KAWAK AVIATION TECHNOLOGIES, INC.

MODEL 38400
JP1600 SERIES PUMP ASSEMBLY

FOR THE:
BAMBI BUCKET WITH 27" TORRENTULA VALVE
MODELS: HL4000, HL5000, HL7600, HL9800

Operations and Service Manual
## RECORD OF REVISIONS

<table>
<thead>
<tr>
<th>VERSION NO.</th>
<th>ISSUE DATE</th>
<th>REVISION DESCRIPTION</th>
<th>DATE INSERTED</th>
<th>BY</th>
</tr>
</thead>
<tbody>
<tr>
<td>IR</td>
<td>Jan. 12, 2010</td>
<td>Initial Release</td>
<td>N/A</td>
<td>N/A</td>
</tr>
</tbody>
</table>

Version IR
Revision Date July 21, 2016
# TABLE OF CONTENTS

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>INTRODUCTION</td>
<td>1</td>
</tr>
<tr>
<td>TERMINOLOGY</td>
<td>2</td>
</tr>
<tr>
<td>DEFINITION OF PROCEDURAL WORDS</td>
<td>3</td>
</tr>
<tr>
<td>REFERENCES</td>
<td>4</td>
</tr>
<tr>
<td>REQUIREMENTS</td>
<td>5</td>
</tr>
<tr>
<td>SECTION 1 – DESCRIPTION</td>
<td>7</td>
</tr>
<tr>
<td>SECTION 2 – INSTALLATION</td>
<td>8</td>
</tr>
<tr>
<td>SECTION 2.1 – AIRCRAFT ELECTRICAL INSTALLATION</td>
<td>8</td>
</tr>
<tr>
<td>SECTION 2.2 – GENERAL</td>
<td>8</td>
</tr>
<tr>
<td>SECTION 2.3 – JP 1600 SERIES PUMP MECHANICAL INSTALLATION</td>
<td>9</td>
</tr>
<tr>
<td>SECTION 2.4 – POST INSTALLATION TESTING</td>
<td>24</td>
</tr>
<tr>
<td>SECTION 3 – MAINTENANCE AND INSPECTION RECOMMENDATIONS</td>
<td>26</td>
</tr>
<tr>
<td>SECTION 3.1 – INSPECTION INTERVALS</td>
<td>26</td>
</tr>
<tr>
<td>SECTION 3.2 – RECOMMENDED LUBRICANTS</td>
<td>26</td>
</tr>
<tr>
<td>SECTION 3.3 – RECOMMENDED SPARES</td>
<td>26</td>
</tr>
<tr>
<td>SECTION 4 – JP 1600 SERIES PUMP OPERATION</td>
<td>27</td>
</tr>
<tr>
<td>SECTION 4.1 – PREFLIGHT</td>
<td>27</td>
</tr>
<tr>
<td>SECTION 4.2 – OPERATION</td>
<td>28</td>
</tr>
<tr>
<td>SECTION 5 – JP 1600 SERIES PUMP OVERHAUL</td>
<td>29</td>
</tr>
<tr>
<td>SECTION 5.1 – WORK AREA/PREPARATION</td>
<td>29</td>
</tr>
<tr>
<td>SECTION 5.2 – JP 1600 SERIES PUMP DISASSEMBLY</td>
<td>29</td>
</tr>
<tr>
<td>SECTION 5.3 – JP 1600 SERIES PUMP INSPECTION</td>
<td>32</td>
</tr>
<tr>
<td>SECTION 5.4 – JP 1600 SERIES PUMP ASSEMBLY</td>
<td>36</td>
</tr>
<tr>
<td>SECTION 6 – TROUBLESHOOTING</td>
<td>42</td>
</tr>
<tr>
<td>APPENDIX I – SEAL AND BEARING KIT 38400-401-RB-K</td>
<td>43</td>
</tr>
<tr>
<td>APPENDIX II – SAMPLE WIRING DIAGRAM</td>
<td>44</td>
</tr>
<tr>
<td>APPENDIX III – PARTS DIAGRAM</td>
<td>45</td>
</tr>
</tbody>
</table>
INTRODUCTION

This publication provides the basic procedures for the installation and maintenance of a Kawak Aviation Technologies Model JP1600 bucket pump system into SEI Ind. Bambi Bucket 27" Torrentula valve equipped models. This manual shall not be used as a substitute for sound judgment and accepted practice. Except where applicable, SEI Ind. procedures, instructions, and parts are to be used when installing and maintaining this equipment.

The information contained within this manual is based upon data available at the time of publication. We reserve the right to make changes at any time without notice. No part of this manual may be reproduced, stored in a retrieval system, or transmitted, in any form by any means- electronic, mechanical, photocopying, recording, or otherwise without the prior written permission of the publisher. This includes text, figures, and tables.
TERMINOLOGY

Warnings, cautions, and notes are used throughout this manual to emphasize important and critical instructions and are used as follows:

***WARNING*** An operating procedure, practice, or etc., if not correctly followed, could result in personal injury or loss of life.

**CAUTION** An operating procedure, practice, or etc., if not strictly observed, could result in damage or destruction of equipment.

*NOTE* An operating procedure, condition, which is essential to highlight.

**CAUTION** Detailed descriptions of standard workshop procedures, safety principles and service operations are NOT included in this manual. Please note that this manual DOES contain warnings and cautions against some specific service methods which could cause PERSONAL INJURY, or could damage an aircraft or MAKE IT UNSAFE. Please understand that these warnings cannot cover all conceivable ways in which service, whether or not recommended by Kawak Aviation Technologies, Inc., might be done, or of the possible hazardous consequences of each conceivable way, nor could Kawak Aviation Technologies, Inc. investigate all such ways. Anyone using Service procedures or tools, whether or not recommended by Kawak Aviation Technologies, Inc., must satisfy himself thoroughly that neither personal safety nor aircraft safety will be jeopardized.
DEFINITION OF PROCEDURAL WORDS

Procedural word usage and their intended meanings as used throughout this manual are as follows:

‘Shall’ is used when an application of a procedure is mandatory.

‘Should’ is used only when the application of a procedure is recommended.

‘May’ and ‘Need Not’ is used only when the application of a procedure is considered optional.

‘Will’ is used only to indicate futurity and never to indicate a mandatory procedure.
REFERENCES

In the event adjustments, maintenance, or repair are needed to the Torrentula valve or the Bambi Bucket, consult the appropriate version of the SEI Industries Operations and Service Manual.

*NOTE* This manual makes references to item numbers in the SEI Torrentula Operations and Service Manual parts list and Kawak Aviation Technologies drawings. Having these manuals and drawings available will speed identification of referenced parts. For assembly assistance of the JP 1600 Series pump, consult Kawak Aviation Technologies, Inc. drawing number 38400 and applicable subassembly drawings found in Appendix III.
REQUIREMENTS

Prior to installation of a Kawak Aviation Technologies JP 1600 Series, aircraft electrical system modifications must be made to provide power for system control and the pump motor.

Connection to the aircraft power supply should be done in accordance with FAA Advisory Circulars AC43.13-1B and AC43.13-2A and any applicable aircraft manufacturers’ instructions.

***WARNING***

Do not connect the JP 1600 Series system to any aircraft bus bar that is used for emergency or essential loads. Before installation, do an electrical load analysis to ensure that the generator capacity is adequate to operate the system and amend the aircraft electrical load to the new requirement.

General Requirements

Completion of an Aircraft Electrical Loads Analysis

208VAC 400Hz 3ф, 50 Amps (Minimum) Non-Essential/Non-Emergency Buss Power

Crew Operator Switch (Momentary or Maintained)

50 Amp, 3ф Circuit Breaker

50 Amps (Minimum) 3ф Relay

Appropriate wire/cable and hardware (clamps, etc.) to complete the primary and secondary circuits.
*NOTE*

Though an optional connector is supplied with the JP 1600 Series system, it is recommended that a breakaway connector is used at the connection between the aircraft and cable in case jettisoning of the Bambi Bucket is required. This connector should be sized to handle the load requirements of the JP 1600 Series system.

CHANGES AND DISTRIBUTION OF THIS MANUAL

Kawak Aviation Technologies provides this manual with the sale of each new JP 1600 Series Kit. Replacement manuals as well as revisions to this manual will be forwarded upon request. Revisions to this manual will carry a new revision letter and date as noted in the front of this manual and supersede any previous revision levels of the manual. The current version of this manual is also available at http://www.kawakaviation.com/
SECTION 1 – DESCRIPTION

The JP1600 Series pump system is designed to be a simple and modular design for easy installation and maintenance. The key components that make up the pump system are the JP1600 Series pump (electric motor, axial pump assembly, outlet assembly), and valve plate structure.

The motor is a high torque 400Hz AC electric motor designed to operate specifically with the Kawak axial pump assembly. The motor current draw in most JP1600 Series applications is less than 35amps during normal operations. The motor case is a water tight design that eliminates the single most common cause of failure in OEM motors due to leakage. During normal operations the motor case is directly submersed in water, this allows for maximum heat rejection, preventing the electric motor from overheating, and providing the operator with continuous refilling cycles.

The motor plugs into the 6” 6061 aluminum outlet assembly which houses the bearing carrier for one end of the pump assembly drive shaft and incorporates the heavy duty flapper valve assembly.

The axial pump assembly is bolted directly to the outlet assembly. Within the pump assembly the axial impeller is located onto the drive shaft and enclosed by the stator housing. The entire rotating assembly is carried by a heavy duty double bearing arrangement sealed inside of the stator housing. The stator body acts as a shroud to guide the water up the discharge outlet. The impeller and the stator body are cast from 17-4 stainless steel alloy for maximum toughness and wear characteristics.

The valve plate structure consists of a new valve plate configured for the installation of the JP1600 Series pump and also provides connection points for stabilizing struts between the pump and new valve plate.
SECTION 2 – INSTALLATION

SECTION 2.1 – AIRCRAFT ELECTRICAL INSTALLATION

2.1.1 POWER BUDGET

Upon completion of an Electrical Loads Analysis, select an appropriate circuit to power the system.

2.1.2 CONNECTIONS

The JP 1600 Series Kit is shipped with a ~35 foot long cable appropriately sized to handle the load requirement. This cable has a connector installed at the motor end with flying leads at the aircraft end. A spare connector is supplied for the aircraft end of the cable. See Appendix II for a sample Wiring Diagram.

2.1.3 LONG LINE USE

For long line use of the JP 1600 Series pump, use minimum 8 ga wire/cable for up to 200 feet of long line extension.

SECTION 2.2 – GENERAL

**CAUTION** Due to the weight and balance of the JP 1600 Series pump assembly, two people are recommended for removal and installation to prevent damage to the system.

2.2.1 WORK AREA/PREPARATION

1. Before beginning installation of the JP 1600 Series pump, locate a suitable area to work. You will need a smooth, level area with enough space to open the Bambi Bucket while lying on its side for access to the Torrentula valve from inside the bucket. To avoid damage to the exterior of the bucket it is recommended that it be laid out on a heavy duty tarp on the tarmac or dirt.
2. Following instructions from the SEI manual, lay out the Bambi Bucket rigging so that the top of the bucket and IDS are accessible. The bucket is properly positioned if the ballast bars are oriented toward the ground. Open the bucket following instructions found in the SEI Industries operations manual.

3. Using a web sling, connect the crane or hoist to the outboard end of a spoke and raise the hoist to hold open the top of the bucket.

**CAUTION** A crane or hoist is recommended to hold open the top end of the bucket to prevent damage to the IDS components.

SECTION 2.3 – JP 1600 SERIES PUMP MECHANICAL INSTALLATION

2.3.1 TORRENTULA VALVE AND JP 1600 SERIES PUMP

1. Referring to SEI’s manual, remove the Top Plate from the Torrentula Valve assembly (Figure 2.1). If a PowerFill system is installed, follow the applicable procedures for removal of the pumps, debris screens, and wiring first.

![Figure 2.1 Valve Assembly](image)

The basic steps are as follows:

a. Disconnect the Actuator Cable from the Lift Bar. (Figure 2.2)
b. Remove the four nuts and bolts, and eight washers that attach the Lift Bar to the Valve Tube. Set them aside for reassembly later. (Figure 2.3)

c. Open the valve and using a thick piece of protective material (rubber, plastic, etc.) on each side of both springs, place a clamp on the Constant Force Springs (ref SEI Item # 13) such that the springs cannot recoil (See Figure 2.4) once the Spring Brackets (ref SEI Item # 11) are unbolted from the Flange (ref SEI Item #204) (See Figure 2.4).
Figure 2.4 Clamping Constant Force Springs

*NOTE* Failure to secure the Constant Force Springs prior to disassembly will cause them to uncoil and complicate reassembly.

d. Remove the six bolts and nuts and twelve washers holding the Flange to the Top Plate (ref SEI Item #12). This includes the two bolts holding the Spring Brackets to the flange. Put this hardware aside for reassembly later. (See Figure 2.5)

![Flange Bolts and Spring Brackets](image)

Figure 2.5 Flange Bolts

e. The upper portion of the Valve Assembly is now free and can be placed out of the way inside the bucket. (See Figure 2.6)

**CAUTION** Place padding underneath the Valve Assembly before setting it down inside the bucket as damage to the Bucket walls may occur.
f. Remove the four bolts and lock washers holding the Top Plate to the Support Rods (ref SEI Item # 7) and remove the Top Plate. Place the bolts and lock washers aside for reassembly. Store the SEI Top Plate in an appropriate location in the event reinstallation is required in the future.

*NOTE* Do not remove the Lift Bar from the Support Rods.

2. INSTALL JP 1600 SERIES PLATE ASSEMBLY

   (Reference Kawak Aviation drawing 38400)

   a. Install the two Stabilizer Weldments (38429-401) using the fasteners provided in Bolt Kit #14 to the bottom of the new Plate Assembly (opposite side from the Strut Brackets). Do not tighten the fasteners at this time. (See Figure 2.7)
b. Install the Plate Assembly (38438-401) on the Support Rods orienting it such that the Stabilizer Weldments are on the opposite Support Rods from the Lift Bar. (See Figure 2.8.)

c. From the bottom side, slide the Lift Bar up the support rods until it is next to the Top Plate. Reinstall and tighten the four previously removed bolts and
washers through the Top Plate into the Support Rods. Slide the Lift Bar up and down the Support Rods a few times to check for binding. If the Lift Bar does not operate smoothly, loosen the four bolts and allow the Support Rods to find their natural position, then retighten the bolts. When the Lift Bar operates smoothly, tighten the Stabilizer Weldment hardware.

3. REINSTALL TORRENTULA VALVE ASSEMBLY

a. Position the Valve Assembly over the Top Plate roughly orienting the Lift Bar holes in the Valve Tube to the Lift Bar.

b. Align the Flange with the holes in the Top Plate and install four of the previously removed bolts/washers through the Flange leaving the holes for the Spring Brackets open for now. Add the washers and lock nuts to the bottom side of the Top Plate.

c. One spring at a time, push the bolt/washer through the Spring Bracket and guide the bolt through the hole in the Flange and Top Plate and secure on the
bottom side of the Top Plate with the washer and lock nut. When one is in place, perform the same operation with the other Spring Bracket.

d. Align the Lift Bar holes to the Valve Tube holes and install the four previously removed bolts/washers/nuts and tighten.

e. DO NOT reinstall the Actuator Cable end to the Lift Bar at this time. Post-installation inspection needs to be accomplished prior to connection of the Valve Actuator Cable. See **SECTION 2.4 – POST INSTALLATION TESTING**.

4. INSTALL JP 1600 SERIES PUMP ASSEMBLY

   **CAUTION** Removal of the motor from the Pump Assembly is recommended to reduce weight during installation. Ensure that the O-ring installed between the motor and the pump assembly is not lost or damaged during motor removal or storage. This O-ring is critical to ensuring water does not enter the space between the motor and pump that could potentially damage bearings in the area.

   a. Remove the motor from the pump assembly.

   b. Using Bolt Kit #11, install the Pump Assembly into the hole in the Top Plate with Pump to Main Plate Gasket (38434-1) in between. Orient the outlet Check Valve toward the Strut Mounts on the Plate Assembly and align the holes. Install eight bolts, sixteen washers and eight locknuts in the holes and tighten.

   c. Using Bolt Kit #12, install the shorter of the Strut Assemblies (38430-401) between the Pump Assembly (38401-401) and the Top Plate (38438-401).

      i. First loosen the jam nuts at both ends of the Strut Tube.

      ii. Install the bolt with the larger washer under the bolt head through the rod end on the Support Strut. Push the bolt through the outermost tab on the pump assembly and install the washer and lock nut. (See Figure 2.10)
iii. Install a second bolt, again with the larger washer under the bolt head, through the rod end and attempt to push the bolt through the Strut Mount tab on the Plate Assembly that is nearest to the Pump Assembly. Adjust the Strut Assembly length until the bolt easily slips through the hole in the Strut Mount. Install the washer and lock nut on the Strut Mount and tighten. (See Figure 2.11)
*NOTE* Both ends of the Strut Assembly are threaded with right hand threads.

iv. Tighten the jam nuts to the Strut Tube and safety wire.

d. Using the remaining hardware from Bolt Kit #12, install the longer of the Strut Assemblies (38431-401) to the inboard Strut Mount tab on the Pump Assembly and the other Strut Mount tab on the Plate Assembly following the same procedure (steps 4.c.i through 4.c.iv), except the bolts should go through the tab and mount in the opposite direction. (See Figures 2.12 and 2.13)
e. If previously removed, reinstall the Motor on top of the Pump Assembly. Use caution when installing motor ensuring the O-ring is properly positioned at the bottom of the shoulder on the motor. (See Figure 2.14)
2.3.2 POWER CABLE

*Note* Prior to installation, a connector should be installed on the aircraft end of the Power Cable.

1. Lay out the power cable with the factory installed connector end oriented toward the Jet Pump and bucket.

2. Feed the Power Cable through the center of the Bambi Bucket hub adjacent to the Actuator Cable Housing.

3. Install the cable connector on the connector on the pump motor.

4. Leaving a minimal service loop, position the power cable adjacent to the actuator cable housing and secure it to the housing using one set of the supplied clamp kits from Bolt Kit #16. Place one clamp at approximately the height of the top of the motor.

   *NOTE* One hole in the clamps is slightly larger than the other and should be placed over the Actuator Cable Housing with the smaller hole clamping the Jet Pump power cable.

   **CAUTION** Make sure not to adversely bend, kink, or otherwise deform the Valve Actuator Cable Housing during installation of the clamps to ensure proper functioning of the Valve Assembly.

5. Install the second cable clamp kit approximately 12 inches below the Valve Control Head.

2.3.3 ROTATIONAL CHECK

*NOTE* - Aircraft electrical system modification needs to be accomplished prior to completion of this step.

1. Connect power to the buss by resetting the circuit breaker.

2. Apply power to the pump motor for 4 or 5 seconds. Viewing from the bottom end of the pump assembly (through the Inlet Screen Basket) verify that the Jet Pump impeller is rotating clockwise.
3. If the impeller is rotating the wrong direction, swap any two of the three secondary power wires. This should typically be done at the output relay. Recheck the impeller direction of rotation.
   *NOTE* - If the aircraft has had a Jet Pump Series system previously installed, the impeller direction of rotation should not need to be changed.

**2.3.4 STANDOFF RING**

1. Remove five bolts to free one Bumper Block.
   *NOTE* DO NOT remove more than one Bumper Block at a time as the bucket can shift and be very difficult to reassemble to the base plate.

2. Using the supplied large OD washers on the head end of the bolt, reinstall two of the bolts adjacent to each other in two of the end holes, then install one bolt at the opposite end. (See Figure 2.15)

3. Remove the next Bumper Block and replace bolts, again with the supplied large OD washers, install two more bolts leaving a gap of two bolts. (See Figure 2.16)
4. Continue around the base of the bucket removing one of the Bumper blocks and installing bolts in two adjacent holes, leaving two adjacent holes open until ten bolts have been installed and ten holes are left open.

5. Using the ten leftover bolts from removal of the Bumper Blocks, adding the large OD washers as before, begin securing the Standoff Ring to the bottom of the bucket in the open holes around the base of the bucket. (see Figure 2.17)
Figure 2.17 Install the Standoff Ring

*NOTE* It may be necessary to support the bottom of the bucket off the ground in order to properly fit the Standoff Ring. (See Figure 2.18)

6. Using the supplied 3-1/2 inch long bolts with the leftover washers from Steps 1 through 4, begin securing the Bumper Blocks to the bottom of the Standoff Ring with

Figure 2.18 Bottom of Bucket Propped Up for Standoff Ring Installation
the supplied washers and nuts. (See Figure 2.19)

6. *NOTE* Be sure to use the leftover washers from the Bumper Block removal steps under the heads of the bolts so that they sit below the surface of the Bumper Blocks. Failure to do so will lead to wear on the head of the bolts and possible loss of Bumper Blocks.

7. Installation of Blanking Plate (Optional)

   *NOTE* It is recommended that the Blanking Plate be installed on the Plate Assembly ensuring quick access for replacement of the Pump Assembly in the event of loss or damage to the Check valve.

   Using Bolt Kit #13 install the Blanking Plate (38437-1) on the Plate Assembly opposite to the Pump Assembly (See Figure 2.20)
SECTION 2.4 – POST INSTALLATION TESTING

1. Torrentula Valve Testing

   a. Ensure Valve Actuation Cable is moved out of the way of the Torrentula Valve during testing. Failure to keep this cable out of the way could lead to damage to cable.

   b. Ensure smooth operation by manually operating Torrentula Valve with the Lift Bar from the outside/bottom of the bucket. The Torrentula Valve should freely open and close with no binding.

      *NOTE* There may be some minor sluggishness on closing of the valve due to extra friction from the bucket laying on its side. The important point is that there is no binding on the Support Rods and the Constant Force Springs.

   c. Measure that the Torrentula Valve fully opens to a distance of approximately 9 inches. A significant difference in this measurement indicates that an
installation or reassembly step was performed improperly. Investigate and remedy the cause of this discrepancy.

2. Valve Actuation Cable Installation

Connect the Valve Actuation Cable by pushing the cable end through the Lift Bar and installing the nut and washers on the end of the cable.
SECTION 3 – MAINTENANCE AND INSPECTION RECOMMENDATIONS

Kawak Aviation Technologies recommends the following maintenance/inspection guidelines for your JP 1600 Series pump:

SECTION 3.1 – INSPECTION INTERVALS

A. PREFLIGHT – See SECTION 4.1 – PREFLIGHT below for preflight checks.

B. WEEKLY – Inside-the-bucket inspection verifying presence and security of all installation and assembly hardware. Check parts and fasteners for presence of corrosion.

C. 3 MONTHS – Weekly inspection items in addition to removal of Inlet Screen to inspect condition and security of Impeller.

D. END OF SEASON – A complete overhaul is recommended before storing the JP 1600 Series pump for the off season. This will ensure that there is adequate time to address any maintenance issues that may be found and have the system ready to perform as new for the next season. See SECTION 5 for overhaul procedures.

SECTION 3.2 – RECOMMENDED LUBRICANTS


B. SHAFT SEALS – NLGI Grade 1 or Grade 2 with a synthetic base oil and Calcium Sulfonate, Silica, or Silicone thickener are recommended shaft seal lubricants.

SECTION 3.3 – RECOMMENDED SPARES

A. 38400-401-JB-KIT JP 1600 Series Bearing and Seal Kit

B. 38711-1 Spline Grease

C. 38409-401 Inlet Screen Basket

D. 38411-401 Check Valve, 6” Discharge
SECTION 4 – JP 1600 SERIES PUMP OPERATION

SECTION 4.1 – PREFLIGHT

1. INSPECTION
   a. Inspect power cable and connectors for damage.
      A damaged power cable, especially where worn through or cut can cause a short.
      Replace any worn or damaged cable or connectors before flight.
   b. Inspect Inlet Screen
      Check the Inlet Screen for damage or excessive foreign material.
      Clean or replace the Inlet Screen as required.
   c. Visually Inspect Impeller
      Check the leading edges of the Impeller through the Inlet Screen for any damage that may cause excessive vibration or degradation of system operation. If any question as to Impeller serviceability arises, consult Section 5.3 - Inspection.
      Repair or replace the Impeller as required.
   d. Inspect Check Valve for damage, rubber seal for tears.

2. OPERATIONAL CHECK
   Operate the JP 1600 Series pump from the main aircrew control to ensure the system is working properly.
   Run the motor for approximately 15 to 30 seconds listening and feeling for any excessive vibration in the motor or pump system that may indicate a damaged impeller or bearings and potentially lead to system failure.
   If damage is suspected, remove the JP 1600 Series pump from service by electrical isolation or physical removal until further inspection and/or repairs can be accomplished.
SECTION 4.2 – OPERATION

The JP 1600 Series pump is designed to be operated in a fill then dump duty cycle. Because the motor is submerged through most of the fill/dump cycle, overheating is not a problem. However, it is recommended that the JP 1600 Series pump be operated in air for no more than 5 minutes continuously at an ambient air temperature of 70 degrees.
SECTION 5 – JP 1600 SERIES PUMP OVERHAUL

SECTION 5.1 – WORK AREA/PREPARATION

**CAUTION** Due to the weight and balance of the JP 1600 Series pump assembly, two people are recommended for removal and installation to prevent damage to the system.

1. Before beginning maintenance of the JP 1600 Series pump, locate a suitable area to work. You will need a smooth, level area with enough space to open the Bambi Bucket while lying on its side for access to the Torrentula valve from inside the bucket. To avoid damage to the exterior of the bucket it is recommended that it be laid out on a heavy duty tarp on the tarmac or dirt.

2. Following instructions from the SEI manual, lay out the Bambi Bucket rigging so that the top of the bucket and IDS are accessible. The bucket is properly positioned if the ballast bars are oriented toward the ground. Open the bucket following instructions found in the SEI Industries operations manual.

3. Using a web sling, connect the crane or hoist to the outboard end of a spoke and raise the hoist to hold open the top of the bucket.

   **CAUTION** A crane or hoist is recommended to hold open the top end of the bucket to prevent damage to the IDS components.

SECTION 5.2 – JP 1600 SERIES PUMP DISASSEMBLY

*NOTE* All bearings, seals, and O-rings should be replaced prior to long term storage for optimum performance of the JP 1600 Series pump. See Bearing and Seal Kit part number 38400-401-RB-KIT in Appendix I.

1. MOTOR REMOVAL

   (Reference Kawak Aviation drawing 38401)

   a. Disconnect the Power Cable from the Motor.
b. Remove the four socket head cap screws and lock washers securing the motor to the motor adaptor. Set them aside for reuse on assembly.

2. JET PUMP REMOVAL

(Reference Kawak Aviation drawing 38400)

a. Remove the bolts attaching the Support Struts (38430-401 and 38431-401) to the upper Strut Tabs.

b. Remove the eight bolts attaching the Pump Assembly to the Top Plate.

c. If the Pump Assembly will not be immediately reinstalled, remove the Strut Rods from the Top Plate. Store the Strut Rods and hardware in an appropriate place for reinstallation at a later time. If the bucket is intended to be used before the pump can be reinstalled, install the Blanking Plate in place of Pump Assembly.

3. GENERAL DISASSEMBLY

(Reference Kawak Aviation drawing 38401)

a. Cut the safety wire and remove the four bolts securing the Horizontal Support Plate (38427-1) to the Elbow (38406-401).

b. Remove Motor to Elbow Adaptor (38408-401).

c. Remove the Elbow (38406-401).

d. Remove the Center Section (38407-401).

e. Remove Inlet Screen (38409-401).

4. PUMP DISASSEMBLY

(Reference Kawak Aviation drawing 38405)

a. Grasp the Impeller Drive Shaft (38419-1) and remove the socket head bolt on the impeller end of the shaft. If necessary to loosen the bolt, clamp the Impeller Drive Shaft in a vise with non-marring jaws.
Figure 5.1 Clamp Area of Shaft

b. Remove the lock washer, Impeller Retaining Plug (38420-1), and Impeller (38418-1).
   *NOTE* Two Spacers (38400-401-JB-KIT) may come out with the Impeller.

c. Slide the Impeller Drive Shaft out of the Stator Assembly. All bearings and seals should remain in the Stator section.

d. Remove the V-Ring (VS-032) from the shaft.

5. STATOR DISASSEMBLY

(Reference Kawak Aviation drawing 38405)
*NOTE* All bearings, seals, and O-rings should be replaced during annual or preventive maintenance for optimum performance of the JP 1600 Series pump. See Bearing and Seal Kit part number 38400-401-RB-KIT in Appendix I.

a. Remove the Stator Outlet Cone (38417-1) and Shaft Seal Sleeve (38415-1).

b. Remove the O-ring (2-120V75BR) from the Shaft Seal Sleeve.

c. From the inlet end of the stator, remove the Shaft Seal (152043 TL-H).

d. From the outlet end of the Stator, remove the Shaft Seal (12136 TB-H), Bearing (6205-2RSH), Spacer (38416-1), and the second Bearing (6205-2RSH).

e. Remove the Retaining Ring (3000-X206P) from the Stator housing.

6. MOTOR TO ELBOW ADAPTOR DISASSEMBLY
a. From the Elbow side of the adaptor, remove the Shaft Seal Sleeve (38415-1).

b. Remove the Shaft Seal (152043TL-H).

c. Remove the Bearing (6205-2RSH).

7. ELBOW AND CHECK VALVE DISASSEMBLY

a. Cut Safety Wire and remove the four bolts securing the Check Valve Assembly (38411-1) and Swing Stop Bracket (38424-1) to the elbow.

b. Remove the four screws, washers, and nuts holding the Check Valve Assembly together.

SECTION 5.3 – JP 1600 SERIES PUMP INSPECTION

*NOTE* Prior to inspection, it is important to clean all parts that will not to be replaced upon reassembly. Pay particular attention to cleaning anaerobic sealant residue from inside of Stator and Motor to Elbow Adaptor.

*NOTE* All bearings, seals, and O-rings should be replaced during annual or preventive maintenance for optimum performance of the JP 1600 Series pump. See Bearing and Seal Kit part number 38400-401-RB-KIT in Appendix I.
1. IMPELLER

Figure 5.1 Impeller Inspection Points/Areas

Table 5.1 - Wear/Damage Limits: Impeller, Modified, P/N 38418-1

<table>
<thead>
<tr>
<th>AREA</th>
<th>TYPE OF DAMAGE</th>
<th>MAXIMUM DAMAGE/WEAR LIMIT</th>
<th>REPAIR</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Mechanical, Impeller Blade</td>
<td>Gouges, dings, or damage Significantly degrading pump performance or impeller balance</td>
<td>Replace</td>
</tr>
<tr>
<td>B</td>
<td>Mechanical, Spline teeth,</td>
<td>0.005” depth on driving face of spline teeth</td>
<td>Replace Superficial corrosion may be removed using fine steel wool.</td>
</tr>
<tr>
<td></td>
<td>Wear Clearance</td>
<td>If the clearance between the impeller and the wear sleeve exceeds .015”</td>
<td>Replace</td>
</tr>
</tbody>
</table>
2. SHAFT

![Figure 5.2 Impeller Drive Shaft Inspection Points/Areas](image)

Table 5.2 - Wear/Damage Limits: Shaft, Impeller Drive, 38419-1

<table>
<thead>
<tr>
<th>AREA</th>
<th>TYPE OF DAMAGE</th>
<th>MAXIMUM DAMAGE/WEAR LIMIT</th>
<th>REPAIR</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Mechanical, Spline Teeth</td>
<td>.005&quot; depth on driving face of spline teeth</td>
<td>Replace Superficial corrosion may be removed using fine steel wool.</td>
</tr>
<tr>
<td>B</td>
<td>Mechanical, Seal Surface</td>
<td>Any scratches, dents, or grooves that would preclude proper sealing</td>
<td>Replace Light Polishing is permissible</td>
</tr>
<tr>
<td>C</td>
<td>Mechanical, Bearing Mounting Surface</td>
<td>Less than 0.9820” diameter or any damage that would preclude proper mounting and alignment of the bearing</td>
<td>Replace Light Polishing is permissible</td>
</tr>
<tr>
<td>D</td>
<td>Mechanical, Bearing Mounting Surface</td>
<td>Less than 1.245” diameter or any damage that would preclude proper mounting and alignment of the bearing</td>
<td>Replace Light Polishing is permissible</td>
</tr>
</tbody>
</table>
3. ELBOW AND CHECK VALVE

   a. Elbow – Inspect sealing edge of Elbow for damage i.e. bent lip, gouges, etc. Minor Damage that will still allow check valve to seal is acceptable and should be dressed to smooth burrs and gouges edge. Areas of deformation that do not allow Check Valve to close fully require replacement of Elbow.

   Figure 5.4 Check Valve Sealing Edge Inspection

   Inspect welds for cracks.
Figure 5.5 – Weld Inspection

b. Check Valve – Inspect Seal Backing Plate and Top Cover Plate for flatness, repair or replace as necessary.

c. Seal & Hinge – Check for tears and gouges that will prevent leakage, replace as necessary. Inspect the Lanyard for general condition. Replace as necessary.

4. BEARINGS, SEALS/O-RINGS
Kawak Aviation Technologies recommends replacement of all bearings and seals whenever the JP1600 is disassembled.

SECTION 5.4 – JP 1600 SERIES PUMP ASSEMBLY

1. MOTOR TO ELBOW ADAPTOR ASSEMBLY

(Reference Kawak Aviation Drawing 38408)

*NOTE* Ensure ID of bearing and seal area is clean and no traces of
grease or sealant remain prior to assembly.

*NOTE* Clean Shaft Seal Sleeve thoroughly with isopropyl alcohol or other non-residue solvent prior to installation of the O-ring.

a. Place the Elbow to Motor Adaptor (38426-1) down with the larger ID facing up.

b. Install the Bearing (6205-2RSH) in the Motor to Elbow Adaptor (38408-401).

c. Apply a thin bead of a medium strength anaerobic sealant (ex. Loctite 518) to OD of Shaft Seal (15204 TL-H) and install in Motor to Elbow Adaptor with the open side of the seal facing up. Apply a thin layer of grease to the lip area of the seal.

![Diagram of Seal Orientation and Grease Location](image)

Figure 5.6 – Seal Orientation and Grease Location

d. Install the O-ring (2-120V75BR), WITHOUT GREASE, in groove in the ID of Shaft Seal Sleeve and install the Shaft Seal Sleeve in the seal installed in step 2.

**CAUTION** It is important that this O-ring not be lubricated as the Shaft Seal Sleeve (38415-1) MUST rotate inside the Shaft Seal (12163 TB-H) instead of the shaft (38419-1) rotating inside the O-ring (2-120V75BR). Failure to follow this instruction will cause premature wear on the O-ring and a leak will develop.

e. Set this subassembly aside to be installed in later time.

2. **STATOR ASSEMBLY**
(Reference Kawak Aviation Drawing 38405)

*NOTE* Ensure ID of bearing and seal area is clean and no traces of grease or sealant remain prior to assembly.

*NOTE* Clean Shaft Seal Sleeve thoroughly with isopropyl alcohol or other non-residue solvent prior to installation of the O-ring.

a. Position the Stator housing so the inlet end is facing up.

b. Install the Internal Retaining Ring (3000-X206P) with the sharp edge facing the inlet end of the Stator Housing.

c. Apply a thin bead of a medium strength anaerobic sealant (ex. Loctite 518) to OD of Shaft Seal (152043 TL-H) and install in Stator Housing with the open side of the seal facing up. Apply a thin layer of grease to the lip area of the seal. (See Figure 5.)

![Image of seal orientation and grease location]

Figure 5.7 Seal Orientation and Grease Location

d. Turn the Stator housing over with the outlet end facing up.

e. Install the Bearing (6205-2RSH) in the outlet end of the Stator.

f. Install Spacer (38416-1) on top of the bearing installed in Step 1.

g. Install another Bearing (6205-2RSH) on top of the spacer.

h. Apply a thin bead of a medium strength anaerobic sealant (ex. Loctite 518) to OD of Shaft Seal (12163 TB-H) and install in Stator housing with the open side of the seal facing up. Apply a thin layer of grease to the lip area of the seal.
i. Install the Outlet Cone on the Stator housing and secure the fasteners.

j. Turn the Stator housing over again with the inlet end facing up.

k. Install the O-ring (2-120V75BR), WITHOUT GREASE, into the groove in the ID of the Shaft Seal Sleeve (38415-1) and install the Shaft Seal Sleeve in the seal installed in step 3.

**CAUTION** It is important that this O-ring not be lubricated as the Shaft Seal Sleeve (38415-1) MUST rotate inside the Shaft Seal (12163 TB-H) instead of the shaft (38419-1) rotating inside the O-ring (2-120V75BR). Failure to follow this instruction will cause premature wear on the O-ring and a leak will develop.

3. PUMP ASSEMBLY

(Reference Kawak Aviation Drawing 38405)

a. Use isopropyl alcohol to lubricate the V-ring (VS-032) and slide it up the shaft from the external spline end. Slide it up the shaft until the lip touches the top shoulder in the groove for the V-ring. Lubricate the underside of the V-ring with a thin layer of grease. (See Figure 5.10 and 5.11)

**CAUTION** DO NOT apply grease to the Impeller Shaft (38491-1) to V-ring interface as the V-ring is intended to rotate with the shaft. Application of grease to the V-ring to shaft interface will cause the shaft to spin inside the V-ring leading to premature wear and leakage.
b. Install the Impeller Shaft in the Stator housing being very careful to not get grease on the shaft in the area indicated in Figure 5.12. as the Impeller Shaft is being pushed through the Shaft Seal Sleeve (38415-1), ensure the sleeve is not pushed out of the seal.
c. Install the two Impeller Drive Shaft Spacers over the end of the splines.

d. Apply some grease to the splines on the end of the Impeller Shaft and also to the splines on the ID of the Impeller and install the Impeller, Impeller Retaining Plug, Lock Washer, and Socket Head Cap Screw on the end of the shaft.

4. GENERAL ASSEMBLY

   (Reference Kawak Aviation Drawing 38401)

   a. Install the Inlet Screen using the previously removed hardware.

   b. Install the Center Section using the previously removed hardware.

   c. Install the Elbow using the previously removed hardware.

   d. Install the Motor to Elbow Adaptor and Horizontal Support Plate using the previously removed hardware.

5. PUMP INSTALLATION

   (Reference Kawak Aviation Drawing 38400)

   Install the JP 1600 Series pump on the Plate Assembly using the previously removed hardware.

6. MOTOR INSTALLATION

   (Reference Kawak Aviation Drawing 38405)

   Install the Motor on the JP 1600 Series pump using the previously removed hardware.
SECTION 6 – TROUBLESHOOTING

*NOTE* Possible causes for problems are listed in no particular order.

Symptom

1. No Operation – If your JP 1600 Series pump is not operating, whether the motor is not spinning at all, or the motor is spinning and the pump isn’t working.
   a. Electrical – Check the circuit breakers, power cable, connectors (loose, disconnected or corroded), relay, primary or secondary wiring.
   b. Mechanical – Inlet screen damaged, impeller damaged, drive shaft broken, bearings seized.

2. Slow to Fill
   a. Electrical – Secondary voltage low, poor contacts on relay or connectors.
   b. Mechanical – Inlet screen damaged or clogged with debris, impeller damaged, bearings worn corroded, damaged.

3. Noisy
   a. Mechanical – Pump bearings worn, inlet screen loose, impeller damaged (splines, blades, bent).
### APPENDIX I – SEAL AND BEARING KIT 38400-401-RB-K

<table>
<thead>
<tr>
<th>DRAWING AND ITEM NUMBER</th>
<th>QTY</th>
<th>PART NUMBER</th>
<th>NOMENCLATURE</th>
</tr>
</thead>
<tbody>
<tr>
<td>DRAWING 38400, ITEM 31</td>
<td>1 EA</td>
<td>38434-1</td>
<td>GASKET, PUMP TO MAIN PLATE</td>
</tr>
<tr>
<td>DRAWING 38401, ITEM 25</td>
<td>1 EA</td>
<td>2-042V75BR</td>
<td>O-RING, 3.25 X 3.375</td>
</tr>
<tr>
<td>DRAWING 38401, ITEM 26</td>
<td>1 EA</td>
<td>2-120V75BR</td>
<td>O-RING, 1 X 1.1875</td>
</tr>
<tr>
<td>DRAWING 38405, ITEM 1</td>
<td>2 EA</td>
<td>6205-2RSH</td>
<td>BEARING, DEEP G, .98425 X 2.04724 X .591</td>
</tr>
<tr>
<td>DRAWING 38405, ITEM 2</td>
<td>1 EA</td>
<td>12163TB-H</td>
<td>SHAFT SEAL, 1.25 X 1.687 X .313, NITRILE</td>
</tr>
<tr>
<td>DRAWING 38405, ITEM 3</td>
<td>1 EA</td>
<td>152043TL-H</td>
<td>SHAFT SEAL, 1.5 X 2.048 X .312, NITRILE</td>
</tr>
<tr>
<td>DRAWING 38405, ITEM 14</td>
<td>1 EA</td>
<td>VS-032</td>
<td>V-RING, 1.220-1.338 SHAFT, NITRILE</td>
</tr>
<tr>
<td>DRAWING 38405, ITEM 16</td>
<td>1 EA</td>
<td>2-120V75BR</td>
<td>O-RING, 1 X 1.1875</td>
</tr>
<tr>
<td>DRAWING 38408, ITEM 2</td>
<td>1 EA</td>
<td>6205-2RSH</td>
<td>BEARING, DEEP G, .98425 X 2.04724 X .591</td>
</tr>
<tr>
<td>DRAWING 38408, ITEM 3</td>
<td>1 EA</td>
<td>152043TL-H</td>
<td>SHAFT SEAL, 1.5 X 2.048 X .312, NITRILE</td>
</tr>
<tr>
<td>DRAWING 38408, ITEM 5</td>
<td>1 EA</td>
<td>2-120V75BR</td>
<td>O-RING, 1 X 1.1875</td>
</tr>
<tr>
<td>DRAWING 38411, ITEM 3</td>
<td>1 EA</td>
<td>38423-1</td>
<td>SEAL &amp; HINGE, CHECK VALVE</td>
</tr>
</tbody>
</table>
APPENDIX III – PARTS DIAGRAMS

BFP ASSEMBLY, KIT, 7.5 HP, 400 HZ (4 SHEETS).................................................. 38400
PUMP ASSEMBLY, BUCKET FILL, 6" (2 SHEETS).................................................. 38401
STATOR W/IMPELLER AND SHAFT (2 SHEETS).................................................... 38405
ELBOW, ASSEMBLY, W/CHECK VALVE (1 SHEET).................................................. 38406
ADAPTOR ASSEMBLY, ELBOW TO MOTOR (2 SHEETS)......................................... 38408
CHECK VALVE, 6" DISCHARGE (1 SHEET).............................................................. 38411
STRUT, ELBOW TO MAIN PLATE, 9" (1 SHEET).................................................... 38430
STRUT, ELBOW TO MAIN PLATE, 10.75" (1 SHEET)............................................... 38431