NAVISTAR EDUCATION

Recalibration of the HVAC Actuator Motors

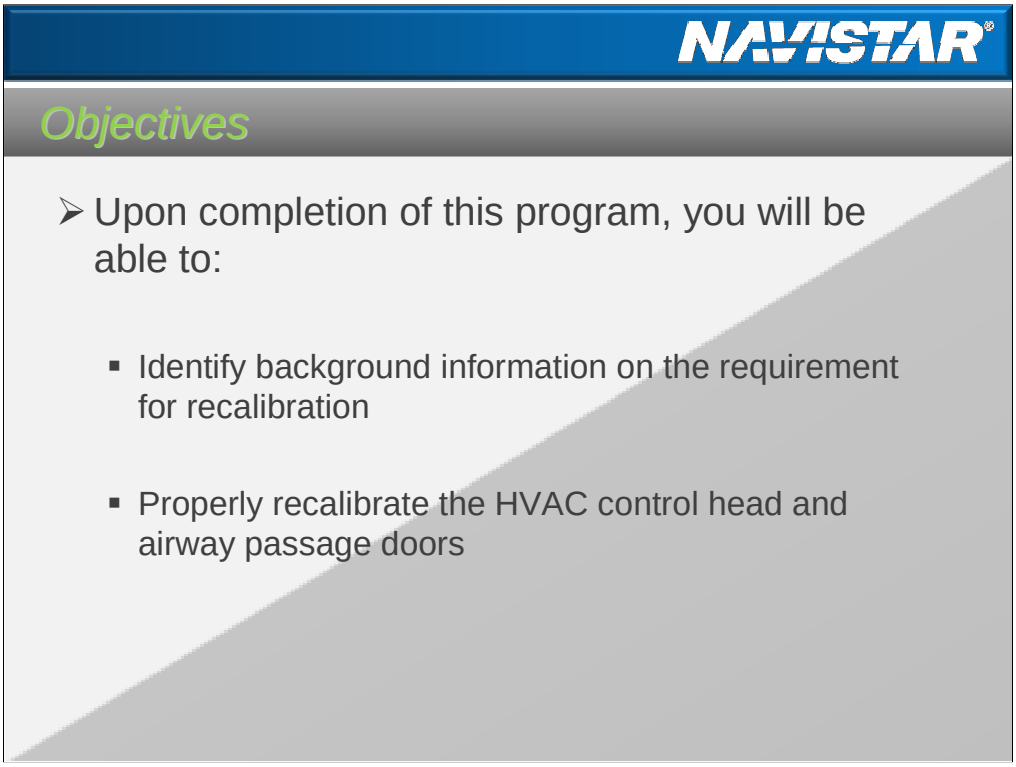
Study Guide

NAVISTAR®

Recalibration of the HVAC Actuator Motors

Welcome to this Navistar training program on the Recalibration of the HVAC Actuator Motors.

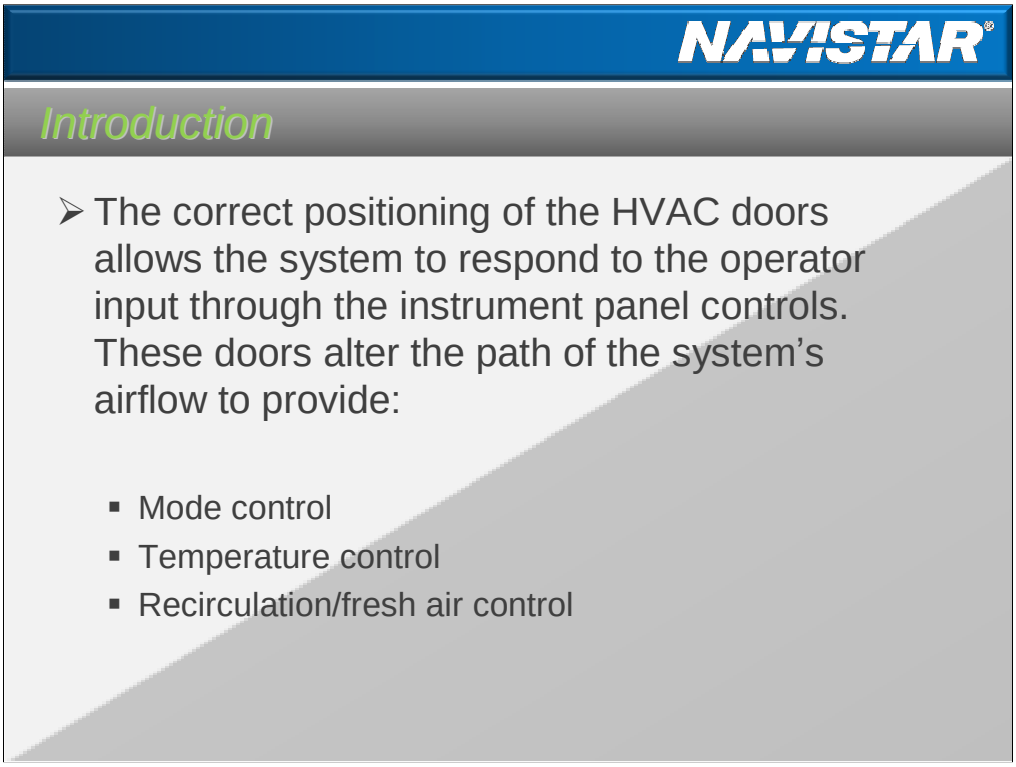
This training provides technicians with the information needed to effectively recalibrate the HVAC control head and actuator motors after testing or replacement.



Upon completion of this program, you will be able to:

- Identify background information on the requirement for recalibrating the HVAC control head and the airway passage doors

- Properly synchronize the HVAC control head and airway passage doors

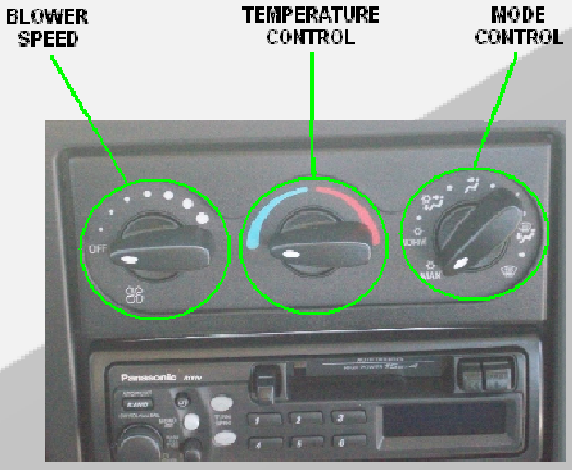


The correct positioning of the HVAC doors allows the system to respond to the operator input through the instrument panel controls. These doors alter the path of the system's airflow to provide:

- Mode Control
- Temperature Control
- Recirculation or fresh air control

HVAC Control Head

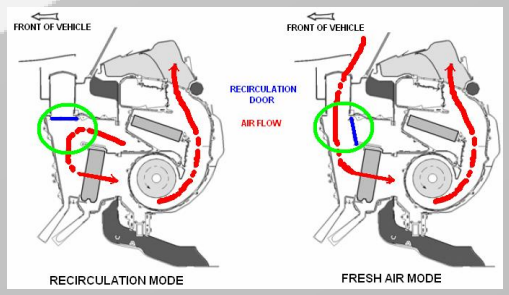
- All major functions of the A/C-heater system are controlled from the HVAC control head



All major functions of the A/C-heater system are controlled from the HVAC control head. The HVAC control head consists of three knobs: blower speed, temperature control, and mode control. The knobs are connected to potentiometers which electronically control the blower fan speed, the A/C compressor clutch, and the actuators that move the air doors used to control system air distribution and temperature.

Recirculation Door Motor

- The recirculation door motor controls an air door that opens and closes the fresh air intake for the cab
- The recirculation motor is controlled by the right-hand knob on the HVAC control

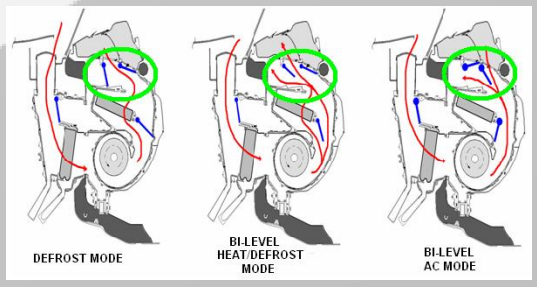


The recirculation door motor controls an air door that opens and closes the fresh air intake for the cab. When the air intake is open, fresh outside air is drawn through the system and into the cab. When the air intake is closed, outside air is blocked and the air inside the cab is recirculated by the HVAC system.

The recirculation actuator motor is controlled by the right-hand knob (mode selector) on the HVAC control.

Mode Actuator Motor

- The mode actuator motor controls the two mode doors located at the top of the heater housing
- The position of the actuator motor is controlled by the setting of the mode control

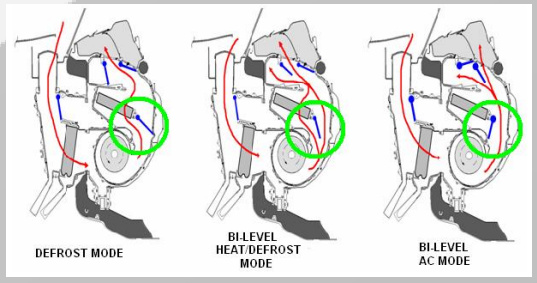


The mode actuator motor controls the two mode doors located at the top of the heater housing through a kinematics or gear drive system. The two doors direct airflow to the air outlets, the floor ducts, instrument panel vents, and/or defrost vents, based on the mode selected by the operator.

The position of the actuator motor (and mode door) is controlled by the setting of the mode control, the right knob, on the HVAC control head.

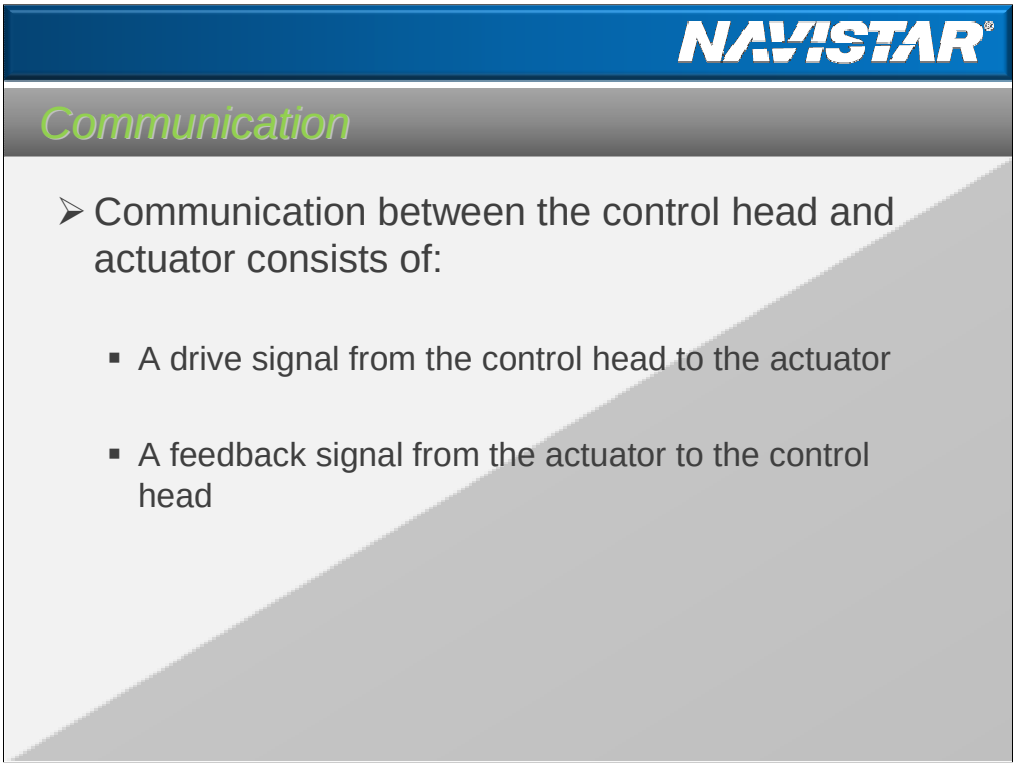
Temperature Door Actuator

- The temperature control knob controls a temperature blend air door
- The position of the actuator motor is controlled by the setting of the temperature control



The temperature control knob controls a temperature blend air door that regulates the temperature of the air discharged from the vents. The blend air door determines what portion of the system input air is deflected through the heater core depending on the setting of the temperature control knob.

The position of the actuator motor and the blend air door is controlled by the setting of the temperature control, the center knob, on the HVAC control head.

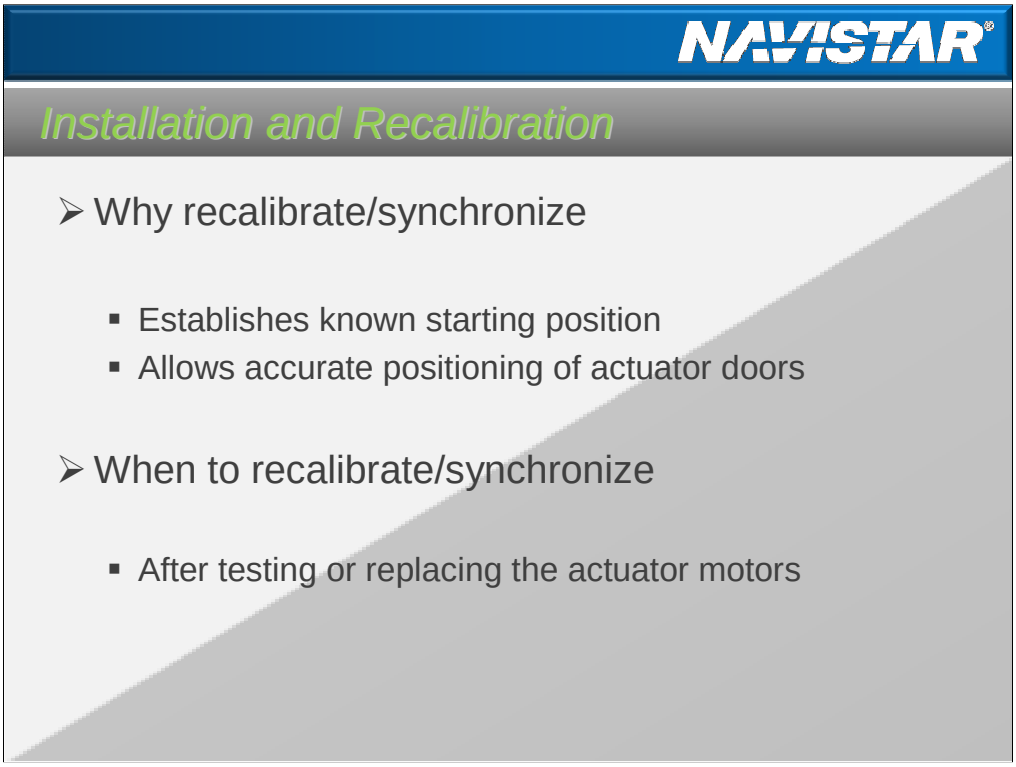


Communication between the HVAC control head and the actuator motors is needed for proper positioning. Communication between the control head and actuator consists of:

- A drive signal originating from the control head going to the actuator
- A feedback signal from the actuator back to the control head

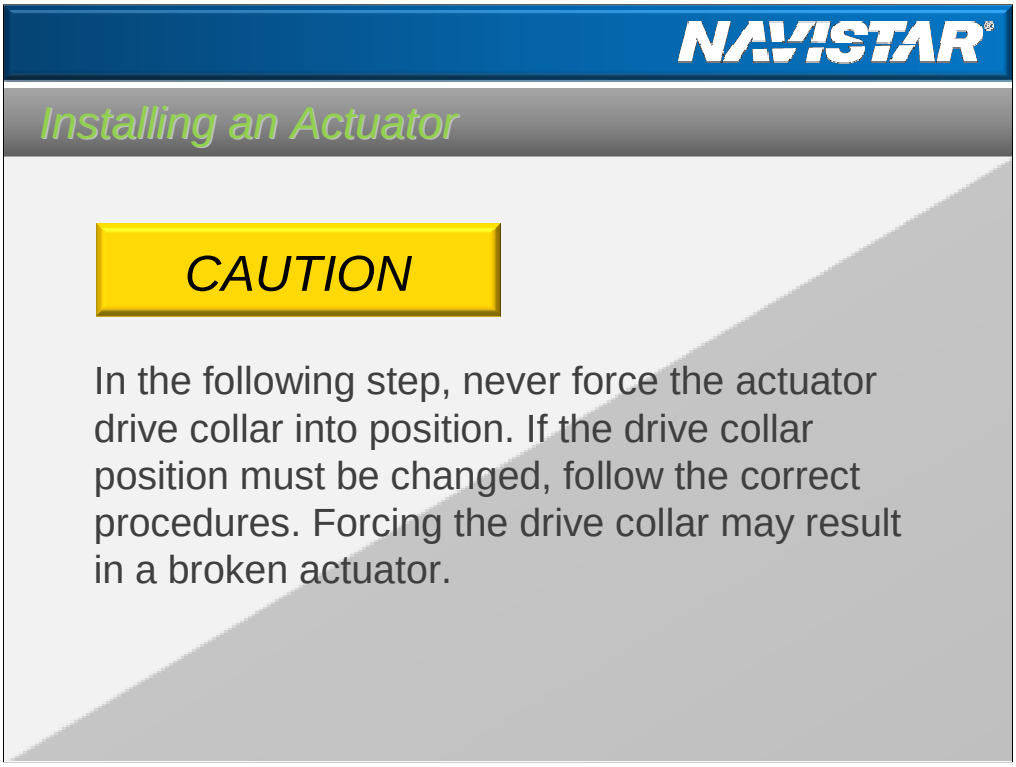
When a mode is selected that requires a change in position of the recirculation door, the control head will apply a drive voltage to the motor causing it to turn the recirculation door to the desired position. Circuitry within the control head senses when the door reaches the correct position, and stops outputting the drive voltage.

Because the actuator motor can be driven in either direction, the drive voltage can be of either polarity. In order to position the door correctly, circuitry within the control head keeps track of the actuator position at all times. To accomplish this, the HVAC control head must provide an output based on the known starting position of the actuator. It can then drive the actuator to any position by applying a drive voltage of the correct polarity and sensing the number of actuator motor revolutions.

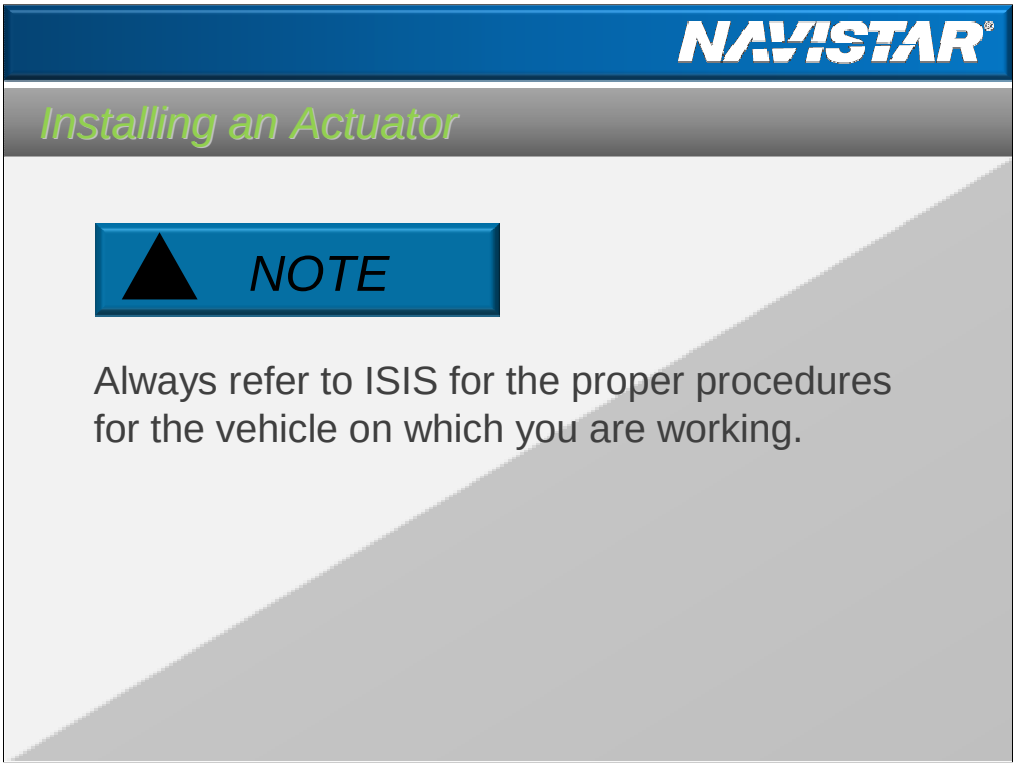


Recalibration or synchronizing is used to establish a known starting position. Once this is established, the control head will accurately position the actuator to provide the correct door movement and thus the proper airflow for the mode selected.

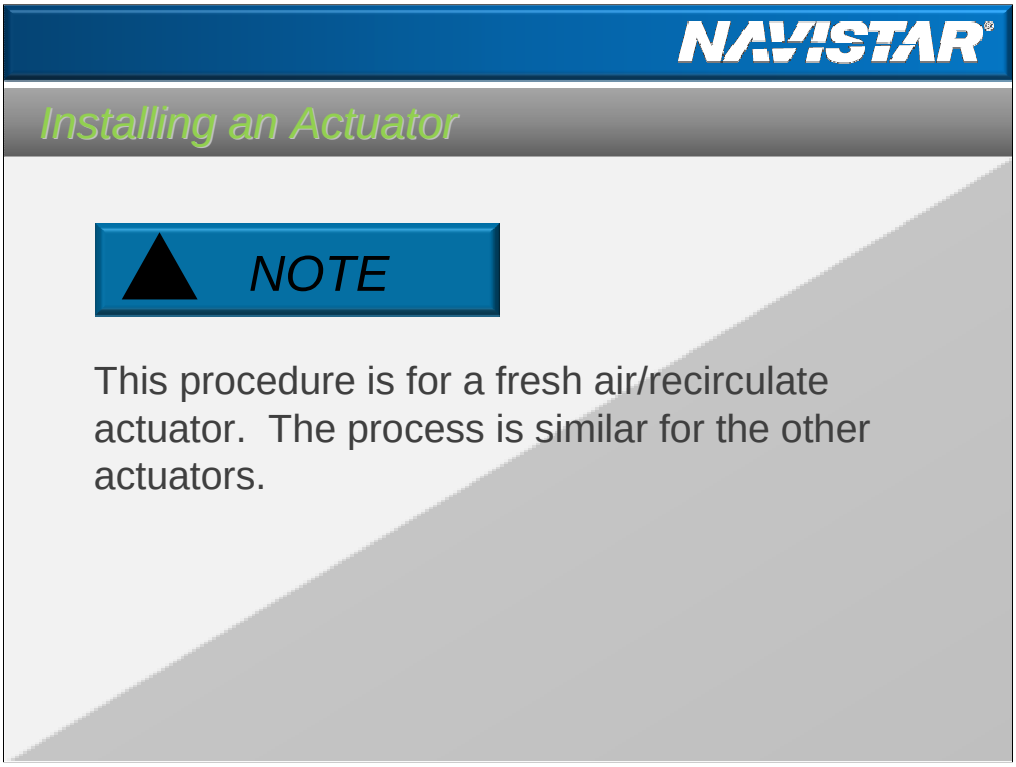
Recalibration or synchronizing is required anytime the actuator is removed or replaced for any reason.



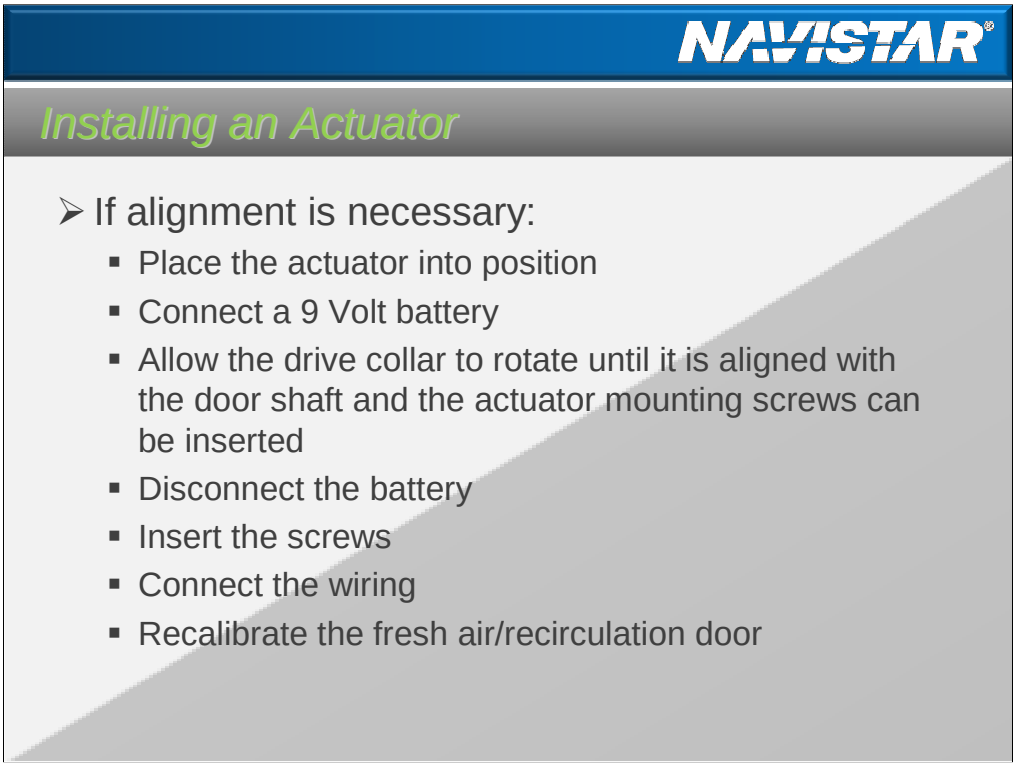
CAUTION: In the following step, never force the actuator drive collar into position. If the drive collar position must be changed, follow the correct procedures. Forcing the drive collar may result in a broken actuator.



NOTE: Always refer to ISIS for the proper procedures for the vehicle on which you are working.



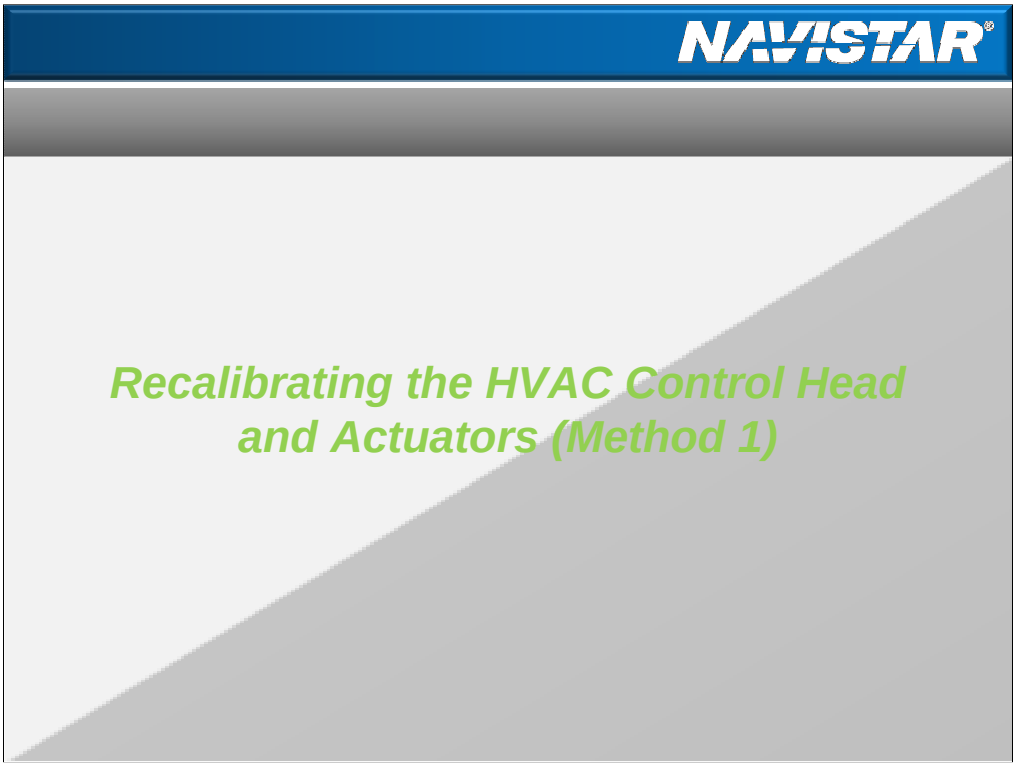
NOTE: This procedure is for a fresh air/recirculate actuator. The process is similar for the other actuators.



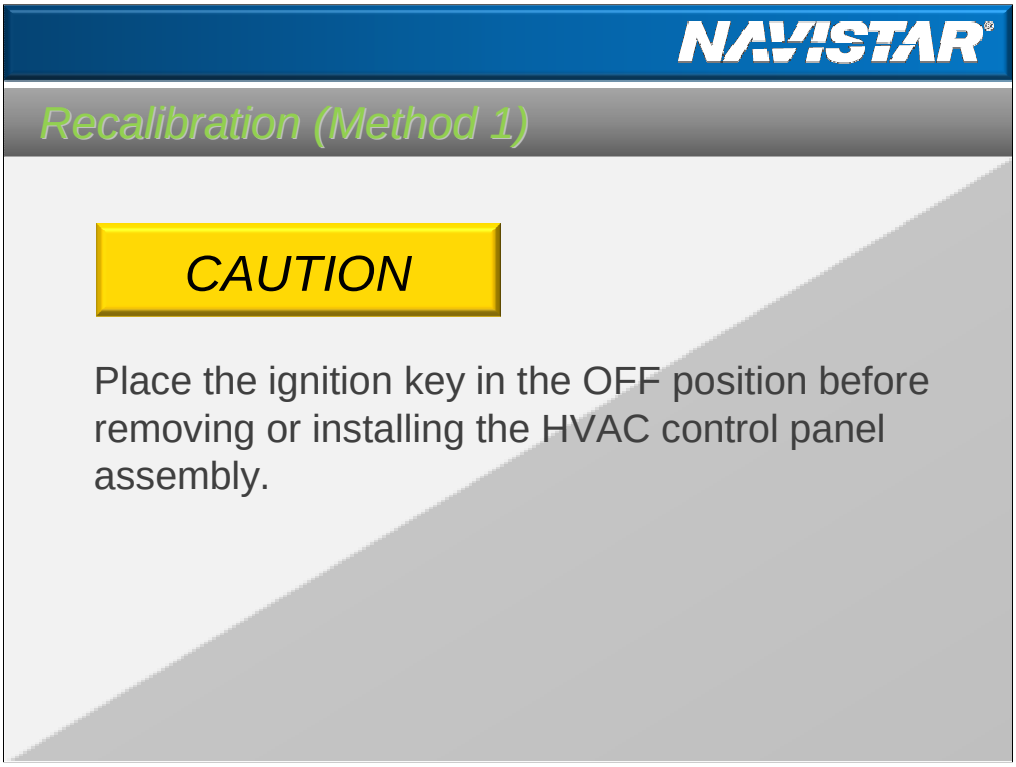
It may be necessary to align the actuator drive collar to the door shaft before the actuator may be installed.

If alignment is necessary:

- Place and hold the actuator into its approximate position.
- Using jumper wires, connect a 9 Volt battery across pins A and F of the actuator connector to rotate the drive collar. Reverse the connection to rotate the drive collar in the opposite direction if necessary.
- Allow the drive collar to rotate until it is aligned with the door shaft and the actuator mounting screws can be inserted.
- Then, disconnect the 9 Volt battery.
- Install the actuator to the evaporator housing using two screws.
- Connect the actuator wiring.
- Recalibrate the fresh air/recirculation door by using one of the two following methods.

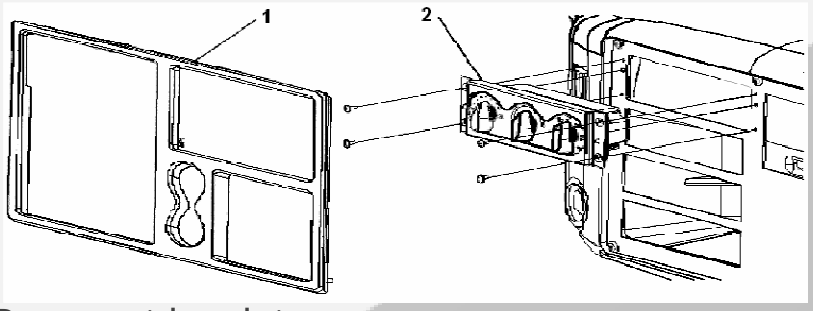


To develop the common point required to position the airway doors complete either of the following two procedures.



CAUTION: Place the ignition key in the OFF position before removing or installing the HVAC control panel assembly.

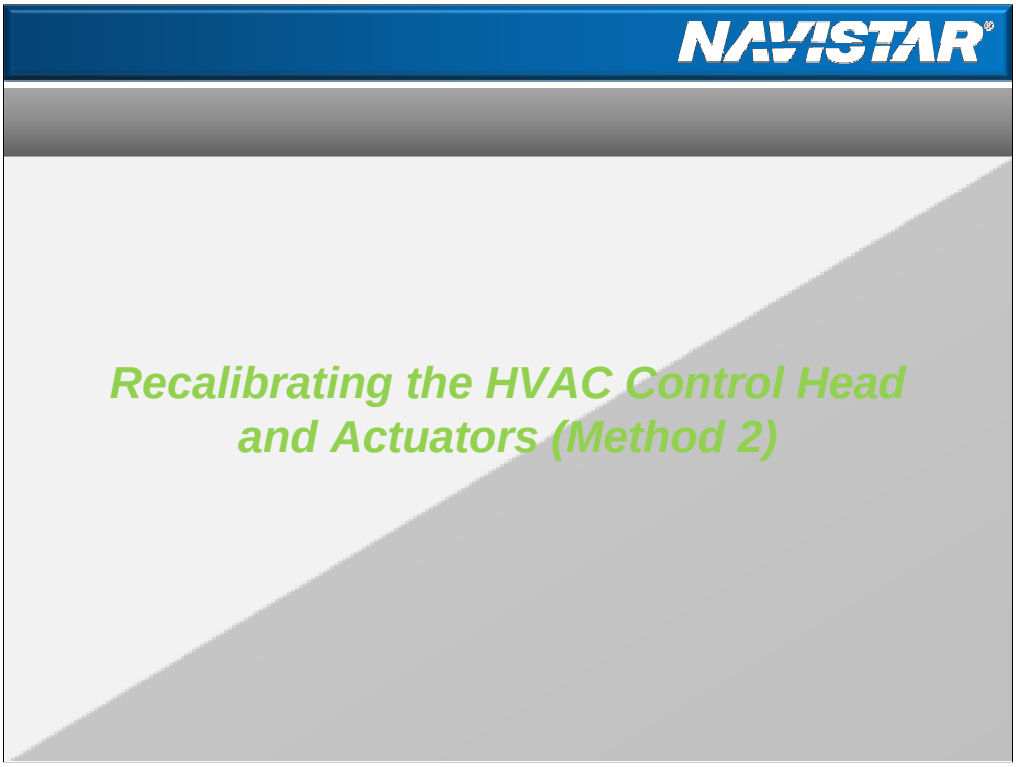
Recalibration (Method 1)



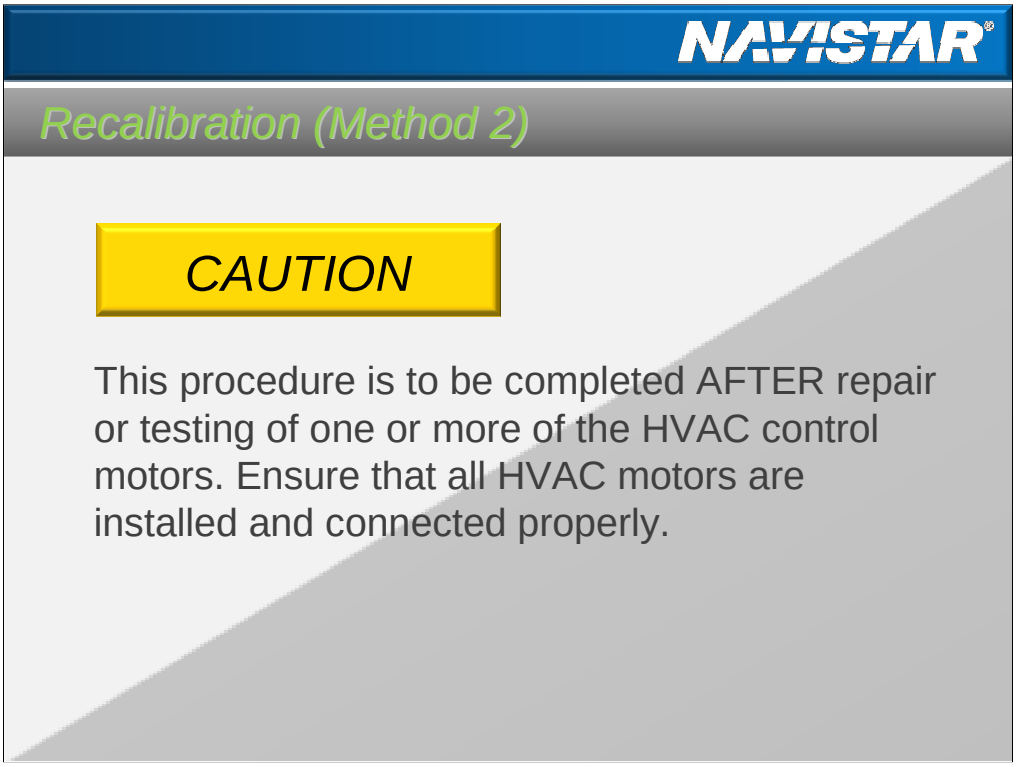
- Remove trim plate
- Remove screws and control panel
- Disconnect connector and reinstall connector
- Reinstall control head and trim panel

To recalibrate the actuators you must first gain access to the connector of the HVAC control head.

- Carefully pry the trim plate, item 1, from the center section of the instrument panel. The trim plate is secured by five spring clips.
- Remove the four screws securing the HVAC control panel assembly, item 2, to the instrument panel. Remove control panel assembly from the instrument panel by pulling it straight out of its mounting cavity.
- Next, disconnect the wiring connector from rear of the HVAC control panel. Wait for a minimum of 15 seconds.
- Reinstall the connector. The doors will cycle and then stop. Finish by reinstalling the control head and trim panel.



The control head and actuators may also be recalibrated using the following procedure. The technician has the option of using whichever is best suited to the situation.



CAUTION: This procedure is to be completed AFTER repair or testing of one or more of the HVAC control motors, blend door, mode door, or fresh air door actuators. Ensure that all HVAC motors are installed and connected properly.

Recalibration (Method 2)

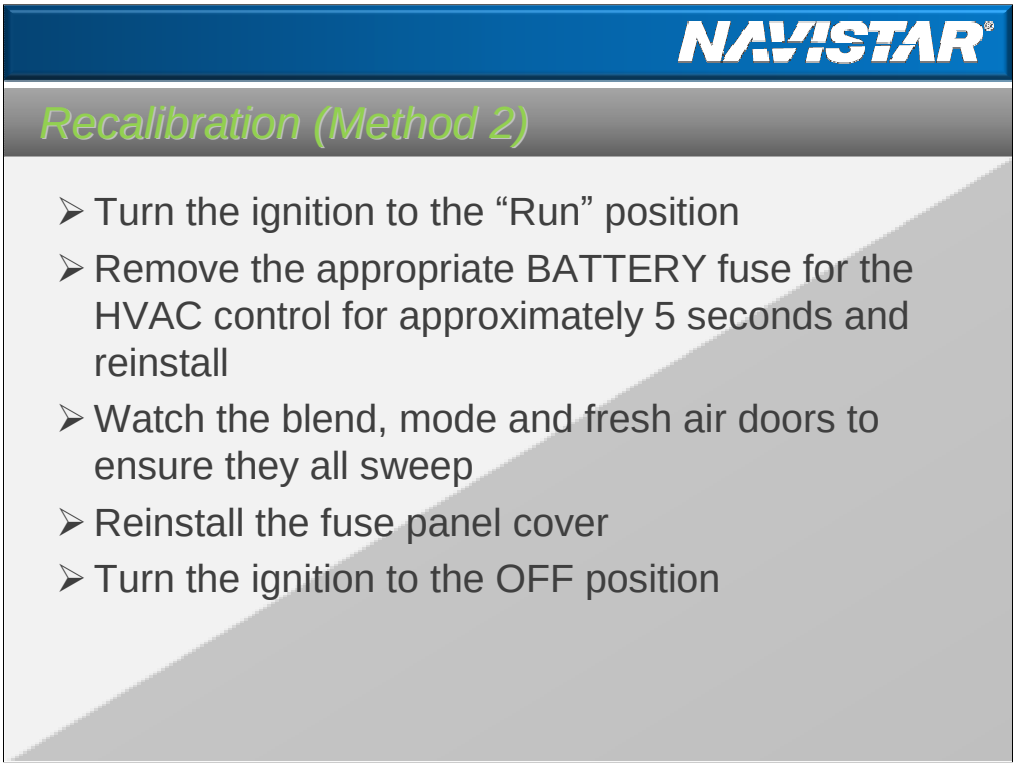
- Remove the interior fuse panel cover to access the fuse panel.

First remove the interior fuse panel cover to gain access the fuse panel.

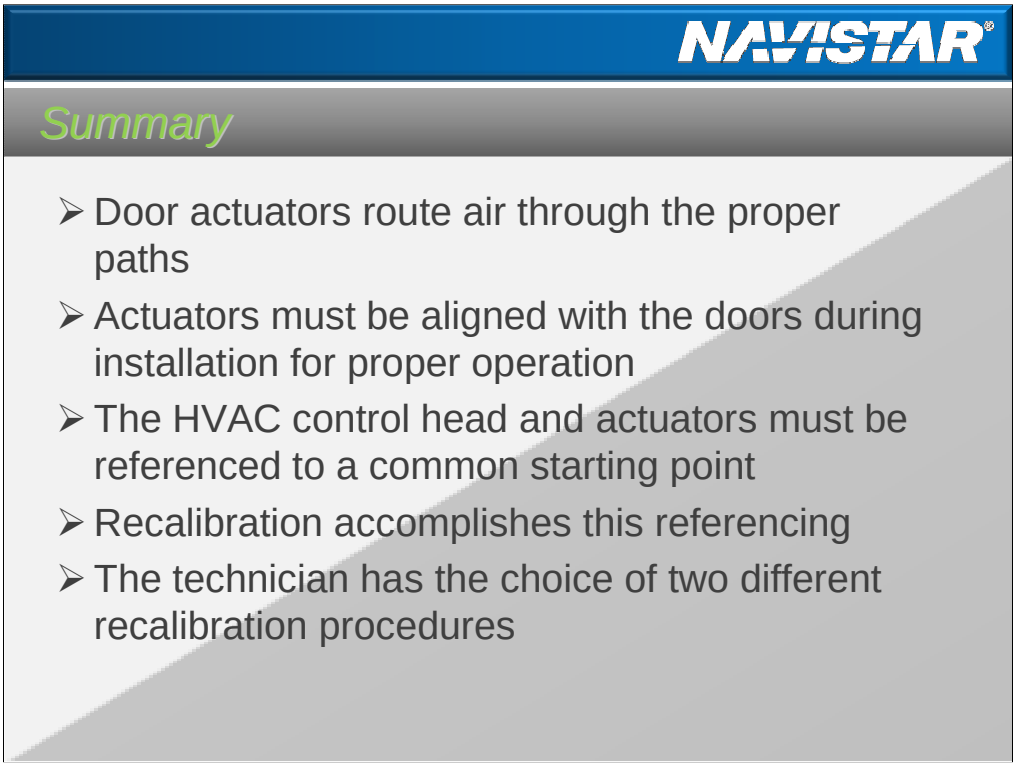
Recalibration (Method 2)

- Locate the BATTERY fuse for the HVAC control head.

- Locate the BATTERY fuse for the HVAC control head. This is typically F1-B.
- Use the schematic in ISIS or the fuse panel callout.



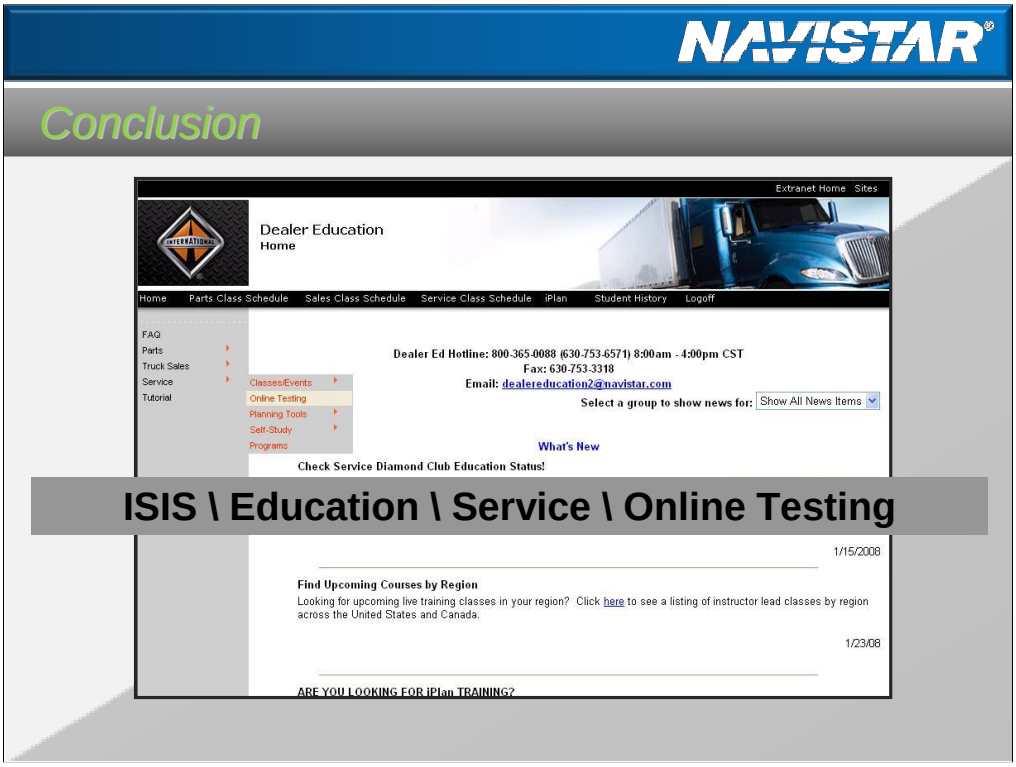
- Turn the ignition switch to the “Run” position.
- Remove the appropriate BATTERY fuse for the HVAC control for approximately 5 seconds, and then reinstall.
- Watch the blend, mode and/or fresh air doors to ensure they all sweep.
- Reinstall the fuse panel cover.
- Finally, turn the ignition to the OFF position.
- The actuators and control head are now recalibrated.



In summary, the function of the door actuators is to position the doors so as to route air through the proper paths to provide conditioned air as requested by the driver.

- The actuators must be aligned with the doors during installation for proper operation and control of airflow.
- The HVAC control head and actuators must be referenced to a common starting point or reference position.
- The process of recalibration accomplishes this referencing.
- As a technician, you have the choice of two different recalibration procedures. Select the one that may be accomplished in the easiest manner.

Conclusion



This concludes the Recalibration of the HVAC Actuators training program.

You are now required to take a post test via ISIS \ Education \ Service \ Online Testing.