

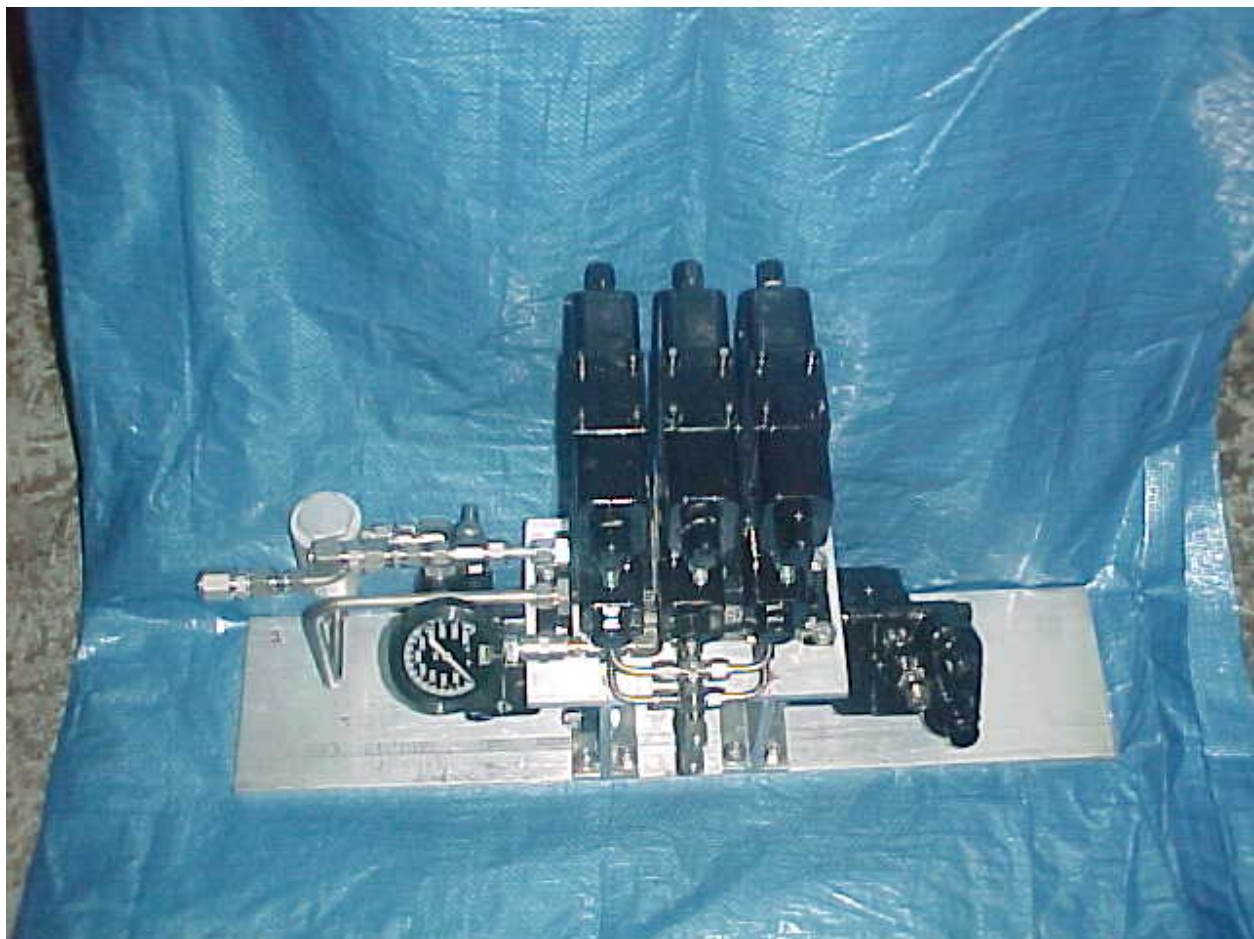
# MARSTEN BENTLEY INTENSIFIER SYSTEM OPERATIONS MANUAL



## OPERATIONAL INSTRUCTIONS

### FOR MBI SYSTEM

#### (3) STATION MARSTEN BENTLEY PUMP



# MARSTEN BENTLEY INTENSIFIER SYSTEM OPERATIONS MANUAL

## 1.0 Scope

- 1.1 Scorpion Subsea has developed a proprietary ROV integrated isolated hydraulic supply system utilizing a hydraulic motor driving a hydraulic pump.
- 1.2 The heart of this system is a Voac F11-10 hydraulic motor driving a Voac F11-5 pump, capable of outputting up to 4,800 psi at 3.5 gpm. The system is supplied with three pilot operated directional control, pressure reducing, flow control valve, and dual pilot operated check valves.
- 1.3 The Marsten Bentley Pump is powered by the ROV's hydraulic supply. The directional control of the hydraulic circuit is controlled by hydraulic solenoid valves located in the ROV solenoid valve packs.

## 2.0 Hydraulic Input Requirements

- 2.1 The Marsten Bently pump requires a range of flows to operate and a pressure of 2900 psi. To achieve desired flow output use flow input / output chart located in the back of this manual. Maximum input is 6 gpm for a 3.5 gpm output at 4,800 psi.
- 2.2 The input pressure and flow required for the control lines are 500-3000 psi at .5 gpm. Depending on how many circuits are required, the system needs 2 control lines per circuit. These controls must be tandem center valves A and B tied to tank in the center position. A P.O. check valve is not used on these control lines, if one is in the circuit it will cause the directional control valve to stay stuck energizing the circuit , thus causing output pressures to differ from pressure reducing valve setting.

## 3.0 INSTALLATION

Before making any connections to the sub the following procedure must be followed. Use a flow meter and pressure gauge to connect the A and B ports of the tooling valve on the sub. Ensure that 6 gpm at 2,90 psi is available.

- 3.1.1 There are 6 to 10 possible hydraulic connections that may be required. The connections are as follows, 2 from ROV to power the

## MARSTEN BENTLEY INTENSIFIER SYSTEM OPERATIONS MANUAL

Voac F11-10 hydraulic motor (pressure and return).

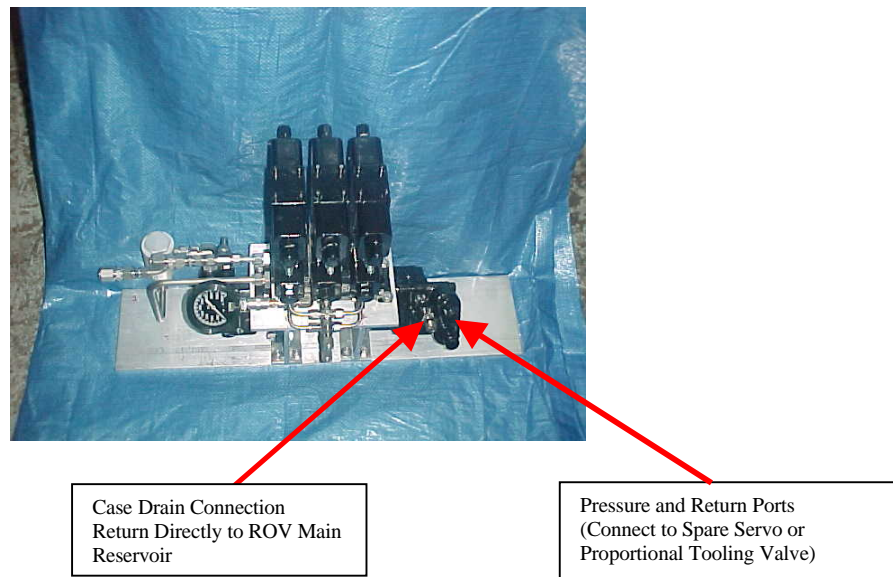
- 3.1.2 2 from the Marsten Bently assembly to the to the reservoir supplied with the system, and either 2 or 6 controls from the directional control valves on the stack assembly to the solenoid valves on the ROV.

***\*NOTE: If only one directional control station is needed, ensure that the remaining (2) directional control pilots are either hooked up back to the ratepack or left open to sea. If not, valves will build up internal pressure and shift the valves. This will cause reduced output pressure less than the desired setting.***

### 3.2 Hydraulic input connections to Marsten Bently pump

- 3.2.1 Connect one of the ports of the F11-10 drive motor to the A port on the tool stack on the ROV. Connect the opposite port on the F11-10 drive motor to the B port of the tooling valve on the ROV. Connect the case drain of the F11-10 drive motor to the main reservoir on the ROV. Once this is accomplished energize the ROV tooling valve and check for proper rotation of the motor/pump combination. The rotation will be clockwise looking from the back of the drive motor. See **Figure 1** for reference of connections to Marsten Bently pump.

**Figure 1**

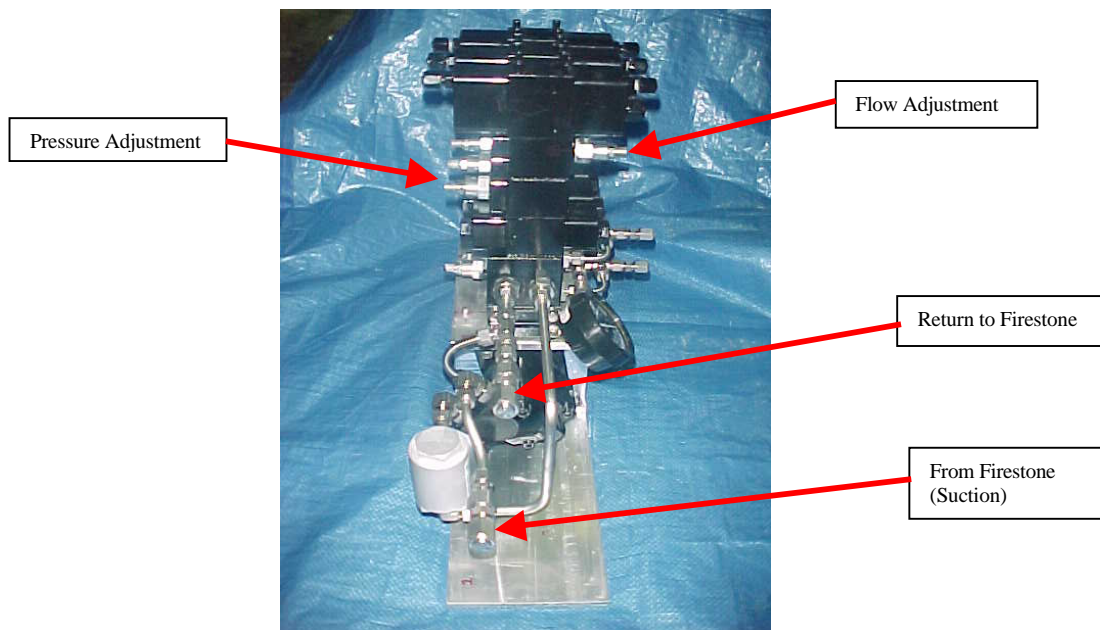


## MARSTEN BENTLEY INTENSIFIER SYSTEM OPERATIONS MANUAL

### 3.3 Connections from the reservoir to the Marsten Bentley assembly

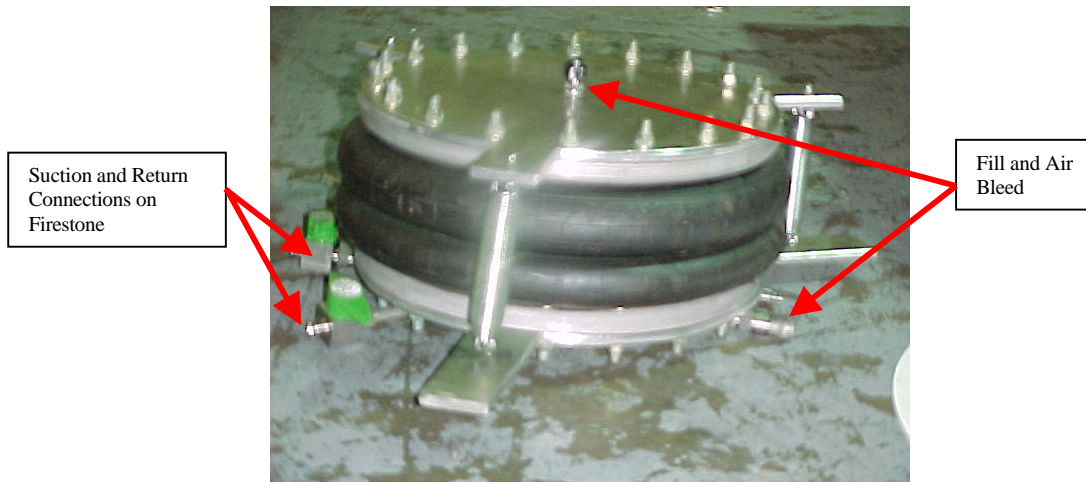
- 3.3.1 Connect the two 1/2" parflex and/or hydraulic hoses from the Marsten Bentley assembly to the reservoir supplied with the unit, as shown in **Figure 2** and **Figure 3**

**Figure 2**



## MARSTEN BENTLEY INTENSIFIER SYSTEM OPERATIONS MANUAL

**Figure 3**



### 3.4 Connections of the directional control valves to the ROV ratepack

**3.4.1** On the Marsten Bently assembly there is a valve manifold with directional control valve, pressure reducing valve, flow control valve, and P.O. check valve. The pilot operated directional valves have to be plumbed to a 3 way 2 position (or 4 way, 3 position) solenoid valve that is open center.

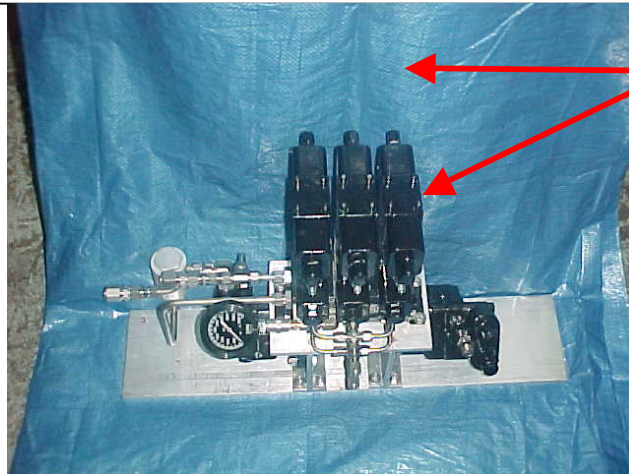
***\*NOTE: PO checks in the ROV ratepack must be removed for this system to work properly. Any checks will hold the valves in the shifted position causing a lower pressure output than desired.***

**3.4.2** Connections to the pilot operated directional control valve are shown in **Figure 4**. Connections to the solenoid valves are shown in **Figure 5**.

**Figure 4**



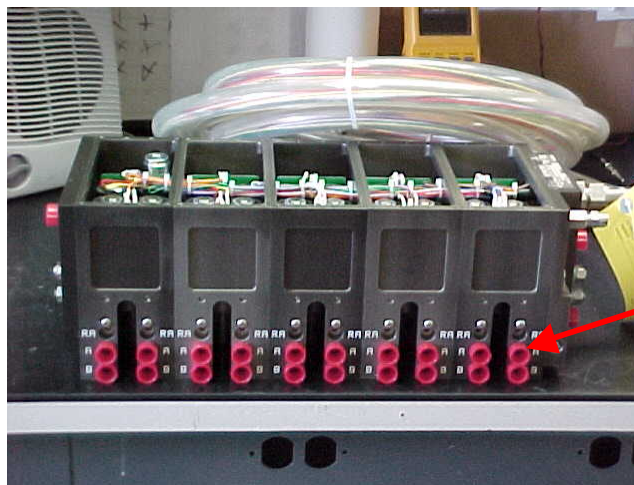
## MARSTEN BENTLEY INTENSIFIER SYSTEM OPERATIONS MANUAL



Pilot connections. 1/4" JIC connections X 6.

NOTE: If all (3) valves are not required, ensure that caps are left open to sea or connected to ratepack.

Figure 6



Ratepack connections  
1/4" JIC connections.

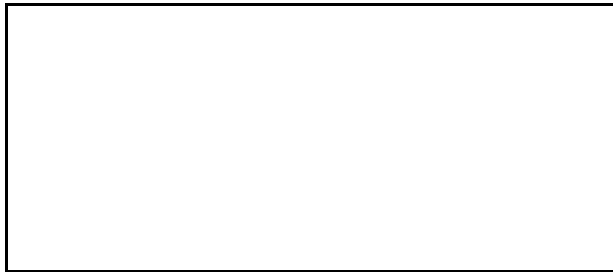
NOTE: Insure PO checks are removed from spare functions being used. PO dummy checks can be secured through Patterson Inventory should system spares be out.

### 4.0 After Use And For Storage

- 4.1 Wash down complete system with fresh water and run Hydraulic oil through Marten Bentley (MB) side of transformer before storage. Do not let system stay contaminated with MB fluid.

# Iverson Intensifier

## *Operational Instructions*



---

## 1 TOOL INFORMATION

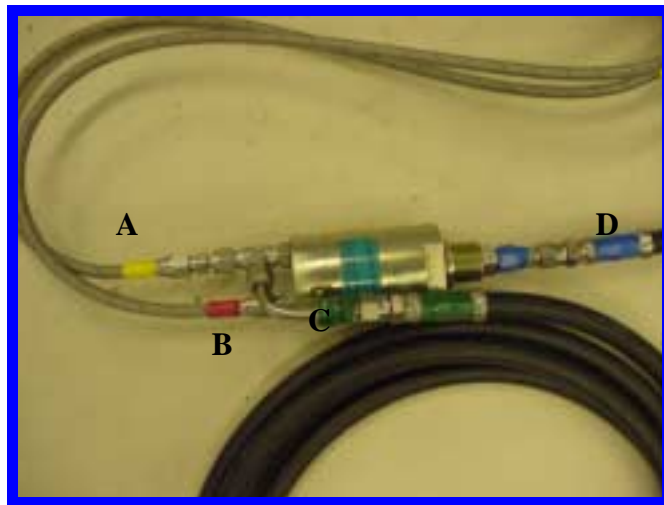
---

- **Pressure Requirement:** 1/4 of output pressure is required
- **Flow Requirement:** 2.0 GPMs max at any required pressure
- **Max Pressure Input:** 2500 psi
- **Max Pressure Output:** 10,000 psi

---

***! Flow in excess of 2.0 GPMs will blow the body o-rings.  
Changing o-rings will not repair intensifier. It is not serviceable  
once o-rings are blown!***

---



- A. Return to tool stack
- B. Pressure in from tool stack
- C. Return from hot stab
- D. High pressure output to hot stab



---

## 2 OPERATING PROCEDURE

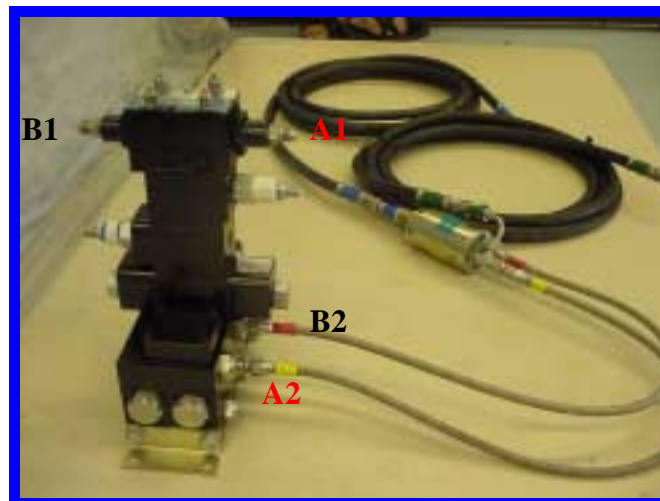
---

Set the Vickers/Sun Tool Stack flow and pressure.

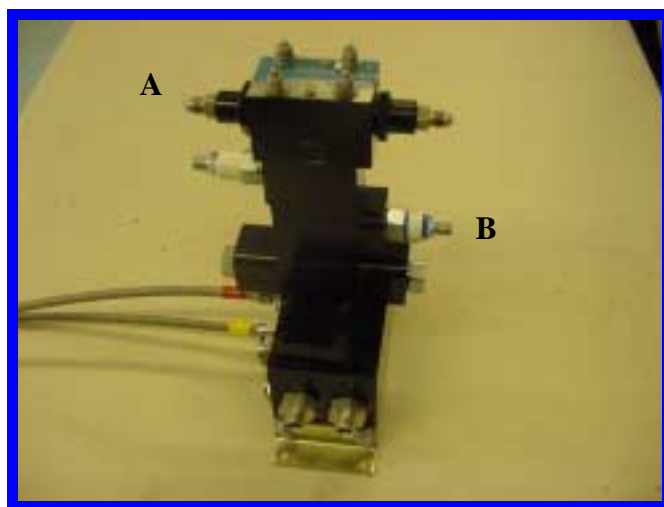
1. Connect a flow meter across A and B output ports on the Vickers/Sun tool stack.
2. Function ROV Hydraulics and adjust the flow control valve to 2 gpm maximum.
3. Shut down hydraulics and remove flow meter.
4. Connect a pressure gauge (0-5000 psi) to the output of the tool stack (either A or B side will work).

**Note:** Some ROVs already have a gauge installed at the pressure-reducing valve block.

5. Once the gauge is connected, function ROV hydraulics and adjust the pressure-reducing valve to 1/4 pressure (required for total output of Iverson Intensifier).
6. Shut down hydraulics and disconnect pressure gauge.



- A1. A Port: Pressure from rate pack to relieve pressure**  
**A2. Return from Iverson**  
**B1. B Port: Pressure from rate pack to energize Iverson Intensifier**  
**B2. Pressure to Iverson**



**A. Flow control cartridge FBDA-LAN. Set at 2.0 gpm max**  
**B. Pressure-reducing cartridge PPDB-LWN. Set at 1/4 total pressure required for total output of Iverson Intensifier.**

