



**ELECTRONIC
VALVE
CONTROLLER
III**

INSTALLATION MANUAL

NOTICE

This manual assumes that you have the knowledge in the operation of tools and equipment which are necessary to safely and efficiently perform service operations on your vehicle. This manual also assumes that you are familiar with typical automotive systems and basic service and repair procedures. Always have access to a factory shop manual as some of the procedures and specifications required for the proper installation of this product may be referenced to the shop manual. To avoid the risk of personal injury to yourself and/or others and to avoid the possibility of rendering your vehicle unsafe, follow the lifting, supporting and safety precautions contained in the factory shop manual for the vehicle you are working on.

INTRODUCTION

HKS would like to thank you for purchasing the Electronic Valve Controller (EVC). The HKS EVC provides immediate selection of preset manifold boost pressure selections or variable manifold boost pressure control from within the vehicle cockpit. The HKS EVC incorporates two main components, the control module and valve body which are linked only by electrical harness connection. No hoses are routed through the firewall and into the cockpit. This unit is equipped with fuzzy logic and requires a special preadjustment to utilize this feature. The EVC actually learns the turbocharger (boost) characteristics and optimizes the boost curve. If this feature is not desired, the EVC can be programmed without it.

USER NOTES:

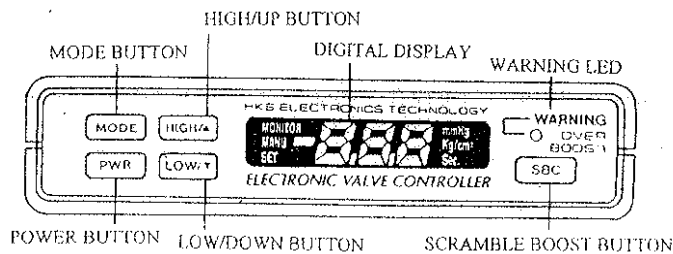
- 1) EVC is not capable of boost levels lower than OEM (stock) levels.
- 2) EVC can be used on both internal (single port actuator) and external (dual port actuator) wastegate type turbochargers.
- 3) Serial numbers much match between EVC controller and Valve body or unit will not function properly.
- 4) EVC is a sensitive electronic component therefore handle as such. Mis-wiring or shock will damage unit. It must not be exposed to extreme heat, water or dust.
- 5) Most factory turbocharged equipped vehicles are equipped with a secondary boost limiting system (e.g. fuel cut circuit or pop-off valve) to safeguard against wastegate failure. Due to this, 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 (FCD) / Programmed Fuel Computer (F-con) / Injector Upgrade and HKS adjustable pop-off valve.
- 6) If vehicle has a fuel cut defenser such as the HKS FCD, make certain you do not excessively increase boost levels otherwise you will damage engine/turbocharger. HKS will not warranty damaged caused by excessive boost levels.
- 7) Make certain you have the proper fuel management system for vehicle when boost levels are increased. HKS will not warranty damaged caused by improper fuel management (Lean Air/Fuel Ratios).
- 8) 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.
- 9) Increasing the boost pressure will also increase the intake air temperature. If the intake air temperature is above 220deg F (100deg C) performance increases may be minimal and detonation may occur.
- 10) For best performance and safety, always use the highest octane fuel (92 minimum) available.
- 11) Do not rely on the factory boost gauge when adjusting the maximum boost pressure. Install an accurate auxiliary boost gauge such as one produced by HKS to monitor manifold boost pressure levels.
- 12) The utilization of an exhaust gas temperature meter such as one produced by HKS is recommended to monitor engine conditions.
- 13) Mount the EVC control unit and harness away from high power two way radios, mobile phones and their respective antenna cables to prevent malfunction of EVC.
- 14) Read entire manual to understand how the HKS EVC functions then install and perform boost level adjustment. Do no attempt to install or adjust the EVC without thorough knowledge of how this unit works.

FEATURES

- ⇔ Adjust boost levels within vehicle cockpit.
- ⇔ Compact design.
- ⇔ Capable of high boost increases. Boost adjusting range from OEM (stock) levels up to 2.0 bar. Note: This may not be possible

- ⇒ in all vehicles due to engine/turbocharger restrictions but electronically it is possible.
- ⇒ Digital boost meter. EVC shows real time boost levels except when in adjusting mode.
- ⇒ Direct boost input. Displays adjusted/selected boost levels
- ⇒ Three mode adjusting feature. (High/Low/Manual)
- ⇒ When EVC is turned off, boost level returns to OEM level.
- ⇒ Liquid crystal display (LCD) with three color illumination.
- ⇒ Offset feature. Alters actual boost curve of turbocharger. This feature gives you an adjustment window for the self learning boost adjustment mode.
- ⇒ Scramble boost feature. Allows selected (by user) boost level increase for a selected time period (also by user). Optional scramble boost controller (SBC) external switch available.
- ⇒ Selected boost memorization. Once boost levels are set, EVC will retain memory regardless of power until readjusted.
- ⇒ Warning feature. Audible and visual warning when boost levels exceed warning level.
- ⇒ Wategate type selection. Can alter EVC for external or internal wastegate function.
- ⇒ Serial port. EVC can interface with other HKS components.

CONTROL UNIT EXPLANATION



POWER BUTTON

- ⇒ OFF: No boost control and boost pressure level is OEM (stock). LCD will display boost levels
- ⇒ ON: Boost control according to selected settings

MODE BUTTON

When power is on, you can select several modes as shown below

- ⇒ Boost Pressure Control Mode
EVC works in automatic low/high mode. Display will read current boost pressure.
- ⇒ Adjusting Mode
Can set desired boost pressures and scramble boost pressure. When you press MODE button unit emits audible alarm then changes EVC to boost pressure adjusting mode, offset adjusting mode, scramble boost pressure mode, scramble boost time mode, warning pressure mode. With EVC power button off, press and hold HIGH button then change setup switch located in back of controller (Just switch to other direction). After completed turn Ign. off, and move switch to original position, Turn Ign. on. and procedure is completed. After this, EVC will not allow further boost adjustment setup. To cancel safety mode, power button off, press and hold LOW button then move setup switch in back of controller. Turn Ign. switch off, setup switch to original position, Ign. on. Procedure is now completed.
- ⇒ Manual Mode
During boost pressure control mode, depress MODE button for more than 1 second. You will hear alarm indicating EVC has now changed to manual mode. In this mode you can adjust the boost by depressing the LOW and HIGH buttons.

LOW BUTTON

- ⇒ During boost pressure control mode press the LOW button and then EVC will go into low pressure mode. During this mode, boost pressure is set between OEM (stock) level up to 1.0 kg/cm².
- ⇒ During adjusting mode by pressing LOW button, desired boost will reduce by one step increments. During both boost pressure adjusting mode and offset adjusting mode, press LOW button and SBC button simultaneously. You can select the low mode during each mode.
- ⇒ In manual mode by pressing LOW button you lower the boost.

HIGH BUTTON

- ⇒ Functions identical to LOW button with the exception of maximum boost levels can be adjusted up to 2.0kg/cm² and button will increase instead of decrease levels.

SBC BUTTON

- ⇒ During boost pressure control mode by pushing SBC button or optional SBC button, boost setup for scramble will be added to boost levels already set. Scramble boost will apply for time which has been preset during adjusting mode. During scramble boost mode, SBC button illuminates red with SBC button illuminating green after scramble boost mode is over. Scramble boost mode preset time level will start once SBC button is let go (If you depress and hold button for 10 seconds, total SBC time will be 10 seconds + preset time). Note: Scramble boost mode does not work during manual mode.

DIGITAL DISPLAY

- ⇒ Three digit LCD
- ⇒ Shows desired boost and current boost levels
- ⇒ Illuminates:
 - Green* when power switch is off
 - Red* when in control mode
 - Orange* when in adjusting mode
- ⇒ Indicates:
 - On left side of display- MONITOR / MANU / SET
- ⇒ Unit display:
 - On right side of display - mmHg / Kg/cm² / Sec



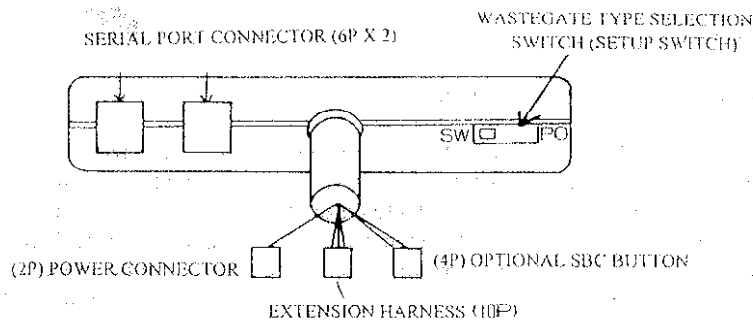
WARNING DISPLAY

- ⇒ When boost levels exceed warning set up or maximum adjustable level (2.0 Kg/cm²) warning system activates red warning LED and audible alarm. When warning system activates, boost control will cancel and boost levels will return to OEM (stock) levels. Warning system cancels when vacuum is applied to EVC. If vehicle is equipped with a small turbocharger, when EVC finds the maximum boost level limit warning LED will flash.

BUTTON ILLUMINATION

- ⇒ EVC buttons illuminates at all times.
 - *Green* if EVC on.
 - *Red* if button depressed.

REAR PANEL



WASTEGATE TYPE SELECTION SWITCH

- ⇒ Choose SW for internal wastegate / PO for external wastegate

EXTENSION HARNESS FOR VALVE UNIT (TEN PIN CONNECTOR)

- ⇒ Connect Control unit to valve body via extension harness

POWER (2 pin)

- ⇒ Connect to Ignition power and ground.

OPTIONAL SCRAMBLE BOOST BUTTON (4 pin)

- ⇒ For remote scramble boost button if desired

SERIAL PORT (6 pin)

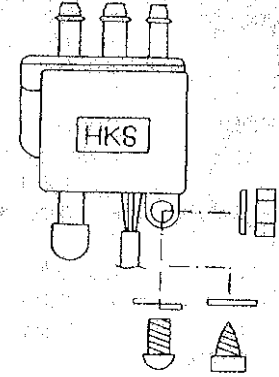
- ⇒ Interface port for future HKS components

INSTALLATION

1) DISCONNECT NEGATIVE TERMINAL FROM BATTERY

2) EVC VALVE UNIT INSTALLATION

- A) Determine ideal mounting location of valve body.
- ⇒ Do not install valve unit close to exhaust manifold or areas of high temperature.
 - ⇒ Do not install unit where it will be exposed to water or moisture.
 - ⇒ Ports 1, 2 and 3 must face upward with Port No.4 facing downward.
 - ⇒ Length of hoses must be kept short as possible.
- B) Mount valve unit to chassis using M6 bolt or M6 tapping screw included in the kit. Valve body must be grounded through chassis.



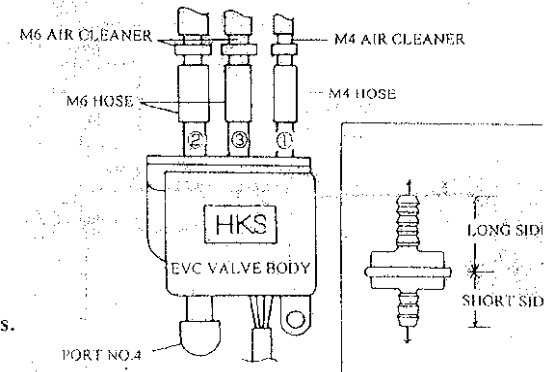
3) EVC HOSE CONNECTIONS

USER NOTES:

Air filter Installation

- ⇒ Install air filters as per diagram. Make sure filters are within 15cm length from valve unit.
- ⇒ The 6mm filters must be installed with short side facing Valve body.
- ⇒ Inspect air filters every oil change.
 - Must be clean for proper function.
 - If contaminated (dirty), replace with new air filters.
Do not attempt to clean filters.
 - EVC cannot function properly with contaminated filters.
Engine damage may occur.
 - If filters frequently need replacement due to contamination (dirt/oil/water) relocate pressure source.

CAUTION: EVC valve body port location is different from past HKS EVC's.
Port No. 2 and 3 are switched.



DETERMINE IF VEHICLE IS EQUIPPED WITH A INTERNAL WASTEGATE (SINGLE PORT ACTUATOR) OR EXTERNAL WASTEGATE (DUAL PORT ACTUATOR) SYSTEM THEN PROCEED TO PROPER SECTION.

INTERNAL WASTEGATE (SINGLE PORT ACTUATOR) INSTALLATION

PORT 1: Connect to an uninterrupted intake manifold pressure source after throttle body such as compressor bypass signal line using 4mm hose.

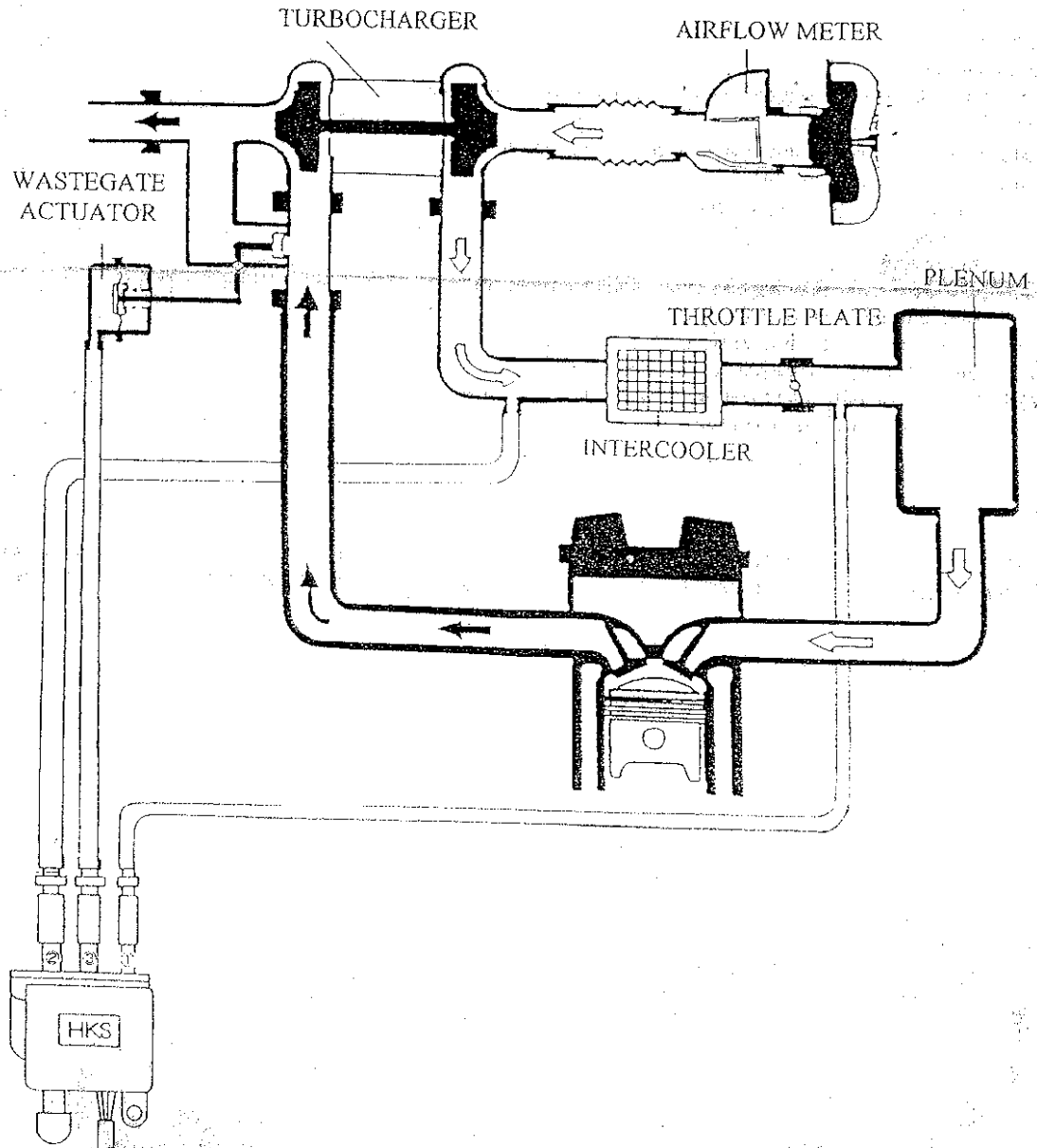
- Do not connect Port No.1 to the line that operates the fuel pressure regulator unless instruction supplement specifically directs you to do so.
- The hose should be as short as possible and not exceed 1 meter (3ft 4in).
- Install air filter within 10cm (3.9in) of port No.1 fitting.

PORT 2: Connect to a source of pressurized air such as turbocharger compressor housing (discharge side) or compressor outlet pipe (before intercooler) using 6mm hose.

- This line should be short as possible and must not exceed 1 meter (3ft 4in).
- Install M6 air filter within 10cm (3.9in) of port No.2 fitting with short side facing valve body.

PORT 3: Connect to port on wastegate actuator.

- This line should be as short as possible and not exceed 1 meter (3ft 4in).
- Install M6 air filter within 10cm (3.9in) of port No. 3 fitting with short side facing valve body.



EXTERNAL WASTEGATE (DUAL PORT ACTUATOR) INSTALLATION

PORT 1: Connect to an uninterrupted intake manifold pressure source after throttle body such as compressor bypass signal line using 4mm hose.

- Do not connect port No.1 to the line that operates the fuel pressure regulator unless instruction supplement specifically directs you to do so.
- The hose should be as short as possible and not exceed 1 meter (3ft 4in).
- Install air filter within 10cm (3.9in) of port No.1 fitting.

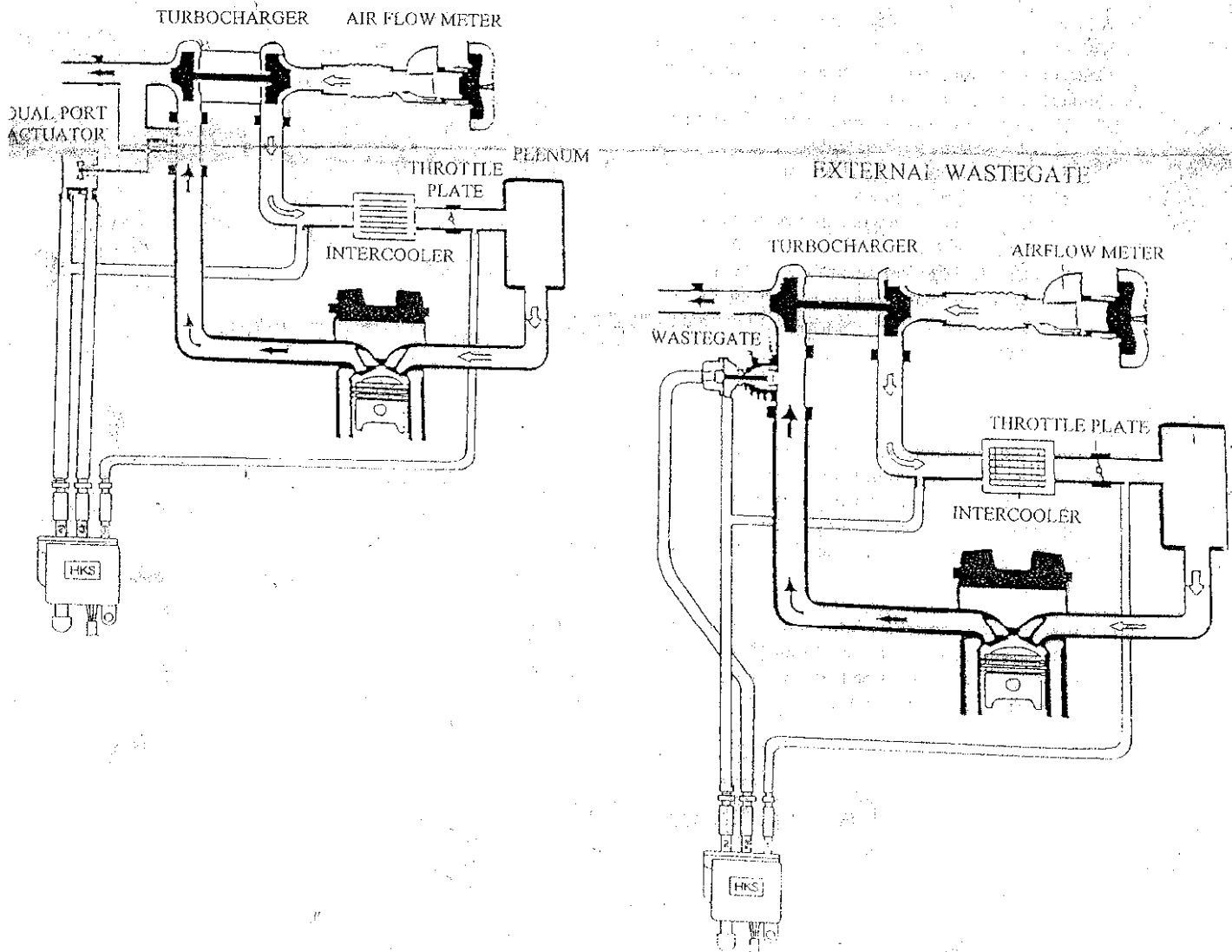
PORT 2: Connect to a source of pressurized air such as turbocharger compressor housing (discharge side) or compressor outlet pipe (before intercooler) using 6mm hose. Use a provided tee fitting to connect a pressure line to the secondary port on the wastegate actuator.

- Both lines should be short as possible and must not exceed 1 meter (3ft 4in).
- Install M6 air filter within 10cm (3.9in) of port No.2 fitting with short side facing valve body.

PORT 3: Connect to port on wastegate actuator.

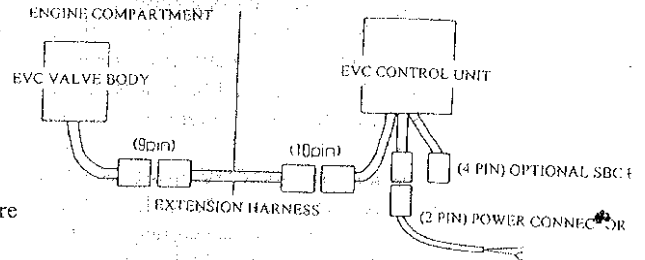
- This line should be as short as possible and not exceed 1 meter (3ft 4in).
- Install M6 air filter within 10cm (3.9in) of port No. 3 fitting with short side facing valve body.

DUAL PORT ACTUATOR



4) EXTENSION HARNESS INSTALLATION

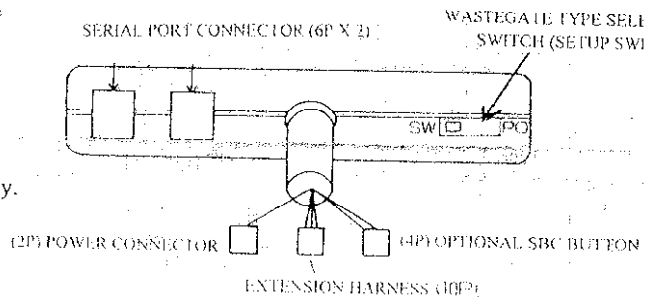
- Connect 9 pin connector on extension harness to valve unit.
- Route other end of extension harness (10 pin connector) from engine compartment into passenger compartment using existing grommet factory hole if possible.
 - ⇒ Route extension harness away from extreme heat and moving parts using zip ties.
 - ⇒ To facilitate harness routing, it is possible to remove the 10 pin 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 installation more sanitary.



- Verify wire terminal location in 10 pin connector
- Utilize a jewelers screwdriver and press (lift) tab (accessible through the front of connector) and pull wire terminal out through back of connector.
- Route harness through grommet factory hole.
- Insert each wire terminal deep into the 10 pin 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.*

5) EVC CONTROL UNIT INSTALLATION

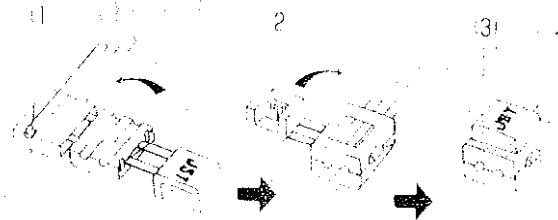
- Adjust switch on back of controller for type of wastegate:
SW = Internal wastegate PO = External wastegate
- Connect control unit 10 pin connector to extension harness.
- Connect control unit 2 pin power connector
 - ⇒ The RED wire must be connected to source that has 12 volts with the ignition key on.
 - Connection must be clean and well secured
 - Recommended key on source is from EFI main relay.
 - Inspect wiring diagram and use voltage meter for proper source
 - ⇒ Connect BLACK wire securely to a clean, true ground
 - Verify ground condition by checking for continuity between that point and negative terminal of the battery.



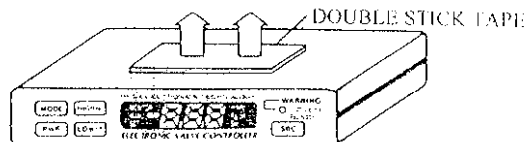
USER NOTES

Wire connectors

- Place wire to be spliced into side A without stopper and wire from harness to side A with stopper (make sure wire touches stopper)
- Fold side B and C to side A using a plier to insure snap is secured.
- Fold side C to side A and B using a plier to insure snap is secured.
- Note: Do not strip wire ends. Gently pull on the wires to insure a proper splice.



- Install the EVC control module inside vehicle using double sided tape
 - ⇒ Install unit away from direct sunlight and heater ducts.
 - ⇒ When using double sided tape, use cleaner spray on surface to remove water, oil, and dirt.



ADJUSTMENT PROCEDURE

PRECAUTIONS

- ⇒ Cannot lower boost levels lower than OEM (stock) levels.
- ⇒ Maximum boost levels obtainable is 2.0bar. (In low mode 1.0 bar is Max.) but turbocharger performance may lower maximum boost levels.
- ⇒ If vehicle is equipped with a boost pressure control solenoid, it must be removed.
- ⇒ The self learning mode procedure is very crucial for proper EVC function. Follow procedure exactly as outlined or EVC may not function properly. If any doubt exists as to if procedure was completed properly, clear EVC memory and re-perform the EVC self learning process as described below.
- ⇒ When changing vehicle or any engine components which enhance performance, you will need to clear EVC memory and update (re-perform) the EVC self learning process.
 - Turn ignition on, EVC off, press and hold SBC button while turning switch in back of EVC controller.
 - EVC Warning LED should turn on and audible beep should continue for approximately 5 seconds.
 - After audible beep stops, self learning mode should be reset.
 - Turn ignition off then reset switch behind EVC controller to original position.
 - Turn ignition on and turn EVC on then perform self learning mode again as described in the preadjustment section (Step 6).
- ⇒ If boost levels do not reach levels set on EVC, the self learning process might have not been performed properly. Possibly engine RPM or road conditions were not identical during all 3 steps. All conditions (road, transmission gear, vehicle speed, engine rpm, etc.) must be **exactly** the same when programing EVC.
- ⇒ If boost levels do not reach levels set on EVC, offset mode can be used to lower or raise boost levels. If offset level is adjusted too far out of range, warning LED will illuminate and EVC will not function properly. Note: Lower offset number will raise boost levels.
- ⇒ If boost levels vary inspect
 - Wastegate valve diameter and stroke is too small.
 - Wastegate actuator spring is too weak.
 - Turbocharger capacity too small for engine displacement. If this is the case, boost curve will drop off during high RPM compared to boost curve at OEM (stock) levels.

EVC ADJUSTMENT PROCEDURES

PREADJUSTMENT

NOTE: DURING PREADJUSTMENT PROCEDURE NO.6, DO NOT AT ANY TIME BREAK ANY LOCAL, STATE, OR FEDERAL VEHICLE LAWS SUCH AS SPEEDING/RECKLESS DRIVING/ETC. VEHICLE GEAR SELECTION CAN BE SUBSTITUTED FOR A LOWER GEAR IF NECESSARY OR COMPLETE PROCEDURE CAN BE BYPASSED.

- 1) Confirm switch on back of controller is in correct position for type of wastegate. SW = internal PO = external
- 2) Confirm all hoses and wire connections are
 - ⇒ Installed correctly and secure.
 - ⇒ Secure as to prevent contact with sharp objects.
 - ⇒ Routed away from extreme heat such as exhaust manifold, turbocharger, Intercooler pipes.
 - ⇒ Allows clearance from fan, pulleys, belts, and other moving parts.
- 3) 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.
- 4) With engine running (Ignition on) EVC display should illuminate green with "3" showing on the LCD display.
- 5) "3" showing on the LCD display confirms EVC unit is in the self learning mode.
- 6) When in self learning mode drive vehicle under full boost condition (stock level) and have EVC evaluate engine turbocharger boost curve.
 - A) Drive vehicle full throttle in 3rd gear starting at idle (1000rpm). If vehicle is equipped with an automatic transmission use 2nd gear if possible. EVC display should illuminate red. as soon as boost pressure is detected. When EVC display turns green and emits audible alarm, let off engine throttle. EVC display should illuminate green with a "2" showing on the LCD display. This completes the first step in the self learning mode.
 - B) Repeat prior step **exactly** as just performed (same boost levels, same RPM, same transmission gear, same road conditions, etc.). After 3 times, display should read 0 and color should be green with a continuous beeping noise. When vacuum is applied to EVC, self learning data will be stored in memory. You will need to complete this self learning mode before you can use (program) EVC utilizing the fuzzy logic feature.
 - C) If for some reason the self learning mode is not functioning properly or an error was made, turn off ignition then on again and start all over. This will cancel previous inputs and EVC will start over with the LCD display showing a "3" illuminating in green.
- 7) For vehicles equipped with a sequential turbocharger system, a slightly different self learning mode procedure must be completed.
 - A) Drive vehicle in 3rd gear to determine when (what RPM) second turbocharger activates.
 - B) Turn off ignition then on again to reset EVC.
 - C) Drive vehicle below 0 psi boost to 3rd gear at the point (RPM) right before second turbocharger activates.
 - D) Confirm EVC still displays a "3". Keep vehicle at a steady speed/RPM in 3rd gear then apply full throttle. EVC display should illuminate red as soon as boost pressure is detected. When EVC display turns green and emits audible alarm, let off engine throttle. EVC display should illuminate green with "2" showing on the LCD display. This completes the first step in the self learning mode.
 - E) Repeat prior step **exactly** as just performed (same boost levels, same RPM, same transmission gear, same road conditions, etc.). After 3 times, display should read 0 and color should be green with a continuous beeping noise. When vacuum is applied to EVC, self learning data will be stored in memory.
 - F) This procedure is somewhat difficult therefore HKS recommends bypassing step No. 7 and proceeding straight to step No. 8 below.
- 8) If self learning procedure cannot be done or is not desired you can cancel self learning procedure by pressing MODE button first, HIGH button second, then LOW button third during self learning mode. After this is performed, EVC should show boost set up mode. Enter peak OEM boost level by using HIGH and LOW button (you have to find out peak OEM boost level). After setting correct boost, hit SBC button to enter boost. OEM (stock) boost level can be set from 0.2 to 1.2 bar.