



EVC SYSTEM

INTEGRAL WASTEGATE
ORIGINAL EQUIPMENT (SWING VALVE TYPE)
SINGLE PORT ACTUATOR

INSTALLATION MANUAL

NOTICE

This manual assumes that you have and know how to use the tools and equipment which are necessary to safely and efficiently perform service operations on your vehicle. This manual assumes that you are familiar with typical automotive systems and basic service and repair procedures. DO NOT attempt to carry out the operations shown in this manual unless these assumptions are correct. ALWAYS have access to a factory service manual as many of the procedures and specifications required for the proper installation of this product will be referenced to the shop manual. To avoid the risk of personal injury to yourself and to others, and to avoid the possibility of damaging your vehicle and rendering it unsafe, follow the safety precautions contained in the factory shop manual for the vehicle you are working on. Prior to going any further, please check your invoice and the part number on the box to insure they match, also match serial numbers on the EVC control unit and valve (units are optimized to be used as a pair before they leave the factory). Report any discrepancy to your HKS representative or dealer immediately. Please retain all packing materials for safe repacking and reshipment if service should be required at a later date.

NOTE: FAILURE TO FOLLOW THE DIRECTIONS IN THIS MANUAL MAY RESULT IN NON-WARRANTABLE DAMAGE.

INTRODUCTION

The HKS EVC (Electronic Valve Controller) provides immediate selection of up to four preset manifold boost pressure selections or variable manifold boost pressure control from within the cockpit. The HKS EVC incorporates two main components, the control module and control valve, which are linked only by electrical harness connection. No hoses are routed through the firewall and into the cockpit. The fully illuminated control unit contains 64K of memory capacity, with an 8-bit, 16MHz CPU. With this capability, intake manifold pressure can be sampled every 2.5 microseconds (1 nsec = one billionth sec) and has access to 64 steps of control. The major advantage of this electronic control is vastly superior boost pressure regulation resulting in not only monitoring even levels through all gears and the entire power band, but a more rapid ascending boost curve at lower rpm. For additional flexibility and more precise control of boost pressure, consult your HKS dealer for information regarding EVC support components: HKS Scramble Boost Controller (SBC) and Graphic Control Computer (GCC).

USER NOTES

Before installing these components, read through the entire manual and familiarize yourself with the terms used herein. Pay special attention to the following precautions and information.

The purpose of the HKS EVC is to increase the boost pressure accurately and reliably, but most factory turbocharged vehicles also have a secondary boost limiting system (e.g. fuel cut circuit or pop-off valve) to safeguard against wastegate or wastegate actuator failure. Due to this secondary boost control system, the HKS EVC alone will not be able to raise the boost pressure above the point at which this system is engaged. Under these conditions consult your HKS distributor for information regarding the HKS Fuel Cut Defencer/Programmed Fuel Computer, Injector Upgrade and HKS adjustable pop-off valve.

Increasing the boost pressure (intake air volume) may require additional fuel volume to the engine. Make sure the engine has the correct air/fuel ratio and correct ignition timing to prevent detonation.

The HKS EVC unit will not lower the boost pressure below the original minimum level.

The HKS EVC is a very precise electronic component. The unit should be handled with extreme care to avoid possible damage. The HKS EVC components must not be exposed to extreme heat, water or dust.

TEMPERATURE RANGE OF CONTROL UNIT: -13 to 170 F° (-25 to 77 C°)

TEMPERATURE RANGE OF VALVE UNIT: -13 to 212 F° (-25 to 100 C°)

The HKS EVC cannot control boost pressure above the maximum efficiency point of the turbocharger. Boost pressure drop at high rpm may not be totally eliminated, the EVC will not be able to compensate for pressure loss due to turbocharger sizing. Boost creep or spikes due to inadequate wastegate flow capacity, lean air-fuel ratio, poor compressor bypass design or excessive back pressure may not be fully alleviated.

Increasing the boost pressure will also increase the intake air temperature. If the intake air temperature is above 210 F° (100 C°) performance increases may be minimal and detonation may occur.

Increasing the boost pressure will cause high temperature combustion process. Due to this fact, ignition timing may require retarding.

For best performance and safety, always use the highest octane (92 minimum) available since quality and octane rating vary within different locations.

DO NOT rely on the factory boost gauge when adjusting the maximum boost pressure. Install an accurate auxillary boost gauge to monitor manifold boost pressure levels. We recommend one of the following:

HKS PEAK BOOST GAUGE - 2.375 in dia. with memory feature.	PART NUMBER
25" hg - 20 psi (orange characters)	4380XX-90000X
600 mm hg - 1.6 kg/cm ² (orange characters)	4382XX-90000X
HKS BOOST GAUGE - 2.125 in dia.	PART NUMBER
30" hg - 20 psi (orange characters)	4080XX-90000X
30" hg - 20 psi (white characters)	4081XX-90000X

The utilization of an exhaust gas temperature meter is recommended to monitor engine condition.

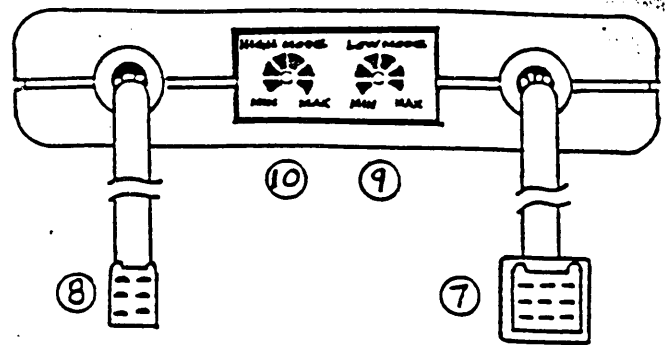
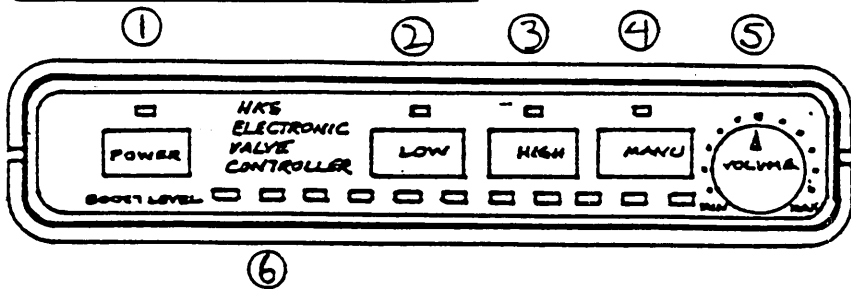
The following gauges are recommended:

HKS PEAK EGT GAUGE - 2.375 in dia. with memory feature.	PART NUMBER
800 - 2200 F° (orange characters)	4382XX-90000X
500 - 1100 C° (orange characters)	4482XX-90000X
HKS EGT GAUGE - 2.125 in dia.	PART NUMBER
400 - 2200 F° (orange characters)	4090XX-90000X
400 - 2200 F° (white characters)	4091XX-90000X

Mount the control unit and harness away from high power two way radios, mobile phones and their respective antenna cables to prevent malfunction of EVC.

The EVC valve body may emit a repetitive buzzing or clicking noise during operation. This normal operational cycling may be audible from the cockpit.

EVC CONTROL MODULE FEATURES fig.1



NOTE: LED light above each button will indicate "RED" for ON and "GREEN" for OFF.

1. POWER BUTTON

OFF position: The control valve will allow maximum pressure to reach the wastegate resulting in original minimum pressure levels.

ON position: Boost pressure will change according to the low, high or manual switch selected on the control module.

2. LOW MODE BUTTON

Selection of the low mode switch will adjust the maximum boost pressure according to the position of the rotary potentiometer accessible at the rear of the control module. Low mode selection will permit an increase of maximum boost pressure up to approximately 100% over the original boost pressure level.

3. HIGH MODE BUTTON

Selection of the high mode switch will adjust the maximum boost pressure according to the position of the rotary potentiometer accessible at the rear of the control module. High mode selection will permit an increase in boost pressure up to approximately 150% over the original boost pressure level.

4. MANUAL MODE BUTTON

Selection of the manual mode switch will adjust the maximum boost pressure according to the position of the adjacent adjustable manual mode control knob.

5. MANUAL CONTROL KNOB

Use of the manual mode offers maximum boost pressure adjustability up to approximately 200% over the original boost pressure level. When the manual mode switch is selected, the manual mode control knob can be adjusted to increase the maximum boost pressure level as desired. Once set, the knob can be easily recessed to be flush with the face of the control module until it is needed again.

NOTE: The EVC can only increase the boost pressure within the turbochargers capacity. This increase will also be limited to actuator spring rate calibration.

6. BOOST LEVEL BAR GRAPH

The EVC control module face also incorporates a small LED bar graph (0.1 kg/cm² per LED) to indicate approximate boost pressure between 7 - 21.5 psi (.5 - 1.5 kg/cm²).

7. 9 PIN MALE CONNECTOR

For wire harness connection between EVC module to control valve.

6 PIN FEMALE CONNECTOR

For optional GCC IV (Graphic Control Computer) offers the user the ability to alter the base EVC setting up to a maximum of + or - 40% at rpm points of 2,500 - 3,500 - 4,500 - 5,500 - 6,500 and 7,500.

LOW MODE ADJUSTMENT

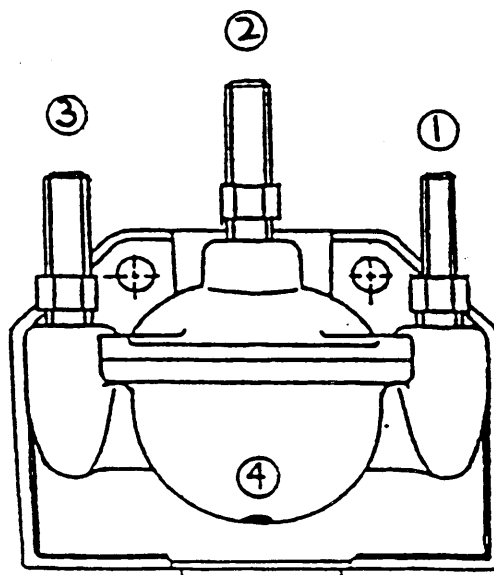
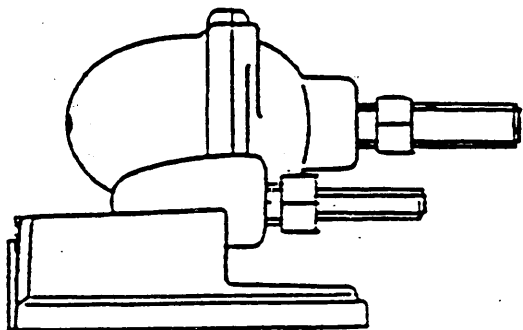
Used to adjust the LOW MODE boost pressure that is activated by the LOW MODE button on the front of the EVC.

HIGH MODE ADJUSTMENT

Used to adjust the HIGH MODE boost pressure that is activated by the HIGH MODE button on the front of the EVC.

EVC CONTROL VALVE FEATURES

fig.2



1. MANIFOLD PRESSURE SENSOR PORT #1

This port when connected to an uninterrupted intake manifold source (compressor by pass signal line for example) will allow the EVC microprocessor to sample plenum conditions every 2.5 ns. Using this data the EVC can constantly feed the wastegate corrections.

2. CONTROL VALVE PRESSURE INLET PORT #2

Pressurized air, drawn directly from the compressor housing (discharge side) or compressor outlet pipe (before intercooler), is routed to the control valve pressure inlet port #2. This pressurized air is then modified (by the solenoid valve housed within this chamber) according to the selected control module setting.

3. CONTROL VALVE PRESSURE OUTLET PORT #3

From the control valve pressure outlet port, constantly modified pressurized air received by the control valve pressure inlet port is routed to the wastegate actuator. This precisely regulated pressure maintains accurate wastegate action resulting in stable maximum boost levels in any gear and almost any atmospheric condition.

4. BLEED OFF PORT #4

Through this port excess signal pressure is discharged.

INSTALLATION PROCEDURES

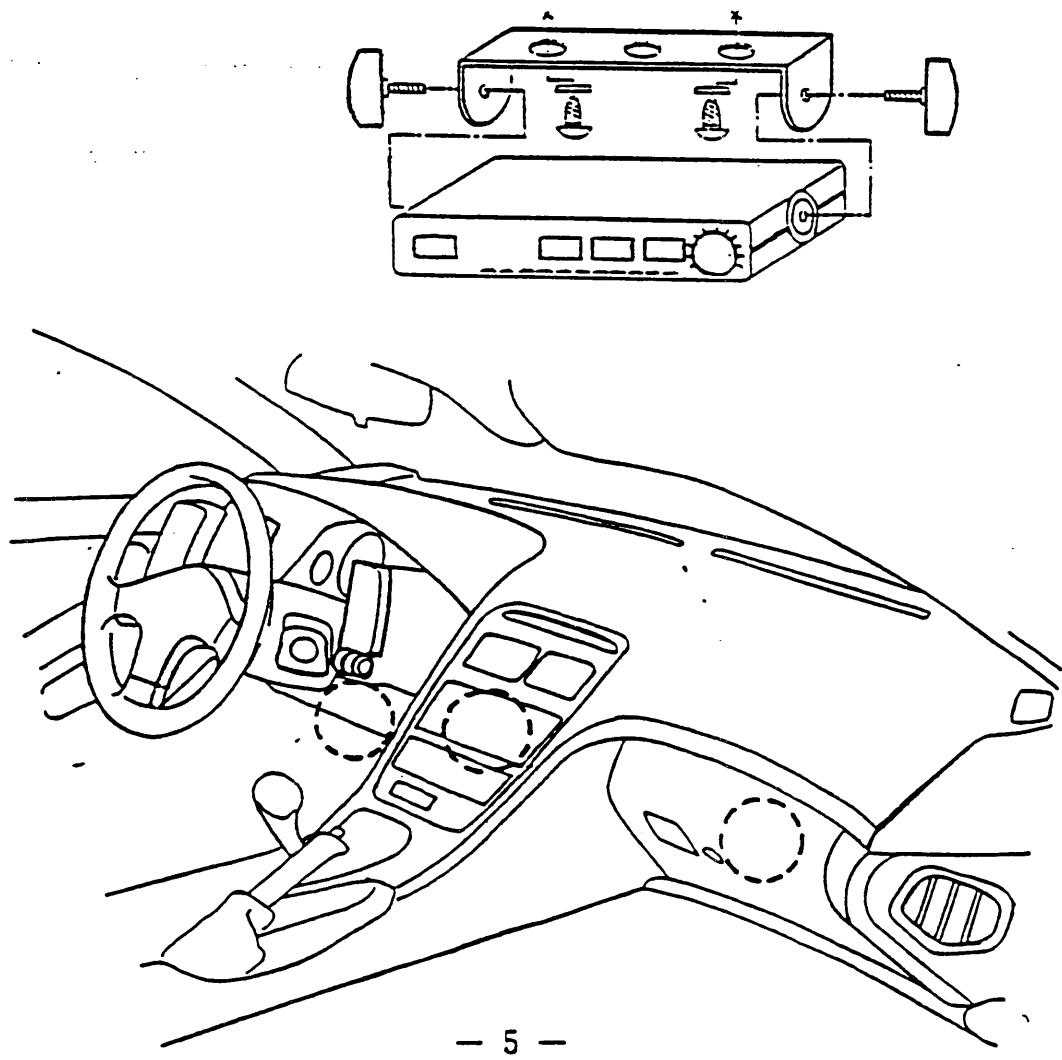
Before installing this product on this on your vehicle, read through the entire manual and familiarize yourself with the terms and procedures used herein. If the installation procedures are not clear to the installer or the installer has questions, please call HKS USA for assistance. Please have a thorough knowledge of the vehicle you are working on and access to a service manual before you call.

NOTE: FAILURE TO ADHERE TO THE FOLLOWING INSTRUCTIONS MAY RESULT IN NON-WARRANTABLE DAMAGE TO THE EVC SYSTEM AND/OR THE VEHICLE'S O.E. SYSTEMS. CAREFULLY FOLLOW THE INSTRUCTIONS IN THIS SECTION.

Disconnect the negative terminal of the battery. Memory loss on the clock and/or AM/FM radio tuner presets may result.

Install the EVC control module inside the vehicle. Mount the unit using the supplied mounting bracket. Make sure the control module is mounted away from direct sunlight and heater ducts. fig.3

fig.3



NOTE: Suggested locations for mounting control module.

Check the inside hose diameter of the wastegate actuator line. If the inside hose diameter does not match ports 2 and 3, replace them with the correct fittings supplied.

Mount the EVC control valve inside the engine compartment away from extreme heat and water with fittings pointed upward if possible, to prevent discharge port blockage.

Connect the 9 pin male control module wire harness to the control valve interface wire harness available in standard 2.4 meters (8 ft) and optional 4.5 meters (15 ft) lengths. Run harness into passenger compartment using existing grommets factory holes if possible. fig.4

(NOTE: To facilitate harness routing, it is possible to remove the white plastic connector from harness. Damage incurred during this procedure is not warrantable therefore HKS USA INC does not recommend this action.

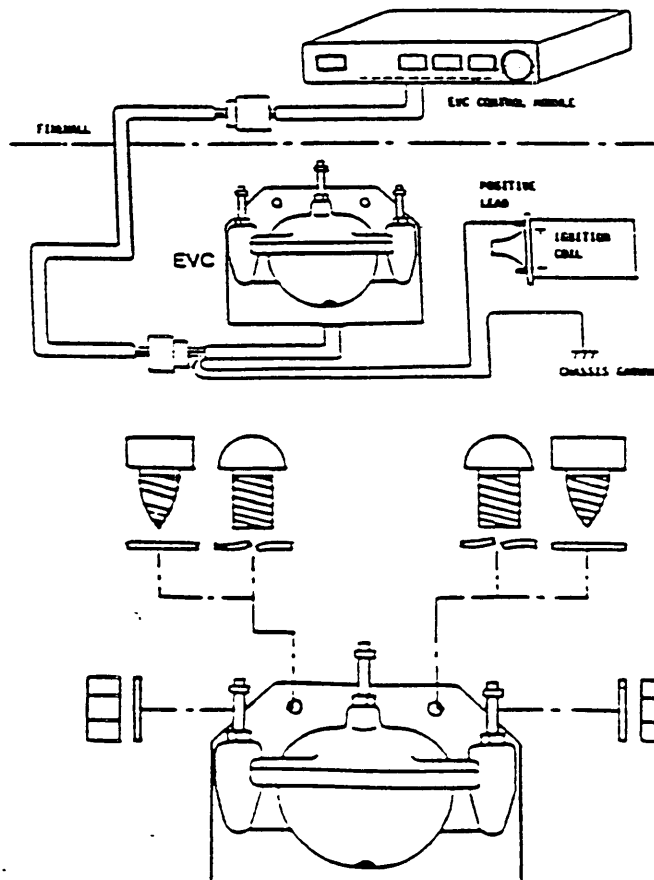
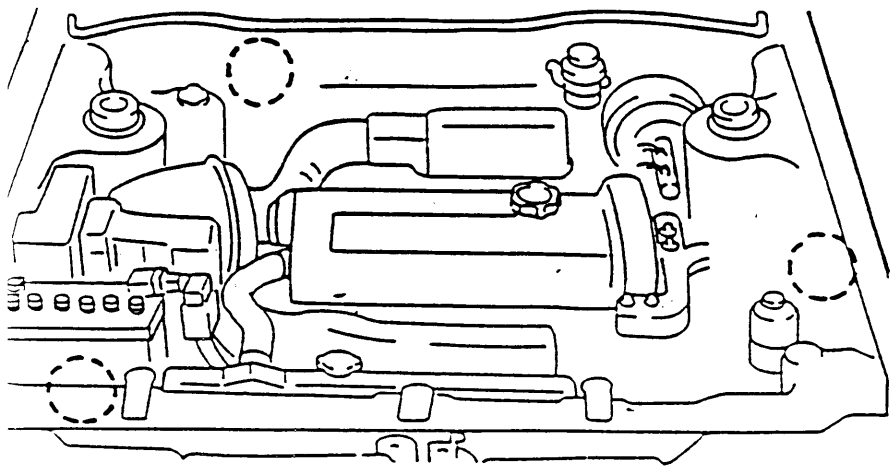
Connector removal will make it possible to making installation more sanitary. Removal is accomplished by utilizing a jewelers screwdriver by pressing against tab (accessible through the front of connector) and pulling wire terminal out through back of connector. To reinstall insert each wire terminal deep into the connector from harness side until it locks into position. After reinstalling terminals into connector gently pull each wire to assure that it is engaged properly. Connector disassembly should only be attempted by an experienced installer and is done at your own risk. IMPORTANT: To disengage connectors, pull on the connectors itself, not the wire harness.

The power lead (red wire) must be connected to a source that has 12 volts with the ignition key on. This connection must be clean and well secured. A suggested source is the positive terminal on the ignition coil. Other type ignition amplifiers will require the red wire to be connected to a 12 volt source. fig.4

Connect the ground lead (black wire) securely to a clean, true ground point. Verify this condition by checking for continuity between that point and the negative terminal of the battery.

Reconnect the battery lead to the negative terminal of the battery. This should be the last step after all other electrical connections are made. Reprogram the clock and/or AM/FM tuner presets.

fig.4

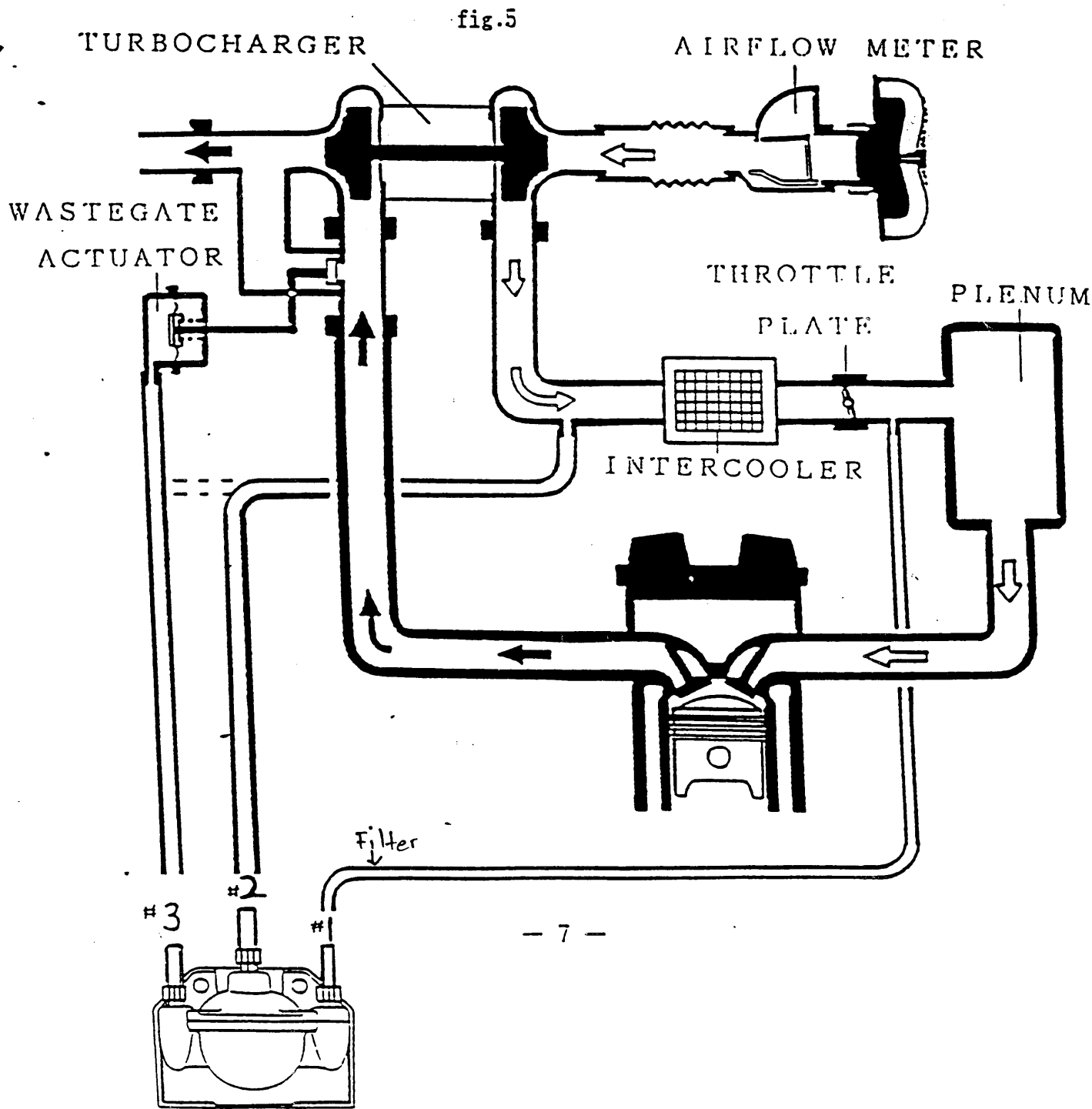


NOTE: Suggested locations for mounting control valve.

Port #1: Connect to an uninterrupted intake manifold pressure source, such as compressor bypass signal line, after the throttle valve using a piece of 4mm hose. The hose should be as short as possible and not exceed 1 meter (3ft 4in). DO NOT connect port #1 to the line that operates the fuel pressure regulator unless instruction supplement specifically directs you to do so. Install moisture filter within 10cm (3.9in) of port #1 fitting.

Port #2: Connect a section of hose to a source of pressurized air such as turbocharger compressor housing (discharge side) or compressor outlet pipe (before intercooler). This line should be as short as possible and must not exceed 1 meter (3ft 4in).

Port #3: Connect a section of hose to the port on the wastegate actuator. This line should be as short as possible and not exceed 1 meter (3ft 4in).



EVC TEST PROCEDURES

Check the hose and wiring are secured as to prevent contact with sharp objects or extremely hot parts such as exhaust manifold, turbocharger or intercooler pipes. Hose and wiring layout must also allow clearance from fan pulley, fan belts and other moving parts.

Start engine and allow it to reach operating temperature. Check for smooth engine idling. If the vehicle does not idle smoothly, check for vacuum leaks.

With the engine on, the EVC should display a red LED light with the power button "ON" and green with the power button "OFF". With the ignition off, the EVC should not light up.

Turn the power button "OFF". Test drive the vehicle with all accessories, climate control equipment off, all windows, sun or T-roofs closed. Observe all laws and regulations pertaining to the circumstances you are testing under. Monitor boost pressure in 3rd gear listening for any audible traces of detonation. Lift off throttle instantly, if any detonation is encountered. The boost pressure should be at the level it was before the EVC was installed. If the boost pressure is above the original level, refer to the trouble shooting section.

Activate the manual button. Increase the boost pressure, without detonation, up to the final level by adjusting the volume knob. Test drive the vehicle under full load in 3rd gear making sure the EVC is functioning properly. If the boost pressure is not above the original level refer to the trouble shooting section.

The boost pressure levels for the "LOW" and "HIGH" modes are adjusted on the back panel. Select the "LOW" button and using a small precision screwdriver, adjust the "LOW" boost level to the desired position. Test drive the vehicle after every adjustment while noting the maximum boost pressure reached. All test driving must be done under full load and in 3rd gear. Perform the same adjustment procedure for the "HIGH" button. Always adjust the boost pressure below the detonation occurrence point.

Affix the octane warning stickers to a visible locations. Gas filler door (yellow sticker) and instrument panel (clear sticker) are recommended locations.

TROUBLE SHOOTING SECTION

SYMPTOM: EVC CONTROL UNIT WILL NOT ILLUMINATE

CHECK: 1. Power connection (must be constant 12V under all conditions with ignition on).

2. Ground connection.

3. Make sure the harness connectors are securely locked, and that the wires are not pinched.

SYMPTOM: NO CONTROL OF BOOST PRESSURE

CHECK: 1. Proper EVC unit is being used and serial numbers match on control module and valve.

2. Possible misadjustment of the volume knob.

3. The EVC power button indicates green when it is in the off position and red with the ignition key on.

4. Hose connections are not leaking and hose layout is correct.

5. Monitor control valve for cycling noise with unit on.

6. Stock solenoid boost control system (should be disabled).