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## **OPERATION GUIDELINES FOR - OMC VACUUM DIE CASTING SYSTEM**

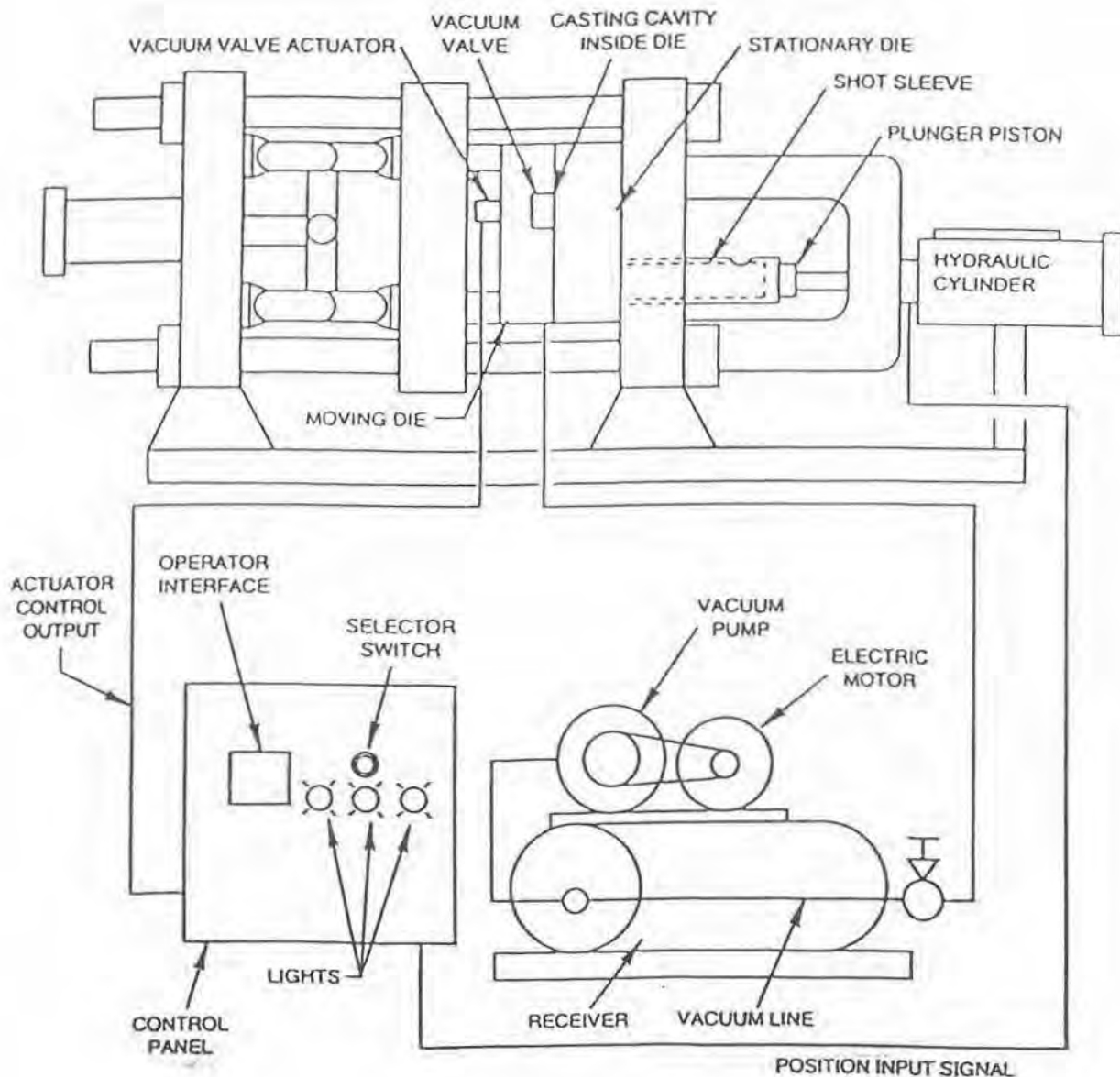
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1. Start-Up of Vacuum System
  - A. Power up vacuum unit, pull start switch, push jog mode, vac test and purge test valve.
  - B. Make first few castings with die cast machine and discard.
  - C. Check set-points through DTAM interface.
  - D. Push run mode, machine will be on auto cycle from die cast machine signal.
  - E. Castings will now be made with OMC vacuum cycle.
  - F. Monitor mechanical gauges and interface for proper operation of system.
  - G. Provide routine system maintenance, as needed.
  
2. Set-points
  - A. Follow item 3, DTAM main menu, enter access code.
    1. Adjust purge and vac test die close, set points to minimum safe operating range limits, as recommended.
    2. Adjust valve open and close set points to settings determined by calculations and measurement of die casting process.
      - a. Valve open: Set the valve to open one inch after the pour hole is closed.
      - b. Valve close: Close valve either one inch before sleeve full or one inch before start of fast shot, whichever is first.
    3. Adjust plunger stroke reset-point to stroke of plunger in shot sleeve without follow through.
  - B. Run unit in autcycle, if valve fails and fault light does not light or fault light comes on during purge, re-adjust max purge pressure test. Retest by autcycle.
  - C. If fault light comes on and die will not close, re-adjust vac test set-point.
  
3. Maintenance
  - A. Provide pump maintenance as described in pump operating and service instructions.
  - B. Provide vacuum system components with maintenance as described in vacuum system operating instructions.
  - C. Keep spare parts including valves and seats on hand.

# INTRODUCTION

The Outboard Marine Corporation Vacuum Die Casting System is an automated system for evacuating air from a die casting cavity and shot sleeve prior to metal injection. This system may be used on cold or hot chamber machines without any alterations to the metal injection system or shot end.

A digital plunger position is required to the Allen Bradley programmable controller. The valve opening height and vacuum runner system are sized according to the amount of external parting line using a patented relationship. The pump and system process piping are sized with respect to the die cavity, shot sleeve and production rate.



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## VACUUM SYSTEM OPERATING PROCEDURE

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We advise warming up the die with the vacuum system in manual mode.

When the die reaches proper operating temperature or after 2-3 shots (vacuum cycle and purge in MANUAL mode) switch the vacuum system to automatic. The vacuum pump will evacuate the reservoir to a predetermined level. If the fault light comes on the cycle will be aborted. REFER to the Troubleshooting section to determine the fault.

When the die casting machine cycle is initiated the vacuum system will be purged, then evacuated and tested for pressure rise. This process may be observed on the gauge on the valve body or on the DTAM panel. If the purge is NOT successful the fault light will come on. REFER to the Troubleshooting section to determine the fault.

During the spray cycle the vacuum system will be evacuated and tested for pressure decay in preparation for the next shot. If this test fails a fault light will come on and the cycle will be aborted. REFER to the Troubleshooting section to determine the fault.

When the pour hole is sealed off with the plunger head the vacuum valve will open to evacuate the shot sleeve and die cavity. This process may be observed on the vacuum gauge on the valve body or on the DTAM panel screen.

*During the shot cycle,*

There is a test for die vacuum just before the vacuum valve closes. If the vacuum does not reach the preset level, the cycle may be aborted and the fault light will come on. REFER to the Troubleshooting section to determine the fault. *NOTE: Failure of vacuum to drop during shot cycle indicates a plugged line*

The valve will close at the position set in the DTAM. Initially the closing position should be one inch before shot sleeve full or start of fast shot. Use whichever number is smaller.

Proceed with the die casting cycle.

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## Vacuum System Electrical Requirements

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1. Power supply; 460 or 575 volt, 3 phase, 20 amp circuit for 5 to 7.5 HP pumps or 30 amp circuit for 10 to 15 HP units.
2. 120 volt AC signal from die casting machine to vacuum system controller for start of die casting machine cycle. (cycle start push button or ejector pins forward limit switch)  
(Close Coil Terminal)
3. 120 volt AC signal from die casting machine to vacuum system controller for die close.  
(Lock Limit Terminal)
- X 4. 120 volt output from vacuum die casting system controller to the die casting machine to indicate fault condition and stop the machine from cycling.
5. Digital plunger position signal (5 volt DC quadrature) to vacuum die casting system controller. If needed, we will supply a digital position encoder or a signal buffer board for a reasonable cost.

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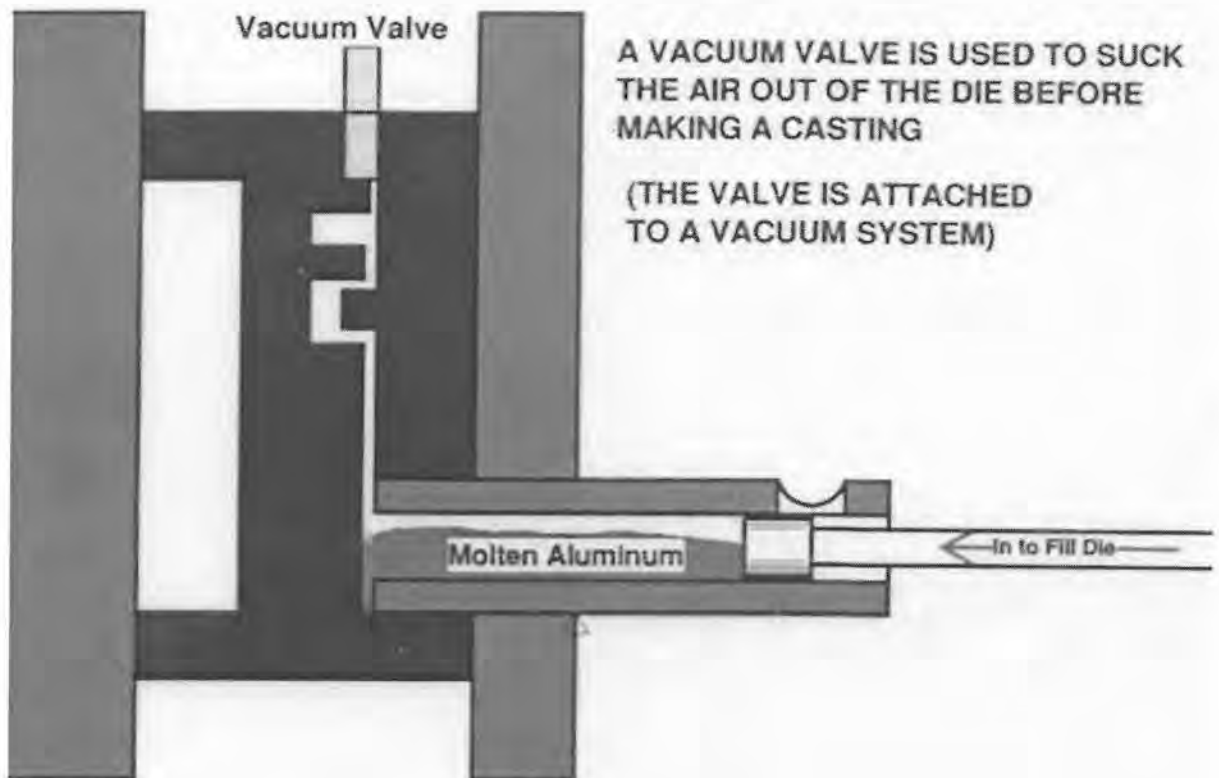
## **INTRODUCTION**

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The OMC/Prince Vacuum Die Casting System is an automated system for evacuating air from a die casting cavity and shot sleeve prior to metal injection. This system may be used on cold or hot chamber machines without any alterations to the metal injection system or shot end.

A digital plunger position is required to the Allen Bradley programmable controller. The valve opening height and vacuum runner system are sized according to the amount of external parting line using a patented relationship. The pump and system process piping are sized with respect to the die cavity, shot sleeve and production rate.

### **Vacuum Die Casting of Aluminum**



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# INSTALLATION INSTRUCTIONS

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REFERENCES: Electrical Specifications  
Electrical Prints

EQUIPMENT: Vacuum system,  
Installation parts box.

## 1. Unit placement:

The Vacuum Die Casting System should be placed within 20 feet of the die casting die being served on a solid floor or stand capable of holding 1500 pounds. The unit may be free standing or rigidly anchored to floor or suitable stand with bolts. If unit is to be placed more than 20 feet from the die casting machine, contact supplier for additional quantities of cable and hose and splice appropriately. Additional distance using flexible piping must not exceed 30 feet.

## 2. Installation Procedure:

### A. Position Signal:

*Position signal is calibrated counts per unit of length of injection plunger travel in the DTAM operator interface program.*

#### 1. BEI ROTARY ENCODER

*Prince Machine provides 35 feet of Belden 9503 shielded cable and connectors for these connections. We require a 0 to 5 volt quadrature signal. Off-state to be 0-.8 volts DC, on-state to be 3.3 to 5.5 volts DC.*

Route the cable through one of the available knock out holes on the bottom of the cabinet. If the cable will be subjected to foot or vehicle traffic, it must be protected with conduit. Connect cable as follows:

BEI junction box	VDC control cabinet
(red wire)	A+
(green wire)	B+
(black wire) common	A-
(black wire) common	B-

#### 2. CELESCO DIGITAL ENCODER

Mount the encoder adjacent to the plunger stem out of the way of the ladler and any hoses. Construct bracket to fit as needed. The string encoder cable must be attached to the plunger stem so it is pulled parallel to shot piston travel. The length of plunger travel can not exceed the length of the encoder cable.

See diagram for wiring instructions.

#### 3. TYMAC CONTROL SYSTEM

See the attached wiring diagram for connecting the OMC/PRINCE Vacuum Die Casting System to the Tymac SuperShot Control Board AUX. Output. The resistor can be any value between 470 ohm and 1k ohm.



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# INSTALLATION INSTRUCTIONS

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## A. Position Signal; continued

### 4. Visi-Trak Transducer

a. Install Visi-Trak buffer board in injection cylinder position sensing circuit on the die casting machine (DCM) as per instructions enclosed with device.

b. Connect one end the cable to terminals A+, A-, B+, and B- on the buffer board. Connect the drain wire to the DCM ground. Connect other end of cable to terminals A+, A-, B+, and B- in control cabinet. Route the cable through one of the available knock out holes on the bottom of the cabinet. If the cable will be subjected to foot or vehicle traffic, it must be protected with conduit.

### 5. OTHER DEVICES

To be determined using device wiring diagram.

## B. Machine Control Interface;

*Prince Machine provides 35 feet of 16/7 SO service cord connected to the control cabinet for this connection. Before proceeding, disconnect all wires on this cord from their terminals in the vacuum system control cabinet.*

1. The black and white-with-black stripe wires are used for cycle start input from the die casting machine to the vacuum system controller. This is a 120volt output taken from ejector pin forward signal. Connect the black wire to the signal output. The white with black stripe wire is connected to the DCM common.
2. The blue and white wires are used for the die close input from the die casting machine to the vacuum system controller. This is a 120 volt output taken from the die close output. Connect the blue wire to the signal output. The white wire is connected to the DCM common.
3. The red and orange wires are used for the fault output from the vacuum system controller to the die casting machine. We use a normally open set of contacts to keep the DCM from cycling in the event of a vacuum system fault. Connect the red wire to the signal output and the orange wire to DCM common. Typically, this is used to keep the DCM from closing or the auto-ladler from pouring.
4. The green wire is connected ground on the DCM.

## C. Power to Vacuum system;

Prince Machine provides 35 feet of 10/4 or 12/4 SEOW-A service cord connected to the control cabinet for this connection.

1. Connect the cord to a grounded 460 or 575 volt, 3 phase, 20 ampere fused disconnect for 5 to 7.5 HP pumps and a 30 ampere fused disconnect for 10 to 15 HP pumps.
2. Check for proper rotation of motor.

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# **INSTALLATION INSTRUCTIONS**

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## D. Actuator cords and Vacuum hoses:

### 1. Actuators:

Prince Machine provides two -- 35 foot lengths of 16/3 SEOW-A service cord per actuator and amphenol connectors for actuator wiring. The actuators are located on the vacuum valves on the die casting die. If the cords will be subjected to foot or vehicle traffic, they must be protected with conduit. They must be routed on the die casting machine to avoid being pinched by machine linkage or doors.

### 2. Vacuum Lines:

Prince Machine provides 25 feet of flexible hose per vacuum valve for connecting the vacuum system to the vacuum valves, in addition to female quick disconnects, male quick disconnects, pipe couplings and Parker fittings. The vacuum valve(s) are located on the die casting die.

- a. Cut the hoses to length allowing slack for the travel of the ejector platen.
- b. Attach the female quick disconnects to each end of the vacuum hose.
- c. Install the Filter Canister, Parker fitting, and male quick disconnects to the vacuum valve.
- d. Connect one end of vacuum hose to the filter canisters and the other end to the fittings on the process piping module.

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## **OPERATION GUIDELINES**

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### 1. Start-Up of Vacuum System

- A. Power up vacuum unit, pull start switch, push jog mode, vacuum test and purge test valve.
- B. Make first few castings with die cast machine and discard.
- C. Check set-points through DTAM interface.
- D. Push run mode, machine will be on auto cycle from die cast machine signal.
- E. Castings will now be made with OMC/Prince vacuum cycle.
- F. Monitor mechanical gauges and interface for proper operation of system.
- G. Provide routine system maintenance, as needed.

### 2. Set-points

- A. Follow item 3-2, DTAM main menu, enter access code.

#### 1. Set-Set Points

Restricted access: enter code

Adjust valve open and close set points to settings determined by calculations and measurement of die casting process.

- a. Valve open: Set the valve to open one inch after the pour hole is closed.

Metal Valve Open Position, inches (Position at which the vacuum valve will open should be set to coincide with the position the pour hole is covered by the plunger tip.).

- b. Valve close: Close valve either one inch before sleeve full or one inch before start of fast shot, whichever is first.

Metal Valve Close Position, inches (Position at which the vacuum valve will close. Set initially at sleeve full or one inch before fast shot (whichever number is smaller).

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## OPERATION GUIDELINES

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continued

2. Adjust purge and vacuum test die close, set points to minimum safe operating range limits, as recommended

Leak Down Set Point, PSIA (Vacuum level that the machine will fault at if valve leakage causes to be exceeded, set at approximately 2.5 PSIA).

Minimum Purge Pressure Set Point (Pressure setting for fault during the purge to ensure the valve is functioning properly, set at 5.00- 7.00 PSIA).

Minimum vacuum for fast shot (vacuum level required for fast shot to occur without setting fault alarm, normally set from 2.00 to 3.00 PSIA).

*\*NOTE! To change set points, for valve open and close positions, enter the desired setting on the DTAM key pad and press enter. To transfer the new set point from the DTAM to the PLC you must do the following: if in run mode; press the jog and run buttons in succession. If in the jog mode; press run, jog, and run buttons in succession.*

- B. Run unit in automatic, if valve fails and fault light does not light or fault light comes on during purge, re-adjust purge pressure test point. Retest by running in automatic.
- C. If fault light comes on and die will not close, re-adjust vacuum test set-point.

### 3. Maintenance

- A. Provide pump maintenance as described in pump operating and service instructions.
- B. Provide vacuum system components with maintenance as described in vacuum system operating instructions.
- C. Keep spare parts including valves and seats on hand.

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## ***DIE CASTING MACHINE SET-UP RECOMMENDATIONS***

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Shot pressure and intensification pressures should be set so that the pressure within the die cavity is no greater than 10,000 psi.

Move the plunger at 3 - 4 in/sec to cover the pour hole, then go into intermediate shot velocity and fast shot.

The gate velocities should be kept within North American Die Casting Association guidelines.

While observing the gate velocity limits, the cavity fill time should be as fast as possible.

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## **VACUUM SYSTEM CYCLE SEQUENCE OF EVENTS**

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1. Ejector Pins Forward or Automatic Extractor Signal

Purge vacuum valve  
Test for successful purge  
If okay, go to No. 2  
If NOT PASSED, fault light activated and fault signal set to die cast machine

2. Lubricate Die

Evacuate system  
Test for vacuum decay  
If okay, go to No. 3  
If NOT PASSED, fault light activated and fault signal set to die cast machine

3. Return Ejector Pins -- Close Moveable Cores (if applicable)

4. Close Die -- Die Lock Up

Evacuate system up to vacuum valve body and hold for next shot

5. Pour Metal -- Creep Plunger Forward Past Pour or Fill Hole

Energize the actuator solenoid to open valve  
Evacuate shot sleeve and cavity

6. Start Intermediate Speed or Continue Slow Shot

Test vacuum level continuously  
If okay, continue  
If NOT PASSED, fault light activated and fault signal sent to die cast machine after die opens  
At predetermined point, de-energize solenoid to close valve

7. Start Fast Shot -- Fill Die Cavity -- Dwell Time -- Open Die -- Pull Moveable Cores (if equipped)

8. Eject Casting

Return to Step 1



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# **VACUUM CONTROLLER SET-UP THROUGH DTAM PLUS OPERATOR INTERFACE**

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MAIN MENU...Enter one of the numbers below to access this information

1. Current Vacuum Level
2. Vacuum Control Status
3. Set Points
4. Process Monitor

## SUB MENUS

1. Current System vacuum Level bar-graph, PSIA  
*next* Vacuum Level Last Shot, PSIA  
  
*next* Vacuum Level Last Purge Test, PSIA  
  
*next* Vacuum Level Last Leak Down Test, PSIA
2. Machine Vacuum Controls:  
*next* Receiver Valve ON/OFF, Line Valve ON/OFF,  
Vacuum Valve(s) ON/OFF  
  
*next* Plunger Position, inches
3. 1. Read-Set Points  
  
Metal Valve Open Position  
  
*next* Metal Valve Close Position  
  
*next* Leak Down Pressure  
  
*next* Minimum Purge Pressure  
  
*next* Minimum vacuum for fast shot

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# **VACUUM CONTROLLER SET-UP**

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# THROUGH DTAM PLUS OPERATOR INTERFACE

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(continued)

## \*2. Set-Set Points

Restricted access: enter code

Metal Valve Open Position, inches (Position at which the vacuum valve will open should be set to coincide with the position the pour hole is covered by the plunger tip.)

*next* Metal Valve Close Position, inches (Position at which the vacuum valve will close. Set initially at sleeve full or one inch before fast shot (whichever number is smaller).

*next* Leak Down Set Point, PSIA (Vacuum level that the machine will fault at if valve leakage causes to be exceeded, set at approximately 2.5 PSIA.

*next* Minimum Purge Pressure Set Point (Pressure setting for fault during the purge to ensure the valve is functioning properly, set at 5.00- 7.00 PSIA).

*next* Minimum vacuum for fast shot (vacuum level required for fast shot to occur without setting fault alarm, normally set from 2.00 to 3.00 PSIA).

*\*NOTE! To change set points, for valve open and close positions, enter the desired setting on the DTAM key pad and press enter. To transfer the new set point from the DTAM to the PLC you must do the following: if in run mode; press the jog and run buttons in succession. If in the jog mode; press run, jog, and run buttons in succession.*

## 4. System Status;

Purge

Die Open or Die Closed

Leak-down testing

Shot Complete

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## **VACUUM SYSTEM OPERATING PROCEDURE**

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We advise warming up the die with the vacuum system in manual mode so that the vacuum valve does not operate.

When the die reaches proper operating temperature (vacuum cycle and purge in MANUAL mode) switch the vacuum system to automatic. The vacuum pump will evacuate the reservoir to a predetermined level. If the fault light comes on the cycle will be aborted. REFER to the Troubleshooting section to determine the fault.

When the die casting machine cycle is initiated the vacuum system will be purged, then evacuated and tested for pressure rise. This process may be observed on the gauge on the valve body or on the DTAM panel. If the purge is NOT successful the fault light will come on. REFER to the Troubleshooting section to determine the fault.

During the spray cycle the vacuum system will be evacuated and tested for pressure decay in preparation for the next shot. If this test fails a fault light will come on and the cycle will be aborted. REFER to the Troubleshooting section to determine the fault.

When the pour hole is sealed off with the plunger head the vacuum valve will open to evacuate the shot sleeve and die cavity. This process may be observed on the vacuum gauge on the valve body or on the DTAM panel screen.

There is a test for die vacuum just before the vacuum valve closes. If the vacuum does not reach the preset level, the cycle may be aborted and the fault light will come on. REFER to the Troubleshooting section to determine the fault.

The valve will close at the position set in the DTAM. Initially the closing position should be one inch before shot sleeve full or start of fast shot. Use whichever number is smaller.

Proceed with the die casting cycle.

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## **MAINTENANCE SCHEDULE**

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### **Metal Valve Assembly**

**Every 120 hours or weekly.**

- Remove the valve assembly from the die and check for vacuum tightness with the vacuum leak-down tool. A leak-down test greater than 1" Hg/second will require lapping of the valve in the valve seat, or replacement of the valve and seat, plus final lapping.
- Check the free play of the valve stem in the valve guide. A light slip fit is desirable. Replace the valve guide if there is too much free play. Remove the debris and burrs if the fit is too tight.
- Check the integrity of the valve guide seal. If it is worn or cracked, replace it.
- For reassembly, use a thin film of oil resistant sealant between the valve block halves to provide the final seal in the block.

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### **Actuator**

**Every 120 hours or weekly.**

- Remove the actuator assembly from the die and tighten the cap screws, clean the unit and check the adjustments (.005-.010 inches at rest; .002 inches max when bottomed out). Alter as needed and re-tighten the jam-nuts.
- Check the dampers for wear and replace as needed.
- Check the electrical connections for wear and tightness. Repair or replace as needed.

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### **Metal Valve Filter**

**Every 24 hours or daily.**

- Remove the bottom from the filter canister and clean the aluminum deposits and other debris from the screen and inside the container. The clogged screens must be replaced.
- Check the gasket on the lid. Cracked or worn gaskets must be replaced. Reassemble the canister with care to ensure a good seal.
- If the canister fills up with excessive spray it should be emptied more frequently. Die spray can wash debris into the vacuum control solenoids. Spray heads or hand spray methods should be redirected or altered to reduce the buildup of die spray in the canister.

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### **Pump Filter**

**Every 120 hours or weekly.**

- Remove the bottom from the filter canister, clean the debris from inside the container and filter element. Clogged filters must be replaced.
- Check the gasket on the lid. Cracked or worn gaskets must be replaced.
- Reassembly the canister with care to ensure a good seal.

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### **Vacuum Pump and Motor**

**Refer to Squire-Cogswell  
Operation & Maintenance  
Manual**

Pump service information is included in the Component Information section of the users binder.

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### **Control Cabinets**

**Every 1,000 hours or  
six months.**

- Check the control relays for tightness.
- Check that the doors are tightly sealed.

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## **OMC/PRINCE VDC TEST TOOL**

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The test tool included with the OMC/Prince Vacuum Die Casting System can be used to help diagnose problems when the system indicates fault at purge but the valve is operating normally. This situation could indicate a clogged or leaking line or filter and could even be caused by a partial failure of the vacuum pump (i.e. belt slippage, stuck or broken vanes). To use:

1. Remove tank truck hose from filter canister and attach test tool.
2. Switch unit into JOG mode and start the test mode.
3. Watch vacuum gauge on test tool. Normal levels will indicate 22 to 26 "Hg.
4. If leak is detected, check at other locations moving down the line towards the pump. This action will isolate the failure.

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## **OMC/PRINCE VDC VACUUM VALVE TEST TOOL**

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The vacuum valve test tool should be used to help diagnose leakage problems in the vacuum valve assembly. The following steps should be used after each valve rebuild or if the VDC system senses insufficient vacuum levels.

1. Remove valve assembly from die, if attached, and remove nipple and filter canister.
2. Insert Parker fitting into valve body and hand tighten.
3. Run surgical tubing between hand pump and the Parker fitting.
4. Use the hand pump to obtain between 15 to 20 "Hg in the valve. If the valve spring is not yet in place, apply light pressure to the face of the poppet valve to simulate spring force while using the hand pump to create a vacuum in the valve body.
5. Watch the vacuum gauge on the hand pump, if the leak-down rate is 1 "Hg per second or less the seal is sufficient to achieve proper vacuum.

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## **TROUBLESHOOTING SECTION**

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<b>Problem</b>	<b>Solution</b>
<b>Vacuum runner is stuck on valve head</b>	<ol style="list-style-type: none"><li>1. Remove the runner with a brass chisel.</li><li>2. Check the head of the poppet valve to verify that it has a five degree chamfer around the head.<ol style="list-style-type: none"><li>A. If there is no chamfer, withdraw the valve body from the die and remove the poppet valve. Turn the poppet valve with the correct chamfer. Reassemble the valve body and replace it in the die.</li><li>B. If the valve is okay, go to No. 3.</li></ol></li><li>3. Check for metal around the valve seat.<p>If the valve seat is clogged, withdraw the valve body from the die, dismantle and clean. Remove and clean the metal from the filter canister. Clean and replace the process piping as needed. With the system on JOG, test for vacuum using the test tool provided. Check for the origin of the failure. See section on Valve Clogging.</p></li></ol>
<b>No purge at cycle start OR the metal valve doesn't open or will not stay open</b>	<ol style="list-style-type: none"><li>1. Start the die casting machine cycle to run another purge cycle and observe the valve opening. If it does not open, or opens briefly, press the manual purge button and check for an output on the Triac output card. If there is an output at the controller, go to A. If not, refer to electrical drawings.<p>When the purge signal is activated, check that there is power to the solenoid. Press the manual purge button and check for 108 volts DC between the solenoid output terminals. If there is power, check the solenoid coil for continuity. If an open circuit is found remove the actuator assembly from the die and replace the faulty solenoid. If there is no power to the terminals check for a faulty rectifier circuit. If all checks out okay, go to 2.</p></li><li>A. Remove the valve body from the die. Disassembly and check for free movement of the valve. If the movement is restricted remove the debris from the valve stem or guide and replace. Check the valve seat and re-lap or replace as needed. Reassembly the valve. Testing it with the leak test tool. Replace and restart the die casting machine to run another blow off cycle. See that the valve opens and closes during the purge cycle.</li></ol>
<b>No vacuum at metal valve at cycle start</b>	<ol style="list-style-type: none"><li>1. Check for vacuum at the receiver and valve manifold.<p>Switch the system into JOG and manually pump down the system. Check the vacuum level on the gauge at the filter canister. If okay, then check for the pressure sensor connections and an input signal at the controller. If not, go to No. 2.</p></li></ol>



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## **TROUBLESHOOTING SECTION**

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### **No vacuum at metal valve at cycle start (continued)**

2. Visually check for flash at the valve seat.
  - A. If there is flash, rerun purge cycle
  - B. If the system still leaks, go to No. 3.
3. Check for valve leakage using the valve leak-down test tool provided.
  - A. If the valve leaks, withdraw the valve from the die, rebuild, retest and replace in die.
  - B. If the valve is okay, go to No. 4.
4. Check the lines and the pump connections for leakage using the vacuum system test tool provided.
  - A. Install the test tool on a line where the metal valve would be attached. Switch the unit into JOG mode and start the test mode.
  - B. If a leak is detected, go through the lines starting from the metal valve and move toward the pump. This is done to isolate the source.
  - C. Correct the leak or repair the pump.
  - D. If there is no leak detected, go to No. 5.
5. Check that the vacuum control solenoid valves are opening.
  - A. Check that the vacuum control solenoids (both line and receiver) are energized by checking for voltage output at the control panel terminals. If no output check the related fuses and connections. If electrically okay, go to B.
  - B. Check the mechanical operation of the solenoids.

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### **No die vacuum before the fast shot**

1. Remove all flash from the face of both the die halves and recheck for die vacuum. If die face is okay, go to No. 2.
2. Check for the specified valve opening stroke per specifications.

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### **Valve is clogging**

1. Check the set-point for valve closure and compare it to the position for runner full. Adjust the position if the valve is closing beyond the runner full position. If okay, go to No. 2.
  2. Check the biscuit size. It should be within 10% of the size it was for the initial calculations of sleeve and runner full.
    - A. If it is not, adjust ladle or the valve closing position. Starting out use one inch before fast shot or one inch before shot sleeve full. Whichever comes first.
  3. Check for consistency in the shot trace. If it is not repeatable or is jerky, fix the problem.
  4. Check position signal calibration.
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## ***VACUUM SYSTEM ELECTRICAL REQUIREMENTS***

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1. Power supply, 460 or 575 volt, 3 phase, 20-ampere circuit.
2. 120 volt AC signal from die casting machine to vacuum system controller for start of die casting machine cycle (cycle start push button or ejector pins forward limit switch).
3. 120 volt AC signal from die casting machine to vacuum system controller for die close.
4. Dry contact output from vacuum die casting system plc to the die casting machine to indicate fault condition and stop the machine from cycling.
5. Digital plunger position signal (5 volt DC quadrature) to vacuum die casting system controller. If needed, we will supply a digital position encoder or a signal buffer board for a reasonable cost.

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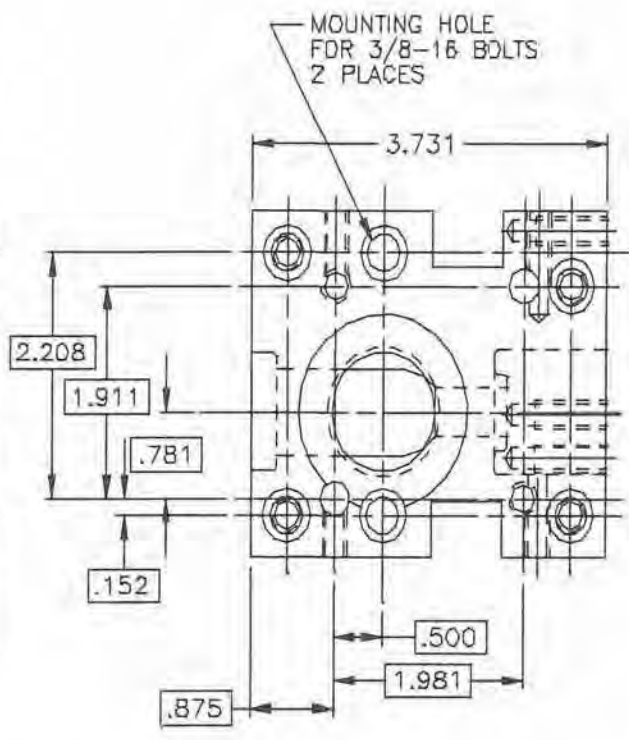
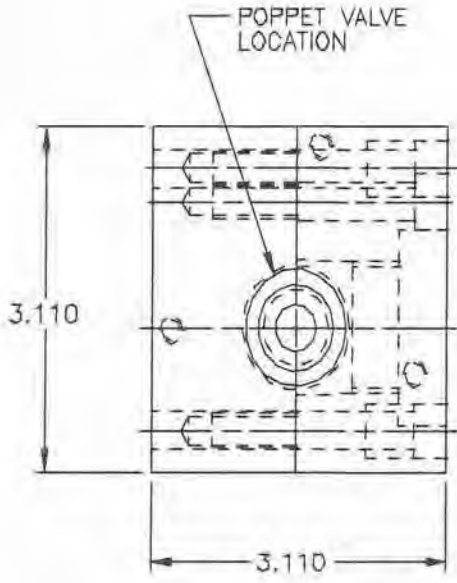
## **REPLACEMENT PARTS FOR A SINGLE MACHINE OMC/PRINCE VDC SYSTEM 7.5SC12 Series II Valves**

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<i>Description, Brand</i>	<i>Part Number</i>	<i>Recommended Quantity</i>
Poppet Valve	963Y627	6
Valve Seat	963Y625	6
Valve Guide VG791	335279	6
Valve Lock VK242	335269	4
Valve Spring CO9751121250M	335276	2
Valve Spring Retainer 13741-1601	335271	2
Valve Stem Seal S572-656	335315	6
Filter Element--Piping Module 849	335297	1
Filter Element--Vacuum Valve 848S	335272	2
Tank Truck Hose, 150 psi, 1" id	335760	20
Parker Fitting 14-3/4 F50GS	335709	1
Filter Canister—Vacuum Valve	335295	1
Quick Disconnect-1" Male	335383	2
Quick Disconnect-1" Female	335461	2

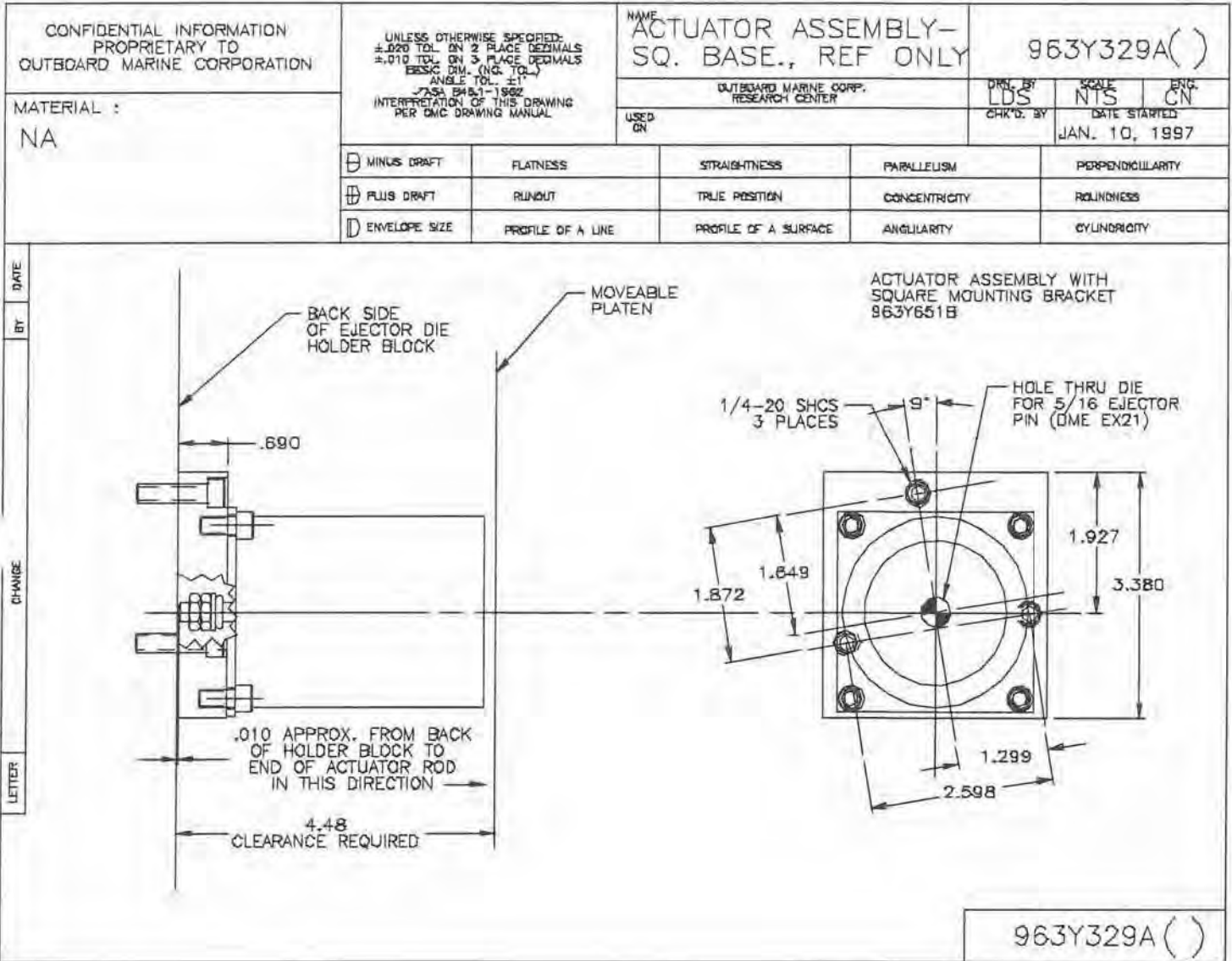
# VALVE ASSEMBLY

CONFIDENTIAL INFORMATION PROPRIETARY TO OUTBOARD MARINE CORPORATION	MATERIAL 1 SEE DETAIL 963Y616C	NAME VALVE-SERIES #2 JD MTG HOLES 963Y674B ( )	DATE DEC. 10, 1995	DESIGNED BY FULL CHECKED BY DATE	APPROVED BY DATE
CONFIDENTIAL INFORMATION PROPRIETARY TO OUTBOARD MARINE CORPORATION		NAME VALVE-SERIES #2 JD MTG HOLES 963Y674B ( )	DATE DEC. 10, 1995	DESIGNED BY FULL CHECKED BY DATE	APPROVED BY DATE
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963Y674B ( )

# ACTUATOR ASSEMBLY



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## ***PATENT NUMBERS***

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Issued to date (8/15/96)

Vacuum Valve for Die Casting 5,203,396

Sealed Shot Sleeve for Vacuum Die Casting 5,119,480

Vacuum Die Casting Process 5,219,409

Vacuum Valve Design 5,293,693

Vacuum Valve Apparatus for Die Casting 5,314,002

Double Solenoid Valve Actuator 5,490,534

Vacuum System Testing Tool 5,540,084

Other Patents Pending