

State of California  
AIR RESOURCES BOARD

EXECUTIVE ORDER D-138-3  
Relating to Exemptions under Section 27156  
of the Vehicle Code

OMNI-COOL CORPORATION  
BLIZZARD I INTERCOOLER

Pursuant to the authority vested in the Air Resources Board by Section 27156 of the Vehicle Code; and

Pursuant to the authority vested in the undersigned by Sections 39515 and 39516 of the Health and Safety Code and Executive Order G-45-5;

IT IS ORDERED AND RESOLVED: That the installation of the Blizzard I add-on intercooler kit manufactured by Omni-Cool Corporation, of 300-B Pine Avenue, Goleta, California 93117, has been found not to reduce the effectiveness of required motor vehicle pollution control devices and, therefore, is exempt from the prohibitions of Section 27156 of the Vehicle Code for the intercooler models as listed below:

<u>Model</u>	<u>Application</u>
87V1000	1981-1983 Volvo GL Turbo;
87D1000	1981-1983 Datsun 280ZX Turbo;
87M1000	1981-1984 Saab 900 Turbo;
87M2000	1979-1980 Saab 900 Turbo;
87T1000	1983-1985 Ford Thunderbird 2.3 Turbo;
	1984 Ford Mustang 2.3 Turbo;
	1984 Mercury Capri 2.3 Turbo;
	1984-1985 Mercury Cougar 2.3 Turbo;
87B1000	1984 Dodge/Plymouth Colt 1.6 Turbo.
87B1200	1985 Colt/Mirage Turbo

This Executive Order is valid provided that installation instructions for this device will not recommend tuning the vehicle to specifications different from those submitted by the device manufacturer.

Changes made to the design or operating conditions of the device, as exempted by the Air Resources Board, that adversely affect the performance of a vehicle's pollution control system shall invalidate this Executive Order.

Marketing of this device using an identification other than that shown in this Executive Order or marketing of this device for an application other than those listed in this Executive Order shall be prohibited unless prior approval is obtained from the Air Resources Board. Exemption of a kit shall not be construed as an exemption to sell, offer for sale, or advertise any component of a kit as an individual device.

This Executive Order does not constitute any opinion as to the effect that the use of this device may have on any warranty either expressed or implied by the vehicle manufacturer.

THIS EXECUTIVE ORDER DOES NOT CONSTITUTE A CERTIFICATION, ACCREDITATION, APPROVAL, OR ANY OTHER TYPE OF ENDORSEMENT BY THE AIR RESOURCES BOARD OF ANY CLAIMS OF THE APPLICANT CONCERNING ANTI-POLLUTION BENEFITS OR ANY ALLEGED BENEFITS OF THE BLIZZARD I INTERCOOLER.

No claim of any kind, such as "Approved by Air Resources Board" may be made with respect to the action taken herein in any advertising or other oral or written communication.

Section 17500 of the Business and Professions Code makes untrue or misleading advertising unlawful, and Section 17534 makes violation punishable as a misdemeanor.


Section 43644 of the Health and Safety Code provides as follows:

"43644. (a) No person shall install, sell, offer for sale, or advertise, or, except in an application to the state board for certification of a device, represent, any device as a motor vehicle pollution control device for use on any used motor vehicle unless that device has been certified by the state board. No person shall sell, offer for sale, advertise, or represent any motor vehicle pollution control device as a certified device which, in fact, is not a certified device. Any violation of this subdivision is a misdemeanor."

Any apparent violation of the conditions of this Executive Order will be submitted to the Attorney General of California for such action as he deems advisable.

Executive Order D-138-2, dated July 30, 1984, is superseded and of no further force and effect.

Executed at El Monte, California, this 31<sup>st</sup> day of July, 1985.

  
K. D. Drachand, Chief  
Mobile Source Division

State of California  
AIR RESOURCES BOARD

Evaluation of Omni-Cool Corporation's Turbocharger Intercooler Kit No. 87B1200 for 1985 Colt/Mirage Turbo Vehicles and Kit No. 87T1000 for 1985 Ford 2300 cc Thunderbird/Cougar turbo vehicles for Exemption from the Prohibitions in Vehicle Code Section 27156 in Accordance with Section 2222, Title 13, of the California Administrative Code.

July 12, 1985

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Evaluation of Omni-Cool Corporation's Turbocharger Intercooler Kit No. 87B1200 for 1985 Colt/Mirage Turbo vehicles and Kit No. 87T1000 for 1985 Ford 2300 cc Thunderbird/Cougar Turbo Vehicles for Exemption from the Prohibitions in Vehicle Code Section 27156 in Accordance with Section 2222, Title 13, of the California Administrative Code.

#### I. INTRODUCTION

Omni-Cool Corporation, of 300-B Pine Avenue, Goleta, California, 93117, has requested an update to the existing Air Resources Board's Executive Order (E.O.) No. D-138-2. Omni-Cool Corporation has requested to include, in the exemption, their add-on intercooler kit (Blizzard I kit No. 87B1200 and kit No. 87T1000) for installation on 1985 Colt/Mirage Turbo vehicles and 1985 Ford 2300 cc Thunderbird/Cougar Turbo vehicles.

#### II. CONCLUSION

Based on: (1) previous performance analysis of the air-to-air intercooler; and (2) the staff's engineering evaluation of the intercooler's impact on exhaust emissions from vehicles, the staff concludes that Omni-Cool Corporation's add-on turbocharger intercooler kit No. 87B1200 and kit No. 87T1000 will not adversely affect exhaust emissions from vehicles for which exemption update is requested.

#### III. RECOMMENDATIONS

The staff recommends that Omni-Cool Corporation be granted an updated exemption as requested and that Executive Order No. D-138-3 be issued.

#### IV. INTERCOOLER KIT DESCRIPTION AND OPERATION

The purpose of intercooling a turbocharger is to reduce the temperature of the intake air/fuel charge going into the engine. This

reduction in intake charge temperature will allow a higher charge density (more mass of air per minute to flow through the engine) which means more fuel into the engine at a given intake manifold vacuum/pressure.

The Blizzard I Intercooler kit consists of a standard sized 63.6 cubic inch air-to-air heat exchanger and 2.250 inch O.D. interconnecting tubing. The inlet and outlet on the upper and lower plenum chambers of the heat exchanger can be arranged at the factory to allow for either "U" or "Z" flow-through design depending upon ease of installation. A typical "U" flow-through design intercooler is found in Drawing 1. The interconnecting tubing varies in length and bends depending upon the vehicle application. The most severe bend used in any of the kits is 90° with a 3 inch radius (on center line). All bends are made with a mandrel type bender to lessen shrinkage which would result in increased flow restriction. Connectors and fasteners are of a silicone type which can withstand high temperatures.

The heat exchanger is normally mounted in the fresh air stream located near the front of the vehicle. Inlet tubing ducts hot compressed air (150-280°F) from the turbocharger compressor to the heat exchanger inlet where, as it passes through baffles within, the hot compressed air transfers its heat to the fresh (ram) air causing the compressed air temperature to drop (50 to 150°F). The cooled compressed air is then passed out of the heat exchanger to the throttle(s) for induction into the engine.

The Omni-Cool intercoolers are not designed to be used with "suck through" turbocharger systems, i.e. ones which compress the air/fuel mixture since the heat exchanger may cause the fuel to condense and

remain within it. The Omni-Cool systems are designed only to be used with "blow through" turbocharger systems, i.e., ones which compress the inlet air only.

V. DISCUSSION

Omni-Cool Corporation is making available an add-on turbocharger intercooler kit for the 1985 Colt/Mirage Turbo vehicles and the 1985 Ford 2300 cc Thunderbird/Cougar Turbo vehicles. The kits are similar in design and principle as their previously exempted intercooler kits for limited Volvo, Datsun, Saab, Ford, Mercury, Dodge, and Plymouth vehicles exempted under Executive Order D-138-2.

The applicant previously conducted performance analysis on their intercooler kits. Results indicated that the mean thermal efficiency of the air-to-air intercooler ranged from 84% (high) to 40% (low) depending upon the air flow rates (figure 1), and the calculated pressure drop was 1.5 psi at 37 #/min air flow (figure 2).

In addition, it is the staff's opinion that the combustion temperature will be reduced as a result of cooler intake charge with the use of the turbocharger intercooler kit. This reduction in combustion temperature will reduce the formation of NOx gases in the combustion chamber, resulting in the less NOx emissions expelled through the exhaust system.

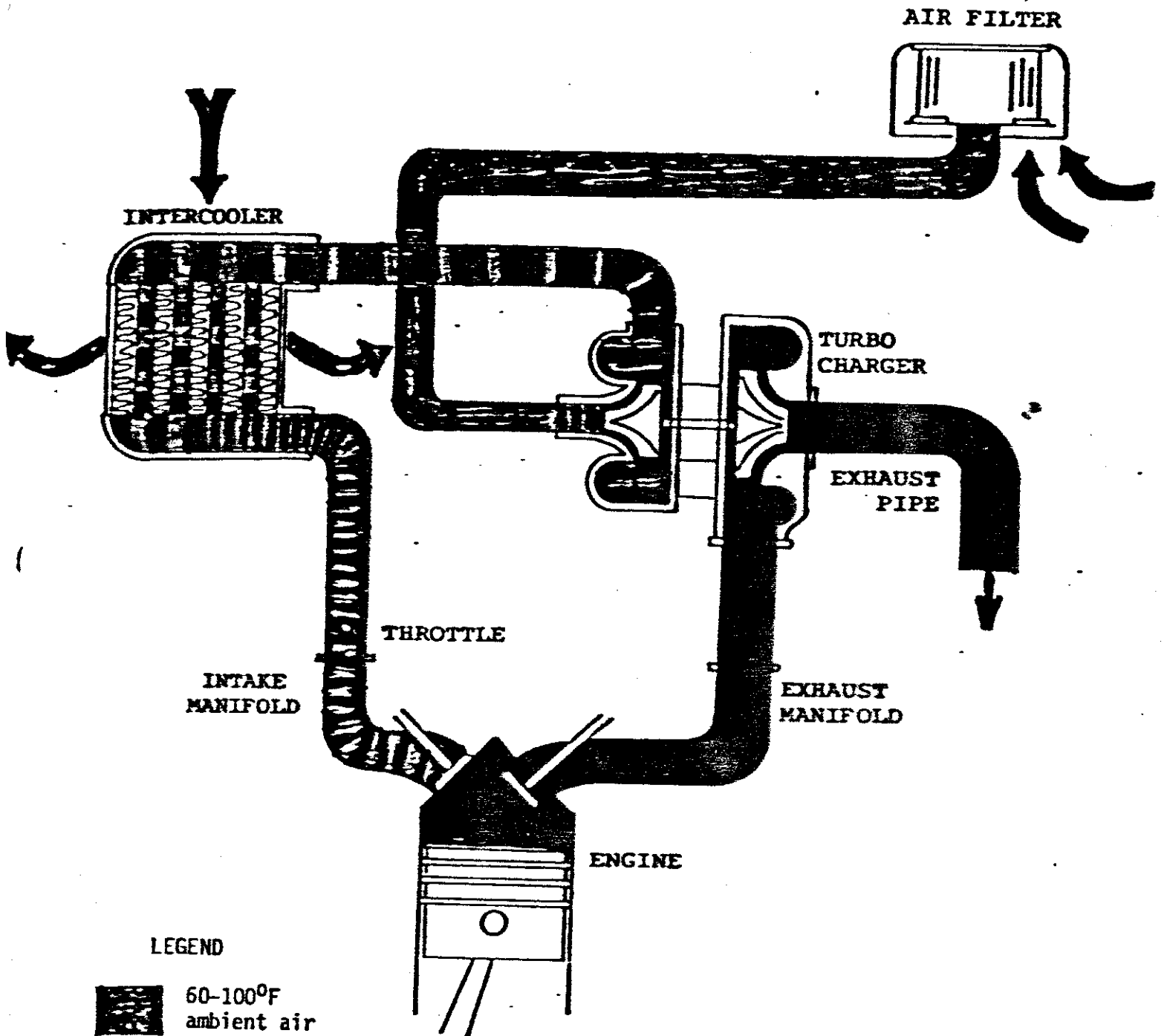
Based on the above discussion, the staff does not recommend conducting emissions testing on the 1985 Colt/Mirage turbo vehicles or the 1985 Ford 2300 cc Thunderbird/Cougar turbo vehicles for granting Omni-Cool Corporation's request.

APPENDICES





Drawing 1

Typical Installation  
of a 'U' Type Intercooler



LEGEND

 60-100°F  
ambient air

 140-250°F  
compressed air


 1000-1500°F  
exhaust gasses

FIGURE 1

RON  
/HEAT

Predicted Intercooler Efficiency

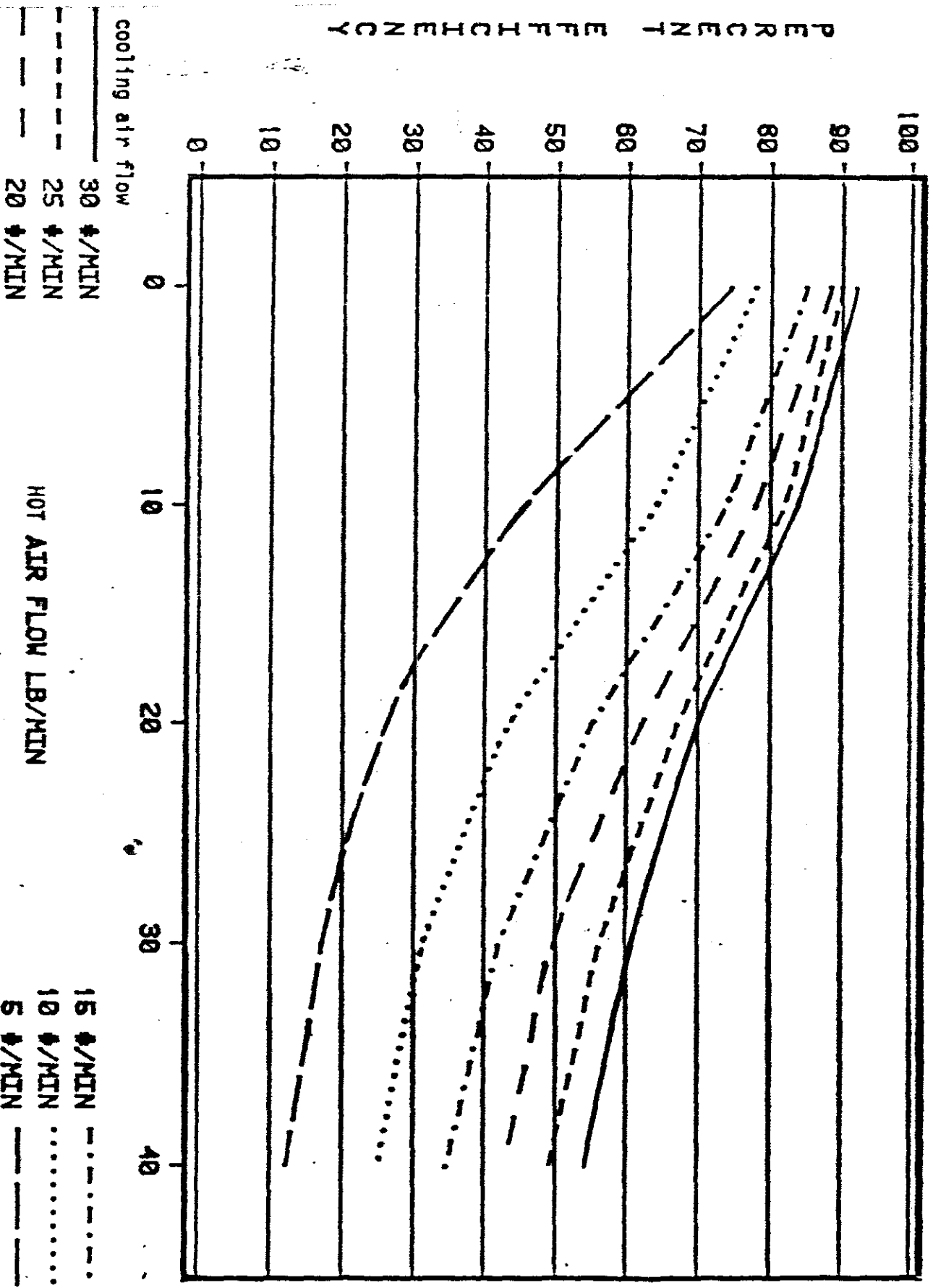
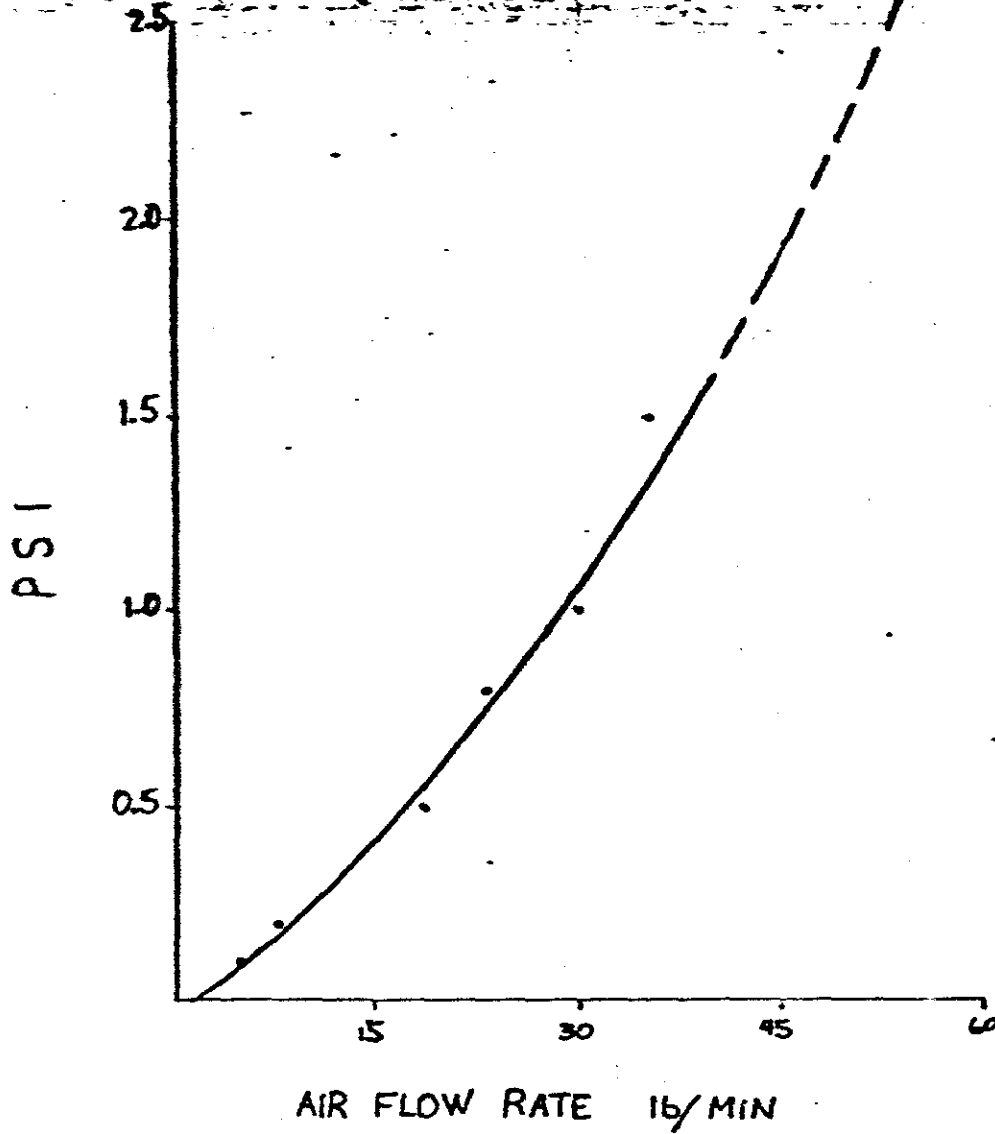


FIGURE 2

Predicted Pressure Drop  
of Blizzard 1 Intercooler



Predicted At:

Inlet Air Temp. 280°F  
Inlet Air Pressure 28.7 psia