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MACHINE MODEL NO.:_____

SERIAL NO.:_____

POWER SOURCE VOLTAGE:_____

MODEL LT 30 MASSAGE TUMBLER
SPECIFICATION SHEET

CONSTRUCTION

All Stainless Steel Construction with USDA approval

PHYSICAL DIMENSIONS

Length	52"
Width	31"
Height	49"
Drum Size	30" diam. x 29" long
Approximate Weight	500#

PRODUCT CAPACITY

Gallons	85
Liters	335
Pounds	500

VACUUM PUMP SYSTEM

Pump capable of delivering 26" Hg (Mercury)
Easily Accessible Liquid Trap

DRUM SPEED

Variable Speed Drive	1 - 9 RPM

TIMER CONTROLS

Tumbler Timer	99 H 59 M Timer (changeable)
* Intermittent Timer	
On Time	Up to 99 Hr. 59 Min.
Off Time	Up to 99 Hr. 59 Min.

MOTORS

Variable Speed Motor	1/2 HP, 11.0 Amps
Vacuum Pump Motor	1/3 HP, 9.4 Amps

ELECTRICAL CONNECTIONS

115 volts, 60 cycle single phase (standard)
220 volts, 50 cycle single phase
220 volts, 60 cycle single phase
380 volts, 50 cycle single phase

(See outside cabinet of machine for electrical requirement, below serial # plate)

* Optional Equipment

Specifications Subject to change at anytime

INSTALLATION INSTRUCTIONS

A. Unpacking

1. Carefully remove crate from the skid.
2. Remove machine from skid.
3. Wipe down outside of the machine.
4. Clean inside of the drum (use the bolts on the end of the frame to hold the drum cover when not on the drum).
5. Check aim of photo-eyes (see instructions in trouble-shooting section)- this is required due to vibration in shipping.

B. Checking Control Panel

1. Check outside the cabinet for the required voltage requirement for your machine. Plug the machine into the required outlet.
2. Press the (RST) button on the tumbler timer.
3. Check photo-eyes for power (The red light on the back side of the photo-eye should be on. This can be see through the observation windows near each photo-eye. The light on both photo-eyes must be on. If they are not, wipe the face of the photo eye and the reflectors opposite them to remove all moisture.(If still not on see instructions for checking aim of the photo-eyes).

C. Check Vacuum Pump Control

1. Press the vacuum start button. It should run.

D. Check Tumbler Motor Controls

1. Set variable speed control to 20.
2. Set tumbler timer to 2 minutes.(See "SETTING THE CONTROL TIMER" in the Operating Instructions Section).
3. Set continuous-forward-reverse jog switch to continuous.
4. Press the tumbler start button - Drum will now turn.
5. Turn the variable speed control up & down (Drum will speed up & slow down).
6. The drum will turn until the tumbler timer counts down to zero at which time the drum will stop.
7. Press the (RST) button on the tumbler timer.
8. The machine is now ready to use.

E. Check Forward & Reverse Jog (useful for unloading the drum)

1. Set variable speed control to a slow speed setting (0-10).
2. Set continuous-forward-reverse jog switch to reverse.
3. Press and hold the start button. The drum will turn only while the start button is being held in.
4. Repeat steps 2 & 3 for forward jog.

OPERATING INSTRUCTIONS

A. Loading and Tumbling

1. Clean the machine drum.
2. Put the gasket and drain cap on the drum drain pipe.
3. Load the product into the drum.
4. Place the gasket over the drum opening.
5. Place the cover on the gasket.
6. Make sure the gasket is under the cover all the way around by pushing it up and into the opening or by visual inspection.
7. Tighten the cover by alternately tightening the knob in a diagonal pattern.
8. Plug the machine into the proper voltage receptacle.
9. Check for power to the photo-eyes through observation windows (Red light should be on, If they are not on wipe the photo-eye face and reflector to remove moisture).
10. Turn on vacuum pump.
11. Open vacuum valve on the drum (next to the drum cover) (Make sure the vacuum passage to the drum is clean and that it is to the top. Pulling vacuum with the fitting not at the top position will result in liquid being drawn into the vacuum pump. THIS WILL DAMAGE THE PUMP!)
12. Push vacuum hose onto drum fitting.
13. Run vacuum pump until 15 inches of vacuum is drawn. (Higher vacuum can be drawn if you want to).
14. Shut off the valve on the drum.
15. Remove the hose.
16. Turn off the vacuum pump.
17. Set the tumbler timer to the desired time.
18. Set variable speed knob to the desired speed.
19. Set the continuous-forward-reverse jog switch to continuous.
20. Make sure the vacuum hose is disconnected.
21. Press tumbler start button, The drum will now rotate until the tumbler timer runs down to zero.

* It can be stopped at any time by pressing the tumbler stop button or by breaking the beam from the photo-eye to the reflector.
* To restart the machine, press the tumbler start button, it will run for the time remaining on the timer.

B. Unloading the Drum

a. Manual Unloading

1. Set the Continuous-Forward-Reverse Jog switch to forward.
2. Press and hold the tumbler start button until the cover is facing you, at the 2 o'clock position.
3. Loosen the cover knobs.
4. Open the vacuum valve on the drum to release the vacuum (Loosen cover knobs first).
5. Remove the cover.
6. Remove the gasket.
7. Unload the drum.

b. <u>Unloading into a buggy or cart</u>

1. Set the Continuous-Forward-Reverse Jog switch to forward.
2. Press and hold the tumbler start button until the cover is facing you, at the 2 o'clock position.
3. Loosen the cover knobs.
4. Open the vacuum valve on the drum to release the vacuum (Loosen cover knobs first).
5. Remove the cover.
6. Remove the gasket.
7. Tighten the cover knobs so you don't lose them while unloading.
8. Place the cart under the drum.
9. Press and hold the tumbler start button until the product starts to roll out of the drum opening.
10. Release the tumbler start button when the product starts to roll out, press again if necessary.
11. To reverse the drum to stop unloading, set the continuous-forward-reverse switch to reverse. Press and hold tumbler button until the product stops coming out of the drum.
12. To continue unloading set the continuous-forward-reverse jog switch to forward.
13. Repeat steps 9 - 11.

LT30 or LT60
CONTROL PANEL WITH ELECTRONIC TUMBLER TIMER #CT4S

CONTROL PANEL FUNCTIONS

TUMBLER PUSH BUTTONS
Starts and stops timers for tumbling cycle.

VACUUM PUSH BUTTONS
Starts and stops vacuum pump.

TOTAL TIMER
Sets the total amount of time the drum will rotate.

SETTING THE CONTROL TIMER
Direct start continuous tumbling

1. Press (RST) button on the tumbler timer.
2. Set the set point on the tumbler timer for total tumbling time (time required for the drum to rotate).
3. To set the time on the tumbler timer, press the left arrow button on the timer, notice the far right position on the lower display is blinking.
4. Use the UP or DN., arrow button to change the value of this number. (The timer is set for hour-min.).
5. Use the left arrow button to change to a new position, then repeat step #4. (Do this for each position).
6. When all the values are entered, press the (MD) button on the timer. (This will enter the time into memory).
7. Press the (RST) button to change the upper values on the timer.
8. The tumbler timer is ready to run.
9. Press the tumbler start button to begin the cycle.

Stopping the tumbler with the STOP button or photo-eye switch will stop the tumbler timer and maintain it's time.
Pressing the tumbler START button will restart the total timer where it left off. Pressing the reset button on the tumbler timer in the middle of a tumbling cycle will reset that timer to the preset time setting.

LT30 or LT60
CONTROL PANEL WITH ELECTRONIC INTERVAL AND TUMBLER TIMER #CT4S

CONTROL PANEL FUNCTIONS

TUMBLER PUSH BUTTONS
Starts and stops timers for tumbling cycle.

VACUUM PUSH BUTTONS
Starts and stops vacuum pump.

TOTAL TIMER
Sets the total amount of time the drum will rotate. During the intermittent tumbling cycle, this timer runs only during the on period of the cycle.

INTERVAL TIMER
Set point 1 "t.off" sets amount of time drum rotates during on cycle.
Set point 2 "t.on" sets amount of time drum rests during off cycle.

SETTING THE CONTROL TIMER
Direct start continuous tumbling

1. Press (RST) button on the tumbler timer.
2. Set the set point on the tumbler timer for total tumbling time (time required for the drum to rotate).
3. To set the time on the tumbler timer, press the left arrow button on the timer, notice the far right position on the lower display is blinking.
4. Use the UP or DN., arrow button to change the value of this number. (The timer is set for hour-min.).
5. Use the left arrow to change to a new position, then repeat step #4. (Do this for each position).
6. When all the values are entered, press the (MD) button on the timer. (This will enter the time into memory).
7. Press the (RST) button to change the upper values on the timer.
8. The tumbler timer is ready to run.
9. Press (RST) button on the interval timer.
10. Set, set point 1 "t.off" to a time greater than was set on the tumbler timer.
11. To set the "t.off" time on the interval timer press the left arrow button.
12. Notice the "t.off" in the upper display of the timer is for the on time, notice the far right position on the lower display is blinking.
13. Use the UP or DN., arrow button to change the value of this number. (The timer is set for hour-min.).
14. Use the left arrow button to change to a new position, then repeat step #13. (Do this for each position). Set this time higher than what was set on the tumbler timer.
15. When all the values are entered, press the (MD) button on the timer. (This will enter the time into memory, and "t.on" will be displayed in the upper display).
16. Set, set point 2 "t.on" to 1 min.
17. The far right position on the lower display should now be blinking on the interval timer.
18. Use the UP or DN., arrow button to change the value of this number to "1". (The timer is set for hour-min.).
19. Use the left arrow to change to a new position, change all of these positions to "0"(The far right position should be the only position with a value in it when you are done for the "t.on").
20. Press the (MD) button on the timer to enter the time into memory. (The display will go to the "t.off" time on the display).

21. After the times are set, press the (RST) button to enter the time.
22. The Interval timer is now ready to run.
23. Press the tumbler start button to begin the cycle.

Direct start intermittent tumbling

1. Press (RST) button on the tumbler timer.
2. Set the set point on the tumbler timer for total tumbling time (time required for the drum to rotate).
3. To set the time on the tumbler timer, press the left arrow button on the timer, notice the far right position on the lower display is blinking.
4. Use the UP or DN., arrow button to change the value of this number. (The timer is set for hour-min.).
5. Use the left arrow to change to a new position, then repeat step #4. (Do this for each position).
6. When all the values are entered, press the (MD) button on the timer. (This will enter the time into memory).
7. Press the (RST) button to change the upper values on the timer.
8. The tumbler timer is ready to run.
9. Press (RST) button on the interval timer.
10. Set, set point 1 “t.off” for the amount of time you want the tumbler to run during it’s on cycle. (The on cycle will start first).
11. To set the “t.off” time on the interval timer press the left arrow button.
12. Notice the “t.off” in the upper display of the timer is for the on time, notice the far right position on the lower display is blinking.
13. Use the UP or DN., arrow button to change the value of this number. (The timer is set for hour-min.).
14. Use the left arrow button to change to a new position, then repeat step #13. (Do this for each position). Set this time for the amount of time you want the tumbler to run during it’s on cycle. (The on cycle will start first).
15. When all the values are entered, press the (MD) button on the timer. (This will enter the time into memory, and “t.on” will be displayed in the upper display).
16. Set, set point 2 “t.on” for the amount of time you want the tumbler to rest during it’s off cycle. (The total timer will not time down during this time).
17. The far right position on the lower display should now be blinking on the interval timer.
18. Use the UP or DN., arrow button to change the value of this number. (The timer is set for hour-min.).
19. Use the left arrow to change to a new position, then repeat step #18.(Do this for each position).
20. Press the (MD) button on the timer to enter the time into memory. (The display will go to the “t.off” time on the display).
21. After the times are set, press the (RST) button to enter the time.
22. The Interval timer is now ready to run.
23. Press the tumbler start button to begin the cycle.

During the continuous or intermittent timing cycle the tumbler timer will only count down when the “t.off” cycle is timing on the interval timer.
Stopping the tumbler with the STOP button or photo-eye switch will stop the tumbler timer and maintain it’s time. The interval timer will reset to the preset times.
Pressing the tumbler START button will restart the interval timer. The total timer will restart from where it left off. Pressing the reset button on either the tumbler timer or interval timer in the middle of a tumbling cycle will reset that timer to the preset time setting.

CLEANING PRECAUTIONS

Do not clean photo-eyes and reflectors with abrasive material, this could damage the components.

Do not spray water directly at the control panel, it could damage the components. Use a damp rag to clean the control panel face.

CLEANING YOUR MACHINE

Fill your machine so warm water goes to top of paddle. Using your standard cleaning solution, put in 1/2 to 1 cup, depending on the strength. Turn machine on and agitate for ten to fifteen minutes. When you stop the machine, make sure the drain plug is on top. Remove the plug and turn the machine on until drain is at the bottom. Remove lid and rinse. (CAUTION: Extremely hot water will cause fat to bake on walls.) Wipe off safety eyes and reflectors after cleaning.

FLUSHING VACUUM VALVE ON DRUM

Open vacuum valve and thoroughly flush with water. This must be done between loads, before pulling vacuum on the drum. If valve is not cleaned properly, food particles will be drawn into the vacuum hose.

CLEANING VACUUM HOSE

To clean food particles from the vacuum hose, remove glass jar (located inside cabinet) from the filter, and flush water through hose. Clean glass jar before replacing.

EMERGENCY STOP PHOTO-EYES

These are installed for your protection! When the sensor beam is broken, the machine is automatically shut off. If the machine does not want to start, it is possible either the reflector or sensor eyes are dirty or wet. If you do have a problem with the sensor, it is quickly identified by a red light located on the back of the sensor. Check for power to the photo-eyes through observation window. (Red light should be on, if they are not on wipe the photo-eye face and reflector to remove moisture.)

RECOMMENDED PROCEDURES FOR TUMBLING PRODUCT

PRODUCT & INSTRUCTION	% OF BRINE GREEN WT.	TOTAL TIME	DRUM LOAD	MOTOR SPEED%
Dried Beef Pump product with normal or recommended % of brine. Put product and excess purge into tumbler.	10%	3 hrs. 2.5 hrs.	1/2 or more 1/2 or less	40
Beef Jerky Get total weight of sliced product to verify % of brine to be added	10%	25 min. 15 min.	1/2 or more 1/2 or less	40
Chunked & Formed Using Ham Meat and Boston Butt parts (90%lean), run product through kidney plate on grinder. Get total weight to verify % of brine to be added. Tumble for stated period of time. Remove from tumbler. Run product through stuffer into large casing. Put into ham press and smoke under normal smoking conditions.	10%	1 hr.		70
Chicken After obtaining total weight of birds, add normal or recommended % of brine and tumble product and brine for required time.	10%	1 hr.	1/2 or more	40
Turkey Obtain total weight of birds. Pump breast, leg and wings on both sides with normal or recommended % of brine. Put product and excess purge in tumbler for recommended time. Then follow normal smoking procedures.	10%	1 hr.	1/2 or more	60

Bone-In Ham Pump your normal or recommended % of brine per green weight and put product and excess purge in tumbler.	15%	3.5 hrs. 3 hrs.	1/2 or more 1/2 or less	60
Boneless Ham Same process as Bone-In	15%	3 hrs. 2.5 hrs.	1/2 or more 1/2 or less	50
Bacon Obtain total weight of all product. Using your normal or recommended % of brine per green weight, put bellies and brine into tumbler	10%	3 hrs. 2.5 hrs.	1/2 or more 1/2 or less	50
Cottage Bacon Pump product with normal or recommended % of brine per green weight. Put product and excess purge into tumbler.	10%	3 hrs. 2.5 hrs	1/2 or more 1/2 or less	50
Pork Ribs Get total weight of the product to verify % of brine to be added.	10%	.5 hrs.		40
Pork Hocks Get total weight of the product to verify % of brine to be added.	15%	2 hrs. 1.5 hrs.	1/2 or more 1/2 or less	40
Beef or Pork Roast Pump roasts with normal or recommended soluble roast spice.	10%	4 hrs. 3.5 hrs.	1/2 or more 1/2 or less	40

* After tumbling put into cooking bag and bring internal temperature to 150 degrees. Product is now ready for sale.

MAINTENANCE

WARNING: DISCONNECT POWER BEFORE SERVICING.

NOTE: Lock and tag power disconnect to prevent application of power.

CLEANING

Properly selected and installed electric motors are capable of operating for long periods with minimal maintenance. Periodically clean dirt accumulations from open-type motors, especially in and around vent openings, preferably by vacuuming (avoid imbedding dirt in windings). At the same time check that electrical connections are tight.

LUBRICATION

The motor is equipped with pre-lubricated ball bearings and will not require re-lubrication. The gears and bearings should be re-lubricated on a regular basis, use type "L-Industrial 30" (American Oil Co.) grease or its equivalent. The following is a list of lubricants which can be used: Mobile UX-EP2, Philube =EP2, Gulf Crown =EP2, Alvania =EP2, or Mutifax =EP2.

IMPORTANT: COMPLETELY CLEAN THE OLD LUBRICANT FROM THE GEAR BOX BEFORE ADDING FRESH LUBRICANT. UNDER NO CIRCUMSTANCES SHOULD DIFFERENT TYPES OF LUBRICANTS BE MIXED!

MAINTENANCE & LUBRICATION SCHEDULE

MOTOR BRUSHES

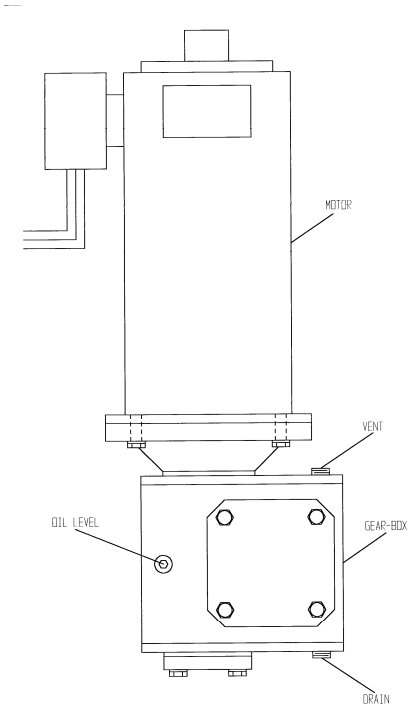
Motor brushes need period inspection and replacement as wear indicates. Brush wear is greatly influenced by individual application. It is recommended that brush wear be checked at intervals of operation in order to determine future required inspection. Standard LEESON brushes have an initial length of 1-1/4". When the brushes are worn to a length of 5/8" they should be replaced.

LUBRICATION

This motor is supplied with pre-lubricated ball bearings, lubricated for life of bearings.

GEAR BOX MAINTENANCE

Frequently check the oil level of the reducer. If the oil level is low add lubrication through filler plug until it comes out the oil level plug. Inspect vent plug often to insure it is clean and operating.



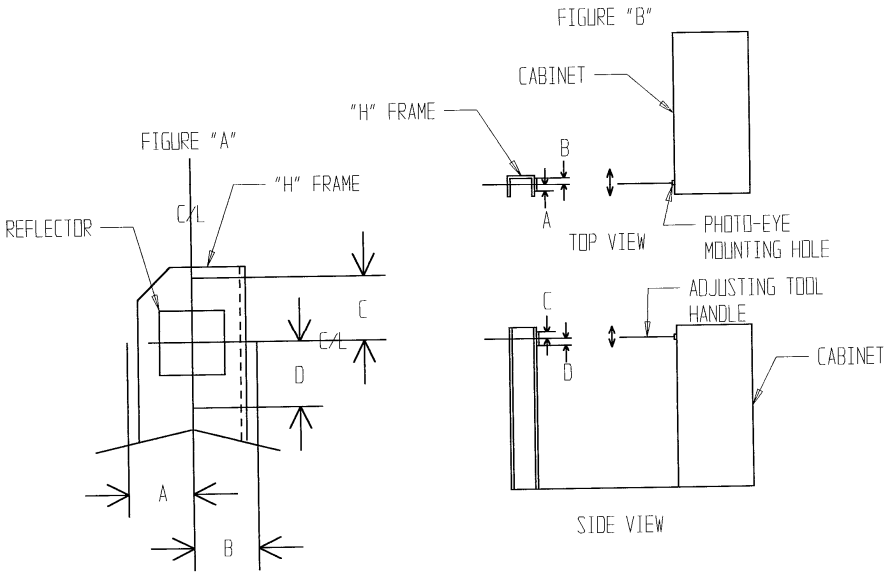
MANUFACTURER'S RECOMMENDED LUBRICANTS

MANUFACTURER	30-100 F AMBIENT TEMPERATURE AMGA Compounded No.7
Mobile Oil Corp.	600 W Super Cylinder

CHECKING THE AIM OF A PHOTO-EYE

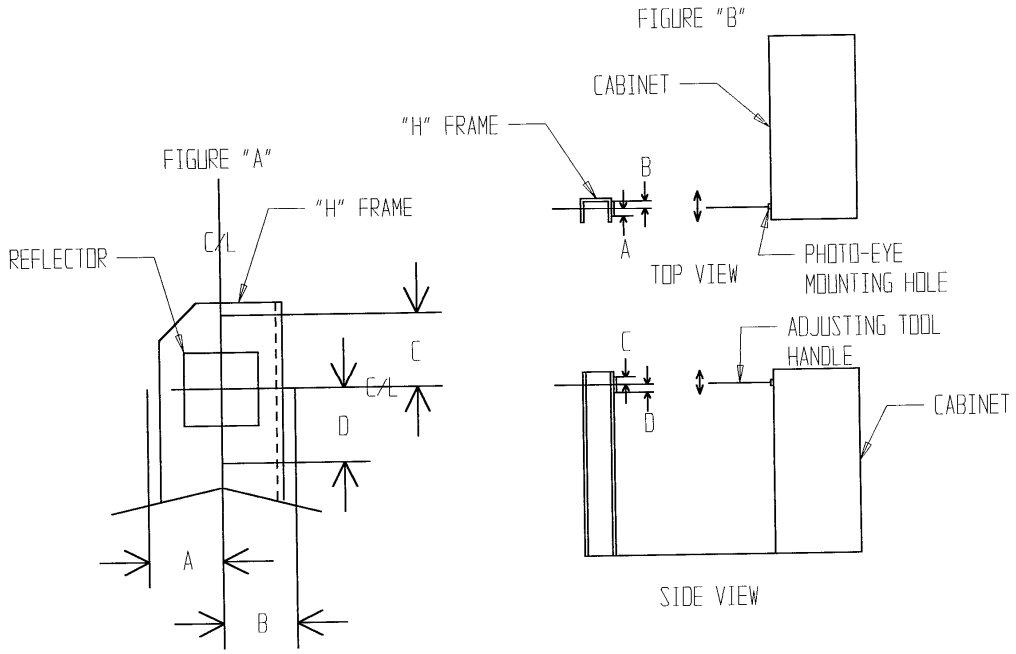
1. Press the (RST) button on the timer. This will supply power to the photo-eyes which will be indicated by a red light on at the back of the photo-eye. (If they won't come on, the photo-eye might be out of alignment.)
2. Take a piece of masking tape and cover up the reflector. Only the one reflector that is opposite of the photo-eye that you are checking.
3. Use a reflector for checking the sensing range of the photo-eye. Take this reflector and hold it over the reflector that you taped up.
   - A. Move the reflector to the left until the red light on the photo-eye goes out, measure this distance (see Figure "A"), which we will call distance "A".
   - B. Move the reflector to the right until the red light on the photo-eye goes out, measure this distance (see Figure "A"), which we will call distance "B".
   - C. Move the reflector up until the red light on the photo-eye goes out, measure this distance (see Figure "A"), which we will call distance "C".
   - D. Move the reflector down until the red light on the photo-eye goes out, measure this distance (see Figure "A"), which we will call Distance "D".

4. Distance "A" & "B" should be about the same and "C" & "D" should be about the same. If measurement "A" & "B" are not equal and "C" & "D" are not equal the photo-eye aim needs to be adjusted (see **ADJUSTING THE AIM OF THE PHOTO-EYE**). If they are equal repeat this procedure on the second photo-eye (Model LT30 and LT60 only).



ADJUSTING THE AIM OF A PHOTO-EYE

1. Remove side panel of cabinet.
2. Press the (RST) button on the timer. This will supply power to the photo-eyes which will be indicated by a red light on at the back of the photo-eye. (If they don't come on, the photo-eye might be out of alignment.)
3. For adjusting the mounting hole on the cabinet, there is an Adjusting Tool available.
    A. Remove the photo-eye from the cabinet.
    B. Remove one of the nuts that is threaded onto the Adjusting Tool and insert the threaded end into the hole in the cabinet (from the outside) and thread the nut back on the tool.
    C. Pull the handle of the Adjusting Tool into the direction of the smaller measurements that you recorded in step #4 (see Figure "B"). You should be able to bend the mounting hole in the cabinet, to align the photo-eye.
4. Install the photo-eye back into the cabinet.
5. Repeat instructions for **CHECKING THE AIM OF THE PHOTO-EYE**. Re-adjust again if necessary.
6. Once this is complete remove the tape from the reflector and put the side panel back on the cabinet.
7. Alignment is now complete.

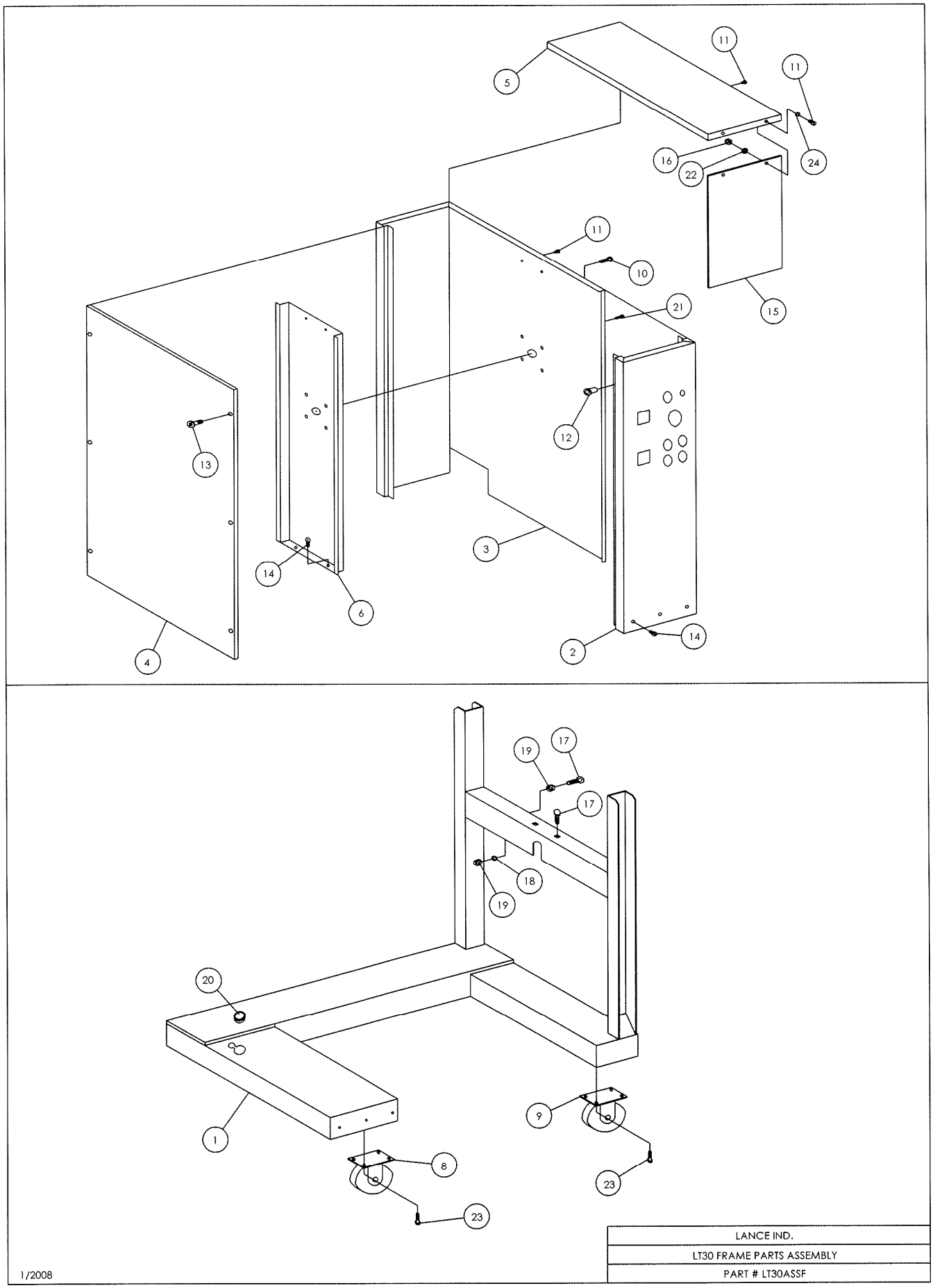


LT30 FRAME PARTS ASSEMBLY

31x52 UNIT

REF. NO.	PART NO.	DESCRIPTION	QTY.
1	LT30FW	MAIN FRAME	1
2	1012A	FACE PANEL	1
3	1013	BACK	1
4	1014	SIDE PANEL	1
5	1015	TOP COVER	1
6	1024	DRUM SUPPORT	1
7	NONE		
8	CS4W890	RIGID CASTER	2
9	CS4W887	SWIVEL CASTER	2
10	BOS0AB240125	3/8-16x1 1/4" CARR. BOLT SS	4
11	BOS0AU160050	10-24x1/2" PH RHMS SS	12
12	RNA2520A080	¼-20 ALUM. RIVNUT	6
13	BOS0AU200125	1/4"-20x1 1/4" PH RHMS SS	6
14	BOS0AU200050	1/4-20x1/2" PH RHMS SS	11
15	PL75-011DX-02	VINYL STRIP	1
16	NUS0EA16	10-24 HEX NUT SS	2
17	BOS0AB280150	1/2-13x1 ½" CARR BOLT SS	4
18	WASGI050	1/2" STD. LOCK WASHER SS	2
19	NUSOEA28	1/2-13 HEX NUT SS	4
20	SB2210	SNAP BUSHING	1
21	BOS0AU160100	10-24 X 1" PH RHMS SS	3
22	WASGA020	#10 STD. FLAT WASHER SS	2
23	BOS0AA240075	3/8-16x3/4" HHCS SS	16
24	WA98449A011	#10 LOCK WASHER SS	2
*25	WP1305	WINDOW PLUG	2
*26	RNAKA1616-150	3/8-16 ALUM. RIVNUT	16

* NOT SHOWN



LANCE IND.
LT30 FRAME PARTS ASSEMBLY
PART # LT30ASSF

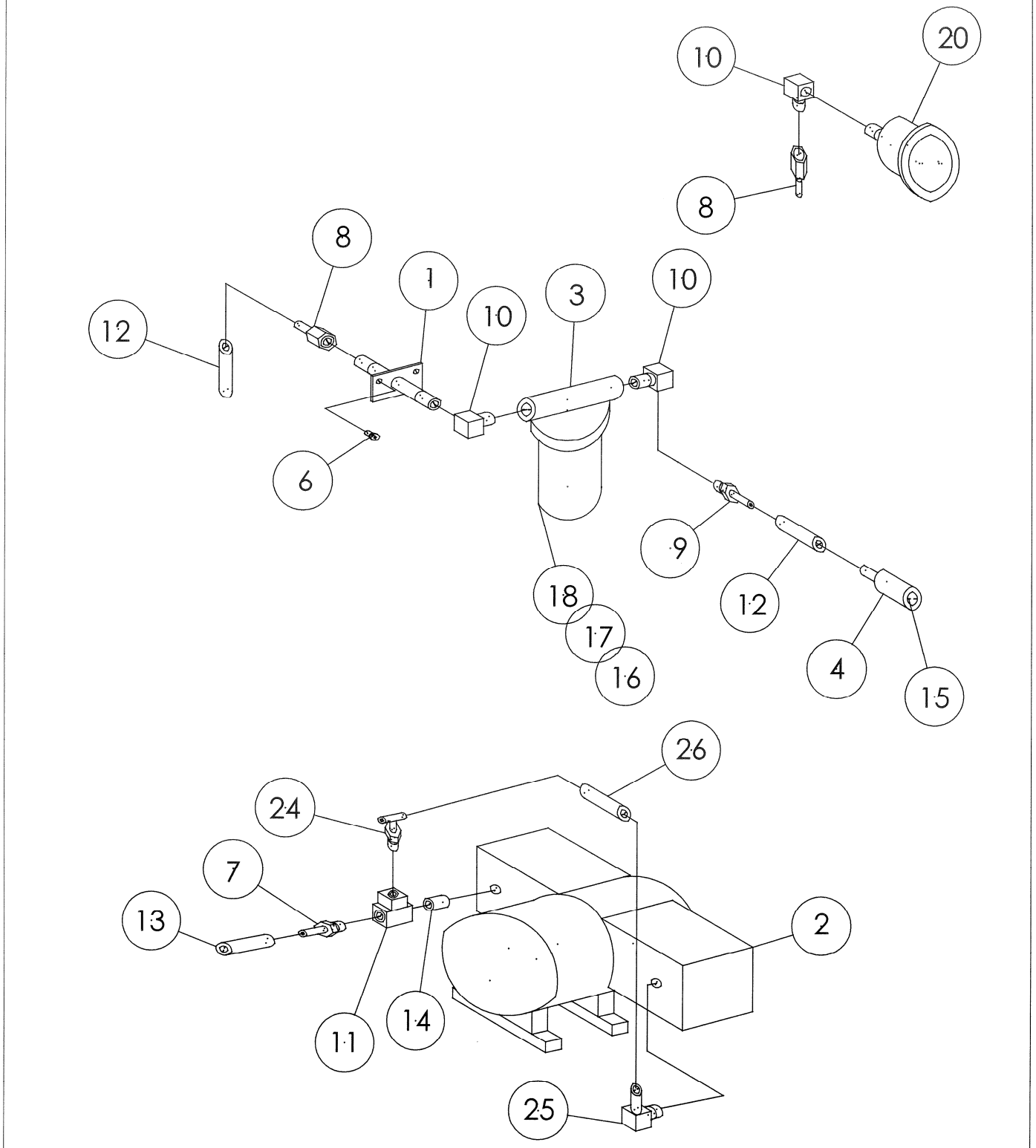
1/2008

LT30 VACUUM PARTS ASSEMBLY

31x52 UNIT

REF. NO.	PART NO.	DESCRIPTION	QTY.
1	1036TW	TRAP BRACKET	1
2	VU4LCB-251-M450X	VACUUM PUMP	1
3	VTAA672K	BALL TRAP	1
4	0002-49	VACUUM PLUG	1
*5	BOS0AA200100	1/4-20x3/4" HHCS SS	8
6	BOS0AU160050	10-24x1/2" PH RHMS SS	3
7	HN5346K14	MALE HOSE NIPPLE 1/4"-1/4"	1
8	HN5346K42	FEMALE HOSE NIPPLE 1/4"-1/4"	2
9	HN5346K18	MALE HOSE NIPPLE 3/8"-1/4"	1
10	EL116SC	90 STREET ELBOW 1/4"-1/4"	3
11	TEE101C	TEE ¼"	1
12	HS26-705AM-54	3/8" HOSE 54"LG	1
13	HS26-702AM-30	¼" HOSE 30"LG	1
14	PNS025B0150	PIPE NIPPLE	1
*15	OR9464K26	O-RING	1
*16	VTAJ554	TRAP BALL	1
*17	VTAJ473	TRAP FUNNEL	1
*18	VTAE274	TRAP JAR	1
*19	WASGI025	¼" STD LOCK WASHER SS	8
20	GA203L-204A	VACUUM GAUGE	1
*21	GS9523K31	GAUGE SEAL	1
*22	1083	VACUUM PUMP BRACKET	1
*23	RNAHA1-420-165	¼-20 HEX RIVNUTS	8
24	HN5372K636	TEE ¼"NPT-3/8" HOSE	1
25	HN5372K317	HOSE NIPPLE ¼"NPT-3/8" HOSE	1
26	HS26-705AM-14	3/8" HOSE 14" LG.	1
*27	WASGA025	¼" FLAT WASHER	8

* NOT SHOWN



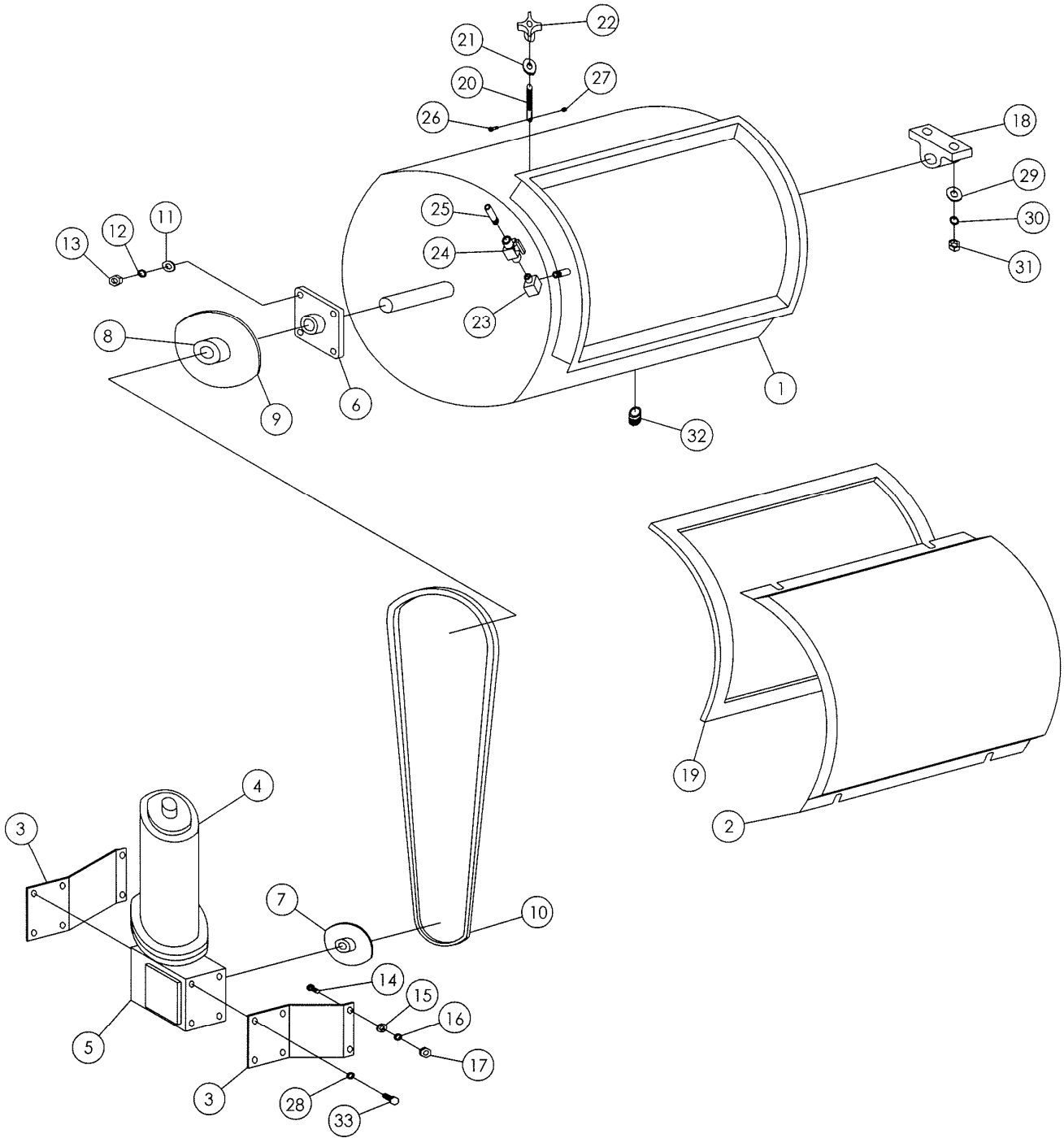
LANCE IND.
LT30-60 VACUUM PARTS ASSEMBLY
PART # LT30-60V

7/2010,REV."A"

LT 30 DRIVE-TRAIN ASSEMBLY

REF. NO.	PART NO.	DESCRIPTION	31x52 UNIT QTY.
1	LT30DW	DRUM	1
2	LT30CW	COVER	1
3	1030	MOTOR MOUNTING BRACKET	2
4	MO098000	MOTOR (LESSON)	1
5	GB175BQ040562	GEAR BOX	1
6	PBHCFS207-23-1-7/16	FLANGE BEARING	1
7	SP40B12-7/8	SPROCKET	1
8	BUSDS-1-7/16	BUSHING	1
9	SP40SDS60	SPROCKET (FOR 60 CYCLE MACHINES)	1
	SP40SDS48	SPROCKET (FOR 50 CYCLE MACHINES)	1
10	RC404475	#40 ROLLER CHAIN (44.75” LG.)	1
11	WASGA037	3/8" STD FLAT WASHER SS	4
12	WASGI037	3/8" STD LOCK WASHER SS	4
13	NUS0EA24	3/8-16 HEX NUT SS	4
14	BOS0AB220075	5/16-18 X 3/4" CARRIAGE BOLT SS	4
15	WASGA031	5/16" STD FLAT WASHER SS	4
16	WASGI031	5/16" STD LOCK WASHER SS	4
17	NUSOEA22	5/16-18 HEX NUT SS	4
18	PBUCP207-23-1-7/16	PILLOW BLOCK BEARING	1
19	GALT153060	GASKET	1
20	0002-43	COVER BOLT	4
21	WASGA050	COVER WASHER	4
22	PK2840	COVER KNOB	4
23	EL116SC	90 DEG. STREET ELBOW	1
24	PV4886K56	BRASS VALVE	1
25	600-56	PIPE NIPPLE	1
26	BOS0BF700062	10-32 X 5/8" PH TH HD MS SS	4
27	NUSOEN17	10-32 ACORN NUT SS	4
28	WASGI025	1/4" STD LOCK WASHER SS	8
29	WASGA050	½" STD FLAT WASHER SS	2
30	WASGI050	½" STD LOCK WASHER SS	2
31	NUS0EA28	½-13 HEX NUT SS	2
32	PC63745T81	END CAP	1
33	BOS0AA200100	1/4"-20 X 1 HHCS SS	8
34	NONE		
*35	BRBP900163.11	BRUSH (LEES0N)(MOTORS AFTER 1999)	2
*36	BRBP900116.02	BRUSH (LEES0N)(MOTORS BEFORE 1999)	2
*37	BRBP900115.01	BRUSH SPRING (LEES0N)	2
*38	PW1041	PLASTIC WASHER	4
*39	LI-40	#40 CONNECTING LINK	1

* NOT SHOWN



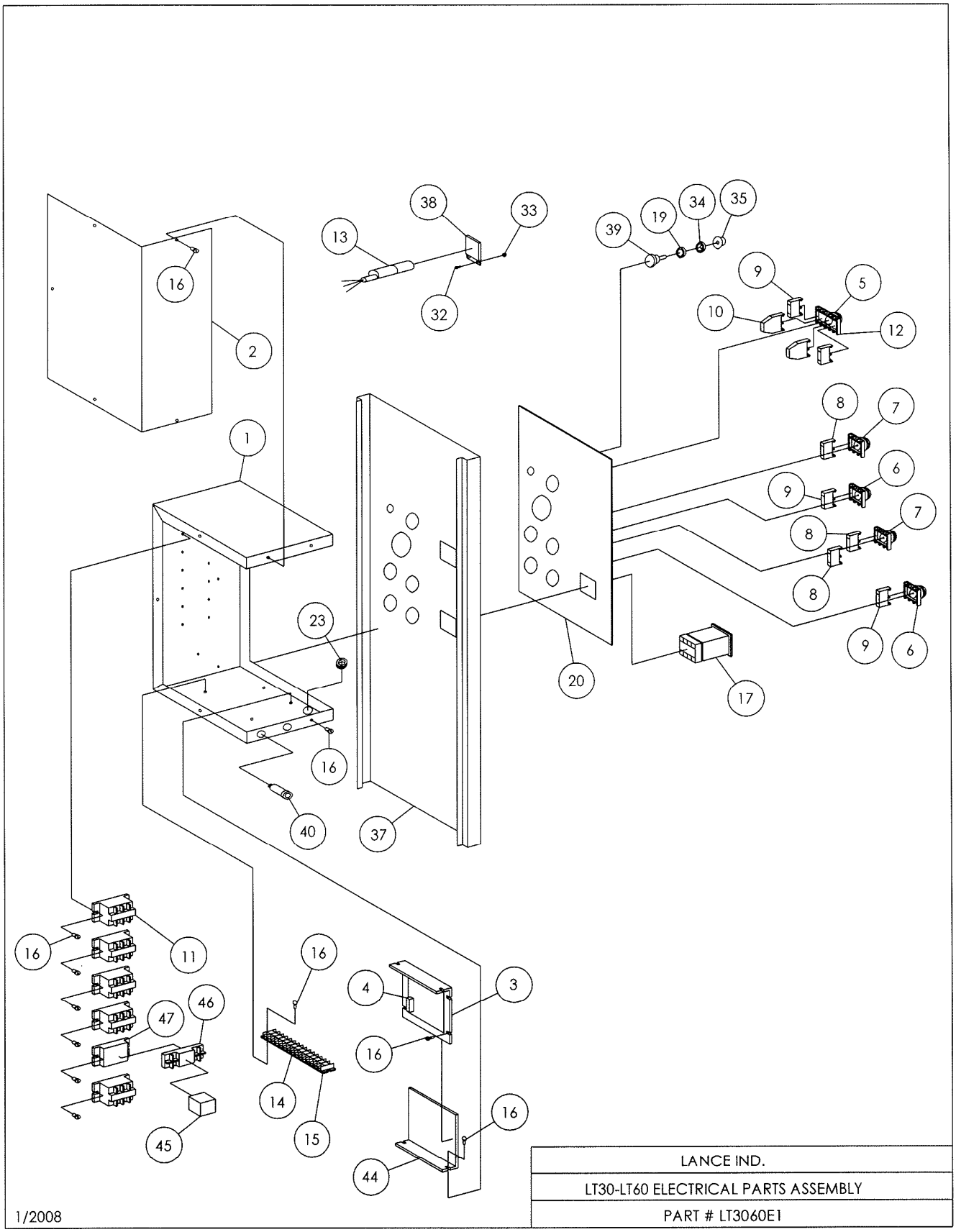
LANCE IND.
LT30 DRIVE-TRAIN PARTS ASSEMBLY
PART # LT30ASSD

1/2008

LT 30 ELECTRICAL PARTS ASSEMBLY

REF. NO.	PART NO.	DESCRIPTION	31x52 UNIT QTY.
1	1016A	ELECTRICAL BOX	1
2	1018	ELECTRICAL BOX COVER	1
3	BCBC141	CONTROLLER	1
4	BCBR0025	HP RESISTOR	1
5	SWP9CSMUON	SELECTOR SWITCH	1
6	PBP9CPNRS	PUSH BUTTON-RED	2
7	PBP9CPNVG	PUSH BUTTON-GREEN	2
8	CBP9B10VN	CONTACT BLOCK-N.O	3
9	CBP9B01VN	CONTACT BLOCK-N.C	4
10	CBP9B11VN	CONTACT BLOCK-N.O./N.C	2
11	RL2XC20	RELAY	5
12	FBP9ACFS5	FLANGE BLOCK	1
13	PE14150AL14	PHOTOELECTRIC EYE	2
14	TE2A691	TERMINAL SECTION	15
15	TE2A696	END SECTION	1
16	BOS0AU140037	8-32 X 3/8" PH RHMS SS	17
17	TMCT4S	TIMER	1
18	NONE		
19	WA93650A160	WASHER SEAL	1
20	BPLT30PA-1	BLUE PANEL	1
*21	SR1200	5/8" STRAIN RELIEF	3
*22	SR1157	½" STRAIN RELIEF	2
23	GM9600K22	GROMMET	1
*24	WI1W661	16/3 WIRE	6’
*25	CR3453	CORD RESTRAINT	1
*26	CT3500	NYLON CABLE TIES	10
*27	CL3608	CABLE HOLDER	6
*28	CT3503	NYLON CABLE TIES	10
*29	CN4X290	SPLICE CONNECTOR	3
*30	CN534-0550	1/4"-90 CONNECTOR	4
*31	CN4X308	RING CONNECTOR	5
32	BOS0CA120037	6-32 X 3/8" PH PAN HD MS SS	4
33	NUS0EN12	6-32 ACORN NUT SS	4
34	NU70205K21	SEALING NUT	1
35	SK753-2352	SPEED KNOB	1
*36	CS2W687	POWER CORD 12’LG.	1
37	1012	FACE PANEL	1
38	00001812300	REFLECTOR	2
39	SPBC-148	5K SPEED POTENTIOMETER	1
40	FHHTB-36I	FUSE HOLDER	2
*41	FU6F019	GGC12-12 AMP FUSE	1
*42	FU6F046	GAB8-8 AMP FUSE	1
*43	----------	TRANSFORMER (220& 380 volt units only) (see tag on transformer for part #)	1
44	LT30-77	CONTROLLER BRACKET	1
45	RL2W928	RELAY	1
46	SO2A582	RELAY SOCKET	1
47	LT30-78	RELAY BRACKET	1

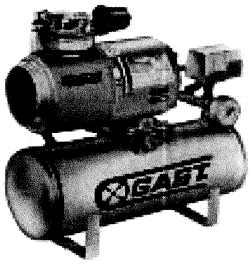
*NOT SHOWN


LANCE IND.
LT30-LT60 ELECTRICAL PARTS ASSEMBLY
PART # LT3060E1
1/2008

MODEL # 4LCB-251-M450X

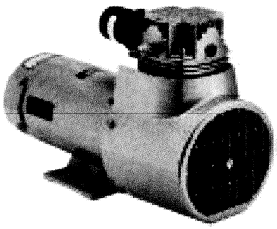
OIL-LESS PISTON VACUUM PUMPS & COMPRESSORS

OPERATION & MAINTENANCE MANUAL

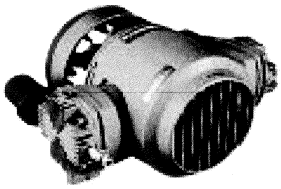


Model 1HAB Shown

Model 3HBB Shown



Model 3HEB Shown



Model PCD Shown

Thank you for purchasing this Gast product. It is manufactured to the highest standards using quality materials. Please follow all recommended maintenance, operational and safety instructions and you will receive years of trouble free service.

IMPORTANT: PLEASE READ THIS MANUAL AND SAVE FOR FUTURE REFERENCE.

Product Use Criteria:

- Pump only clean, dry air.
- Operate at 32°F - 104°F (0°C - 40°C).
- Protect unit from dirt & moisture.
- Do not pump flammable or explosive gases or use in an atmosphere that contains such gases.
- Protect all surrounding items from exhaust air. This exhaust air can become very hot.
- Corrosive gases and particulate material will damage unit. Water vapor, oil-based contaminants or other liquids must be filtered out.
- Consult your Gast Distributor/Representative before using at high altitudes.
- These pumps are oil-less and require NO lubrication. The Teflon-filled rings are self-lubricating and require no oil.
- The motor bearings are grease-packed for the lifetime of the bearings.

GAST
A Unit of IDEX Corporation

ISO 9001 & 14001 CERTIFIED

www.gastmfg.com

Your safety and the safety of others is extremely important.

We have provided many important safety messages in this manual and on your product. Always read and obey all safety messages.

This is the safety alert symbol. This symbol alerts you to hazards that can kill or hurt you and others. The safety alert symbol and the words "DANGER" and "WARNING" will precede all safety messages. These words mean:

DANGER

You will be killed or seriously injured if you don't follow instructions.

WARNING

You can be killed or seriously injured if you don't follow instructions.

All safety messages will identify the hazard, tell you how to reduce the chance of injury, and tell you what can happen if the safety instructions are not followed.

INSTALLATION

WARNING

Electrical Shock Hazard

Disconnect electrical power at the circuit breaker or fuse box before installing this product.

Install this product where it will not come into contact with water or other liquids.

Install this product where it will be weather protected.

Electrically ground this product.

Failure to follow these instructions can result in death, fire or electrical shock.

Correct installation is your responsibility. Make sure you have the proper installation conditions and that installation clearances do not block air flow.

Lift the unit by the motor shell, motor foot or flywheel (depending upon model design). Do Not lift unit by shroud, filters or mufflers. These parts are not designed to support the weight of the unit.

Blocking air flow over the product in any way can cause the product to overheat.

Install safety guards as required to prevent potential injury hazards or damage to surrounding objects.

Mounting

This product can be installed in any orientation. Mounting the product to a stable, rigid operation surface and using shock mounts will reduce noise and vibration.

Plumbing

Remove plugs from the IN and OUT ports. Connect with pipe and fittings that are the same size or larger than the product's threaded ports. Be sure to connect the intake and exhaust plumbing to the correct inlet and outlet ports. Ports will not support plumbing.

Accessories

If unit will be used in a system where it will be required to start against any system of back pressure, a positive sealing, one-way check valve should be installed in the air line between system and unit. This check valve is included with all tank mounted compressor units.

The product's intake and exhaust filters will provide adequate filtration in most applications. Check filters periodically and replace when necessary. Please consult your Gast Distributor/Representative for additional filter recommendations.

Install relief valves and gauges at inlet or outlet, or both, to monitor performance. Check valves may be required to prevent back streaming through the unit.

Motor Control

It is your responsibility to contact a qualified electrician and assure that the electrical installation is adequate and in conformance with all national and local codes and ordinances. Grounding is required.

Determine the correct overload setting required to protect the motor (see motor starter manufacturer's recommendations). Select fuses, motor protective switches or thermal protective switches to provide protection. Fuses act as short circuit protection for the motor, not as protection against overload. Incoming line fuses must be able to withstand the motor's starting current. Motor starters with thermal magnetic overload or circuit breakers protect motor from overload or reduced voltage conditions.

The wiring diagram supplied with the product provides required electrical information. Check that power source is correct to properly operate the dual-voltage motors.

Electrical Connection

WARNING

Electrical Shock Hazard

This product must be properly grounded.

Do not modify the plug provided. If it will not fit the outlet, have the proper outlet installed by a qualified electrician.

If repair or replacement of the cord or plug is necessary, do not connect the grounding wire to either flat blade terminal. The wire with insulation that is green or green with yellow stripes is the grounding wire.

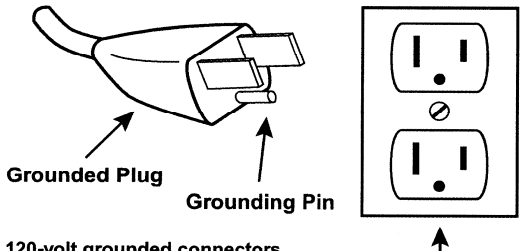
Check the condition of the power supply wiring. Do not permanently connect this product to wiring that is not in good condition or is inadequate for the requirements of this product.

Failure to follow these instructions can result in death, fire or electrical shock.

Model with a power supply cord:
This product must be grounded. For either 120-volt or 220/240-volt circuits connect power supply cord grounding plug to a matching grounded outlet. Do not use an adapter. (See diagram.)

In the event of an electrical short circuit, grounding reduces the risk of electric shock by providing an escape wire for the electric current. This product may be equipped with a power supply cord having a grounding wire with an appropriate grounding plug. The plug must be plugged into an outlet that is properly installed and grounded in accordance with all local codes and ordinances.

Check with a qualified electrician or serviceman if the grounding instructions are not completely understood, or if you are not sure whether the product is properly grounded. Do not modify the plug provided. If it will not fit the outlet, have the proper outlet installed by a qualified electrician.



120-volt grounded connectors shown. 220/240-volt grounded connectors will differ in shape.

Model that is permanently wired:
This product must be connected to a grounded, metallic, permanent wiring system, or an equipment grounding terminal or lead on the product.

Power supply wiring must conform to all required safety codes and be installed by a qualified person. Check that supply voltage agrees with that listed on product nameplate.

Extension cords:
Use only a 3-wire extension cord that has a 3-blade grounding plug. Connect extension cord plug to a matching 3-slot receptacle. Do not use an adapter. Make sure your extension cord is in good condition. Check that the gage wire of the extension cord is the correct size wire to carry the current this product will draw.

An undersized cord is a potential fire hazard, and will cause a drop in line voltage resulting in loss of power causing the product to overheat. The following table indicates the correct size cord for length required and the ampere rating listed on the product nameplate. **If in doubt, use the next heavier gage cord. The smaller the gage number, the heavier the wire gage.**

Minimum gage for extension cords

Amps	Volts	Length of cord in feet								
	120v	25	50	100	150	200	250	300	400	500
	240v	50	100	200	300	400	500	600	800	1000
0-2		18	18	18	16	16	14	14	12	12
2-3		18	18	16	14	14	12	12	10	10
3-4		18	18	16	14	12	12	10	10	8
4-5		18	18	14	12	12	10	10	8	8
5-6		18	16	14	12	10	10	8	8	8
6-8		18	16	12	10	10	8	6	6	6
8-10		18	14	12	10	8	8	6	6	4
10-12		16	14	10	8	8	6	6	4	4
12-14		16	12	10	8	6	6	6	4	2
14-16		16	12	10	8	6	6	4	4	2
16-18		14	12	8	8	6	4	4	2	2
18-20		14	12	8	6	6	4	4	2	2

OPERATION

WARNING

Injury Hazard

Install proper safety guards as needed.

Keep fingers and objects away from openings and rotating parts.

When provided, motor terminal covers must be in place for safe operation.

Product surfaces become very hot during operation, allow product surfaces to cool before handling.

Air stream from product may contain solid or liquid material that can result in eye or skin damage, wear proper eye protection.

Wear hearing protection. Sound level from motor may exceed 70 dBA.

Failure to follow these instructions can result in burns, eye injury or other serious injury.

It is your responsibility to operate this product at recommended pressures or vacuum duties and room ambient temperatures. Do not start against a vacuum or pressure load. Do not remove relief valve head while unit is operating.

Start Up
If motor fail to start or slows down significantly under load, shut off and disconnect from power supply. Check that voltage is correct for motor and that motor is turning in the proper direction. If the motor is turning in the wrong direction, it will overheat.

MAINTENANCE

⚠ WARNING

Electrical Shock Hazard

Disconnect electrical power supply cord before performing maintenance on this product.

If product is hard wired into system, disconnect electrical power at the circuit breaker or fuse box before performing maintenance on this product.

Failure to follow these instructions can result in death, fire or electrical shock.

⚠ WARNING

Injury Hazard

Product surfaces become very hot during operation, allow product surfaces to cool before handling.

Air stream from product may contain solid or liquid material that can result in eye or skin damage, wear proper eye protection.

Failure to follow these instructions can result in burns, eye injury or other serious injury.

It is your responsibility to:
- **Regularly inspect and make necessary repairs to product in order to maintain proper operation.**
- **Make sure that pressure and vacuum is released from product before starting maintenance.**

If unit is operated at maximum duties in a fairly clean, 65°F - 75°F (18°C - 24°C) ambient environment with 35% relative humidity, complete first inspection and maintenance after 4000 hours of operation. Earlier maintenance may be required depending upon the environment.

Check intake and exhaust filters after first 500 hours of operation. Clean filters and determine how frequently filters should be checked during future operation. This one procedure will help assure the product's performance and service life.

Check the thickness of the rider ring. It should measure greater than .055". Change all rings if thickness measures .055" or less.

1. Disconnect electrical power supply to unit.
2. Vent all air lines.
3. Remove filter cover.
4. Check filter felt. Replace felt if it is covered with contamination or shows signs of increasing differential pressure.
5. Reinstall felt and filter cover.

Check that all external accessories such as relief valves and gauges are attached and are not damaged before re-operating product.

Pressure or Vacuum Tank Systems
Check the air filter cartridge. A dirty filter restricts air flow and causes unit to run hotter resulting in longer operating cycles.

Check the air receiver for moisture regularly. The humidity in the environment will determine how quickly moisture will accumulate and need to be drained.

Clean the pump and motor regularly. Dirt and film buildup on the outer shell affects the unit's ability to dissipate heat.

SHUTDOWN PROCEDURES

It is your responsibility to follow proper shutdown procedures to prevent product damage.
NEVER ADD OIL TO THIS OIL-LESS PUMP.

Proper shutdown procedures must be followed to prevent pump damage. Failure to do so may result in premature pump failure. Gast Manufacturing Oil-Less Piston Vacuum Pumps and Compressors are constructed of ferrous metals or aluminum which are subject to rust and corrosion when pumping condensable vapors such as water. Follow the steps below to assure correct storage and shutdown between operating periods.

1. Disconnect plumbing.
2. Operate product for at least 5 minutes without plumbing.
3. Run at maximum vacuum for 10 - 15 minutes.
4. Repeat step 2.
5. Disconnect power supply.
6. Plug open ports to prevent dirt or other contaminants from entering product.

SERVICE KIT INSTALLATION

⚠ WARNING

Electrical Shock Hazard

Disconnect electrical power supply cord before installing Service Kit.

If product is hard wired into system, disconnect electrical power at the circuit breaker or fuse box before installing Service Kit.

Vent all air lines to release pressure or vacuum.

Failure to follow these instructions can result in death, fire or electrical shock.

Gast will NOT guarantee field-rebuilt product performance. For performance guarantee, the product must be returned to a Gast Authorized Service Facility.

Service Kit contents vary. Most contain head and cylinder gaskets, valves, piston rings and seals, rider rings and felt filters.

1. Disconnect electrical power to pump.
2. Disconnect air supply and vent all air lines to release pressure or vacuum.
3. Remove shroud, cylinder head and valve components.
4. Remove cylinder and rings.
5. Clean all parts with water or non-petroleum based solvent such as Gast AH255B Solvent. Do Not use kerosene or ANY other combustible solvents.
6. Install piston seals, piston rings and rider rings on piston. Locate ring joints approximately opposite each other.
7. Use cylinder screws with washers to attach cylinder to bracket. Tighten screws only until they are finger tight.
8. Move pistons to top dead center position. Adjust each cylinder flush with top of piston.
9. Torque cylinder screws to 150-160 in. lbs.
10. Replace valve components in original order.
11. Install cylinder head and head screws. The exhaust ports have been marked on the cylinder heads by omitting the ends of two of the fins. Do not tighten screws at this time.
12 Install manifold nuts and seals on manifold. Insert into cylinder head and manifold.
13. Torque head screws to 150-160 in. lbs.
14. Turn fan by hand to check that rod assembly is not hitting head. If rod hits head, loosen cylinders and adjust.
15. Install manifold and tighten manifold nut one-quarter to one-half turn beyond finger tight.
16. Operate unit for 10 minutes. Tighten screws again.
17. Install fan shroud.

Check that all external accessories such as relief valves and gauges are attached to cover and are not damaged before re-operating product.

If pump still does not produce proper vacuum or pressure, send unit to a Gast Authorized Service Facility for repair.

SPECIFIC PROBLEMS AND REMEDIES

Unit stalls after vacuum or pressure starts building up in receiver:

1. Disconnect electrical power supply from unit.
2. Check that voltage from power source matches that listed on nameplate.
3. Check wiring connections against diagram on nameplate. Single voltage motors will operate only at designated voltage.

Motor will not start:

1. Disconnect electrical power supply from unit.
2. Check that voltage from power source matches that listed on nameplate.
3. Check wiring connections against diagram on nameplate. Single voltage motors will operate only at designated voltage.
4. Reconnect electrical supply to unit. Check that power is on. If extension cord is used, check that it is the correct size and length to adequately supply power to the unit.
5. If unit will still not operate, contact your Gast Distributor/Representative or a Gast Authorized Service Facility.

Motor starts at 0 PSI but will not start under pressure:

1. Replace the check valve.
2. Wait for the thermal overload switch to reset before attempting to operate.
3. If unit will not restart, the thermal overload switch may need to be replaced. If there isn't a thermal overload switch, the motor may be damaged and requires service.

Motor starts intermittently:

1. Disconnect electrical power supply from unit.
2. Check points in the pressure or vacuum switch for wear or dirt.
3. Check for dirt buildup or uneven wear.
4. Replace parts as required.

Unit cycles On-Off more often than when first installed:

1. Check air receiver and drain water that has accumulated.

Unit or motor is running more often than when first installed:

1. Check system for air leaks. If new or different pneumatic equipment has been added, the air requirements may have changed.
2. Check and clean filters.
3. Check for buildup of foreign material on head.
4. Check valves and rings for wear and damage.

PARTS & ORDERING INFORMATION

Please reference the exploded view on the opposite page for the following model and parts tables.

1VBF – 3LBD SERIES

REF	DESCRIPTION	QTY	1VBF	1VSF	2LBB	2HBB	2HBC	3HBB	3HBE	3LBA	3LBD
1	INLET FILTER ASSEMBLY	1		B300A							
		2	B300A		B300A	B300A	B300A	B300A	B300A	B300A	B300A
2 Δ	FELT	2	B344A	B344A	B344A	B344A	B344A	B344A	B344A	B344A	B344A
3	SAFETY VALVE	1	–	–	AT517D	AT517	AT517	AT517	AT517	AT517D	AT517D
4	CYLINDER HEAD	2	AF508	AF508	AF508	AF508	AF508	AF508	AF508	AF508	AF508
5 Δ	HEAD GASKET	2	AF518	AF518	AF518	AF518	AF518	AF518	AF518	AF518	AF518
6 Δ	OUTLET VALVE	2	AF531	AF531	AF531	AF531	AF531	AF531	AF531	AF531	AF531
7	PLATE VALVE	2	AF529	AF529	AF529	AF529	AF529	AF529	AF529	AF529	AF529
8 Δ	INLET VALVE	2	AF530	AF530	AF530	AF530	AF530	AF530	AF530	AF530	AF530
9 Δ	CYLINDER GASKET	2	AF519A	AF519A	AF519A	AF519A	AF519A	AF519A	AF519A	AF519A	AF519A
10	CYLINDER	2	AF510	AF510	AF510	AF510	AF510	AF510	AF510	AF510	AF510
11 Δ	PISTON RING	4	AF527	AF527	AF527	AF527	AF527	AF527	AF527	AF527	AF527
12 Δ	PISTON SEAL	4	AF526	AF526	AF526	AF526	AF526	AF526	AF526	AF526	AF526
13	PISTON ROD ASSEMBLY	2	AF560F	AF560F	AF560B	AF560B	AF560C	AF560B	AF560E	AF560A	AF560D
14 Δ	RIDER RING	2	AF594	AF594	AF594	AF594	AF594	AF594	AF594	AF594	AF594
15	FLAT KEY	1	AF524	AF524	AF524	AF524	AF524	AF524	AH984	AF524	AH984
16	FAN/FAN ASSEMBLY	1	AF533	AF533	AF533	AF533	AF533	AF533	AF547	AF533	AF547
17	SHROUD	1	AF535	AF535	AF535	AF535	AF535	AF535	AF535	AF535	AF535
18 Δ	MANIFOLD SLEEVE	2	AF567A	AF567A	AF567A	AF567A	AF567A	AF567A	AF567A	AF567A	AF567A
***	SERVICE KIT	1	K260	K260	K260	K260	K260	K260	K260	K260	K260

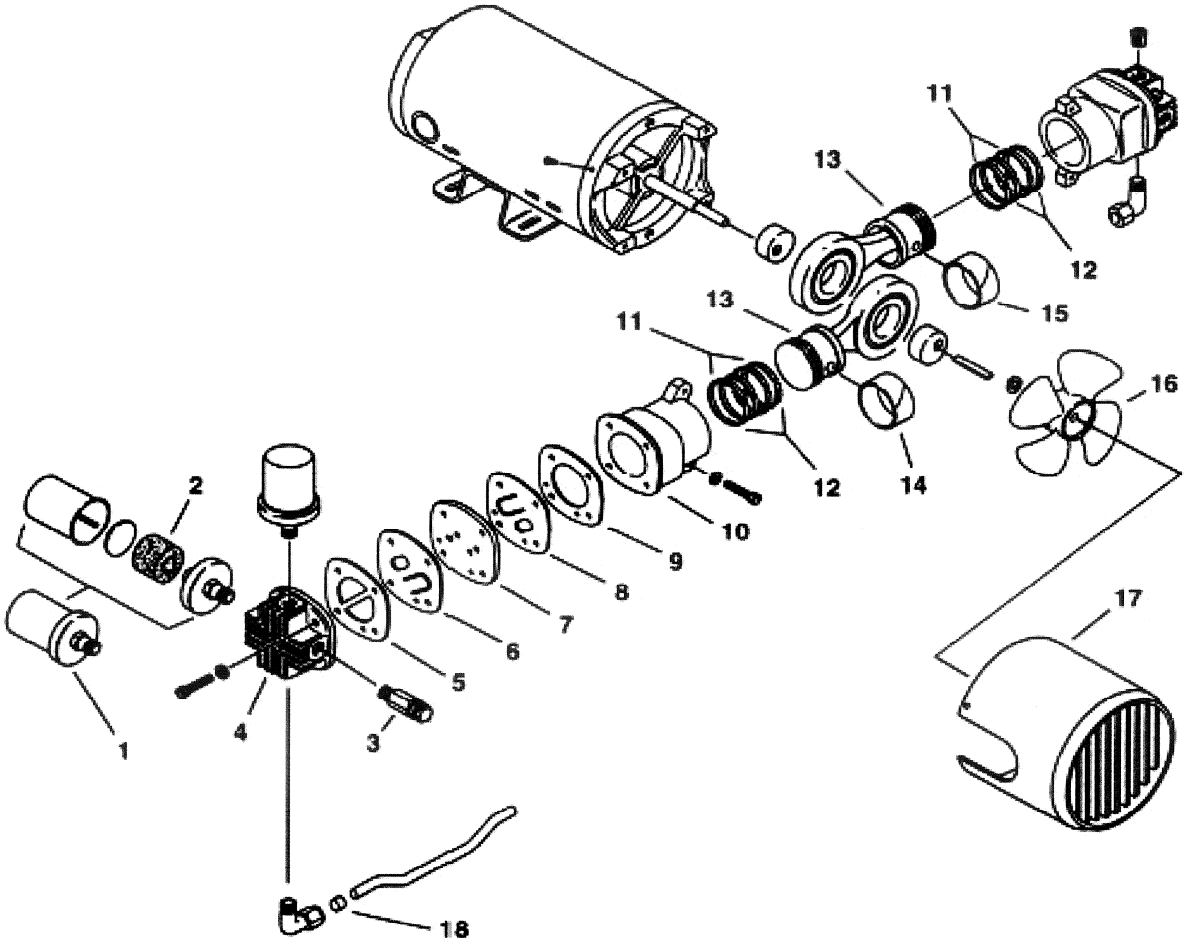
MODEL # 4LCB-251-M450X

4VCF – 6HCA SERIES

REF	DESCRIPTION	QTY	4VCF	4VSF	4HCJ	4LCB	4HCC	5LCA	5HCD	5HCE	6HCN	6HCA
1	INLET FILTER ASSEMBLY	1		B300F								
		2	B300F		B300A	B300A	B300A	B300F	B300A	B300A	B300F	B300F
2 Δ	FELT	2	B344A	B344A	B344A	B344A	B344A	B344A	B344A	B344A	B344A	B344A
3	SAFETY VALVE	1	–	–	AT517A	AT517E	AT517A	AT517F	AT517B	AT517B	AT517C	AT517C
4	CYLINDER HEAD	2	AF507	AF507	AF507	AF507	AF507	AF507	AF507	AF507	AF507	AF507
5 Δ	HEAD GASKET	2	AF520A	AF520A	AF520A	AF520A	AF520A	AF520A	AF520A	AF520A	AF520A	AF520A
6 Δ	OUTLET VALVE	2	AF545	AF545	AF545	AF545	AF545	AF545	AF545	AF545	AF545	AF545
7	PLATE VALVE	2	AF543	AF543	AF543	AF543	AF543	AF543	AF543	AF543	AF543	AF543
8 Δ	INLET VALVE	2	AF544	AF544	AF544	AF544	AF544	AF544	AF544	AF544	AF544	AF544
9 Δ	CYLINDER GASKET	2	AF521	AF521	AF521	AF521	AF521	AF521	AF521	AF521	AF521	AF521
10	CYLINDER	2	AF509	AF509	AF509	AF509	AF509	AF509	AF509	AF509	AF509	AF509
11 Δ	PISTON RING	4	AF541	AF541	AF541	AF541	AF541	AF541	AF541	AF541	AF541	AF541
12 Δ	PISTON SEAL	4	AF540	AF540	AF540	AF540	AF540	AF540	AF540	AF540	AF540	AF540
13	PISTON ROD ASSEMBLY	2	AF561F	AF561F	AF561J	AF561B	AF561C	AF561A	AF561D	AF561E	AF561N	AF561A
14 Δ	RIDER RING	2	AF595	AF595	AF595	AF595	AF595	AF595	AF595	AF595	AF595	AF595
15	KEY	1	AB136D	AB136D	AB136D	AB136D	AB136D	AB136D	AB136D	AB136D	AB136F	AB136F
16	FAN/FAN ASSEMBLY	1	AF547	AF547	AF547	AF547	AF547	AF547	AF547	AF547	AF747	AF747
17	SHROUD	1	AF549	AF549	AF549	AF549	AF549	AF549	AF549	AF549	AF656	AF656
18 Δ	MANIFOLD SLEEVE	2	AF567A	AF567A	AF567A	AF567A	AF567A	AF567A	AF567A	AF567A	AF567A	AF567A
***	SERVICE KIT	1	K263	K263	K263	K263	K263	K263	K263	K263	K263	K263

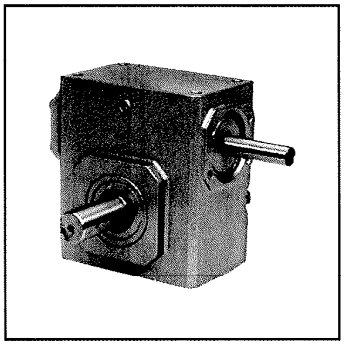
Model 1VBF shown.
*** Item not shown.
Δ Denotes parts included in the Service Kit.
Parts listed are for stock models. For specific OEM models, please consult the factory.
When corresponding or ordering parts, please give complete model and serial numbers.

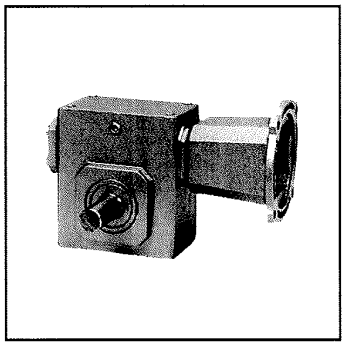
EXPLODED PRODUCT VIEW – MODEL 1VBF

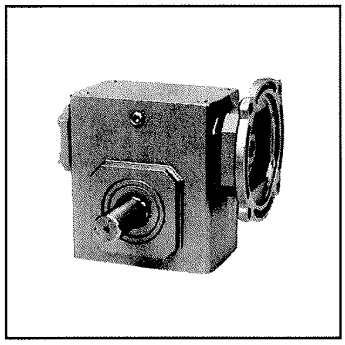


GROVE GEAR

FLEX-A-LINE SPEED REDUCERS







Installation, Lubrication and Maintenance Instructions

CONGRATULATIONS!

Your decision to purchase an American Crafted Speed Reducer from Grove Gear will provide you with many years of trouble free service if the following installation and maintenance instructions are adhered to.

Selection Information

Read ALL instructions prior to operating reducer. Injury to personnel or reducer failure may be caused by improper installation, maintenance or operation.

Written authorization from Grove Gear is required to operate or use reducers in man lift or people moving devices.

Check to make certain application does not exceed the allowable load capacities published in the current catalog.

Buyer shall be solely responsible for determining the adequacy of the product for any and all uses to which Buyer shall apply the product. The application by Buyer shall not be subject to any implied warranty of fitness for a particular purpose.

Safety Alert

⚠WARNING

- For safety, Buyer or User should provide protective guards over all shaft extensions and any moving apparatus mounted thereon. The User is responsible for checking all applicable safety codes in his area and providing suitable guards. Failure to do so may result in bodily injury and/or damage to equipment.
- Hot oil and reducers can cause severe burns. Use extreme care when removing lubrication plugs and vents.
- Make certain that the power supply is disconnected before attempting to service or remove any components. Lock out the power supply and tag it to prevent unexpected application of power.
- Reducers are not to be considered fail safe or self-locking devices. If these features are required, a properly sized, independent holding device should be utilized. Reducers should not be used as a brake.
- Any brakes that are used in conjunction with a reducer must be sized or positioned in such a way so as to not subject the reducer to loads beyond the catalog rating.
- Lifting supports including eyebolts are to be used for vertically lifting the gearbox only and no other associated attachments or motors.
- Use of an oil with an EP additive on units with backstops may prevent proper operation of the backstop. Injury to personnel, damage to the reducer or other equipment may result.
- Overhung loads subject shaft bearings and shafts to stress which may cause premature bearing failure and/or shaft breakage from bending fatigue, if not sized properly.

⚠CAUTION

- Test run unit to verify operation. If the unit tested is a prototype, that unit must be of current production.
- If the speed reducer cannot be located in a clear and dry area with access to adequate cooling air supply, then precautions must be taken to avoid the ingestion of contaminants such as water and the reduction in cooling ability due to exterior contaminants.
- Mounting bolts should be routinely checked to ensure that the unit is firmly anchored for proper operation.

Important Information

In the event of the resale of any of the goods, in whatever form, Resellers/Buyers will include the following language in a conspicuous place and in a conspicuous manner in a written agreement covering such sale:

> *The manufacturer makes no warranties or representations, express or implied, by operation of law or otherwise, as to the merchantability or fitness for a particular purpose of the goods sold hereunder. Buyer acknowledges that it alone has determined that the goods purchased hereunder will suitably meet the requirements of their intended use. In no event will the manufacturer be liable for consequential, incidental or other damages. Even if the repair or replacement remedy shall be deemed to have failed of its essential purpose under Section 2-719 of the Uniform Commercial Code, the manufacturer shall have no liability to Buyer for consequential damages.*

Resellers/Buyers agree to also include this entire document including the warnings above in a conspicuous place and in a conspicuous manner in writing to instruct users on the safe usage of the product.

This instructions manual should be read together with all other printed information such as catalogs, supplied by Grove Gear.

General Operation

1. Run the motor which drives the reducer and check the direction of reducer output rotation. Consult motor nameplate for instructions to reverse the direction of rotation.
2. Attaching the load: On direct coupled installations, check shaft and coupling alignment between speed reducer and loading mechanism. On chain/sprocket and belt/pulley installation, locate the sprocket or pulley as close to the oil seal as possible to minimize overhung load. Check to verify that the overhung load does not exceed specifications published in the catalog.
3. High momentum loads: If coasting to a stop is undesirable, a braking mechanism should be provided to the speed reducer output or the driven mechanism.

⚠CAUTION The system of connected rotating parts must be free from critical speed, torsional or other type vibration, no matter how induced. The responsibility for this system analysis lies with the purchaser of the speed reducer.

Installation

1. Mount the unit to a rigid flat surface using grade 5 or higher fasteners. The mounting fasteners should be the largest standard size that will fit in the base mounting hole. Shim as required under flange or base feet which do not lie flat against the mounting surface.
2. For shipment, pipe plugs are installed in the unit and a vent plug is packed separately. After mounting the unit in position, remove the appropriate pipe plug and install the vent plug in the location shown on page 5. On double reduction units both the primary and the secondary must be vented. Failure to vent the unit can cause premature seal wear or loss of seal and oil. These conditions are not covered by warranty. Check for correct oil level. Contact the factory for level and vent recommendations on non-standard mounting positions. **Grove Gold** units with optional internal pressure compensating system do not use vents. See (internal pressure compensating system) under **Lubrication** for further information.
3. **Grove Gold** units include synthetic oil and an internal pressure compensation system pre-installed at the factory. It is not necessary to vent these units, and they can be used as supplied from the factory. Do not loosen the nut holding the stem of the pressure compensator, and do not block the hole in the stem. Do not blow pressurized air into the hole, and avoid spraying washdown chemicals directly into the hole.
4. Connect motor to speed reducer.

⚠WARNING Depending upon gear geometry and operating conditions worm gear reducers may or may not backdrive. Special consideration should be given to high inertia loads connected to the output shaft. Consult the factory for further details.

⚠CAUTION DO NOT CHANGE MOUNTING POSITIONS WITHOUT CONTACTING FACTORY.
Altering the mounting position may require special lubrication provisions which must be factory installed.

⚠CAUTION Do not operate the reducer without making sure it contains the correct amount of oil. Do not overfill or underfill with oil, or injury to personnel, reducer or other equipment may result. **Grove Gold** units are lubed and sealed for life, so in most applications it will not be necessary to drain or re-fill the unit.

⚠CAUTION A unit cannot be used as an integral part of a machine superstructure which would impose additional loads on the unit other than those imposed by the torque being transmitted either through a shaft-mounted arrangement, and any shaft mounted power transmitting device. *(e.g., sprockets, pulleys, couplings)*

⚠CAUTION For safe operation and to maintain the unit warranty, when changing a factory installed fastener for any reason, it becomes the responsibility of the person making the change to properly account for fastener grade, thread engagement, load, tightening torque and the means of torque retention.

Lubrication - Standard Units

With the exception of unit sizes 2700, 2800 and 21000 which are shipped dry, all standard reducers ordered from the factory are filled with lubricant to operate within a 30° to100° F ambient temperature range. Double and triple reduction units have separate oil sumps and must be filled/checked independently. Prior to startup, verify that the oil is at the level shown on the drawings on page 5. If the ambient temperature will be outside the range for the lubricant installed at the factory, drain and refill the reducer with the proper viscosity lubricant prior to use. Consult the chart on page 4 or the factory for alternate lubricants.

Change Intervals: Standard compounded lubricants should be changed every six months or 2500 operating hours, whichever comes first. Factory installed synthetic lubricants should be changed every two years or 6000 hours, whichever comes first.

Internal pressure compensating system: Grove Gold and stainless steel reducers come standard with an internal pressure compensating system and synthetic oil pre-installed at the factory. It is not necessary to vent these reducers, and they can be used as supplied from the factory.

CAUTION Oil should be changed more often if reducer is used in a severe environment. *(i.e. dusty, humid)*

CAUTION In the Food and Drug Industry (including animal food), consult the lubrication supplier for recommendation of lubricants which are acceptable to the Food and Drug Administration and/or other authoritative bodies having jurisdiction. Factory supplied oil is not suitable for these applications or this industry.

CAUTION Do not mix different oils in the reducer. Oils should be compatible with Viton® seal material.

Special Lubrication Requirements - Sizes 218 & Larger

Units shipped from the factory are assembled to properly lubricate all internal components based on a specific assumed mounting orientation. The factory assumed mounting orientations are given below. If a size 218 or larger unit will be mounted in a different orientation than listed below, or run with sustained input speeds less than 900 RPM, it should be specified with the order. The unit can then be modified to assure proper lubrication.

Factory Assumed Mounting Orientation	Applicable Unit Styles*	
Worm Over	B, T, F, H, FH, C,	Single Reduction
	D, DT, DF, DH, DFH	Double Reduction Worm-Worm
	DX, DXT, DXH, DXFH,	Double Reduction Helical-Worm
	TT	Triple Reduction Worm-Worm-Worm
Worm Under	U	Single Reduction
	DU	Double Reduction Worm-Worm
Vertical Output	VL/VH, FE	Single Reduction
	DVL/DVH, DFE	Double Reduction Worm-Worm
	DXVL/DXVH, DXFE	Double Reduction Helical-Worm
Vertical Input	J	Single Reduction
	DJ	Double Reduction Worm-Worm
	DXJ	Double Reduction Helical-Worm
	** Includes "M" and "MQ" versions of all styles listed*	

The precision-made gears and bearings in Grove Gear Speed Reducers require high-grade lubricants of the proper viscosity to maintain trouble-free performance. For best results, use lubricants on the following chart for worm gear reducers:

Manufacturer	30° to 100° F Ambient Temperature AGMA Compounded No. 7	50° to 125° F Ambient Temperature AGMA Compounded No. 8
Amoco Oil Co.	Worm Gear Oil	Cylinder Oil #680
Chevron USA, Inc.	Cylinder Oil #460X	Cylinder Oil #680X
Exxon Co. USA	Cylesstic TK-460	Cylesstic TK-680
Gulf Oil Co.	Senate 460	Senate 680D
Mobile Oil Corp.	600 W Super Cylinder	Extra Hecla Super
Shell Oil Co.	Valvata Oil J460	Valvata Oil J680
Sun Oil Co.	Gear Oil 7C	Gear Oil 8C
Texaco	Honor Cylinder Oil	650T Cylinder Oil
Union Oil Co. of CA	Steaval A	Worm Gear Lube 140

Standard factory-installed lubricant, shipped with 6.00" C.D. and smaller units.

Some gear lubricants contain E.P. additives that can be corrosive to gear bronze. Avoid lubricants that are compounded with sulfur and/or chlorine.

For temperature ranges not shown, contact factory.

For lubrication requirements of **Grove Gold** or helical reducers (primaries of helical/worm reducers, ratio multipliers, and styles BAMCQ, BAMC, and BA), contact factory.

Oil Capacities (pints) - Standard Units

Mounting Position	UNIT SIZE													
	213	215	~~217~~ 218	220	224	226	230	232	242	252	2600	2700*	2800*	21000*
Worm Over	1/2	3/4	1	1 1/2	1 3/4	3	3 3/4	5	8 1/4	12 1/2	19 1/2	35	48	72
Worm Under	1/2	3/4	1	1 1/2	1 3/4	3	3 3/4	5 1/2	8	13 1/2	20 1/2	32 3/4	51 1/4	80
Vertical Output	1/2	3/4	1	1 1/2	1 3/4	3	3 3/4	5	8	13 1/2	20	20 3/4	28 3/4	40
✳ → Vertical Input	1/2	3/4	(1)	1 1/2	1 3/4	3	3 3/4	5	8	13 1/2	20 1/3	36 1/2	50	75
Extended Bearing	N/A	N/A	N/A	N/A	N/A	N/A	N/A	8	12	17	27	40	63	102
Worm over on Secondary Unit of Double Reduction				N/A	N/A	N/A	N/A	12	19 1/4	20	30 1/3	50 1/3	71 1/2	107 1/4

*Shipped Dry

16 oz. = 1 pint
2 pints = 1 quart
4 quarts = 1 gallon
1 gallon = 128 oz. = 231 cu. in.

✳ **CAUTION** Always check for proper oil level after filling. Capacities vary somewhat with model and mounting position. Oil should rise to bottom edge of level hole. Do not overfill.

Synthetic Lubricants

Synthetic lubricants provide the potential for numerous benefits including wider temperature range and increased interval between changes. Use of synthetics can cause problems if they are not compatible with the seals or the conventional lubricants they replace. For continuous duty at normal ambient temperatures (-10°F to 105°F) we recommend the use of Mobil SHC 634 which is compatible with the standard compounded oil shipped in our product and the Viton® seal material used through size 252. For other temperatures, or for intermittent operation below 20° F, contact the factory for a recommendation.

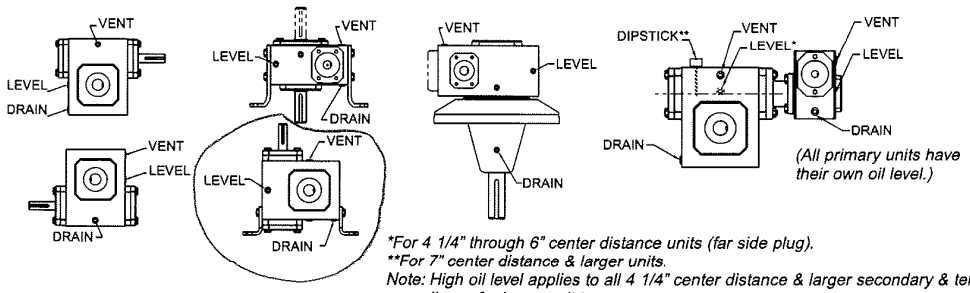
For synthetic lubrication to be used in helical reducers (primaries of helical/worm reducers, ratio multipliers, and styles BAMCQ, BAMC, and BA), contact factory.

Lubrication - Grove Gold

All **Grove Gold** reducers are shipped from the factory filled with synthetic lubricant suitable for continuous operation within a -10° F to 105° F ambient environment. If ambient temperature will be outside the above range, or if operation will be intermittent at temperatures below 20° F, consult the factory for lubrication recommendations. The unit is factory filled with the correct amount of oil for most mounting positions. If the unit will operate at input speeds below 900 RPM, or if a 230 or larger unit is to operate with one of its shafts in a vertical position, consult the factory for special lubrication considerations.

CAUTION In the Food and Drug Industry (including animal food), consult the lubrication supplier for recommendation of lubricants which are acceptable to the Food and Drug Administration and/or other authoritative bodies having jurisdiction. Factory supplied oil is not suitable for these applications or this industry.

Standard Speed Reducer Mounting Positions & Vent Plug, Level and Drain Locations



(All primary units have their own oil level.)

*For 4 1/4" through 6" center distance units (far side plug).
**For 7" center distance & larger units.
Note: High oil level applies to all 4 1/4" center distance & larger secondary & tertiary units regardless of primary unit type.

Maintenance - Standard Units

Your Grove Gear reducer has been tested and adjusted at the factory. Dismantling or replacement of components must be done by Grove Gear to maintain the warranty.

Frequently check the oil level of the reducer. If oil level is low, (refer to reducer vent and level position chart) add proper lubrication through the filler plug until it comes out the oil level plug.

Inspect vent plug often to insure it is clean and operating.

⚠CAUTION Mounting bolts should be routinely checked to ensure that the unit is firmly anchored for proper operation.

Seals: The Grove Gear line of speed reducers utilize premium quality seals which are the state-of-the-art in sealing technology. Seals are, however, a wear item and eventually need to be replaced. Replacement can be easily accomplished by following the steps below:

1. Remove the worn seal without damaging the shaft surface or the seal bore. This can be done by drilling a .062 diameter hole in the seal casing (being careful not to drill into the bearing behind the seal). Screw a #10 sheet metal screw into the hole and pry out the seal.
2. Clean the seal bore of sealant.
3. Before installing the new seal, use electrical tape to cover any keyways on the shaft to prevent seal lip damage.
4. Grease the seal lips with bearing grease and apply a sealant to the seal bore.
5. Slide the seal into the shaft being careful not to fold the inner lip over on any shaft steps.
6. Press the seal into its bore with a sleeve that presses on the seal casing, being careful to keep the seal square in its bore.

Maintenance - Grove Gold

Your **Grove Gold** reducer has been tested and adjusted at the factory. Dismantling or replacement of components must be done by Grove Gear to maintain the warranty.

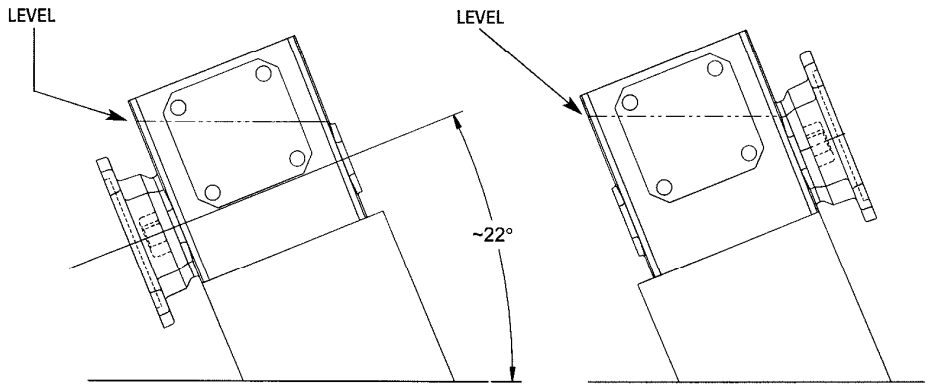
Inspect the stem of the pressure compensating system often to ensure it is clean and operating properly.

⚠CAUTION Mounting bolts should be routinely checked to ensure that the unit is firmly anchored for proper operation.

Seals: The **Grove Gold** line of speed reducers utilize premium quality seals which are state-of-the-art in sealing technology. Seals are, however, a wear item and eventually need to be replaced. Replacement can easily be accomplished by following the procedure given under **Maintenance - Standard Units** above.

If seal leakage has resulted in the loss of a significant amount of oil, it may be necessary to add more lubricant. For normal ambient temperature conditions, Grove Gear recommends Mobil SHC 634 synthetic gear oil for worm drives, and Mobil SHC 150 for helical drives. For all worm drives, fill the gearbox to the level indicated in the diagram below.

Standard Oil Level for Grove Gold Reducers



⚠CAUTION Always check for proper oil level after filling. Do not overfill or underfill with oil, or injury to personnel, reducer, or other equipment may result.

⚠CAUTION Do not mix different oils in the reducer.

Class of Service

All capacity ratings are based on American Gear Manufacturers Association (AGMA) Standards. Load conditions must be within cataloged ratings published in the current Grove Gear Catalog (available upon request).

Warranty From Grove Gear - See catalog pages 192-195 for warranty terms and conditions.

GROVE GEAR
A Division of REGAL-BELOIT
1524 15th Avenue • Union Grove, WI 53182
Phone: 262-878-1221 • Fax: 262-878-1968 • www.grovegear.com

6-02/BH

Single Reduction Parts List

Item # Description

Basic Single Reduction Unit

1. Gear Housing
2. Pipe Plug
3. Vent Plug
4. Splash Guard
5. Input Cover
6. O-Ring
7. Hex Head Cap Screw
8. Input Oil Seal
9. Input Bearing
10. Input Bearing
*11. Retaining Screw
12. Input Shaft
13. Output Cover
14. Output Cover
15. O-Ring
16. Output Cover Gasket (as required)
17. Output Oil Seal
18. Output Bearing
19. Hex Head Cap Screw
***20. Single Output Shaft
***21. Double Output Shaft
22. Gear Spacer
23. Gear Key (only used on size 2-5/8" center distance and larger units)
24. Output Gear (supplied only as output assembly on size 1-1/3" through 2-3/8" center distance units)
25. Input Cover (only used on size 4-1/4" center distance and larger units)
26. Input Cover
27. Input Oil Seal
*28. Retaining Ring - Shaft
29. Double Input Shaft
170. Internal Pressure Compensation Chamber (optional)
171. Internal Pressure Compensation Chamber Stem Plug
172. Internal Pressure Compensation Chamber Stem Nut

**not used on 4-1/4" center distance and larger units*

Quill Motor Flange Unit

30. Double Input Shaft
40. Quill Motor Flange
41. Input Oil Seal
42. Hex Head Cap Screw
43. Retaining Ring - Shaft
44. Retaining Ring - Housing (only used on size 4-1/4" center distance and larger units)
45. Quill Input Shaft

Hollow Output Shaft Unit

50. Gear Housing
51. Output Cover
52. Output Oil Seal
53. Output Bearing
54. Gear Spacer
***55. Output Shaft
56. Setscrew
57. Gear Key (only used on size 2-5/8" center distance and larger units)

Item # Description

58. Output Gear (supplied only as output assembly on size 1- 1/3" through 2-3/8" center distance units)

Mounting Bracket Options

70. Horizontal Mounting Foot
71. Cap Screw
72. High and Low Riser Bracket
73. Hex Head Cap Screw
74. "J" Mount Bracket
75. Output Flange
76. Machine Faced Output Cover (only used on size 2-3/8" center distance and larger solid output shaft units)
77. Hex Head Cap Screw
78. Torque Bracket
79. Hex Head Cap Screw

Extended Bearing Unit

90. Flange
91. Output Shaft
92. Bearing
93. Output Oil Seal
94. Hex Head Cap Screw
95. Pipe Plug
96. Expansion Plug
*97. Flange Cover
*98. Gasket
*99. Hex Head Cap Screw

**only used on size 5-1/4" center distance and larger units*

Long Motor Flange and Coupling Kit

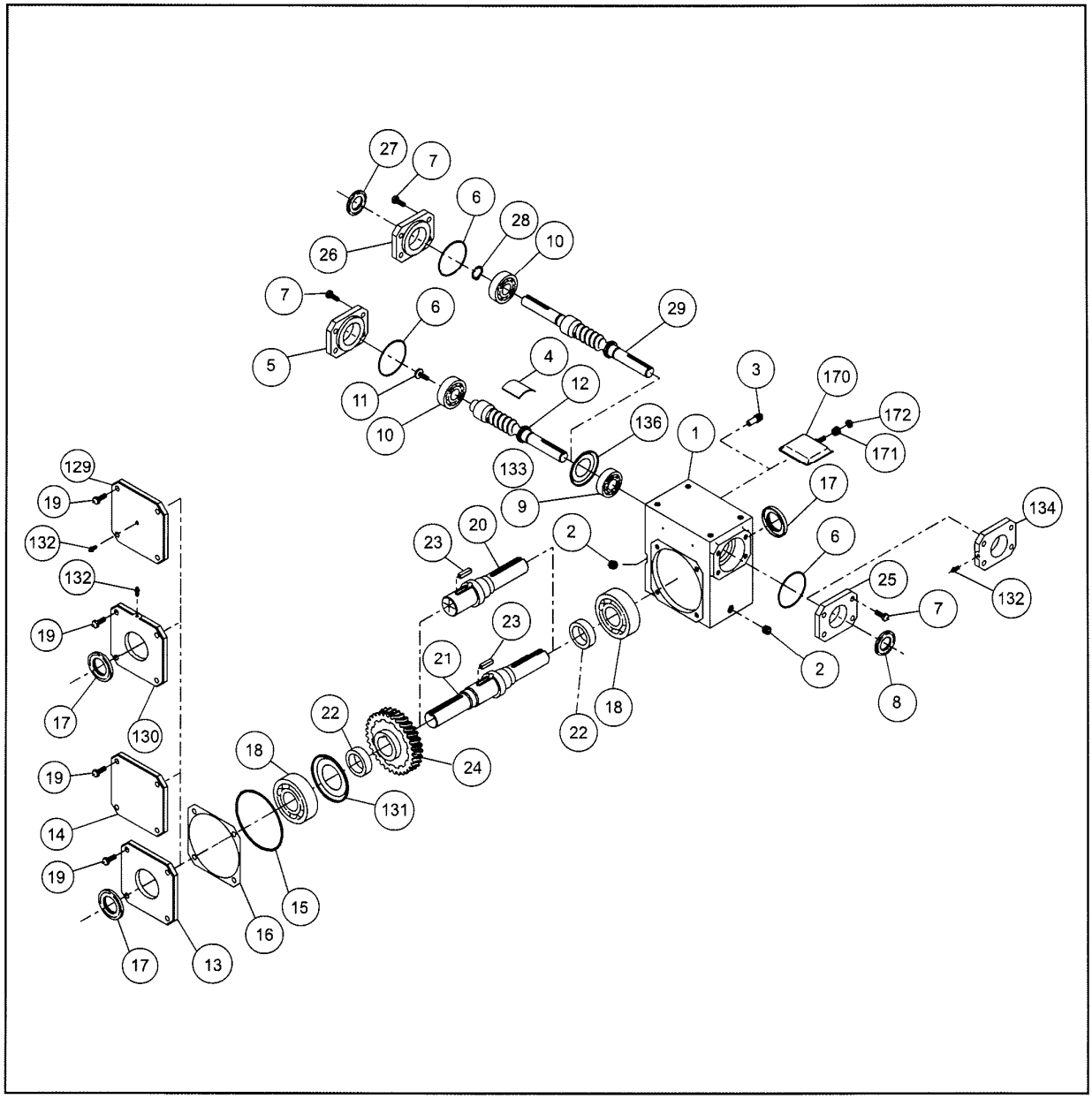
110. "C" Face Motor Flange
111. Hex Head Cap Screw
112. Coupling Key - Reducer Shaft
113. Setscrew - Reducer Shaft
114. Coupling Gear - Reducer Shaft
115. Coupling Sleeve
116. Setscrew - Motor Shaft
117. Coupling Gear - Motor Shaft
118. Coupling Key - Motor Shaft

Vertical Shaft Required Parts (Supplied only when mounting position involves a vertical shaft.)

*129. Output Cover
*130. Output Cover
*131. Output Bearing Grease Retainer
132. Grease Fitting
133. Sealed Ball Bearing (only used on size 1-3/4" through 2-5/8" center distance units)
**134. Input Cover
**136. Input Bearing Grease Retainer

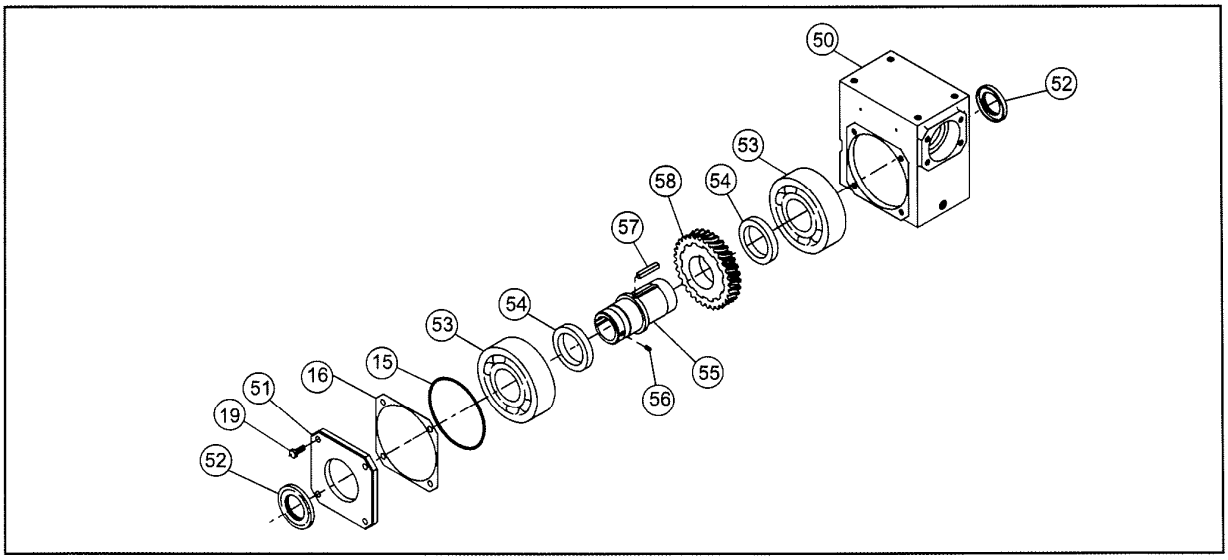
** Only used on size 4-1/4" center distance and larger units.*
*** Only used on size 3" center distance and larger units.*
**** Supplied only as output assembly on size 1-1/3" through 2-3/8" center distance units.*

Basic Single Reduction Unit

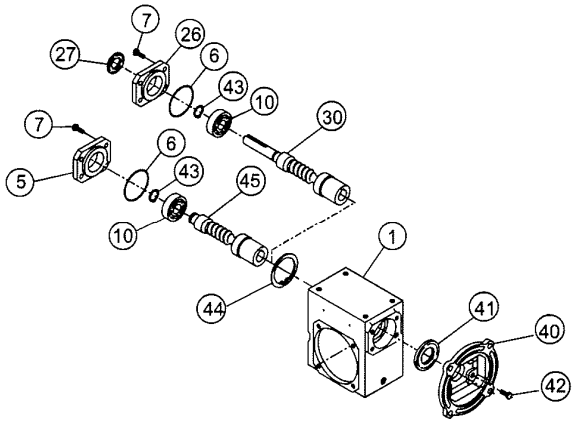


Multiple Parts List

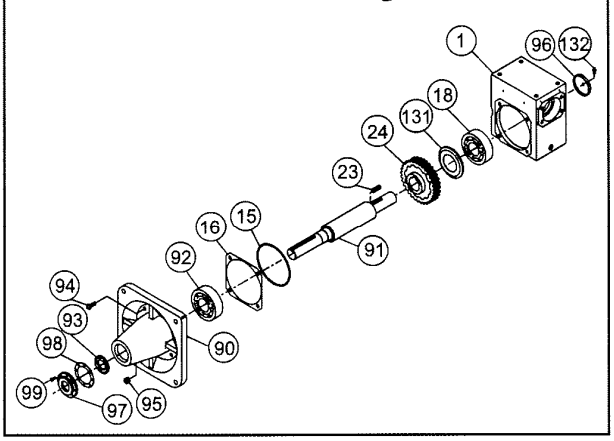
Hollow Output Shaft Unit



Quill Motor Flange Unit

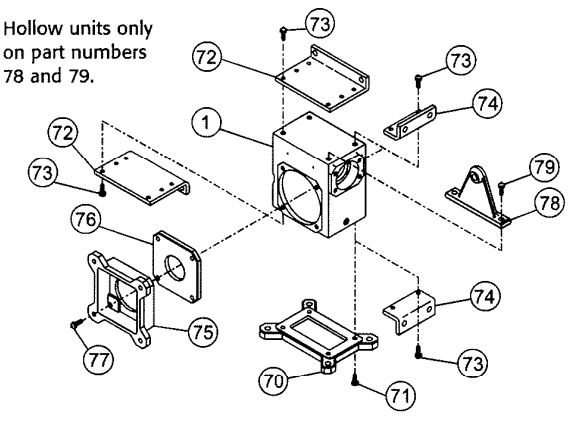


Extended Bearing Unit

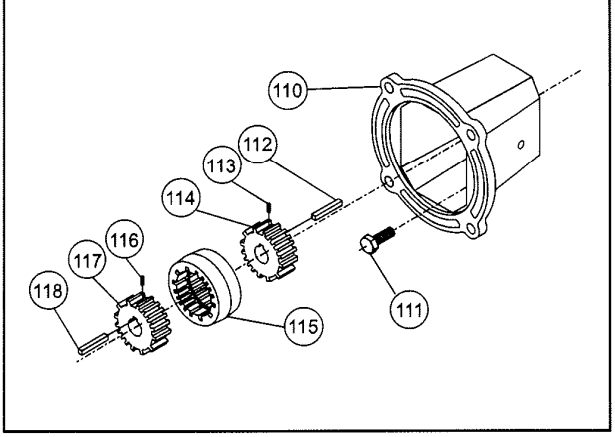


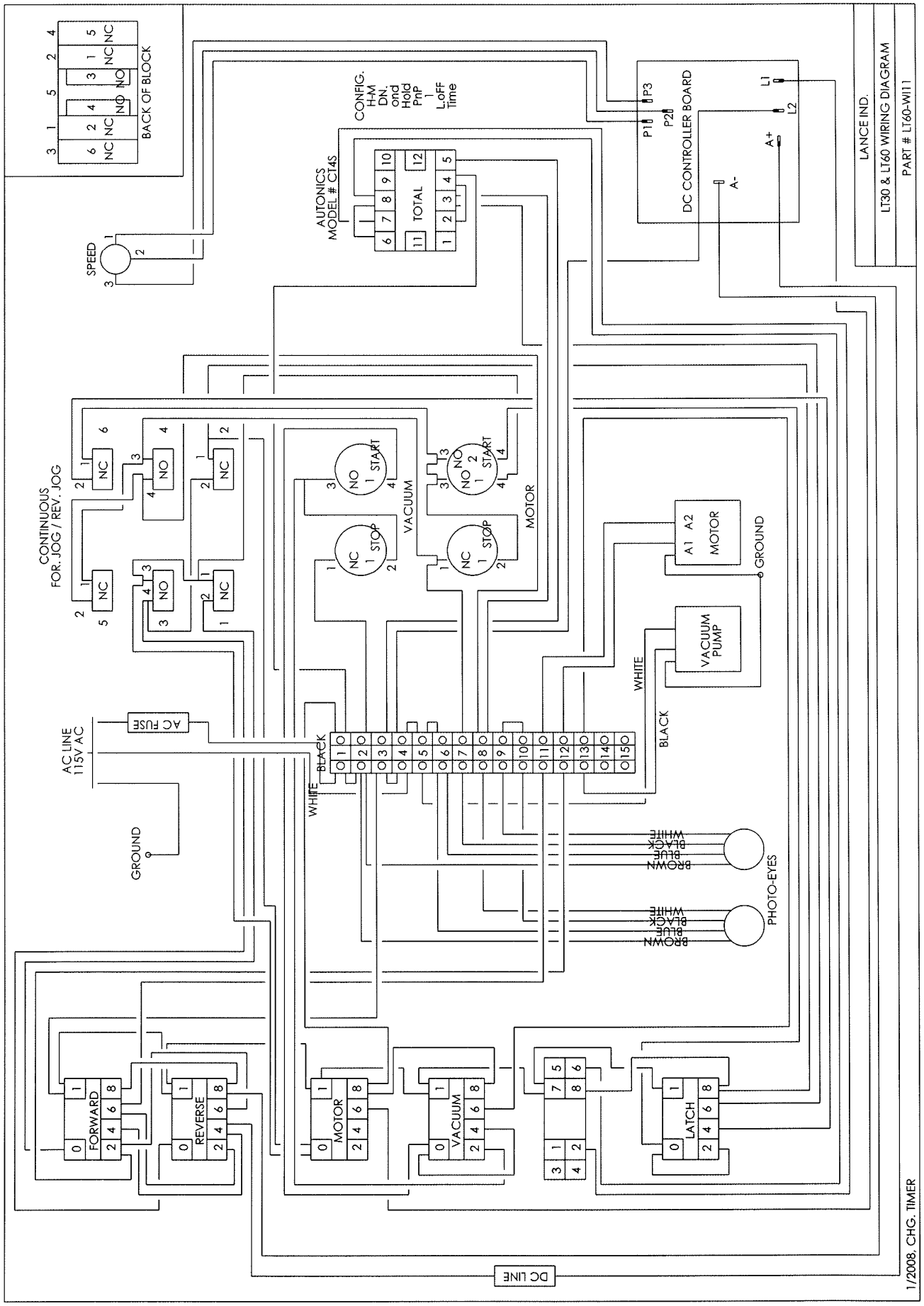
Mounting Bracket Options

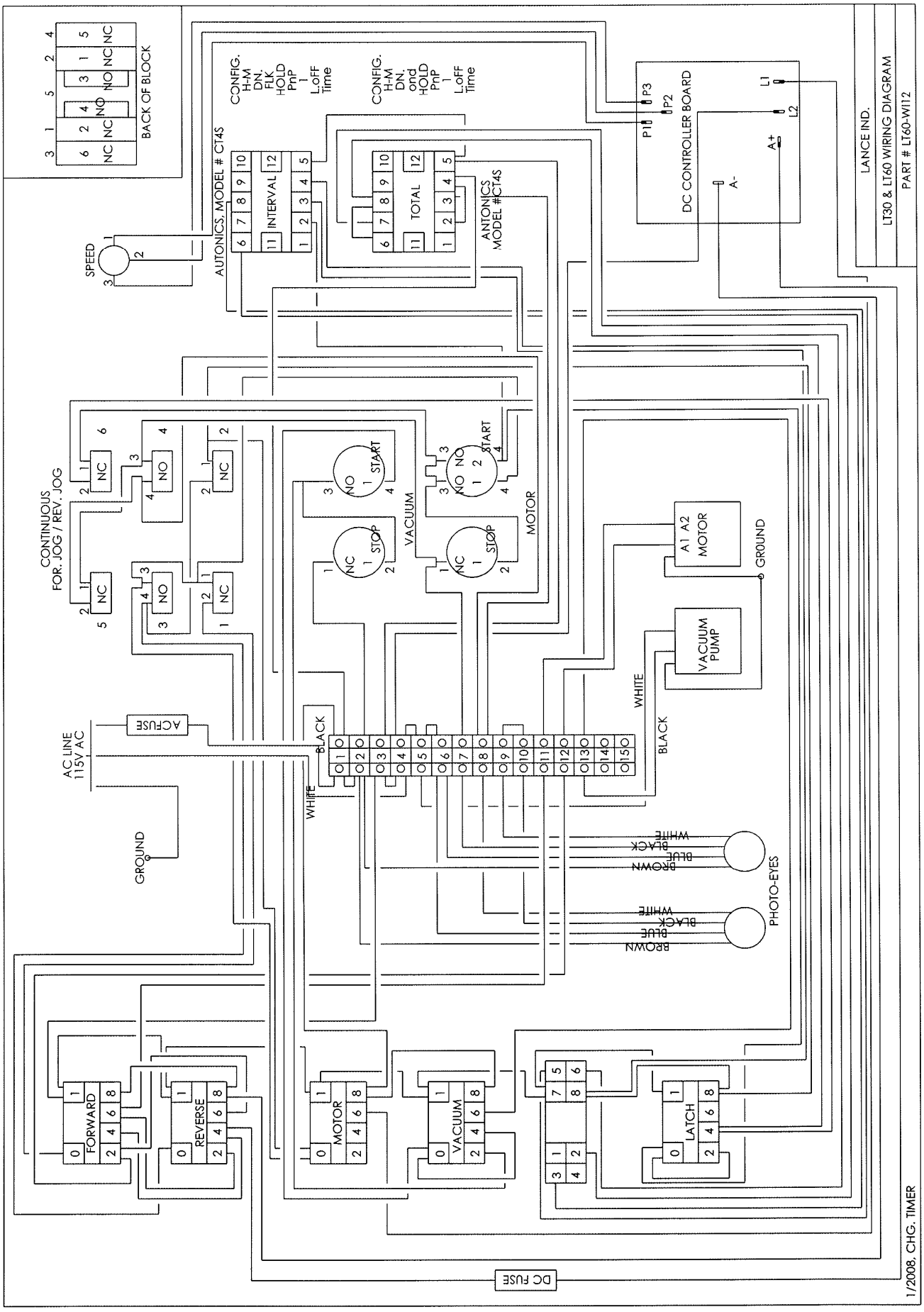
Hollow units only on part numbers 78 and 79.



Long Motor Flange & Coupling Kit




LANCE IND.
LT30 & LT60 WIRING DIAGRAM
PART # LT60-W111
1/2008. CHG. TIMER
DC CONTROLLER BOARD
P1
P2
P3
A+
A-
L1
L2
AUTONICS
MODEL # CT4S
CONFIG.
H-M
DN
and
Hold
PnP
L-OFF
Time
TOTAL
SPEED
BACK OF BLOCK
CONTINUOUS
FOR. JOG / REV. JOG
NC
NO
START
STOP
VACUUM
MOTOR
A1 A2
MOTOR
GROUND
VACUUM
PUMP
WHITE
BLACK
AC FUSE
AC LINE
115V AC
GROUND
PHOTO-EYES
BROWN
BLUE
BLACK
WHITE
FORWARD
REVERSE
MOTOR
VACUUM
LATCH
DC LINE


LANCE IND.
LT30 & LT60 WIRING DIAGRAM
PART # LT60-W112
1/2008, CHG. TIMER
BACK OF BLOCK
AUTONICS, MODEL # CT4S
CONFIG. H-M DN. FLK HOLD PnP 1 LoFF Time
CONFIG. H-M DN. ond HOLD PnP 1 LoFF Time
INTERVAL
TOTAL
ANTONICS MODEL #CT4S
SPEED
DC CONTROLLER BOARD
P1
P2
P3
L1
L2
A+
A-
CONTINUOUS FOR. JOG / REV. JOG
NC
NO
START
STOP
VACUUM
MOTOR
A1 A2 MOTOR
GROUND
VACUUM PUMP
AC LINE 115V AC
A.C FUSE
BLACK
WHITE
BROWN
BLUE
BLACK
WHITE
PHOTO-EYES
FORWARD
REVERSE
MOTOR
VACUUM
LATCH
DC FUSE