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Mechanical Parts and Service

42044SR2, SR3

PELLERIN MILNOR CORPORATION Post Office Box 400, Kenner, Louisiana 70063–0400, U.S.A.

Contents

Figures

Tables

1 General Service & Safety-Related Components

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PELLERIN MILNOR CORPORATION
LIMITED STANDARD WARRANTY

We warrant to the original purchaser that MILNOR machines including electronic hardware/software (hereafter referred to as "equipment"), will be free from defects in material and workmanship for a period of one year from the date of shipment (unless the time period is specifically extended for certain parts pursuant to a specific MILNOR published extended warranty) from our factory with no operating hour limitation. This warranty is contingent upon the equipment being installed, operated and serviced as specified in the operating manual supplied with the equipment, and operated under normal conditions by competent operators.

Providing we receive written notification of a warranted defect within 30 days of its discovery, we will—at our option—repair or replace the defective part or parts, EX Factory (labor and freight specifically NOT included). We retain the right to require inspection of the parts claimed defective in our factory prior to repairing or replacing same. We will not be responsible, or in any way liable, for unauthorized repairs or service to our equipment, and this warranty shall be void if the equipment is tampered with, modified, or abused, used for purposes not intended in the design and construction of the machine, or is repaired or altered in any way without MILNOR's written consent.

Parts damaged by exposure to weather, to aggressive water, or to chemical attack are not covered by this warranty. For parts which require routine replacement due to normal wear—such as gaskets, contact points, brake and clutch linings, belts, hoses, and similar parts—the warranty time period is 90 days.

We reserve the right to make changes in the design and/or construction of our equipment (including purchased components) without obligation to change any equipment previously supplied.

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THE PROVISIONS ON THIS PAGE REPRESENT THE ONLY WARRANTY FROM MILNOR AND NO OTHER WARRANTY OR CONDITIONS, STATUTORY OR OTHERWISE, SHALL BE IMPLIED.

WE NEITHER ASSUME, NOR AUTHORIZE ANY EMPLOYEE OR OTHER PERSON TO ASSUME FOR US, ANY OTHER RESPONSIBILITY AND/OR LIABILITY IN CONNECTION WITH THE SALE OR FURNISHING OF OUR EQUIPMENT TO ANY BUYER.

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1.1 How to Get the Necessary Repair Components

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You can get components to repair your machine from the approved supplier where you got this machine. Your supplier will usually have the necessary components in stock. You can also get components from the Milnor® factory.

Tell the supplier the machine model and serial number and this data for each necessary component:

- The component number from this manual
- The component name if known
- The necessary quantity
- The necessary transportation requirements
- If the component is an electrical component, give the schematic number if known.
- If the component is a motor or an electrical control, give the nameplate data from the used component.

To write to the Milnor® factory:

Pellerin Milnor Corporation
Post Office Box 400
Kenner, LA 70063-0400
UNITED STATES

Telephone: 504-712-7775
Fax: 504-469-9777
Email: parts@milnor.com

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1.2 Trademarks

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These words are trademarks of Pellerin Milnor® Corporation and other entities:

Table 1. Trademarks

AutoSpot™	GreenFlex™	MilMetrix®	PulseFlow®
CBW®	GearTrace™	MilTouch™	RAM Command™
Drynet™	GreenTurn™	MilTouch-EX™	Recirc*ONE*®
E-P Express®	Hydro-cushion™	MilRAIL®	RinSave®
E-P OneTouch®	Mentor®	Miltrac™	SmoothCoil™

Table 1 Trademarks (cont'd.)

E-P Plus®	Mildata®	MilVision™	Staph Guard®
Gear Guardian®	Milnor®	PBW™	

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1.3 Safety — Divided Cylinder and Staph Guard® Washer-Extractors

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1.3.1 Safety Alert Messages—Internal Electrical and Mechanical Hazards

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The following are instructions about hazards inside the machine and in electrical enclosures.

WARNING: **Electrocution and Electrical Burn Hazards** — Contact with electric power can kill or seriously injure you. Electric power is present inside the cabinetry unless the main machine power disconnect is off.

- Do not unlock or open electric box doors.
- Do not remove guards, covers, or panels.
- Do not reach into the machine housing or frame.
- Keep yourself and others off of machine.
- Know the location of the main machine disconnect and use it in an emergency to remove all electric power from the machine.

WARNING: **Entangle and Crush Hazards** — Contact with moving components normally isolated by guards, covers, and panels, can entangle and crush your limbs. These components move automatically.

- Do not remove guards, covers, or panels.
- Do not reach into the machine housing or frame.
- Keep yourself and others off of machine.
- Know the location of all emergency stop switches, pull cords, and/or kick plates and use them in an emergency to stop machine motion.

1.3.2 Safety Alert Messages—External Mechanical Hazards

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The following are instructions about hazards around the front, sides, rear or top of the machine.

WARNING: **Crush Hazards —** Suspended machines only—Spaces between the shell and housing can close and crush or pinch your limbs. The shell moves within the housing during operation.

- Do not reach into the machine housing or frame.
- Keep yourself and others clear of movement areas and paths.

1.3.3 Safety Alert Messages—Cylinder and Processing Hazards

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The following are instructions about hazards related to the cylinder and laundering process.

WARNING: **Crush Hazards —** Contact with the turning cylinder can crush your limbs. The cylinder will repel any object you try to stop it with, possibly causing the object to strike or stab you. The turning cylinder is normally isolated by the locked cylinder door.

- Do not attempt to open the door or reach into the cylinder until the cylinder is stopped.
- Do not place any object in the turning cylinder.
- Do not operate the machine with a malfunctioning door interlock.
- Divided cylinder machines only—Keep yourself and others clear of cylinder and goods during inching or Autospot operation.
- Do not operate the machine with malfunctioning two-hand manual controls.

WARNING: **Confined Space Hazards —** Confinement in the cylinder can kill or injure you. Hazards include but are not limited to panic, burns, poisoning, suffocation, heat prostration, biological contamination, electrocution, and crushing.

- Do not attempt unauthorized servicing, repairs, or modification.

WARNING: **Explosion and Fire Hazards —** Flammable substances can explode or ignite in the cylinder, drain trough, or sewer. The machine is designed for washing with water, not any other solvent. Processing can cause solvent-containing goods to give off flammable vapors.

- Do not use flammable solvents in processing.
- Do not process goods containing flammable substances. Consult with your local fire department/public safety office and all insurance providers.

1.3.4 Safety Alert Messages—Unsafe Conditions

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1.3.4.1 Damage and Malfunction Hazards

BNWVUS04.C02 0000235092 D.2 A.2 A.3 12/11/20, 8:32 AM Released

1.3.4.1.1 Hazards Resulting from Inoperative Safety Devices

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DANGER: **Entangle and Sever Hazards —** Cylinder door interlock—Operating the machine with a malfunctioning door interlock can permit opening the door when the cylinder is turning and/or starting the cycle with the door open, exposing the turning cylinder.

- Do not operate the machine with any evidence of damage or malfunction.

WARNING: **Multiple Hazards —** Operating the machine with an inoperative safety device can kill or injure personnel, damage or destroy the machine, damage property, and/or void the warranty.

- Do not tamper with or disable any safety device or operate the machine with a malfunctioning safety device. Request authorized service.

WARNING: **Electrocution and Electrical Burn Hazards —** Electric box doors—Operating the machine with any electric box door unlocked can expose high voltage conductors inside the box.

- Do not unlock or open electric box doors.

WARNING: **Entangle and Crush Hazards —** Guards, covers, and panels—Operating the machine with any guard, cover, or panel removed exposes moving components.

- Do not remove guards, covers, or panels.

1.3.4.1.2 Hazards Resulting from Damaged Mechanical Devices

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WARNING: **Multiple Hazards —** Operating a damaged machine can kill or injure personnel, further damage or destroy the machine, damage property, and/or void the warranty.

- Do not operate a damaged or malfunctioning machine. Request authorized service.

WARNING: **Explosion Hazards —** Cylinder—A damaged cylinder can rip apart during extraction, puncturing the shell and discharging metal fragments at high speed.

- Do not operate the machine with any evidence of damage or malfunction.

WARNING: **Explosion Hazards** — Inner door latches (divided cylinder machines)—A damaged or improperly seated latch can cause the inner door to open during operation, damaging the cylinder and shell. A damaged cylinder can rip apart during extraction, puncturing the shell and discharging metal fragments at high speed.

- Ensure that the inner door is securely latched after loading and unloading.
- Do not operate the machine with any evidence of damage or malfunction.

WARNING: **Explosion Hazards** — Clutch and speed switch (multiple motor machines)—A damaged clutch or speed switch can permit the low speed motor to engage during extract. This will over-speed the motor and pulleys and can cause them to rip apart, discharging metal fragments at high speed.

- Stop the machine immediately if any of these conditions occur: • abnormal whining sound during extract • skidding sound as extract ends • clutches remain engaged or re-engage during extract

1.3.4.2 Careless Use Hazards

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1.3.4.2.1 Careless Operation Hazards—Vital Information for Operator Personnel (see also operator hazards throughout manual)

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WARNING: **Multiple Hazards** — Careless operator actions can kill or injure personnel, damage or destroy the machine, damage property, and/or void the warranty.

- Do not tamper with or disable any safety device or operate the machine with a malfunctioning safety device. Request authorized service.
- Do not operate a damaged or malfunctioning machine. Request authorized service.
- Do not attempt unauthorized servicing, repairs, or modification.
- Do not use the machine in any manner contrary to the factory instructions.
- Use the machine only for its customary and intended purpose.
- Understand the consequences of operating manually.

1.3.4.2.2 Careless Servicing Hazards—Vital Information for Service Personnel (see also service hazards throughout manuals)

BNWVUS04.C07 0000235125 D.2 A.2 A.4 12/11/20, 8:32 AM Released

WARNING: **Electrocution and Electrical Burn Hazards** — Contact with electric power can kill or seriously injure you. Electric power is present inside the cabinetry unless the main machine power disconnect is off.

- Do not service the machine unless qualified and authorized. You must clearly understand the hazards and how to avoid them.
- Abide by the current OSHA lockout/tagout standard when lockout/tagout is called for in the service instructions. Outside the USA, abide by the OSHA standard in the absence of any other overriding standard.

WARNING: **Entangle and Crush Hazards —** Contact with moving components normally isolated by guards, covers, and panels, can entangle and crush your limbs. These components move automatically.

- Do not service the machine unless qualified and authorized. You must clearly understand the hazards and how to avoid them.
- Abide by the current OSHA lockout/tagout standard when lockout/tagout is called for in the service instructions. Outside the USA, abide by the OSHA standard in the absence of any other overriding standard.

WARNING: **Confined Space Hazards —** Confinement in the cylinder can kill or injure you. Hazards include but are not limited to panic, burns, poisoning, suffocation, heat prostration, biological contamination, electrocution, and crushing.

- Do not enter the cylinder until it has been thoroughly purged, flushed, drained, cooled, and immobilized.

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1.4 Torque Requirements for Fasteners

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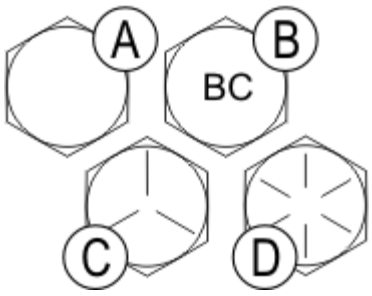
The document about the assembly gives the torque requirements for other fasteners. **If fastener torque specifications or threadlocker requirements in an assembly document are different from this document, use the assembly document.**

Figure 1. The Bolts in Milnor® Equipment

The Marks on Bolt Heads	Legend
	**A . . .** SAE Grades 1 and 2, ASTM A307, and stainless steel **B . . .** Grade BC, ASTM A354 **C . . .** SAE Grade 5, ASTM A449 **D . . .** SAE Grade 8 and ASTM A354 BD

1.4.1 Torque Values

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These tables give the standard dimension, grade, threadlocker, and torque requirements for fasteners frequently used on Milnor® equipment.

NOTE: Data from the Pellerin Milnor® Corporation “Bolt Torque Specification” (bolt_torque_milnor.xls/2002096).

1.4.1.1 Fasteners Made of Carbon Steel

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1.4.1.1.1 Without a Threadlocker

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Table 2. Torque Values for Standard Fasteners with Maximum 5/16-inch Diameters and No Lubricant

	The Grade of the Bolt							
	Grade 2		Grade 5		Grade 8		Grade BC	
Dimension	Pound-Inches	N-m	Pound-Inches	N-m	Pound-Inches	N-m	Pound-Inches	N-m
1/4 x 20	66	7	101	11	143	16	126	14
1/4 x 28	76	9	116	13	163	18	–	–
5/16 x 18	136	15	209	24	295	33	258	29
5/16 x 24	150	17	232	26	325	37	–	–

Table 3. Torque Values for Standard Fasteners Larger Than 5/16-inch Diameters and No Lubricant

	The Grade of the Bolt							
	Grade 2		Grade 5		Grade 8		Grade BC	
Dimension	Pound-Feet	N-m	Pound-Feet	N-m	Pound-Feet	N-m	Pound-Feet	N-m
3/8 x 16	20	27	31	42	44	59	38	52
3/8 x 24	23	31	35	47	50	68	–	–
7/16 x 14	32	43	49	66	70	95	61	83
7/16 x 20	36	49	55	75	78	105	–	–
1/2 x 13	49	66	75	102	107	145	93	126
1/2 x 20	55	75	85	115	120	163	–	–
9/16 x 12	70	95	109	148	154	209	134	182
9/16 x 18	78	106	121	164	171	232	–	–
5/8 x 11	97	131	150	203	212	287	186	252
5/8 x 18	110	149	170	231	240	325	–	–
3/4 x 10	172	233	266	361	376	510	329	446
3/14 x 16	192	261	297	403	420	569	–	–
7/8 x 9	167	226	429	582	606	821	531	719
7/8 x 14	184	249	473	641	668	906	–	–
1 x 8	250	339	644	873	909	1232	796	1079
1 x 12	274	371	704	954	994	1348	–	–
1 x 14	281	381	723	980	1020	1383	–	–
1 1/8 x 7	354	480	794	1077	1287	1745	1126	1527
1 1/8 x 12	397	538	891	1208	1444	1958	–	–
1 1/4 x 7	500	678	1120	1519	1817	2464	1590	2155
1 1/4 x 12	553	750	1241	1682	2012	2728	–	–
1 3/8 x 6	655	888	1469	1992	2382	3230	2085	2827
1 3/8 x 12	746	1011	1672	2267	2712	3677	–	–
1 1/2 x 6	869	1178	1949	2642	3161	4286	2767	3751
1 1/2 x 12	979	1327	2194	2974	3557	4822	–	–

Table 4. Torque Values for Plated Fasteners with Maximum 5/16-inch Diameters and No Lubricant

	The Grade of the Bolt							
	Grade 2		Grade 5		Grade 8		Grade BC	
Dimension	Pound-Inches	N-m	Pound-Inches	N-m	Pound-Inches	N-m	Pound-Inches	N-m
1/4 x 20	49	6	76	9	107	12	95	11
1/4 x 28	56	6	88	10	122	14	–	–
5/16 x 18	102	12	156	18	222	25	193	22
5/16 x 24	113	13	174	20	245	28	–	–

Table 5. Torque Values for Plated Fasteners Larger Than 5/16-inch Diameters and No Lubricant

	The Grade of the Bolt							
	Grade 2		Grade 5		Grade 8		Grade BC	
Dimension	Pound-Feet	N-m	Pound-Feet	N-m	Pound-Feet	N-m	Pound-Feet	N-m
3/8 x 16	15	20	23	31	33	44	29	38
3/8 x 24	17	23	26	35	37	49	–	–
7/16 x 14	24	32	37	50	52	71	46	61
7/16 x 20	27	36	41	55	58	78	–	–
1/2 x 13	37	49	56	76	80	106	70	93
1/2 x 20	41	55	64	85	90	120	–	–
9/16 x 12	53	70	81	110	115	153	101	134
9/16 x 18	59	79	91	122	128	174	–	–
5/8 x 11	73	97	113	150	159	212	139	186
5/8 x 18	83	110	127	172	180	240	–	–
3/4 x 10	129	173	200	266	282	376	246	329
3/14 x 16	144	192	223	297	315	420	–	–
7/8 x 9	125	166	322	430	455	606	398	531
7/8 x 14	138	184	355	474	501	668	–	–
1 x 8	188	250	483	644	682	909	597	796
1 x 12	205	274	528	716	746	995	–	–
1 x 14	210	280	542	735	765	1037	–	–
1 1/8 x 7	266	354	595	807	966	1288	845	1126
1 1/8 x 12	298	404	668	890	1083	1444	–	–
1 1/4 x 7	375	500	840	1120	1363	1817	1192	1590
1 1/4 x 12	415	553	930	1261	1509	2013	–	–
1 3/8 x 6	491	655	1102	1470	1787	2382	1564	2085
1 3/8 x 12	559	758	1254	1672	2034	2712	–	–
1 1/2 x 6	652	870	1462	1982	2371	3161	2075	2767
1 1/2 x 12	733	994	1645	2194	2668	3557	–	–

1.4.1.1.2 With a Threadlocker

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Table 6. Threadlocker by the Diameter of the Bolt (see below Note)

LocTite Product	Dimension			
	1/4-inch	1/4- to 5/8-inch	5/8- to 7/8-inch	1-inch +
LocTite 222	OK			
LocTite 242		OK		
LocTite 262			OK	
LocTite 272			High temperature	
LocTite 277				OK

NOTE: The acceptable bolt size ranges for various LocTite® threadlocking products is the LocTite manufacturer's **general** recommendation. Specific applications sometime require that a LocTite product is applied to a bolt size outside the ranges shown here. For example, Milnor® specifies LocTite 242 for use on certain 1" bolt applications and has confirmed this usage with the LocTite manufacturer. You may see variances such as this in the documentation for specific machine assemblies.

Table 7. Torque Values if You Apply LocTite 222

Dimension	The Grade of the Bolt							
	Grade 2		Grade 5		Grade 8		Grade BC	
	Pound-Inches	N-m	Pound-Inches	N-m	Pound-Inches	N-m	Pound-Inches	N-m
1/4 x 20	60	7	96	11	132	15	108	12
1/4 x 28	72	8	108	12	144	16	–	–

Table 8. Torque Values if You Apply LocTite 242

Dimension	The Grade of the Bolt							
	Grade 2		Grade 5		Grade 8		Grade BC	
	Pound-Feet	N-m	Pound-Feet	N-m	Pound-Feet	N-m	Pound-Feet	N-m
5/16 x 18	11	15	17	23	25	34	22	30
5/16 x 24	13	18	19	26	27	37	27	37
3/8 x 16	20	27	31	42	44	60	38	52
3/8 x 24	23	31	35	47	50	68	–	–
7/16 x 14	32	43	49	66	70	95	61	83
7/16 x 20	36	49	55	75	78	106	–	–
1/2 x 13	49	66	75	102	107	145	93	126
1/2 x 20	55	75	85	115	120	163	–	–
9/16 x 12	70	95	109	148	154	209	134	182
9/16 x 18	78	106	121	164	171	232	–	–
5/8 x 11	97	132	150	203	212	287	186	252
5/8 x 18	110	149	170	230	240	325	–	–

Table 9. Torque Values if You Apply LocTite 262

	The Grade of the Bolt							
	Grade 2		Grade 5		Grade 8		Grade BC	
Dimension	Pound-Feet	N-m	Pound-Feet	N-m	Pound-Feet	N-m	Pound-Feet	N-m
3/4 x 10	155	210	240	325	338	458	296	401
3/4 x 16	173	235	267	362	378	512	–	–
7/8 x 9	150	203	386	523	546	740	477	647
7/8 x 14	165	224	426	578	601	815	–	–

Table 10. Torque Values if You Apply LocTite 272 (High-Temperature)

	The Grade of the Bolt							
	Grade 2		Grade 5		Grade 8		Grade BC	
Dimension	Pound-Feet	N-m	Pound-Feet	N-m	Pound-Feet	N-m	Pound-Feet	N-m
1 x 8	350	475	901	1222	1272	1725	1114	1510
1 x 12	383	519	986	1337	1392	1887	–	–
1 x 14	393	533	1012	1372	1428	1936	–	–
1-1/8 x 7	496	672	1111	1506	1802	2443	1577	2138
1-1/8 x 12	556	754	1247	1691	2022	2741	–	–
1-1/4 x 7	700	949	1568	2126	2544	3449	2226	3018
1-1/4 x 12	774	1049	1737	2355	2816	3818	–	–
1-3/8 x 6	917	1243	2056	2788	3335	4522	2919	3958
1-3/8 x 12	1044	1415	2341	3174	3797	5148	–	–
1-1/2 x 6	1217	1650	2729	3700	4426	6001	3873	5251
1-1/2 x 12	1369	1856	3071	4164	4980	6752	–	–

Table 11. Torque Values if You Apply LocTite 277

	The Grade of the Bolt							
	Grade 2		Grade 5		Grade 8		Grade BC	
Dimension	Pound-Feet	N-m	Pound-Feet	N-m	Pound-Feet	N-m	Pound-Feet	N-m
1 x 8	325	441	837	1135	1181	1601	1034	1402
1 x 12	356	483	916	1242	1293	1753	–	–
1 x 14	365	495	939	1273	1326	1798	–	–
1-1/8 x 7	461	625	1032	1399	1674	2270	1464	1985
1-1/8 x 12	516	700	1158	1570	1877	2545	–	–
1-1/4 x 7	650	881	1456	1974	2362	3202	2067	2802
1-1/4 x 12	719	975	1613	2187	2615	3545	–	–
1-3/8 x 6	851	1154	1909	2588	3097	4199	2710	3674
1-3/8 x 12	970	1315	2174	2948	3526	4781	–	–
1-1/2 x 6	1130	1532	2534	3436	4110	5572	3597	4877
1-1/2 x 12	1271	1723	2852	3867	4624	6269	–	–

1.4.1.2 Stainless Steel Fasteners

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Table 12. Torque Values for Stainless Steel Fasteners 5/16-inch and Smaller

Dimension	316 Stainless		18-8 Stainless		18-8 Stainless with Loctite 767	
	Pound-Inches	N-m	Pound-Inches	N-m	Pound-Inches	N-m
1/4 x 20	79	9	76	9	45	5
1/4 x 28	100	11	94	11	56	6
5/16 x 18	138	16	132	15	79	9
5/16 x 24	148	17	142	16	85	10

Table 13. Torque Values for Stainless Steel Fasteners Larger Than 5/16-inch

Dimension	316 Stainless		18-8 Stainless		18-8 Stainless with Loctite 767	
	Pound-Feet	N-m	Pound-Feet	N-m	Pound-Feet	N-m
3/8 x 16	21	28	20	27	12	16
3/8 x 24	23	31	22	29	13	18
7/16 x 14	33	44	31	42	19	25
7/16 x 20	35	47	33	45	20	27
1/2 x 13	45	61	43	58	26	35
1/2 x 20	47	64	45	61	27	37
9/16 x 12	59	81	57	77	34	46
9/16 x 18	66	89	63	85	38	51
5/8 x 11	97	131	93	125	56	75
5/8 x 18	108	150	104	141	62	84
3/4 x 10	132	179	128	173	77	104
3/4 x 16	130	176	124	168	75	101
7/8 x 9	203	275	194	263	116	158
7/8 x 14	202	273	193	262	116	157
1 x 8	300	406	287	389	172	233
1 x 14	271	367	259	351	156	211
1-1/8 x 7	432	586	413	560	248	336
1-1/8 x 12	408	553	390	529	234	317
1-1/4 x 7	546	740	523	709	314	425
1-1/4 x 12	504	683	480	651	288	390
1-1/2 x 6	930	1261	888	1204	533	722
1-1/2 x 12	732	992	703	953	422	572

1.4.2 Preparation

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WARNING: **Fire Hazard —** Some solvents and primers are flammable.

- Use threadlocker and primers with sufficient airflow.
- Do not use flammable material near ignition sources.

1. Clean all threads with a wire brush or a different tool.
2. Remove the grease from the fasteners and the mating threads with solvent. Make the parts dry.

NOTE: LocTite 7649 Primer™ or standard solvents will remove grease from parts.

3. Apply a spray of LocTite 7649 Primer™ or equal on the fasteners and the mating threads. Let the primer dry for one minute minimum.

1.4.3 How to Apply a Threadlocker

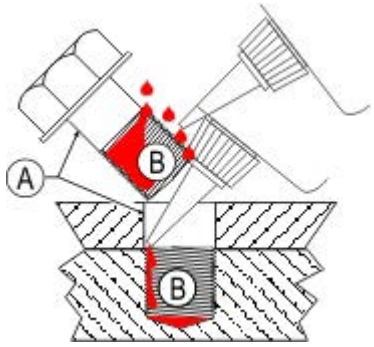
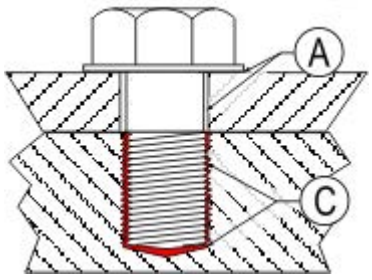
BNUUUN02.T02 0000222508 D.2 B.3 B.2 4/20/23, 9:09 AM Released

CAUTION: **Malfunction Hazard —** Heat, vibration, or mechanical shocks can let the fasteners loosen if you do not apply the threadlocker correctly. Loose fasteners can cause malfunctions of the equipment.

- Read the threadlocker manufacturer's instructions and warnings. Obey these instructions.

Apply the threadlocker only to the areas where the fastener threads and the mating threads engage.

Figure 2. Apply Threadlocker in a Blind Hole

Application	Coverage
	

Legend

A . . . No threadlocker here
B . . . Apply here
C . . . Fill all space with threadlocker

1.4.3.1 Blind Holes

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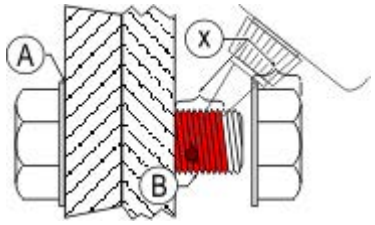
1. Apply the threadlocker down the threads to the bottom of the hole.
2. Apply the threadlocker to the bolt.
3. Tighten the bolt to the value shown in the correct table (Table 6: Threadlocker by the Diameter of the Bolt (see below Note), page 17 to Table 12: Torque Values for Stainless Steel Fasteners 5/16-inch and Smaller, page 19).

1.4.3.2 Through Holes

BNUUUN02.T04 0000222506 D.2 B.3 A.3 11/26/19, 2:51 PM Released

1. Put the bolt through the assembly.
2. Apply the threadlocker only to the bolt thread area that will engage the nut.
3. Tighten the bolt to the value shown in the correct table (Table 6: Threadlocker by the Diameter of the Bolt (see below Note), page 17 to Table 12: Torque Values for Stainless Steel Fasteners 5/16-inch and Smaller, page 19).

Figure 3. Apply Threadlocker in a Through Hole

Application	Legend
	**A . . .** No threadlocker here **B . . .** Apply the threadlocker to this area **X . . .** Nut depth

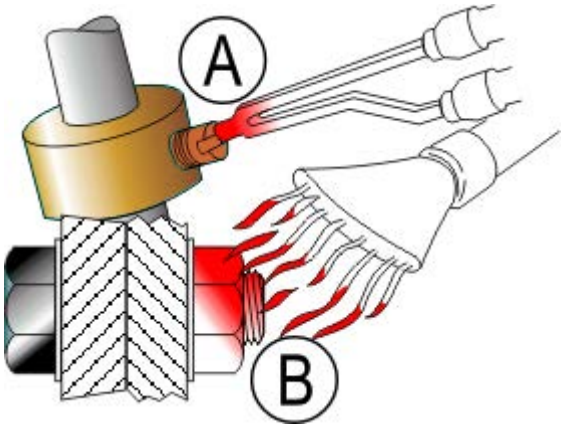
1.4.3.3 Disassembly

BNUUUN02.C07 0000222444 D.2 B.3 A.3 11/26/19, 2:59 PM Released

For high-strength threadlocker, apply heat for five minutes. Disassemble with hand tools while the parts are hot.

For low-strength and moderate-strength threadlocker, disassemble with hand tools.

Figure 4. Use heat for disassembly of fasteners with threadlocker.

Apply Heat to a Small Area	Legend
	**A . . .** How to apply heat to a small fastener **B . . .** How to apply heat to a large fastener

BPWG4U01 / 2020082 BPWG4U01.1 0000266749 D.2 A.13 2/17/20, 1:59 PM Released

General Assembly

6 Sheets

4244SP2 SM

Clean Side

Legend

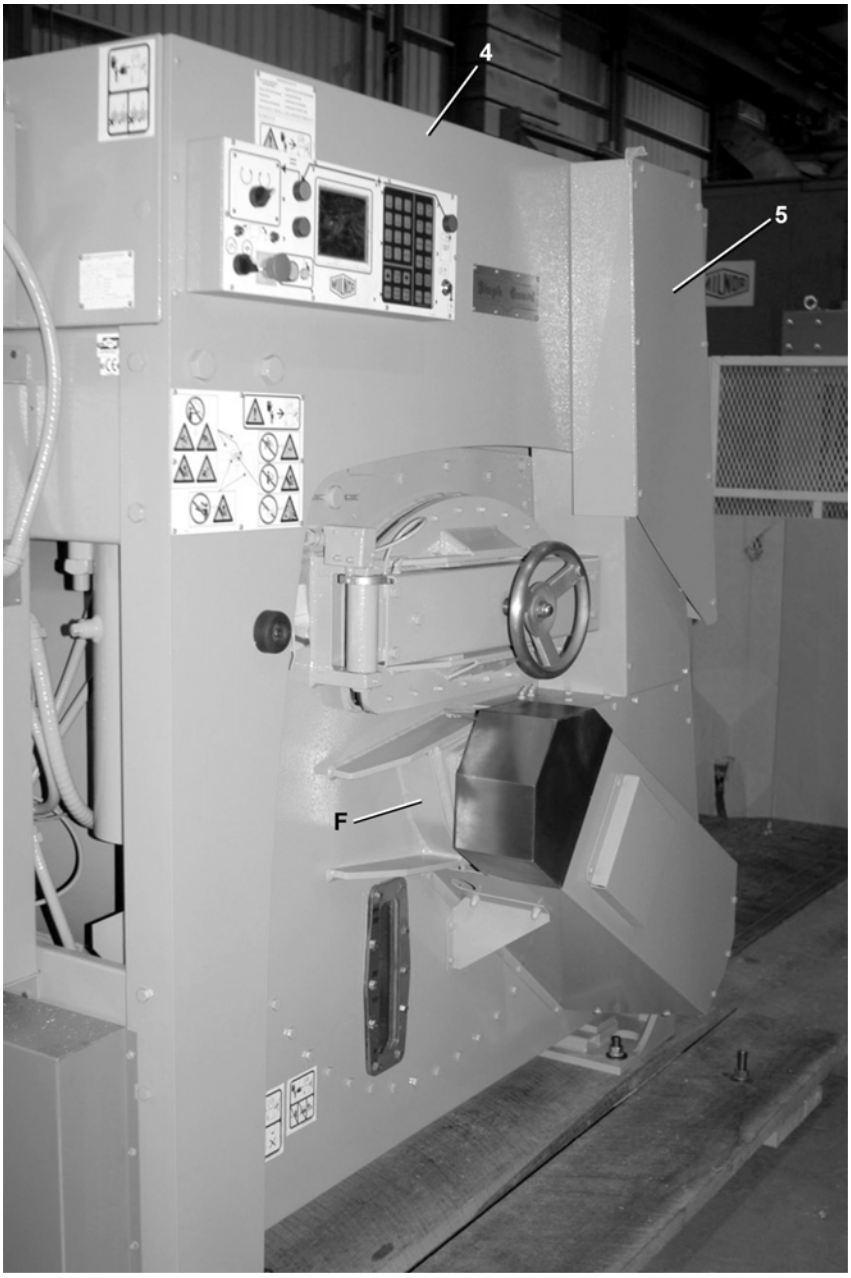
A . . . Peristaltic connection, see BPWG4C01
B . . . Suspension cylinders, see BPWVUJ01
C . . . Soapchute, see BPWG4C02
D . . . Idler shaft bearings, see BPWG4B03
E . . . Staphairtrol, see BPWG4P02

General Assembly

6 Sheets

4244SP2 SM

Soil Side



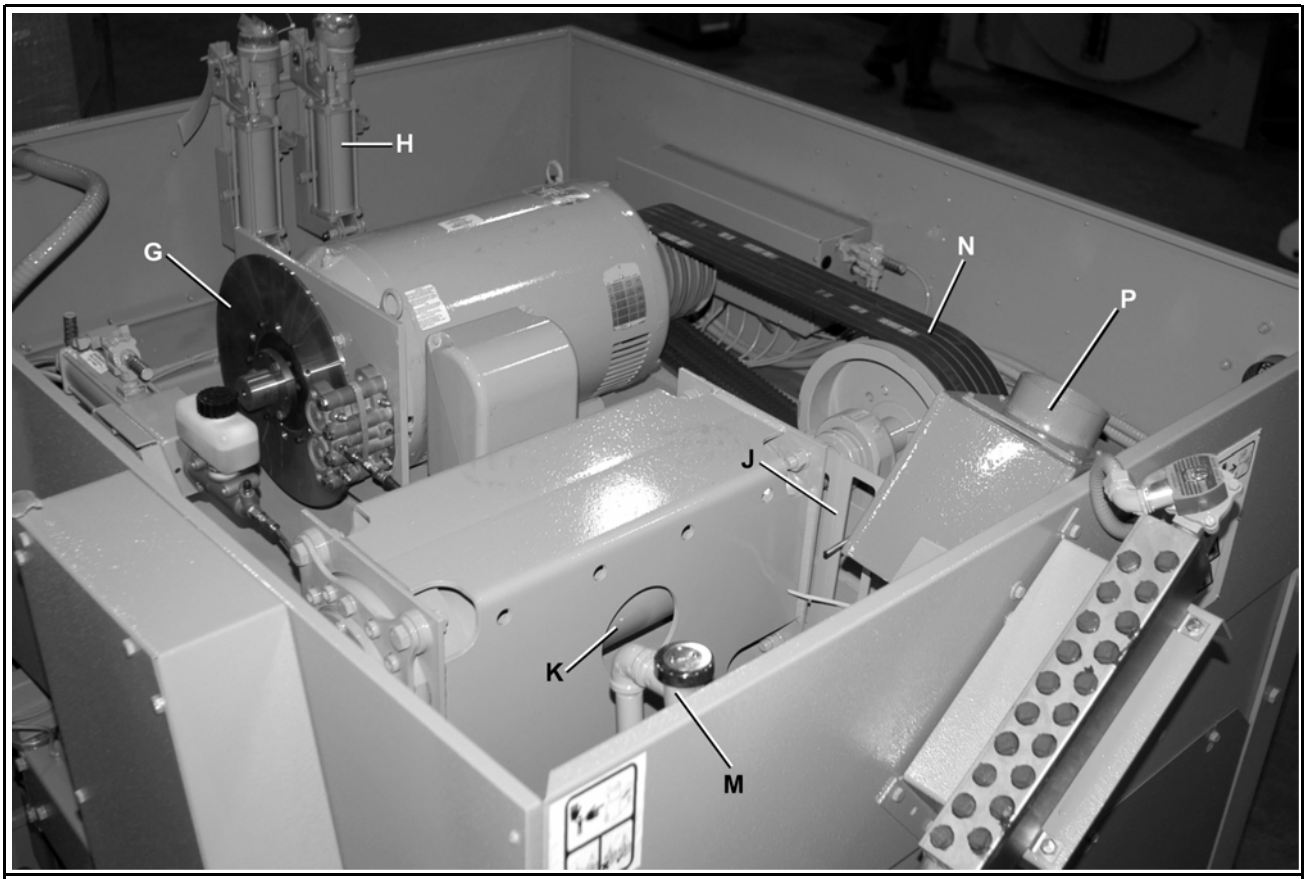
Legend

F . . . Main bearing, see BPWG4B01

General Assembly

6 Sheets

4244SP2 SM



Legend

G . . . Brake assembly, see BPWG4I04
H . . . Water inlets, see BPWG4W02
J . . . Excursion switch, see BPWG4Z01
K . . . Jackshaft, see BPWG4I03
M . . . Cooldown, see BPWG4W03
N . . . Drive chart, see BPWG4I01
P . . . Staphairtrol, see BPWG4P02

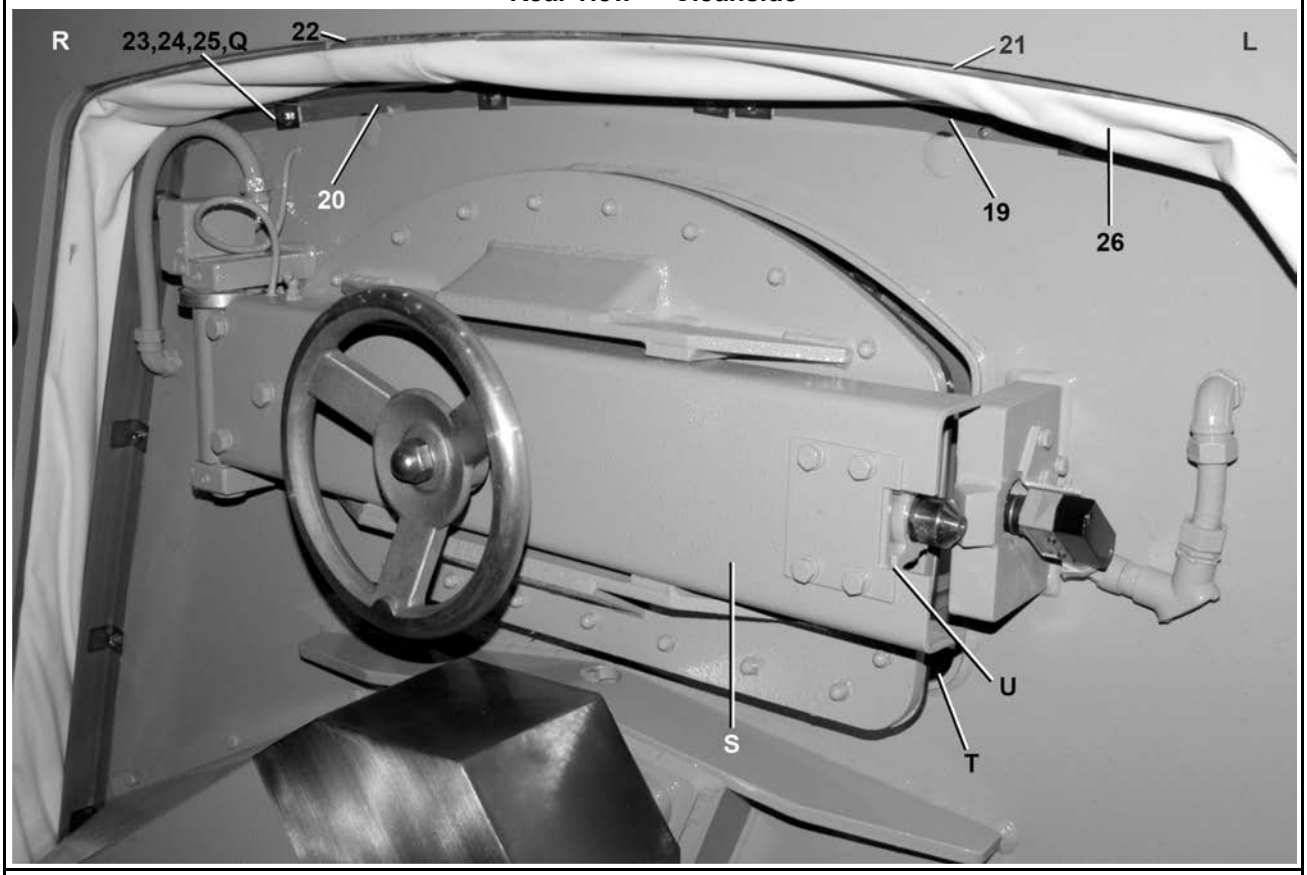
General Assembly

6 Sheets

4244SP2 SM

NOTE: The loading side (soil side) is considered the front of the machine. The staph barrier rubber extrusions (items 19–22) are designed for left and right of the machine, using this rule.

Rear view — Cleanside



Legend

L . . . Left side
Q . . . 60 places
R . . . Right side
S . . . Shell doors, see BPWG4D01
T . . . Cylinder doors, see BPWVUD02
U . . . Interlock plunger, see BPWG4D02

General Assembly

6 Sheets

4244SP2 SM

General Assembly

6 Sheets

4244SP2 SM

Table 14. Parts List—General Assembly

Find the assembly for your machine and the letter shown in the "Item" column. The components for your machine will show this letter or the word "all" in the "Used In" column. The numbers shown in the "Item" column are those shown in the illustrations.				
Used In	**Item**	**Part Number**	**Description/Nomenclature**	**Comments**
			Components	
all	1	02 16163	ENCLOSURE=DRIVE PERISTAL	
all	2	02 18334	NAMEPLATE-STAPHGUARD	
all	3	02 03344	TRIM=REAR CONSOLE TOP 7FT/PC	
all	4	X2 16166	ENCL DR. BSE-SD 59.063"LG	
all	5	AD 15 081	BELT GUARD ASSY=SG-SOILSIDE	
all	6	02 20014	COVER=RIGHT SIDE (FT)4244SGH	
all	7	02 15936A	COVER=4244WP2&3 SUPPLY SIDE	
all	8	02 20015	COVER=LOWER SHAFT 4244SGH	
all	9	W2 15774	*BELTGUARD=WELD CLEANSIDE	
all	10	02 15822	BOTTOM WELD COVER CLEANSIDE	
all	11	AD 15 112	KICKPLATE INST=SG-CLEANSIDE	
all	15	02 15759	COVER=STEAM PIPING 4244 SP2	
all	16	AD 15 101	SIGHT GLASS ASSY-SS=WEHU	
all	17	02 15853A	LEVEL INDICATOR 3-13 INCH	
all	18	02 15924A	LEVEL INDICATOR 10-30 CM	
all	19	02 18781A	EXTRUSION SHELL CS LF 42SG	
all	20	02 18781B	EXTRUSION SHELL CS RT 42SG	
all	21	02 18781C	EXTRUSION FRAME CS LF 42SG	
all	22	02 18781D	EXTRUSION FRAME CS RT 42SG	
all	23	15U320	FLATWASHER(USS STD) 3/4" UNPLT	
all	24	02 175032	CLAMP BOOT 60142 +60SG	
all	25	15P175	TRDCUT-F HXHD 1/4-20UNC2AX1/2	
all	26	Y2 15797	BOOT ASSEMBLY 42SGH OUR MATL	

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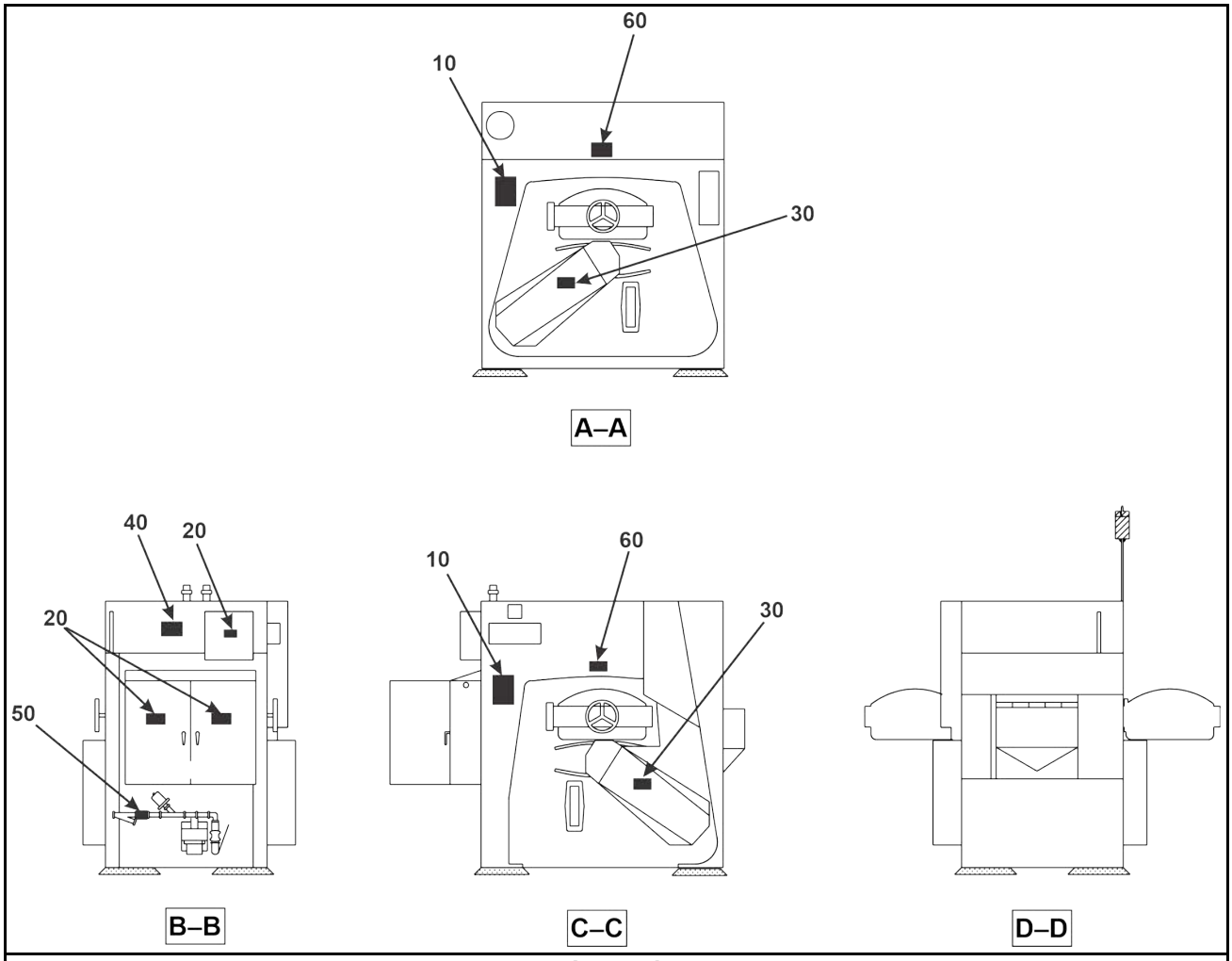
Safety Placard Use and Placement

2 Sheets

42031, 42044 SP2/SR2 & SP3/SR3 SINGLE MOTOR DRIVE

NOTICE: Replace placard immediately, if removed or unreadable. Approximate locations of placards are shown. If aluminum placard, mounting holes are provided on machine. Use #8 self-tapping screws.



Legend

A–A . . Rear (unload end) view
B–B . . Left view
C–C . . Front (Load end) view
D–D . . Right view

Safety Placard Use and Placement

2 Sheets

42031, 42044 SP2/SR2 & SP3/SR3 SINGLE MOTOR DRIVE

Table 15. Parts List—Safety Placard Use and Placement

Find the assembly for your machine and the letter shown in the "Item" column. The components for your machine will show this letter or the word "all" in the "Used In" column. The numbers shown in the "Item" column are those shown in the illustrations.				
Used In	**Item**	**Part Number**	**Description/Nomenclature**	**Comments**
Reference Assemblies				
none				
Components				
all	10	01 10627A	NPLT:DIV-CYL/STAPH WARN-TCATA	
all	20	01 10377A	NPLT:ELEC HAZARD LG-TCATA	
all	30	01 10689A	NPLT:BELT HAZARD SM TCATA	
all	40	01 10648A	NPLT:GEAR HAZARD-TCATA	
all	50	01 10685A	NPLT:BURN HAZARD WARN-TCATA	
all	60	01 10699B	NPLT:SERV HZRD-ALUM-TCATA	

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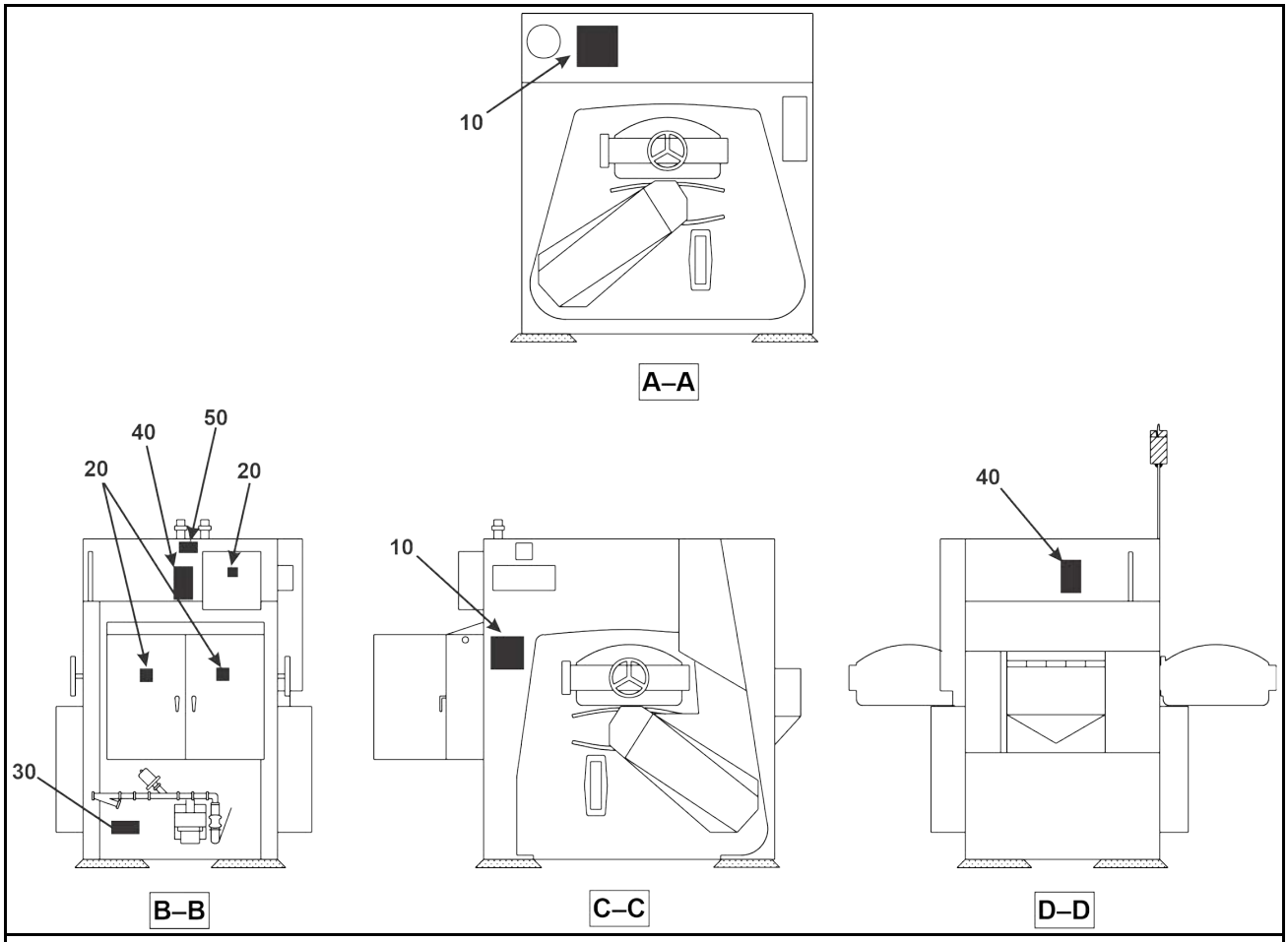
Safety Placard Use and Placement ISO

2 Sheets

42031, 42044SP2/SR2 & SP3/SR3 SINGLE MOTOR DRIVE

NOTICE: Replace placard immediately, if removed or unreadable. Approximate locations of placards are shown. If aluminum placard, mounting holes are provided on machine. Use #8 self tapping screws.



Legend

A–A . . Rear (unload end) view
B–B . . Left view
C–C . . Front (load end) view
D–D . . Right view

Safety Placard Use and Placement ISO

2 Sheets

42031, 42044SP2/SR2 & SP3/SR3 SINGLE MOTOR DRIVE

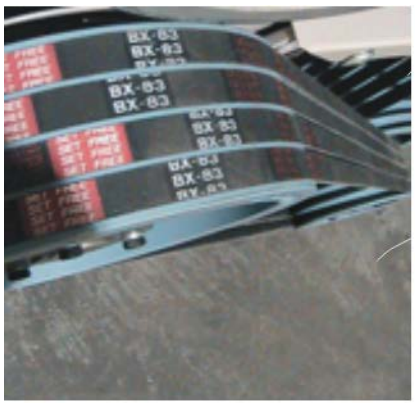
Table 16. Parts List—Safety Placard Use and Placement ISO

Find the assembly for your machine and the letter shown in the "Item" column. The components for your machine will show this letter or the word "all" in the "Used In" column. The numbers shown in the "Item" column are those shown in the illustrations.				
Used In	**Item**	**Part Number**	**Description/Nomenclature**	**Comments**
Components				
all	10	01 10627X	NPLT:DIVCYL SG WARNG FRT ISO	
all	20	01 10377	NPLT:WARNING 4X4	
all	30	01 10649X	NPLT:HOT BEHIND CVR WARN-ISO	
all	40	01 10628X	NPLT:NONTILT W/E WARNING SIDE	
all	50	01 10648X	NPLT:ACTUATED VALVE WARN-ISO	

2 Drive Assemblies

2.1 Drive Pulley and Belt Maintenance

Figure 5. Examples of drives this instruction applies to: one or more V-belts, attached V-belts and tooth belts



NOTICE: "Remove power from the machine" means use the necessary safety procedure for your location. In the USA, this is the OSHA lockout/tagout (LOTO) procedure. More local requirements can also apply.

WARNING: **Risk of Injury or death —** A machine in operation without safety guards is dangerous. Drive belts can pull in your body or clothing.

- Remove power from the machine when you do work on the mechanisms.
- Stay out of the machine frame when you do a test on the machine.
- Replace all covers before you put the machine into operation.

TIP: Read these documents from the Gates Corporation (`www.gates.com`) to know more about pulley and belt maintenance: "Belt Drive Preventive Maintenance & Safety Manual" and "Preserve your investment - Check Engine Belts Often."

2.1.1 Pulley Requirements

- Keep pulleys free of dirt, oil and other contamination.
- Replace pulleys with groove damage.
- Align pulleys and shafts.
- Keep run-out in tolerance.

2.1.1.1 Condition of Grooves on Pulleys

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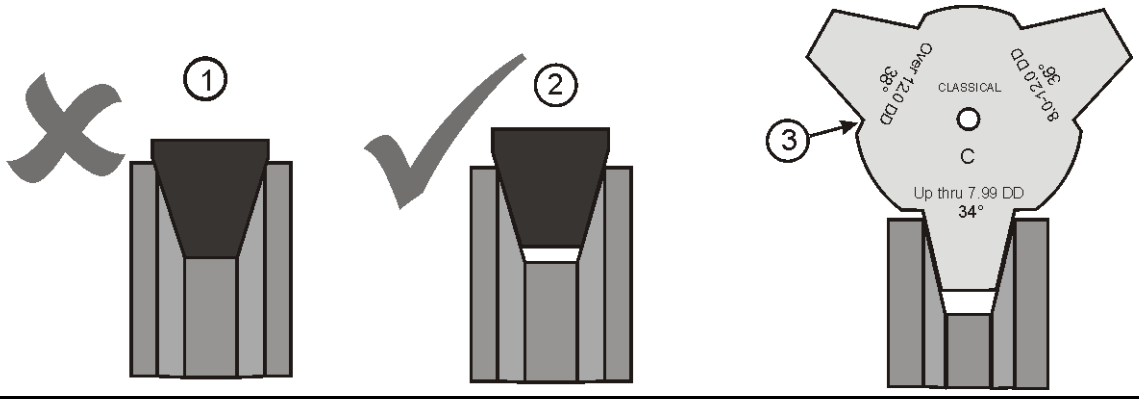
Replace a pulley if:

- the grooves have burrs, cracks, or worn areas that can cause damage to the belts.
- the belts touch the bottom of the groove at any point (Figure 6, page 33).

Figure 6. Pulley Groove Condition

Views of Incorrect and Correct Condition



Legend

1. Incorrect: Too much pulley wear. The belt touches the bottom of the groove.
2. Correct: The belt does not touch the bottom of the groove.
3. Use a sheave (pulley) gage to see if grooves are worn.

2.1.1.2 Pulley and Shaft Position

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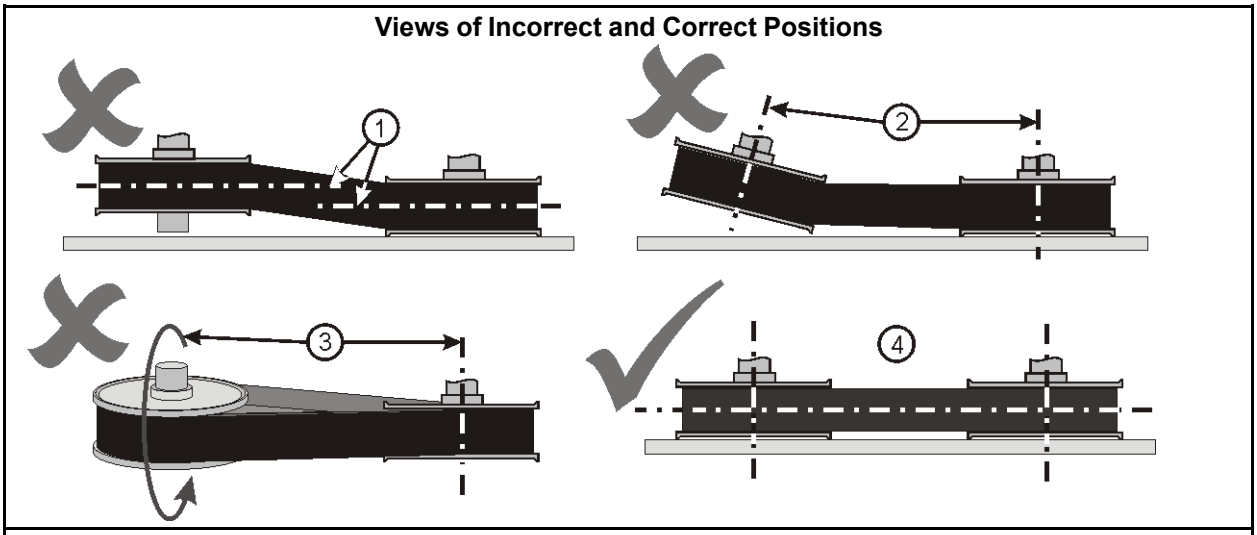
Align To adjust parts until they are in a correct position to other parts.

- Always align components when you replace a motor, bearing housing, pulley, or belt.
- The belts must not twist or make unusual noises or show vibration.

Figure 7. Pulley and Shaft Position



Legend

1. Not aligned: Pulley grooves are in different planes.
2. Not aligned: Pulley grooves are in different planes and shafts are not parallel.
3. Not aligned: Pulley shafts are not parallel (not at the same slope).
4. Aligned: Pulley grooves are in the same plane and shafts are parallel.

2.1.1.3 Keep Run-Out in Tolerance

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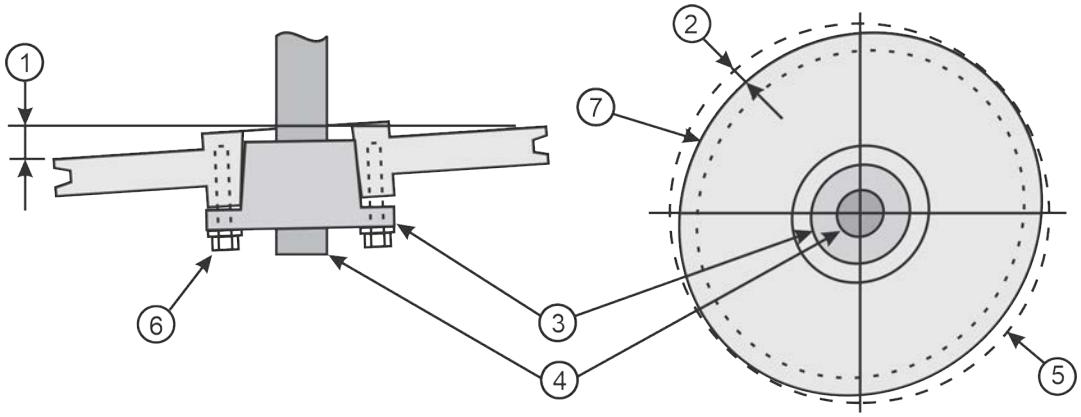
Axial run-out The difference between the minimum and maximum distance between the face of a pulley and a plane perpendicular to the pulley shaft (Figure 8, page 35, item 1). Incorrect installation or damage can cause a pulley to be not at a 90 degree angle to the shaft.

Radial run-out The difference between the minimum and maximum diameter in one turn (Figure 8, page 35, item 2). If a force causes damage to a pulley, it can bend. It will not have a circular shape.

Figure 8. Run-out

Views of Axial and Radial Run-out

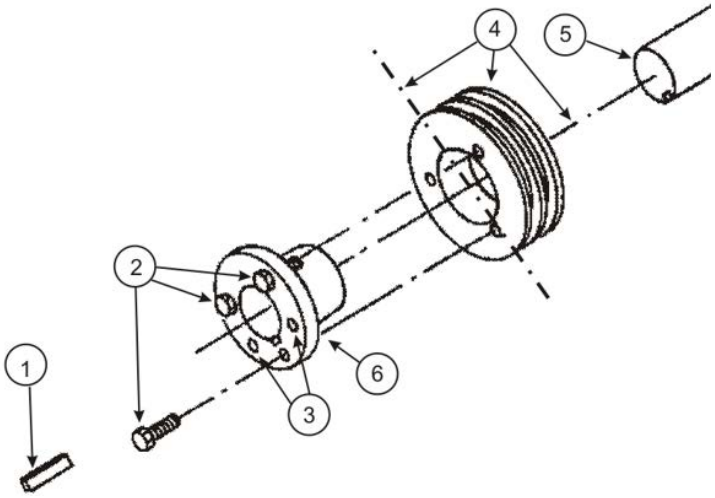


Legend

1. Axial run-out. This pulley is bent or not perpendicular to the shaft. This condition must not be more than 1 mil for each inch (0.1 mm for each dm) of the pulley diameter.
2. Radial run-out. This pulley is not circular. This condition must be less than 10 mils (0.25 mm).
3. Bushing
4. Shaft
5. A circle
6. Bushing bolts
7. Sheave

Figure 9. Typical Pulley Assembly

View of Pulley Components



Legend

1. Key
2. Bushing bolts. Tighten bolts in a pattern that gives the same torque. This will give minimum axial run-out.
3. Push-off holes
4. Pulley. Measure the radial run-out of the pulley after you assemble. Make sure that the center of the pulley is the same as the center of the shaft.
5. Shaft. Make sure that the shaft is not bent.
6. Bushing

2.1.2 Belt Requirements

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- Replace damaged belts.
- The pulleys must stay aligned when you adjust the belt tension.
- Do not use belts made from cut belts.

- For a drive with more than one belt:
  - Replace all of the belts together.
  - Do not mix new and used belts.
  - Do not mix belts from more than one manufacturer.

CAUTION: **Risk of damage —** A screwdriver or metal tool can cause damage to the belt.

▶ Do not push the belt on with a tool.

2.1.2.1 Condition of Belts

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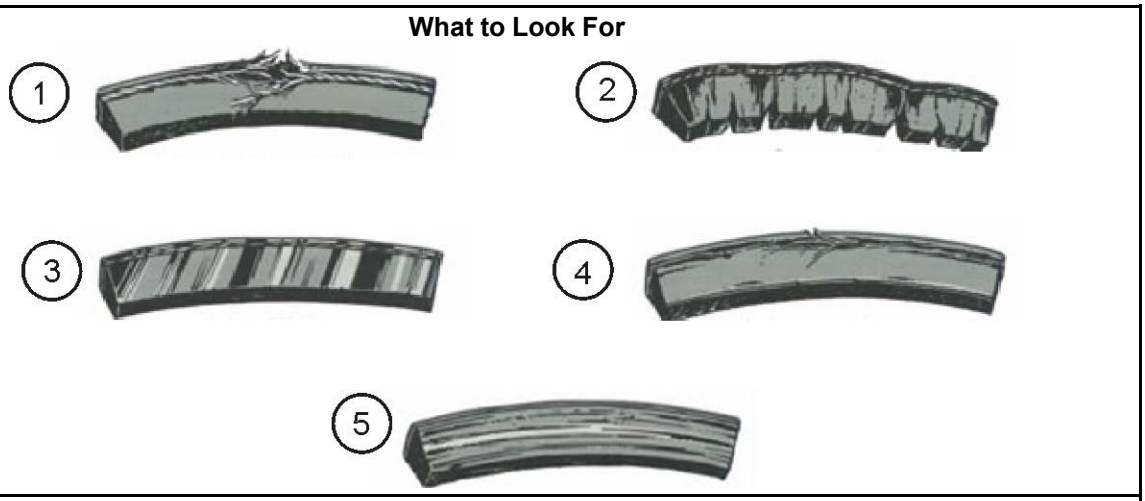
Slippage when the pulley turns more quickly than the belt can move

Slippage occurs if belts are not aligned (see Section 2.1.1.2 , page 33) or by incorrect tension explained in Section 2.1.1.2 , page 33. Slippage can cause belts to become too hot. Belts must not have a temperature more than than 140F (60° C).

TIP: The belt storage area must be cool and dry with no sun light.

TIP: New and used belts can look the same. These belts will have different strength properties and a small difference in length.

Figure 10. Types of Belt Damage



Legend

1. Broken cord—The belt was pushed across the groove with a metal tool.
2. Cracks—The belt is too large for the pulley.
3. Shiny sidewalls—slippage, oil, grease.
4. The belt layers disconnect—oil, grease.
5. Bands on sidewalls—rough surface or particles in the pulley groove.

2.1.2.2 Tension of Belts

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This data does not apply to belts where a spring holds the correct belt tension. Manual tension adjustment is not necessary for this type of drive.

The correct belt tension is the lowest tension that prevents belt slippage with a full load condition. If the belt is too tight, this can cause damage to the belt, the pulleys, bearings, and other drive components. If the belt is too loose, this can cause belt slippage. Incorrect belt tension or belt slippage can cause components to make an unusual noise.

When you install a new belt, use these rules to get the correct belt tension:

- Set the tension of the belt when you replace a motor, bearing housing, pulley, or belt.
- Replace all belts on a pair of pulleys when you replace one of them.
- After adjustment, operate the machine in all of its standard conditions to make sure that the belt operates correctly. For example, operate a washer-extractor in its full speed range with a full load of wet goods.
- Adjust the tension when you first install a belt. Do the adjustment again after 24 and 48 hours of operation. All belts will become longer after a short time. A V-belt will move down in the grooves of the pulleys. These conditions will cause the tension to decrease.

When you do scheduled maintenance, examine the belts for correct tension. With operation, belts become longer.

2.1.3 The pulleys must stay aligned when you adjust the belt tension

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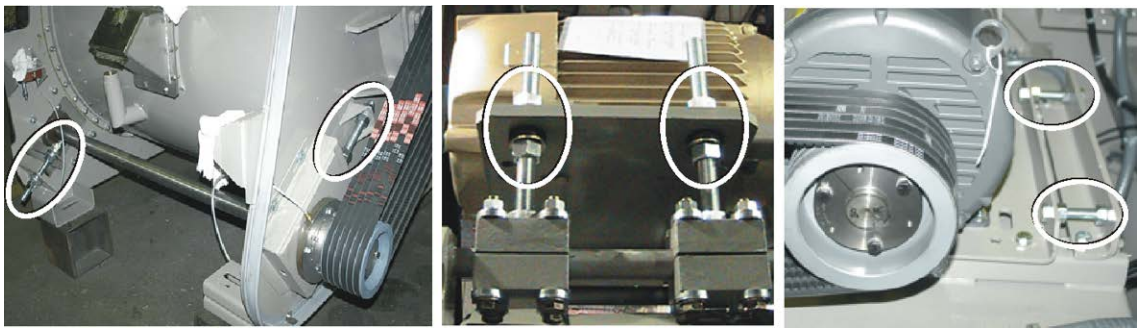
Some tension mechanisms do not have an effect on pulley and shaft requirements. Pulleys will stay aligned when you adjust them. Figure 11, page 38 is an example of these. Where tension mechanisms are a pair of threaded rods, you must adjust the nut, on each rod carefully. If not, the pulleys will not stay aligned. Examples of this type are shown in Figure 12, page 38.

Figure 11. A Tension Mechanism that will not Change the Angle of the Pulleys

Figure 12. Some Pairs of Tension Mechanisms that Can Change the Angle of the Pulleys



2.1.4 How to Do Maintenance on Pulleys and Belts

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Table 17. Typical Tools for Pulley and Belt Maintenance

Tool	Function	Related Data
Torque wrench	Make the bushing bolts the same torque to get the minimum axial run-out.	Figure 9, page 35, item 2
Laser, straight edge, or string	Align pulleys	Tools are listed in order of preference. Section 2.1.1.2 , page 33 and Figure 13, page 40
Bubble level	Align shafts	Section 2.1.1.2 , page 33 and Figure 14, page 41
Dial indicator	Measure run-out	Section 2.1.1.3 , page 34 and Figure 15, page 41

Table 17 Typical Tools for Pulley and Belt Maintenance (cont'd.)

Tool	Function	Related Data
Sheave (pulley) gage	Examine pulley wear	Figure 6, page 33.
Infrared thermometer	Examine belt temperature	Section 2.1.2.1 , page 36.

2.1.4.1 Typical Steps to Replace Pulleys and Belts

BNUUUM02.C11 0000274652 D.2 B.2 A.2 2/4/20, 8:08 AM Released

Preparation Remove power from the machine.

Belt removal Use the belt tension mechanism to decrease the distance between the pulleys until you have sufficient clearance. Figure 11, page 38 and Figure 12, page 38 show typical belt tension mechanisms.

Pulley removal On the typical type of pulley and bushing shown in Figure 9, page 35, use the push-off holes to remove the pulley easily. On special types of pulleys (example: large drive pulley and cone), look at the parts document in the maintenance manual for more data. Some pulleys are too heavy for only one person to hold.

Pulley installation Figure 9, page 35 shows the typical pulley and bushing components. Make sure that you keep run-out tolerances when you assemble and tighten the components.

Belt installation Decrease the distance between the pulleys to put the belt on easily. Assemble the components carefully. Make sure that the components are aligned. Adjust the belt tension so the belt is tight.

Test Before you connect power again, make sure that you remove all tools. Operate the machine with a full load. If the belts slip, increase belt tension with the machine shut down and power removed. Then test again. Make sure that the machine is safe before you put it into regular operation.

2.1.4.2 Examples of Procedures Used at the Milnor® Factory to Align Pulleys

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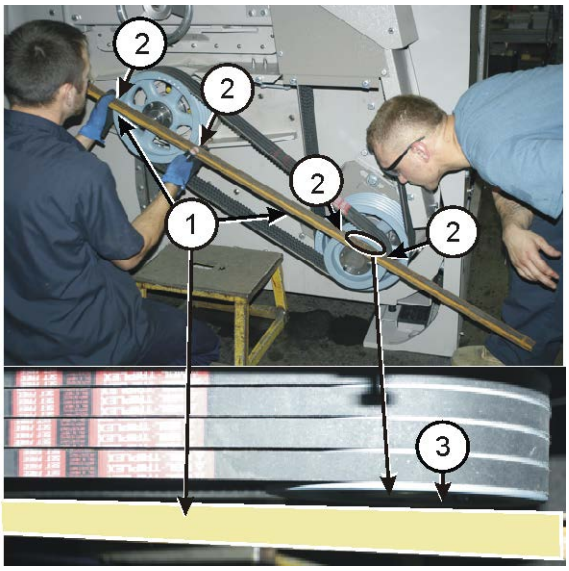
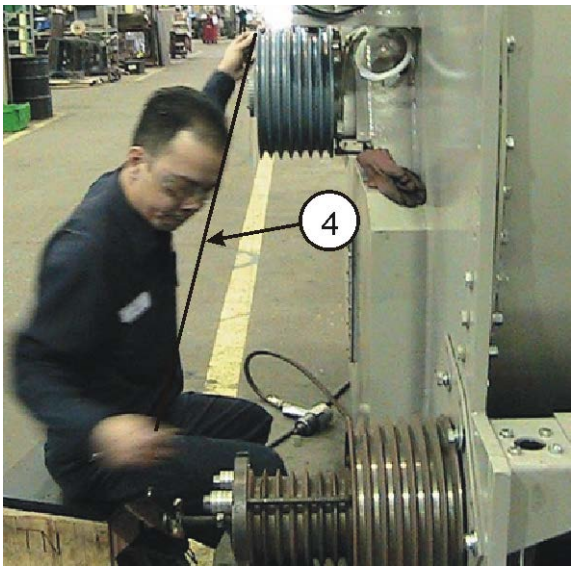
Figure 13. Use a straight edge, a string, or a laser to make sure that all pulleys are in the same plane.

Straight edge



String



Legend

1. Straight edge.
2. Four points where the straight edge must touch the pulleys.
3. Space between the straight edge and the pulley. This shows that the pulleys are not in the same plane.
4. You can use a string as a straight edge if you hold it tight.
5. Magnet-mounted laser
6. Three targets to point the laser at.

Laser

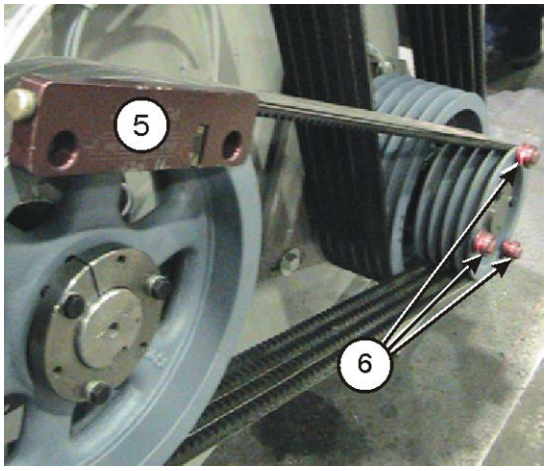
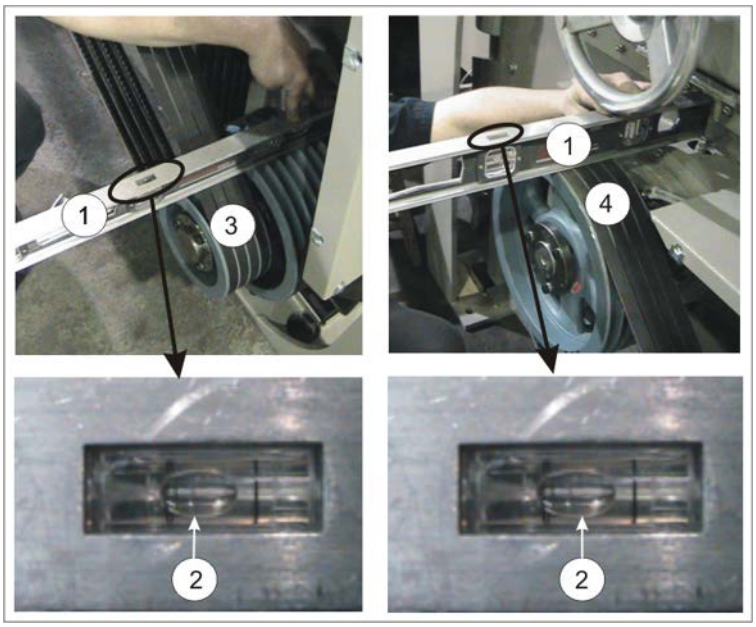


Figure 14. Use a level to make sure that the pulleys are at the same slope.

A level on the top of two pulleys

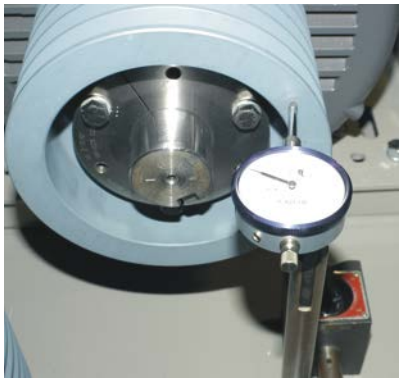


Legend

1. Bubble level: Use this tool to make sure that the slopes of pulleys are equal. This is to make sure that you do not have the condition in Figure 7, page 34, item 3. Mechanisms shown in Figure 12, page 38 can change the pulley slopes.
2. If the slopes of the pulleys are equal, the bubble will be in the same position for each pulley. The bubbles do not have to be in the center of the level.
3. A pulley
4. A second pulley on the same drive

Figure 15. Dial indicator used to find the axial and radial run-out of a pulley.

Axial Run-out (1)



Radial Run-out (2)

Legend

1. Dial indicator in position to measure axial run-out
2. Dial indicator in position to measure radial run-out

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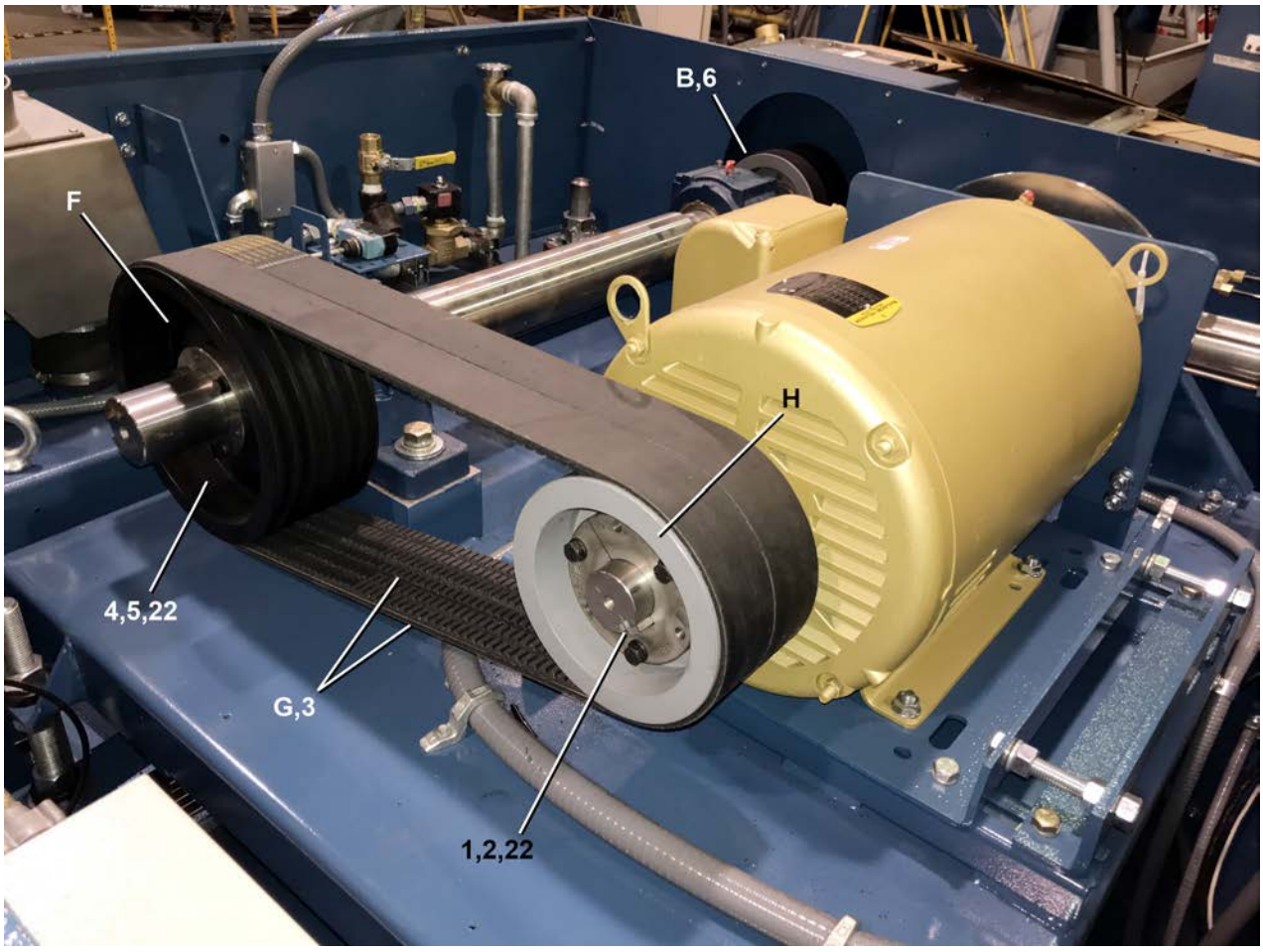
Drive Chart

5 Sheet

4244SR2

Figure 16. Drive Chart: Effective (4/12/16). Jackshaft with no housing and two pillow block bearings. For previous design, see BPWG4I01.



Legend

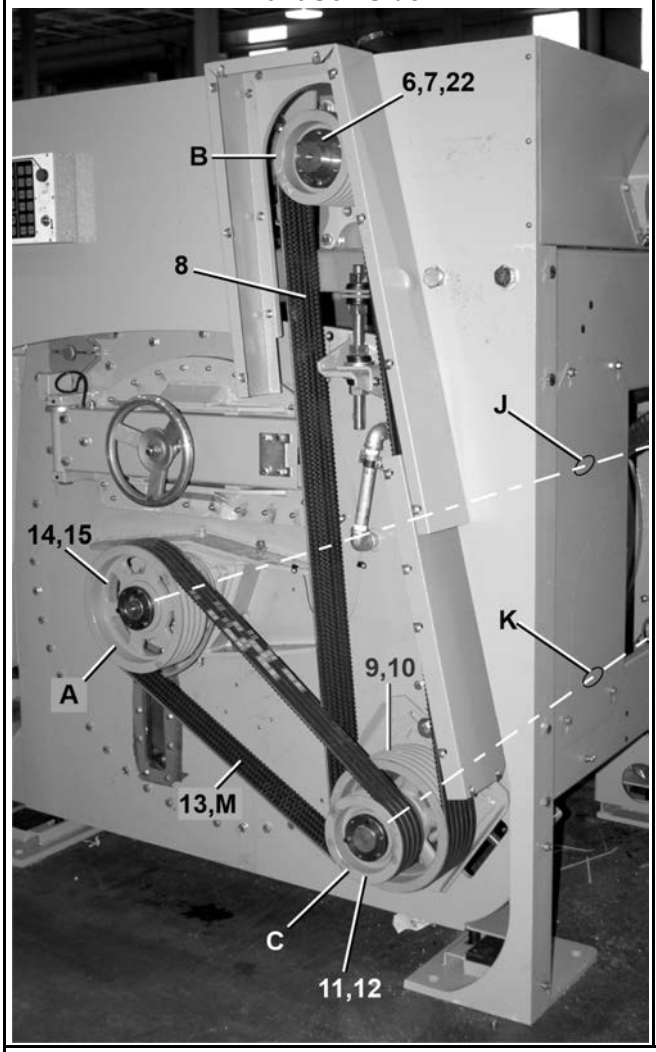
B . . . Front jackshaft pulley
F . . . Rear jackshaft pulley
G . . . 3 rib belt, uses 2
H . . . Motor pulley

Drive Chart

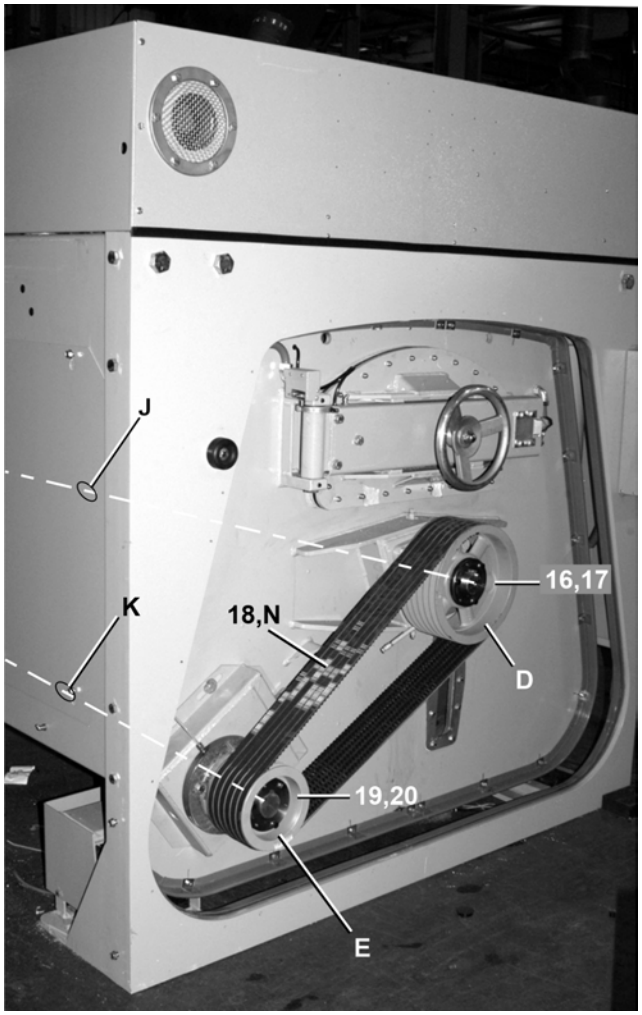
5 Sheet

4244SR2

Front Soil Side



Rear Clean Side



Legend

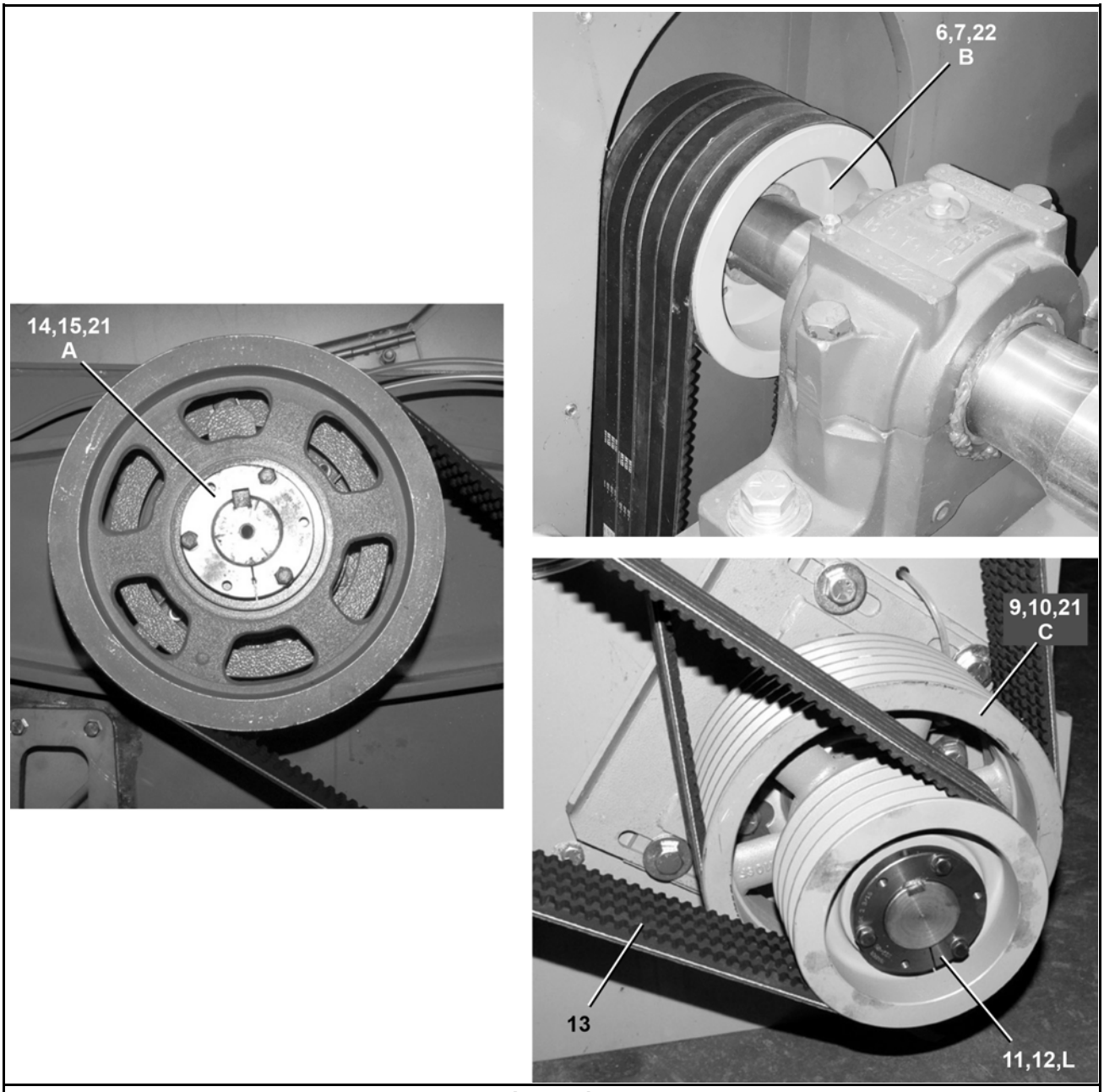
A . . . Front main pulley
B . . . Front jackshaft pulley
C . . . Front idler pulley
D . . . Rear main pulley
E . . . Rear idler pulley
J . . . Main shaft
K . . . Idler shaft
M . . . uses 4
N . . . uses 6

Drive Chart

5 Sheet

4244SR2

Figure 17. Soil Side



Legend

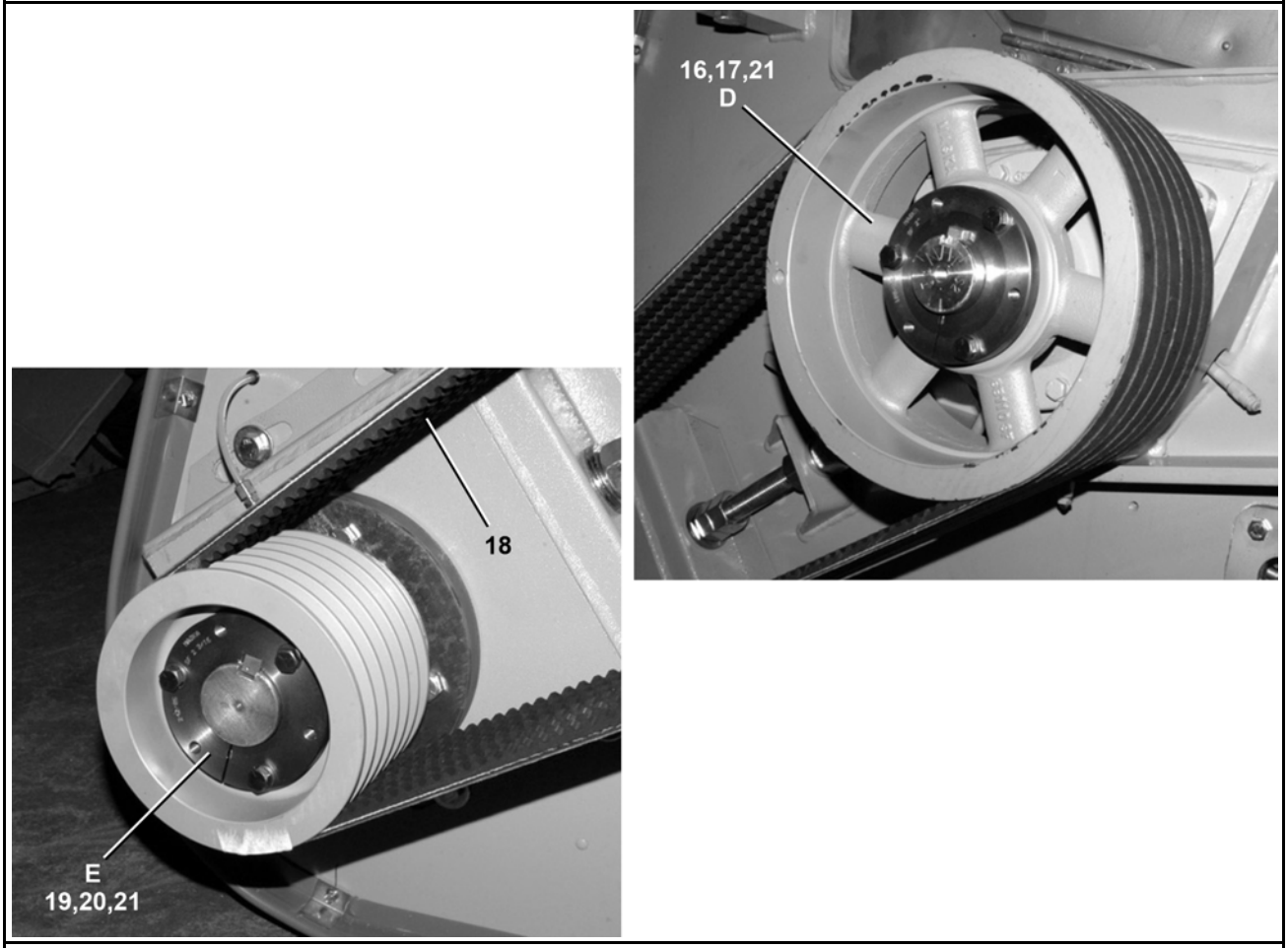
A . . . Front main pulley
B . . . Front jackshaft pulley
C . . . Front idler pulley
L . . . Key comes with bushing

Drive Chart

5 Sheet

4244SR2

Figure 18. Clean Side



Legend

D . . . Rear main pulley
E . . . Rear idler pulley

Table 18. Parts List—Drive Chart

Find the assembly for your machine and the letter shown in the "Item" column. The components for your machine will show this letter or the word "all" in the "Used In" column. The numbers shown in the "Item" column are those shown in the illustrations.

Used In	Item	Part Number	Description/Nomenclature	Comments
Reference Assemblies				
	A	D16 00461	DRIVECHART=4244SP SINGLE MOTOR	
Components				
all	1	56070B6SF	VPUL 6B7.0/A6.6 (SF) TYPE QD	
all	2	56Q1RSF	1+7/8" BUSH VPUL QD TYPE SF	
all	3	56VB070XB3	VBAND 3RBX70 EACH=1	

Drive Chart

5 Sheet

4244SR2

Table 18 Parts List—Drive Chart (cont'd.)

Find the assembly for your machine and the letter shown in the "Item" column. The components for your machine will show this letter or the word "all" in the "Used In" column. The numbers shown in the "Item" column are those shown in the illustrations.

Used In	Item	Part Number	Description/Nomenclature	Comments
all	4	56110B6SF	VPUL 6B11.0/A10.6 (SF) TYPE QD	
all	5	56Q2PSF	2+3/4" BUSH VPUL QD TYPE SF	
all	6	56070B6SF	VPUL 6B7.0/A6.6 (SF) TYPE QD	
all	7	56Q2HSF	2+7/16" BUSH VPUL QD TYPE SF	
all	8	56VB133X	VBELT BX133 RAWEDGE COG	
all	9	56110B6SF	VPUL 6B11.0/A10.6 (SF) TYPE QD	
all	10	56Q2DSF	2+3/16" BUSH VPUL QD TYPE SF	
all	11	56070B4SK	VPUL 4B7.0/A6.6 (SK) TYPE QD	
all	12	56Q2DSK	2+3/16" BUSH VPUL QD TYPE SK	
all	13	56VB083X	VBELT BX83 RAWEDGE COG	
all	14	56110B4SK	VPUL 4B11.0/A10.6 (SK) TYPE QD	
all	15	56Q2ASK	2.0" BUSHING VPUL QD TYPE "SK"	
all	16	56110B6SF	VPUL 6B11.0/A10.6 (SF) TYPE QD	
all	17	56Q2ASF	2.0" BUSHING,VPUL QD TYPE "SF"	
all	18	56VB083X	VBELT BX83 RAWEDGE COG	
all	19	56070B6SF	VPUL 6B7.0/A6.6 (SF) TYPE QD	
all	20	56Q2DSF	2+3/16" BUSH VPUL QD TYPE SF	
all	21	02 15794	KEY-1/2X2+1/2 4231-4244SGH	
all	22	02 175121	KEY=5/8SQ	

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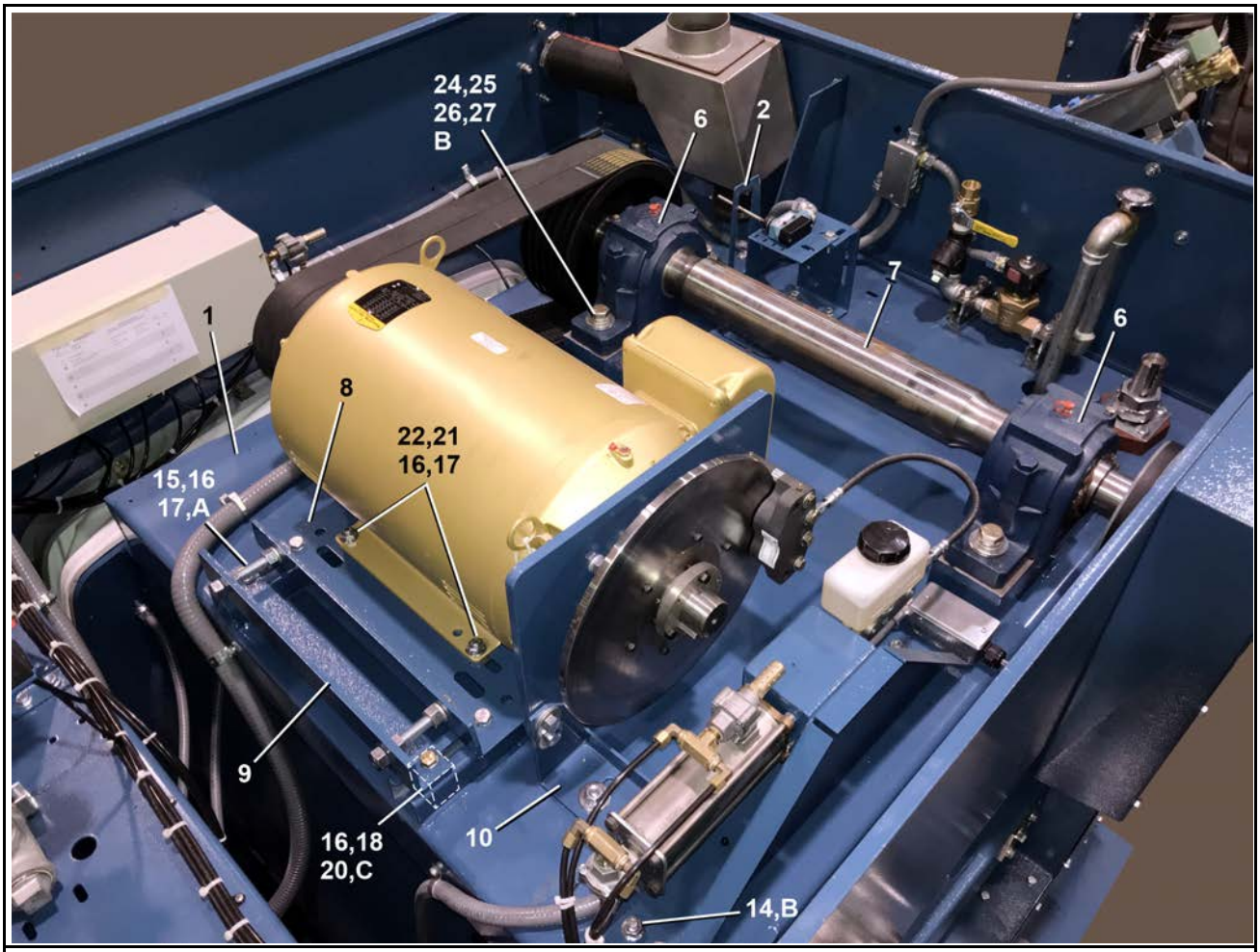
Drive Base

6 Sheet

4244SR2

Figure 19. Jackshaft with no housing and two pillow block bearings. Effective 4/12/16. For previous design, see BPWG4I02.



Legend

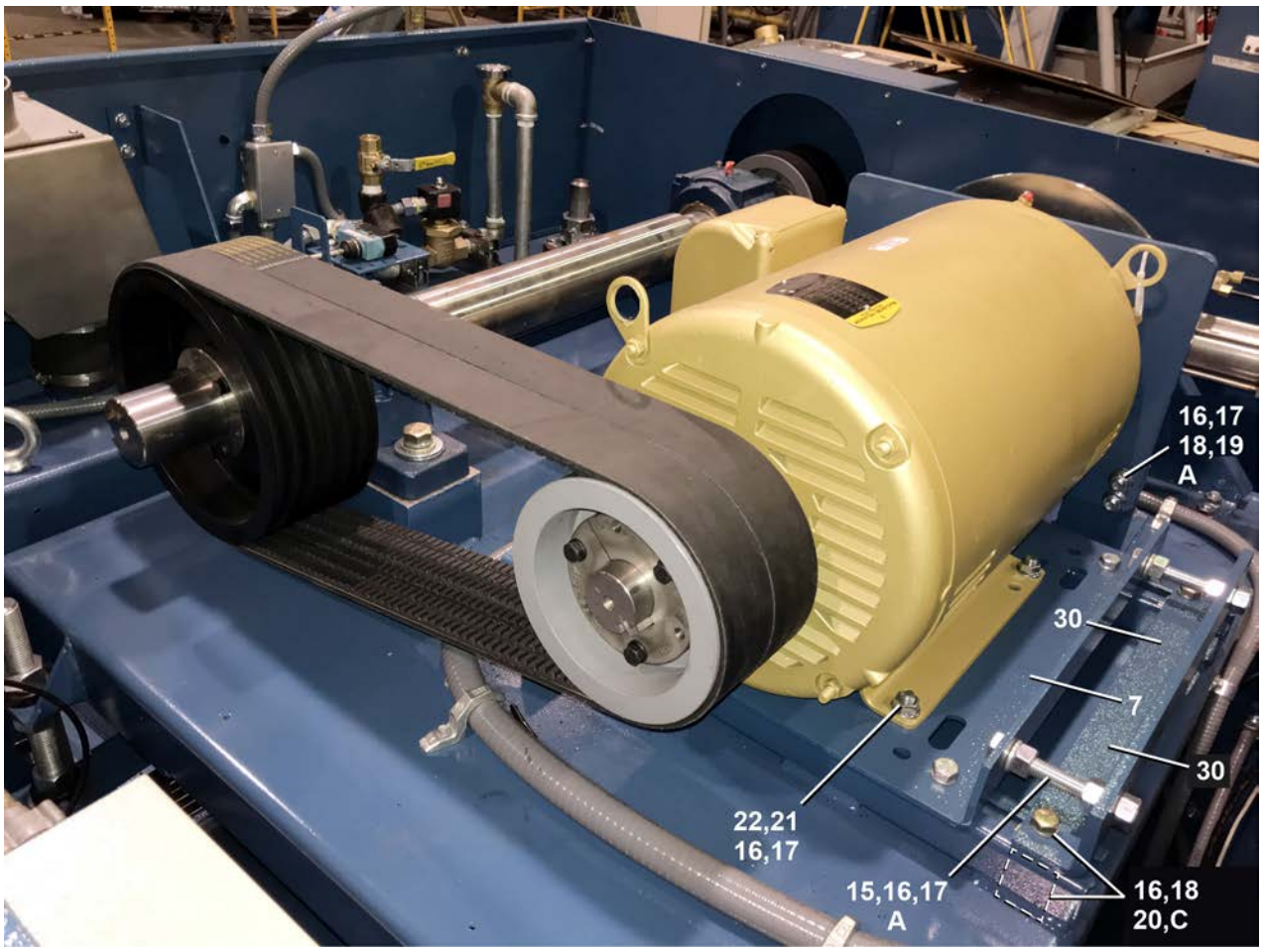
A . . . 2 instances
B . . . 4 instance
C . . . 6 instances

Drive Base Installation

6 Sheet

4244SR2

Figure 20. Motor Mount Adjustment



Legend

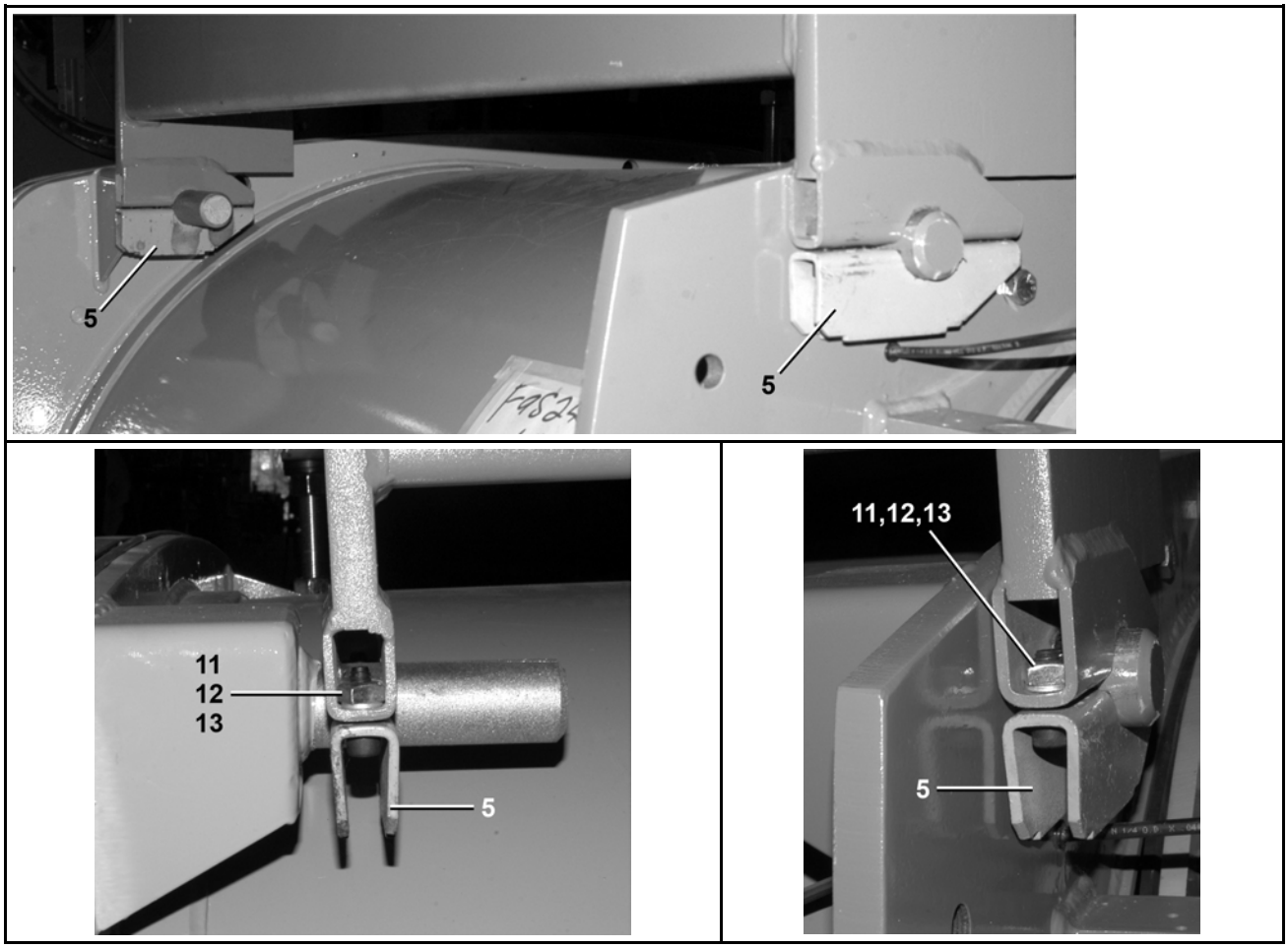
A . . . 2 instances
B . . . 4 instances

Drive Base Installation

6 Sheet

4244SR2

Figure 21. Pivot Clamps

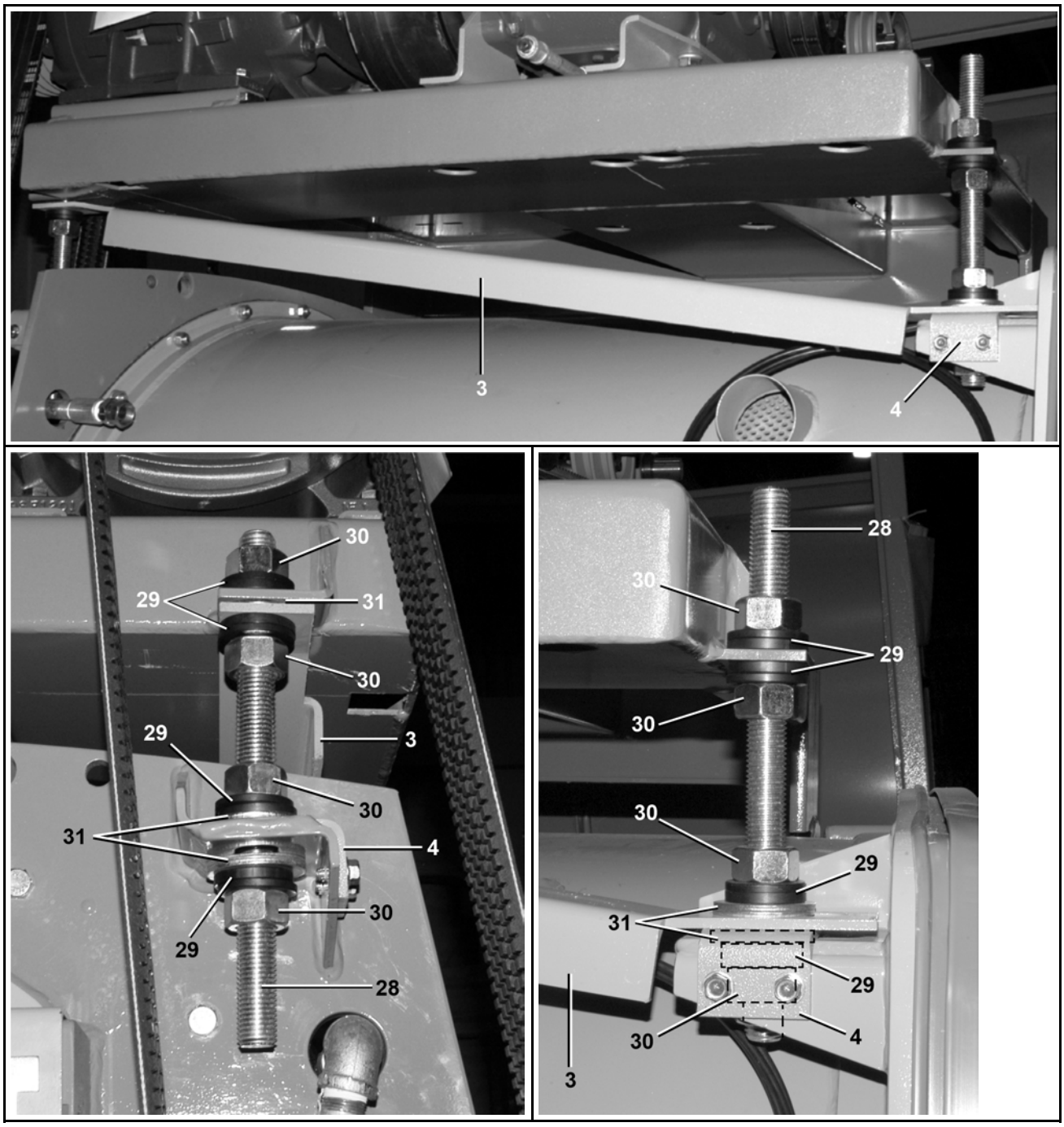


Drive Base Installation

6 Sheet

4244SR2

Figure 22. Drive Base Adjusting Bolts



Drive Base Installation

6 Sheet

4244SR2

Table 19. Parts List—Drive Base

Find the assembly for your machine and the letter shown in the "Item" column. The components for your machine will show this letter or the word "all" in the "Used In" column. The numbers shown in the "Item" column are those shown in the illustrations.				
Used In	**Item**	**Part Number**	**Description/Nomenclature**	**Comments**
			Reference Assemblies	
	A	GA 16 042S	4244SP DRIVE BASE INSTALL	
	B	SA 16 042S	DRIVE BASE 4244SG SGL MOTOR	
	C	SA 16 042B	4244SP DRIVE BASE & JACKSHAFT	
			Components	
all	1	W2 16168A	4244SP DR BASE WLMT-PILLOW	
all	2	02 15605F	ACTUATOR=EXCURSION SW 6044SP	
all	3	02 16088	SWAY BRACE=MOTOR MOUNT 4244	
all	4	02 15652	FORK=MOTOR MOUNT ADJ SCREW	
all	5	X2 15604	CLAMP=MTR MTG HINGEPIN	
all	6	56S22217A	SPHEROLBRG PILLOW BLK 3.346"ID	
all	7	X2 18711M	PILLOW BLOCK JACKSHAFT: SPHRCL 2.75 BORE	
all	8	05 20131E	MTRPLATE 6044SG 1 MOTOR	
all	9	02 19577	ADJ ANGLE MOTOR	
all	10	02 21859N	BRAKE TORQUE ARM 1 MOTOR	
all	11	15K108	SKCPSC 3/8-16 UNC 3X1 BLK	
all	12	15U255	LOCKWASHER MEDIUM 3/8 ZINCPL	
all	13	15G216	SQNUT 3/8-16UNC2B SAE ZINC GR2	
all	14	15P200	TRDCUT-F HXWASHD 3/8-16X3/4NIK	
all	15	15D119	HXTAPSCR 1/2-13X4 GR5 ZNC FTL	
all	16	15U300	LOKWASHER REGULAR 1/2 ZINC	
all	17	15G230	HXNUT 1/2-13UNC2B SAE ZINC GR2	
all	18	15K173A	HXCAPSCR 1/2-13UNC2AX1.75 GR5	
all	19	02 11603C	WASHER DBLR=1.5W/CUTOFF SIDE	
all	20	02 19283	NUT=1/2-13UNCX1+1/2SQ SPEC	
all	21	15U490	FLTWASH 1+1/2X17/32X1/4 ZINC	
all	22	15K180	HXCAPSCR 1/2-13UNCAX2 GR5 ZINC	
all	23	15K162	HXCAPSCR 1/2-13UNC2AX1.5 GR5 P	
all	24	15K235AB	HXCAPSCR 3/4-10UNC2AX3"GR8 ZIN	
all	25	15U320	FLATWASHER(USS STD) 3/4" UNPLT	
all	26	15U340	LOCKWASH MEDIUM 3/4 ZINCPL	
all	27	15U321H	FLTWASH 3/4 HARD ASTM F436	
all	28	02 19023	DRIVE BASE ADJ. SCREW 13.5LG	
all	29	17W060	SPHERICALWASHER SET 1" M/F	

Drive Base Installation

6 Sheet

4244SR2

Table 19 Parts List—Drive Base (cont'd.)

Find the assembly for your machine and the letter shown in the "Item" column. The components for your machine will show this letter or the word "all" in the "Used In" column. The numbers shown in the "Item" column are those shown in the illustrations.				
Used In	**Item**	**Part Number**	**Description/Nomenclature**	**Comments**
all	30	15G250	HXNUT 1-8UNC2B SAE ZNC GR2	
all	31	15U393	FLTWASH 1" HARD ASTM F436	

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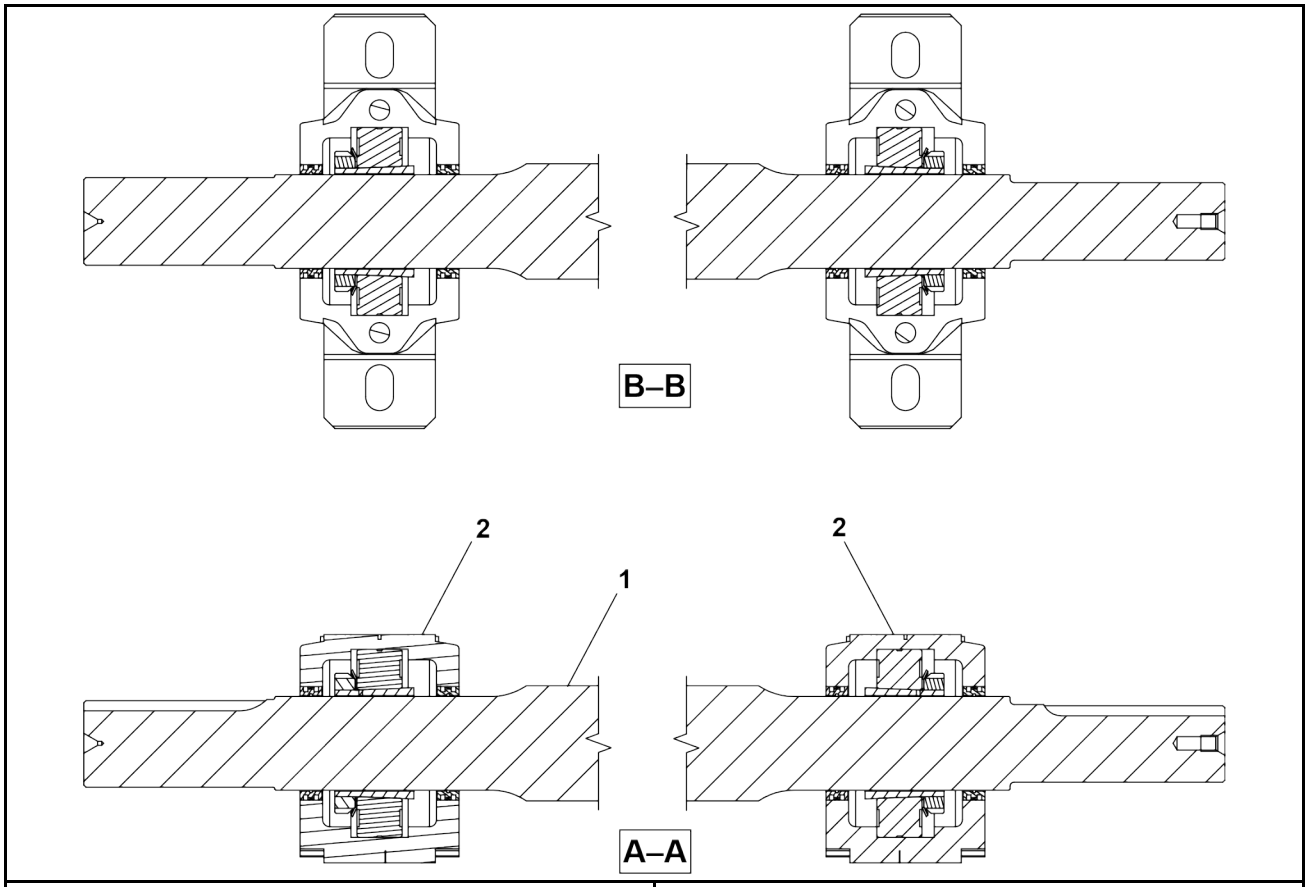
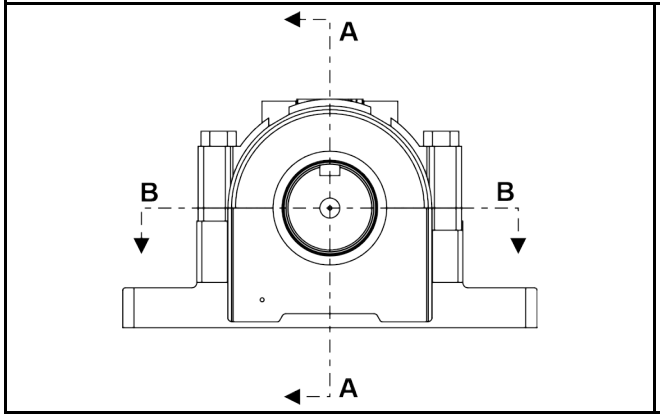
Jackshaft

2 Sheets

42044WR2, 42044SR2, 60044WR2, 60044SR2





Legend

A–A . . Detail view A–A
B–B . . Detail view B–B

Jackshaft

2 Sheets

42044WR2, 42044SR2, 60044WR2, 60044SR2

Table 20. Parts List—Jackshaft

Find the assembly for your machine and the letter shown in the "Item" column. The components for your machine will show this letter or the word "all" in the "Used In" column. The numbers shown in the "Item" column are those shown in the illustrations.				
Used In	**Item**	**Part Number**	**Description/Nomenclature**	**Comments**
Reference Assemblies				
	A	ABJ25006B	JACKSHAFT-PILLOW BLK BRG	2.75”SHAFT 6044WR2 EFFECTIVE 2015193 (5/5/2015) 6044SR2, 4233WR2,& 4244SR2 EFFECTIVE 2016163 (4/12/2016)
Components				
all	1	X2 18711M	6044WP JACKSHAFT: PILLOW BLOCK/SPHRCL 2.75 BORE	
all	2	56S22217A	SPHEROLBRG 22217EK/C3 SAF517 PILLOW BLK 3.346"ID	

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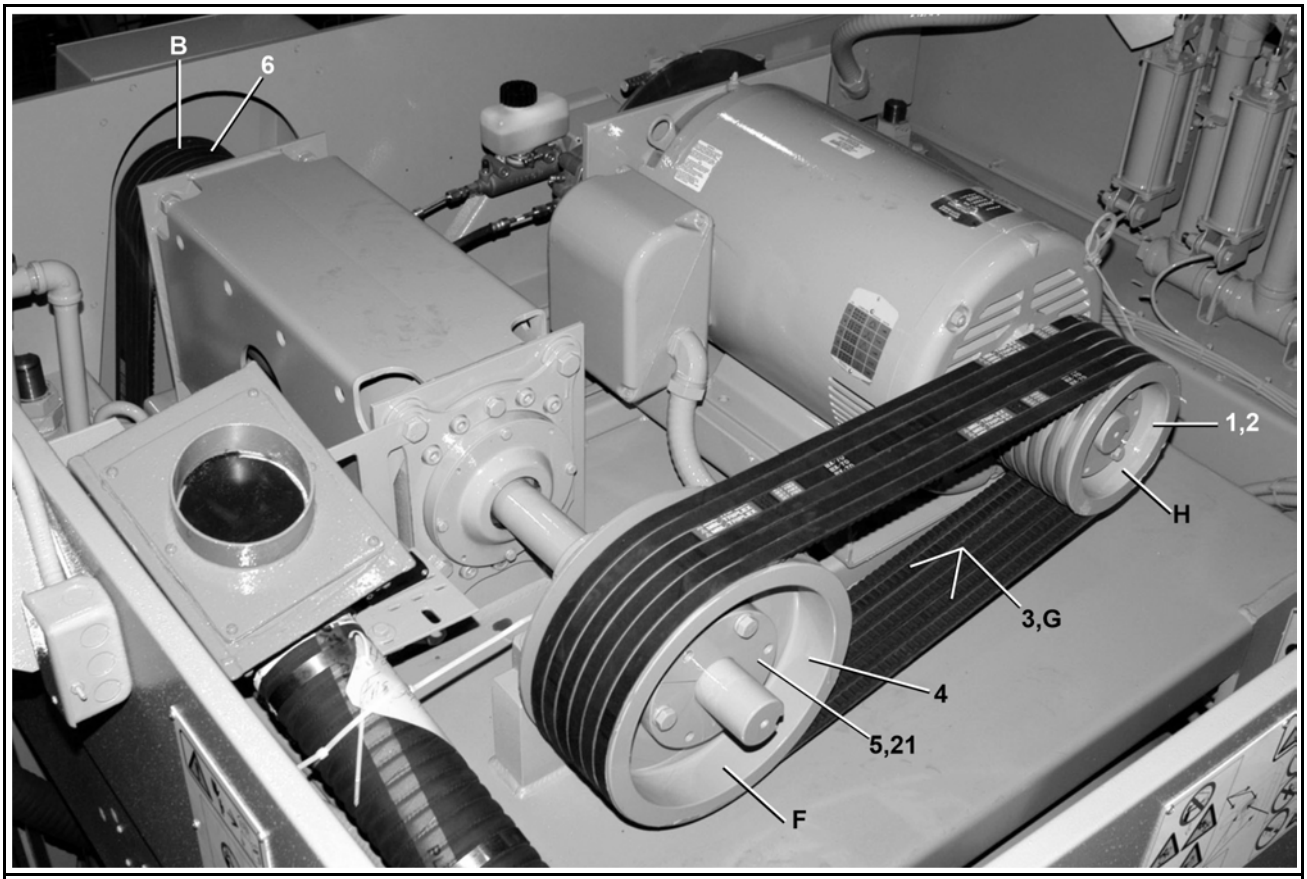
Drive Chart

5 Sheets

4244SP2 SM (Single Motor)



Legend

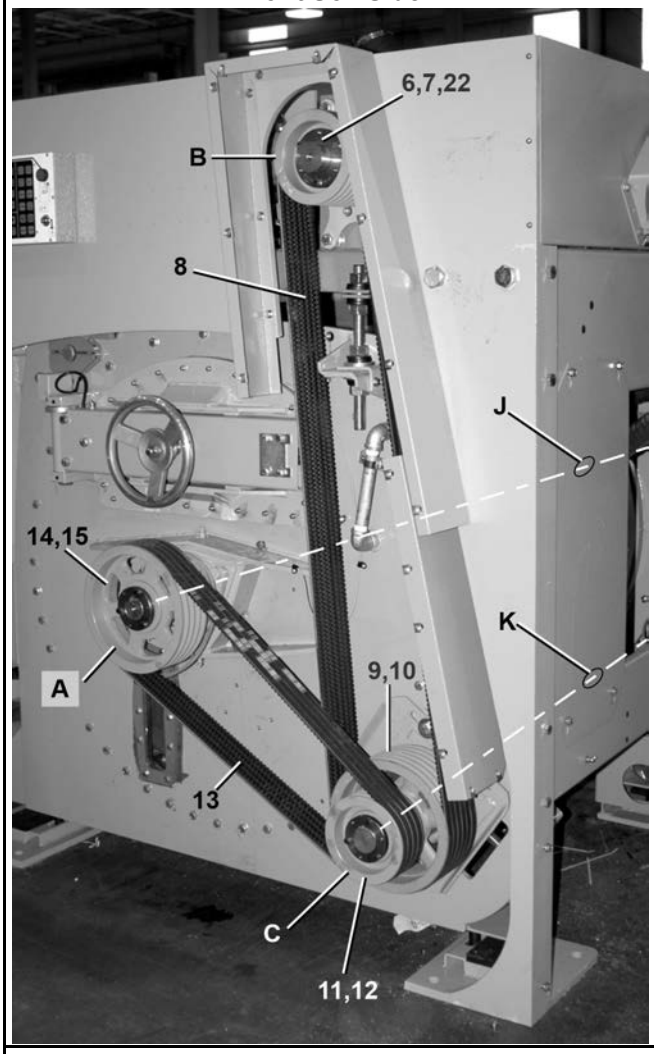
B . . . Front jackshaft pulley
F . . . Rear jackshaft pulley
G . . . 3 rib belt, uses 2
H . . . Motor pulley

Drive Chart — Prior to 04/12/2016

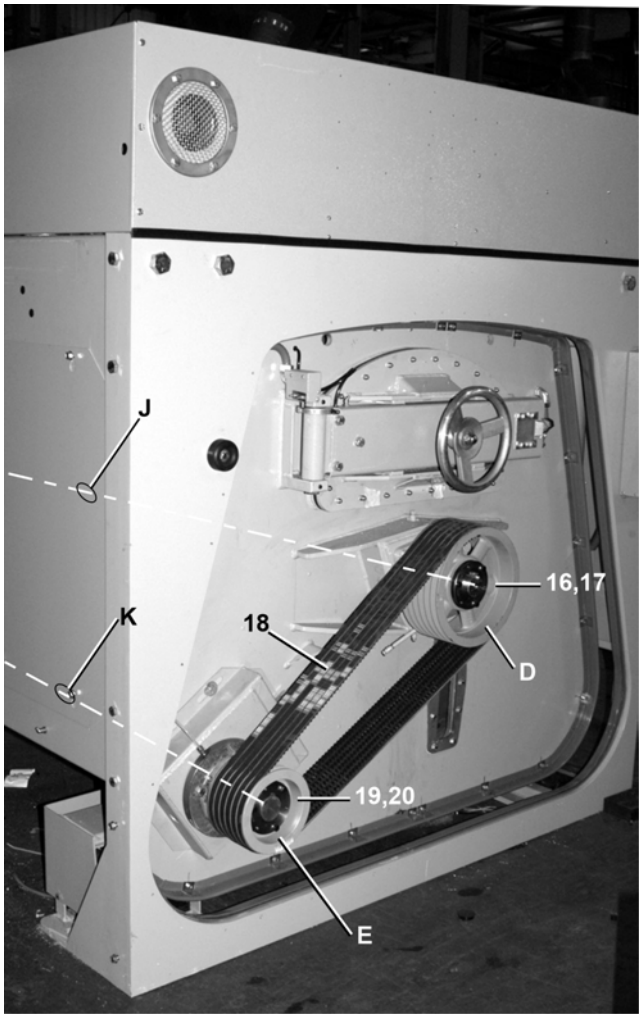
5 Sheets

4244SP2 SM (Single Motor)

Front Soil Side



Rear Clean Side



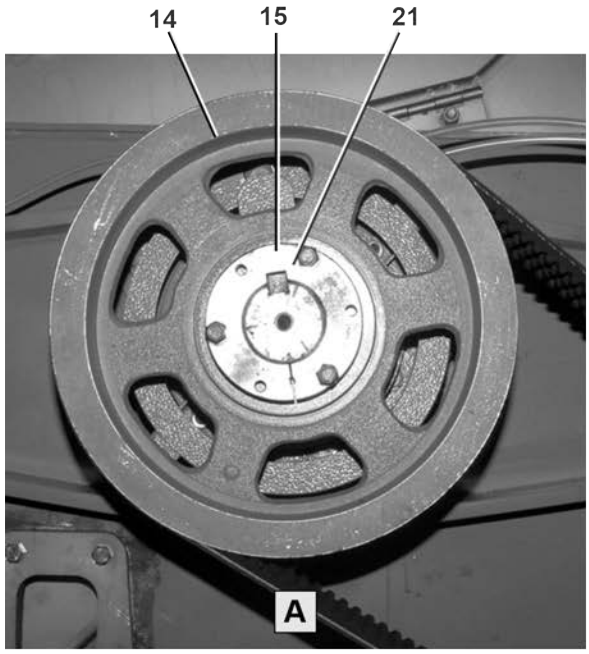
Legend

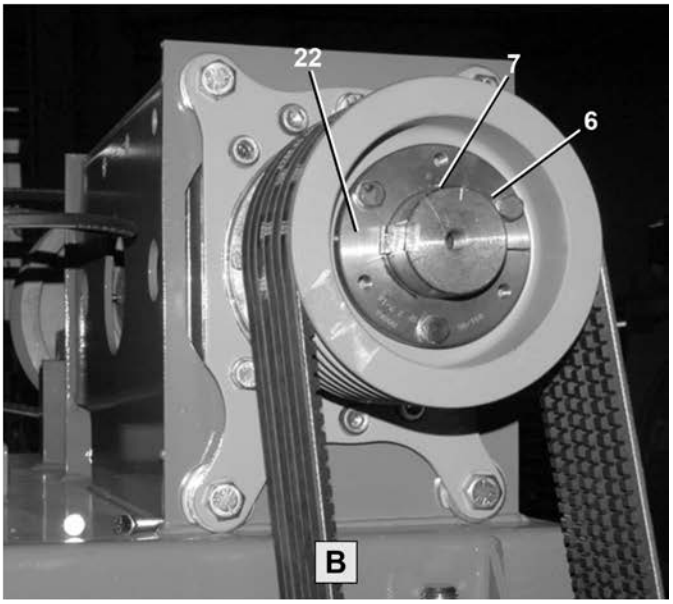
A . . . Front main pulley
B . . . Front jackshaft pulley
C . . . Front idler pulley
D . . . Rear main pulley
E . . . Rear idler pulley
J . . . Main shaft
K . . . Idler shaft

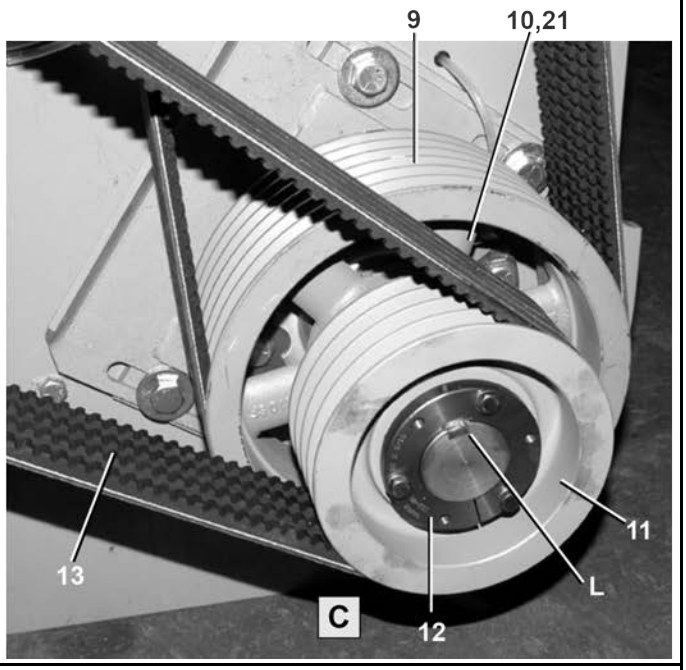
Drive Chart — Prior to 04/12/2016

5 Sheets

4244SP2 SM (Single Motor)







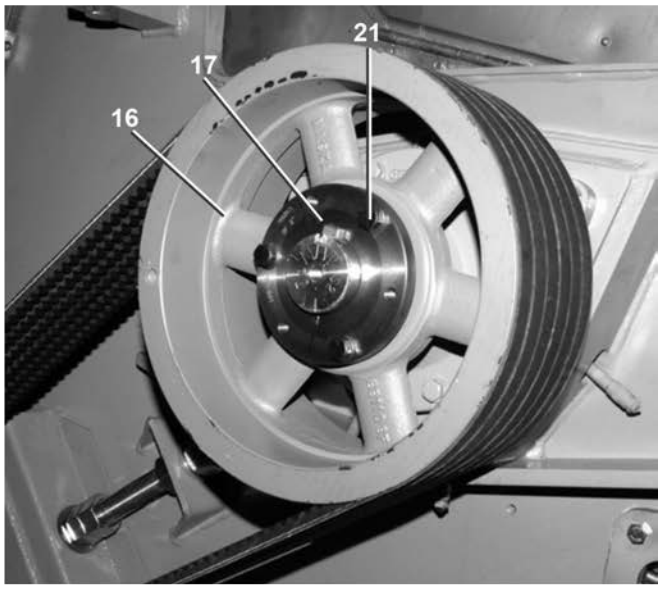
Legend

A . . . Front main pulley
B . . . Front jackshaft pulley
C . . . Front idler pulley
L . . . Key comes with bushing

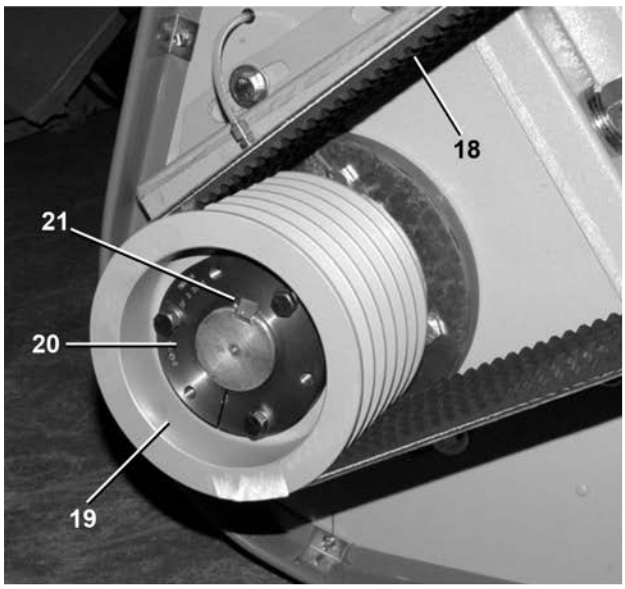
Drive Chart — Prior to 04/12/2016

5 Sheets

4244SP2 SM (Single Motor)



D



E

Legend

D . . . Rear main pulley
E . . . Rear idler pulley

Drive Chart — Prior to 04/12/2016

5 Sheets

4244SP2 SM (Single Motor)

Table 21. Parts List—Drive Chart

Find the assembly for your machine and the letter shown in the "Item" column. The components for your machine will show this letter or the word "all" in the "Used In" column. The numbers shown in the "Item" column are those shown in the illustrations.				
Used In	**Item**	**Part Number**	**Description/Nomenclature**	**Comments**
Reference Assemblies				
	A	D16 00461	DRIVECHART=4244SP SINGLE MOTOR	
Components				
all	1	56070B6SF	VPUL 6B7.0/A6.6 (SF) TYPE QD	
all	2	56Q1RSF	1+7/8" BUSH VPUL QD TYPE SF	
all	3	56VB070XB3	VBAND 3RBX70 EACH=1	3 RIB BELT, USES 2
all	4	5607B110	PULLEY 7B11.0 TYPE E	
all	5	56Q2AE	2.0" BUSHING VPUL QD TYPE "E"	
all	6	56070B6SF	VPUL 6B7.0/A6.6 (SF) TYPE QD	
all	7	56Q2HSF	2+7/16" BUSH VPUL QD TYPE SF	
all	8	56VB133X	VBELT BX133 RAWEDGE COG	
all	9	56110B6SF	VPUL 6B11.0/A10.6 (SF) TYPE QD	
all	10	56Q2DSF	2+3/16" BUSH VPUL QD TYPE SF	
all	11	56070B4SK	VPUL 4B7.0/A6.6 (SK) TYPE QD	
all	12	56Q2DSK	2+3/16" BUSH VPUL QD TYPE SK	
all	13	56VB083X	VBELT BX83 RAWEDGE COG	
all	14	56110B4SK	VPUL 4B11.0/A10.6 (SK) TYPE QD	
all	15	56Q2ASK	2.0" BUSHING VPUL QD TYPE "SK"	
all	16	56110B6SF	VPUL 6B11.0/A10.6 (SF) TYPE QD	
all	17	56Q2ASF	2.0" BUSHING,VPUL QD TYPE "SF"	
all	18	56VB083X	VBELT BX83 RAWEDGE COG	
all	19	56070B6SF	VPUL 6B7.0/A6.6 (SF) TYPE QD	
all	20	56Q2DSF	2+3/16" BUSH VPUL QD TYPE SF	
all	21	02 15794	KEY-1/2X2+1/2 4231-4244SGH	
all	22	02 175121	KEY=5/8SQ	

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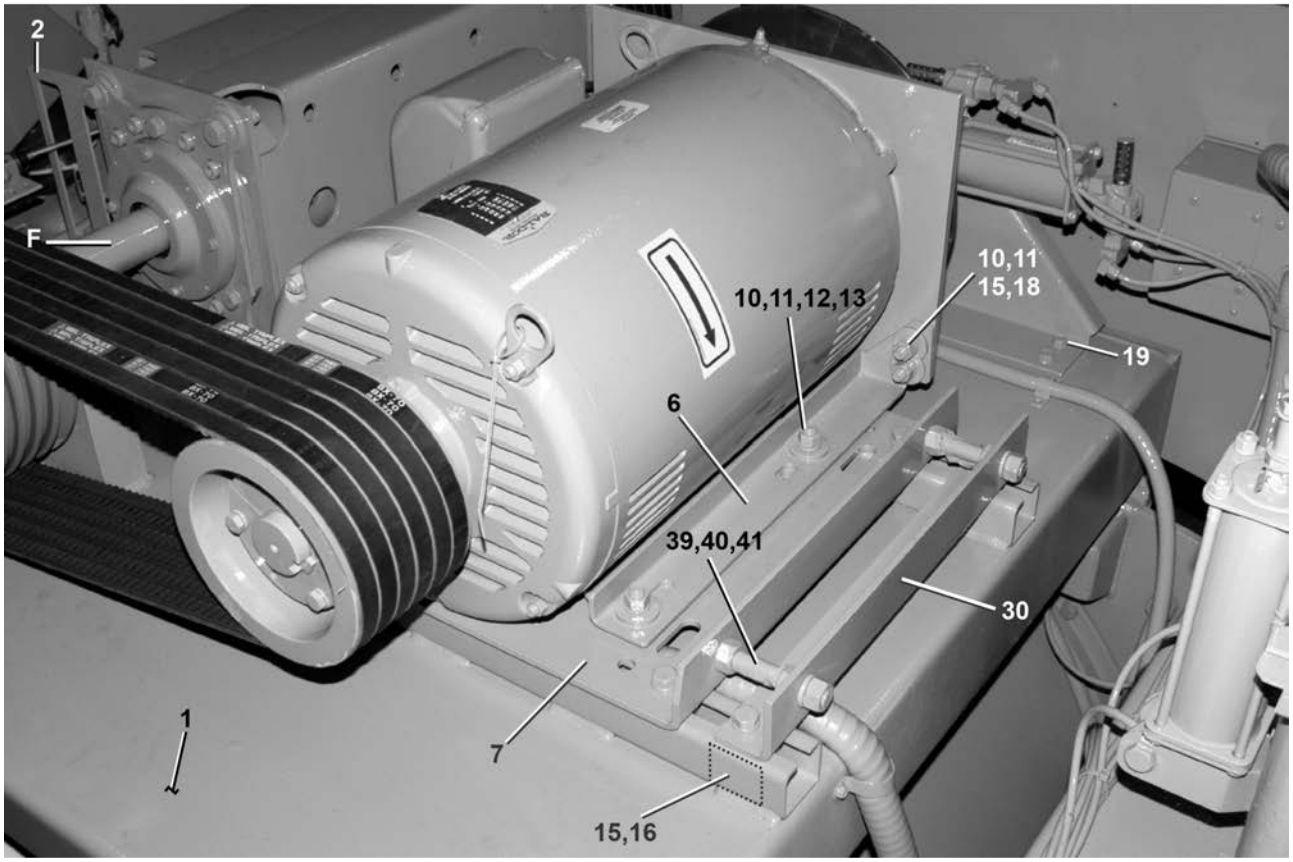
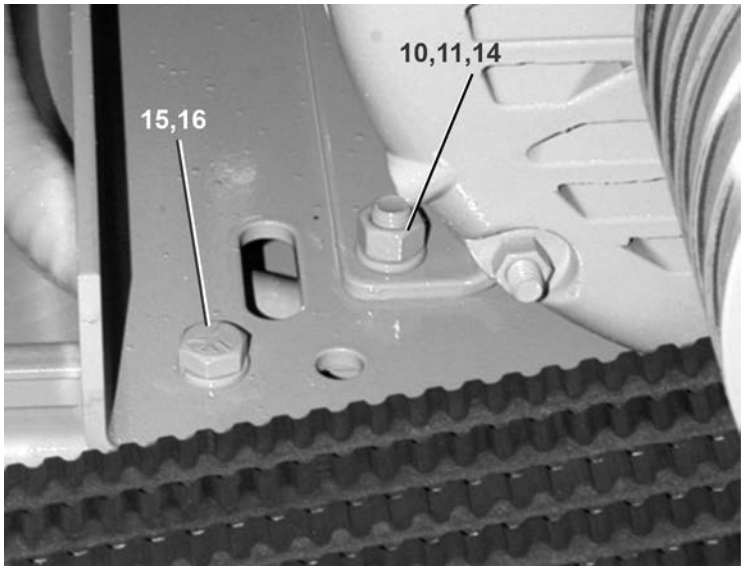
Drive Base

5 Sheets

4244SP2 SM (Single Motor)





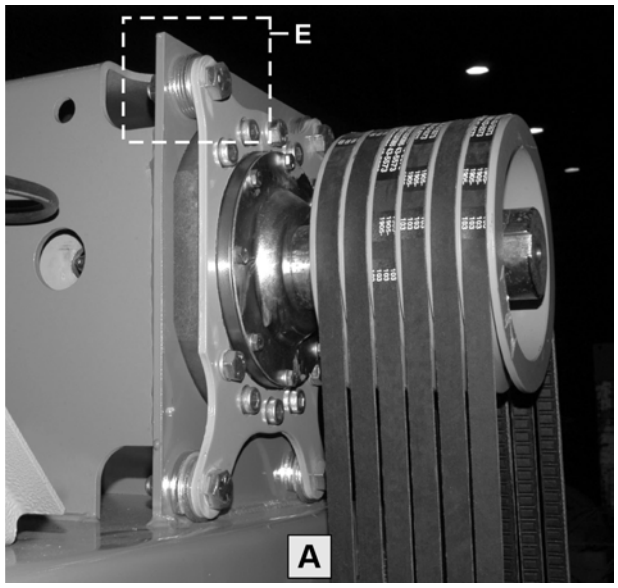
Legend

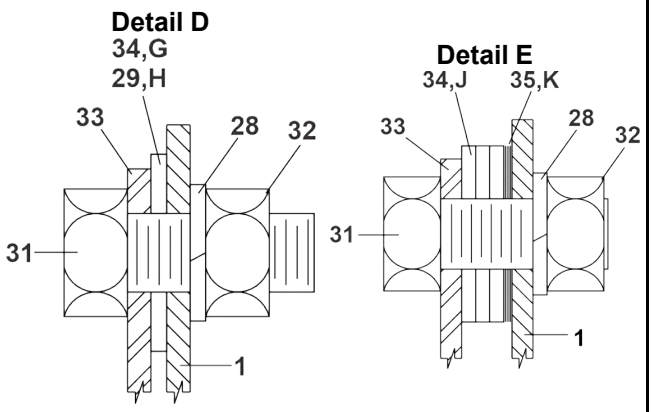
F . . . Jackshaft

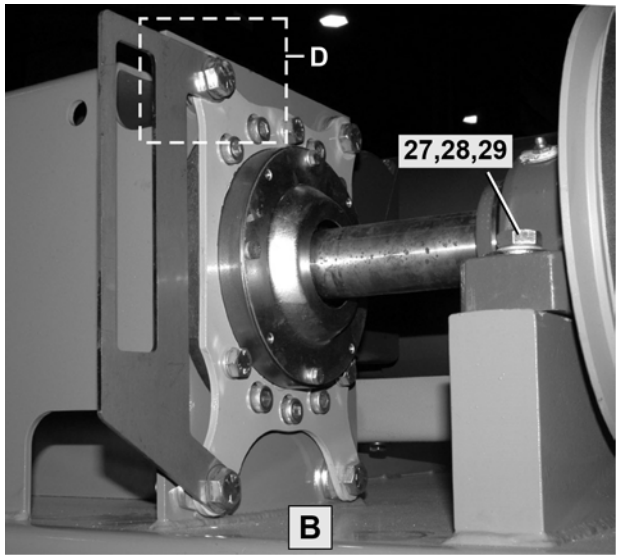
Drive Base — Prior to 04/12/16

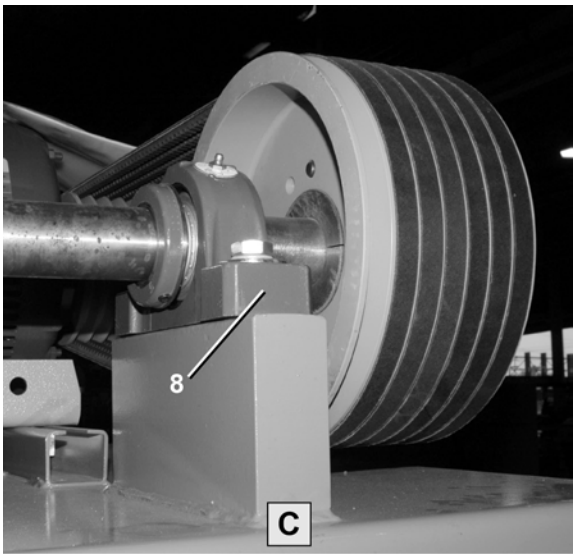
5 Sheets

4244SP2 SM (Single Motor)









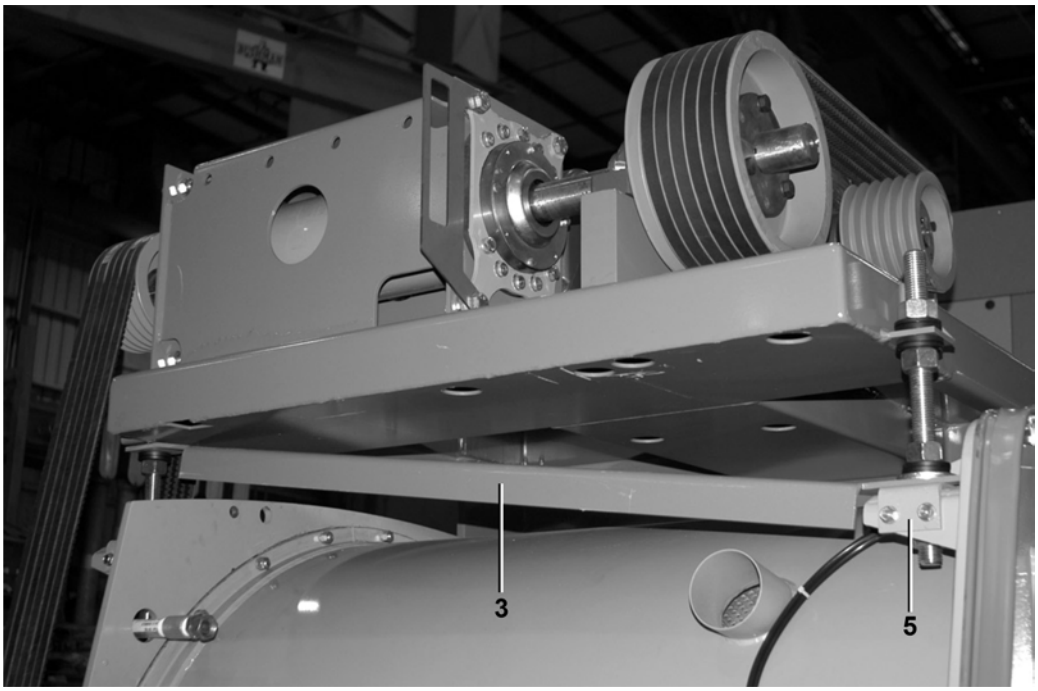
Legend

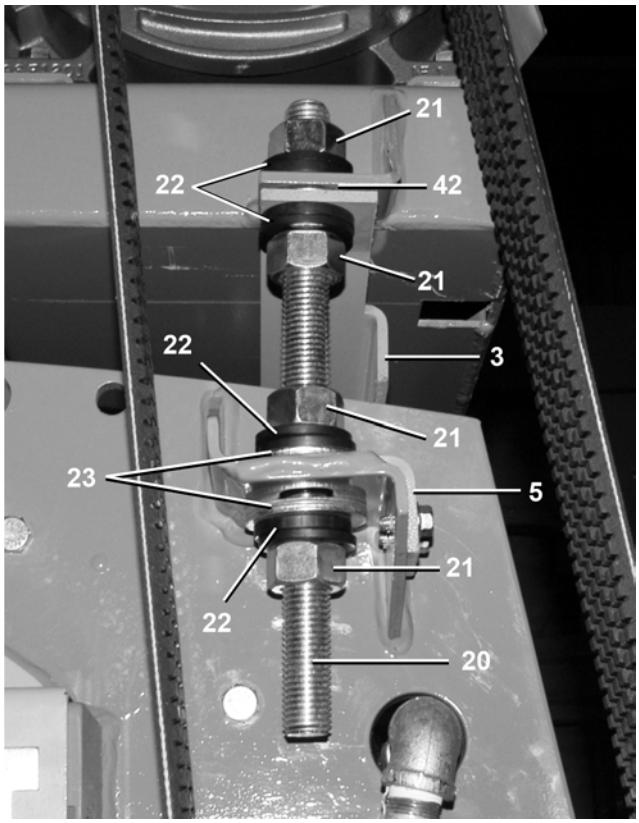
A . . . Front jackshaft
B . . . Rear jackshaft
C . . . Pillowback bearing
D . . . See detail D
E . . . See detail E
G . . . Upper
H . . . Lower
J . . . Uses 3
K . . . As required

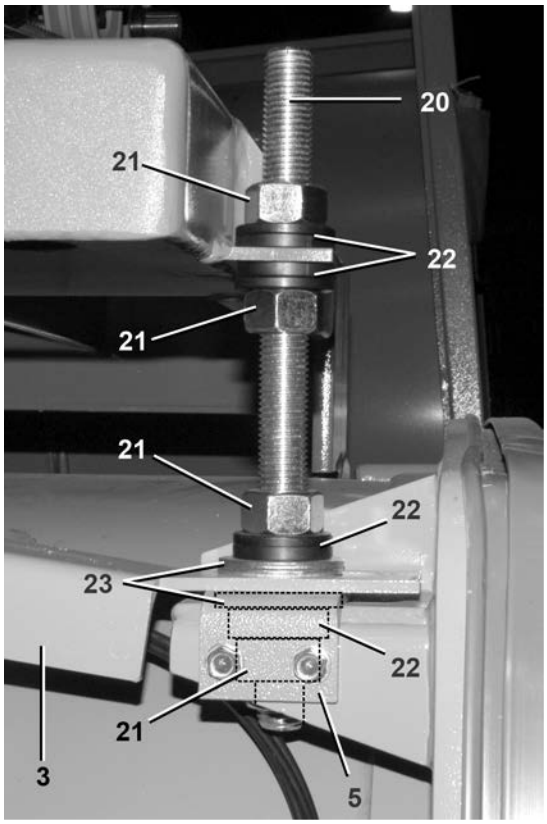
Drive Base — Prior to 04/12/16

5 Sheets

4244SP2 SM (Single Motor)







Drive Base — Prior to 04/12/16

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4244SP2 SM (Single Motor)

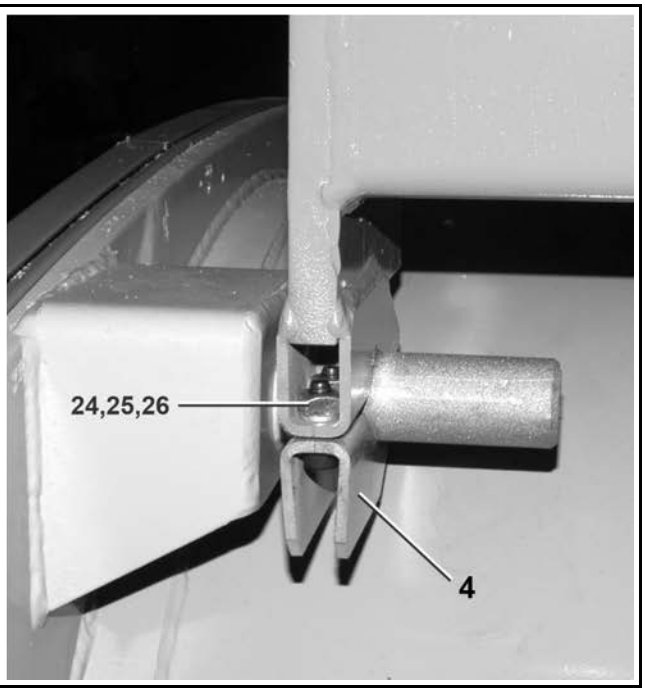

Table 22. Parts List—Drive Base

Find the assembly for your machine and the letter shown in the "Item" column. The components for your machine will show this letter or the word "all" in the "Used In" column. The numbers shown in the "Item" column are those shown in the illustrations.				
Used In	**Item**	**Part Number**	**Description/Nomenclature**	**Comments**
Reference Assemblies				
	A	SA 16 042S	DRIVE BASE 4244SG SGL MOTOR	
Components				
all	1	W2 16160A	WELD DRIVE BASE 42SG SGL MOTOR	
all	2	02 15605E	ACTUATOR=EXCURSION SW 42SG-SIG	
all	3	02 16088	SWAY BRACE=MOTOR MOUNT 4244	
all	4	X2 15604	CLAMP=MACH MTR MTG HINGEPIN	
all	5	02 15652	FORK=MOTOR MOUNT ADJ SCREW	
all	6	02 21859A	BRAKE TORQUE ARM 42 1 MOTOR	
all	7	05 20131E	MTRPLATE 6044SG 1 MOTOR	
all	8	54AF22210	PILLBLK BRG - BALDOR DODGE IMPERIAL 2"	
all	10	15U300	LOKWASHER REGULAR 1/2 ZINC PLT	
all	11	15G230	HXNUT 1/2-13UNC2B SAE ZINC GR2	
all	12	15U490	FLTWASH 1+1/2X17/32X1/4 ZINC	
all	13	15K180	HXCAPSCR 1/2-13UNCAX2 GR5 ZINC	
all	14	15K151	HXCAPSCR 1/2-13UNC2AX1.25 GR5	
all	15	15K173A	HXCAPSCR 1/2-13UNC2AX1.75 GR5	

Drive Base — Prior to 04/12/16

5 Sheets

4244SP2 SM (Single Motor)

Table 22 Parts List—Drive Base (cont'd.)

Find the assembly for your machine and the letter shown in the "Item" column. The components for your machine will show this letter or the word "all" in the "Used In" column. The numbers shown in the "Item" column are those shown in the illustrations.

Used In	Item	Part Number	Description/Nomenclature	Comments
all	16	02 19283	NUT=1/2-13UNCX1+1/2SQ SPEC	
all	17	15K162	HXCAPSCR 1/2-13UNC2AX1.5 GR5 P	
all	18	02 11603C	WASHER DBLR=1.5W/CUTOFF SIDE	
all	19	15P200	TRDCUT-F HXWASHD 3/8-16X3/4NIK	
all	20	02 19023	DRIVE BASE ADJ. SCREW 13.5LG	
all	21	15G250	HXNUT 1-8UNC2B SAE ZNC GR2	
all	22	17W060	SPHERICALWASHER SET 1" M/F	
all	23	15U390P	FLATWASHER(USS STD) 1" ZNC P	
all	24	15K108	SKCPSC 3/8-16 UNC 3X1 BLK	
all	25	15U255	LOCKWASHER MEDIUM 3/8 ZINCPL	
all	26	15G216	SQNUT 3/8-16UNC2B SAE ZINC GR2	
all	27	15K225	HEXCAPSCR 5/8-11X2+1/2	
all	28	15U315	LOKWASHER MEDIUM 5/8 ZINCPL	
all	29	02 11603A	WASHER DBLR=2" W/CUTOFF SIDE	
all	30	02 19577	ADJ ANGLE MOTOR	
all	31	15K221	HEXCAPSCR 5/8-11 UNC2X2GR5 ZIN	
all	32	15G238	HXNUT 5/8-11UNC2B SAE ZINC GR2	
all	33	02 19383	BEARHOUSE MT PLATE FRONT	
all	34	15U314	FLATWASHER(USS STD) 5/8" ZNC P	
all	35	15U355A	28GA ADJWASH=BRGHOUS ZINC PL	
all	36	54M025	HYDFIT 1/8"-90 ALEMITE 1613-B	
all	37	5SCC0CBE	NPT COUP 1/8 BRASS 125# 103A-A	
all	38	5N0C03AG42	NPT NIP 1/8X3 TBE GALSTL SK40	
all	39	15D125	HXTAPSCR 5/8-11X4-FLTHRD GR5	
all	40	15U315	LOKWASHER MEDIUM 5/8 ZINCPL	
all	41	15G238	HXNUT 5/8-11UNC2B SAE ZINC GR2	
all	42	15U393	FLTWASH 1" HARD ASTM F436	

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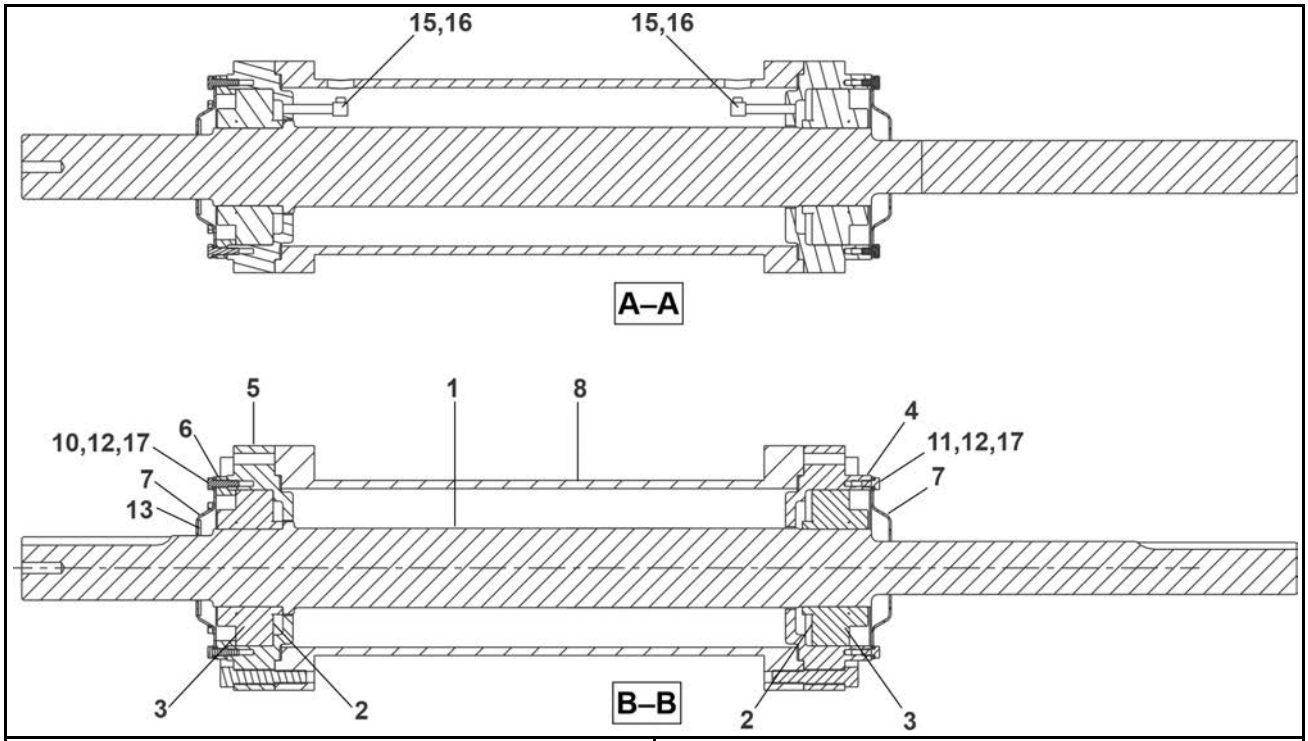
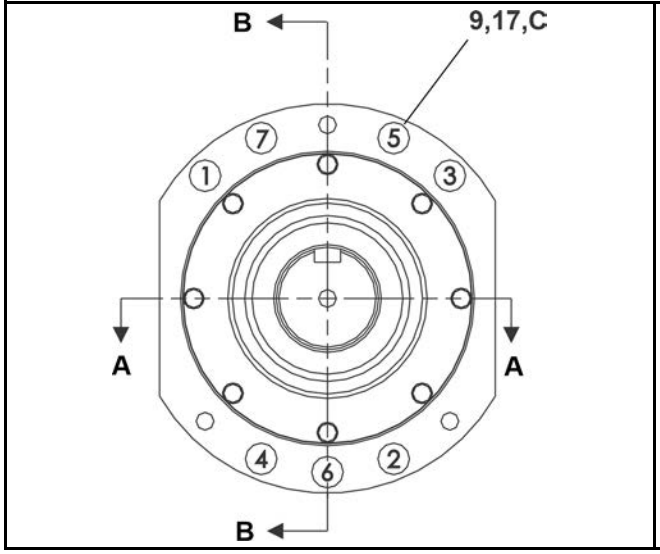
Jackshaft

2 Sheets

4244SP2 SM (Single Motor)





Legend

A–A . . Detail view A–A

B–B . . Detail view B–B

C . . . Insert all 1/2” fasteners hand tight, then torque in the sequence shown, front and back.

Jackshaft — Prior to 04/12/16

2 Sheets

4244SP2 SM (Single Motor)

Table 23. Parts List—Jackshaft

Find the assembly for your machine and the letter shown in the "Item" column. The components for your machine will show this letter or the word "all" in the "Used In" column. The numbers shown in the "Item" column are those shown in the illustrations.				
Used In	**Item**	**Part Number**	**Description/Nomenclature**	**Comments**
Reference Assemblies				
L	A	ABJ25006	JKSHFT 4244SG/WE 1 MOTOR SPHRCL	
Components				
all	1	X2 18711H	JACKSHAFT=6440SG SPHERICAL	
all	2	54A988	SKF BRNG #22217CCK/C3/W33	
all	3	54A989	SNW 17 X 2–15/16” ADAPTER	
all	4	X2 19381D	BRNG HOLDER=SPHRCL BRNG-REAR	
all	5	X2 19381C	BRNG HOLDER=SPHRCL BRNG-FRT	
all	6	X2 15702A	RETAINER-SPHRCL BRNG	
all	7	02 19384	COVER=BRG HOUSE FT+REAR	
all	8	X2 19378	BRGHSG SUP=TIMKENS MACHINED	
all	9	15K193	SOKCAPSCR 1/2-13X2.75GR8 HK	
all	10	15U180	LOCKWASHER MEDIUM 1/4 ZINCPL	
all	11	15K030	HEXCAPSCR 1/4-20UNC2X1/2 GR5 Z	
all	12	15K041	HXCAPSCR 1/4-2OUNC2AX1 GR 5 ZI	
all	13	02 19195	RING=GREASE SLNGR JKSHFT WHT	
all	15	51A001	ADAPTER 1/8 PT BRASS	
all	16	5SL0CBEC	NPTELB 90DEG STRT 1/8 BRASS125	
all	17	20C007G	THDLOCKSEAL LCT24231 RMUBL50CC	

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2.2 Disk Brake Maintenance

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NOTICE: "Remove power from the machine" means use the necessary safety procedure for your location. In the USA, this is the OSHA lockout/tagout (LOTO) procedure. More local requirements can also apply.

You can do these types of maintenance on the disk brake:

- do an inspection of the brake as specified in the maintenance schedule,
- replace the friction pads,
- do an overhaul on the calipers,
- replace the hydraulic fluid,
- adjust the connection between the brake cylinder and the air cylinder.

For the first four types of maintenance, you must remove air from (bleed) the hydraulic circuit.

Section 2.2.6 : Operation of Brake Systems, page 79 tells how to operate the disk brakes. You can use it in some of the types of maintenance in this procedure.

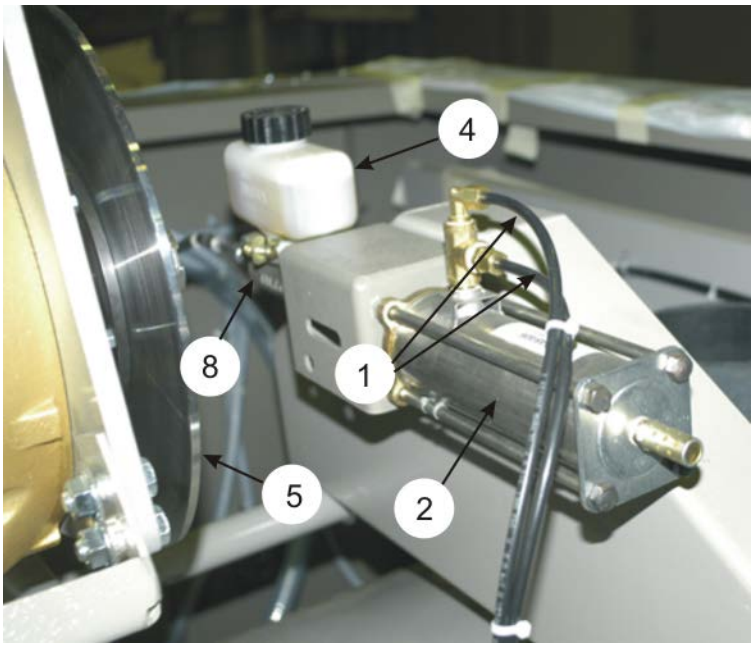
WARNING: **Risk of injury or death** — A machine in operation without safety guards is dangerous.

- ▶ You must be an approved maintenance technician.
- ▶ Use special caution when this instruction tells you to do work with electrical power on. Remove power from the machine for all other maintenance. Obey safety codes.
- ▶ Replace all guards and covers.

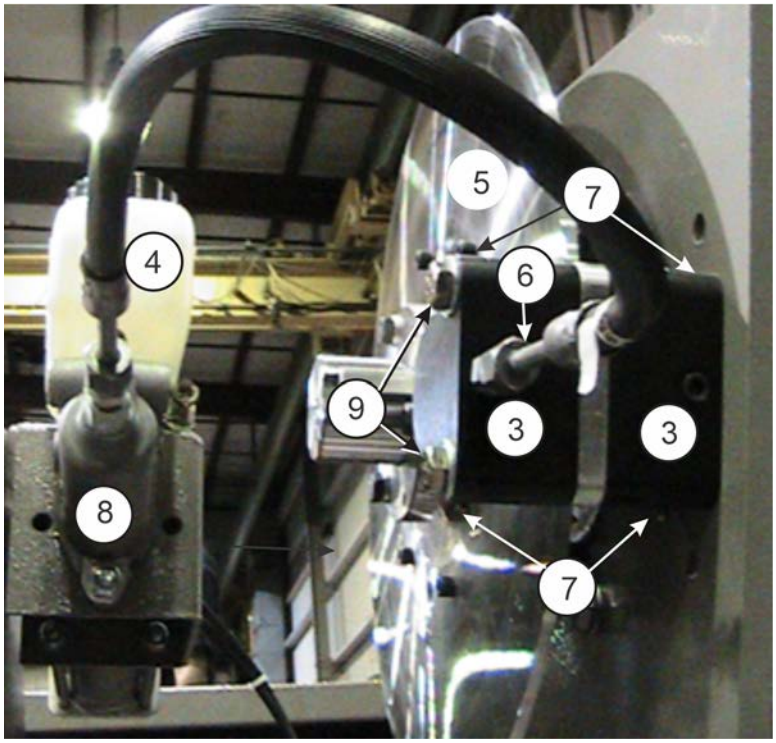
TIP: During parts of this procedure when you open up the calipers or hydraulic lines, put a cloth under the calipers to catch hydraulic fluid and parts that will fall. For safety, fully remove spilled hydraulic fluid after brake maintenance. This will help you easily identify leaks.

Figure 23. A typical hydraulic brake system

The air cylinder



The hydraulic cylinder and the caliper



Legend

1. Tubing for air
2. Air cylinder
3. Caliper body halves (Figure 24, page 72, item 2)
4. Hydraulic reservoir
5. Rotor disk
6. Hydraulic inlet
7. Valves to drain fluid and bleed the brake
8. Hydraulic cylinder
9. Bolts to attach the caliper (Figure 24, page 72, item 1)

2.2.1 The Inspection of the Brake

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NOTE: The brakes shown in this document can look different from your equipment.

NOTE: Do this inspection when the maintenance schedule tells it is necessary. Do this inspection after you replace friction pads or do a caliper overhaul.

1. Examine the fluid in the reservoir. Change the hydraulic fluid if it smells, has contamination, or has an unusual color. See Section 2.2.4 : How to Change Hydraulic Fluid and Remove (Bleed) Air from the Brake Circuit , page 73.

   NOTE: Brake fluid can become defective from heat in the brake system. Brake fluid absorbs water from air. Water in the brake system causes corrosion.

   If necessary, add new DOT 3 fluid to 0.25 inch (6.35 millimeters) from the top of the reservoir. Follow the precautions on the container.
2. Examine the rotor disk surface (Figure 23: A typical hydraulic brake system, page 69 , item 5). Replace the disk if it is worn or if it is not flat.
3. Examine the brake pads (Figure 24: The Caliper Components, page 72 , item 4). To do this, you will remove/replace the calipers and bleed the hydraulic system. See Section 2.2.3 : How to Do a Caliper Overhaul, page 72 and Section 2.2.4 : How to Change Hydraulic Fluid and Remove (Bleed) Air from the Brake Circuit , page 73.
   a. **Remove power from the machine (see above notice).**
   b. Remove the bolts (Figure 23, page 69, item 9) that attach the caliper halves (Figure 23, page 69, item 7).
   c. Remove the caliper halves.
   d. Replace the pads as told in Section 2.2.2 : How to Do a Friction Pad Replacement, page 71 if
      - the pads make an unusual noise when you apply the brake
      - if the rotor is worn or damaged
      - if the pad thickness is less than 1/16 inches (2 mm) (Figure 24, page 72, item 14) above the mounting screw (Figure 24, page 72, item 3). Always replace the two brake pads at the same time.
   e. Put the caliper halves in their positions on the brake assembly. Tighten the mounting bolts to 30 foot-pounds (41 Newton-meters).
   f. Bleed the hydraulic systems as told in Section 2.2.4 : How to Change Hydraulic Fluid and Remove (Bleed) Air from the Brake Circuit , page 73.
   g. Supply electrical power to the machine.
4. Examine the condition of all of the brake system.
   a. Make sure that brake mounting components are tightly installed.
   b. Make sure that fittings are tight. Make sure that there are no leaks.

2.2.2 How to Do a Friction Pad Replacement

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You must have the necessary replacement friction pads for your machine. Refer to the brake parts document in your machine manual. You will find part numbers for components or overhaul/repair kits. The overhaul/repair kit contains O-rings, pads, and other components.

1. **Remove power from the machine (see above notice).**
2. Remove the used fluid. See Section 2.2.4 : How to Change Hydraulic Fluid and Remove (Bleed) Air from the Brake Circuit , page 73.
3. Remove the two bolts that attach the caliper (Figure 23, page 69, item 9) and the two caliper halves (Figure 23, page 69, item 3) to get access to the friction pads. Do not disconnect the hydraulic line (Figure 23, page 69, item 6).
4. If there are leaks, see Section 2.2.3 : How to Do a Caliper Overhaul, page 72 before you continue.
5. Replace each friction pad:
   a. Remove the brass screw (Figure 24, page 72, item 3) that attaches the pad to the piston.
   b. Attach the new pad to the piston. Tighten the screw.
   c. Make sure that the screw head is fully in the recess in the pad.
6. Make sure that the connection o-rings are clean and in their positions (Figure 24, page 72, item 7).
7. Put the caliper halves in their positions on the brake assembly. Tighten the mounting bolts to 30 foot-pounds (41 Newton-meters).
8. Bleed the brake. See Section 2.2.4 : How to Change Hydraulic Fluid and Remove (Bleed) Air from the Brake Circuit , page 73.
9. Supply electrical power to the machine.

2.2.3 How to Do a Caliper Overhaul

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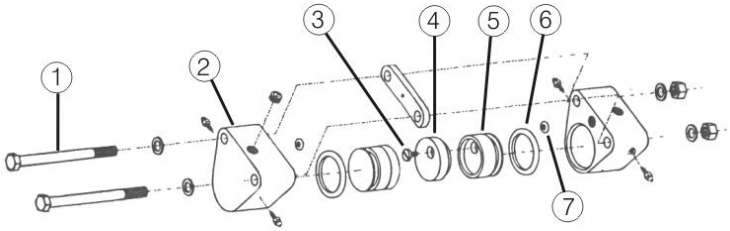
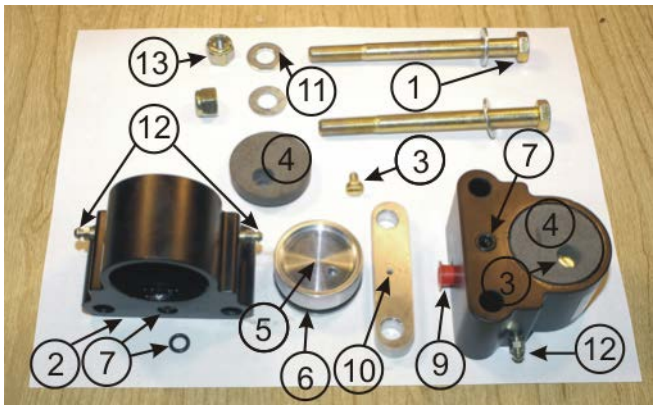
Figure 24. The Caliper Components

The Expanded View (Shows the Piston and the O-rings)



The Caliper and the Pad



Legend

1. The bolts to attach the caliper (Figure 23, page 69, item 9)
2. Caliper body halves (Figure 23, page 69, item 3)
3. Brass screw
4. Friction pad
5. Piston
6. The Piston O-ring
7. The connection O-ring and its position
8. Plug for the hydraulic inlet
9. A hydraulic inlet (connected on one caliper, a plug (item 8) on the other)
10. The hole in the spacer
11. Washer
12. One of the four valves to bleed the fluid
13. Nut
14. The pad thickness must be more than than 1/16 inches (2 mm) above item 3

Fittings for the Hydraulic Inlet

Look at the pad thickness above the top of the screw

TIP: Hydraulic fluid flows from one caliper to the other caliper. Fluid flows through the connection O-rings (Figure 24, page 72, item 7) and the hole in the spacer (Figure 24, page 72, item 10). When you disconnect the calipers, hydraulic fluid can flow from the hole at the connection O-rings. Air can get in the line. After you connect the calipers, you must bleed the system.

You must have the necessary kit for the overhaul of your machine. Refer to the brake parts document in your machine's manual.

1. **Remove power from the machine (see above notice).**
2. Get access to the caliper halves (see Section 2.2.2 : How to Do a Friction Pad Replacement, page 71).
3. Do an overhaul on each caliper:
   a. Remove and discard the connection O-rings (Figure 24, page 72, item 7) on the caliper bodies.
   b. Apply compressed air to the fitting for the hydraulic inlets (see Figure 24, page 72, item 8) to push the pistons out.
   c. Replace the piston O-rings (Figure 24, page 72, item 6).
   d. Put the pistons in the caliper body. Carefully tap the pistons with a wood or rubber hammer to install it.
   e. Replace the connection O-rings. (Figure 24, page 72, item 7)
   f. Replace the friction pads (see Section 2.2.2 : How to Do a Friction Pad Replacement, page 71).
4. Replace the caliper halves as specified in Section 2.2.2 : How to Do a Friction Pad Replacement, page 71.
5. Bleed the brake circuit (see Section 2.2.4 : How to Change Hydraulic Fluid and Remove (Bleed) Air from the Brake Circuit , page 73).
6. Supply electrical power to the machine.

2.2.4 How to Change Hydraulic Fluid and Remove (Bleed) Air from the Brake Circuit

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Risks and Precautions

WARNING: **Risk of injury** — Machine power must be on for these procedures.

- Stay away from operating mechanisms.

CAUTION: **Risk of injury and damage** — This procedure releases pressurized brake fluid.

- Keep brake fluid out of your eyes and mouth. Wear eye protection.
- Follow procedures carefully to prevent damage to the face of the disk or the pistons.

CAUTION: **Risk of malfunction —** Air in hydraulic fluid will compress. Compressed air in the brake line will cause brake malfunctions.

▶ Remove (bleed) air from the brake circuit before you operate the machine.

Requirements—These personnel and items are necessary for this procedure:

- Two technicians
- An 8-ounce container of new brake fluid
- Alternative procedures to remove air and used brake fluid:
  - a suction pump (faster procedure) (see Figure 25: Pumps Used to Remove Hydraulic Fluid Quickly, page 75)
  - with pressure in the hydraulic cylinder and gravity (see Figure 26: Typical Tools to Remove Air (Bleed) Brakes and Used Hydraulic Fluid, page 75)

TIP: The Vacula suction pump can do the work more quickly than by gravity and pressure in the hydraulic cylinder. It is also cleaner because all of the hydraulic fluid goes into the container supplied. It helps you not spill the hydraulic fluid.

- If you use a suction pump as shown in Figure 25, page 75, follow the manufacturer's instructions.
- If you use the tools as shown in Figure 26, page 75, follow the instructions in Section 2.2.4 : How to Change Hydraulic Fluid and Remove (Bleed) Air from the Brake Circuit , page 73.

Figure 25. Pumps Used to Remove Hydraulic Fluid Quickly

Alternative Pumps for Suction of Hydraulic Fluid

Legend

1. A manual suction pump
2. The Vacula suction pump uses compressed air and holds used hydraulic fluid.

Figure 26. Typical Tools to Remove Air (Bleed) Brakes and Used Hydraulic Fluid

These tools use gravity and pressure in the hydraulic cylinder

Legend

1. a clean 12 ounce container
2. a flexible hose to attach from the bleed valves to a container
3. a wrench for the bleed valves (Figure 24, page 72, item 12)
4. a suction device to remove brake fluid from the reservoir

1. Use the tools in Figure 26: Typical Tools to Remove Air (Bleed) Brakes and Used Hydraulic Fluid, page 75 to remove the used hydraulic fluid and clean the line. Do these steps:
   a. Use a suction tool (Figure 26, page 75, item 4) to remove the used fluid from the reservoir. Clean the contamination.
   b. Connect the tubing (Figure 26, page 75, item 2) and container (Figure 26, page 75, item 1) to the valve on the caliper (Figure 23, page 69, item 7).
   c. Open the valve.
   d. Add new fluid to flush out the lines.
   e. Apply/release the brake (see Section 2.2.6 : Operation of Brake Systems, page 79) approximately 5 to 15 times. This will flush the used fluid out of the lines.
   f. Close the valve.

   NOTE: These steps will cause air to go into the line.

2. Add new hydraulic fluid and remove (bleed) air from the brake circuit.

   NOTE: This procedure uses pressure in the hydraulic cylinder and the tools in Figure 26: Typical Tools to Remove Air (Bleed) Brakes and Used Hydraulic Fluid, page 75 .

   a. Fill the reservoir with new DOT 3 brake fluid. When you do the remaining steps, continue to add new fluid to the reservoir. Do not let the reservoir become more than half empty. You must make sure that the reservoir has fluid to prevent air flow into the system from the reservoir
   b. Apply electrical power to the machine. Release the brake.
   c. See the part of the machine reference manual that tells how to operate the outputs manually.
   d. Put a small quantity of new brake fluid (approximately inches (50 mm)) in the 12 ounce container (Figure 26, page 75, item 1).
   e. Do these steps for each bleed valve (Figure 23, page 69, item 1) . Two technicians are necessary. This will move the fluid in one direction and push air out of the line:
      - Attach a clean tube to the valve. Put the other end in the container (Figure 26, page 75, item 1) below the fluid.
      - Make sure that the reservoir is full of fluid.
      - Apply the brake (See Section 2.2.6 : Operation of Brake Systems, page 79).
      - Open the bleed valve. (Figure 24, page 72, item 12)
      - Look for air bubbles in the container when you push the air and fluid out through the tube.
      - Close the valve.
      - Release the brake.
      - Continue the steps above until no more air comes out of the line.

f. Add fluid to the top of the reservoir. Replace the cap.

g. Operate the brake many times. Make sure that it operates correctly.

2.2.5 How to Adjust the Connection between the Brake Cylinder and the Air Cylinder

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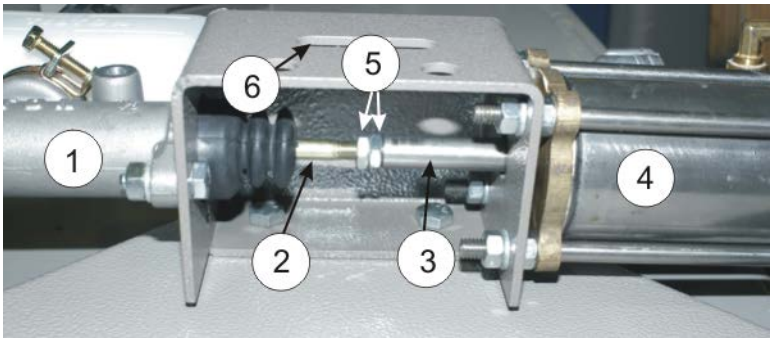
If you removed the brake cylinder or the air cylinder, you must adjust this connection.

Figure 27. The Connection between the Brake Cylinder and the Air Cylinder

A view of the brake rod and related components

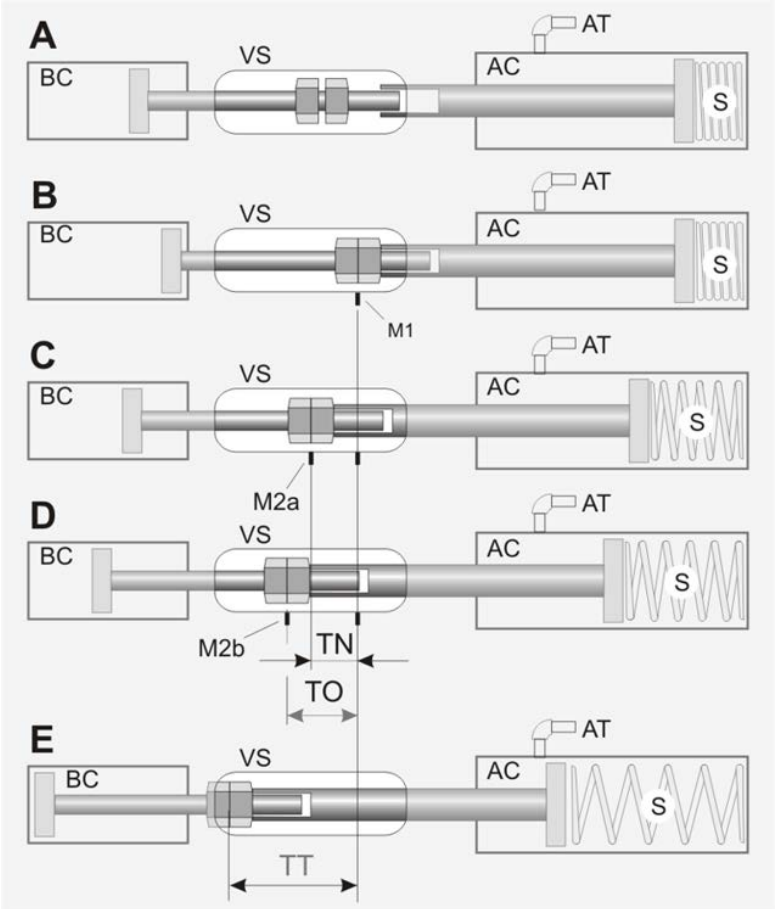


Legend

1. The brake cylinder
2. The rod for the brake cylinder
3. The rod for the air cylinder
4. The air cylinder
5. Two nuts to lock the rods together
6. The slot to see the nuts

Figure 28. The Adjustment between the Brake Rod and the Air Cylinder

Schematic Views of Different Conditions



Legend

AC . . Air cylinder (Figure 27, page 77, item 4)
BC . . Brake cylinder (Figure 27, page 77, item 1)
VS . . Slot to see the nuts (Figure 27, page 77, item 6)
A . . . Before travel adjustment—Rods not locked by nuts (Figure 27, page 77, item 5)
B . . . After travel adjustment—the brake released (See Section 2.2.6.2 : How to Release the Brake for Machines with a "Brake Release" Output, page 80)
C . . . Brake applied—NEW pads (See Section 2.2.6.1 : How to Apply the Brake for Machines with a "Break Release" Output, page 79)
D . . . Brake applied—OLD pads
E . . . This will occur if you apply the brake with the hydraulic line removed
TN . . Rod travel, new pads
TO . . Rod travel, very worn pads
TT . . Full travel with the hydraulic line removed
M1 . . First mark at the view slot—the brake released
M2a . . Second mark—one possible position—the brake applied
M2b . . Second mark—a different position—the brake applied
AT . . Air tubing (See Figure 23: A typical hydraulic brake system, page 69 , item1). Air releases the brake.
S . . . Spring applies the brake

1. Adjust for maximum rod travel.
   a. Operate the master switch to energize control power.
   b. Make sure that the air pressure that releases the brake (Figure 29: A Typical First and Second Brake on a Divided Cylinder Machine, page 80 , item 1) is 85 -100 PSI (5.95 - 07.0 kg/cm-cm).
   c. Make sure that the nuts that lock the rods together (Figure 27, page 77, item 5) are loose.
   d. Release the brake (see Section 2.2.6 : Operation of Brake Systems, page 79). Let the air cylinder rod fully retract into the air cylinder as shown in Figure 28, page 78, item A.
   e. Turn the brake rod into the air cylinder rod until the brake rod comes out of the brake cylinder fully. See Figure 28, page 78, item B.
   f. Lock the brake rod (Figure 27, page 77, item 2) to the air cylinder rod (Figure 27, page 77, item 3) with two nuts (Figure 27, page 77, item 5).
2. Make sure that the brake will continue to operate while the pads wear.
   a. Release the brake. On the view slot, put a mark at the position of the lock nuts. (Figure 28, page 78, item M1).
   b. Apply the brake. See Section 2.2.6 : Operation of Brake Systems, page 79.
   c. Put a mark at the position of the lock nuts when the brake is applied. This can be at position M2a, M2b, or between M2a and M2b. When the pads wear, this position will move.
   d. Make sure that the distance the rod moves when you apply the brake is 0.75 to 1.0 inches (19-25 mm). If the travel is more than this, the brake piston can hit the mechanical stop before the brake engages fully. This condition is shown in Figure 28, page 78, item E (dimension TT).

2.2.6 Operation of Brake Systems

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Look at the electrical schematics of your machine to find how your brake is controlled. Some machines release the brake when you close the door. Some machines have a control relay to release or apply the brake.

2.2.6.1 How to Apply the Brake for Machines with a "Break Release" Output

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1. Turn the "brake release" control output off to de-energize the air valve to remove air pressure to the air cylinder (Figure 23: A typical hydraulic brake system, page 69 , item 1).
2. With no air pressure, a spring in the air cylinder will apply force to the hydraulic cylinder (Figure 23: A typical hydraulic brake system, page 69 , item 8). This will apply pressure to the brake pads (Figure 24: The Caliper Components, page 72 , item 4) against the rotor disk (Figure 23: A typical hydraulic brake system, page 69 , item 5). (Figure 28: The Adjustment between the Brake Rod and the Air Cylinder, page 78 , item C,D)

NOTE: If electrical power or compressed air is missing, hydraulic pressure will apply the brake.

2.2.6.2 How to Release the Brake for Machines with a "Brake Release" Output

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1. Turn the control output called "brake release" on to energize the air cylinder valve.
2. Air pressure compresses the spring and releases the brake. (Figure 28: The Adjustment between the Brake Rod and the Air Cylinder, page 78 , item B)

2.2.6.3 How to Apply and then Release the Brake Quickly

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There are two air tubes at (Figure 23: A typical hydraulic brake system, page 69 , item 1). One supplies compressed air from an air valve. The other sends this compressed air to a pressure switch. If you remove one of the two tubes when compressed air is there, you will apply the brake.

1. Disconnect the air tubing (Figure 23: A typical hydraulic brake system, page 69 , item 1).
2. Turn the "brake release" output on. The air valve will supply compressed air to one of the tubes. (Figure 23: A typical hydraulic brake system, page 69 , item 1).
3. Quickly move one of the compressed air tubes (Figure 23: A typical hydraulic brake system, page 69 , item 1) on and off the air cylinder.
4. After you complete this procedure, connect the air tubing.

2.2.6.4 How the Brake Operates on Divided Cylinder Machines

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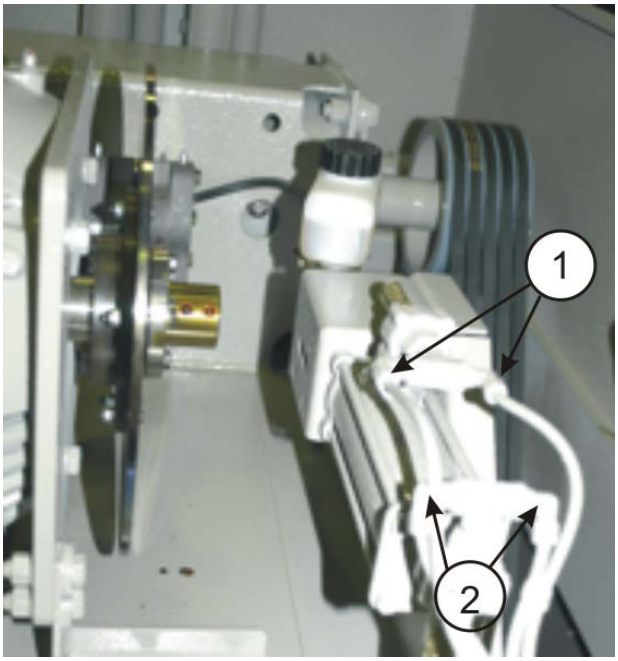
Figure 29. A Typical First and Second Brake on a Divided Cylinder Machine

Two pairs of air tubing connect to different ends of the air cylinder.



Legend

1. Tubing for air that releases the first brake (85 -100 PSI) (5.95 - 07.0 kg/cm-cm)
2. Tubing for air that applies the second brake (10 – 12 PSI) (0.7-0.84 kg/cm-cm)

- On divided cylinder machines, two pair of air tubes connect to different ends of the air cylinder.
- When the cylinder turns, air pressure at Figure 29: A Typical First and Second Brake on a Divided Cylinder Machine, page 80 , item 1 compresses the spring and releases the brake.
- When you operate the stop control, air pressure at 1 is removed. Then the spring in the air cylinder applies the brake.
- If you open the door, the 2nd brake is applied. Then the air pressure at Figure 29: A Typical First and Second Brake on a Divided Cylinder Machine, page 80 , item 2 and the spring apply the brake.

2.2.6.5 The Second Brake

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If your machine has a second brake which uses air pressure and spring pressure, it will have a pressure regulator. Make sure that you adjust the air pressure of the second brake (Figure 29: A Typical First and Second Brake on a Divided Cylinder Machine, page 80 , item 2) to 10 – 12 PSI (0.7-0.84 kg/cm-cm).

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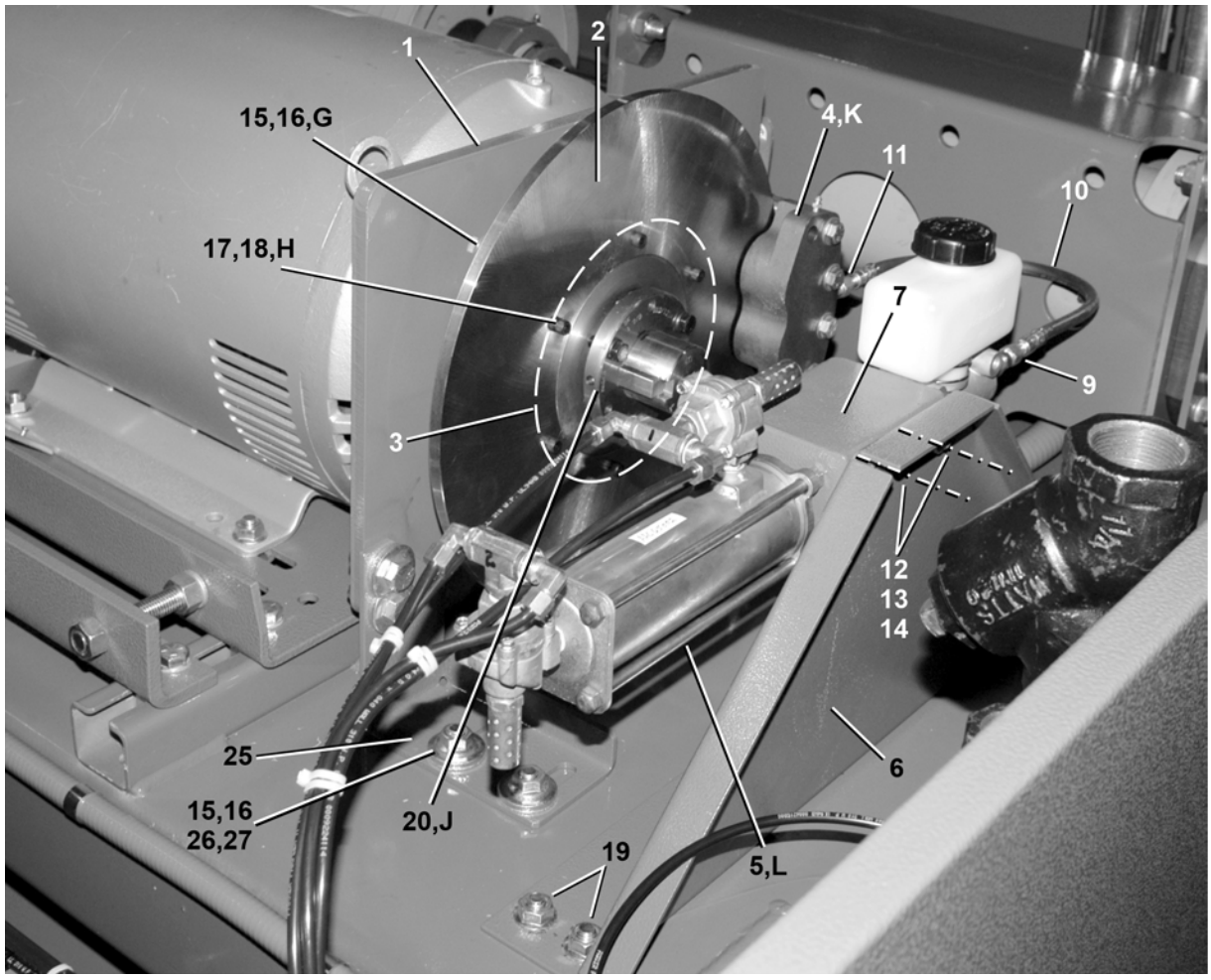
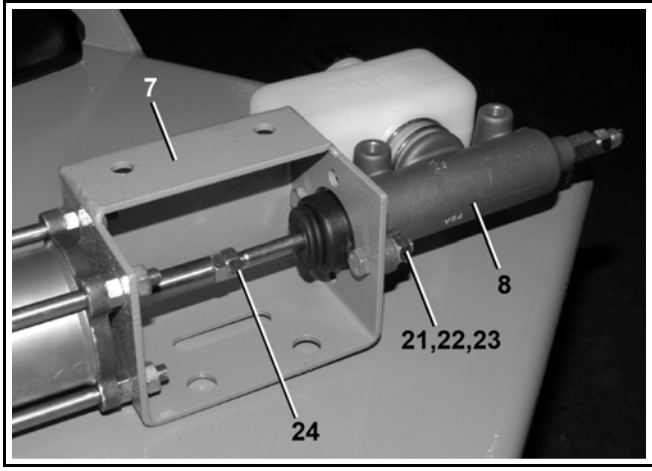
Brake Assembly

3 Sheets

4244WP2/WR2, 4244SP2/SR2





Legend

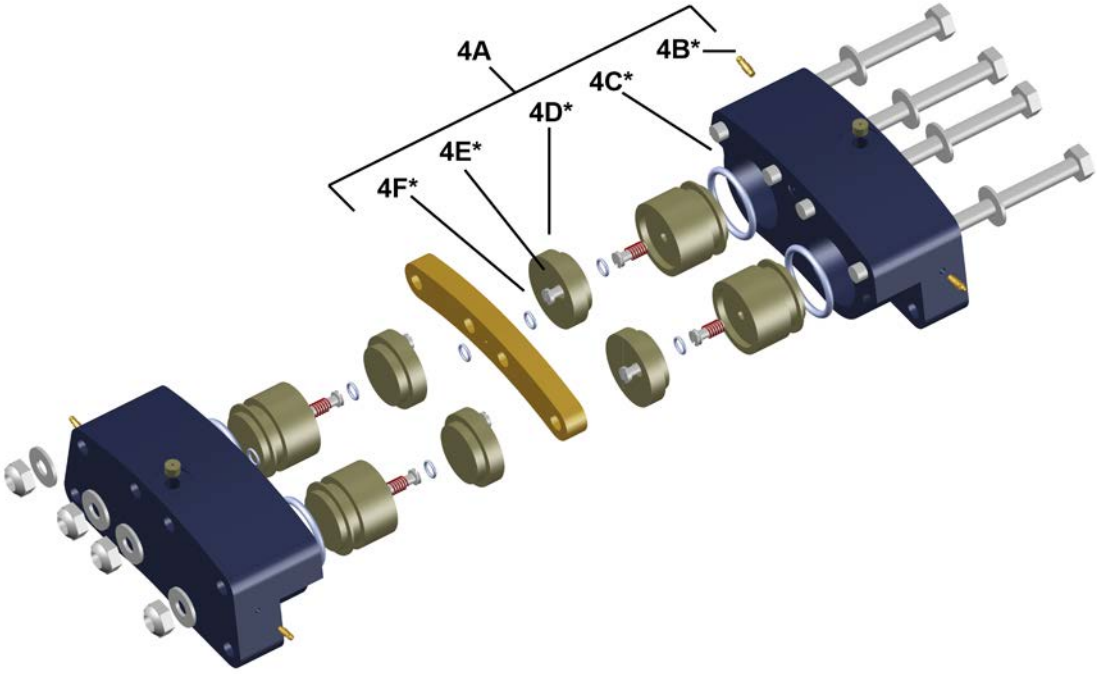
G . . . 4 places
H . . . 6 places
J . . . Bushing includes hardware
K . . . See figure 1
L . . . See BPWVUP01

Brake Assembly

3 Sheets

4244WP2/WR2, 4244SP2/SR2

Figure 30. Exploded view of the caliper and repair kit components



Legend

M. . .* — 2 per kit

Table 24. Parts List—Brake Assembly

Find the assembly for your machine and the letter shown in the "Item" column. The components for your machine will show this letter or the word "all" in the "Used In" column. The numbers shown in the "Item" column are those shown in the illustrations.				
Used In	**Item**	**Part Number**	**Description/Nomenclature**	**Comments**
Reference Assemblies				
	A	GBR42002	DISC BRAKE 4244SP2 SM	4244WP2/WR2, 4244SP2 /SR2 INSTALLATION PARTS-REFERENCE NUMBER
	B	ABR42002	DISC BRAKE ASSY 4244SP2 SM	ASSEMBLY
Components				
A	1	X2 21858	MACH=BRK CALPR MNT PLT,4840	
A	2	X2 21866	MACH=CALIPER DISK, 4840F	
A	3	X2 21867	MACH=CALIPER DISK HUB,4840F	
A	4	54KC7976	CALIPER HYD D/A 3/8IN RETRACT.H200DLRG	CALIPER
	4A	54KC7964RK	54KC7964 REPAIR KIT	REPAIR KIT
	4B	54KC7964R2	BLEEDER SCREW-W. C. BRANHAM #4000-1049	PART OF KIT — 4A
	4C	54KC7964R1	ORING EPR #220 W. C. BRANHAM #4000-1059	PART OF KIT — 4A

Brake Assembly

3 Sheets

4244WP2/WR2, 4244SP2/SR2

Table 24 Parts List—Brake Assembly (cont'd.)

Find the assembly for your machine and the letter shown in the "Item" column. The components for your machine will show this letter or the word "all" in the "Used In" column. The numbers shown in the "Item" column are those shown in the illustrations.

Used In	Item	Part Number	Description/Nomenclature	Comments
	4D	54KC7963R1	PUCK/FRICTION PAD=W. C. BRANHAM #4000-1052	PART OF KIT — 4A
	4E	54KC7963R2	PANHD SCREW - W. C. BRANHAM #4000-1118	PART OF KIT — 4A
	4F	54KC7963R4	ORING,EPR#010 W. C. BRANHAM #4000-1002	PART OF KIT — 4A
B	5	AAC65002	AIRCYL BRAKE SINGLE MOTOR	PART OF B, SEE BPWVUP01
B	6	02 21650	MASTER CYL SUPP BRKT	PART OF B
B	7	W3 65238	*WLMT=MASTER BRAKE CYL BRKT	PART OF B
B	8	54KMC1125U	MASTER CYL = WILWOOD # 260-3380	PART OF B
B	9	52XY0ER004	STRADTUN3/16MJX1/8FP#2405-3-2	PART OF B
B	10	54KC7961BG	BRAKE HOSE=1/8"X18"OAL # 50612	PART OF B
B	10B	54KC7961BSEAL	SEAL WASHER CONICAL,BRAKE HOSE	PART OF B
B	11	52AY0ER003	STR.1/4"MJICX1/8"MP#2404-4-2	PART OF B
B	12	15K095	HXCPSCR 3/8-16UNC2AX1 GR5 ZINC	PART OF B
B	13	15U255	LOCKWASHER MEDIUM 3/8 ZINCPL	PART OF B
B	14	15G205	HXNUT 3/8-16UNC2B ZINC GR2	PART OF B
all	15	15K162	HXCAPSCR 1/2-13UNC2AX1.5 GR5 P	
all	16	15U300	LOKWASHER REGULAR 1/2 ZINC PLT	
all	17	15K041E	SKCPSCR 1/4-20X1+1/4"BLK	
all	18	15G166A	HXLOKNUT NYL1/4-20 UNC2A STL/Z	
all	19	15P200	TRDCUT-F HXWASHD 3/8-16X3/4NIK	
all	20	56Q1RSK	1+7/8" BUSH VPUL QD TYPE SK	
all	21	15K065	HEXCAPSCR 5/16-18UNC2AX1 GR5 Z	
all	22	15U210	LOKWASHER MEDIUM 5/16 ZINCPL	
all	23	15G185	HXNUT 5/16-18UNC2B SAE ZINC GR	

3 Bearing Assemblies

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3.1 Main Bearing and Seal Replacement for Divided Cylinder Machines

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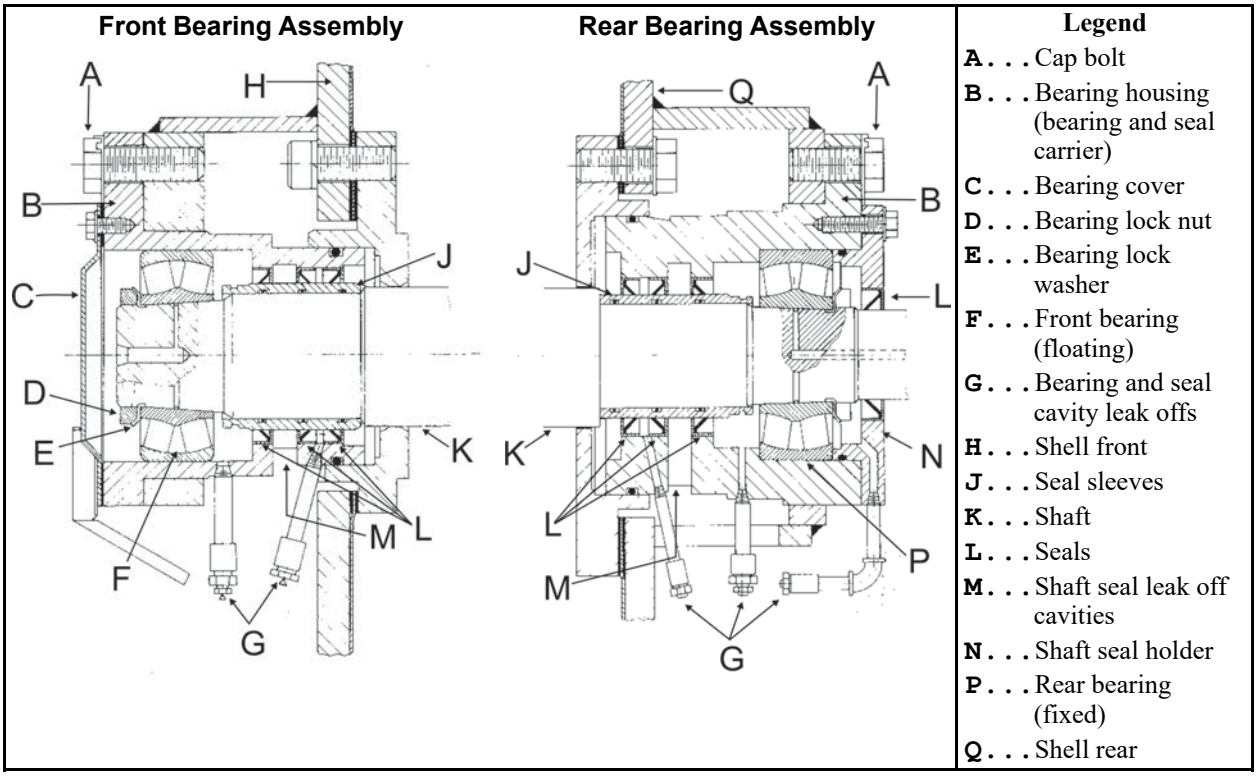
This section applies to the front and rear cylinder shaft bearings of all divided cylinder machines (Rapid Load, Staph Guard®, dye machines, etc.). It does not apply to jackshaft bearings, idler shaft bearings or bearings on open pocket machines.

The bearings covered by this section are double row, spherical roller, self aligning bearings; Koya, SKF, FMC, Torrington or equal. Referring to Figure 31, page 86, the rear (clean side on Staph Guard® models) bearing is firmly held in the bearing housing (bearing and seal carrier) by the shaft seal holder, preventing axial movement. The front (soil side on Staph Guard® models) bearing is free to move axially in the bearing housing to accommodate thermal expansion of the shaft during operation and is thus the “floating” bearing. Both bearings are held in place on the tapered portion of the shaft by a bearing lock washer and lock nut.

The front and rear bearings are each protected from contamination from wash water by three spring loaded, lip type seals and a shaft seal leak off cavity (that carries off any water that leaks past the main water seals) as shown in Figure 31, page 86.

Figure 31. Cross Section View of Front and Rear Bearing Assemblies (Bearing Assembly for 60" and 72" WED Shown. Others similar.)



Access to the bearings and seals for lubrication is provided by the various grease passages. Excess lubricant is excreted through the bearing and seal cavity leak offs as shown on Figure 31, page 86. The bearings and seals must be lubricated regularly and the leak off cavities flushed out periodically through the plugged cleanout connections, in strict accordance with the preventive maintenance procedures elsewhere.

If bearing replacement becomes necessary due to wear, it is essential that the bearings **and seals** are replaced. Seal replacement requires removal of the bearing housing and seal sleeve. (In rare instances where the seals are known to be in good condition, it is not necessary to remove the bearing housing, seals or seal sleeve when a bearing is replaced.) **A pulling fixture is required to remove the bearing housing. A set of guide rods, a seal sleeve setting fixture and a bearing setting fixture are required for reinstallation of the housing.** These tools are available for rental or purchase from the Milnor® factory and are pictured elsewhere in this section. Contact the factory two weeks in advance of repairs, when ordering these tools.

This maintenance is performed in the following order:

1. Remove old bearing(s). When removing both bearings, remove the front (soil side) bearing first.
2. Remove bearing housings, seal sleeves, and seals.
3. If both bearings were removed, install the bearing housing, seal sleeve, seals, and new bearing on the rear (clean side).
4. Install the bearing housing, seal sleeve, seals, and new bearing on the front (soil side).

5. Tighten bearing(s).

See the Main Bearing Assembly drawing for your machine for bearing component part numbers.

3.1.1 Removing the Bearing (Front or Rear)

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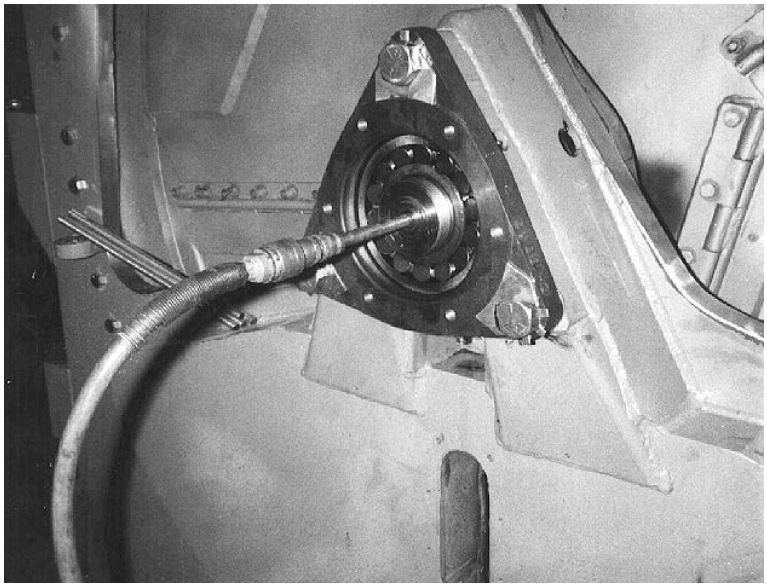
1. Loosen, then remove the main drive belts and cylinder shaft pulley (if applicable) by lowering the drive base with the jacking bolts. Do not attempt to pry belts off with a pry bar or by rolling the sheave. Remove the bearing cover (or shaft seal holder) to expose the bearing.
2. Bend back the locking tang on the bearing lock washer then remove the lock nut and lock washer.
3. The center tapped hole in the shaft end is an oil passage through which oil may be forced between the tapered shaft and the bearing inner race. Install a pipe fitting into this tapped hole as shown in Figure 32: Connection From Hydraulic Pump to Assist in Bearing Removal, page 87 . Using a “Porta Power” or similar hand operated hydraulic pump, force fluid into the passage. Pump hard to build up fluid pressure. This pressure will cause the inner race to expand slightly; just enough to free the tapered surfaces and allow the bearing to slip off easily. If the bearing is not readily removed, remove the front water level inspection plate and use a timber to pry up the cylinder to remove cylinder weight from the bearings. Once the bearing is removed, the cylinder drops only approximately 1/32" before the shaft comes to rest on the shaft support.
4. Slide the bearing off of the shaft and if it is to be reused, place it on a clean surface and cover with a clean, lint free cloth.

Figure 32. Connection From Hydraulic Pump to Assist in Bearing Removal



3.1.2 Removing the Bearing Housing (Bearing and Seal Carrier), Seal Sleeve, and Seals (Front or Rear)

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These procedures require the use of a pulling fixture and guide rods available from the Milnor® factory. With the bearing cover (or shaft seal holder) and the bearing removed, proceed as follows:

1. Remove the three bearing housing cap bolts and the grease lines from the bearing housing front plate. Install guide rods in two of the bolt holes, as shown in Figure 33, page 88.
2. Install the pulling fixture as shown in Figure 34, page 88, by placing each of the four threaded rods through a hole in the steel plate with hexnuts to the outside of the plate then screwing each rod into the appropriate tapped hole in the bearing housing (same holes as used to mount the bearing cover or shaft seal holder).

Figure 33. Two Bearing Housing Guide Rods in Position

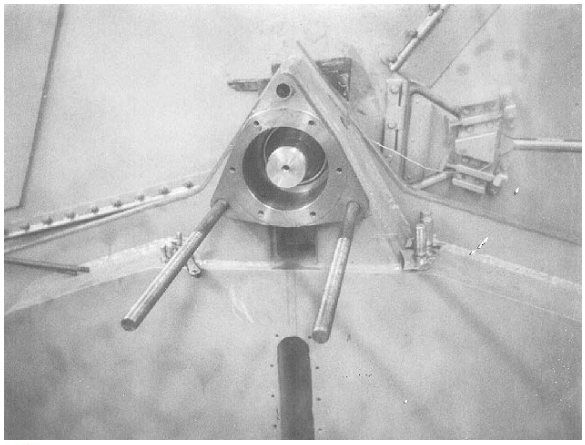
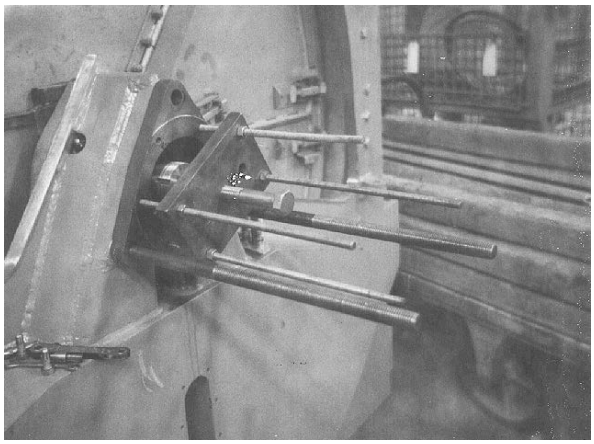


Figure 34. Bearing Housing Pulling Fixture in Position



NOTE: Step 2a or 2b below will cause the bearing housing to slide away from the shell. Shims were placed under one or more of the three bearing housing pads during factory assembly to align the housing and insure its being exactly parallel with the shaft. **When removing the bearing housing, be sure to keep these shims separate and identified so that they may be returned to their proper location, otherwise the bearing and seal will be out of line and may be damaged after a short operating period.** As a precaution in case the shims are lost during disassembly, you will find stamped next to the bearing housing the proper thickness of shims required (if any) under each adjacent bearing housing pad. The stamped number indicates the shim thickness in thousandths of an inch. For example, the number “38” indicates that 38/1000 (.038") shims would be required under this pad.

a. Tighten all four hex nuts on the threaded rods such that the pulling fixture plate is pressed against the shaft end. With an impact wrench, tighten down on the center bolt until the housing slides out, or

b. If no impact wrench is available, simply continue to tighten down on each of the four hex nuts behind the pulling fixture plate, alternately and progressively, until the housing slides out. It may be necessary to place a spacer (approx. two inches long) between the plate and the shaft to provide enough clearance between the plate and the bearing housing.

3. Once the bearing housing is free of the shell, carefully slide it off of the guide rods and place on a clean work surface.
4. The seal sleeve will almost always remain on the shaft when the housing is removed. Remove the seal sleeve **taking care not to damage or scar it** and place it on a clean work surface.

3.1.3 Precautions for Bearing Replacement

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The most important ingredient in successful bearing and seal installation is **cleanliness**. The bearing housing must be free of all **foreign** matter. The grease and leak off passages must be blown clear and all **foreign** matter removed. You must have a clean work area. Keep your hands and tools free from grit and grime. Wash your hands before starting and as required during these procedures. **Foreign** matter is, without doubt, the most frequent cause of bearing failure, and one over which the manufacturer has no control.

Where cleaning is required, bearings, bearing housings and seal sleeves may be cleaned with the following solvents or cleaning agents (in strict accordance with the manufacturer's recommendations as such substances are generally toxic and/or explosive under certain conditions):

Benzene	Gasoline	Naptha
Chlorethane	Kerosene	Tricholorethylene
Freons	Mineral Spirts	

Do not, however, expose any components to the above substances for more than 24 hours and only use at room temperature. Never use the following solvents or cleaning agents: alcohols, cresols, phenols, flouro propanols, or other similar chemicals or mixtures.

NOTE: Hammer blows, overheating, or improper use of force can damage precision parts.

3.1.4 Replacing the Bearing Housing, Seal Sleeve, and Seals (Front or Rear)

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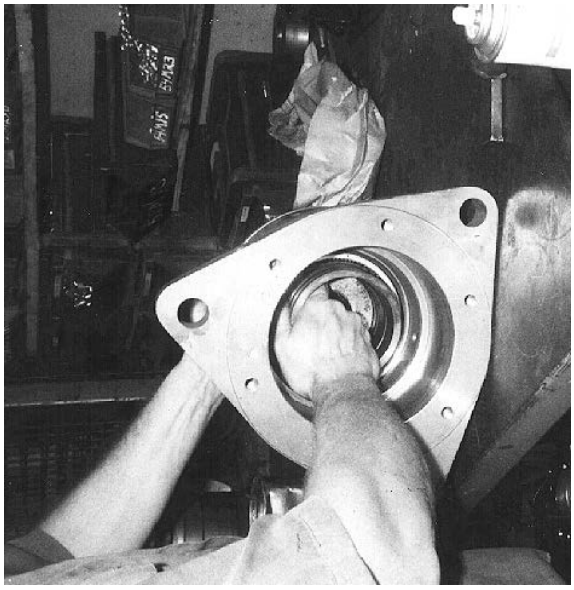
1. With the seal sleeve removed, press all old seals out of the bearing housing. Remove the large o-ring from the outside of the housing. Thoroughly clean the bearing housing and flush out all grease passages to make certain they are unblocked. Remove the o-rings from the inside of the seal sleeve and clean the seal sleeve.
2. While the bearing housing is disassembled, charge all grease passages with grease. This will assure that there are no blockages.
3. Replace the o-rings in the seal sleeve and the large o-ring on the outside of the bearing housing. Replace with new o-rings if the old ones are worn.
4. Press new seals into the bearing housing. You may gently work the seals in with a mallet and metal drift as shown in Figure 35, page 90.

CAUTION: Each seal must be of the proper material and face the proper direction. The type of material and direction the seal faces may differ from one seal to another within the same bearing housing and also from one type of machine to another. It is essential to consult the Main Bearing Assembly drawing for your machine for the proper part number and direction to face each seal.

5. Slip the seal sleeve into the bearing housing as shown in Figure 36, page 90, using care not to damage or fold under any of the seal lips. Be sure to insert the sleeve in the proper direction (see Bearing Assembly drawing).

Figure 35. Installing Seals in Bearing Housing

Figure 36. Installing Seal Sleeve in Bearing Housing

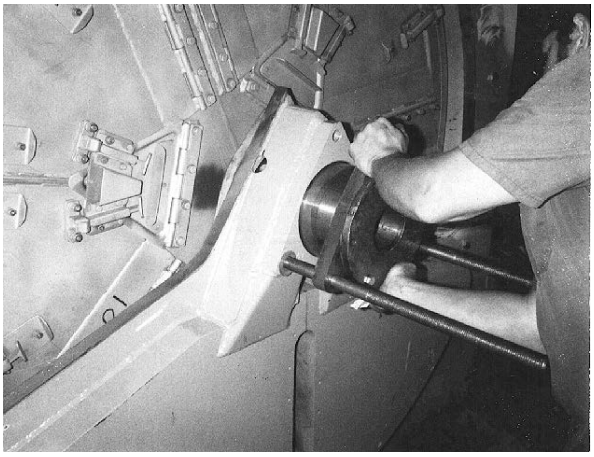


NOTE: If both housings are being installed, install the rear housing first.

6. With two of the three temporary guide rods in position on the shell, place the bearing housing onto the guide rods and install the seal sleeve setting fixture on to the bearing housing as shown in Figure 37, page 91. The seal sleeve setting fixture prevents the seal sleeve from being pushed out of the housing as the housing is inserted into the shell. Note that the seal sleeve setting fixture and the bearing setting fixture are very similar, but the seal sleeve setting fixture has a longer hub.
7. With a clean, lint free cloth, apply a coating of light machine oil to the outside of the housing, to assist in installation. Push the housing into the shell as shown in Figure 38, page 91. Once the housing is far enough into the shell to support itself, place any shims back into position between the housing and the shell. Remove, then replace guide rods if required to place shims under bearing housing pads.

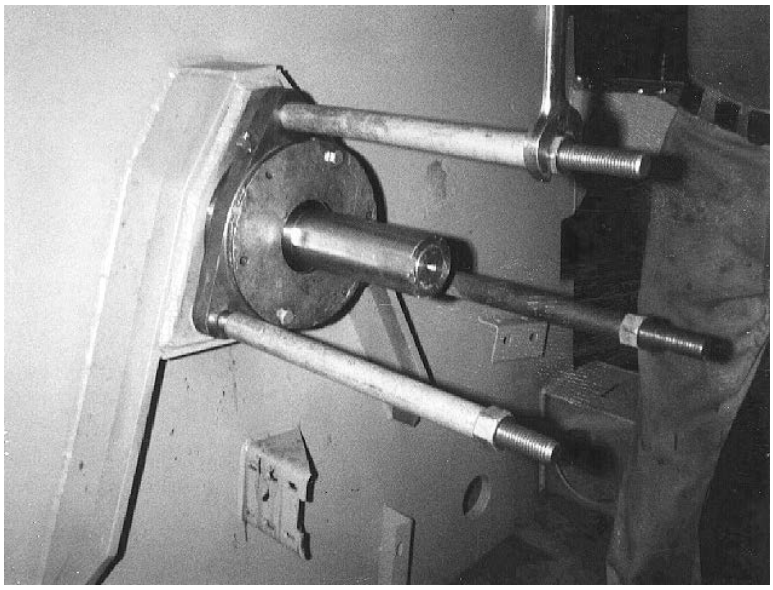
Figure 37. Installing the Bearing Housing Setting Fixture onto Housing (42" machine shown)

Figure 38. Pushing the Bearing Housing into the Shell (60" Rapid-load machine shown)



8. Install the third guide rod, spacers if required, and hex nuts, using these to seat the housing fully, as shown in Figure 39, page 91. Remove the seal sleeve setting fixture.

Figure 39. Tightening the Bearing Housing into the Shell (42" machine shown)



9. Remove the guide rods and install the bearing housing cap bolts. See “Bolt Torque Requirements” elsewhere, for proper torques.
10. With the grease gun, pump grease into the inner portion of the bearing cavity, such that when the bearing is installed, the space between the bearing and the seals will be approximately 1/3 full of grease.
11. Proceed to Section 3.1.5 : Measuring Unmounted Clearance and Setting Bearing (Front or Rear), page 92, even if both the front and rear bearings are being replaced. Once the rear bearing is installed, the bearing housing replacement procedures may then be repeated for the front (soil side) bearing housing.

3.1.5 Measuring Unmounted Clearance and Setting Bearing (Front or Rear)

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The bearings used on Milnor® washer and dye extractors are the very best anti-friction devices available for these applications. However, the anti-frictional characteristics of the bearings will be reduced if they are not properly installed. It is of critical importance when installing these tapered roller bearings, to accomplish the following (A step by step procedure follows this synopsis):

1. Accurately measure the unmounted internal clearance of the bearing (gap between the rollers and outer race before the bearing is installed). This is an essential quality control measure.
2. Calculate the final internal clearance by subtracting the specified clearance reduction (amount that the internal clearance must be reduced when the bearing is tightened onto the tapered shaft) from the unmounted clearance.
3. Tighten the bearing onto the shaft until the final internal clearance as calculated is achieved and verified by measurement.

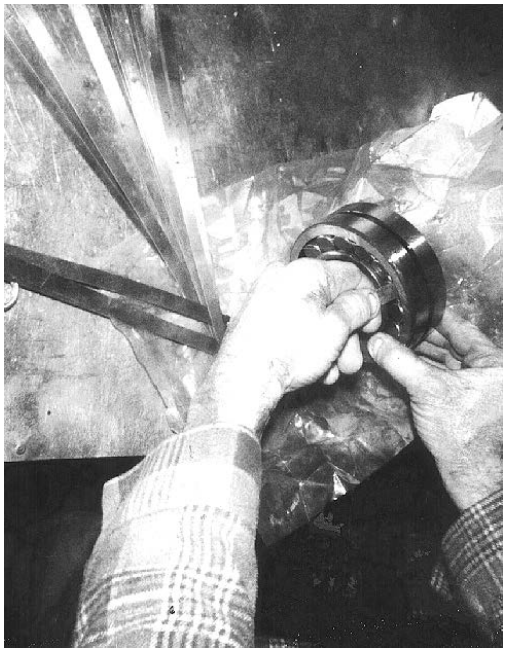
   These measurements are taken in thousandths of an inch. Although this requires precise work, attention to detail and a good set of feeler gauges, it is the only way to insure that the bearing will be tightened onto the shaft to precisely the right tension. If you have any questions on performing the measurements or adjustments described below, your local bearing supplier or the Milnor® factory can assist you. Although these procedures require precision over and above that normally required for laundry room maintenance, they are standard in bearing installation and absolutely essential:

   NOTE: Step 4 requires a good set of feeler gauges including .001" through .010" in thousandths of an inch increments. Contact your local bearing supplier.

4. When you are ready to proceed (and not before), remove the new bearing from it's box or protective wrapping. Do not attempt to clean the bearing or wash out the preservative coating. On a clean work surface, stand the bearing on edge and insert a .003 feeler gauge into the bearing as shown in Figure 40, page 93. The gauge should be inserted just inside the outer race between two rollers and worked through to the opposite row of rollers. Rotate the inner race of the opposite row so that the end of the feeler gauge is caught between a roller and the outer race.

Figure 40. Measuring Bearing Unmounted Clearance (bridge for 42" machine shown)



5. Try to pull the gauge straight out. If it comes out, increase the size of the gauge by .001". If it does not come out, decrease the gauge by .001". The thickest feeler gauge that will come out is the unmounted internal clearance of the bearing.
6. Compare the measured clearance with the "Unmounted Clearance" in Table 25: Table of Bearing Clearances, page 93 . If the measured clearance is not within the range shown, do not use the bearing. Contact your bearing supplier for an exchange.

NOTE: The clearances listed in the chart are industry standards and therefore apply to all brands of bearings supplied by Milnor®. If other sources of bearings are used, refer to the manufacturer's instructions for proper clearances.

NOTE: To locate your bearing on the chart, match the first five characters of the manufacturer's part number (**not the** Milnor® **part number**) with those in the chart. For example, for a manufacturer's part number 22217LBK, find under "Manufacturer Part Number" the line "22217 . . ."

Table 25. Table of Bearing Clearances

Manufacturer Part Number	Unmounted Clearance		Clearance Reduction	
	Minimum	Maximum	Minimum	Maximum
22330...	.0071	.0091	.002	.003
22213...	.0030	.0039	.001	.002
22216...	.0028	.0037	.001	.002
22217...	.0044	.0057	.0015	.0025
22312...	.0030	.0039	.001	.002
22316...	.0037	.0049	.001	.002
22320...	.0044	.0057	.0015	.0025

Table 25 Table of Bearing Clearances (cont'd.)

Manufacturer Part Number	Unmounted Clearance		Clearance Reduction	
	Minimum	Maximum	Minimum	Maximum
22328...	.0063	.0081	.002	.003
23220...	.0044	.0057	.0015	.0025

7. Calculate and record the final internal clearance by deducting the “Clearance Reduction” for your bearing (see Table 25, page 93) from the measured clearance. For example, if you measured .004 and the clearance reduction is .001 to .002, then the final internal clearance should be between .002 and .003.
8. Hand pack the bearing with grease by rotating the inner race and rollers, forcing grease between all rollers.

NOTE: The bearing will be set into position in Step 9. If both front and rear bearings are being installed, the rear (clean side on Staph Guard® models) bearing should be set in position first because it is the fixed bearing.

9. Set the bearing into the housing (with the taper facing the proper direction) and seat the bearing using the bearing setting fixture. This fixture is installed in similar fashion to the seal sleeve setting fixture. If you have just set the rear bearing and the front bearing housing is yet to be installed, leave the bearing setting fixture in place for now.
10. If you have just set the rear bearing and the front bearing housing is yet to be installed, repeat all steps in bearing housing installation, measuring unmounted clearance and setting bearing, for the front bearing and housing. The bearing setting fixture should not be removed from the rear housing until it is needed to seat the front bearing. This will prevent rear bearing components from being pushed out of position by the shaft as the front housing components are seated. Remove the bearing setting fixture from the front housing once the bearing is seated.

3.1.6 Tightening Bearing(s) (Front and/or Rear)

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1. Once both bearings are seated, or if only one bearing was replaced, install the bearing lock washer(s) and lock nut(s). Use a hammer and a metal drift as shown in Figure 41, page 95, to tighten the lock nut. **It is imperative to only tap lightly and to assure that metal chips from the drift or lock nut do not fall off and contaminate the bearing.** If both bearings are being tightened, work between the front and rear bearings and turn the basket by hand periodically, while tightening the lock nut(s).
2. After tightening the bearing(s) onto the tapered shaft, check the internal clearance as pictured in Figure 42, page 95, by working a feeler gauge between the outer race and a roller of the outer row then between the outer race and a roller of the inner row.

NOTE: Sometimes, when setting the bearings, all the load is taken by only one row of rollers (although the load would quickly equalize on both rows after the machine has run for only a few minutes). If all the load is taken by one row, you will get an erroneous clearance reading. It is therefore, necessary to use the feeler gauge to measure the **clearance of both rows of rollers**. With the bearing in place on the machine it is admittedly rather difficult to get a feeler gauge back past the first row of rollers to measure the second **but it must be done**.

3. If one row of rollers is tight but the other has measurable clearance, tap lightly on the end of the shaft nearest the tight row of rollers to cause the shaft to shift axially and equalize the roller loading. Adjust the bearing tightness to achieve the internal clearance previously calculated.
4. When the proper internal clearance has been attained, lock the nut by bending over the matching tang on the lock washer, making sure that all unused tangs are bent as near the nut as possible so that they will not rub against the bearing roller cage.

NOTE: Check each unused tab individually to insure this.

Figure 41. Tightening the Bearing Lock nut (42" machine shown)

Figure 42. Measuring the Mounted Internal Clearance of the Bearing (42" machine shown)

5. With the grease gun, fill the space between the bearing and the front of the housing 1/3 full of grease.
6. Install the bearing cover plate or shaft seal holder, as appropriate. When installing the shaft seal holder, take care not to damage the seal as it is gently pushed over the shaft. Cover the keyway on the end of the shaft with tape to prevent the sharp corners of the keyway from cutting the seal lip. Also, make sure that the seal lip does not turn over as it passes over rough areas.

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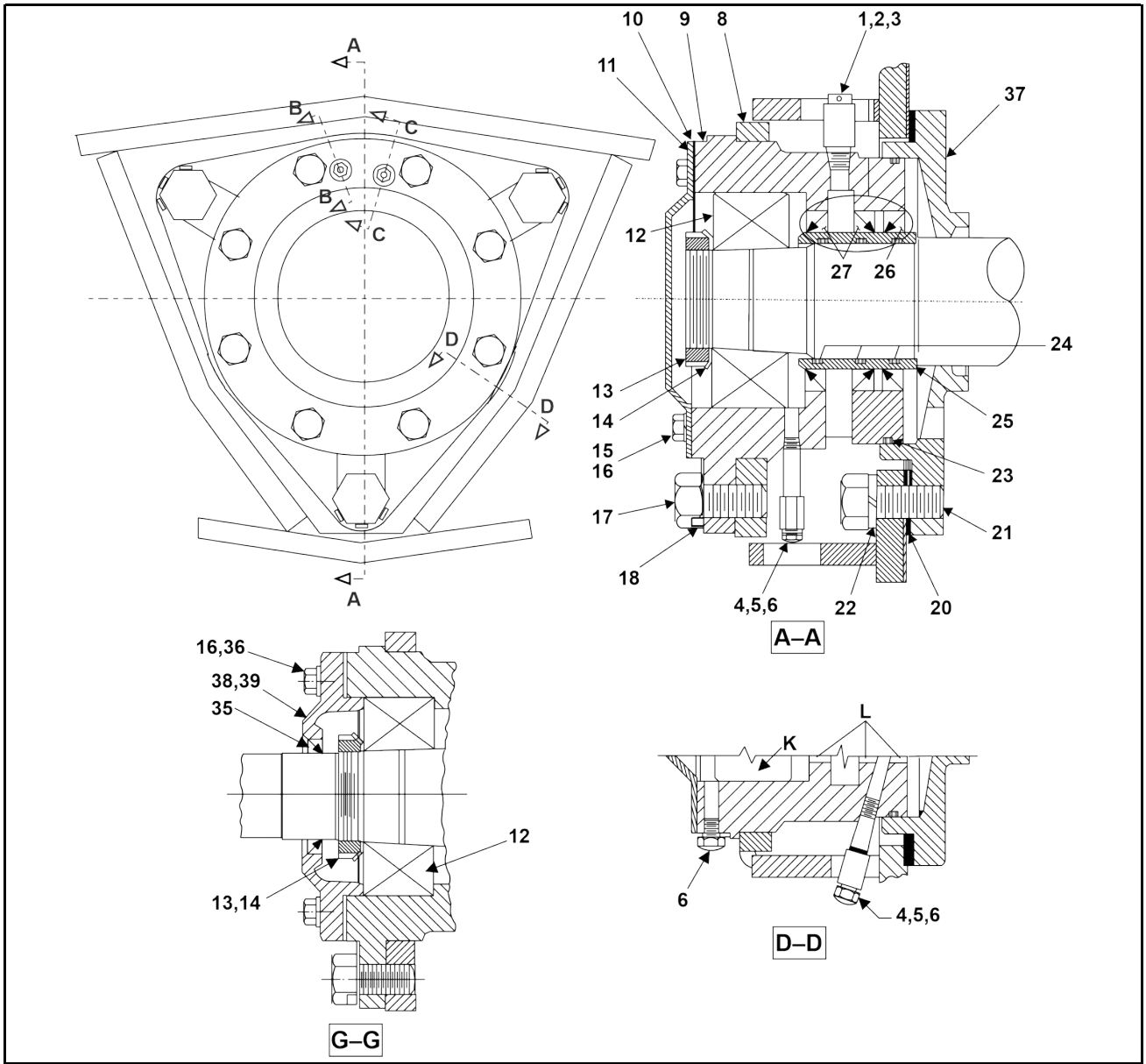
Main Bearing Assembly

4 Sheets

42031, 42044 CP2/CP3, NP2/NP3, WP2/WP3, SP2/SP3, DA2/DA3, DP2/DP3



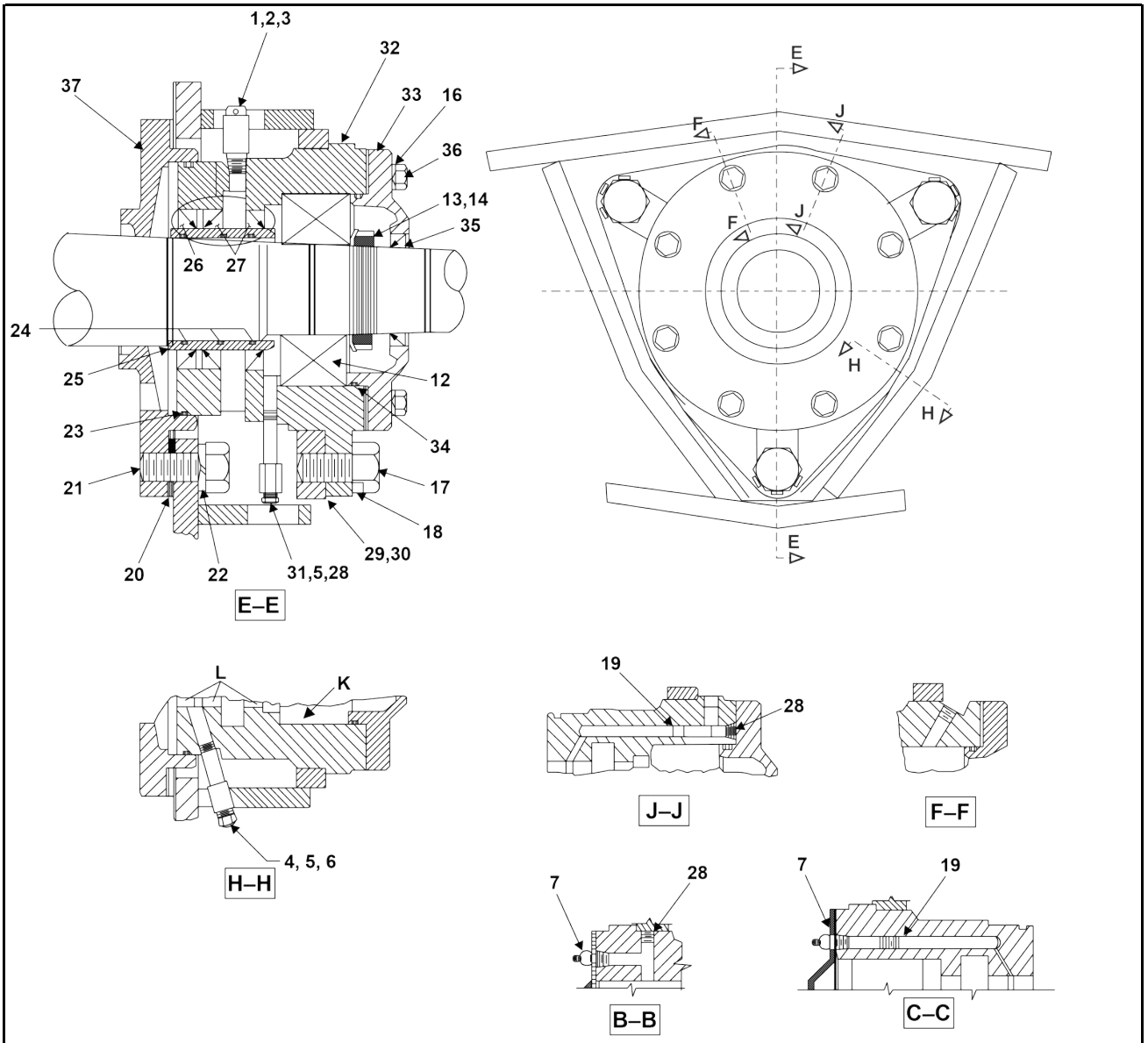
Legend

A-A . . Section view, Non Staph-Guard models
B-B . . Section view
C-C . . Section view
D-D . . Section view
G-G . . Section view, Staph-Guard machines only
K . . . Bearing
L . . . Seal

Main Bearing Assembly

4 Sheets

42031, 42044 CP2/CP3, NP2/NP3, WP2/WP3, SP2/SP3, DA2/DA3, DP2/DP3



Legend

B-B . . Section view
C-C . . Section view
E-E . . Section view
F-F . . Section view
H-H . . Section view
J-J . . Section view
K. . . Bearing
L. . . Seal

Main Bearing Assembly

4 Sheets

42031, 42044 CP2/CP3, NP2/NP3, WP2/WP3, SP2/SP3, DA2/DA3, DP2/DP3

Table 26. Parts List—Main Bearing Assembly

Find the assembly for your machine and the letter shown in the "Item" column. The components for your machine will show this letter or the word "all" in the "Used In" column. The numbers shown in the "Item" column are those shown in the illustrations.				
Used In	**Item**	**Part Number**	**Description/Nomenclature**	**Comments**
			Reference Assemblies	
	A	GBM15001	*FRONT-REAR MAIN BRG ASSY 42W	4244WP2,CP2,CP3
	B	GBM15001V	*42WE+CM+NS BEARASY=VITONSEAL	4244WP2,WP3 VITON SEALS 4244CP2,CP3 VITON SEALS
	C	AD 16 018	*BEARASY.MAIN(LOD+CLN)4244SGU	4244SP2,SP3;4231SP2
			Components	
all	1	5N0ECLSBE2	NPT NIP 1/4XCLS TBE BRASS 125#	
all	2	51P008B	PLUG SQSLD 1/4"BLK LVENT STEEL	
all	3	5SCC0EBE	NPT COUP 1/4 BRASS 150#PSI W/HEX	
all	4	5N0C01KG42	NPT NIP 1/8X1.5 TBE GALSTL S40	
all	5	5SCC0CBE	NPT COUP 1/8 BRASS 125# 103A-A	
all	6	54M029	RELIEFFIT 1/8STR ALEMITE 47200	
all	7	54M015	GREASEFIT 60X36/60X44 1610BL	
all	9	X2 15538	CARRIER=FRONT BRG+SEAL	
all	10	02 15706	GASKET = BEARCAP	
all	11	02 15578	BEARCAP-CADSTL (1/42C)	
all	12	56S22312T	SPHEROLBRG FAG#22312E1AK.M.C3	
all	13	56AHN12	N12 BEARING LOCKNUT	
all	14	56AHW12	W12 BEARING LOCKWASHER	
AB	15	15K083	HXCAPSCR 3/8-16 UNC2AX1/2 GR5	
all	16	15U255	LOCKWASHER MEDIUM 3/8 ZINCPL	
all	17	15K228B	HEXCAPSCR 3/4-10 X 1+1/2 GR 5/	
all	18	02 15292	LOCK WASH=BEARHSN 6/42C CAD	
all	19	02 15528	GREASE RESTRICTOR=42"SEALS	
all	20	02 15695	GASKET=SHAFT SUP 2/42WEHU	
all	21	15B245	HXCAPSCR 3/4-10UNC2AX1.75 GR5	
all	22	15U340	LOCKWASH MEDIUM 3/4 ZINCPL	
all	23	60C164	ORING 6+1/21DX1/8 #260	
all	24	60C137A	ORING 2+3/4ID1/8CS BUNA70 #232	
All	25	X2 15263D	SEALSLEEVE=2.75SHAFT(17-4PH)	
all	26	24S120	SEAL 3.25X4.25X.5 JM#9547LUP-N	
AC	27	24S120	SEAL 3.25X4.25X.5 JM#9547LUP-N	
B	27	24S120V	SEAL 3.25X4.25X.50 JM#9547LUP	
all	28	5SP0CBEHS	NPT PLUG 1/8 HXCTRSNK BRASS	

Main Bearing Assembly

4 Sheets

42031, 42044 CP2/CP3, NP2/NP3, WP2/WP3, SP2/SP3, DA2/DA3, DP2/DP3

Table 26 Parts List—Main Bearing Assembly (cont'd.)

Find the assembly for your machine and the letter shown in the "Item" column. The components for your machine will show this letter or the word "all" in the "Used In" column. The numbers shown in the "Item" column are those shown in the illustrations.

Used In	Item	Part Number	Description/Nomenclature	Comments
all	29	15U355F	24GA ADJWASH=BRGHOUS ZINC PL	
all	30	15U355F	24GA ADJWASH=BRGHOUS ZINC PL	
all	31	5N0C03AG42	NPT NIP 1/8X3 TBE GALSTL SK40	
all	32	X2 15539	CARRIER=REAR BRG+SEAL	
all	33	X2 15702	RETAINER=REAR BRG+SEAL	
all	34	60C152C	ORING 4+7/8IDX1/8CS BUNA70#249	
all	35	24S005	SEAL 2.25 X 3.0 X .375 SS BUNA	
all	36	15K095	HXCPSCR 3/8-16UNC2AX1 GR5 ZINC	
all	37	X2 15683	SUPPORT-SHAFT=2/42WEHU	
C	38	51P013	PLUG HXCNTRSUNK 1/4"BRASS	
C	39	X2 15746	RETAINER=BRG=SOILSD:C2-15702	

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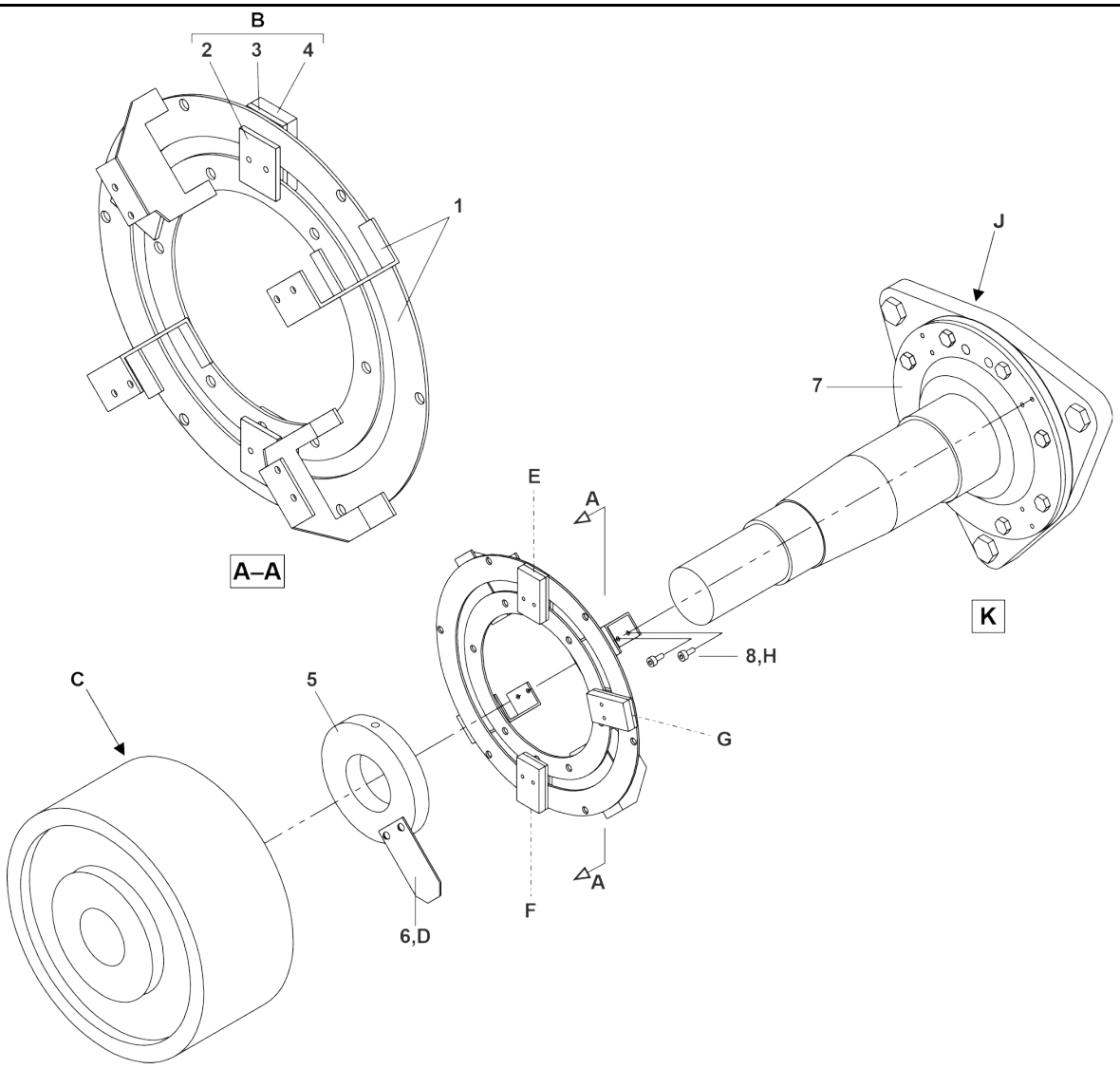
Autospot

2 Sheets

4244SP2 SM



Legend

A–A . . Detail view
B . . . Typical 3 places
C . . . Rear main pulley, see Drive chart
D . . . Target
E . . . Pocket 1
F . . . Pocket 2
G . . . Speed sensor
H . . . Typical 8 places
J . . . Rear main bearing, see BPWG4B01
K . . . Clean side

Autospot

2 Sheets

4244SP2 SM

Table 27. Parts List—Autospot

Find the assembly for your machine and the letter shown in the "Item" column. The components for your machine will show this letter or the word "all" in the "Used In" column. The numbers shown in the "Item" column are those shown in the illustrations.				
Used In	**Item**	**Part Number**	**Description/Nomenclature**	**Comments**
Reference Assemblies				
	A	G28 15700B	BEAR ASSY SGL/MTR 42" SG	
Components				
all	1	W2 19178	WLMT=AUTOSPOT SW/MNT 42"SG	
all	2	02 19179	SWITCH MNT PLATE INNER	
all	3	02 19179A	SWITCH MNT PLATE OUTER	
all	4	09RPS07RDS	7MM SENSING RECTANGULAR SHLD	
all	5	02 19186B	SHT/COLLAR PROX TARGET 42" SG	
all	6	02 19186A	PROX TARGET 60" SM DRIVE	
all	7	X2 15747	SEAL HOLDER SGL/MTR 42" SG	
all	8	15K018	SKCPSCR 10-24 UNC 3X3/8 BLK	

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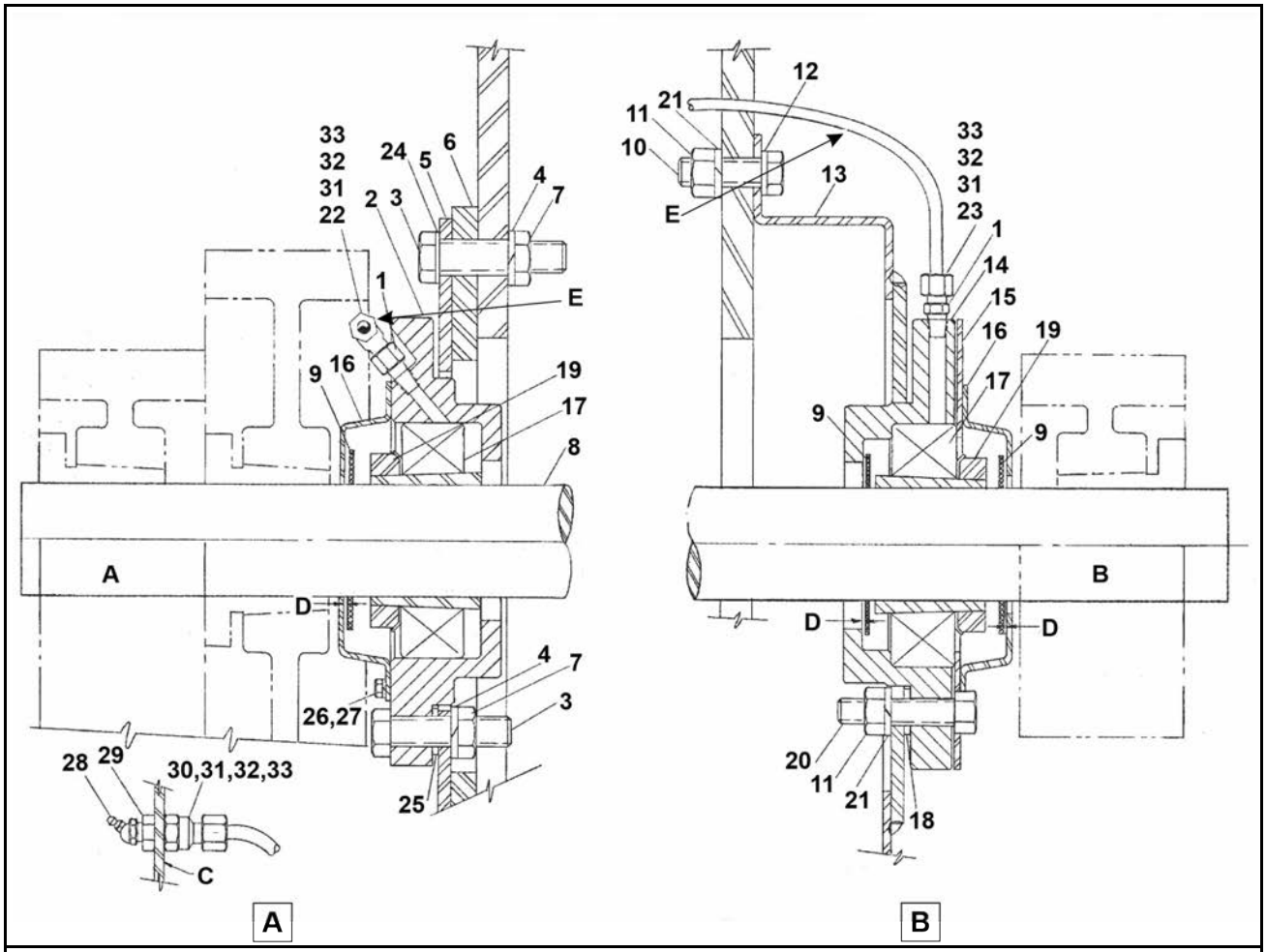
Idler Shaft Bearing

2 Sheets

42031, 42044SP2/SP3 & 4244SP2 SM



Legend

A . . . Soil side, floating side
B . . . Clean side, lock side
C . . . Lower right X-brace
D . . . 1/16” all around
E . . . Route tubes to grease fittings on lower right brace

Idler Shaft Bearing

2 Sheets

42031, 42044SP2/SP3 & 4244SP2 SM

Table 28. Parts List—Idler Shaft Bearing

Find the assembly for your machine and the letter shown in the "Item" column. The components for your machine will show this letter or the word "all" in the "Used In" column. The numbers shown in the "Item" column are those shown in the illustrations.				
Used In	**Item**	**Part Number**	**Description/Nomenclature**	**Comments**
			Reference Assemblies	
	A	AD15 066	BEARASY,LO JACKSHAFT 4231SGU	42031SP2/SP3
	B	AD 16 020	BEARASY,LO JACKSHAFT 4244SGU	4244SP2/SP3, 4244SP2 SM
			Components	
all	1	51A001	ADAPTER 1/8 PT BRASS	
all	2	X2 18712	BEARHOUSE=JACKSHAFT REAR	
all	3	15K225	HEXCAPSCR 5/8-11X2+1/2	
all	4	15U315	LOKWASHER MEDIUM 5/8 ZINCPL	
all	5	X2 18744	MACH=TAKEUP=SG-SOILSIDE	
all	6	02 18748	SPACER=BEAR MTG PLATE	
all	7	15G238	HXNUT 5/8-11UNC2B SAE ZINC GR2	
A	8	X2 15737	SHAFT-IDLER=1/4231SGH	
B	8	X2 16155	IDLERSHAFT LOWER=4244SGH	
all	9	02 15882	RING=SLINGER IDLER SHAFT	
all	10	15K173A	HXCAPSCR 1/2-13UNC2AX1.75 GR5	
all	11	15G230	HXNUT 1/2-13UNC2B SAE ZINC GR2	
all	12	15U280	FL+WASHER(USS STD)1/2 ZNC PL+D	
all	13	W2 15743	* TAKEUP WELD=SG IDLERSHAF-C5	
all	14	X2 18713	BEARHOUSE=JACKSHAFT :C2-18712	
all	15	02 18710	RETAINER=UPJACK GALSTL	
all	16	02 175122	CAP=BEARING JACKSHAFT	
all	17	56S22213T	SPHEROLBRG 22213LBK-C3-W33	
all	18	02 03476	SHIM=SINT BRASS-1/8THKX.51ID	
all	19	56AHS13	SNW13 BRG ADAPT 2+3/16"CYLBORE	
all	20	15K191	HXCAPSCR 1/2-13UNC2AX2.5 GR5 Z	
all	21	15U300	LOKWASHER REGULAR 1/2 ZINC PLT	
all	22	53A031B	BODY-EL90MALE.25X1/8 #269C-42B	
all	23	53A005B	BODYMALCON1/4X1/8COMP #B68A-4A	
all	24	15U314	FLATWASHER(USS STD) 5/8" ZNC P	
all	25	02 18714	SHIM=SINT BRASS-1/8THKX.65ID	
all	26	15K030	HEXCAPSCR 1/4-20UNC2X1/2 GR5 Z	
all	27	15U180	LOCKWASHER MEDIUM 1/4 ZINCPL	
all	28	54M020	GREASEFIT 30DEG 1611-B ALEMITE	
all	29	5SB0E0CBEO	NPTHEXBUSH 1/4X1/8 BRASS 125#	

Idler Shaft Bearing

2 Sheets

42031, 42044SP2/SP3 & 4244SP2 SM

Table 28 Parts List—Idler Shaft Bearing (cont'd.)

Find the assembly for your machine and the letter shown in the "Item" column. The components for your machine will show this letter or the word "all" in the "Used In" column. The numbers shown in the "Item" column are those shown in the illustrations.				
Used In	**Item**	**Part Number**	**Description/Nomenclature**	**Comments**
A	30	53A007B	BODYFEMCON.25X.25COMP#B66A-4B	
B	30	53A008B	BODYMALECON.25X.25COMP#B68A-4B	
all	31	53A500	SLEEVE DELRIN 1/4"OD#60PT-4	
all	32	53A059A	NUT 1/4"BR.HOLYOKE AND #61A-4	
all	33	53A501	TUBE INSERT .163"OD #63PT-4-40	

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3.2 Idler Shaft Bearing Replacement

BNWG4M01.C01 0000279244 D.2 A.2 3/20/20, 10:26 AM Released

The bearings used on the idler shaft are double-row spherical roller self-aligning bearings, SKF, Link-Belt, Torrington, or equal. Bearings are attached to the shaft with locknuts and tapered adapters. The idlershaft is designed with one bearing “fixed” and the other bearing “floating”. Lubrication is provided by grease passages that are tubed to two grease fittings located on the lower right cross brace. Grease is retained in the bearing housings by close-fitting covers.

3.3 How to Remove the Bearings

BNWG4M01.T01 0000279243 D.2 A.2 3/20/20, 10:26 AM Released

1. Remove the idler shaft pulleys on both ends of the shaft.
   a. Remove the bearing caps.
   b. Loosen the set screws which lock the bearings for the brake assembly to the idler shaft (total of four (4) setscrews).
2. Remove the soil side bearing.
   a. Screw a 1/4"-18NPT pipe fitting into the hole in the soil side end of the idlers haft.
   b. Loosen the bearing locknut.
   c. Using a hand operated hydraulic pump, force fluid into the hydraulic removal passage.

   Pump hard to build up fluid pressure. This pressure will be transferred to the bearing inner race causing the race to expand slightly, just enough to free the tapered surface and allow the bearing to slip off easily.
3. Remove the clean side bearing.
   a. Loosen the bearing locknut on the bearing adapter, backing the nut about 1/8" from the bearing. DO NOT take the locknut off of the adapter.
   b. Slip a piece of pipe (approx. 15" long) over the shaft.
   c. Place one end of the pipe against the locknut and adapter.
   d. Strike the other end of the pipe with a 5 lb. hammer, gently at first, then harder until the adapter snaps loose.

      Hitting a block placed over the end of the pipe helps to inflict an even impact on the bearing adapter; this should prove helpful in bearing removal.
   e. After the bearing has been snapped loose, remove the pipe, bearing locknut, and washer; now the bearing will come out of the housing with a little assistance.

      Be sure not to remove the bearing locknut from the adapter when trying to snap the bearing loose; otherwise, the bearing and bearing adapter may come apart violently. Also, there is a chance of damaging the adapter which may be used again if it is not damaged during disassembly.

When it is known that only the soil side bearing is bad, it may be changed by the above mentioned hydraulic method without damaging the clean side bearing.

If only the clean side bearing must be changed, however, the soiled-side bearing should be removed first (hydraulically) before the clean side bearing is mechanically removed. If it is not removed first, minute indentations, invisible in most cases, will be formed on the inner and outer races of the soil side bearing rendering it unserviceable.

When both bearings must be changed the order of bearing removal is not critical.

3.4 How To Install New Bearings

BNWG4M01.T02 0000279242 D.2 A.2 3/20/20, 10:26 AM Released

NOTICE: The most important ingredient in successful bearing and seal installation is **cleanliness**. The bearing housing must be free of all **foreign** matter. The grease and leak-off passages must be blown clear and all **foreign** matter removed. You must have a clean work area. Keep your hands and tools free from grit and grime. (Wash your hands before actually inserting the bearing in the housing.) **Foreign** matter is, without doubt, the most frequent cause of bearing failure, and one over which the manufacturer has no control.

Before installing bearings, use a feeler gauge to measure the internal clearance in the bearing. Read the section “Measuring Unmounted Clearance and Setting Bearing (Front or Rear)” before installing the bearings in the housing, found in “Main Bearing and Seal Replacement for Divided Cylinder Machines”. (This section describes adjustment of the main bearings which also applies to the idler shaft bearing.)

1. The “fixed” bearing is always installed first.
   a. Install the bearing housings in the take-up units with three mounting bolts. Don’t put the bearing covers on the housings; however, make sure the mounting bolts are tight.
   b. Pass the idler shaft through the housings.
   c. Slip the bearing adapters on the shaft with the threaded end of the adapter near the end of the shaft.
   d. Next, pass the bearing over the shaft and onto the tapered adapters.
   e. Hand tighten the locknut on the adapter, and adjust the location of the end of the idler shaft assembly drawing.
2. With both bearings on the shaft and in the housing, measure the distance from the center of the main shaft to the center of the idler shaft on both ends of the machine. If the center distances are different, loosen the take-up units and adjust the position of the shaft.

   It is important that the idler shaft be parallel to the main shaft before setting the bearings, so that the plane of rotation of the rollers is approximately in the same plane with the bearing races; further, if the shaft is cocked, the floating bearing will not be located accurately from the face of the bearing housing as shown on the assembly drawing.
3. Tighten the bearing locknuts to the proper internal clearance using the procedure explained in section entitled “How To Adjust The Bearing”.
4. Loosen the three bearing housing mounting bolts, and put the covers on the bearings as shown on the idler shaft assembly. Check to make sure bearing housing mounting bolts are tight.
5. Lubricate the bearing before operation. Follow the instructions for bearing lubrication as outlined in section “Tightening Bearing(s) (Front and/or Rear)” found in “Main Bearing and Seal Replacement for Divided Cylinder Machines”.

4 Frame and Suspension

4.1 Suspension Adjustments for Divided Cylinder Machines

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The suspension system on Milnor® Hydro-cushion™ machines is adjusted and thoroughly tested at the factory. It should not require subsequent adjustment unless the machine is distorted during shipment or installation or unless some component of the system, such as a Hydro-cushion™ cylinder is replaced.

There are two primary objectives when adjusting the suspension system on any Hydro-cushion™ machine model:

1. To position the shell in the proper location within the frame (hanging dimensions) to maximize freedom of movement of the shell and to insure proper draining, and
2. To adjust the length of up and down travel at each of the push-down locations (push down travel) so that the shell will not be distorted (racked) when pushed down.

All Milnor® Hydro-cushion™ machines contain the following suspension system components:

1. Hydro-cushion™ cylinder—which suspend the shell and cylinder within the frame and provide vibration damping during extraction.
2. Pneumatic push down devices (air bags)—which when inflated, force the shell downward where it is held against rigid pads during loading, unloading, washing, and draining.
3. Metal or rubber pads—some rigidly fixed to the shell and some rigidly fixed to the frame, which come in contact when the shell is pushed down.

The actual configuration of these components varies from model to model.

4.1.1 How Shell Adjustments are Made

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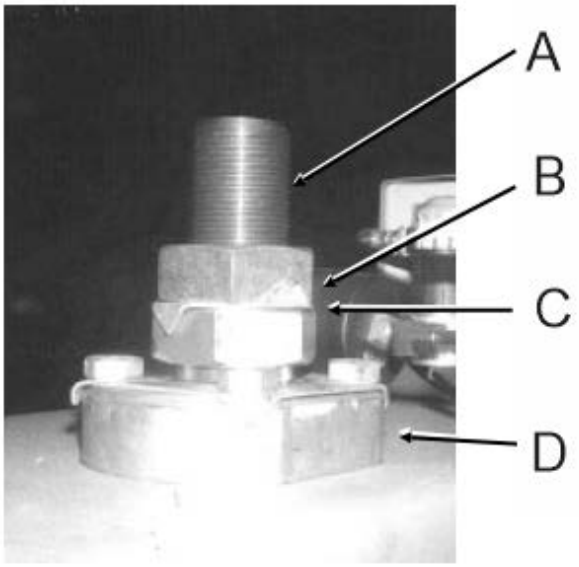
Regardless of machine model, repositioning of the shell is always accomplished by adjusting the nuts at the top of the upper Hydro-cushion™ shafts. To move the shell up or down at the location of any Hydro-cushion™, see Figure 43: Hydro-cushion™ Upper Shaft and Adjusting Nuts, page 108 and proceed as follows:

CAUTION: These procedures should be accomplished with power to the machine locked off.

1. Straighten the tongues on the keyed lock washer using pliers, screw driver, etc.
2. Loosen the lock nut (upper hex nut) and move it all the way up to the top of the shaft, but do not remove it.

3. Use the adjusting nut (lower hex nut) to “crank” the shaft up or down as required.
4. Once final adjustment is made, while holding the adjusting nut to prevent it from turning, re-tighten the lock nut against the adjusting nut (with the lock washer between).
5. Rebend the tongues on the lockwasher as before, to prevent movement of the nuts.

Figure 43. Hydro-cushion™ Upper Shaft and Adjusting Nuts



Legend

A . . . Hydro-cushion™shaft
B . . . Locknut
C . . . Keyed lockwasher
D . . . Adjusting nut

4.1.2 Shell Hanging Dimensions and Adjustment Procedures

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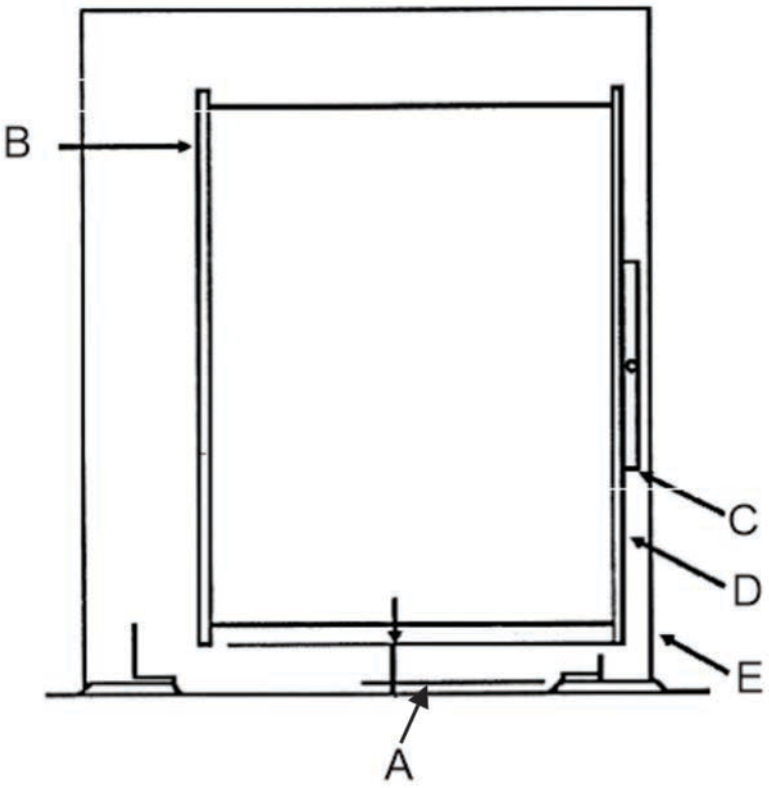
To adjust the shell of a divided cylinder machine, proceed as follows:

1. Locate the shell hanging dimension for your machine in Table 29: Hanging Dimensions, page 109 and adjust your machine accordingly. Take measurements on the left and right sides of the shell, to assure that the shell is horizontal, left to right.
2. The shell and cylinder should be level front to back. Check this with a bubble level, as shown in Figure 44: Shell Hanging for Divided Cylinder Machines (Left side view of 60044WE shown), page 109 .
3. If further adjustment is required in order to level the cylinder, make small adjustments at all four corners. For example, if the cylinder slopes down to the front, try raising the two front corners by 1/16" (2mm) and lowering the two rear corners by 1/16" (2mm). Always split the difference.

NOTE: Only slight deviations from the dimensions shown should be used to level the shell. If large deviations are required, this may indicate that the frame is out of level. If so, this condition must be corrected before attempting to level the shell.

Figure 44. Shell Hanging for Divided Cylinder Machines (Left side view of 60044WE shown)



Legend

A . . . Hanging Dimensions
B . . . Shell back
C . . . Bubble level
D . . . Shell front
E . . . Frame

Table 29. Hanging Dimensions

Machine Model	Dimension A
42031WE	4 1/8" (105)
42031SG	4 1/8" (105)
44044WE	4 1/8" (105)
42044SG	4 1/8" (105)
60031WE	3 5/8" (92)
60031SG	3 5/8" (92)
60044WE	3 5/8" (92)
60044SG	3 5/8" (92)
72044SG	3 3/4" (95)
72044WE	3 3/4" (95)

4.1.3 Push-Down Travel Dimensions and Adjustment Procedures

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CAUTION: Some of the following procedures require power to the machine. Take the necessary precautions to assure that no one operates the machine controls while personnel are adjusting the push-down components.

4.1.3.1 42" Divided Cylinder Machines

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The push-down stops on these machines consist of brackets attached to the shell and rubber rest pads, mounted atop the base pads (see Figure 45: Push-down Travel Adjustment: 42" Div-cyls (42" Staph Guard®), page 111) which make contact when the shell pushes down. The rubber rest pads sit in metal pans and are raised or lowered by adding metal shims to or removing the shims from inside the pans. Extra shims and adhesive for securing the shims were supplied with your machine.

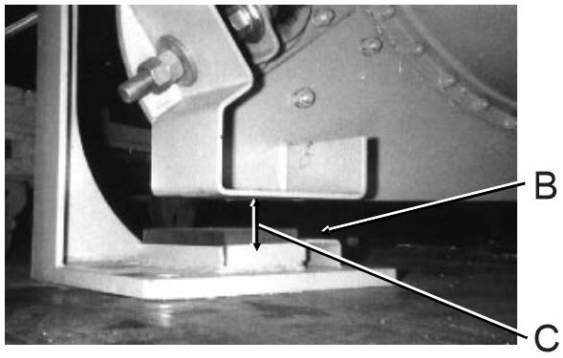
There is no specific push-down travel dimension for these machines; however, length of travel must be adjusted as follows:

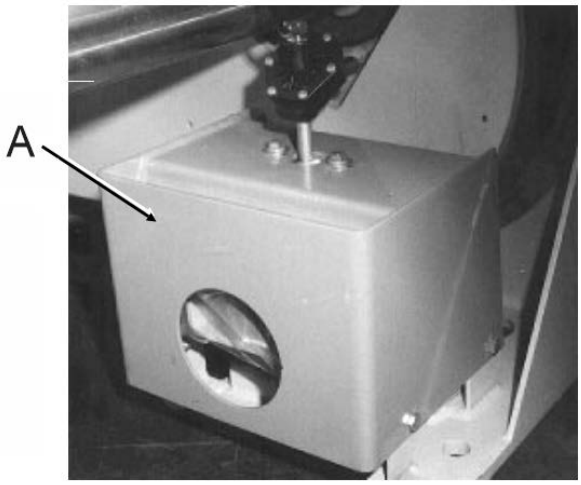
1. With the **Master switch** set to **off**, and the shell hanging free, measure the gap between each bracket and base pad.
2. Add or remove shims from the appropriate pads as required to make all four gaps equal and to insure that no rest pad protrudes completely from its metal pan.

Test for equal length of travel at all four locations as follows:

3. With four sheet metal shims of **equal** thickness, set one shim **on top of** each rubber rest pad, such that at least a one inch length of the shim overhangs the outside edge of the pad.
4. Set the **Master switch** to **manual**, causing the shell to push-down.

Figure 45. Push-down Travel Adjustment: 42" Div-cyls (42" Staph Guard®)





Legend

A . . . Push-down housing (rest pads and brackets within)
B . . . Rubber rest pad (shim between rubber pan and metal pan)
C . . . Gaps must be equal.

5. With the shell pushed down, attempt to pull each test shim out from between the bracket and rubber pad. The test shims should all be tight. If any shim(s) are not pinched tightly between the bracket and pad, take note of which one(s) are not.

   Make final adjustments as follows:

6. Set the **Master switch** to **off**, remove the test shims and make the necessary changes to the shims below the rubber pads as indicated by the above test.
7. Repeat Steps 3 through 6 as required, until this test is successful.
8. Once the adjustments are completed, secure all shims and rubber rest pads with the adhesive provided.

4.1.3.2 60" Divided Cylinder Machines

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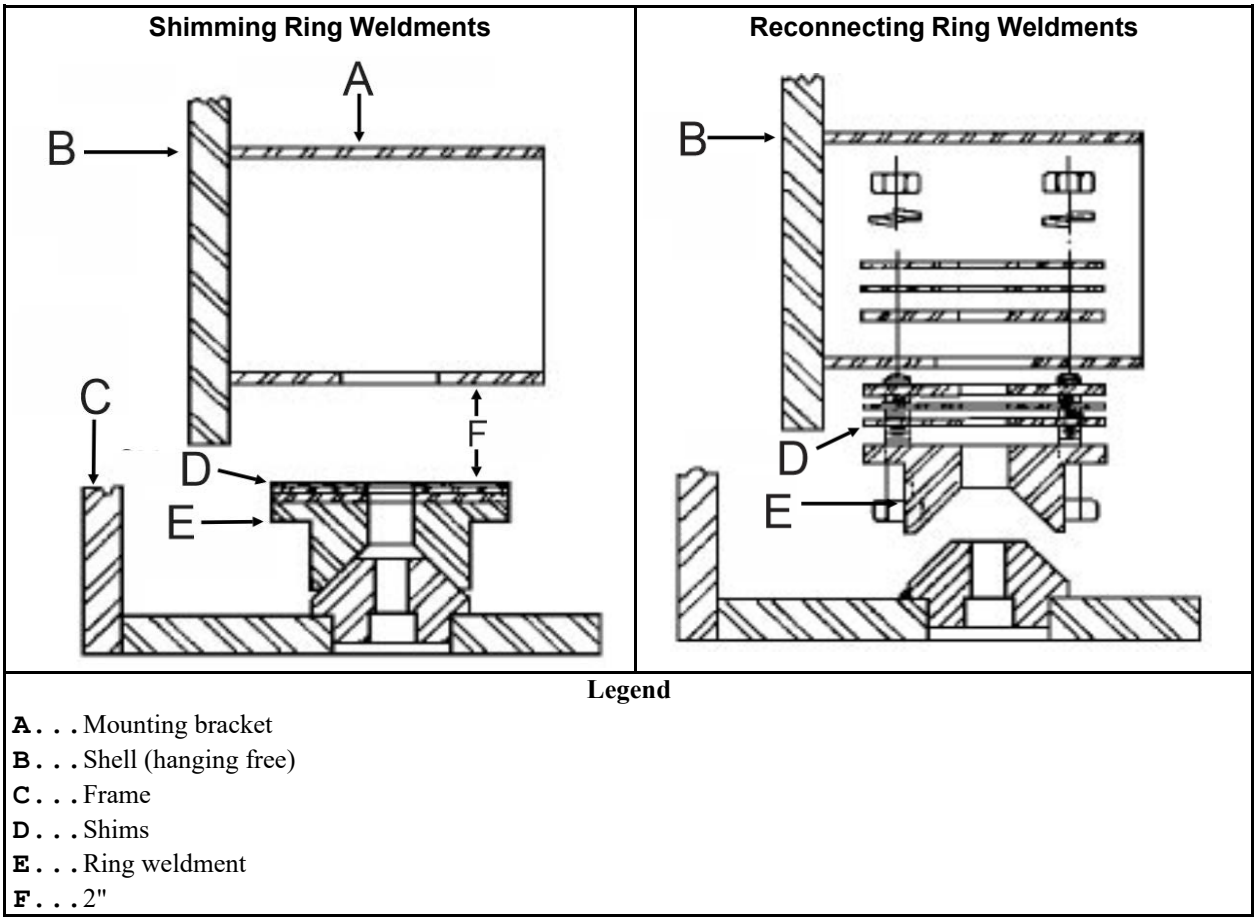
These machines have push-down stops on the four corners of the frame which appear as shown in Figure 46: Ring Weldments, page 112 . When pushed down, the ring weldments (which move with the shell) must seat firmly onto the plugs which are mounted atop the base pads. The push-down travel dimension must assure that 1) the ring weldments and plugs are far enough apart when the shell is not pushed down, so as not to interfere with the free movement of the shell, and 2) that all four stops are in solid contact when the shell is pushed down. To accomplish this, proceed as follows:

1. With the **Master switch** set to **off** and the shell hanging free, remove the bolts securing the ring weldments to the mounting brackets. Set each ring weldment on top of its respective plug, removing any shims which may have been used and placing them next to the ring weldment.

2. Measure the gap between the top of the ring weldment and the bottom of the mounting bracket, at each location.

Figure 46. Ring Weldments



Legend

A . . . Mounting bracket
B . . . Shell (hanging free)
C . . . Frame
D . . . Shims
E . . . Ring weldment
F . . . 2"

3. Stack shims on top of the ring weldment as required to make each gap **exactly 2 inches** as shown in the left side of Figure 46: Ring Weldments, page 112 . If the gap at any location is less than 2 inches without shims, the shell must then be raised in the frame, using the procedures previously described.
4. Once the proper arrangement of shims is made, remount the ring weldment and shims to the mounting bracket (see the right side of Figure 46: Ring Weldments, page 112). Any extra shims may be stacked on the top side of the mounting bracket plate to which the ring weldment is attached.

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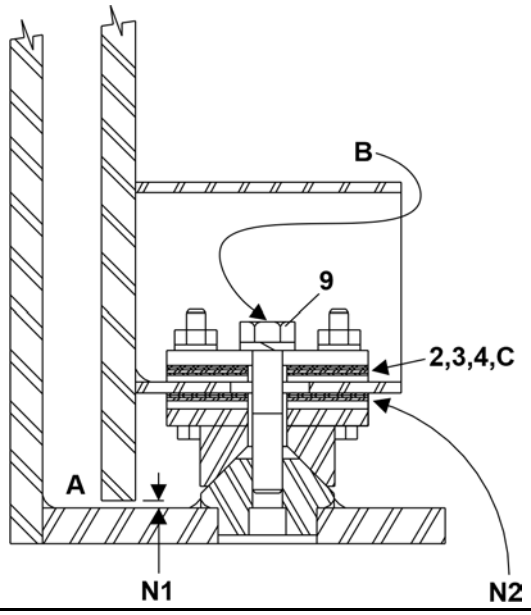
Hold Down Adjustment

2 Sheets

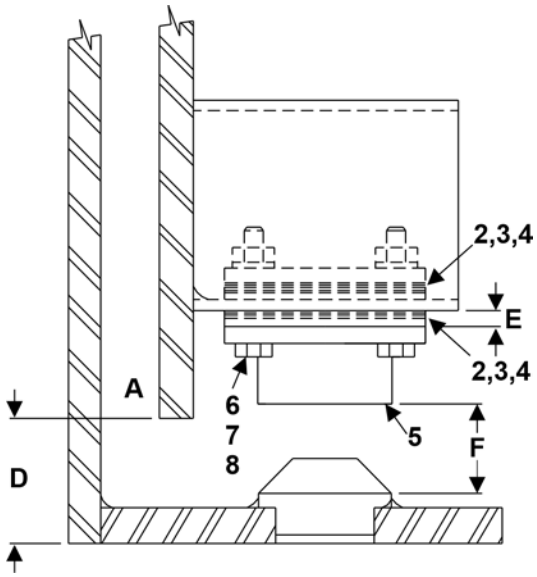
6044SR2/SR3, 6044WR2/WR3, 72044SR2/SR3, 72044WR2/WR3

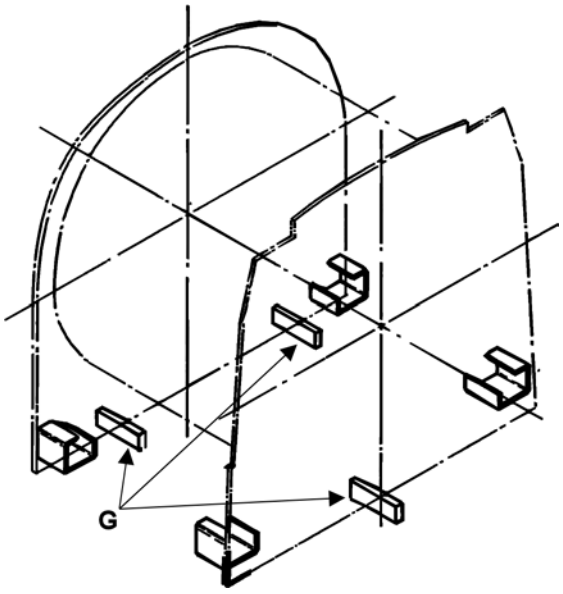
NOTE: For instruction: push down travel dimensions and adjustment procedures, see BNWVUM01

Cross Section: Machine Locked down for Shipment



Adjustment Complete, Machine Up





Legend

A . . . Machine Shell

B . . . Remove shipping bolt before running machine. See instructions for Adjustment of Hold Down

C . . . Place extra shims above

D . . . Unloaded 3-3/4”

E . . . 1/2” approx.

F . . . 2” travel of empty basket

G . . . Setting blocks for adjustment. Blocks must hold shell approximately 3/8” above base pads when machine is pushed down.

N1 . . Be sure shell does not bottom on basepad, there must be clearance at this point. Check each corner

N2 . . Place shims here to adjust ring weldment so that all four corners seat simultaneously.

Hold Down Adjustment

2 Sheets

6044SR2/SR3, 6044WR2/WR3, 72044SR2/SR3, 72044WR2/WR3

Table 30. Parts List—Hold Down Adjustment

Find the assembly for your machine and the letter shown in the "Item" column. The components for your machine will show this letter or the word "all" in the "Used In" column. The numbers shown in the "Item" column are those shown in the illustrations.				
Used In	**Item**	**Part Number**	**Description/Nomenclature**	**Comments**
none				
Components				
all	2	03 06216A	SHIM=HOLDOWN 1/4"THICK	
all	3	03 06216B	SHIM=HOLDOWN 10GA THICK	
all	4	03 06216C	SHIM=HOLDOWN 16GA THICK	
all	5	W3 06406	*RING=HOLD DOWN CENT-STAMPED	
all	6	15G238	HXNUT 5/8-11UNC2B SAE ZINC GR2	
all	7	15U315	LOKWASHER MEDIUM 5/8 ZINCPL	
all	8	15D125	HXTAPSCR 5/8-11X4-FLTHRD GR5	
all	9	15K300	HXCAPSCR 1-8UNC2A X4.5 SAE GR5	

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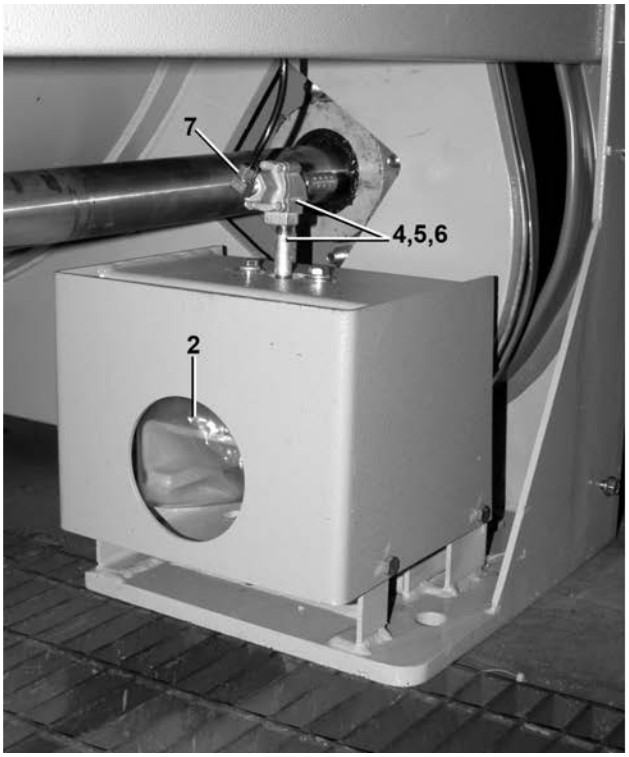
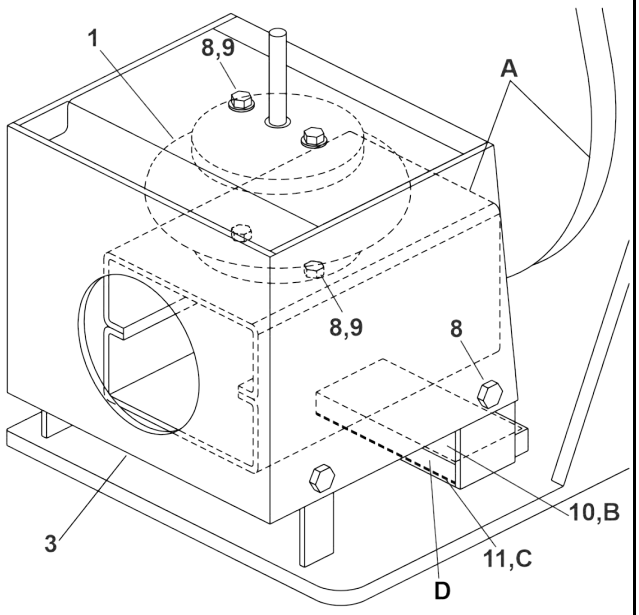
Pushdown

2 Sheets

4244SP2 SM

LEFT FRONT AIRMOUNT





Legend

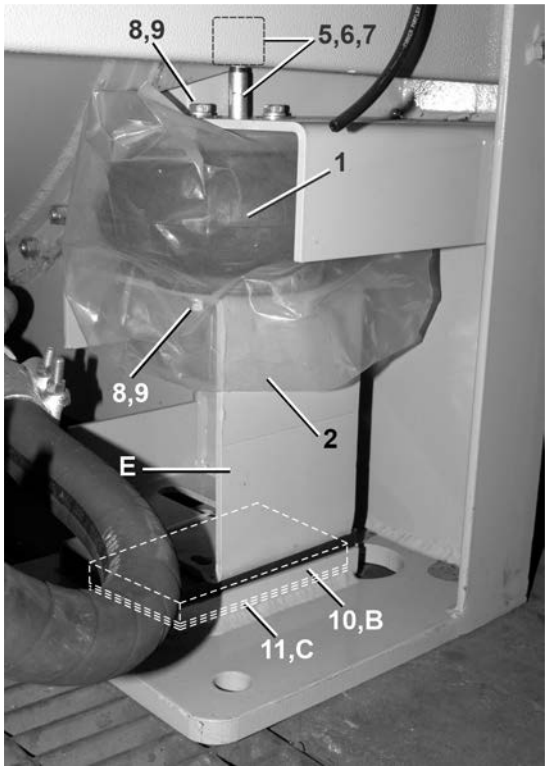
A . . . Shellfront
B . . . Restpad
C . . . Shims
D . . . See Pushdown travel dimensions and adjustment procedures, BNWVUM01.

Pushdown

2 Sheets

4244SP2 SM

RIGHT REAR AIRMOUNT



Legend

B . . . Restpad
C . . . Shims
E . . . Shellback

Table 31. Parts List—Pushdown

Find the assembly for your machine and the letter shown in the "Item" column. The components for your machine will show this letter or the word "all" in the "Used In" column. The numbers shown in the "Item" column are those shown in the illustrations.

Used In	Item	Part Number	Description/Nomenclature	Comments
			Components	
all	1	60B100	AIRMT S116B 1CONV F#W01-358-7564	
all	2	69C050A	POLYETHYLENE BAG 9X6X13X.005	
all	3	W2 15993	*BRACKET=HOLDOWN WELDMENT SG	
all	4	5N0E02KG42	NPT NIP 1/4X2.5 TBEGALSTL SK40	
all	5	96M055	DELTROL QUICK EXHAUST VLV.1/4"	
all	6	27A005	MUFFLER 3/8" BANTAM B38	
all	7	53A031XB	BODY-EL90MALE.25X25 #269C-4-4B	
all	8	15K095	HXCPSCR 3/8-16UNC2AX1 GR5 ZINC	
all	9	15U240	FLATWASHER(USS STD) 3/8" ZNC P	
all	10	02 15450	RESTPAD(RUBBER) 4/42WEHU	
all	11	02 15921	SHIM=HOLDDOWN=42"WEHU	

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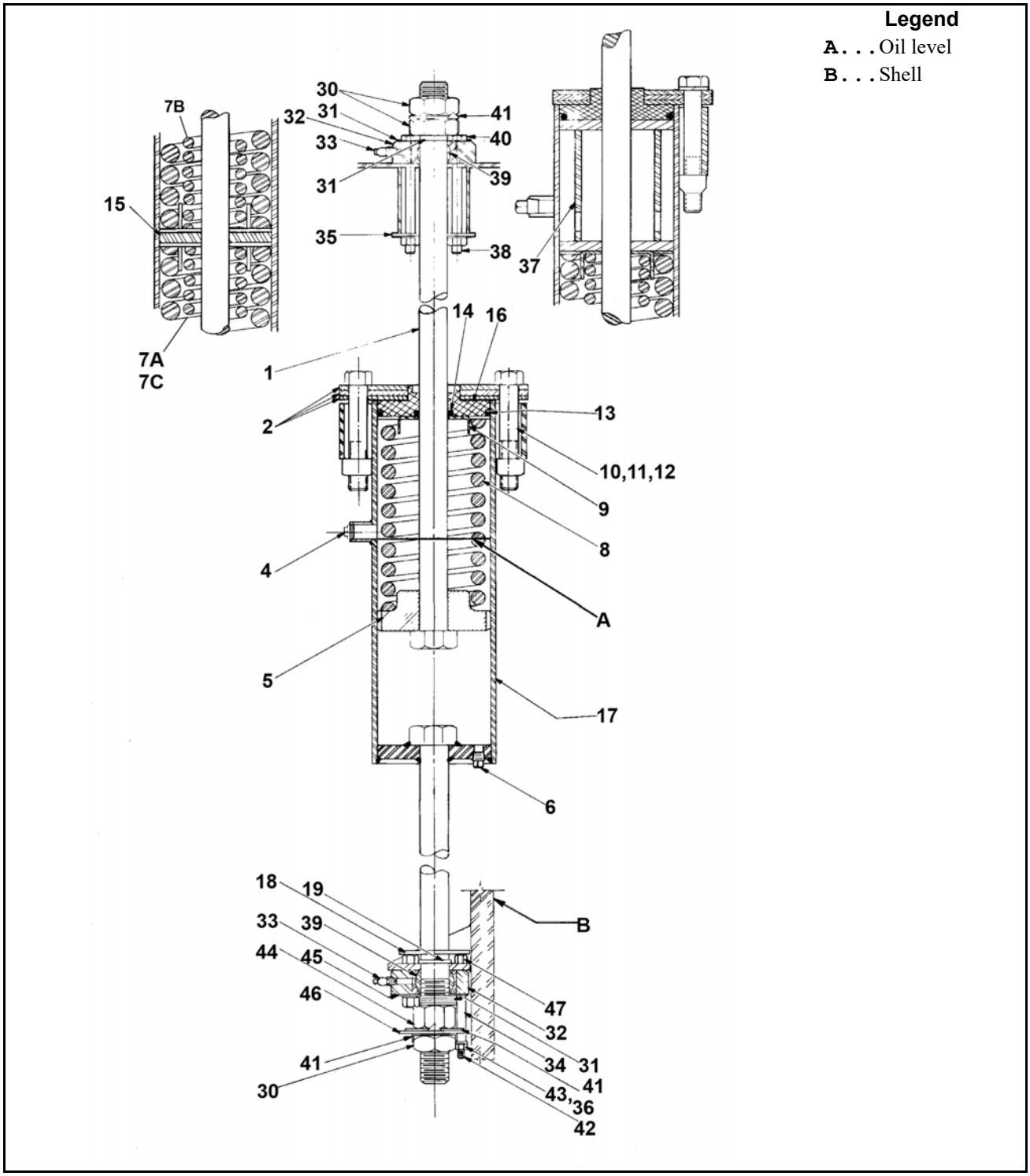
Suspension Cylinder Assemblies

3 Sheets

42031,42044,52038,60044,72044



Suspension Cylinder Assemblies

3 Sheets

42031,42044,52038,60044,72044

Table 32. Parts List—Suspension Cylinder Assemblies

Find the assembly for your machine and the letter shown in the "Item" column. The components for your machine will show this letter or the word "all" in the "Used In" column. The numbers shown in the "Item" column are those shown in the illustrations.				
Used In	**Item**	**Part Number**	**Description/Nomenclature**	**Comments**
			Reference Assemblies	
	B	SA 16 039	*HYDROCUSHION CYL ASSY-"B"	CYLINDER ASSY B
	C	SA 16 038	*HYDROCUSHION CYL ASSY-"C"	CYLINDER ASSY C
	D	SA 28 091	*HYDROCUSHION CYL ASSY-"D"	CYLINDER ASSY D
	F	SA 36 021	*HYDROCUSHION CYL ASSY-"F"	CYLINDER ASSY F
	G	SA 36 023	*HYDROCUSHION CYL ASSY-"G"	CYLINDER ASSY G
	H	SA 36 047	*HYDROCUSHION CYL ASSY-"H"	CYLINDER ASSY H
	K	SA 29 031K	*HYDROCUSHION CYL ASSY-"K"	CYLINDER ASSY K
			(To identify which cylinder is supplied with your machine, see BPWVUJ02 which should be located in the manual next to this document. Once you know which cylinder assembly you have, “B-K” listed above, identify your parts by referencing the “Used In” coding.)	
			Components	
ABCDK	1	02 18244	BOLT=HYDCYL 27+7/8LG+KEYWAY	
K	1	02 18244A	BOLT=HYDCYL 28+7/8LG+KEYWAY	
FGH	1	03 06201	BOLT=HYDCYL 41+7/8LG+KEYWAY	
all	2	02 18840A	UPCAP=HYDROCYL 42+52+60	
all	4	5SP0KGFSS	NPT PLUG 1/2 SOSOLID GALSTL	
BC	5	X2 15356	PISTON=HYDROCYL 6"- 6 NOTCH	
DFGHK	5	X2 18228	PISTON=HYDROCYL 6"- 3 NOTCH	
all	6	5SP0GHFHKM	NPT PLUG 3/8"-HEXCSMAGNETIC ZN	
FG	7A	03 06139	SPRING=IN HYDRO CYL 331LB/IN	FULL SPRING (PURPLE)
G	7B	03 06139A	SPRING=IN HYDRO CYL	PLUS 1/2 SPRING “G” ONLY (PURPLE)
H	7C	03 06338	SPRING INNER-GOLD 14"LONG	GOLD
B	8	02 16068	MAIN SPRING 212LB/IN RED	RED
C	8	02 16125	MAIN SPRING 300LB/IN BLACK	BLACK
D	8	02 19039	MAIN SPRING 480LB/IN GREEN	GREEN
FG	8	03 06138	SPRING=OUT HYDROCYL 667LB/IN	ORANGE
G	8	03 06138A	SPRING=OUT HYDRO CYL	ORANGE
H	8	03 06337	SPRING-OUTER-GOLD 14.5"LONG	GOLD
K	8	03 09016	MAIN SPRING 1035LB/IN BLUE	BLUE
ABCDFG-K	9	02 18619	BUSHING RETAINER + CAD	
H	9	03 06358	BUSHING RETAINER.CAD	
all	10	15B237	HXCAPSCR 1-8UNC2AX5.5 SAEGR5 Z	

Suspension Cylinder Assemblies

3 Sheets

42031,42044,52038,60044,72044

Table 32 Parts List—Suspension Cylinder Assemblies (cont'd.)

Find the assembly for your machine and the letter shown in the "Item" column. The components for your machine will show this letter or the word "all" in the "Used In" column. The numbers shown in the "Item" column are those shown in the illustrations.

Used In	Item	Part Number	Description/Nomenclature	Comments
all	11	15G255A	SQNUT 1-8UNC2B SAE ZINC GR2	
all	12	15U400	LOCKWASHER MEDIUM 1" ZINCPL	
all	13	60C159A	ORING 5.475ID 1/4CS BN70 #433	
all	14	24S040	SEAL URETHNE 1-7/16 2.25 13/32	
GH	15	M2 18690	LOWER CAP=HYDROCYL	
all	16	02 18839A	MACHBUSH HYDRCYL CAP #433-OR	
BC	17	SA 15 084	*HYDCUSH CYL WLDMT (18"X/12")	
DI	17	SA 28 090	*HYDCUSH CYL WLDMT (18"/23")	
FGH	17	W3 06203	*HYDCUSH CYL WLDMT (35"/12")	
K	17	W2 18233	*HYDCUSH CYL WLDMT (20"X22")	
all	18	02 175034	SHIELD-BALLBUSH-4/HYDRO MACH	
BDFGH	19	02 02230	6 WATER BARRIER (NEOPRENE)	
all	30	15G268	HXFINJAMNUT 1+1/2-12UNF2B ZINC	
all	31	02 18571A	PISTON ROD WASHER-.25"TK	
all	32	X3 06252	RETAINER-BALBUSH=4/72WEDU	
all	33	54M025	HYDFIT 1/8"-90 ALEMITE 1613-B	
all	34	27B240	SPCRROLL.5ID.813L.062T STLZNC	
all	35	02 18534	HOLDPLATE= BALLBUSH ZNC/CAD	
all	36	15G230	HXNUT 1/2-13UNC2B SAE ZINC GR2	
F	37	Y3 06200	SPACER=HYDRO-CUSHION CYL-MACH	
all	38	15K203	HXTAPSCR TFL 1/2-13X5 GR5 ZINC	
all	39	54A705	BALBRUSH 1.5 SKF#GEZ108ESAVE467	
all	40	15N037	HXCAPSCR 1/2-13UNC2AX6.5 GR5 Z	
all	41	02 18256	LOKWASH-TONGUE 8/WEH ZINC	
all	42	15K202	HEXCAPSCR 1/2-13UNC2AX5 GR5 ZIN	
all	43	15U300	LOKWASHER REGULAR 1/2 ZINC PLT	
all	44	15G231	HXFINJAMNUT 1/2-13UNC2B ZINC G	
all	45	02 18534	HOLDPLATE= BALLBRUSH ZNC/CAD	
all	46A	02 18795A	WASH-TIMING=HYDRO CYL 45DEG	USE ONE
all	46B	02 18795B	WASH-TIMING=HYDRO CYL 75DEG	USE ONE
all	47	15K191	HXCAPSCR 1/2-13UNC2AX2.5 GR5 Z	
FGH	48	AVH52001	ASSY=OILFIL SPOUT 72HYD CYL	

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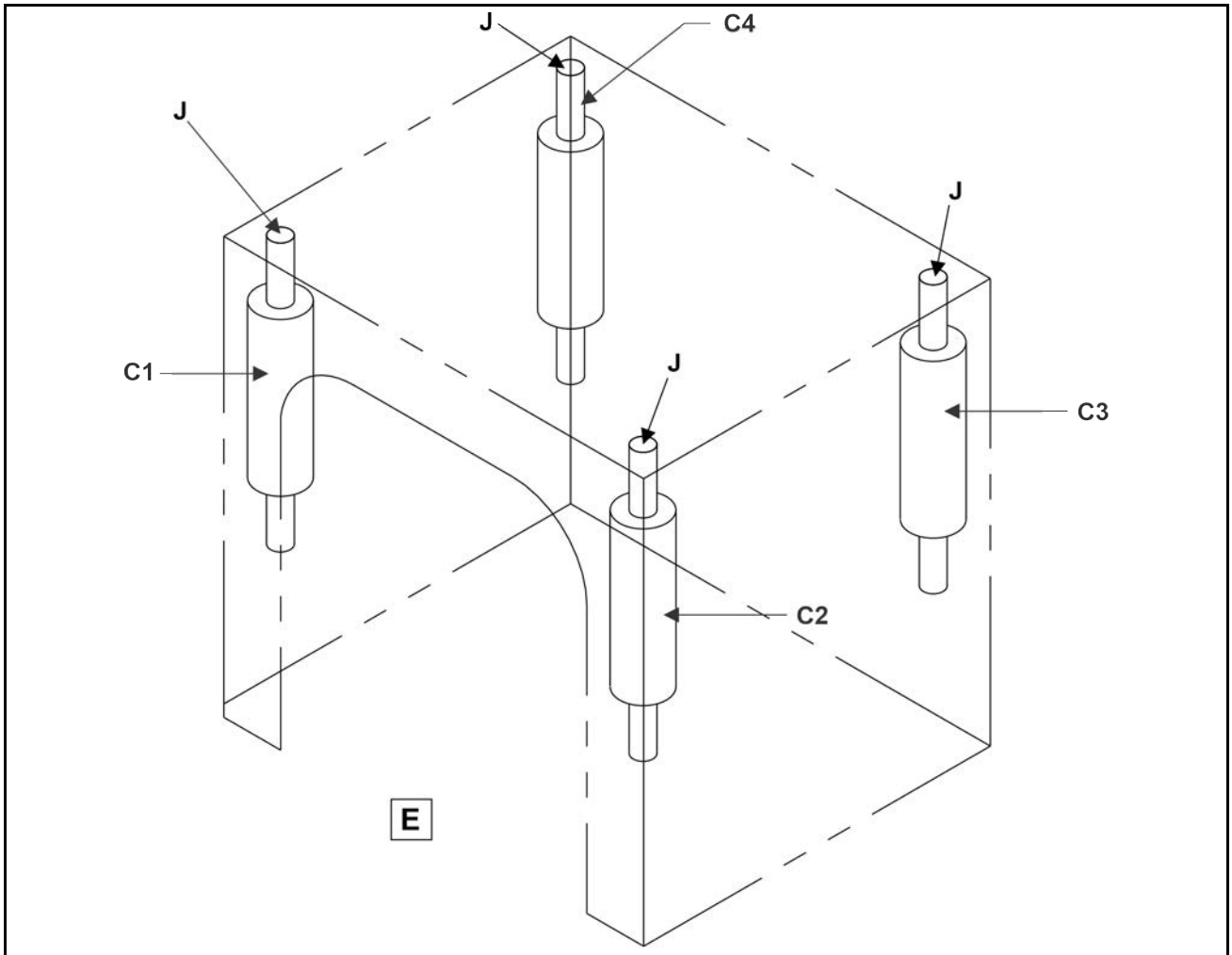
Suspension Cylinder Locations

2 Sheets



Legend

C1 . . Cylinder #1
C2 . . Cylinder #2
C3 . . Cylinder #3
C4 . . Cylinder #4
E . . . Front or soil side
J . . . A letter is stamped on the end of the upper bolt to designate the cylinder assembly.

Suspension Cylinder Locations

2 Sheets

NOTE: See BPWVUJ01. For repair parts: hydrocushion cylinder assembly “B” through hydrocushion cylinder assembly “K”

	Machine Models:								
Position	42031 CP2,NP2, WP2,WP3	42031 SP2, SP3	42044 CP2, NP2,WP2, WP3,D7P	42044 SP2/3; SR2/3	42044 WP2 SM, WP3 SM WR2,WR3	52038 WTL,WTN, WP1	60044 WP2/3 SM SP2/3 SM WR2/3 SR2/3	72044 WP2,WP3, DA1	72044 SP2,SP3 SR2/SR3
Cylinder #1	B	B	C	C	C	D	K	H	G
Cylinder #2	B	C	B	C	C	D	K	H	G
Cylinder #3	B	C	B	C	C	D	K	F	G
Cylinder #4	B	C	C	C	C	D	K	F	G

5 Shell, Cylinder and Doors

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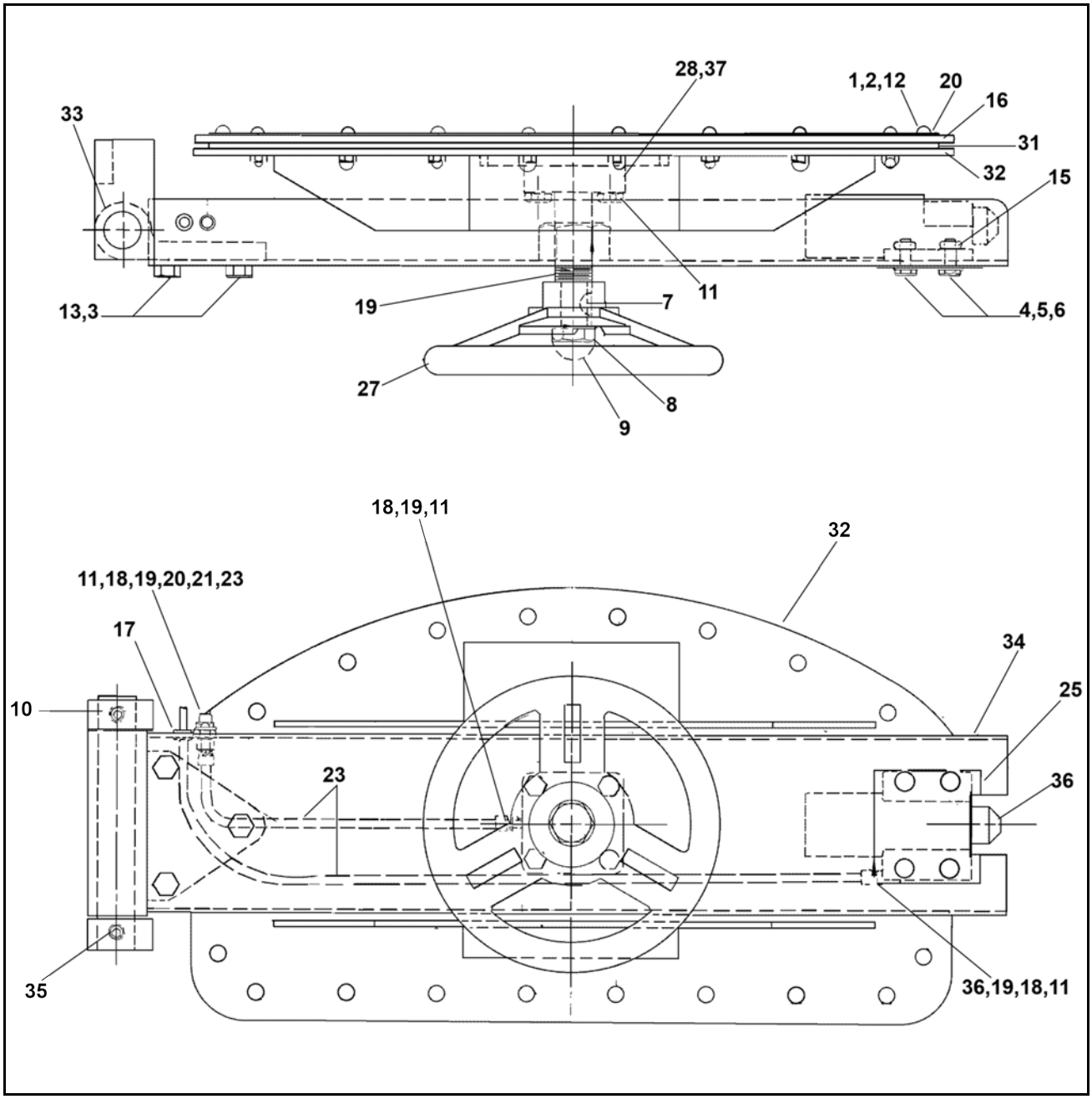
Shell Doors

3 Sheets

42031/42044CP2,NP2,WP2,WP3,SP2,SP3, 4244SP2 SM



Shell Doors

3 Sheets

42031/42044CP2,NP2,WP2,WP3,SP2,SP3, 4244SP2 SM

Table 33. Parts List—Shell Doors

Find the assembly for your machine and the letter shown in the "Item" column. The components for your machine will show this letter or the word "all" in the "Used In" column. The numbers shown in the "Item" column are those shown in the illustrations.

Used In	Item	Part Number	Description/Nomenclature	Comments
			Reference Assemblies	
	A	SA 15 076A	SHELL DOOR ASY 42WE&SG CLEAN	
	B	SA 15 097A	*SHELL DOOR ASY 42SG SOIL	
	C	ASD42001	DOOR&LINER ASSY 42WE&SG	
			Components	
C	1	15N196	PHILRDMACSCR 1/4-20UNC2X1+1/4S	
C	2	15G140	HXCAPNT 1/4-20 #C250=20 NKLPLT	
AB	3	15K151	HXCAPSCR 1/2-13UNC2AX1.25 GR5	
AB	4	12K095	1" X 3/4" WASHER REDUCER	
AB	5	15U255	LOCKWASHER MEDIUM 3/8 ZINCPL	
A	6	15K110	HEXCAPSCR 3/8-16UNC2AX1.5 GR5-	
AB	7	15E007	KEY #7 WOODRUFF 3/4X1/8 SAE103	
AB	8	15U340	LOCKWASH MEDIUM 3/4 ZINCPL	
AB	9	15G244	HEXCAPNUT 3/4-10 #3292 BRASS-N	
AB	10	15Q140	SOKSETSCR CUP 3/8-16X1/2 BLK	
AB	11	53A059A	NUT 1/4"BR.HOLYOKE AND #61A-4	
C	12	15U181	LOCKWASHER MEDIUM 1/4 SS18-8	
AB	13	15U300	LOKWASHER REGULAR 1/2 ZINC PLT	
C	14	15K105	HXCAPSCR 3/8-16UNC2A1.25 GR5 P	
AB	15	15K041E	SKCPSCR 1/4-20X1+1/4"BLK	
C	16	02 15058	GASKET SHELDOR#APG726=BUNA N	
AB	17	12P1AGSB	SNAPBUSH 3/8"MH X 1/4" T=1/8	
C	18	53A501	TUBE INSERT .163"OD #63PT-4-40	
C	19	53A500	SLEEVE DELRIN 1/4"OD#60PT-4	
AB	20	54M020	GREASEFIT 30DEG 1611-B ALEMITE	
AB	21	5SB0E0CBEO	NPTHEXBUSH 1/4X1/8 BRASS 125#	
C	22	53A007B	BODYFEMCON.25X.25COMP#B66A-4B	
AB	23	60E004TE	1/4"OD X.170"ID NYL(BLK)TUBING	
AB	25	15U349	FLTWASH 101NYLON 1.93ODX1.25ID	
AB	26	53A031B	BODY-EL90MALE.25X1/8 #269C-42B	
AB	27	02 15053	HANDWHEEL-10" DDS+KW+POLISH	
B	28	X2 15035	RETAINER=DOOR HANDLE SCREW	
C	29	02 15036	DOOR HANDLE SCREW 100-175WE	
C	30	02 15059	LINER=SHELLDOOR,GASKET	

Shell Doors

3 Sheets

42031/42044CP2,NP2,WP2,WP3,SP2,SP3, 4244SP2 SM

Table 33 Parts List—Shell Doors (cont'd.)

Find the assembly for your machine and the letter shown in the "Item" column. The components for your machine will show this letter or the word "all" in the "Used In" column. The numbers shown in the "Item" column are those shown in the illustrations.

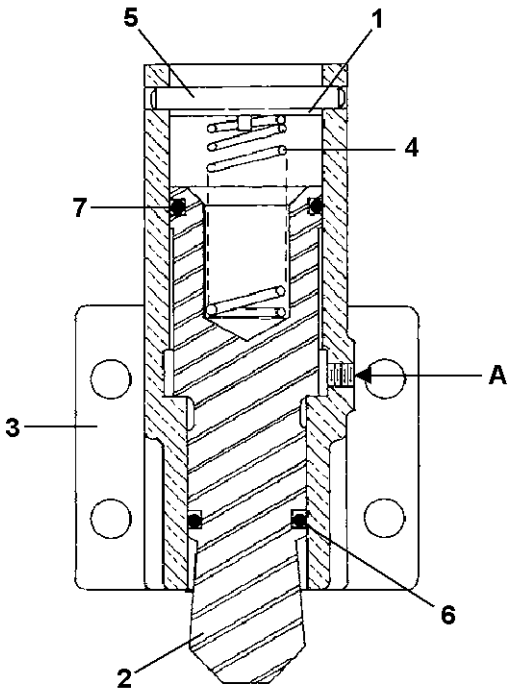
Used In	Item	Part Number	Description/Nomenclature	Comments
C	31	02 15059A	SPACER=HR, SHELLDOOR 42WE	
C	32	Y2 15078	SHELL DOOR 42	
AB	33	X2 15016	DOOR HINGE MACHINED 6.218 LG	
A	34	W2 15034	*BAR DOOR LOCKING WELD	
B	34	W2 15763	*BAR DOOR INTLK WLMT-SG ONLY	
AB	35	02 15633S	ADJPLATE=DOORLATCH SS	
AB	36	SA 15 028	* DOOR LATCH ASSY-DIVCYLS	
C	37	03 64039D	COVER PLATE HANDWHEEL SCREW	
AB	38	54JH13125B	HINGE COL SPLIT 3.12 FL TOP	
AB	39	02 10391A	COVER STRIP=MICRO SW #10	

BPWG4D02 / 2020034 BPWG4D02.1 0000267678 D.2 A.2 1/15/20, 9:51 AM Released

Door Latch

1 Sheet

Cross Section



Legend

A . . . Compressed air

Table 34. Parts List—Door Latch

Find the assembly for your machine and the letter shown in the "Item" column. The components for your machine will show this letter or the word "all" in the "Used In" column. The numbers shown in the "Item" column are those shown in the illustrations.

Used In	Item	Part Number	Description/Nomenclature	Comments
			Reference Assemblies	
	A	SA 15 028	Assembly, Door latch	
			Components	
all	1	02 15105	RETAINER RING	
all	2	02 15297	STRIKER	
all	3	02 15298	CYLINDER	
all	4	02 15836	SPRING	
all	5	15H090	PIN	
all	6	60C122	O-RING, 1”X1/8	
all	7	60C128	O-RING, 1+3/8X1/8	

BPWG4D03 / 2020035 BPWG4D03.1 0000267730 D.2 A.3 1/16/20, 8:50 AM Released

Installation Door Switches

1 Sheet

4244SP2, 4244SP2 SM

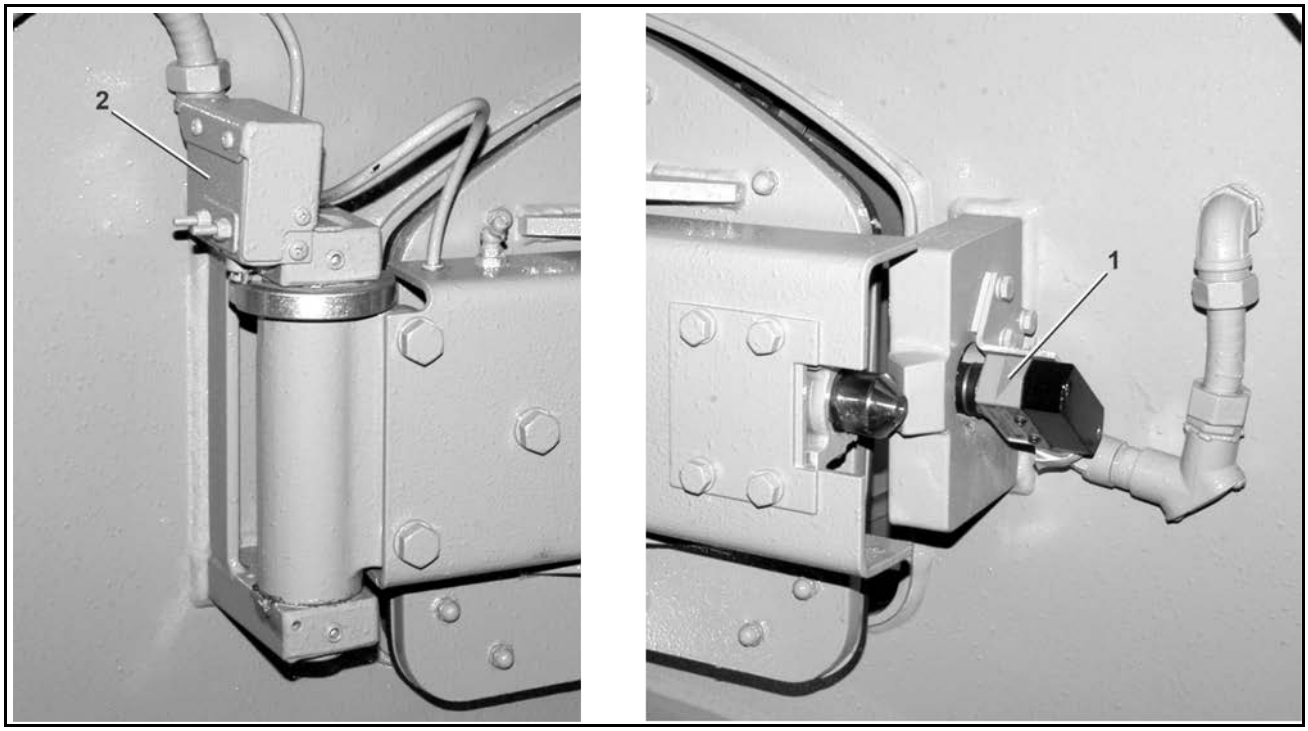


Table 35. Parts List—Installation Door Switches

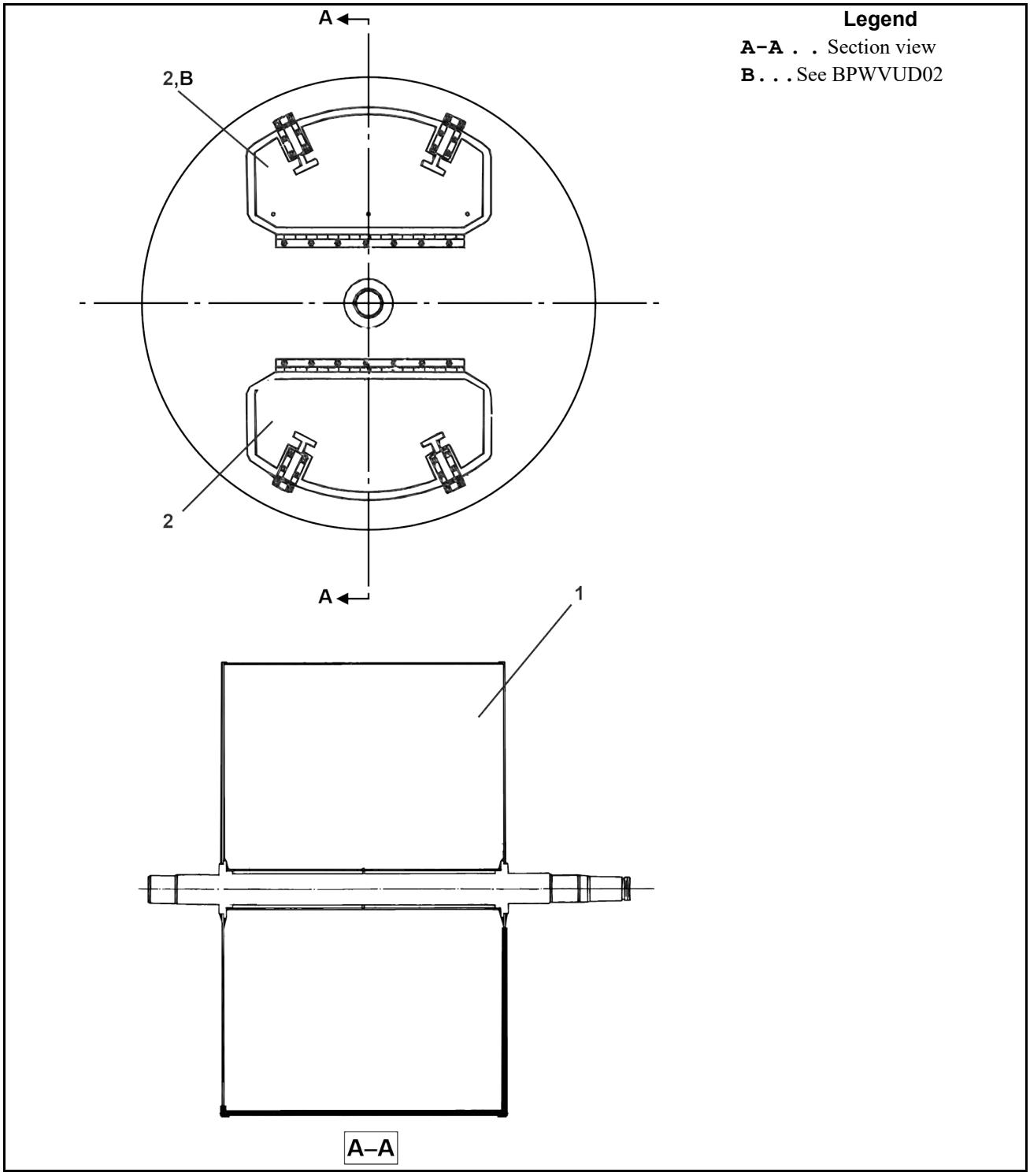
Find the assembly for your machine and the letter shown in the "Item" column. The components for your machine will show this letter or the word "all" in the "Used In" column. The numbers shown in the "Item" column are those shown in the illustrations.				
Used In	**Item**	**Part Number**	**Description/Nomenclature**	**Comments**
Reference Assemblies				
	A	AD 15 042A	DOOR INTERLOCK SWITCH INSTAL	
	B	AD 15 079	DOOR INTERLOCK ASSY S/S <>	
Components				
all	1	09R012STDG	* 09R012 +MOUNTING HDWRE+INST	
all	2	09RM02212S	CAPSW 12' 180DEG ROLLER SILVER	

BPWVUD01 / 2020042 BPWVUD01.1 0000267727 D.2 A.4 1/20/20, 9:33 AM Released

Cylinder Assembly

2 Sheets

42044WP2, NP2, CP2, SP2



Cylinder Assembly

2 Sheets

42044WP2, NP2, CP2, SP2

Table 36. Parts List—Cylinder Assembly

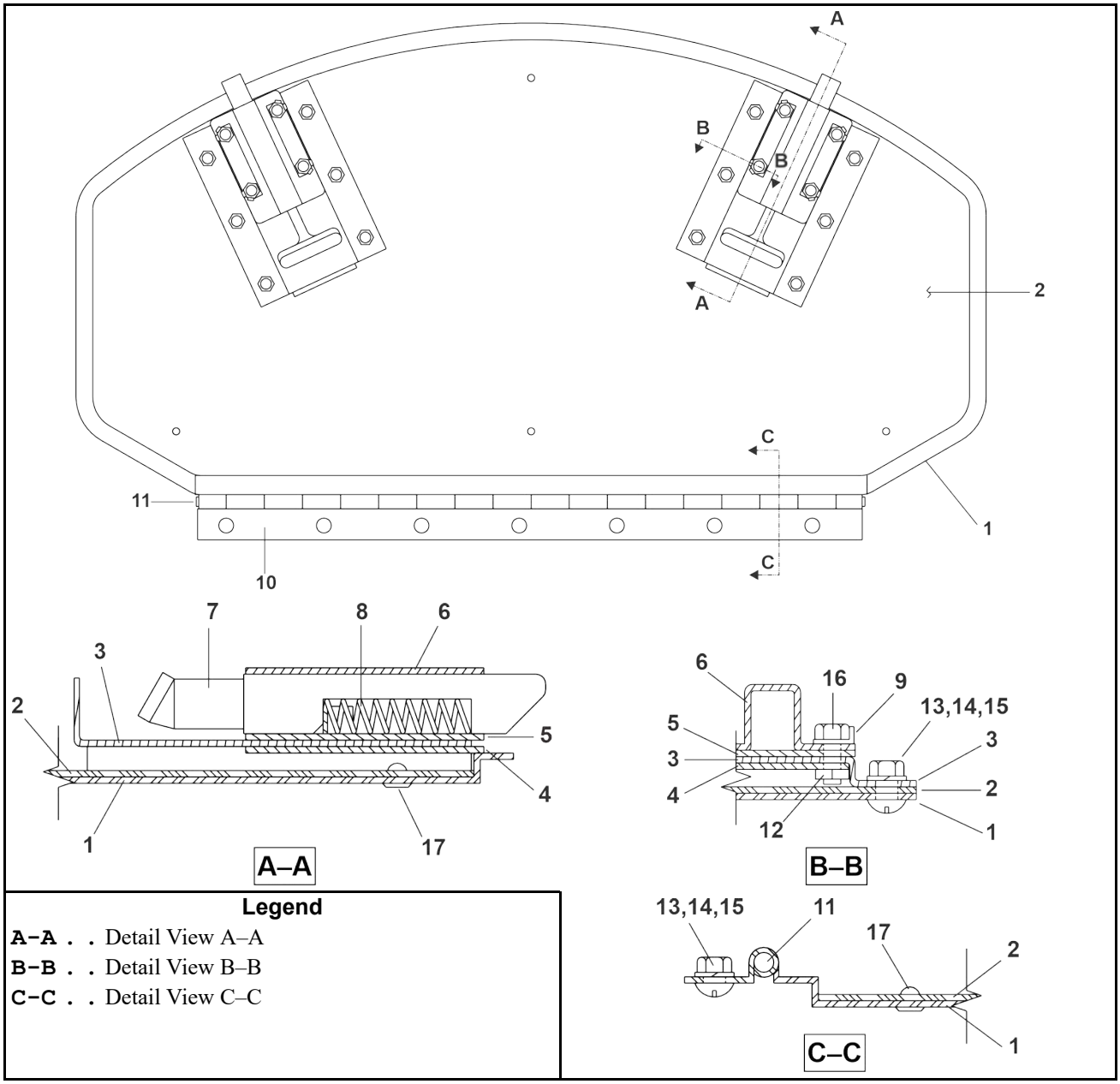
Find the assembly for your machine and the letter shown in the "Item" column. The components for your machine will show this letter or the word "all" in the "Used In" column. The numbers shown in the "Item" column are those shown in the illustrations.				
Used In	**Item**	**Part Number**	**Description/Nomenclature**	**Comments**
Components				
all	1	ACA16WE2B	* CYL ASSY=4244WE2 304L TUNNL	42044WP2,CP2,NP2
all	1	ACA16SG2B	* CYL ASSY=4244SG2 304L TUNNL	42044SP2
all	2	SA 15 103	* CYLDOOR ASSY,STAMPED =42U	

BPWVUD02 / 2020042 BPWVUD02.1 0000267837 D.2 A.3 1/20/20, 9:19 AM Released

Cylinder Doors

2 Sheets

42031/42044 CP2,CP3,NP2,NP3,WP2,WP3,SP2,SP3,DA3; 4244WP2 SM,WP3 SM,SP2 SM



Legend

A-A . . Detail View A–A
B-B . . Detail View B–B
C-C . . Detail View C–C

Cylinder Doors

2 Sheets

42031/42044 CP2,CP3,NP2,NP3,WP2,WP3,SP2,SP3,DA3; 4244WP2 SM,WP3 SM,SP2 SM

Table 37. Parts List—Cylinder Doors

Find the assembly for your machine and the letter shown in the "Item" column. The components for your machine will show this letter or the word "all" in the "Used In" column. The numbers shown in the "Item" column are those shown in the illustrations.				
Used In	**Item**	**Part Number**	**Description/Nomenclature**	**Comments**
Reference Assemblies				
	A	SA 15 103	* CYLDOOR ASSY,STAMPED =42U	
Components				
all	1	02 15826	DOOR-CYLINDER-SS-DRAWN	
all	2	02 15830	PLATE-CYLDOOR REINFORCING	
all	3	02 15825	ADAPTER PLATE=DOOR LATCH	
all	4	02 15832	SHIM=CYL DOOR LATCH	
all	5	02 15077	PLATE = SMALL DOORLATCH	
all	6	02 15041	BODY=CYLDOOR LATCH	
all	7	02 15040	PLUNGER=CYLDOOR LATCH(CAST)	
all	8	02 15093	SPRING=DOOR LATCH 9.4#/INCH	
all	9	02 15255	LOCKWASHER CYLDOOR LATCH	
all	10	02 15823	HALFHINGE-2/42"WEHU-302 SS	
all	11	02 15829	PIN=HINGE 1/4"	
all	12	15G168	SQNUT 1/4-20UNC2 SS18-8	
all	13	15U181	LOCKWASHER MEDIUM 1/4 SS18-8	
all	14	15K031	BUTSOKCAPSCR 1/4-20X1/2 SS18-8	
all	15	15G170	HEXNUT 1/4-20UNC2 SS18-8	
all	16	15N174	HXCAPSCR 1/4-20UNC X5/8SS18-8	
all	17	15J008H	BUTTON HD RIVET 3/16 X 1/2" SS	

6 Staph Guard®

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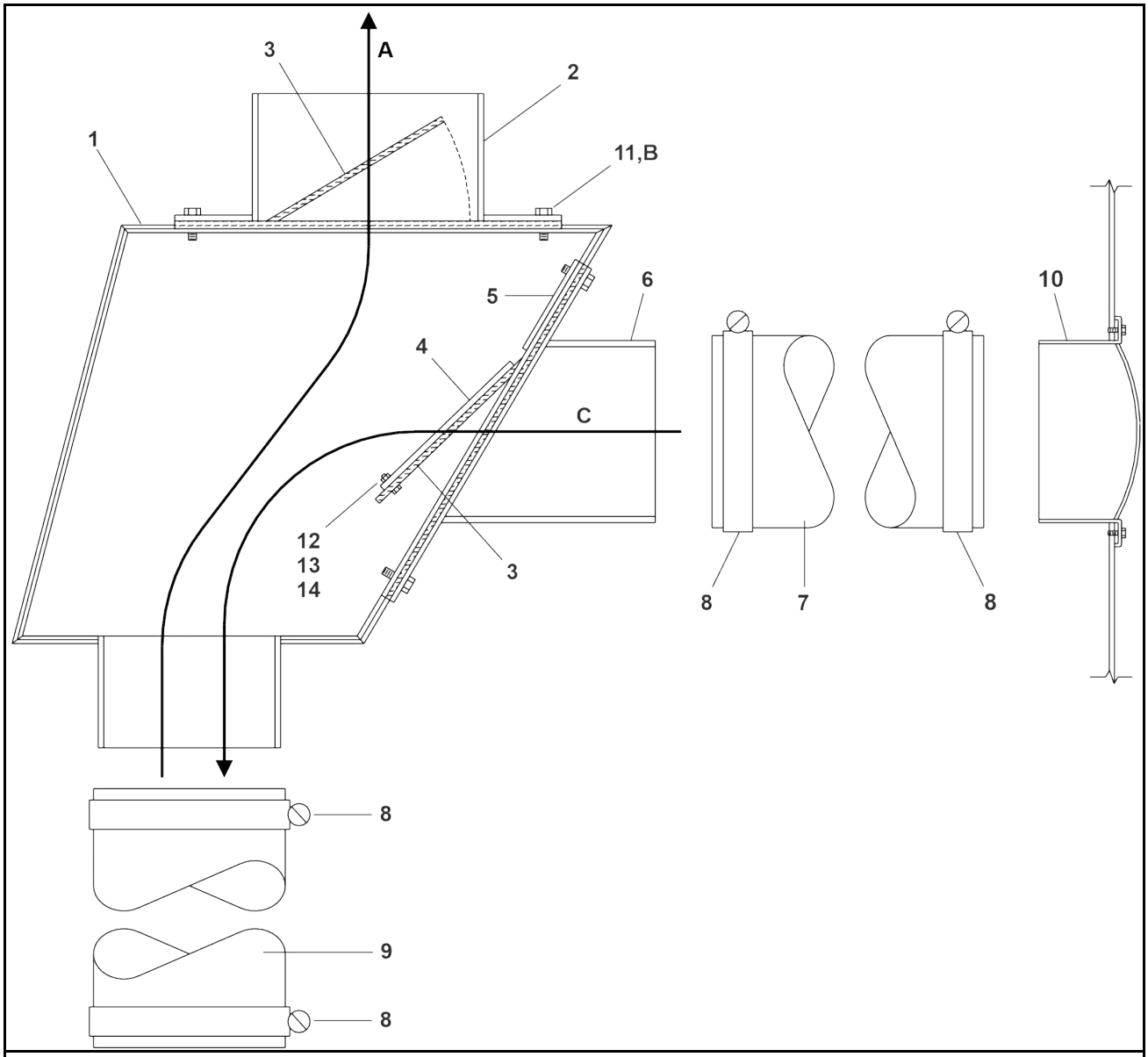
BPWG4P02 / 2020082 BPWG4P02.1 0000276869 D.2 A.3 2/17/20, 2:20 PM Released

Staphairtrol

2 Sheets

4244SP2, 4244SP2 SM



Legend

A . . . Exhaust
B . . . Typical
C . . . Intake

Staphairtrol

2 Sheets

4244SP2, 4244SP2 SM

Table 38. Parts List—Staphairtrol

Find the assembly for your machine and the letter shown in the "Item" column. The components for your machine will show this letter or the word "all" in the "Used In" column. The numbers shown in the "Item" column are those shown in the illustrations.				
Used In	**Item**	**Part Number**	**Description/Nomenclature**	**Comments**
Reference Assemblies				
	A	SA 15 106	* STAPHAIRTROL 4" =42SGU	
Components				
all	1	W2 15842	* WLMT,AIRTROL BODY =42SGU	
all	2	W2 15843	* WLMT,AIRTROL EXHAUST=42SGU	
all	3	02 15386	FLAPPER-AIRTROL 7.5X6=42SGH	
all	4	02 15837	PLATE=AIRTROL FLAPPER	
all	5	02 15862	PLATE-BACKUP AIRTROL 42SGH	
all	6	W2 15844	* WLMT,AIRTROL INTAKE =42SGU	
all	7	60E306A12A	HOSE *3.5"ID GATES PE X12"	
all	8	27A084	HOSECLAMP 3+9/16-4.5CADSC#HS64	
all	9	60E306A06A	HOSE= *3.5 ID PE X6"	
all	10	W2 15892A	* WLMT,AIRTROL INSCREEN=42SGU	
all	11	15P010	TRDCUT PHILPANHDSCR 10-24X1/2S	
all	12	15N050	RDMACSCR 6-32UNC2X1/2 SS18-8	
all	13	15G071	MACHSCRLOKNUT 6-32 NM SER ZINC	
all	14	15U060	FLAT WASHER#6 ANSI TYPEB BRASS	

7 Control and Sensing

BPWG4Z01 / 2020043 BPWG4Z01.1 0000267916 D.2 A.4 1/21/20, 10:52 AM Released

Excursion Switch

1 Sheet

4244SP2 SM

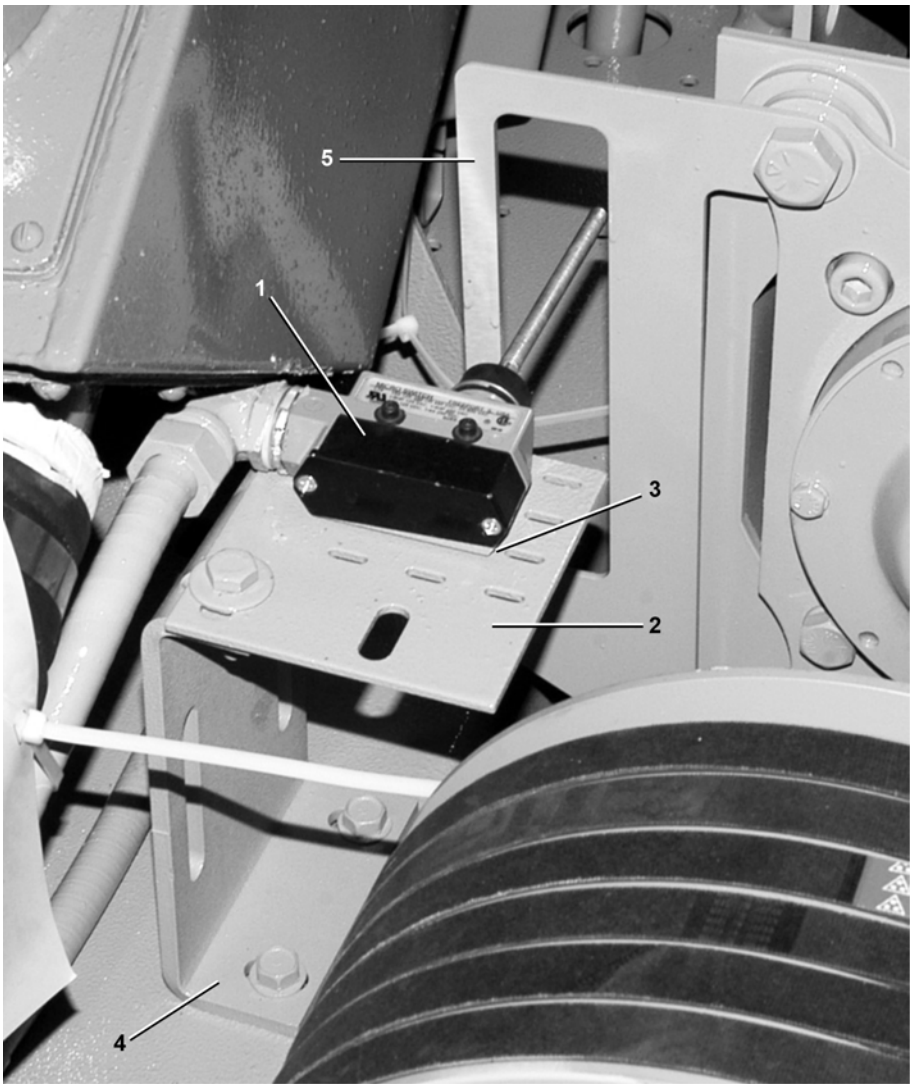


Table 39. Parts List—Excursion Switch

Find the assembly for your machine and the letter shown in the "Item" column. The components for your machine will show this letter or the word "all" in the "Used In" column. The numbers shown in the "Item" column are those shown in the illustrations.				
Used In	**Item**	**Part Number**	**Description/Nomenclature**	**Comments**
Reference Assemblies				
	A	E03 33100A	EXCURSION SWITCH ASSY 42SGH	
Components				
all	1	09R008ASTD	* 09R008A+MOUNTING HDWRE+INST	
all	2	02 15783A	*PLATE=EXCURSION SW MTG	
all	3	02 10391	COVER STRIP=MICRO SW #6-8	

Excursion Switch

1 Sheet

4244SP2 SM

Table 39 Parts List—Excursion Switch (cont'd.)

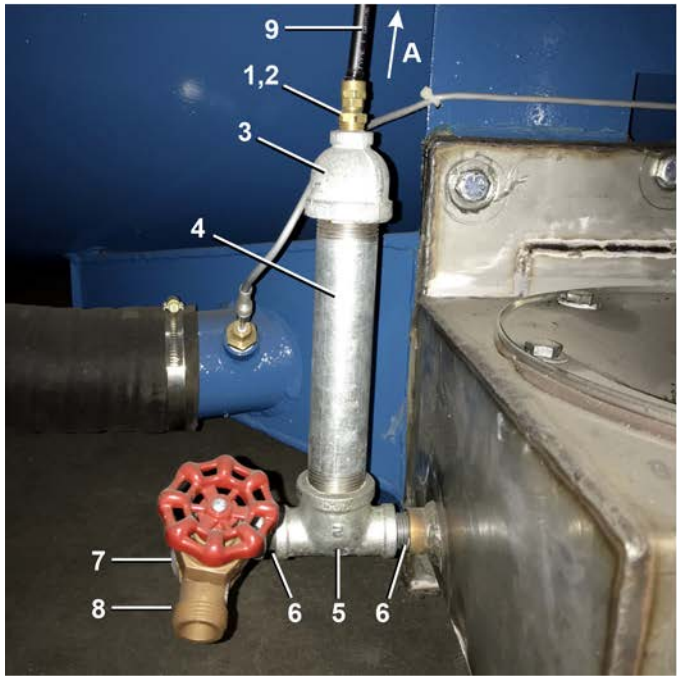
Find the assembly for your machine and the letter shown in the "Item" column. The components for your machine will show this letter or the word "all" in the "Used In" column. The numbers shown in the "Item" column are those shown in the illustrations.				
Used In	**Item**	**Part Number**	**Description/Nomenclature**	**Comments**
all	4	02 15789A	BKT=EXCURSION SWITCH=SGU	
all	5	02 15605E	ACTUATOR=EXCURSION SW 42SG-SIG	

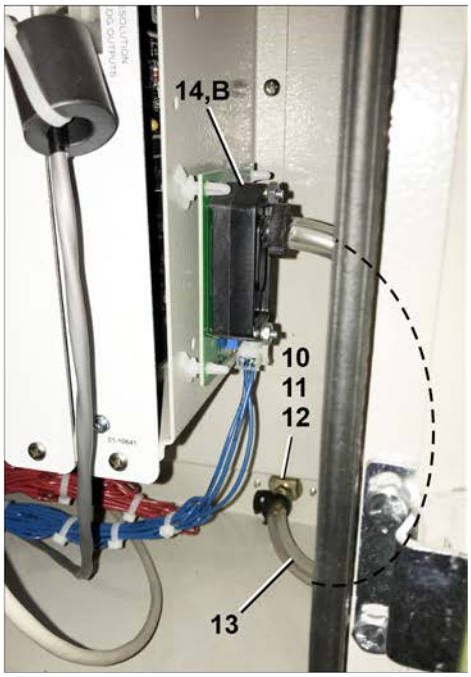
BPWVUZ01 / 2020043 BPWVUZ01.1 0000267913 D.2 A.3 1/21/20, 10:27 AM Released

Air Chamber Level Switch

1 Sheet

42044WR2,WR3,SR2,SR3; 6044WR2,WR3,SR2, SR3; 72044WR2, WR3, SR2, SR3





Legend

A . . . To transducer
B . . . Transducer

Table 40. Parts List—Air Chamber Level Switch

Find the assembly for your machine and the letter shown in the "Item" column. The components for your machine will show this letter or the word "all" in the "Used In" column. The numbers shown in the "Item" column are those shown in the illustrations.

Used In	Item	Part Number	Description/Nomenclature	Comments
Reference Assemblies				
	A	AD 15 090A	AIRCHAMBER PRESWITCH INSTALL	
Components				
all	1	5SB0E0CBEO	NPTHEXBUSH 1/4X1/8 BRASS 125#	
all	2	53A047H	MALCON 5/16X1/8POLY PH#68P-5-2	
all	3	5SR1A0ENF	NPT RED 1X1/4 GALMAL 150#	
all	4	5N1A07AG42	NPT NIP 1X7 TBE GALSTL SK40	
all	5	5S0KNFA1A	NPT TEE 1/2X1/2X1" GALMAL 150#	
all	6	5N0KCLSG42	NPT NIP 1/2XCLS TBE GALSTLSK40	
all	7	5SL0PNFC0K	NPT 90D STREET 3/4X1/2 GAL150#	
all	8	96DB0PNA	HOSEBIBB 3/4" MALEINLT 45DEG. ACETAL	
all	9	60E005	TUBING BLK.POLY.5/160DX3/16ID	
all	10	51V010A	TEE 1/8"BRSEXTR BLOCTYP#2203P2	
all	11	51E502A	HOSESTEM BRASS 1/8MPT X3/16	

Air Chamber Level Switch

1 Sheet

42044WR2,WR3,SR2,SR3; 6044WR2,WR3,SR2, SR3; 72044WR2, WR3, SR2, SR3

Table 40 Parts List—Air Chamber Level Switch (cont'd.)

Find the assembly for your machine and the letter shown in the "Item" column. The components for your machine will show this letter or the word "all" in the "Used In" column. The numbers shown in the "Item" column are those shown in the illustrations.				
Used In	**Item**	**Part Number**	**Description/Nomenclature**	**Comments**
all	12	5SP0CBEHS	NPT PLUG 1/8 HXCTRSNK BRASS	
all	13	60E004NA	TUBING CLEAR PVC 3/16"IDX5/16"OD	
all	14	08BNLTT	LEVEL TRANSDUCER BD->TEST	

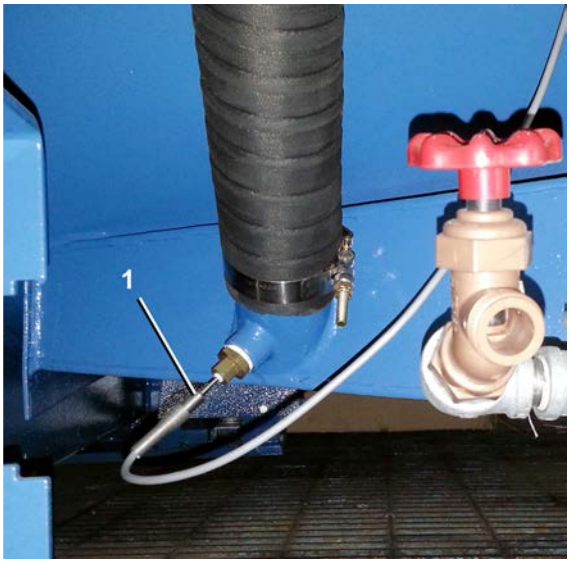
BPWVUZ02 / 2020043 BPWVUZ02.1 0000267993 D.2 A.4 1/21/20, 11:26 AM Released

Temperature Probe

1 Sheet

42044SR2, 42044WR2

42044SR2



42044WR2

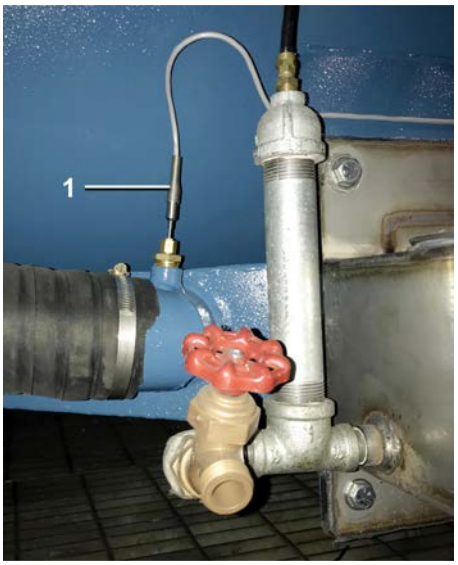


Table 41. Parts List—Temperature Probe

Find the assembly for your machine and the letter shown in the "Item" column. The components for your machine will show this letter or the word "all" in the "Used In" column. The numbers shown in the "Item" column are those shown in the illustrations.				
Used In	**Item**	**Part Number**	**Description/Nomenclature**	**Comments**
Components				
all	1	30R0043P	TEMP PROBE:THERMISTOR 30K OHMS	

BNWUUM01 / 2019345 BNWUUM01 0000250244 C.2 11/7/19, 10:43 AM Released

7.1 Vibration Safety Switch Adjustments

BNWUUM01.C01 0000250243 D.2 C.2 A.3 1/2/20, 2:19 PM Released

7.1.1 What the Vibration Safety Switch Does

BNWUUM01.C02 0000250242 D.2 C.2 A.3 1/2/20, 2:19 PM Released

The **vibration safety switch** in Figure 47: Vibration Switch, page 145 is an important safety feature. If properly adjusted, the switch will momentarily actuate as a result of repeated machine movement caused by an out-of-balance condition. Table 42, page 144 below illustrates the effect of the **vibration safety switch** actuation.

Table 42. Effect of Tripping Vibration Safety Switch

Machine Model	Function of Vibration Safety Switch
30015, 30020, and 30022	Disables high speed extract
All microprocessor-controlled washer-extractors not listed above, and all dye machines	De-energizes three-wire relay, effectively terminating machine operation

7.1.2 Adjustments

BNWUUM01.C03 0000250240 D.2 C.2 B.2 11/7/19, 10:43 AM Released

When the machine leaves Milnor®, the actuator arm is tie-wrapped to prevent damage (except on 30015, 30020, and 30022 models). **This tie wrap must be removed after the machine is set into position but before the machine is operated.**

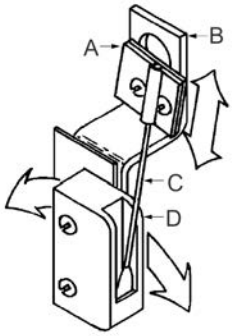
Adjustment of this switch from the factory setting is not recommended; however, it should be checked for proper functioning and adjusted if its proper setting is lost.

As shown in Figure 47: Vibration Switch, page 145 , the unit consists of a **sensitive micro-switch** with an extended actuating arm supporting an eccentric weight. The weight may be adjusted by moving it up and down on the arm and by rotating it on the arm. In addition, the **micro-switch** itself may be tilted from side to side.

The sensitivity of the switch increases as the eccentric weight is raised on the actuating arm and decreases as the weight is lowered.

The unit should be adjusted so that the actuating arm will always reset by itself, this being accomplished by rotating either the switch or the weight to give just enough bias to cause the switch to reset. Check the adjustment by moving the arm to the left then slowly releasing it. Make sure the micro-switch clicks when the arm is **slowly** released, thus indicating that it has reset. In the released position, the arm should rest **lightly** but definitely against the stop on the **micro-switch** case that prevents any further arm movement to the left.

Figure 47. Vibration Switch



Legend

A . . . Eccentric weight (adjusts up and down)
B . . . Mounting bracket
C . . . Actuating arm
D . . . Microswitch (adjusts side to side)

For machines with rigid mounted shells, where the machine is bolted to a very substantial foundation, very little machine movement will occur for a given degree of out-of-balance. Under such conditions it may be better to adjust the switch to be very sensitive. With less substantial foundations (e.g., ones where the sub-soil is mushy or springy or otherwise not as desirable), considerably greater machine movement will occur for a given degree of out-of-balance, in which case a less sensitive **vibration switch** setting may be indicated.

BPWOAZ03 / 2019375 BPWOAZ03.1 0000252209 D.2 B.3 1/2/20, 2:25 PM Released

Vibration Safety Switch

1 Sheet

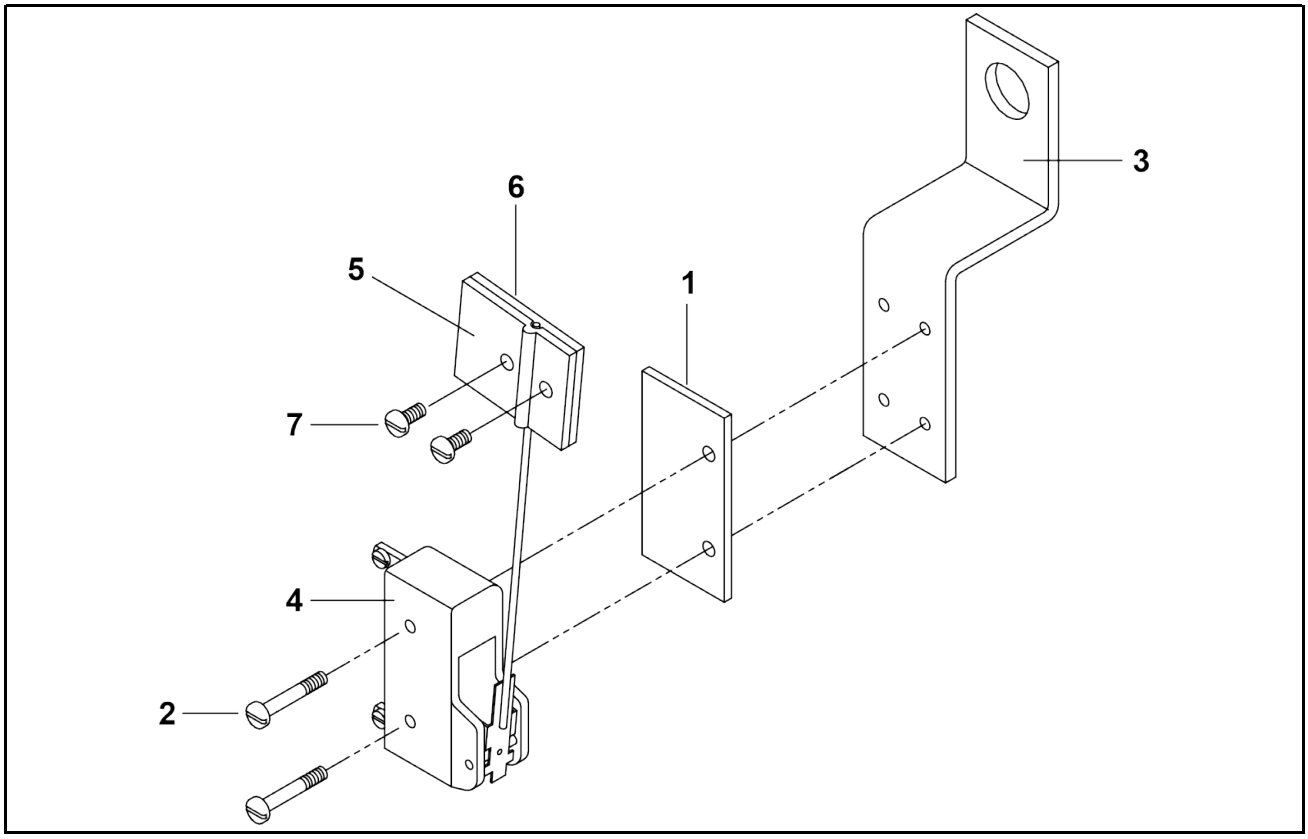


Table 43. Parts List—Vibration Safety Switch

Find the assembly for your machine and the letter shown in the "Item" column. The components for your machine will show this letter or the word "all" in the "Used In" column. The numbers shown in the "Item" column are those shown in the illustrations.				
Used In	**Item**	**Part Number**	**Description/Nomenclature**	**Comments**
Reference Assemblies				
	A	SAE03 151	* ASSY-VIBRATION SWT=LG CONTR	
Components				
all	1	02 02038	PLATE INSULATING SMALL 9NOV51	
all	2	15P008	TRDCUT PANHD 6-32X1 NIKSTL +WA	
all	3	02 15119	BRACKET=VIBSW CAD	
all	4	09R020	SWITCH NC VIBR#WZ-2RW84429-P52	
all	5	03 01059	VIBSWITCH CLAMP CADSTL	
all	6	03 01058	VIBSWITCH WEIGHT-CADSTL	
all	7	15P101	TRDCUT-F PANHD 8-32X3/8 NIKSTL	

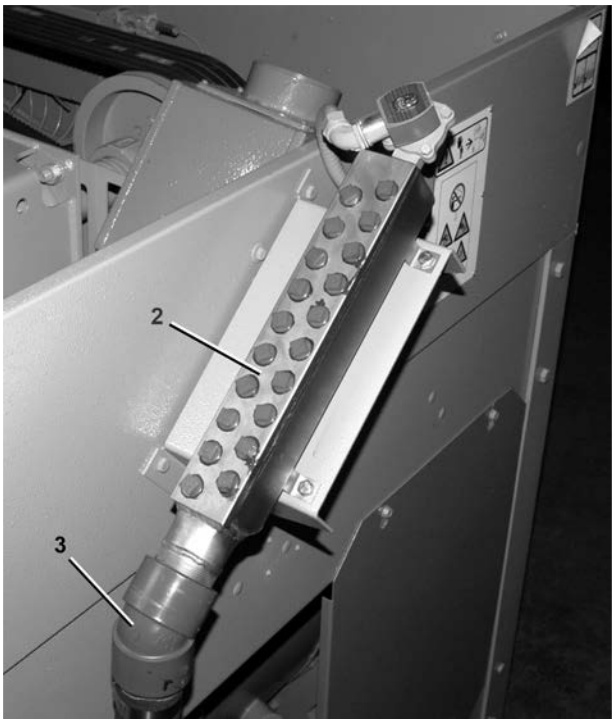
8 Chemical Supply Devices

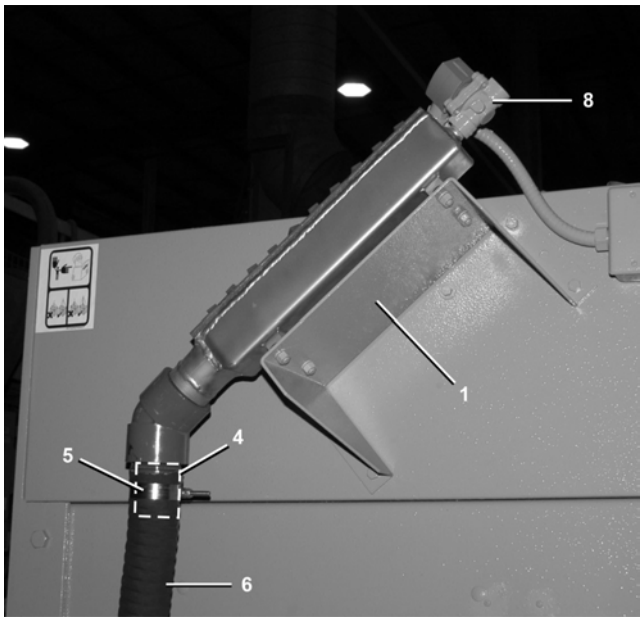
BPWG4C01 / 2020045 BPWG4C01.1 0000268020 D.2 A.4 1/23/20, 11:50 AM Released

Peristaltic Connection

2 Sheets

4244SP2, SP3, 4244SP2 SM





Peristaltic Connection

2 Sheets

4244SP2, SP3, 4244SP2 SM

Table 44. Parts List—Peristaltic Connection

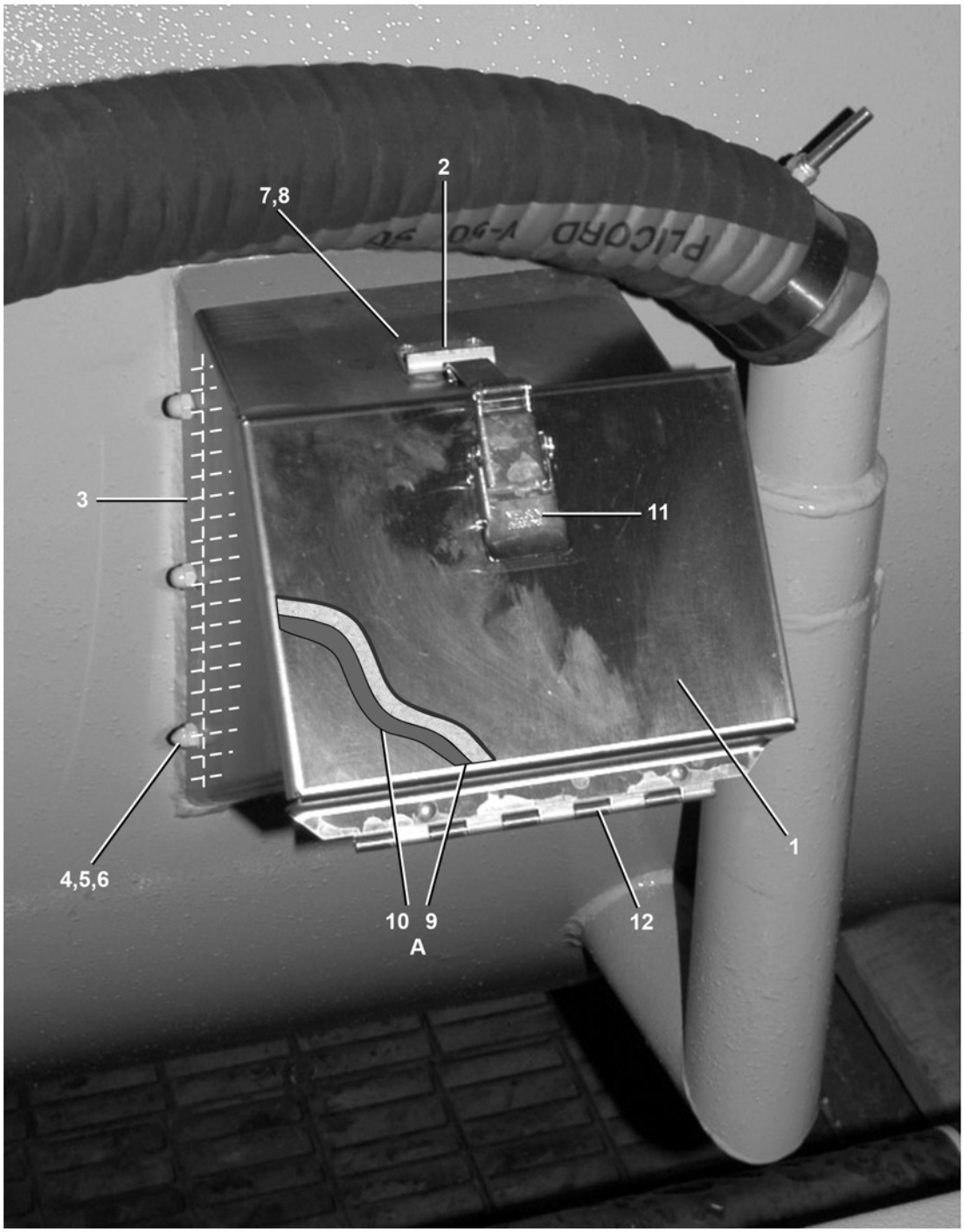
Find the assembly for your machine and the letter shown in the "Item" column. The components for your machine will show this letter or the word "all" in the "Used In" column. The numbers shown in the "Item" column are those shown in the illustrations.				
Used In	**Item**	**Part Number**	**Description/Nomenclature**	**Comments**
Components				
all	1	03 25267E	PERISTALTIC MOUNTING BRACKET	
all	2	AWL64005A	ASSY=PARASTALTIC CONNECT 60	
all	3	5SL2AP8K	NPT EL45DEG 2"PVC SH80 FPTXFPT	
all	4	51AB2AN2AA	HOSE INSERT X MPT 2"PVC40	
all	5	27A072	T-BOLT HOSECLAMP2.16-2.47CADSC	
all	6	60E255	HOSE 2" WATER CORRUGATED(V50)	
all	7	02 15936A	COVER=4244WP2&3 SUPPLY SIDE	
all	8	96TDC2AA37	1/2"N/C2WY120V50/60C VALVE	

BPWG4C02 / 2020045 BPWG4C02.1 0000268041 D.2 B.2 6/29/20, 11:04 AM Released

Soap Chute

1 Sheet

4244SP2/SP3, 4244SP2 SM



Legend

A . . . Within lid

Soap Chute

1 Sheet

4244SP2/SP3, 4244SP2 SM

Table 45. Parts List—Soap Chute

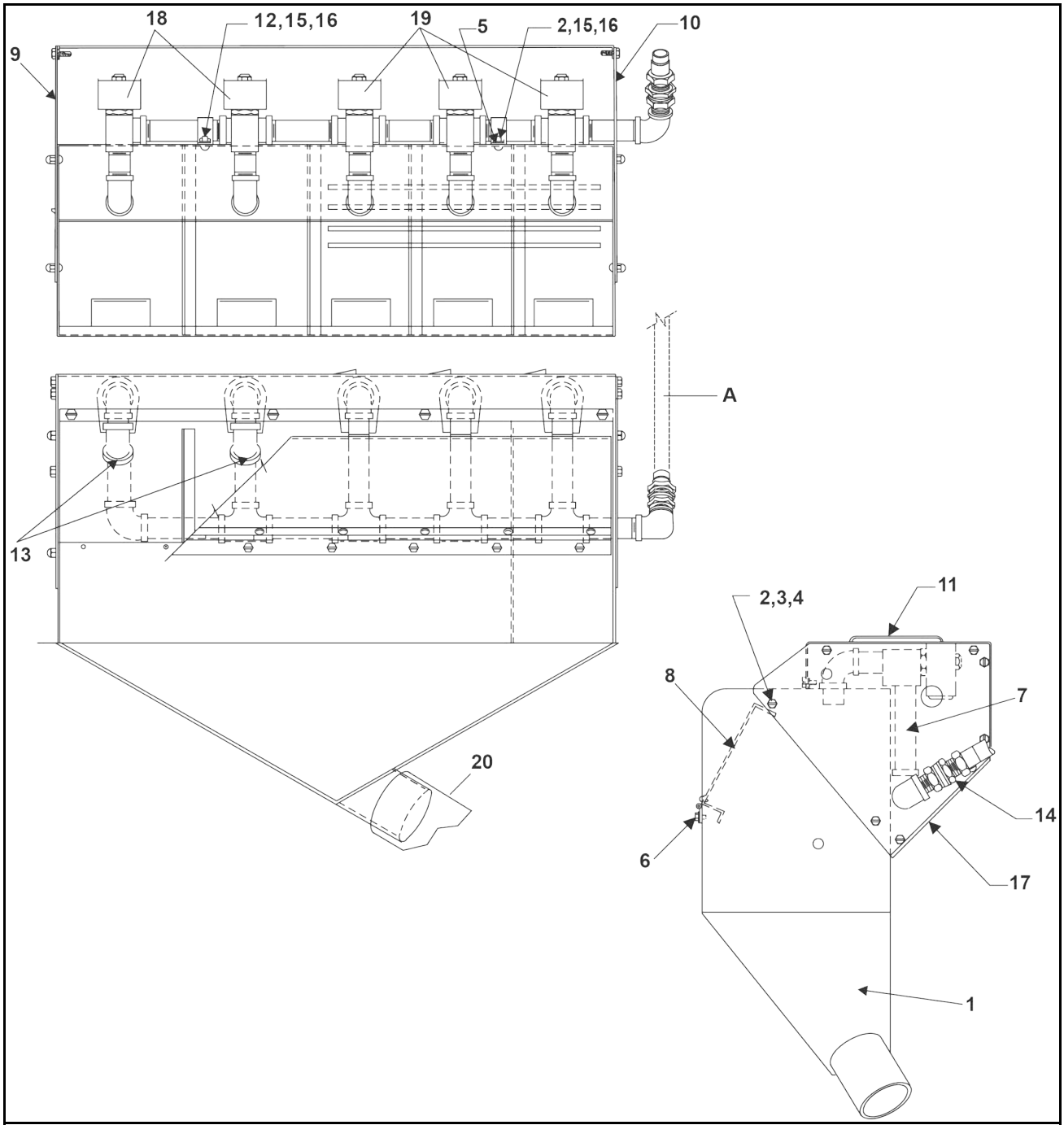
Find the assembly for your machine and the letter shown in the "Item" column. The components for your machine will show this letter or the word "all" in the "Used In" column. The numbers shown in the "Item" column are those shown in the illustrations.				
Used In	**Item**	**Part Number**	**Description/Nomenclature**	**Comments**
Reference Assemblies				
	A	AD 15 091	SOAP CHUTE LID INSTALLATION	
	B	SA 15 102	*LID ASSY=SOAPCHUTE-GASKETED	
Components				
A	1	SA 15 102	*LID ASSY=SOAPCHUTE-GASKETED	
A	2	02 18640	HOOK=SOAPCHUTE LATCH	
A	3	02 15982	GUARD=42WE SOAP CHUTE	
A	4	15N130	RDMACSCR 10-24UNC2A X 1/2 SS18	
A	5	15G121	HXCAPNUT 10-24UNC2 #3266BR NKL	
A	6	24G018N	ROLLED WASH.194ID NYLTITE 10W	
A	7	15P100	#8 X 3/8 PHILPANHD TYPE B SMS	
A	8	15U181	LOCKWASHER MEDIUM 1/4 SS18-8	
B	9	02 15838	GASKET-SPONGRUBBER=SOAPCHUTE	
B	10	02 15839	GASKET-SHEETRUBBER=SOAPCHUTE	
B	11	27A009B	CATCH SPECIAL 2-HOLE BASE	
B	12	02 02706	HINGE=SOAP CHUTE	

BPWVUC01 / 2020063 BPWVUC01.1 0000268133 D.2 A.6 2/4/20, 9:29 AM Released

Supply Injector Assembly

2 Sheets

4244WP2/WP3, 4244WP2 SM, 4244SP2/SP3, 4244SP2 SM



Legend

A . . . Flushing water supply (see BPWVUW01)

Supply Injector Assembly

2 Sheets

4244WP2/WP3, 4244WP2 SM, 4244SP2/SP3, 4244SP2 SM

Table 46. Parts List—Supply Injector Assembly

Find the assembly for your machine and the letter shown in the "Item" column. The components for your machine will show this letter or the word "all" in the "Used In" column. The numbers shown in the "Item" column are those shown in the illustrations.

Used In	Item	Part Number	Description/Nomenclature	Comments
			Reference Assemblies	
	A	SA 16 035A	ASSY,5FLUSHSUPINJ=4244WP+SP	4244WP2/WP3,4244SP2/SP3
	B	SA 16 034A	VALVASSY 5FLUSH=4244 WP+SP	
			Components	
all	1	W2 15805	92612C* SUP-CHUTE 5-FLUSH=4231SGU	
all	2	24G018N	ROLLED WASH. 194ID NYLTITE 10W	
all	3	15G121	HXCAPNUT 10-24UNC2 #3266BR NKLPLTG2	
all	4	15N117	RDMACSCR 10-24UNC2X3/8 SS18-8	
all	5	15G130	HEXMACHSCRNUT 10-24UNC2 SS18-8	
all	6	15P100	07Z THDCUT-F PANHD 8-32 X 3/8 SS410	
all	7	SA 16 034A	86081# VALVASSY 5FLUSH=4244 WP+SP	
all	8	SA 09 047	70297B COVER=SUPPLY INJECTOR	
all	9	02 09100	92303B FRT VALVE ENCLOSURE	
all	10	02 09112	92303B REAR VALVE ENCLOSURE	
all	11	02 09103	93363C ENCLOSURE-VAL, TP+SIDES	
all	12	27A017	PIPESTRP 1/2" 1-HOLE R. COND.	
all	13	5SL0KBEA	NPTELB 90DEG 1/2 BRASS 125#	
all	14	51X017	UNIONSTRADT 1/2" PH#0107-8-8	
all	15	15N140	RDMACSCR 10-24UNC2AX3/4 ZINC GR2	
all	16	15G125	HXMACHSCRNUT 10-24 UNC2B ZINC GR2	
all	17	02 09102	91116B+ ENCLOSURE=VALVE LOW SIDEWRAP	
all	18	96TDC2AA37	1/2" N/C 2WAY 120V50/60C VALVE	
all	19	96TCC2AA37	3/8" N/C 2WAY 120V50/60C VALVE	
all	20	60E301A18A	HOSE= *2.5"ID PE X18"	

9 Water and Steam

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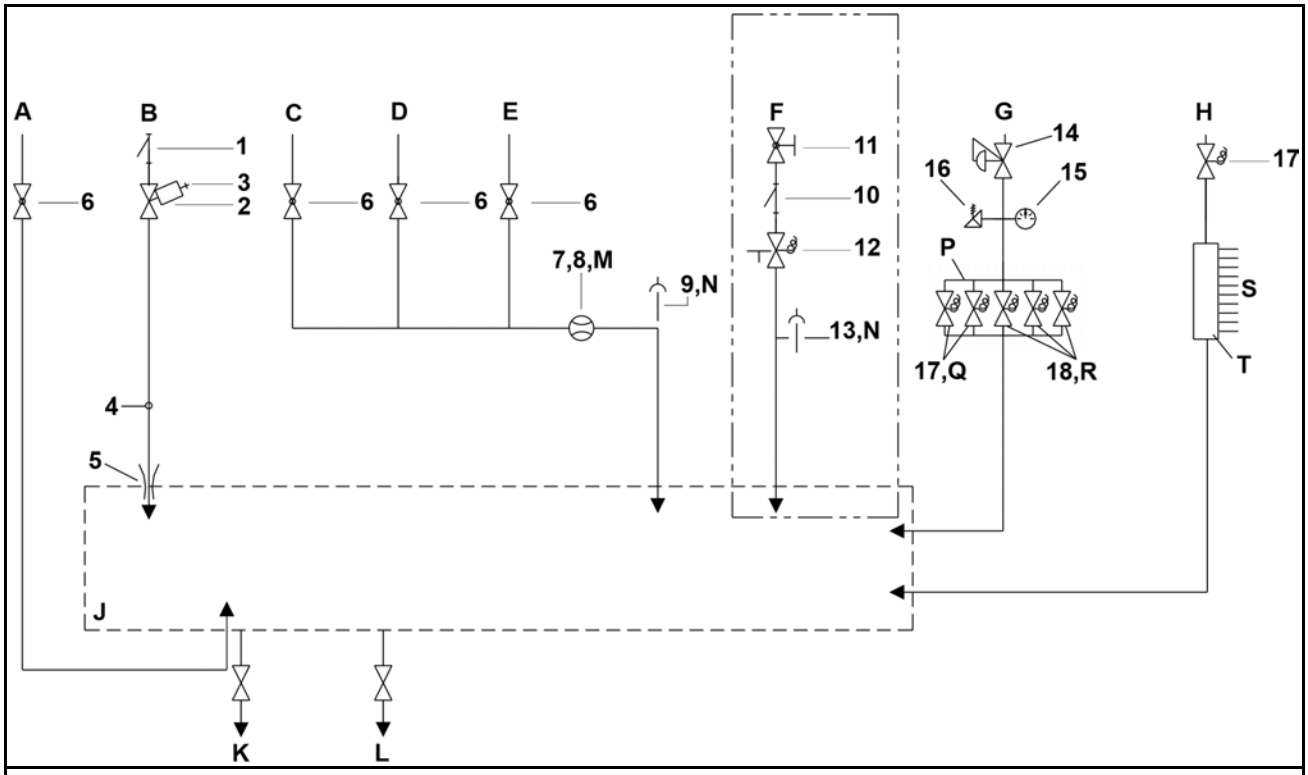
Water and Steam Schematics

2 Sheets

4244SP2/SP3, 4244SP2 SM



Legend

A . . . Optional reuse inlet
B . . . Steam
C . . . Hot water
D . . . Cold water
E . . . Third water
F . . . Optional independent cooldown assembly
G . . . Flushing inlet 5 compartment supply
H . . . Flushing inlet peristaltic pump connection
J . . . Shell
K . . . Optional reuse drain
L . . . Standard drain
M . . . Optional flow sensor
N . . . Optional siphon breaker
P . . . Supply injector
Q . . . 2 places
R . . . 3 places
S . . . Chemical supply lines by others
T . . . Peristaltic supply manifold

Water and Steam Schematics

2 Sheets

4244SP2/SP3, 4244SP2 SM

NOTE: Standard cooldown uses the standard water inlet vale and is software controlled. The independent cooldown valve is optional.

Table 47. Parts List—Water and Steam Schematics

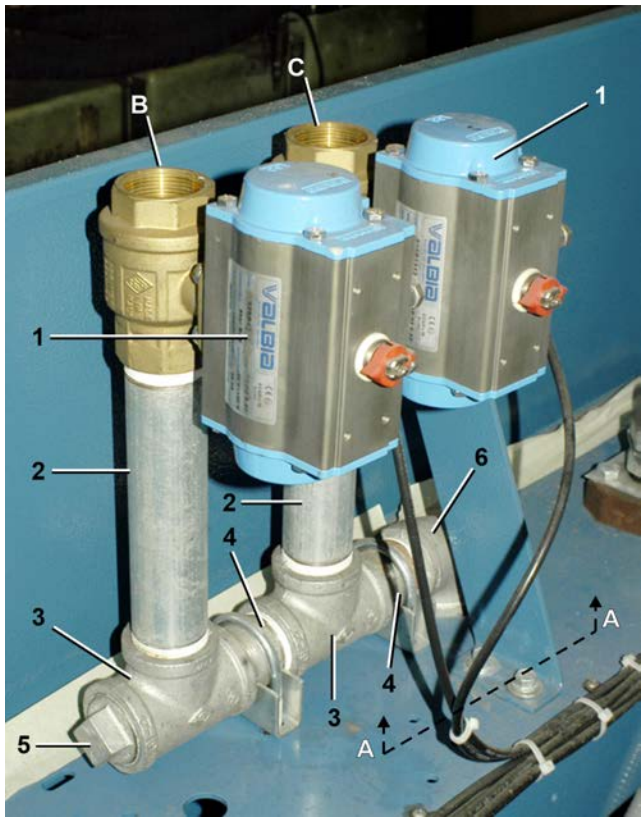
Find the assembly for your machine and the letter shown in the "Item" column. The components for your machine will show this letter or the word "all" in the "Used In" column. The numbers shown in the "Item" column are those shown in the illustrations.				
Used In	**Item**	**Part Number**	**Description/Nomenclature**	**Comments**
Components				
all	1	51T060	Y-STRAINER 1+1/4" CAST IRON	
all	2	96D0011E	1.25"NPTBRZ N/C STEAMVALANGBD	
all	3	96H018	ANGLE NEEDLE VLV 1/4"T X 1/8MP	
all	4	60E096C35A	STEAMH*OSE=1.25"X35"+2ENDS=(NO	
all	5	W2 18801	*LMT=STEAM NOZZLE	
all	6	96D087FBA	1.5"BALVAL+ACT BRS N/C BONOMI (SPRING RET)	
all	7	30F515	FLOW SENSOR SIGNET #P51530-PO	
all	8	30F518	SIGNET S/S PIPE TEE 1.5"	
all	9	96M033	2.5"VAC BREAKER WATTS288A M2	
all	10	51T030	Y-STRAINER 3/4" CAST IRON	
all	11	96D050A	3/4"BALLVALVE BRZ WATTS#B6100	
all	12	96P053A37	3/4"VAL 110V HAYS#6-2110IS-120	
all	13	96M022	3/4" VAC BREAKER #288A	
all	14	96J030D	1/2"PRESSREG SET28# FEMXUN	
all	15	30N100	PRESSGAUGE 1/8"BACKCN.0-30PSI	
all	16	96M001	1/2X3/8" RELIEF VALVE SET31#	
all	17	96TDC2AA37	1/2" N/C 2WAY 120V50/60C VALVE	
all	18	96TCC2AA37	3/8" N/C 2WAY 120V50/60C VALVE	

BPWG4W02 / 2020055 BPWG4W02.1 0000268938 D.2 A.4 1/30/20, 2:35 PM Released

Water Inlets

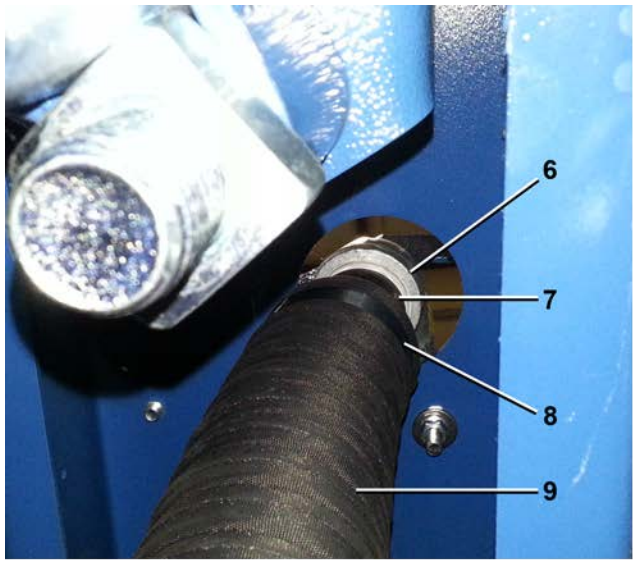
2 Sheets

42044SR2

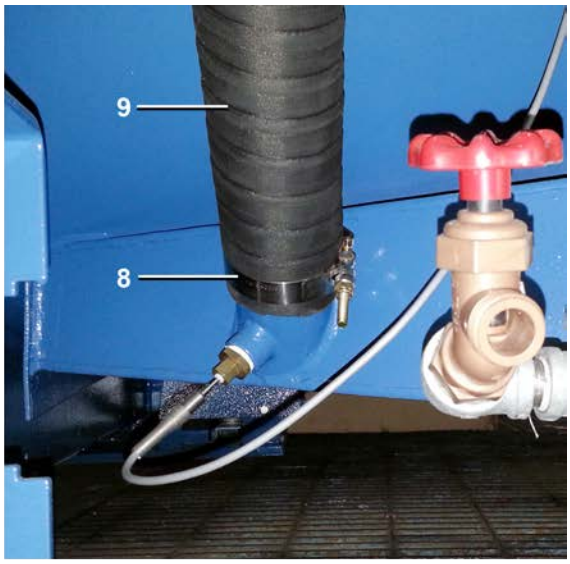


Legend

A–A . . Detail view A–A
B . . . Hot
C . . . Cold



A–A



Water Inlets

2 Sheets

42044SR2

Table 48. Parts List—Water Inlets

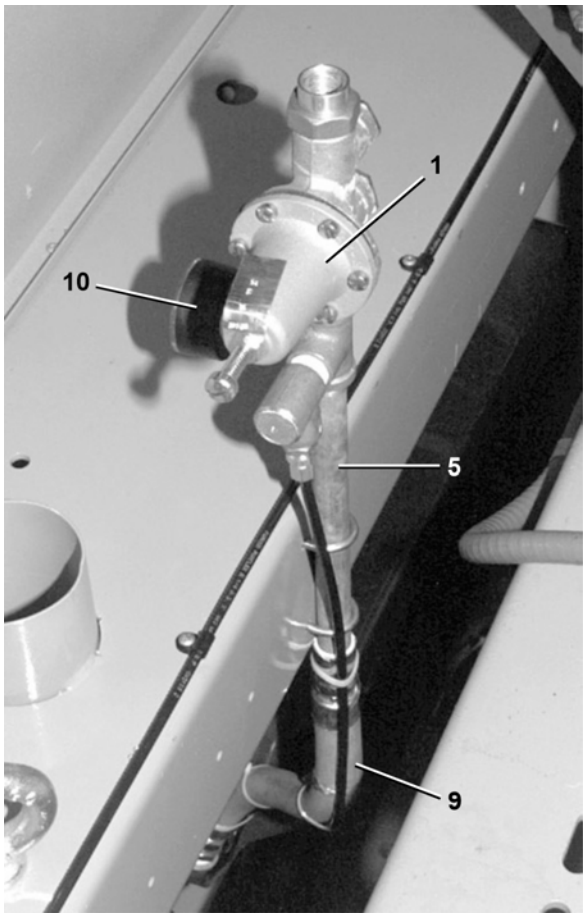
Find the assembly for your machine and the letter shown in the "Item" column. The components for your machine will show this letter or the word "all" in the "Used In" column. The numbers shown in the "Item" column are those shown in the illustrations.				
Used In	**Item**	**Part Number**	**Description/Nomenclature**	**Comments**
Reference Assemblies				
	A	G15 15900B	WATER INSTALLED H+C	
Components				
all	1	96D087FBA	1.5"BALVAL+ACT BRS N/C BONOMI (SPRING RET)	
all	2	5N1K09AG42	NPT NIP 1.5X9 TBE GALSTL SK40	
all	3	5S1KNFA	NPT TEE 1.5" GALMAL 150#	
all	4	5N1K03AG42	NPT NIP 1.5X3 TBE GALSTL SK40	
all	5	51P055	NPTPLUG 1.5 SQCORED GALCI 125#	
all	6	5SL1KNFA	NPT ELBOW 90DEG 1.5" GALMAL 15	
all	7	W2 15847A	*RED1.5NPT-MALEX2.5S/S TUBE	
all	8	27A075	T-BOLT HOSECLAMP 2.78-3.09"	
all	9	60E301A43A	*HOSE=2.5"ID PE X 43"	

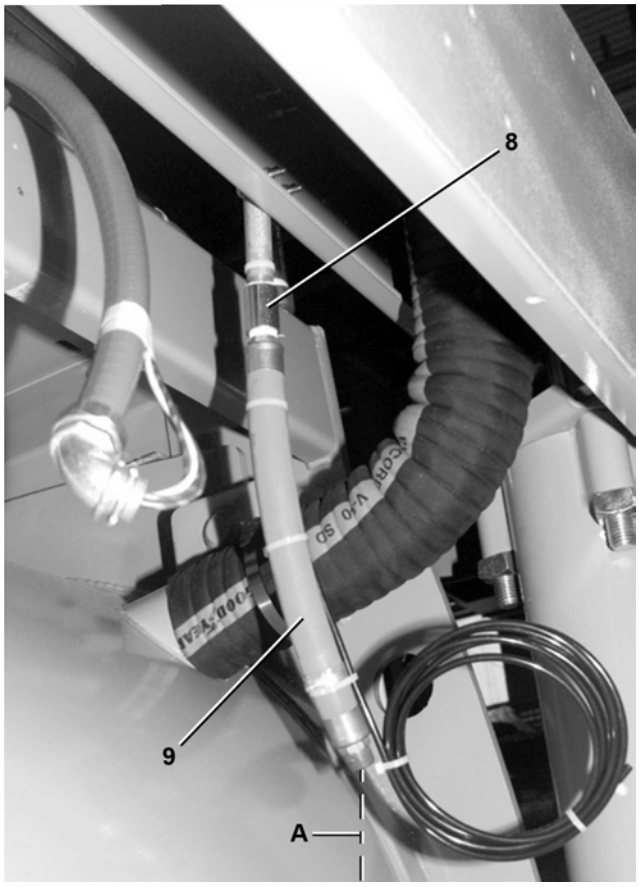
BPWVUW01 / 2020063 BPWVUW01.1 0000268959 D.2 A.4 2/4/20, 8:37 AM Released

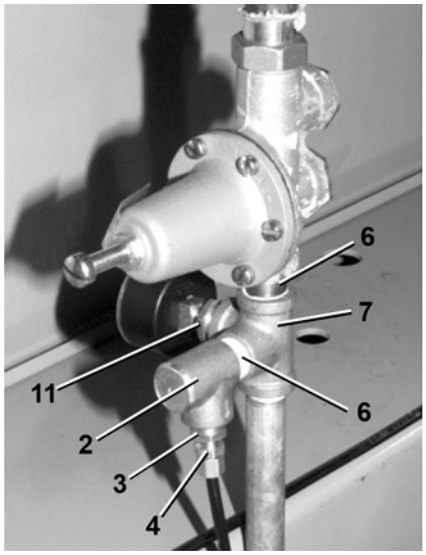
Flushing Water Supply

2 Sheets

4244WP2/WP3, 4244WP2 SM, 4244SP2/SP3, 4244SP2 SM







Legend

A . . . To 5 compartment supply

Flushing Water Supply

2 Sheets

4244WP2/WP3, 4244WP2 SM, 4244SP2/SP3, 4244SP2 SM

Table 49. Parts List—Flushing Water Supply

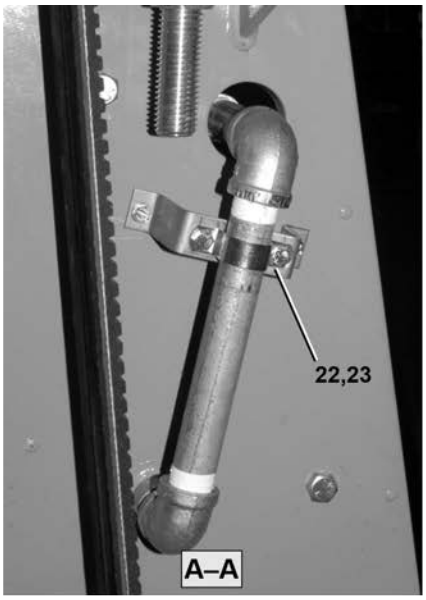
Find the assembly for your machine and the letter shown in the "Item" column. The components for your machine will show this letter or the word "all" in the "Used In" column. The numbers shown in the "Item" column are those shown in the illustrations.				
Used In	**Item**	**Part Number**	**Description/Nomenclature**	**Comments**
Reference Assemblies				
	A	SA 15 080H	$INLET=FLUSHSUP 42HYDRO	4244WP2/WP3
	B	SA 15 080I	$INLET=FLUSHSUP 42SG	42442SP2/SP3
Components				
all	1	96J030D	1/2"PRESSREG SET28# FEMXUN	
all	2	96M001	1/2X3/8" RELIEF VALVE SET31#	
all	3	5SB0G0EDEO	NPTHEXBUSH 3/8X1/4 GALCI 125#	
all	4	53A008B	BODYMALECON.25X.25COMP#B68A-4B	
all	5	5N0K10AG42	NPT NIP 1/2X10 TBE GALSTL SK40	
all	6	5N0KCLSG42	NPT NIP 1/2XCLS TBE GALSTLSK40	
all	7	5S0KNFB	NPT SIDEOUT TEE 1/2" GALMAL	
all	8	5SCC0KNF	NPT COUP 1/2 GALMAL 150#	
A	9	60E086K14A	3/4X14 WATER HOSE W/1/2ENDS	
B	9	60E086K28A	3/4X28 WATER HOSE W/1/2ENDS	
all	10	30N100	PRESSGAUGE 1/8"BACKCN.0-30PSI	
all	11	5SB0K0CDEO	NPTHEXBUSH 1/2X1/8 GALCI 125#	

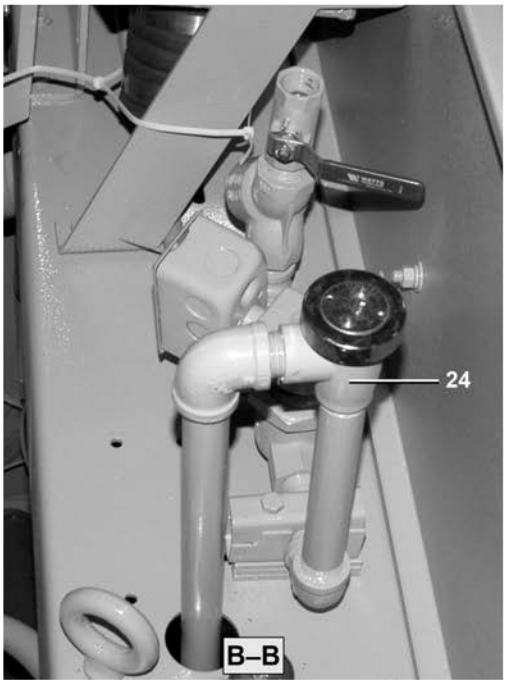
BPWG4W03 / 2020082 BPWG4W03.1 0000272207 D.2 A.4 2/17/20, 9:51 AM Released

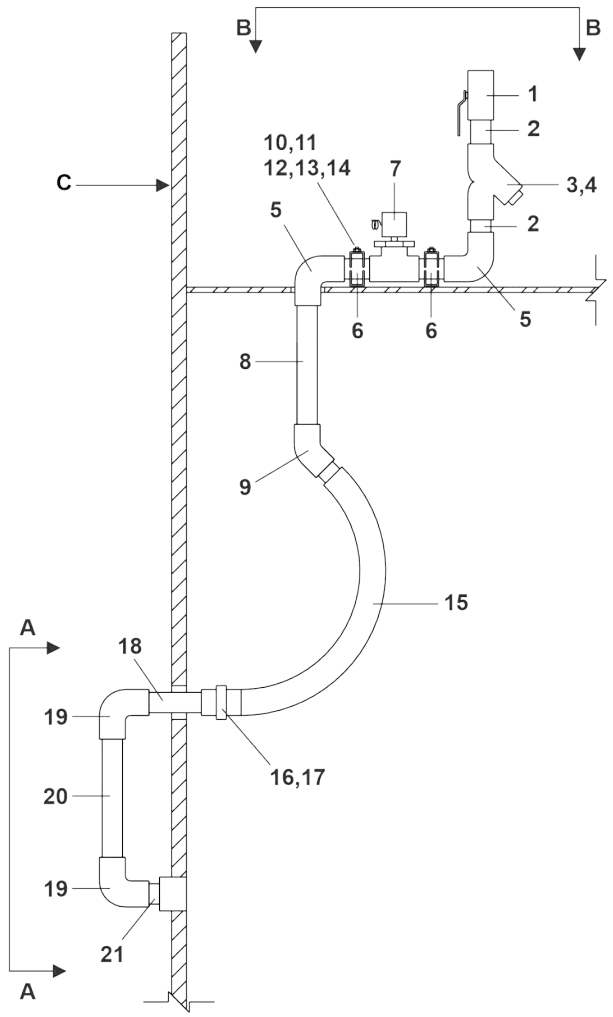
Cooldown

2 Sheets

4244SP2, 4244SP2 SM







Legend

A–A . . Detail view A–A
B–B . . Detail view B–B
C . . . Shellfront, soil side

Cooldown

2 Sheets

4244SP2, 4244SP2 SM

Table 50. Parts List—Cooldown

Find the assembly for your machine and the letter shown in the "Item" column. The components for your machine will show this letter or the word "all" in the "Used In" column. The numbers shown in the "Item" column are those shown in the illustrations.				
Used In	**Item**	**Part Number**	**Description/Nomenclature**	**Comments**
Reference Assemblies				
	A	G15 15800B	INLET=COOLDN 42SP(FRT) WO/SB	
	B	A15 15500B	*INLET=COOLDWN-42"SP W/O SIPH	
Components				
all	1	96D050A	3/4"BALLVALVE BRZ WATTS#B6100	
all	2	5N0PCLSG42	NPT NIP 3/4XCLS TBE GALSTL S40	
all	3	51T030	Y-STRAINER 3/4" CAST IRON	
all	4	5SP0KGFSS	NPT PLUG 1/2 SQSOLID GALSTL	
all	5	5SL0PNFA	NPTELB 90DEG 3/4 GALMAL 150#	
all	6	5N0P02KG42	NPT NIP 3/4X2.5 TBE GALSTL S40	
all	7	96P053A37	3/4"VAL 110V HAYS#6-2110IS-120	
all	8	5N0P05AG42	NPT NIP 3/4X5 TBE GALSTL SK40	
all	9	5SL0PNFK	NPTELB 45DEG 3/4 GALMAL 150#	
all	10	02 15680	PIPECLAMP 3/4"ZINC OR CAD	
all	11	15G185	HXNUT 5/16-18UNC2B SAE ZINC GR	
all	12	15K060	HXCAPSCR 5/16-18UNCAX3/4 GR5 Z	
all	13	15U210	LOKWASHER MEDIUM 5/16 ZINCPL	
all	14	02 10539	SPACER FOR PIPE ZINC PLATED	
all	15	60E086C22K	*WATERHOSE 3/4"=22.5"LG+ENDS	
all	16	51X019	UNIONSTRADT 3/4"#0107-12-12	
all	17	5SCC0PNF	NPT COUP 3/4 GALMAL 150#	
all	18	5N0P05AG42	NPT NIP 3/4X5 TBE GALSTL SK40	
all	19	5SL0PNFA	NPTELB 90DEG 3/4 GALMAL 150#	
all	20	5N0P08AG42	NPT NIP 3/4X8 TBE GALSTL SK40	
all	21	5N0PCLSG42	NPT NIP 3/4XCLS TBE GALSTL S40	
all	22	02 14170	SUPPORT=PIPE SUPPLEMNT STEAM	
all	23	27A018A	3/4"PIPESTR 2HOLE STAMPGAL PRO	
all	24	96M022	3/4" VAC BREAKER #288A	

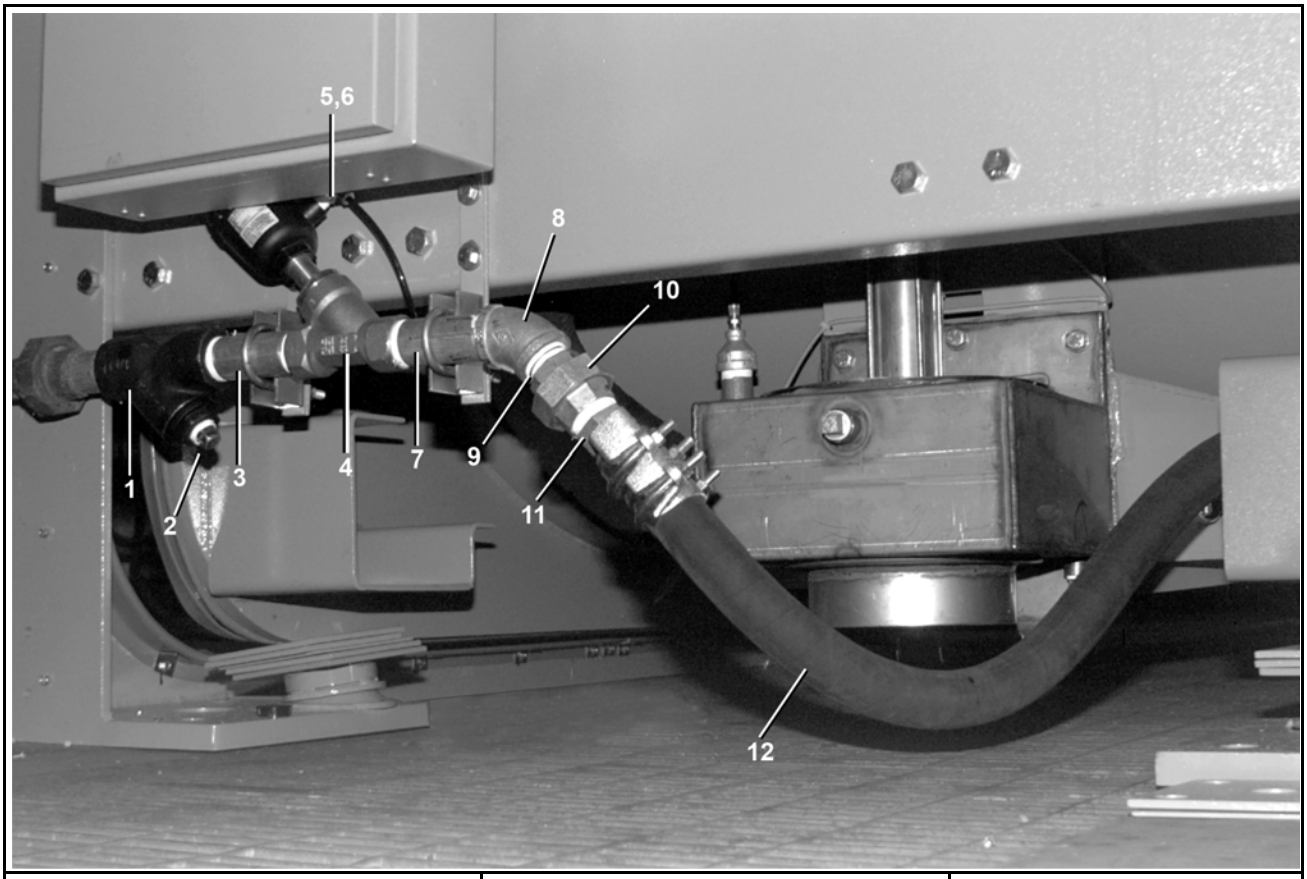
BPWGUW01 / 2020082 BPWGUW01.1 0000274513 D.2 A.4 2/17/20, 9:57 AM Released

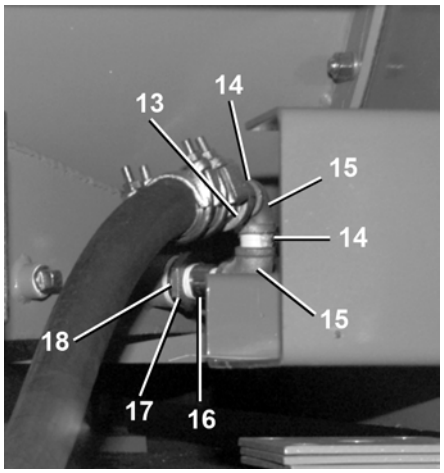
Steam Inlet & Sparger

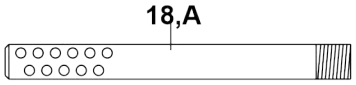
2 Sheets

4244SP2, 4244SP2 SM, 6044SP2/SP3, 6044SP2 SM

NOTE: 6044SP2 Shown







Legend

A. . . Sparger

Steam Inlet & Sparger

2 Sheets

4244SP2, 4244SP2 SM, 6044SP2/SP3, 6044SP2 SM

Table 51. Parts List—Steam Inlet & Sparger

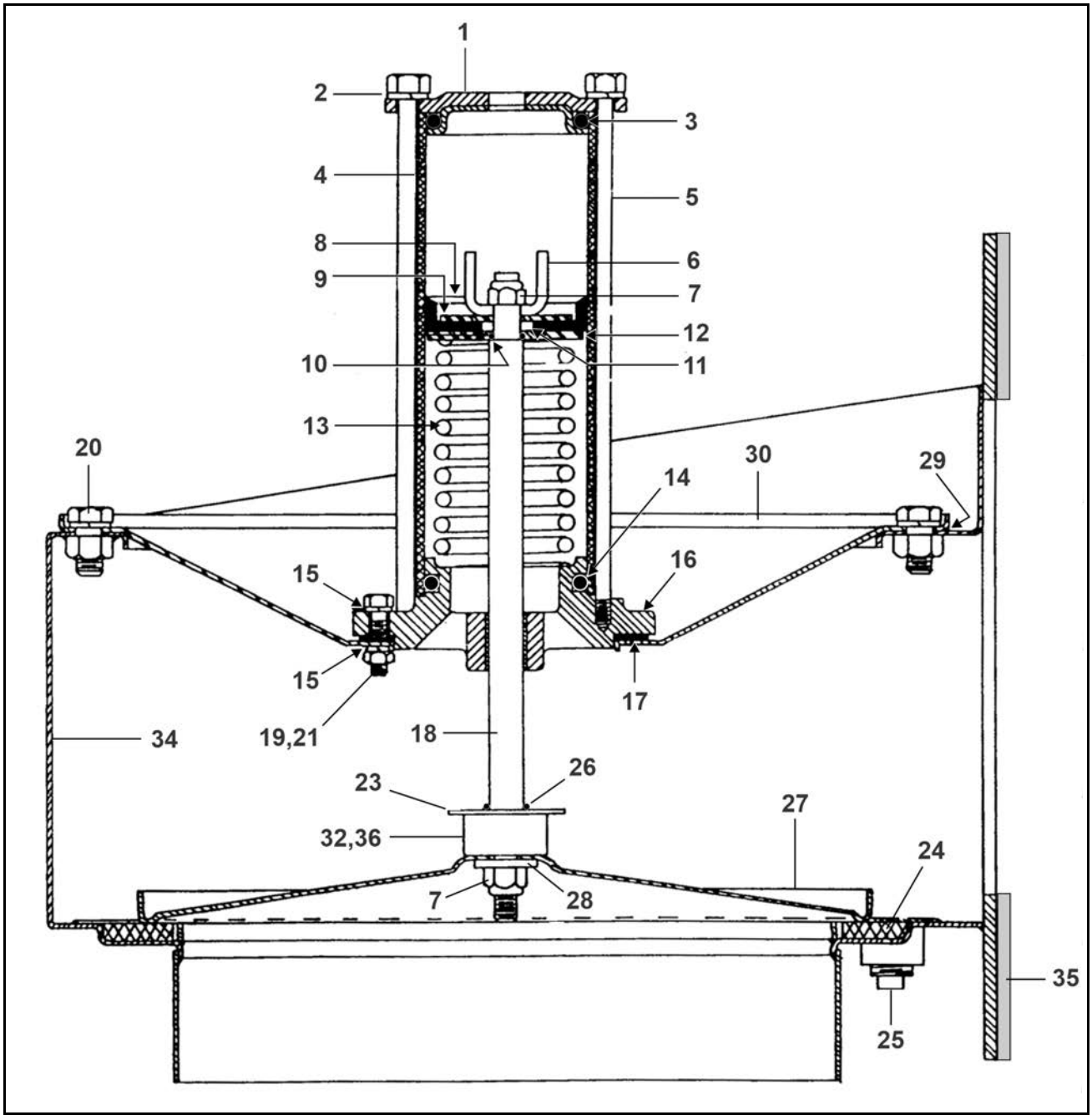
Find the assembly for your machine and the letter shown in the "Item" column. The components for your machine will show this letter or the word "all" in the "Used In" column. The numbers shown in the "Item" column are those shown in the illustrations.				
Used In	**Item**	**Part Number**	**Description/Nomenclature**	**Comments**
			Reference Assemblies	
	A	AVS03001	*1+1/4BURKERT +STRAINER	4244SP2,6044SP2/SP3
	B	AVS28002	$1.25 BURKERT STEAM=60SG2+3	6044SP2/SP3
	C	GVS28002	INSTALL=1.25STEAM 6044SG2+3	6044SP2/SP3
	D	AVS04001	$1.25 BURKERT STEAM=42+72SG23	4244SP2
	E	GVS15001	INSTALLATION=1+1/4STEAM 42SG	4244SP2
			Components	
A	1	51T060	Y-STRAINER 1+1/4" CAST IRON	
A	2	5SP0PHFSS	NPT PLUG 3/4 SQ SOLID STL/ZINC	
A	3	5N1E05AG42	NPT NIP 1.25X5 TBE GALSTL SK40	
A	4	96D0011E	1.25"NPTBRZ N/C STEAMVALANGBD	
A	5	96H018	ANGLE NEEDLE VLV 1/4"T X 1/8MP	
A	6	5SB0E0CBEO	NPTHEXBUSH 1/4X1/8 BRASS 125#	
B,D	7	5N1E05AG42	NPT NIP 1.25X5 TBE GALSTL SK40	
B	8	5SL1ENFK	NPT ELB 45DEG 1.25 GALMAL 150#	
D	8	5SL1EMFK	NPT ELB 45DEG 1.25 BLKMAL 150#	
B,D	9	5N1ECLSF42	NPT NIP 1.25XCLS TBE BLKSTLS40	
B,D	10	5SU1EMH	NPT UNION 1.25" BLKMAL 150#	
B,D	11	51E096C	MALESTEM 1.25"CADPL CAMP#IMS5	
C	12	60E096C35A	STEAMH*OSE=1.25"X35"+2ENDS=(NO	
E	12	60E096C22A	STEAMH*OSE=1.25"X22=+2ENDS=(NO	
C,E	13	5SR1E0PNF	NPT RED 1.25X3/4 GALMAL 150#	
C,E	14	5N0PCLSG42	NPT NIP 3/4XCLS TBE GALSTL S40	
C,E	15	5SL0PNFA	NPTELB 90DEG 3/4 GALMAL 150#	
C,E	16	5N0PCLSG42	NPT NIP 3/4XCLS TBE GALSTL S40	
C,E	17	5SB1K1ADEO	NPTHEXBUSH 1.5X1 GALCI 125#	
C,E	18	W2 18801	*LMT=STEAM NOZZLE	

BPWVUW02 / 2020264A BPWVUW02.1 0000274870 D.2 B.2 6/24/20, 9:30 AM Released

Stainless Dump Valve

3 Sheets

42044WR2/WR3/SR2/SR3; 60044WR2/WR3/SR2/SR3; 72044WR2/WR3/SR2/SR3



8”X10” Stainless Dump Valve

3 Sheets

42044WR2/WR3/SR2/SR3; 60044WR2/WR3/SR2/SR3; 72044WR2/WR3/SR2/SR3

Table 52. Parts List—8”X10” Stainless Dump Valve

Find the assembly for your machine and the letter shown in the "Item" column. The components for your machine will show this letter or the word "all" in the "Used In" column. The numbers shown in the "Item" column are those shown in the illustrations.				
Used In	**Item**	**Part Number**	**Description/Nomenclature**	**Comments**
			Reference Assemblies	
	A	SA 28 124	*8"SGL.DUMPVALVE 4244+52+60	42044WR2/WR3 42044SR2/SR3; 60044WR2/WR3; 60044SR2/SR3
	B	SA 36 015	10"SGL.DUMP VALVE 72WE+SG+WT	72044WR2/WR3; 72044SR2/SR3
	C	SA 28 158	* BONNET+AIRCYL=8"SS DUMPVALV	8" DUMP VALVE
	D	SA 36 044	* BONNET+AIRCYL=10"SS DUMPVAL	10" DUMP VALVE
			Components	
CD	1	02 02101	CYLHEAD W/TAPPED HOLE	
CD	2	15U210	LOKWASHER MEDIUM 5/16 ZINCPL	
CD	3	60C132	ORING 2"IDX3/16CS BUNA70 #329	
CD	4	02 02068	AIRCYL-STAINLESS=DUMP VALVE	
CD	5	02 10585D	TIE BOLT=5/16-18X7.875 PLTD	
CD	6	03 01313	STOP=AIR CYL W/2+11/16STROKE	
CD	7	15G220	LTHX THIN LOKNUT 3/8-24 SSNTE	
CD	8	02 02194	PISTON CUP=DUMPVALVE 2+3/8"	
CD	9	02 02085	UP WASHER=2"OD=PISTON CUP	
CD	10	60C106	ORING 5/16ID 1/16CSBUNA70#011	
CD	11	02 02185	WASHER=PISTON CUP COMP LIMIT	
all	12	02 02105B	2.38"ACYL BRASS PISTONCUP WSHR	
CD	13	03 06429	SPRING=2.11ODX6.5FL 64#/"	
CD	14	60C132	ORING 2”IDX/316CS BUNA70 #329	
CD	15	24G020N	ROLLED WASH.252ID NYLTITE 25W	
CD	16	X2 02743	BONNET=2"DUMP VALVE	
CD	17	02 18931F	GASKET=DUMPVALVE-1/60+72WEHU	
CD	18	02 16021I	DUMPVAL STEM-4"+8"316SS	
CD	19	15G168	SQNUT 1/4-20UNC2 SS18-8	
all	20	15K086	HXCAPSCR 3/8-16NCX3/4 SS18-8	
CD	21	15K041S	HEXCAPSCR 1/4-20UNC2AX1 SS18-8	
CD	23	02 16021E	WASHER 3/8IDX1.250D DUMPVAL	
A	24	02 18068	9 SEAT-RESILIENT=8"DUMPVALVE	
B	24	03 06084	SEAT-RESILIENT=10"DUMPVALVE	
A	25	5SP0KGFSS	NPT PLUG 1/2 SOSOLID GALSTL	
CD	26	60C106	ORING 5/16ID 1/6CS BUNA70#011	
AC	27	02 18796	DISC-8" DUMP VALVE S/S	

8”X10” Stainless Dump Valve

3 Sheets

42044WR2/WR3/SR2/SR3; 60044WR2/WR3/SR2/SR3; 72044WR2/WR3/SR2/SR3

Table 52 Parts List—8”X10” Stainless Dump Valve (cont'd.)

Find the assembly for your machine and the letter shown in the "Item" column. The components for your machine will show this letter or the word "all" in the "Used In" column. The numbers shown in the "Item" column are those shown in the illustrations.

Used In	Item	Part Number	Description/Nomenclature	Comments
BD	27	03 06083	DISC-10"DUMP VALVE S/S	
all	28	15U245	FLTWASH 3/8 STD COMM 18-8 SS	
A	29	02 18104	GASKET=8"DUMP VALVE BONNET	
B	29	03 06086G	GASKET=10" DUMP VALVE BONNET	
A	30	02 18931E	BONNET-8"DUMP VALVE	8" DUMP VALVE
B	30	03 06086F	BONNET=10"DUMP VALVE	10" DUMP VALVE
CD	32	02 16021C	BUMPER=DUMP VALVE BONNET	
CD	33	02 16021D	DUMP VALVE BUMPER RETAINER	
A	34	W2 18931	* BODY=8"DUMPVALV=4244,60,52	8" DUMP VALVE
B	34	W3 06086	*BODY=10"DUMP VALVE 72WE,SG,T	10" DUMP VALVE
A	35	02 18107	GASKET=8"FLANGED DUMP VALVE	8" DUMP VALVE
B	35	03 06085D	GASKET=10"FLANGEDUMP72D 8050	10" DUMP VALVE

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Burket Steam Valve

1 Sheet

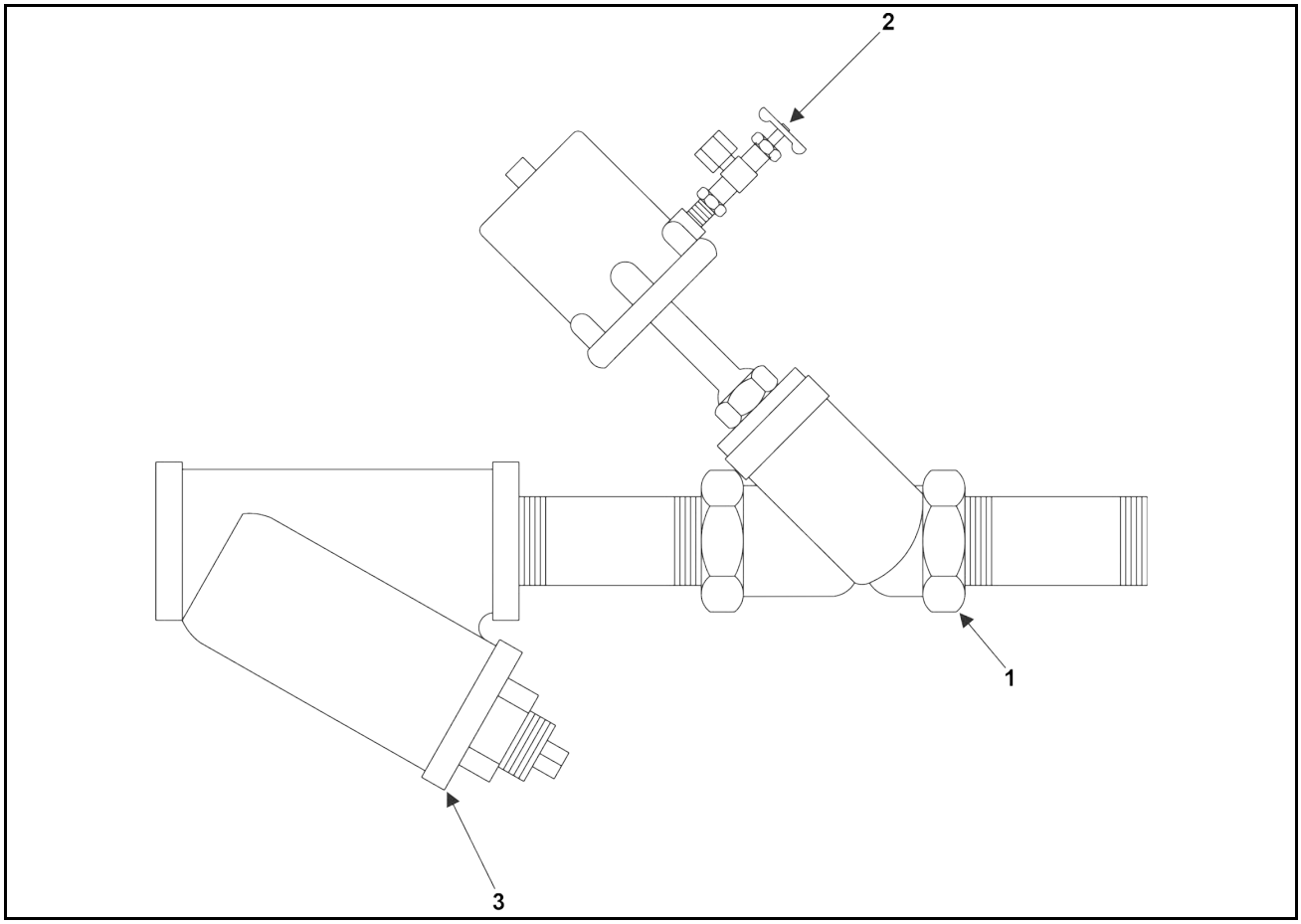


Table 53. Parts List—Burket Steam Valve

Find the assembly for your machine and the letter shown in the "Item" column. The components for your machine will show this letter or the word "all" in the "Used In" column. The numbers shown in the "Item" column are those shown in the illustrations.				
Used In	**Item**	**Part Number**	**Description/Nomenclature**	**Comments**
Reference Assemblies				
	W	96D0009ER1	02Z REPAIR KIT 3/4" STEAM VALVE	KIT FOR 001A
	X	96D0011ER1	02Z REPAIR KIT 1.25" STEAM VALVE	KIT FOR 001B
	Y	96D0011ER2	ACTUATOR HOUSING FOR BURKET #251	KIT FOR 001B
	Z	96D0011ER3	REPAIR KIT MULLER 1.25" VALVE #554	KIT FOR 001B
Components				
all	1	96D0009E	03Z 3/4"NPT N/C STEAMVAL ANGLE BODY	3/4"
all	1	96D0011E	08Z 1/25"NPT N/C STEAMVAL ANGLE BODY	1–1/4"
all	2	96H018	NEEDLE VALVE	
all	3	51T030	01Z Y-STRAINER 3/4" CAST IRON	USED WITH 001A
all	3	51T060	01Z Y-STRAINER 1+1/4" CAST IRON	USED WITH 001B

10 Pneumatics

10.1 Servicing Air Cylinders

This is the general procedure for rebuilding an air cylinder using a Milnor® furnished repair kit, once the air cylinder has been removed from the machine. See the specific air cylinder and major assembly parts drawing(s) for component identification and removal/replacement information.

Maintenance procedures require:

- Two threaded rods and nuts, twice the length of the tie bolts.
- The appropriate repair kit.

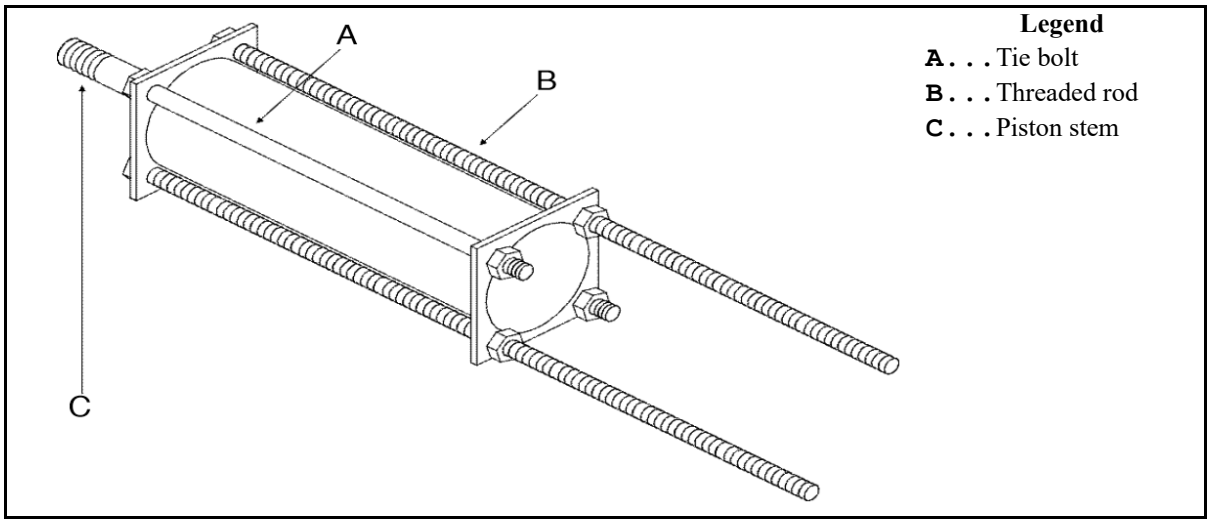
CAUTION: **EXPLOSION HAZARD —** Spring tension can cause air cylinder to burst apart with great force during dissassembly. You can be struck by air cylinder parts.

- ▶ Follow maintenance instructions carefully.
- ▶ Wear eye protection.

NOTE: Use a new locknut when re-assembling air cylinder (see the appropriate parts drawing).

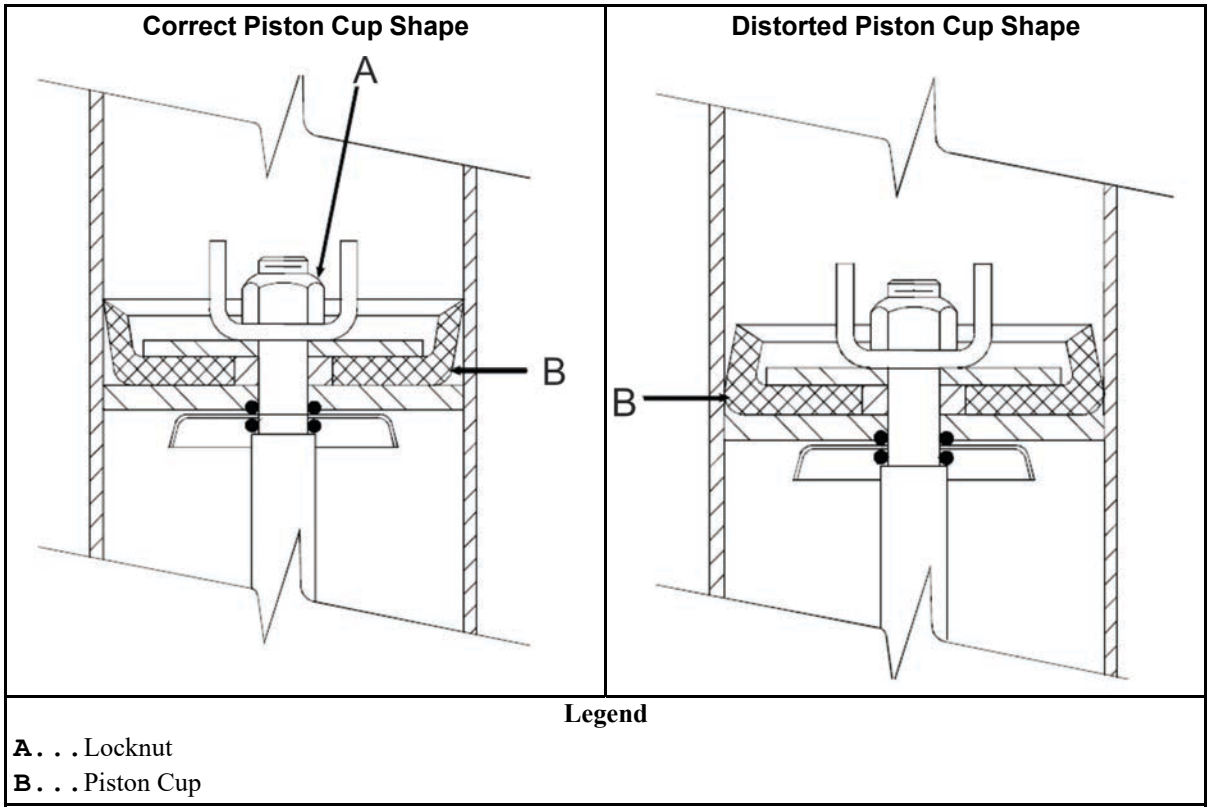
1. Replace two diagonally opposite tie bolts with threaded rods and nuts as shown in Figure 48: Using Threaded Rods, page 171 .
2. Tighten nuts on the threaded rods until they contact the air cylinder.
3. Remove the other two tie bolts and the nuts, washers, clips, and actuators from the external end of piston stem.

Figure 48. Using Threaded Rods



4. Loosen nuts on threaded rods evenly, permitting cylinder heads to separate. Use only a few turns on one nut before moving to the other one. Continue until springs have no tension.

Figure 49. Ensuring Correct Piston Cup Shape



5. Note the position and orientation of the piston cup(s), washers, and springs. Replace the worn parts, then reassemble them in reverse order. Tighten the locknut until it is just barely possible to turn the piston cup and washer assembly on the stem. The correct piston cup shape is shown on the left side of the above figure. **Do not** overtighten the locknut, as this causes the

piston cup to deform to the shape shown on the right side of the figure and may cause the piston to bind in the cylinder.

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Pneumatic Schematic

3 Sheets

4244SP2

NOTE: All pilot valves shown de-energized.

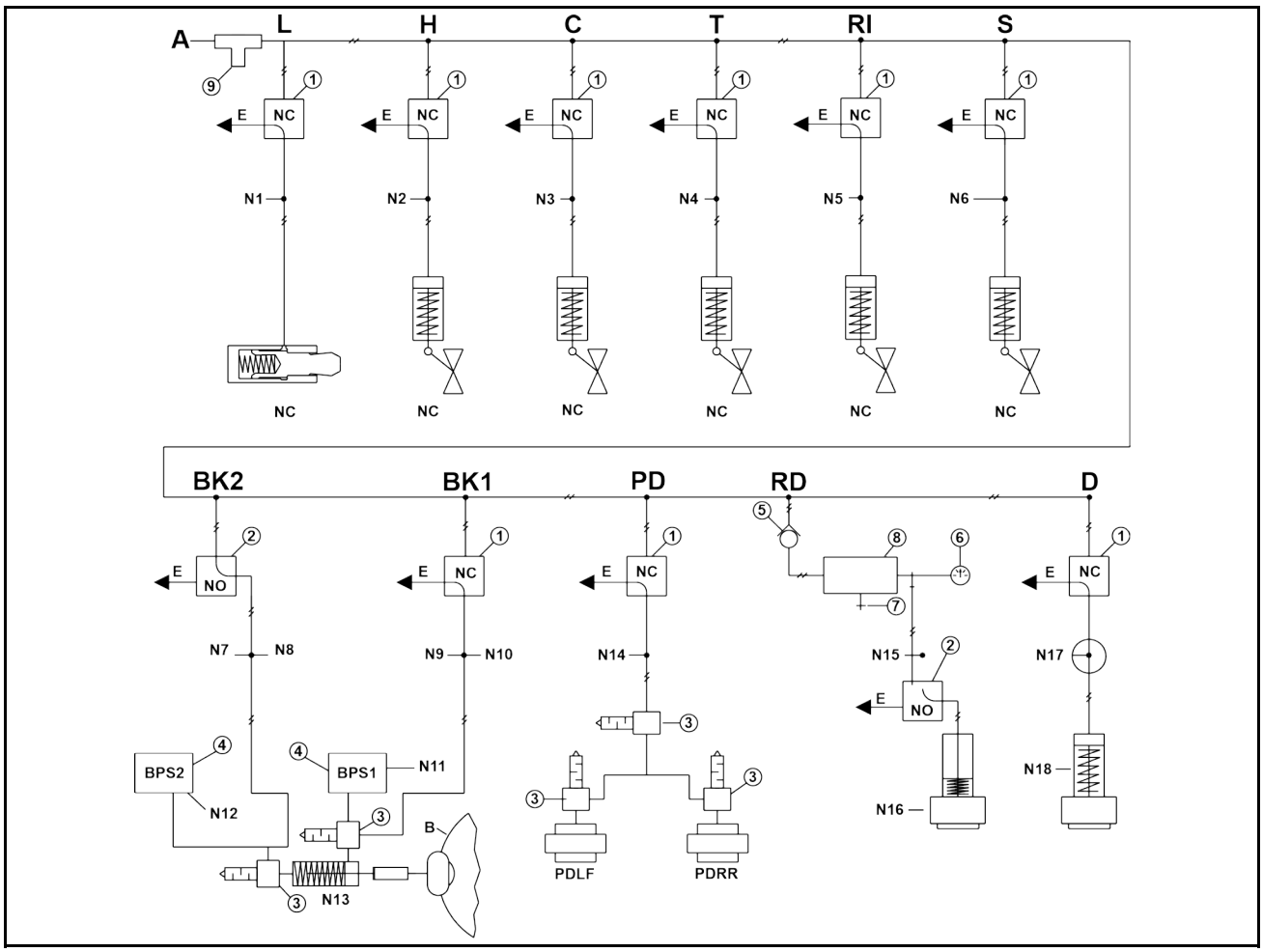


Table 54. Legend – Pneumatic Schematic

Item	Description
A	Compressed air, 85-100 PSI (5.8-7.5 ATU)
B	Brake
BK1	1st brake
BK2	2nd brake
BPS1	1st brake pressure switch
BPS2	2nd brake pressure switch
C	Cold
D	Drain

Pneumatic Schematic

3 Sheets

4244SP2

Table 54 Legend – Pneumatic Schematic (cont'd.)

Item	Description
E	Exhaust
H	Hot
L	Latch
N1	Pressure is applied to latch to retract & open latch when pilot valve is energized.
N2	Pressure is applied to actuator to open hot water valve when pilot valve is energized.
N3	Pressure is applied to actuator to open cold water valve when the pilot valve is energized.
N4	Pressure is applied to actuator to open third water valve when pilot valve is energized.
N5	Pressure is applied to actuator to open reuse water valve when pilot valve is energized.
N6	Pressure is applied to actuator to open steam valve when pilot valve is energized.
N7	The normally open 2nd brake pilot valve, de-energized, applies pressure to the cylinder to assist the spring to close the brake tightly, 2nd brake.
N8	The normally open 2nd brake pilot valve, energized, allows cylinder to exhaust to disengage 2nd brake.
N9	The normally closed 1st brake pilot valve, de-energized, applies no pressure to the cylinder allowing the spring actuated cylinder to engage 1st brake. (Loose air engage brake)
N10	The normally closed 1st brake pilot valve, energized, allows air to compress the spring to release the 1st brake, allowing the cylinder to turn.
N11	1st brake pressure switch verifies air pressure to cylinder.
N12	2nd brake pressure switch verifies air pressure of cylinder.
N13	Spring actuated 1st brake
N14	Pressure inflates pushdown cushions when pilot valve is energized. De-energized pushdowns exhaust through quick releases.
N15	Pressure is applied to actuator to close reuse drain when pilot valve is de-energized.
N16	Normally open drain to reuse (spring open, air close)
N17	Pressure is applied to actuator to close drain valve when pilot valve is energized.
N18	Normally open, drain to sewer
NC	Normally closed
NO	Normally open
PD	Pushdown
PDLF	Pushdown left front
PDRR	Pushdown right rear
RD	Reuse drain option
RI	Reuse inlet option
S	Steam
T	Third

Pneumatic Schematic

3 Sheets

4244SP2

Table 55. Parts List—Pneumatic Schematic

Find the assembly for your machine and the letter shown in the "Item" column. The components for your machine will show this letter or the word "all" in the "Used In" column. The numbers shown in the "Item" column are those shown in the illustrations.				
Used In	**Item**	**Part Number**	**Description/Nomenclature**	**Comments**
Components				
all	1	96R301B37	1/8"AIRPILOT 3W NC 120V50/60	
all	2	96R302B37	1/8"AIRPILOT 3W NO 120V50/60	
all	3	96M055	DELTROL QUICK EXHAUST VLV.1/4"	
all	4	09N082A	PRESSW NASON CLOSE @ 62 LB.	
all	5	96D047AAK	CHECK VALVE 1/4"DELT#CMMQ20B	
all	6	30N102	PRESSGAUGE 1/4BOTCON.0-150PSI	
all	7	96H018	ANGLE NEEDLE VLV 1/4"T X 1/8MP	
all	8	W3 25307D	*TANK=AIR PRESSURE RESERVE	
all	9	51T020	STRAINER 1/4 AND.BRASS#234S-L	

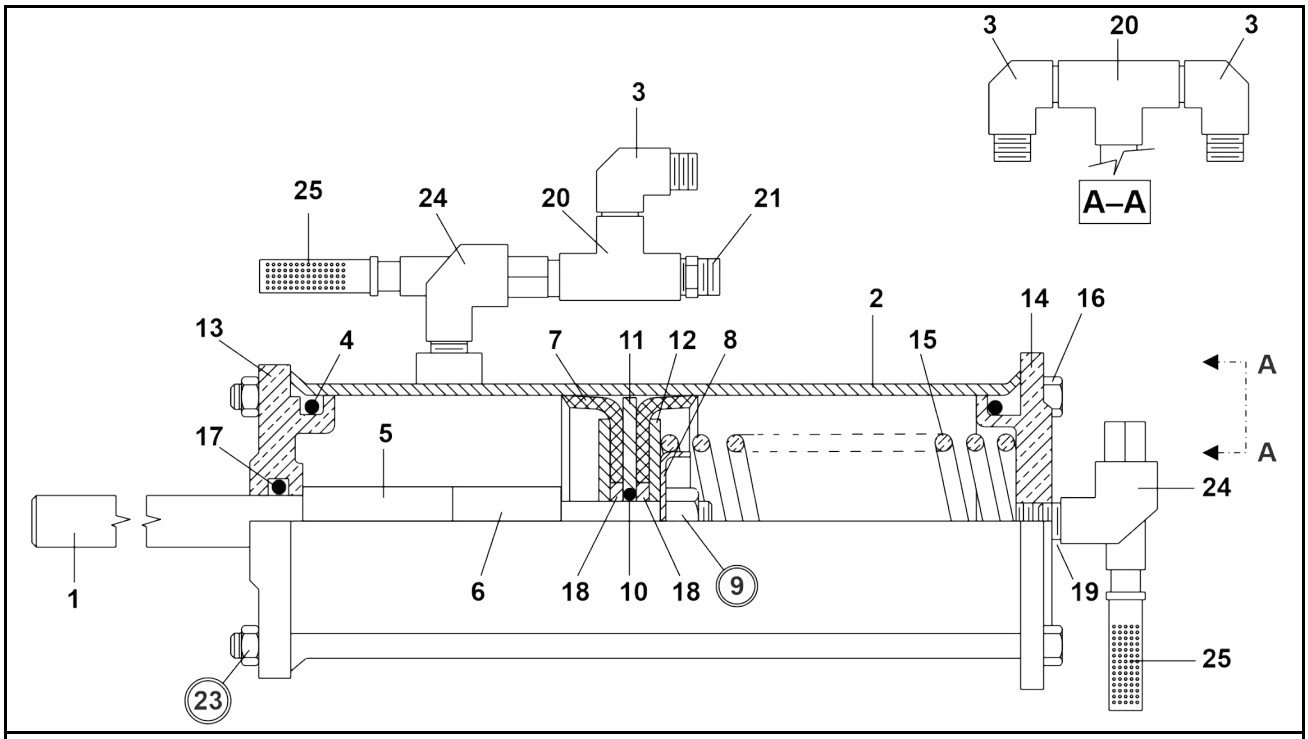
BPWVUP01 / 2020083 BPWVUP01.1 0000276675 D.2 A.4 2/18/20, 9:31 AM Released

Brake Air Cylinder

2 Sheets

CAUTION: **Circled items are under high spring tension —** Air cylinder can burst apart with great force.

- Follow maintenance instructions BNWUUM02 carefully.



Legend

A–A . . Detail view A–A

General Service & Safety-Related Components

2 Sheets

Table 56. Parts List—Brake Air Cylinder

Find the assembly for your machine and the letter shown in the "Item" column. The components for your machine will show this letter or the word "all" in the "Used In" column. The numbers shown in the "Item" column are those shown in the illustrations.				
Used In	**Item**	**Part Number**	**Description/Nomenclature**	**Comments**
Reference Assemblies				
	A	AAC65002	AIRCYL BRAKE SINGLE MOTOR	
Components				
all	1	02 18650B	STEM=2WAY AIRCYL BRAKE 7.88L	
all	2	W2 18646	*CYLINDER-AIR=DOUBLEACT BRAKE	
all	3	53A031XB	BODY-EL90MALE.25X25 #269C-4-4B	
all	4	60C132	ORING 2"IDX3/16CS BUNA70 #329	
all	5	27B250	SPCRROLL.5ID1.5L.062T STLZNC	
all	6	27B34010SS	SPACERROLL .51ID.625L.062T SS	
all	7	02 02194	PISTON CUP=DUMPVALVE 2+3/8"	
all	8	02 18651	WASHER=2 WAY BRAKE CYL	
all	9	15G220	NUTLOK THINHX 3/8-24 SS/NYL	
all	10	60C106	ORING 5/16ID 1/16CSBUNA70#011	
all	11	02 02105B	2.38"ACYL BRASS PISTONCUP WSHR	
all	12	02 02085	UP WASHER=2"OD=PISTON CUP	
all	13	06 20702E	FLOW NOT ACTUATOR CYL HEAD	
all	14	02 02101	CYLHEAD W/TAPPED HOLE	
all	15	02 17024	SPRING-SS=DUMP 1.5OD4FL40#/"	
all	16	W6 20702F	*FLOW NOT VLV=AIR-CYL ROD WLD	
all	17	60C110	ORING 1/2IDX3/32CS BUNA70 #112	
all	18	02 02185	WASHER=PISTON CUP COMP LIMIT	
all	19	5N0ECLSBE2	NPT NIP 1/4XCLS TBE BRASS 125#	
all	20	51V015	TEE 1/4 FGDBRASS 101T7-444	
all	21	53A008B	BODYMALECON.25X.25COMP#B68A-4B	
all	22	5SCC0EBE	NPT COUP 1/4 BRASS 125# W/HEX	
all	23	15G185	HXNUT 5/16-18UNC2B SAE ZINC GR	
all	24	96M055	DELTROL QUICK EXHAUST VLV.1/4"	
all	25	27A005	MUFFLER 3/8" BANTAM B38	