2.2. Peer to Peer Data Boards

There are four different peer input boards (two analogue and two digital) that can be selected to ensure that the optimum communication packet size can be used for the application. Each input board has a corresponding output board that must be of the same type and channel quantity.

There are two versions of the analogue data boards, a 16 channel version and a 128 channel version. Both are configured the same. They only differ in the number of data channels supported. Similarly there are 16 and 128 channel versions of the digital channel boards.

Each output board delivers data to one or more input boards across one peer network. Note that the subnet of the peer network used to send the data is transparent to the input and output boards. More than one subnet may be defined using Peer Subnet Control boards to provide redundant communications. Peer subnet control boards must be defined before their respective input/output boards in the I/O connection editor.

Note that for a Peer output to communicate with a Peer input, they must share the same network number (NETWORK_ID), reference each others' peer numbers (TARGET_PEER_ID and SOURCE_PEER_ID) and have the same data block number (SOURCE_DATA_ID). The combination of these three identities should be considered as a global data identifier which must be uniquely defined across the entire peer network for each I/O board pair. The SOURCE_DATA_ID must be unique for all peer traffic between any two peers. It is recommended to set different SOURCE_DATA_IDs for each output block within each network in each system; this will ensure that they are unique at all destinations.

2.2.1. Analogue Input Boards

Figure 5 shows the data rack display associated with an IEC 61131 Toolset 16 channel analogue input board selected for incoming data to a Trusted controller.

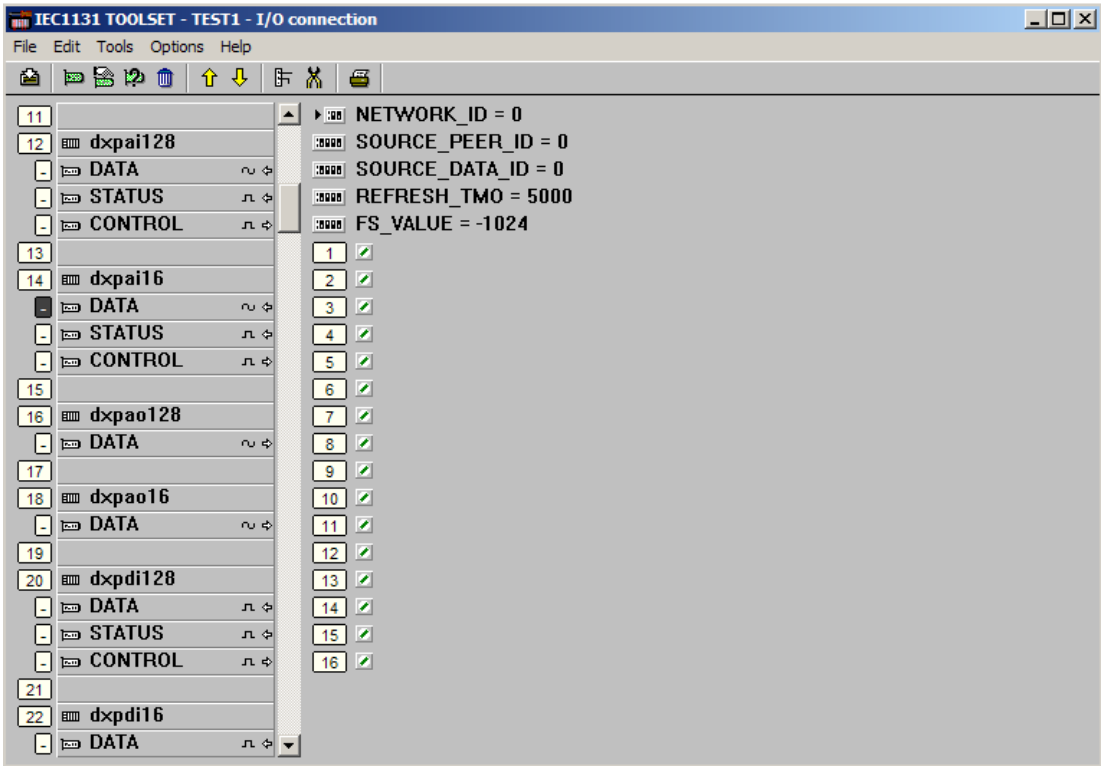

Figure 5 Peer to Peer Input Board Display

The user must enter data as detailed below.

1. NETWORK_ID – The network that is carrying the data. Data will be received via all peer controllers that share this network identity. Range 1 – 8.
2. SOURCE_PEER_ID – The peer that is sending the data. Range 1 – 40.
3. SOURCE_DATA_ID - Unique data block number defined at the output board. Range 1-64.
4. REFRESH_TMO - The maximum number of milliseconds allowed between successive refreshes of input data before the data is declared invalid. Note that following this time the input data will either retain the last received values or revert to a fail-safe condition according to the state of control rack variable 1. Range 1-10000.
5. FS_VALUE - Control value adopted by inputs when input is status has failed. Where input corresponds to an integer, fractional part is truncated. This value is always adopted at application start-up, though it will not be used again while RACK 3:Variable 1 is set TRUE. Range -9.999999e+38 to +9.999999e+38.

6. Analogue variable inputs 1 to 16 – Analogue values received from the corresponding channel of the selected output board in the sending system. The values are 32 bit and will assume either a 32 bit signed integer format or 32 bit real format depending on the variable to which it is connected. Both the specific input channel and its corresponding output channel must be connected to the same variable type. Different channels on a rack can use different variable types.
7. The 128 input peer board supports 128 analogue inputs instead of 16 but is otherwise identical. Note that safety related data using 128 analogue channel blocks must be sent via two different input/output block pairs and compared at the receiving input end in the application to ensure safety integrity. Alternatively it may be broken into 16 channel blocks.

Figure 6 shows a display of the refresh status rack of the associated analogue input board.

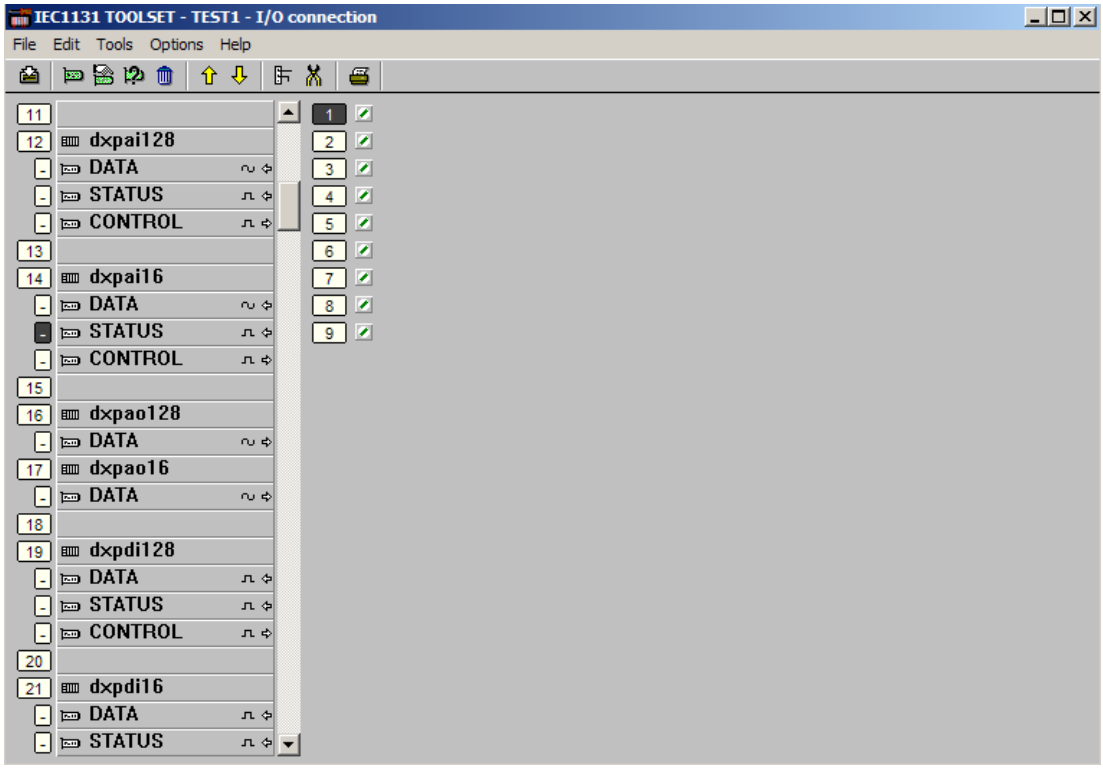

Figure 6 Input Board Status Display

Variable 1: TRUE = Input data is valid, i.e. refreshed within REFRESH_TMO

Variable 2-9: TRUE = Data has been refreshed within REFRESH_TMO by subnet 1-8, respectively. This status is intended for detection of latent faults within a redundant network. The data is delivered over all available programmed subnets simultaneously. If any of these variables goes FALSE for a programmed subnet, then data has failed to arrive on that subnet within the REFRESH_TMO. The variables for programmed subnets may be combined through an AND gate to provide an indication of full redundancy on that particular data path.

Figure 7 shows a display of the control rack of the associated analogue input board.

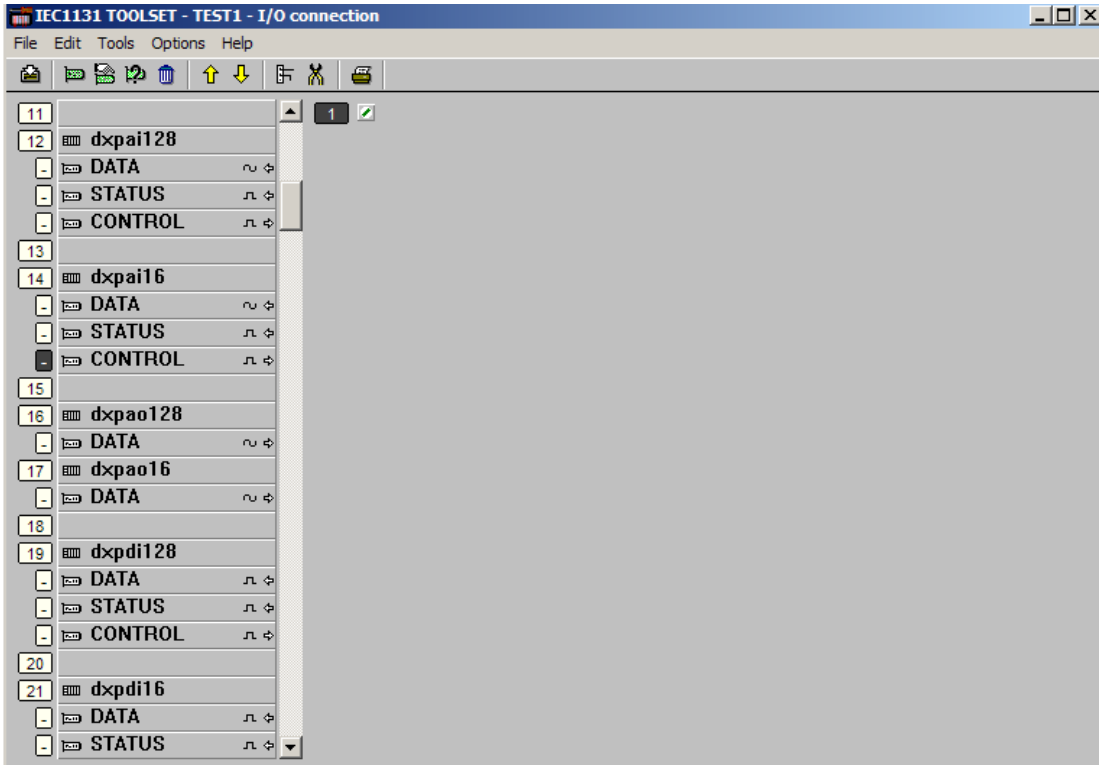

Figure 7 Input Board Control Display

This rack controls the whether the input values hold last state if refresh timer expires or go to 0.

Variable 1: FALSE = Force data to the fail safe state when data is invalid. TRUE = Allow previous data to persist when data is invalid.

2.2.2. Digital Input Boards

Figure 8 shows the data rack display associated with an IEC 61131 Toolset 16 channel digital input board selected for incoming data to a Trusted controller.

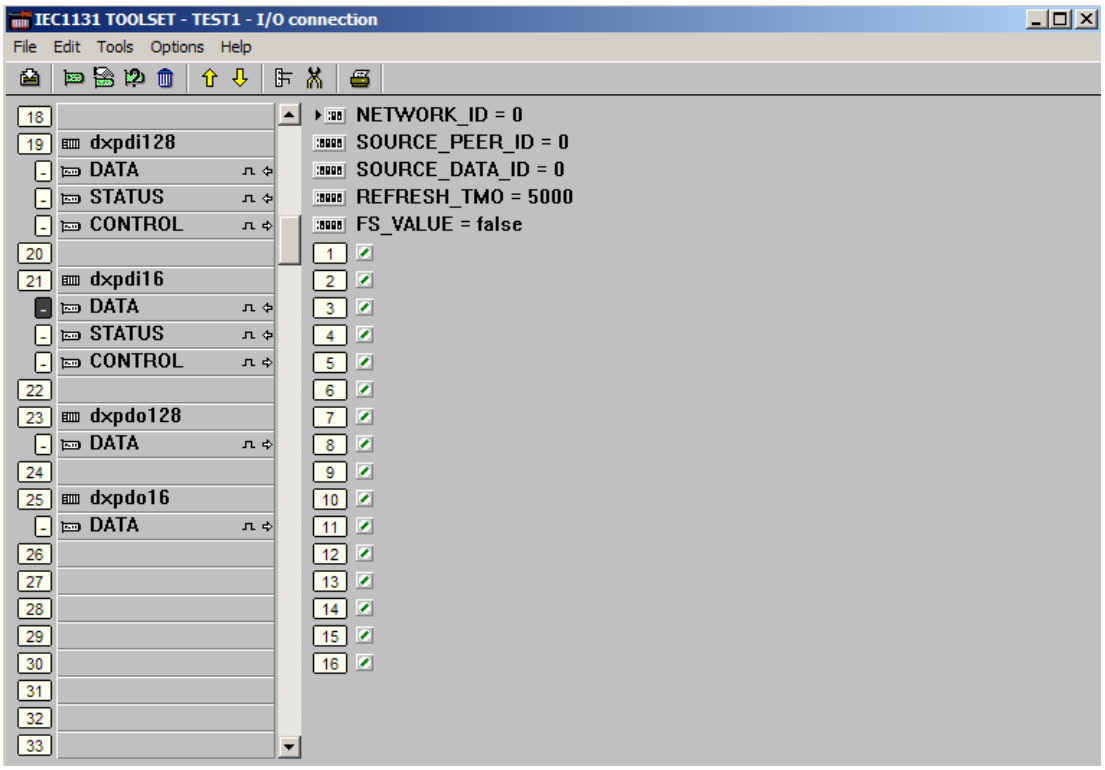

Figure 8 Peer to Peer Input Data Rack Display

The user must enter data as detailed below:

1. NETWORK_ID – The network that is carrying the data. Data will be received via all peer controllers that share this network identity. Range 1 – 8.
2. SOURCE_PEER_ID – The peer that is sending the data. Range 1 – 40.
3. SOURCE_DATA_ID - Unique data block number defined at the output board. Range 1-64.
4. REFRESH_TMO - The maximum number of milliseconds allowed between successive refreshes of input data before the data is declared invalid. Note that following this time the input data will either retain the last received values or revert to a fail-safe condition according to the state of control rack variable 1. Range 1-10000.
5. FS_VALUE - Control value adopted by inputs when input is status has failed. This value is always adopted at application start-up, though it will not be used again while RACK 3:Variable 1 is set TRUE. Range FALSE/TRUE.
6. Boolean variable inputs 1 to 16 – Boolean values received from the corresponding channel of the selected output board in the sending system.
7. The 128 input peer board supports 128 Boolean inputs instead of 16 but is otherwise identical.

Figure 9 shows a display of the refresh status rack of the associated digital input board.

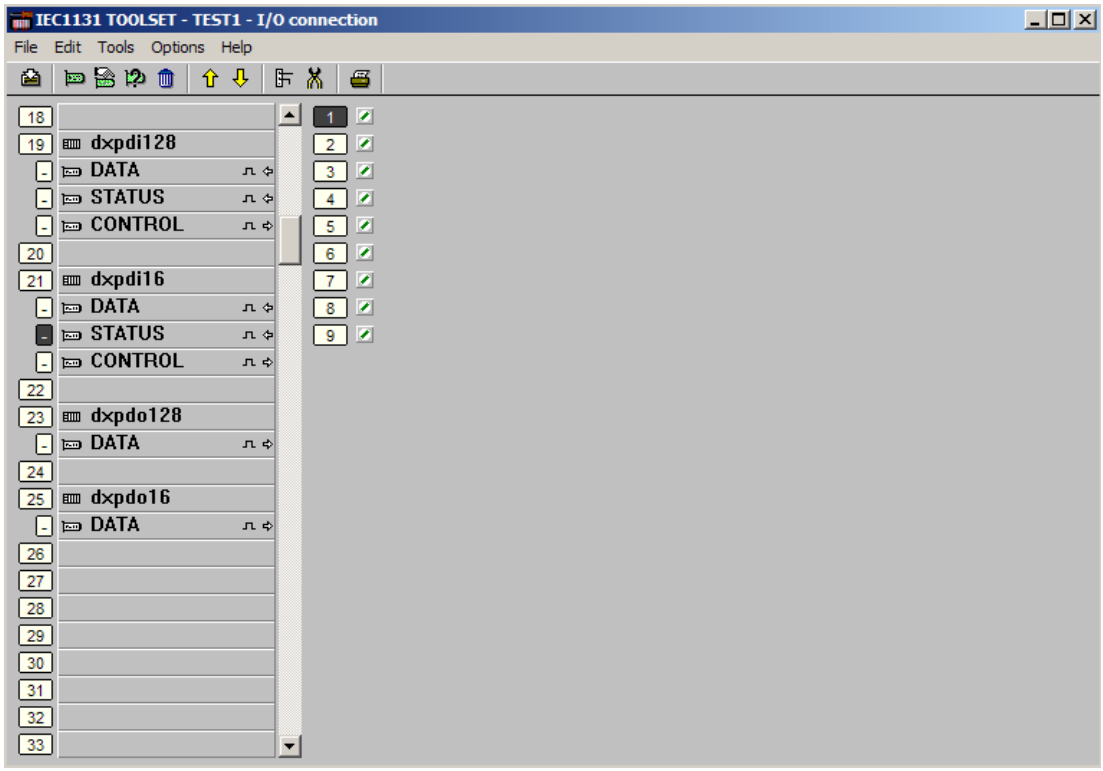

Figure 9 Input Board Status Display

Variable 1: TRUE = Input data is valid, i.e. refreshed within REFRESH_TMO

Variable 2-9: TRUE = Data has been refreshed within REFRESH_TMO by subnet 1-8, respectively. This status is intended for detection of latent faults within a redundant network. The data is delivered over all available programmed subnets simultaneously. If any of these variables goes FALSE for a programmed subnet, then data has failed to arrive on that subnet within the REFRESH_TMO. The variables for programmed subnets may be combined through an AND gate to provide an indication of full redundancy on that particular data path.

Figure 10 shows a display of the control rack of the associated digital input board.

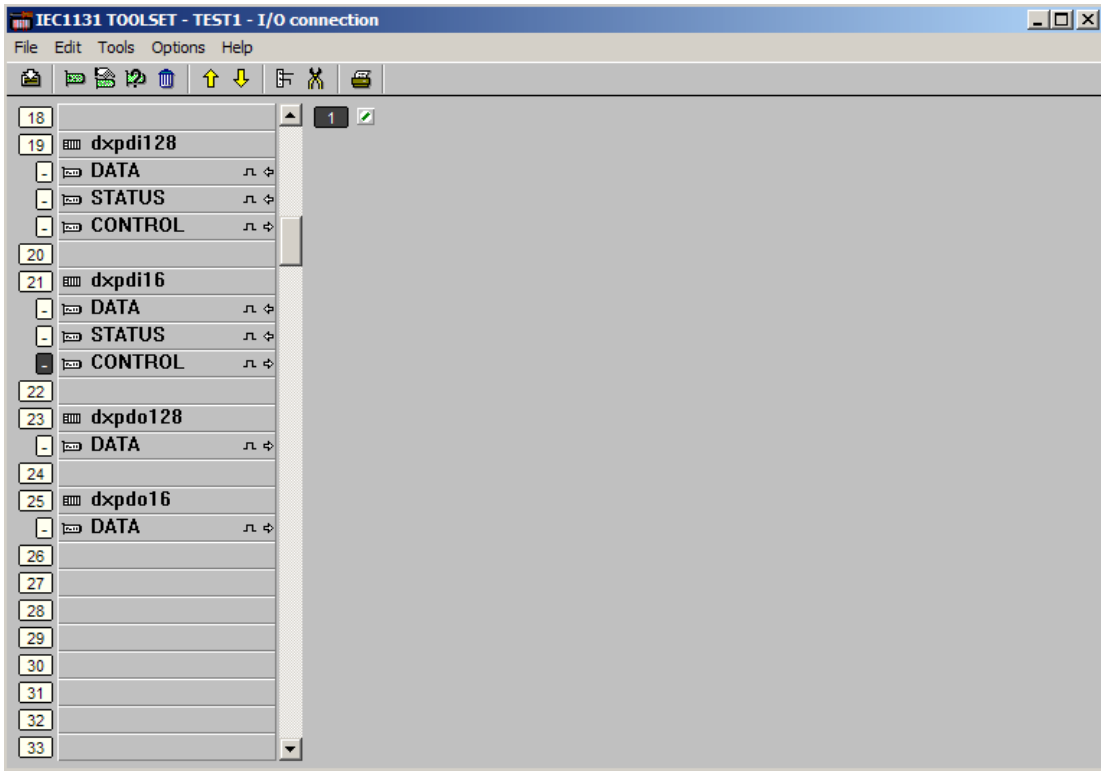

Figure 10 Input Board Control Display

This rack controls whether the input values hold last state if refresh timer expires or go to FALSE.

Variable 1: FALSE = Force data to RACK 1:FS_VALUE when data is invalid. TRUE = Allow previous data to persist when data is invalid.

2.2.3. Analogue Output Boards

Figure 11 shows the display associated with an IEC 61131 Toolset 16 channel analogue output board selected for outgoing data to a Trusted controller.

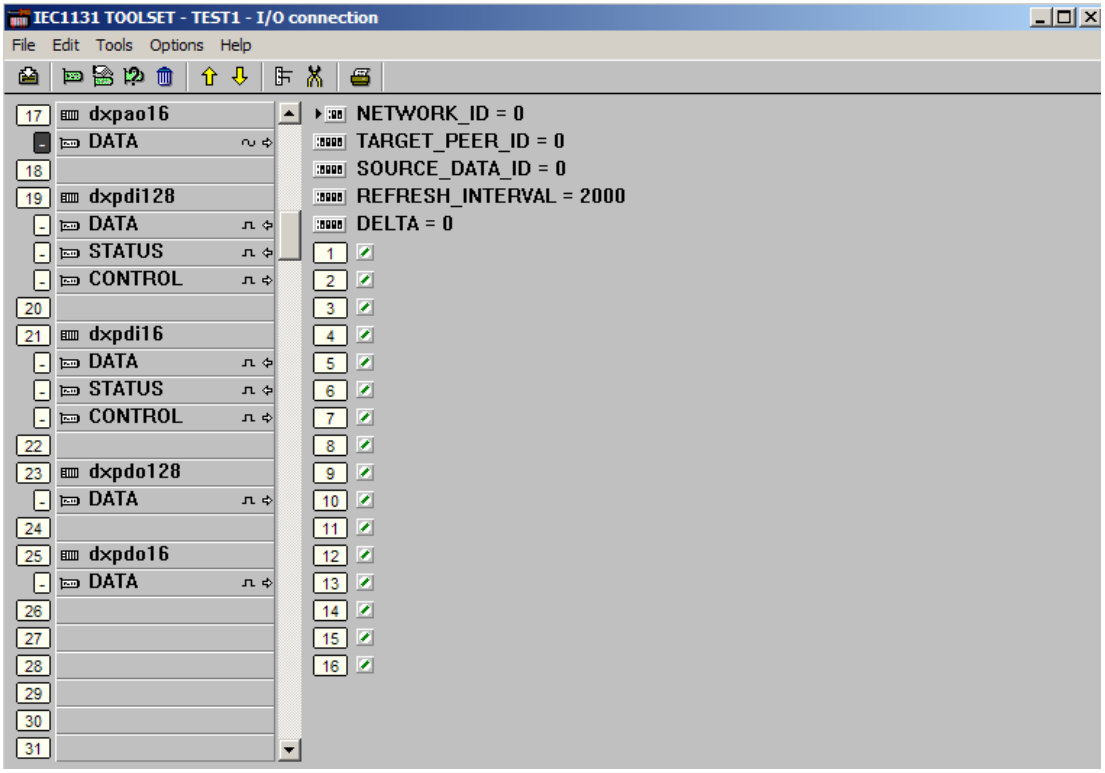

Figure 11 Peer to Peer Analogue Output Board Display

The user must enter data as detailed below:

1. NETWORK_ID – The network that is carrying the data. Data will be received via all peer controllers that share this network identity. Range 1 – 8.
2. TARGET_PEER_ID - The peer that is receiving the data, or the multicast 'peer'. Range 1 – 40.
3. SOURCE_DATA_ID - Unique data block number to allow input boards to distinguish the data. Range 1-64.
4. REFRESH_INTERVAL - The maximum number of milliseconds allowed between successive transmissions of the output data. Note that data will be sent immediately following any change of output state. If a value of zero is specified in this field then data will be refreshed every application scan regardless of output state change. Range 0-10000.
5. DELTA - Minimum change in any output variable required before update is sent to Peer, not withstanding refresh interval. When applied to integers, fractional part is truncated. Range 0 to 9.999999e+038.
6. Analogue variable outputs 1 to 16 – 32 bit integer or real analogue outputs. Note that no conversion will be applied when transferring real or integer data and therefore it is required that each input data variable matches its respective output variable type.
7. The 128 output peer board supports 128 analogue outputs instead of 16 but is otherwise identical. Note that safety related data using 128 analogue channel blocks must be sent via two different input/output block pairs and compared at the receiving input end in the application to ensure safety integrity. Alternatively it may be broken into 16 channel blocks.

2.2.4. Digital Output Boards

Figure 12 shows the display associated with an IEC 61131 Toolset 16 channel digital output board selected for outgoing data to a Trusted controller.

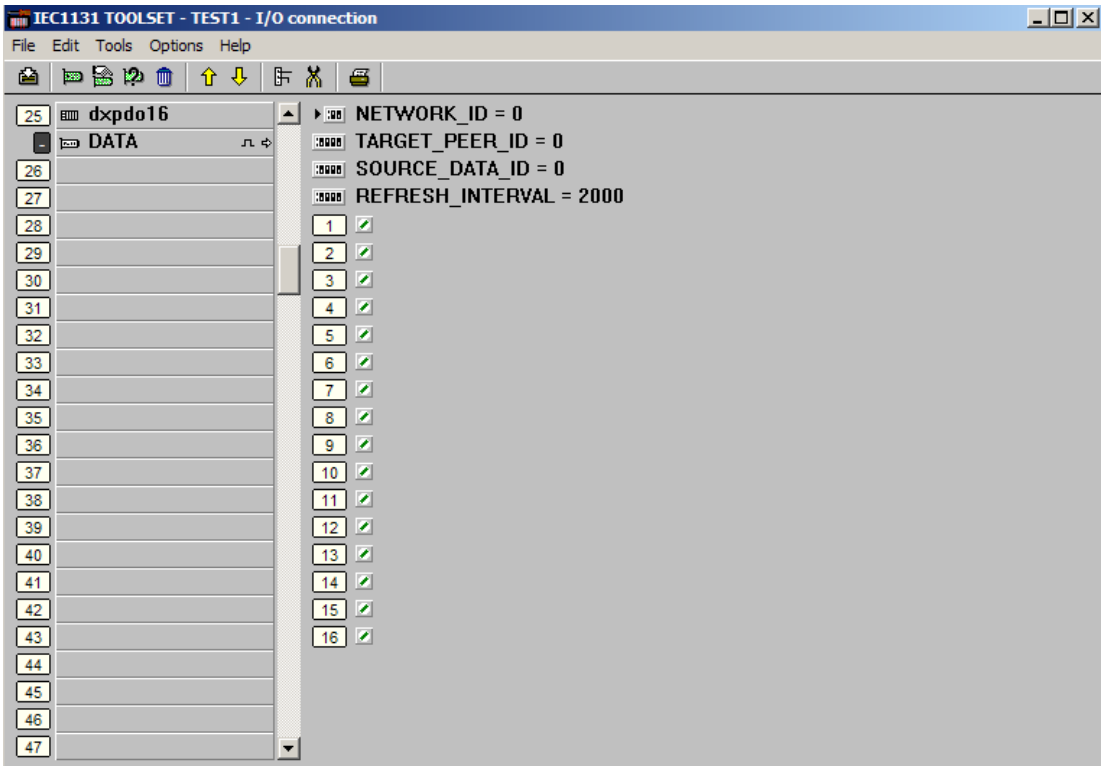

Figure 12 Peer to Peer Digital Output Board Display

The user must enter data as detailed below:

1. NETWORK_ID – The network that is carrying the data. Data will be received via all peer controllers that share this network identity. Range 1 – 8.
2. TARGET_PEER_ID - The peer that is receiving the data, or the multicast 'peer'. Range 1 – 40.
3. SOURCE_DATA_ID - Unique data block number to allow input boards to distinguish the data. Range 1-64.
4. REFRESH_INTERVAL - The maximum number of milliseconds allowed between successive transmissions of the output data. Note that data will be sent immediately following any change of output state. If a value of zero is specified in this field then data will be refreshed every application scan regardless of output state change. Range 0-10000.
5. Boolean variable outputs 1 to 16 – Boolean outputs.
6. The 128 output peer board supports 128 Boolean outputs instead of 16.