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Report number 1，969号

Proof test of PEAM

(Additives to Diesel)

Based on Test on Ravenna city bus

Vehicle : 343 Orlandi 型

Engine : 8200-12 FIAT

Milage mater befoere Test : 232,861 Km

Drive test of Fuel consumption and Accelerating without PEAM

◎ Fuel consumption test

(60 Km／H , V 通常ギア)

Go	5 Km	行き 3 Km	合 計	8 Km
Fuel	960 cc	消費量 704 cc	合 計	1664 cc
Back	5 Km	帰り 3 Km	合 計	8 Km
Fuel	961 cc	消費量 607 cc	合 計	1568 cc

Total trip fuel consumption : 3，222 cc

Total trip distance : 16 Km

Milage ..... 201.37 cc／Km , 4.96 Km／L

◎ Accelerating test

(30 ⟶ 80 Km／H V 通常ギア)

Go : 41.2 sec. , 44.3 秒

Back : 39.0 sec. , 39.3 秒

Ave. ... 40.95 sec.

Drive test of with PEAM

/55 Km 走行後、 Alternater is unactuated

◎ Fuel consumption test

(60 Km/H V 通常ギア)	Go	5 Km	行き	3 Km	合計	8 Km
	Fuel	856 cc	消費量	581 cc	合計	1437 cc
	Back	5 Km	帰り	3 Km	合計	8 Km
	Fuel	917 cc	消費量	617 cc	合計	1534 cc
	Go	5 Km	-----		合計	5 Km
	Fuel	908 cc	-----		合計	908 cc

Total trip fuel consumption : 3,879 cc

Total trip distance : 21 Km

Time : 21 min

発電機と合形口の3ベルト伝導により、吸収される力は電気的・機械的効率を考慮すると、/馬力以内となる。 交流器の遮断の為、吸収されるべき力が無いので、ここで測定された消費量を若干増加させなくてはならない。 と言うのは、合形口3ベルト伝導が作動している時には、交流器による吸収エネルギーを考慮せねばならないからである。The absorption energy needs to be considered by converter when activating 3 Band conductance. Therefore, the total consumption of the above 21km shall be 3,879 cc to 3,963 ccであると導く。 Diesel / litter of fuel consumption 5.3 Km/H と言う事になる。

The reduction of Fuel consumption by adding PEAM can be shown as the following formula

$$\frac{5.3 - 4.96}{4.96} \times 100 = 6.8\ \%$$

◎ Accelerating test

(30 ⟶ 80 Km/H)		(1st time)	(2nd time)
	Go	44.3 sec.	40.5 秒
	Back	35.2 sec.	37.4 秒
	Total trip Ave.	39.35 sec.	

fractional shortening of Acceleration time can be shown as the following formula

$$\frac{40.95 - 39.35}{40.95} \times 100 = 3.8\ \%$$

Alternator's breakdown (その力吸収によって) は加速試験に関しては、データを無効にしてしまい、誤差は約3%と考えられる。

Emission gas opacity test

◎ Driving without PEAM

於 60 Km／H (V 通常ギア) Emission gas opacity : BOSH = 0.60
MSA = 0

30 → 80 Km／H accelerating (Ave.)
(V 通常ギア) スモーク 不透明度 : MSA Linear = 70
% A x 0.4m = 90.8

Low speed drive from Neutral スモーク 不透明度 : MSA Linear = 39.3
% A x 0.4m = 62.5

◎ Driving with PEAM

/55 Km after driving Alternator is unactuated :

於 60 Km／H (通常 V ギア) Emission gas opacity : BOSH = 0.55 (8% reduction)
MSA = 0

30 → 80 Km／H 加速時 (通常 V ギア) (Ave.)
スモーク 不透明度 : MSA Linear = 67.5 (reduction : 3.5%)
% A x 0.4m = 89 (reduction : 2%)

低速走行 (ニュートラルギア) からの加速 スモーク 不透明度 : MSA Linear = 32 (減少率 :18.5%)
%A x 0.4m = 52.5 (減少率 : 16%)

Conclusion

Consistant speed (60 Km／H) dirivng of Diesel, effect of PEAM is
は、約 6 ～ 7 % of fuel reduction 、 30 → 80 Km／H of acceleration test
約 3 ～ 4 % of improvement on engine is be possible.

This additive improves the opacity of emission gas a little. (MAS - TECNECO 暗度試験器 Linear scale によった) Accuratelly, at accelaration (30 → 80 Km／H) に於いて、8 % reduction, and at Neuteral gear to acceleration, では、18 % of reduction.

San Donato Milanese Chief Director
1982 年 12 月 9 日 署 名 Dr. Salvi

reduction,

Fuel additive (PEAM) test on City bus

K city transportation authority

1. TEST Vehicle

K 22か354号　　HINO R E 100　49 年式

Engine : EB 200, 185 PS／2400 rpm, After engine overhaul 82,865 km

2. TEST date

1980 年 1 月 29 日　　10 : 30 ～ 15 : 00　　小雨　　Temp. 15 ℃

K M 営業所

3. TEST subject

(1) Idling fuel consumption

(2) Driving fuel consumption

(3) Black smoke emission

4. TEST result

(1) Idling fuel consumption　Measure time ... / min　Water ... 70 ℃, 500 rpm

		1st time (cc)	2nd time (cc)	Ave. (cc)
PEAM	Without	27	26	26.5
	With	26	25	25.5

3.8 % reduction

(2) Driving fuel consumption

(イ) 30 km／H , 750 rpm , Measure time ... 1 min

	1st time (cc)	2nd time (cc)	3rd time (cc)	Ave. (cc)
Without	117	104	111	110.6
With	109	108	102	106.3

3.9 % reduction

(ロ) 40 km／H , 1,000 rpm , Measure time ... 1 min

		1st time (cc)	2nd time (cc)	Ave. (cc)
PEAM	Without	126	124	125
	With	126	124	125

No change

(3) Black smoke emission amount

	1st time %	2nd time %	3rd time %	4th time %	5th time %	Ave. %
Without	32	33	34	34	30	31.8
With	20	22	17	24	18	20.2

36 % reduction

5． Route test

(1) Vehicle : same as the last test

(2) Period : Feb. 4 to 22, 1980

(3) TEST result

		Date	Temp. AM 6：00	Distance km	Supply fuel L	Bus route
Without	添加前	2．4	0℃	53	—	京塚線
		5	−1	87	37	京塚線
		6	−6	86	35	京塚線
		7	−1	87	33	京塚線
		8	−3	45	37	京塚線
		計	—	358 km	142 L	0.396 L／km
With	添加後	2．18	3℃	52	—	保田窪線
		19	13	86	40	京塚線
		20	6	102	29	画図線
		21	6	102	40	画図線
		22	3	52	35	画図線
		計	—	394 km	144 L	0.365 L／km

7．8 % Reduction

路線テストの場合、気温・道路事情・運転操作等により、多少影響が出るものと考えられる。

For Route test, Temperature, Traffic, Driving and etc may effect on the results.

AUT CT 807

Fuel additive (PEAM) test on Truck

O K Logistics K.K. 管理部

Field data of fuel consumption on Truck can be effected by various factors such as Cargo weight, Air resistance, Air pressure of Tire, Traffic condition, etc.

A daily route delivery truck has been selected for the test and coefficient value to be calculated a coefficient value from data of Distance, Cargo weight, Fuel and Milage.

Comparing coefficient values of the same vehicle with PEAM and without

Vehicle ... Nissan CD 43 V, 11 ton capacity 、 July 1977 , No5748, Self weight 9 ton

Supply fuel .... 於当社 及 当社京都支店, Diesel by Idemitsu

Route .... Nagoya ⟷ Kyoto (Incl. pickup & delivery) Express highway, National route

Diesel without P E A M						
試行 No	mo／d	走行 km	荷重 Ton	Fuel L	燃費 km／L	T K 係数 T·km／L
1	2／2	379	19.06	128	2.96	83.08
2	3	372	28.27	128	2.91	108.32
3	6	365	14.86	120	3.04	72.57
4	7	329	20.88	107	3.07	91.87
5	8	363	21.93	118	3.08	95.15
6	9	337	17.03	100	3.37	87.72
7	10	349	23.65	112	3.12	101.74
8	13	337	18.36	120	2.81	76.84
9	14	358	23.93	110	3.25	107.17
10	15	330	18.35	102	3.23	88.49
11	16	330	14.85	112	2.95	70.27
12	17	349	25.60	115	3.03	105.00
13	18	357	15.74	100	3.57	88.32
14	20	368	27.12	130	2.83	102.25
15	21	334	21.05	105	3.18	95.59
16	22	339	21.49	110	3.08	93.96
17	23	335	11.48	100	3.35	68.61
18	24	337	20.50	100	3.37	99.42
19	27	343	15.40	105	3.27	79.71
Total		6,611	379.55	2,122		1,716.08
Ave.		348.0	19.98	111.7	3.13	90.32

Diesel with 1/5000 P E A M						
試行 No	月／日	走行 km	荷重 Ton	給油 L	燃費 km／L	T K 係数 T·km／L
1'	3／1	351	21.24	117	3.00	90.72
2'	2	336	24.85	105	3.20	108.32
3'	3	336	22.30	100	3.36	105.17
4'	4	364	16.12	125	2.91	73.15
5'	6	336	21.19	100	3.36	101.44
6'	7	364	27.85	100	3.64	134.13
7'	8	336	18.66	130	2.58	71.49
8'	9	334	12.70	100	3.34	72.48
9'	10	366	29.11	120	3.05	116.24
10'	11	319	13.79	100	3.19	72.70
11'	13	341	23.27	100	3.41	110.04
12'	14	359	20.85	139	2.58	77.09
13'	15	365	21.49	100	3.65	111.29
14'	16	345	19.04	120	2.87	80.62
15'	17	351	26.49	100	3.51	124.57
16'	18	339	21.31	100	3.39	102.75
17'	22	349	30.34	129	2.70	106.43
18'	23	349	19.19	100	3.49	98.38
19'	4／13	330	18.51	120	2.75	75.65
20'	14	332	26.52	100	3.32	117.93
21'	18	332	23.60	120	2.77	90.19
22'	19	400	29.88	130	3.08	119.63
23'	20	411	14.46	140	2.93	68.87
24'	21	331	23.77	100	3.31	108.47
25'	22	333	19.26	100	3.33	94.11
26'	24	328	20.05	110	2.98	86.62
27'	25	336	22.27	100	3.36	105.07
28'	28	328	25.65	110	2.91	103.32
Total		9,701	613.76	3,115		2,726.87
Ave.		346.5	21.92	111.3	3.14	97.39

Coefficient value Without PEAM

1) Arithmetic Average

90.32

2) Standard Deviate

$\sqrt{2{,}794.91 \div (19 - 1)}$

$= 12.46$

$102.78 \leftarrow 90.32 \rightarrow 77.86$

$1107.30 \div (19 - 7)$

$= 92.28$

3) Frequency Distribution Average

$4 \div 19 = 0.21$

$93.95 + (2 \times 0.21)$

$= 94.37$

Coefficient value With PEAM

1') Arithmetic Average

97.39

2') Standard Deviate

$\sqrt{8{,}929.29 \div (28 - 1)}$

$= 18.19$

$115.58 \leftarrow 97.39 \rightarrow 79.20$

$1602.94 \div (28 - 12)$

$= 100.18$

3') Frequency Distribution Average

$(-130) \div 28 = -0.46$

$101.95 + (2 \times -0.46)$

$= 101.03$

Fuel comparison by TK Coefficient values

	Without	With PEAM	Gap %
Arithmetic Average	90.32	97.39	7.83
Standard Deviate	92.28	100.18	8.56
Frequency Average	94.37	101.03	7.06
	276.97	298.60	7.81

P E A M （1／10,000） Additive Test

K I Logistics K.K. 運行管理部

(1) Vehicle ... 11 ton , Nissan 43式 CD 329

Driving route ... Osaka → Nagoya → Osaka

	without PEAM		with PEAM	
	1979. April	May	June	July
Operating days	24 days	25 days	25 days	26 days
Dirving Distance km	10082	10508	10724	10921
Fuel Consumption L	3876	3906	3672	3778
Milage km／L	2.60	2.69	2.92	2.89
PEAM usage ml	0	0	360	380
Improvement %	0	0	10.6	9.5

(2) Vehicle ... 11 ton , Isuzu 52 年式 SRM 680

Driving route ... Osaka → Kyoto → Osaka

	1979. April	May	June	July
Operating days	24 days	25 days	26 days	26 days
Dirving Distance km	3121	3254	3386	3407
Fuel Consumption L	1243	1321	1235	1247
Milage km／L	2.51	2.46	2.74	2.73
PEAM usage ml	0	0	120	120
Improvement %	0	0	10.4	10.0

(3) Vehicle ... 11 ton , Mitsubishi 54 年式 FV 119 S

Driving route ... Osaka → Tokyo → Kobe → Osaka

	1979. April	May	June	July
Operating days	26 days	26 days	26 days	28 days
Dirving Distance km	15146	14221	15741	16994
Fuel Consumption L	4429	4332	4289	4694
Milage km／L	3.41	3.28	3.67	3.62
PEAM usage ml	0	0	440	480
Improvement %	0	0	9.8	8.4