NTRD Program Disclaimers

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Texas Commission on Environmental Quality
New Technology Research & Development (NTRD) Program
Monthly Project Status Report

Contract Number: 582-5-655-91-0007

Grantee: Converter Technology Inc

Date Submitted: November 9, 2004

Report for the **Monthly** period:

Starting Date Aug 1, 2004 Ending Date Oct 31, 2004

Section I. Accomplishments *(Please provide a bulleted list of project accomplishments as well as a description of their importance to the project.)*

- First meeting with CARB verification team took place on September 2, 2004, in El Monte, California, to coordinate verification plan. The meeting lasted four hours with anticipated full cooperation and support for the tasks ahead. A liaison engineer is assigned to our case, first submittal was sent to them in September 2004.
- Development of data acquisition system for demo projects on the road. The attached schematics highlight the current status of the system to be used.
- Search; acquire all relevant data regarding EGR injection strategies. We have a good plan for achieving 70% NOx reduction. We have a preliminary plan for developing EGR injection strategy based on effective PM control system.
- Design of particulate retrofit for two engine families

Indicate which part of the Grant Activities as defined in the grant agreement, the above accomplishments are related to:

1. Task #3, Design of retrofit system for two engine families, converter design has been accomplished. EGR design is in progress.
2. Task #4, Construction of converter system, EGR and data acquisition system
3. Task #5 and #6, EGR mapping
4. Task #8, on-the-road emission testing and durability
5. Task #11, verification program, EPA and CARB

Section II: Problems/Solutions

Problem(s) Identified *(Please report anticipated or unanticipated problem(s) encountered and its effect on the progress of the project)*	*None during this period*
Proposed Solution(s) *(Please report any possible solution(s) to the problem(s) that were considered/encountered)*	*n/a*
Action(s) Conducted and Results *(Please describe the action(s) taken to resolve the problem(s) and its effect)*	*n/a*

Section III. **Goals and Issues for Succeeding Period**: (*Please provide a brief description of the goal(s) you hope to realize in the coming period and identify any notable challenges that can be foreseen)*

1. Start of in-house emission testing for EGR mapping for the Caterpillar 3406 engine.
2. Develop a maintenance-free particulate converter employing off-flow path particulate incinerator. This alternative is a potential substitute for the reverse pulse jet technique. If successful, we could have a particulate converter with 100,000 miles maintenance-free intervals.
3. Demonstrate the particulate converter capabilities in particulate reduction in-house and on-the-road to appreciate its effectiveness in assisting with the highest NOx reduction.
4. Procure and construct mobile data acquisition system for trial runs on the road.
5. Start working on task #1, Texas Market Assessment and needs

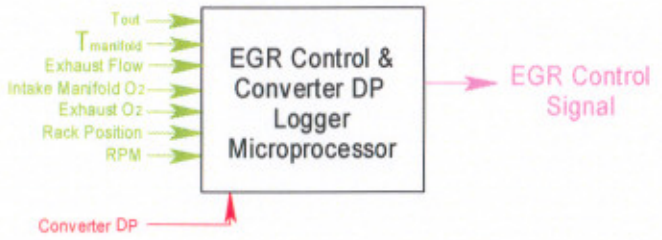
R. D. Kamman Date: Nov. 9, 2004

Authorized Project Representative's Signature

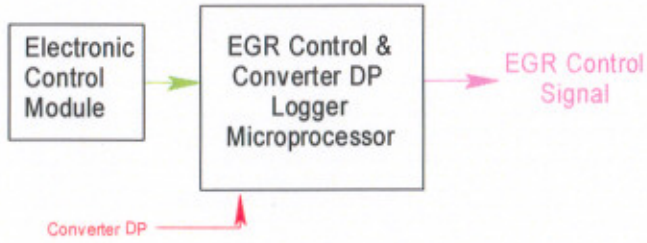
NOTE: *Please attach any additional information that you feel should be a part of your report or that may be required to meet the deliverable requirements for tasks completed during this reporting period.*

Attachments:

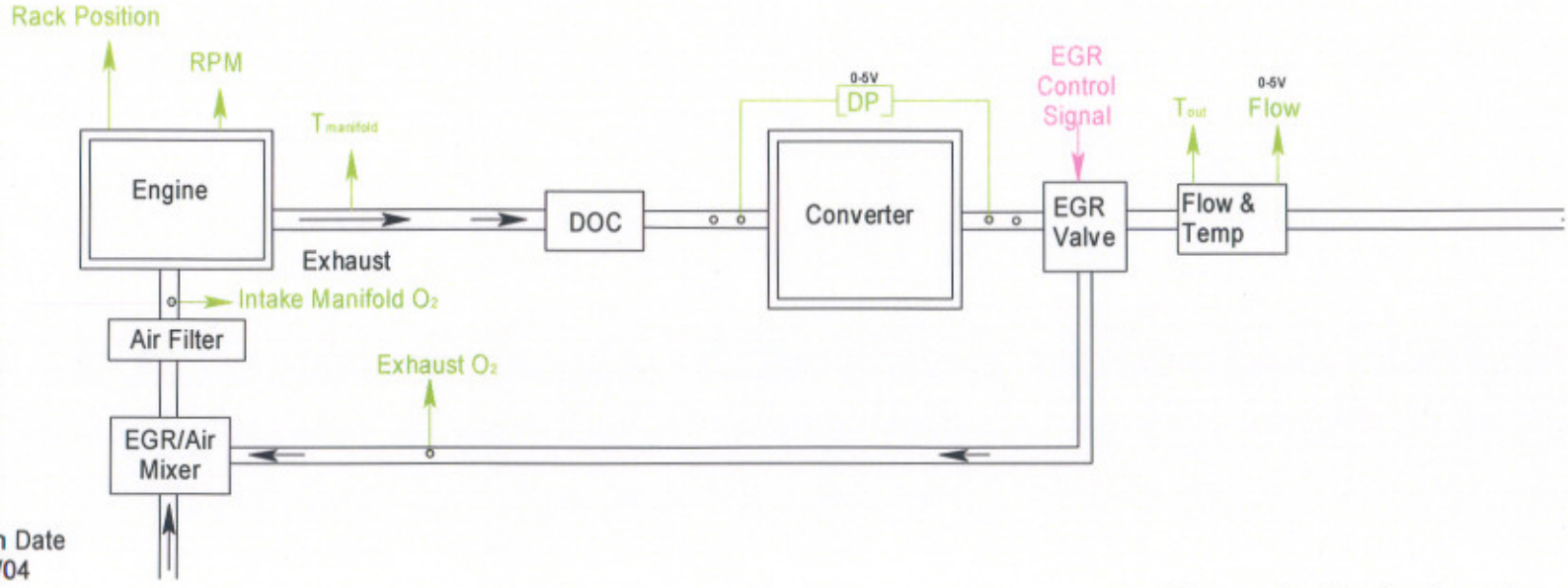
1. Mobile Data Acqusition System, two drawings
2. Traverse City Newspaper Article



Old Engine Configuration



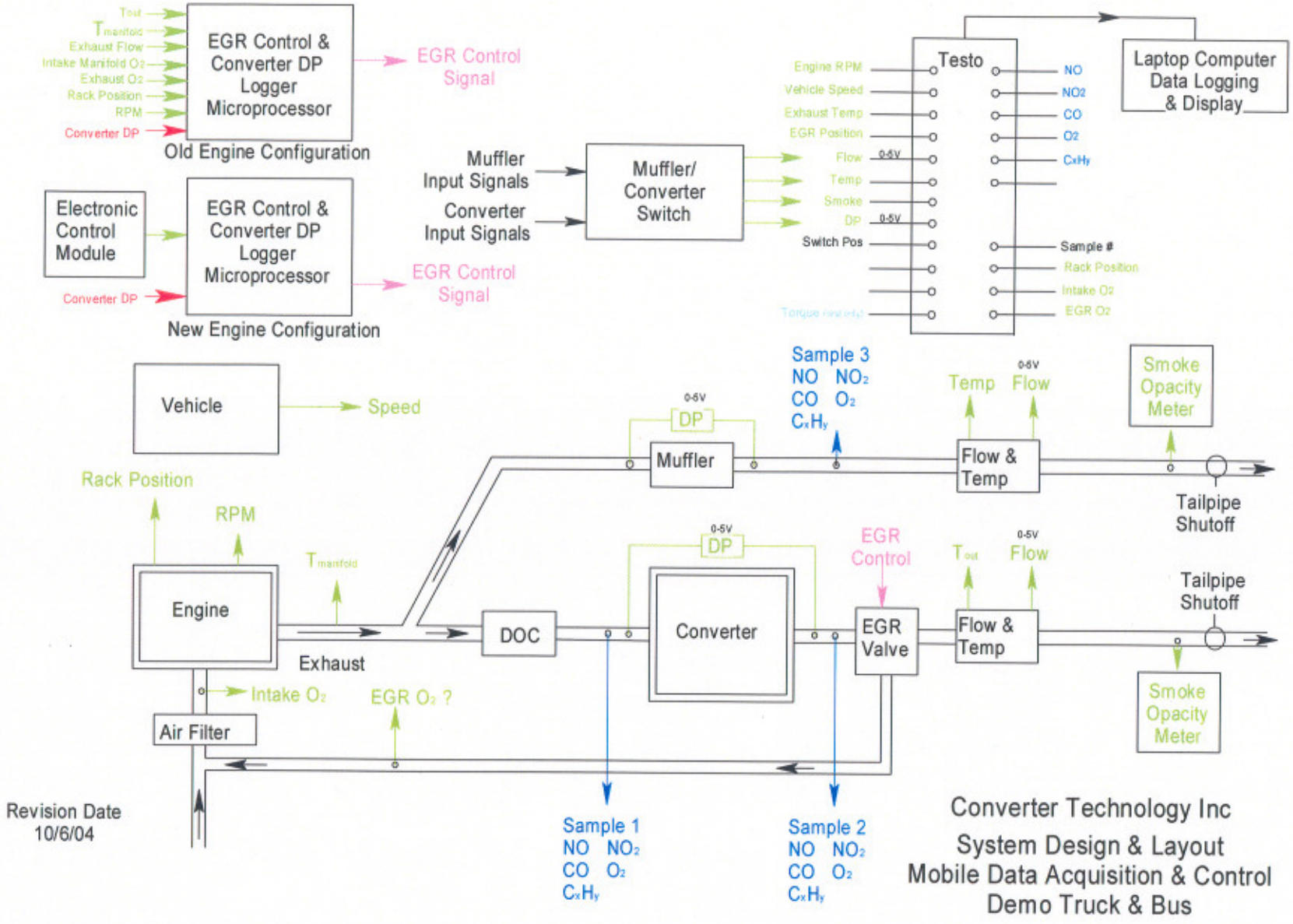
New Engine Configuration



Revision Date
10/6/04

Note: Converter DP Logger stores D P value once per second for the last hour of vehicle operation.

Converter Technology Inc
System Design & Layout
Converter & EGR System
Truck & Bus


Tout
Tmanifold
Exhaust Flow
Intake Manifold O2
Exhaust O2
Rack Position
RPM
Converter DP
EGR Control & Converter DP Logger Microprocessor
EGR Control Signal
Old Engine Configuration
Electronic Control Module
Converter DP
EGR Control & Converter DP Logger Microprocessor
EGR Control Signal
New Engine Configuration
Muffler Input Signals
Converter Input Signals
Muffler/ Converter Switch
Testo
Engine RPM
Vehicle Speed
Exhaust Temp
EGR Position
Flow
Temp
Smoke
DP
Switch Pos
0-5V
0-5V
NO
NO2
CO
O2
CxHy
Sample #
Rack Position
Intake O2
EGR O2
Laptop Computer Data Logging & Display
Vehicle
Speed
Rack Position
RPM
Tmanifold
Engine
Exhaust
Intake O2
EGR O2 ?
Air Filter
DP
Muffler
Sample 3
NO NO2
CO O2
CxHy
Temp
Flow
0-5V
Flow & Temp
Smoke Opacity Meter
Tailpipe Shutoff
DP
DOC
Converter
EGR Control
EGR Valve
Tout
Flow
0-5V
Flow & Temp
Tailpipe Shutoff
Smoke Opacity Meter
Sample 1
NO NO2
CO O2
CxHy
Sample 2
NO NO2
CO O2
CxHy
Revision Date
10/6/04
Converter Technology Inc
System Design & Layout
Mobile Data Acquisition & Control
Demo Truck & Bus

TRAVERSE CITY RECORD-EAGLE
SUNDAY July 26, 2004

Muffling pollution problem

Converter system virtually eliminates blue smoke, bus odor

BY BILL O'BRIEN
Record-Eagle business editor

Mechanic Chris Burke of the Bay Area Transportation Authority inspects a Michigan-made stainless steel converter on a Cherriot bus. The system removes more than 90 percent of the pollution particles in diesel exhaust.

TRAVERSE CITY- The Bay Area Transportation Authority will utilize a Michigan-made product to tackle noxious fumes from its city bus fleet.

BATA is installing a two-part converter system on its Cherriot buses developed by a technology company near Jackson to keep its pledge to the city's neighborhoods to clean up its diesel bus fleet. Smoke and smell from those vehicles were a major source of complaints in some neighborhoods when BATA's fixed-route bus runs started in and around Traverse City four years ago.

"We were taking a lot of heat over our buses," said Don Scharmen, BATA's assistant executive director for operations. "Our board made a promise to look at these issues and this is part of what we're doing."

After almost two years of researching various engine filter and converter systems, BATA connected with Converter Technologies Inc. of Michigan Center. The company is headed by Ray Kammel, who began working on diesel engine converters back in the 1980s to help foreign car makers meet federal emission standards for diesel vehicles.

Merv Carse, who heads the company's marketing arm, said the firm spent around $3 million to develop the converter technology being used by BATA.

"Diesel exhaust is pretty nasty stuff," said Carse, a former executive in Ford Motor Co.'s European division.

But diesels continue to have an advantage in terms of mileage, cost and durability over other engine types, he said. "The diesel is still the engine of the future, at least for the next few decades," Carse said.

The converter system being installed on BATA buses involves two major components. The first stage runs the diesel exhaust through an "oxidation catalyst" under the bus that produces a chemical reaction to eliminate some of volatile organic compounds.

At the back end of the system, the exhaust is cooled through a winding 15-foot pipe before entering a large stainless steel converter under the back end of the bus. The trap collects most of the remaining particles, virtually eliminating odors and blue smoke typically associated with diesel engines.

Carse said the steel converter, which looks like a large muffler, is designed to force the tiny exhaust particles to collide and stick together, and then traps them at the back end of the unit. The system is maintained every few months by blowing air back through the system, forcing the collected carbon into a trap that can be removed and cleaned.

Scharmen said one advantage is that the converter works with standard diesel fuel, and doesn't require low-sulfur diesel that is more costly and difficult to get in some parts of the country.

"The best thing about this system is that there are no moving parts," Carse said. "The more you run it, the better it works."

The equipment costs about $8,000 per vehicle and eventually will be installed on all eight Cherriot buses, Scharmen said.

Carse said the company is presently spending around $800,000 to have the system approved by the U.S. Environmental Protection Agency. That would make the product eligible for federal funding and would create potentially hundreds of new markets for the converter, he said.

"There seems to be interest all around the state in putting these in," Carse said.