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A. PARTS LIST AND DIAGRAM WG001

1) Pre-load adjustment screw
2) Port A
3) Port B (unused)
4) Port C
5) Port D
6) Wastegate Inlet
7) Wastegate Discharge
8) Valve Seat A (1)
9) Wastegate Inlet Seal (1)
10) Weld-On Inlet Flange SS (1)*
11) Weld-On Discharge Flange SS (1)*
12) Valve Travel Limiter

Not Pictured:
M8 Studs (4)*
M12 Flange Nuts (4)*
Spring A (blue) (installed) – Rate = 45 lb/inch
Spring B (green) – Rate = 60 lb/inch*
Spring C (red)
Valve Seat B (1)

*Some retail packages do not include these components
B. PARTS LIST AND DIAGRAM WG002

1) Pre-load adjustment screw
2) Port A
3) Port B (unused)
4) Port C
5) Port D
6) Wastegate Inlet
7) Wastegate Discharge
8) Valve Seat A (1)
9) Wastegate Inlet Seal (1)
10) Weld-On V-Band Flange (2)*
11) Valve Travel Limiter

Not Pictured:
- Valve Seat B (1)
- V-Band Clamp (2)*
- Spring A (blue) (Installed) – Rate = 45 lb/inch
- Spring B (green) – Rate = 60 lb/inch*
- Spring C (red)

*Some retail packages do not include these components
C. WELDING AND INSTALLATION TIPS

WELDING

• Pre-heat thick steel components when welding to thin wall tubing
• Use an abrasive wheel to remove any oxidation from welding surface before welding
• When welding stainless steel with carbon, or mild steel, consult your welding rod supplier for appropriate weld rod. 300 series weld rod such as 309 has been used to weld steels of dissimilar chemistry.

INSTALLATION

• Lightly coat the Wastegate Inlet Seal (9) with a high temp spray sealant to eliminate all exhaust leaks.
• Lightly coat the discharge flange with a high temp spray sealant to eliminate all exhaust leaks.
• Locate the wastegate in an orientation that minimizes uneven exposure of the actuator housing to radiant or conductive heat sources.
C1. WASTEGATE LOCATION

C2.

WASTEGATE PRIORITY

TURBINE PRIORITY

EXHAUST PULSE PRIORITIZATION
The wastegate can be one of the more valuable components in your system that will allow you to change the performance characteristics of your turbocharged engine. To avoid boost creep or boost spiking it is recommended to use turbo exhaust manifold designs that prioritize the wastegate. Giving the wastegate priority, or at a minimum an equal priority with the turbine, will give you the greatest flexibility in controlling boost pressure and fine tuning turbocharger response.
**D1. Synchronic WG – Conventional Mode**

Synchronic Wastegate as a Conventional WG – Use this method for quick setup and/or if you are confused by the port scheme and boost level adjustment method. Connect your boost source to port C. First start with the smallest valve seat available to you (2). If you are experiencing boost creep, or excessive backpressure, switch to the largest valve seat available (1). Adjust pre-load (1) setting clockwise to raise or counter-clockwise to lower initial valve opening.

Tuning Workflow – Install the smallest valve seat diameter available (2) – Adjust boost control settings to achieve desired boost level – Change out to higher rate spring (6) - Adjust spring pre-load adjustment to refine boost response

**D2. Integrated Boost Control**

By simply switching your combination of ports you can change the boost level of your system. This is done by changing the rising rate ratio of the valve in the wastegate, or in other words, how many mm the valve will lift per pound of boost.
Levels of Increasing Boost

Connect your boost source to Port C&D
Connect your boost source to Port C&D&A
Connect your boost source to Port C
Connect your boost source to Port C&A
Connect your boost source to Port D
Connect your boost source to Port D&A

D3. Flow Control

Begin by using the smallest valve seat available to you (2). If you are experiencing boost creep, or excessive backpressure, switch to the largest valve seat available (1).

WG001 Valve Seats

28 mm

36 mm

WG002 Valve Seats

40 mm

46 mm
D4. Spring Rates and Ratios

Spring A (blue) (Installed) – Rate = 45 lb/inch
Spring B (green) – Rate = 60 lb/inch*
Spring C (red) – Pre-load spring

BOOST PRESSURE ESTIMATION TABLE

<table>
<thead>
<tr>
<th></th>
<th>WG001 40 MM</th>
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<th>WG002 50 MM</th>
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<tbody>
<tr>
<td></td>
<td>45 lb/in</td>
<td>60 lb/in</td>
<td>45 lb/in</td>
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<td>D&amp;A</td>
<td>13.8</td>
<td>19</td>
<td>9.9</td>
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</tbody>
</table>

Use this table as a general guide in estimating what your predicted boost pressure can be with each port combination. However, the data is based on the assumption that the system has an intake manifold to exhaust manifold pressure ratio of 1:1. So that if there is 1 psi of boost in the intake manifold, then there would also be 1 psi of boost in the exhaust manifold. The table also assumes, that there is no adjustment for pre-load. This is only a very rough guide, and should not be substituted for real world testing, and subsequent setting of boost.
### D5. Rising Rate Ratio Calculations

This table can be used as a general reference guide to illustrate how fast your valve will rise for a given setting. In other words, how many millimeters will the valve lift, per pound of boost. This change in rising rate will determine your boost pressure for that setting. But it can also help to fine tune the response characteristics of a given turbo system. The lower the mm per pound of boost, the faster the response of the turbo. A lower mm/lb boost also means more exhaust force to open the valve.

#### Valve Rising Rate Ratio Calculations

<table>
<thead>
<tr>
<th>Millimeters of Valve Lift Per Pound of Boost</th>
<th>Spring A (blue) 45 lb/in</th>
<th>Spring B (green) 60 lb/in</th>
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### D6. Backpressure Calculations

There are only two forces that will open a wastegate: The boost pressure in the actuator and the exhaust manifold pressure. The backpressure table will allow you to predict the value of your pre-turbo exhaust backpressure. Simply match your indicated boost pressure to the port setting for the spring you have installed and you get the value for backpressure. Ex. Spring A, 5 psi of boost and port C&D&A equals 7 psi of backpressure. The data below is only valid based on the following assumptions for the calculations: No pre-load setting, wastegate valve is open and boost pressure has stabilized. As you can see, the boost pressure rises as exhaust manifold backpressure decreases. This can also explains boost creep and illustrates the importance of giving the wastegate equal priority when fabricating the exhaust manifold.
<table>
<thead>
<tr>
<th>BOOST PORT SETTING</th>
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## BOOST PRESSURE: INTAKE MANIFOLD

### Spring A (blue) - 45 lbs/in Spring Rate

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</table>

### Spring B (green) - 60 lbs/inch Spring Rate

| BOOST PORT SETTING | 3  | 5  | 7  | 8  | 9  | 11 | 12 | 15 | 16 | 19 | 21 | 24 | 27 | 29 | 40 | 45 | 50 | 55 |
|--------------------|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|
| C&D               | 10.4| 6.9| 3.5| 1.8| 0  |    |    |    |    |    |    |    |    |    |    |    |    |    |
| C&D&A             | 12.9| 10.1| 7.2| 5.8| 4.3| 1.5| 0  |    |    |    |    |    |    |    |    |    |    |
| C                 | 14.5| 12.2| 10 | 8.9| 7.8| 5.6| 4.5| 1.2| 0  |    |    |    |    |    |    |    |    |    |
| C&A               | 10.7| 9.1| 7.4| 6.6| 5.8| 4.1| 3.3| 0.9| 0  |    |    |    |    |    |    |    |    |    |
| D                 | 16  | 14.8| 13.6| 13 | 12.3| 11.1| 10.5| 8.7| 8  | 6.2| 5  | 3.1| 0  |    |    |    |    |    |
| D&A               | 17  | 16.3| 15.7| 15.3| 15 | 14.4| 14 | 13.1| 12.7| 11.8| 11.1| 10.1| 8.5| 4.9| 3.3| 1.7| 0 |
D7. Approaches to Fine Tuning

- **Boost Creep** – If your wastegate is not installed in an optimum location on the turbo manifold, you may not be able to completely eliminate boost creep. However, you can begin by using lower spring rates and the largest valve seat. Start with Spring A and C installed, then only A. Lastly, you can try using only spring C installed for maximum valve lift.

- **Turbo Lag** – Install the smallest valve seat diameter available, use a higher rate spring such as Spring B, adjust pre-load setting higher.

- **Large A/R Ratio/Turbine Housing** - Install the smallest valve seat diameter available, use a higher rate spring such as Spring B, adjust pre-load setting higher.

- **Low Torque/Narrow Power Band** - Use a higher rate spring such as Spring B and/or install the smallest valve seat diameter available.

- **Small A/R Ratio/Turbine Housing** – Install the largest valve seat diameter available, use a lower rate spring such as Spring A, adjust pre-load setting lower, or potentially upgrade to a larger wastegate.

- **Excessive Backpressure** – Install the largest valve seat diameter available use a lower rate spring such as Spring A, adjust pre-load setting lower, or potentially upgrade to a larger wastegate.

- **High EGTs pre-turbo** - Install the largest valve seat diameter available use a lower rate spring such as Spring A, adjust pre-load setting lower, or potentially upgrade to a larger wastegate.

- **Excessive Low End Torque (FWD Drag Racing)** – Install the largest valve seat diameter available, use a lower rate spring such as Spring A, adjust pre-load setting lower, or potentially upgrade to a larger wastegate.
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