Leeds and Northrup Conitel 2020 Master Protocol

Connector Configuration Parameters

Control TimeoutX10ms

Not used for Master

Pre-trans MARK ms

This field allows the user to define the Pre-Transmission Mark time in milliseconds. The Pre-Transmission Mark time is used to frame Conitel messages.

RTS ON DelayX10ms

Enter a number from 0 to 255 (0 to 2.55 seconds) to delay sending a message after turning on Request To Send (RTS). Commonly used with modem communication to allow additional time for the modems to synchronize.

RTS OFF DelayX10ms

Enter a number from 0 to 255 (0 to 2.55 seconds) to keep RTS on after a message has been sent. Commonly used to keep a radio on for a short period of time at the end of a message.

Handshake Option

If Full Handshake is selected the Omnii-Comm will assert RTS and wait for CTS before sending a message. RTS will be turned off after the message has been sent. If Constant Carrier is selected the Omnii-Comm will assert RTS when it sends its first message and leave it asserted. It will wait for CTS before sending. If Ignore CTS is selected, RTS will be asserted before sending a message and removed at the end of the message. The CTS input will be ignored. If No Handshake is selected, RTS will be asserted when the Omnii-Comm sends its first message. RTS will not be turned off at the end of the message. The CTS input will be ignored. If Activity Monitor is selected, the Omnii-Comm will check the DCD input before sending a message. If DCD is ON, the Omnii-Comm will delay sending the message.

Option Bit Parameters

Master

Must be checked for Master

Use Radio Key

If checked, Bit 0 in a register specified by the "Radio Key Address" on the Header configuration screen will be turned ON before a message is sent and turned OFF after the message has been completed.

Ext. Baud Rate Gen.

Conitel Messages are asynchronous and can vary in length. Long messages require a very accurate baud rate clock to insure their recovery at the receiving end. The Conitel variable word width UART is implemented in special on board hardware that uses the microprocessors clock for basic timing. The processor clock is an 8MHZ crystal which is not a multiple of the baud rates that Conitel systems typical use. If this box is checked, the clock from UART 1 Channel A is used for the special UART hardware. This is typically an exact multiple of the standard baud rates used for Conitel (typically 1200 baud). Note if you use UART 1 Channel A for on any other communications port you can only use at the same baud rate as specified on the Conitel connector screen

Use DCD

If this box is checked, the Omnii-Comm will only receive data if the DCD line is high. If this box is unchecked the state of the DCD line is not used.

Direct SETPOINT

If this box is checked an Execute message is not sent after a Setpoint A or Setpoint B Select message. If the box is unchecked, the Execute is automatically sent if the Select returns with no errors.

Direct TRIP/CLOSE

If this box is checked an Execute message is not sent after a Trip or Close Select message. If the box is unchecked, the Execute is automatically sent if the Select returns with no errors.

Error Replies Enabled

If this box is checked, error replies are expected.

Protocol Extension Table Parameters

The Protocol extension table is used to define additional parameters required for CONITEL Master operation. Click on the box to enable the Protocol Extension Table. Click on the button to bring up the specific options as detailed below. Controls are initiated by a write command from the host to a digital bit or register address installed in the CTDB by dummy reads. Four dummy reads must be made to generate enough addresses for the master to address all possible writes in each of 15 possible RTU addresses. Each read is made from a different data type, and the data type will be used, with the address written from the host, to form a write address to send data to a Conitel RTU.

Digital Control Data Type

This is the data type that will be used to initiate digital controls (Trip and Close) There are two digital commands (TRIP and CLOSE) for EIGHT groups for each RTU, with 12 points per command. Thus each RTU can have 96 each "trip" and "close" commands. TRIPs are the first 1440 points, and CLOSEs are the next 1440 points. Only eight groups are supported; the 5th byte in the port extension table is the first group supported, and the number is added to the group that is derived with the following math.

The data point to write is calculated as follows:

    a. Since RTU address 0 is reserved for broadcast commands, and we will not allow broadcast commands, the first bit is the first TRIP for the first group of RTU address 1. The first component of the bit address is

$$(RTU\# - 1) * 96$$

    b. The second component of the bit address is the

$$(GroupAddress - CON1STDG) * 12$$

    c. The third component of the bit address is the point number within the group. The three components are added together to arrive at the point number. Add 1440 if the command is a CLOSE, and 0 if it is a TRIP.

        Example: The bit to write for a TRIP of RTU# 3, Group 4, and point 5, if the 1st group is 2, is calculated as follows:

$$\{[(3-1) * 96] + [(4-2) * 12] + 5\} + 0 = 221$$

The corresponding CLOSE would be $221+1440 = 1661$

NOTE: This point number is 1-based. For hosts that have 0-based addressing, the bit number would be 1 less. There are two freeze commands (FC E and FC F) for each group for each RTU, so we need 480 bits to allow for all of the freeze commands. The bit number is generated as follows:

$$[(RTU\# - 1) * 32] + [Group] + <240 \text{ if } FC=F \mid 0 \text{ if } FC=E>$$

This must be added to 2880, to get past the digital outputs. The value of the bit written is ignored.

Setpoint A Data Type

This is the Data Type to use for Setpoint A Commands. There are two setpoints (Setpoint A and B) per group per RTU. The address generation for setpoints uses two separate data types for Setpoint A and Setpoint B, so the base address for each is the same, but each will have a different starting address in the host computer's data space.

For example, using a Modbus host, the Force Register command will be used to write to the OmniiComm. Changes have been made in the OmniiComm to allow three data types to be addressed with this Modbus command, addressed at 1-256 (data type 4, ANAOUT), 1001-1256 (data type 5, where 32-bit registers are not used), and 2001-2256 (data type 6). Therefore if the first group is used for Setpoint A and the second group is used for Setpoint B, the Setpoint B address for the same RTU and Group will be the same as the Setpoint A address plus 1000.

The address calculation is similar to the address calculation for digital controls, but easier, and the result is a register number. There are only two components to the address -- the RTU number (-1) times 16, and the group address. So the calculation for RTU number 3, Group 4, is

$$[(3-1) * 16] + 4 = 36$$

Setpoint B Data Type

This is the Data Type that will be used for Setpoing B commands. Addressing is the same as discussed above in Setpoint A Data Type

Unit Raise/Lower Data Type

This is the Data Type that will be used for Unit Raise/Lower commands. The "Unit Raise/Lower" command is treated like a register write from the host. There is one "register" output for each group of AGC commands, addressed exactly like Setpoint A and Setpoint B. The value of the data to be written has three sets of raise/lower flags and 3-bit times for each flag.

1st Digital Output Group Number

Enter the first Trip/Close Group Number

Poll Table Read Parameters

Station Addx (hex)

The Address of the RTU that will respond to this Read Request. Valid addresses are 0 to F.

Function

The type of Read to be performed. Valid selections are Scan and SOE reads.

GROUP Address (hex)

The Group number to Read. Valid selections are 0 thru F.

Bytes Expected

The total number of bytes of data expected from the RTU for this Read.

Poll Table Write and Error Parameters

INVALID SELECTION. Can not Write to the Conitel port from the poll table. Use Commands to Write to the Conitel Slave. Writes will automatically be sent if a database point linked to Conitel is changed.
Note: System Error Protocol Definitions are the same as Poll Table Write and Error Parameters

Database Extension Table Parameters

Index	Name	Size:Max Length
0	SCAN Group 0	2:256
1	SCAN Group 1	2:256
2	SCAN Group 2	2:256
3	SCAN Group 3	2:256
4	SCAN Group 4	2:256
5	SCAN Group 5	2:256
6	SCAN Group 6	2:256
7	SCAN Group 7	2:32
8	SCAN Group 8	2:32
9	SCAN Group 9	2:32
10	SCAN Group A	2:64
11	SCAN Group B	2:32
12	SCAN Group C	2:32
13	SCAN Group D	2:32
14	SCAN Group E	2:32
15	SCAN Group F	2:32
16	TRIP/CLOSE	2:32
17	SETPOINT A/B	2:32
18	AGC	2:32
19	MCD & Freeze	2:32