



**VIVATECH, INC**

...for the life of your tube

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375 North Street, Teterboro, NJ 07608-1200

▽ PHONE (201) 488-1881

▽ FAX (201) 488-4965

## **Operator's Manual**

## **VIVATECH Service Cart**

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## Operators Manual VIVATECH Service Cart

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## SECTION 1 - SERVICE CART OVERVIEW

The **VIVATECH Service Cart** is the answer to the question: How can I change X-Ray tube oil in the field? The Service Cart has been designed to implement the patented **VIVATECH** process simply and effectively, with no oil spillage, contamination, or introduced air bubbles.

The **VIVATECH Service Cart** is ruggedly constructed to withstand transportation throughout the health care facility. All components are selected for safety, long life, and ease of use.

### 1.1 Service Cart Description

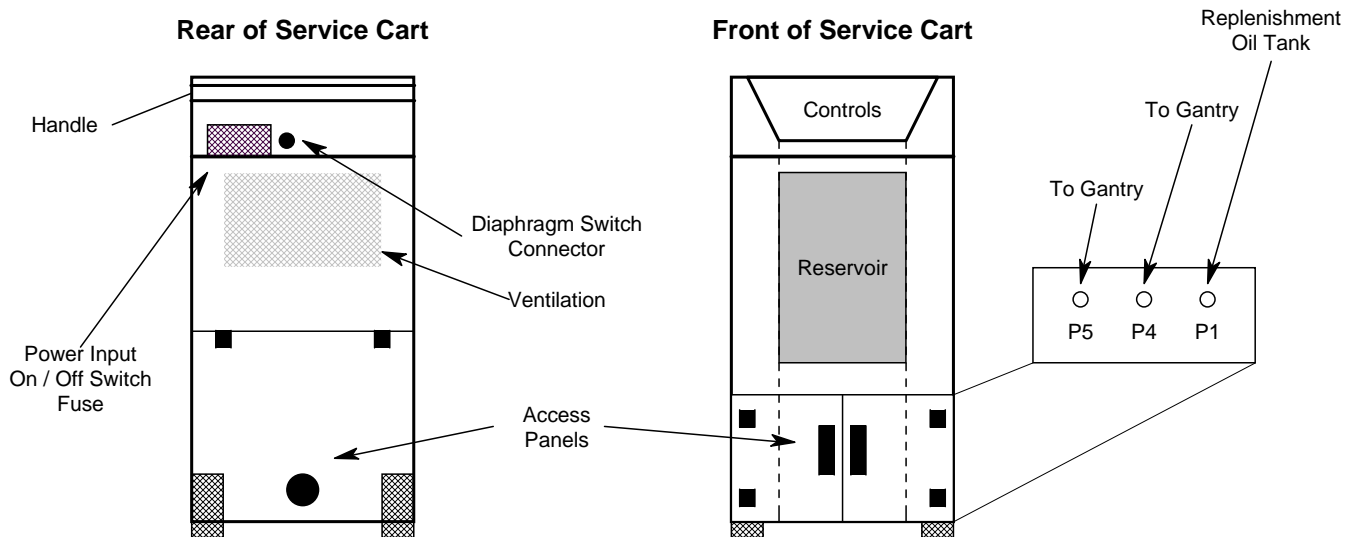
The **VIVATECH Service Cart** has the following features:

- Powered from 120 VAC via a standard NEMA 5-15 Outlet. The maximum current draw of the service cart is 6 Amps
- The Cart is compact and transportable.
- Storage space is provided for oil hoses and power cord
- All **VIVATECH** supplied hydraulic fittings are leak-proof to eliminate the mess and spillage of oil that makes conventional tube-service a time consuming process.
- The **VIVATECH Service Cart** is UL Listed (*UL-Pending*)

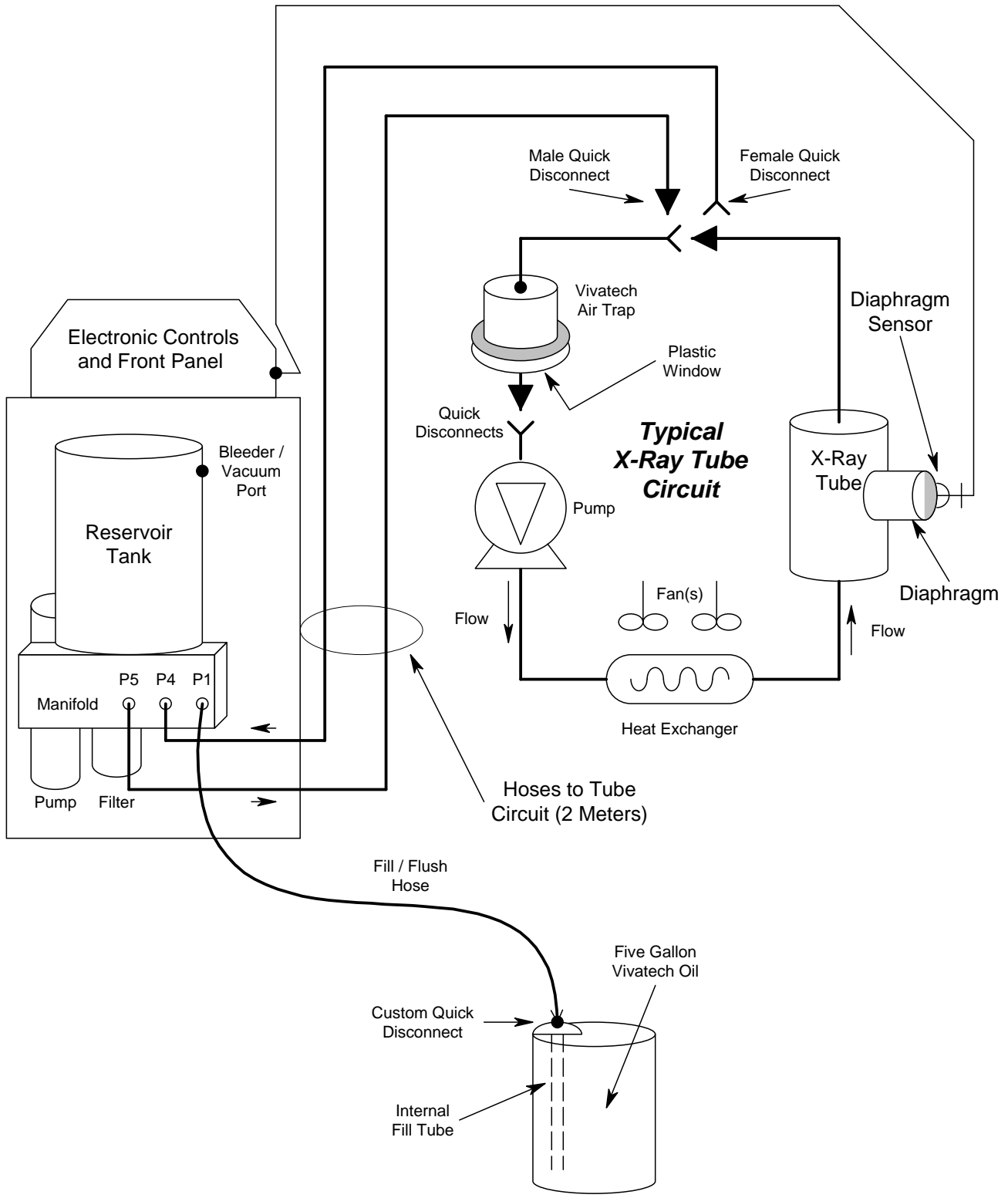
## 1.2 Service Cart Block Diagram

The **VIVATECH Service Cart (VSC)** consists of the following major components:

- Service cart reservoir tank
- Oil filtering and pumping manifold
- Transport wheels
- Electronic Controls
- Provision for Tube Diaphragm Sensor
- Storage Compartment for line cord and hose storage



**VIVATECH Service Cart**



**VIVATECH Functional Diagram**

### 1.3 Service Cart in Use

To use the **VIVATECH Service Cart (VSC)**, the cart is rolled into place physically close to the medical imaging system tube location, such as the CT system Gantry. Consult the **VIVATECH System Specific Manual (SSM)** for optimum positioning for specific imaging systems.

On the front of the unit, hydraulic hoses are connected between the **TUBE IN** and **TUBE OUT** fittings and the X-Ray Tube. A container of replacement oil is connected to the **VIVATECH Service Cart** through the **FLUSH** fitting and hose.

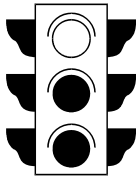
A special **Tube Diaphragm Sensor** is fitted to the X-Ray Tube, and connected to the **VIVATECH Service Cart** on the rear of the unit. In some cases, a Tube Diaphragm Sensor is not used, and a special remote switch is connected to the Diaphragm Switch connector. Consult the SSM for system specific information.

Finally, the **VIVATECH Service Cart** is connected to a standard NEMA 5-15R Receptacle (120 VAC / 15 Amps)

## SECTION 2 - COMPONENTS AND DESCRIPTIONS

### 2.1 Transportation Cart

The **VSC** is designed to be easily moved within the health care facility. This permits the **VSC** to be moved easily between service locations and a storage location. Transport the cart only in an upright position. Use an elevator to move the cart between floors. Do not use the service cart handle to lift the cart between floors or up/down stairs.



**Warning:** *Do Not move the VIVATECH SERVICE CART when the Reservoir tank is filled !*

The transportation cart wheels, doors, and other components may be replaced if lost or damaged. Consult the spare parts list for replacement wheels.



## 2.2 Electronic Controls

### 2.2.1 Mains Power

The **VSC** requires 120 VAC nominal power from a standard NEMA 5-15R Receptacle. No special grounding or electrical supplies are required.

<b>Nominal Voltage:</b>	<b>120 VAC +/-10%</b>
<b>Stand-by Current:</b>	<b>0.5 Amps</b>
<b>Operating Current:</b>	<b>4.0 Amps</b>

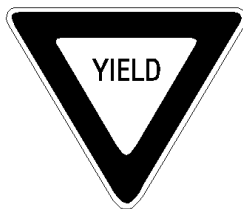
The VSC is fitted with a 10' (3 meter) power cable, with a standard IEC-320 type inlet. If an extension cord is used to power the **VSC**, ensure that is a grounded (3 prong) type with adequate rating for the equipment.

### 2.2.2 Control Panel

The front panel contains all controls and indicator lamps required to operate the **VIVATECH Service Cart**. These are detailed in Section 3 "Service Cart Controls". The VSC uses a Programmable Logic Controller (PLC) for proper sequencing, timing, and fault sensing.

In the event of a problem, the electronic controls can be accessed by qualified service personnel through the hinged front control panel. (2) 5/32" Allen screws are used to open the control compartment.

Section 8 of this manual includes a schematic and physical layout of the control electronics.



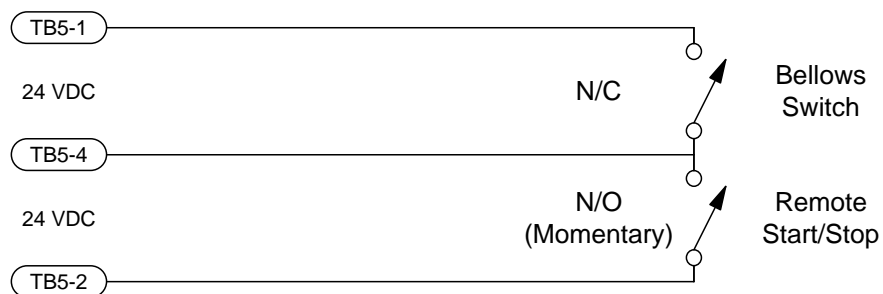
*Caution:*

*120 VAC signals are accessible with the control panel open. This should only be opened by qualified service personnel.*

### 2.2.3 Interface Connectors

The rear panel of the Service Cart includes an AMP brand circular connector (206061-1) which permits interface of a remote diaphragm sensor. VIVATECH has developed individual sensors for specific OEM systems. Please consult the **VIVATECH System Specific Manual (SSM)** for the proper sensor and cable type for specific applications.

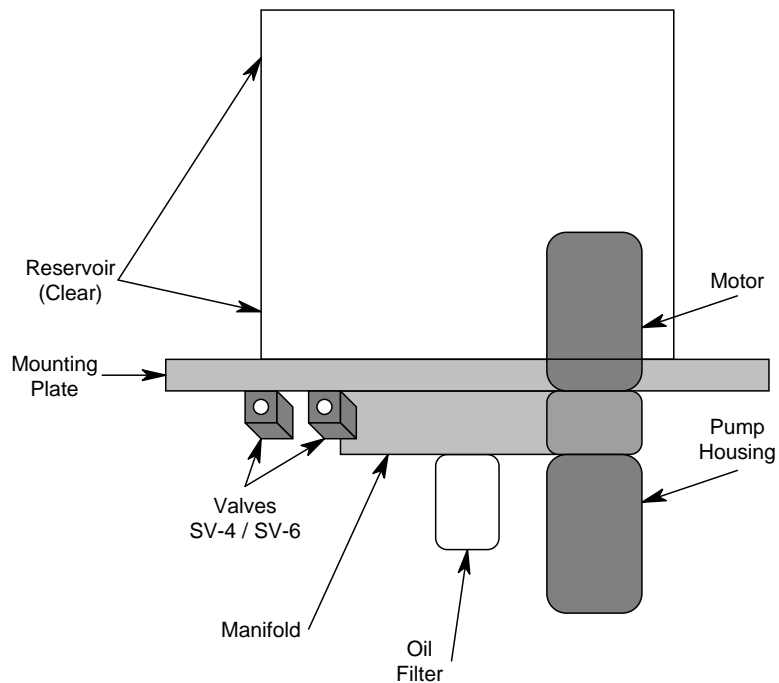
Normally, the Diaphragm switch is used to indicate that the tube is full, and the remote Start / Stop is not used. In some cases, the service engineer must visually determine tube fullness. The special VIVATECH cable for these systems has the Diaphragm Switch disabled; the service engineer can remotely start and stop the VSC pump while checking the tube. Consult the **VIVATECH SSM** for additional information



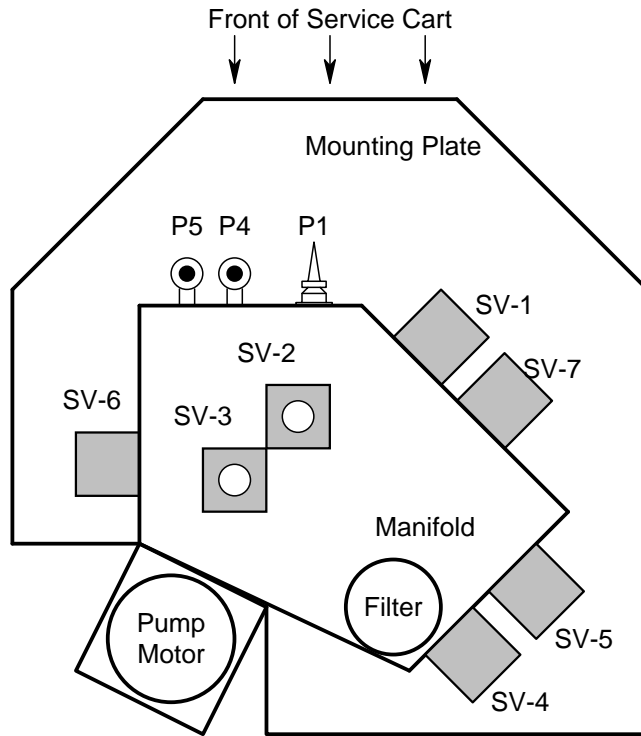
## 2.3 Oil Replenishment and Filtering Compartment

The bottom 2/3 of the **VIVATECH Service Cart** consists of the Oil Reservoir Tank and a manifold that houses the pump, valves, and oil filter. These components can be accessed, if required, through the rear doors of the VSC. The following components may be found on the manifold:

- Oil Pump & Motor
- Valves (7)
- Pressure Sensor
- Limit Switches (3)
- Oil Lamp



**Rear View of Manifold and VSC Components**



**Bottom View of VSC**

## 2.4 Reservoir Tank

The Reservoir Tank provides visual evidence of oil quality, and is used to store clean replacement oil and imaging system oil during processing. The Reservoir Tank is made of high impact \_\_\_\_\_ type plastic.

## 2.5 Storage Compartment

On the front of the VSC is the Storage Compartment. This compartment has been designed to accommodate the required connection hoses and interface cables when the **VSC** is not in use. In addition, the storage compartment is kept open to access the hydraulic fittings during tube servicing.

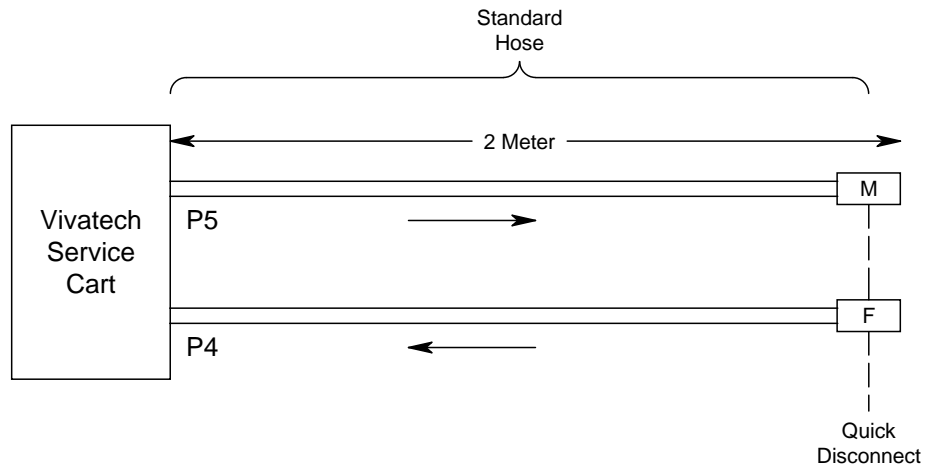
## 2.6 Hydraulic Hoses

One set of specially designed Hydraulic hoses are supplied with the **VIVATECH Service Cart**.

Length:	6 Feet (2 Meters) per hose
Diameter:	3/8"
Material:	High quality hydraulic hose rated for 300 PSI
Fittings:	VSC End - Consult Spare Parts List X-Ray System End - Consult VIVATECH SSM

The Quick-Disconnect ends of the hoses can be connected to form a loop - this can help to clear the hoses after service has been completed, or to circulate oil through the filter without connecting the service cart to an X-Ray tube.

Please consult VIVATECH if you need optional fittings or hose lengths for your specific imaging system.

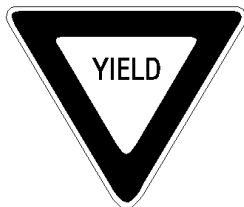


## 2.7 Sensors

The rear panel has provision for a gantry interface sensor:

### TUBE DIAPHRAGM SWITCH

This sensor is fitted to the X-Ray tube, and is used to ensure proper tube filling. There are a number of different sensors and mounting brackets available depending upon the OEM system and tube type being serviced. Consult the **VIVATECH SSM** for the proper Tube Diaphragm Sensor for specific imaging systems.



*Caution: The **TUBE DIAPHRAGM SENSOR** is designed and calibrated for use with cool (less than 100°F / 38 °C). Use of the VSC and oil processing at higher oil temperatures may result in improper system filling.*

## SECTION 3 - CONTROLS

### 3.1 Power On/Off Switch and Power Cord

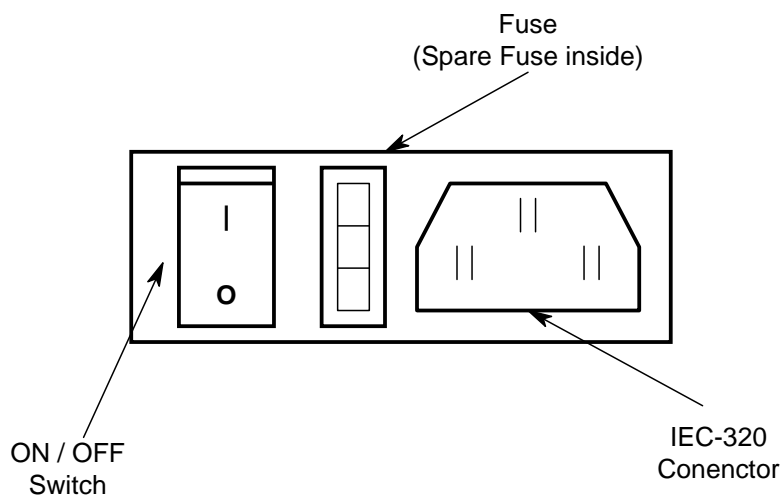
The On / OFF switch is conveniently located on the rear of the VSC, on the upper right side (as viewed from the front of the cart)

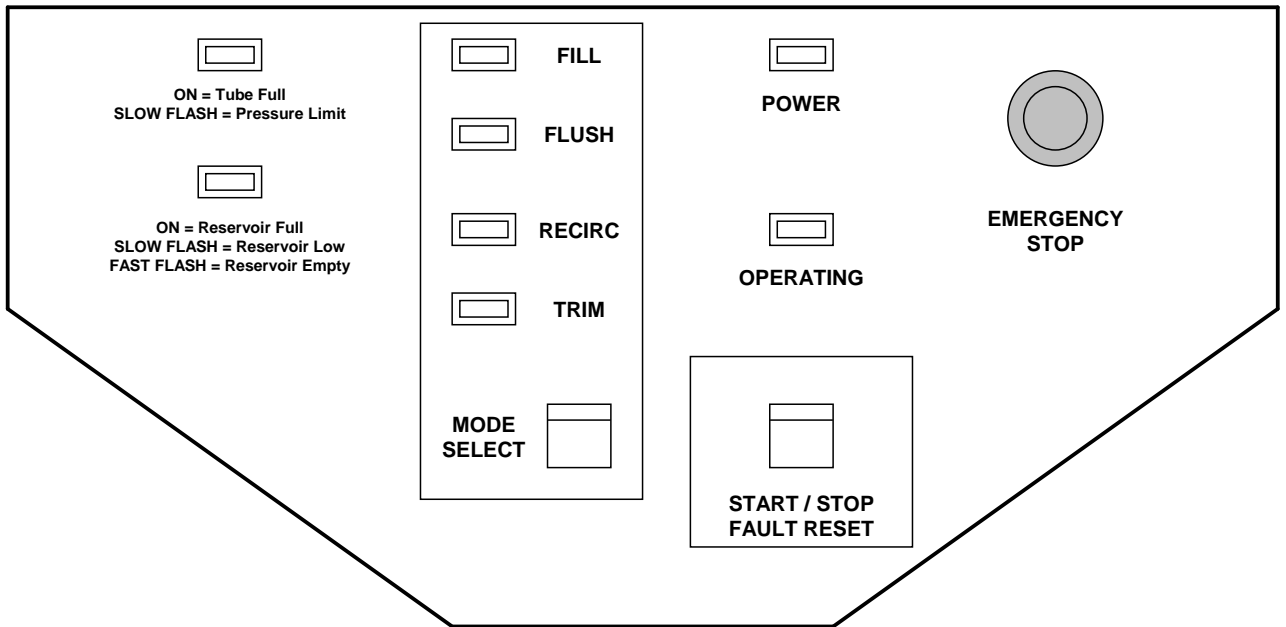
The Power interface consists of the following:

- IEC-320 standard connector. A 10' (3M) power cord is supplied with the VSC.
- Fuse (6 Amp, 5 x 20 mm, Time Delay Fuse)
- On / Off switch

A spare fuse is located within the removable fuse block. In the event that an additional fuse is required, replace only with the same type and size. Replacement fuses may be obtained from VIVATECH, consult the spare parts list (Section 7)

In the event that the VSC needs to be serviced, power should be removed by disconnecting the IEC-320 cable.





## ***Front Panel Controls***

### **3.2 Indicator Lamps**

#### **3.2.1 Power (*Amber*)**

Indicates 120 VAC power is applied and the On/Off switch in the back is turned on.

#### **3.2.2 Operating (*Green*)**

Indicates **VIVATECH Service Cart** has been energized (Start Button) and pump motor is operating



### 3.2.3 Mode Selector Lamps

These indicate that the **VIVATECH Service Cart** is in one of the following modes. These lamps will be solid (continuously lighted) when the VSC is in stand-by mode, and slowly flashing (1 second) when the VSC is operating (pump active)

Fill:	Transfer oil from the new container to the reservoir at the beginning of tube service
Flush:	Flushes old tube oil into an empty container, and replaces old oil with new oil from reservoir
Recirc:	Circulates new oil through imaging system, and through the Service Cart filters and reservoir tank
Trim:	Supplies additional oil to the imaging system to pressurize the tube diaphragm properly
Drain:	A special Drain Mode is available to purge the reservoir tank at the completion of a service procedure. This is indicated by all lamps lighted (stand-by mode) or all lamps alternately flashing (operating mode)

### 3.2.4 Tube Status Lamp (*Red*)

This is a two level indicator lamp.

Status	Indicates
Off	No tube faults
Slow Flash	Shut-off due to Pressure Limit
On	Shut-off due to Tube Full (Diaphragm Switch)

### 3.2.5 Reservoir Status Lamp (*Amber*)

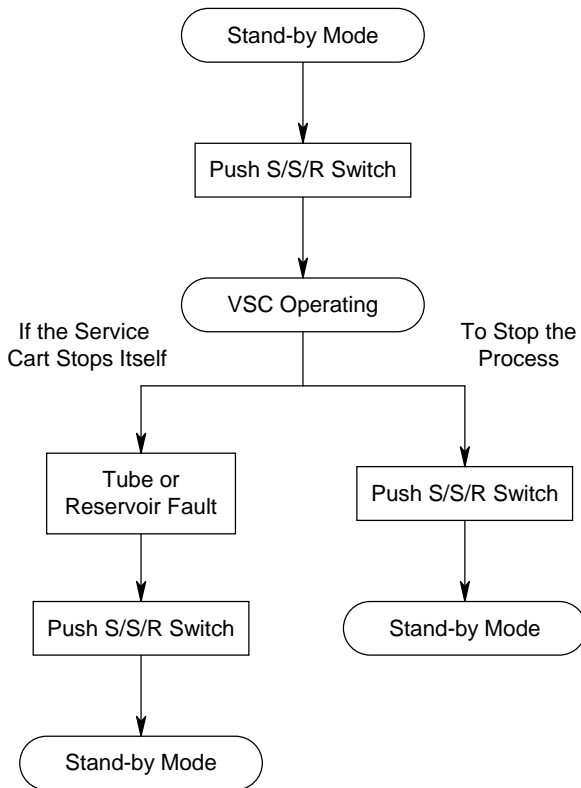
This is a three level indicator lamp

Status	Indicates
Off	No reservoir faults
Slow Flash	Shut-off due to Reservoir Low
Fast-Flash	Shut-off due to Reservoir Empty
On	Shut-off due to Reservoir Full

### 3.3 Push Button Indicators

Two push-button switches are located on the front panel. These switches are spring-action, positive feedback, and are designed to minimize switch-bounce.

#### 3.3.1 START / STOP / FAULT RESET (S/S/R) Push-button



The START / STOP / RESET Push-button starts the pump motor, lights the START indicator lamp and starts the **VSC**. Ensure that the Mode Selector Switch is in the correct position prior to starting the **VSC**.

During any operation, this button will also STOP the VSC operation.

In the event that the VSC is interrupted by a Tube Fault or a Reservoir Fault, the START / STOP / RESET push-button must be pressed once to clear the fault, and a second time to restart the VSC.

### 3.3.2 MODE SELECT Push-button

The Mode Select Push-button is used to switch between the VSC service modes. There are four modes of operation (Fill, Flush, Recirc, and Trim), and a final Drain Mode. The corresponding Indicator Lamp provides positive feedback that the correct mode has been selected.

<b>Operating Mode</b>	<b>Pressing the MODE SELECT will:</b>
Stand-by	Switch the VSC to the next mode
Operating	Switch the VSC to Stand-by Mode, but will not switch the process mode until the MODE SELECT is pressed a 2 <sup>nd</sup> time

Pressing and holding the MODE SELECT switch for 3 seconds will put the VSC into Drain Mode. This is a special mode that permits the VSC to be fully drained at the end of a service procedure.

When in Drain Mode, pressing the MODE SELECT again will return the cart to a normal operating mode. (FILL, FLUSH, RECIRC, or TRIM)

### 3.4 Emergency Stop

The Emergency Stop button prevents all cart functions if it is depressed. This is a latching button. The Emergency Stop button must be pulled out to enable the VSC to be used.

When the EMERGENCY STOP button is depressed all Lamps (except for the POWER lamp) will slowly flash.

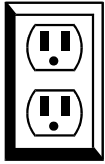
## SECTION 4 - SERVICE CART FUNCTIONS

### 4.1 Introduction

The **VIVATECH Service Cart** has been designed for use in the VIVATECH Tube Service system. This system is custom designed for individual imaging systems. Specific process steps are identified in the VIVATECH SSM (System Specific Manuals). You must consult these manuals for step-by-step tube service instructions.

VIVATECH has developed tube diaphragm sensors and processes as required for individual imaging systems. Ensure that you are using the proper sensor and process manual for your specific system.

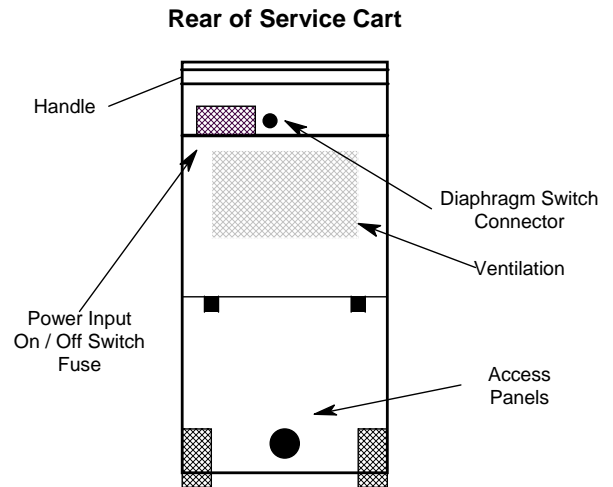
## 4.2 Preparation



Plug the **VIVATECH Service Cart** into a standard NEMA 5-15R receptacle.

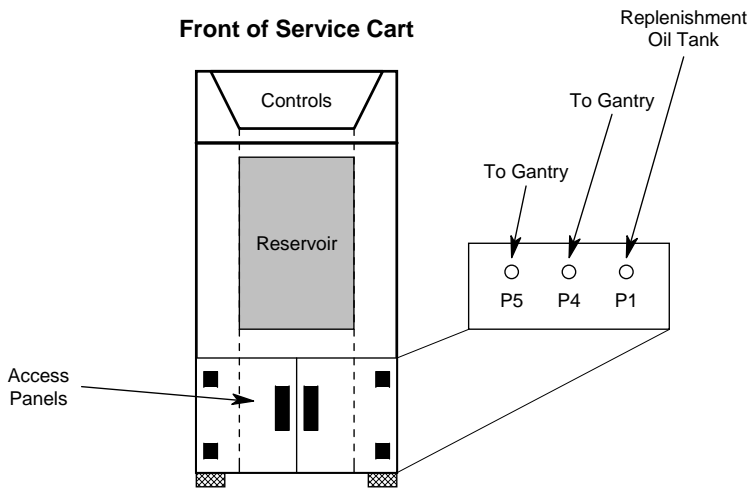
Ensure that the power switch is ON and that the Emergency Stop button is pulled out.

Prior to tube servicing, the VSC filter must be replaced. To access this filter, open the access panel on the lower rear of the VSC. The filter is a specially designed filter to trap water and particulates; obtain this filter only from VIVATECH.



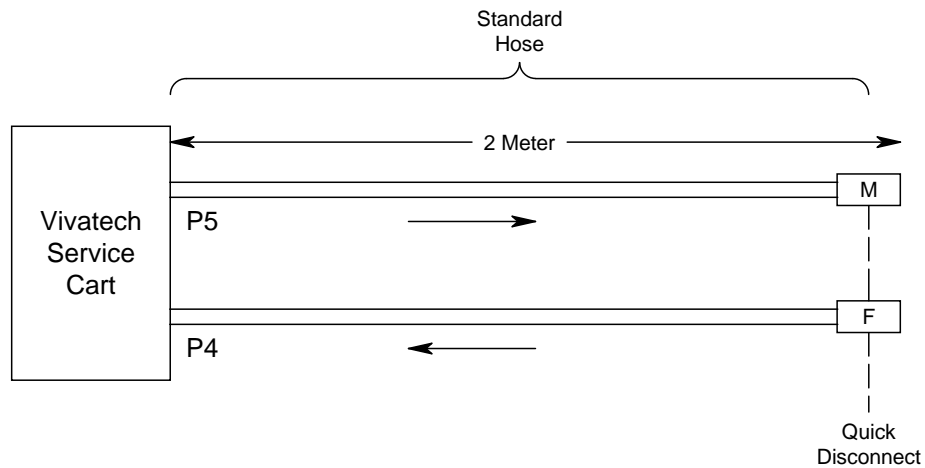
If the Tube service being performed will require replacing oil, connect the container of replacement oil. Connect the FLUSH / FILL hose to the P1 fitting on the front of the VIVATECH SERVICE CART. Connect the FILL / FLUSH hose to the custom disconnect on the top of the 5 Gallon container of VIVATECH replacement oil. For most imaging system types, 5 gallons of oil are required.

### 4.3 Connecting the Service Cart



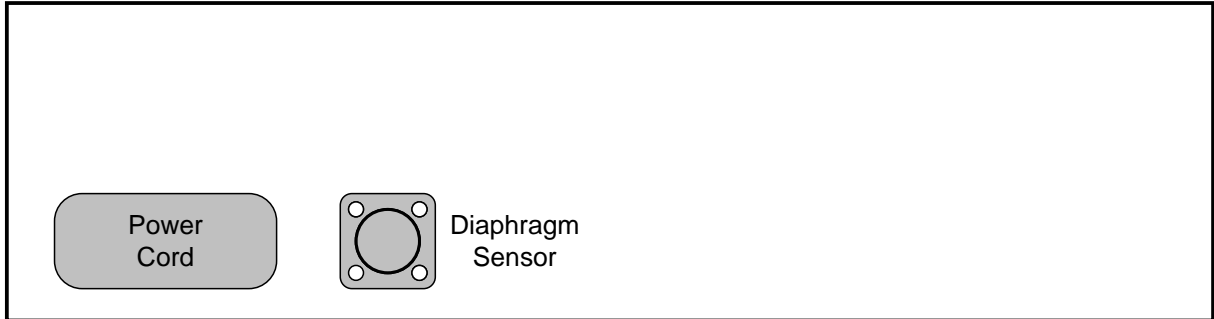
The imaging system under test must have been fitted with patented VIVATECH air trap and quick-connect fittings. These make connection of the VIVATECH Service Cart expedient and clean.

Connect the hydraulic hoses to the Imaging system as detailed in the VIVATECH SSM.



Finally, connect the Tube Diaphragm Sensor to the Imaging System. This sensor varies from system to system, but will be connected to the X-Ray tube. Consult the VIVATECH SSM for additional information on this device.

In some cases, the diaphragm switch is not used, and a remote S/S (Start / Stop) switch is used.



### ***Rear Panel Connections***

## 4.4 Operating Modes

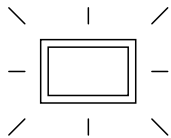
The VSC has five operation modes.

<b>Fill</b>	To fill the VSC Reservoir with replenishment oil in preparation for servicing
<b>Flush</b>	To replace old oil in the X-Ray system with replenishment oil
<b>Recirc</b>	To filter and de-aerate fresh oil
<b>Trim</b>	To pressurize the tube
<b>Drain</b>	To empty the VSC Reservoir at the end of service procedures

### 4.4.1 Fill Mode

With the VSC in FILL Mode and the Flush / Fill Hose inserted into a container of fresh oil, the VSC draws replacement oil from the container, through the FILL/FLUSH hose. This oil fills the Reservoir Tank with a sufficient amount of oil to flush the imaging cooling system, and recirculate the oil.

FILL Mode will continue until the service engineer stops the process, or the reservoir is completely full. If the reservoir becomes completely full, the VSC will automatically interrupt FILL Mode.



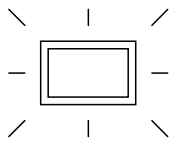
Reservoir Status Lamp (Amber) will be steady on to indicate that the reservoir is full and has automatically terminated FILL mode



#### 4.4.2 Flush Mode

With the VSC in FLUSH Mode and the Flush / Fill hose inserted into an empty container for waste oil, the VSC draws the contaminated oil from the X-Ray tube, and replaces it with fresh oil from the reservoir tanks. The contaminated oil is pumped into the now-empty replacement oil container.

Flush Mode will continue until the Service Engineer stops the process. In addition, the Reservoir Tank Low, Tube Pressure Limit, and Diaphragm Switch will all stop the FLUSH process automatically.



Reservoir Status Lamp (Amber) will flash slowly to indicate that the reservoir is low and has automatically terminated FLUSH mode

#### 4.4.3 Recirc Mode

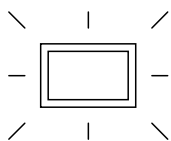
With the VSC in RECIRC Mode, the VSC pumps the Imaging System cooling oil through the cart filter and Reservoir tank, to remove trapped air bubbles and filter the oil.

Recirc Mode will automatically terminate in 30 minutes, or when the Service Engineer stops the process. In addition, the Reservoir Tank Empty, Tube Pressure Limit, and Diaphragm Switch will all stop the RECIRC process automatically.

#### 4.4.4 Trim Mode

With the VSC in TRIM Mode, the VIVATECH SERVICE CART pressurizes the cooling system. The pump will automatically stop when the Tube Diaphragm Sensor indicates proper diaphragm deflection (corresponding to proper cooling system pressure), if the Diaphragm Switch is connected.

Trim Mode will continue until the Service Engineer stops the process. In addition, the Reservoir Tank Empty, Tube Pressure Limit, and Diaphragm Switch will all stop the TRIM process automatically.



Tube Status Lamp (Red) will be steady on to indicate that the diaphragm switch has operated that that the X-Ray system is properly energized

#### 4.4.5 Drain Mode

At the completion of Tube servicing, press and hold the Mode Select switch for 3 seconds. This puts the VSC into Drain Mode. All Mode lamps will be lighted.

Pressing the S/S/R button will cause the VSC to Drain all unused oil into the replacement oil container. The Drain process will continue for 90 seconds, and then shut-off automatically. If all oil has not been emptied from the Reservoir Tank, press the S/S/R switch again to initiate a second Drain.

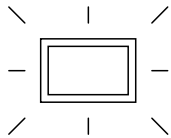
## 4.5 Fault Modes and Protection

The VSC incorporates a number of protective devices and sensors that are used to detect normal process limits and abnormal faults. These are:

Emergency Stop	High Oil Limit
Diaphragm Switch	Low Oil Limit
Tube Pressure Sensor	Empty Oil Limit

### 4.5.1 Emergency Stop

The Emergency Stop button, when pressed will cause all VSC procedures and functions to stop. The Emergency Stop does not remove power from the VSC. Power can be removed with the ON / OFF switch (rear) or by removing the power cord.

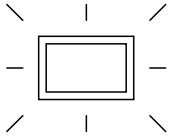


*When the Emergency Stop button is depressed, all indicator lamps (except the POWER ON lamp) will slowly flash.*

To enable VSC functions, make sure that the Emergency Stop button is pulled out.

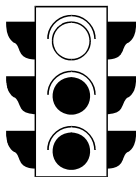
## 4.5.2 Diaphragm Switch

The **Diaphragm** Switch is designed to stop the TRIM function when the tube is full and properly pressurized. In addition, the **Diaphragm** switch will interrupt the Flush Mode and the Recirc Mode.

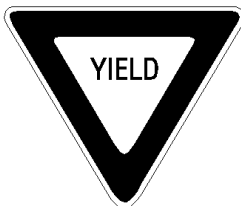


*If the Diaphragm Switch has interrupted a process, the Tube Status lamp (Red) will be lighted steadily.*

The *Diaphragm* Switch / Diaphragm Sensor is used to detect when the X-Ray tube diaphragm is properly pressurized to prevent overfilling. VIVATECH engineers have developed custom tube diaphragm sensors for many different OEM and replacement tube styles. Contact VIVATECH if the supplied diaphragm sensor(s) are not compatible with your system tubes.



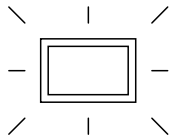
**Warning:** *Use the proper diaphragm sensor and mounting bracket ! Failure to do so may result in over or under pressurization of the tube cooling system !*



**Caution:** *If the Diaphragm Switch or the Optional Remote On/Off Switch is not connected, the **VIVATECH Service Cart** will not operate.*

### 4.5.3 Tube Pressure Switch

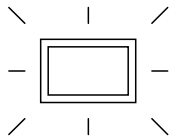
A pressure switch is installed in the VSC to detect excessive oil pressure. This is factory set for \_\_\_\_\_ PSI. The pressure switch will protect the X-Ray cooling system from excessive pressure due to cooling line obstruction or other fault during the VIVATECH servicing. The Tube Pressure Switch will interrupt the FLUSH Mode, TRIM mode, and RECIRC Mode.



*If the Tube Pressure Switch has interrupted a process, the Tube Status lamp (Red) will slowly flash.*

### 4.5.4 High Oil Limit

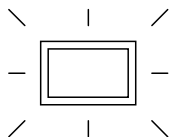
A limit switch protects the VSC from over-filling in the FILL mode.



*If the High Oil Limit Switch has interrupted the FILL process, the Reservoir Status lamp (Amber) will be lighted steadily.*

### 4.5.5 Low Oil Limit

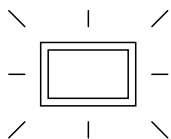
A limit switch controls the reservoir oil level during FLUSH mode. This ensures that there is adequate oil left in the Reservoir tank to complete the RECIRC and TRIM modes.



*If the Low Oil Limit Switch has interrupted the FLUSH process, the Reservoir Status lamp (Amber) will slowly flash.*

### 4.5.6 Reservoir Empty Limit

A limit switch protects the VSC from completely emptying during the RECIRC, FLUSH, and TRIM modes. This ensures that there is adequate oil left in the Reservoir tank to prevent air from being introduced to the X-Ray system.



*If the Reservoir Empty Limit Switch has interrupted a process, the Reservoir Status lamp (Amber) will quickly flash.*

#### **4.6 Completion of Tube Servicing**

At the completion of Tube servicing, disconnect the VSC hydraulic hoses from the imaging system. Mate the hydraulic hoses (male to female) to protect the fittings from dirt and to prevent accidental leakage.

#### **4.9 Cleaning and Storage of Service Cart Accessories**

There is no need to clean the hydraulic hoses between tube servicing. Simply flushing the hoses with the type of clean oil required by the next imaging system is adequate. The VSC process (FILL and FLUSH) and the filter system will prevent particulates from affecting the imaging systems, or from being passed between imaging systems.

There are no recommended solvents or cleaning solutions to be used for the hydraulic system or hoses.

## SECTION 5 - TROUBLE-SHOOTING

### Symptoms

### Corrective Actions

#### *Mains Power Related*

5.1.1	Power On Lamp is not lighted	<ul style="list-style-type: none"> <li>(a) Check On / Off Switch (Rear of VSC)</li> <li>(b) Check Fuse (Rear of VSC)</li> <li>(c) Check mains supply for power</li> </ul>
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#### *Start / Stop Circuitry*

5.2.1	Start Button Does Not Start Pump Motor in FILL mode	<ul style="list-style-type: none"> <li>(a) Check for POWER lamp lighted</li> <li>(b) Check for Defective Tube Full Sensor (Check Reservoir Status Lamp)</li> </ul>
5.2.2	Start Button Does Not Start Pump Motor in FLUSH mode	<ul style="list-style-type: none"> <li>(a) Check for POWER lamp lighted</li> <li>(b) Diaphragm switch not connected or improperly fitted to Tube (Check Tube Status Lamp)</li> <li>(c) Low Oil Level in Reservoir Tank (Check Reservoir Status Lamp)</li> </ul>
5.2.3	Start Button Does Not Start Pump Motor in RECIRC or TRIM mode	<ul style="list-style-type: none"> <li>(a) Check for POWER lamp lighted</li> <li>(b) Diaphragm switch not connected or improperly fitted to Tube (Check Tube Status Lamp)</li> <li>(c) Low Oil Level in Reservoir Tank (Check Reservoir Status Lamp)</li> </ul>

#### *FILL Mode*

5.3.1	In FILL mode, VIVATECH SERVICE CART does not draw oil from the replenishment container	<ul style="list-style-type: none"> <li>(a) Ensure that Flush / Fill hose is properly connected to the container of fresh oil</li> <li>(b) Ensure that the pump motor is energized</li> <li>(c) Ensure that the Mode Selector indicators properly indicate FILL mode</li> </ul>
5.3.2	In FILL Mode, reservoir tank becomes full before replenishment oil container is empty	<ul style="list-style-type: none"> <li>(a) No problem. The VSC will automatically stop when the reservoir is full</li> </ul>

**Symptoms****Corrective Actions***FLUSH Mode*

5.4.1	In FLUSH mode, VIVATECH SERVICE CART does not draw drain oil from the system into the discard container	(a) Ensure that the hoses are connected properly (b) Ensure that the reservoir tank has oil (check Reservoir Status lamp)
5.4.2	In FLUSH Mode, discard container becomes full before reservoir tank is empty	(a) Use a second discard container

*RECIRC Mode*

5.5.1	In the RECIRC Mode, Reservoir tank oil is discolored, polluted	(a) Improper or incomplete FLUSH - begin process from start
5.5.2	Oil flow is slow, pump motor is noisy	(a) Check to ensure that hoses are not obstructed or kinked, and that filter has been replaced at the start of the tube service
5.5.3	RECIRC mode stops for no apparent reason	(a) No problem - RECIRC mode has an automatic time-out of 30 minutes. If you would like to run this mode longer, simply restart the VSC

*TRIM Mode*

5.6.1	In the TRIM mode, motor stops or does not run	(a) Normal, if TUBE Status lamp lights (b) Ensure that Diaphragm Switch is plugged into VSC
5.6.2	In the TRIM mode, motor does not stop	(a) Check for proper connection of Diaphragm Switch sensor
5.6.3	Pressure Fault in TRIM Mode, VSC will not restart	(a) In the event of a Pressure Fault, the VSC will lock-out. Switch to Recirc Mode using the MODE SELECT and restart the VSC. Then repeat the TRIM operation.

*DRAIN MODE*

5.7.1	In the DRAIN mode, VSC stops before all oil is drained from the VSC Reservoir	(a) No problem, the DRAIN mode has an automatic time-out of 90 seconds. Simply restart the VSC to completely drain the reservoir
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*Clean-up and Storage*

5.7.1	Hydraulic hoses leak	(a) Ensure that fittings are not held open by particles or other substances (b) Connect hoses together to close ends
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## **SECTION 6 - PLANNED MAINTENANCE**

### **6.1 Hydraulic Hose Care**

Hydraulic system and hoses are normally not required to be cleaned or flushed. Inspect hoses for nicks, abrasions, and kinks. Inspect the quick-disconnect valves for corrosion, mechanical defect, or leaky connection to the hoses.

Replace the hoses and / or fittings if required.

### **6.2 Filter Replacement**

A specially designed oil filter is installed in the VSC, accessed through the rear panel opening. The filter should be replaced at the start of a tube servicing. Replacement filters are supplied with the VIVATECH replacement oil.

It is vital that the filter be replaced with the correct size and type, as supplied by VIVATECH.

The old filters should be returned to VIVATECH for analysis and proper disposal.

### **6.3 Cleaning the Service Cart**

All exterior components of the service cart should be wiped down periodically to remove dirt, dust, and oil. Use a clean cloth and a mild detergent to clean the VSC. Do not use solvents for internal or exterior cleaning of the VSC.

## SECTION 7 - PARTS LIST

Item	Qty	Description	Manufacturer	Part Number
1	1	Power Cord		
2	1	Fuse - 6 A		
3	1	Oil Filter		
4	1	Pump Motor		
5	1	Pump Motor Capacitor		
6	1	Pump Motor Dooley-bop		
7	2	2M Hydraulic Hoses		
8	1	1M Hydraulic Fill / Flush Hose		
9	1	Cart Handle		
10	1	Cart Wheels		
11	1	Front Panel PC Board		
12	1	Programmable Logic Controller		
13	1	Motor Control Relay		
14	3	Level Switches		
15	8	Valve Solenoids		
16	1	Emergency Stop Button		
17	1	Reservoir Lamp		
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40	3	Microswitch Mounting Brackets		
41	3	Air Trap Mounting Brackets		
42	1	Oil Reservoir		
43	1	Air Trap		

## SECTION 8 - SCHEMATICS AND MECHANICAL DRAWINGS

8.2	Drawing:	Mechanical View(s)	Under Preparation
8.3	Drawing:	Hydraulic Block Diagram	Under Preparation
8.4	Drawing	Electrical Schematic	Under Preparation





