

Tractor PTO Cruise Trouble Shooting Guide

Problem:

Undertake the following test

NOTE: - The most common cause of cruise control malfunction is loose or dirty electrical connections. Disconnect, clean and reconnect ALL electrical connections if the cruise control will not operate in diagnostic mode. Check the stop codes on the computer as that will give you an indication of what might be stopping the cruise control from engaging. The usual connections are: computer plug, control switch plug, throttle servo plug, fuse, speed sensor or speedometer connection, brake light switch, ground (usually battery negative), neutral sensing (neutral switch and sometimes tach sensing (ignition coil or tachometer).

1 Indicator light on control switch flashing red/green after ON-OFF button pressed to turn cruise control on

Brakes have not been operated after ignition turned on
 Brake light globe faulty or brake light stuck on
 Brake light wiring fault
Check stop codes (see page 4)

2 Cruise will not engage.

NOTE: The cruise control will NOT engage after power up (ignition turned on) until the brakes have been applied and released at least once.

Use the result of the stop code and diagnostic test to indicate which of the following tests should be performed

Brakes have not been operated after power up
 Brake light globe faulty or brake light stuck on
Check stop codes (see page 4)
Perform diagnostic test (see page 5)
 Computer power test.
 Brake wire test
 Control switch test
 Throttle servo tests
 Throttle servo cable test
 CIU test
 Speed sensor signal
 Harness continuity and voltage/resistance tests
 Incorrect calibration or computer not calibrated

3 Cruise control erratic, surges or looses/gains speed.

*Note: - We have seen several instances where the throttle spindles on carburettors or throttle bodies have become 'sticky' with age. Spraying all linkages and spindles with silicone or teflon spray can be beneficial. Clean and lubricate the twist grip/handlebar with engine oil. This is THE most common cause of cruise control performance issues.

4 Cruise lags or overshoots when engaged

Note: - Speed Pulse Calibration, Initial throttle Pull Calibration and Sensitivity adjustment procedures are shown in Section 9 of the Information, Setup and Operation Manual.

Lubricate all throttle and cruise control cables*

Adjust cruise control sensitivity
 Check carburettor/throttle body cable free play
 Speed sensor test if sensor installed
 Throttle servo tests
 Throttle servo cable test
 CIU test if CIU installed

Check carburettor/throttle body cable free play
 Perform Speed Signal Pulse Rate calibration
 Perform Initial Throttle Pull calibration
 Adjust cruise control sensitivity
 Throttle servo tests
 Throttle servo cable test
 CIU test if CIU installed

5 Cruise disengages (Note: Carefully check all wiring for intermittent connections)

Check diagnostic stop codes (see page 4)

Brake light globe faulty
 Brake light switch faulty/adjustment
 Brake wire test
 Clutch/neutral switch faulty
 Throttle servo tests

6 Cruise accelerates too slow

Throttle servo tests
 Incorrect calibration/re-calibrate computer

7 Cruise will not disengage with brake

- Brake light switch faulty
- Brake wire test
- Throttle servo tests
- Throttle servo cable test

8 Engine will not return to idle

- Check carburettor/throttle body cable free play
- CIU test if CIU installed
- Throttle servo cable test
- Broken throttle spring or sticking carburetors

9 Cruise will not operate at higher speeds (up to 25 kph / 15 mph)

Check diagnostic stop codes (see next page)

- Speed sensor test / gap too small
- Incorrect calibration/perform speed calibration

10 Cruise will not operate at lower speeds (below 5 kph / 3 mph)

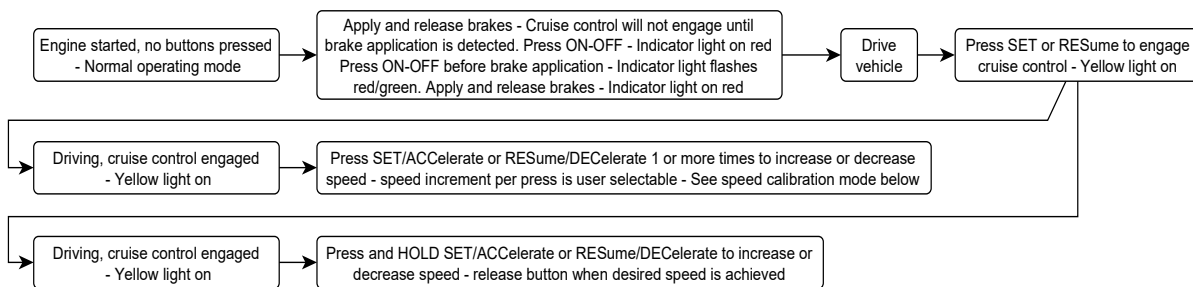
Check diagnostic stop codes (see next page)

- Speed sensor test / gap too large
- Incorrect calibration/perform speed calibration

CRUISE CONTROL MENUS

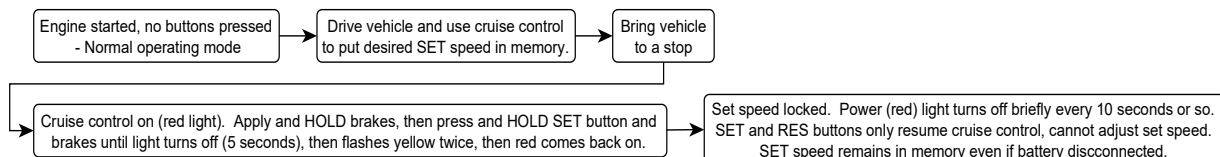
This section shows all the menus and sub-menus used for normal operation, diagnostics, setup and calibration and adjustment procedures available on the QuadCruise ATV cruise control

Normal cruise control operation



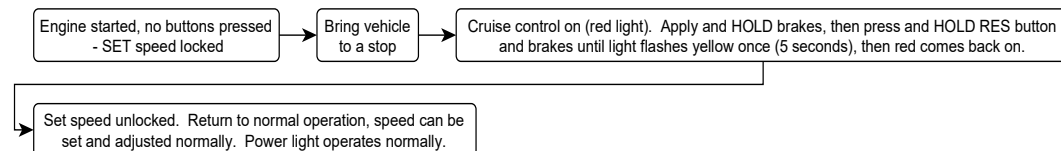
Normal cruise control operation - Lock SET speed

If a fixed speed is desired for spraying or similar operation, the SET speed can be locked to prevent accidental changes to SET speed.



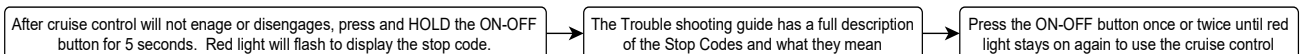
Normal cruise control operation - Unlock SET speed

Return to normal operation without locked SET speed.



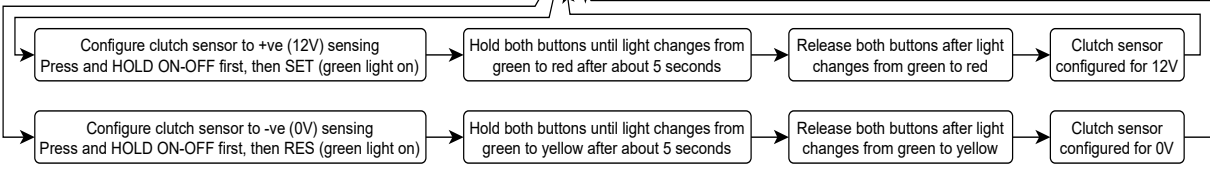
Access stop codes

This is used to diagnose why the cruise control disengages or will not engage



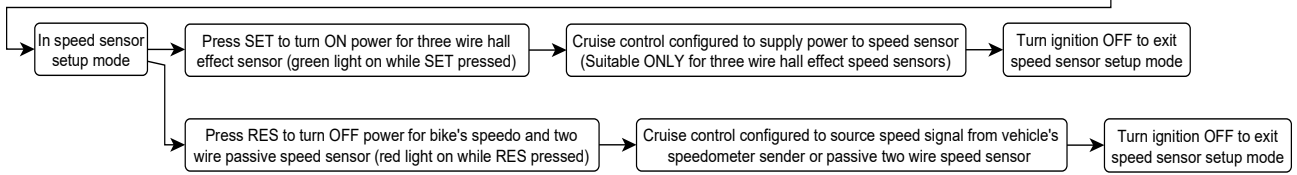
Diagnostic mode → Test electrical and mechanical operation of cruise control. Setup neutral/clutch sensor and speed sensor configuration. Advanced throttle servo/actuator testing

Enter diagnostic mode (press and HOLD SET & ON-OFF, Turn ignition ON, release buttons after 5 seconds) → Button back lights will be on No other lights on → See detail in trouble shooting guide for diagnostic mode testing → Turn ignition OFF to exit diagnostic mode



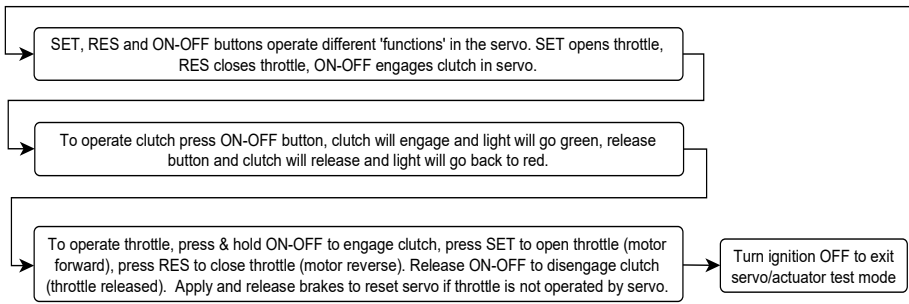
Speed sensor setup mode → To configure cruise control for for passive speed sensor and original vehicle speedo OR for three wire hall effect sensor that requires power from the cruise control

Enter diagnostic mode (press and HOLD SET & ON-OFF, Turn ignition ON, release buttons after 5 seconds) → Button back lights will be on No other lights on → Press and HOLD ON-OFF and apply brakes (green light on) → Release button and brakes after green light turns off after about 5 seconds



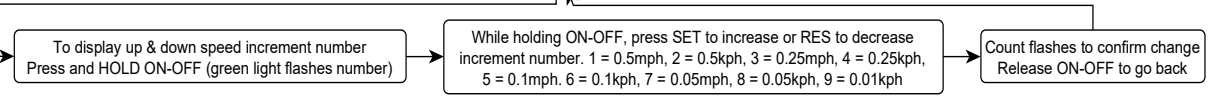
Throttle Servo Diagnostic Test mode → For advanced testing of cruise control throttle servo/actuator faults
WARNING: - DO NOT USE THIS FUNCTION WITH THE ENGINE RUNNING

Enter diagnostic mode (press and HOLD SET & ON-OFF, Turn ignition ON, release buttons after 5 seconds) → Button back lights will be on No other lights on → Press and HOLD ON-OFF (green light on) → Release button when green light turns red after about 15 seconds



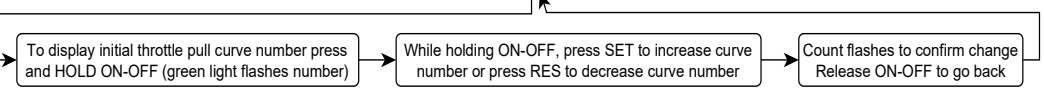
Speed sensor calibration mode → Calibration routine for speed sensor frequency and select SET & RES button speed increments

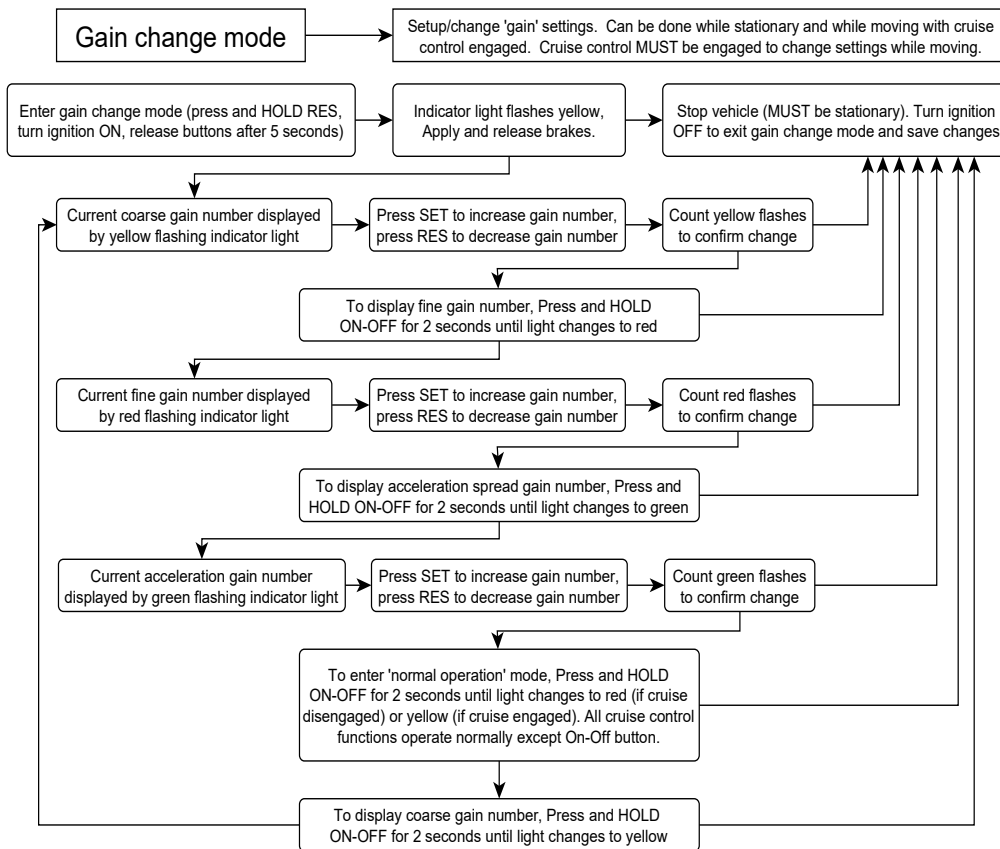
Enter speed calibration mode (press and HOLD RES & ON-OFF, turn ignition ON, release buttons after 5 seconds) → Green indicator light on. Button back lights will be on → See detail in setup manual for speed sensor calibration procedures → Stop vehicle (MUST be stationary). Turn ignition OFF to exit speed sensor calibrate mode



Initial Throttle Pull mode → Calibration routine for initial throttle pull and selection of Initial Throttle Pull curve

Enter initial throttle pull mode (press and HOLD SET, Turn ignition ON, release button after 5 seconds) → Green indicator light on, Button back lights will be on → See detail in setup manual for initial throttle pull calibration procedures → Stop vehicle (MUST be stationary). Turn ignition OFF to exit initial throttle pull mode





MOTORCYCLE CRUISE TROUBLE SHOOTING TESTS

Diagnostic Stop Codes

This cruise control has stop code function built in. The indicator light on the control switch can display the stop code at any time by pressing and holding the ON-OFF button for 5 seconds. The red light (LED) beside the connector on the cruise control computer also displays the code by flashing at all times. This stop code is displayed whenever the cruise control fails to engage when SET or RES are pressed or whenever the cruise control disengages and on power up.

When the ignition is first turned on stop code 11 (power reset) will be shown, unless there is a fault that causes another code to display. The cruise control may be disengaged by the operator on purpose (by applying the brakes for example, a code 6 would display), by the operator accidentally (manually accelerating for example, a code 4, 5, or 9 would display) or if there is a fault. Note that this is NOT a fault code, it is a stop code and a code is produced and displayed at all times except when the cruise control is engaged.

Drive the vehicle at normal speeds (6~15 kph or 4~10 mph). Press SET to engage cruise control. If cruise control does not engage, check that the indicator light does NOT come on YELLOW (red indicates power on, yellow indicates cruise is engaged).

If the engage light DOES come on (yellow light), but the cruise control does not control the vehicle speed, then the problem is either an electrical or mechanical failure in the throttle control system, as the cruise control 'believes' that it is engaged and is trying to control the vehicle speed. Enter diagnostic mode (second page of this manual) and perform a full diagnostic test. In particular, check that the engine rpm can be raised and lowered using the SET and RES keys in diagnostic mode. If engine rpm cannot be raised in diagnostic mode, check electrical connections to the cruise control throttle servo, check voltages to and at the servo, test servo operation, check servo cable and CIU operation.

If the engage light does NOT come on when you press SET, or the cruise control disengages unexpectedly, stop the vehicle. DON'T TURN THE IGNITION SWITCH OFF. Press and hold the ON-OFF button for 5 seconds or observe the RED LED (light) beside the connector on the computer. If the cruise control will not engage or disengages, the red LED on the computer and the control switch (if ON-OFF is pressed for 5 secs) will flash to indicate what is **preventing** the cruise control from engaging, or what was the **last** cause of the cruise control disengaging. The red LED will flash on and off, about once per second, the number of times that indicate the appropriate stop code number, then will pause for 2 to 3 seconds then will flash the stop code again. The computer red LED will continue to flash this code until power (ignition switch) is turned OFF or the SET or RES button is used to engage or attempt to engage the cruise control. To stop the code being displayed on the control switch, press and release the ON-OFF button.

Remember, if the engage light does come on when the SET button is pressed (light changes from red to yellow), the cruise control HAS engaged, even if the throttle is not being operated. If this happens, when you stop the bike, you could get any one of several different stop codes displayed. Any of the following codes are possible in this event, 2, 3, 5, 6, 7, 9 or 10 as any of these events could be what disengages the cruise control when you slow down to a stop. None of these codes are the real cause of the problem, the problem is an issue with the throttle control systems.

Stop Code Description

Code Possible cause

ON-OFF switch signal detected	1	ON-OFF switch accidentally pressed/faulty
No speed signal	2	Speed signal/sensor/wiring faulty
Below minimum engage speed (about 2.5kph)	3	Speed pulse rate too slow/faulty#
Above maximum engage speed (about 30kph)	4	Speed pulse rate too high/faulty#
Over speed or under speed (200% or 50% of SET speed)	5	Speed signal/sensor/wiring faulty
Brake signal detected\$	6	Brake light/wiring fault/sticking brake switch
Clutch/neutral signal detected Hi-Lo input	7	Clutch/neutral/sidestand switch/wiring fault
Clutch/neutral/gear position signal detected Voltage level input	8	Clutch/neutral/sidestand switch/wiring fault
Exceed maximum allowable acceleration	9	Too much speed pulse variation^
Overrev sense (tacho sensing)	10	Changed gear or clutch slip, ignition system wiring/connection fault.
Power reset	11	Fault in power wiring to cruise control <u>or</u> ignition turned off and back on.
Not yet calibrated/lost calibration	12	Calibration routine must be performed%*
Brake signal detected OR no brake power detected\$	13	Brake light/wiring fault/sticking brake switch OR bad brake power connection or blown brake fuse
Brakes not detected on power up (if cruise turned on, indicator light on switch will flash red/green until brakes are detected)	14	Brakes not applied (cruise will not engage until brake application has been detected)
Lost tach signal	15	Tach sensor wiring fault
Disengage/brake application time out@	16	SET or RES button pressed too soon after cruise disengaged or brakes released
Brake circuit logic failure	17	Internal circuit fault in cruise computer
CruiseSafe brake circuit power fault	18	Internal circuit fault in cruise computer
CruiseSafe brake circuit no power fault	19	Internal circuit fault in cruise computer
CruiseSafe monitor circuit fault	20	Internal circuit fault in cruise computer
Servo current leak	21	Internal circuit fault in cruise computer
Servo current too high	22	Jammed throttle servo motor or internal circuit fault in cruise computer
Servo current too low	23	Throttle servo fault or bad connection

#Note: - Speed pulse rate errors could also be caused by the computer calibration being incorrect for the vehicle. See Chapter 9 of the Information, Set up & Operation Manual to re-calibrate the speed signal pulse rate.

\$Note: - Brake application can produce stop code 6 OR stop code 15 depending on how the brake light switch is wired in the vehicle. If the brake light switch controls power to the brake light (the most common method) , stop code 6 will be generated. If the brake light switch control ground from the brake light, stop code 15 will be generated. Stop code 15 will also be generated if power to the brake light system fails, ie. A blown brake circuit fuse.

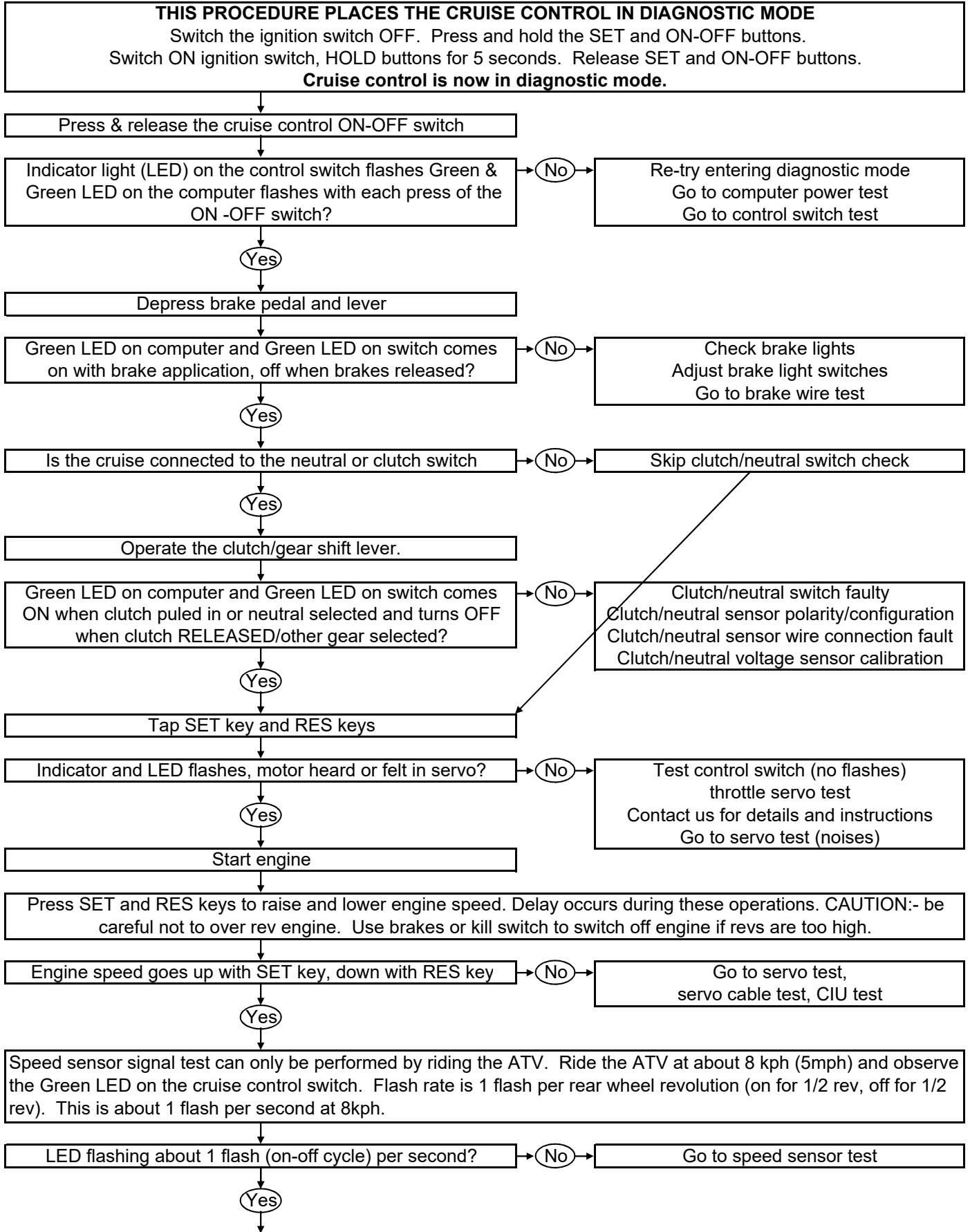
^Note: - Speed pulse acceleration errors can be caused by intermittent/dirty wiring connections, missing speed sensor magnets or one or more magnets that have been turned around (wrong pole facing the speed sensor).

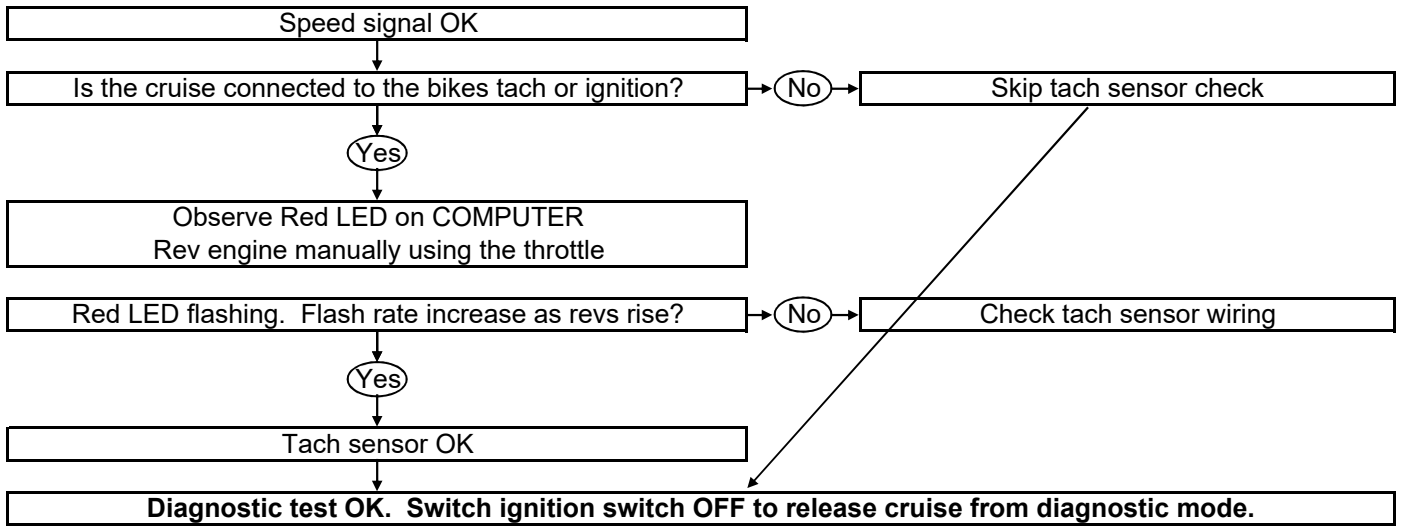
*Note: - If the computer resets or has to be re-calibrated more than once it should be returned for warranty investigation.

%Note: - Code 12 requires that the configuration of the computer be rebuilt. This is easy for the user to do. See Chapter 8 (Diagnostic Mode Operation) of the "Information, Set up & Operation Manual" to perform a full diagnostic check to ensure that everything works as it should and to configure the clutch/neutral sensor. See Chapter 9 (Calibration, Adjustments & Road Test) of the "Information, Set up & Operation Manual" to re-calibrate the speed signal pulse rate and initial throttle pull and to adjust the sensitivity.

@Note: - After the cruise control is disengaged AND every time after the brakes are released, there is a delay time of ~1.5 seconds during which the cruise control will not engage.

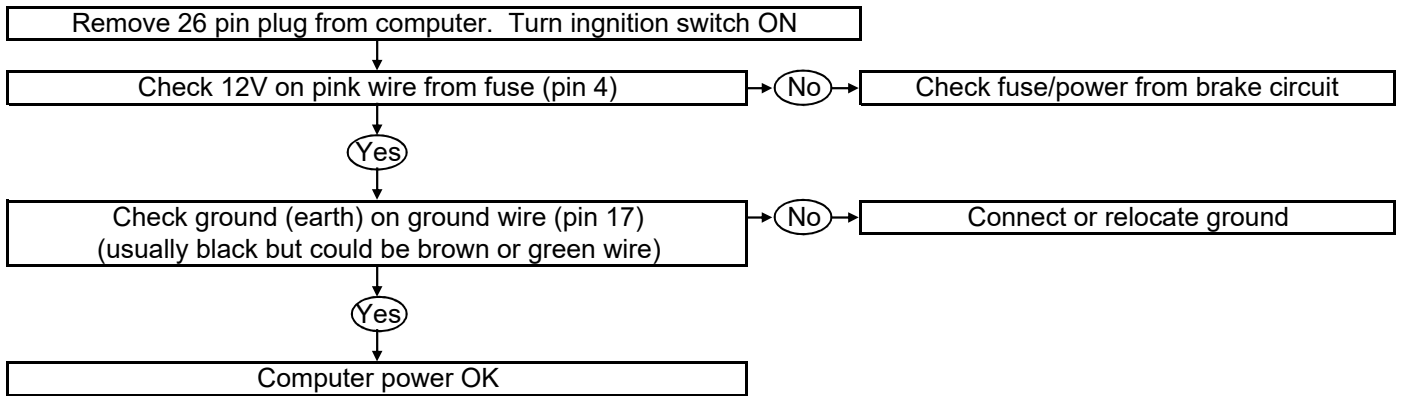
Cruise control diagnostic test



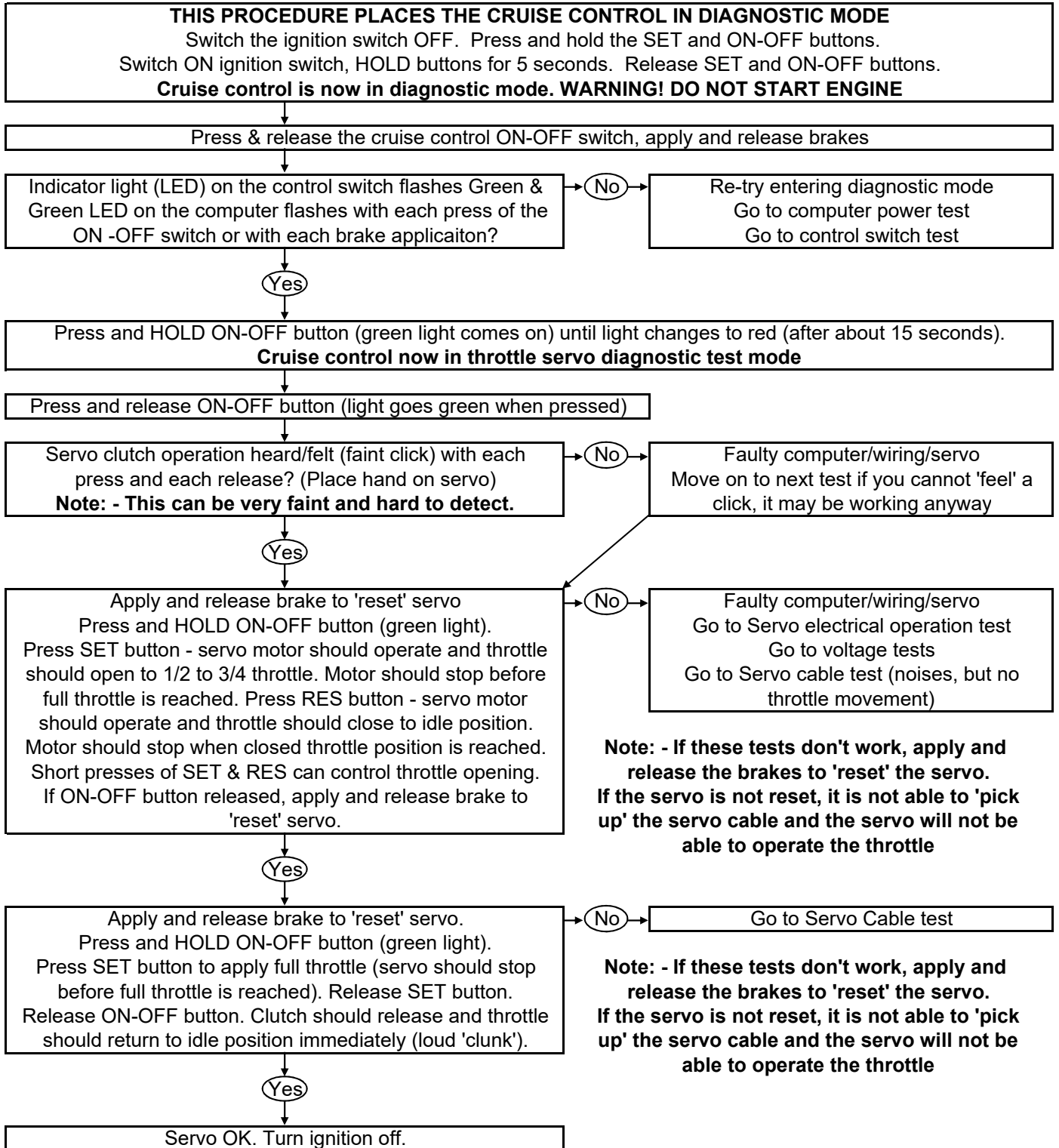


Computer power test (a multimeter set to 15 volts range will be needed for this test)

Note: - You will need a small pin with a rounded or tapered end and not over 1.0mm (0.040") diameter to use as a test probe. Wire paper clips are ideal. This can be inserted into the terminal holes in the 26 way computer plug. **BE CAREFUL NOT TO DAMAGE THE TERMINALS. IF THE PROBE WILL NOT SLIP INTO THE TERMINAL HOLE EASILY, DON'T USE IT.**



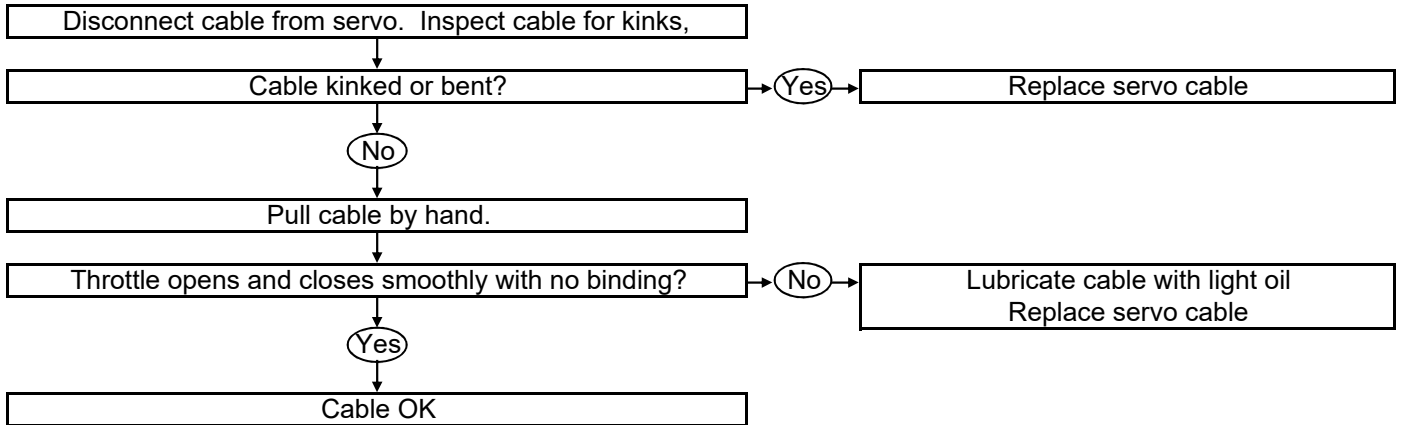
Throttle servo advanced diagnostic operation test



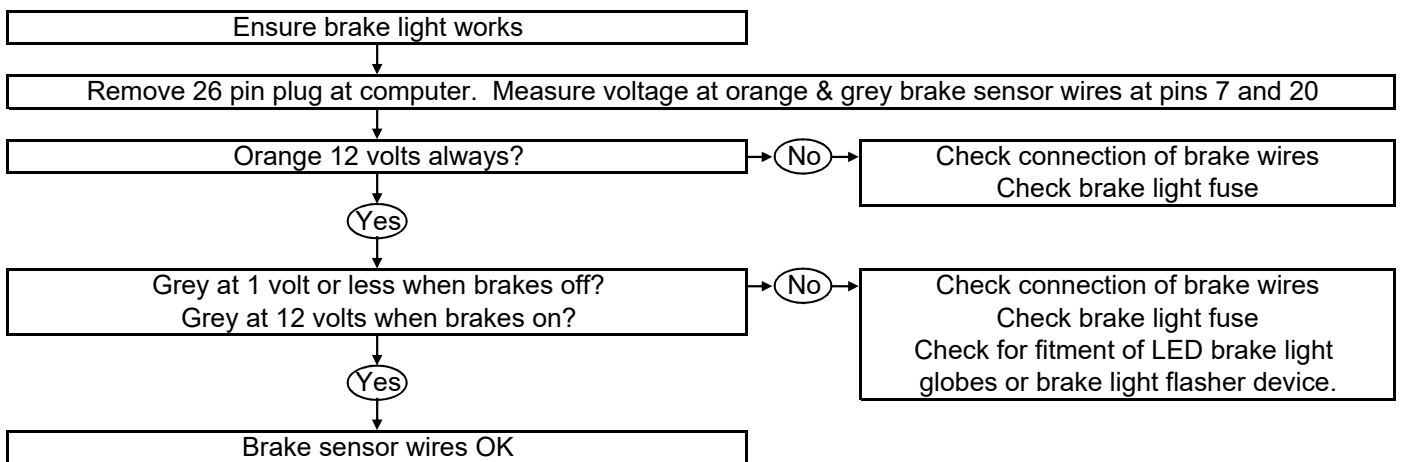
Throttle servo electrical operation test

Email us for the servo test manual at sales@mccruise.com

Throttle Servo Cable test

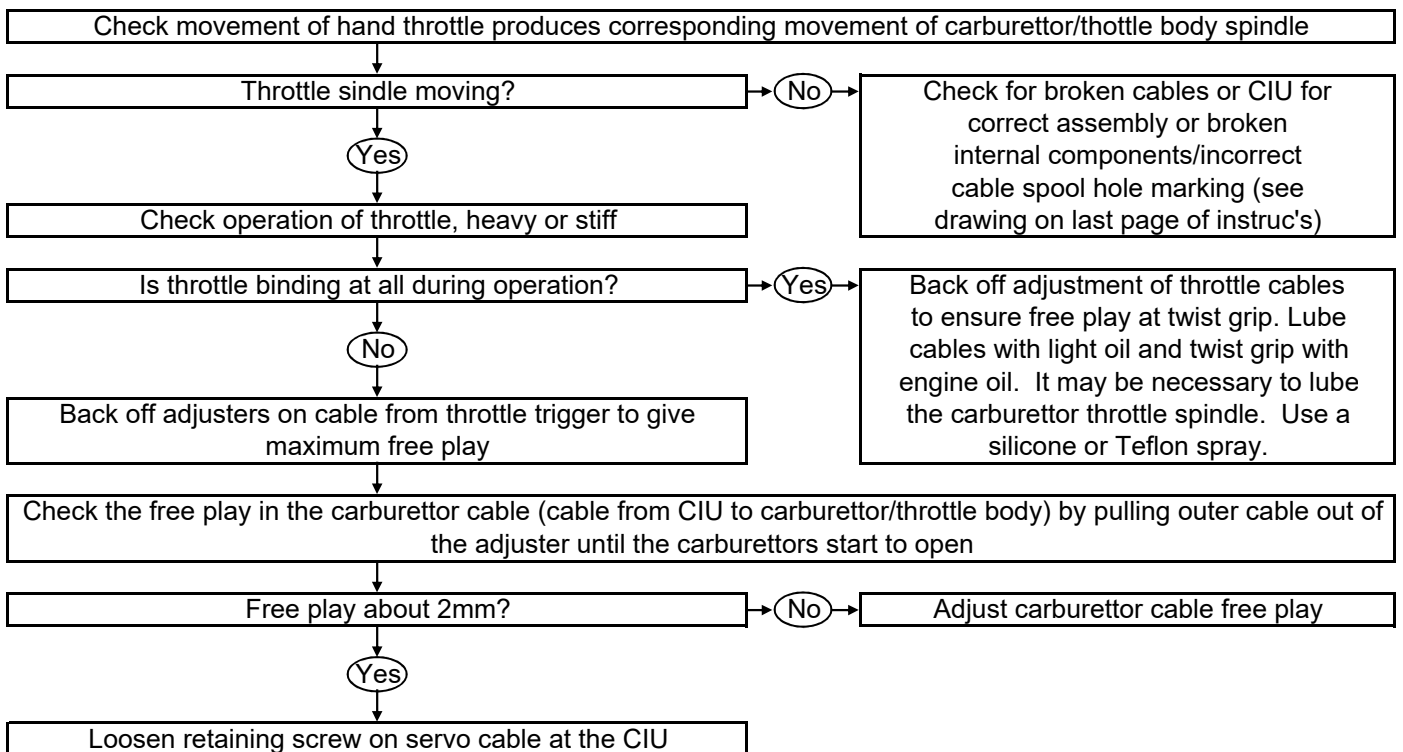


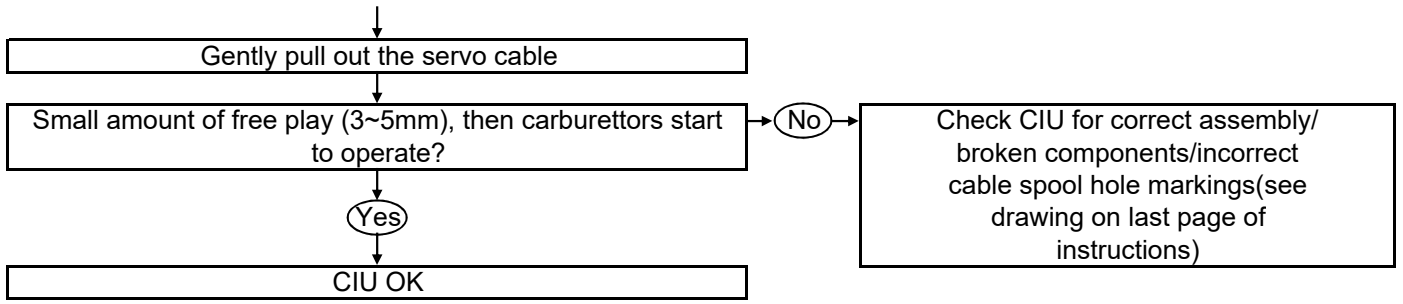
Brake wire test



CIU test

(Only models that don't have the throttle servo cable connected directly to the carburettor or throttle body spindle)



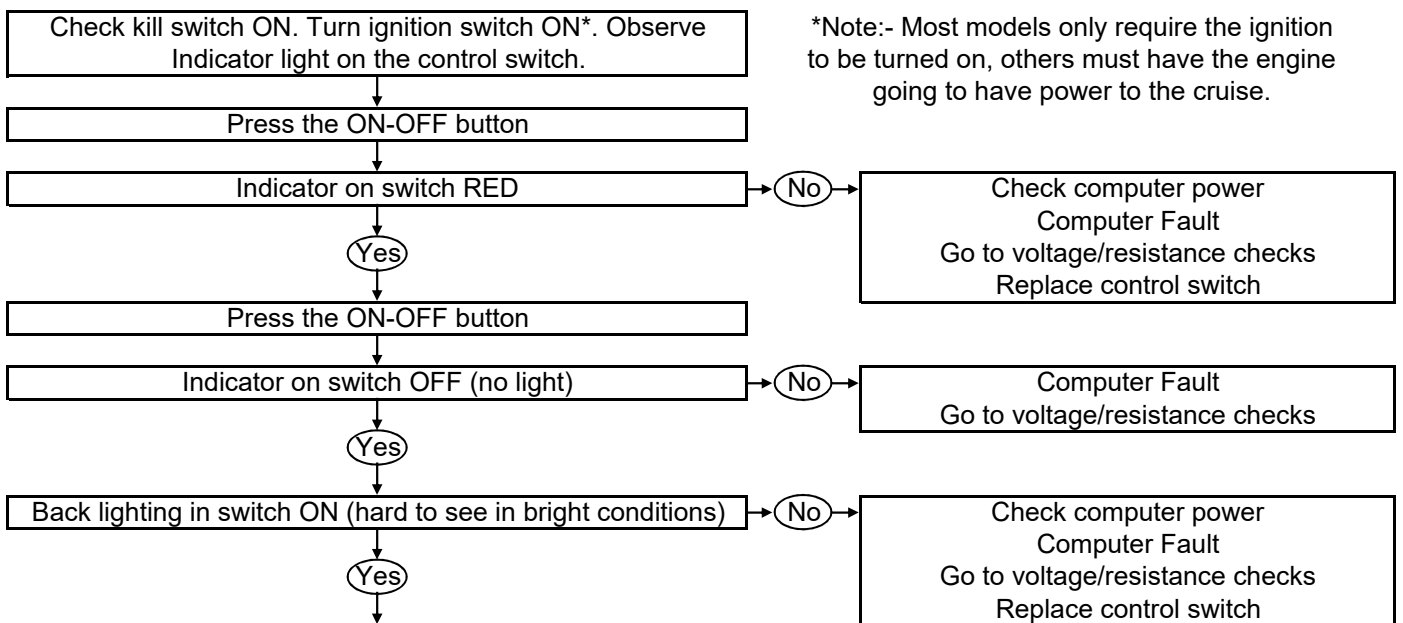


Computer calibration

Refer to the Chapter 9 (Calibration, Adjustment & Road Test) of the Information, Set up & Operation Manual for information about Speed Sensor Pulse Rate and Initial Throttle Pull calibration and Adjusting the Sensitivity.

Control switch test#

Note: - refer to switch voltage and resistance values at end of guide for detailed check of switch

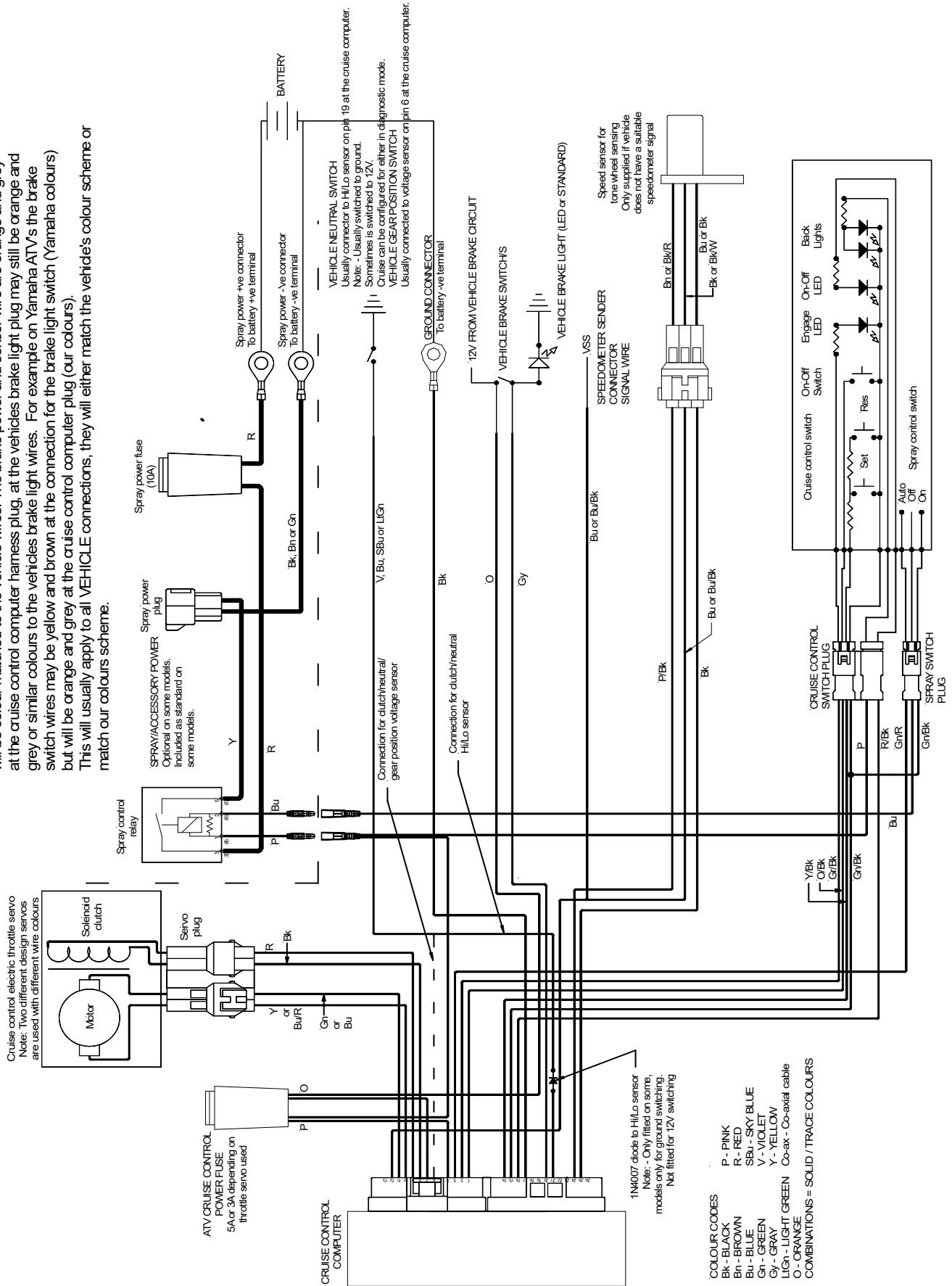


*Note:- Most models only require the ignition to be turned on, others must have the engine going to have power to the cruise.

Refer to diagnostic mode checks on the third page of this guide and to voltage and resistance values at the end of this guide for detailed control switch checks.

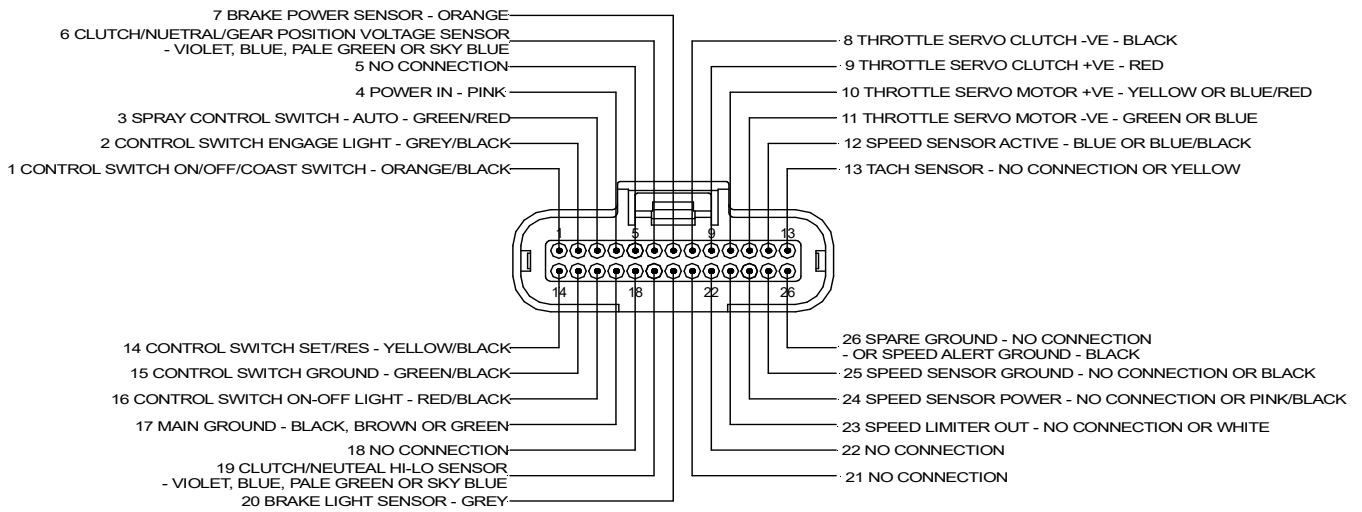
Wiring diagram

NOTE: - In many cases, the wires on the cruise control harness that connect to the vehicle wires will be colour matched to the vehicle wires. The brake power and sensor wire are orange and grey at the cruise control computer harness plug, at the vehicles brake light plug may still be orange and grey or similar colours to the vehicles brake light wires. For example on Yamaha ATVs the brake switch wires may be yellow and brown at the connection for the brake light switch (Yamaha colours) but will be orange and grey at the cruise control computer plug (our colours). This will usually apply to all VEHICLE connections, they will either match the vehicle's colour scheme or match our colours scheme.



Harness wiring pin configuration and tests

Harness computer plug pin configuration Check continuity of all wires and that the wires go to the correct pins.



NOTE: - In some cases, position 6 may be used for clutch/neutral/gear position sensing instead of position 19

Resistance checks

Resistance values at harness computer plug for suspected Control Switch fault

Note: - check with ignition switch **OFF** and computer **UNPLUGGED** from loom

Note: - You will need a small pin with a rounded or tapered end and not over 1.0mm (0.040") diameter to use as a test probe. Wire paper clips are ideal for this. This can be inserted into the terminal holes in the 26 way computer plug. **BE CAREFUL NOT TO DAMAGE THE TERMINALS. IF THE PROBE WILL NOT SLIP INTO THE TERMINAL HOLE EASILY, DON'T USE IT.**

Note: - switch wires have a black trace (stripe) unless otherwise specified below

ON-OFF switch

Pin 1 (power switch, orange) & Pin 5 (switch ground, green) $\infty \Omega$ (ohms) when cruise ON-OFF switch released
 " 0Ω (ohms) when cruise ON-OFF switch pressed

SET & RES buttons

Pin 14 (switch signal, yellow) & Pin 5 (switch ground, green) $\infty \Omega$ (ohms) when no buttons pressed
 " 820Ω (ohms) on SET
 " $1.5 K\Omega$ (K ohms) on RES

Resistance values at harness computer plug for suspected ground connection fault

(check with ignition switch **OFF** and computer **UNPLUGGED** from loom)

Touch the ohmmeter probes to the pin numbers or locations indicated

Pin 17 (ground, black) & battery negative 0Ω (ohms)

Voltage values at loom computer plug

Note: - check with cruise computer plugged in, ignition ON and cruise control ON in DIAGNOSTIC mode

Do the following to put cruise control in diagnostic mode: Turn ignition switch OFF. Press and hold the SET and ON-OFF buttons. Turn the ignition switch ON. Release the SET and ON-OFF buttons. Cruise control is now in diagnostic mode.

Place +ve probe in the back of the computer plug to measure voltages and -ve probe to battery negative or frame.

Note: - you will need a small sharp probe to either push through the wire insulation or push in between the seal and the wire on the back of the computer plug to contact the terminal inside the plug.

Control switch

Note: - switch wires have a black trace (stripe) unless otherwise specified below

Note: - check with cruise computer plugged in, ignition ON and cruise control ON in DIAGNOSTIC mode

Do the following to put cruise control in diagnostic mode: Turn ignition switch OFF. Press and hold the SET and ON-OFF buttons. Turn the ignition switch ON. Wait 5 seconds, then release the SET and ON-OFF buttons. Cruise control is now in diagnostic mode.

Pin 2 (engage light signal, grey/black) Indicator light OFF	0V with no buttons pressed
Pin 2 (engage light signal, grey/black) Indicator light Green	~2V with brakes applied or SET or RES pressed
Pin 3 (spray control auto signal, green/red)	0V after SET or RES pressed, spray switch in Auto
Pin 3 (spray control auto signal, green/red)	~12V after brakes applied, spray switch in Auto
Note: - check with cruise computer plugged in, ignition ON and cruise control NOT in DIAGNOSTIC mode	
Turn ignition switch OFF, then turn ignition switch back ON to release cruise from diagnostic mode	
Pin 1 (power switch signal, orange/black)	4~5V with ON-OFF released
"	0V with ON-OFF pressed
Pin 14 (SET & RES switch signal, yellow/black)	~4.8V no buttons pressed
"	~2.0V with SET pressed
"	~2.8V with RES pressed
Pin 15 (switch ground, green/black)	0V
Pin 16 (ON-OFF indicator light, red/black) Indicator light ON Red	~12V with ON-OFF pressed & released
Pin 16 (ON-OFF indicator light, red/black) Indicator light OFF	0V with ON-OFF pressed & released

Clutch/Neutral sensor (only the Hi-Lo sensor, this does not apply to Voltage Level sensor)

Clutch sensor check should be done with the vehicle in gear (not in neutral) for clutch sensor test. Often the clutch switch & neutral switch are all part of the same circuit. Neutral sensor check should not have any special requirements.

Clutch/Neutral sensor (when configured for 0V or low signal detection)

Pin 19 or 6 (clutch/neutral sensor, violet, blue or light green)	0~0.5V clutch pulled in or neutral selected
"	5~12V clutch released or other gear selected

Clutch/Neutral sensor (when configured for 12V or high signal detection)

Pin 19 or 6 (clutch/neutral sensor, violet, blue or light green)	6~12V clutch pulled in or neutral selected
"	~0V clutch released or other gear selected

Power

Pin 4 (12V power in , pink)	~12V
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Throttle servo

Pin 8 (servo clutch ground, black)	< 0.5V after SET or RES pressed
Pin 8 (servo clutch ground, black)	0V after brakes applied (meter may flicker once)
Pin 9 (servo clutch power, red)	~12V after SET or RES pressed
Pin 9 (servo clutch power, red)	0V after brakes applied
Pin 10 (servo motor +ve, yellow or blue/red)	*0V with ~12V pulses when SET pressed
Pin 11 (servo motor -ve, green or blue)	*0V with ~12V pulses when RES pressed

Ground

Pin 17 (ground, black)	0V
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Speed sensor

Pin 12 (speed sensor active signal, blue or blue/black)	0V to 4~12V pulses with wheel rotation (normally 5V)
Pin 25 (speed sensor ground, black) OR	0V
Pin 17 (main ground, black)	0V
Pin 24 (speed sensor power, pink/black)	0V

Note: - Pins 24 and 25 are usually only used when the cruise control kit comes with a speed sensor and tone wheel, usually fitted to a drive shaft, rear axle or rear wheel. If the vehicle has an electric speedometer, the cruise control speed signal wire will be connected to the vehicles speedometer sender wire.

Brake sensor

Pin 7 (power/brake sensor supply, orange)	~12V
Pin 20 (brake sensor, grey) incadescent (standard) lights	0V with brakes OFF
Pin 20 (brake sensor, grey) LED lights	0~5V with brakes OFF
Pin 20 (brake sensor, grey)	~12V with brakes applied

Unused positions

- Pin 5 NOT USED
- Pin 6 or 19 NOT USED (if one is used the other is usually not used)
- Pin 18 NOT USED
- Pin 19 or 6 NOT USED (if one is used the other is usually not used)
- Pin 21 NOT USED
- Pin 22 NOT USED
- Pin 23 NOT USED OR SPEED LIMITER OUTPUT - WHITE OR WHITE/BLACK
- Pin 24 SPEED SENSOR POWER - NOT USED WHEN CONNECTED TO VEHICLES SPEEDO SENDER
- Pin 25 SPEED SENSOR GROUND - USUALLY NOT USED WHEN CONNECTED TO VEHICLES SPEEDO SENDER
- Pin 26 SPARE GROUND - SOMETIMES USED WITH LED BRAKE LIGHTS OR AS GROUND FOR SPEED LIMITER

Notes: