ISRAEL INSTITUTE OF METALS • מכון המתכות הישראלי

MINISTRY OF INDUSTRY COMMERCE AND TOURISM INDUSTRIAL RESEARCH ADMINISTRATION
משרד התעשיה, המסחר והתיירות מו"פ לתעשיה

TECHNION RESEARCH AND DEVELOPMENT FOUNDATION LTD.
מכון הטכניון לפיתוח בע"מ

TESTING OF THE RAM-JET DEVICE

CERTIFICATE # 27675/B

" A "

IMPORTANT

This translation, dated 11/29/78, is from TECHNION INSTITUTE, a renowned Israel government laboratory, who tested the RAMJET in October and November 1978. After proving its effectiveness, the product was granted certificate no. 27675/B which permits it to be sold in that country. Translation shows the following: Engine Dynamometer test on a Fiat 128 proved increased engine efficiency, no drastic temperature increase to cause engine damage, gas savings, and less exhaust pollutants. Tests on a Volvo showed 7.5% gas savings on a chassis dyno. 5% savings on a high way and 9% gas savings on a city driving test. An 0-1 km acceleration test showed 3 seconds faster acceleration. A summary sheet in Hebrew is also attached.

Michel Cohen
3 Symor Drive
Morristown, N. J. 07960
U.S.A.

I, the undersigned, Michel Cohen, Project Engineer with BASF Wyandotte Corporation, formerly of Herzaliyah, Israel, residing at 3 Symor Drive, Morristown, N.J., U.S.A., hereby declare that I am well acquainted with the Hebrew and English languages and I am in full command of technical terms and that the documents attached hereto and marked "A" have been translated to English by me from the documents marked "B" drawn up in the Hebrew language.

This authentication of the translation shall be deemed to be an authentication of the contents of the translated document for the legal validity or its intended use.

In witness whereof I certify the correctness of the said translation by subscribing hereto this day 11/29/78.

Dennie R. Schlosser
Sworn Before Me
Notary Public of
New Jersey
DENNIE R. SCHLOSSER
NOTARY PUBLIC OF NEW JERSEY
My Commission Expires Sept. 11, 19[illegible]

Michel Cohen
Project Engineer
BASF Wyandotte Corp.

Validated by the
Morris County Clerk

STATE of NEW JERSEY — COUNTY of MORRIS ss. I, **FRANK A. HEADLEY**, Clerk of the County of Morris and Clerk of the Morris County Court, Law Division, holden in and for said County, the same being a Court of Record, do hereby certify the Notary herein set forth by whom the foregoing proof, acknowledgment or affidavit taken and certified was at the time of taking such proof, acknowledgment or affidavit a *Notary Public*, duly commissioned, sworn and residing in said County and State, and was as such officer of this State, authorized to take and certify said proof, acknowledgment or affidavit as well as to take and certify proofs of acknowledgments of deeds for conveyance of lands, tenements or hereditaments and other instruments in writing, to be recorded in said State; and full faith and credit are and ought to be given to his official acts and I am well acquainted with the handwriting of said Notary and believe the signature to the instrument to which the certificate is attached is his genuine signature.

Dennie R. Schlosser (Notary)

In Testimony Whereof, I have set my hand and affixed the seal of said Court and County at Morristown:

Dated: NOV 29 1978 Frank A. Headley Clerk

1. General

1.1 Purpose of the Testing

We were asked by the Client to perform tests on a device named RAM-JET. The purpose is to test the degree of savings in gasoline, influences, if there are any, on the engine, its performances and pollutents.

1.2 Description

The RAM-JET is a device that is said to inject air into the engine during deceleration and fast travel when the vacume in the engine is low. The addition of air is done through the opening of a ball check valve (see attached picture). The device itself is installed on a hose between the PCV valve and the pressure chamber, under the evaporator. When the vacume is high the force pushes the ball in its seat and the device has no influence on the engine. When the vacume of the engine is low during acceleration or during exertion, when traveling fast or climbing up an incline, the spring in the device pushes the ball out and outside air through the filter filtrates into the engine.

In this condition the device improves the performance of the engine in the following way:

A. Weakens the mixture which brings to savings in gas.
B. Weakens the mixture reducing the quantity of pollutents exhausted.
C. The stream of air carries a better distribution of the excess of oil and gas that did not burn and are drained through the little container which is part of the RAM-JET. (See attached picture).

This result also reduces the pollutents and also reduces gas consumption.

D. The addition of air during high exertion under the evaporator increases somehow the amount of air which is sucked into the engine so that it is expected to have a small improvement in the performance of the engine.
E. The cleaner combustion of the gases will protect the engine and will keep it in better condition for a longer time.

It is important to note that it is possible to regulate the amount of vacume which will open the ball check valve through a screw which defines the force on the spring. For smaller vehicles weaker springs are also available.

2. Description of the tests

2.1 Test of the Dynamometer Engine

The first test was run on a Dynamometer engine on 10/29/78 in the Energy Laboratory of the Mechanical Faculty. The test was performed on a new Fiat 128 engine. The procedure of the test was to test at 3000 rpm with different loadings (vacume) how the device effects gas consumption, pollutents, and engine temperatures.

The data is given on Table # 1.

The device in this case was not hooked up to the PVC hose, only to the vacume at the evaporator. The reason for this is that the engine did not have a proper connection and the recommendation of the devices' manufacturer was to close one opening and hook up the other opening directly to the vacume suction side.

The engine temperature was tested using thermocouples, one in the cooling water system, one in the gas exhaust, and one under the spark plug at cylinder # 3.

ISRAEL INSTITUTE OF METALS

Lab. Laboratory for the Engineering of Vehicles and Machines

Certificate No. 27675/8 Haifa, 11/10/78

Testing of the Ram-Jet Device

Client: AUTO IMPORTS, P.O. Box 426, New Jersey 07960, USA

Subject of work. Testing of the Ram-Jet Device

Time of execution: October - November 1978

RESULTS

- See attached documents -

Signature of the Director of Faculty

Signature of the Director of the Laboratory

Signature of the Performer

TABLE 1 - RESULTS OF DYNAMOMETER TEST

	RPM		OUTPUT FORCE		TEMPERATURE COMBUST. CHAMBER °C		WATER °C		POLLUTENT GASES		PRESSURE * MERCURY		EJECTION OF CO_2		EJECTION OF HC		AVERAGE GAS REQUIREMENT /H.PWR/HR	
	W/O	W	W/O	W	W/O	W	W/O	W	W/O	W	W/O	W	W/O	W	W/O	W	W/O	W
1	3100	3100	3.44	3.44	71	73	50	51	546	543	18.5	17.9	2	1.9	220	200	685	675
2	2950	2930	9.18	9.11	83	85	53	54	549	553	14.4	13.8	0.1	0.1	80	80	332	331
3	3050	3050	14.64	14.64	92	93	55	56	606	601	10.4	9.8	0.04	0.0	65	40	272	267
4	3060	3060	18.28	18.28	93	97	58	59	611	613	8.3	3.9	0.1	0.06	75	50	239	233
5	2880	2890	23.29	23.50	101	106	60	61	596	604	2.7	1.2	1.15	1.0	90	60	230	222

ENGINE: FIAT 128

DYNAMOMETER: FROUDE

DATE: 10-29-78

TABLE # 2 - RESULTS OF THE ROAD TEST

GAS USED AT 90 km/hr	W/O DEVICE 9.6 l/100 km	W DEVICE 9.13 l/100 km	IMPROVEMENT 5 %
GAS USED IN DYNAMOMETER CHASSIS SPEED 80 km/hr 10" VACUME	11.3 l/100 km	11.06 l/100 km	7.3 %
ACCELERATION AND STOP TO 60 km/hr	17.59 l/100 km	16.03 l/100 km	9 %
TIME OF ACCELERATION 1 km	39 SECONDS	36 SECONDS	

CAR USED - VOLVO 144, YEAR 1971, AUTOMATIC TRANSMISSION

DATE - 11/7/78

2.3.3 Test of Performance

To test the influence of the device on the cars performance, tests were run from idle to acceleration for a distance of 1 km. The test was performed twice with the device and twice without it. Results were 39 seconds without the device and 36 seconds with the device.

3. Summary (Table # 2-1)

3.1 Conclusion of the Dynamometer Test

1. As the load was increased the efficiency of the device was increased as expected.
2. The engine temperature was not influenced drastically and therefore it is not expected to witness any damage to the engine by the installation of the device.
3. The device reduces the quantity of the gas pollutents, CO and especially HC in a drastic manner.
4. The savings in gasoline was not high, however it should be noted that this engine is very efficient in its ratio relationship of air to gas as it can be seen from the low quantity of CO exhausted.

3.2 Conclusion of the Tests Performed on the Dynamometer and Road Test

1. The savings in gasoline of 5 - 9 % was observed using different road conditions.

2. The device improves the cars performance at full load.

Signature of the
Assistant Director
of Faculty

Signature of the
Engineer

Signature of the
Assistant Director
of the Laboratory
of Engineering
Vehicles and
Machinery

The test was run in this manner: First, the engine was taken to a steady load, after stabilization of temperature, readings were taken. After that, using a simple mechanical mechanism without stopping the engine, the device was connected to the Vacume suction and readings were taken again, this way we assured minimal influence of outside factors.

2.2 Tests of a Dynamometer Chassis

The test was performed on a Volvo car No. 755-200, Model # 144, Year 1971, with automatic transmission and which was supplied by the client. Also in this case the device was hooked up only to the vacume and not to the PVC valve. To the Dynamometer was put an equivalent load of 80 km/hr and a vacume of 19" of mercury without the device. The time required to consume 150 cm^3 of gas was measured. After that, without any changes on the dynamometer the device was installed with a traveling speed equivalent to 80 km/hr. the time required to consume 150 cm^3 was taken. The times taken were 57 seconds and 61 seconds which is 11.93 liter for 100 km and 11.06 liters for 100km for an improvement of 7.3% in gasoline performance.

2.3 Test Drive

2.3.1 Testing at a constant speed

With the same car, having at the drivers window a device for measuring volume. The test was performed on a speed road, Haifa - Tel-Aviv, in this manner: At the constant speed of 90 km/hr using highway markers the gasoline consumption was tested. The test was performed in both directions at least twice, every 5 km the volumetric reading was taken.

The tests were performed between highway markers 82-77 and 76-71 in the Haifa - Tel-Aviv direction, also 72-77, 78-73 in the direction Tel-Aviv - Haifa. In every test a stop watch was used so as to assure no discrepency in the traveling speed.

A total of ten tests were performed with the device for a total of 50 km travel for a consumption of 4.565 liters of gasoline and without the device a total of 40 km travel for a total consumption of 3.84 liters of gasoline. The consumption of gas with the device was 9.13 liters for 100 km and without the device 9.6 liters for 100 km, for an improvement in gas consumption of 5%.

2.3.2 Tests in City Driving

With the Volvo car on the raod at the entrace to Atlit the following tests were performed: On a level road for a distance of 1.7 km the car was accelerated to a speed of 60 km/hr and then stopped. The above was repeated five to six times, the tests were performed six times with the device and four times without the device. The average results were as follows: 272.5 cm^3 for 1.7 km with the device and 299 cm^3 for 1.7 km without the device. The average gas consumption was 16.03 liters for 100 km/hr with the device and 17.59 liters for 100 km/hr without the device. For an improvement in gas consumption of 9%.