

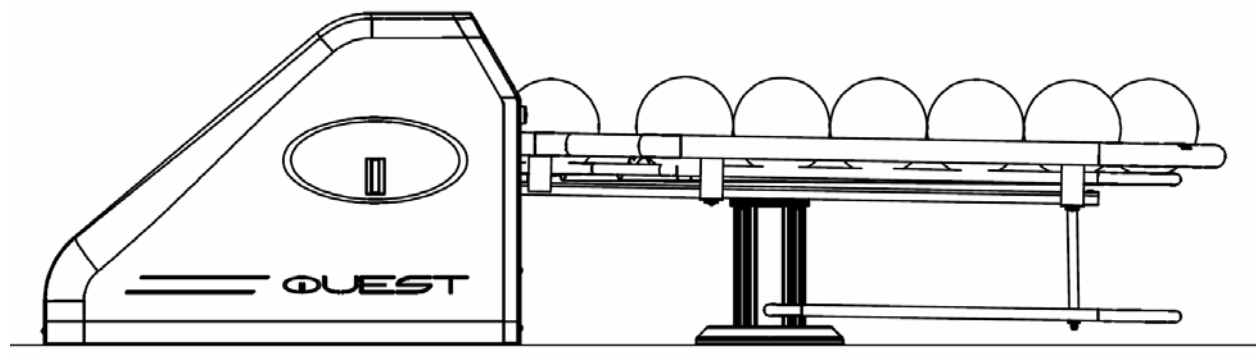
QUBICAAMF

THE POWER OF PARTNERSHIP



QubicaAMF QUEST BALL RETURN

INSTALLATION, OPERATION, SERVICE, AND PARTS MANUAL



400-100-002 Rev. A

WORLDWIDE HEADQUARTERS
8100 AMF Drive – Mechanicsville, VA 23111 – USA
Tel: (804) 730-4000 – Fax: (804) 559-8650



EUROPEAN HEADQUARTERS
Via della Croce Coperta, 15 – 40128 Bologna – Italy
Tel: +39 051.4192.611 – Fax: +39 051.4192.602

www.qubicaamf.com – info@qubicaamf.com

ALL RIGHTS RESERVED

All rights to this manual including the diagrams, figures, and technical specifications are the property of QubicaAMF Worldwide. Reproduction or transmission of any of the material contained in this manual without the prior written permission of QubicaAMF Worldwide is strictly prohibited. All of the product information in this manual was carefully prepared based on the latest information available and was believed to be correct at the time of printing. While every effort has been made to ensure accuracy, this publication may inadvertently contain typographical errors, inaccuracies, or errors of omission. QubicaAMF cannot be held responsible for any claims resulting from these errors.

DOCUMENT UPDATES

QubicaAMF Worldwide reserves the right to revise and/or update this manual at any time without obligation to notify any person or entity of such revision. The document number, revision level, and date below indicate the edition of this manual.

TRADEMARK NOTICES

QubicaAMF and the QubicaAMF logo are the trademarks of QubicaAMF Worldwide

AMF TECHNICAL SUPPORT

Technical Support: (International) 804.730.4000 - (Domestic) 1-800-342-5263

Worldwide Headquarters
8100 AMF Drive
Mechanicsville, VA 23111

Copyright © 2006 QubicaAMF Worldwide
400-100-002 Rev. A
Issued: 09/18/2006



QubicaAMF QUEST BALL RETURN

INSTALLATION, OPERATION, SERVICE, AND PARTS MANUAL

400-100-002 Rev A

SUMMARY OF CHANGES

Change No.	ECR No.

List of Effective Pages

Page	Change No.	Effective Date
All	Original	09/18/2006

Table of Contents

HOW TO USE THIS GUIDE	1
INTRODUCTION	1
PACKING LISTS, COMPONENT SPECIFICATIONS, AND TOOLS	2
QUEST BALL RETURN INSTALLATION	4
APPROACH OPENING AND LIFT INSTALLATION	5
INSTALLING THE BALL STOP	9
PREPARING THE BALL LIFT	10
CONNECTING THE WIRING	12
PEDESTAL ASSEMBLY	15
BALL RACK ASSEMBLY	16
ASSEMBLING THE HOOD DOOR	16
ATTACHING THE HOOD DOOR TO THE BALL LIFT	18
FINISHING THE BALL RACK INSTALLATION	19
FINISHING THE HOOD INSTALLATION	19
SETUP AND TESTING	20
OPERATION	21
OPERATIONAL SAFETY	21
BALL LIFT CONTROLS	21
OTHER FEATURES	22
SERVICE	23
DRAWINGS AND PART NUMBERS	25
BALL LIFT	26
UPPER SHAFT ASSEMBLY	29

LOWER SHAFT ASSEMBLY	30
CLUTCH HOUSING ASSEMBLY	31
CONTROL BOX WITH SAFETY SWITCH	32
MAIN POWER CABLE ASSEMBLY	33
UNDERLANE RETURN BALL STOP	34
RAIL ADAPTER PLATE	35
QUEST HOOD DOOR AND BRACKETS	36
BLOWER ASSEMBLY	38
QUEST RACK	39
QUEST RACK AND PEDESTAL	40
QUEST LOWER RACK AND PEDESTAL	42
QUEST HOOD	44




HOW TO USE THIS GUIDE

This Guide contains information needed to properly install, operate, and maintain the **Quest Ball Return**. If any terms, concepts, or operations contained in this Guide are not clear to you, consult an experienced professional or QubicaAMF Technical Support.

INTRODUCTION

Before you begin the installation, check your shipment against the packing list to ensure that all parts have been included. Report missing items to QubicaAMF at 1-800-342-5263 between the hours of 8:00 a.m. and 5:00 p.m. Eastern Time. After 5:00 p.m., you can leave a message on the voice mail system. The 24-hour fax line is 1-804-730-4390. Address all faxes to: QubicaAMF Products Technical Support.

 <p>WARNING! Read This <u>BEFORE</u> Proceeding.</p>
<p>TO AVOID INJURY:</p> <p>Read these safety precautions before attempting to install or modify any QubicaAMF equipment.</p> <p>Failure to follow these procedures may result in severe personal injury, fire, or permanent damage to property.</p>

- ◆ **When you see this symbol associated with an instruction,**



a possible hazard is indicated. Follow these instructions carefully.

- ◆ **Before installing, removing, or replacing electronic equipment, be certain that the supply power to the unit has been turned OFF at the main circuit breaker box.**
 - ◆ **Verify that the power source matches that required by your Ball Return. The load rating is 10 amps for 115-volt units and 5 amps for 220-volt units. The circuit breaker should be sized according to applicable local and regional codes.**
 - ◆ **Protect the approach and lane surfaces before you begin installation of the Ball Return unit.**
- ◆ **Before applying power to a Ball Return, be sure that all cables have been connected properly — especially the main power cables.**
 - ◆ **Before operating a Ball Return, be sure that all GUARDS are in place.**



PACKING LISTS, COMPONENT SPECIFICATIONS, AND TOOLS

Now that you have received your new **Quest Ball Return**, the first thing that you should do is to verify that you have received all the correct parts. Refer to the appropriate list below.

If installing Part Number 612-520-110, you should receive the following parts:

<u>Part Number</u>	<u>Description</u>	<u>Quantity</u>
400-100-002	Installation, Operation, Service, and Parts Manual	1
250-001-001	Ball Lift	1
122-200-001	Ball Rack Assembly	1
133-200-001	Quest Hood Assembly	1
611-353-105	Ball Stop Underlane Return	1
610-494-444	Underlane Track Shim Assortment	1

And one of the following:

HK1002000230	Quest Hood and Rack Hardware Kit (230v)	1
HK1002000115	Quest Hood and Rack Hardware Kit (115v)	1



COMPONENT SPECIFICATIONS

The following table lists the dimensions for the major components of the **Quest Ball Return**.

COMPONENT	SPECIFICATIONS
Ball Lift	29 inches L x 12.38 inches W x 39.51 inches H (73.7 cm L x 31.5 cm W x 100.4 cm H)
Hood (at base)	External: 42.38 inches L x 16 inches W x 29.38 inches H (107.6 cm L x 40.6 cm W x 74.6 cm H)
Ball Rack	67.8 inches L x 22.5 inches W x 18.76 inches H (with leg) (172.2 cm L x 57.2 cm W x 47.7 cm H)
Leg Assembly	13.13 inches L x 9.34 inches W x 12.69 inches H (33.4 cm L x 23.7 cm W x 32.2 cm H)
Lower Rack	37.13 inches L x 14.5 inches W x 3.5 inches H (94.3 cm L x 36.8 cm W x 8.9 cm H)

INSTALLATION TOOLS

The following is a list of tools needed for the installation of the **Quest Ball Return**. Other tools may be required depending on whether you are installing the unit on a wood or synthetic approach.

Tape Measure	Straight Edge / Framing Square
Hacksaw & Blades	3/8-Inch Drive Ratchet
Washable Marker	12-Inch, 3/8"-Drive Extension
Circular Saw	7/16", 1/2", & 12mm Sockets
Hammer Drill	7/16", 1/2", 9/16", 1-1/8" Combination Wrenches
Wire Strippers	#2 Phillips Screwdriver
Wire Cutters	Small Flat Blade Screwdriver
Utility Knife	3/16", 7/32", 9/32", & 7/16" Drill Bits
Crimpers	5/16" Masonry Bit
Level	



QUEST BALL RETURN INSTALLATION

The standard foundation for the Ball Lift consists of two 2 x 6 x 18-inch boards over a concrete subfloor. While shims are provided to level and raise the Ball Lift to the required height, you may need to plane the boards and/or use additional materials to achieve the 14-7/16-inch (367 mm) required distance from the bottom surface of the Ball Lift base plate to the top surface of the approach.

Depending on the length of your approach, you may or may not have the ball rack overhanging the end of the approach. To determine the overhang at your center, perform the computation below using the numbers from your center.

IMPORTANT!

The position of the ball lift on the approach in the following calculation is based on a standard QubicaAMF underlane track installation that results in the end of the track being 125-7/16 inches from the lane side of the foul line. If possible, check this distance, and if different, offset the installation (including the cutout) as needed. Minor differences (no more than ± 1 inch) do NOT require any offset. If an installation other than the standard installation is desired, the underlane track can be lengthened or shortened as needed.

BALL RACK OVERHANG CALCULATION

(See Figure 1)

	Ball Rack (in inches)
1. Distance from Lane Side of Foul Line to End of Underlane track	125.4375
2. Overall length of ball return (including Ball Rack and Hood)	105.1875
3. Subtotal A	230.6250
4. Distance from End of Track to back end of Hood (overlap of the two items above)	-21.1250
5. Subtotal B	209.5000
6. Length of Approach (includes Foul Line, your approach may be different)	-192.0000
7. OVERHANG	17.5000

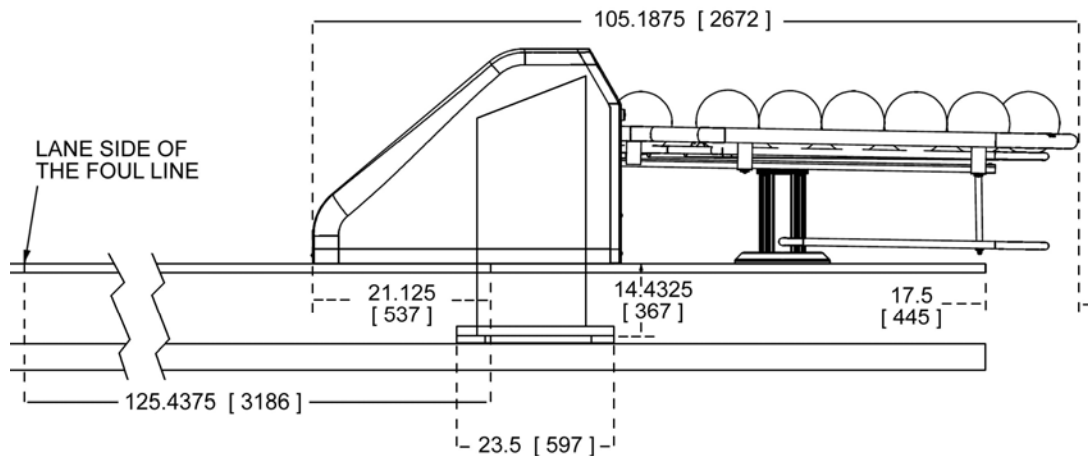


Figure 1, Standard Layout



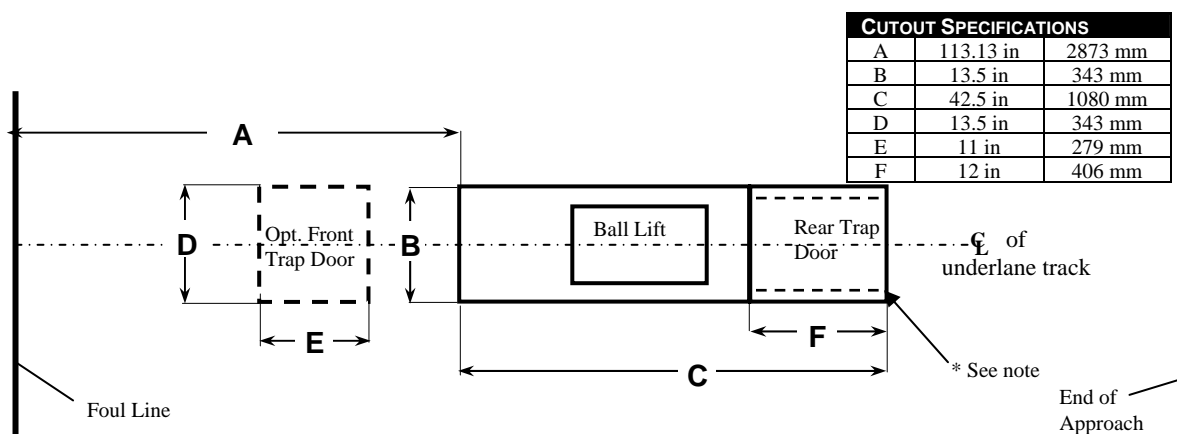
APPROACH OPENING AND LIFT INSTALLATION

For new bowling centers, cut out the approach opening to meet the specifications given below. When replacing an existing installation, remove the old ball lift and fill in and/or cut out the approach opening, as necessary, to meet the specifications given below.

Cut out the opening and install the Ball Lift by completing the following steps and referring to Figure 2.

NOTE: The dimensions specified in the following directions are for a standard underlane ball return track installation and for **an approach length of 16 ft. (4877 mm)**, as shown in the calculation example on the previous page. Adjust the dimensions as necessary for the installation at your center. **If the location of the Ball Lift is shifted, it may be necessary to cut and splice the underlane ball return track to accomplish the installation.**

1. Mark the centerline of the underlane track on the approach.
2. Measure 113.13 inches (2873 mm) from the lane side of the foul line along the centerline you made in the previous step, and use a framing square to draw a 13.5-inch (343 mm) line perpendicular to and centered on the line you made in step 1.
3. From the 13.5-inch line, draw a rectangle 42.5 inches L x 13.5 inches W (1080 mm x 343 mm) (C in Figure 2). Within this rectangle, measure 30.5 inches from the 13.5-inch line and draw another line to create the rear trap door (F in figure 2). We recommend you also create the front trap door for access (D and E in Figure 2), depending on where the Ball Stop is mounted. Locate the rear of this trap door about 12 inches from the cutout for the Ball Lift. Center the opening(s) on the centerline you drew in step 1.



* Underlayment should be cut narrower in area of the rear trap door.

Figure 2, Approach Opening Layout – Top View



4. When installing the Ball Lift on wood approaches, for the front and rear trap door cutouts (E and F on Figure 2), make angled cuts to provide a “lip” for the pieces to rest upon the subfloor structure to keep them in place, as shown in Figure 3. For the Ball Lift cutout, make straight cuts.
5. If not installed earlier, attach the rail adapter plate (049-006-359), which is included with the underlane track, to the end of the underlane track using two 1/4 lock washers (951-148-002) and 1/4-20 x 1/2 hex screws (809-849-085) (See Figure 6). Tighten securely.
6. Place the first 2 x 6 board on the subfloor, perpendicular to the underlane track under the rail adapter plate. This is an approximate location.
7. Place the other 2 x 6 x 18-inch board on the subfloor parallel to the first board with its front edge 23.5 inches (597 mm) from the first board’s front edge (see Figure 3).

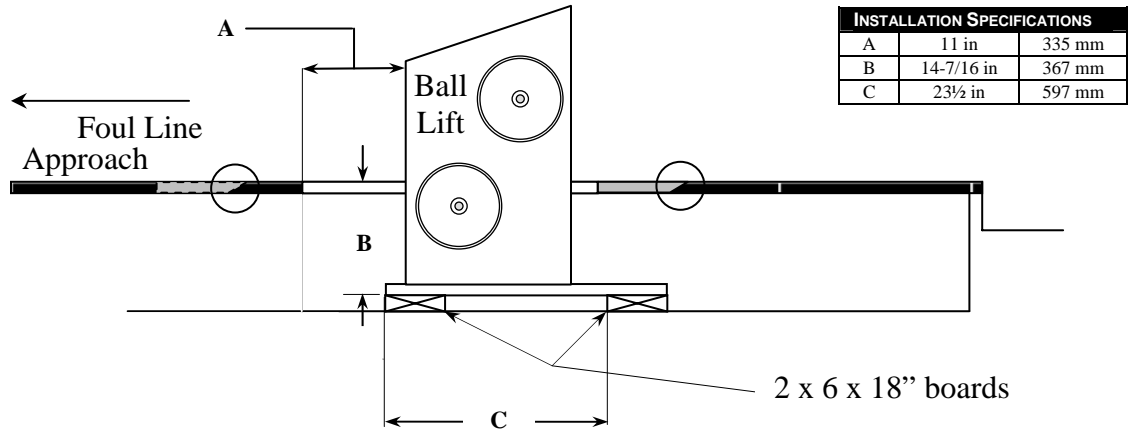


Figure 3, Ball Lift Installation – Side View

8. All Ball Lift assemblies are shipped configured for 230-volt operation and, if necessary, must be reconfigured for 115-volt operation. To configure the Ball Lift motor for 115-volt operation, remove the motor’s electrical cover plate and reconnect the wiring for low voltage operation as shown in the wiring diagram on the motor’s frame. Reinstall the cover plate.
9. Lower the Ball Lift mechanism into the opening and onto the two 2 x 6’s. Position the Ball Lift in line with the underlane track so that the holes in the adapter plate on the end of the underlane track align with the four studs on the Ball Lift base plate.
10. If necessary, reposition the 2 x 6 boards under the bolt holes in the Ball Lift base plate and check the Ball Lift for level side to side and front to back. Use shims from the shim pack (610-494-444), as needed. Position the 2 x 6 closest to the Ball Rack end of the Ball Lift more to the side of the lift without the belt and pulleys for mounting the Blower Assembly.



11. Measure the distance from the underside of the Ball Lift base plate to the top surface of the approach. This distance **must be** 14-7/16 inches (367 mm). If necessary, add or remove shims, plane the 2 x 6 boards, etc. to achieve this measurement. Maintain the unit level side to side and front to back.
12. Mark the edges of the Ball Lift Base Plate on the Ball Rack end 2 x 6 and remove the 2 x 6.
13. Attach the Blower Motor to the Hand Dryer Bracket using 10-32 screws (7016-411032-075), 7/32 x 1/2 x 3/64 flat washers (7050-021050-006), and 10-32 nylon lock nuts (7036-001032-000). See Figure 4.
14. Attach the hose (P-0880-20-1) to the Hand Dryer Bracket using the hose collar (302-4620-00). See Figure 4.

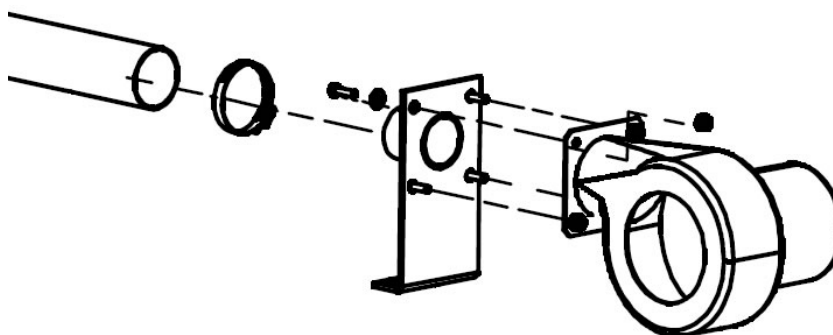


Figure 4, Blower Assembly

15. Mount the Blower Assembly to the 2 x 6 that was removed. It should be mounted outside of the mark on the 2 x 6 and on the opposite side of the ball lift from the pulleys.
16. Replace the 2 x 6 with the attached Blower Assembly under the end of the Ball Lift and check the ball lift to make sure it is level.
17. Drill four 7/16-inch (11-mm) clearance holes through the shims (if any) and 2 x 6 boards using the base plate mounting holes as a guide.
18. Drill four 5/16-inch (8-mm) holes in the concrete subfloor to a depth of at least 5/8-inch (16-mm) deeper than the estimated screwbolt embedment using the previously drilled clearance holes as a guide. Clean out loose material from the holes.
19. Anchor the Ball Lift to the subfloor using four 8-mm x 100-mm screwbolts (709-013-060) and 7/8-inch outer diameter flat washers (948-964-142). Apply moderate downward pressure to the screwbolts and **do NOT exceed 50 ft-lbs. (68 newton-meters) torque.** (See Figure 5.)

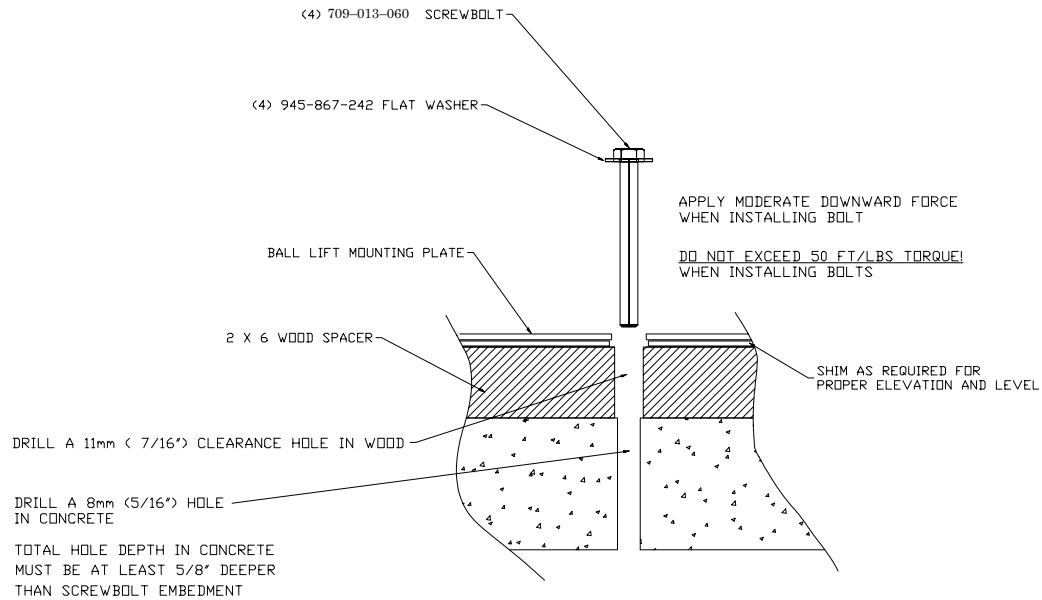


Figure 5, Ball Lift Mounting Requirements

20. Secure the adapter plate on the end of the underlane track to the Ball Lift base plate studs using four 11/32-inch inner diameter flat washers (948-722-111) and 5/16-18 nylon insert lock nuts (839-057-002) as shown in Figure 6. Track alignment is critical for the smooth transition of the ball to the Lift. Adjust the track as necessary to ensure that the track is centered between the Ball Lift side plates. Shim the adapter plate as needed to obtain a smooth, level track joint.
21. If necessary, trim off any excess plastic track using a utility knife.

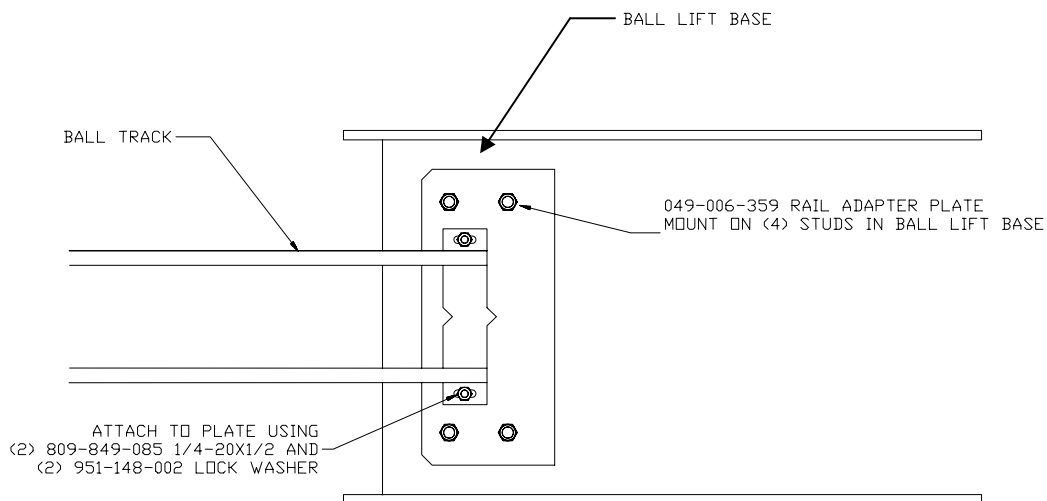


Figure 6, Track to Lift Connection



INSTALLING THE BALL STOP

The ball stop allows the ball to move down the track to the Ball Lift, but prevents the ball from moving backwards past the ball stop should the ball fail to be handled properly by the Ball Lift.

1. Assemble the ball stop as shown in Figure 7. Place the tube through the hole in the plastic stop and then position the stop between the ears of the metal bracket. Secure the plastic stop using the 5/16-18 x 2-1/4 inch bolt (809-857-365) and lock nut (844-057-002). The longest side of the plastic stop must be placed against the metal bracket and should hang down as shown in Figure 7.
2. Mount the Ball Stop to the first leveling strip forward of the Ball Lift as follows:
 - a) Center the plastic stop over the ball track with the centerline of the 2-1/4 inch bolt exactly 10 inches (25.4 cm) above the track's mounting plate.
 - b) Mark the leveling strip through the holes in the ball stop bracket, and drill two 7/32-inch pilot holes for mounting the Ball Stop at the marks on the leveling strip.
 - c) Mount the Ball Stop to the leveling strip using 5/16 x 1-1/2 inch lag screws (810-556-240) and flat washers (948-761-112).

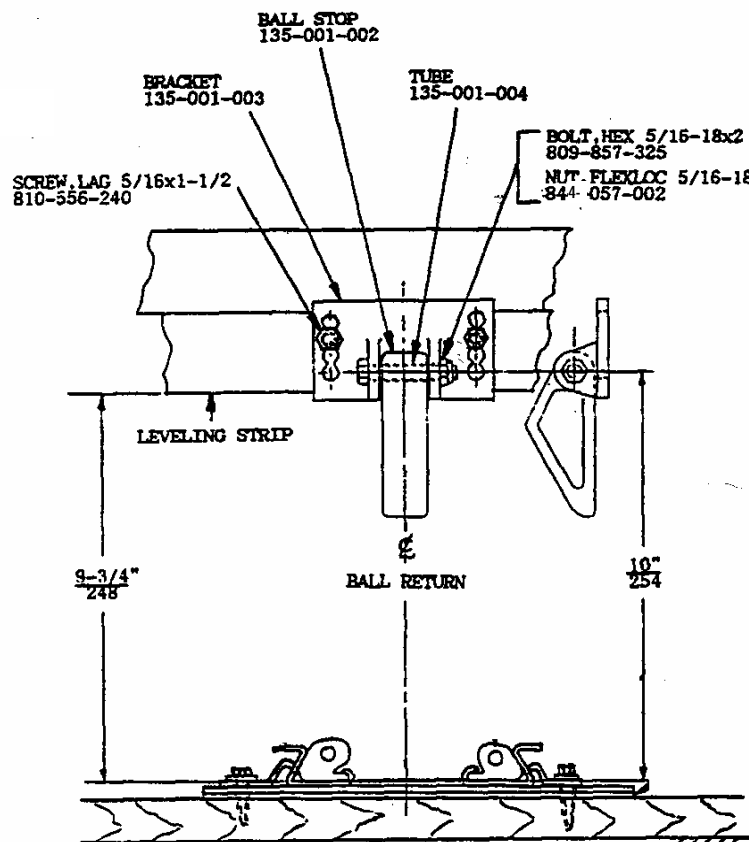


Figure 7, Ball Stop Installation



PREPARING THE BALL LIFT

Some Ball Lifts have a hand guard installed on them. If your lift has a guard installed, it will need to be removed to attach the Hood Door. See Figure 8.

1. Remove the Hand Guard from the ball lift. The bolts and pulley shown below will need to be removed and then replaced once the guard has been taken off.

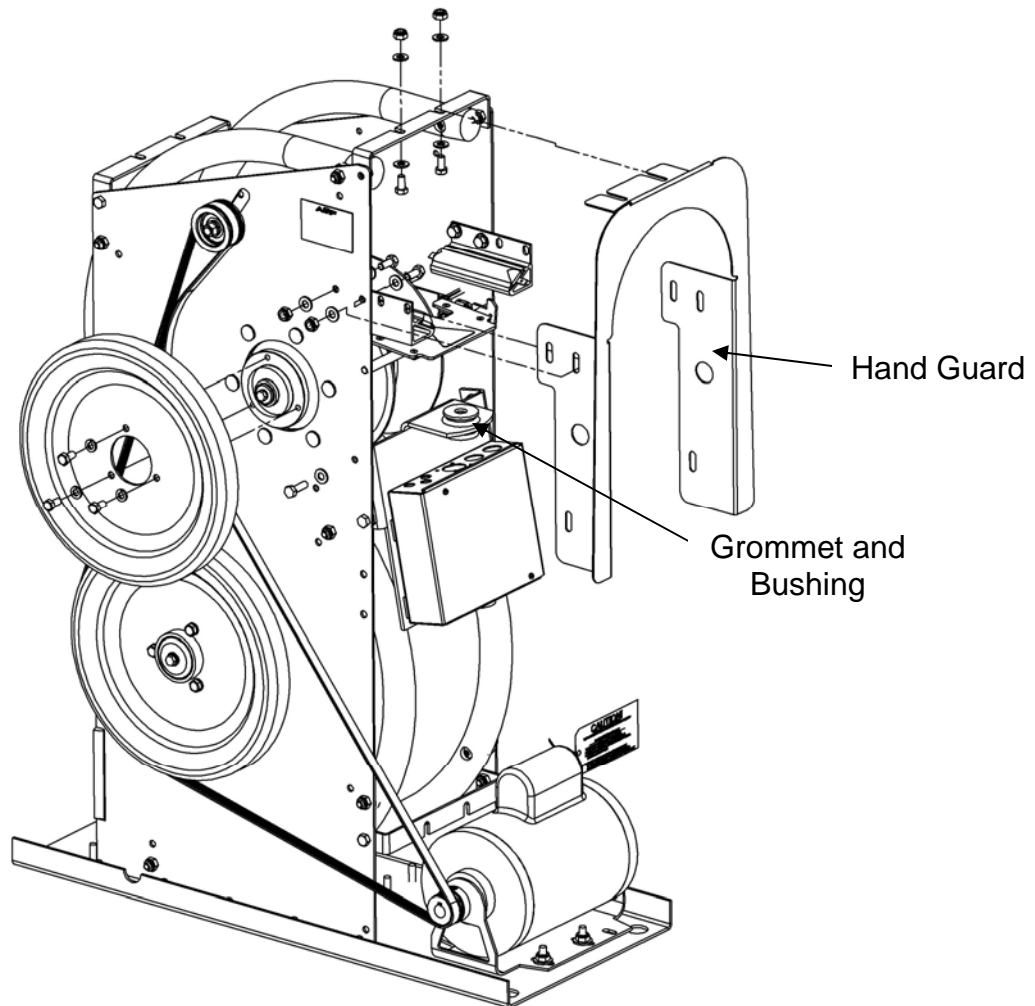


Figure 8, Hand Guard Removal

2. Remove the bushing from the grommet where the Ball Rack connects to the Ball Lift. The bushing will not be used for the Quest Hood and Rack.
3. Remove the upper bolt from both sides of the Ball Lift Brace located on the foul line end of the lift (See figure 9).

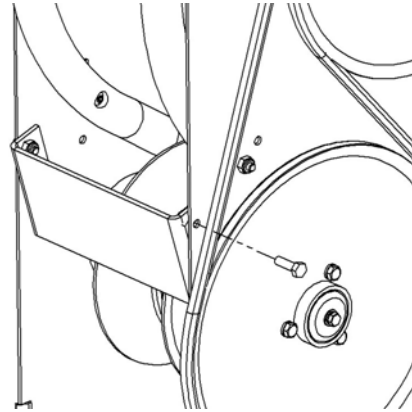


Figure 9, Ball Lift Brace Bolt

4. Attach the hood stabilizer brackets in the location of the bolts that were removed in the previous step (as shown in Figure 10) using 5/16-18 x 1-1/4 hex cap screws and 11/32 x 11/16 x 1/16 flat washers. The lock nuts that were taken off of the Ball Lift Brace should be used again on the new bolts.
5. Attach the Powerlift Door Brackets to the Ball Lift with a 5/16-18 x 1/4 hex cap screw, 11/32 x 11/16 x 1/16 flat washers, and a 5/16-18 nylon lock nut (See figure 10).
6. Assemble the Powerlift Stabilizers by attaching a 5/16-18 nut to the 5/16-18 x 1-1/2 Elevator Bolt and securing it on the Powerlift Stabilizer brackets.
7. Attach Powerlift stabilizer brackets to the Ball Lift using a 1/4-20 hex cap screw, 9/32 x 5/8 x 1/16 flat washers and a 1/4-20 nylon nut. The Powerlift stabilizer bracket will attach to the Ball Lift just below the Powerlift door brackets.

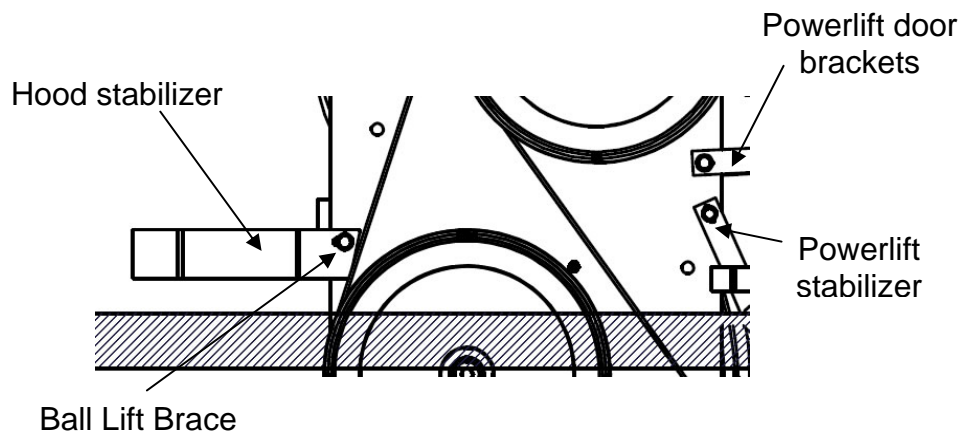


Figure 10, Ball Lift Brackets



CONNECTING THE WIRING

WARNING

Before wiring the Quest Ball Return, all power to the unit must be switched off at the main breaker box or serious injury could result.

CAUTION

To avoid equipment malfunction or damage, the power supply must be rated for the appropriate voltage and current.



1. Verify that the power to the unit and its associated pinspotters is turned OFF at the main circuit breaker.



2. Verify that the circuit voltage and current ratings correspond to those of the Ball Lift. All Ball Lift assemblies are shipped configured for 230-volt operation and, as necessary, must be reconfigured for 115-volt operation as described in this section. (Reconfiguring the motor for 115-volt operation is discussed on Page 6.)
3. Attach the flexible conduit of the power supply cable (234-001-330), which is supplied with the Ball Lift, to the applicable distribution box. Connect the wires in accordance with local electrical codes. For electrical systems containing a neutral wire, such as 115-volt systems in the United States, connect the green and yellow wire to ground, the blue wire to neutral, and the brown wire to line.
4. Remove the cover from the Ball Lift control box, and then remove a lock nut from the center and left grounding (earthing) lugs in the control box.
5. Attach the power supply cable's flexible conduit to the control box at the "AC IN" location shown in Figure 11.

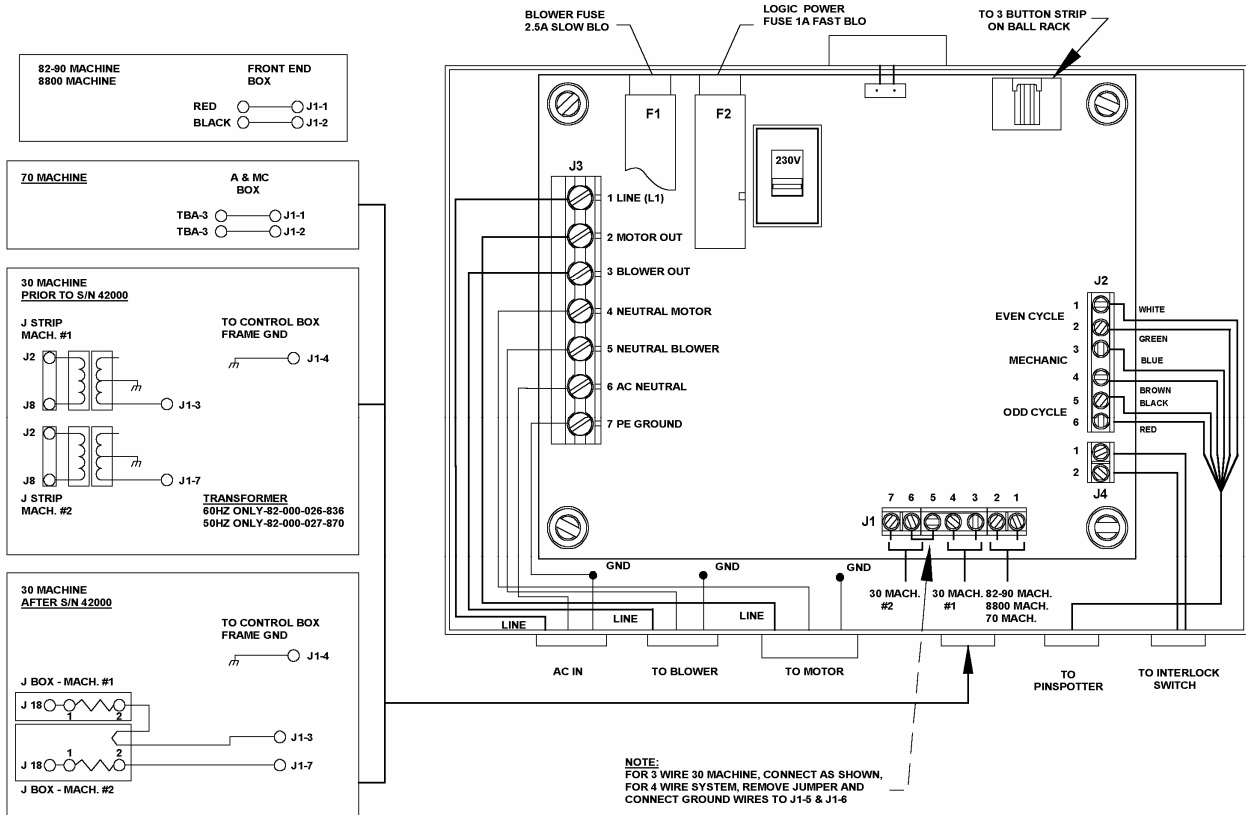


Figure 11, Electrical Connections

6. Attach the ring terminal on the green and yellow ground wire of the power supply cable to the leftmost grounding (earthing) lug inside the control box using one of the lock nuts that was removed in Step 4.
7. Cut off the two spade terminals from the brown and blue power supply wires, and strip approximately 3/8-inch of insulation from the ends of these wires.
8. Connect the blue wire (neutral) to terminal #6 on junction block **J3** and the brown wire (line) to terminal #1 on **J3** (see Figure 11).
9. Cut off the three prong plug for the blower motor power cord. Remove approximately 8 inches of the outer protective sheath from the end of the blower power cord. Route this cable into the control box (see Figure 11). Tighten the cable clamp to secure the cable to the box. Strip approximately 3/8-inch of insulation from the ends of the black, white, and green blower wires.
10. Crimp a ring terminal (760-014-015) to the blower's green ground wire and connect it to the center grounding (earthing) lug inside the control box. Secure it using the remaining lock nut that was removed earlier.
11. Connect the white blower wire to terminal #5 on junction block **J3** and the black blower wire to terminal #3 on **J3**.



12. Depending on the specific pinspotters in your bowling center, connect the pinspotter's control wires to junction block **J1** as shown in Figure 11.
13. Crimp the 10th frame switch wires to the adapter cable provided (282-000-061). Table 1 below shows which wires are used and their functions.

Wire Color	Function
Red	Odd 10th frame switch
Black	Odd 10th frame switch
Brown	Not Used
Blue	Not Used
Green	Even 10th frame switch
White	Even 10th frame switch

Table 1

14. Plug the adapter cable connector into the six-pin connector on top of the control box.
15. Route the wires for the pinspotter cycle control (10th frame) circuits coming from the pinspotters into the control box, and connect them to junction block **J2** as follows:
 - a. Connect the even pinspotter's cycle control (10th frame) wires to terminals **#1 & #2**.
 - b. Connect the mechanic call control wires to terminals **#3 & #4**. The mechanic call feature is not currently used on the Quest ball return.
 - c. Connect the odd pinspotter's cycle control (10th frame) wires to terminals **#5 & #6**.
16. Secure all of the wires connected to junction blocks **J1** and **J2** to the inside of the control box using the cable clamps provided.
17. Verify that the voltage selector switch on the control board in the Ball Lift control box is selected to the correct voltage – down for 230 volts and up for 115 volts – and install the control box cover.



PEDESTAL ASSEMBLY

1. If the Ball Rack is to have the optional lower ball rack, attach the lower rack to the pedestal and use the grey moldings that have the semi-circle cut in them instead of the square edged pieces. See Figure 12.

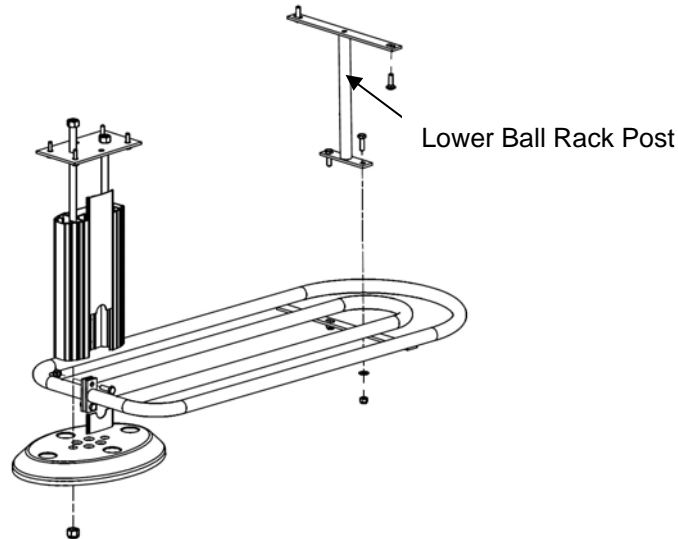


Figure 12, Pedestal Assembly with Lower Ball Rack

2. Slide the black and grey moldings into the Ball Rack Column. See Figure 13.
3. Attach the Ball Rack Base Plate, the Ball Rack Column, and the Base using the Ball Rack Special Thread Rod as shown below.

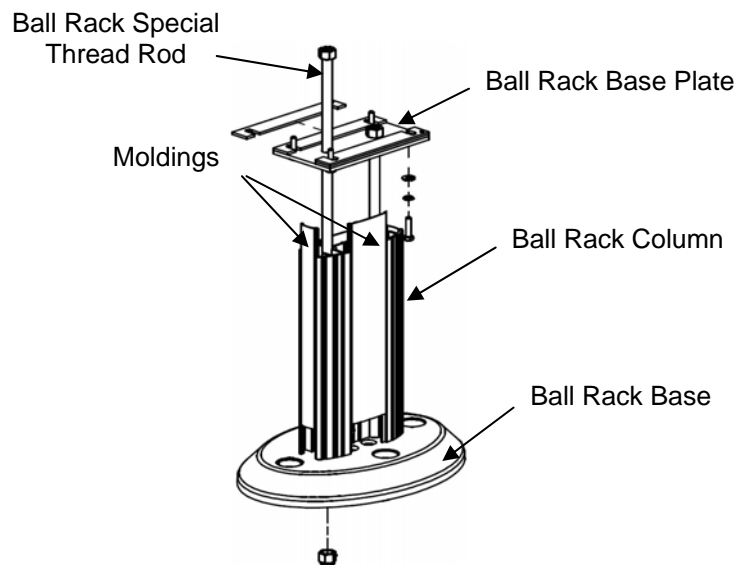


Figure 13, Pedestal Assembly



BALL RACK ASSEMBLY

1. Attach the Ball Rack Bracket to the underside of the Ball Rack as shown below in Figure 14.

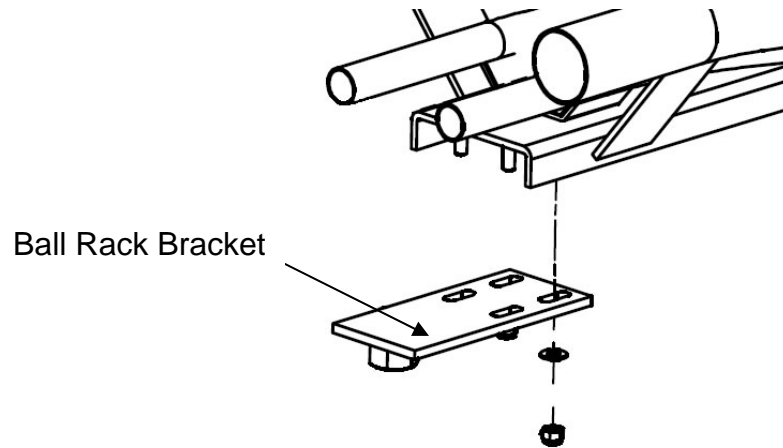


Figure 14, Ball Rack Bracket Installation

2. Attach the Pedestal and if there is one, the Lower Ball Rack Post (shown in figure 12) to the underside of the Ball Rack.

ASSEMBLING THE HOOD DOOR

1. Assemble the push button switches (E-592BK) and attach them to the hood door. See figure 15. The switch button should be lined up with the plunger from the switch housing. Considerable force might need to be applied to get the switch to lock into place in the switch housing.
2. Attach the Hood Door Bracket (M-0890-99) and Hood Support Brackets (102-2090-00) to the hood door using 1/4-20 carriage bolts (7012-002520-100), 9/32 x 5/8 x 1/16 flat washers (7050-028062-006), and 1/4-20 kep nuts (7038-002520-000).
3. Put the air connector tubing assembly through the air connector hole in the Hood Door.
4. Put the end of the Ball Rack into the opening of the hood door making sure to align the rack and the air connector tubing so they will connect together.
5. Connect the 5-inch threaded rod to the Ball Rack Bracket which will be behind the finished surface of the Hood Door.

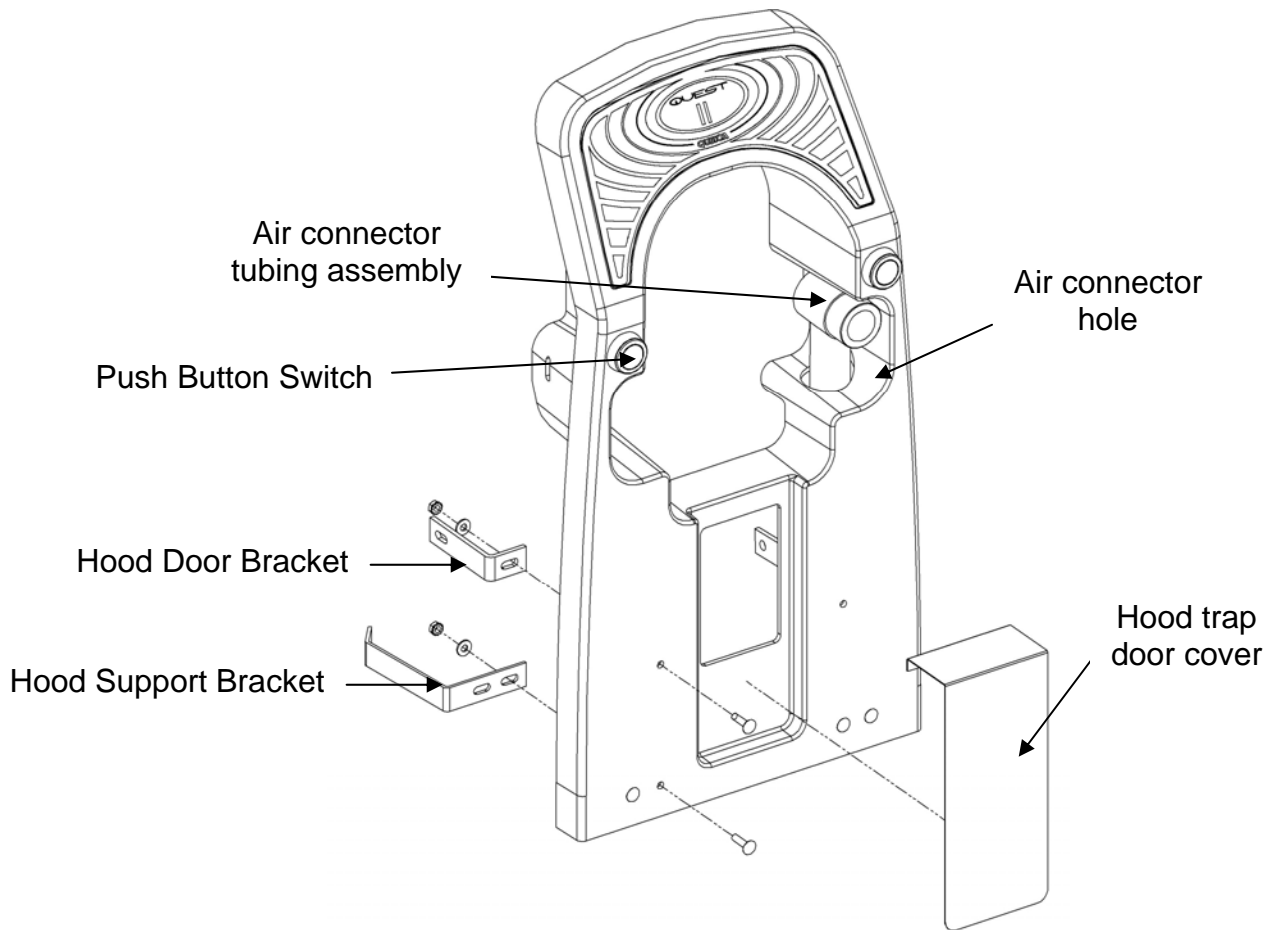


Figure 15, Hood Door Assembly

6. Put a 3/4-10 nut on the threaded rod and run it about 2/3 of the way up the rod.
7. Place a 15/16 x 2-1/4 flat washer on top of the rubber grommet on the ball lift connector bracket and place the Ball Rack's threaded rod through the grommet and washer.
8. On the bottom side of the threaded rod, add the other 15/16 x 2-1/4 washer followed by a 3/4 x 1-1/4 lock washer and then a 3/4-10 nut. Leave these loose for now until the ball rack has been mounted to the approach.



ATTACHING THE HOOD DOOR TO THE BALL LIFT

1. Attach the Powerlift Door Brackets to the Hood Door Brackets with a 5/16-18 hex cap screw, 11/32 x 11/16 x 1/16 flat washers, and a 5/16-18 nylon lock nut.
2. Attach the 10th frame switch wires to the odd and even lane switches. For each switch, put one connector on the common or "COM" and the other on the normally open or "NO" terminals (see figure 16).

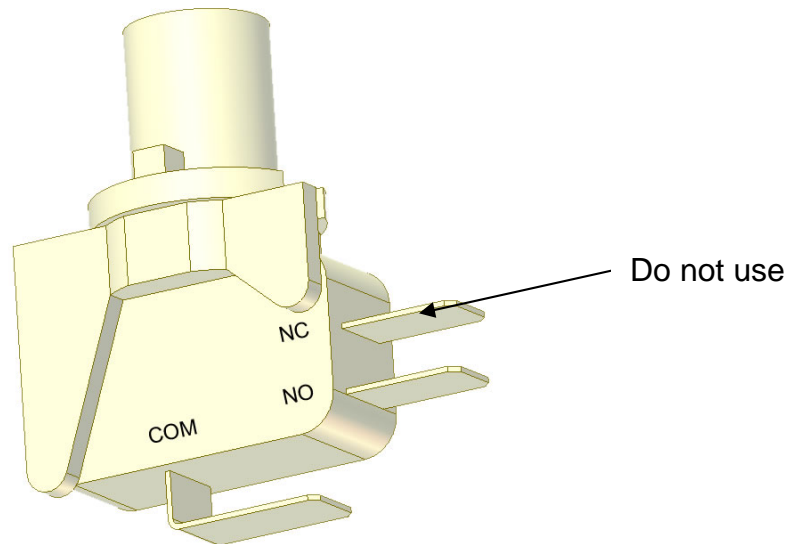


Figure 16, 10th Frame Switch



FINISHING THE BALL RACK INSTALLATION

1. Align the Ball Rack so that the pedestal base is centered and flat on the centerline of the division.
2. Attach the pedestal to the approach with the 5/16 x 2-inch lag screws, 5/16-inch lock washers, and 11/32 x 1 x 1/8 flat washers. If there is a Lower Ball Rack, the pedestal can only be connected using the front and back holes in the base.
3. Insert caps to cover the bolt holes in the pedestal.
4. Attach the Hand Dryer hose to the Air Connector Tubing in the Hood Door using a Hose Collar.
5. Tighten the 3/4-10 nuts against the washers and grommet where the ball rack attaches to the ball lift.

FINISHING THE HOOD INSTALLATION

1. Install the Hood Trap Door cover to the front of the Hood Door (See figure 15).
2. Put the Hood in place centered on the division centerline.
3. Lightly mark the approach just below the screw hole at back of the Hood.
4. Remove the hood and install the Front Hood Bracket on the division centerline 3/16 inch to the ball lift side of the mark.
5. Replace the hood and attach it to the Front Hood Bracket using a 10-32 x 3/4 round head screw and a 7/32 x 1/2 x 3/64 flat washer (See figure 17).

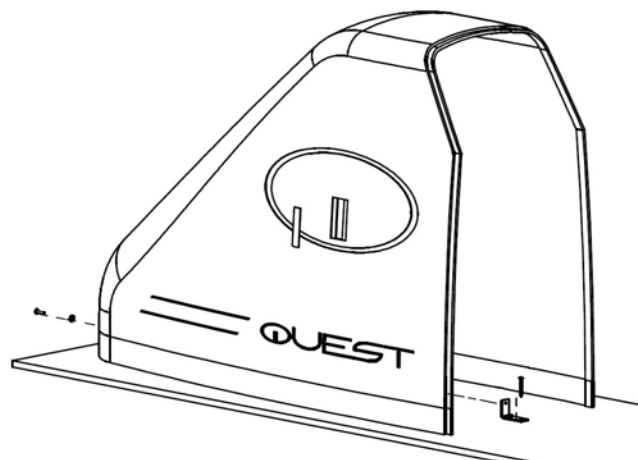


Figure 17, Hood Installation



SETUP AND TESTING

After completing the installation, perform the following steps to ensure proper operation.

1. Turn on power at the main circuit breaker, turn on one of the associated pinspotters, and verify that the speaker on the ball lift control box emits three one-second beeps before the Ball Lift starts.

CAUTION

The Ball Lift contains belts, pulleys, and other moving parts that can present a grabbing and pinching hazard. Keep hands, loose clothing, and jewelry away from moving parts.



2. Check the operation of the Ball Lift's safety switch by carefully depressing the V-wheel guard assembly. The Ball Lift motor should immediately stop and the control box speaker should sound an alarm by emitting a continual beeping sound. **NOTE: on Model 8800 pinspotters equipped with the horizontal ball return (HBR), any time the Ball Lift turns off, the horizontal ball return's motor should also turn off.**
3. Reset the V-wheel guard so that the wheel on the safety switch fits into the detent in the actuator on the end of the guard's pivot rod. The Ball Lift should not restart.
4. To silence the audible alarm and return the ball lift to operation, **SIMULTANEOUSLY** press the two 10th frame buttons on the hood door. The beeping should stop and the Ball Lift should restart.
5. Turn off the pinspotters and wait for the Ball Lift to turn off. **There is a built-in time delay of 30 seconds before the Ball Lift turns off. This allows any bowling balls in the system to return through the Ball Lift to the ball rack.**
6. Turn on the pinspotters and return a few balls through the Ball Lift. Adjust the transition brackets, as needed, to obtain a smooth transfer of the ball to the ball rack.
7. Press each 10th frame (cycle) push button on the hood and verify that the corresponding pinspotter cycles properly.
8. Verify that the blower is functioning properly (The blower turns on and off together with the Ball Lift motor).
9. When the results of these tests are satisfactory, the Ball Lift may be placed into service.



OPERATION

The Operation of the Ball Lift is very simple. The Ball Lift starts when you start either of the two associated pinspotters, and will continue to run for 30 seconds after both pinspotters are turned off to allow any bowling balls in transit to pass through the lift and return to the ball rack.

OPERATIONAL SAFETY

There is a safety switch built into the Ball Lift to protect against someone placing a hand inside the lift and having it grabbed by the V-wheel and pulled further into the machinery. The switch is actuated by a guard that when moved from its normal position will actuate the safety switch stopping the Ball Lift. **EVEN THOUGH THIS SAFETY SWITCH IS DESIGNED TO PREVENT INJURY, NEVER PLACE A HAND INSIDE THE MECHANISM WHILE IT IS IN OPERATION.**



A moving bowling ball contains a considerable amount of energy and can appear at the outlet opening of the Ball Lift with little or no warning. Keep hands away from the exit opening to prevent injury.



There are two urethane transition pads at the mouth of the Ball Lift's exit opening. When adjusted properly, these pads reduce the forward momentum and rotation of the ball so that it enters the rack section with minimal energy. The task that these pads must perform has been compounded by the advent of new bowling ball materials and technology. These pads must be adjusted to assure that the lightest bowling balls as well as the new "reactive" bowling balls exit the lift satisfactorily. A slick, oil coated, heavy bowling ball may still have significant momentum after exiting the Ball Lift. For this reason, **a pinching hazard can exist when two bowling balls come together on the rack. KEEP HANDS CLEAR OF THE BALL RACK UNTIL THE RETURNING BALL COMES TO REST.**



BALL LIFT CONTROLS

Ball Lift operation is normally controlled by the operation of its associated pinspotters. Whenever either pinspotter is in operation, the Ball Lift is in operation. When both pinspotters are turned off, the Ball Lift turns off after a 30-second time delay, which allows any bowling balls that have been played to return to the ball rack.

The Ball Lift can also be controlled manually through the operation of the two 10th frame push buttons on the hood door. Normally, when any one of these buttons is pressed, it initiates the operation of the associated equipment; that is, the 10th frame switches cause the associated pinspotter to cycle to spot or respot pins.

NORMAL mode allows Ball Lift Operation to be controlled by the pinspotters as discussed above. When a pinspotter is turned on, the Ball Lift speaker will emit three one-second warning beeps before starting. The Ball Lift normally starts in this mode.



EMERGENCY mode is activated by the operation of the safety interlock, which is designed to minimize injury should someone place a hand in the Ball Lift's outlet opening during operation. When the Ball Lift's safety interlock is actuated, the Ball Lift immediately turns off and emits a continual beeping alarm. Removing the hand and resetting the interlock's V-wheel guard will not reset the Ball Lift's operation to normal. This is to prevent the Ball Lift from inadvertently restarting should the V-wheel guard be reset while removing the hand from the machine.

To return the Ball Lift to normal operation and silence the alarm, verify that the outlet opening has been cleared, reset the V-wheel guard, and then SIMULTANEOUSLY press both of the 10th frame push buttons.

Table 2, Ball Lift Operation

Push Button Designation		*Push buttons must be pressed simultaneously; otherwise, the normal function of the button will be executed.	
ODD Lane's 10 th Frame Button	= 1		
EVEN Lane's 10 th Frame Button	= 2		
Mode	To Initiate	Audible Warning	To Return to Normal Operation
Normal	Startup Default	3 one-second beeps	N/A
Emergency	Actuate Safety Interlock Switch	continual beeping	To Silence Alarm and return to Normal: Press 1 & 2*

OTHER FEATURES

The rails on the ball rack have a slight downward slope to help maintain the momentum of the ball around the rack.

There is also air flow that comes out slots near the end of the ball rack. The air flows continuously when the Ball Lift is in operation.



SERVICE

The Ball Lift requires very little maintenance. All of the ball bearings on the lift and in the motor are sealed and lubricated for life. There are several wear items described below that should be monitored periodically and replaced as necessary. The most critical factor in assuring long and trouble-free operation is the transition between the underlane track and the Ball Lift. The better the alignment of these components, the smoother the handoff is. Whenever banging is heard as a ball enters a lift, it is a sign that the alignment is out of adjustment and should be corrected.

The Ball Lift mounting hardware can become loose either where the track joins the lift or where the lift is secured to the subfloor. If the screwbolts that mount the lift to the subfloor are loose, tighten them, but do not exceed 50 ft-lbs. of torque. It is a good idea to inspect these attachments periodically especially for the first few months following Ball Lift installation.

When the alignment is correct, the Ball Lift will be centered along a continuation of the centerline of the underlane track, and when a bowling ball is placed on the track where it joins the lift, there will be equal clearance between the ball and side plates.

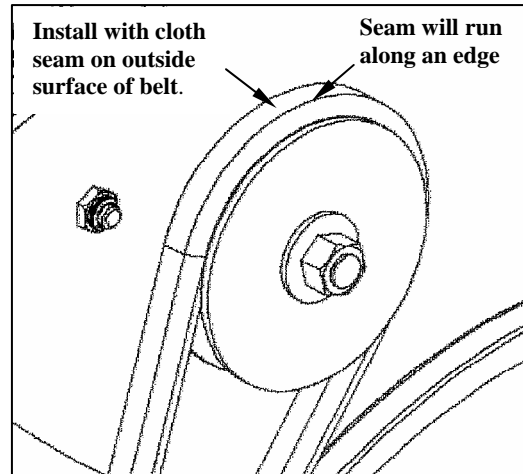


Figure 18

If there is a protective cloth overwrap surrounding the belt, **INSTALLING THE BELT WITH THE PROTECTIVE OVERWRAP'S SEAM ON THE OUTSIDE SURFACE OF THE BELT (see Figure 18) WILL PROVIDE THE LONGEST BELT LIFE.**

WEEKLY

- Observe the operation of each of the lifts. Wipe down the shroud, ball rack, and transition blocks to remove oil and handprints. Make any necessary adjustments.
- Press the 10th frame push buttons and verify proper response from the pinspotters. The push buttons can be replaced individually.
- With the Ball Lift running, verify that the blower is operating. If not, check the fuse located on the top of the Ball Lift control box. If the fuse is bad and blows again after being replaced, replace the blower.

MONTHLY

- Inspect the belt. Some cracks may appear after moderate use. If the cracks are very deep or the belt starts to split or delaminate, replace the belt. Each bowling center should develop a belt replacement schedule based on lineage rather than on the calendar. This method maximizes useful belt life while minimizing inconvenience to the bowler due to belt failure during play.



- With the Ball Lift OFF, check the belt tension. You should be able to deflect the belt approximately 3/8 inch when pressed in the middle of the longest unsupported span. During operation the belt should not slip or flap. To adjust the tension, turn the Ball Lift OFF and loosen the nut on the idler pulley. Slide the idler assembly along the slot in the side panel to either increase or decrease belt tension. When the tension is correct, tighten the nut.
- Return a ball through the ball lift and observe the braking action of the transition blocks. The momentum of the ball should be significantly reduced, and there should be no jumping or bouncing of the ball. Inspect the urethane transition pads. Replace them before they become so worn that they allow the bowling ball to contact metal, or if they are badly gouged or no longer function adequately to slow the ball as it exits the Ball Lift.

QUARTERLY

- Inspect the upper and lower V-wheels. These items are very tough and should provide a very long life, but can be damaged from use. To replace a V-wheel, remove the three bolts that secure it to the upper or lower shaft assembly and install a new wheel in its place. Tighten the three bolts securely.
- Check the operation of the safety switch. The guard should pivot freely, and when actuated, the Ball Lift should turn off immediately and sound an audible alarm. Lubricate the pivot shaft where it passes through the side plates sparingly as needed. Reset the switch actuator and return the Ball Lift to the NORMAL Mode.
- Wipe up or vacuum out any accumulated debris. Inspect the brackets for damage and check for the smooth operation of the pulleys, bearings, etc. With the belt removed, the lower large pulley should be capable of rotating independently of its associated V-wheel when turned in the clockwise direction, but should immediately lock up and rotate as a unit with the V-wheel when rotated in the counterclockwise direction. This arrangement allows the V-wheel to momentarily rotate faster than the pulley without causing stress to the drive components when a ball first enters the Ball Lift.

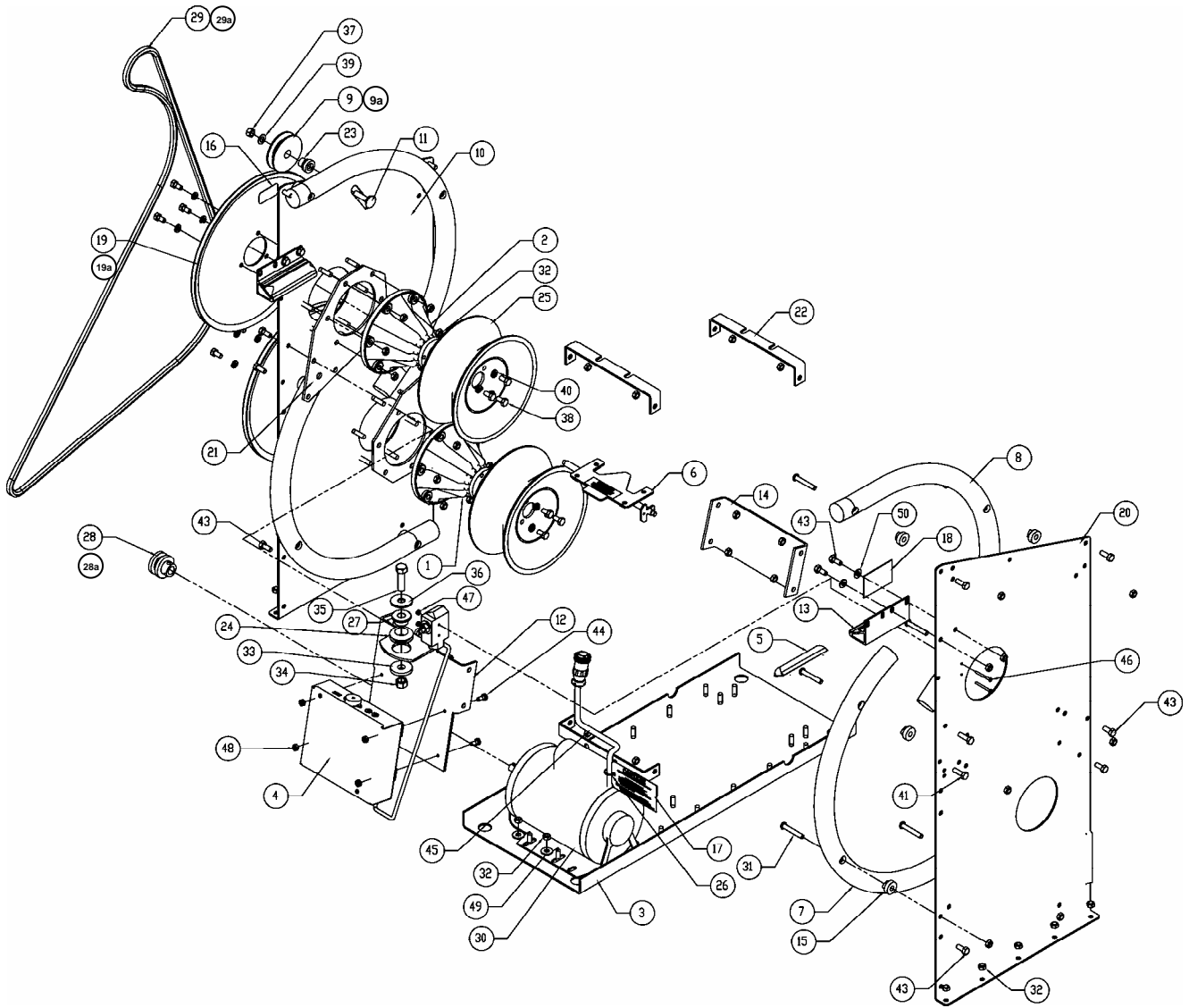
For replacement part numbers, refer to the Drawings and Part Numbers section at the back of this manual.



DRAWINGS AND PART NUMBERS



BALL LIFT, 250-001-001



V-Belt cross section



Flat belt cross section



BALL LIFT, 250-001-001

	Part Number	Description
1	250-001-127	Lower shaft assembly
2	250-001-126	Upper shaft assembly
3	250-001-003	Base plate assembly
4	252-002-156	Control box w/safety switch assembly
5	250-001-109	Transition pad assembly
6	250-004-056	V-wheel guard assembly
7	250-001-013	Lower track assembly
8	250-001-012	Upper track assembly
9	250-001-085	Idler pulley, V-belt
9a	250-001-134	Idler pulley, Flat belt
10	250-001-002	Left side assembly
11	250-001-108	Idler stud
12	250-002-207	Support bracket
13	250-001-107	Transition pad mount
14	250-001-106	Brace
15	250-001-034	Rail spacer
16	252-002-152	Serial Number Tag
17	250-001-158	115V Motor Decal
18	250-001-103	Warning Label, Interlock switch
19	250-001-057	Pulley, V-belt
19a	250-001-133	Pulley, Flat belt
20	250-001-062	Right side plate
21	250-001-054	Stiffener plate
22	250-001-023	Spacer bracket
23	250-001-102	Idler shaft
24	250-001-046	Grommet
25	250-001-051	V-wheel, Ball Return
26	770-013-043	Panduit Strap
27	Not used	
28	250-001-537	Pulley, V-belt
28a	250-001-130	Pulley, Flat belt
29	250-001-037	V-Belt
29a	250-001-131	Flat Belt
30	250-001-116	Motor
31	808-557-320	Screw, button head, 5/16-18 x 2
32	844-057-002	Lock nut, 5/16-18, Stover
33	Not used	See page 41
34	Not used	See page 41
35	Not used	See page 42
36	Not used	See page 41
37	839-665-002	Lock nut, 3/8-16, flex
38	809-857-100	Screw, hex, 5/16-18 x 5/8
39	948-767-132	Flat washer, 13/32
40	951-156-002	Lock washer, 5/16 split
41	809-857-165	Screw, hex, 5/16-18 x 1
42	809-857-145	Screw, hex, 5/16-18 x7/8
43	809-857-125	Screw, hex, 5/16-18 x 3/4



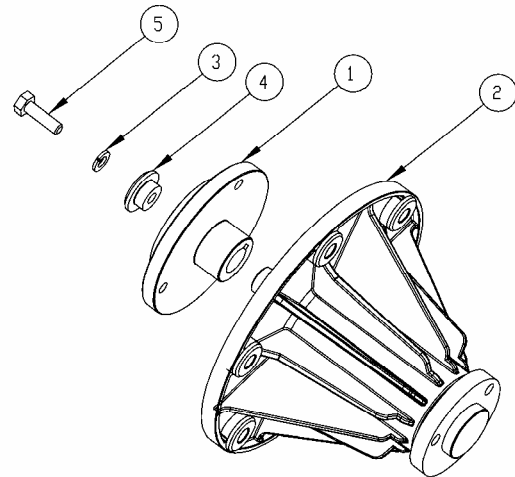
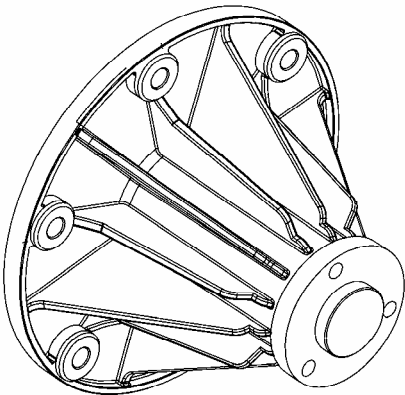
BALL LIFT, 250-001-001, CONT.

	Part Number	Description
44	809-849-100	Screw, 1/4 -20 X 5/8, hex head, black
45	250-001-115	Ball lift motor cord (with connector)
46	812-627-242	Screw, round head, 6-32 x 1-1/2
47	843-127-002	Nut, 6-32, keps
48	844-049-002	Nut, 1/4 -20, stover GR 8, zinc
49	948-964-142	Washer, 5/16 USS, flat
50	948-722-111	Washer, 5.16. SAE, flat, black oxide



UPPER SHAFT ASSEMBLY, 250-001-126

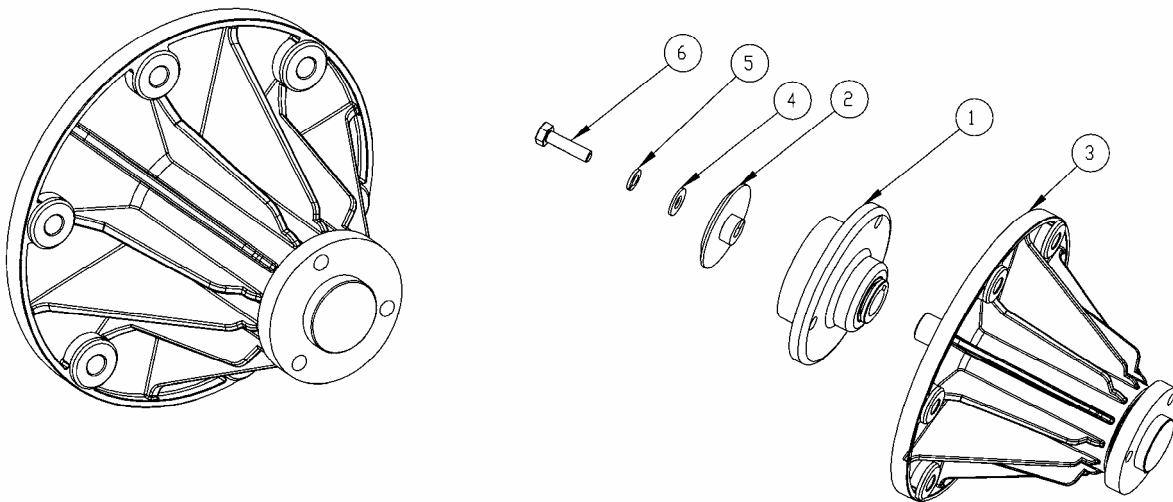
	Part Number	Description
1	250-001-060	Hub
2	250-001-128	Plastic Bell Housing
3	951-148-002	Washer, 1/4, split, zinc
4	250-001-226	Pulley washer
5	809-849-145	Screw, 1/4 -20 X 7/8, Hex Head





LOWER SHAFT ASSEMBLY, 250-001-127

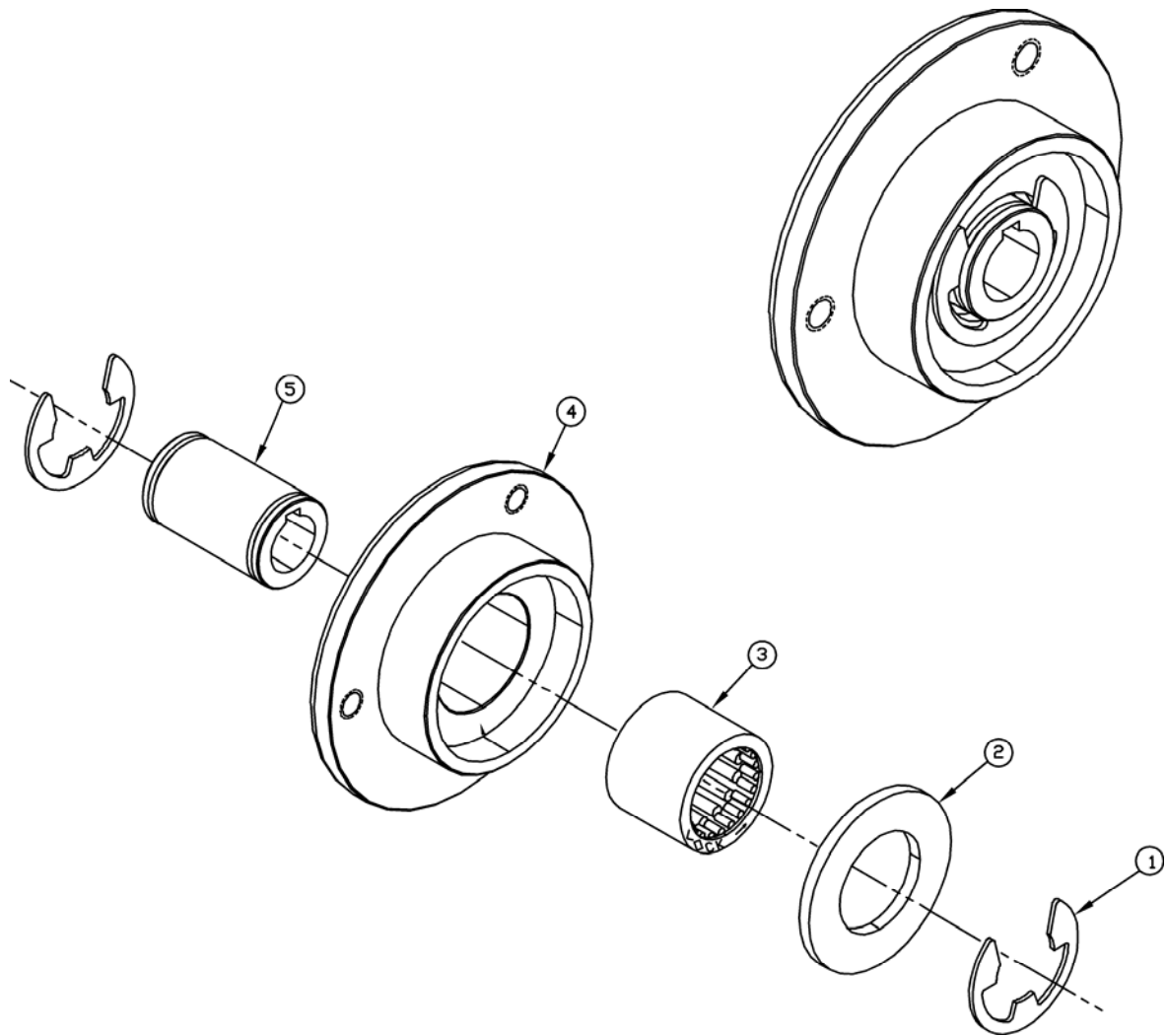
	Part Number	Description
1	250-001-008	Clutch Housing Assembly
2	250-001-231	Clutch Cover
3	250-001-128	Plastic Bell Housing
4	948-743-101	Washer, 1/4, Flat, Black Oxide
5	951-148-002	Washer, 1/4, split, zinc
6	809-849-165	Screw, 1/4-20 X 1, Hex Head, GR 8, Black





CLUTCH HOUSING ASSEMBLY, 250-001-008

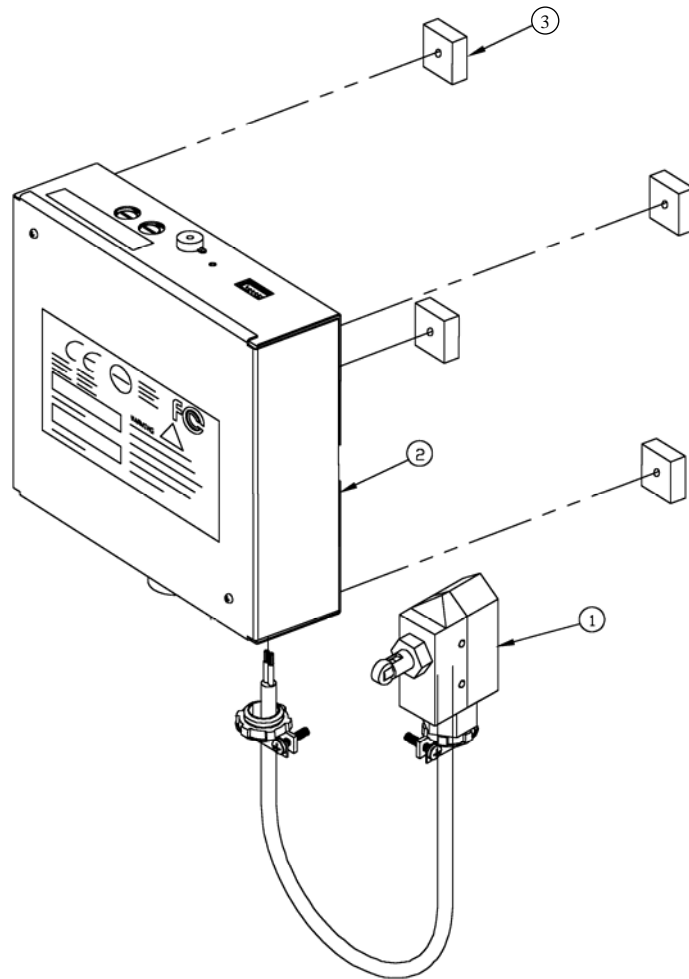
	Part Number	Description
1	919-010-910	Retaining ring
2	941-092-320	1-inch wrought washer
3	070-007-291	Roller clutch
4	250-001-053	Clutch housing
5	250-001-234	Clutch sleeve
6	700-112-830	RTV silicone gasket (not shown)





CONTROL BOX WITH SAFETY SWITCH, 252-002-156

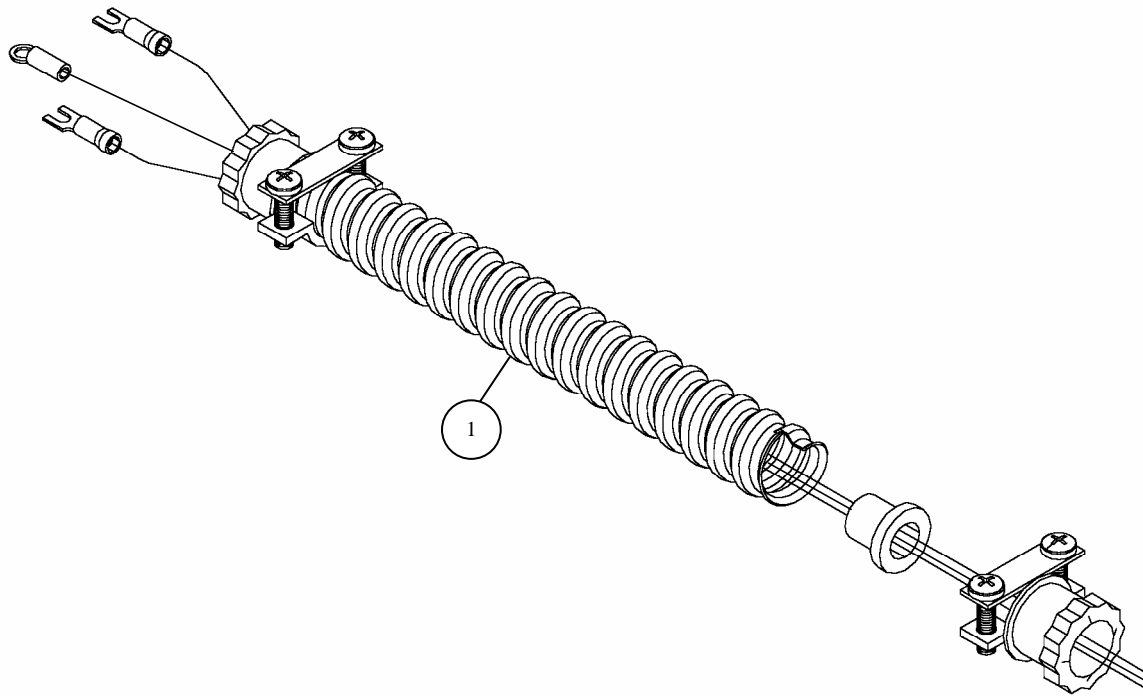
	Part Number	Description
1	252-002-155	Safety switch assembly
2	250-001-850	Enhanced control box w/circuit board
3	250-001-673	Dampener





MAIN POWER CABLE ASSEMBLY, 234-001-330

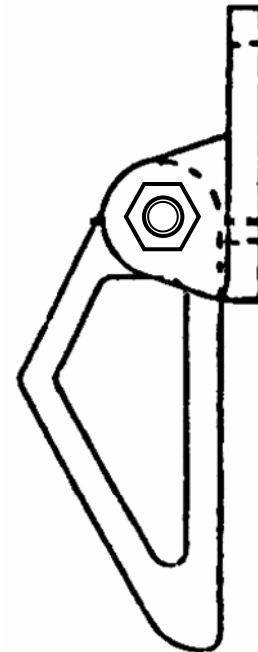
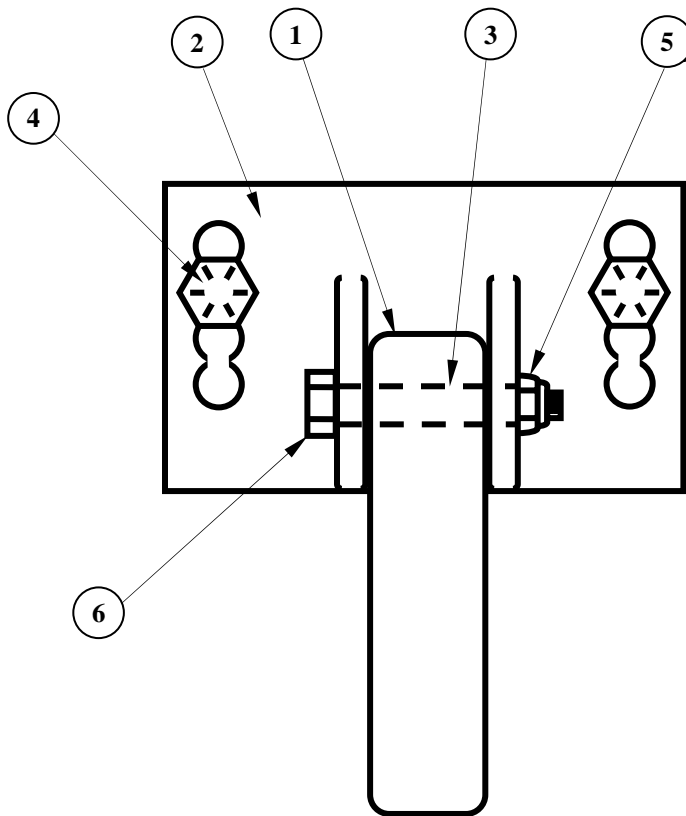
	Part Number	Description
1	234-001-330	Main power cable assembly





UNDERLANE RETURN BALL STOP, 611-353-105

	Part Number	Description
1	135-001-002	Ball stop
2	135-001-003	Ball stop bracket
3	135-001-004	Tube
4	810-556-240	Lag screw, 5/16 x 1-1/2
5	844-057-002	Nut, 5/16-18, Stover lock
6	809-857-365	Screw, 5/16-18 x 2-1/4, Hex

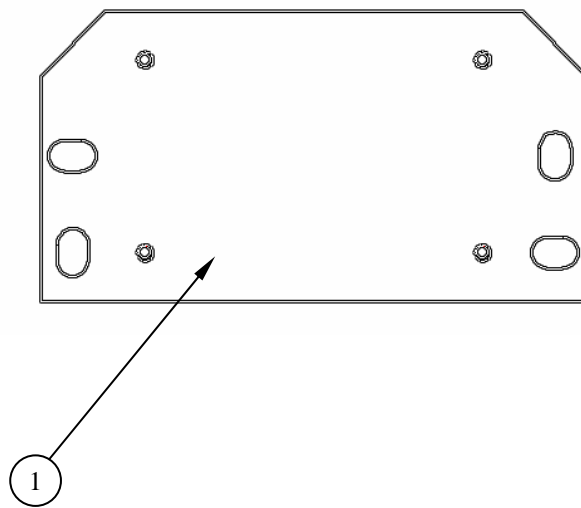


Side View



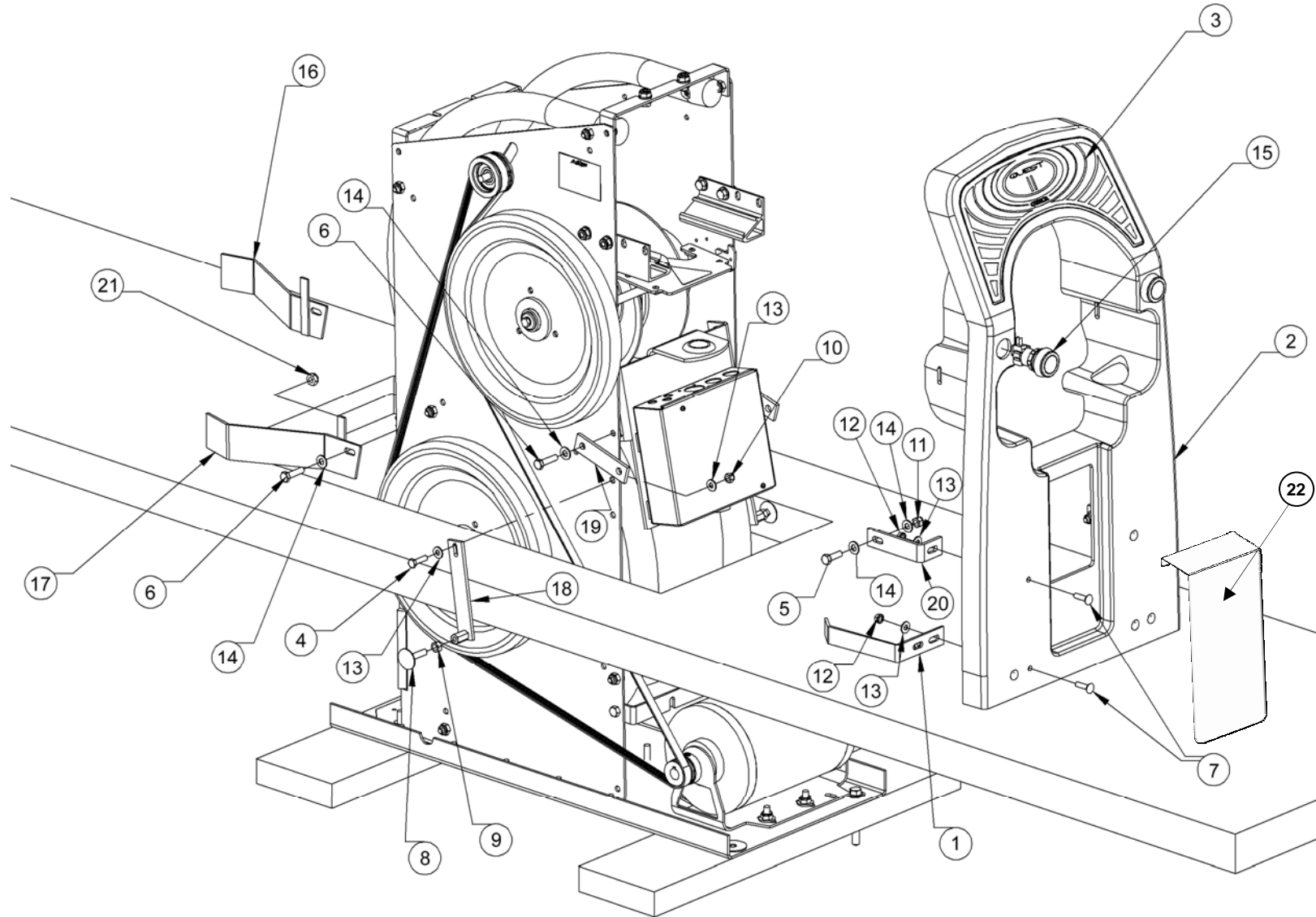
RAIL ADAPTER PLATE, 049-006-359

	Part Number	Description
1	049-006-359	Rail adapter plate





QUEST HOOD DOOR AND BRACKETS





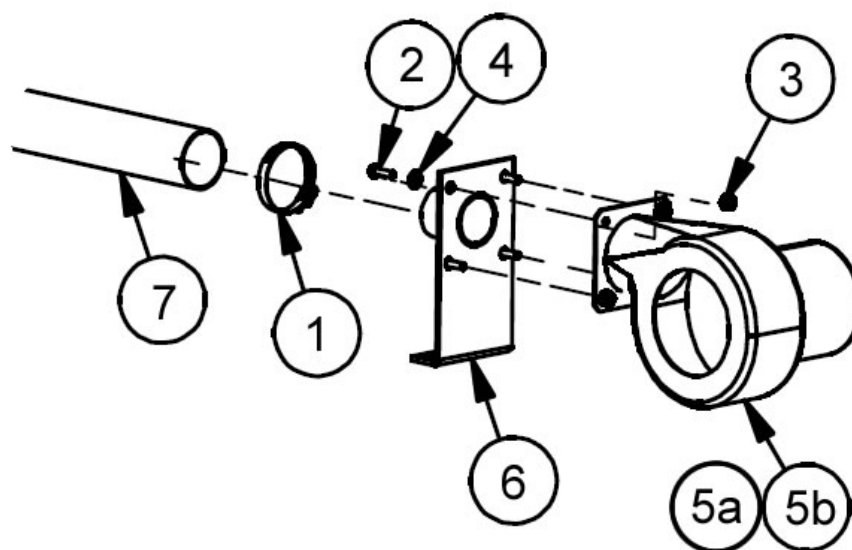
QUEST HOOD DOOR AND BRACKETS

	Part Number	Description
1	102-2090-00	HOOD SUPPORT
2	103-2010-01	QUEST HOOD DOOR
3	103-2050-30	HOOD FACIA
4	7010-002520-100	SCREW, 1/4-20 X 1, CAP, HEX
5	7010-003118-100	SCREW, 5/16-18 X 1, CAP, HEX
6	7010-003118-125	SCREW, 5/16-18 X 1-1/4, CAP, HEX
7	7012-002520-100	BOLT, 1/4-20 X 1, CARRIAGE
8	7013-003118-150	BOLT, 5/16-18 X 1-1/2, ELEVATOR
9	7034-003118-000	NUT, 5/16-18
10	7036-002520-000	NUT, 1/4-20, NYLON, HEX
11	7036-003118-000	NUT, 5/16-18, NYLON, HEX
12	7038-002520-000	NUT, 1/4-20, KEP, HEX
13	7050-028062-006	WASHER, 9/32 X 5/8 X 1/16, FLAT
14	7050-034068-006	WASHER, 11/32 X 11/16 X 1/16, FLAT
15	E-592BK	PUSH BUTTON SWITCH
16	M-0890-92	HOOD STABILIZER LEFT
17	M-0890-92-1	HOOD STABILIZER RIGHT
18	M-0890-97	POWERLIFT STABILIZER
19	M-0890-98	POWERLIFT DOOR BRACKET
20	M-0890-99	HOOD DOOR BRACKET
21	839-057-002	NUT, 5/16-18, NYLON INSERT, LOCK
22	102-2050-00	HOOD TRAP DOOR COVER



BLOWER ASSEMBLY

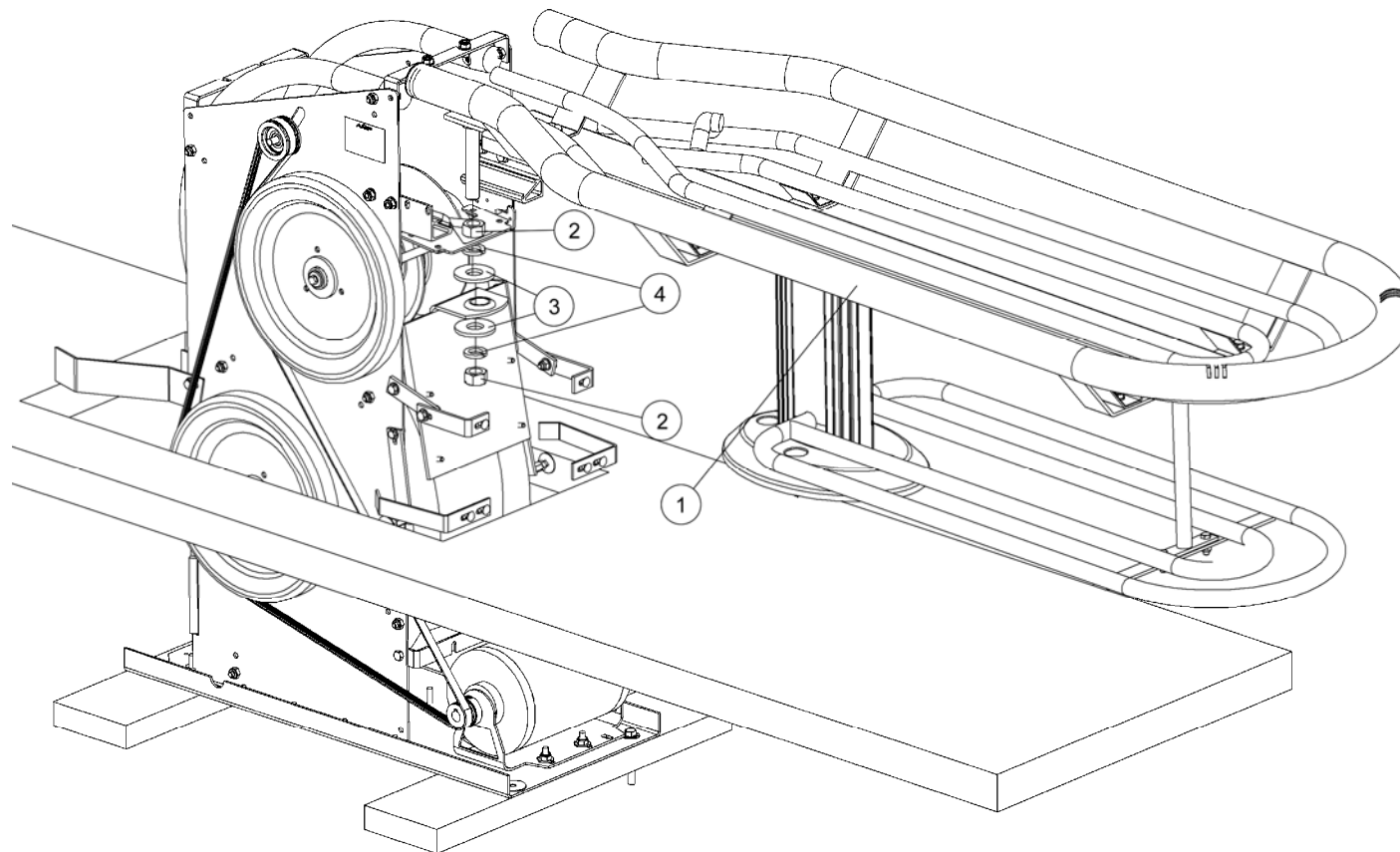
	Part Number	Description
1	302-4620-00	HOSE COLLAR, 2"
2	7016-411032-075	SCREW, 10-32 X 3/4, ROUND HEAD, SQUARE
3	7036-001032-000	NUT, 10-32, NYLON, HEX
4	7050-021050-006	WASHER, 7/32 X 1/2 X 3/64, FLAT
5a	E-0880-0115	AIR DRYER, 115 VOLT
5b	E-0880-0230	AIR DRYER, 230 VOLT
6	M-0891-08	HAND DRYER BRACKET
7	P-0880-20-1	HOSE





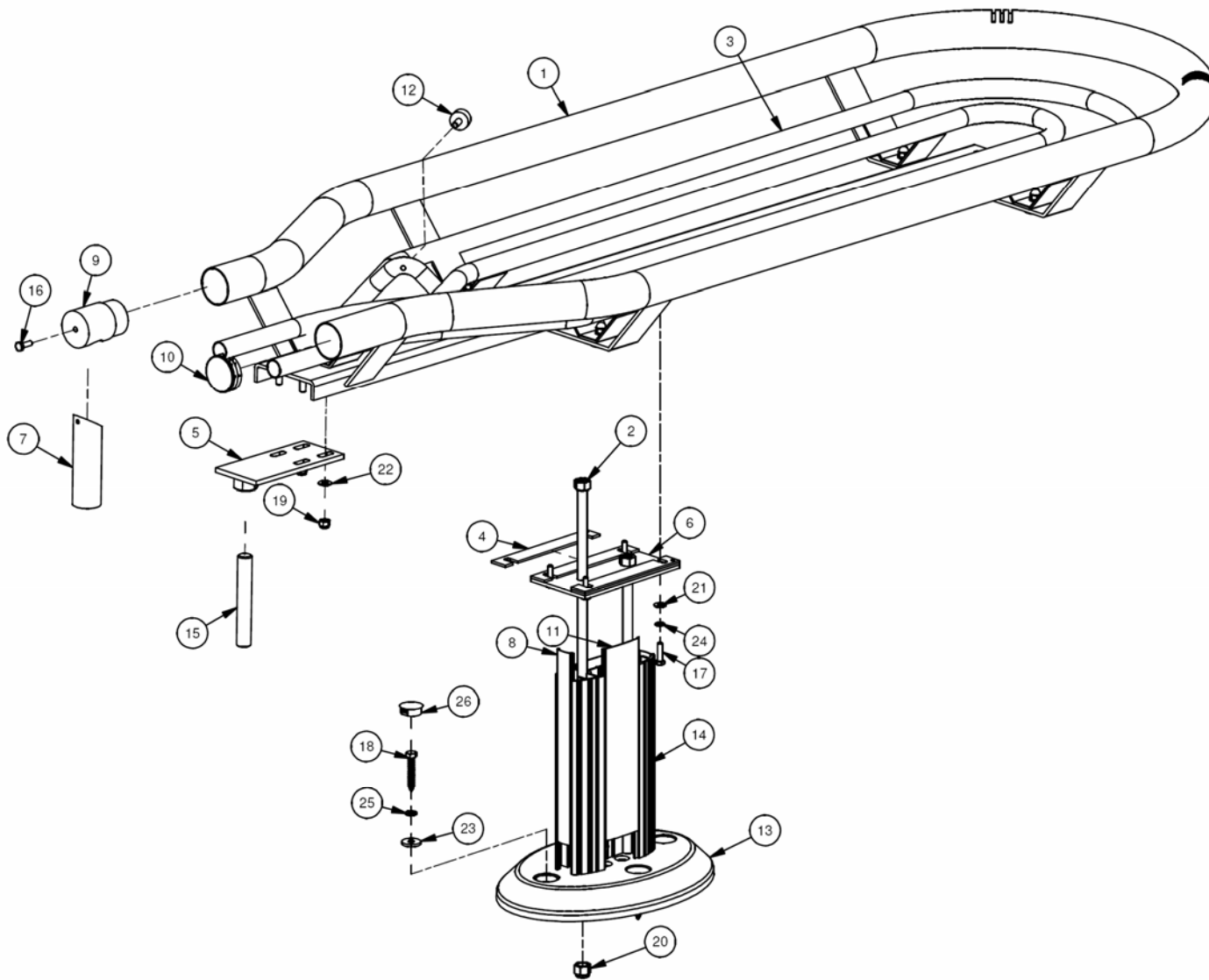
QUEST RACK

	Part Number	Description
1	122-2000-01	BALL RACK ASSEMBLY
2	7034-007510-000	NUT, 3/4-10, HEX
3	7052-093225-018	WASHER, 15/16 X 2-1/4 X 3/16, FLAT
4	7060-075125-020	WASHER, 3/4", LOCK





QUEST RACK AND PEDESTAL



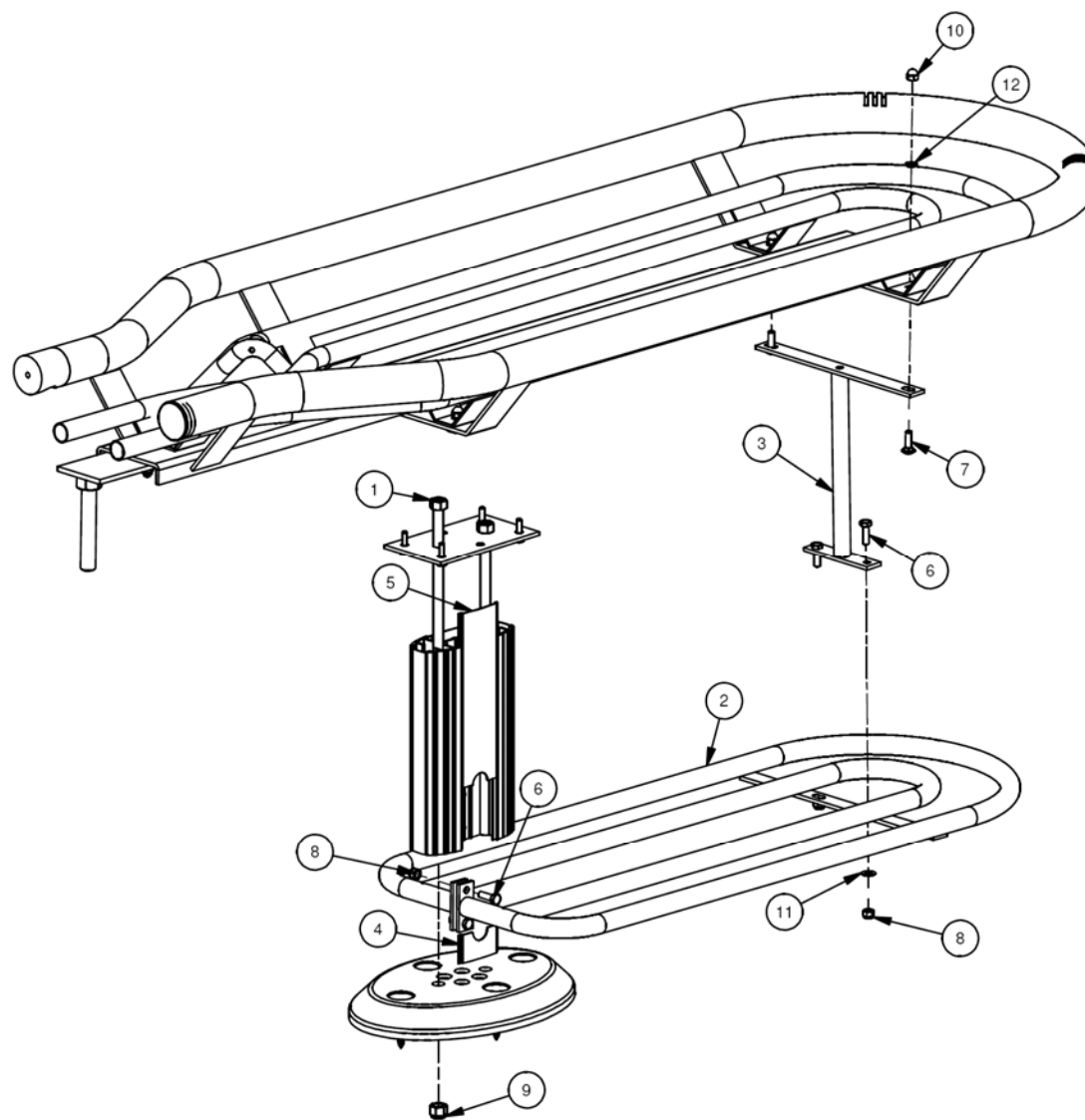


QUEST RACK AND PEDESTAL

	Part Number	Description
1	102-2000-01	BALL RACK TUBING
2	102-2005-00	BALL RACK SPECIAL THREAD ROD
3	102-2010-01	INSIDE RAIL TUBING
4	102-2015-00	BALL RACK SPACER
5	102-2020-00	BALL RACK BRACKET
6	102-2030-00	BALL RACK BASE PLATE
7	102-2120-00	AIR CONNECTOR TUBING
8	103-1020-00	SMALL MOULDING, BLACK
9	103-2060-00	CAP ADAPTOR
10	103-2070-00	PLASTIC CAP
11	103-2075-04	LARGE MOULDING, GREY
12	104-2010-00	BUMPER PAD
13	108-1000-00	SINGLE BASE
14	108-2000-00	BALL RACK COLUMN
15	302-0370-00	THREAD ROD [REAR]
16	7010-002520-075	SCREW, 1/4-20 X 3/4, HEX
17	7010-002520-100	SCREW, 1/4-20 X 1, HEX
18	7028-003100-200	SCREW, 5/16 X 2 LAG
19	7036-003118-000	NUT, 5/16-18, NYLON, HEX
20	7036-005013-000	NUT, 1/2-13, NYLON, HEX
21	7050-028062-006	WASHER, 9/32 X 5/8 X 1/16, FLAT
22	7050-034068-006	WASHER, 11/32 X 11/16 X 1/16, FLAT
23	7050-034100-012	WASHER, 11/32 X 1 X 1/8, FLAT
24	7060-025046-006	WASHER, 1/4", LOCK
25	7060-031057-009	WASHER, 5/16", LOCK
26	P-1000-01	NYLON PLUG BUTTON, 1"



QUEST LOWER RACK AND PEDESTAL





QUEST LOWER RACK AND PEDESTAL

	Part Number	Description
1	102-2005-00	BALL RACK SPECIAL THREAD ROD
2	102-2060-01	BALL STORAGE RACK
3	102-2070-00	OPTIONAL BALL RACK POST
4	103-2065-04	BALL RACK MOULDING, LARGE #1
5	103-2066-04	BALL RACK MOULDING, LARGE #2
6	7010-003118-100	SCREW, 5/16-18 X 1, HEX
7	7012-003118-100	BOLT, 5/16-18 X 1, CARRIAGE
8	7036-003118-000	NUT, 5/16-18, NYLON, HEX
9	7036-005013-000	NUT, 1/2-13, NYLON, HEX
10	7037-003118-000	NUT, 5/16-18, HEX
11	7050-034068-006	WASHER, 11/32 X 11/16 X 1/16, FLAT
12	7060-031057-009	WASHER, 5/16", LOCK



QUEST HOOD

	Part Number	Description
1	102-2080-00	FRONT HOOD BRACKET
2	103-2000-01	QUEST HOOD BALL RACK
3	103-2050-00	HOOD JEWEL
4	7016-411032-075	SCREW, 10-32 X 3/4, ROUND HEAD, SQUARE
5	7026-311000-150	SCREW, #10 X 1-1/2, SELF DRILLING, FLAT HEAD
6	7050-021050-006	WASHER, 7/32 X 1/2 X 3/64, FLAT

