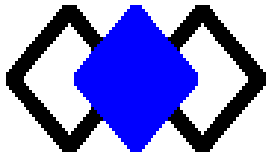
NBT 

Visual Programmer

Visual PLC Programmer

A Windows$_{tm}$ based graphical

functional block diagram

PLC programmer / documentor

- *Slashes RA-PLC programming time*
- *Intuitive operation - No learning curve*
- *Live data monitoring & editing*

Table of Contents

1. Overview

1.1 General

The Visual PLC programmer is a full featured, programming tool for the NBT SM805 family of controllers. It provides a user friendly graphic means of creating the program for a customer specific application. The drawing then provides full documentation for field use and project requirements.
It is used in conjunction with the Sensor Modem Programmer from NBT.

The normal mode is to create a Visio ™ drawing of the RTU hardware and the logic associated with it. This drawing is then "compiled" using the VALIDATE macro program. If there are no errors, the uploadable RTU program file (e.g., *.RTU) is created.

In cases where an RTU file already exists (i.e., in field use) but no corresponding Visio ™ drawing file exists, the REGEN macro can be used to create a drawing file that matches the RTU file.

Pre-defined Master stencils are available for all hardware modules, logic/arithmetic operations and communications transactions (i.e., RTU to RTU, Fax messages, Pager Calls, etc.)

A separate drawing would be created for each individual RTU in a system.

The normal arrangement of pages within a drawing (user definable) is to show the hardware modules on the first page. Following this, would be as many pages as required to show the program logic. Lastly, one or more pages would define any communications transactions with their associated parameters.

The flow of a typical Input-Logic-Output example would entail:

a Digital Input block linked to the hardware point nick-name,
(either by name or by CONNECTOR)

the output of the Dig In block linked to a Logic block(s)

the output of the Logic block linked to a Digital Output block

the output block linked to a hardware output point.

2. Setup

2.1 Installation

If your version of Visio has a "Solutions" subdirectory, you can copy the NBT-VPLC subdirectory (and its contents) into the Solutions subdirectory.

OR

Install the .vst files in the template subdirectory of Visio.

Install the .vss files (stencils) in the solutions subdirectory of Visio.

Install the executable (.exe) files in the "add-ons" subdirectory of Visio.

2.2 Visio Set Up

If your Visio has the tools to set up a custom UI (User Interface), then you may want to add a menu item for the executable (.exe) files added to the add-ons subdirectory.

Otherwise, the executable (.exe) files can be accessed as macros through the tools item in the Visio menu. The use of the executable (.exe) files is explained in later sections.

2.3 Requirements for use:

1. Visio[tm] drawing program.

2. Minimum: 486 -166 , 8MB RAM.
   Recommended: Pentium with at least 16MB RAM.

3. Drawing files can be as large as 800KB. Sufficient hard disk space is necessary.

2.4 Related Files Used:

Drawing Files *.VSD Graphically depict the program and hardware for a RTU. The name of the file cooresponds to the station name of the RTU.

RTU Files *.RTU This is the configuration of an RTU. It defines the register assignments and operation of the station. (Created by SM Programmer or the VPLC/Visio tm program.)

Stencil Files *.VSS Station logic stencil files. These files contain the master shapes for all hardware, logic and communications operations for the SM805. Smart shapes are also available for new page layout. Master shapes are grouped into the following stencil files:

Digital
Analog
I/O Hardware
T2 Buffers (communications operations)
New Page (border, title block, etc.)
Timer Functions
Special Functions

ANN Files *.ANN RTU files edited or created with the SM Programmer will create a ANN (annotations) file which contains comment type support information to accompany the RTU file. (Not used or supported by the VPLC programs)

HRD Files *.HRD Windows Meta Files. RTU files edited or created with the SM Programmer will create a HRD (Hardware) file which, if defined, documents the I/O point assignments of the RTU. (Not used or supported by the VPLC programs)

3. Creating/Editing a Logic Diagram

3.1 Starting a new Drawing

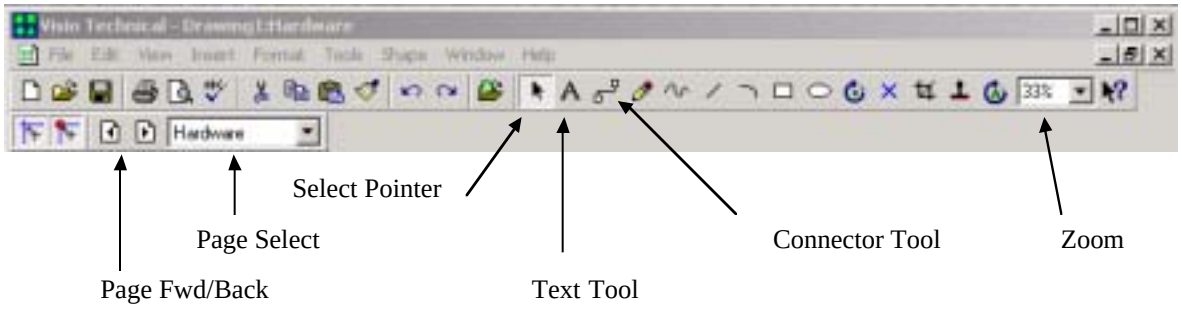
Start Visio. Visio at start-up allows you the option of selecting a template to start a new drawing. If you hit cancel, then you can select "FILE", "New" and then select the NBT-prog template to create a new drawing.

When using NBTPROG.VST to create a new drawing, three pages are defined in the template: 1) Hardware, 2) Logic, and 3) Buffers. (borders, title block are already included) (the new drawing will be named "drawing1" until, finally, it is saved as (i.e., MyFile.vsd.)

The Hardware page is used to place I/O module masters (from the IO module stencil) which define the hardware of the station. IO module masters are base units (only one base unit used per station), digital inputs, digital outputs, analog inputs, analog outputs and counter modules.

Logic pages are used to place Table 1 inputs/outputs and calculated point blocks. Connections are made between inputs and outputs by using the "universal connector" from the tool bar. Each block contains 1 output connection point and 0, 1, 2 or 3 input connection points.

3.2 Intro to Visio Toolbars

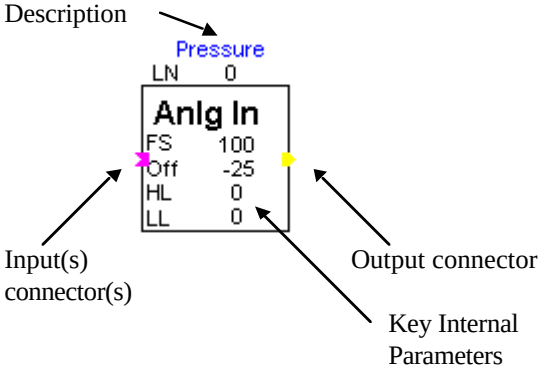


The selection of which toolbars are visible is changable. The above represents the Page toolbar plus the standard Toolbar.

For most operations the Selector Pointer will be active. Use the Connector tool when drawing connections between blocks. (double click a connector to insert a nickname)

3.3 Intro to a Logic Block

Generic Logic block shape:



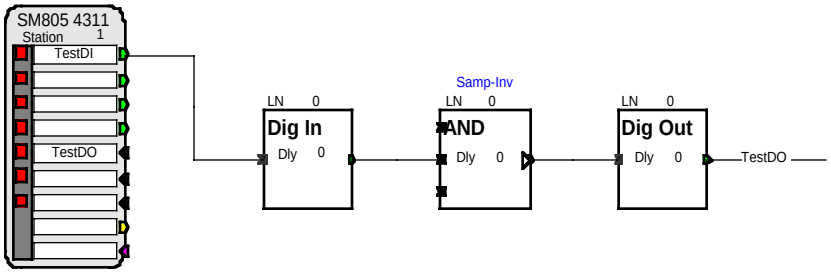
All custom parameters are editable by double-clicking on the symbol.
(DO NOT try to edit parameters by opening the shape group!)

The connection point color denotes whether it is a digital point type (on/off) or an analog point type. The "Dig In", "Dig Out", "Analog In", "Analog Out" and "Counter In" use nicknamed connections to link to the hardware points represented on the Hardware page or to communications buffers defined on the Buffers page.

NOTE: Any of the hardware, logic and buffer master blocks can be placed on any page and linked. It is only convention that specifies the Hardware, Logic and Buffers pages.
Additional pages (typically Logic pages) can be inserted as needed. Use the "Reordering" selection to rearrange pages.

3.4 Sample 1st Program

In the following example we will create a program that reads an input contact, inverts it logically, and outputs it to a digital output for a relay or light. It is illustrated in the Following Figure. Note that the shapes have differing numbers of input connectors (depending on the type). Logical connections can be made two ways: by drawing a line (connector) or by a "nickname". Connectors or IO points having the same "nickname" are considered connected.



3.4.1.1 Create Hardware drawing:

1. Drag a Base Unit shape onto the Hardware page. (shape asks for station address)

2. Double click on base unit. Fill in point names for points to be used.
   (assume 1st DI point= ”TestDI” and 1st DO point= “TestDO”)

3.4.1.2 Go to LOGIC1 page.

1. (on menu: EDIT, GOTO…. (select Logic1 page)
   (NOTE: for illustration this step is not done so all items are on a single page)

2. Drag a Dig In shape off of the D_Logic Stencil onto the page.

3. Drag an AND shape off of the D_Logic Stencil onto the page.
   Just for grins, double click this shape, and set the INVERT parameter to TRUE.

4. Drag an Dig Out shape off of the D_Logic Stencil onto the page.

3.4.1.3 On the Tool Bar, select the “Connector” tool. (close to pointer tool)

1. Draw a connector from the output of the Dig In shape to the input of the AND shape.
   Note that the ends of the connector will be a red square with either a + or x if the connection is made. The end will be a green square if the link was not made. In this case, nudge the connector end away from and then to the shape’s connection pt.

2. Draw a connector from the output of the AND shape to the input of the Dig Out shape.

3. Draw a connecter from the input of the Dig In shape about 1.5 inches to the left.
   (no connection on one end) Double click on the connector and when the text box appears, enter the nickname of the hardware Digital input point (“TestDI”).

4. Draw a connecter from the output of the Dig Out shape about 1.5 inches to the right. (no connection on one end) Double click on the connector and when the text box appears, enter the nickname of the hardware Digital output point ("TestDO").

You have just created an RTU program which will read an input contact, invert it logically, and output it to a digital output for a relay or light.

Save your drawing in the project sub-directory. (It is suggested that you create a project sub-directory per customer job to store files in) Whatever file name you assign will by default become the RTU's name.

Run VALIDATE to validate all of your logic drawing and to generate the RTU file.
(via Menu—"Tools", "Macro", "NBT-vplc", "Validate32")

------- Done!

3.4.2 Page Modes

The Page Mode of all pages in the drawing can be set to "Programming" or "Sampling" by using the Pagemode Macro. (via Tools, Macro, NBTvisplc menu selections) This changes the information that is displayed within each block on the drawing, appropriate to what you are in the process of setting up or reviewing.

Action: With the drawing created above, try changing the display mode to Sampling. Then restore it to Programming Mode.

NOTE: The real time DDE data monitoring macro will automatically put your drawing into the "Real-Time" mode so that current Status (or values) will be shown for logic blocks.

Most configuration work is done in the Programming mode, although the mode is only for visual convenience.

3.4.3 Inserting New Pages

To add pages to a drawing, use the Insert Page operation, and name it accordingly. A blank page will be added to your drawing. Under "Edit", "Drawing Page" the pages can be re-ordered and re-named as desired.

Use the new page stencils to drag the drawing border and title block onto the new page. Note that the information in the title block automatically fills in the file name and the directory and the page name.

CAUTION: *If you type over these fields they are no longer linked to these default fields.*

3.5 Hardware Modules

Stencil name: IO_Hrdw.vss

Hardware blocks are representations of the base unit and its connected modules. Select the "IO-Hrdw" stencil and pick a base or expansion I/O module to drag onto your drawing. A connection point color indicates the nature of that point (i.e., digital in, digital out, analog in, etc.). You will be prompted for an address entry when you drop the block onto your drawing. Module addresses should match the corresponding physical hardware addresses (defined by its jumpers).

Double clicking the block will expose the form to enter (edit) nicknames of the I/O points and the address.

Note: In most cases you will enter nicknames in the block, and there will not be connector lines attached to the connection points on the side of the module.

3.6 Logic

Stencil names: D_logic.vss, A_logic.vss, Timers.vss, SpecFunc.vss

3.6.1 Stencils

Stencils are available for Digital Points, Analog Points, Timer Functions, I/O Modules and Table 2 (communications) buffers.

3.6.2 Custom Properties

(see Appendix A for details of parameters associated with symbols)

Custom properties are accessible by double clicking a block or by selecting a block and using the custom properties selection under the shape menu.

Custom properties of a block are dependent on the block type. Typical custom properties include a descriptive name, an invert selector, an alarm delay value, a sample parameter, high and low limits, decimal point selector, and scaling parameters.

3.6.3 Connections and Nicknames

Connections are made by drawing a universal connector line between two connection points on logic blocks. The connection ends will show as a red * (beginning of connector) or a red + (end of connector). If the universal connector tries to connect to something other than a connection point on a block (i.e., the mid point of a block, etc.), the end will appear as a larger plain red square. If a connection is not made, the end of the connector will show as green.

A connection network is comprised of one and only one source point (block output) and at least one destination (block input). Connectors may be connected together to form a long chain of multiple destinations from a single source. Each network can have a nickname associated with it. (which is the nickname of the source block)

A network may be fragmented across several pages or for appearances sake. Each fragment must then be labeled with the common Nickname for that network. A universal connector with only one end connected to a block must have a Nickname to connect it to a source or destination somewhere in the drawing.

Note that nicknames are also specified in I/O modules and buffers.

3.7 Communications Buffers

Stencil name: T2Buffers.vss

Communications buffers are master symbols in the T2 buffers stencil (they correspond to parameters in a Table 2 line in the RTU). Master symbols are defined for general RTU-to-RTU transfers of register data, fax messages, pager messages, and Comm Status buffers.

Custom properties for buffer blocks allow specification of port, station address, source (or destination) data registers, the type of operation, trigger point (if required), phone number (if required) and where the data should be stored (or retrieved from).

A separate phone number block can be placed on the drawing to provide phone number information (not required for COMM port transactions).

Fax capabilities imply the presence of the internal dial modem in the base unit (P1 port).

3.7.1 Communications Buffer Nicknames

Communications buffer blocks may transfer up to 100 registers of data. In order to specify the nicknames of these individual registers (and/or bits), provision is made for a register list under each buffer block.

The register list is initially displayed as a text label of "point list……". To assign nicknames to this register list click on the buffer block, pause, then click the label mentioned (gray object handles will appear on the text). Select the text tool on the tool bar, and then type in the nickname list.

A register nickname is a single alphanumeric word on a line. Lines are terminated with a 'return'. Thus a list of register names would appear as a single file list of names with the top (first) name corresponding to Register 0 of the block, followed by register 1, register 2, etc.

Bits are entered as multiple nicknames, separated by commas, on a single line which represents a register. Thus several bits would be a comma separated list on a single line, beginning with bit 0 as the first name, etc.

NOTE: If the bit names and commas for a single register contain more characters than will fit on a single display line, then the text will wrap to the next line. It may appear as two lines, but is treated as a single logical line if there is no return at the point where it wraps to the next line.

3.8 Special/Internal Nicknames

There are several internal status nicknames that support RTU functions. These Nicknames are pre-assigned and implicit in every program drawing. (They may not be required or accessed for any given program)

MAJALM -Links to internal Major Alarm point which sets if any points in the major alarm group changes alarm state.

MINALM -Links to internal Major Alarm point which sets if any points in the major alarm group changes alarm state.

ALMRESET -Internal DO type which resets major and minor alarm flags.

CS1 - CS60 -Automatic link names for comm status of each Table 2 line (buffer).

MYCS -Links to Master (up-stream) communication status indicating whether unit is being polled.

3.9 Selecting Display Points

The natural order of assigning line numbers within a drawing is based the following order:

Drawing Page sequence.

Placement order of blocks on a page.

Re-ordering of points on a single page can be effected by sending blocks forward or backward (via the Shape menu). Line numbers are assigned in order from the back most block to the front most block.

In order to specify blocks on any page that are desired to be at the lowest line numbers (line numbers are Table 1 line numbers in the RTU) for reasons of display order on the RTU panel display, you can select one

or multiple blocks on a page and run the VisDisp add-on program. It will give you the choice of marking the selected blocks for display preference or de-selecting them for display preference.

All blocks marked for display preference (on any page) will be assigned the lowest line numbers when the program is generated.

3.10 RTU Alarm groups

Alarm Groups

The alarm group parameter specifies if a shape (point) is to be included in either the major or minor alarm groups.

The Major and Minor alarm groups cause activation of an associated built in alarm point. These built in alarm points can be accessed by a DIG IN shape with a named input connector, with a name of MAJALM or MINALM.

Any point that is specified to be in either of these groups will set the cooresponding built in alarm bit when the member point changes state(digitals) or changes alarm state (analog hi/lo limit).

Resetting of the MAJALM or MINALM points is accomplished by having a DIG OUT shape with a named output connector, named RESMAJ or RESMIN.

These built-in points are convenient for common alarm light, audible alarm or communications trigger.

3.11 Sampling and Min/Max Reset

Each logic block is capable of recording a timestamped sample on a minute interval, an hour interval, or based on the turn on strobe of another line which can be set by any user defined conditions.

For review, after a diagram has been created, you can use the Pagemode macro to change the display mode of all the pages to display Sampling parameters. Then you can review or select any logic block(s) and set the sampling type and/or the Min/Max reset parameters so that recording or operator use of that information can be effected.

Also, each logic block can have the Min/Max registers reset at midnight each day or continue indefinitely to record Min/Max values until manually or programmatically reset.

Note that for digital logic blocks, the Min/Max registers record Elapsed Time and start Cycles.

4. Creating the RA-PLC program file (Validate)

4.1 Validating Connections

The Validate add-on program (validate.exe) is used to read the data from a program drawing file and validate the connections and nicknames used to connect the blocks. This process may take a few minutes for large program drawings with many pages and many blocks.

If errors are detected, they are displayed for review in a list box, and shown in red on the drawing page.

Hint: *Do not close the list box* until the errors listed have been thoroughly reviewed (and corrected). Just click on the Visio drawing page to have the drawing come to the front for editing. After correcting a problem, either minimize the drawing so the list box is visible again or go to the list box via the task bar.

After all errors have been corrected, simply close the error list box and run the Validate function again.

If no errors are detected during the validate procedure, you are given the choice to generate the RTU program file(xxx.rtu). The name of the RTU file is the same as the drawing file that it is created from. A cross reference file (xxx.txt) is generated which lists the summary programming information in a text format.

4.2 Uploading the Program File

Once the RTU file has been generated, it can be uploaded to the RTU via a serial connection (or via a modem connection). This is accomplished using the Sensor Modem programmer in the ONLINE mode.

4.3 Cross Reference Information

The cross reference file lists the following in a text format (comma separated):

For Table 1:

Nickname, Row, Page, Source, Direct Tag, Description

For Table 2 (Buffers):

Row, Offset, T2 Register Tag, Nickname

Error messages (if any) and the file information is also printed.

4.4 Running VALIDATE Macro

After completing the construction of a drawing, save the drawing. Then, select TOOLS, MACRO, NBT-VPLC32, VALIDATE.

The VALIDATE form will pop-up and ask if you want to re-number all lines or simply re-number added lines. Selecting re-number all lines will evaluate and re-assign all line numbers in the order of the shapes in the drawing (back to front symbol order within a page and first page to last)

Selecting re-number added lines will preserve previously assigned line numbers and generate line numbers for any newly added shapes.

5. Re-creating a Diagram (from an existing program) (Regen)

5.1 Downloading PLC Program to PC

The Sensor Modem programmer is used to off-load programs from an RTU via a serial connection.

5.2 Re-creating Drawing

First, download the RTU file to your hard drive. Then use the VisReGen add-on to select the RTU file. This will create a new drawing for that file. Since the drawing is created from the RTU file, it will not contain comment text or other amenities that would normally be found in drawings created manually. Also, VisReGen attempts to organize the program drawing in a logical manner but may need minor editing to shift overlapping connectors or to make things more visually appealing.

Note that if you subsequently run Validate with the "Renumber All Lines" option, the line numbers will be reassigned in a completely different order than the original program.

5.3 REGENerating a Drawing -Details

See also: Reading/Writing RTU Files

If an RTU file exists in a RTU, first offload it to a PC resident file (*.RTU) using the Sensor Modem Programmer.

To regenerate a Visio drawing that reflects the RTU file:

Start Visio without any open files.
Go to the menu and select: Tools, Macro, NBT-VPLC and VIS-REGEN.

You then have the option of doing a complete drawing file regeneration or a subset (just Table 1).

Note: Just as disassembly operations cannot recover "comment" information, Regenerating a drawing can only approximate the layout of an original drawing. The drawing will accurately reflect the program, but will be arranged differently, not contain supplimentary comments, etc.

In order to get maximum use of the regenerated file, you may need to do some re-arrangement to minimize overlapping lines, increase readability, etc. Also, clarifying remarks may need to be added.

6. Monitoring Live Data from a PLC (VisDDE)

The Visual Logic drawing may be used to monitor live data from the RTU on the drawing itself. The Vis-DDE add-on is used to connect the drawing to the DDE server and thus the physical RTU selected by the DDE Topic. Live data is retrieved for the currently active and selected display page only.

6.1 Live Page Modes

The VisDDE macro will automatically change the page mode in the drawing to “Real Time”. Labels showing ON (OFF) will be visable next to each block output. Analog blocks will show the current value of the block (within the block itself). (Note: a value is displayed even if the drawing is not actively linked to an RTU.)

6.2 DDE Topics

The DDE topic is the RTU name that the DDE server uses to link to a particular station. That name must be used to select the station to view in the fields of the VisDDE pop-up window.

6.3 Connecting

A connect button in the VisDDE window activates the connection with the RTU. Live data will then be routed to the selected page of the drawing.

6.4 Live Editing Functions

While connected to a live RTU, selected parameters can be modified in either the RTU or in the drawing. Such parameters as delays, limits, sample selector and scaling values can be modified from the VisDDE point edit window.

7. FAQ / Troubleshooting

7.1 Frequently Asked Questions

1. How do I restore the normal colors after errors have been detected by the Validate macro?
After correcting errors, re-run the Validate macro. If it completes with no errors, connectors will return to their normal colors.

2. When an error is detected and an I/O module turns red, it remains red when the error is corrected. Why? And how can I change it back to the normal color?

This condition is a refresh limitation in Visio. To correct this condition, select the I/O module and go to the menu item: Format- Layer. Simply click OK. (The pop-up will show the layers that the selected I/O is a member of. If the error has been corrected, none of the layers will be highlighted.)

3. After running REGEN, it seems that the descriptions and values associated with shapes is displayed with a vertical alignment instead of the normal horizontal printing. Why?

When programmatically generating a drawing, the width of certain text fields is initially 0 since there is no associated text to define the width in the smart shape. This condition can easily be remedied (for the entire drawing) by going to the menu item: File- Page Setup. Then simply click OK.

7.2 Known Limitations

The only known limitation of the VALIDATE and REGEN macros is that they DO NOT support the UNITS field in the RTU. This is a display only field and does not impact operation. It's primary function is for user convenience and clarity when in the RAPLC programmer online mode.

7.3 ERROR INDICATORS

Connection errors detected by VALIDATE are flagged by changing all of the connections in the erring network to red. I/O modules that have name errors will also turn red.

Errors include:

1. Multiple nicknames in a single network.
2. Multiple outputs (sources) in a single network.
3. Analog and digital types connected in a single network.
4. Network with no source.

. 5. Hardware connected to other than In/Out blocks.
(intermixed logic and I/O network)

In addition, the macro form will display a list of errors, including page location, for operator use.

7.4 Tech Support

Product Support

If you have any questions regarding the use of this product please call or Fax us.

Phone (952) 928-8872
FAX (952) 928-8874
WWW techsupport@nbtinc.com

7.5 OTHER APPLICATIONS

NBT provides other supporting applications and files to support the Monitor program:

Sensor Modem Programmer- This program is used to program an NBT 800 series RTU. This can be accomplished OFFLINE (creating a downloadable RTU file) or ONLINE (connected to a live RTU). Supports XMODEM upload and download operations and interactive log-on with RTU.
NOTE: This is required for use with the Visual Programmer.

Alarm Pager- This program can be run in the background and links to the Monitor program to provide numeric pager calls for Communications failures, digital changes of state or analog limit alarms. Any points selected for 'local' alarming in the monitor will trigger calls. Manually triggered messages can be set up also.

Excel Reports Template- A daily and monthly report template for use with sampled data collected into CSV files.

Reports Control Database An ACCESS Report Control Form containing macros to display RTU Historic sample data in table, report or graphic form.

Other Files available from NBT:

Visio page layout template- provides a scaled blank page convenient for creating additional customized Visio drawings (for background pictures) (Windows Metafiles)

Visio pipe and pump templates

SM305 and SM315 RTU templates

Note that VISIO, ACCESS and EXCEL are commercial software packages that are complatable with the VPLC programs, but are *not provided* as part of the VPLC package.

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8. Appendix A- Master Shapes

Color Codes:

Connector points on a logic or hardware shape are color coded to facilitate making connections between blocks:

Digital Point-Input	(Destination)		Black
Digital Point-Output	(Source)	Green	
Analog Point- Input	(Destination)		Magenta
Analog Point-Output	(Source)	Yellow	
Counter HW Point	(Source)	Red	
Enable Signals (digital)	(Destination)		Blue

8.1 I/O Hardware Shapes

Base Modules	4311 model
	2240 model
Digital Modules	8 Pt Digital Input
	8 Pt Digital Output
	16 Pt Digital Output
Analog Modules	8 Pt Analog Input
	4 Pt Analog Output
Counter Input	4 Counters/4 Rates & 4 Digital Inputs

8.2 Logic Shapes

Digital Logic Shapes

Digital Input
Digital Output
AND (NAND)
OR (NOR)
XOR (NXOR)
LATCH
MUX- (2 Input Selector)
Controller (Pump-In or Pump-Out)
Change Detect (Edge Detect)
Greater Than Limit
Less Than Limit
Compare Analog Values
Count Down

Analog Logic Shapes

Analog Input
Analog Output
HS Counter Input
Analog Input Totalizer
Logic (Calc) Totalizer
ADD
SUBTRACT
MULTIPLY
DIVIDE
MUX- (2 Input Selector)
CLIP

Communications Buffers Shapes

RTU-RTU Send/Read
Table 1
FAX
PAGER
Communication Status
Local Transfers
Phone Number List

TIMER Shapes

Cycle Timer
One Shot (0.1sec, 1 sec)
Date Compare
Time of Day

New Page Shapes

Border
Title Block
Page Mode Block
Revision Block

8.3 Special Functions

Copy From

This shape allows a user to specify whether the input value is obtained from the current value of a connected shape or from its Minimum value, Maximum value (for analog shapes) (alternately # of starts or Elapsed time for digital shapes), or its High or Low Limit values (analog shapes only). This is useful to get totalizer (hi & lo words) into registers for transfer or display.

Copy To

Annunciator- (This is an automatically generated BASIC program)
4 Pump Controller- (This is an automatically generated BASIC program)
Connections:

For input links- Use any labeled connector or direct connection to the input connection point from any Table 1 logic symbol, except for the outputs of DigOuts or AnlgOuts and inputs of DigIns and AnlgIns.

For output links, draw a connector from the connection point on the block to any Table 1 connection, except for the outputs of DigOuts or AnlgOuts and inputs of DigIns and AnlgIns. NOTE: The output of these BASIC special functions can only be connected to a single Table 1 logic shape. Also, the connected shape needs to "hold" the value from the BASIC special function. This is accomplished by connecting to a LATCH or to an AND block with no invert. The output of that shape can then be connected to other various output shapes, etc.

8.4 Custom Properties

See also: Individual Shapes List

Double clicking on a master shape will reveal any user enterable custom properties associated with that shape.
The following is a list of parameters. A subset of these parameters apply to any given shape.

Line Number	Reflects line number in RTU Table 1. (Automatically assigned)
Description	(Used for description in RTU Line, unless output is nicknamed.)
Invert	(digital) Indicated by triangle on output. Logically inverts output.
Scaling Full Scale	(analog) Determines EU fullscale value.
Scaling Offset	(analog) Determines EU range.
RTU AI scaling:	EU= (RAW% *(FS-Offset))+Offset
High Limit	(analog) Threshold limits:
Low Limit	(analog) " Used for triggering events or controller,<, > functions.
Sampling	Used to specify capture of data for historical recording.
Alarm Delay	Delay time (sec) that condition must exist before alarm. (or output).

8.5 Individual Shape Parameters

8.5.1 Base Shape Parameters

Represents physical base I/O module.

Parameters:

8 (9)	User Assigned names for points. (2240 or 4311)
Station Number	Set to match physical station number.

8.5.2 Digital I/O Shape Parameters

Represents physical expansion I/O module. (DI= 8 points, DO= 8 or 16 points)

Parameters:

8(16) I/O point names.	Nicknames used to link to Logic blocks
Module address	Set to match physical module address.

8.5.3 Analog I/O Shape Parameters

Represents physical expansion I/O module. (AI=8 points, AO=4 points)

Parameters:

8(4) I/O point names.	Nicknames used to link to Logic blocks
Module address	Set to match physical module address.
Resolution:	10 Unsigned, 10 Bipolar, 12 Unsigned, 12 Bipolar (set to match model and jumper settings of module)

8.5.4 Counter In Shape Parameters

Represents physical expansion I/O module. This module provides 4 high speed counter inputs (~2000Hz) and 4 standard digital inputs. The HS counter inputs (first 4 points) can be linked to:

Logic Counter Inputs to accumulate a scaled pulse totalizer
Logic Analog Input to read the associated 'Pulse Rate'
Logic Digital Input to read normal digital status (open/close).

Parameters:

8 I/O point names.
Module address

8.5.5 Logic DI Parameters

Used to read physical point value into logic area.
Auxilliary registers provide # Cycles and Elapsed On Time.

Parameters:

Description:	Text field.	
Invert:	True/False	(True: open contact in = on state)
Delay:	Delay in seconds that output will lag	

Sampling Trigger:	line # which is the trigger or
	250= sample on change of state
	251= sample every minute
	252= sample every hour
	253= sample MM values every hour	

#Cyc/ET Daily Reset	T/F	(False = no reset)
Sample #Cycles/ElapsedTime	T/F	(False= sample Curr Value)
Alarm Group	Select if member of Major or Minor alarm groups.	

8.5.6 Logic DO Parameters

Used to write linked logical input to physical point.
Auxilliary registers provide # Cycles and Elapsed On Time.

Parameters:

Description: Text field.
Delay: Delay in seconds that output will lag
Sampling Trigger: line # which is the trigger or
250= sample on change of state
251= sample every minute
252= sample every hour
253= sample MM values every hour
#Cyc/ET Daily Reset T/F (False = no reset)
Sample #Cycles/ElapsedTime T/F (False= sample Curr Value)

8.5.7 Logic AI Parameters

Used to read physical point value into logic area.
Auxilliary registers provide Maximum and Minimum values.

Parameters:

Description: Text field.
Delay: Delay in seconds that output must exceed limit before “alarm” is set.
Decimal Point
Sampling Trigger: line # which is the trigger or
250= sample on change of state
251= sample every minute
252= sample every hour
253= sample MM values every hour
Min/Max Daily Reset T/F (False = no reset)
Sample Min/Max T/F (False= sample Curr Value)
High Limit High threshold value
Low Limit Low Threshold value
EU Full Scale Scaling Value
EU Offset Scaling Value
Alarm Group Select if member of Major or Minor alarm groups.

8.5.8 Logic AO Parameters

Used to write linked logical input to physical point.
Auxilliary registers provide Maximum and Minimum values.

Parameters:

Description: Text field.
Delay: Delay in seconds that output must exceed limit before “alarm” is set.
Decimal Point
Sampling Trigger: line # which is the trigger or
250= sample on change of state
251= sample every minute
252= sample every hour
253= sample MM values every hour
Min/Max Daily Reset T/F (False = no reset)
Sample Min/Max T/F (False= sample Curr Value)

High Limit	High threshold value
Low Limit	Low Threshold value
EU Full Scale	Scaling Value
EU Offset	Scaling Value
Alarm Group	Select if member of Major or Minor alarm groups.

8.5.9 Logic AND Parameters

Function: Logically ANDs (NANDs) 3 linked input points.
True Output: All linked inputs =1. (Unlinked inputs do not affect output)
Auxilliary registers provide # Cycles and Elapsed On Time.

Parameters:

Description:	Text field.	
Invert:	True/False	(True= NAND)
Delay:	Delay in seconds that output will lag	

Sampling Trigger:	line # which is the trigger or
	250= sample on change of state
	251= sample every minute
	252= sample every hour
	253= sample MM values every hour	

#Cyc/ET Daily Reset	T/F	(False = no reset)
Sample #Cycles/ElapsedTime	T/F	(False= sample Curr Value)
Alarm Group	Select if member of Major or Minor alarm groups.	

8.5.10 Logic OR Parameters

Function: Logically ANDs (NORs) 3 linked input points.
True Output: Any one (or more) linked inputs =1.
(Unlinked inputs do not affect output)
Auxilliary registers provide # Cycles and Elapsed On Time.

Parameters:

Description:	Text field.	
Invert:	True/False	(True= NOR)
Delay:	Delay in seconds that output will lag	

Sampling Trigger:	line # which is the trigger or
	250= sample on change of state
	251= sample every minute
	252= sample every hour
	253= sample MM values every hour	

#Cyc/ET Daily Reset	T/F	(False = no reset)
Sample #Cycles/ElapsedTime	T/F	(False= sample Curr Value)
Alarm Group	Select if member of Major or Minor alarm groups.	

8.5.11 Logic XOR Parameters

Function: Logically XORs (NXORs) 3 linked input points.
True Output: One and only one of linked inputs =1.
(Unlinked inputs do not affect output)
Auxilliary registers provide # Cycles and Elapsed On Time.

Parameters:

Description:	Text field.

Invert: True/False (True= NXOR)
Delay: Delay in seconds that output will lag
Sampling Trigger: line # which is the trigger or
250= sample on change of state
251= sample every minute
252= sample every hour
253= sample MM values every hour
#Cyc/ET Daily Reset T/F (False = no reset)
Sample #Cycles/ElapsedTime T/F (False= sample Curr Value)
Alarm Group Select if member of Major or Minor alarm groups.

8.5.12 Logic ADD Parameters

Function: Logically ADDs 3 linked input points and/or constant. (Range= +-32767)
(Unlinked inputs do not affect output)

Parameters:

Description: Text field.
Delay: Delay in seconds that output must exceed limit before “alarm” is set.
Sampling Trigger: line # which is the trigger or
250= sample on change of state
251= sample every minute
252= sample every hour
253= sample MM values every hour
High Limit High threshold value
Low Limit Low Threshold value
Min/Max Daily Reset T/F (False = no reset)
Sample Min/Max T/F (False= sample Curr Value)
Alarm Group Select if member of Major or Minor alarm groups.

8.5.13 Logic SUB Parameters

Function: Logically SUBs 1(2) linked input points and/or constant from 1st input. (Range= +-32767)
(Unlinked inputs do not affect output)

Parameters:

Description: Text field.
Delay: Delay in seconds that output must exceed limit before “alarm” is set.
Sampling Trigger: line # which is the trigger or
250= sample on change of state
251= sample every minute
252= sample every hour
253= sample MM values every hour
High Limit High threshold value
Low Limit Low Threshold value
Min/Max Daily Reset T/F (False = no reset)
Sample Min/Max T/F (False= sample Curr Value)
Alarm Group Select if member of Major or Minor alarm groups.

Logic Totalize Parameters

Function: Logically Totalizes linked input point. Result is in auxiliary registers (same as min/max) (Range= 99999999)
(Note: separate shapes are used for physical vs calc totalizers)

Parameters:

Description: Text field.
Delay: Delay in seconds that output must exceed limit before "alarm" is set.
Sampling Trigger: line # which is the trigger or
250= sample on change of state
251= sample every minute
252= sample every hour
253= sample MM values every hour
High Limit High threshold value
Low Limit Low Threshold value
Min/Max Daily Reset T/F (False = no reset)
Sample Min/Max T/F (False= sample Curr Value)
Alarm Group Select if member of Major or Minor alarm groups.

8.5.14 Logic CLIP Parameters

Function: Logically CLIPs linked input point to the range specified by:
a) this point's high/low limit values, or
b) the source point's high/low limits.

The result can be optionally be scaled to percent (0-100).
(Range= +-32767) (Unlinked inputs do not affect output)

Parameters:

Description: Text field.
Delay: Delay in seconds that output must exceed limit before "alarm" is set.
Sampling Trigger: line # which is the trigger or
250= sample on change of state
251= sample every minute
252= sample every hour
253= sample MM values every hour
Min/Max Daily Reset T/F (False = no reset)
Sample Min/Max T/F (False= sample Curr Value)
High Limit High threshold value
Low Limit Low Threshold value
Alarm Group Select if member of Major or Minor alarm groups.

8.5.15 Logic Change Detect Parameters

Function: Logically detects leading, trailing or both edges of the linked input point.

True Output: Pulse, on detection of specified edge (rising/falling/both).
Auxilliary registers provide # Cycles and Elapsed On Time.

Parameters:

Description: Text field.
Invert: True/False
Delay: Delay in seconds that output will lag
Sampling Trigger: line # which is the trigger or
250= sample on change of state

251= sample every minute
252= sample every hour
253= sample MM values every hour

Alarm Group Select if member of Major or Minor alarm groups.

8.5.16 Logic Cycle Timer Parameters

Function: Time based pulse output which goes set every time specified interval expires.

True Output: All linked inputs =1. (Unlinked inputs do not affect output)

Parameters:

Description: Text field.
Invert: True/False
Delay: Delay in seconds that output will lag
Sampling Trigger: line # which is the trigger or
250= sample on change of state
251= sample every minute
252= sample every hour
253= sample MM values every hour
Min/Max Daily Reset T/F (False = no reset)
Sample Min/Max T/F (False= sample Curr Value)

8.5.17 Logic Time of Day Parameters

Function: Goes True when current time matches Minute and Hour parameters and Day-of-week parameter.
If Minute parameter is 0, then match is on Hour parameter only.
If Hour parameter is 0, then match is on Minute only.

Parameters:

Description: Text field.
Sampling Trigger: line # which is the trigger or
250= sample on change of state
251= sample every minute
252= sample every hour
253= sample MM values every hour
Min/Max Daily Reset T/F (False = no reset)
Sample Min/Max T/F (False= sample Curr Value)

8.5.18 Logic Date Check Parameters

Function: Goes True when current time matches Month and Day parameters.
If Month parameter is 0, then match is on Day parameter only.
If Day parameter is 0, then match is on Month only.

Parameters:

Description: Text field.
Sampling Trigger: line # which is the trigger or
250= sample on change of state

251= sample every minute
252= sample every hour
253= sample MM values every hour

Min/Max Daily Reset	T/F	(False = no reset)
Sample Min/Max	T/F	(False= sample Curr Value)

8.5.19 Logic Multiplexer (Selector) Parameters

Function: Logically selects 1 of 2 linked input points based on state of 3rd linked input (selector).

Output: =Input #1 if selector =0, =Input #2 if selector =1.

Parameters:

Description:	Text field.
Invert:	True/False
Delay:	Delay in seconds that output will lag
Sampling Trigger:	line # which is the trigger or
	250= sample on change of state
	251= sample every minute
	252= sample every hour
	253= sample MM values every hour
Min/Max Daily Reset	T/F (False = no reset)
Sample Min/Max	T/F (False= sample Curr Value)
Alarm Group	Select if member of Major or Minor alarm groups.

8.5.20 Logical LATCH

Function: Provides Latching function of Set and Reset inputs. Either Level sensitive or Edge sensitive inputs can be selected.

Output: Maintains state of last true Set or Reset input. If ambiguous input, Reset prevails.

Enable Input, if used, must be logically ON to enable Latch operation.
Auxilliary registers provide # Cycles and Elapsed On Time.

Parameters:

Description:	Text field.
Level Sensitive Inputs	True/False
Sampling Trigger:	line # which is the trigger or
	250= sample on change of state
	251= sample every minute
	252= sample every hour
	253= sample MM values every hour
Cyc/ET Daily Reset	T/F (False = no reset)
Sample Cyc/ET	T/F (False= sample Curr Value)
Alarm Group	Select if member of Major or Minor alarm groups.

8.5.21 Logic Controller Parameters

Function: Provides Latching function of HI or LOW Threshold trigger inputs for either 'Pump In' or 'Pump Out' control.

Output: Maintains state of last true Set or Reset input. If ambiguous input, Reset prevails.

Enable Input, if used, must be logically ON to enable Latch operation.
Auxilliary registers provide # Cycles and Elapsed On Time.

Parameters:

Description:	Text field.	
Pump In	True/False	(False= Pump Out)

Sampling Trigger:	line # which is the trigger or
	250= sample on change of state
	251= sample every minute
	252= sample every hour
	253= sample MM values every hour	

Cyc/ET Daily Reset	T/F	(False = no reset)
Sample Cyc/ET	T/F	(False= sample Curr Value)
Alarm Group	Select if member of Major or Minor alarm groups.	

8.5.22 Logic MULT Parameters

Function: Logically MULTIPLYs 3 linked input points and/or constant. (Range= +-32767)

(Unlinked inputs do not affect output)

Parameters:

Description:	Text field.
Delay:	Delay in seconds that output must exceed limit before “alarm” is set.

Sampling Trigger:	line # which is the trigger or
	250= sample on change of state
	251= sample every minute
	252= sample every hour
	253= sample MM values every hour

Min/Max Daily Reset	
Sample Min/Max	
High Limit	High threshold value
Low Limit	Low Threshold value
Alarm Group	Select if member of Major or Minor alarm groups.

8.5.23 Logic DIV Parameters

Function: Logically DIVIDEs 1st linked input point by 2nd linked input and then scaled by 10 ^x, where x=0,1,2, 0r 3. (Range= +-32767)

(Unlinked inputs do not affect output)

Parameters:

Description:	Text field.
Delay:	Delay in seconds that output must exceed limit before “alarm” is set.

Sampling Trigger:	line # which is the trigger or
	250= sample on change of state
	251= sample every minute
	252= sample every hour
	253= sample MM values every hour

Min/Max Daily Reset
Sample Min/Max
High Limit High threshold value
Low Limit Low Threshold value
Alarm Group Select if member of Major or Minor alarm groups.

8.5.24 Logic High Speed Counter Parameters

Function: Logically reads pulse total from CTRIN hardware into 8 digit counter in Max/Min registers. (Current value is not used)

Parameters:

Description: Text field.
Sampling Trigger: line # which is the trigger or
250= sample on change of state
251= sample every minute
252= sample every hour
253= sample MM values every hour
Min/Max Daily Reset
Sample Min/Max
EU Full Scale Scaling Value
EU Offset Scaling Value
Alarm Group Select if member of Major or Minor alarm groups.

8.5.25 Compare Values Parameters

Function: Provides Comparison of 1st and 2nd inputs (analogs).
Output: State is true if 1st input is > the 2nd input.
Enable Input, if used, must be logically ON to enable operation.
Auxilliary registers provide # Cycles and Elapsed On Time.

Parameters:

Description: Text field.
Pump In True/False
Sampling Trigger: line # which is the trigger or
250= sample on change of state
251= sample every minute
252= sample every hour
253= sample MM values every hour
Min/Max Daily Reset
Sample Min/Max
Alarm Group Select if member of Major or Minor alarm groups.

8.5.26 Greater than High Limit Parameters

Function: Digital point which provides detection of an analog point exceeding its high limit.
Output: State is true if analog point exceeds its high limit.
Enable Input, if used, must be logically ON to enable operation.
Auxilliary registers provide # Cycles and Elapsed On Time.

Parameters:

Description:	Text field.
Pump In	True/False

Sampling Trigger:	line # which is the trigger or
	250= sample on change of state
	251= sample every minute
	252= sample every hour
	253= sample MM values every hour

Min/Max Daily Reset	
Sample Min/Max	
Alarm Group	Select if member of Major or Minor alarm groups.

8.5.27 Less than Low Limit Parameters

Function: Digital point which provides detection of an analog point exceeding its low limit.

Output: State is true if analog point exceeds its low limit.

Enable Input, if used, must be logically ON to enable operation.
Auxilliary registers provide # Cycles and Elapsed On Time.

Parameters:

Description:	Text field.
Pump In	True/False

Sampling Trigger:	line # which is the trigger or
	250= sample on change of state
	251= sample every minute
	252= sample every hour
	253= sample MM values every hour

Min/Max Daily Reset	
Sample Min/Max	
Alarm Group	Select if member of Major or Minor alarm groups.

8.5.28 RTU-RTU Communications Buffer

Defines Modbus communications transaction with other unit, PLC, or computer.

Parameters:

Buffer Number	Unique number between 1 and 60.
Station Number	Station number of target unit of communication.
Data Type	Table 1, Table 2, registers in remote unit.
Operation	Read/Write (or passive forms: Receive/Give)
Trigger Name	If defined, point which initiates transaction. (else continuous)
Remote Register	Address of register block in remote unit.
Data Length	Number of Registers in transaction.
Register Block Address	Address of holding registers which will receive data from (or send to) remote unit. (Table 2 address= 0 to 899)
Comm Port	COMM, P0, or P1. (P1 and P0 are potential dial ports)
Phone # Index	1-6. Indicates 1 of 6 phone # in Phone # Block.
Data List	List of Point names for points to send/receive.

8.5.29 Communications Status Buffer

Defines Buffer of Comm Status' (1 per Buffer # defined) which are by default named CS1 through CS60.

Parameters:

Buffer Number	Unique number between 1 and 60.
Remote Register	Default=0. (Address' of buffers to get status from.)
Data Length	Default=15. (Number of Registers in transaction.)
Register Block Address	Address of holding registers which will hold communication status points (bits). (Table 2 address= 0 to 899)
Data List	Contains CS1 through CS60.

8.5.30 FAX Communications Buffer

Defines Fax message transaction to be sent.

Parameters:

Buffer Number	Unique number between 1 and 60.
Data Type	Table 1, Table 2, registers in remote unit.
Operation	Default Write.
Trigger Name	If defined, point which initiates transaction. (required)
Remote Register	NU
Data Length	Number of Registers in transaction.
Register Block Address	Address of holding registers which will be sent to remote Fax unit. (Table 2 address= 0 to 899)
Phone # Index	1-6. Indicates 1 of 6 phone # in Phone # Block.
Data List	List of Point names for points to send/receive.

8.5.31 PAGER Communications Buffer

Defines Pager message transaction to be sent.

Parameters:

Buffer Number	Unique number between 1 and 60.
Operation	Default Write.
Trigger Name	If defined, point which initiates transaction. (required)
Remote Register	NU
Register Block Address	Address of holding registers which will be sent to remote Fax unit. (Table 2 address= 0 to 899)
Phone # Index	1-6. Indicates 1 of 6 phone # in Phone # Block.
Data List	List of Point names for points to send/receive.

8.5.32 Phone Number List

Defines list of 6 Phone Numbers for P1 or P0 Communications transactions.

Parameters:

Phone Number	6 Phone numbers. (18 characters max)
Fax Heading	6 Attention text or recipient name. (24 characters max)

Note: For Pager messages, phone number consists of Pager service modem phone number followed by "/" and pager number (7 digits).

9. Appendix B -Operational info

9.1 Linking to BASIC Programs

All Logic points and registers in communications buffers are accessable to an RTU resident BASIC program. There is no specific requirements for BASIC to read any register or point. However, it is recommended that, for the sake of good documentation, a note be placed next to symbols being accessed by BASIC.

For points which are written to, by BASIC, the point should save or maintain the last value set by the BASIC program until it is again set by BASIC. To do this, a symbol (line) is used as the recipient of the BASIC write operation (TBLWRT).
For digital points, use an AND symbol and 'connect' the input to the output.
For analog points, use an ADD symbol with one of the inputs 'connected' to the output.

For special function blocks, 4-Pump Controller and Annunciator, see the Special Functions description for details.

9.2 Ordering Display Points

The SM805 keypad/display option (DISP01) displays up to the first 32 lines (points) from the Table 1 area. The normal assignment of Line Number to the symbols placed in your drawing is in the order of the pages, and within a page, from back to front. (e.g., first placed on page to last placed on page)

A subset of points can specifically be identified for placement at the beginning of Table 1 (e.g., line numbers 1 through n). This is accomplished by selecting one or more symbols on a page and then running the VIS_DISP32 macro.

The selected symbols will then show a "D" in the line number field in addition to any line number. The next time the VALIDATE macro is run the symbols with the D display flag will be numbered before any other symbols, regardless of location.

Within the D display selected symbols, they will be numbered or assigned in the order of creation and by page order.

A similar sequence is used to deselect display points that have been previously set as display points.

9.3 Manually Assigning Line Numbers

Normally, VALIDATE assigns line numbers automatically.

Occasionally (rarely), especially after field changes are made to an RTU program, you may need to manually append or insert a new logic symbol and manually assign the line number to match the RTU program.

To Accomplish this, select the symbol that has been added to the drawing (e.g., click). Go to the Window selection on the Menu line. Click on Shape Sheet. The Shape sheet associated with the selected shape will pop-up. Scroll down till you can see the **User Parameter section**.

Select the **Line Number parameter**. Edit the line number in the parameter edit line (at the top of the screen). (i.e., enter: '=55cr', where cr = carriage return, and 55 is the new line number)

Close the shape sheet and return to the drawing. (click X in the upper right corner)

DO NOT try to edit other parameters in the shape sheet or by opening the symbol group!!

Nicknames and connectors

Logical names used to link connectors and connector networks.

Nicknames are created by double clicking a connector and entering a nickname in the text field of the connector.

All connectors, on all pages, which are physically connected to the same symbol connection points or have the same nickname are logically one large connector.

9.4 Reading/Writing an RTU Configuration File

(Use the Sensor Modem Programmer for this operation)
The Sensor Modem Programmer allows you to get the configuration files from RTU's and load new configuration files to the RTU. RTU files are the configuration data that gets physically loaded into the RTU.

Transferring an *.RTU file to/from an RTU is done while connected to the RTU in the online mode of the SM Programmer.

Transfers:

RTU prep:

In Online mode, use the following *RTU* menu line sequence:

/, Transfer (cr), Xmodem (cr),
Enter choice 1-5. (1= to computer; 3=from computer)

Computer side:

Click the large DOWN Arrow or UP Arrow in the Programmer Toolbar and provide file information. (UP Arrow is from computer, DOWN Arrow is to computer)

9.5 Creating a Drawing

The steps involved in creating a drawing include:

1. Start Visio tm

2. From the Menu line click File, New

3. In the list of templates, go to NBT-VPLC32 and select the NBTPROG template.
   (Note: On initial startup of Visio, the browse template screen is visible)

4. A drawing file will be started with a generic name of Drawing1.vsd (or drawingN.vsd where N is some number) The template has three pages defined (Hardware, Logic & Buffers). These can be renamed, reordered or additional pages can be inserted as needed. The NBT Stencil files will be opened as part of the drawing.

5. Drag master shapes from the stencils onto the drawing pages as needed.

6. Use the "connector" mode to connect the input/outputs of the shapes together as desired. Making links between pages (or where it is more convenient) is done by 'nicknaming' connections. All like nicknamed connectors are logically connected.

7. Use SAVE AS to save the drawing in the desired sub-directory with the RTU name.

9.6 Pre-defined POINT Names (Built In)

There are several internal status and control points which can be accessed for use in a program.

INPUTS:

MYCS	Shows communications status of this station relative to being polled by another (Master) site.
MAJALM	Reflects whether there are any internal unacknowledged alarms (set on change of state) for any point having the MAJOR alarm flag set. (see ACKALL below)
MINALM	Reflects whether there are any internal unacknowledged alarms (set on change of state) for any point having the MINOR alarm flag set. (see ACKALL below)
CS1-CS60	Reflects comm status of buffers defined for communications to other sites, etc. (see Table 2 Buffers) This is used at the Master to track comm status of remotes. Numbers 1-60 reflect the buffer number (not the remote address!) Note: a CommSts buffer must be included in your drawing (i.e., on the buffer page).

OUTPUTS:

ACKALL	Acknowledges all alarms in Table 1. Unacknowledgement may be used for flashing lites or as a setting criteria for Major and Minor alarms. (see MAJALM and MINALM above)
RESMAJ	Resets the internal MAJOR Alarm point.
RESMNR	Resets the internal MINOR Alarm point.
LED0	Allows control of user LEDs on face of SM800.
LED1	Allows control of user LEDs on face of SM800.