Module Overview

The AMCI Nexus module is a single resolver input programmable limit switch module that is programmed by and communicates on ControlNet. The functionality of the NX3B1C is similar to the 8513 module with the following exceptions.

1. This module has a total of 16 real outputs. The 16 virtual outputs are not present.
2. The default mode of operation is independent mode, not group mode.
3. The NX3B1C does not have any interrupt functionality.
4. Transducer Fault Latch has been added to the functionality.
5. Resolver Type, either AMCI or Autotech, has been added to the functionality.
6. Group mode 6 has been added.
7. The offset value has been removed from the setup parameters. Since this module stores its parameters on power down, this parameter is not necessary to maintain absolute position on power down.
8. A programmable feature allows the outputs to either be disabled, or to remain enabled, if the network connection is removed. Forced outputs are always disabled when the network connection is removed.
9. The outputs are always disabled if the unit is in transducer fault. However, the outputs are not disabled when the PLC is in program mode.
10. Up to 16 timed outputs can be programmed into the NX3B1C module.

This unit has sixteen I/O points. Eight of outputs and all sixteen inputs are located on the Nexus module itself, and the remaining eight outputs can be located on an external relay board.

The inputs can be programmed to be used either high true or low true, and provide ANDing functions and group control. The inputs are divided into two groups of eight, and can be used as either sinking or sourcing inputs. The status of the 16 inputs is reported to the PLC over ControlNet.

Each of the outputs has 8 On/Off setpoints, and can be programmed to operate in normal, timed, or pulse mode. The outputs can be ANDed with an input or with a motion detector, and can also be forced ON or OFF from the PLC. The outputs will turn off when there is a transducer fault condition, even if it is a clearable transducer fault. The status of the 16 outputs is reported to the PLC over ControlNet. **Outputs should not be programmed on the fly.** The outputs can either be used independently or grouped together in up to six groups. The groups can be programmed to operate in 1 of 6 modes.

Mode 0: Outputs operating in Mode 0 function normally and are not affected by the input terminal or group channel.

Mode 1: Outputs operating in Mode 1 are always enabled to turn on at their programmed setpoints. When the group input is activated, the group's position is preset to the group's preset value. The input is ignored until the group control position is reached. The input must transition from 0 to 1 after the group control position is reached.

Mode 2: Outputs operating in Mode 2 are disabled until the group input is activated, at which time the group's position is preset to the preset value. The outputs will be active until the group control position is reached. The input is ignored until the group control position is reached. The input must transition from 0 to 1 after the group control position is reached.

Mode 3: Outputs operating in Mode 3 can be active only when the group control input is active. The group channel On/Off points are not used in mode 3.

Mode 4: Outputs operating in Mode 4 will be active for one cycle only when the group's input transitions from 0 to 1 between the group channel's On and Off points. The cycle ends when either the group channel On or Off point is reached, at which point the outputs turn off.

Mode 5: Outputs operating in Mode 5 will be active for one cycle only when the group's input is active in the range between the group channel's On and Off points. The outputs will be active only when the resolver's shaft is turning, or if the first cycle input is active. The outputs will turn off after there is no change in position for either 504ms or 120ms, depending on how the tachometer response parameter is set. The cycle ends when either the group channel On or Off setpoint is reached, at which point the outputs turn off.

Mode 6: Mode 6 is similar to mode 5 except that the outputs will be disabled when the group's position data rolls over to zero.

Note 1: There are two force functions, Force On and Force Off. When a Force On bit is set, the output it represents will be activated, regardless of the output state. When a Force Off bit is set, the output is represents will be turned off, regardless of the output state. The Force Off bit takes priority over the Force On bit.

Note 2: The module can be programmed to operate two ways, either in Independent or Group mode. When used in independent mode, the outputs will only fire when its corresponding input is active. That is, input 1 will control output 1, input 2 will control output 2, etc. To use independent mode without inputs, set the input state to be active low. Also, when in independent mode, the outputs can only be motion ANDed, they cannot be enable ANDed. When group mode is used, the inputs control the groups.

Note 3: The inputs to the NX3B1C have a debounce time of 0ms, and are scanned every 1ms.

Note 4: In group mode, inputs will be acted on only if the position data is scanned between the programmed group channel's On and Off points. If the resolver position data passes through the group channel in less than 1 ms, the input may not be detected.

Note 5: The module contains non-volatile memory. The setup data and On/Off setpoints will be saved on power down. The offset values and On/Off setpoints are stored in a battery backed RAM, so they can be changed often without damaging the module.

Input Registers

The NX3B1C module reports the resolver position and velocity data, as well as module status and programming errors to the PLC using 20 input registers. These registers have the following function.

Note: In **ControlLogix** systems, the first two transferred words will be zero. If you are using the NX3B1C module in a **ControlLogix** system, then you must configure 22 input registers in the PLC, and the register functions described below will be offset by 2. For example, the module status shown to be in register 0 below will instead be located in register 2.

Word(s)	Function
0	module status
1 to 4	position, velocity, output status, and input status
5	module setup programming errors
6 to 13	group programming errors and group positions
14 to 16	output programming errors
17 to 19	Reserved, equal to zero

A detailed description of each of the input register's function is shown below.

Word 0: Module Status

Bit 0: set when setup data is invalid (see input register 5 for a detailed description of the error)

Bit 1: set when group data is invalid (see input registers 6 and 7 for a detailed description of the error)

Bit 2: set when Limit Switch data is invalid (see input registers 14 to 16 for a detailed description of the error)

Bit 3: set when Increment / Decrement Output Number is invalid (range 1 to 16). Also set if any of the unused bits are set in the control word are set, if neither the increment or decrement setpoint bits are selected, or if you try to increment or decrement an output that has not yet been programmed.

Bit 4: set when the Increment / Decrement Setpoint Number is invalid (range 1 to 9, 9 programs all of the on/off setpoints), if you try to increment an on setpoint past the off setpoint or vice versa, or if you try to increment or decrement a setpoint that has not been programmed.

Bit 5: set when Message Ignored Error (generated by trying to program the module when a programming error exists)

Bit 6: set when Module Fault (generated if the NX3B1C fails its power up test) This bit will also be set if there is no reference voltage present.

Bit 7: set when Transducer Fault. If the fault is clearable, the position data will be updated, the velocity data will be zero, and the outputs will be disabled.

Bit 8: MD1 bit, set when the transducer's velocity in RPM is within the range programmed into Motion Detector 1.

Bit 9: MD2 bit, set when the transducer's velocity in RPM is within the range programmed into Motion Detector 2.

Bit 10: Tachometer Overflow, set when the scaled tachometer value in input register 2 exceeds 32,767.

Bit 11: Set when the output registers are being used to force the outputs and inputs on and off.

Bit 12: Command Error. Set when more than one of the bits 0 to 4 are set, if reserved bits 5 to 12 are set during a programming cycle, or if you try to program groups when the module is operating in independent mode.
Bit 13: reserved, always equal to zero
Bit 14: mode status bit, 0 = independent mode, 1 = group mode
Bit 15: Acknowledge bit. Set when the NX3B1C module sees that the Transmit bit in output register 0 is set.

Word 1: Machine Position (The position data is reported if there is a clearable transducer fault)
Word 2: Scaled Resolver Velocity Data (The velocity data will be zero if there is a clearable transducer fault.
Word 3: Limit Switch Output Status (bit 0 = output 1, bit 1 = output 2 … bit 15 = output 16)
Word 4: Input Status (bit 0 = input 1, bit 1 = input 2 … bit 15 = input 16) (If the input is configured to be active high, than these bits will be on when the input is receiving power. If the input is configured to be active low, than these bits will be on when the input is not receiving power.)
Word 5: Setup Programming Errors
Bit 0: Scale Factor Error. Set if the Scale Factor is outside of the range of 2 to 8192.
Bit 1: Preset Value Error. Set if the Preset Value is outside of the range of 0 to (SF-1).
Bit 2: reserved, will always be zero.
Bit 3: Motion Detect 1 Error. Set if one or both Motion Detector 1 setpoints are outside the range of 0 to 32,767, or if the setpoints are equal but not zero.
Bit 4: Motion Detect 2 Error. Set if one or both Motion Detector 2 setpoints are outside the range of 0 to 32,767, or if the setpoints are equal but not zero.
Bit 5: Tachometer Scalars Errors. Set if the Tachometer Multiplier, Tachometer Divisor, or Tachometer Decimal Point parameters are outside of their programmable ranges.
Bits 6 to 14: Reserved, will always set to zero.
Bit 15: Setup Command Word Error. Set if one or more of the reserved bits in the setup command word are set to "1" during a setup programming cycle.
Word 6: Group Programming Errors
Bit 0: Group Offset/Preset Error. Set if the Group Offset/Preset value is outside of the range of 0 to (SF-1)
Bit 1: Group Programming Error. Set if the output quantity or operating mode parameter is invalid.
Bit 2: Group Channel Setpoint Error. Set when one or both of the group channel setpoints are outside of the range of 0 to (SF-1) of both setpoints are equal but not zero.
Bits 3 to 14: Reserved, will always be set to zero.
Bit 15: Group Command Word Error. Set when one or more of the reserved bits in the group command word are set to "1" during a group programming cycle.
Word 7: Group Number with error. If any of the bits 0 to 2 are set in input register 6, than this word will indicate which group, 1 to 6, has the programming error.
Word 8: Group 1 position data
Word 9: Group 2 position data
Word 10: Group 3 position data
Word 11: Group 4 position data
Word 12: Group 5 position data
Word 13: Group 6 position data
Word 14: Output Programming Errors

Bit 0: On Setpoint Error. Set when a Limit Switch ON Setpoint is outside of the range of 0 to (SF – 1). Input registers 15 and 16 will report which output and setpoint have the error.

Bit 1: Off Setpoint Error. Set when a Limit Switch OFF Setpoint is outside of the range of 0 to (SF – 1) or if the on and off setpoints are equal but not zero. Input registers 15 and 16 will report which output and setpoint have the error.

Bit 2: Advance Error. Set when an advance value is outside of the range of ±999. Input register 16 will report which output has the error.

Bit 3: Timed Output Error. Set when a timed output range is outside of the range of (1 to 9999) or if the on/off setpoints of a timed output are outside of the range of 0 to (SF-1).

Bit 4: Reserved, will always be equal to zero.

Bit 5: Pulsed Output Error. Set if there is an error with one or more of the pulsed output parameter. The difference between the leading and trailing edge setpoints must be less than ((Pulse Quantity * On count) + (Pulse Quantity – 1)). This bit will also be set if the on/off setpoints of the pulsed outputs are outside of the range of 0 to (SF-1).

Bit 6: Output Quantity Programming Error. This bit will be set if you try to program more than two outputs at a time in Output Programming Block word 1, if no outputs are selected in word 1, or if you try to program outputs not assigned to a group.

Bit 7: Reserved, will always be equal to zero.

Bit 8: Limit Switch Disabled. Set to "1" when the outputs are disabled because the outputs have not been programmed, if there is a transducer fault, or if the outputs have been disabled by the disable output command. The outputs will also be disabled, and this bit set when either the Setup or Group data has been programmed.

Bits 9 to 14: Reserved, will always be equal to zero.

Bit 15: Limit Switch Command Word Error. Set under the following three conditions

1. Set when one or more of the reserved bits in the output command word are set to "1" during a group programming cycle.
2. Set if you try to use both motion detect ANDing on a single output.
3. When the module is used in group mode, this bit is set if you attempt to program a limit switch that has not been assigned to a group.

Word 15: Output Number where output programming error occurred, range of 1 to 16.

Word 16: Setpoint Number where output programming error occurred, range of 1 to 8

Words 17 to 19: Reserved, set to zero

Output Registers

The NX3B1C module is programmed through 40 output registers. Because of the amount of data that is be required to totally program the module, and to limit the number of words transferred over ControlNet, five different programming blocks are used to program the module. Output register 0 always has the same function, and the function of registers 1 to 39 will vary depending on the data contained in word 0. Because of this programming method, a maximum of 10 programming cycles will be required to completely program the module. The following table outlines the five programming blocks.

Programming Block	Function
Setup	Count Direction, Tachometer Response, Module type, Transducer Fault Latch, Transducer Input Type, Scale Factor, Preset Value, Motion Detect Values, and Input Active State.
Group	Number of outputs assigned to group, group mode, group channel on and off setpoints, group preset/offset value. All six groups are programmed with one cycle.
Output	Limit switch type, ANDing type, on/off advances, 8 on/off setpoints. Two outputs can be programmed with each programming cycle, requiring 8 programming cycles to program all 16 outputs.
Increment / Decrement	Select increment/decrement type, limit switch to be adjusted, and setpoint to be adjusted. Only one output can be changed with each programming cycle.
Force	Force outputs and inputs on or off. Sending this programming block places the module in a "Force Mode" in which any changes to the appropriate output registers will be acted on without a programming cycle.

Word 0: Control Word (This Command word will be used to program all of the programming blocks. Setting more than one of the bits 0 to 4, or setting bits 5 to 12 during a programming cycle will generate a command error, Input register 0, bit 12)

Bit 0: Apply Preset Value to Machine Position
Bit 1: Program Setup
Bit 2: Program Groups
Bit 3: Program Outputs
Bit 4: Program Increment / Decrement Function
Bit 5: Place Output Registers in Force mode
Bits 6 to 12: Reserved, must be equal to zero
Bit 13: Set to disable all outputs, reset to enable all outputs (This parameter is not saved on power down.)
Bit 14: Clear Errors
Bit 15: Transmit bit

Note: If the PLC is powered, and the transmit bit is set when the Nexus unit is powered up, then the Nexus unit will act on any valid data contained in the output registers. If the PLC is powered up with the transmit bit on, then the Nexus unit will ignore any valid data in the output registers.

Setup Programming Block, Words 1 to 39

Note: Programming the Setup Data clears both the Group and Output Programming.

Word 1: Bit level Setup Functions
- Bit 0: Count Direction (0 = CW, 1 = CCW)
- Bit 1: Tachometer Response (0 = 504ms, 1 =120ms update time. The update time applies to the tachometer data reported over ControlNet, and the ON/OFF status of the motion detectors.)
- Bit 2: Module Type (0 = Independent Mode, 1 = Group Mode)
- Bit 3: Reserved, must be set to zero.
- Bit 4: Transducer fault latch (0 = fault latched, 1 = fault cleared. Default value is latched)
- Bit 5: Resolver Type (0 = AMCI, 1 = Autotech, default is AMCI)
- Bit 6: Reserved, must be set to zero.
- Bit 7: Reset to disable the outputs when there is no network connection. Set to have the outputs remain enabled when there is no network connection. If set, the outputs will turn on and off based on the resolver's position. Please note that forced outputs are always disabled when the network connection is removed, regardless of the state of this bit.
- Bits 8 to 15: Reserved, must be equal to zero

Word 2: Scale Factor (2 to 8192)
Word 3: Preset Value (0 to (SF-1))
Word 4: Motion Detect 1 Low RPM (0 to 32,767)
Word 5: Motion Detect 1 High RPM (0 to 32,767)
Word 6: Motion Detect 2 Low RPM (0 to 32,767)
Word 7: Motion Detect 2 High RPM (0 to 32,767)
Word 8: Real Input Active State. Reset if the input is active low, set if the input is active high. (bit 0 = input 1, bit 1 = input 2, … bit 15 = input 3)
Word 9: Tachometer Multiplier (0 to 1100)
Word 10: Tachometer Divisor (0 to 63, 0 only if Tachometer Multiplier is 0)
Word 11: Tachometer Decimal Point (0 to 3)
Word 12: Reserved, must be set to zero.
Words 13 to 39: Not used. These words should be "don't cares."

Group Programming Block, Words 1 to 39

Note: Programming the Group Setup clears the output programming

The setup programming bits of all six groups has the following layout:

Bit(s)	Function
0 to 5	The number of limit switch outputs in the group, range of 1 to 16
6 and 7	Reserved, must be reset to zero
8 to 10	The mode used in the group, range of 0 to 6
11 to 14	Reserved, must be reset to zero
15	set when the group is to be used, reset if the group is to be disabled

Word 1: Group 1setup programming bits
Word 2: Group 1 Channel On Point

Word 3: Group 1 Channel Off Point
Word 4: Group 1 Offset or Preset Value (mode dependent)
Word 5: Group 2 setup programming bits
Word 6: Group 2 Channel On Point
Word 7: Group 2 Channel Off Point
Word 8: Group 2 Offset or Preset Value (mode dependent)
Word 9: Group 3 setup programming bits
Word 10: Group 3 Channel On Point
Word 11: Group 3 Channel Off Point
Word 12: Group 3 Offset or Preset Value (mode dependent)
Word 13: Group 4 setup programming bits
Word 14: Group 4 Channel On Point
Word 15: Group 4 Channel Off Point
Word 16: Group 4 Offset or Preset Value (mode dependent)
Word 17: Group 5 setup programming bits
Word 18: Group 5 Channel On Point
Word 19: Group 5 Channel Off Point
Word 20: Group 5 Offset or Preset Value (mode dependent)
Word 21: Group 6 setup programming bits
Word 22: Group 6 Channel On Point
Word 23: Group 6 Channel Off Point
Word 24: Group 6 Offset or Preset Value (mode dependent)
Words 25 to 39: Not used. These words should be "don't cares."

Output Programming Block, Words 1 to 39

Word 1: Outputs programmed. This word controls which two outputs are programmed in output registers 2 to 39. Each bit in this word corresponds to an output, that is bit 0 = output 1, bit 1 = output 2, … bit 15 = output 16. Any two bits can be set during an output programming cycle. The output assigned to the least significant bit of the two will be programmed in words 2 through 20. The most significant bit of the two will be programmed in words 21 through 39. If only one bit is set, only registers 2 through 20 will be used, and the data in words 21 through 39 will be ignored. Setting more than two bits will generate an Output Quantity Error, which is indicated by input word 14, bit 6. Any errors in the output programming data will cause even valid changes to be ignored.

The two output setup words have the following format:

bits 0 → 1: output type

Bit 1	Bit 0	Function
0	0	Output not used
0	1	Pulse Output
1	0	Timed Output (Starts timing only after the input is active. This does not include the group mode enable bit.)
1	1	Normal Output

bits 2 → 12: not used
bits 13 → 14: motion ANDing control bits

Bit 14	Bit 13	Function
0	0	No Motion ANDing
0	1	Motion ANDing 1
1	0	Motion ANDing 2
1	1	Reserved for future use

Note: The operation of motion ANDing function includes the Low Value setpoint, but not the High Value setpoint. That is, an output that is motion ANDed will turn on at the Low Value, and off when the High Value setpoint is reached.

bit 15: In group mode only, this bit is set for Output Enable ANDing (by input) and reset for no ANDing. In group mode, enable ANDed timed outputs start timing regardless of the state of the enable input. This bit is a "don't care" in independent mode.

Word 2: Lower output setup bits
Word 3: Lower output ON advance/retard value, entered in 0.1ms increments. Range of ±99.9ms.
Word 4: Lower output OFF advance/retard value, entered in 0.1ms increments. Range of ±99.9ms.
Word 5: Lower Output, Normal Output On setpoint 1
Timed Output On Setpoint 1
Pulsed Output On position of leading edge of first pulse
Word 6: Lower Output, Normal Output Off setpoint 1
Timed Output Off setpoint 1
Pulsed Output Off position of trailing edge of final pulse
Word 7: Lower Output, Normal Output On setpoint 2
Timed Output, length of time in ms, range of 1 to 9999ms
Pulsed Output, total number of pulses
Word 8: Lower Output, Normal Output, Output 1 Off setpoint 2
Pulsed Output, the duration of each pulse (the ON time)
Word 9: Lower Output, On setpoint 3
Word 10: Lower Output, Off setpoint 3
Word 11: Lower Output, On setpoint 4
Word 12: Lower Output, Off setpoint 4
Word 13: Lower Output, On setpoint 5
Word 14: Lower Output, Off setpoint 5
Word 15: Lower Output, On setpoint 6
Word 16: Lower Output, Off setpoint 6
Word 17: Lower Output, On setpoint 7
Word 18: Lower Output, Off setpoint 7
Word 19: Lower Output, On setpoint 8
Word 20: Lower Output, Off setpoint 8
Word 21: Upper output setup bits
Word 22: Upper output ON advance/retard value, entered in 0.1ms increments. Range of ±99.9ms.

Word 23: Upper output OFF advance/retard value, entered in 0.1ms increments. Range of ±99.9ms.
Word 24: Upper Output, Normal Output On setpoint 1
Timed Output On Setpoint 1
Pulsed Output On position of leading edge of first pulse
Word 25: Upper Output, Normal Output Off setpoint 1
Timed Output Off setpoint 1
Pulsed Output Off position of trailing edge of final pulse
Word 26: Upper Output, Normal Output On setpoint 2
Timed Output, length of time in ms, range of 1 to 9999ms
Pulsed Output, total number of pulses
Word 27: Upper Output, Normal Output, Output 1 Off setpoint 2
Pulsed Output, the duration of each pulse (the ON time)
Word 28: Upper Output, On setpoint 3
Word 29: Upper Output, Off setpoint 3
Word 30: Upper Output, On setpoint 4
Word 31: Upper Output, Off setpoint 4
Word 32: Upper Output, On setpoint 5
Word 33: Upper Output, Off setpoint 5
Word 34: Upper Output, On setpoint 6
Word 35: Upper Output, Off setpoint 6
Word 36: Upper Output, On setpoint 7
Word 37: Upper Output, Off setpoint 7
Word 38: Upper Output, On setpoint 8
Word 39: Upper Output, Off setpoint 8

Note 1: Output words 8 to 39 are "don't cares" if the output is being programmed as a timed output.
Note 2: Output words 9 to 39 are "don't cares" if the output is being programmed as a pulsed output.
Note 3: Unused normal on/off setpoints should be set to zero.

Increment / Decrement Programming Block, Words 1 to 39

Word 1: control bits
Bit 0: set to change on setpoint
Bit 1: set to change off setpoint
Bit 2: reset to increment setpoint, set to decrement setpoint
Bits 3 to 15: reserved, must be reset to zero
Word 2: Increment/Decrement Limit Switch Number (range 1 to 16)
Word 3: Increment/Decrement Setpoint Number (range 1 to 9) (if the value equals 9, than all of the on/off setpoints will be incremented or decremented.)
Words 4 to 39: Not used. These words should be "don't cares.

Note: The Increment/Decrement function cannot be used on outputs that have not been programmed.

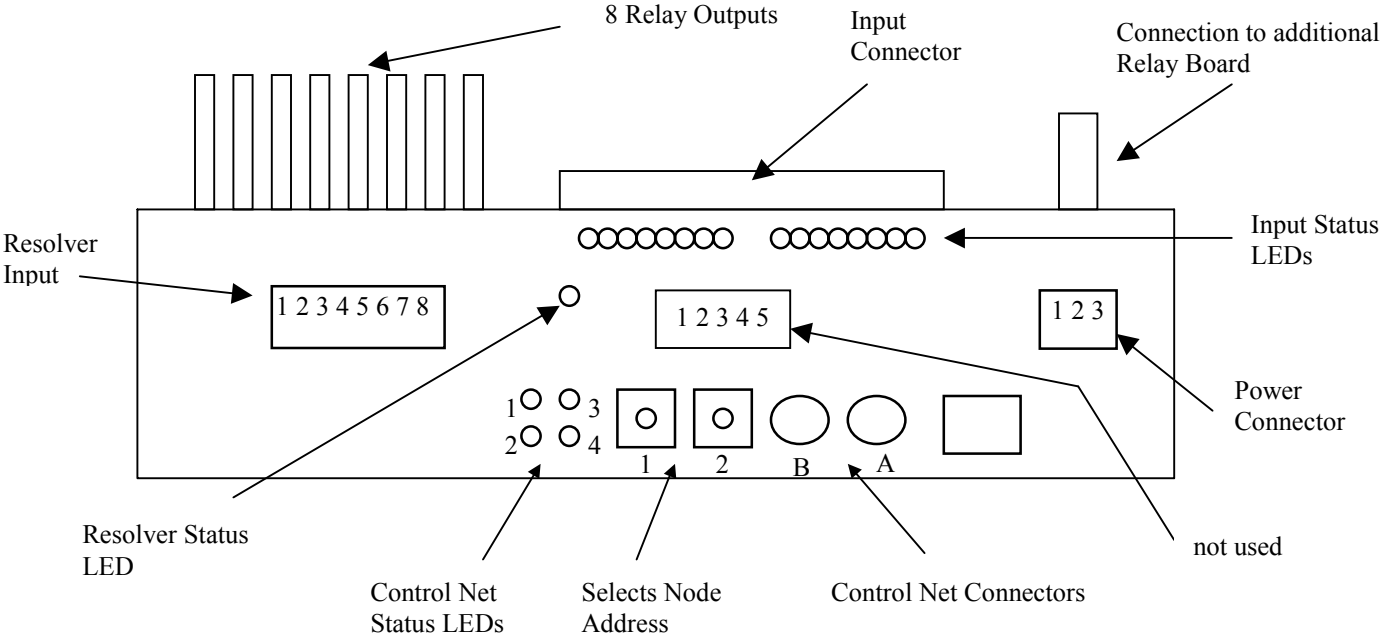
Force Function Programming Block, Words 1 to 39

The force function works differently than the other programming blocks. Once the output registers are in force mode, any changes to the data will be acted on immediately. That is it will not be necessary to use a programming cycle to change the force values. Input register 0, bit 11 will be set to indicate that the module is in force mode.

Word 1: Force Outputs On
Word 2: Force Outputs Off
Word 3: Force Inputs On
Word 4: Force Inputs Off
Words 5 to 39: Not used, should be considered "don't cares."

Note 1: Force Off takes priority over Force On.
Note 2: It is not necessary to program the outputs before the force will take affect.
Note 3: Cycling power to the unit takes the module out of force mode.
Note 4: Transmitting any of the other programming blocks to the Nexus takes the unit out of force mode.
Note 5: Outputs that have been forced on will remain on even if the unit is in transducer fault.

Nexus Hardware Overview



Notes:

1. The ribbon cable from the NX3B1C must be plugged into the CN2 connector of the additional relay board.
2. The additional relay board does not require any external power connections
3. The inputs on the relay board do not have any function.
4. Dimensions: Length = 10 inches, Width = 4 inches (not including ControlNet Connectors), and Height = 4.75 inches (including relays)

Resolver Connectors

Pin Number	Single Turn Function
1	R1
2	R2
3	Shields
4	S1 & S2
5	S4
6	S3
7	no connection
8	no connection

Resolver Status LED

LED Pattern	Function
solid green	Resolver OK
flashing green	Clearable Transducer Fault
flashing red	Non Clearable Transducer Fault
solid red	Module Fault

Input Status LEDs

The Nexus unit has 16 inputs that are divided into two groups, each with its own common. Depending on what is connected to the common, the inputs can be either sinking or sourcing.

Common Connection	Input Type	LED color when input active
Ground	sinking	Red
+DC voltage	sourcing	Green

Input Function

In Independent Mode, each input is anded with each output. That is, input 1is anded with output 1, input 2 is anded with output 2 … input 16 is anded with output 16. In group mode, the inputs have the following functions.

Input	Function
1	Group 1 Control
2	Group 2 Control
3	Group 3 Control
4	Group 4 Control
5	Group 5 Control
6	Group 6 Control
7	Limit Switch Enable Input
8	First Cycle Input
9 to 16	not used in group mode

Power Requirements

Power Connector

Pin	Function
1	10 to 30Vdc
2	DC Common
3	Shields

The Nexus Module requires exactly 200mA @24Vdc to operate. If the reference voltage pins are shorted together, the unit will draw 300mA @24Vdc.

Even though the unit will operate within a voltage range of 10 to 30Vdc, it is recommended that the unit be powered with a supply that is within the operating range of the relays. The Opto 22 ODC24 have an operating range of 18 to 30Vdc.

ControlNet Connectors

The Nexus module has two BNC network connections labeled A and B.

Node Address Selection

The Nexus module has two rotary switches used to set the module's address on the network. Any node from 0 to 99 can be selected. Switch 1 sets the one digit and switch 2 sets the 10s digit of the address. For example, if the Nexus is to be installed at node 46, switch 1 would be set to 6, and switch 2 would be set to 4. Note, changing the node address only takes affect at power up. Changing the address while power is applied to the Nexus module will generate a minor fault.

ControlNet Status LEDs

The following table describes the function of the four network status LEDs.

LED Number	Name	LED Pattern	Function
1	Channel B status	Solid Green Flashing Red/Off Solid Off	Channel Operating Correctly Channel Disconnected from Network Channel Disabled
2	Channel A status	Solid Green Flashing Red/Off Solid Off	Channel Operating Correctly Channel Disconnected from Network Channel Disabled
3	Module Owned	Solid Green Off	Network Card is communicating with Nexus Network Card is not communicating with Nexus
4	Module Status	Flashing Green Solid Green Flashing Red Solid Red	Network Card is waiting for initialization Module is initialized and operating correctly Minor Fault (For example Node address changed) Major Fault, module must be restarted

Note: If the Nexus module is removed from the Network, than both LEDs 1 and 2 will flash RED.

Throughput Time

The NX3B1C has a typical throughput time of 100µs from input to output. The maximum throughput time from input to output is 200µs.

Network Update Time

The NX3B1C has a minimum network update time of 5ms.

Revision History

Version 1.2 changed the name in the specifications from Nexus PLS to NX3B1C, added in several places that the forced outputs are disabled when the network connection is removed, and added information on the function of the inputs in both group and independent mode. The quick start guides for both the ControlLogix and PLC-5 systems were also updated.

Version 1.3 was released on 3/18/02. The RSLogix version references were removed from the quickstart guide. Dimensions were also added to the Nexus Hardware Overview.

Quick Start Guide
AMCI Nexus to ControlLogix

1. With the power off, use the rotary switches on the Nexus to select the desired node address.
2. Connect the Nexus to the ControlNet using a ControlNet Tap to coax media. Either the A or B port can be used, depending on how your network is configured.
3. Apply power to the Nexus unit.
4. Start RSLogix 5000.
5. Start RSLinx and establish communications to the ControlLogix system.
6. Configure the ControlLogix hardware system, processor and discrete I/O. If it is not already present, also add the ControlNet adapter 1756-CNB(R) module to the system.
7. Right-click on the 1756-CNB(R) module and Click on **New Module…**
8. Define the NX3B1C as a generic CONTROLNET-MODULE. Click on **OK** and define the properties as follows.

Name:	*Your Choice*
Description:	*Your Choice*
Comm Format:	Data-INT (must be Data_INT)
Node:	Set it to the same value as the Node address on the NX3B1C

Assembly Instance – 100, **Input** – 22 for the NX3B1C
Assembly Instance – 150, **Output** – 40 for the NX3B1C
Assembly Instance – 110, **Config** – 0 for the NX3B1C

9. Click on **Next>**
10. Define the RPI. The minimum value is 5.0ms, however the value may be set higher.
11. Click **Finish**.
12. Save and Download the file to the Processor
13. Start RSNetworx for ControlNet and either open an existing project or create a new one.
14. If this is the first time using the NX3B1C, register the appropriate EDS and icon files. These files are available from AMCI's website www.AMCI.com.
15. Go Online. RSNetWorx will scan the ControlNet network and should discover the NX3B1C.
16. Click on the Enable Edits checkbox and then save the project.

At this point, the 1756-CNB(R) should be communicating; steady green LED and the top right LED (ControlNet Status LED #3) for the NEXUS communication should be on.

Go online to the ControlLogix processor. Select the **Logic** menu, followed by **Monitor Tags**. The data associated with the NX3B1C is available under the name you chose when configuring it.

Quick Start Guide
AMCI Nexus to PLC-5

1. With the power off, use the rotary switches on the Nexus to select the desired node address.
2. Connect the Nexus to the ControlNet using a ControlNet Tap to coax media. Either the A or B port can be used, depending on how your network is configured.
3. Apply power to the Nexus unit.
4. Start RSNetworx. If this is the first time using the NX3B1C, register the appropriate EDS and icon files. These files are available from AMCI's website www.AMCI.com.
5. From RSNetworx for ControlNet, go Online. After browsing the network, the NX3B1C will appear as an "Extra Device" at the node selected by the Nexus' rotary switches.
6. Click the **Enable Edits** checkbox and choose "Use online data (upload)". Click **OK**. At this point you can right click on the NX3B1C icon and select **Properties** from the pop-up menu. In the properties window, you can change the name associated with the unit and add a description.
7. Go Offline.
8. Click the **Enable Edits** checkbox.
9. Right Click on the PLC-5 icon and click on **Scanlist Configuration** in the pop-up menu.
10. In the Device Name column, right click on the name of the Nexus unit, and click on **Insert Connection** in the pop-up menu. The Connection Properties window will appear on the screen.
11. If needed, set the Input Size and Input Address of the Data Input File. This file resides in the PLC-5 and is used by all of the ControlNet nodes. Therefore, it must be large enough to hold all of the input data on the network. The number of words that the NX3B1C transfers to the PLC-5 is shown below.

    20 Input words for the NX3B1C

12. If needed, set the Output Size and Output Address of the Data Output File. This file resides in the PLC-5 and is used by all of the ControlNet Nodes. Therefore, it must be large enough to hold all of the output data on the network. The number of words that the NX3B1C receives from the PLC-5 is shown below.

    40 Output words for the NX3B1C

13. Set the Request Packet Interval time. This has a minimum acceptable value of five milliseconds, but can be set higher.
14. Click OK to close the Connection Properties window. In the Scanlist Configuration window, save the changes and close the window.
15. Go Online.
16. Verify that the PLC is in Program Mode.
17. Click on **Network** in the toolbar select **Download to Network** from the pull down menu that appears. After the download is complete, the Nexus unit should be communicating with the PLC.

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