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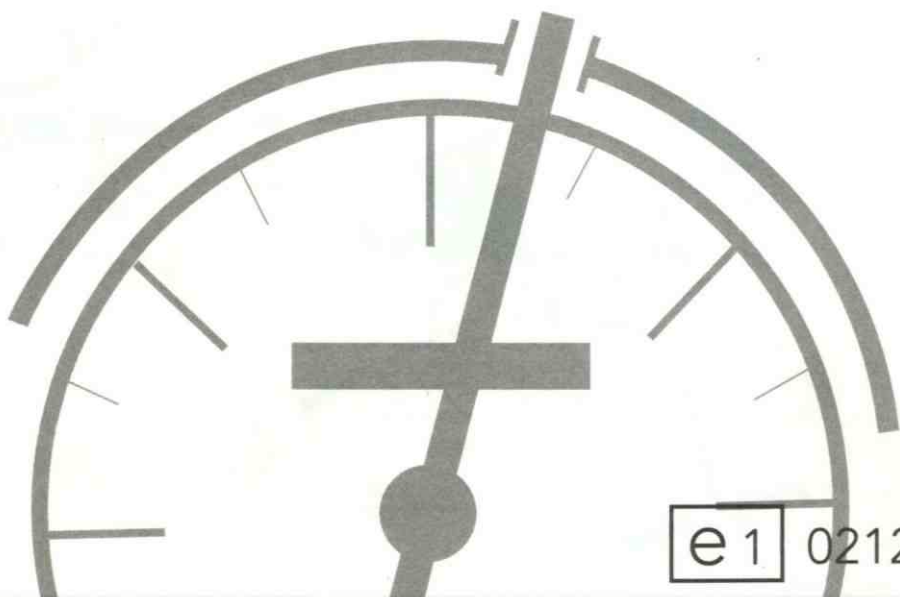
AUTOPILOT
SERIES



COMMAND™

CRUISE®
CONTROL

INSTALLATION MANUAL



e1 021219

START READING HERE!

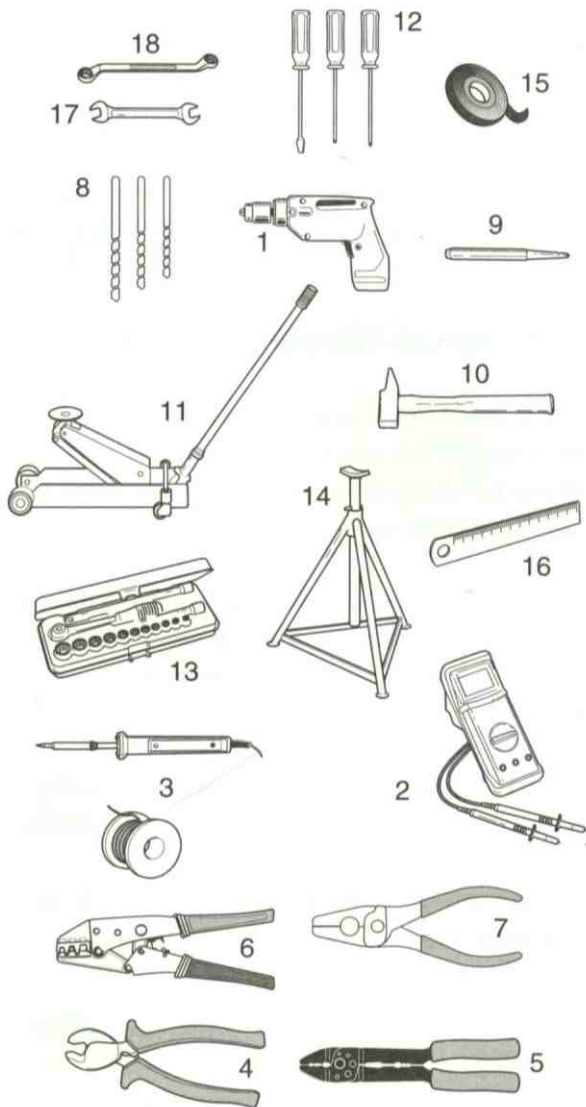
PART LIST:

ITEM	QTY	DISCRPTION	
1	1	MANUAL	
2	1	ACTUATOR	
3	1	ELECTRONIC MODULE	
4	1	WIRING HARNESS	
5	1	VACUUM HOSE	
6		COMMAND MODULE KIT	
6.1	1	COMMAND MODULE	
6.2	1	4-PIN CONNECTOR	
6.3	1	DOUBLE ADHESIVE TAPE	
7		SPEED SENSOR KIT	
7.1	3	MAGNETS	
7.2	1	SENSOR	
7.3	2	CABLE TIE	
7.4	2	SHEET METAL SCREW	
7.5	1	DOUBLE SIDED TAPE	
7.6	1	NUT M6	
7.7	1	SPRING WASHER M6	
7.8	1	BRACKET	
* 8		CLUTCH SWITCH KIT	
8.1	1	REED SWITCH	
8.2	1	MAGNET	
8.3	1	BRACKET	
8.4	2	CABLE TIE	
8.5	1	DOUBLE SIDED TAPE	
8.6	2	SELF TAPPING SCREW	
8.7	2	SHEET METAL SCREW	
9		HARDWARE KIT	
9.1	1	CARBURETOR SHAFT ADAPTOR	
9.2	1	LOCK WASHER M8	
9.3	1	ROTATING BOLT	
9.4	1	SELF LOCKING M4 NUT	
9.5	1	WASHER M4	
9.6	2	NYLON WASHER M5	
9.7	1	CABLE WIRE CLAMP	
9.8	1	ALLAN SCREW M4x6	
9.9	3	CABLE COVER	
9.10	1	SPLIT PIN	
9.11	2	SHEET METAL SCREW (1/4" x 3/4")	
9.12	1	END CLAMP	
9.13	1	ALLAN SCREW M4x4	
9.14	2	SELF-TAPPING SCREW	
9.15	1	THROTTLE P-CLAMP 3/16"	
9.16	1	NUT M6	
9.17	1	SPRING WASHER M6	
9.18	1	T-PIECE 5mm	
9.19	1	T-PIECE 1/4" to 5/16"	
9.20	1	T-PIECE 3/8" to 1/2"	
9.21	1	CABLE THROTTLE CLAMP	
9.22	1	CABLE THROTTLE CLAMP WITH THREAD	
9.23	3	BOLT M6X15	
9.24	1	ALLAN SPANNER	
9.25	1	GROMMET	
9.26	10	WIRE TIE	

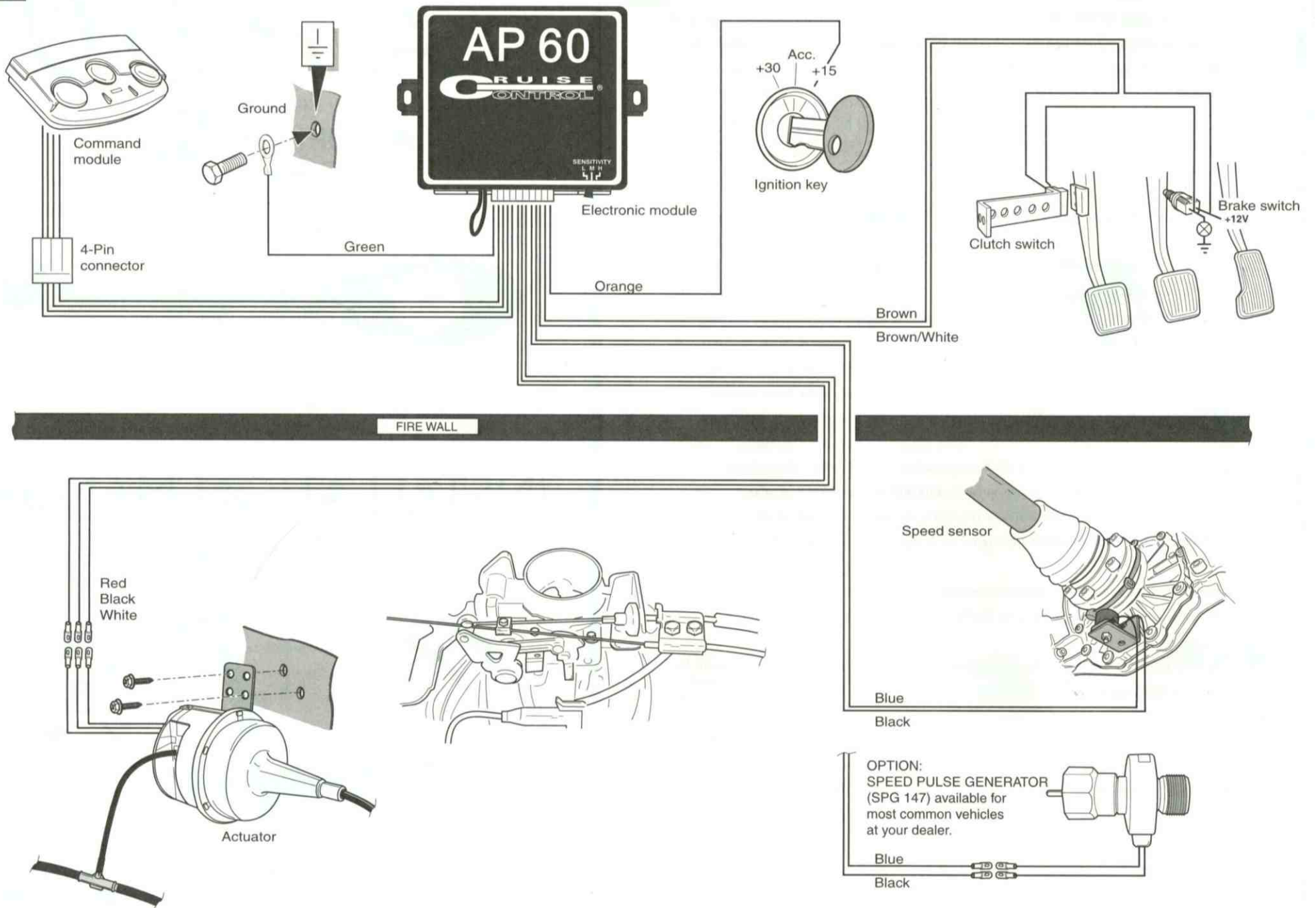
2

TOOLS REQUIRED:

The following is a list of tools required to properly install the cruise control. While this unit may be installed without some of the tools listed, it is recommended that the installer has all these tools available. Scotch Locks are provided in the Cruise Control kit for making connections, but we strongly recommend soldering the connections to make sure of a reliable connection.



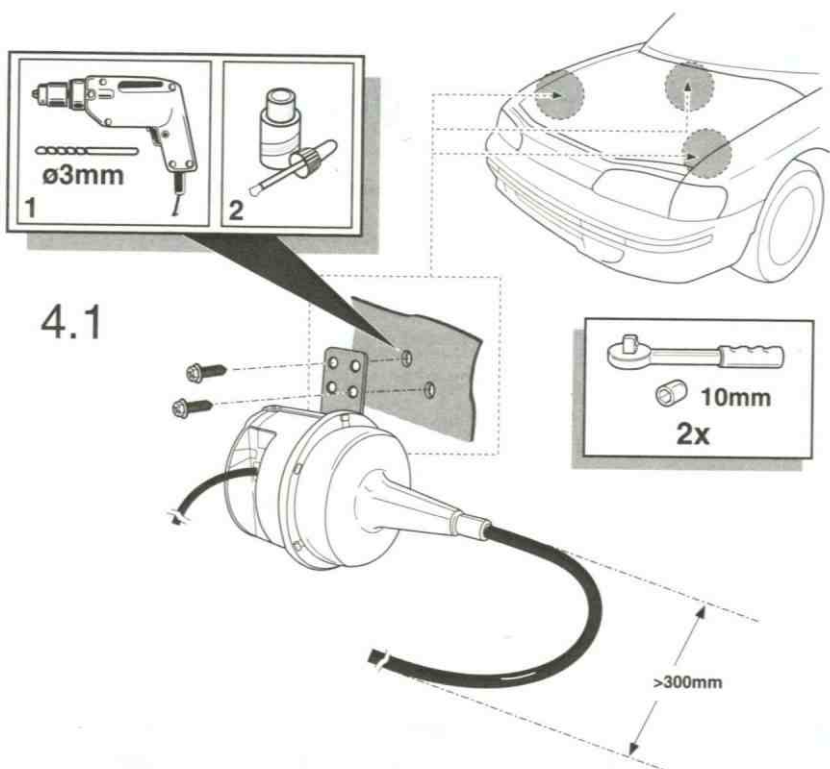
- 1 Electric drill
- 2 Volt meter
- 3 Soldering iron + solder
- 4 Wire cutters
- 5 Strippers
- 6 Crimping tool
- 7 Pair of pliers
- 8 Drill bits
- 9 Center punch
- 10 Hammer
- 11 Floor jack
- 12 Screw driver set
- 13 Socket set
- 14 Axle stands
- 15 Insulation tape
- 16 Measure
- 17 spanner set
- 18 ring spanner set



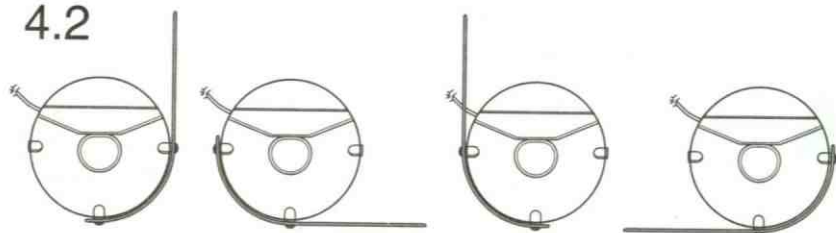
4

ACTUATOR

The actuator needs to be mounted in the engine compartment on the firewall or side skirt (fig.4.1). It is important to mount the actuator away from excessive heat and at least 300mm away from any high-tension leads such as the distributor, coil, ignition wires, or alternator. The actuator cable should reach the throttle linkage without requiring a bend tighter than a diameter of 300mm and away from hot or rotating surfaces. The mounting bracket of the actuator can be attached to the actuator in four different positions for maximum flexibility of installation (fig. 4.2).



4.2



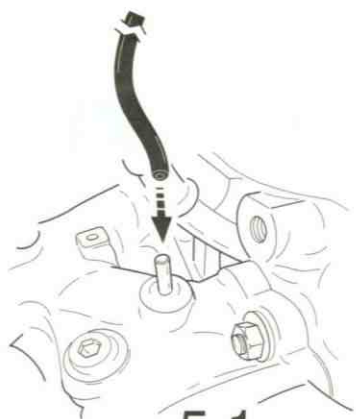
VACUUM CONNECTION:

Locate a good non-restricted vacuum source to connect the vacuum hose of the actuator. The most common location would be straight to the intake-manifold of the engine. This can be achieved by using a separate and blocked off nipple at the intake-manifold (Fig. 5.1) or at the non-return valve located between the intake-manifold and brake booster (Fig. 5.2). For cars with a separate vacuum pump, it is recommended to make the vacuum connection between the pump and the non-return valve of the vacuum brake booster.



Caution:

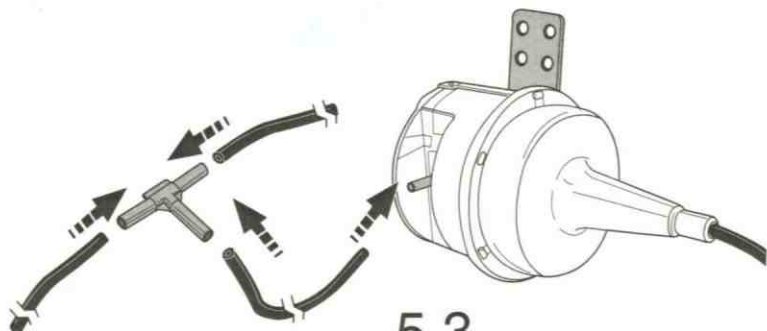
Never use a vacuum source directly from the vacuum brake booster.



5.1



5.2



5.3

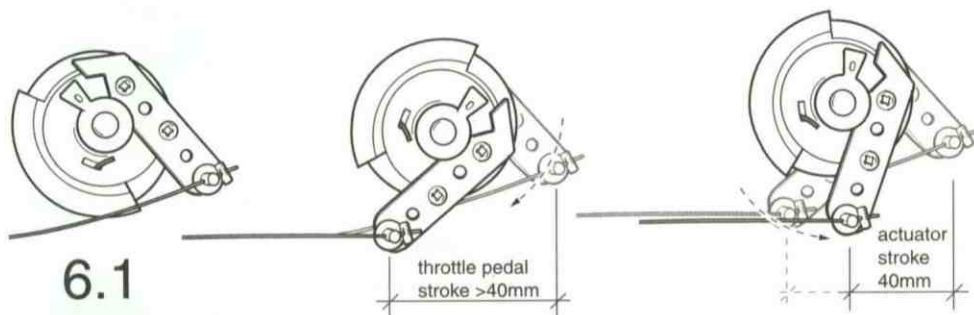
THROTTLE LINKAGE:

Determine the most suitable throttle linkage for your vehicle and a suitable place to mount the actuator cable and cable bracket. To make a secure and reliable throttle linkage, the cruise control kit is supplied with a Rotating Bolt (item 9.3) and with a Cable Wire Clamp (Item 9.7) to make the throttle linkage attachment. The Rotating Bolt can be mounted on the supplied bracket directly to the throttle. The Cable Wire Clamp has been developed to make the connection directly to the throttle cable.

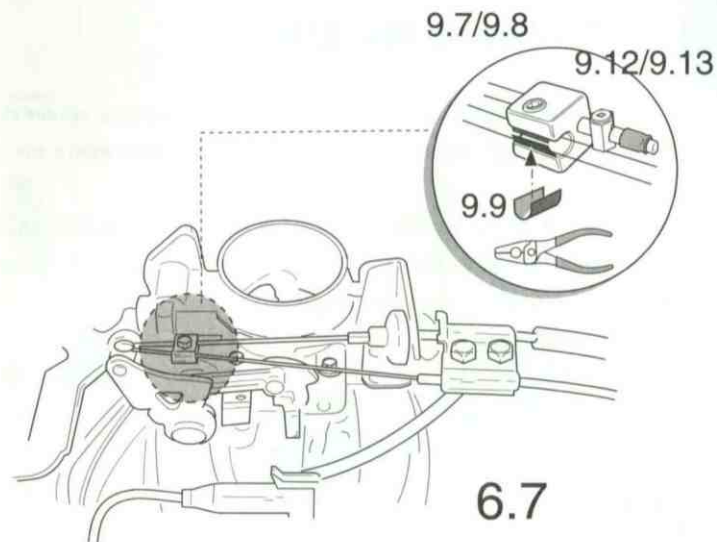
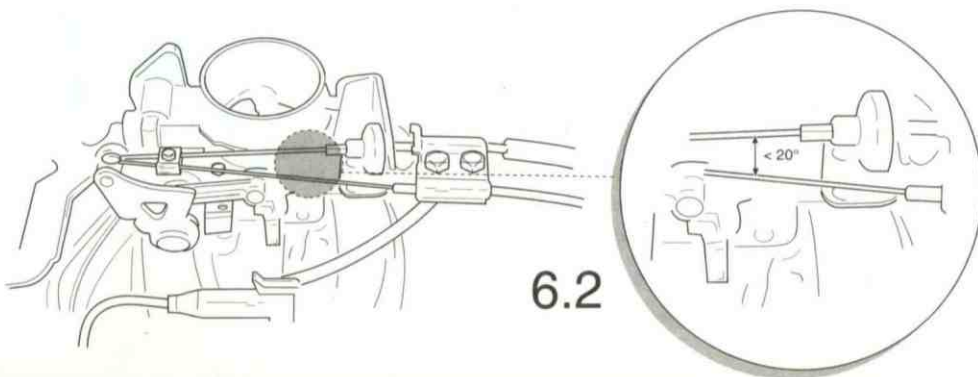


Caution:

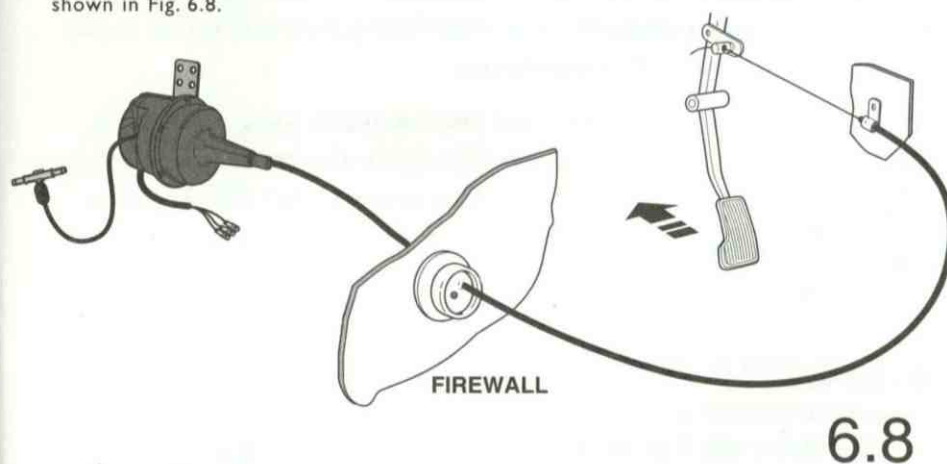
The travel of the throttle pedal cable must be longer than the travel of the actuator cable. Before making the connection, check the travel of the throttle cable from closed to open throttle position (Fig. 6.1).



The actuator cable has a travel of 40mm. The cable wire clamp has a length of 10mm, which must be included in checking a combined distance of 50mm free path along the vehicle throttle cable. It is important that the travel of the cable is at least 50mm when the Cable Wire Clamp is used. The Actuator Cable should pull in a straight line or the angle from the attachment point must be less than 20 degrees (Fig. 6.2).



Some modern vehicles do not have a throttle cable. With these vehicles a connection directly to the throttle pedal is required. The best location for the actuator should still be the engine compartment. The actuator cable should route from the engine bay via the bulkhead into the passenger compartment. An overview of the attachment is shown in Fig. 6.8.



Caution:

Your cruise control is designed with numerous safety features, but none of these can prevent a tangled or jammed throttle linkage. Double check the throttle by hand and by pressing the throttle pedal to make sure the throttle operates smoothly and will not jam in an open throttle condition.

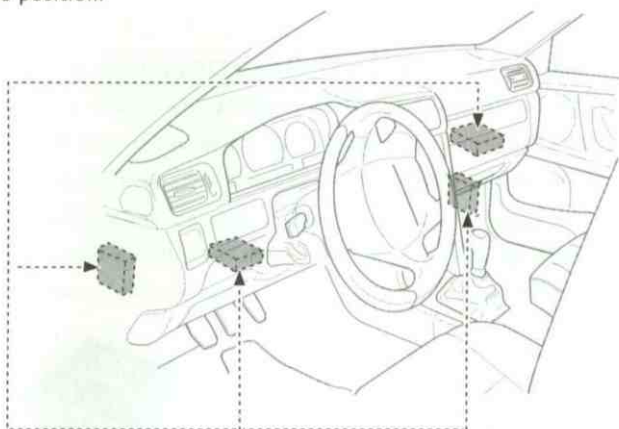
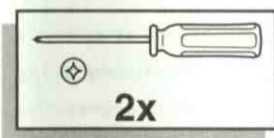
ELECTRONIC MODULE:

The electronic module should always be mounted in the passenger compartment of the car with the 4mm sheet metal screws. Avoid places with excessive heat, dampness and high-tension leads. The most common mounting locations are under the dashboard on the drivers side, behind the glove compartment or the drivers- or passenger-side kick panels (Fig.7.1). Do not mount the electronic module in the engine compartment. For mounting, mark holes, center punch and drill two 3mm holes.

Always check the other side for clearance before drilling.

Temporarily install the electronics module in the selected position.

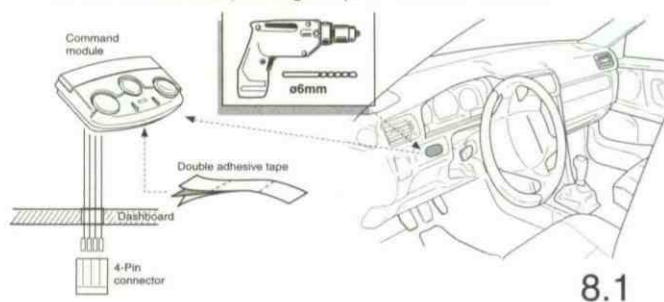
DO NOT firmly screw the electronic module down unless you have easy access to the electronic module. Until the installation has been finished, the electronic module can be screwed down in the selected position.



WIRING HARNESS:

Once you have the location of the electronic module, it is possible to mount the wiring harness of the Cruise Control. Use a voltmeter to locate the wires where the connection should be made.

Command Module The Cruise Control command module should be located in a suitable position to allow operating the unit properly in all circumstances. Suitable positions are on the dashboard (see Fig. 8.1), or central console.

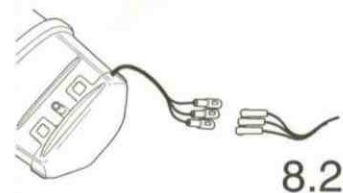


8.1

After selecting a suitable location for the command module, a hole of 6mm needs to be drilled near the command module. The wires of the command module can now be routed via the 6mm hole to the cruise control main harness. The terminals of the command module harness can be pushed into the connector housing (Item 9.28) and can be plugged in the 4-pin connector of the main harness.

Red, Black and White Actuator wires

Route the three (RED, BLACK and WHITE) actuator wires into the engine compartment through a hole in the firewall (original grommet) or via a drilled hole and grommet as supplied in the kit. The three connectors can now be plugged into the connectors of the actuator at the location with the corresponding wire color (Fig.8.2).



8.2

Orange wire

Connect the ORANGE wire to a fused Ignition Switched Feed. This Ignition Switched Feed must have battery voltage (+12V) when the ignition key is in the ON position. Be sure that the ignition key is in the off position when making the connection to prevent blowing a fuse.



Caution: Check with a Voltmeter that the ignition switch feed you select supplies a full battery voltage. A suitable location is usually at the fuse box. It is not recommended to connect this orange wire to vehicle ACC power wire. Make sure to disconnect the battery before making the connection.



Caution: Ensure that the driver does not have to insert his hand through the steering wheel for operating the command module.

Green wire

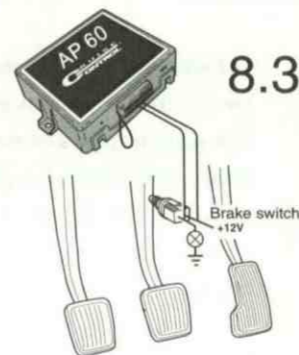
Attach the GREEN wire to an existing vehicle ground or a bare metal ground on the chassis. Most common locations for a central vehicle ground would be at the left or right-side kick panels.

Brown wires

The BROWN wires are the wires to connect to the brake switch (Fig. 8.3). If there are more than two wires coming from the brake switch, use a voltmeter to locate the two wires, which should be used. One of the two wires should be either a permanent feed or ignition switched feed. The other wire should read the battery voltage (+12V) when the brake pedal is depressed and zero (0V) when released.



Note: The two BROWN wires are reversible. However as a safety feature, the cruise will not work if the connections are not made securely and correctly.

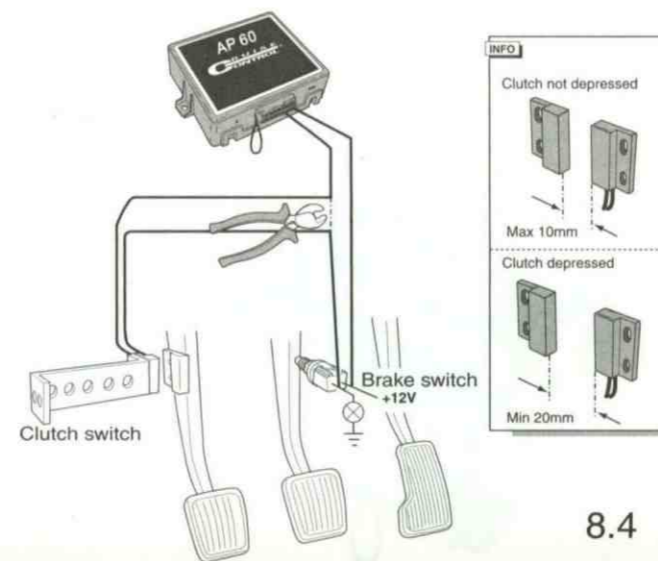


8.3

Clutch switch kit (OPTIONAL)

The Clutch Switch Kit as supplied with the Cruise Control Kit, is required as an engine over-rev protection on cars with a manual gearbox. The cruise will automatically disengage when the clutch is depressed and will prevent engine damage caused by over-revving. The magnet (Item 8.2) should be attached with double-sided tape, or cable tied to the clutch pedal. While the reed switch (Item 8.1) is attached to the chassis or pedal buffer, with the supplied self-tapping screws (Item 8.6) or with the double-side tape (Item 8.5).

The two wires of the reed switch need to be connected to one of the two BROWN brake wires of the cruise control wiring harness (Fig.8.4). Cut one of these two brown wires and connect the clutch switch in series.



8.4

Speed sensor kit

The Speed Sensor kit as supplied with the Cruise Control, generates the Speed Signal. The installing set has a numerous possibilities.

To mount the magnets (Item 7.1), use the double-sided tape (Item 7.5) to stick the magnets to the driving shaft or universal joint. The cable tie (Item 7.3) is then used to fix the magnets to the driving shaft or universal joint.

Front wheel driven car (Fig. 8.5):

Block the wheels at the rear, ensure the gearbox is in neutral and use the hand brake. Lift the front end of the car until there is sufficient space for working and use axle stands for supporting the car. Fit the sensor (Item 7.2) on the bracket and determine a location to mount the bracket. This should be as close as possible to the gearbox as there is less movement of the shaft at this point. The inner universal joint of the shaft would be the best option. Use double-sided tape for sticking 2 or 3 magnets to the shaft and once these are divided equally around the shaft use the cable tie to fix these to the shaft. The adjustment to the sensor should be made so there is gap of 3-5mm between the magnets and the speed sensor. Ensure that there is less than 5mm movement in a vertical direction of the shaft at this point.

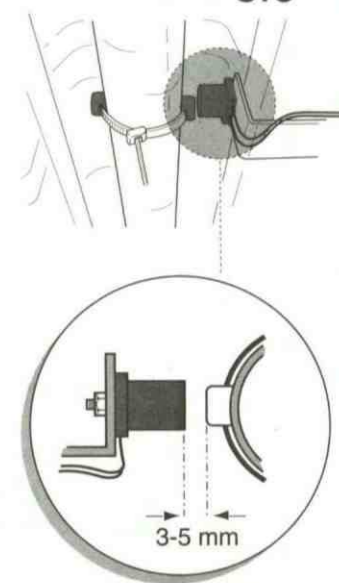


8.5

8.6

Rear wheel driven car (Fig. 8.6):

Block the wheels at the front and ensure the gearbox is in neutral. Lift the rear end of the car until there is sufficient space for working and use axle stands for supporting the car. Fit the sensor (Item 7.2) on the bracket and determine a location to mount the bracket. This should be as close as possible to the gearbox as there is less movement of the shaft at this point. Use double-sided tape for sticking 1 or 2 magnets to the shaft and once these are divided over the shaft use the cable tie to fix these to the shaft. The adjustment to the sensor should be made so there is gap of 3-5mm between the magnets and the speed sensor. Ensure that there is less than 5mm movement in a vertical way of the shaft at this point.



DIAGNOSTIC MODE:

The Cruise Control has an integrated self-diagnostic mode. The three steps A, B and C, of which the self-diagnostic mode exists, are to check and test all features and functions of the Cruise Control. Check over your installation one more time to verify all connections are secure. Be sure to engage the handbrake and place the gearbox in neutral or park if the car has an automatic gearbox.

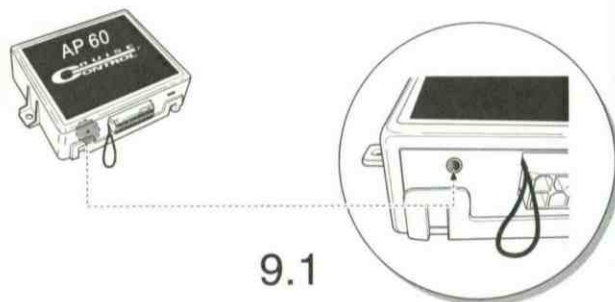
Diagnostic mode A.)

This first mode allows you to verify that all electric connections are made correctly and that the command module, brake and when installed the clutch switch are functioning correctly. This can be checked

and tested via the LED on the electronic module (Fig. 9.1) when the ignition is switched on. The LED will flash ON and OFF whenever the SET, RES or BRAKE switches are activated and will remain on when the command module is turned off. If a clutch switch is fitted, the LED turns on when the clutch pedal is pressed. If there is a defective connection, for example with the brake switch connection, the LED on the electronics module will come on and will remain on for 8 seconds as soon as the IGN is switched on. After 8 seconds it will turn off so the other functions can be tested. This allows you to identify the cause of the mal-function because the LED will not respond when the defective part is tested.

Diagnostic mode B.)

When the test of the features and functions in diagnostic mode A are completed successfully, the test of the Cruise Control can be continued with the diagnostic mode B. In this mode it is possible to test the functions of the actuator. Engage the handbrake and place the gearbox in neutral or park if the car has an automatic gearbox. To enter this diagnostic mode, turn on the ignition to start the engine while you press and hold the SET/ACC button of the command module. Release the SET/ACC button when the engine runs. Turn on the Cruise Control by pressing the ON/OFF button. The LED of the Command Module will turn on. Tap at the SET/ACC button of the Command Module and the actuator should start to pull the throttle in and will increase the engine revs. Use the SET/ACC and RES/DEC buttons on the command module to adjust the throttle position. The actuator can release the throttle instantly by pressing the brake pedal or using the ON/OFF switch of the command module. Turn the ignition key off to exit the diagnostic mode.



Diagnostic mode C.)

This third test is to check the speed signal. Driving the car on the road the speed signal can be checked by the LED of electronic module. The LED will flash at a rate determined by the pulse frequency of the speed signal. While driving around 50 KM/H, the LED should flash once per second. Turn the ignition key off, after the car is stopped, to exit the diagnostic mode.



NOTE:

The diagnostic mode can be used to test all features and functions of the cruise control. The cruise uses an internally generated speed reference signal to test the actuator in the diagnostic mode B. Therefore, if you completed diagnostic mode B but your cruise control will not engage the most likely cause of the problem is the speed signal.

SAFETY FEATURES:

The cruise control is fitted with numerous safety features, which will disengage the cruise control by any of the following methods:

- 1 Depressing the brake pedal;
- 2 Press the OFF button of the command module;
- 3 Over-rev protection of the engine when a clutch switch is fitted;
- 4 Decelerating to 75% of set speed
- 5 Overspeed dropout (150% of the set speed);
- 6 Turn the ignition OFF.

The cruise control will disengage if the brake fuse blows, brake lights burn out, or any of the connections become disconnected. For safe and economical operation NEVER operate any cruise control in congested traffic or on a wet slippery road.



SAFETY NOTE:

Should a situation ever arise where action 1 through to 5 above will not disengage the cruise you can always turn the ignition OFF (action 6). If your vehicle has a steering lock, be sure it cannot be activated when the ignition key is in the ignition lock or the car is in gear.



CAUTION:

Your cruise control is designed with numerous safety features, but none of these can prevent a tangled or jammed throttle linkage.
Double-check it!

ROAD TEST:

Start your vehicle and press the Command Module on with the On/Off switch.

While driving at around 40 KM/H (25 MPH). Press and release the SET/ACC button and you should feel the cruise control take over. The lowest speed that your cruise control actually takes over is the minimum engage speed for your vehicle. If the minimum engage speed is within 30 to 40 KM/H, the number of magnets on the driving shaft is ideal. If the minimum engage speed is too high, the number of magnets on the driving shaft should then be increased.

Sensitivity adjustments:

The three-position switch at the electronic module (Fig. 11.1) can adjust the sensitivity.

Adjustments at this switch need to be done with the ignition switch in the off position.

If the cruise control gains speed, acts erratically, or seems too responsive, DECREASE the sensitivity by resetting the sensitivity switch from M (medium) to L (low). If the cruise control loses speed or seems to be sluggish in responding, then INCREASE the sensitivity by resetting the sensitivity switch to the H (high) position.

Check the Tap Up, Tap Down, Decel, Accel, Resume and ON-OFF Switch functions.



11.1



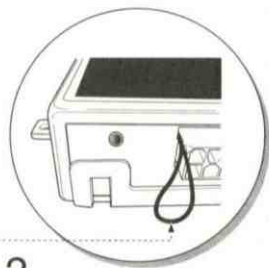
The black wireloop (Fig. 11.2)

that comes out of the electronics module at the connector side gives the possibility to increase the PPM (Pulse Per Mile) of the speed signal from 2000 to 5000.

Cutting the wire would change the pulses per mile to 5000.



11.2



Use the throttle pedal to accelerate the vehicle to 80 KM/H (50 MPH) and maintain a steady speed. Now press and release the SET/ACC button and slowly release your foot from the throttle pedal. The cruise control should engage smoothly and maintain a stable vehicle speed.

TROUBLE SHOOTING GUIDE:

This section of the manual includes a list of potential problems and a list of recommended checks to perform to solve these problems.

The LED on the electronic module does not light when the command module buttons are pressed.

Check the 4-pin command module connector from the electronic module and make certain that it is connected correctly to the command module.

Check the color code on the command module connector and make certain that you have inserted the terminals into the command module correctly. If not, check the main electronic module power supply and earth connection. The Orange wire should have the battery voltage (+12V) when the ignition is switched on and earth at all times on the Green wire.

The LED on the electronic module does not light when the brake is pressed.

Check that the LED on the electronic module lights up when the command module buttons are pressed. If not, check the main electronic module power supply and earth connection. The Orange wire should have the battery voltage (+12V) when the ignition is switched on and earth at all times on the Green wire.

Using a Voltmeter, check the connections to the brake switch. One Brown wire from the electronic module should be connected to a brake light switch wire, which is either permanent feed, or an ignition switched feed. The other Brown wire should be connected between the brake light bulb and the brake light switch. You will therefore read earth through the brake light bulb when the brake pedal is not pressed and the battery voltage (+12V) when the brake pedal is pressed. The two Brown wires are interchangeable. Some brake light circuits will have an ignition switched feed, so test the wires with the ignition switch in the ON position.

For safety purposes, the Cruise Control will not work if you have a problem with the vehicle's original brake light circuit. Therefore, test the brake lights and make certain they are operating correctly.

The LED does not flash with a speed signal input

When the speed sensor kit is used for the speed source you first need to check the connectors at the speed sensor side of the wiring harness for poor connection or damaged connectors or wiring. Once you have checked the connections you need to check the space between the sensor and the magnets that are mounted at the driving shaft. The space should be adjusted between the 3 to 5mm. By driving the car you can check with a voltmeter the voltage of the signal and should be more than 0.8V when driving the car around the 50 KM/H. By decreasing the space between the sensor and the magnets the voltage speed signal will increase.

The Actuator does not pull the Throttle in Diagnostic Mode

Perform all other diagnostic mode tests to check that the problem is not either power supply or command module related.

Turn off the ignition and exit diagnostic mode. Leave the ignition off for a few seconds and then press and hold the SET/ACC button while you turn on the ignition to re-enter diagnostic mode. Repeat the test and make certain that the actuator is still not working. Check the actuator connectors to make certain the connectors have been inserted into the connectors with the same wire colors.

Check the vacuum source to ensure that it is suitable. Remove the chosen hose with the engine running. Check the vacuum pressure at different engine RPM's by placing your thumb over the end of the hose. Release the hose and the idle speed of the engine should fall and either should stall the engine or bring the engine to a near stall situation.

Press the SET/ACC key on the command module and listen to the actuator. You should hear the valves in the actuator clicking as the button is pressed.

The cruise control does not function smoothly and tends to surge or hunt for the correct SET speed

If the cruise control gains speed, acts erratically, or seems too responsive, then DECREASE the sensitivity by resetting the sensitivity switch at the electronic module from M (medium) to L (low). If the cruise control loses speed or seems to be sluggish in responding, then INCREASE the sensitivity by resetting the sensitivity switch to the H (high) position. Adjustments to this switch should be made with the ignition key in the off position.