



Installation manual

Cruise Control

AP500



Foreword

This installation manual is written for professional installers with knowledge and experience of contemporary vehicle technology and vehicle electronics.

The AP500 is a modular product developed with great attention and manufactured to the highest quality standards of the automotive industry.

Please read this installation manual and user manual carefully. After installation for the driver, always leave a user manual in the vehicle.

In text boxes you will come across the safety instructions below.



Read the texts behind the warning signs carefully.



Read the information notes to speed up installation and ensure proper operation of the cruise control.

With this manual, we try to support you as much as possible in a smooth product installation. We recommend that you read the manual in its entirety before starting the installation. If you need further assistance, please contact your supplier or one of our experts for technical support. Contact details can be found on the last page of this manual.

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1 PURPOSE, STRUCTURE AND OPERATION OF THE AP500

1.1 Construction

The AP500 is a cruise control for vehicles with a mechanical accelerator. The AP500 consists of the following components:

- electronics module
- electric servo
- servo cable
- main wiring harness
- servo wiring loom
- mounting material
- mounting instruction





- controls (CM7, CM30 or CM35 to be ordered separately)
- clutch switch (AA170 or AA177 optional)
- speed pulse generator (AA142 optional)

1.2 Operation

The AP500 consists of an electric servo and an electronics module. This electronics receives and processes the signals coming from the control and signals from the car. Based on these signals, the servo operates the throttle actuator, which controls the required throttle position to maintain the set speed.

SAFETY INSTRUCTIONS

The following safety instructions apply to the AP500, found with the item:

	The installer of the AP500 should be knowledgeable and experienced with contemporary automotive engineering and car electronics.
	Incorrect and/or inexperienced installation, connection, setting and/or diagnosis can lead to malfunctions of the vehicle and/or the AP500 and affect road safety.
	Never modify or manipulate an AP500. Changes or technical manipulations may adversely affect safety.
	Operating the clutch pedal should always disengage cruise control. Fit and connect a clutch switch if it is not already in the car.



Always connect the brown and brown/white wires so that when the brake pedal is in the idle position, there is +12V on one wire through the brake light fuse and ground on the other wire through the brake lights. Operating the brake pedal should always lead to a situation where there is the same voltage on the brown and brown/white wires. This can be +12V on both wires or ground (0V) on both wires!!!



After installation, always check the smooth operation of the throttle mechanism, throttle cable and servo cable by operating the throttle mechanism with your foot and by hand. The throttle cables must not be able to become blocked or entangled in any way, as this may result in the throttle/diesel pump not returning to idle!!!



The servo cable should stick straight out from the adjustment and should pull in a straight line. See chapter 3.3 servo cable connection



Some cars barely decelerate when the throttle is left slightly open. Always give the servo cable a little slack in the idle position



Always solder the connections and insulate them with good quality insulating tape



Always mount the electronics module in a place where heat, vibration and moisture are minimal such as under the dashboard



Always disconnect the negative pole of the battery before working on the vehicle. Loss of volatile data is possible (radio, on-board computer, clock, etc.)



Always use a digital multimeter when measuring on the vehicle



Cut all wires to length and keep them as short as possible. Do not bundle excess wire



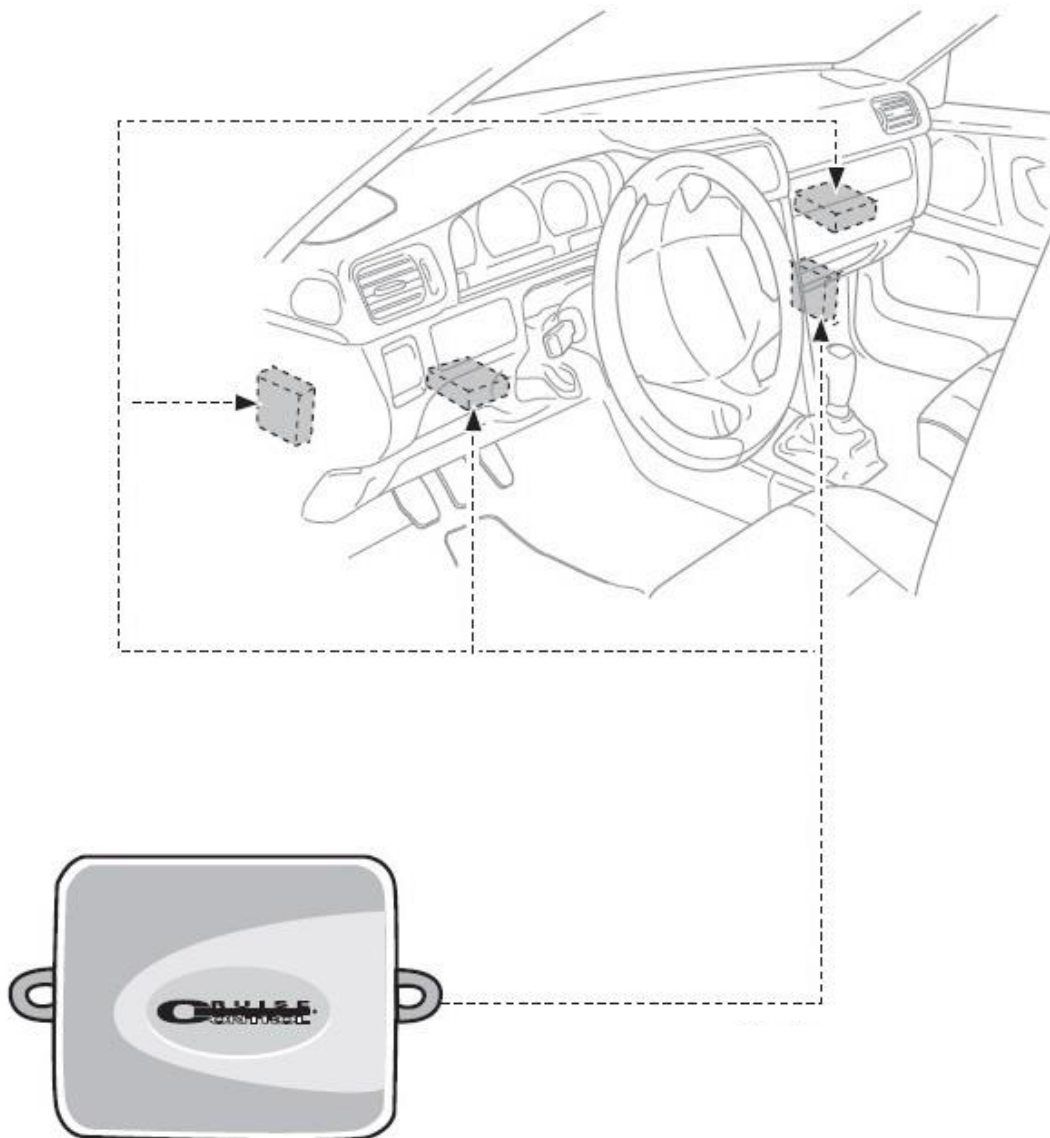
Always use the 10 amp fuse supplied, **never and heavier fuse!**

3 MOUNTING AND CONNECTIONS

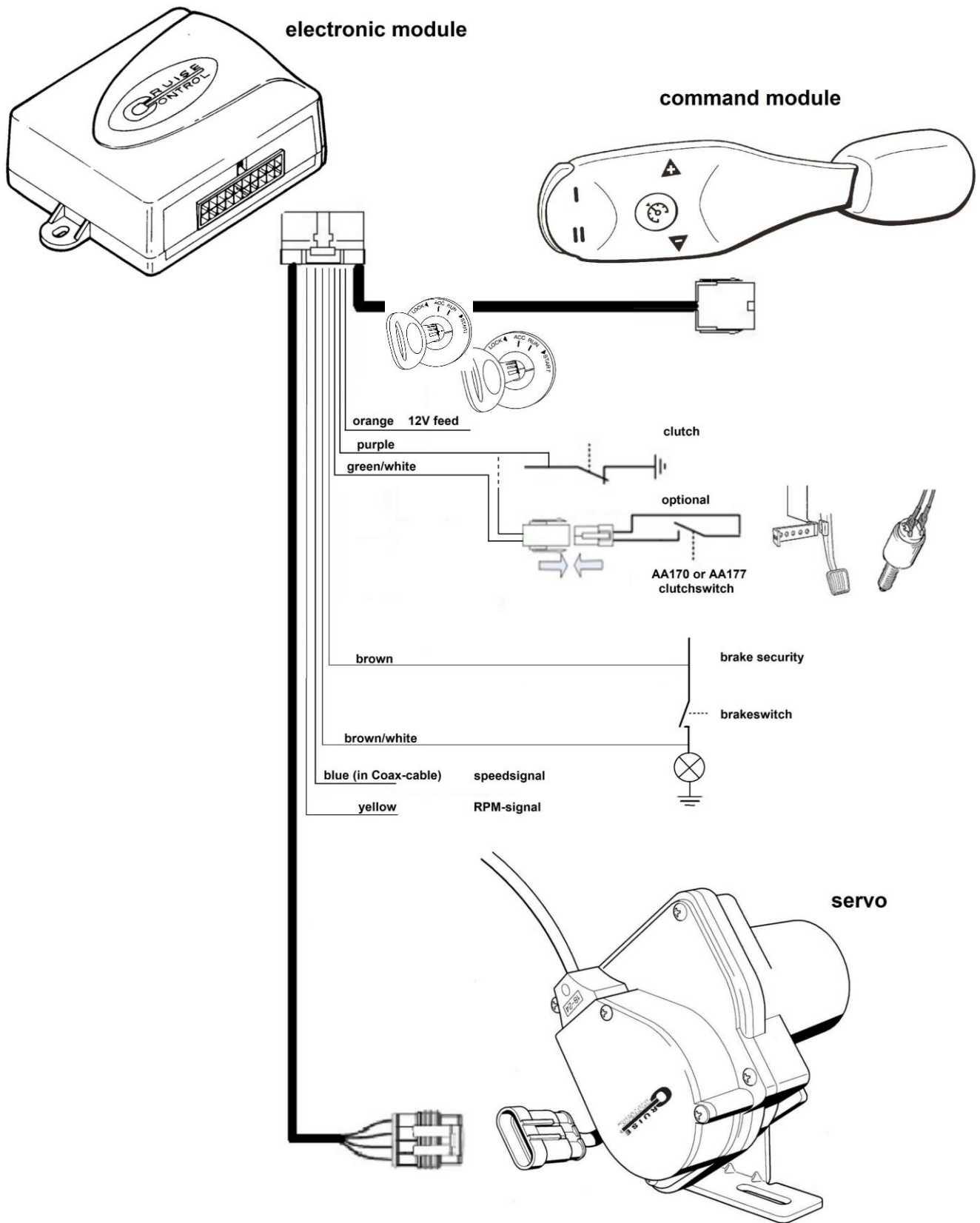
3.1 Mounting the electronic module

Always mount the electronics module in a place where heat, vibration and moisture are minimal such as under the dashboard, **never** in the engine compartment.

Temporarily place the module in the selected location, do not permanently attach it yet unless it is still easily accessible. When the installation is complete, the module can be permanently attached.



3.2 Wiring diagram



3.3 Servo cable connection



Never make bends in the servo cable smaller than with a diameter of 40cm



Keep at least 30cm distance between the servo cable and moving parts in the engine compartment and/or exhaust system



The servo outer cable and inner cable should stick straight out of the adjustment and should tighten in a straight line, even at half throttle and full throttle



There are 4 options for the servo cable stroke. Depending on the chosen pulley and mounting method:
Pulley with red dot = 31 or 38mm
Pulley with yellow dot = 18 or 24mm



Adjust the servo cable with the engine warm because of any cold-start device.



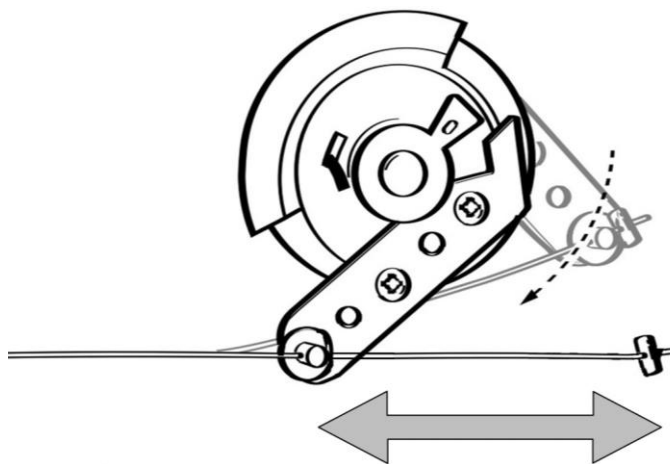
Some cars barely decelerate when the throttle is left slightly open. Always give the servo cable a little slack in the idle position, large enough for the servo to regulate back to idle in the self-diagnostics.



After installation, always check the smooth operation of the throttle mechanism, throttle cable and servo cable by operating the throttle mechanism with your foot and by hand. The throttle cables must not be able to become blocked or entangled in any way, as this may result in the throttle/diesel pump not returning to idle!!!

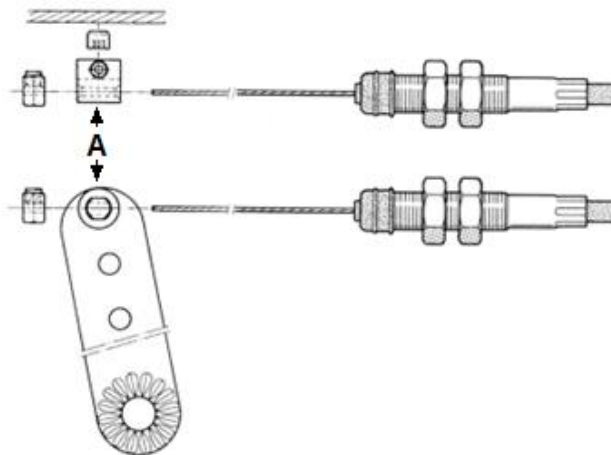


When accelerating with the foot, the servo inner cable should **not** be pushed into the outer cable. In this case, the servo inner cable should slide through the swivel bolt or aluminium block.



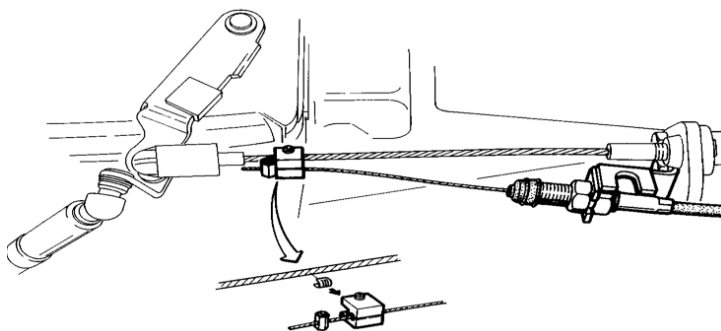
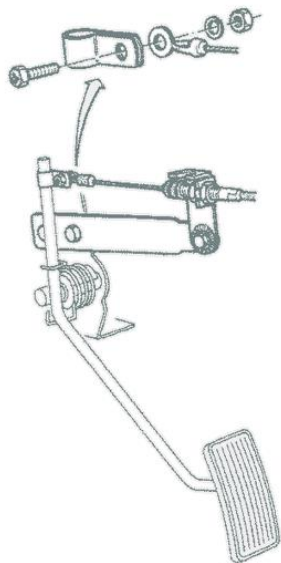
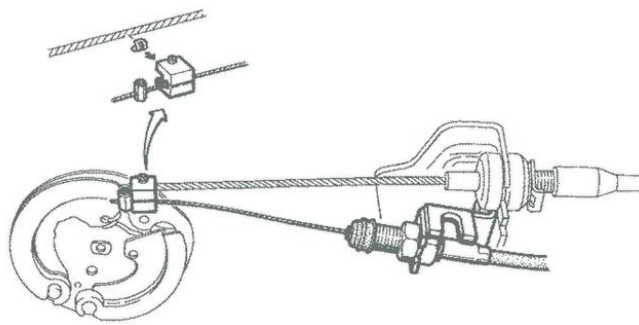
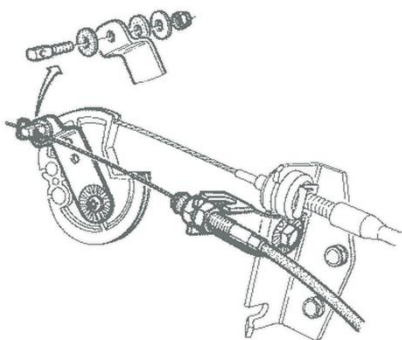
Throttle attachment can be made using the following components:

When accelerating with the foot, the servo cable should not press into the outer cable but slide through the fasteners



If an idle contact or kick-down switch is mounted behind the accelerator pedal, the servo cable should be mounted directly to the accelerator pedal.

Examples of servo cable attachments on the throttle mechanism:



3.3.1 Adjusting servo cable stroke



After the throttle attachment is made, use a caliper to determine the stroke. Determine the length the servo cable needs to go from idle to full throttle. Based on this length, the choice of pulley to be used is made.

In the hardware kit, you will find 2 pulleys. Each pulley can be mounted 2 ways. This gives you 4 options for the stroke of the servo cable:

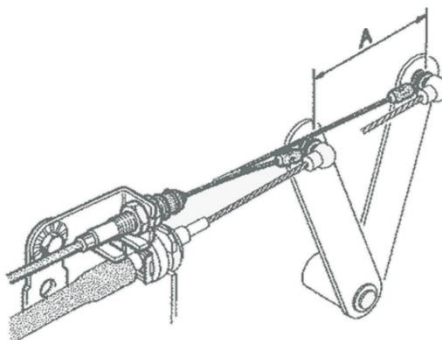
Pulley with red dot: 38 mm

Pulley with red dot: 31 mm

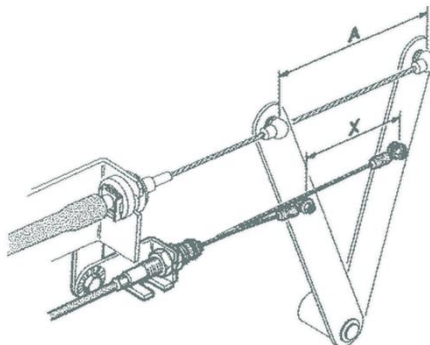
Pulley with yellow dot: 24 mm

Pulley with yellow dot: 18 mm

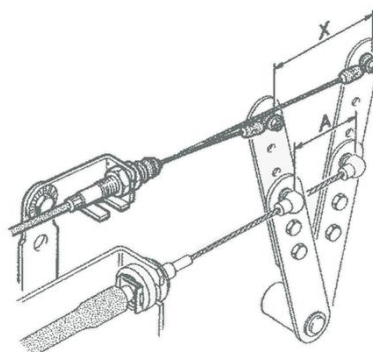
Ideally, the stroke of the chosen pulley should be a few millimetres shorter than distance A



If the distance A of the throttle mechanism is too large for a pulley, fit the throttle attachment closer to the pivot point so that the stroke X is shorter



If the distance A of the throttle mechanism is too small for a pulley, mount the throttle attachment further from the pivot point so that the stroke X is larger.



Always check the smooth operation of the throttle, throttle cable and servo cable by operating the throttle mechanism with your foot and hand. These should not be able to block in any way.

3.4 Electric servo



The servo can either be mounted to the body in the engine compartment or under the dashboard. Never mount it directly on the engine.



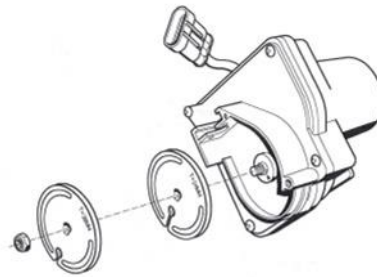
Place the servo at least 30cm from electrical interference sources and heat-emitting parts.

Before the servo can be mounted, it must first be assembled.

3.4.1 Assembly servo

Remove the red cap from the axis of the servo

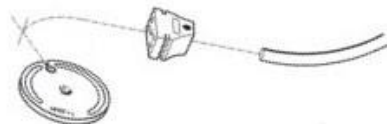
Place the pulley on the axle, with the correct stroke size on top, secure it with the M6 locknut



Remove the servo inner cable

If required, shorten the servo outer cable by cutting it at the servo side

Insert the servo outer cable into the triangular plastic block and make sure the visible colour on it matches the colour on the pulley

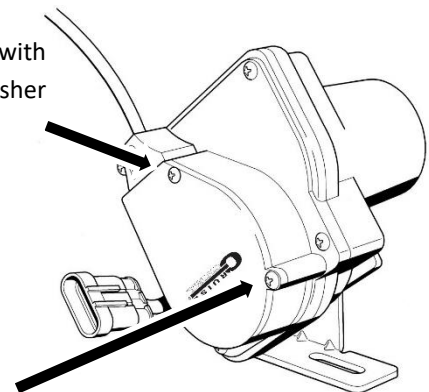


Insert the servo inner cable into the outer cable and insert the nipple of the inner cable into the pulley

Slide the cover onto the servo and secure it using the screws provided

short screw with
spring washer

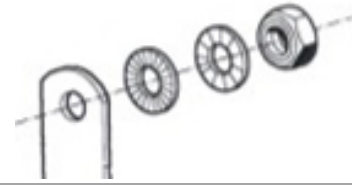
long screw



3.4.2 Mounting electric servo

Secure the servo in a location where it can be fixed using one of the two brackets provided.





Secure the bracket with the lock washers between the bracket and the M10 nut, with the large serrations against each other and the small serrations on the outside.



Connect the 4-pin plug to the servo connection cable, this will later be routed through the bulkhead to be connected to the main wiring harness.

3.5 Connecting wiring harness

Once the module is positioned, it is possible to route and connect the wiring harness. If necessary, use a digital multimeter to determine the correct connection points. See also the wiring diagram on page 6.

Orange wire	12V switched feed (+15)
	Make sure the ignition is off when the connection is made for the switched-mode power supply.
	Using a digital multimeter, check that the selected switched-mode power supply provides full battery voltage.
Brown wire	Brake protection, connect to a wire which is connected to ground and will be 12V when the brake is applied
Brown/white wire	Brake protection, connect to a wire carrying 12V via the brake fuse and will remain 12V when the brake is applied
2-pins wireharness Purple + green/white	Clutch signal (if applicable)
<p>These twisted wires can be connected in 2 ways</p> <ol style="list-style-type: none"> To a switch wire of the factory clutch switch Connect the purple wire to a wire that when operating the clutch: <ul style="list-style-type: none"> • Switches to ground • Switches off from ground • Switches from ground to 12V • Switches from 12 V to ground On an optional clutch-switch that is installed. This can then be connected directly to the 2-pole connector with the purple and green/white. 	
	WARNING: If clutch protection is not applied, engine damage may occur!
	The cruise control will function as normal when the purple wire is not Connected, as for vehicles with automatic transmission.

There are two types of speed signals that can be used for cruise control:

1. Speed signal: This type of signal indicates the actual speed of the vehicle. On a vehicle with an manual transmission this signal requires a RPM protector such as a clutch switch.
2. RPM signal: This type of signal indicates the RPM. The speed of the vehicle is related to the engine speed as long as the vehicle remains in the same gear. This type of signal can be used on vehicles with a manual gearbox. In this case, no RPM protection is required.

This signal is not suitable for vehicles with an automatic transmission!

The cruise control has two wires that can be used for speed detection.

1. Blue wire: Speed signals and engine speed signals with a voltage of 1.5 volts to 24 volts and a frequency between 6 Hz and 8.5 kHz.
2. Yellow wire: Engine speed signals only, with a voltage of 6 volts to 250 volts and a frequency between 6 Hz and 488 Hz. The yellow wire may only be used for engine speed signals, where the voltage exceeds 20 volts. In all other cases, the yellow wire may be used for speed protection when the engine speed signal is between 6 and 250 volts.

2-pins black cable Blue + black	Speedsignal, RPM signal (max. 24V)
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Connect the blue wire (core of the coaxial cable) to a wire on which the vehicle speed signal is present. Or if no speed signal is present then connect the 2-pole connector to an optional pulse generator (AA142) on the drive shaft. Possible locations for a speed signal are:

- Pulse generator on the gearbox
- At the back of the clock-unit
- In the radio connector

Yellow wire	RPM signal / RPM protection
--------------------	------------------------------------

If no speed signal is available in the vehicle, the yellow wire can be connected to a RPM signal. This is **not** possible if the vehicle has an automatic gearbox!

The yellow wire can also be used for clutch protection if there is no switch on the clutch pedal. When the blue wire is used for a speed signal, the yellow wire can be connected to an RPM signal there is then no need to fit an optional clutch switch.

Possible locations for a speed signal are:

- W connection alternator
- minus Ignition coil

If the yellow wire cannot be used as a speed signal, connect the purple wire to the clutch switch or fit an optional clutch switch.

Servo connection cable	Plug in and connect to the servo
-------------------------------	---

Run this cable from the engine compartment through the bulkhead to the location where the module is placed. Then insert the loose 4 pins of this cable into the connector of the main wiring harness according to the colorsticker on this connector.

8-pins connector	Command module
-------------------------	-----------------------





Various controls are available to provide the most suitable solution for every application. Mount the control in a location that ensures safe operation under all conditions. See the installation manual supplied with the control for specific mounting instructions.

First calibrate the AP500 to the speed signal before using cruise control. See chapter 4.0 Settings.

4 SETTINGS

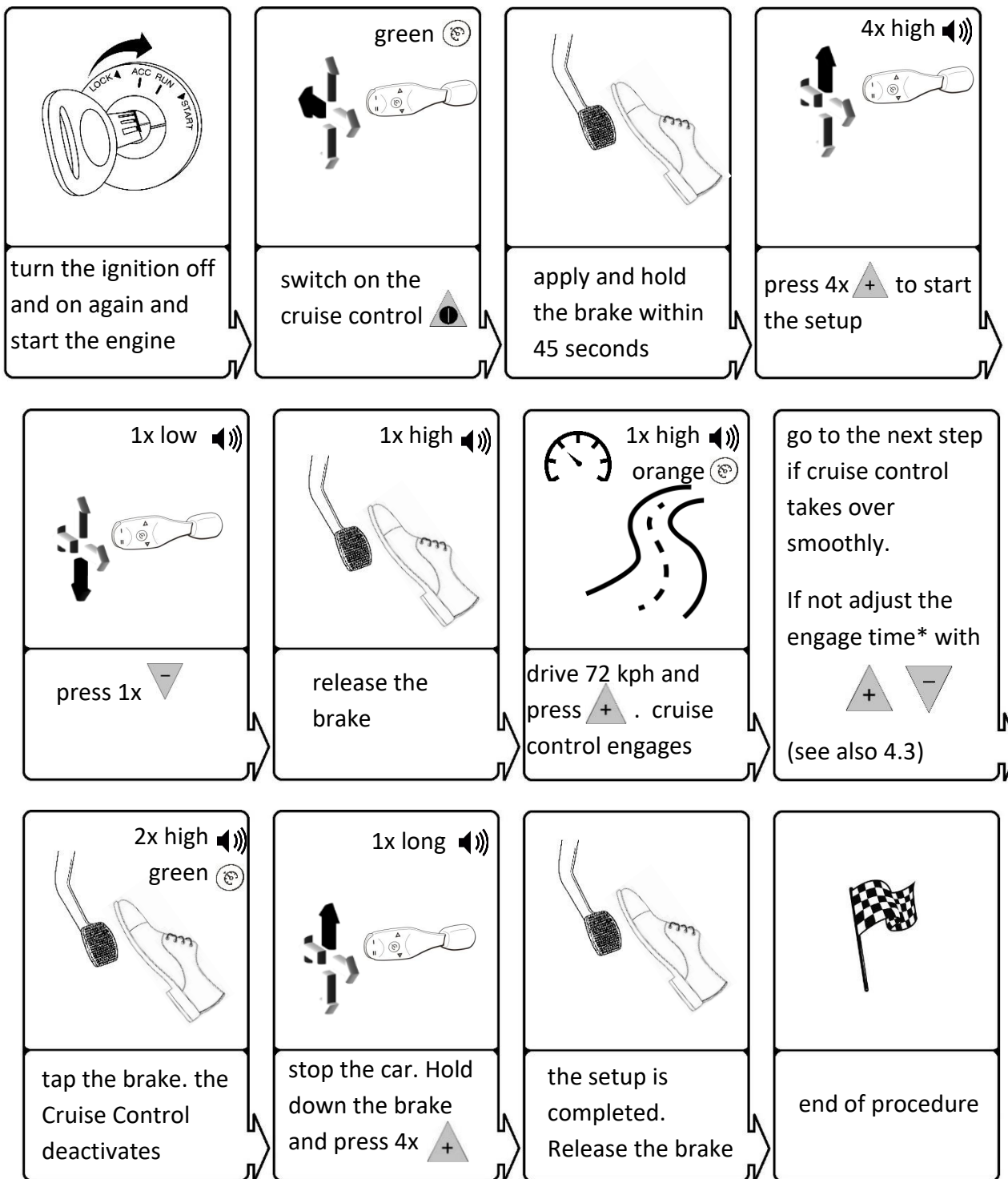
4.1 Introduction settings

The following symbols are used for control module:


	actie	symbool	functie
i	UP		SET /ACC
	DOWN		RES/DEC
	PUSH		ON/OFF
	PULL		PAUSE/COAST


4.2 Speed signal calibration

To learn the speed signal, perform the steps below.



* During speed calibration, the reaction time of switching on the Cruise Control can be adjusted directly. The reaction time is properly adjusted if the Cruise Control keeps the speed exactly constant when engaged.

If the speed increases, reduce the reaction time by pressing  . Tap the brake briefly and activate Cruise Control again to now test the reaction time again. Repeat this procedure if necessary.

If the speed decreases on activation, increase the reaction time by pressing  .

4.3 Adjust engage timing

	green		4x high
turn the ignition off and on again and start the engine	switch on the cruise control	apply and hold the brake within 45 seconds	press 4x to start the setup

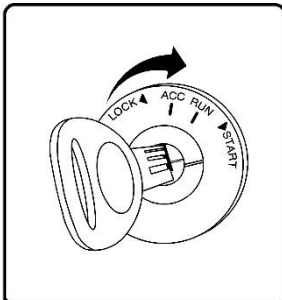
3x low	3x high		orange
		Drive at least 70 kph	
press 3x	Release the brake		press cruise control engages

Adjust the engage timing so that the cruise control takes over smoothly by increasing or decreasing the engage time by operating the or the respectively.

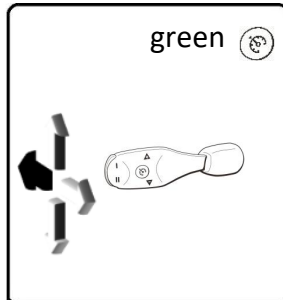
Tap the brake and then press to test engagement.

engagement time too high cruise control accelerates first (overshoot).	1x long		
engagement time too low cruise control decelerates first (undershoot)	green		end of procedure
	close setup. Hold the brake and operate 4x	release the brake	

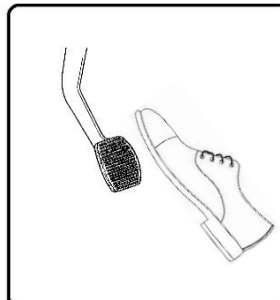
4.4 Adjust speed sensitivity



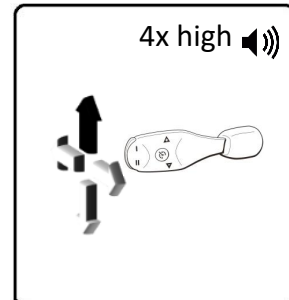
turn the ignition off and on again and start the engine



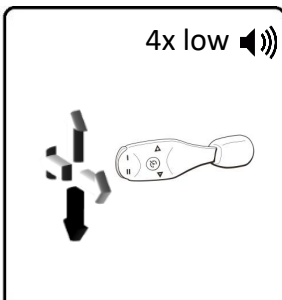
switch on the cruise control



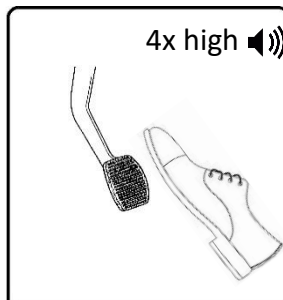
apply and hold the brake within 45 seconds



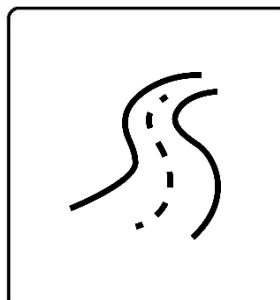
press 4x **+** to start the setup



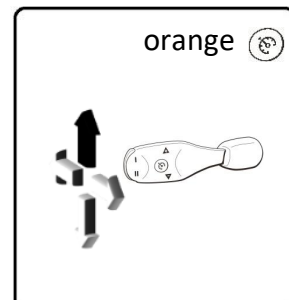
Press 4x **-**



release the brake



drive at least 70 kph

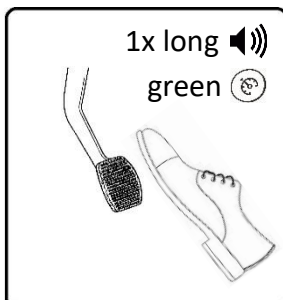


press **+** cruise control engages

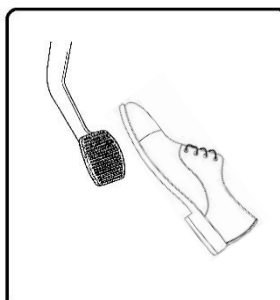
Adjust the sensitivity until the cruise control adjusts very steadily (flat road +/- 1kph, viaduct up/down max 2-3kph speed difference. Increase or decrease stability by operating the **+** or the **-** respectively. Tap the brake and then press **+** to test the stability.

sensitivity too low, speed is not stable and fluctuates around set speed.

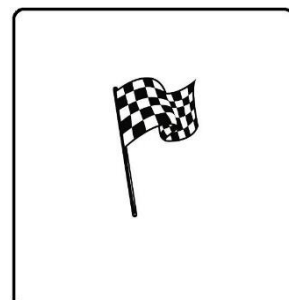
sensitivity too high, speed fairly stable but feels nervous.



close setup. Hold the brake and operate 4x **+**



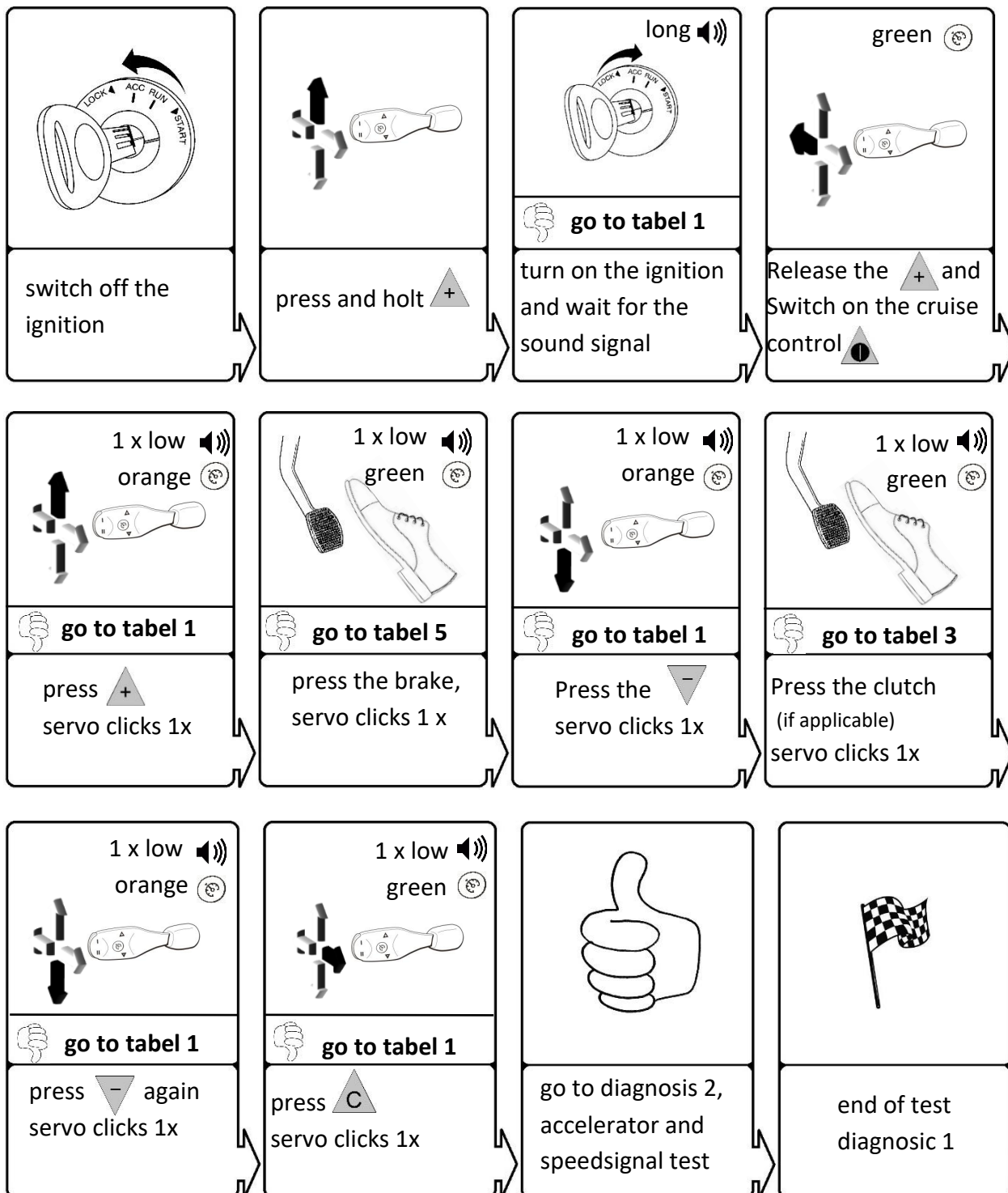
release the brake



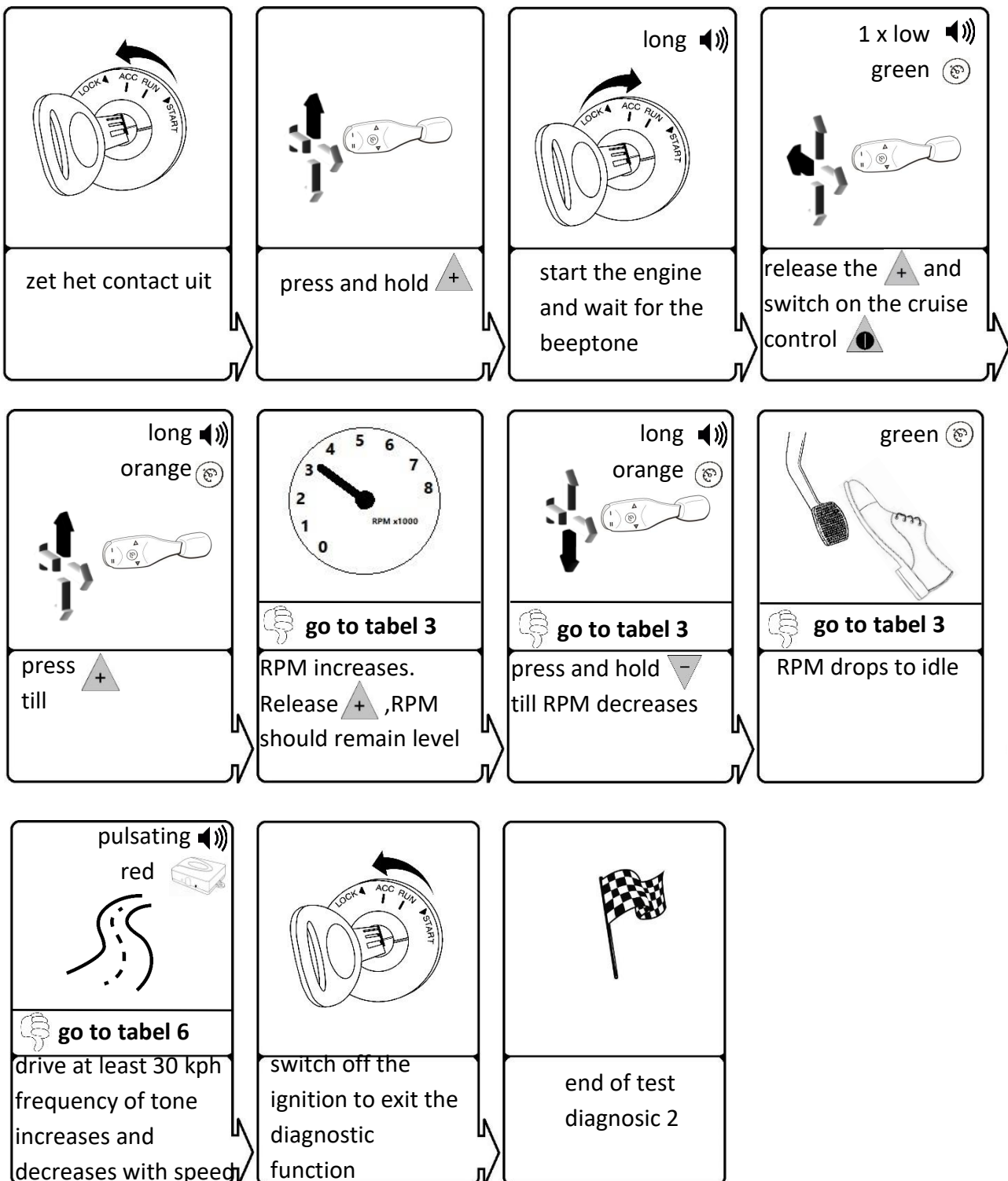
end of procedure

5 DIAGNOSTIC AND TROUBLESHOOTING

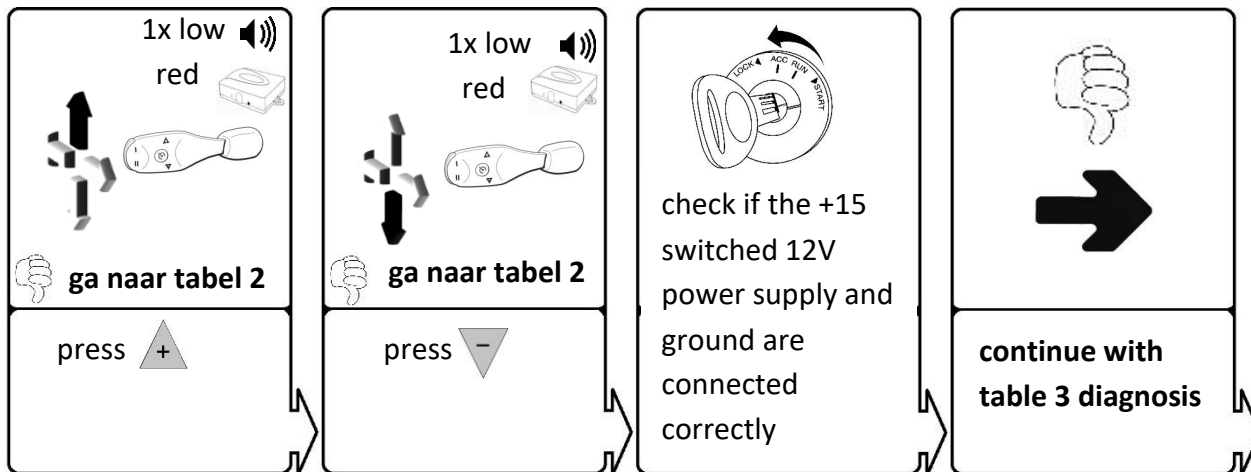
5.1 Diagnostic 1 (brake, clutch and command module test)



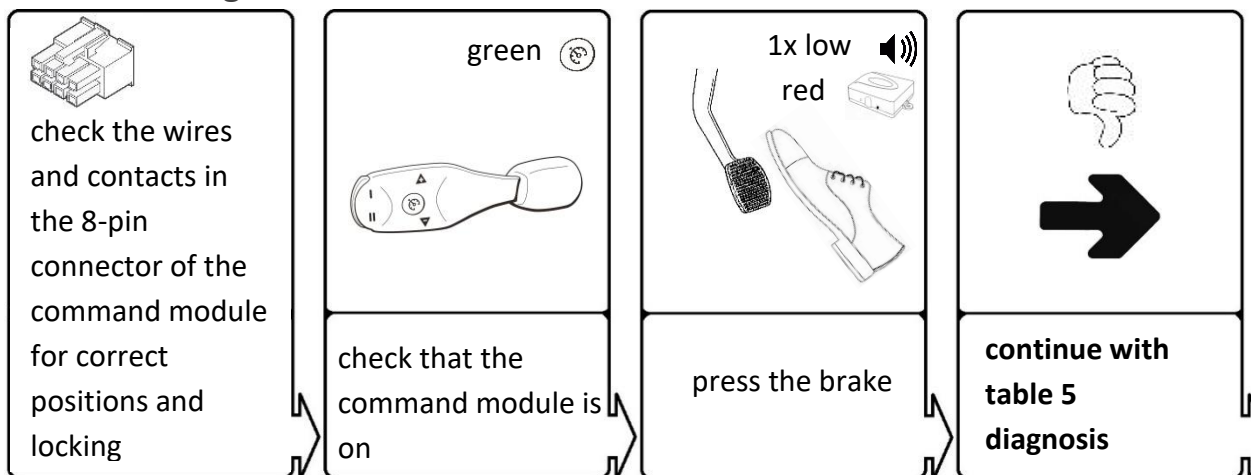
5.2 Diagnostic 2 (throttle, speedsignal test)



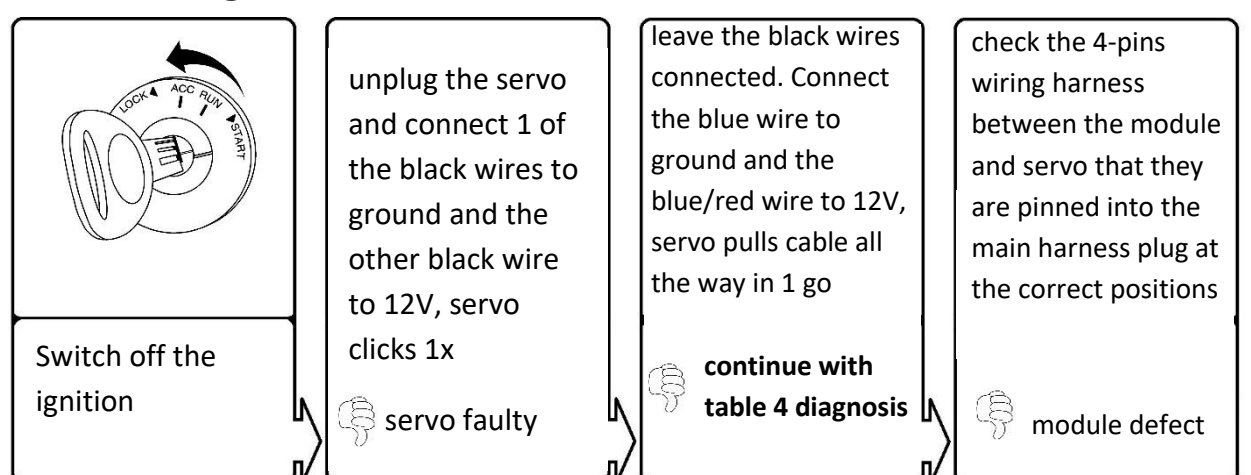
5.3 Table 1 diagnosis



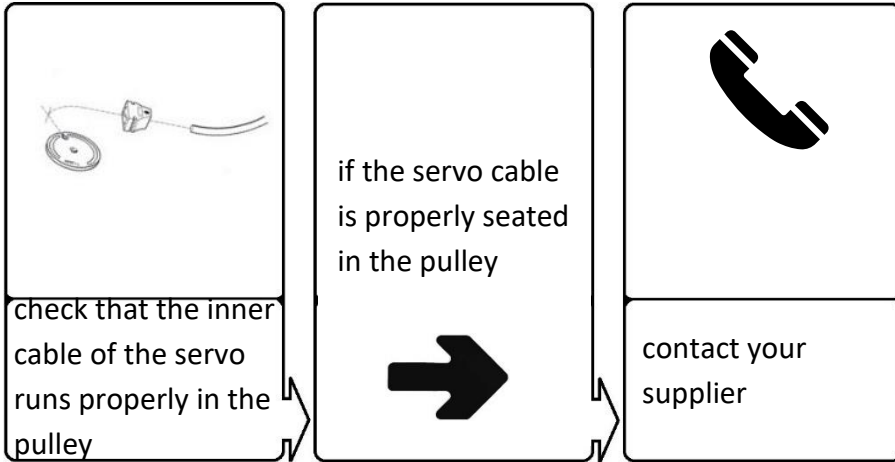
5.4 Table 2 diagnosis



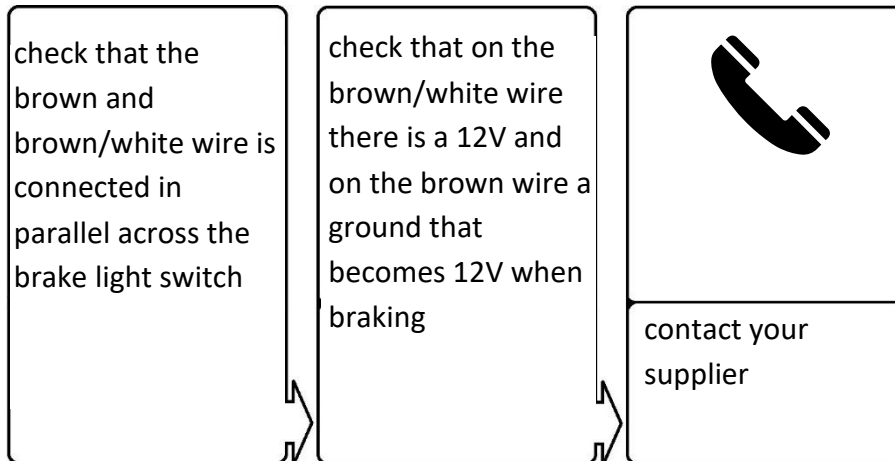
5.5 Table 3 diagnosis



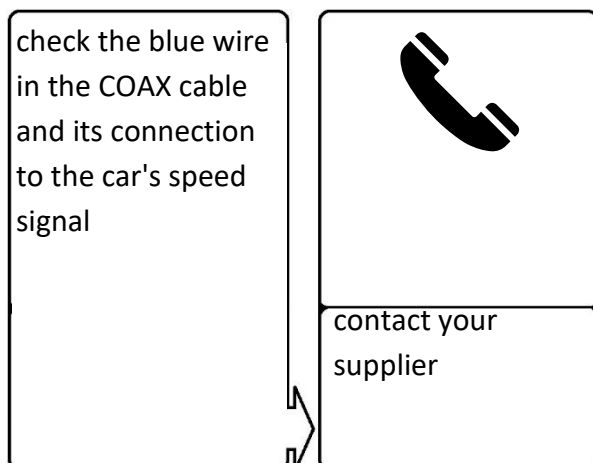
5.6 Table 4 diagnosis




5.7 Table 5 diagnosis



5.8 Table 6 diagnosis



6 FREQUENTLY ASKED QUESTIONS

	Question	Possible cause
1	Procedure calibrating speed signal does not work	<ol style="list-style-type: none"> 1. Check if the confirmation beeps are audible 2. Perform diagnostics 3. Check if the blue wire is connected to the speed signal
2	Cruise control speed drops way back during test drive	<ol style="list-style-type: none"> 1. Check the bend of the servo cable (minimum diameter of 40cm) 2. Check if the stroke of the throttle attachment matches the selected pulley and that the correct side is on top 3. Setting engage timing is too low, increase the engage timing for setting
3	Cruise control speed accelerates after engagement	<ol style="list-style-type: none"> 1. Lower the setting for the engagement time 2. make the slack on the servo cable longer
4	While cruising, the speed fluctuates	<ol style="list-style-type: none"> 1. Check if the stroke of the gas attachment matches the selected pulley and that the correct side is on top 2. Check the bend the servo cable (minimum diameter of 40cm) 3. Check if the servo inner cable pulls straight out of the outer cable under all conditions 4. Check if the outer cable support is firm enough (no suspension) 5. The speed sensitivity is incorrectly set. Adjust the speed sensitivity
5	Cruise control doesn't respond	<ol style="list-style-type: none"> 1. Check if the fuse is inserted in the fuse holder of the orange wire 2. Perform diagnostics 3. Check if the pins are correctly inserted in the connector of the command module, see installation manual command module 4. Check if the cruise control is switched on after starting 
6	Cruise control disengages when a power user is switched on	<ol style="list-style-type: none"> 1. Check if the orange wire is connected directly behind the ignition switch or to a proper switched 12V feed 2. Check if the green wire is connected to a proper ground 3. Check if the speed signal wire does not run close to anything that could affect the signal, connect at another point if necessary
7	Cruise control doesn't work above a certain speed	<ol style="list-style-type: none"> 1. Check if the stroke of the gas attachment matches the selected pulley and that the correct side is on top 2. Repeat the speed calibration procedure 3. Calibrate the speed signal at a speed higher than 72 kph
8	Cruise control doesn't work below a certain speed	<ol style="list-style-type: none"> 1. Calibrate the speed signal at a speed lower than 72 kph 2. Check if the servo cable has sufficient slack
9	When switched on, the speed becomes higher than set speed	<ol style="list-style-type: none"> 1. Check that the servo cable has sufficient slack 2. Reduce the engage timing

