



# Performance Evaluation Fixture

## Team: 14026

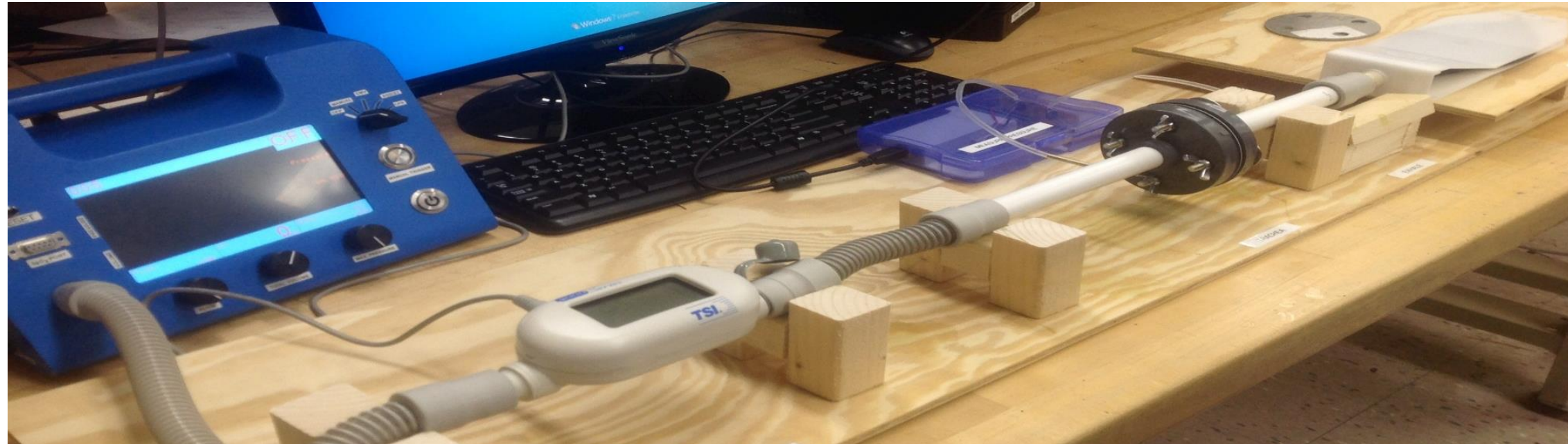


A Portable Emergency Ventilator (PEV) is a device used to provide mechanical ventilation to a person incapable of breathing on his or her own. In the 1980's, Jeff Gutterman and Dr. Roman Press developed the MEDIRESP III a PEV capable of a manual, assist, constant mechanical ventilation, and CPR mode. Years later the PEV was passed on to team 13026 and then 13027. This project focuses on characterizing the performance of the PEV designed by team 13027. The goal of this project is to determine if the MEDIRESP is capable of saving a life and what range of people the device would be successful on.

### Acknowledgements

Prof. Edward Hanzlik – RIT

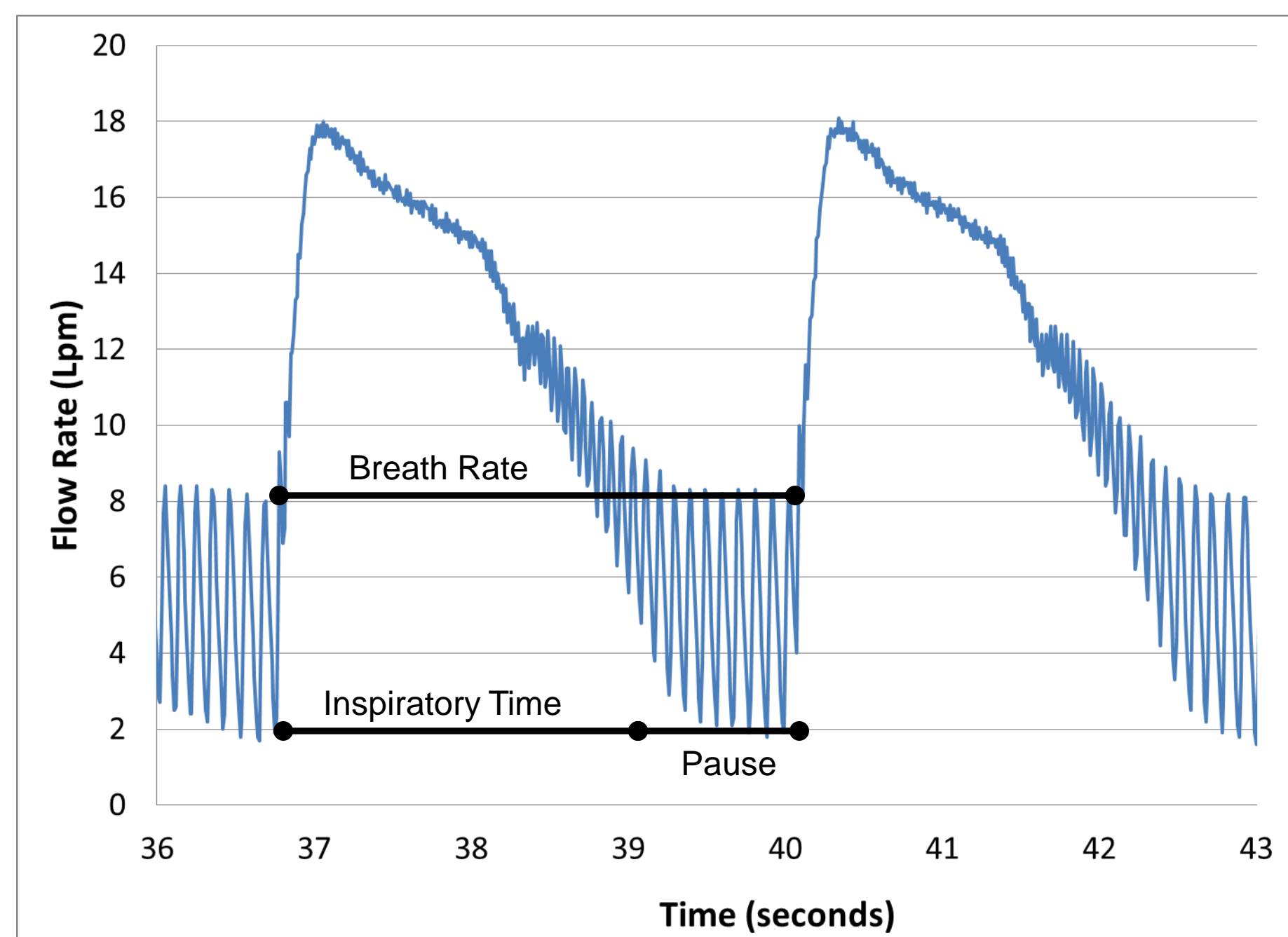
Jeffery Gutterman  
Dr. Roman Press  
Mary Murphy



## Key Engineering Requirements

## Tests & Results

rqmt. #	Engr. Requirement (metric)	Unit of Measure	Marginal Value	Ideal Value(s)
A2	Flow Rate Measurement Capability	mL/sec	+/- 1	0-100
A3	Lung Compliance	mL/cmH2O		0.1
A5	Pressure Measurement Capability	cmH2O		+/- 0.1
A6	Resistance of Trachea & Lung	cmH2O/L/sec		19-27
A7	Leak Test Configuration 3	Lpm		0
A8	Maximum Lung Volume	mL		1000
S1	Breath Rate	bpm		0-80
S2	Inspiration Time	sec		0.3-9.9
S3	Rise Time	sec		.1-.9
S4	Tidal Volume	mL		1000
S5	Inhale:Exhale Ratio	-		1:1
S6	Pressure Provided	cmH2O		0-108
S9	Extrinsic Peak End-Expiratory Pressure	cmH2O	0.05	0-20
S11	Mean Airway Pressure	cmH2O	0.61	0-99
S12	Intrinsic Peak End-Expiratory Pressure (AKA Auto-PEEP)	cmH2O	0.03	3.0-5.0



## Key Customer Requirements

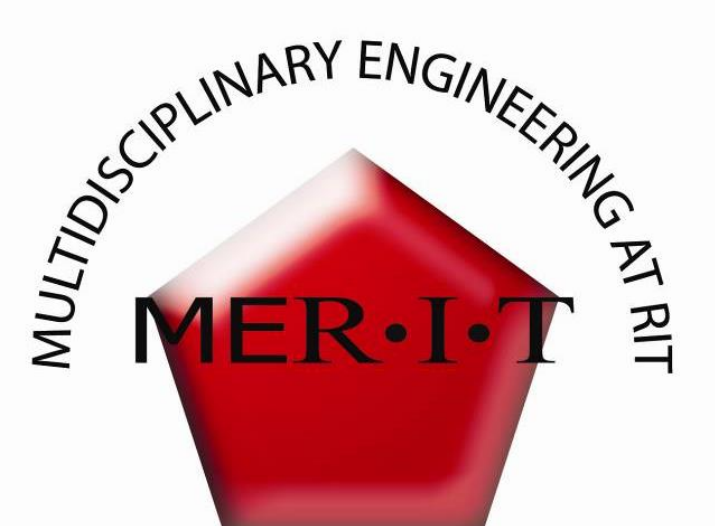
Tidal Volume via PEV	Max Flow via PEV	Max Flow via Tester	Breath Rate	Rise Time	Inspiration Time	Pause
780 mL	32 Lpm	18.1 Lpm	18.07 bpm	.27 sec	2.43 sec	.89 sec

Customer Need #	Importance	Description
CN1	9	Adjustable Lung Compliance
CN3	9	Measures Respiratory Rate
CN4	9	Measures that air pressure is always at PEEP level
CN6	9	Measures Inspiration/Exhalation Ratio
CN7	9	Measures pressure levels
CN8	9	Measures max lung volume
CN9	9	Measures flow rates
CN17	9	Validation of 4 PEV Modes
CN2	3	Adjustable Trachea and Lung Resistance

Type	Condition	Age [y]	Breath Rate [bpm]	Height [cm]	Tidal Vol [mL]
Preteen	Healthy	10	22	129.5	300.0
				147.3	445.1
		14	16	157.5	747.9
				160.0	795.1
Teen	Healthy	15	20	167.6	966.2
				170.2	1015.4
		19	14	172.7	1172.6
				177.8	1269.0



Team 14026: (Top Row, left to right) Soham Chakraborty (Electrical Engineer), Michael Allocco (Mechanical Engineer), Andrew Miller (Mechanical Engineer); (Bottom Row, left to right) Stephanie Zambito (Electrical Engineer), Kristeen Yee (Industrial Engineer), Danielle Koch (Mechanical Engineer), and Leslie Havens (Electrical Engineer).



Senior Design