USER MANUAL

Advantage 400

ADV 400 User Manual

700-100002-xUxx

November 2, 2007

DELTA TAU
Data Systems, Inc.
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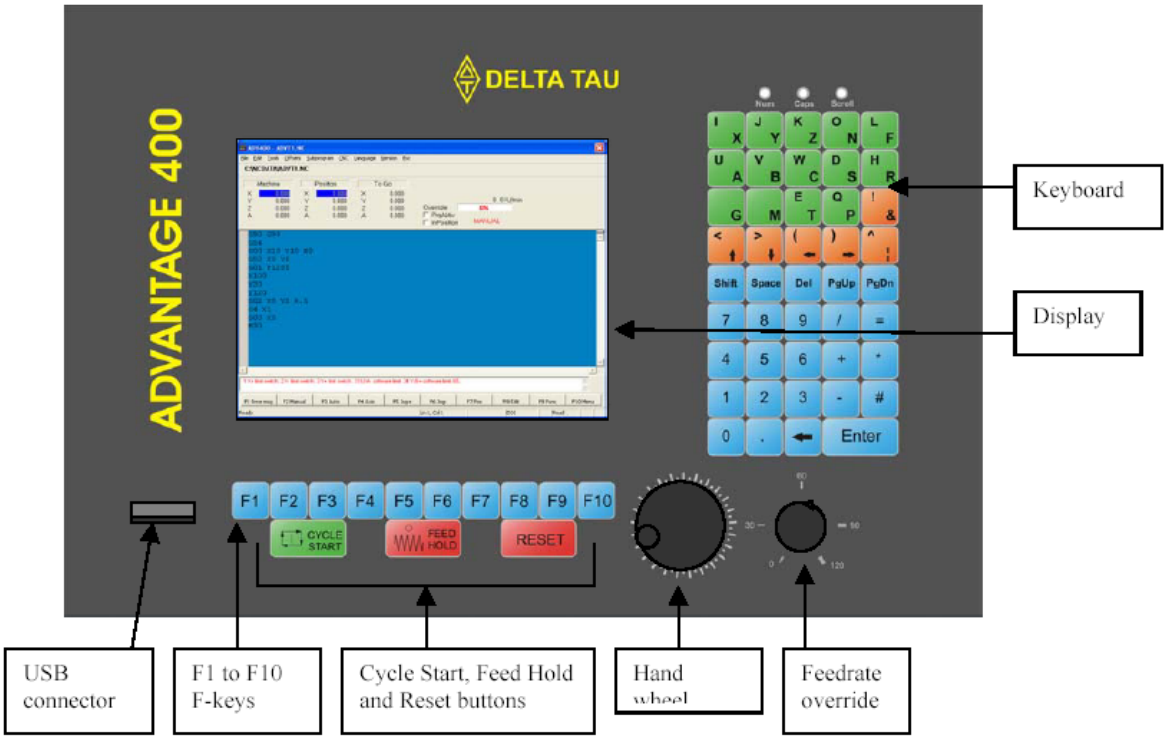
REVISION HISTORY				
REV.	**DESCRIPTION**	**DATE**	**CHG**	**APPVD**
1	NEW MANUAL CREATION – PRELIMINARY	12/21/04	N/A	N/A
2	UPGRADE FROM PRELIM TO FULL RELEASE	11/02/07	CP	VB

Table of Contents

INTRODUCTION

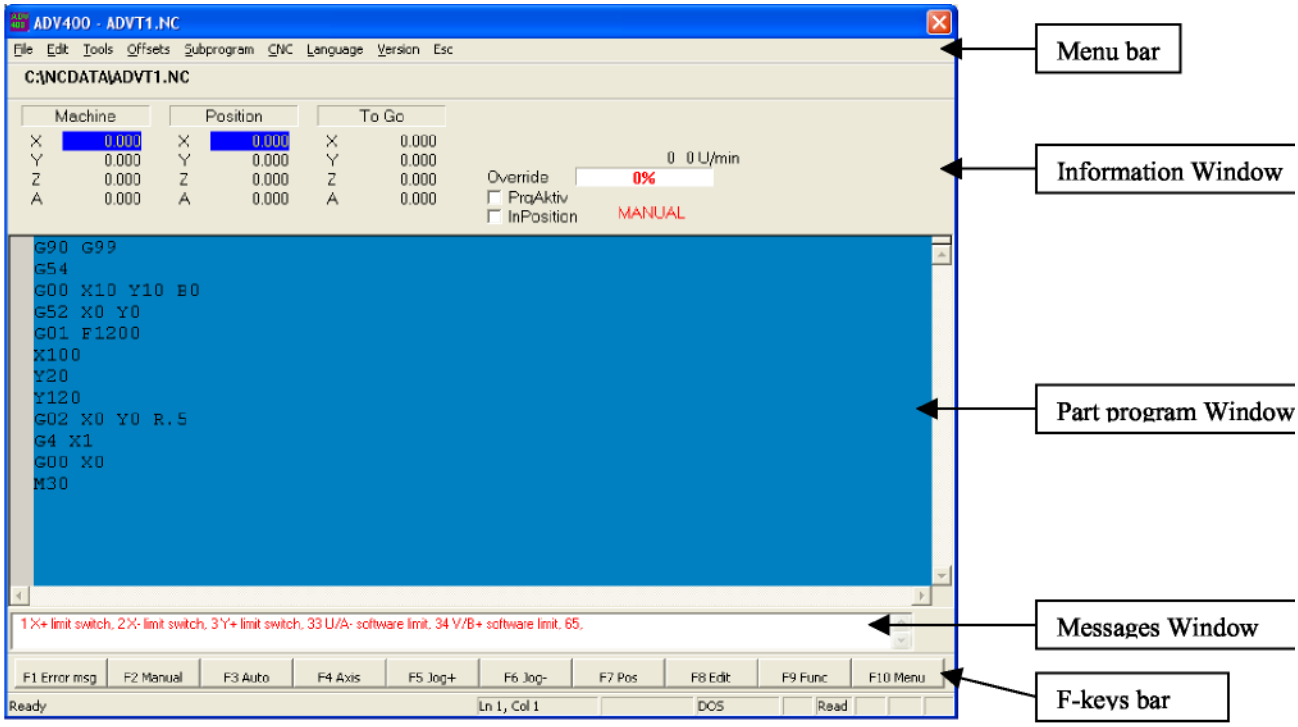
Adv 400 Control Panel Overview



- The **Keyboard** (alphanumeric and numeric) contains the necessary keys for easy control of the different Adv 400 NC software features and for typing the different programs (part or PLC) of the machine.
- The flat color **Display** shows the different Adv 400 NC screens.
- The **F1 to F10 keys** permit easy control of the Adv 400 NC software, modes, and axis of the machine.
- The **Cycle Start, Feed Hold** and **Reset** buttons are used to control the start/stop/reset of the part program.
- The **Hand Wheel,** in manual mode, moves the axis manually. In this case, the feedrate override button is divided in four quadrants to give the unit of the axis movement (0.001 or 0.01 or 0.1 or 0.2 millimeters per hand wheel increment). First quadrant is between 0% and 30%, second quadrant is between 30% and 60%, third quadrant is between 60% and 90% and fourth quadrant is between 90% and 120%.
- The **Feedrate Override** has a range between 0 and 120%. In automatic mode, the axis speeds can be varied from 0 to 120% of the programmed speed in the part program.
- In manual mode, the axis can have varied jogging speeds from 0 to 100% of the maximum jogging speed indicated in the Machine Setting Page. (See the Machine Setting section of this manual.)
- The **USB Connector** connects any USB device (mouse, keyboard).

MAIN SCREEN

At power-up of the Adv 400 NC software, the following window (main screen) appears:



Password

If a password is not entered (by clicking **F2 OK)**, the system will be at machine user level. In the user level, the axis can be homed or moved manually and the present part program can be run.

With a first password, the system will be at machine manager level. In this level the part program can be modified and the different menus for managing the production can be accessed (Tool menu, Work Offset menu, Subprograms).

With a second password, the system will be at machine Integration level. At this level, all menus can be accessed and the machine integration can be performed (PLCs, tuning, etc.).

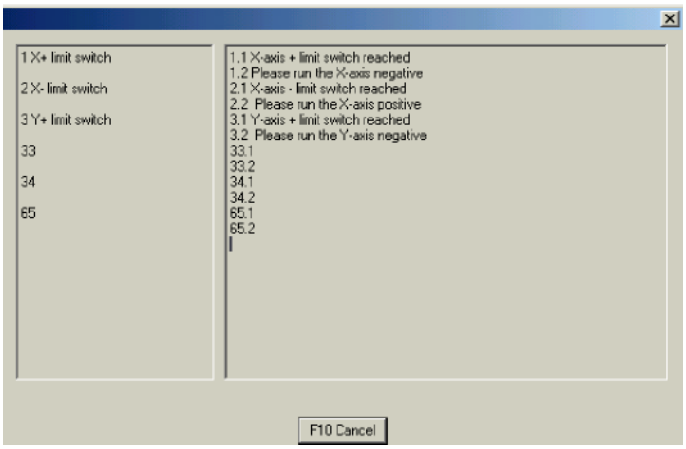
Refer to the Integration Manual for these passwords.

F-Keys

This key opens the Help window when there is an error message:

F1 Help

This window gives detailed information about errors or warning messages of the machine status.



F2 Manual Mode

This key puts the machine in Manual mode.

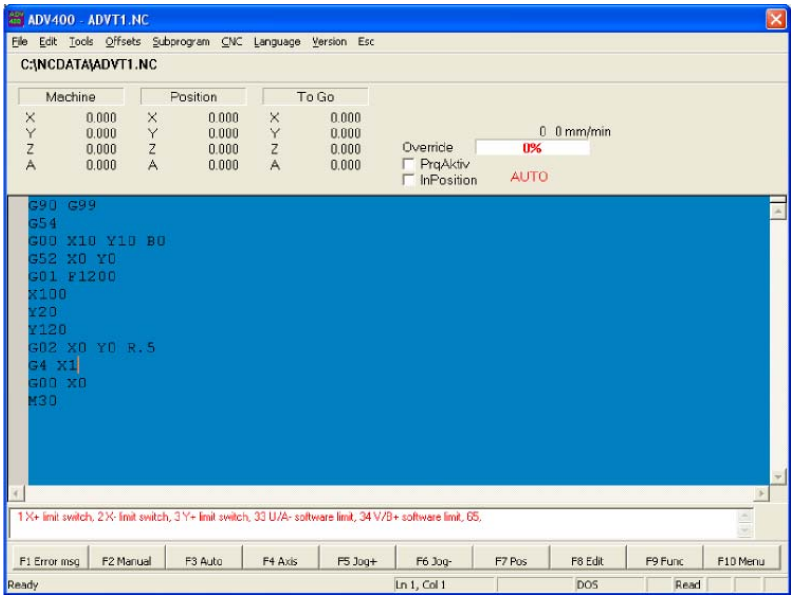
In this mode, the axis can be selected with the **F4** button and moved manually with Jog buttons (**F5** or **F6**) or with the Hand Wheel.

In addition, the **F8** key gives access to the editor to create, edit, and modify the Part program. Once in editing mode, the **F8** key becomes a teach-in key to create move blocks with the actual axis positions.

F3 Automatic Mode

This key puts the machine in Automatic mode.

The Part program window takes another color (not an editor anymore) and shows the status of the running program (active block) by highlighting the active line.



This mode runs the part program with **Cycle Start** button, stops the program with the **Feed Hold** button or resets the program with the **F2** or **Reset** buttons (going back to the manual mode).

F4 Axis Select

This key is active in manual and home modes.

- In Manual mode, it selects the axis and moves it manually with the F5 or F6 keys or the Hand Wheel.
- In Home mode, it selects the axis which will run its homing routine by pushing either the F5 or F6 key.

F5 Axis Manual JOG in Plus Direction or Home Axis

- In Manual mode, this key jogs the selected motor manually in plus direction.
- In Home mode, this key runs the homing routine of the selected axis using the F6 key.

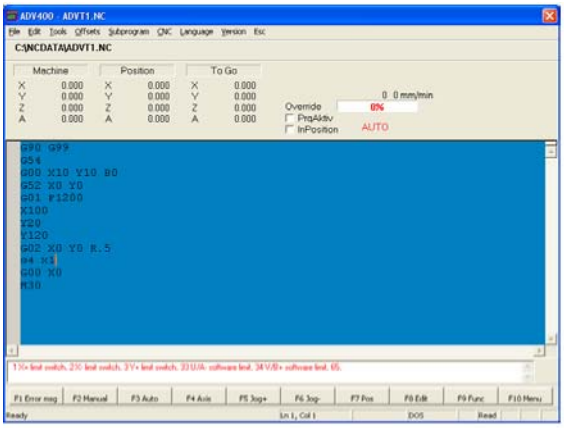
F6 Axis Manual JOG in Minus Direction or Home Axis

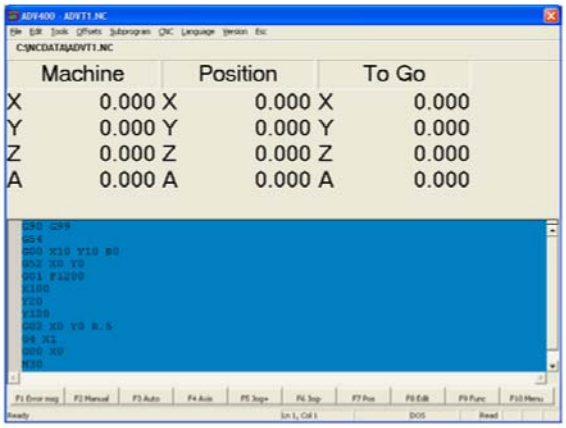
- In manual mode, this key jogs the selected motor in minus direction manually.
- In Home mode, this key runs the homing routine of the selected axis using the **F5** key.

F7 Information Window Type of Display

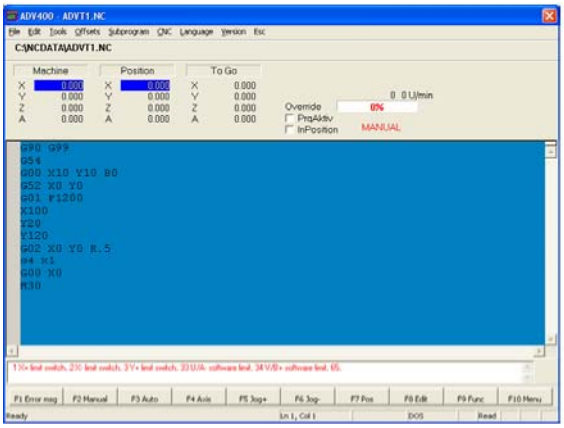
This key switches between complete information and only positions on big letters.

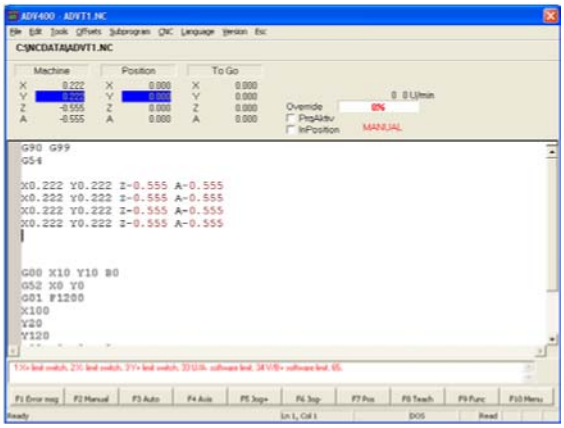
Edit/Teach In





In manual mode, this key is first labeled Edit. A first push on this key puts the part program window in Edit mode (back color windows switch from color to white). At this point, the **F8** key is labeled Teach In and creates a part program moves blocks with the actual axis positions.

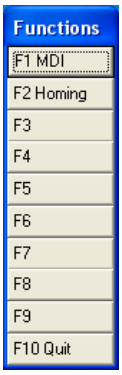




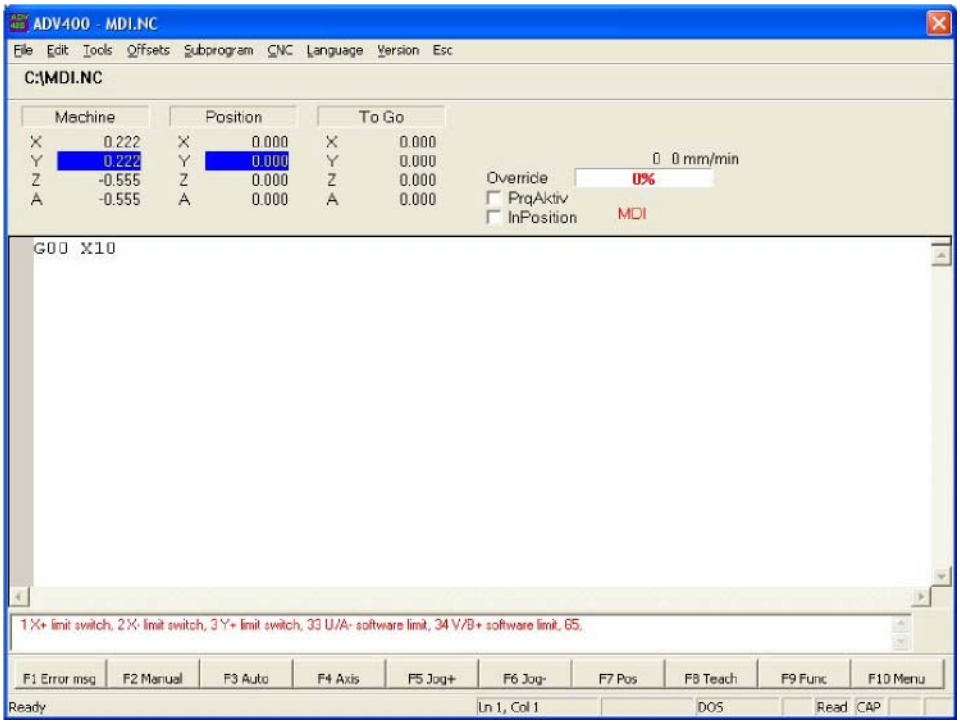
F9 Functions

When using this key, a sub-F-key menu displays.

In this sub-menu, the **F1** key changes to MDI (Manual Data Input) mode. The **F2** key changes to Home mode.



In the MDI mode, some move blocks can be entered and run with the **Cycle Start** button.



The Home mode runs the homing sequence axis by axis (with the **F5** or **F6** keys) or all axes in the selected sequence (with the Cycle Start button).

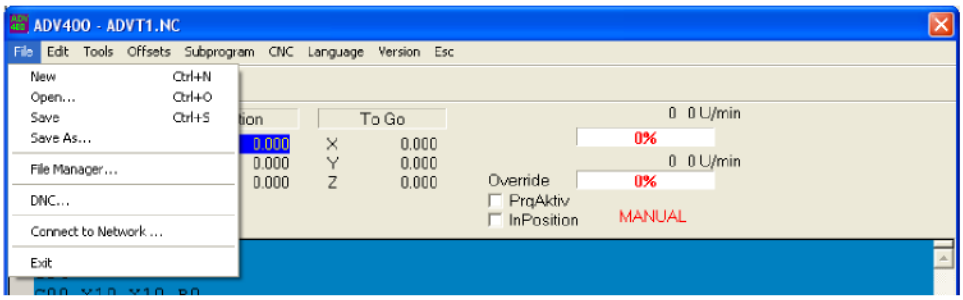
F10 Access to the Menu Bar

This key accesses the Menu bar.

Menu Bar

File

This menu manages the part program for creating, opening, and saving.



- **File Manager** accesses a menu for managing the files (copying files from an external hard disk to internal hard disk, moving files from directories, etc.). See the File Manager section for more details.
- **DNC** runs a long part program in DNC mode. See the DNC section for more details.
- With the Adv 400 Ethernet option present, **Connect to Network** opens a command menu to connect the Adv 400 to the Ethernet Network. See the Ethernet Connection section for more details.

Edit

This menu provides the tools necessary to modify the program.

Tools

This menu opens the Tools Management window. See this section in this manual for further details.

Offsets

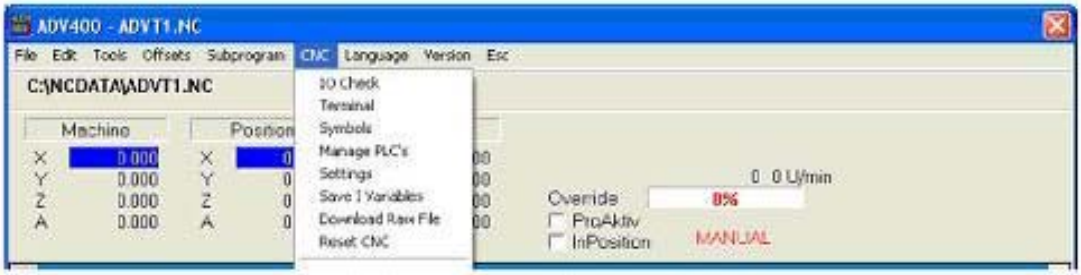
This menu accesses the Work Offset, Home Position and P Var windows. See these sections in this manual for further details.

Subprograms

This menu opens the subprogram window. See the Subprogram section in this manual for further details.

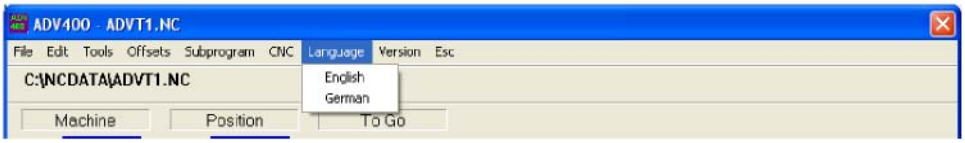
CNC

This menu gives access to different tools for machine integration. Refer to the Adv 400 Integration manual for details.



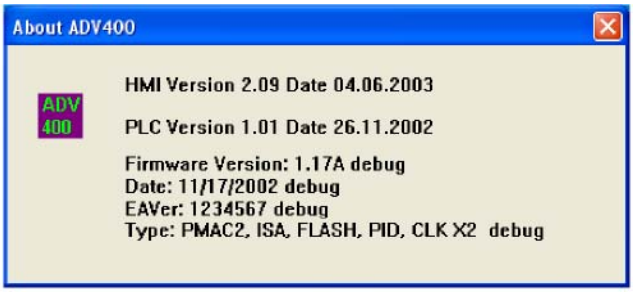
Language

Two languages are possible with the Adv 400 system. The first language is English. The second language can be any language. A text file must be created with the second desired language. Contact Delta Tau Europa if a second language is needed.



Version

This menu opens the About page with information regarding the version of the CNC system.



ESC

Currently has no function.

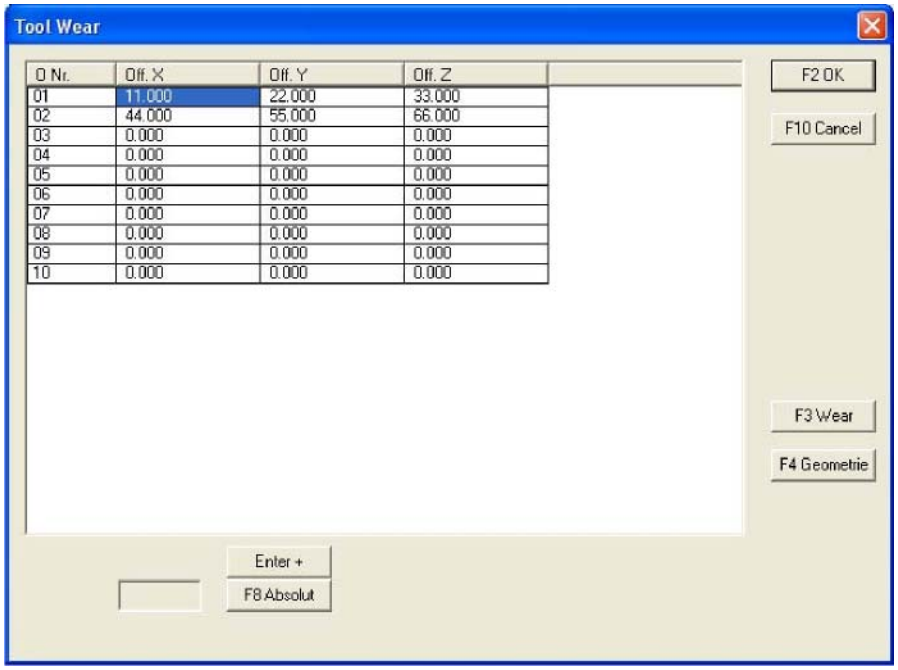
TOOLS MANAGEMENT

Enter specifications of the tools of the machine with this menu. The Adv 400 allows the management of up to 24 tools.

The offsets entered in this menu will be used by the Txxyy tool call code and by the Radius Cutter compensation G41 and G42 codes of the part program. There are two pages for managing the tool offsets. The two buttons **F3 Wear** (or **F3** F-key) and **F4 Geometry** (or **F4** F-key) switch from one page to the other one.

Tool Wear Page

The first page is the Tool Wear page.



The Tool Wear page can be modified at any time (in Manual Mode or in Automatic Mode), even when the part program is running. However, the new Wear offset will be affected when a new tool (with Txxyy code) is called by the part program.

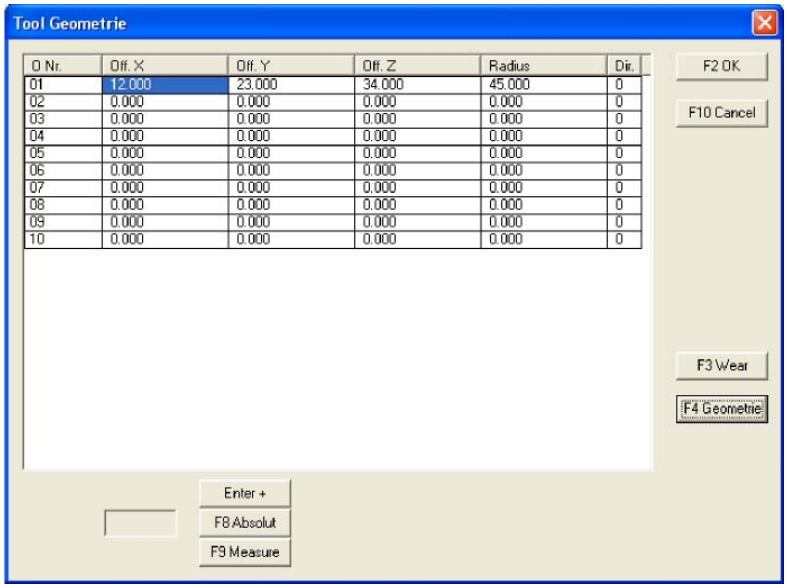
It is possible to add an offset to the actual one by clicking the **Enter+** button (or **Enter** key) or to enter a new offset by pushing the **F8 Absolute** button (or **F8** F-key).

The Wear offset is added to the Geometry offset and this addition of values is the offset affected to an axis when a tool is used.

The Wear offset is used usually for small offset modifications on the fly (due to tool usury).

Tool Geometry Page

The second page is the Tool Geometry page.



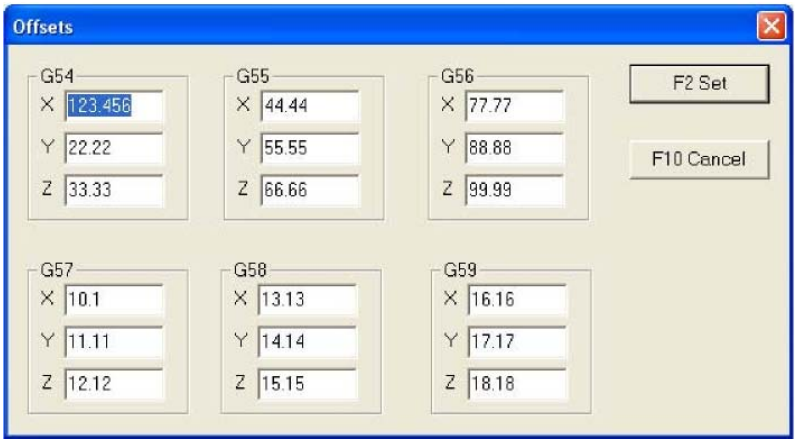
The offsets of this page must be entered before running a part program.

- Off X, Off Y and Off Z are the tool lengths in millimeters.
- Radius is the Cutter Radius of the tool in millimeters.
- Dir is the direction of the tool, used for Cutter Radius Compensation for lathe machines. It is possible to add an offset to the actual one by clicking the **Enter+** button (or **Enter** key) or to enter a new offset by clicking the **F8 Absolute** button (or **F8** F-key) or to measure the offset by moving the axis to the right position (tool touching the part) and clicking the **F9 Measure** button (or **F9** F-key).
- Wears are added to Geometries and this addition makes the axis offsets for this tool.
- A tool must also be called previously before using Cutter Radius Compensation with G41 and G42 part program codes. Then, when one of these codes G41 or G42 is used, the tool radius "yy" value is taken from this table.

Work Offset

The Adv 400 provides six coordinate system Work Offsets.

These six Work offsets are selected with G54 to G59 part program codes.

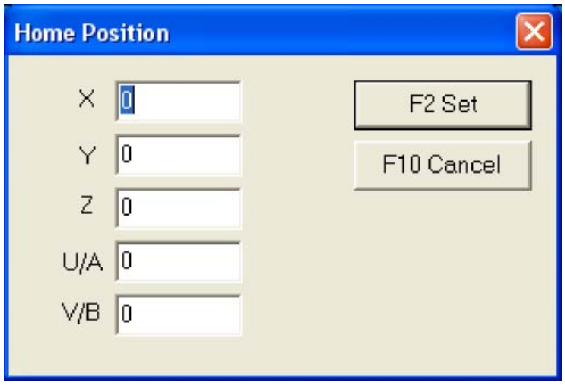


Work offsets must be entered in this menu and the **F2 Set** button (or **F2** F-key) must be pushed to validate these values.

The G54 to G59 G-codes of the part program will use these offsets.

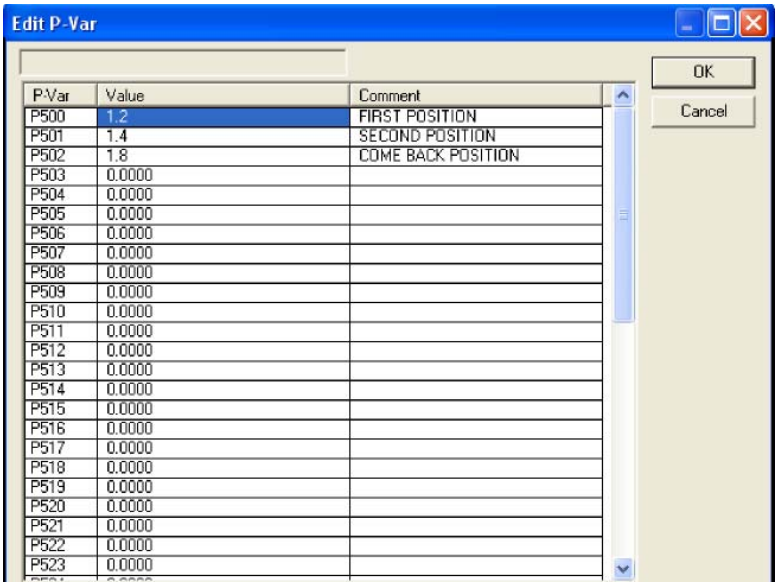
Home Position

This menu sets the position of each axis. The value introduced here for each axis will be the machine position at reference point.



P Var

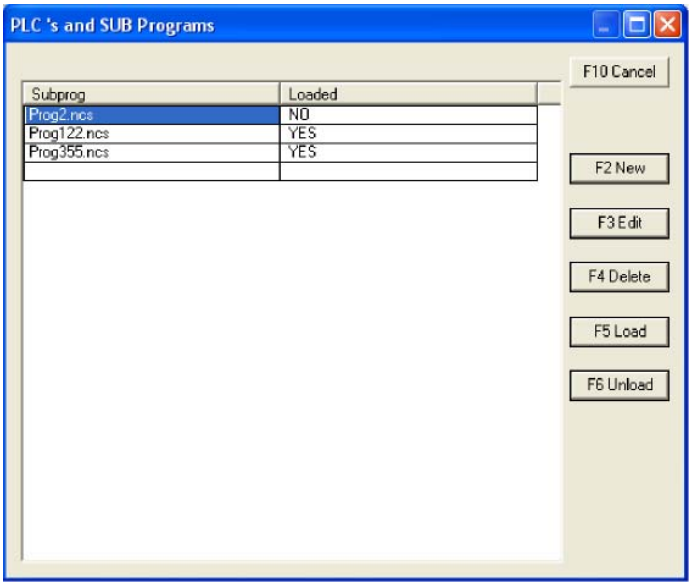
Up to 50 user variables are available for general-purpose use (calculation, parametric programming, etc.). This menu sets a value to these variables and puts a comment on each of them. These P-variables can then be used in the part program and in PLCs.



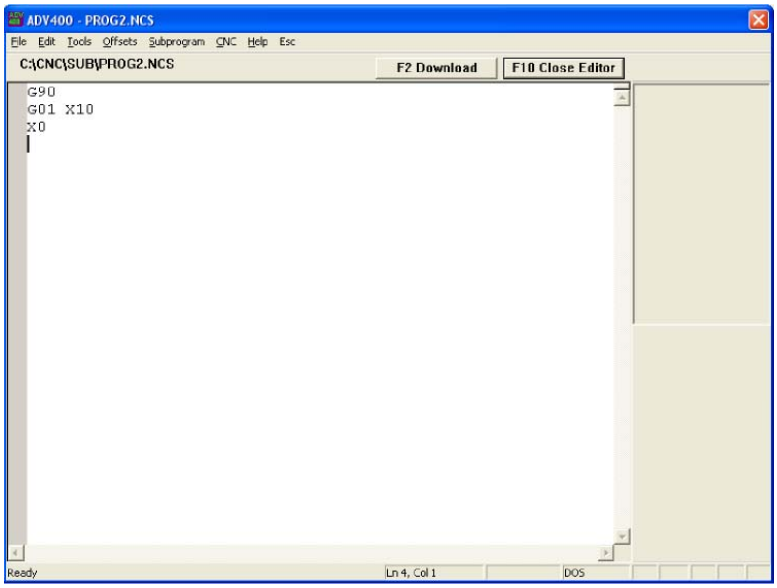
Subprogram

With this feature, custom subprograms, called by the main part program, can be created. Subprograms number 2 to 999 are available for these subprograms. Subprograms 998 and 999 are reserved for special functions. Refer to the Adv 400 Integrator manual for details.

From the main menu, the PLCs and subprograms management page creates (New), Edit, Delete, Load and unloads subprograms.



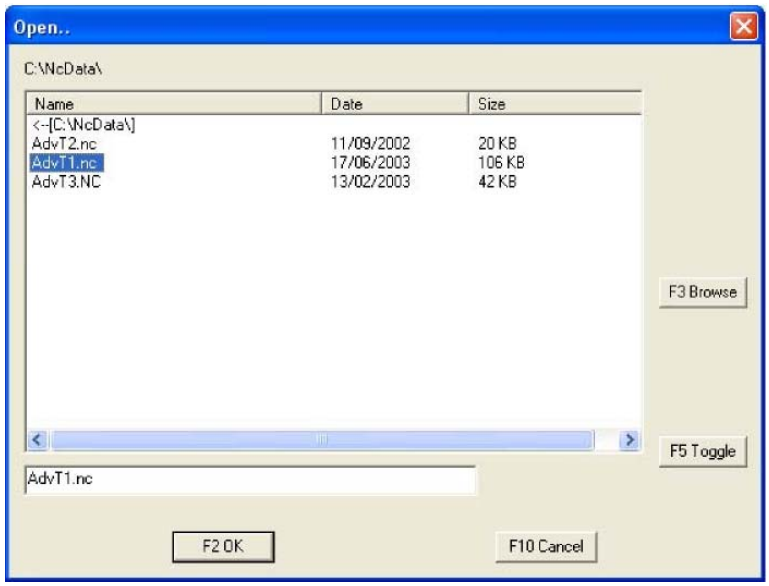
- New (or **F2** on the keyboard) creates a new subprogram (opening text editor with blank page).
- Edit (or **F3** on the keyboard) opens an existing subprogram (opening text editor with this subprogram inside) for consulting or modification.
- Delete (or **F4** on the keyboard) removes an existing subprogram from the list.
- Load (or **F5** on the keyboard) loads a subprogram in the controller. A Yes appears in the Loaded section of this subprogram, indicating that this subprogram will be present in the controller and can be called by a main part program at any time.
- Unload (or **F6** on the keyboard) removes an existing subprogram from the controller. A No appears in the Loaded section for this subprogram, meaning that this subprogram will not be present in the controller. This is useful when many subprograms are created and all of them are loaded in the controller which could overload the controller memory.
- When creating a new subprogram or editing an existing subprogram, a text editor opens and the subprogram code can be entered.



- Download (or **F2** on the keyboard) sends the subprogram to the controller to make it available for calls from the main part program (e.g., the Load button on the Managing Subprogram page).
- Close Editor (or **F2** on the keyboard) provides an exit of this page and asks to save any entered code.

DNC

The DNC mode permits the running of long (indefinite length) programs.



The controller asks to open a part program (on the local hard disk on an external device like an USB memory stick or on the Network if option present) and then jumps to Auto mode.

A cycle start runs this program. A few programming features are not allowed when running a part program in DNC mode.

Ethernet Connection

On this menu, the CNC displays a prompt menu. Enter the Windows command for connecting to a server computer through the Ethernet (optional) connection.

At this point, enter the server name.

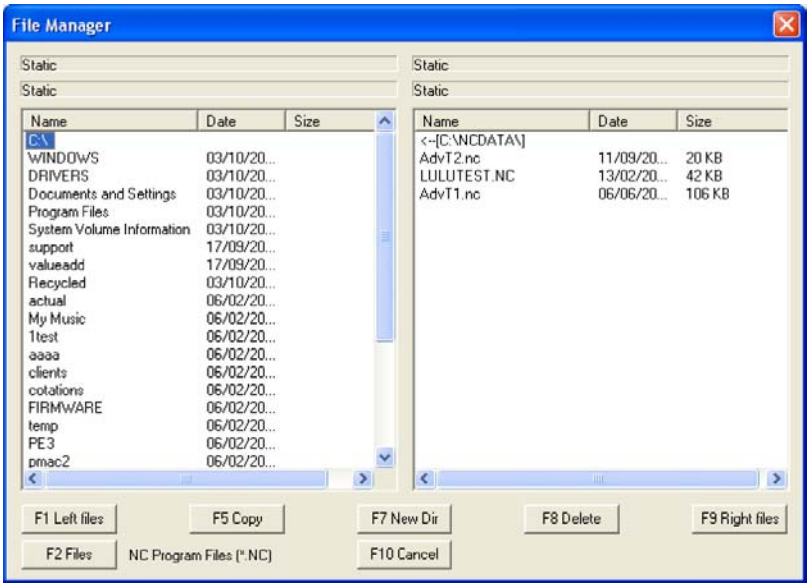
In the server, at least one shared directory must be present and, of course, the network with the user name and password must be set.

A normal client/server connection window (with user name, password and workgroup) is displayed on the Adv 400 and must be completed.

File Manager

This menu manages the files in the Adv 400 system.

Based on the Windows directory structure, this menu creates directories and copies files.



This menu is useful for copying files from an external device (memory stick connected to the USB connector) to the internal hard disk, or from the internal hard disk to an external device.

This menu is organized in two windows, a left one and a right one.

One window is used as origin (from where) and the other one as target.

- The **F1** and **F9** keys jumps from one to the other page.
- **F2** is used to show the type of files (*.NC for the part programs, *.* for all files).
- **F5** performs the file copy of the selected file in the active window to the other window.
- **F7** creates a new directory.
- **F8** deletes the selected file.
- **F10** quits this menu.

APPENDIX A — WRITING A PART PROGRAM

A Part program creates movements of axis with rapid moves, interpolated moves (linear or rotary interpolation) and manages some machine features such as spindle or tool length and radius compensation.

G/M/T codes manage most of these features. Refer to the programming manual for further details.

The flexibility of the Adv 400 allows programming of additional useful features, such as tests of conditions (reading input status), write an output directly to 1 or 0, loops to wait a condition, etc.

A symbol table exists in the system, giving names for inputs, name of outputs and information about status of the system. Refer to the Table of Symbols in this manual.

Testing an Input

```
If (ON_INPUT1)                ; test is Input1 true action
Endif
.........................................
If (OFF_INPUT4)               ; test is Input4 false action
Else
other action
Endif
```

Waiting State of an Input

```
While (ON_INPUT2)             ; wait as long as Input2 is true action
Endw
```

Note:

In a part program, it is not allowed to wait in a While loop without any action (move) in this loop. Therefore, put at least a G04X0 function in the loop.

```
While (ON_INPUT2)             ; wait as long as Input2 is true G04 X0
Endw
```

Setting an Output Asynchronously

```
SET_OUTPUT2                   ; set Ouput2 asynchronously
RESET_OUTPUT3                 ; Reset Ouput3 asynchronously
```

Setting an Output Synchronously

```
SETS_OUTPUT2                  ; set Ouput2 synchronously
RESETS_OUTPUT3                ; Reset Ouput3 synchronously
```

Testing or Waiting on Information

With an If condition or a While loop, it is also possible to test or wait for other information coming from the CNC. The Table of Symbols gives the list of information available.

```
If (CS_SPND_AT_ZERO != 0) ; test is spindle is at zero speed ; action
Endif
While (CS_SPND_AT_SPEED = 0) ; wait that spindle is at programmed speed. G04
X0
Endif
```

Jump to a Label

It is possible to jump to a label (coming back in the program or jumping a part of the program) using the GOTO function.

```
N10 G01 X15 F100 N20 G04 X1
N30 GOTO 10 ; jump to label N10
N20 G00 X0
If (ON_INPUT1) ; If Input1 is true, jump to label N50 GOTO 50
Endif
N30 G01 X10 F100 N40 G01 Y20 N50 G00 Y0 Z0
```

Limitations when Running a Program in DNC Mode

As the DNC mode is tacking the program partially, it is not possible to use test conditions (IF), loops to wait a condition (While), GOTO and GOSUB statements. Only setting outputs (synchronously or asynchronously) is possible in DNC mode.

APPENDIX B — TABLE OF SYMBOLS

```
;*************************************************************************
; INPUTS / OUTPUTS
;*************************************************************************
;       for PLCs and Part Programs
; Test an INPUT true    : If (ON_INPUTx)
; Test an INPUT false   : If (OFF_INPUTx)
; Set an OUTPUT         : SET_OUTPUTx
; Reset an OUTPUT       : RESET_OUTPUTx
; Test an OUTPUT true   : If (ON_OUTPUTx)
; Test an OUTPUT false  : If (OFF_OUTPUTx)
;       for Part Programs only
; Set an OUTPUT Sync    : SETS_OUTPUTx
; Reset an OUTPUT Sync  : RESETS_OUTPUTx
;*************************************************************************
```

Inputs

Inputs True

Symbol	Comment
ON_INPUT1	Input 1 true
ON_INPUT2	Input 2 true
ON_INPUT3	Input 3 true
ON_INPUT4	Input 4 true
ON_INPUT5	Input 5 true
ON_INPUT6	Input 6 true
ON_INPUT7	Input 7 true
ON_INPUT8	Input 8 true
ON_INPUT9	Input 9 true
ON_INPUT10	Input 10 true
ON_INPUT11	Input 11 true
ON_INPUT12	Input 12 true
ON_INPUT13	Input 13 true
ON_INPUT14	Input 14 true
ON_INPUT15	Input 15 true
ON_INPUT16	Input 16 true
ON_INPUT17	Input 17 true
ON_INPUT18	Input 18 true
ON_INPUT19	Input 19 true
ON_INPUT20	Input 20 true
ON_INPUT21	Input 21 true
ON_INPUT22	Input 22 true
ON_INPUT23	Input 23 true
ON_INPUT24	Input 24 true
ON_INPUT25	Input 25 true
ON_INPUT26	Input 26 true
ON_INPUT27	Input 27 true
ON_INPUT28	Input 28 true
ON_INPUT29	Input 29 true
ON_INPUT30	Input 30 true
ON_INPUT31	Input 31 true
ON_INPUT32	Input 32 true

Inputs False

Symbol	Comment
OFF_INPUT1	Input 1 false
OFF_INPUT2	Input 2 false
OFF_INPUT3	Input 3 false
OFF_INPUT4	Input 4 false
OFF_INPUT5	Input 5 false
OFF_INPUT6	Input 6 false
OFF_INPUT7	Input 7 false
OFF_INPUT8	Input 8 false
OFF_INPUT9	Input 9 false
OFF_INPUT10	Input 10 false
OFF_INPUT11	Input 11 false
OFF_INPUT12	Input 12 false
OFF_INPUT13	Input 13 false
OFF_INPUT14	Input 14 false
OFF_INPUT15	Input 15 false
OFF_INPUT16	Input 16 false
OFF_INPUT17	Input 17 false
OFF_INPUT18	Input 18 false
OFF_INPUT19	Input 19 false
OFF_INPUT20	Input 20 false
OFF_INPUT21	Input 21 false
OFF_INPUT22	Input 22 false
OFF_INPUT23	Input 23 false
OFF_INPUT24	Input 24 false
OFF_INPUT25	Input 25 false
OFF_INPUT26	Input 26 false
OFF_INPUT27	Input 27 false
OFF_INPUT28	Input 28 false
OFF_INPUT29	Input 29 false
OFF_INPUT30	Input 30 false
OFF_INPUT31	Input 31 false
OFF_INPUT32	Input 32 false

Outputs

Set Outputs Non-Synchrone

Symbol	Comment
SET_OUTPUT1	Set Output 1 true
SET_OUTPUT2	Set Output 2 true
SET_OUTPUT3	Set Output 3 true
SET_OUTPUT4	Set Output 4 true
SET_OUTPUT5	Set Output 5 true
SET_OUTPUT6	Set Output 6 true
SET_OUTPUT7	Set Output 7 true
SET_OUTPUT8	Set Output 8 true
SET_OUTPUT9	Set Output 9 true
SET_OUTPUT10	Set Output 10 true
SET_OUTPUT11	Set Output 11 true
SET_OUTPUT12	Set Output 12 true
SET_OUTPUT13	Set Output 13 true
SET_OUTPUT14	Set Output 14 true
SET_OUTPUT15	Set Output 15 true
SET_OUTPUT16	Set Output 16 true

Set Outputs Synchrone for Programming Only

Symbol	Comment
SETS_OUTPUT1	Set Output 1 true synchronously (for Part Prog only)
SETS_OUTPUT2	Set Output 2 true synchronously (for Part Prog only)
SETS_OUTPUT3	Set Output 3 true synchronously (for Part Prog only)
SETS_OUTPUT4	Set Output 4 true synchronously (for Part Prog only)
SETS_OUTPUT5	Set Output 5 true synchronously (for Part Prog only)
SETS_OUTPUT6	Set Output 6 true synchronously (for Part Prog only)
SETS_OUTPUT7	Set Output 7 true synchronously (for Part Prog only)
SETS_OUTPUT8	Set Output 8 true synchronously (for Part Prog only)
SETS_OUTPUT9	Set Output 9 true synchronously (for Part Prog only)
SETS_OUTPUT10	Set Output 10 true synchronously (for Part Prog only)
SETS_OUTPUT11	Set Output 11 true synchronously (for Part Prog only)
SETS_OUTPUT12	Set Output 12 true synchronously (for Part Prog only)
SETS_OUTPUT13	Set Output 13 true synchronously (for Part Prog only)
SETS_OUTPUT14	Set Output 14 true synchronously (for Part Prog only)
SETS_OUTPUT15	Set Output 15 true synchronously (for Part Prog only)
SETS_OUTPUT16	Set Output 16 true synchronously (for Part Prog only)

Reset Outputs

Symbol	Comment
RESET_OUTPUT1	Reset Output 1
RESET_OUTPUT2	Reset Output 2
RESET_OUTPUT3	Reset Output 3
RESET_OUTPUT4	Reset Output 4
RESET_OUTPUT5	Reset Output 5
RESET_OUTPUT6	Reset Output 6
RESET_OUTPUT7	Reset Output 7
RESET_OUTPUT8	Reset Output 8
RESET_OUTPUT9	Reset Output 9
RESET_OUTPUT10	Reset Output 10
RESET_OUTPUT11	Reset Output 11
RESET_OUTPUT12	Reset Output 12
RESET_OUTPUT13	Reset Output 13
RESET_OUTPUT14	Reset Output 14
RESET_OUTPUT15	Reset Output 15
RESET_OUTPUT16	Reset Output 16

Reset Outputs Synchrone for Programming Only

Symbol	Comment
RESETS_OUTPUT1	Reset Output 1 synchronously
RESETS_OUTPUT2	Reset Output 2 synchronously
RESETS_OUTPUT3	Reset Output 3 synchronously
RESETS_OUTPUT4	Reset Output 4 synchronously
RESETS_OUTPUT5	Reset Output 5 synchronously
RESETS_OUTPUT6	Reset Output 6 synchronously
RESETS_OUTPUT7	Reset Output 7 synchronously
RESETS_OUTPUT8	Reset Output 8 synchronously
RESETS_OUTPUT9	Reset Output 9 synchronously
RESETS_OUTPUT10	Reset Output 10 synchronously
RESETS_OUTPUT11	Reset Output 12 synchronously
RESETS_OUTPUT12	Reset Output 13 synchronously
RESETS_OUTPUT13	Reset Output 14 synchronously
RESETS_OUTPUT14	Reset Output 15 synchronously
RESETS_OUTPUT15	Reset Output 16 synchronously
RESETS_OUTPUT16	Reset Output 17 synchronously

Outputs On

Symbol	Comment
ON_OUTPUT1	Output 1 true
ON_OUTPUT2	Output 2 true
ON_OUTPUT3	Output 3 true
ON_OUTPUT4	Output 4 true
ON_OUTPUT5	Output 5 true
ON_OUTPUT6	Output 6 true
ON_OUTPUT7	Output 7 true
ON_OUTPUT8	Output 8 true
ON_OUTPUT9	Output 9 true
ON_OUTPUT10	Output 10 true
ON_OUTPUT11	Output 11 true
ON_OUTPUT12	Output 12 true
ON_OUTPUT13	Output 13 true
ON_OUTPUT14	Output 14 true
ON_OUTPUT15	Output 15 true
ON_OUTPUT16	Output 16 true

Outputs Off

Symbol	Comment
OFF_OUTPUT1	Output 1 false
OFF_OUTPUT2	Output 2 false
OFF_OUTPUT3	Output 3 false
OFF_OUTPUT4	Output 4 false
OFF_OUTPUT5	Output 5 false
OFF_OUTPUT6	Output 6 false
OFF_OUTPUT7	Output 7 false
OFF_OUTPUT8	Output 8 false
OFF_OUTPUT9	Output 9 false
OFF_OUTPUT10	Output 10 false
OFF_OUTPUT11	Output 11 false
OFF_OUTPUT12	Output 12 false
OFF_OUTPUT13	Output 13 false
OFF_OUTPUT14	Output 14 false
OFF_OUTPUT15	Output 15 false
OFF_OUTPUT16	Output 16 false