



DUAL FUEL (DIESEL/LPG) SYSTEM OVERVIEW

The GRA Dual Fuel system is a performance product designed to produce optimum power and torque by combusting LPG and Diesel simultaneously in the engine. The GRA Dual Fuel system achieves this by restricting diesel flow by 25% to the injectors and then supplementing that restricted diesel flow with a predetermined metered flow of LPG gas. The metered Gas and Diesel is ignited by compression ignition simultaneously.

The system is designed so it can be tuned to produce the same or improved power and torque as 100% diesel fuel.

The cleaner combustion resulting from diesel/gas mixture produces less carbon contamination of the engine oil, which can prolong engine life.

The supplementing gas is less expensive than diesel so the vehicles fuel costs are reduced accordingly.

It also produces a much improved emission profile for Particulates CO, CO₂, NO_x and HC than 100% diesel.

The GRA Dual Fuel system is a unique system utilising several patented products. It incorporates gas metering and total Air/Gas mixing and is infinitely adjustable. The system incorporates a GasResearch Patented Metering Valve and Diffuser device. The complete Air/Gas mixing is completed by the diffuser design, the diffuser is also used to generate a vacuum signal, this vacuum signal is critical to fuel delivery and improves upon other designs by ensuring minimal restriction and a constant signal. The unique GRA Diffuser signal generated is not related to engine vacuum and so is ideal in high load applications.

The system can be divided into six main components:

1. Tank and plumbing
2. Low Pressure Lock-off
3. Converter assembly
4. Metering Valve assembly
5. Diffuser assembly
6. Diesel fuel pump adjuster

1. Tank and plumbing

- Supplied by the customer to suit the vehicle

2. Low Pressure Lock-off (fig 4)

- Electronic fuel cut off at fuel line.
- High flow unit.
- Australian made unit.
- Technical Specifications:
 - Burst pressure – 10.6 Mpa
 - Flow rate (@ 0.1 Mpa) – 180 ltr/hr
 - Working pressure – 3.0 Mpa
 - Aust Gas Approval No. – 5065



3. Converter Assembly (fig 3)

- Vaporises Liquefied Gas to vapour.
- Provides gas fuel supply depending on engine demand.
- Reduces fuel pressure from tank.
- High flow unit capable of providing 160 hp of fuel flow.
- Low maintenance, Australian made, and modified to GasResearch specifications.
- Technical Specifications:
 - Working pressure – 2.6Mpa
 - Primary working pressure – 5 P.S.I.
 - Water Capacity – 0.74 kg.
 - Aust Gas Approval No. – 4971



4. Metering valve assembly (fig 2)

- Controls fuel mixtures to engine.
- Patented Metering Rod allows optimum tuning for desired engine cycle.
- CNC machined to exacting tolerances.
- Operates in conjunction with the throttle position.
- Technical Specifications:
 - i. Ball Bearings on throttle shaft.
 - ii. Metering rod – a range available or blanks for R&D Development
 - iii. Operating Temperature of 120degC.
 - iv. Aust Gas Approval No. Not Required



5. Diffuser Assembly (fig 1)

- Patented design generates optimum vacuum signal in intake air stream.
- Input point for gas fuel from metering valve assembly into the intake air stream.
- Unique design ensures maximum Air/Gas mixing.
- Technical Specifications:
 - i. Working Temperature – 150 deg C
 - ii. Material: Di-cast Aluminium
 - iii. Aust Gas Approval No. – Not Required



6. Diesel injection pump adjuster

- Controls diesel fuel pump injector rack travel.
- Supplied by the customer to suit the application
- Application options can be
- Gas Cylinder Plunger
 - i. Adjusts depending upon the flow of gas available.
 - ii. Allows full power on diesel if no gas is supplied.
- Fixed Limiting Device
 - i. Adjusted & sealed at time of installation
 - ii. In no gas is available, lack of power forces the operator to refill gas

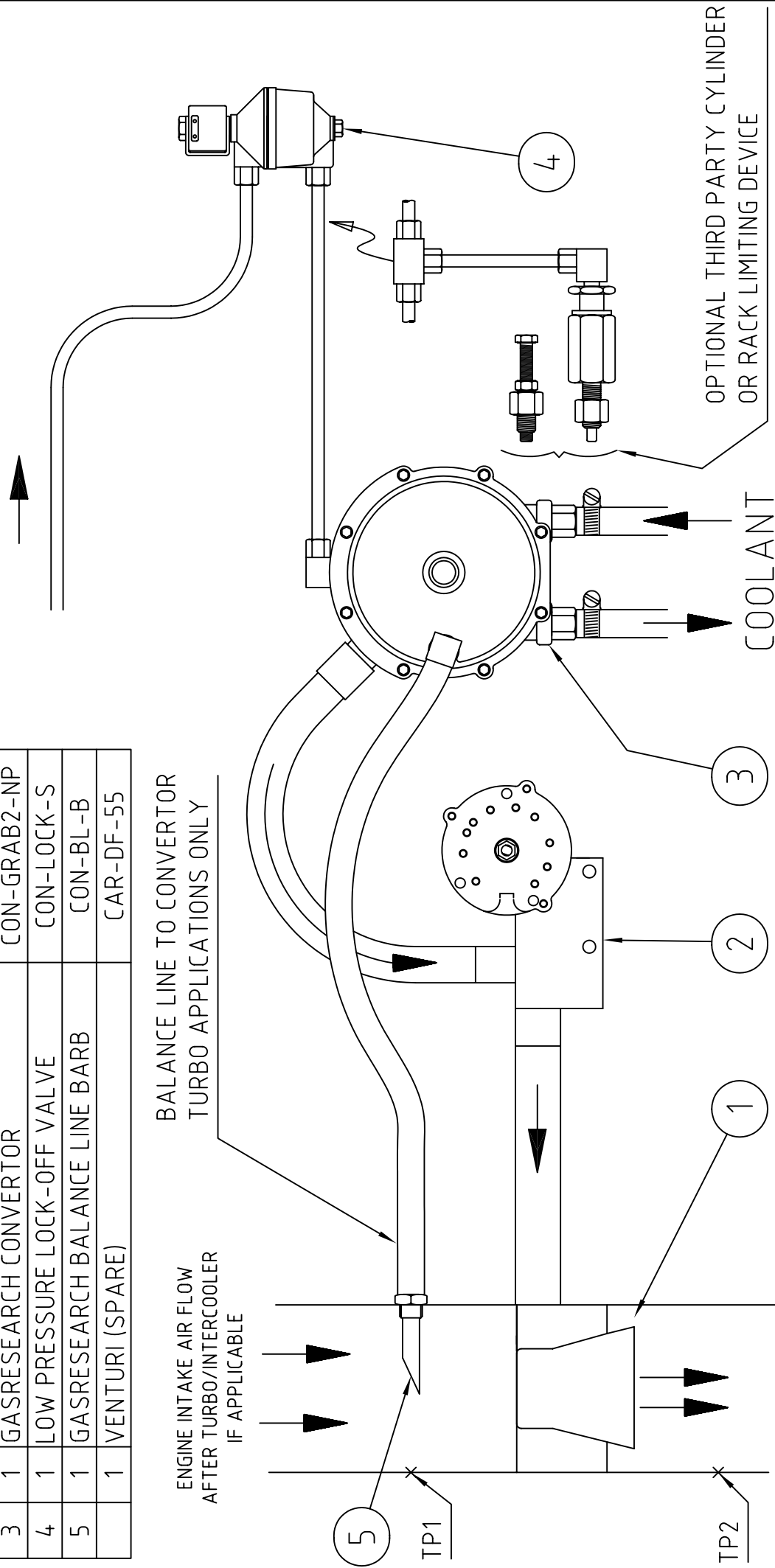
This universal kit is supplied with generic installation & tuning procedures, the universal concept of this kit means the customer must be equipped to adapt it to their specific application

Item	Qty	Description	Part No.
1	1	VENTURI ASSEMBLY	CAR-DF-55NG/D
2	1	GASRESEARCH METERING VALVE	CAR-MV-NG
3	1	GASRESEARCH CONVERTOR	CON-GRAB2-NP
4	1	LOW PRESSURE LOCK-OFF VALVE	CON-LOCK-S
5	1	GASRESEARCH BALANCE LINE BARB	CON-BL-B
	1	VENTURI (SPARE)	CAR-DF-55

BALANCE LINE TO CONVERTOR
TURBO APPLICATIONS ONLY

ENGINE INTAKE AIR FLOW
AFTER TURBO/INTERCOOLER
IF APPLICABLE

FROM LPG TANK



Note:

This diagram is indicative of previous installations by third parties using GasResearch products. It is in no way endorsed or recommended by GasResearch Australia.

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TITLE

DIESEL LPG SYSTEM SCHEMATIC

DATE 09/02/04

DRAWN BY S.VALLELY

PART NO

N/A

DRAWING NO

IN-0001-B



GAS RESEARCH
AUSTRALIA PTY LTD