

Quarterly Technical Progress Report
No. 6 – January 24, 2000

Electronic Refrigerant Leak Detector
Micronic, Inc. – Elie Talamas, Jr.

DE-FG36-98GO10301-002
Period: 10/1/99 to 12/31/99

Introduction

The project comprises of three main tasks. They are: (1) Develop, design and fabricate (20) sensors, (2) Develop, design and fabricate (5) test instruments, (3) Testing and data analysis. The extended project period is from April 30, 1998 to April 30, 2000.

Task 1. Develop, design, and fabricate 20 sensors

- A. Finalize the design of sensor objective with SRI Int., and generate a P.O. (QTPR #1 completed).
- B. Develop, design, and fabricate (20) sensors by SRI Int. (QTPR #5, completed).

Task 2. Develop, design, and fabricate 5 test instruments

- A. Design and optimize each subcircuit.

Purchase test equipment (QTPR #1, 60% completed; QTPR #2, 75% completed; QTPR #3, 90% completed; QTPR #4, 92% completed; QTPR #5, 95% completed; QTPR #6, 98% completed).

- a. The following items were purchased (QTPR #6): 8(partial), 13 (partial), and 14 (partial).
The following items will be purchased (QTPR #7): 8(partial), 14(partial), and 15 (partial).

Evaluate components (QTPR #1, 100 % completed; QTPR #2, additional 15%, QTPR #3, additional 15%, QTPR #4, additional 15%, QTPR #5, additional 5%. completed).

- c. Breadboard circuit (QTPR #1, 0%; QTPR #2, 75% completed, QTPR #3, 90% completed, QTPR #4, 95% completed; QTPR #5, 98% completed; QTPR #6, 100% completed).

The evaluation of the Max618 dc-dc converter was completed. The circuit was used to drive the heater of the sensor. A second Max618 was purchased and tested, since the first one was damaged due to replacement of components.

- d. Simulate circuits (QTPR #1, 20% completed; QTPR #2, 25% completed, QTPR #3, 40% completed), (to be completed QTPR #7).

There were no circuit simulation this quarter.

- e. Design, build, and test two bench prototypes (QTPR #1, 15% completed; QTPR #2, 30% completed, QTPR #3, 60% completed, QTPR #4, 90% completed), (to be completed Quarter #7).
- f. Test the assembler, emulator, and LCD display. (QTPR #1, 80%; QTPR #2, 100% completed).

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G. Write the code for PIC microcontroller (QTPR #1, 0%; QTPR #2, 0%; QTPR #3, 0%, QTPR #4, 0%, QTPR #5, 0%, QTPR #6, 20% completed).

h. Purchase and test measurement system. (QTPR # 1, 20% completed; QTRP # 2, 25% completed; QTPR #3, 50% completed; QTPR #4, 60% completed; QTPR #5, 95% completed, QTPR #6, 98% completed).

Labview programming for control and data acquisition is 90% completed. Labview was used to measure the current response of two sensors. These sensors were tested for response and recovery time due to exposure to refrigerant gas. The effect of several bias voltages, sensitivity to refrigerant-134a, drift, noise and stability, the effect of the heater voltage, and the effect of annealing of the sensor, were investigated.

With the support of Keithly Instruments, the layout of the test fixture for the bias voltage and heater drivers were built and tested. The low-level current measurements are susceptible to noise. The connectors mounted on the detection chamber were also modified.

B. Generate engineering drawings (QTPR # 2; 20% completed, QTPR #3, 30% completed, QTPR #4 30% completed; QTPR #5 30% completed).

C. Generate and revise the layouts for printed circuit board fabrication (QTPR #1, 90% completed; QTPR # 2, 100% complete).

D. Build five prototypes for bench testing. (QTPR #2, 0% completed; QTPR #3, 0% completed), (to be started Quarter #7).

E. Purchase, build and, test the gas delivery system. (QTPR #1, 20% completed; QTPR #2, 50% completed; QTPR #3, 50% completed; QTPR #4, 80% completed; QTPR #5, 95 % completed; QTPR #6 985% completed).

The design and fabrication of the o-ring for the detection chamber was modified. The detection chamber was tested for leaks. Bulkhead adapters were added. The pressure-relief valves were tested and set.

Task 3. Testing and data analysis

A. Test sensors (QTPR #2, 0% ; QTPR #3, 0%; QTPR #4, 0%; QTPR #6, 10% completed)

B. Test 5 instruments (QTPR #2, 0%; QTPR #3, 0%; QTPR #4, 0%), (to be started Quarter # 7).

Task 4. Reporting

QTPR #1, 10/15/98; QTPR #2, 1/25/99; QTPR #3, 4/24/99; QTPR #4, 7/21/99; QTPR #5 10/27/99, QTPR #6, 1/24/00.

Task 5. Business, Marketing, and Patent (Not Funded)

Elie attended the Tech-East show in Miami.

EQUIPMENT

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<u>Item</u>	<u>Description</u>	<u>Quote 6/16/98</u>	<u>Cost</u>	<u>Variance</u>	<u>Comment</u>
8.	Lab supplies	600.00	338.84a	1,573.75	Other items required
13.	Gas testing fixture	1,500.00	52.05	1,509.85	Partial
14.	Gases-refrig, others	1,400.00	86.46	(601.84)	Partial
		<u>\$3,500.00</u>	<u>\$477.35</u>	<u>\$2,481.76</u>	

Notes:

- a. Items purchased for project were paid with non-project funds. \$1,252.43 to be reimbursed to Micronic. \$846.39 charged to American Express + \$406.04 paid with Micronic's corporate check, for a total of \$1,252.43 (QTPR #5) American Express credited \$185.85 (QTPR #6)...

STATEMENT
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<u>DESCRIPTION</u>	<u>PROG. MGT</u>	<u>DIR. LABOR</u>	<u>SUBCONT.</u>	<u>TOTAL</u>
Federal share	338.84	3,948.18	180.00	\$ 4,467.02
Disbursement	338.84	3,948.18	180.00	\$ 4,467.02

Notes:

1. Direct Labor

Draw based on funded amount.

Project period (10/1/99 to 12/31/99) ...\$9,479.04 ...384hrs.@ \$24.685 ...
2592 hr. (see below) – 1664 hr. (funded) = 928 hr. not funded.

DIRECT LABOR HOURS

Based on 32hrs. / Week for 52 weeks or 1664 hr. ...extended 1 year.

Estimated additional direct labor ...May 1999 to April 2000 ... 12 months @ 132 hr./ month = 1584 hr
@ \$24.685 = \$39,101.04 (not funded).

	<u>May</u>	<u>June</u>	<u>July</u>	<u>Aug.</u>	<u>Sept.</u>	<u>Oct.</u>	<u>Nov</u>	<u>Dec</u>
Timetable	136	144	152	136	152	144	136	160
Actual	<u>46</u>	<u>109</u>	<u>119.5</u>	<u>102</u>	<u>174</u>	<u>172</u>	<u>136</u>	<u>220</u>
Cumulative	-90	-125	-157.5	-191.5	-169.5	-141.5	-141.5	-81.5

	<u>Jan</u>	<u>Feb</u>	<u>March</u>	<u>April</u>	<u>May</u>	<u>June</u>	<u>July</u>	<u>Aug</u>
Timetable	136	136	136	(136)	(132)	(136)	(140)	(144)
Actual	<u>136.5</u>	<u>84</u>	<u>143</u>	<u>134</u>	<u>117</u>	<u>106</u>	<u>120</u>	<u>137</u>
Cumulative	-81.0	-133.0	-126.0	+8	+125	+231	+351	+488

	<u>Sep</u>	<u>Oct</u>	<u>Nov</u>	<u>Dec</u>	Total
Timetable	(153)	(136)	(136)	(152)	
Actual	<u>152</u>	<u>122</u>	<u>152</u>	<u>110</u>	2592
Cumulative	+640	+762	+914	+1024	