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Revision  
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## High Boost Turbo Kit Instructions 1071006 & 1071007 (22RE)

This turbo kit includes the necessary parts to upgrade or add a High Boost Turbo to your 22RE 4-Cylinder Engine. This kit does require some fabrication to address your particular application such as intercooler location, exhaust system layout, oil return location, etc.

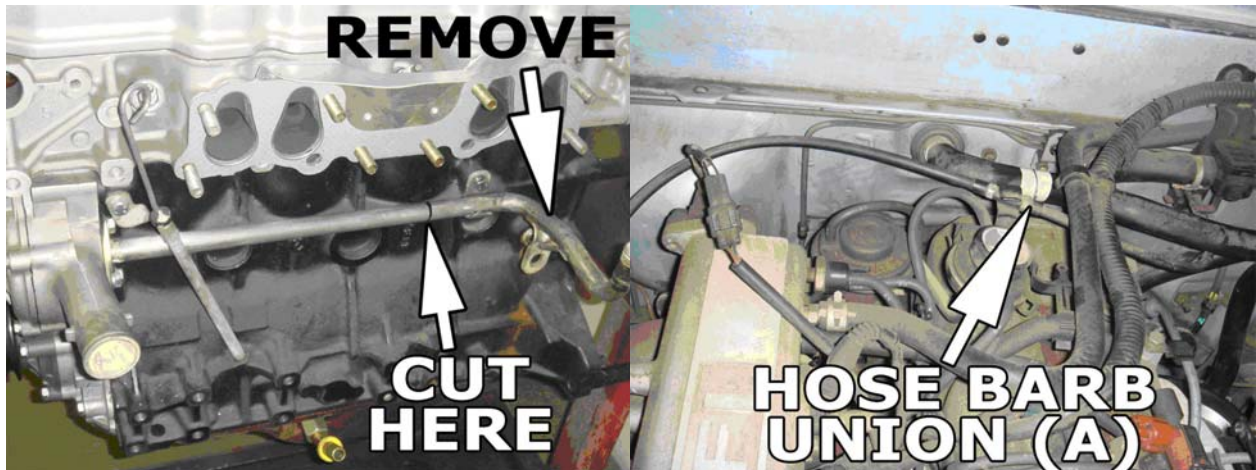
**Note:** *This kit does not address the fuel injection management or ignition control concerns. LC Engineering offers engine components and other accessories to modify your engine assembly as needed to perform with this turbo kit. Please call our technicians if you have any questions on your specific application. 928-855-6341.*

### Remove Stock Components:

Remove exhaust manifold, down tube, heat shield, etc. from your engine. Drain coolant from radiator. Remove air meter/box assembly.

### Heater Tube Relocation:

If your vehicle has a heater using the stock water tube running along the exhaust side of the block, you will need to modify the tube to clear the turbo down pipe. See the illustration for where to cut the steel tube. Cut the rubber heater hose behind the valve cover (See illustration below for the location). Install the supplied hose barb union (A), and run the rubber heater hose from that hose barb union to the cut tube. Use supplied Adel clamp to secure the hose to the block where the factory tube is mounted.





#### **Turbo Manifold:**

Install turbo manifold onto head using the exhaust gasket and existing manifold hardware. Tighten to 33 ft. pounds. Install exhaust down tube onto turbo using supplied stainless steel gasket and hardware provided.

#### **Turbo Oil Drain Line**

**Factory Turbo Block:** Oil drain will be located at the stock drain location. Use the supplied plate to bolt onto the stock turbo block then use the supplied drain line between the turbo drain and the black side plate. Use thread sealant on all oil fittings

**Non Turbo Block:** The oil drain will be located on the oil pan just below the pan rail. Approx. 1.500" down. Mark location. Remove pan, drill hole and weld supplied fitting to pan. Clean, debur, paint, and reinstall pan. Use supplied drain line to install between turbo drain and drain fitting in the oil pan. Remember to always use thread sealant on all oil fittings.

**Warning: Blow out all hoses using compressed air before installation in order to remove any debris.**

#### **Turbo Oil Feed Line:**

On right side of block behind motor mount location remove the oil galley plug. Install the -4 x 28BSPT fitting into block using thread sealant. Route supplied oil line from oil supply fitting to top of turbo oil inlet fitting. Use the supplied Adel clamps to route the line from the block fitting to the turbo. Mount the 90 degree side of the oil feed line at the block, and connect the straight end of the line to the 90 degree fitting on the turbo.

#### **Turbo air inlet and compressor exit:**

The compressor side of the turbo is adjustable, but should be clocked pretty close to its final position when you receive it.

#### **Compressor inlet (center opening):**

LCE recommends using a 3" rubber elbow to connect to either an LC Mass Airflow Conversion Kit or an optional LC Pro Fuel Injection Intake Kit.

**\*\*If you are retaining the factory air meter (NOT RECOMMENDED) you will need to fabricate an intake tube. \*\***



**WARNING: Internal engine damage can result from improper tuning under boosted conditions. We do not recommend using the stock fuel injection with a turbocharger. Our Mass Airflow Conversion Kit is an excellent alternative.**

**Compressor exit:**

Using the 2" 90° hose connector and band clamps, install on exit side of compressor. The charge pipe is designed in two sections to make installation easier. Install tube with long leg on turbo side, short leg on throttle body side. Use 2" silicone coupler to connect the two halves. See image below.

**Wastegate:**

Clamp wastegate to manifold and down pipe utilizing the provided hardware and V-Band clamps.

**Boost Controller:**

Locate the bottom port on the external wastegate and the pressure source port. Install the Boost Tee in the wastegate pressure line with the wastegate arrow pointing towards the bottom port on the wastegate. Secure all silicone hose ends with hose clamps. Mount your boost controller bracket onto the vehicle, then attach the boost controller onto the bracket with the supplied screws.

**Turbo Kit Installed on a 22RE:**







## **TURBO ENGINE SET-UP INFORMATION**

Turbocharging any engine increases the strain on all of its internal components. At each level of additional boost, new issues for engine configuration develop and need to be addressed.

Keep in mind; it is the combination of matched components that will deliver a reliable high horsepower engine. What works for a low boost application may not take the strain of high levels of boost. Following are some guidelines to consider when setting up an engine for turbo or blower use.

### **Camshaft:**

LC Engineering offers specially designed camshafts to achieve full benefit of your turbo engine. We offer custom ground camshafts for all levels of boost and rpm ranges. For most low boost street applications, our Street Turbo Cam (part # 1022027) is an excellent choice. Please call and talk with our technical staff about your specific requirements and for a recommendation.

### **Valves, Valve Springs and Cylinder Head:**

For the most performance, valve size, valve springs and cylinder head porting need to match the desired level of boost and camshaft profile used. Our Pro cylinder head (part #1021024) will be adequate for most low boost 4WD and 2WD street applications. For drag strip and high rpm use, even at low boost levels, we recommend using our Stage 2 Head (part # 1021033) with Pro Dual Valve Springs and Titanium Retainers. Our Pro Cam Kit (Part # 1020000) should be used if you are rebuilding your cylinder head for most applications.

### **Compression Ratio:**

To achieve a reliable turbo charged engine package, you will need to lower your mechanical compression ratio to 8:1. This can be done on stock EFI engine by changing the pistons during a rebuild. We offer both a Street Performer cast pistons and our racing forged piston kit that will achieve this compression ratio. Cylinder head and block modifications can change the compression ratio. Always cc your components during assembly to verify the mechanical compression ratio. Please call our technicians if you have any questions on your specific needs.

### **Bottom End:**

The stock bottom engine has adequate strength for low boost and low rpm applications. For higher levels of boost and performance, our Pro bottom end components (Pro Crank, Pro Rods, Forged Pistons) should be used. A Pro Bottom End (Short Block Kit part # 1011045) will provide adequate strength to 300 hp. For higher horsepower levels or turbo/nitrous applications please call our technicians for specific recommendations.



### **Fuel & Ignition Management:**

LC Engineering offers the LC Pro fuel Injection management system that will control the fuel curve and Ignition timing. Generally, you will need larger injectors, and additional sensors for higher boost applications. We also offer a Mass Airflow Conversion kit that eliminates the stock air box and meter, and replaces it with a hot-wire MAF. We offer several kits with varying fuel injector sizes. Please call our technicians for a specific recommendation.

### **Intercoolers:**

Intercoolers allow the use of high boost levels and increased performance. There are many different intercoolers designs and locations to position them. We suggest a 3.5" x 8" x 13" core unit. These units are available with different tank configurations. Please call our tech line for specific information on the intercoolers.

## **LC ENGINEERING TURBO ENGINE RECOMMENDATIONS**

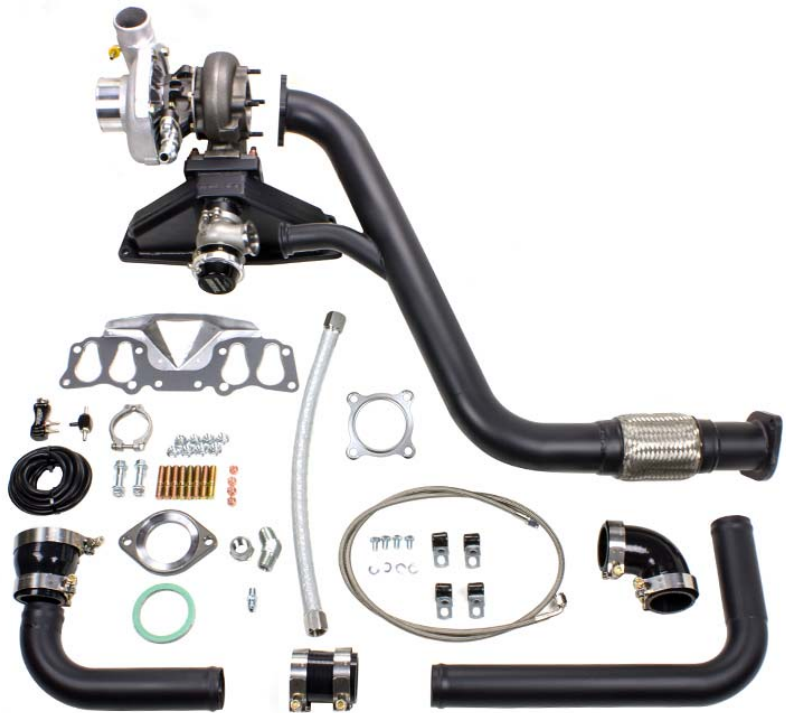
These recommendations are a guideline for the type of modifications needed to build a strong and reliable engine for the desired level of boost and performance. Please talk with a technician about your specific requirements before ordering.

### **Low Boost 0-10 PSI Boost**

Cylinder Head Studs  
Pro Oil Pump  
Street Turbo Cam  
Street Performer Valve Springs  
Low Compression Street Pistons  
Turbo Gapless Ring Set  
Pro Rod Bolts  
Pro Fuel Injection/MAF conversion  
Pro Head Gasket

### **High Boost 10+ PSI Boost**

Cylinder Head Studs  
Pro Oil Pump  
Custom Turbo Camshaft  
Pro Cam Kit w/ Dual Valve Springs  
MLS Head Gasket  
8:1 Forged Piston Kit  
Turbo Gapless Ring Set  
LC Pro Rods  
Timing Chain Conversion Kit  
Pro Fuel Injection/MAF conversion  
3 Core Radiator



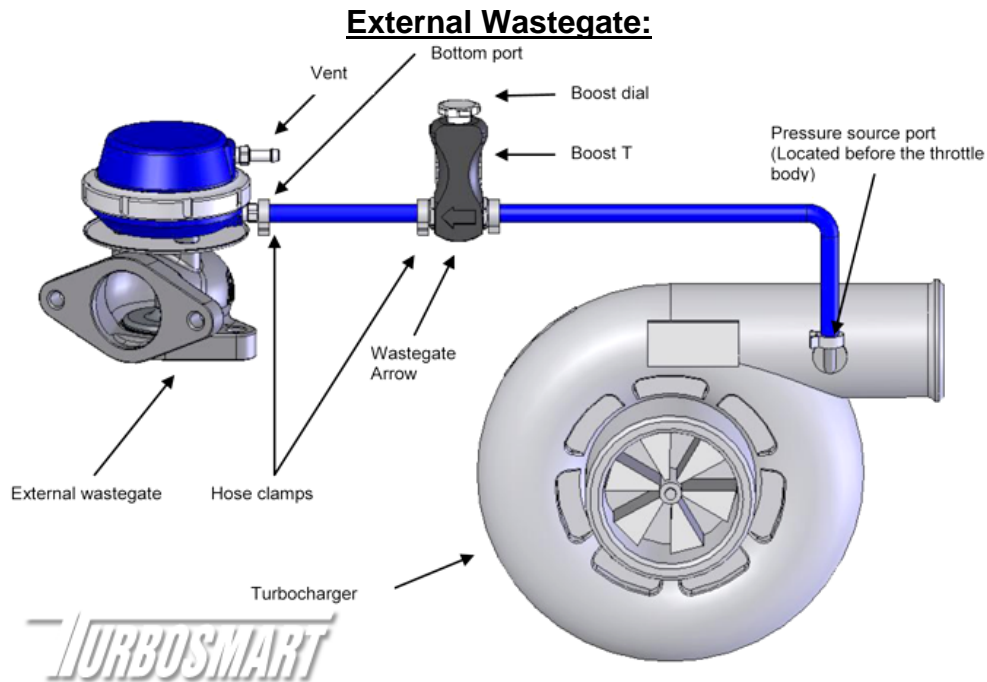


## **IMPORTANT NOTES ON YOUR BOOST CONTROLLER**

- Use only silicone hose that is the correct size and pressure rating for your application when fitting your boost controller – other hoses will be affected by heat and will eventually crack or split which could cause excessive boost pressure and engine damage.
- Ensure that all plumbing is secured with clamps.
- Your boost controller should be mounted at least 100mm from any heat source.
- A Turbosmart Fuel Cut Defender may need to be used in conjunction with your boost controller – refer to [www.turbosmart.com.au](http://www.turbosmart.com.au) The boost dial has a left handed thread, be sure not to over tighten as this will damage the boost controller.
- Please note that the one turn (click) of the boost controller dial does NOT correspond to 1 PSI change in boost pressure.
- It Includes: 2 ramp rates of boost to give you the option of a fast rise in boost or a slightly tame rise for more sensitive setups. A wider boost adjustment range for wastegates with low spring base pressures. A new mounting bracket to make it easier to mount.

## **RECOMMENDATIONS**

- Turbosmart recommends that the Air Fuel ratio is checked once boost pressure is set.
- Turbosmart recommends that boost pressure is set using a Dynamometer and not on the street.
- Turbosmart recommends that a accurate boost gauge be permanently fitted to the vehicle.
- Turbosmart recommends that your boost controller is fitted and adjusted by an appropriately qualified technician.



- Allow the engine to cool down before installing your boost controller.
- Locate the bottom port on the external wastegate and the pressure source port.
- Install the Boost Tee in the wastegate pressure line with the wastegate arrow pointing towards the bottom port on the wastegate.
- Secure all silicone hose ends with hose clamps.
- Mount your boost controller bracket onto the vehicle, then attach the boost controller onto the bracket with the supplied screws.
- Make sure the boost dial is turned completely counter-clockwise before making adjustments.



## SETTING BOOST PRESSURE

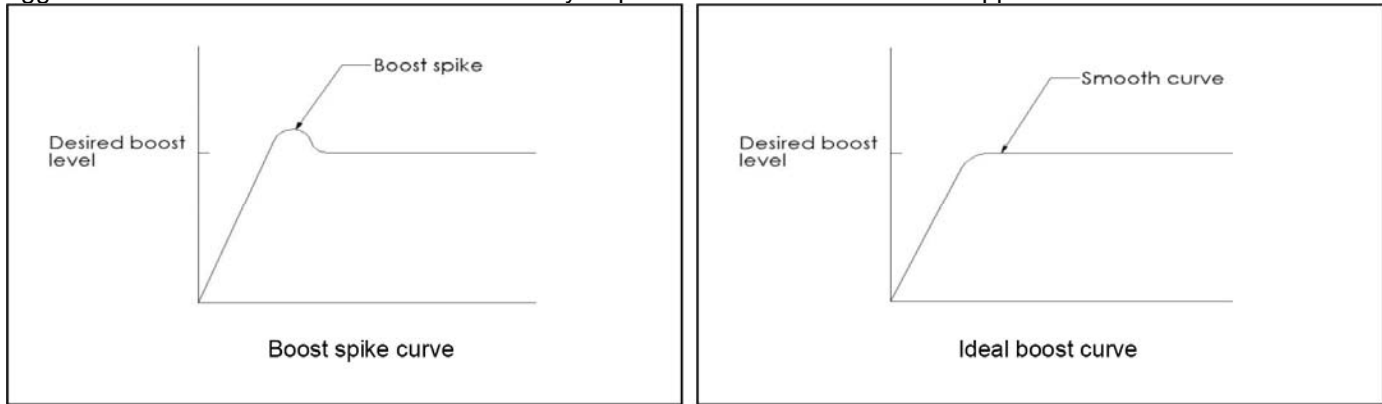
### IMPORTANT NOTES ON BOOST PRESSURE ADJUSTMENT

Adjustment to your boost controller is made by rotating the Boost Dial. Please note that the one turn (click) of the boost controller dial does NOT correspond to 1 PSI change in boost pressure. Rotate in a clockwise direction to increase boost and the reverse direction to decrease boost. Before making any adjustment, the Boost Dial will need to be fully closed (counter-clockwise).

- **Step 1:** Apply full load to the engine in a high gear (at least 3rd or 4th gear) at full throttle and note the boost pressure.
- **Step 2:** To increase boost rotate the Boost Dial clockwise (maximum of 1 complete revolution at a time).
- **Step 3:** Apply full load to the engine and note the boost pressure.
- **Step 4:** Compare the actual boost pressure with the desired boost pressure. If the actual pressure is below the desired pressure, return to step 2. If the actual is above the desired boost then decrease by rotating the Boost Dial anti-clockwise and return to step 3.

### BOOST SPIKING

If boost spiking occurs and is undesirable for your application, the gate system can be removed to give you a less aggressive boost curve. This modification is only required in a minimal number of applications.

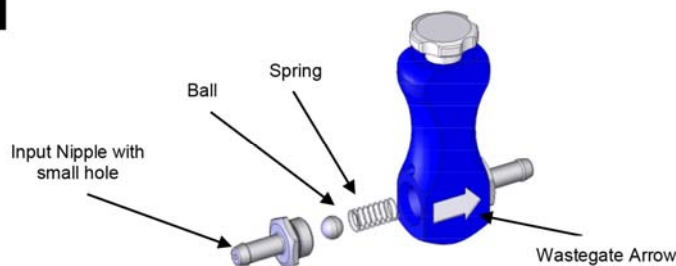


### IMPORTANT NOTES ON GATE SYSTEM REMOVAL

The gate system can be removed by the following steps. Perform this modification on a clean bench so that the ball and spring are not lost.

- Allow the engine to cool down before removing the Boost Tee from your vehicle.
- Identify the input nipple with the restrictor at the end. Loosen the input nipple and remove the ball and spring.
- Check that the internal air passages are clear and free from debris.
- Re-install the boost controller by following the instructions for your setup.
- You will need to re-adjust your boost settings after the removal of the gate.

Drawing 4







## TROUBLE SHOOTING

The following points should be checked if you find that your engine is developing excessive boost, the boost pressure is fluctuating or the desired boost level cannot be achieved. Please note, the following checks will cure 99% of problems experienced when fitting a Turbosmart boost controller.

- Check that the boost controller is installed so that the arrow points toward the wastegate actuator.
- Check the joining hoses for splits, cracks or loose connection and are the correct size for the application.
- Check to see if the boost controller is blocked or contaminated with dirt or debris.
- Ensure that there is nothing but the boost controller in the hose between the pressure source and the wastegate actuator, ie tee pieces for boost gauge or to factory boost solenoid.
- Pressure test the wastegate actuator for leakage, the diaphragm or housing may be cracked or split.
- Check that the wastegate is operating correctly.

