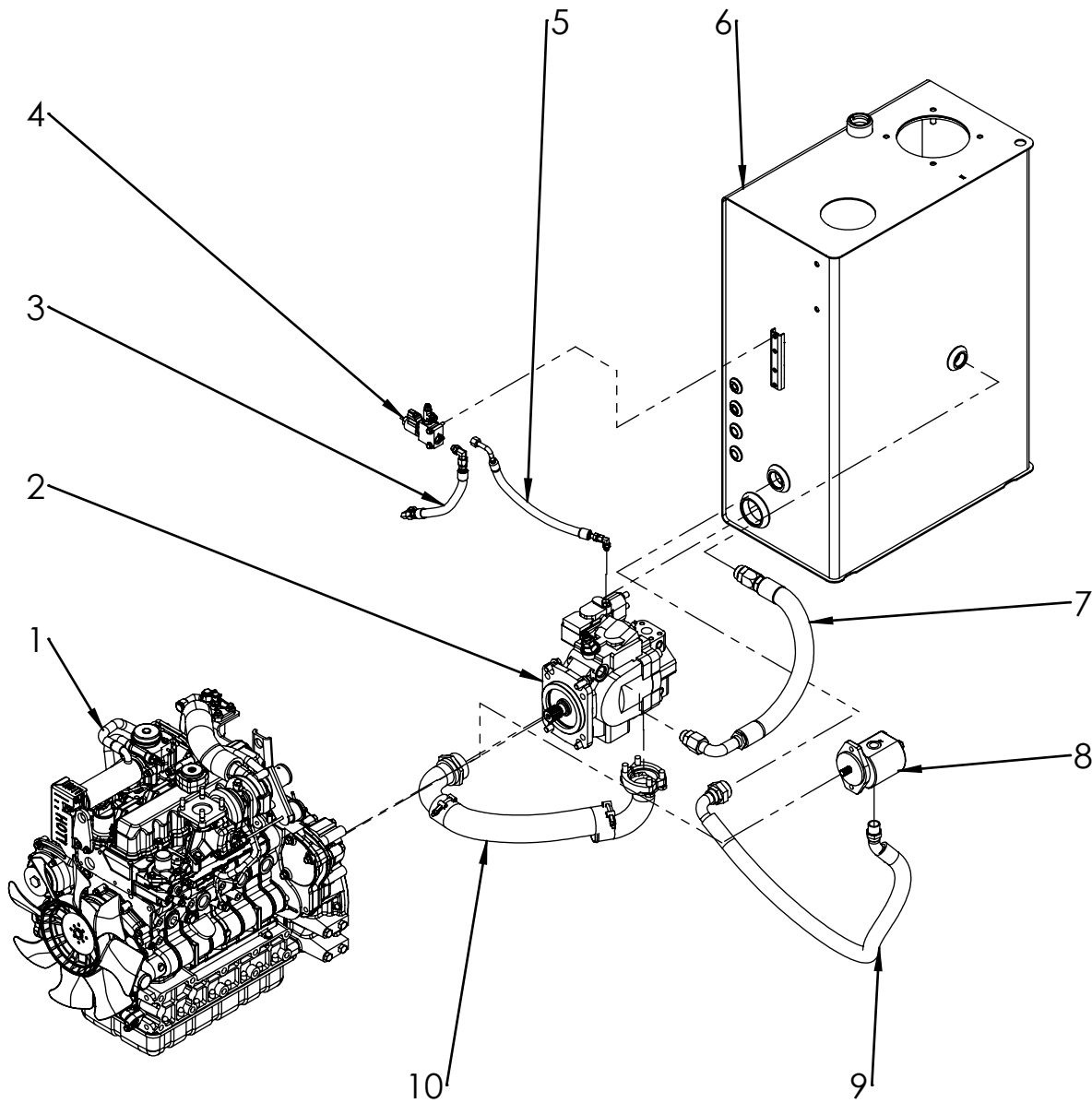
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Notes:

Hydraulic Tank to Engine

HB4500



Hydraulic Tank to Engine

HB4500

Bom ID	Part No	Description	Qty	Remarks
1	933-4541	ENGINE, KUBOTA V3307T	1	
2	933-2501	PUMP, HYDRAULIC P2-075	1	
3	H-01099	HOSE, 6FJ-FJ X 12.5	1	
4	913-7037	VALVE POPPET	1	
5	H-01260	HOSE, 04FJX-06FJX90L X 15.75	1	
6	933-3002	HYDRAULIC TANK - HB4500	1	
7	H-01259	HOSE, 16FJX-16FJX90 X 27	1	
8	933-3043	GEAR PUMP, CASAPPA	1	
9	H-01500	HOSE, SUCTION -16 X 41"	1	
10	H-01504	HOSE, SUCTION -32 X 20"	1	

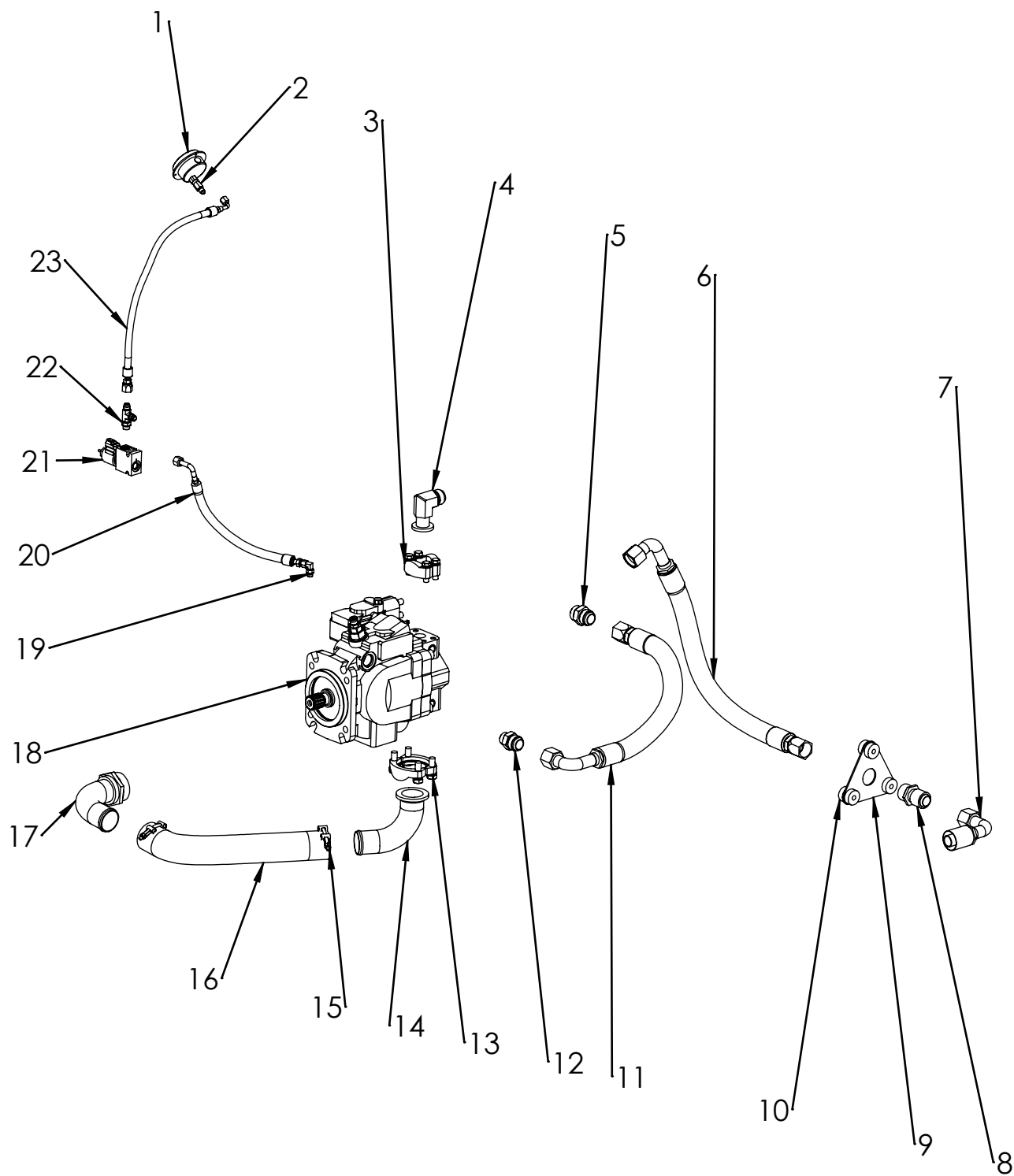
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Notes:

Hydraulic Pump and Hoses

HB4500



Hydraulic Pump and Hoses

HB4500

Bom ID	Part No	Description	Qty	Remarks
1	930-2059	PRESSURE GAUGE, 5000 PSI	1	
2	846-FS-04X04	ADAPTER, 04MJ X 04FP	1	
3	913-7286	FLANGE KIT, SPLIT 1" CODE 62	1	
4	63UF-16X16	ADAPTER, 16MJ-16FLH90	1	
5	848-FSO-16X16	ADAPTER, 16MJ X 16MB	1	
6	H-01503	HOSE, 16FJX-16FJX90 X 27"	1	
7	H-01091	HOSE, 16FJ-16FJ90 X 480 (W/SLEEVE)	1	
8	832-FS-16-16	ADAPTER, MJ X MJ BULKHEAD	1	
9	933-5571	PANEL, BULKHEAD	1	
10	930-1021	ISOLATOR, 40LB	3	
11	H-01259	HOSE, 16FJX-16FJX90 X 27	1	
12	848-FSO-16X12	ADAPTER, 16MJ X 12MB	1	
13	913-7287	FLANGE KIT, 2" CODE 61	1	
14	926-6547	ELBOW, 32HS X 32FL 90°	1	
15	913-7280	CLAMP, T-BOLT 2.5" OD	2	
16	H-01504	HOSE, SUCTION - 32 X 20"	1	
17	926-6512	ELBOW, 32MB X 32HS 90°	1	
18	933-2501	PUMP, HYDRAULIC P2-075	1	
19	849-FSO-04X04	ELBOW, 04MJ X 04MB 90°	1	
20	H-01260	HOSE, 04FJX-06FJX90L X 15.75	1	
21	913-7037	VALVE POPPET	1	
22	851-FSO-06X06	TEE, 06MJ X 06MJ X 06MB RUN	1	
23	913-8378	HOSE, RIGHT STABILIZER BSE	1	

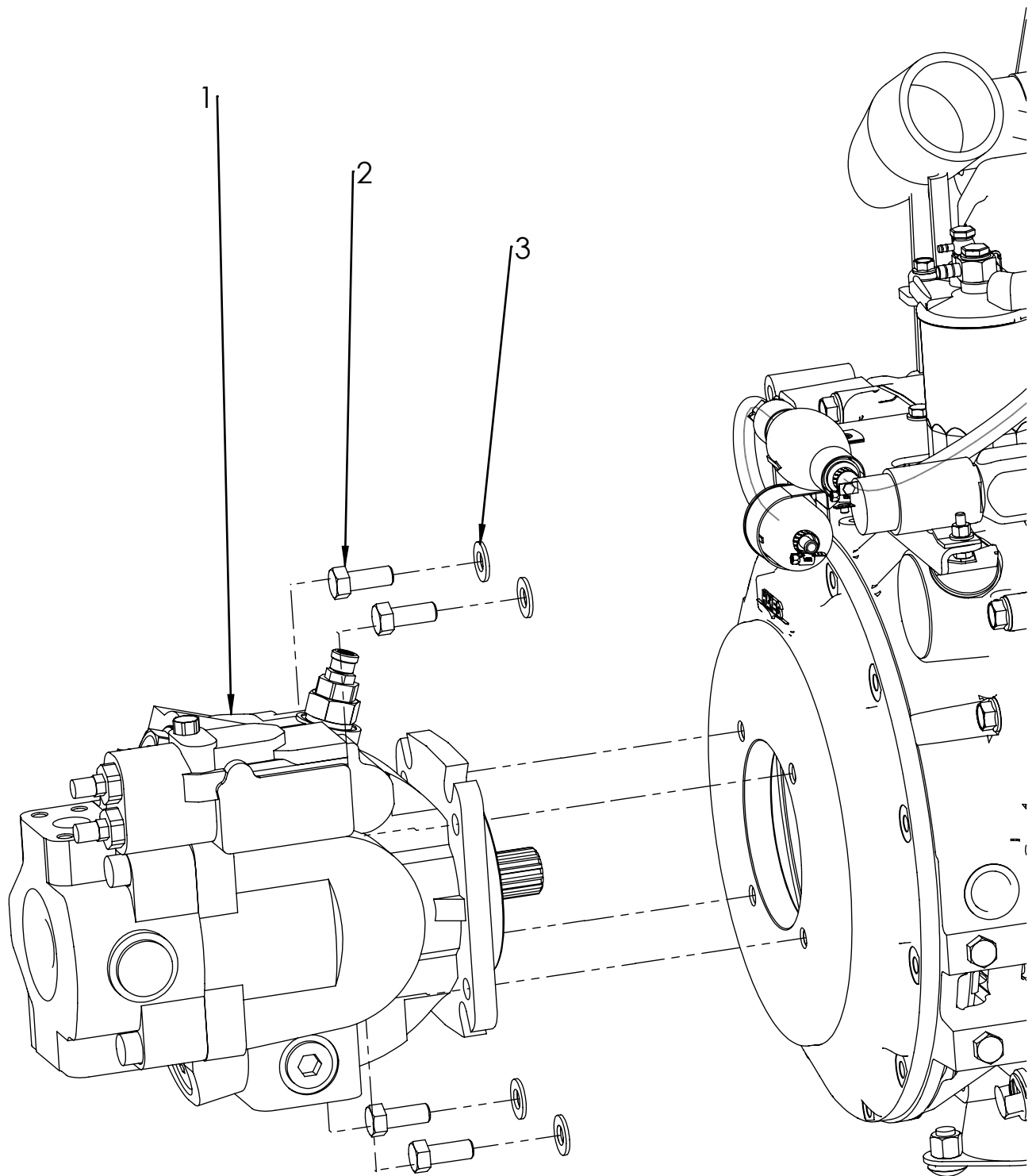
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Notes:

Hydraulic Pump to Engine

HB4500



Hydraulic Pump to Engine

HB4500

Bom ID	Part No	Description	Qty	Remarks
1	933-2501	PUMP, HYDRAULIC P2-075	1	
2	08HH20	SCREW, 1/2-13 X 1.25 HHC - GR8	4	
3	08FW-SAE	WASHER, 1/2"	4	

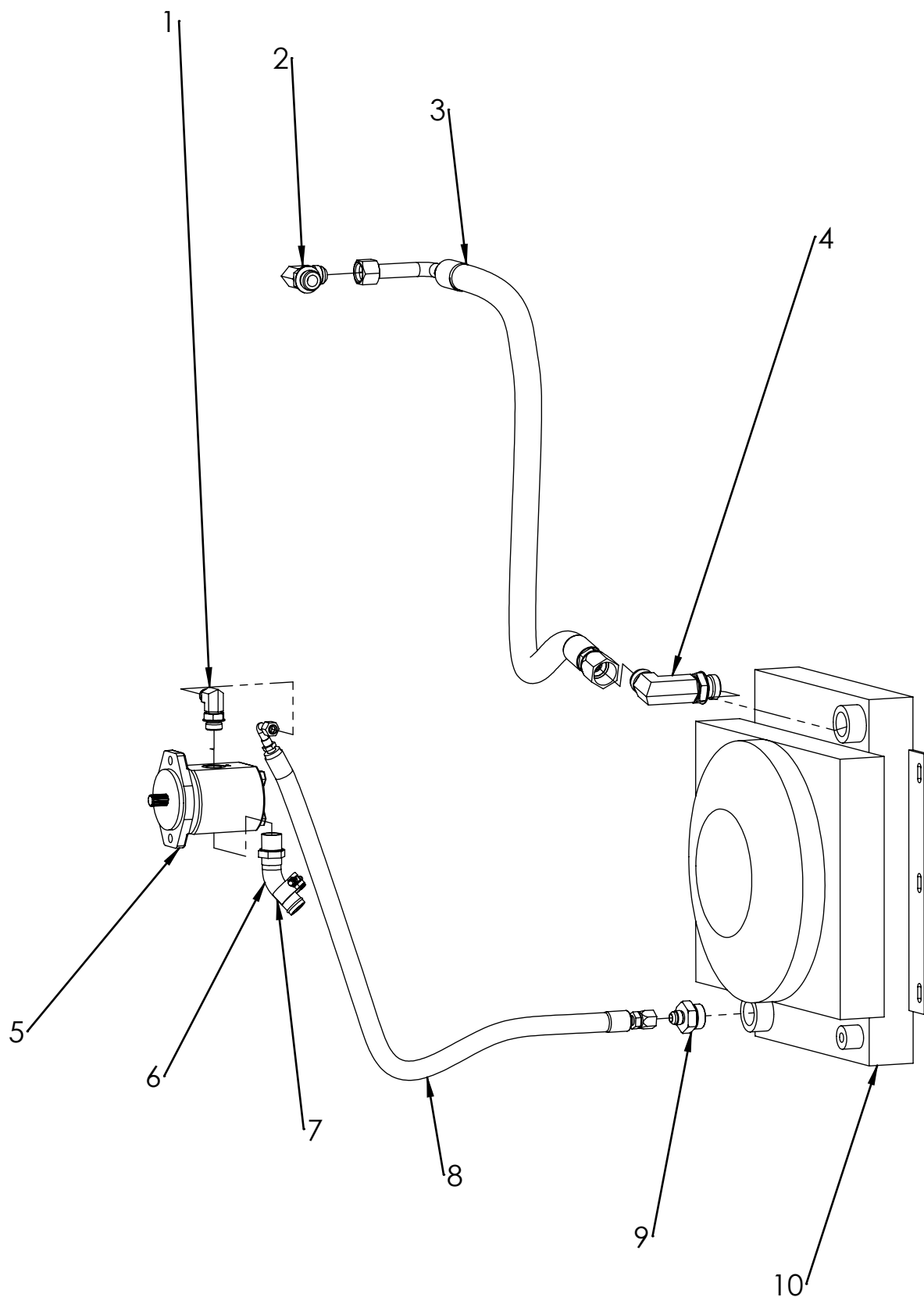
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Notes:

Oil Cooler and Hoses

HB4500



Oil Cooler and Hoses

HB4500

Bom ID	Part No	Description	Qty	Remarks
1	849-FSO-08X10	ELBOW, 08MJ X 10MB 90°	1	
2	849-FSO-12X12	ELBOW, 12MJ X 12MB 90°	1	
3	H-01502	HOSE, 12FJX-12FJX90L X 46"	1	
4	849LL-FSO-16X16	ELBOW, 16MJ X 16MB 90° TALL	1	
5	933-3043	GEAR PUMP, CASAPPA	1	
6	926-6522	ELBOW, 12MB X 16HS 45°	1	
7	913-7279	CLAMP, T-BOLT 1.38" OD	1	
8	H-01500	HOSE, 08FJX-08FJX90X 41"	1	
9	848-FSO-08X16	ADAPTER, 08MJ X 16MB	1	
10	933-3049	OIL COOLER, ELD 4	1	

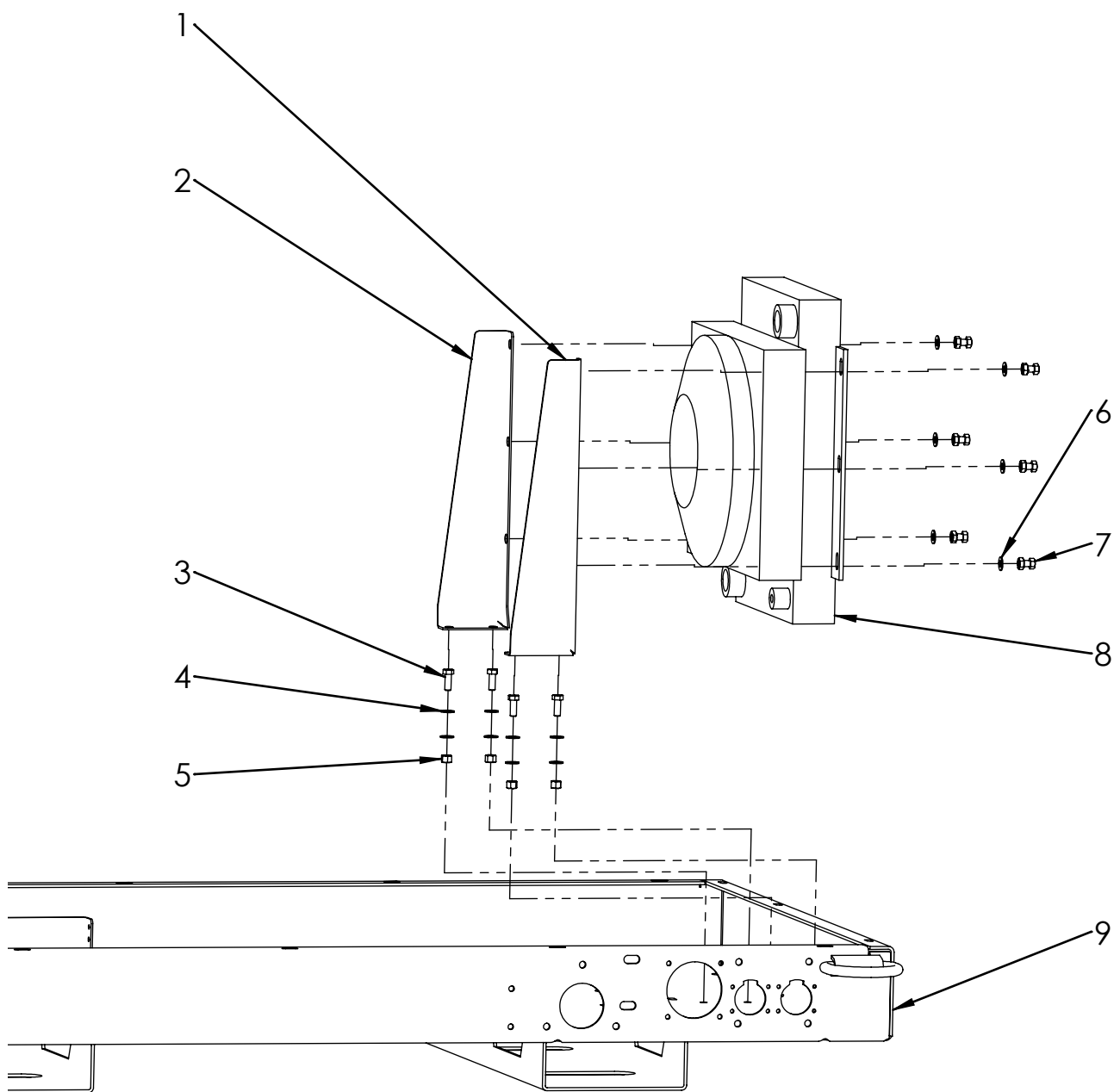
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Footnotes:

Notes:

Oil Cooler to Frame

HB4500



Oil Cooler to Frame

HB4500

Bom ID	Part No	Description	Qty	Remarks
1	933-2507	BRACKET WELDMENT, RH SIDE	1	
2	933-2506	BRACKET WELDMENT, OP SIDE	1	
3	06HH16	SCREW, 3/8-16 x 1.00 HHC - GR8	4	
4	06FW-SAE	WASHER, 3/8"	8	
5	06TLN	NUT, 3/8-16 TOP LOCK	4	
6	06FW-SAE	WASHER, 3/8"	6	
7	06HH10	SCREW, 3/8-16 x .625 HHC - GR8	6	
8	933-3049	OIL COOLER, ELD 4	1	
9	933-5543	BASE FRAME WELDMENT	1	

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Footnotes:

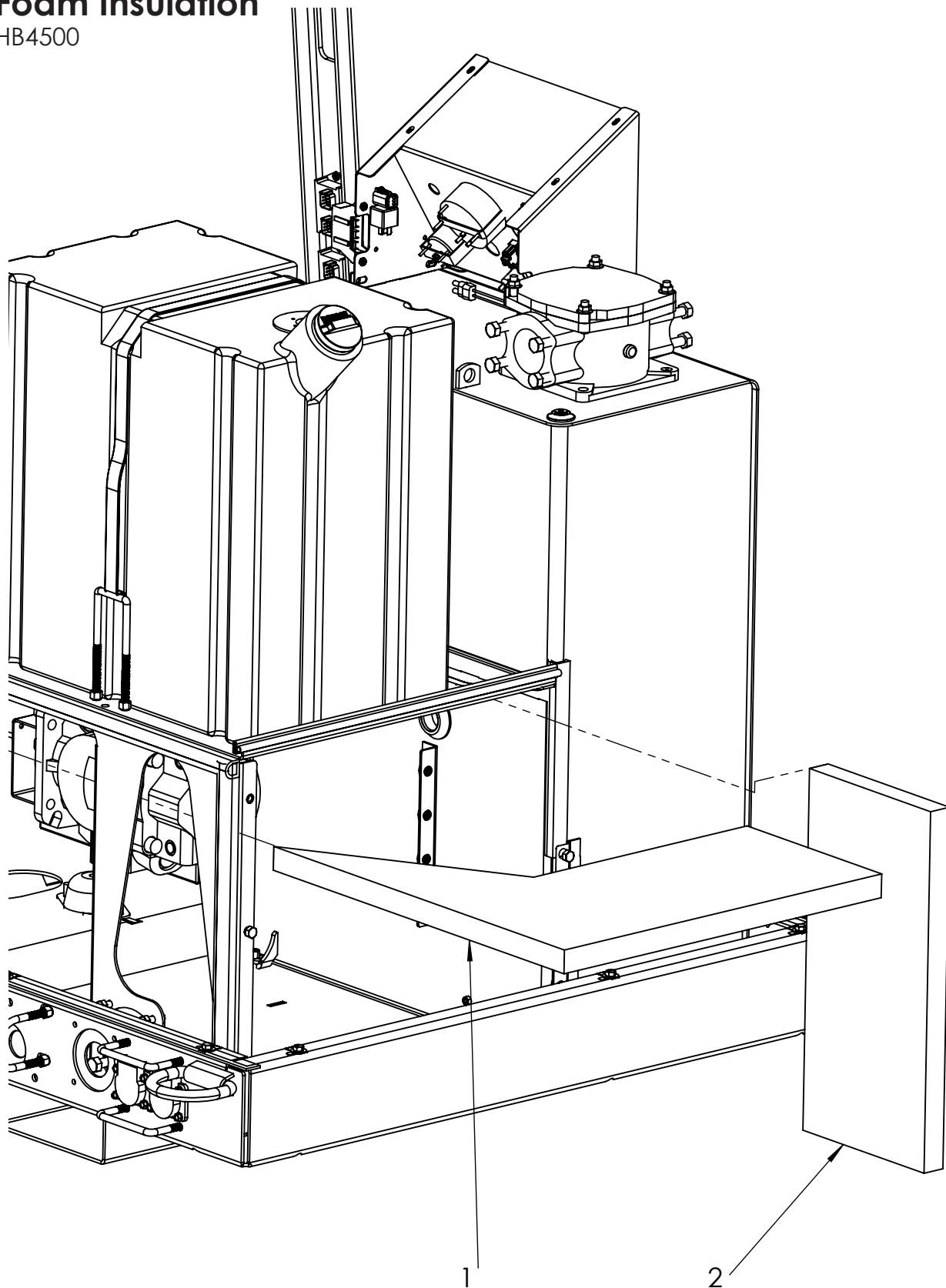
Notes:

Notes

MISCELLANEOUS

Foam Insulation

HB4500



Foam Insulation

HB4500

Bom ID	Part No	Description	Qty	Remarks
1	933-5555	FOAM, FUEL PAN	1	
2	933-5558	FOAM, OIL TANK	1	

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Footnotes:

Notes:

SAE Bolt and Nut Torque Value Chart

Grade 5: UNC or UNF Thread

Size	Coarse		Fine	
	ft-lb	N-m	ft-lb	N-m
1/4	6	8.5	8	11
5/16	13	18	15	20.5
3/8	25	35	30	40
7/16	40	55	45	60
1/2	60	80	70	95
9/16	90	120	950	130
5/8	120	165	145	200
3/4	210	285	240	325
7/8	320	435	350	475
1	480	650	560	760
1-1/8	700	950	780	1060
1-1/4	1020	1385	1100	1545

Grade 8: UNC or UNF Thread

Size	Coarse		Fine	
	ft-lb	N-m	ft-lb	N-m
1/4	10	13	11	15
5/16	20	27	22	29.5
3/8	35	47	40	55
7/16	55	75	65	88
1/2	90	120	95	130
9/16	120	165	135	185
5/8	180	245	195	265
3/4	300	405	340	460
7/8	500	680	560	760
1	800	1085	920	1250
1-1/8	1180	1600	1340	1815
1-1/4	1720	2330	1900	2575

APPLY 242 (BLUE) TO ALL FASTENERS WITHOUT NUTS.

Metric Bolt and Cap Screw Torque Values

Size	Class 4.8				Class 8.8 and 9.8				Class 10.9				Class 12.9			
	Lubricated		Dry		Lubricated		Dry		Lubricated		Dry		Lubricated		Dry	
	N-m	ft-lb	N-m	ft-lb	N-m	ft-lb	N-m	ft-lb	N-m	ft-lb	N-m	ft-lb	N-m	ft-lb	N-m	ft-lb
M6	4.8	3.5	6	4.5	9	6.5	11	8.5	13	9.5	17	12	15	11.5	19	14.5
M8	12	8.5	15	11	22	16	28	20	32	24	40	30	37	28	47	35
M10	23	17	29	21	43	32	55	40	63	47	80	60	75	55	95	70
M12	40	29	50	37	75	55	95	70	110	80	140	105	130	95	165	120
M14	63	47	80	60	120	88	150	110	175	130	225	165	205	150	260	190
M16	100	73	125	92	190	140	240	175	275	200	350	225	320	240	400	300
M18	135	100	175	125	260	195	330	250	375	275	475	350	440	325	560	410
M20	190	140	240	180	375	275	475	350	530	400	675	500	625	460	800	580
M22	260	190	330	250	510	375	650	475	725	540	925	675	850	625	1075	800
M24	330	250	425	310	650	475	825	600	925	675	1150	850	1075	800	1350	1000
M27	490	360	625	450	950	700	1200	875	1350	1000	1700	1250	1600	1150	2000	1500
M30	675	490	850	625	1600	950	1650	1200	1850	1350	2300	1700	2150	1600	2700	2000
M33	900	675	1150	850	1750	1300	2200	1650	2500	1850	3150	2350	2900	2150	3700	2750
M36	1150	850	1450	1075	2250	1650	2850	2100	3200	2350	4050	3000	3750	2750	4750	3500

Do not use these values if a different torque value or tightening procedure is given for specific application. Torque values listed are for general use only. Check tightness of fasteners periodically.

Shear bolts are designed to fail under predetermined loads. Always replace shear bolts with identical property class fasteners.

Fasteners should be replaced with the same or higher property class. If higher property class fasteners are used, these should only be tightened to strength of original.

Make sure fastener threads are clean and that the threads are properly started. This will prevent them from cross threading or galling when tightened.

Tighten plastic insert or crimped type steel locknuts to approximately 50% of dry torque indicated on chart. Apply torque to the nut – not the bolt head. Tighten toothed or serrated type locknuts to full torque value.

LUBRICATED means coated with lubricant. DRY means plain or zinc plated without any type of lubricant.

Torque Standards Hydraulic Fittings

O-Ring Boss Fittings

						ASSEMBLYTORQUE (+10% -0)							
DASH SIZE	NOMINAL SIZE (IN)	SAE SIZE	FEMALE THREAD	MALE THREAD	O-RING	O-RING BOSS		O-RING BOSS		HOLLOW HEX		HEX HEAD	
						NON- ADJUSTABLE		ADJUSTABLE		PLUGS			
			I.D. (IN)	O.D. (IN)	I.D. (IN)	ft-lbs (in-lbs)	N-m	ft-lbs (in-lbs)	N-m	ft-lbs (in-lbs)	N-m	ft-lbs (in-lbs)	N-m
-2	1/8	5/16-24	17/64	5/16	17/64	-	-	-	-	(30)	4	(85)	10
-3	3/16	3/8-24	21/64	3/8	21/64	-	-	-	-	(55)	6	(155)	18
-4	1/4	7/16-20	25/64	7/16	25/64	26	35	(180)	20	(120)	14	22	29
-5	5/16	1/2-20	29/64	1/2	29/64	30	40	30	40	(170)	19	23	32
-6	3/8	9/16-18	1/2	9/16	1/2	35	46	35	46	34	46	29	40
-8	1/2	3/4-16	11/16	3/4	11/16	60	80	60	80	60	80	52	70
-10	5/8	7/8-14	13/16	7/8	13/16	100	135	100	135	100	135	85	115
-12	3/4	1-1/16-12	31/32	1-1/16	31/32	135	185	135	185	135	185	135	183
-14	7/8	1-3/16-12	1-7/64	1-3/16	1-7/64	175	235	175	235	175	235	175	237
-16	1	1-5/16-12	1-15/64	1-5/16	1-15/64	200	270	200	270	200	270	200	271
-20	1-1/4	1-5/8-12	1-35/64	1-5/8	1-35/64	250	340	250	340	250	340	250	339
-24	1-1/2	1-7/8-12	1-51/64	1-7/8	1-51/64	305	415	305	415	305	415	305	414
-32	2	2-1/2-12	2-27/64	2-1/2	2-27/64	375	510	375	510	375	510	375	509

O-Ring Face Seal Fittings

DASH SIZE	NOMINAL SIZE (IN)	THREAD SIZE	FEMALE THREAD	MALE THREAD	ASSEMBLY TORQUE (+10% -0) (PRIMARY METHOD)		FLATS FROM WRENCH RESISTANCE (FFWR) (SECONDARY METHOD)		O-RING I.D. (IN)
					ft-lb	N-m	TUBE NUTS	SWIVEL & HOSE	
-4	1/4	9/16-18	1/2	9/16	18	25	1/2	3/4	5/16
-6	3/8	11/16-16	11/16	11/16	30	40	1/2	3/4	3/8
-8	1/2	13/16-16	3/4	13/16	40	55	1/2	3/4	1/2
-10	5/8	1-14	13/16	1	60	80	1/2	3/4	5/8
-12	3/4	1-3/16-12	1-7/64	1-3/16	85	115	1/2	1/2	3/4
-16	1	1-7/16-12	1-23/64	1-7/16	110	150	1/2	1/2	15/16
-20	1-1/4	1-11/16-12	1-19/32	1-11/16	150	205	1/2	1/2	1-3/16
-24	1-1/2	2-12	1-59/64	2	230	315	1/2	1/2	1-1/2

Ensure the threads and sealing surfaces are free from nicks, burrs, scratches or any foreign material. Lubricate the o-ring with a light coat of oil. To tighten adjustable o-ring fittings, hold the fitting and tighten the nut. To tighten non-adjustable o-ring fittings, tighten the fitting. When tightening together fittings with dissimilar coatings, torque to 115% of maximum recommended torque value for a given size.

Torque Standards Hydraulic Fittings

Pipe Fittings

Nom. SAE Dash Size	Fractional Size	Threads per Inch	Turns from Finger Tight
2	1/8	27	2-3
4	1/4	18	2-3
6	3/8	18	2-3
8	1/2	14	2-3
12	3/4	14	2-3
16	1	11-1/2	1.5-2.5
20	1-1/4	11-1/2	1.5-2.5
24	1-1/2	11-1/2	1.5-2.5
32	2	11-1/2	1.5-2.5

NOTE: Apply sealant/lubricant to male pipe threads. The first two threads should be left uncovered to avoid system contamination. Screw pipe fitting into female pipe port to the finger tight position. Wrench tighten fitting to the appropriate turns from finger tight (TFFT) shown in table above, making sure the tube end of an elbow or tee fitting is aligned to receive incoming tube or hose fitting.



A CHARLES MACHINE WORKS COMPANY