LINGENFELTER

PERFORMANCE ENGINEERING

Lingenfelter NCC-002 Nitrous Control Center Quick Setup Guide

Introduction:

The NCC-002 is capable of controlling two stages of progressive nitrous and fuel. If the NCC-002 is configured only for nitrous, it can control up to four stages of nitrous (if the fuel supply is controlled by the ECM or other method).The NCC-002 controller interface is designed for ease of use and access at the track as all of the settings and options available in the NCC-002 software program are also available on the controller itself. The NCC-002 controller also features enough internal memory to save three user-defined nitrous programs for quick access in the case that track conditions change and a different setup is desired.

NOTE: This is a quick setup guide for the NCC-002 Nitrous Control Center. For a complete detailed list of features and warnings, please read the included instruction manual.

NOTE: The NCC-002 is intended for use in a controlled environment of a racing facility. NEVER use a nitrous oxide injection system on public roadways as it may be illegal, but also extremely dangerous.

Inputs and Outputs:

- Relay Output (+12V) and Relay Ouput (Ground) - programmable based on any combination of: Arming input, clutch input, shift input, TPS%, AFR, Nitrous1 %, Fuel1 %, Nitrous2 %, Fuel2 %, RPM, MPH, Fuel PSI, Nitrous PSI, Analog 1, Analog 2, Clutch Position %
- PWM Output - output for future features (currently not enabled in the software)
- Tach Input - used to measure engine speed
- Shift Light Output (+12V) - activated by rpm value
- Timer Output (+12V) - timer/rpm based
- Fuel Solenoid1/2 Output - used to control solenoids based on user configuration of "Fuel Setup"
- Nitrous Solenoid1/2 Output - used to control solenoids based on user configuration of "Nitrous Setup"
- Ground 1/2 - ground
- +12 Volt Input - power for the NCC-002
- Arming Input (Ground or +12V selectable) - activation enabler
- Clutch Input (Ground or +12V selectable) - for clutch switch, linelock, or transbrake
- Shift Input (Ground or +12V selectable) - increases gear counter
- Analog Output (0-5V) - programmable - for sending to a data acquisition system or to an ECM for external fuel or spark control. Also can link to the LNC-2000 for progressive timing retard on GM LSx V8 engine vehicles.
- Analog2 Input (0-5V) - erase Data Log if enabled
- Analog1 Input (0-5V) - measure clutch percentage if enabled
- N20 PSI Input (0-5V) - nitrous bottle pressure input for closed loop bottle heater control (along with relay)
- Fuel PSI Input (0-5V) - fuel pressure input for fuel pressure safety override
- AFR Input (0-5V) - air to fuel ratio input for air to fuel safety override
- TPS Input (0-5V) - throttle position sensor input
- Sensor Output (+5V) - can be used for Fuel Pressure and Nitrous Pressure sensors or other analog inputs
- Sensor GND - ground
- Hall Input - frequency input to measure vehicle speed

Test Mode:

If the Arming switch is turned on and the NCC-002 is not receiving a tach signal or the rpm reading is zero, the NCC-002 will enter test mode. This will cause the solenoids to pulse without having to run the engine.

Installation of Software:

The installation of software is not required to adjust the settings on the NCC-002.

The controller can be connected via USB cable to any computer equipped with Windows XP, Windows Vista, Windows 7, or Windows 8. Either extract the NC-002 software from the LPE-supplied media or download the software from the LPE web site. Installing the Nitrous Control Center will allow you to adjust the NCC-002 settings from your computer. The NCC Controller FLASH Utility will allow you to update the firmware on the NCC-002.

Hardware:

Please note that the following configurations represent just a small number of possible wiring configurations for the NCC-002 Controller. The optional NCC-002 wire harness (PN: L480310000) is composed of 22 color-coded wires (10 feet in length) that are all individually labeled on their insulation. Make sure that each of the wires required for the desired configuration are correctly installed into their respective terminals. If you choose not to use the optional NCC-002 wire harness, use the supplied terminals to make your own harness. The terminals on the NCC-002 will accept 16-22 AWG wire. It is recommended that the controller ground wires, the controller +12 volt power wires, and the solenoid ground wires should all be 16 gauge wire. All other wires can be 20 gauge wire.

Listed below are some of the example wiring diagrams that can be found in the instruction manual starting on page 15.

- Progressive Nitrous Without Fuel Control
- One Stage of Progressive Nitrous and Fuel
- Two Stages of Progressive Nitrous and Fuel
- NCC-002 Controlling the Solenoids Via Nitrous Solenoid Driver
- NCC-002 Controlling Nitrous Solenoids Via Relays
- NCC-002 Controlling a Bottle Heater
- NCC-002 Connected to the LPE LNC-2000 Launch Controller
- NCC-002 Connected to the LNC-2000 for Simple On/Off Control
- NCC-002 Connected to the Pin on the ECM for EFILive Nitrous Operating System and Fuel Control
- Connecting the NCC-002 to Throttle Position Sensors on Mechanical and Electronic Throttle Vehicles
- NCC-002 Connected to the Clutch Position Sensor
- NCC-002 Connected to the Clutch Position Switch, Line-Lock, or Trans-Brake
- Converting a CPP Sensor Signal Into a 12 Volt Signal Via Conversion Module

Inputs Capable of Activating and Deactivating Nitrous and Fuel Flow:

- Air/Fuel Ratio
- Arming Input
- Clutch Input
- Clutch Position (Analog1) - If Enabled
- Fuel PSI
- MPH (Hall Input)
- RPM (Tach Input)
- TPS
- Gear Position (Activation Only)

Data Logging:

This feature can be accessed by the "SETUP" button on the main screen or by clicking the Options tab in the Data menu of the computer software. The settings in this menu allow the controller to log data only after the criteria in the following sub-sections are satisfied. The data log enable parameters are any parameters that, along with the arming input, allow the controller to log data. If no data log enable parameters are selected, the controller will start the data log when the arming switch is activated. Once the data log is activated, the logging of data will continue even if the data log enable parameters fall below their present settings. The following parameters can enable data log:

- Clutch Input
- MPH
- RPM
- TPS

Note: The NCC-002 can only store one data log. The NCC-002 will log data for 25 seconds. In order to write a new data log to the controller, the old data log must be erased. You can erase the data log from the computer software, in the Setup menu on the NCC-002, or by the Analog 2 input (if enabled). If you would like to save the data log, the NCC-002 computer software must be used to extract the data log from the controller. When you choose to load the data log from the NCC-002, the current configuration on the NCC-002 is saved along with the data log. It is advised that you load the data log before you make any configuration changes to the controller, or you will have configuration settings that do not match your data log.

Hold & Wait Feature:

This feature can be accessed by the "GLOBAL" button on the main screen or by clicking the Setup tab in the computer software. This setting allows the progressive system to Hold & Wait when one of the activation criteria are removed. Example - the throttle is lifted due to wheel spin. The Hold & Wait feature allows the progressive system to resume at the point where the throttle was lifted. Resume settings can be used to create a resume ramp. If the Hold & Wait option is disabled and the throttle is lifted, the nitrous and fuel flows will start over at the beginning of the progressive ramp, along with any applicable cycle start delays. The inputs that will activate the Hold & Wait feature are:

- Arming Input
- Clutch Input
- Clutch sensor (Analog1) - If enabled
- TPS Input - If enabled

Note: If this option is "OFF" the progressive system and the main timer will reset each time any of the arming criteria are removed.

Fuel Pressure Setup:

This feature can be accessed by the "SETUP" button on the main screen or by clicking the Fuel Sensor tab in the Setup menu of the computer software. The fuel pressure menu allows the user to disable nitrous when necessary based on the observed fuel pressure. By having fuel pressure input into the NCC-002, you can also use the relay outputs to trigger an auxiliary fuel pump based on the desired fuel pressure.

Timer Setup Menu:

The Timer Setup can be accessed by the "SETUP" button or by clicking the Timer tab in the computer software.

Timer Out is a +12 volt output that can be controlled by the NCC-002 based on time or engine RPM.

The following options are available in the "TIMER SETUP" menu. If the Timer Output Option is set to a time based output, the "Timer Delay" and "Timer Duration" settings will appear in the "Timer Output Menu". If the Timer Output Option is set to an RPM controlled window switch output, the "Timer On RPM", "Timer Off RPM", and "RPM Hysteresis%" settings will appear in the "Timer Output Menu".

Air/Fuel Ratio Setup:

The AFR Setup menu can be accessed by the "SETUP" button on the main screen of the controller or through the Air-Fuel Ratio tab in the setup menu of the computer software. The Air-Fuel Ratio can be read into the NCC-002 and logged. The AFR signal must be a 0-5 volt linear signal.

This feature can also be used as a safety feature to disable nitrous. By enabling the AFR option, the O2 wideband controller can be used to detect a lean condition. The controller can then disable the nitrous accordingly.

Nitrous Setup:

The NCC-002 allows for two independently progressive stages of nitrous and fuel. The settings for the two different stages are labeled N2O-1 and N20-2 on the Nitrous Control Center. This feature is labeled Nitrous 1 and Nitrous 2 in the computer software.

Quick Setup:

The Quick Setup feature allows you to select the Nitrous and Fuel starting and finishing percentage along with the build time.

Nitrous Graph Setup (Manual Setup):

The Nitrous Percentage can be adjusted for each Pulse during the Progressive Ramp. This is done using a 2-D Graph Editor. The Fuel Percentage/Ramp can be adjusted independently of the Nitrous.

Nitrous Maximum and Minimum RPM:

These settings determine the RPM range at which the nitrous can be active (the nitrous-enabling RPM).

Fuel Advance:

Fuel Advance allows the fuel to start before the nitrous. This can be used to remove the initial lean spike on nitrous activation and to insure that no nitrous flows without fuel present. Some systems may not need any advance, while others may need more fuel advance than others.

Nitrous Gear Position:

This option allows the nitrous to be initiated by gear position. Example-if the nitrous shift count is set to 3rd gear the nitrous would not start until the system is armed and the vehicle has reached 3rd gear. The Nitrous delay timer will not start until the vehicle is in the selected gear position. The gear count is incremented by the shift input.

Nitrous Pulse Frequency:

This setting determines the number of times per second that the solenoids pulse. A lower setting generally will provide a more linear power delivery, as well as allow for lower starting percentages to be used. A higher pulse frequency results in more solenoid pulses per second, which is displayed in the graph setup of the Nitrous Control Center software by more data points. The correct setup will be different depending on the type of solenoids and bottle pressure used. Testing is the only way to determine the best frequency for each application. This setting applies to the respective nitrous and fuel solenoids for each stage.

Global Menu:

The Global Menu of the NCC-002 Nitrous Control Center is where all of the global settings are located. The global settings are the settings that apply to all three user-defined programs. The Global menu can be accessed from the Main Screen by pressing the far left navigation button on the controller.

The Global Menu allows you to select the following options:

- Current Program
  - Program1
  - Program2
  - Program3
- Copy Current Program
  - Copy to Program1
  - Copy to Program2
  - Copy to Program3
- Hold & Wait
  - On
  - Off
- Main Timer
  - 0-20 Seconds
- Fuel Trim Option
  - 0-100%
- Set Input Polarity
  - Back
  - Arming Input
    - Ground
    - +12 Volt
  - Clutch Input
    - Ground
    - +12 Volt
  - Shift Input
    - Ground
    - +12 Volt
- Pulses Per Degree (Tach Signal)
  - 1 Pulse per 720 degrees
  - 1 Pulse per 360 degrees
  - 2 Pulses per 360 degrees
  - 3 Pulses per 360 degrees
  - 4 Pulses per 360 degrees
  - 5 Pulses per 360 degrees
  - 6 Pulses per 360 degrees
- Tachometer Pull-Up
  - On
  - Off
- Help Option
  - On
  - Off
- Factory Reset
  - Yes
  - No
  - Cancel
- Update Software
  - Yes
  - No
  - Cancel
- Display Contrast
  - 0-20
- About NCC-002

Nitrous Menus: Nitrous1 (N20-1) and Nitrous2 (N20-2):

The following options and settings can be found in either the Nitrous1 (N2O-1) or Nitrous2 (N2O-2) menus. The Nitrous1 menu holds the options and settings for the first stage of nitrous while the Nitrous2 menu holds the options and settings for the second stage. For the sake of simplicity, the illustrations in this chapter will show only the Nitrous1 menu, but note that the Nitrous1 and Nitrous2 menus have the exact same options and settings—they just control different nitrous stages. The Nitrous Menus allow you to select the following options:

- Nitrous Delay
  - 0.000-9.990 seconds
- Nitrous Quick Setup
  - Start Percent
    - 0-100%
  - Final Percent
    - 0-100%
  - Build Time
    - 0.200 to 0.990 seconds
- Nitrous Setup
  - Menu
    - Exit
    - Clear Edit Points
    - View Old Data
    - Restore Old Data
    - Zoom In
    - Zoom Out
  - Edit
    - Edit Points
- Fuel Setup
  - Menu
    - Exit
    - Clear Edit Points
    - View Old Data
    - Restore Old Data
    - View Nitrous Data
    - Copy Nitrous Data
    - Zoom In
    - Zoom Out
  - Edit
    - Edit Points
- Nitrous Minimum RPM/Nitrous On RPM
  - 1,000 to 15,000 RPM
- Nitrous Maximum RPM/Nitrous Off RPM
  - 2,000 to 16,000 RPM
- RPM Hysteresis Value/Hysteresis Percentage
  - 0-5%
- Fuel Advance
  - 0.000-0.250 seconds
- Nitrous Gear Position
  - 1st-6th gear
- Pulse Frequency
  - 12.5 Hertz
  - 20 Hertz
  - 25 Hertz
- Resume Start Percentage
  - 10-100%
- Resume Percent Per Pulse
  - 10-50%
- Resume Fuel Percentage
  - 10-100%

Setup Menu:

The following options and settings located in the Setup Menu on the controller can be accessed by pressing the far right navigation button on the NCC-002 controller. Some of these options include using various sensors, vehicle RPM, or vehicle speed to control the arming of the system. Other options in the Setup Menu, such as the Analog Output feature, allow the NCC-002 to control other devices. The Setup Menu allows you to select the following options:

- Erase Data Log
  - Yes
  - No
- Analog Out Menu
  - Graph Type
    - Graph-Table Style
    - Nitrous1 Proportional
    - Nitrous2 Proportional
    - Nitrous 1+2 Proportional
  - Analog Out Graph Setup
    - Menu
      - Exit
      - Clear Edit Points
      - View Old Data
      - Restore Old Data
      - Zoom In
      - Zoom Out
    - Edit
      - Edit Points
- Timer Setup Menu
  - Timer Output Option
    - Time Based
      - Timer Delay
        - 0.000 to 9.990 seconds
      - Timer Duration
        - 0.000 to 9.990 seconds
    - RPM Based
      - Timer On RPM
        - 1000-15500 RPM
      - Timer Off RPM
        - 2000-16000 RPM
      - RPM Hysteresis Percentage
        - 0.0-5.0%
  - Timer Hold
    - ON
    - OFF
- Shift Setup Menu
  - Shift RPM
    - 1000-16000 RPM
- Throttle Position Sensor (TPS) Setup Menu
  - TPS Activation option
    - OFF
    - ON
  - Activation Percentage
    - 10-100%
  - Hysteresis Percentage
    - 0.1-5.0%
  - Set TPS voltage (Live Data)
    - Back
    - SET CLS
    - SET WOT
  - Manually Set Closed Throttle TPS Voltage
    - 0.00-5.00 Volts
  - Manually Set Maximum Wide Open Throttle TPS Voltage
    - 0.00-5.00 Volts
- Analog1 Setup Menu
  - Analog Clutch Option
    - ON
      - Set Clutch Activation Percentage
        - 10.0-100.0%
      - Set Hysteresis Value
        - 0.0-5.0%
      - Set Clutch Voltage (Live Data)
        - Back
        - SET RLS
        - SET DEP
      - Manually Set Clutch Pedal Released Voltage
        - 0.00-5.00 Volts
      - Manually Set Clutch Pedal Depressed Voltage
        - 0.00-5.00 Volts
    - OFF
- Analog2 Setup Menu
  - Data Log Erase Option
    - ON
    - OFF
- AFR Setup Menu
  - AFR Option
  - ON
    - AFR Disable Value
      - 0.0 to 20.0
    - AFR Nitrous Delay
      - 0.00 to 1.00 seconds
    - AFR Nitrous Disable Percentage
      - 10-100%
  - OFF
  - AFR Minimum Voltage
    - 0.0-5.0 Volts
  - AFR Maximum Voltage
    - 0.0-5.0 Volts
  - AFR Minimum Value
    - 0.0-24.0
  - AFR Maximum Value
    - 0.0-24.0
- Relay1 and Relay2 Setup Menus
  - Activation Input Control Option
    - ON
    - OFF
  - Clutch Input Control Option
    - ON
    - OFF
  - Shift Input Control Option
    - ON
    - OFF
- Relay1 and Relay2 Setup Menus (Continued)
  - Throttle Position Sensor (TPS) Percentage Control Option
    - ON
      - ON Percent
        - 0-100%
      - OFF Percent
        - 0-100%
      - Hysteresis
        - 0.0-5.0%
    - OFF
  - Air-Fuel Ratio (AFR) Control Option
    - ON
      - ON Ratio
        - 0.0-24.0
      - OFF Ratio
        - 0.0-24.0
      - Hysteresis
        - 0.0-5.0%
    - OFF
  - Nitrous1 Percentage Control Option
    - ON
      - ON Percent
        - 0-100%
      - OFF Percent
        - 0-100%
      - Hysteresis
        - 0.0-5.0%
    - OFF
  - Fuel1 Percentage Control Option
    - ON
      - ON Percent
        - 0-100%
      - OFF Percent
        - 0-100%
      - Hysteresis
        - 0.0-5.0%
    - OFF
  - Nitrous2 Percentage Control Option
    - ON
      - ON Percent
        - 0-100%
      - OFF Percent
        - 0-100%
      - Hysteresis
        - 0.0-5.0%
    - OFF

Setup Menu (Continued):

- Relay1 and Relay2 Setup Menus (Continued)
  - Fuel2 Percentage Control Option
    - ON
      - ON Percent
        - 0-100%
      - OFF Percent
        - 0-100%
      - Hysteresis
        - 0.0-5.0%
    - OFF
  - RPM Control Option
    - ON
      - ON RPM
        - 0-16000 RPM
      - OFF RPM
        - 0-16000 RPM
      - Hysteresis
        - 0.0-5.0%
    - OFF
  - MPH Control Option
    - ON
      - ON MPH
        - 0-255 MPH
      - OFF MPH
        - 0-255 MPH
      - Hysteresis
        - 0.0-5.0%
    - OFF
  - Fuel Pressure Control Option
    - ON
      - ON PSI
        - 0-150 PSI
      - OFF PSI
        - 0-150 PSI
      - Hysteresis
        - 0.0-5.0%
    - OFF
- Relay1 and Relay2 Setup Menus (Continued)
  - Nitrous Pressure Control Option
    - ON
      - ON PSI
        - 0-2000 PSI
      - OFF PSI
        - 0-2000 PSI
      - Hysteresis
        - 0.0-5.0%
    - OFF
  - Analog1 Voltage Control Option
    - ON
      - ON Voltage
        - 0.0-5.0 Volts
      - OFF Voltage
        - 0.0-5.0 Volts
      - Hysteresis
        - 0.0-5.0%
    - OFF
  - Analog2 Voltage Control Option
    - ON
      - ON Voltage
        - 0.0-5.0 Volts
      - OFF Voltage
        - 0.0-5.0 Volts
      - Hysteresis
        - 0.0-5.0%
    - OFF
  - Clutch Percent Control Option
    - ON
      - ON Percent
        - 0-100%
      - OFF Percent
        - 0-100%
      - Hysteresis
        - 0.0-5.0%
    - OFF
- PWM Out Setup
  - Currently Not Functional
- Hall Input Menu
  - MPH Option
    - ON
      - Nitrous1/2 MPH Activation Option
        - ON
        - OFF
      - Nitrous1/2 Minimum (ON) MPH Setting
        - 0-255 MPH
      - Nitrous1/2 Minimum (OFF) MPH Setting
        - 0-255 MPH
      - Nitrous1/2 Hysteresis Percentage Setting
        - 0.0-5.0%
      - Pulse Per Mile Setting (Live Data)
        - Back
        - Set
      - Manual Pulse Per Mile Setting
        - 1000-2000
    - OFF
  - Hall Pull-Up Option
    - ON
    - OFF
- Fuel PSI Menu
  - Select Default Sensor
    - LPE L480250015, 15 PSI
    - LPE L480260150, 150 PSI
  - Fuel Pressure Minimum Voltage
    - 0.0-5.0 Volts
  - Fuel Pressure Maximum Voltage
    - 0.0-5.0 Volts
  - Fuel Pressure Option
    - ON
      - Fuel PSI Nitrous Oxide Disable
        - 0.0-150 PSI
      - Fuel PSI Nitrous Disable Delay
        - 0.00-1.00 seconds
      - Fuel PSI Nitrous Disable Percentage
        - 0-100%
    - OFF
- Nitrous PSI Menu
  - Use Default Sensor (LPE L480272000, 2000 PSI)
    - YES
    - NO
  - Nitrous Pressure Minimum Voltage
    - 0.0-5.0 Volts
  - Nitrous Pressure Maximum Voltage
    - 0.0-5.0 Volts
  - Nitrous Pressure Minimum Value
    - 0-2000 PSI
  - Nitrous Pressure Maximum Value
    - 0-2000 PSI
- Data Log Menu
  - Clutch Enable Option
    - ON
    - OFF
  - TPS Enable Option
    - ON
      - 0.0-100%
    - OFF
  - RPM Enable Option
    - ON
      - 0-1600 RPM
    - OFF
  - MPH Enable Option
    - ON
      - 0-255 MPH
    - OFF

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