



Installation Instructions

CA-1
Control
Module

PROGRAMMING INSTRUCTIONS FOR CA-1 CONTROL MODULE

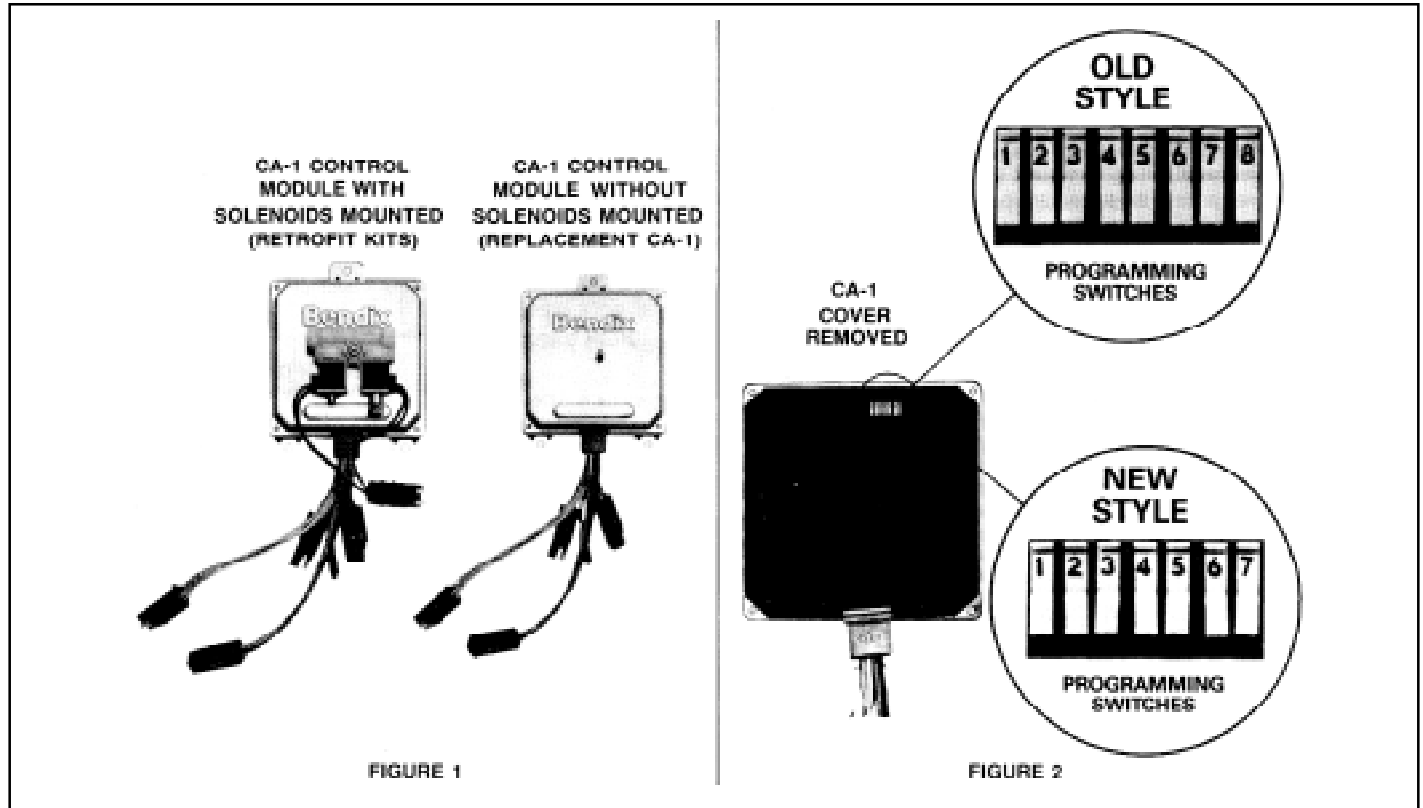


Figure 1

IMPORTANT! PLEASE READ AND FOLLOW THESE INSTRUCTIONS TO AVOID PERSONAL INJURY OR DEATH:

When working on or around a vehicle, the following general precautions should be observed at all times.

1. Park the vehicle on a level surface, apply the parking brakes, and always block the wheels.
2. Stop the engine when working around the vehicle.
3. If the vehicle is equipped with air brakes, make certain to drain the air pressure from all reservoirs before beginning ANY work on the vehicle.
4. Following the vehicle manufacturer's recommended procedures, deactivate the electrical system in manner that removes all electrical power from the vehicle.
5. When working in the engine compartment the engine should be shut off. Where circumstances require that the engine be in operation, **EXTREME CAUTION** should be used to prevent personal injury resulting from contact with moving, rotating, leaking, heated, or electrically charged components.
6. Never connect or disconnect a hose or line containing pressure; it may whip. Never remove a component or plug unless you are certain all system pressure has been depleted.
7. Never exceed recommended pressures and always wear safety glasses.
8. Do not attempt to install, remove, disassemble or assemble a component until you have read and thoroughly understand the recommended procedures. Use only the proper tools and observe all precautions pertaining to use of those tools.
9. Use only genuine Bendix replacement parts, components, and kits. Replacement hardware, tubing, hose, fittings, etc. should be of equivalent size, type, and strength as original equipment and be designed specifically for such applications and systems.
10. Components with stripped threads or damaged parts should be replaced rather than repaired. Repairs requiring machining or welding should not be attempted unless specifically approved and stated by the vehicle or component manufacturer.
11. Prior to returning the vehicle to service, make certain all components and systems are restored to their proper operating condition.

GENERAL INFORMATION

The programmable CA-1 control module may be used as either a SERVICE REPLACEMENT or as part of a cruise control system RETROFIT KIT. Instructions for both applications are presented in this manual under the appropriate headings.

While the CA-1 is user programmable, it is supplied with certain features and vehicle conditions factory programmed. It may, however, be necessary or desirable to change the original factory settings. Listed below are the programmable conditions and features with the factory settings stated.

Engine Make Factory programmed for Cummins & Detroit Diesel. The CA-1 can be programmed for various engine makes, such as: Cummins, D.D.A.D., Caterpillar, Mack.

Stationary Throttle Set Factory programmed with this feature activated. This optional feature may be deactivated if desired. The stationary throttle feature functions similar to a mechanical throttle advance and allows the user to maintain a set throttle position while the vehicle is parked. This feature is not intended as an R.P.M. control and cannot hold a constant engine R.P.M. with a varying engine load.

Speed Signal Source Factory programmed for an 8.4 Hz/m.p.h. speed signal frequency, i.e.; a Bendix 102622 cruise control speed sender.

The CA-1 must be programmed for the proper speed signal frequency. Three frequencies 4.2 Hz/m.p.h., 8.4 Hz/m.p.h., 16.8 Hz/m.p.h. are programmable and will accommodate the most common speed signal sources. The speed signal frequency can be determined by testing if it is not known before hand.

Top Set Limit Factory programmed without this feature. The "top set limit" feature may be activated and adjusted if desired. When activated, the top set limit WILL NOT prevent the driver from manually accelerating to maximum vehicle speed. The function of this feature is to prevent the CA-1 control module from accepting and holding a vehicle speed setting above a programmed maximum. A top set limit within the approximate range of 50-65 m.p.h. can be programmed.

CHANGING THE CA-1 FACTORY PROGRAM GENERAL

With prior knowledge or experience it is possible to COMPLETELY reprogram the CA-1 control module before it is installed in the cruise control system. When the speed signal source frequency is unknown or the top set limit feature is desired, it will be necessary to temporarily install the CA-1 in the cruise control system in an accessible area. This is required so that operational tests can be conducted to determine speed signal frequency and to program the top set limit if desired. Prior to conducting operational tests, it is essential that the cruise control system be installed and functional, particularly the speed sending equipment. Consult the installation manual (in the case of retrofit kits) and/or Bendix service data publication SD-10-1 to confirm that the cruise control system is functioning correctly.

If it is known that the engine make or throttle set feature **must** be reprogrammed, the CA-1 control module cover should be removed and the programming changed PRIOR to temporarily installing the CA-1 in the cruise control system. The engine make **MUST** be correctly set prior to any programming. If the factory engine make setting is correct the CA-1 cover need not be removed prior to the temporary installation. If it is necessary to remove the CA-1 cover prior to installation, see the cover removal and replacement section of this manual. See the appropriate installation section of this manual for installation of the CA-1.

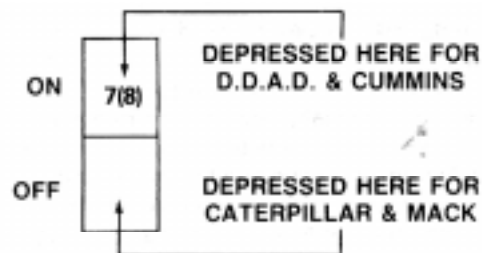
REPROGRAMMING THE ENGINE MAKE

1. The CA-1 Control Module is factory programmed for the Detroit Diesel and Cummins engines.
2. The CA-1 **MUST** be programmed for the appropriate engine make PRIOR TO ITS INSTALLATION IN THE CRUISE CONTROL SYSTEM.
3. Remove the CA-1 cover as instructed in the appropriate section of this manual. (Refer to Figure 1)

IMPORTANT NOTES:

- A. IN SEPTEMBER OF 1991 BENDIX CHANGED THE CA-1 PROGRAMMING SWITCHES FROM AN EIGHT SWITCH MODULE TO A SEVEN. The programming function of each numbered switch has also changed. The instructions and illustrations that follow feature the new seven switch programming module however the equivalent switch number for the old style (8 switch module) is presented in parentheses () adjacent to it. (See figure 2)
- B. Regardless of whether the old or new style switch module is in use it will be covered by a flexible, clear plastic "bubble." **DO NOT REMOVE THE PLASTIC "BUBBLE,"** that encapsulates the switches. This cover provides protection against contamination. Use a **BLUNT** instrument to press against the plastic cover in order to change the switch positions.

4. Switch No. 7(8) of the CA-1 is responsible for engine make programming. This two position rocker switch is depressed to the "ON" position at the factory to program the CA-1 for the D.D.A.D. and Cummins engines. Depress switch No. 7(8) to the "OFF" position to reprogram the CA-1 for CATERPILLAR and MACK engines.



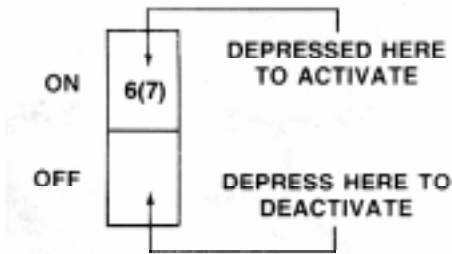
REPROGRAMMING STATIONARY THROTTLE SET

1. Switch No. 6(7) is responsible for stationary throttle programming. This two position rocker switch is depressed to the ON position at the factory to ACTIVATE the stationary throttle feature.

IMPORTANT NOTES:

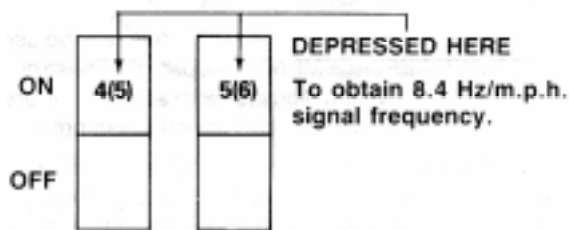
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- B. Regardless of whether the old or new style switch module is in use it will be covered by a flexible, clear plastic "bubble." **DO NOT REMOVE THE PLASTIC "BUBBLE,"** that encapsulates the switches. This cover provides protection against contamination. Use a **BLUNT** instrument to press against the plastic cover in order to change the switch positions.

- 2. Depress switch No. 6(7) to the OFF position to DEACTIVATE the stationary throttle feature.



REPROGRAMMING VEHICLE SPEED SIGNAL FREQUENCY

- 1. Switch numbers 4(5) and 5(6) are responsible for programming the CA-1 to receive the vehicle speed signal frequency being generated by the speed sensing equipment. Both of these two position rocker switches are depressed to the ON position at the factory to allow the CA-1 to receive an 8.4 Hz/m.p.h. signal frequency.

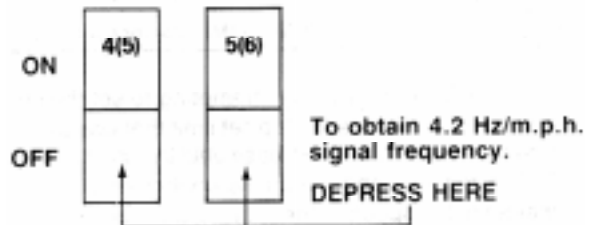


IMPORTANT NOTES:

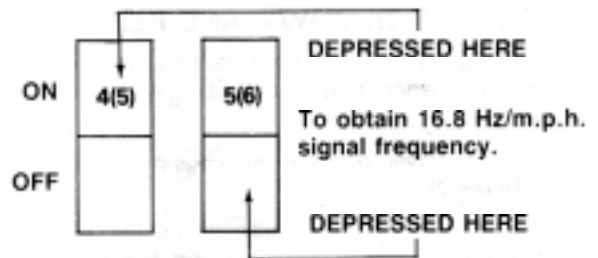
- A. IN SEPTEMBER OF 1991 BENDIX CHANGED THE CA-1 PROGRAMMING SWITCHES FROM AN EIGHT SWITCH MODULE TO A SEVEN. The programming function of each numbered switch has also changed. The instructions and illustrations that follow feature the new seven switch programming module however the equivalent switch number for the old style (8 switch module) is presented in parentheses () adjacent to it. (See figure 2)

- B. Regardless of whether the old or new style switch module is in use it will be covered by a flexible, clear plastic "bubble." **DO NOT REMOVE THE PLASTIC "BUBBLE,"** that encapsulates the switches. This cover provides protection against contamination. Use a **BLUNT** instrument to press against the plastic cover in order to change the switch positions.

- 2. To reprogram the CA-1 to receive a 4.2 Hz/m.p.h. signal frequency both switches are depressed to the OFF position.



- 3. To reprogram the CA-1 to receive a 16.8 Hz/m.p.h. signal frequency, switch No. 4(5) is depressed to the ON position and switch No. 5(6) is depressed to the OFF position.



TESTING TO DETERMINE SIGNAL FREQUENCY

If the signal frequency of the vehicle's speed sending equipment is unknown, the following tests must be conducted. The cruise control system, particularly the speed sending equipment, must be installed and functioning properly or test results will be unsatisfactory. Do not alter the factory set switch position for 4(5) & 5(6) **prior** to testing (both switches in "on" position). The CA-1 Control Module must be installed in the cruise control system prior to conducting these tests. If the CA-1 control module cover has not already been removed for previous reprogramming, it need not be removed prior to installing the controller in the system since signal reprogramming may not be required after testing. If the top set limit feature is to be activated (this is covered in the next section) the controller cover should be removed prior to installing the CA-1 in the cruise control system. After installing the CA-1 Control Module in the vehicle cruise control system, the vehicle must be taken to an area where it can be test driven at speeds up to 60 m.p.h.

TEST #1

Accelerate the vehicle to a speed of 30 m.p.h. and depress and release the cruise control SET switch. After attempting to SET the cruise control, the driver should remove his foot from the accelerator.

- A. If the cruise control system accepts and maintains the speed setting, proceed to TEST #2.
- B. If the cruise control system will not maintain the speed setting, the CA-1 Control Module must be reprogrammed to accept a 4.2 Hz/m.p.h. speed signal frequency. (See Step 2 under Reprogramming Vehicle Speed Signal Frequency). If the CA-1 cover has not been previously removed, remove it now and reprogram the signal frequency. After reprogramming is complete, proceed to the section of this manual entitled "PROGRAMMING THE TOP SET LIMIT". Further reprogramming is unnecessary if the top set limit feature is not desired. Replace the CA-1 Control Module cover and mount the CA-1 in its permanent location.

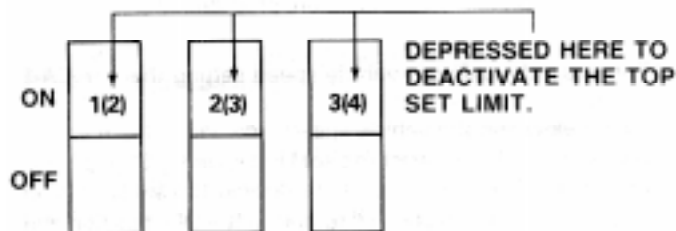
TEST #2

Accelerate the vehicle to a speed of 60 m.p.h. and depress and release the cruise control SET switch. After attempting to set the cruise control, the driver should remove his foot from the accelerator.

- A. If the cruise control system accepts and maintains the speed setting the factory set signal frequency is correct. Proceed to the section of this manual entitled "PROGRAMMING THE TOP SET LIMIT". Further reprogramming is unnecessary if the top set limit feature is not desired. Replace the CA-1 cover, if it was previously removed, and mount the controller in its permanent location.
- B. If the cruise control will not maintain the 60 m.p.h. or higher speed setting, the CA-1 Control Module must be reprogrammed to accept a 16.8 Hz/m.p.h. speed signal frequency. (See Step 3 under "REPROGRAMMING VEHICLE SPEED SIGNAL FREQUENCY"). If the CA-1 cover has not been previously removed, remove it now and reprogram the signal frequency. After reprogramming is complete, proceed to the section of this manual entitled "PROGRAMMING THE TOP SET LIMIT". Further reprogramming is unnecessary if the top set limit feature is not desired. Replace the CA-1 control module cover and mount the CA-1 in its permanent location.

PROGRAMMING THE TOP SET LIMIT

1. Switch Nos. 1(2), 2(3), and 3(4) are responsible for programming the top set limit feature of the CA-1. All three of these two position rocker switches are depressed at the factory to the ON position to DEACTIVATE this feature. NOTE: Switch No. (1) in old style switch module is not used for any purpose and may be placed in either the ON or OFF position without affecting the operation of the CA-1 control module.

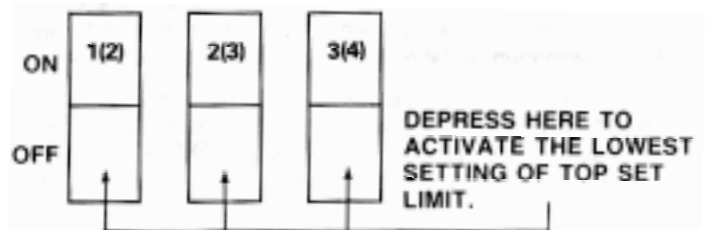


2. Several vehicle factors affect the programming for top set limit, i.e.; tire size, rear end ratio, etc. Because of the large number of combinations these factors can form, it is necessary to test run the cruise control to obtain the desired top set limit. If the CA-1 control module cover has not been previously removed, remove the cover now.

IMPORTANT NOTES:

- A. IN SEPTEMBER OF 1991 BENDIX CHANGED THE CA-1 PROGRAMMING SWITCHES FROM AN EIGHT SWITCH MODULE TO A SEVEN. The programming function of each numbered switch has also changed. The instructions and illustrations that follow feature the new seven switch programming module however the equivalent switch number for the old style (8 switch module) is presented in parentheses () adjacent to it. (See figure 2)
- B. Regardless of whether the old or new style switch module is in use it will be covered by a flexible, clear plastic "bubble." **DO NOT REMOVE THE PLASTIC "BUBBLE,"** that encapsulates the switches. This cover provides protection against contamination. Use a **BLUNT** instrument to press against the plastic cover in order to change the switch positions. The cruise control system, particularly the speed sending equipment, must be installed and functioning properly or test results will be unsatisfactory.

3. Depress all three rocker switches [No. 1(2), 2(3), and 3(4)] to the OFF position to ACTIVATE the top set limit



feature. When all three switches are in the OFF position, the top set limit is programmed for the LOWEST POSSIBLE SPEED of the top set limit feature.

4. With the CA-1 temporarily installed in the cruise control system, accelerate the vehicle to a speed of 60 m.p.h. and depress and release the SET switch. After setting the cruise control, the driver should remove his foot from the accelerator and note that vehicle speed decreases to between 45 and 56 m.p.h. at which time the cruise control system should engage and maintain a specific speed. This speed is the lowest top set limit speed that can be programmed into the CA-1 and should be recorded. Record speed here: _____ m.p.h. NOTE: If the cruise control engages at a speed lower than 45 m.p.h., the vehicle speed signal frequency has not been properly programmed. See section entitled "REPROGRAMMING VEHICLE SPEED SIGNAL FREQUENCY". Program the proper signal frequency before programming the top set limit.

- The desired maximum vehicle speed setting that the CA-1 control module will accept can be programmed using the chart below and the vehicle speed recorded in No. 4 above. For example: if the lowest top set limit speed is 51 m.p.h. (as recorded in No. 4 above) and the desired top set limit is 59 m.p.h., switches 1(2) and 2(3) remain in the OFF position and switch 3(4) is depressed to the ON position. With a base speed of 51 m.p.h. an additional 8 m.p.h. is required to obtain a top setting. NOTE: Speedometer error should be considered when deciding upon an appropriate TOP SET LIMIT. Top set limit programming can only accommodate a setting up to and including 12 m.p.h. above the lowest possible setting in approximately 2 m.p.h. increments.

PROGRAMMING TOP SET LIMIT

Position of Switches			COMMENTS
1(2)	2(3)	3(4)	
OFF	OFF	OFF	Lowest possible top set limit (45-56 mph)
ON	OFF	OFF	Adds 2 m.p.h. to lowest top set limit
OFF	ON	OFF	Adds 4 m.p.h. to lowest top set limit
ON	ON	OFF	Adds 6 m.p.h. to lowest top set limit
OFF	OFF	ON	Adds 8 m.p.h. to lowest top set limit
ON	OFF	ON	Adds 10 m.p.h. to lowest top set limit
OFF	ON	ON	Adds 12 m.p.h. to lowest top set limit
ON	ON	ON	NO TOP SET LIMIT (factory setting)

- Test the CA-1 program by attempting to set the cruise control at a speed above the top set limit that was programmed. Vehicle speed should decrease until the programmed top set limit is reached and the cruise control should engage and maintain that speed. If the system accepts a higher or lower vehicle speed setting, check the CA-1 programming steps specified in steps 3, 4, and 5.
- After programming of the top set limit is complete, replace the CA-1 control module cover and mount the CA-1 in its permanent location.

CA-1 COVER REMOVAL AND REPLACEMENT

- Referring to Figure 1, remove and retain the four screws, nuts and lockwashers that secure the cover to the CA-1 control module.
- Lift off the cover to expose the programming switches. (Refer to Figure 2)
- After programming is complete, secure the cover to the CA-1 control module using the four screws, nuts and lockwashers. Torque to 5 to 8 in. lbs. (.6 to .9 N.M).

INSTALLING THE CA-1 AS A SERVICE REPLACEMENT

When the CA-1 Control Module is to be installed as a replacement part, it is supplied without an attached solenoid assembly. (Refer to Figure 1) The programmable CA-1 should be mounted in the same location as the unit that is being replaced. If the CA-1 is mounted to a metal surface on the vehicle, the surface should be thoroughly cleaned to insure a good ground contact between the CA-1 case and the vehicle.

INSTALLING THE CA-1 AS A PART OF A CRUISE CONTROL RETROFIT KIT

When the programmable CA-1 is part of a retrofit cruise control installation kit, it is supplied with an attached solenoid assembly. (Refer to Figure 1) Installation instructions for the CA-1 are presented in the ENGINE KIT instruction booklet.

IMPORTANT

24V CA-1 CONTROL MODULE RETROFIT KIT

A 24V on/off rocker type control switch is supplied with all 24V CA-1 control module KITS. The standard 12V on/off control switch furnished in the CAB kit must be discarded and the 24V switch used when installing cruise control on a vehicle with a 24V electrical system.