## Allen Bradley 1771 PLC I/O Interface version 1.2.13 TechNote

### Upgrade from version 1.1.17

**Purpose:**

This document details the upgrade procedures for an installation of the Allen Bradley PLC I/O interface (PIO) firmware to version 1.2.13.

**Reasons for Upgrading:**

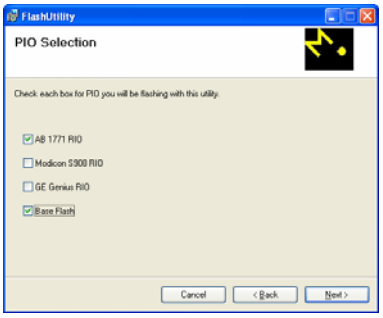
This upgrade may be desired for several reasons. First, the new version along with version 5.0.4 of the PLC Explorer will allow the configuration of PIO modules via Ethernet from the configuring PC. This method removes the requirement for access to the PIO via the DeltaV OPC server and serial card. This method is simpler and faster than the previous serial card download method.

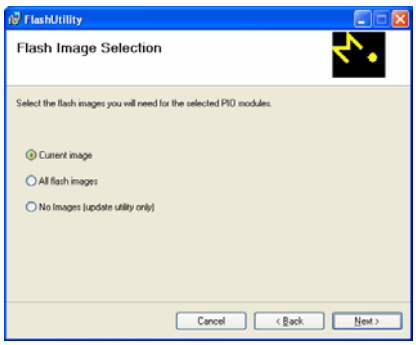
The second reason for upgrading is to access this version's firmware support of ModbusTCP communications as well as the DeltaV serial card. This ModbusTCP access results in faster data transfers and quicker IO response times.

**Procedure:**

### A. Upgrade Flash

1. Install update utility and flash images ("BaseFlash_1-0-7_Files.img" and "AB_1-2-0D_FlashImage.img"). This is supplied as an msi install program ("FlashUtility.msi"). Running this will create and install the utility. Run the install program and select "Next" on the Welcome screen. For the PIO Selection, select "AB 1771 RIO" and "Base Flash," Click "Next" again.

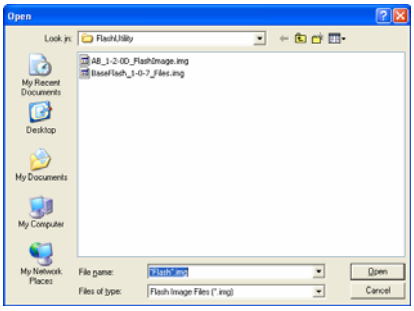




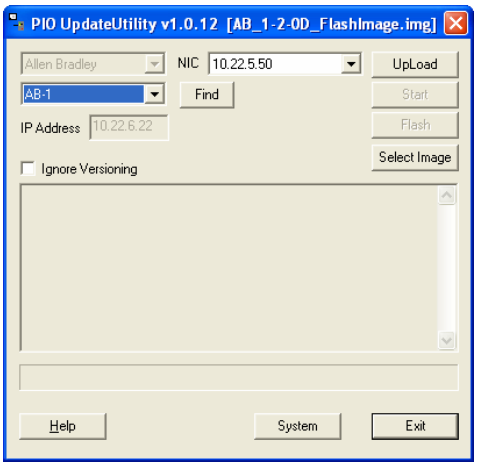

2. This opens the Flash Selection. Select current image and "Next". You can select a specific path to store the utility and image files or accept the suggested value. Select "Next" to go to the confirm screen, then "Next" again to install the files. This will place all files in the install directory and creates an item in your start menu (under All Programs) to access the utility.

3. Connect an Ethernet cable from a NIC on the PC to the PIO. This should either be a cross-over cable or be connected via a switch or hub if PIO modules have different IP addresses configured (not available for version 1.1.17). Set the IP address of the NIC card to an address in the same subnet as the PIO (version 1.1.17 came with IP address of 10.16.6.1), such as 10.16.6.100, and the subnet as 255.255.242.

4. Check and if necessary upgrade the PIO base flash. Older versions of the PIO only communicated via the RS485 ports on the unit. On some units, the Ethernet port chip on the motherboard had microcode that could interfere with high speed communications. This would manifest itself as timeouts in Ethernet communications, either with long cable runs or with a gigabit network card in the PC. The upgrade to the base flash version 1.0.7 corrects this problem.

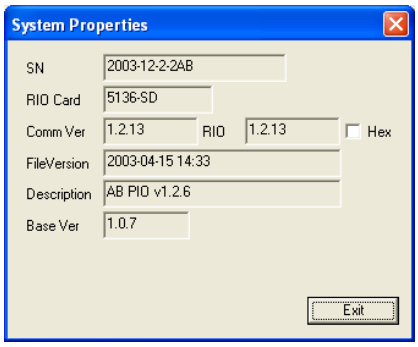



To check if the unit has version 1.0.7 of the base flash, run the update utility, during startup of the utility. Select the "BaseFlash_1-0-7_Files.img" file. Alternatively, once the utility is loaded, click the "Select Image" button, select the image file, and click "Open".




The type of flash selected is displayed in the top left corner of the utility dialog. Below this is a combo box containing any PIO modules found in the current subnet. If no PIO modules are found, check if the NIC card displayed is the one attached to the NIC on the subnet with the PIO. If not, re-select the NIC.

Whenever the NIC selection is changed, the utility automatically polls for PIO modules. You may also manual trigger the poll with the "Find" button.



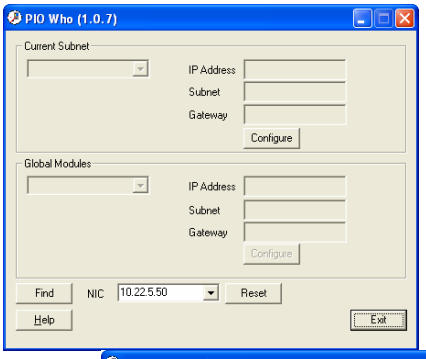

Select the NIC in the combo box (if more than one). Finally, select the "System" button on the bottom to open the systems property dialog for the unit. If the base version is less than 1.0.7, then the unit must be updated. Close the system dialog.

5. To update the base flash, select "Upload", then "Start" if it is enabled, and finally, click "Flash" when it is enabled. The utility will now process the image file and transfer it to the PIO module. When the transfer is complete, it will install the components. Once the process if finished, you must re-boot the PIO.

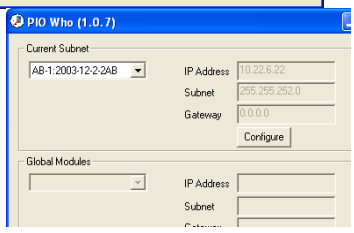
6. Now you may select the "AB_1-2-0D_FlashImage.img" flash using the "Select Image" button and repeat the flash procedure. When this is complete, the PIO will reboot itself to the new process.

7. Next, you must set the PIO address (if the default of 10.16.6.1 is not acceptable). If more than one PIO is to be used, each must have a different address, or you will be restricted to only having one on the Ethernet connection at a time. You may change the address using the PIOWho Utility or PLC Explorer. PIOWho will allow more flexibility in accessing the PIO unit.

8. Install the PIOWho by running the PIOWho.msi installation program. Select the directory (default "C:\Program Files\MYNAH\PIO\PIOWho\"), and user, then select "Next". Select "Next" again to install the files, and "Close" to complete the installation.



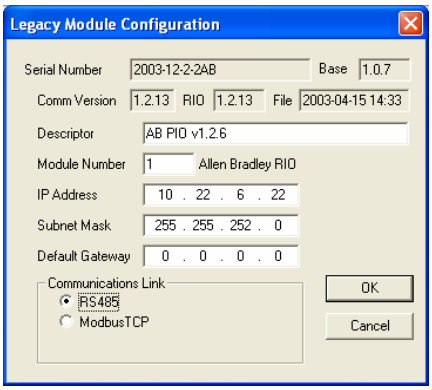

9. Run the PIOWho utility. This initializes with empty fields in the Current Subnet and Global Modules list. Select the appropriate NIC from the list at the bottom. If you re-configure the NIC while the utility is open, select "Reset" to capture the change.




10. Select the "Find" button; this will populate the two module lists. The Current Subnet is all PIO modules that are in the subnet specified for the NIC card. The Global Module list shows all PIOs that are not in the subnet but are

unable to be found with a broadcast over the NIC.

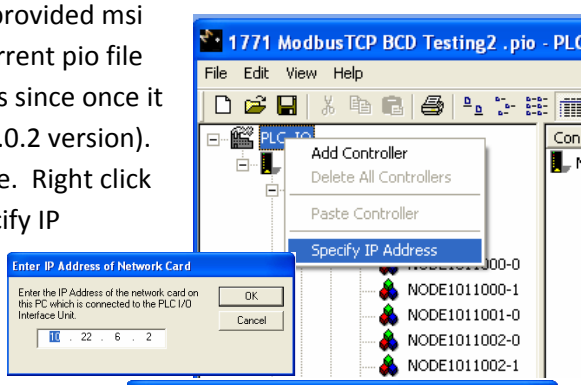
11. To change PIO address, select the PIO in the appropriate list, then the "Configure" button. This opens a dialog that will allow the configuration of the PIO. In this dialog you may enter a description and module number that will help you identify the PIO in future selections. If the PIO is not already set to the communications link you are using, select the correct one. Finally, select the IP address and subnet mask that will be used for PC to PIO communications.



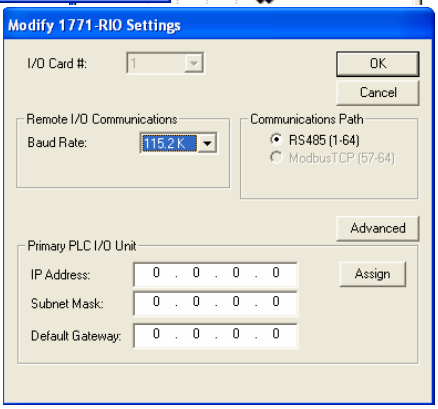

12. Selecting "OK" will download the configuration to the PIO. This will take several moments, and the PIO will be dropped from the list of modules during this time. You may press "Find" to re-gain the module and view the changes.

**B. Download current configuration to PIO via Ethernet connection.**

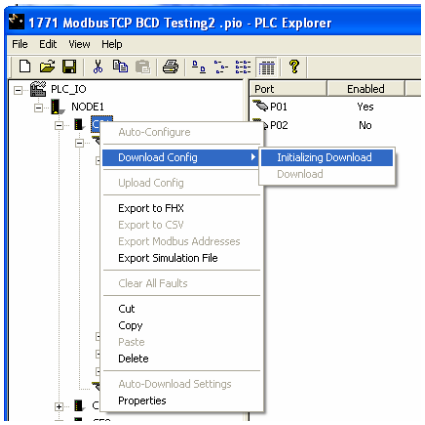
1. Install the new version of the PLC Explorer using the provided msi installation file. Run the new version and load the current pio file for the current configuration. (Save an old copy of this since once it is saved, this copy cannot be re-read by the original 3.0.2 version). Next, select the NIC card that the PLC Explorer will use. Right click on the root element in the explorer tree. Select "Specify IP Address", in the Dialog. Enter the address of the NIC attached to the PIO.




2. Open the card properties (right click on the card), and enter the address of the PIO unit. This may be entered directly or by selecting the "Assign" button and selecting the address from the list.

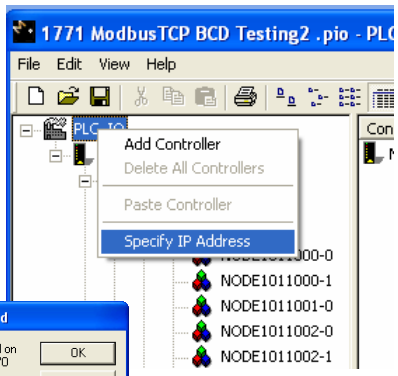



3. Now you are ready to complete a download. Right click on the card. Select "Download Config"/"Initializing Download". This will open the unit selection dialog (with the PIO listed). Select the PIO and click "Next". The download will proceed in the same manner as previously, except you are not prompted for the OPC server or the DeltaV download module. The unit will prompt to test for existing racks and detail the steps of the download. Once all racks and block transfers have been downloaded, the unit will enable the "Finish" button.

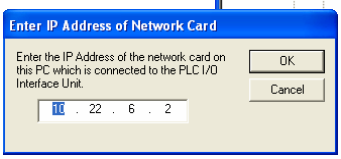


## C. Create a VIM ModbusTCP connection.

1. Install and run the new version of PLC Explorer using the provided msi installation file.

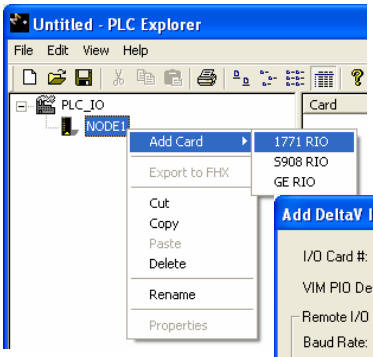



2. Next, select the NIC card that the PLC Explorer will use. Right click on the root element in the explorer tree. Select "Specify IP Address." In the Dialog enter the address of the NIC attached to the PIO.

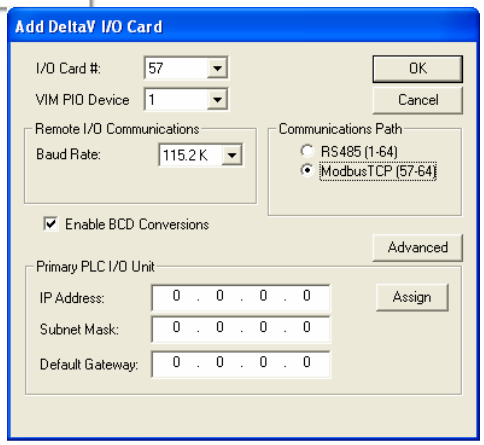



3. Next right click on the root element in the list and select "Add Controller."

4. This will open a dialog with selections of the controller type to use. Selecting OK will create the controller in the tree. Right click on this and select "Add Card."



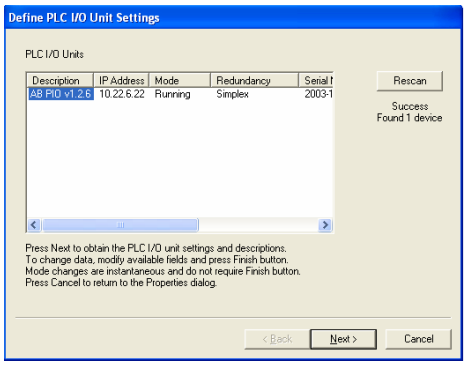

5. For ModbusTCP connections from DeltaV, select a card from 57-64 that will match a card in the VIM (57-60, or 61-64). Under a DeltaV controller, any other card is limited to RS485 access via a programmable serial card. Select the communications path as ModbusTCP.




6. If the Controller is a ModbusTCP controller, then any card may be selected and the card will always be ModbusTCP.

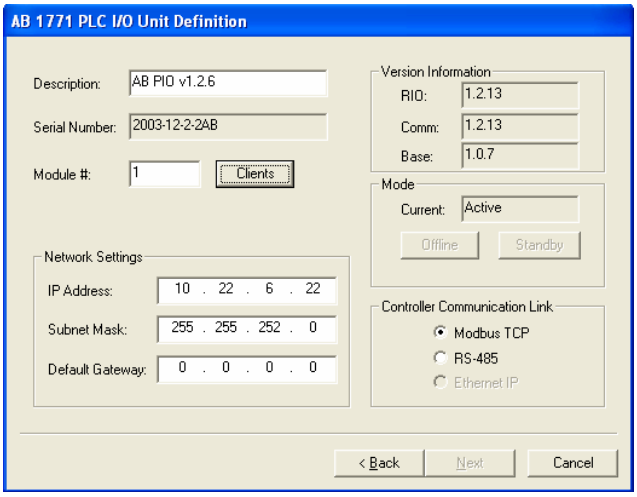
7. Leave the Enable BCD conversions checked so that those analog (block transfer) modules that have mixed binary/BCC IO data may be properly accessed.

8. The IP address may be entered here, or if the PIO is online, the address may be automatically obtained by selecting the "Assign" button.




9. Selecting the "Advanced" button (again if the PIO is on-line) will open a dialog to select a PIO module. All PIOs of the type card that have been configured will be displayed. Select one and click "Next."

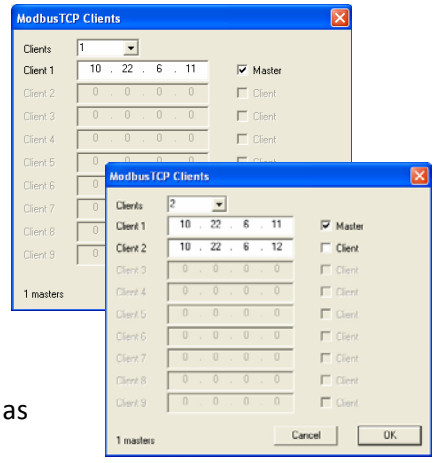
10. This dialog displays the current state of the PIO, including flash versions, running state, IP address, communications link, and client access.




11. If the IP address needs to be changed, enter the new IP address. Moving away from the box triggers a check; if the value changes, the "Apply" button is enabled.

12. Select the communications type if it is not already selected. If different from the current selection, the "Apply" button will be enabled.

13. Finally, select the "Clients" button to open a dialog with a list of clients. If no client IP addresses are in this list, the unit is in "Promiscuous" mode and will respond to ModbusTCP from any IP address. If a client list is enabled, at least one should have the checkbox beside the IP address checked (Master). The master IP address will be the address that writes outputs and is used to determine whether a controller is communicating. Clients may read IO values from the unit, but may not write outputs. (Write outputs from these addresses or any non-master IP addresses are ignored.)

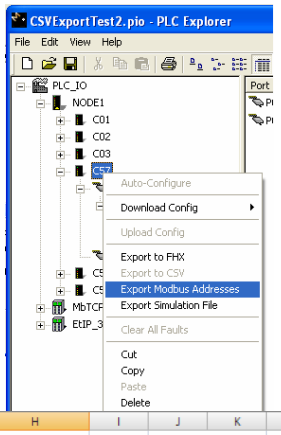



14. Racks and modules are added under the card in the same manner as with the RS485 unit.

15. For DeltaV, the FHX exports are selected as previously; however, datasets are generated based on the ModbusTCP addresses rather than the Rack organization in previous versions (RS485

configured cards still use this format). The new dataset organization is optimized for discrete IO access, with one dataset holding the IO (input or output) of up to 10 racks, including status data on the communications with the rack. Block transfers for analog modules are still mapped to allow up to 4 modules per dataset.

16. An additional export function is available on the card menu. Selecting the "Export Modbus Addresses" will produce a csv file that may be viewed with a spreadsheet. This file contains the mapping information of the PIO status registers and module IO values for all modules on all racks with a cross-reference to the ModbusTCP addresses assigned.




| | Module Name | Controller | Card | Port | Rack | Slot | Point | Discrete | Analog | Module Parameter |
|---|---|---|---|---|---|---|---|---|---|---|
| 2 | CardStatus | NODE1 | C57 | | | | CS1 | | 400001 | Chk Byte 1/2 |
| 3 | CardStatus | NODE1 | C57 | | | | CS2 | | 400002 | Chk Byte 3/Ticker |
| 4 | CardStatus | NODE1 | C57 | | | | CS3 | | 400003 | RIO Baud Rate |
| 5 | CardStatus | NODE1 | C57 | | | | CS4 | | 400004 | Card Cfg State |
| 6 | CardStatus | NODE1 | C57 | | | | CS5 | | 400005 | Mode/Rk comm |
| 7 | CardStatus | NODE1 | C57 | | | | CS6 | | 400006 | Process/WD time |
| 8 | CardStatus | NODE1 | C57 | | | | CS7 | | 400007 | ComType/CurrentRack |
| 9 | CardStatus | NODE1 | C57 | | | | CS8 | | 400008 | Scan time |
| 10 | CardStatus | NODE1 | C57 | | | | CS9 | | 400009 | Driver version |
| 11 | CardStatus | NODE1 | C57 | | | | CS10 | | 400010 | AB driver status |
| 12 | CardStatus | NODE1 | C57 | | | | CS11 | | 400011 | Sync Word |
| 13 | CardStatus | NODE1 | C57 | | | | CS12 | | 400012 | Auto-config time |
| 14 | CardStatus | NODE1 | C57 | | | | CS13 | | 400013 | Reserved |
| 15 | CardStatus | NODE1 | C57 | | | | CS14 | | 400014 | Reserved |
| 16 | CardStatus | NODE1 | C57 | | | | CS15 | | 400015 | Reserved |
| 17 | CardStatus | NODE1 | C57 | | | | CS16 | | 400016 | Rcks 17-32 |
| 18 | CardStatus | NODE1 | C57 | | | | CS17 | | 400017 | Rcks 1-16 |
| 19 | CardStatus | NODE1 | C57 | | | | CS18 | | 400018 | Auto-Cfg |
| 20 | CardStatus | NODE1 | C57 | | | | CS19 | | 400019 | WtchDog |
| 21 | CardStatus | NODE1 | C57 | | | | CS20 | | 400020 | RIO Baud |
| 22 | CardStatus | NODE1 | C57 | | | | CS21 | | 400021 | Mode |
| 23 | DI | NODE1 | C57 | 1 | 0 | 0 | 0-16 | 100001-100016 | 300501 | :0-15 |
| 24 | DI | NODE1 | C57 | 1 | 0 | 1 | 0-16 | 100017-100032 | 300502 | :0-15 |
| 25 | DI | NODE1 | C57 | 1 | 0 | 2 | 0-16 | 100033-100048 | 300503 | :0-15 |
| 26 | DI | NODE1 | C57 | 1 | 0 | 3 | 0-16 | 100049-100064 | 300504 | :0-15 |
| 27 | DI | NODE1 | C57 | 1 | 0 | 4 | 0-16 | 100065-100080 | 300505 | :0-15 |
| 28 | DI | NODE1 | C57 | 1 | 0 | 5 | 0-16 | 100081-100096 | 300506 | :0-15 |
| 29 | DI | NODE1 | C57 | 1 | 0 | 6 | 0-16 | 100097-100112 | 300507 | :0-15 |
| 30 | DI | NODE1 | C57 | 1 | 0 | 7 | 0-16 | 100113-100128 | 300508 | :0-15 |
| 31 | DO | NODE1 | C57 | 1 | 0 | 0 | 0-16 | 1-16 | 400501 | :0-15 |
| 32 | DO | NODE1 | C57 | 1 | 0 | 1 | 0-16 | 17-32 | 400502 | :0-15 |
| 33 | DO | NODE1 | C57 | 1 | 0 | 2 | 0-16 | 33-48 | 400503 | :0-15 |
| 34 | DO | NODE1 | C57 | 1 | 0 | 3 | 0-16 | 49-64 | 400504 | :0-15 |
| 35 | DO | NODE1 | C57 | 1 | 0 | 4 | 0-16 | 65-80 | 400505 | :0-15 |
| 36 | DO | NODE1 | C57 | 1 | 0 | 5 | 0-16 | 81-96 | 400506 | :0-15 |
| 37 | DO | NODE1 | C57 | 1 | 0 | 6 | 0-16 | 97-112 | 400507 | :0-15 |
| 38 | DO | NODE1 | C57 | 1 | 0 | 7 | 0-16 | 113-128 | 400508 | :0-15 |
| 39 | BT | NODE1 | C57 | 1 | 0 | 0 | BT1:0 | | 401001 | 1771-IFE C:BTR[0] |
| 40 | BT | NODE1 | C57 | 1 | 0 | 0 | BT1:1 | | 401002 | 1771-IFE C:BTR[1] |
| 41 | BT | NODE1 | C57 | 1 | 0 | 0 | BT1:2 | | 401003 | 1771-IFE C:BTR[2] |
| 42 | BT | NODE1 | C57 | 1 | 0 | 0 | BT1:3 | | 401004 | 1771-IFE C:BTR[3] |
| 43 | BT | NODE1 | C57 | 1 | 0 | 0 | BT1:4 | | 401005 | 1771-IFE C:BTR[4] |
| 44 | BT | NODE1 | C57 | 1 | 0 | 0 | BT1:5 | | 401006 | 1771-IFE C:BTR[5] |
| 45 | BT | NODE1 | C57 | 1 | 0 | 0 | BT1:6 | | 401007 | 1771-IFE C:BTR[6] |
| 46 | BT | NODE1 | C57 | 1 | 0 | 0 | BT1:7 | | 401008 | 1771-IFE C:BTR[7] |
| 47 | BT | NODE1 | C57 | 1 | 0 | 0 | BT1:8 | | 401009 | 1771-IFE C:BTR[8] |
| 48 | BT | NODE1 | C57 | 1 | 0 | 0 | BT1:9 | | 401010 | 1771-IFE C:BTR[9] |
| 49 | BT | NODE1 | C57 | 1 | 0 | 0 | BT1:10 | | 401011 | 1771-IFE C:BTR[10] |
| 50 | BT | NODE1 | C57 | 1 | 0 | 0 | BT1:11 | | 401012 | 1771-IFE C:BTR[11] |
| 51 | BT | NODE1 | C57 | 1 | 0 | 0 | BT1:12 | | 401013 | 1771-IFE C:BTR[12] |
| 52 | BT | NODE1 | C57 | 1 | 0 | 0 | BT1:13 | | 401014 | 1771-IFE C:BTR[13] |
| 53 | BT | NODE1 | C57 | 1 | 0 | 0 | BT1:14 | | 401015 | 1771-IFE C:BTR[14] |