QUALITY SYSTEMS DEPARTMENT

XCELLSIS
The Fuel Cell Engine Company

TITLE **CUSTOMER REPORT OF ZEBUS AT SUNLINE TRANSIT (JUNE 1, 2001 to JUNE 30, 2001)**

FILE #: QSR-0052 **DATE:** 7/6/2001 **PAGE:** 1 of 5

ISSUED BY:	Quality Systems	
PREPARED BY:	Zhenqi Liu	
DISTRIBUTION APPROVAL:	Project Manager:	Date:

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BILL CLAPPER	SUNLINE

Quality Systems Manager **Quality Supervisor**

Silvano Pozzi

Ron Wallace

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THIS DOCUMENT ADDRESSES ALL SUNLINE TRANSIT REPORTING REQUIREMENTS TO THE FEDERAL TRANSIT ADMINISTRATION REFERENCE AGREEMENT 201-11-G, SECTION 2.11 (a) I, ii, iii, iv and (b) I, ii, iii, iv, vi.

1. BASIC VEHICLE DATA

1.1 BASIC VEHICLE DATA

(a) Baisc Vehicle Data

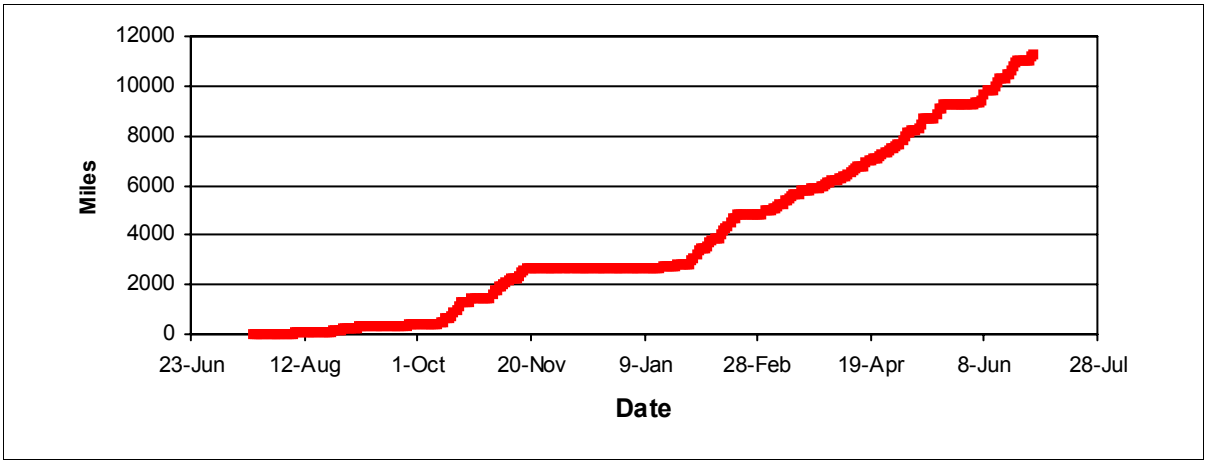
VEHICLE ID	**2FYE2LM19RP015476**
PHYSICAL DIMENSIONS	**40.8x8.5x11.0 ft (12.4x2.57x3.4 m)**
CARRYING CAPACITY:	
Seated	**39 + 1 driver**
WEIGHT:	
Curb - Weight	**32,013 lb (14521 kg)**
GVWR	**38,581 lb (17500 kg)**
HYDROGEN TANK:	
Type	**DYNETEK-DYNECELL (TYPE-3)**
Number	**8 cylinders**
Compression Pressure	**3600 psig**
Volume [M3]	**90.41 Cubic feet (2.56 Cubic meter)**
Capacity	**100.5 lb (45.6 kg)**

(b) Picture of ZEBUS

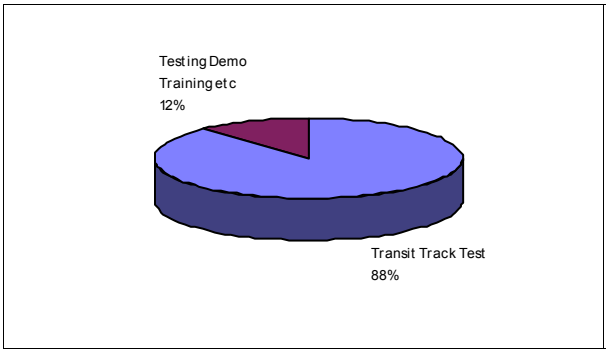
2. OPERATION DATA

2.1 MILEAGE

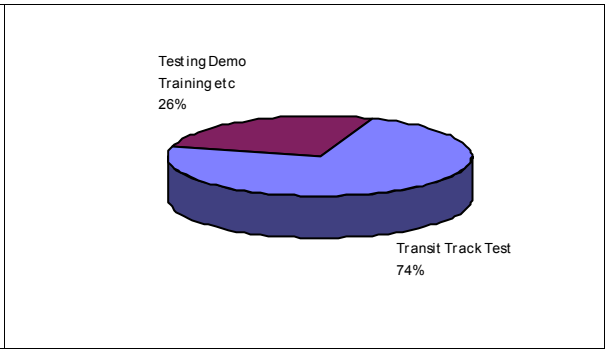
(a) Accumulated miles (all purposes) of ZEBUS at SUNLINE since July 20, 2000



(b) Accumulated miles since July 20, 2000



(c) Accumulated hours since July 20, 2000



(d) Summary of Accumulated miles and hours since July 20, 2000

	Accumulated miles	Accumulated hours	Average speed [mile/hr]
Transit Track Test	9930.2	469.2	21.2
Runs of other purposes	1336.0	168.5	7.9
Total	11266.2	637.7	17.7

ANALYSIS:

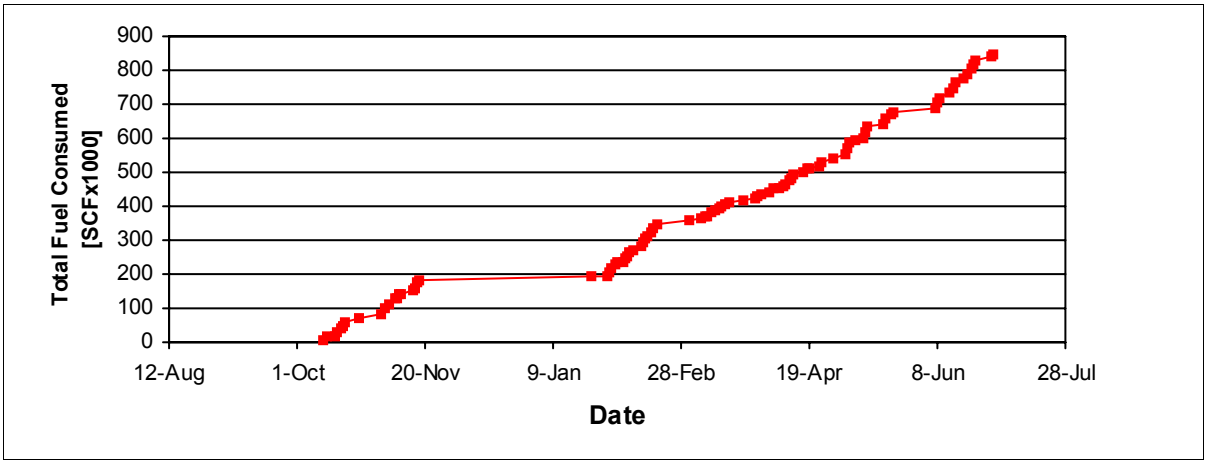
ANALYSIS OF CURRENT SITUATION:
1. High hours relative to low miles are the result of functional testing of engine with bus in static condition (ie. Non-road testing).
2. Unexpected high bus failure rate directly affected availability for scheduled runs.
3. Fuel station performance resulted in limited fuel availability.
4. Water balance has affected scheduled runs.
5. Excessive ambient temperatures limiting engine power output.

APPLICABLE SOLUTION UNDER EVALUATION (Short Term):
1. Limit of engineering P4T upgrades to essential requirements only.
2. Operate test lab P4T engine in Vancouver (Canada) for functional tests to pre-empt failures and evaluate components and sub-systems related to bus engine.
3. Alternate hydrogen sources are being reviewed by SunLine.
4. Optimize cooling system to improve water balance by allowing rad. fans to be operated 100%, obstruction from air intake, separate radiator from engine bay.

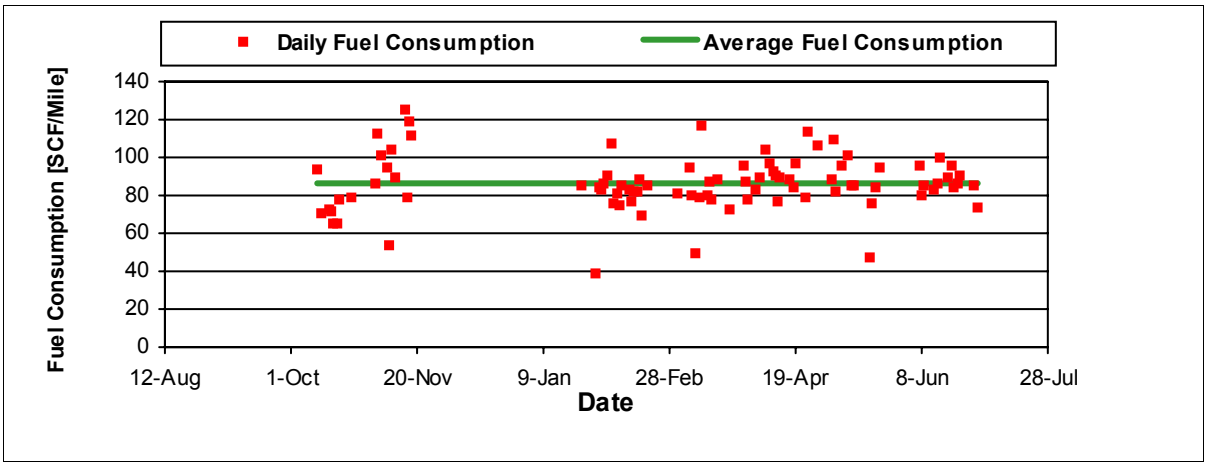
EXTENDED SOLUTION (Long Term):
1. Complete functional test and start transit track testing (long endurance run).
2. Reduce system sensitivity by adjusting warning and alarm settings.
3. Reduce downtime by focusing on improving system reliability.
4. Enlarge cooling capacity for higher ambient temperature range.

2.2 FUEL CONSUMPTION AND DRIVING RANGE

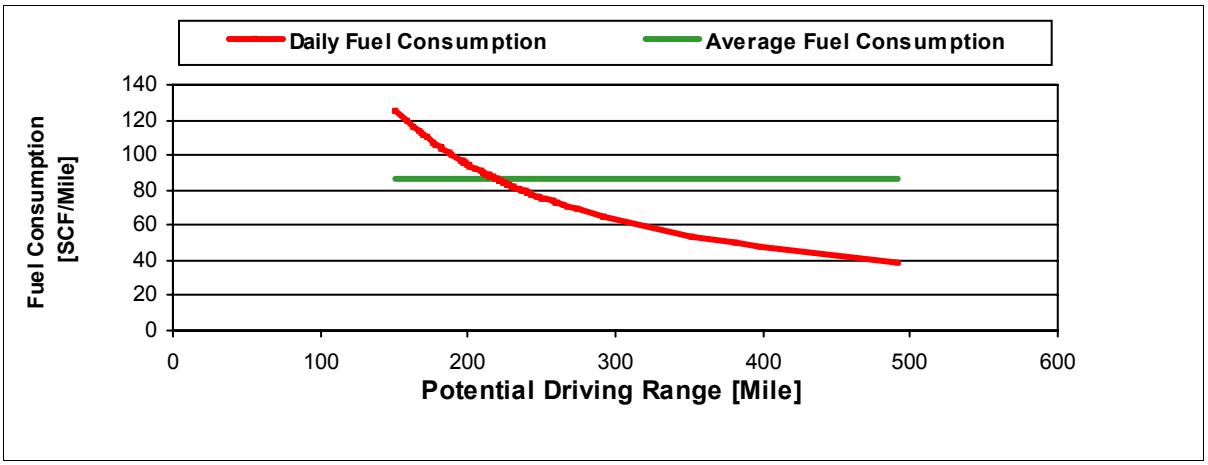
(a) Total Fuel Consumed of ZEBUS for Transit Track Test since July 20, 2000



(b) Fuel Consumption of ZEBUS for Transit Track Test since July 20, 2000



(c) Potential Driving Range of ZEBUS with Full Tank



2.2 FUEL CONSUMPTION AND DRIVING RANGE

(Continues from previous page)

CONCEPTS:

1. Graph (a), "Total Fuel Consumed of ZEBUS for Transit Track Test since July 20, 2000", shows total hydrogen consumed for transit track tests since July 20, 2000.
2. Graph (b), "Fuel Consumption of ZEBUS for Transit Track Test since July 20, 2000", shows daily and average consumption for transit track tests.
3. Graph (c), "Potential Driving Range of ZEBUS with Full Tank", shows fuel consumption vs. correspondent potential driving range (red line) . The potential driving range at average fuel consumption can be read at the intersection of the line "Daily Fuel Consumption" (Red) and the line "Average Fuel Consumption" (Green).

ANALYSIS:

ANALYSIS OF CURRENT SITUATION:

1. Fuel efficiency of fuel cell engine has been limited by the purge cycle. Purging medium is hydrogen and is used to prevent water accumulation and discharge of accumulated fuel impurities.
2. Fuel efficiency of fuel cell engine is negatively affected by parasitic loads.
3. Total kilograms of hydrogen consumed for transit track test at SunLine from July 20, 2000 to date is 2037.2 kg (844980 SCF)

APPLICABLE SOLUTION UNDER EVALUATION (Short Term):

1. Review and seek to optimize the purge cycle.
2. Operate at optimal efficiency.
3. Implement cooling system changes such as increase radiator air flow by removing DI filter canister from air intake area.
4. Implement overcooling on down-transients to reduce average fan power.

EXTENDED SOLUTION (Long Term):

1. Reduce purging as much as possible.
2. Improve hydrogen recirculation.
3. Reduce parasitic loads.
4. Optimize drive train ratios.

2.3 CONSUMABLES

(a) Summary of Consumables since July 20, 2000

	Hydrogen [SCF x 1000]	DI Water [Gallon]	Glycol [Gallon]	ATF [Gallon]	Lube Oil [Gallon]
July 2000	13.6				
August 2000	41.4		53		
September 2000	25.4	15			
October 2000	82.5				
November 2000	123.5	17			
December 2000	4.0				
January 2001	41.5				
February 2001	143.9	5			
March 2001	115.7	2			
April 2001	134.3	7			
May 2001	158.2	27		5	4
June 2001	179.7	24			
Total	1063.6	97	53	5	4

CONCEPTS:

1. The list above shows the summarized consumption results of consumables for all purposes of operation since July 20, 2000 up to the end date of this report.

ANALYSIS:

ANALYSIS OF CURRENT SITUATION:

1. High consumption of glycol and DI water is due to increased engine interventions requiring flushing of all circuits.
2. Functional tests pushing systems to their limits resulting in frequent change outs.
3. Frequent system inspections result in excessive replacement of consumables.
4. Cooling system is at maximum limiting water balance.

APPLICABLE SOLUTION UNDER EVALUATION (Short Term):

1. Completion of function testing on vehicle.
2. Transfer functional tests to the lab. engine.
3. Increase air flow to radiator to improve cooling efficiency.

EXTENDED SOLUTION (Long Term):

1. Inspection frequency will be decreased as result of test experience.
2. Gain a greater understanding of system limits.
3. Increase cooling system capacity.

2.4 MAINTENANCE

(a) Summary of Scheduled Maintenance since July 20, 2000

Scheduled Maintenance	Maintenance Interval	Accumulated number of times of implementation	Accumulated hours of implementation
Scheduled 6000km Inspection	Every 3728 miles (6000 km)	2	15.0
Scheduled 24000km Inspection	Every 14913 miles (24000 km)		
Scheduled 48000km Inspection	Every 29826 miles (48000 km)		
600hr Transmission Filter Change	Every 600 hours		
80hr Inspection and Services	Every 80 hours	7	28.0
300hr Burst Disk Change	Every 300 hours	1	1.5
Daily Inspection	Every day	172	188.3
3000 Miles Coach Inspection	Every 3000 miles	1	5.0
Scheduled 12000km Inspection	Every 7457 miles (12000 km)	1	4.0
New Flyer 12000 miles coach inspection	Every 12000 miles	1	4.0
		Total hours	245.8

ANALYSIS:

ANALYSIS OF CURRENT SITUATION:

1. Inspections are frequent due to training requirements.
2. Inspections are frequent due to level of technology.

APPLICABLE SOLUTION UNDER EVALUATION (Short Term):

1. Data collection for review.

EXTENDED SOLUTION (Long Term):

1. Develop maintenance inspections that equal the standard OEM inspection intervals.
2. Increase miles traveled to determine ideal inspection intervals.

2.5 ROAD CALLS

(a) Summary of Road Call Since July 20, 2000

The Month of Occurrence	Number of Occurrences
October 2000	3
November 2000	7
February 2001	2
April 2001	1
May 2001	5
June 2001	5
Total Number of Occurrences	23

ANALYSIS:

ANALYSIS OF CURRENT SITUATION:

1. Higher than normal due to development of technology.
2. Has increased due to cooling system changes and higher ambient temperature.

APPLICABLE SOLUTION UNDER EVALUATION (Short Term):

1. Decrease system sensitivity warning/alarms.
2. Reduce erroneous shutdowns by improving fault-handling reliability.
3. Interpretation of road call classification to be clarified.

EXTENDED SOLUTION (Long Term):

1. Increase component testing in Labs to establish the component/system MTBF.
2. Increase running hours to establish troublesome area's for failures and evaluation.

3. APPENDIX

Glossary:

- **ATF:** Automatic transmission fluid.
- **Degradation:** Decreased performance over a period of time.
- **DI water:** De-Ionized water.
- **Driving Range:** The driving distance at a given fuel consumption and fuel amount.
- **Fuel Consumption:** The fuel consumed per mile.
- **Glycol:** Anti-Freeze coolant.
- **Lube Oil:** Lubrication oil.
- **MTBF:** Mean time between failures.
- **OEM:** Original equipment manufacturer.
- **Road call:** En-route interruption of revenue service and field service had to been called in.
- **SCF:** A cubic foot of gas at 14.7 psia and 60 °F.
- **Transit Track Test:** Test on designed standard bus route.

Unit Conversion:

1 kg = 2.20462 lb
1 m = 3.2808 ft
1 m^3 = 35.3147 ft^3
1 mile = 1.609334 km
1 gallon = 3.7854 liters

1 SCF contains 0.0053154 lb of hydrogen.

QUALITY SYSTEMS DEPARTMENT

XCELLSIS
The Fuel Cell Engine Company

TITLE **CUSTOMER REPORT OF ZEBUS AT SUNLINE TRANSIT (JULY 1, 2001 to JULY 31, 2001)**

FILE #: QSR-0053 **DATE:** 8/1/2001 **PAGE:** 1 of 5

ISSUED BY:	Quality Systems	
PREPARED BY:	Zhenqi Liu	
DISTRIBUTION APPROVAL:	Project Manager:	Date:

DISTRIBUTION LIST	
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Quality Systems Manager **Quality Supervisor**

Silvano Pozzi

Ron Wallace

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1.1 BASIC VEHICLE DATA

(a) Baisc Vehicle Data

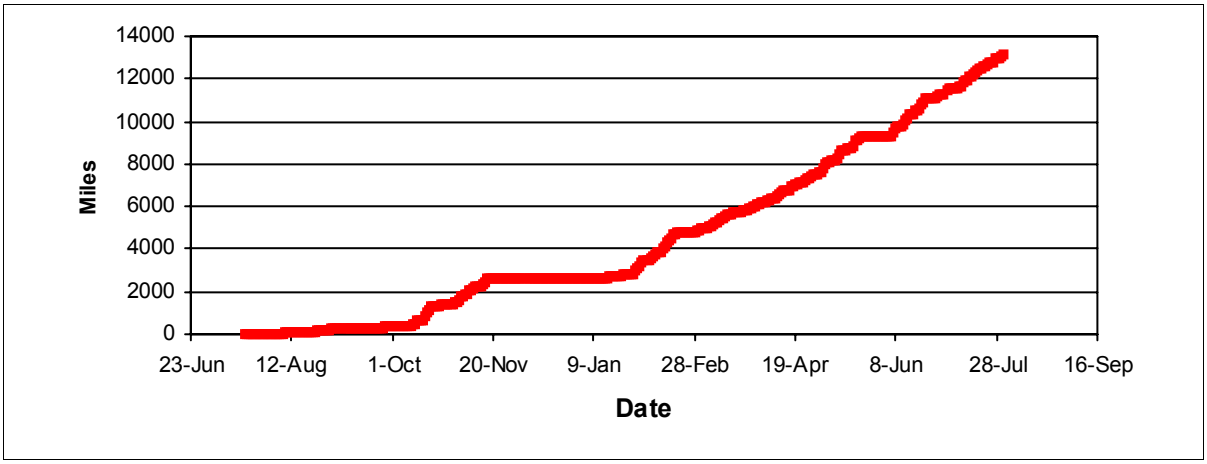
VEHICLE ID	**2FYE2LM19RP015476**
PHYSICAL DIMENSIONS	**40.8x8.5x11.0 ft (12.4x2.57x3.4 m)**
CARRYING CAPACITY:	
Seated	**39 + 1 driver**
WEIGHT:	
Curb - Weight	**32,013 lb (14521 kg)**
GVWR	**38,581 lb (17500 kg)**
HYDROGEN TANK:	
Type	**DYNETEK-DYNECELL (TYPE-3)**
Number	**8 cylinders**
Compression Pressure	**3600 psig**
Volume [M3]	**90.41 Cubic feet (2.56 Cubic meter)**
Capacity	**100.5 lb (45.6 kg)**

(b) Picture of ZEBUS

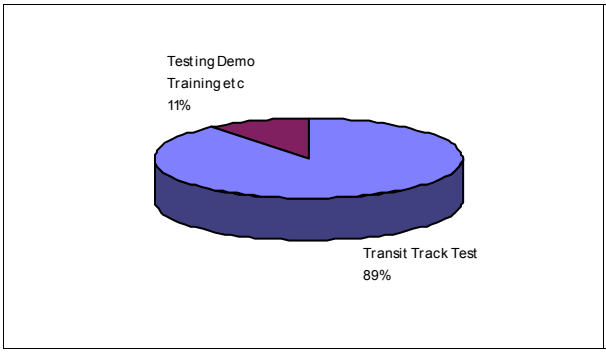
2. OPERATION DATA

2.1 MILEAGE

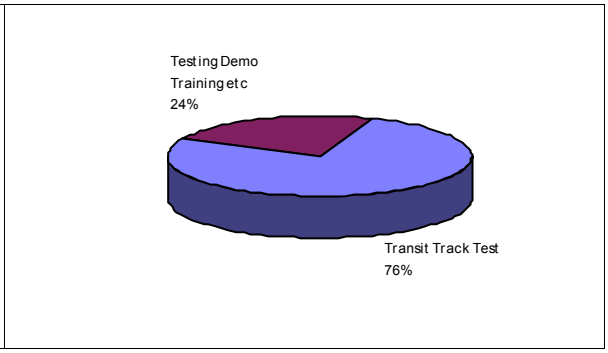
(a) Accumulated miles (all purposes) of ZEBUS at SUNLINE since July 20, 2000



(b) Accumulated miles since July 20, 2000



(c) Accumulated hours since July 20, 2000



(d) Summary of Accumulated miles and hours since July 20, 2000

	Accumulated miles	Accumulated hours	Average speed [mile/hr]
Transit Track Test	11727.8	576.8	20.3
Runs of other purposes	1432.3	179.4	8.0
Total	13160.1	756.2	17.4

ANALYSIS:

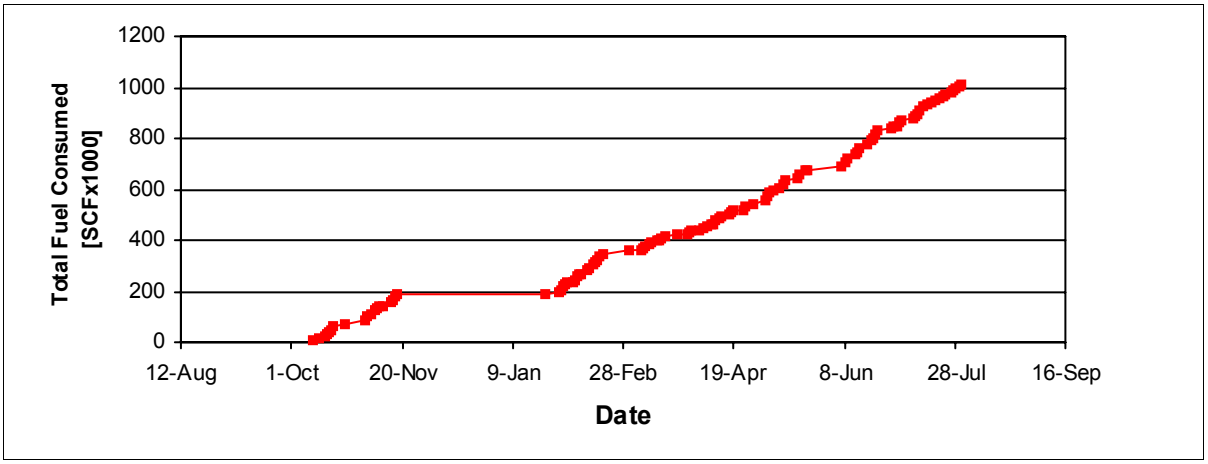
ANALYSIS OF CURRENT SITUATION:
1. High hours relative to low miles are the result of functional testing of engine with bus in static condition (ie. Non-road testing).
2. Unexpected high bus failure rate directly affected availability for scheduled runs.
3. Fuel station performance resulted in limited fuel availability.
4. Water balance has affected scheduled runs.
5. Excessive ambient temperatures limiting engine power output.

APPLICABLE SOLUTION UNDER EVALUATION (Short Term):
1. Limit of engineering P4T upgrades to essential requirements only.
2. Operate test lab P4T engine in Vancouver (Canada) for functional tests to pre-empt failures and evaluate components and sub-systems related to bus engine.
3. Alternate hydrogen sources are being reviewed by SunLine.
4. Optimize cooling system to improve water balance by allowing rad. fans to be operated 100%, obstruction from air intake, separate radiator from engine bay.

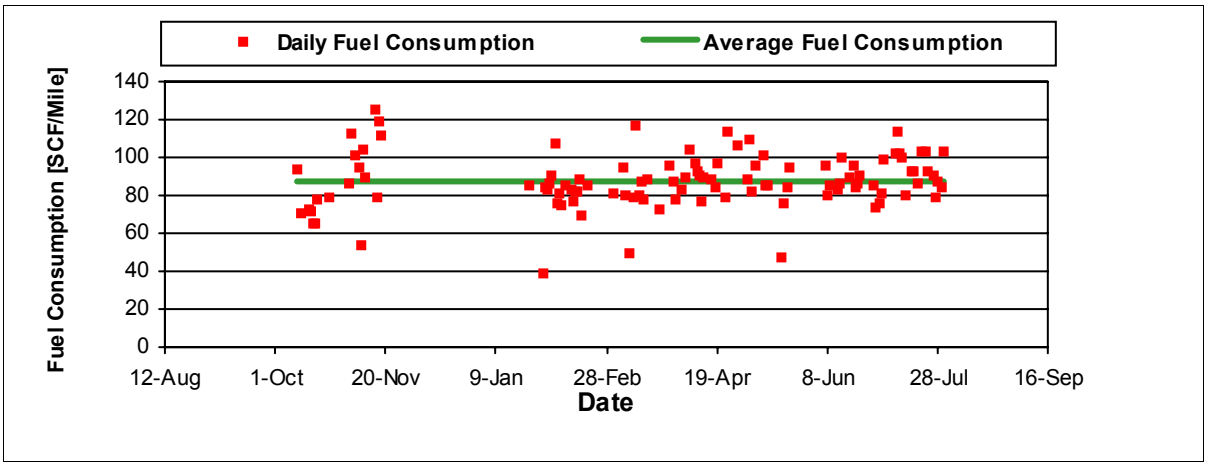
EXTENDED SOLUTION (Long Term):
1. Complete functional test and start transit track testing (long endurance run).
2. Reduce system sensitivity by adjusting warning and alarm settings.
3. Reduce downtime by focusing on improving system reliability.
4. Enlarge cooling capacity for higher ambient temperature range.

2.2 FUEL CONSUMPTION AND DRIVING RANGE

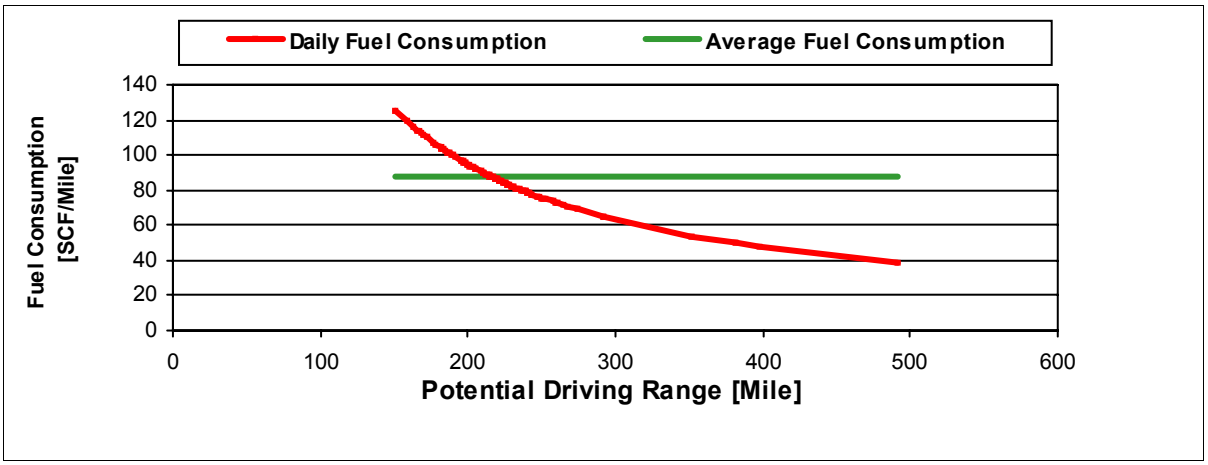
(a) Total Fuel Consumed of ZEBUS for Transit Track Test since July 20, 2000



(b) Fuel Consumption of ZEBUS for Transit Track Test since July 20, 2000



(c) Potential Driving Range of ZEBUS with Full Tank



2.2 FUEL CONSUMPTION AND DRIVING RANGE

(Continues from previous page)

CONCEPTS:

1. Graph (a), "Total Fuel Consumed of ZEBUS for Transit Track Test since July 20, 2000", shows total hydrogen consumed for transit track tests since July 20, 2000.
2. Graph (b), "Fuel Consumption of ZEBUS for Transit Track Test since July 20, 2000", shows daily and average consumption for transit track tests.
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ANALYSIS OF CURRENT SITUATION:

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2. Fuel efficiency of fuel cell engine is negatively affected by parasitic loads.
3. Total kilograms of hydrogen consumed for transit track test at SunLine from July 20, 2000 to date is 2037.2 kg (844980 SCF)

APPLICABLE SOLUTION UNDER EVALUATION (Short Term):

1. Review and seek to optimize the purge cycle.
2. Operate at optimal efficiency.
3. Implement cooling system changes such as increase radiator air flow by removing DI filter canister from air intake area.
4. Implement overcooling on down-transients to reduce average fan power.

EXTENDED SOLUTION (Long Term):

1. Reduce purging as much as possible.
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3. Reduce parasitic loads.
4. Optimize drive train ratios.

2.3 CONSUMABLES

(a) Summary of Consumables since July 20, 2000

	Hydrogen [SCF x 1000]	DI Water [Gallon]	Glycol [Gallon]	ATF [Gallon]	Lube Oil [Gallon]
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August 2000	41.4		53		
September 2000	25.4	15			
October 2000	82.5				
November 2000	123.5	17			
December 2000	4.0				
January 2001	41.5				
February 2001	143.9	5			
March 2001	115.7	2			
April 2001	134.3	7			
May 2001	158.2	27		5	4
June 2001	179.7	24			
July 2001	173.2	36			
Total	1236.8	133	53	5	4

CONCEPTS:

1. The list above shows the summarized consumption results of consumables for all purposes of operation since July 20, 2000 up to the end date of this report.

ANALYSIS:

ANALYSIS OF CURRENT SITUATION:

1. High consumption of glycol and DI water is due to increased engine interventions requiring flushing of all circuits.
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APPLICABLE SOLUTION UNDER EVALUATION (Short Term):

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2.4 MAINTENANCE

(a) Summary of Scheduled Maintenance since July 20, 2000

Scheduled Maintenance	Maintenance Interval	Accumulated number of times of implementation	Accumulated hours of implementation
Scheduled 6000km Inspection	Every 3728 miles (6000 km)	2	15.0
Scheduled 24000km Inspection	Every 14913 miles (24000 km)		
Scheduled 48000km Inspection	Every 29826 miles (48000 km)		
600hr Transmission Filter Change	Every 600 hours		
80hr Inspection and Services	Every 80 hours	8	30.0
300hr Burst Disk Change	Every 300 hours	1	1.5
Daily Inspection	Every day	187	209.3
3000 Miles Coach Inspection	Every 3000 miles	1	5.0
Scheduled 12000km Inspection	Every 7457 miles (12000 km)	1	4.0
New Flyer 12000 miles coach inspection	Every 12000 miles	1	4.0
		Total hours	268.8

ANALYSIS:

ANALYSIS OF CURRENT SITUATION:

1. Inspections are frequent due to training requirements.
2. Inspections are frequent due to level of technology.

APPLICABLE SOLUTION UNDER EVALUATION (Short Term):

1. Data collection for review.

EXTENDED SOLUTION (Long Term):

1. Develop maintenance inspections that equal the standard OEM inspection intervals.
2. Increase miles traveled to determine ideal inspection intervals.

2.5 ROAD CALLS

(a) Summary of Road Call Since July 20, 2000

The Month of Occurrence	Number of Occurrences
October 2000	3
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ANALYSIS:

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APPLICABLE SOLUTION UNDER EVALUATION (Short Term):

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QUALITY SYSTEMS DEPARTMENT

XCELLSIS
The Fuel Cell Engine Company

TITLE **CUSTOMER REPORT OF ZEBUS AT SUNLINE TRANSIT (August 1, 2001 to August 31, 2001)**

FILE #: QSR-0058 **DATE:** 9/4/2001 **PAGE:** 1 of 5

ISSUED BY:	Quality Systems	
PREPARED BY:	Zhenqi Liu	
DISTRIBUTION APPROVAL:	Project Manager:	Date:

DISTRIBUTION LIST	
BILL CLAPPER	SUNLINE

Quality Systems Manager **Quality Supervisor**

Silvano Pozzi

Ron Wallace

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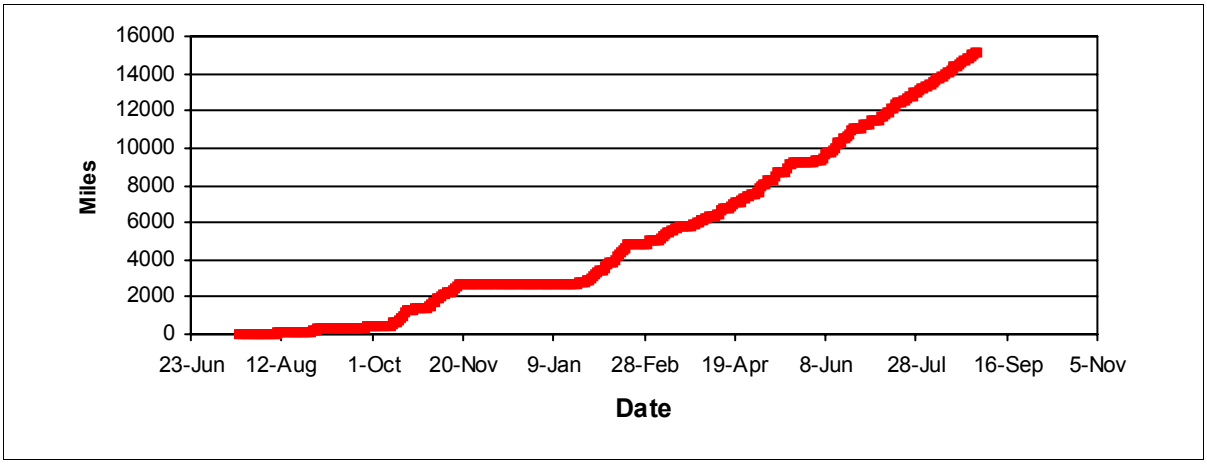
(b) Picture of ZEBUS

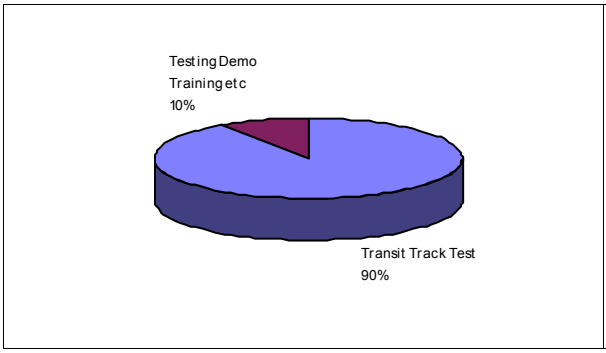
2. OPERATION DATA

2.1 MILEAGE

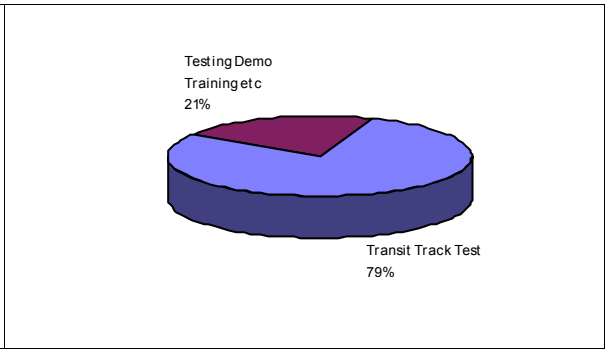
(a) Accumulated miles (all purposes) of ZEBUS at SUNLINE since July 20, 2000



(b) Accumulated miles since July 20, 2000



(c) Accumulated hours since July 20, 2000



(d) Summary of Accumulated miles and hours since July 20, 2000

	Accumulated miles	Accumulated hours	Average speed [mile/hr]
Transit Track Test	13667.8	681.9	20.0
Runs of other purposes	1486.3	183.4	8.1
Total	15154.1	865.3	17.5

ANALYSIS:

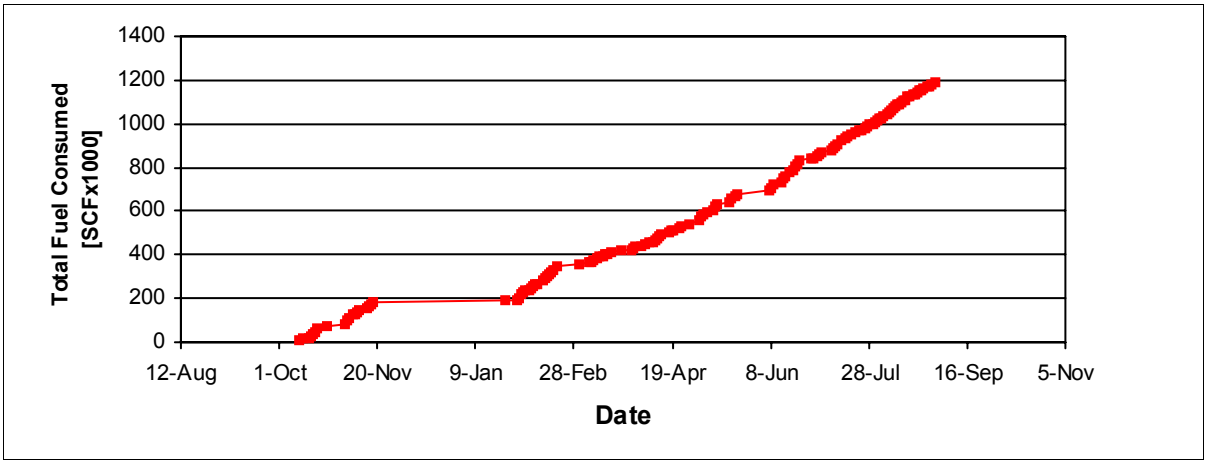
ANALYSIS OF CURRENT SITUATION:
1. Increase availability due to completion of system upgrades i.e cooling package.
2. Water balance has increased also due to installation of 2nd DI fill tank.
3. Inverter device net control card experiencing failure due to overheating.
4. Excessive ambient temperatures limiting engine power output.

APPLICABLE SOLUTION UNDER EVALUATION (Short Term):
1. Alternate hydrogen sources are being reviewed by SunLine to increase full fill pressure to 3600 PSI.
2. Test and evaluate P5 inverter.

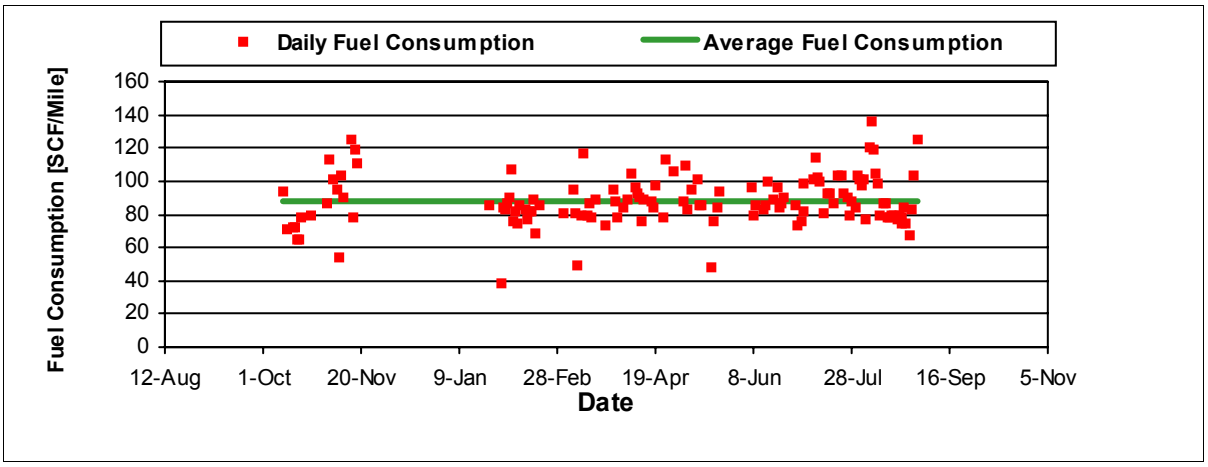
EXTENDED SOLUTION (Long Term):
1. Test and evaluate P5 inverter including device net control card and internal heat management.
2. Reduce system sensitivity by adjusting warning and alarm settings.
3. Reduce downtime by focusing on improving system reliability.

2.2 FUEL CONSUMPTION AND DRIVING RANGE

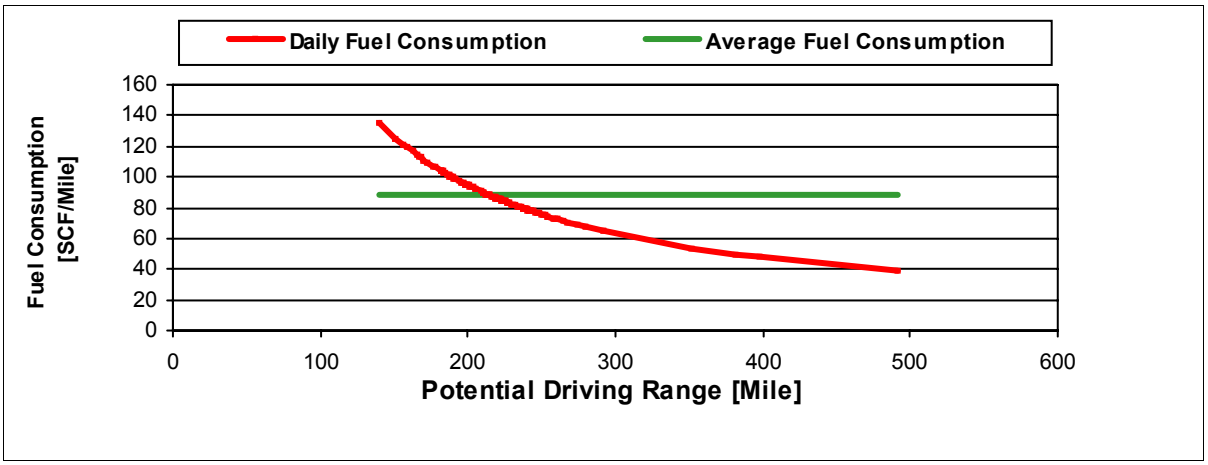
(a) Total Fuel Consumed of ZEBUS for Transit Track Test since July 20, 2000



(b) Fuel Consumption of ZEBUS for Transit Track Test since July 20, 2000



(c) Potential Driving Range of ZEBUS with Full Tank



2.2 FUEL CONSUMPTION AND DRIVING RANGE

(Continues from previous page)

CONCEPTS:

1. Graph (a), "Total Fuel Consumed of ZEBUS for Transit Track Test since July 20, 2000", shows total hydrogen consumed for transit track tests since July 20, 2000.
2. Graph (b), "Fuel Consumption of ZEBUS for Transit Track Test since July 20, 2000", shows daily and average consumption for transit track tests.
3. Graph (c), "Potential Driving Range of ZEBUS with Full Tank", shows fuel consumption vs. correspondent potential driving range (red line) . The potential driving range at average fuel consumption can be read at the intersection of the line "Daily Fuel Consumption" (Red) and the line "Average Fuel Consumption" (Green).

ANALYSIS:

ANALYSIS OF CURRENT SITUATION:

1. Fuel efficiency of fuel cell engine has been limited by the purge cycle. Purging medium is hydrogen and is used to prevent water accumulation and discharge of accumulated fuel impurities.
2. Fuel efficiency of fuel cell engine is negatively affected by parasitic loads.
3. Total kilograms of hydrogen consumed for transit track test at SunLine from July 20, 2000 to date is 2857.6 kg.
4. Fuel cell performance reduced purge cycle frequency, there by increasing fuel efficiency.

APPLICABLE SOLUTION UNDER EVALUATION (Short Term):

1. Review and seek to optimize the purge cycle.
2. Monitor cooling performance during high ambient temperatures.

EXTENDED SOLUTION (Long Term):

1. Reduce purging as much as possible.
2. Improve hydrogen recirculation.
3. Reduce parasitic loads.
4. Optimize drive train ratios.
5. Implement phase 4 field test data as a model for the expected P5 operation conditions.

2.3 CONSUMABLES

(a) Summary of Consumables since July 20, 2000

	Hydrogen [SCF x 1000]	DI Water [Gallon]	Glycol [Gallon]	ATF [Gallon]	Lube Oil [Gallon]
July 2000	13.6				
August 2000	41.4		53		
September 2000	25.4	15			
October 2000	82.5				
November 2000	123.5	17			
December 2000	4.0				
January 2001	41.5				
February 2001	143.9	5			
March 2001	115.7	2			
April 2001	134.3	7			
May 2001	158.2	27		5	4
June 2001	179.7	24			
July 2001	173.2	36			
August 2001	179.3	1			
Total	1416.2	134	53	5	4

CONCEPTS:

1. The list above shows the summarized consumption results of consumables for all purposes of operation since July 20, 2000 up to the end date of this report.

ANALYSIS:

ANALYSIS OF CURRENT SITUATION:

1. System improvements such as: Cooling, 2nd DI header tank, fuel cell performance have contributed to a decrease in repairs and consumables.
2. Cooling system improvements have decreased water consumption.

APPLICABLE SOLUTION UNDER EVALUATION (Short Term):

1. Transfer functional tests to the lab. engine.
2. Monitor cooling system efficiency.

EXTENDED SOLUTION (Long Term):

1. Inspection frequency will be decreased as result of test experience.
2. Gain a greater understanding of system limits.

2.4 MAINTENANCE

(a) Summary of Scheduled Maintenance since July 20, 2000

Scheduled Maintenance	Maintenance Interval	Accumulated number of times of implementation	Accumulated hours of implementation
Scheduled 6000km Inspection	Every 3728 miles (6000 km)	2	15.0
Scheduled 24000km Inspection	Every 14913 miles (24000 km)		
Scheduled 48000km Inspection	Every 29826 miles (48000 km)		
600hr Transmission Filter Change	Every 600 hours		
80hr Inspection and Services	Every 80 hours	9	32.5
300hr Burst Disk Change	Every 300 hours	1	1.5
Daily Inspection	Every day	212	253.8
3000 Miles Coach Inspection	Every 3000 miles	1	5.0
Scheduled 12000km Inspection	Every 7457 miles (12000 km)	1	4.0
New Flyer 12000 miles coach inspection	Every 12000 miles	1	4.0
		Total hours	315.8

ANALYSIS:

ANALYSIS OF CURRENT SITUATION:

1. Inspections are frequent due to training requirements.
2. Inspections are frequent due to level of technology.

APPLICABLE SOLUTION UNDER EVALUATION (Short Term):

1. Data collection for review.
2. Customer feedback on inspection frequency.

EXTENDED SOLUTION (Long Term):

1. Develop maintenance inspections that equal the standard OEM inspection intervals.
2. Increase miles traveled to determine ideal inspection intervals.

2.5 ROAD CALLS

(a) Summary of Road Call Since July 20, 2000

The Month of Occurrence	Number of Occurrences
October 2000	3
November 2000	7
February 2001	2
April 2001	1
May 2001	5
June 2001	5
August 2001	1
Total Number of Occurrences	24

ANALYSIS:

ANALYSIS OF CURRENT SITUATION:

1. Has decreased due to cooling system changes.
2. Increase ambient temperatures effecting inverter performance.

APPLICABLE SOLUTION UNDER EVALUATION (Short Term):

1. Decrease system sensitivity warning/alarms.
2. Reduce erroneous shutdowns by improving fault-handling reliability.
3. Monitor cooling efficiency.

EXTENDED SOLUTION (Long Term):

1. Increase component testing in Labs to reduce MTBF in future developemnt.

3. APPENDIX

Glossary:

- **ATF:** Automatic transmission fluid.
- **Degradation:** Decreased performance over a period of time.
- **DI water:** De-Ionized water.
- **Driving Range:** The driving distance at a given fuel consumption and fuel amount.
- **Fuel Consumption:** The fuel consumed per mile.
- **Glycol:** Anti-Freeze coolant.
- **Lube Oil:** Lubrication oil.
- **MTBF:** Mean time between failures.
- **OEM:** Original equipment manufacturer.
- **Road call:** En-route interruption of revenue service and field service had to been called in.
- **SCF:** A cubic foot of gas at 14.7 psia and 60 °F.
- **Transit Track Test:** Test on designed standard bus route.

Unit Conversion:

1 kg = 2.20462 lb
1 m = 3.2808 ft
1 m^3 = 35.3147 ft^3
1 mile = 1.609334 km
1 gallon = 3.7854 liters

1 SCF contains 0.0053154 lb of hydrogen.