GETTING STARTED

EQUIPMENT NEEDED: LTV 1200 Ventilator, patient appropriate ventilator tubing, patient appropriate mask and system to secure it to the patient’s face. You will probably also need the blue silicone adaptor to connect the mask to the tubing. **REMEMBER, THESE ADAPTORS ARE NOT DISPOSABLE!**

1. Use the pediatric circuit for patients weighing less than 20 kilograms.
2. Tape exhalation holes in mask (if any) to minimize leaks. **The LTV 1200 tubing has an exhalation side. Having exhalation holes open in addition to that will cause excessive leakage, ventilator autocycling, and marked increase in oxygen consumption.**

TO PUT VENTILATOR INTO NONINVASIVE MODE

1. Press ON / STANDBY. “SAME PATIENT” will be displayed.
2. Turn set value dial until “NEW PATIENT” is displayed.
3. Press and release the select button. “INFANT” will be displayed.
4. Turn set value dial until “ADULT” is displayed.
5. Press and release the select button once. The ventilator will begin to cycle using the default adult settings.
6. Press and release the “Assist / Control, SIMV / CPAP” mode button until the NPPV LED flashes. Press the button once more to confirm. **The “NPPV” LED will continue to flash. “SET IPAP” will be displayed. The Pressure Support Control display will be bright. All other controls will be dim.**
7. Adjust the IPAP utilizing the Set Value Dial and watching the Pressure Support LED window. **10 is often a good starting point. Increase the IPAP to correct ventilatory problems (ie high PCO2)**
8. Once the IPAP is set as desired, press the PRES. SUPPORT button to confirm. **“SET EPAP” will display. The PEEP Control display will be bright. All other controls will be dim.**
9. Turn the Set Value dial to adjust the EPAP setting. **5 is often a good starting point for the EPAP setting. Adjust the EPAP to correct oxygenation problems. THIS NUMBER SHOULD NOT EXCEED 10.**
10. Press the PEEP button to confirm the desired EPAP setting.
11. Maintain a 5 to 8 point difference between inspiratory and expiratory pressures. **REMEMBER THAT THE LTV 1200 COMPENSATES FOR PEEP. This means that the sum of the IPAP and the EPAP is the total PIP. To avoid gastric insufflation, the total PIP should not exceed 20.**
12. Set an Inspiratory Time of 0.8 to 1.2 seconds.
13. Set an appropriate breath rate for back up ventilation in the event that the patient becomes apneic. **In the event of patient apnea, the ventilator will alarm and initiate a back up ventilatory rate of at least 12 BPM. Particularly at lower settings, this will probably not generate sufficient tidal volume to support the patient. REMEMBER, APNEA IS A CONTRAINDICATION FOR NPPV. If it becomes an issue, the patient may well need to be intubated and ventilated.**
14. The sensitivity is likely to need to be set significantly higher than would be typical for standard mechanical ventilation to avoid assisting the patient more than they are comfortable with. **Overcycling will significantly increase the patient’s anxiety and reduce the likelihood of their being able to tolerate NPPV via the LTV 1200.**
CIRCUIT SELECTION

1. Use the pediatric circuit for patients weighing less than 20 kilograms.

GENERAL SET UP

1. Standard per tidal volume is 4 to 8 ml / kg ideal body weight. Adjust to maintain plateau pressure 30 or less. May need to increase rate to maintain minute ventilation and avoid hypercarbia.

2. In the setting of ARDS / Acute lung injury, tidal volumes should be set at 4 to 6 ml / kg.

3. Use the following Ideal (AKA Predicted) Body Weight and Tidal Volume formulas or refer to the attached chart.
   \[
   \text{MALES} = 50 + 2.3(\text{height in inches} - 60) \\
   \text{FEMALES} = 45.5 + 2.3(\text{height in inches} - 60)
   \]

4. Standard ventilator rate is 8-12 breaths per minute. Adjust per ABG or ETCO2

5. Usual inspiratory time for an adult is 0.8 to 1.2 second. Adjust for patient comfort/flow rate.

6. Flow is displayed on the ventilator as "Vcalc". This should be between 50 and 60 LPM. It can be manipulated by adjusting the Inspiratory Time.

7. High pressure alarm should be set 10 points above baseline.

8. Low pressure alarm should be set 10 points below baseline.

9. Low minute volume alarm should be set 10% to 15% below baseline.

CHECKING PLATEAU PRESSURE

All patients being ventilated in volume control should have their plateau pressures checked on initiation of ventilation and as needed thereafter. Plateau pressures can only be accurately checked in volume control.

1. Press "Insp / Exp Hold" again and hold until "PLATEAU PRESSURE" and a numeric value are displayed. The plateau pressure should be kept below 30. If needed, the safest way to reduce the plateau pressure is by reducing the tidal volume. It can also be reduced by reducing the PEEP.

Increasing PIP's accompanied by increasing plateau pressures can be indicative of pneumothorax, mainstem intubation or atelectasis. Increasing PIPs without an increase in plateau pressure indicates an airway issue, (ie secretions or bronchospasm).

Plateau pressure is also a good starting point if you need to change your patient from Volume to Pressure Control Ventilation. Begin with a pressure equal to the plateau pressure and increase or decrease the pressure based on the patient's exhaled tidal volume. REMEMBER NOT TO GO ANY HIGHER THAN A TOTAL PRESSURE OF 30 (INSPIRATORY PRESSURE+PEEP).

CHECKING FOR AUTO PEEP

The presence of auto p eep (air trapping) can be evaluated in either volume or pressure control. However, the patient cannot be breathing spontaneously for it to be accurate. High auto p eep in volume control can cause increased alveolar pressures leading to an increased risk for pneumothorax and the potential for hemodynamic compromise. Patients at risk for autpeep are those with asthma, COPD, or tachypnea of any etiology.

1. Press and release "Insp / Exp Hold" button.

2. Repeat once. The indicator light should be blinking and "EXP HOLD" should appear on the display.

3. Press and hold the "Insp / Exp Hold" button until "P EXP" is displayed, then release. The auto p eep value will then be displayed.

High auto p eep can be reduced by reducing minute ventilation. The two best ways to do that are:

1. Respiratory rate reduction.

2. Inspiratory time reduction. This will indirectly increase the expiratory time.
Pressure Control Ventilation is useful in the setting of ARDS / Acute Lung Injury to reduce barotrauma or when the patients flow requirements cannot be met using volume control.

GETTING STARTED
1. Use the pediatric circuit for patients weighing less than 20 kilograms.

GENERAL SET UP
1. Initial pressure control settings can be determined by:
   A. Using the plateau pressure value if the patient had been in volume control ventilation. (See the volume control quick reference for instruction on checking plateau pressure)
   B. If a plateau pressure cannot be obtained, use an initial setting of 20. Either way the pressure should be adjusted to obtain an exhaled tidal volume (Vte) of approximately 4 to 8 ml / kg depending upon the reason for using pressure control. REMEMBER THAT THE LTV 1200 COMPENSATES FOR PEEP. THIS MEANS THAT THE TOTAL PRESSURE SETTING (PIP) IS EQUAL TO THE SUM OF THE INSPIRATORY PRESSURE PLUS THE PEEP. THE TOTAL PRESSURE SETTING (INSPIRATORY PRESSURE + PEEP) SHOULDN'T BE HIGHER THAN 30.

2. Usual inspiratory time for an adult is 0.8 to 1.2 second.
3. Standard ventilator rate is 8-12 breaths per minute. Adjust per ABG or ETCO2
4. High pressure alarm should be set 5 points above the programmed value.
5. Low pressure alarm should be set 5 points below the programmed value.
6. Low minute volume alarm should be set approximately 10% to 15% of the expected value. This is particularly important because the minute volume will decrease if compliance worsens. If allowed to go uncorrected, the patient is at risk for CO2 retention and atelectasis.

Compliance can also suddenly improve following suctioning, bronchodilators, or occasionally even coughing. Monitor the exhaled tidal volume (Vte) and be prepared to adjust the pressure setting if necessary.

CHECKING FOR AUTO PEEP
The presence of auto peep (air trapping) can be evaluated in either volume or pressure control. However, the patient cannot be breathing spontaneously. Patients on pressure control who have a high auto peep can experience difficulty triggering the ventilator, and/or a reduction in exhaled tidal volume potentially leading to CO2 retention and atelectasis. Patients at risk for auto peep are those with asthma, COPD or tachypnea of any etiology.

1. Press and release "Insp / Exp Hold" button.
2. Repeat once. The indicator light should be blinking and "EXP HOLD" should appear on the display.
3. Press and hold the "Insp / Exp Hold" button until "P EXP" is displayed, then release. The auto peep value will then be displayed.

High auto peep can be reduced by reducing minute ventilation. The two best ways to do that are:
   A. Respiratory rate reduction.
   B. Inspiratory time reduction. This will indirectly increase the expiratory time