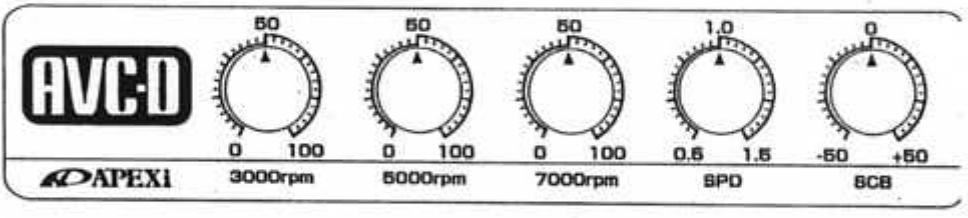
AVC-D

ACTUATOR VALVE CONTROLLER TYPE-D

INSTRUCTION MANUAL



APEXi

Please be sure to read this before attempting installation or operation.

Thank you for purchasing the AVC-D

* In order to properly use this unit, please be sure to read this instruction manual carefully.
* Please store this manual inside of the vehicle for reference.
* Please be sure to include this manual with the unit when selling.

Product Name: AVC-D
Product Code: 420-A003
Applications: 3,4,6,8 Cylinder Electronically Fuel Injected Gasoline Turbo Engines.
Function : Boost control for turbocharged vehicle engines.

Note1:
A separate wiring harness and MOMENTARY TYPE BUTTON SWITCH (the type of switch that turns ON
only when depressed) must be purchased when using the scramble boost feature.

Note2:
Twin turbo, External Wastegate, and Sequential Twin Turbo vehicles requires additional parts which are NOT included in this product.

Note3:
This unit CANNOT control Fuel Cut problems that may occur through raising boost levels. An additional fuel cut controller may become necessary.

Note4:
When raising boost, please make sure that all engine components and related management parts can withstand the increase cylinder pressures.

To Begin

Thank you for purchasing the AVC-D.
In order to properly use this unit, please read this instruction manual carefully.

This product controls the movement of the internal (swing valve) and external (poppet) wastegates to allow control of boost pressure.
By using the click style knobs on the face of the unit, the user can manipulate boost levels in a MANUAL and DIRECT fashion.

Features

1) can set boost at 3000, 5000, and 7000 RPM
2) The main boost levels can be raised or lowered under low speed load (when the vehicle speed is low) by inputting a vehicle speed signal.
3) The main boost levels can be raised or lowered for a set amount of time by adding a scramble boost switch.
4) The unit can handle boost pressures beyond 2.0 kg/cm2 because it does NOT use a pressure sensor.
   * This unit DOES NOT use a feedback system and DOES NOT include a " self learning" function. Although there are no complicated initial calibrations, BOOST OVERSHOOT may occur depending upon the application vehicle and desired boost levels. The boost overshoot will require the user to set the boost levels with this in mind. This unit should be tuned only by an experienced professional tuner.
   * This unit does NOT include a boost level display monitor. An external boost gauge MUST be added to read the boost levels.

---

* Please be sure to double check the contents list (refer to page 5) for any missing or damaged parts. Please contact your dealer of purchase if there is anything missing or damaged.
* This manual is intended to allow the user to properly operate this unit in a responsible fashion.
* Please contact your dealer of purchase or our office to re-order missing parts or manuals.
* THIS PRODUCT IS DESIGNED FOR OFF-ROAD RACE PURPOSES ONLY. This may never be used upon a public highway for any reasons.
* THIS PRODUCT HAS BEEN ENGINEERED TO WORK ON FACTORY SPECIFICATION VEHICLES. Installation and use of this product for any other purposes than specified within this instruction manual will VOID all warranties expressed or implied.
* A'PEX is not responsible for any damages resulting from improper installation or use of this product by the customer or any third party.
* Please be sure that the warranty card and serial number on the unit match correctly. A'PEX will not warranty any products where the serial numbers do not match.
* This product is engineered for any vehicle with a 12 V power source with a negative ground..
* A'PEX reserves the right to change the contents, function, price, and appearance of this product without prior notification.
* A'PEX reserves the right to change this instruction manual without prior notification.
* Please be sure to give this instruction manual and warranty card to the user after installation.
* This product is designed for the Japanese market only.
  If it is used in another country, be aware that some vehicle specifications are different..

Table of Contents

Glossary

* This instruction manual is intended to help the user install this product safely and without harm to others. It is written with the intent that the user will be able to properly utilize all of the functions contained within this unit. The glossary list is below. Please be sure you understand the proper definition of each key word before proceeding with the installation.

KEY WORD	DEFINITION
⚠ DANGER	Failure to obey this warning will likely result in DEATH or severe injury to the user.
⚠ WARNING	Failure to obey this warning may cause DEATH or severe injury to the user.
⚠ CAUTION	Failure to obey this warning may result in light injury to the user, product damage, or damage to the surrounding area.
NOTES	Failure to obey this warning may result in product failure or inability to use all of the functions of this product.

Safety Precautions

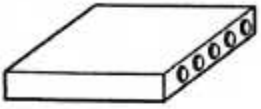
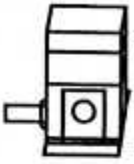
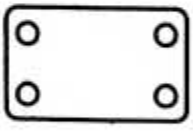
⚠ WARNING

* Please discontinue use of the AVC-D if you hear a burning noise or smell a burning scent. Kindly repack the unit with all of the original material and take it back to the place of purchase or to the nearest sales office.
  Continued use under these conditions may result in electrical shorts, electrical fires, or electrical damage to the product and vehicle.
* Never operate the unit while driving. Using any of the functions other than monitoring may result in injury or accidents.
* Securely mount this unit and keep it away from any areas which might get in the way of driving. Failure to do so may result in injury or accidents.
* This unit is designed only for DC12V type vehicles with a negative ground. Do not install this unit on any other type of vehicle. Failure to do so may result in vehicle fire.
* Be sure to disconnect the negative terminal of the battery before proceeding with installation. Failure to do so may result in vehicle fire, electrical shortage, electrical system damage, and product damage.
* Be sure to securely hold the connector when disconnecting. Failure to do so may result in vehicle fire, electrical shortage, electrical system damage, and product damage.

⚠ CAUTION

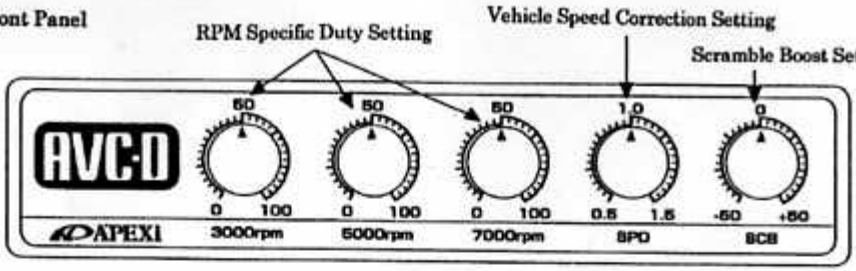
* INSTALLATION OF THIS PRODUCT SHOULD BE PERFORMED BY AN EXPERIENCED INSTALLER OR TUNER.
* Never modify, change, or disassemble this unit.
* Please do not expose this unit to excessive shock.
* ALWAYS DOUBLE CHECK FOR: incorrect wiring and hosing, electrical short, exposed wires, faulty connections, and cut wires.
* Do not expose this unit to water or high temperatures.
  This could lead to electrical shock, vehicle fire, and engine damage.
  Incorrect operation could cause engine damage.
* When raising boost levels, please be sure to confirm that the engine and fuel injection system can withstand the raised boost levels.
  Exceeding the allowable levels of boost may cause severe engine and turbocharger damage.
* Do not set the boost level beyond the turbocharger capacity.
  Exceeding the turbocharger capacity for boost may cause turbocharger damage which could also cause internal engine damage.

Parts List

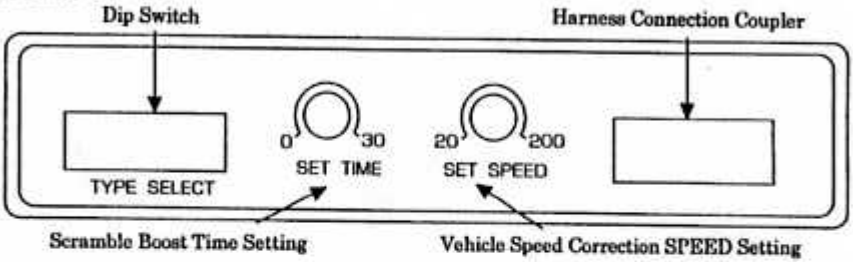
1. Control Unit	2. Solenoid Valve	3. Harness
		
1	1	1
4. Taps	**5. Hose**	**6. Hose clamps**
		
4	6φ 1	6φ 4
7. Protective Rubber Mount for Solenoid Valve	**8.Solenoid Valve Mounting Bolts**	**9. Double-sided Tape**
		
1	M5 4	1
10. Instruction Manual		※ Optional Parts List is on Page 33
		
1		

Product Features (Diagrams / Functions)

Front Panel



Rear Panel



* RPM Specific Duty Setting
  Volume settings for base duty at 3000,5000,7000rpm
  When: VOLUME is set to "0" Then: Factory Actuator/ Wastegate setting
  When: VOLUME is set to "100" Then: Unlimited Boost / No wastegate control
* Vehicle Speed Correction Setting Volume
  Allows correction of 0.5~1.5 times the base duty cycle
  (The vehicle speed correction setting will not operate when the base duty cycle is set to "0"
* Vehicle Speed Correction SPEED Volume
  Allows vehicle speed correction SPEED to be set between 20-200km/h.
* Scramble Boost Setting Volume
  Allows -50%~+50% adjustment of base duty cycle during scramble boost
* Scramble Boost Time Setting Volume
  Sets the scramble boost time from 0~30 seconds
* Dip Switch
  Set according to application vehicle for speed correction function
* Harness Connection Coupler
  For connection of Harness

Installation

Installation Preparation

1) THE FOLLOWING TOOLS ARE NECESSARY FOR INSTALLATION

Please be sure to prepare these items before installation.

Pliers, Box Wrenches, Screwdrivers, Socket wrenches, wire strippers, electrical tape, zip ties, precision screwdriver, wire cutters, and crimper.

* A MOMENTARY type button switch is necessary to use the scramble boost feature. Please use a MOMENTARY button or toggle(ie. Horn button style). These switches ARE NOT INCLUDED WITH THIS UNIT.
* Please prepare a 3 WAY joint and hose clamp that matches the actuator size when installing this unit on a twin turbo vehicle. THESE ITEMS ARE NOT INCLUDED IN THIS UNIT. Optional parts number (430-A001 Twin Turbo Installation Parts)
* A hoseclamp/ 3 WAY/ and PT nipple matching the external wastegate specifications will become necessary when installing the unit on an external wastegate vehicle. These items ARE NOT INCLUDED IN THIS UNIT. Optional parts number (430-A002 External Wastegate Installation Parts)
* A ~~G~~ transition nipple for the actuator is necessary when installing this unit on an EJ20 sequential twin turbo engine. This item IS NOT INCLUDED IN THIS UNIT. (430-A001 Twin Turbo Installation Parts)

2) Be sure to disconnect the negative terminal of the battery before installation.

All stored data from other electrical products will be erased when the battery is disconnected. We recommend taking note of all preset values for when the battery is reconnected.

WARNING

* Please be sure to disconnect the negative terminal of the battery before installation. Failure to do so may result in engine fire, electrical shorts, and electrical product damage.

3) Be sure to check all vehicle wiring and vacuum hoses BEFORE starting installation. Make sure that the vehicle diagrams are the same as the actual vehicle wiring.

⚠CAUTION

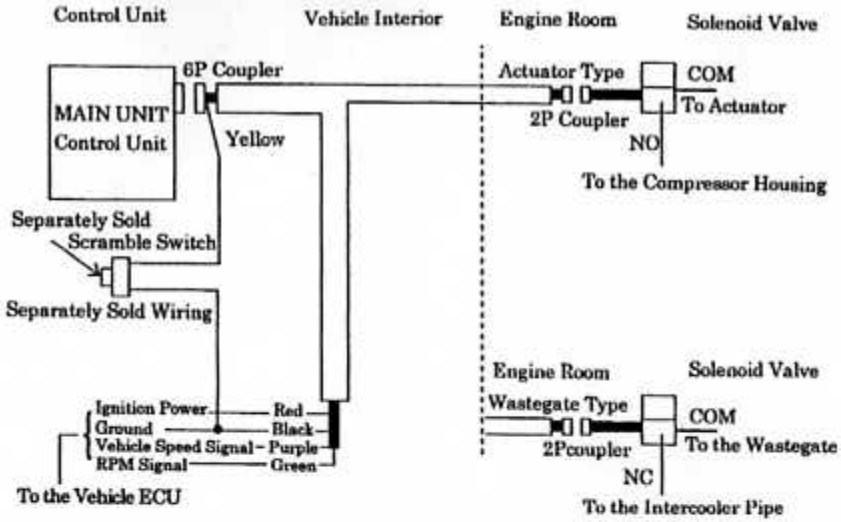
* Avoid incorrect hosing, wiring, connections, hose sizes, and electrical shorts during installation. This may lead to electrical shorts, and engine fire which may damage electrical products. Product failure may also lead to vehicle engine damage.

4) Be sure that the vehicle IS CAPABLE OF HANDLING INCREASED BOOST PRESSURE LEVELS BEFORE INSTALLING THE UNIT.

⚠CAUTION

* When raising boost levels, please be sure to confirm that the engine and fuel injection system can withstand the raised boost levels.Exceeding the allowable levels of boost may cause severe engine and turbocharger damage.

Connection Diagram



Wiring Procedure

Connection of Electrical and Signal Harnesses

1) Disconnect the negative terminal of the battery.

2) Refer to the diagram above to bring the 6P harness and ECU Connection harness into the vehicle cabin. If there is no available hole in the firewall, please make one. Be sure to cover the exposed edges of the new hole with a protective rubber seal to prevent cutting the electrical wires and causing electrical shorts and damage to the harness.

3) Locate the vehicle ECU using the Vehicle Specific Wiring Diagram and Vehicle Specific Computer Location diagram.

4) Use the Vehicle Specific Wiring Diagram to connect the power, ground, and other signal wires to the ECU by SECURELY fastening the included wire Taps.

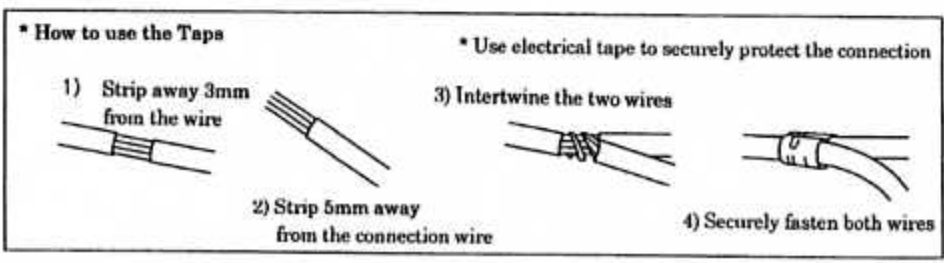
Red Wire- Connect to IG (Ignition) power

Black Wire- Connect to ECU ground

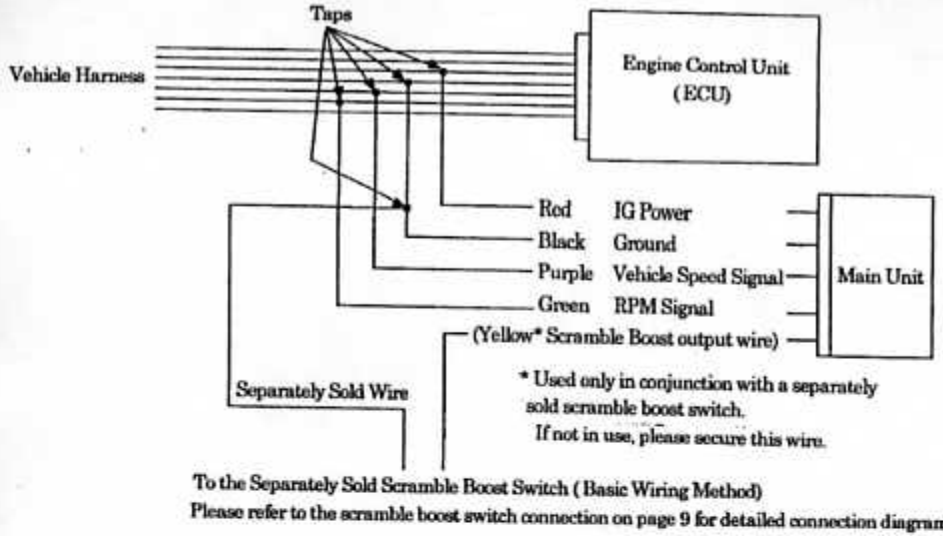
Purple Wire- Connect to Vehicle Speed Signal Wire

Green Wire- Connect to RPM Signal Wire

5) Make sure that all connections made insulated in step (4) with electrical tape.



Wiring Diagram

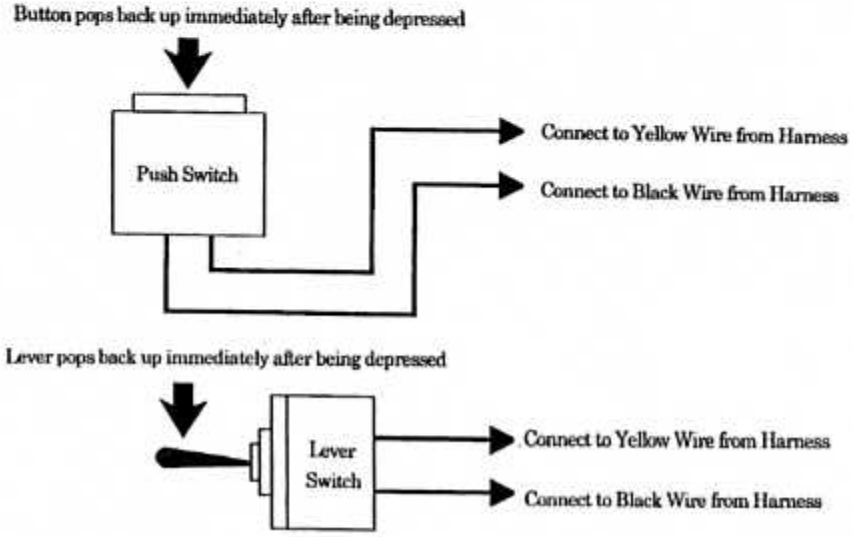


Scramble Boost Switch (Sold Separately) Connection Diagram.

By adding a momentary type switch (button or toggle) to the unit, the user can either raise or lower the boost levels for a preset amount of time.

Please purchase a non-locking PUSH style switch or a level style non-locking switch.

Wiring Diagram



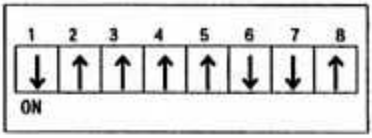
Control Unit Setting

Use the dipswitches on the rear panel of the unit to select cylinder type and vehicle speed pulse type.

BE SURE TO REFER TO THE DIAGRAM BELOW WHEN SETTING

(All switches are in the OFF position out of the factory.)

Setting Example



The example above shows 4 cylinder/ vehicle speed 2 Pulse type/ scramble switch setting (ground style)

Dip Switch Setting Diagram

Switch Number	1	2		3	4		5		6	7	8
Cylinder Number			Vehicle Pulse Setting			Leave in the OFF Position		Scramble Switch Setting			
3 Cylinder	↑	↑	2 Pulse	↑	↑	Leave in the OFF Position	↑	Ground Connection (Standard Connection)	↓	↓	↑
4 Cylinder	↓	↑	4 Pulse	↓	↑						
6 Cylinder	↑	↓	8 Pulse	↑	↓			Power Connection (+12 V Signal)	↑	↑	↓
8 Cylinder	↓	↓	16 Pulse	↓	↓						

* About the Cylinder Setting

For rotaries, please take the number of rotors X 2

* About Vehicle Speed Pulse

The NISSAN Y32 Cedric, Gloria, and CIMA are 16 Pulse. All other NISSAN vehicles are 2 Pulse. All other Japanese vehicles are 4 Pulse.

Vehicle Specific Application Table

Vehicle Specific Computer Wiring Diagram

TOYOTA

Vehicle Name	Model Type	Engine	Year	ECU Location	ECU Wiring	Note
Arist	JZS147	2JZ-GTE	'91.10~'97.8	c	T2	
Soarer	JZZ30	1JZ-GTE	'91.5~	c	T3	
	MZ20	7M-GTE	'89.1~'91.4	d	T6	
			'86.1~'88.12		T9	
	GZ20	1G-GTE	'89.1~'91.4		T6	
			'86.1~'88.12		T10	
Supra	JZA80	2JZ-GTE	'93.5~'97.8	c	T2	
	JZA70	1JZ-GTE	'90.8~'93.4	d	T5	
	MA70	7M-GTE	'88.8~'90.7		T6	turbo A
			'86.1~'90.7			
	GA70	1G-GTE	'88.9~'93.4		T6	
			'86.2~'88.8		T9	
Mark II Chaser Cresta	JZX100	1JZ-GTE	'96.9~	e	T3	
	JZX90		'92.12~'96.8			
	JZX81		'90.8~'92.9	d	T5	
	GX81	1G-GTE	'88.8~'90.8		T6	
MR2	SW20	3S-GTE	'89.10~	Trunk	T6	
Celica	ST205	3S-GTE	'94.2~	e	T6	
	ST185		'89.10~'93.9			
	ST165		'85.8~'89.9		T10	
Starlet	EP91	4E-FTE	'95.12~	d	T7	
	EP82		'89.12~'95.12	e	T8	M/T
			'92.1~'95.12		T7	A/T
	EP71	2E-TE	'86.1~'89.12		T12	

NISSAN

Vehicle Name	Model Type	Engine	Year	ECU Location	ECU Wiring	Note
Cima	FHY33	VQ30DET	'96.6~	a	N1	
	FPY32	VG30DET	'93.9~'93.6		N1	
	FPY31		'89.8~'91.7			
			'88.1~'89.7		N6	
Fairlady Z	Z32	VG30DETT	'89.7~	c	N1	
	Z31	VG30ET	'86.10~'89.7	a	N5	
		RB20DET				
Leopard	JHY33	VQ30DET	'96.3~	a	N4	
	UF31	VG30DET	'88.8~'92.6		N1	
	GF31	VG20DET			N6	
Cedric Gloria	Y33	VQ30DET	'95.6~	a	N4	
	Y32	VG30DET	'91.6~'95.6		N1	
	Y31	VG20DET	'89.6~'91.6			

Cefiro	A31	RB20DET	'88.9~'94.8	a	N1	
Laurel	C34	RB25DET	'94.1~'97.6	a	N1	
	C33	RB20DET	'89.1~'93.1			
Skyline	R33	RB26DETT	'95.1~	a	N1	
		RB25DET	'93.8~			
	R32	RB26DETT	'89.8~'95.1			
		RB20DET	'89.5~'93.8			
	R31	RB20DET	'87.8~'89.5		N5	
Stagea	WC34	RB25DET	'96.8~	a	N7	
Bluebird	U13	SR20DET	'91.9~'96.1	e	N2	
	U12	SR20DET	'89.10~'91.9			
		CA18DET	'87.9~'89.10	e	N1	
Silvia	S14	SR20DET	'96.6~	a	N2	
			'93.10~'96.6		N1	
	PS13		'91.1~'93.10		N3	
	S13	CA18DET	'88.5~'91.1		N1	
180SX	RPS13	SR20DET	'96.8~	a	N2	
			'91.1~'96.8		N3	
	RS13	CA18DET	'89.3~'91.1		N1	
Pulsar	N14	SR20DET	'90.8~'95.1	e	N2	
Avenir	W10	SR20DET	'95.8~	e	N2	

MITSUBISHI

Vehicle Name	Model Type	Engine	Year	ECU Location	ECU Wiring	Note
GTO	Z16A	6G72	'90.10~	e	M3	
Galant	EC5A	6A13	'96.8~	e	M1	
	E84A	6A12	'92.5~'96.8		M3	
	E39A	4G63	'87.10~'92.4	b	M2	
Legnam	EC5W	6A13	'96.8~	e	M1	
Eclipse	D32A	4G63	'95.6~'	e	M1	
	D27A		'89.11~'95.6		M4	
Lancer (Mirage)	CM5A	4G93	'95.10~	b	M1	
	CN9A	4G63	'96.8~		M1	
	CE9A		'93.10~'95.10		M3	
	CD9A		'92.10~'93.10			
	CD5A	4G93	'91.10~'95.10			
Libero	CD5W	4G93	'94.1~'95.10	b	M3	
RVR	N23W	4G63	'94.10~	b	M3	
Pajero Mini	H36A	4A30	'93.9~	j	M6	
Minica Dangan	N23W	4A30	'93.9~	j	M8	

MAZDA

Vehicle Name	Model Type	Engine	Year	ECU Location	ECU Wiring	Note
Cosmo	JCES	20B-REW	'90.3~'95.8	c	Z1	
	JC3S	13B-REW				
RX-7	FD3S	13B-REW	'95.12~	a	Z8	
			'91.12~'95.12		Z2	
	FC3S *	13B	'88.9~'91.12	c	Z3	
			'85.10~'88.9		Z4	

* Only for FC3S with Crise Control (Location is "h")

SUBARU

Vehicle Name	Model Type	Engine	Year	ECU Location	ECU Wiring	Note
Legacy	BD5 BG5	EJ20R	'96.6~	c	F5	
		EJ20H(MT)				
		EJ20H(AT)			F6	
		EJ20H	'93.10~'96.6		F1	
	BC5 BF5	EJ20G	'89.2~'93.10	h	F2	
Impreza	GC8	EJ20G	'92.11~'96.9	c	F2	
	GF8		'93.10~'96.9			
	GC8, GF8	EJ20K	'96.9~	c	F5	
	GF8	EJ20G				

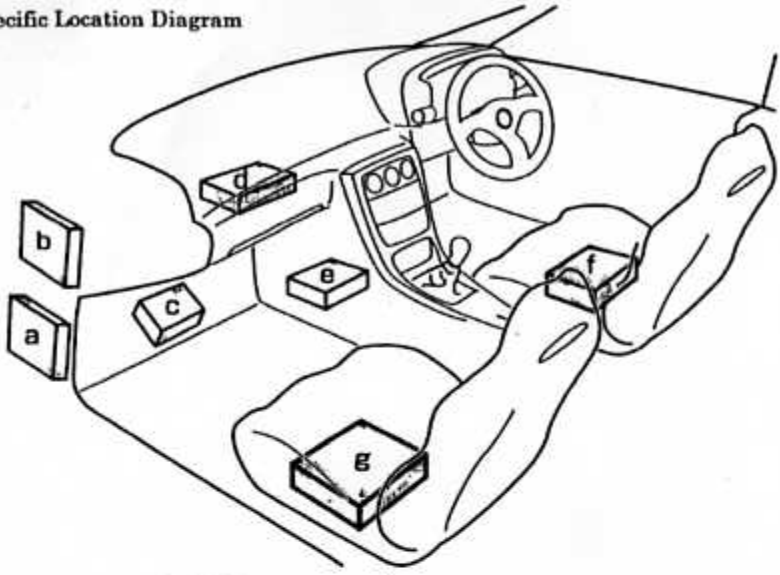
SUZUKI

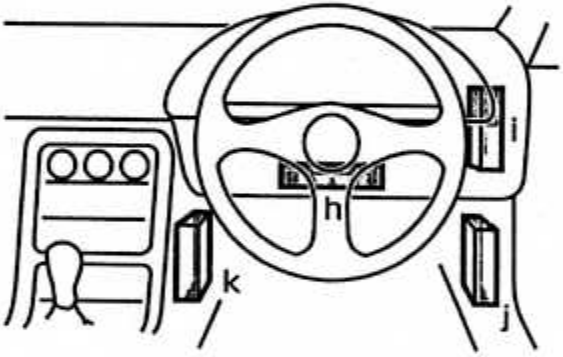
Vehicle Name	Model Type	Engine	Year	ECU Location	ECU Wiring	Note
Alto Works	HA21S	K6A	'94.11~	b	S1	
	HB21S					
	HA11S	F6A			S2	
	HB11S					
Capuchino	EA21R	K6A	'95.5~	k	S3	
	EA11R	F6A	'91.11~'95.5	b	S4	
Wagon-R	CT21S	F6A	'95.11~	b	S5	MT
	CV21S				S6	AT
	CT21S		'93.9~'95.11		S4	MT
	CV21S					

DAIHATSU

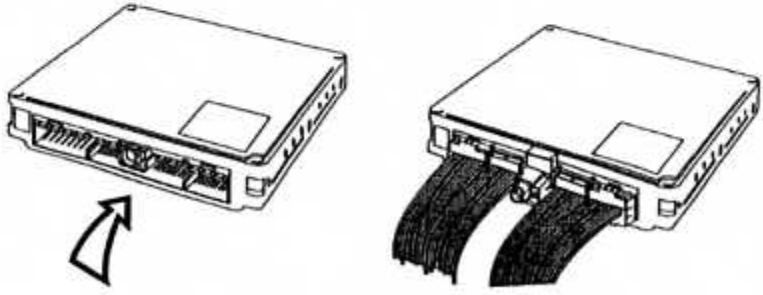
Vehicle Name	Model Type	Engine	Year	ECU Location	ECU Wiring	Note
Mira TR-XX	L502S	JB-JL	'94.9~	d	D1	
	L512S					
	L500S	EF-JL				
	L602S	JB-JL	'95.8~			

Vehicle Specific Location Diagram





a	Passenger Side Lower Dash
b	Left of the Glove Box
c	Passenger Side Foot Rest
d	Behind the Glove Box
e	Behind the Center Console
f	Under the Driver Seat
g	Under the Passenger Seat
h	Near the Steering Column
i	Right of the Meter Panel
j	Driver Side Lower Dash
k	Right of the Center Console

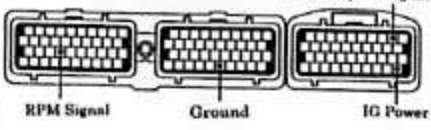


View the Vehicle Specific Wiring Diagram FROM THIS ANGLE.
Some vehicles may have the computer unit mounted backwards. Please be sure to count the number of pins before proceeding with installation.

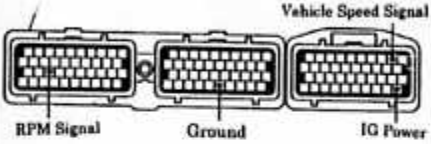
車種別コンピュータ配線図

TOYOTA

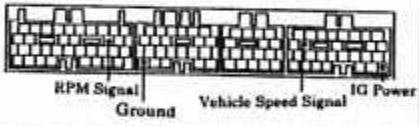
T1 40P 40P 40P



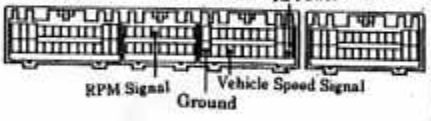
T2 40P 40P 40P



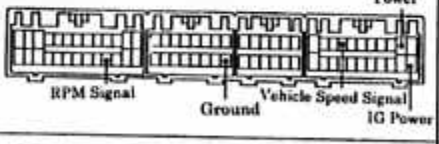
T3 34P 22P 16P 28P



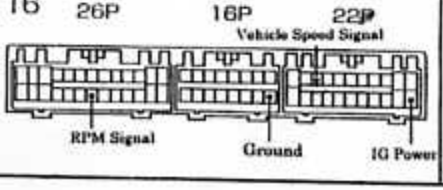
T4 26P 16P 22P 26P



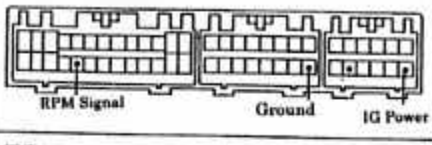
T5 26P 16P 12P 22P



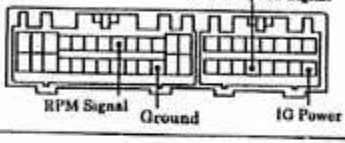
T6 26P 16P 22P



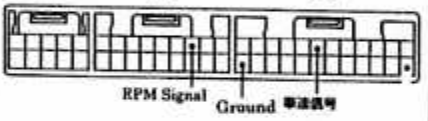
T7 26P 16P 12P



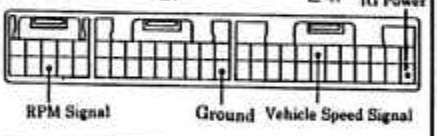
T8 26P 16P



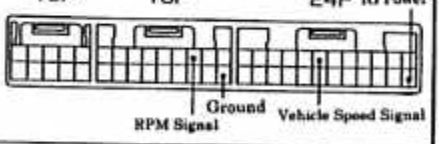
T9 10P 18P 24P



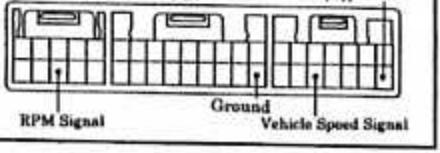
T10 10P 18P 24P

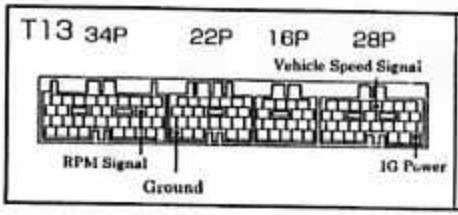


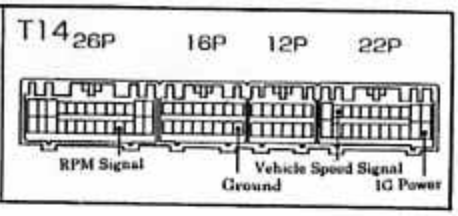
T11 10P 18P 24P



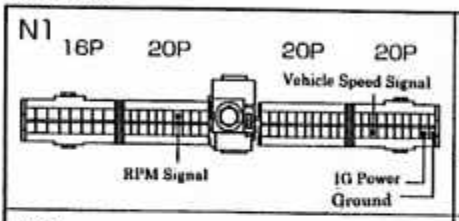
T12 10P 18P 14P

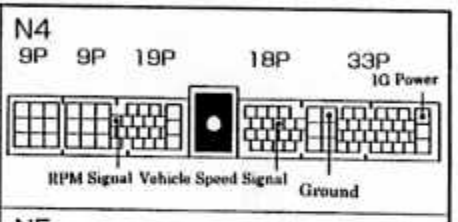


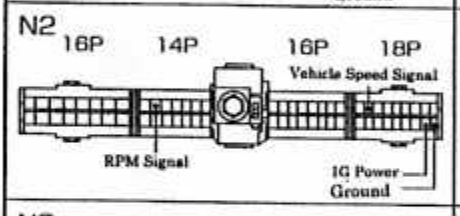

T13 34P
22P
16P
28P
Vehicle Speed Signal
RPM Signal
Ground
IG Power

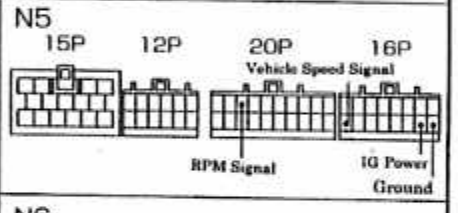

T14 26P
16P
12P
22P
RPM Signal
Ground
Vehicle Speed Signal
IG Power

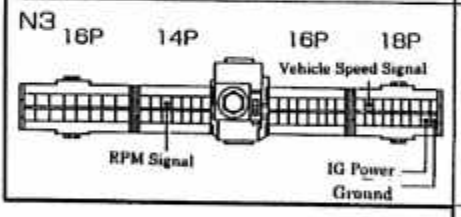
NISSAN

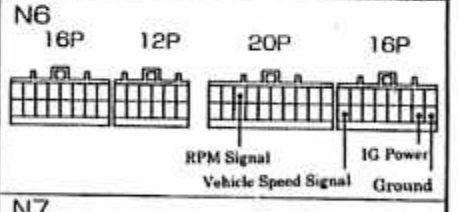

N1
16P
20P
20P
20P
Vehicle Speed Signal
RPM Signal
IG Power
Ground

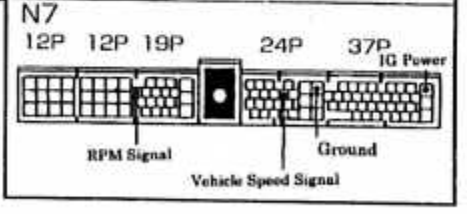

N4
9P
9P
19P
18P
33P
IG Power
RPM Signal
Vehicle Speed Signal
Ground


N2
16P
14P
16P
18P
Vehicle Speed Signal
RPM Signal
IG Power
Ground


N5
15P
12P
20P
16P
Vehicle Speed Signal
RPM Signal
IG Power
Ground

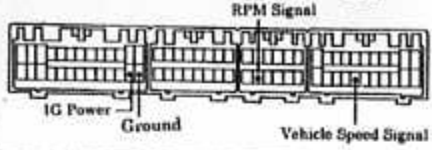

N3
16P
14P
16P
18P
Vehicle Speed Signal
RPM Signal
IG Power
Ground


N6
16P
12P
20P
16P
RPM Signal
Vehicle Speed Signal
IG Power
Ground

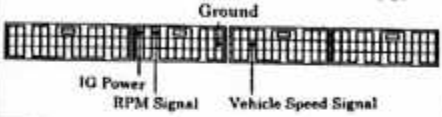

N7
12P
12P
19P
24P
37P
IG Power
RPM Signal
Ground
Vehicle Speed Signal

MITSUBISHI

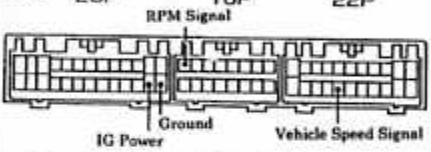
M1



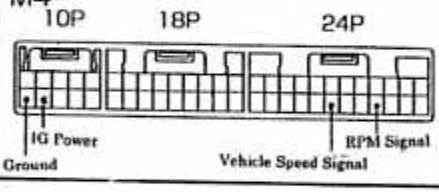
M2



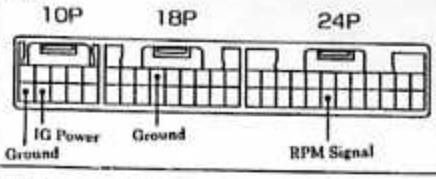
M3



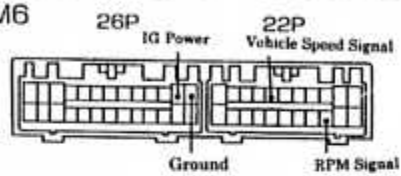
M4



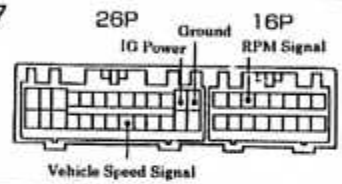
M5



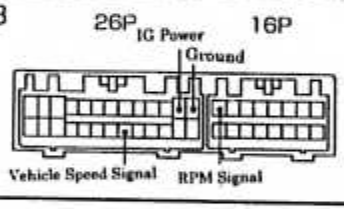
M6

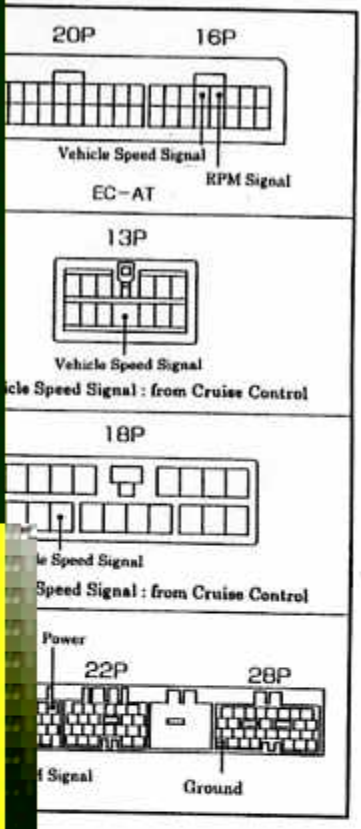


M7



M8




20P
16P
Vehicle Speed Signal
RPM Signal
EC-AT
13P
Vehicle Speed Signal
18P
Power
22P
28P
Ground

Hosing Diagram

Actuator Type (Internal Wastegate) Hosing Diagram

1) Disconnect the hose going from the compressor housing of the turbo to the actuator
2) Cut the included 6 pi hose to the required length
3) Using the diagram below, connect the compressor housing to the NO port of the solenoid valve.
4) Using the diagram below, connect the actuator side to the COM port of the solenoid valve.
5) Leave the NC port of the solenoid valve open atmosphere
6) Mount the solenoid valve away from high temperatures in a position where the harness can reach. Use the rubber mounting plate when mounting the solenoid valve.

⚠ CAUTION

* Do not mount the solenoid valve near high temperatures or without the protective rubber base. Failure to do so may result in shortened solenoid valve lifespan which may cause engine and turbocharger damage.

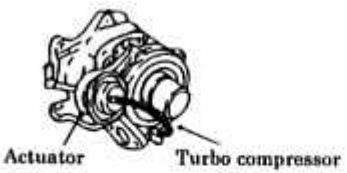
7) Be sure to connect hose clamps to all vacuum hoses to ensure secure connections. Please check for bent or kinked vacuum hoses.

⚠ CAUTION

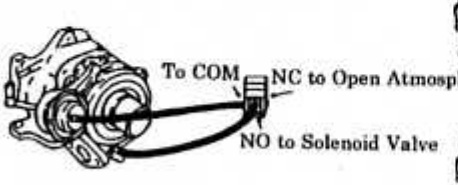
* Be sure to secure ALL vacuum hoses to prevent accidental blow off. Vacuum hoses that blow off during driving may cause extensive engine and turbocharger damage.

⚠ CAUTION

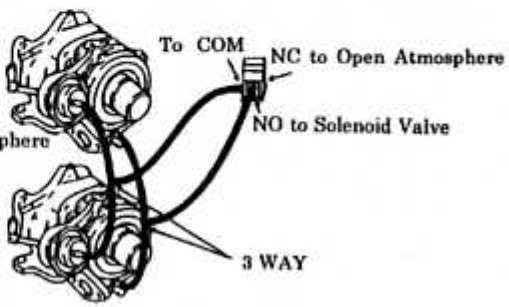
* Some vehicles have a factory boost pressure solenoid valve. Please be sure not to connect the factory solenoid valve with this unit. Connecting the factory boost pressure solenoid valve will prevent proper boost control and will cause engine and turbocharger damage.



Factory Vehicle Hosing Diagram



AVC-D Installation Hosing Diagram



Twin Turbo Hosing Diagram

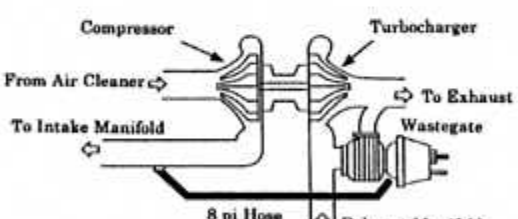
Poppet Type (External Wastegate) Hosing Diagram

1) Connect a metal 6 pi fitting on to the top port of the wastegate. (This 6 pi fitting is NOT included in our unit. Please purchase this item separately.)
   * Use a sealant when screwing the fitting on to the wastegate.
2) Remove the nipple on the NO side of the solenoid valve and attach it tot he NC side of the solenoid valve
   * Use a sealant when screwing the fitting on to the wastegate.
3) Leave the NO open atmosphere
4) Connect the 8 pi-6pi-8pi 3 WAY to the 8 pi hose going from the surge tank to the bottom port of the wastegate.
   (This 8pi-6pi-8pi 3 WAY is not included in this unit. Please purchase this item separately.)
5) Connect a 6 pi hose to the 8pi-6pi-8pi 3 WAY and connect this to the NC nipple of the solenoid valve.
6) Connect a 6 pi hose between the COM nipple of the solenoid valve and the top port of the wastegate from step (1.)
7) Mount the solenoid valve away from high temperatures in a position where the harness can reach. Use the rubber mounting plate when mounting the solenoid valve.

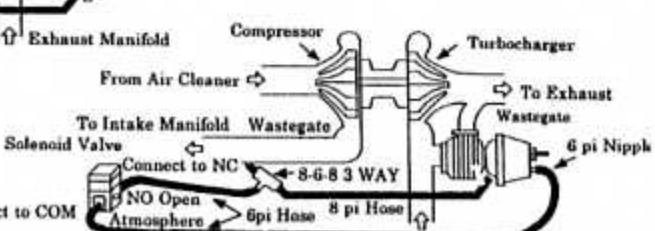
> ⚠ CAUTION
> * Do not mount the solenoid valve near high temperatures or without the protective rubber base. Failure to do so may result in shortened solenoid valve lifespan which may cause engine and turbocharger damage.

8) Be sure to connect hose clamps to all vacuum hoses to ensure secure connections. Please check for bent or kinked vacuum hoses.

> ⚠ CAUTION
> * Be sure to secure ALL vacuum hoses to prevent accidental blow off. Vacuum hoses that blow off during driving may cause extensive engine and turbocharger damage.



Factory Hosing Diagram

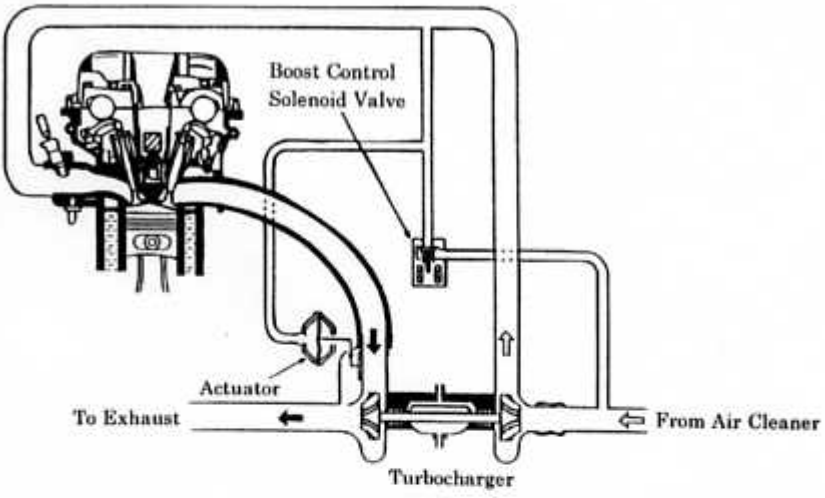


AVC-D Hosing Diagram

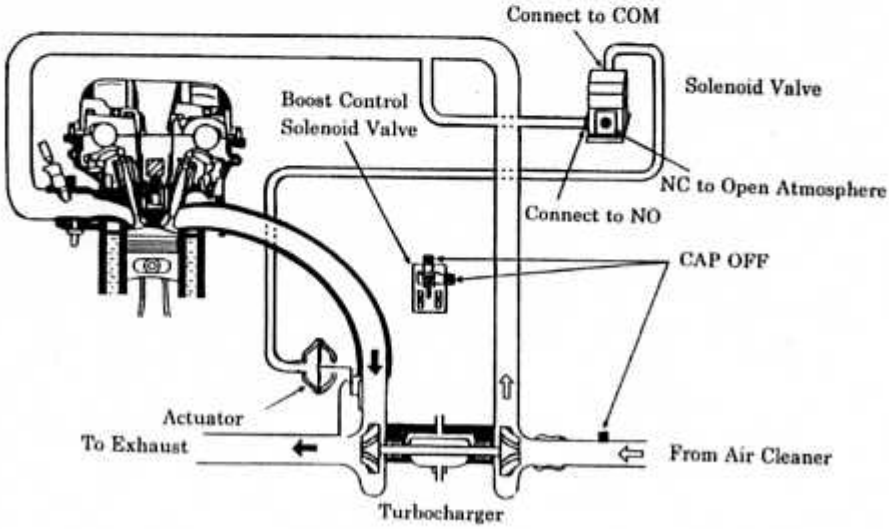
Actuator Type (Internal) Wastegate Hosing Diagram

IMPROPER HOSING CONNECTIONS WILL RESULT IN FAULTY OPERATION OF THIS UNIT. Please be sure to double check all hosing before operation.

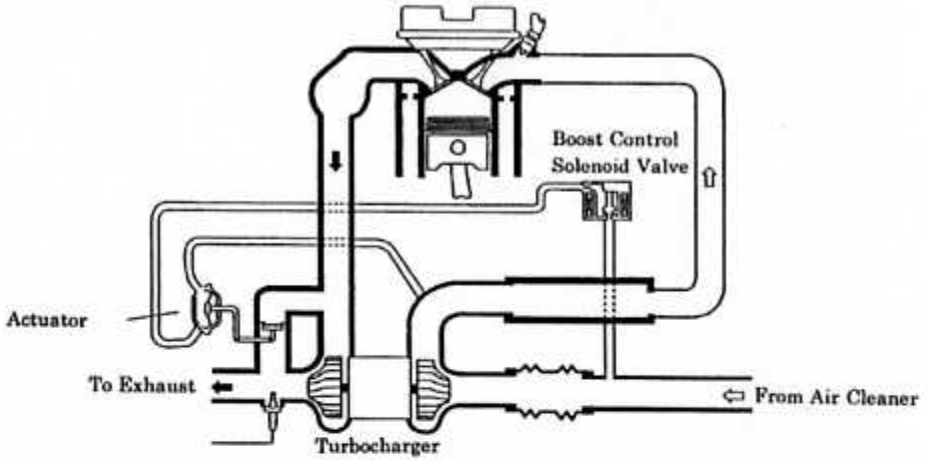
Vehicles with Factory Boost Control Solenoid Valves (1)



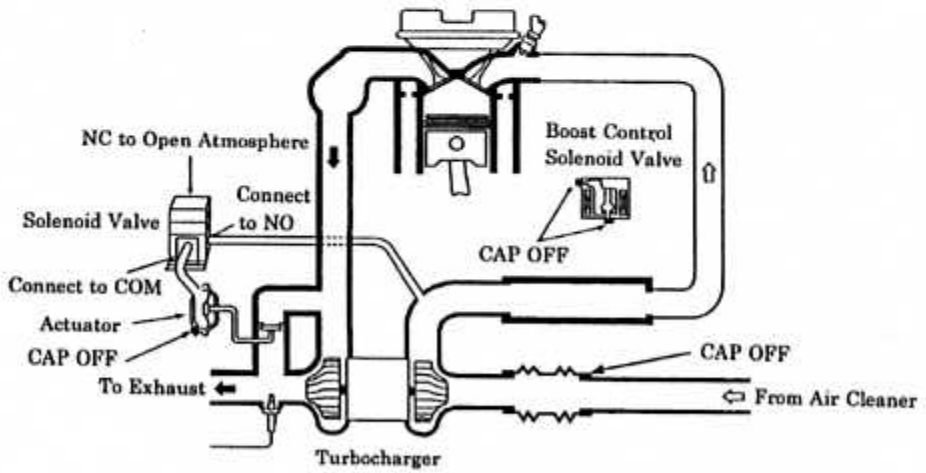
Factory Hosing Diagram



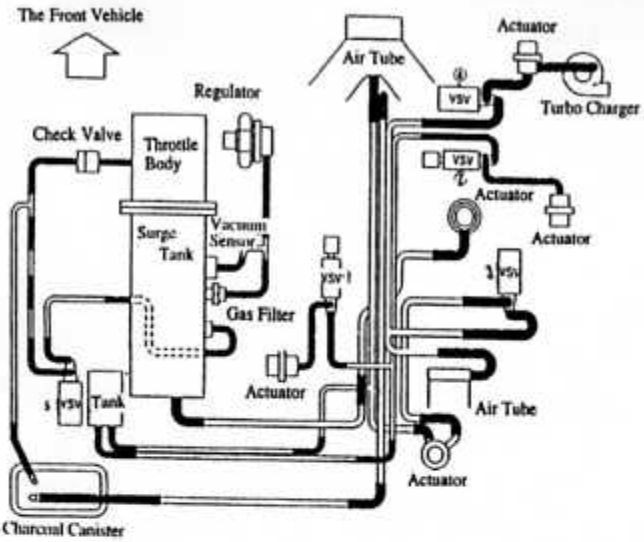
AVC-D Hosing Diagram



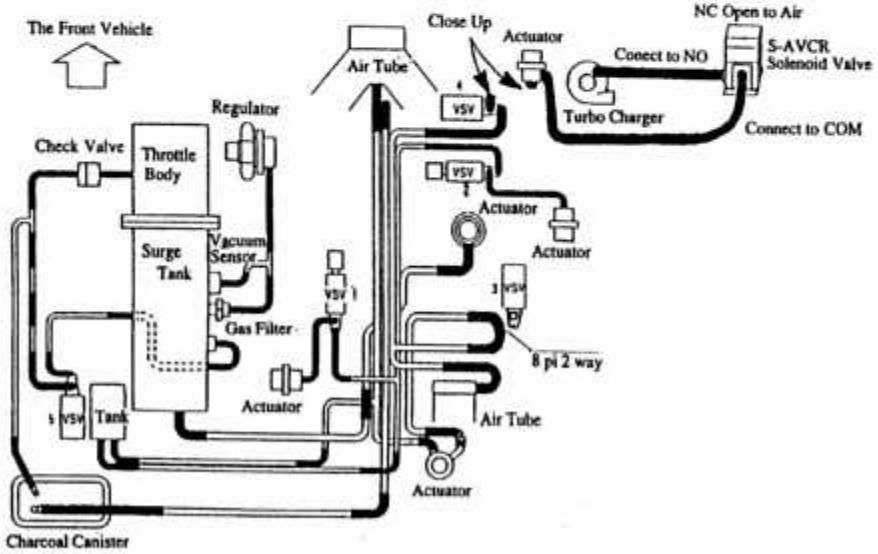
Factory Hosing Diagram



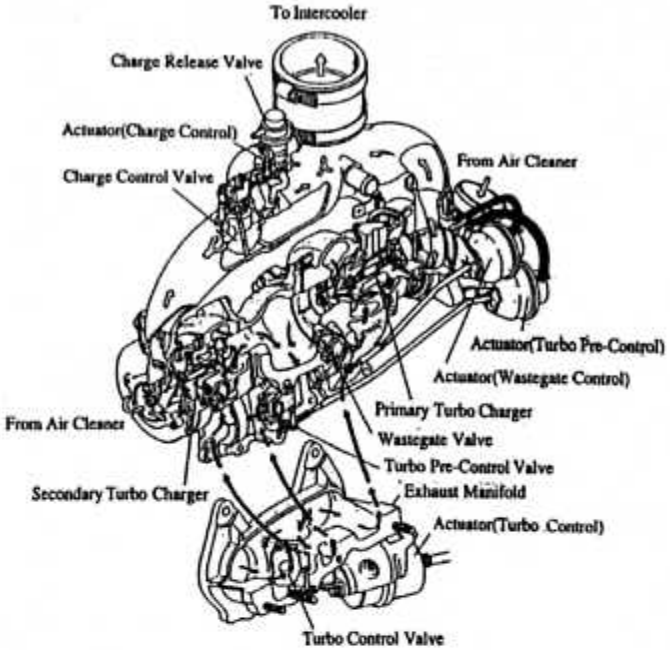
AVC-D Hosing Diagram



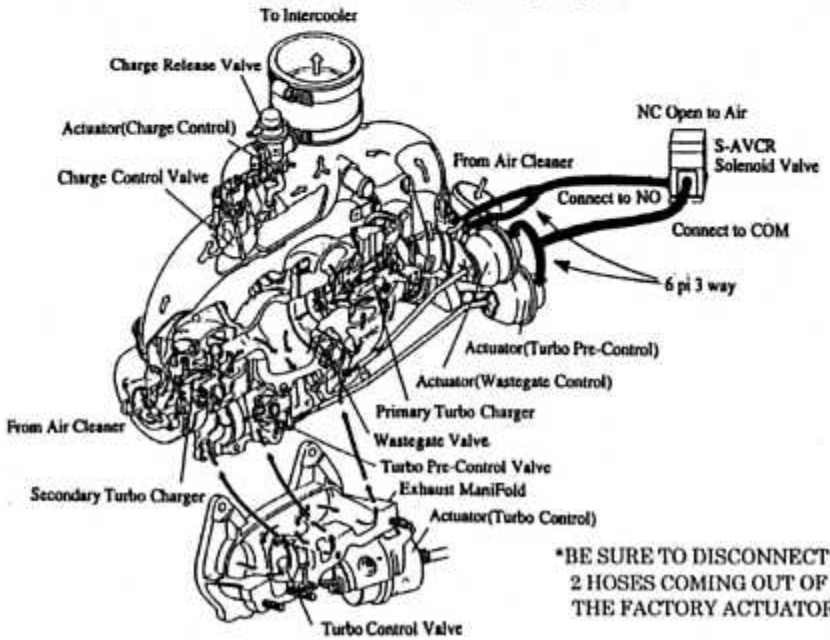
Factory Hosing Diagram



AVC-D Hosing Diagram

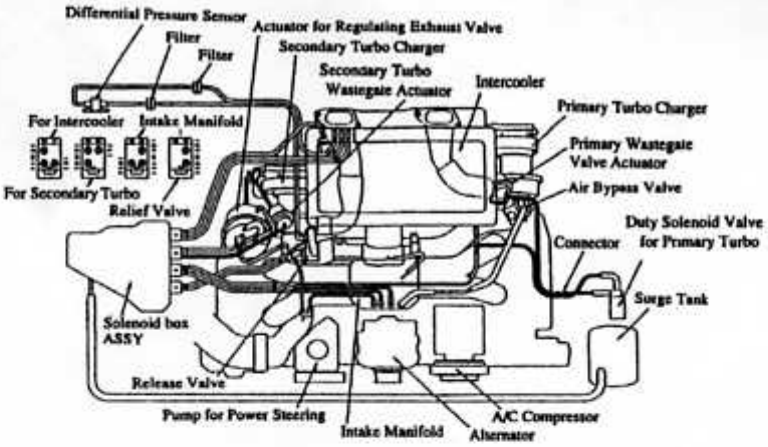


Factory Hosing Diagram

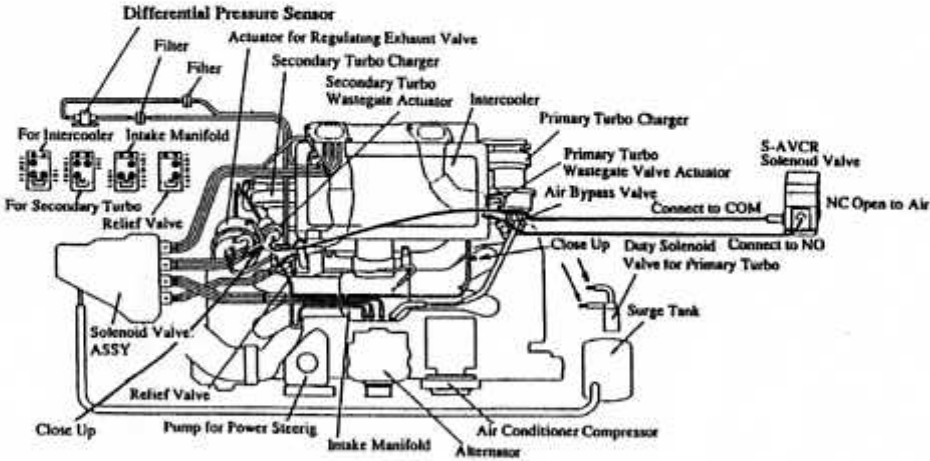


*BE SURE TO DISCONNECT AND CAP OFF TH
2 HOSES COMING OUT OF THE BACK SIDE C
THE FACTORY ACTUATORS.

AVC-D Hosing Diagram



Factory Hosing Diagram

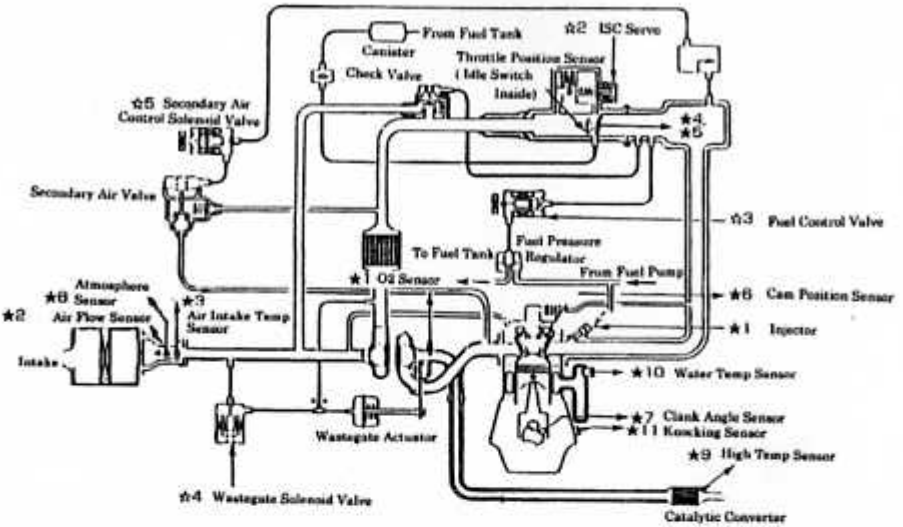


1. Connect the PR. And Secondary wastegate actuators together with a hose and then insert a 3 WAY in between the hose. Connect the open side of the 3 WAY to the COM nipple on the solenoid valve.
2. Connect a hose between the PR compressor housing and the NO nipple.

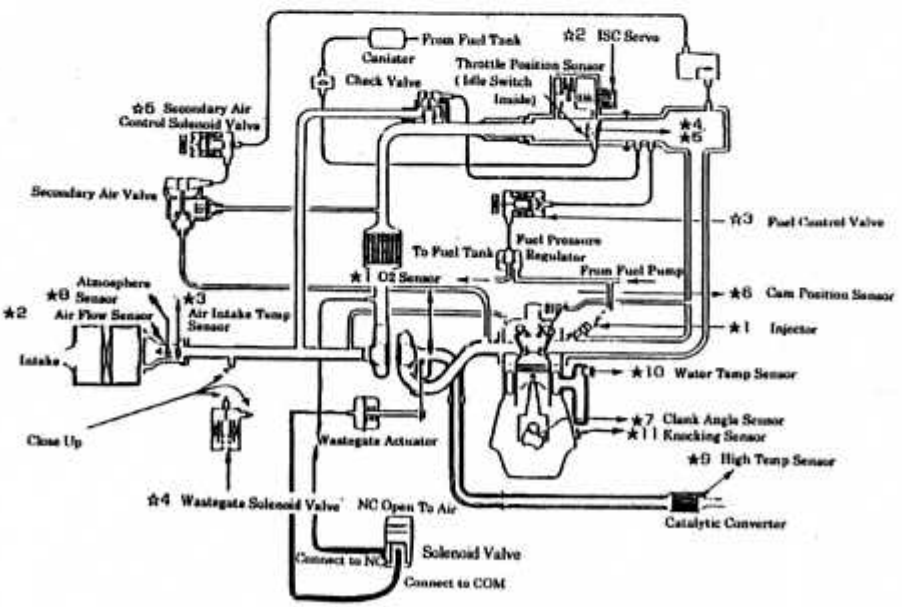
* The factory hose diameter is 4 pi. Please use a transition from 4 to 6 pi.

AVC-D Hosing Diagram

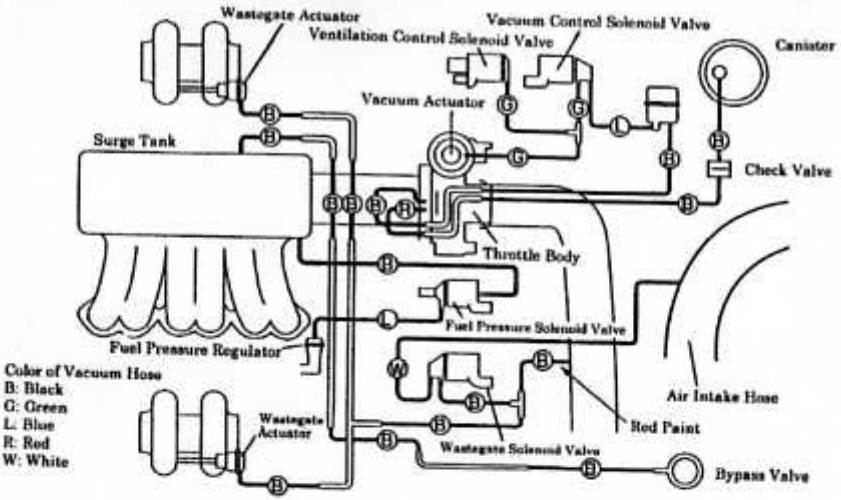
* For cars produced after June of 1996 (including the EJ20R,) please connect the primary turbo only like a single turbo application.



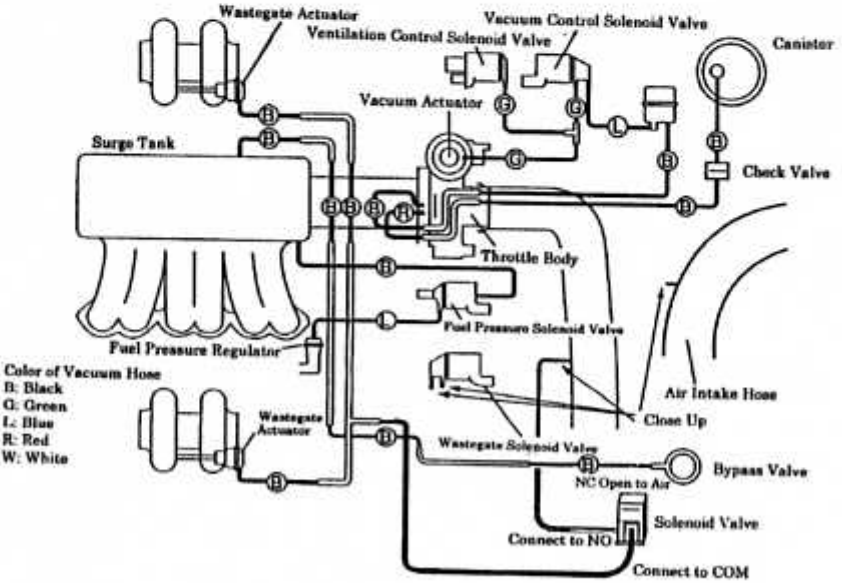
Factory Hosing Giagram



AVC-D Hosing Diagram



Factory Hosing Giagram



AVC-D Hosing Diagram

Mounting Instructions

1) Connect the 6P coupler to the back of the Main Control Unit
2) Use the included double sided tape to mount the control unit. Be sure to wipe any excess oil off of the surface prior to mounting.

> ⚠ CAUTION
> * Be sure to mount the unit in a position which does not interfere with driving operation. Failure to do so may increase the risk of accidents.

> ⚠ CAUTION
> * Avoid mounting the unit under direct sunlight , and near heating ducts. Excessive heat may cause the unit to malfunction and damage the engine and turbocharger.

3) Use zip ties to secure the control unit, and harnesses away from high temperatures and moving parts. (Zip ties are not included in this unit. Please purchase these items separately.)

> ⚠ CAUTION
> * When routing the harness near moving parts, be sure to prevent any contact between the harness and moving parts. Failure to do so may cause an electrical short in the harness which could prevent proper operation of this unit and cause damage to the engine and turbocharger.

4) Double check the control unit and harness installation.
5) Reconnect the negative terminal of the battery.
This concludes the installation of this unit.

Check Points After Installation

Please double check these points after installation.

1) Are the hoses connected properly?
2) Has the factory boost control solenoid valve been properly capped off?
3) Have any of the hoses been unnecessarily stretched or kinked?
4) Are all hose clamps securely fastened?
5) Is the solenoid valve mounted securely?
6) Are the harnesses and hoses mounted securely?
7) Is the wiring correct?
8) Is the negative terminal of the battery securely connected?

Please start the engine and double check the following points.

1) Is there any air leak from hoses or other areas affected by installation?
2) Check solenoid valve operation by keeping the engine RPM at 2000 RPM.
3) Stop the engine and check to see if any hoses have come loose.

Operation and Setting Instructions

The duty setting of this unit is determined by the solenoid valve duty cycle. This BASE DUTY CYCLE is adjustable according to engine RPM (3 position setting.)

If the ratio of the duty cycle "ON" time is longer, the boost level will be HIGHER. Using this BASE DUTY CYCLE as a reference point, boost level correction under load as well as boost level correction according to vehicle speed under drag racing situations can be achieved.

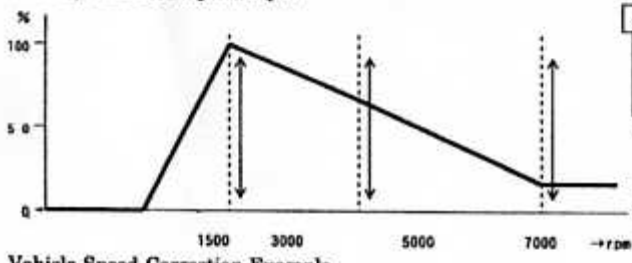
The vehicle speed correction function takes the BASE DUTY SETTING at 0 km/h and modifies it 0.5-1.5 times the BASE DUTY SETTING up until the preset SET SPEED level. The unit will modify this BASE DUTY SETTING up to the SET SPEED level by taking the CORRECTION FACTOR X 1.

Also, by adding a separately sold switch, the BASE DUTY SETTING can be raised (scramble boost) or lowered (Traction Boost) for a preset amount of time -50%~+50% for a period of between 0-30 seconds.

Individual Volume Characteristics

RPM specific Setting Of BASE DUTY 0 ~ 100 %	×	Vehicle Speed Correction when vehicle speed is 0 km/h 0.5 ~ 1.5 times	+	Scramble Correction when switch is ON -50% ~ +50%	=	Solenoid valve output duty

RPM Specific Setting Example



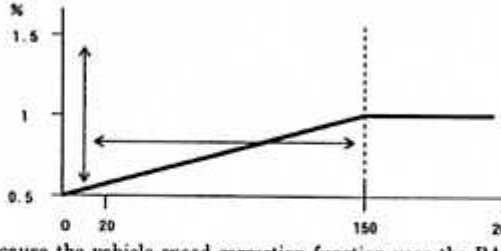
Setting	
3000rpm	100%
5000rpm	75%
7000rpm	25%

Each RPM range is for straight-line conditions

Each RPM 0 ~ 100%

Correction above 7000 RPM is fixed

Vehicle Speed Correction Example



Setting	
0 km/h	0.5
Preset Speed	150 km/h

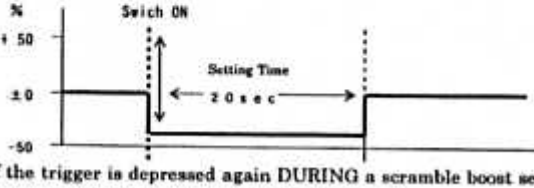
Correction Range 0.5 ~ 1.5

Preset Vehicle Speed20 ~ 200 km/h

0 km/h - preset speed correction is for straight -line conditions

* Because the vehicle speed correction function uses the BASE DUTY SETTING as a reference point, the vehicle correction will multiply " 0 x " when the BASE DUTY SETTING is set at 0 %.

Scramble Setting Example



Setting	
Trigger ON	- 50%
Preset Time Range	20 Sec

Correction Range -50 ~+50%

Setting Time 0 ~ 20 Sec

* If the trigger is depressed again DURING a scramble boost session, the preset time range will reset to the last time the switch is depressed.

Knob Illumination

	Power ON	0~ 4000rpm	4001~ 6000rpm	6001rpm~	Under preset speed	Over preset speed	SCB ON within preset time limit
3000rpm	Green	Red	Green	Green	—	—	—
5000rpm	Green	Green	Red	Green	—	—	—
7000rpm	Green	Green	Green	Red	—	—	—
Vehicle speed correction	Green	—	—	—	Green	Red	—
SCB Setting	Green	—	—	—	—	—	Red (Blinking)

* The knob illumination will change according to conditions

Duty Setting Tips for Various Settings

The Definition of DUTY

The AVC-D controls boost pressure by regulating the ON,OFF movement of the solenoid valve. This instruction manual takes the rate of the solenoid valve ON time and calls this DUTY. For example, IF the solenoid valve is monitored for a 40 mSec amount of time and the solenoid is ON for 30 mSec/ OFF for 10 mSec, THEN the DUTY is 75%.(Please refer to the formula below)

30 / 40 × 100% = 75%

Although the boost levels will increase as the DUTY rate increases, the DUTY will never exceed 100%. In some cases, the boost may not rise even at 100% DUTY due to various engine and turbocharger conditions. On the same note, the boost may rise even at 0 % DUTY due to various engine and turbocharger conditions.

How to categorize various DUTY types

BASE DUTY

0% (Minimal Boost Level Setting) - 100% (Maximum Boost Level Setting)

VEHICLE SPEED CORRECTION

0.5 times (Minimum Vehicle Speed Correction Value) ~ 1.0 times (No Vehicle Speed Correction) ~ 1.5 times (Maximum Vehicle Speed Correction Value)

* The Vehicle Speed Correction Value is MULTIPLIED by the BASE DUTY value.
* Remember that when the preset vehicle speed is reached, the speed correction value will be 1.0 times the BASE DUTY.

For Example IF: Preset Vehicle Speed is 100 km/h
The Vehicle Speed Correction Knob is at 0.6
The Vehicle Speed is at 50 km/h
THEN: The Vehicle Speed Correction Value is 0.8

Scramble Correction Duty

-50%~ 0% (No Scramble Correction)~ +50%

* The Scramble Correction Value is ADDED to the BASE DUTY value.

Setting Example

* IF: BASE DUTY is 30%, Vehicle Speed Correction is 0.5, Scramble Correction is +50%
THEN: 30 x 0.5 +50=65%
The final DUTY value of the solenoid is 65%.
* IF: BASE DUTY is 80%, Vehicle Speed Correction is 1.5, Scramble Correction is -10%
THEN: 80 x 1.5 + (-10) = 110%
IN THIS CASE, THE DUTY WOULD BE 100%. (Duty cannot exceed 100%) The scramble correction would not be effectively working in this case.)

About the Optional Parts

* The following optional parts have been prepared for this unit. Please order these parts according to necessity.

430-A001	Twin Turbo Accessories	
430-A002	Wastegate Accessories	
9933 0020	Zip Ties L=200	10
9933 0030	Zip Ties L=100	10
9933 0040	Zip Ties L=150	10

In Case of Product Malfunction

⚠ WARNING

* If the unit produces unusual sounds or smells during operation, discontinue use immediately and return the unit to the dealer of purchase with a valid receipt. Continued use may result in electrical short or electrical fire and may damage the unit and vehicle.

⚠ CAUTION

* Never disassemble this unit or attempt to repair the unit on your own. Improper repairs may result in electrical fire and electrical short.

Product Specifications

Operating Voltage	DC10 ~ 16 V
Operating Temperature	-20 ~ +60 degrees Celsius

APEXi