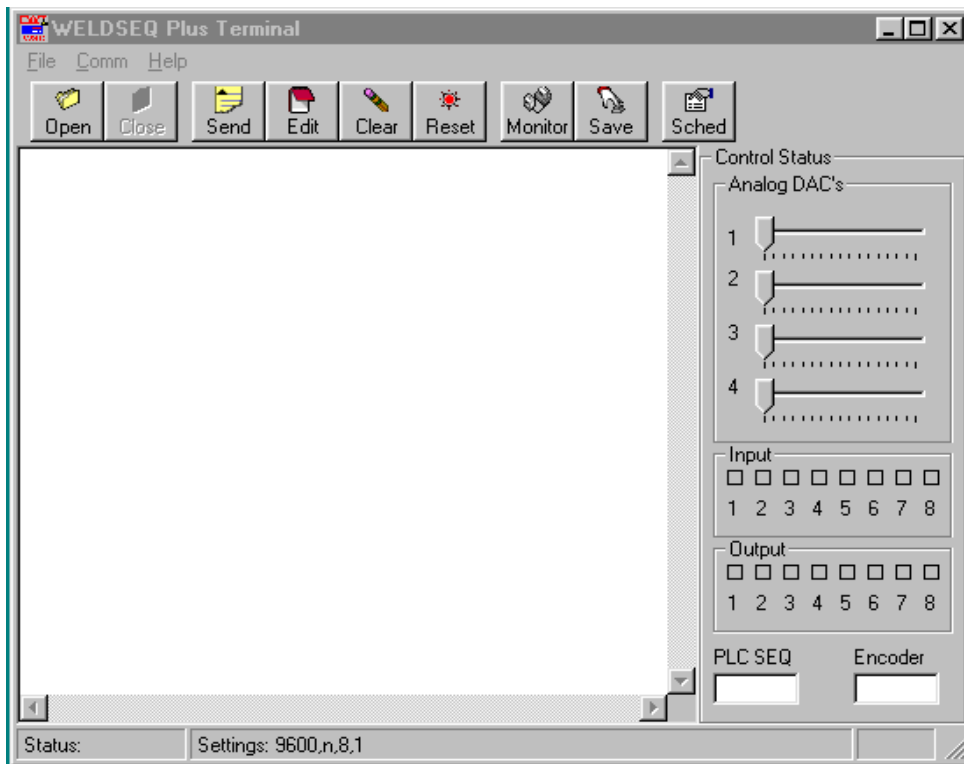# WELDSEQ Plus™

Weld Sequence PLC Terminal Program

Operation / Installation Manual

Manual Part Number: S8M5008
Revised: July 9, 1999

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1.0 SYSTEM OVERVIEW WELDSEQ PLUS™

WELDSEQ Plus™ is a product of Computer Weld Technology, Inc. and is designed to operate in conjunction with our WSC-1000™ and MWC™ weld sequence controllers. The program provides a serial communications program, which is used to communicate with the WSC-1000/MWC and program the Programmable Logic Controller (PLC) and configuration parameters. The program provides a full function, user configurable ASCII terminal program, which can be used to configure all of the WSC/MWC functions. It provides weld data collection routines that allow the user to collect run-time weld data and store this data for future analysis. The WSC/MWC weld schedules can be edited and include a Weld Setup specification sheet, which is used to save process specific information for the current weld schedule. The program also provides a PLC editor, which can be used to generate custom PLC programs.

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2.0 SYSTEM REQUIREMENTS

Processor:	150mhz Pentium™ or higher microprocessor
Memory:	24 Megs minimum for Windows 95/98®, 32 Megs for Windows NT®
Hard Drive:	25 Megs of available hard drive space
Graphics:	Minimum SVGA graphics. XVGA recommended
Serial Port:	RS-232 serial port

3.0 OPERATING SYSTEM

The WELDSEQ Plus™ program is designed for use with Windows 95/98® or Windows NT® 3.51 or later platforms. The program has been tested with Windows 95®, Windows 98® and Windows NT® 4.0.
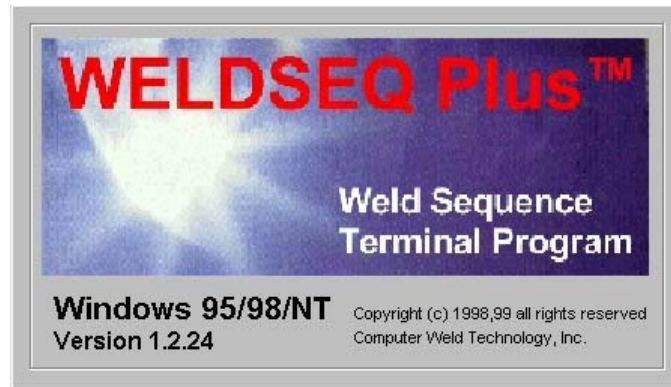
The following steps will guide you through the installation process.

1. Power on your computer and start Windows.

2. Insert Disk 1 of WELDSEQ Plus™ into the computer's floppy drive.

3. From the **START** Button, choose **RUN**.

4. In the **OPEN** field, type **A:Setup.exe** and press **Enter** or click **OK**.

5. Follow the instructions on screen.

6. If the system requires you to restart Windows, remove the floppy diskette and restart the system. Once Windows has restarted repeat the installation procedures for this program starting with **Step 2**.

7.   Once installation is complete you may start the **WELDSEQ Plus** Program by clicking the **START** button on the Windows screen then selecting the **PROGRAMS** folder, **WELDSEQ Plus** folder, and then the **WELDSEQ Plus** file.

5.0 FILE PULL - DOWN MENU

The following Menu items are available under the File Pull-down Menu:
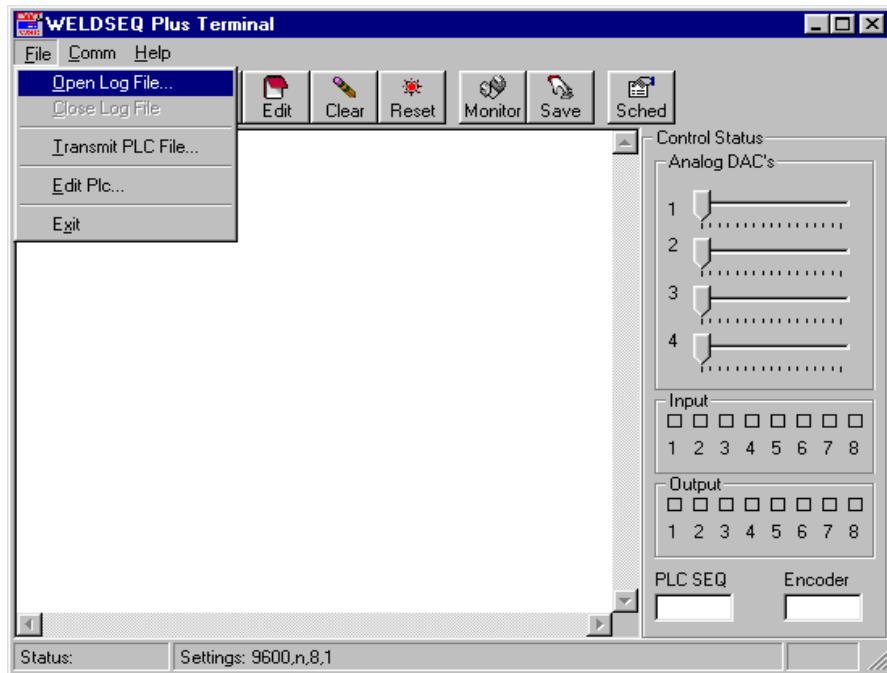
Open Log File…   Opens a Log File when the Terminal mode is active. All commands entered and all data sent by the WSC-1000/MWC will be saved to a user-specified file. If the Collect Welding Data mode is active weld data collected will be saved to the user-

Figure 1 - File Pull-down Menu

specified file.

Transmit PLC File…   Send any opened PLC File to the PLC.

Close Log File…   Close any opened Log File or Weld Data File.

Edit PLC…   Invokes the PLC Editor that can be used to View, Edit or Print any Log File or PLC File.

Exit   Terminates the WELDSEQ Plus program.

6.0 COMM PORT PULL-DOWN MENU

The following Menu items are available under the Comm Port Pull-down Menu:
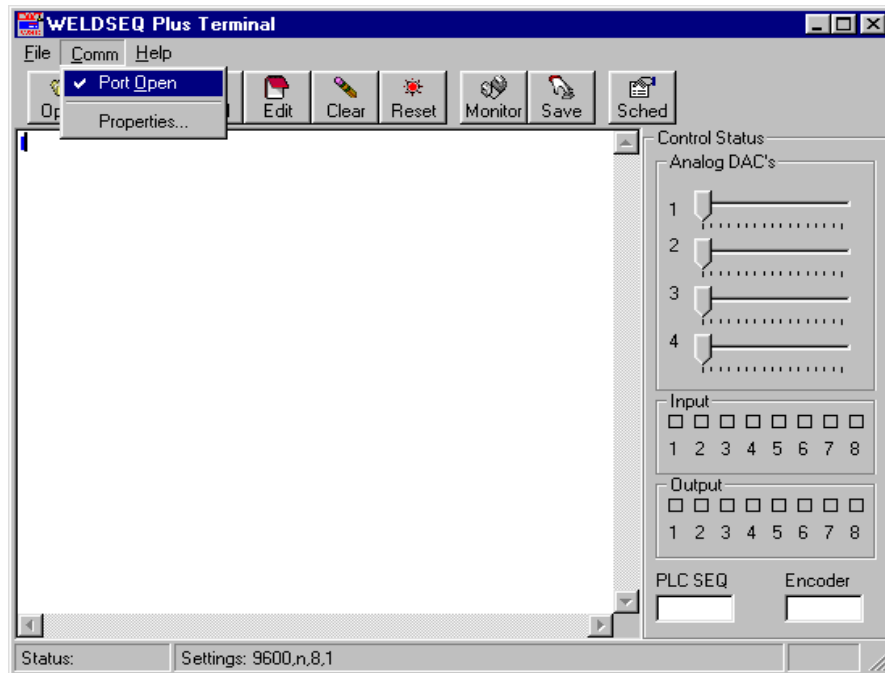
Figure 2 - Comm Port Pull-down Menu

Port Open   Indicates the current port status. If checked, the selected port is open. If unchecked the port is closed. Clicking on the item will toggle the state of the port. The port must be open to communicate with the WSC/MWC.

Properties   Opens the Comm Port Properties dialog and allows the user to configure the serial port. Refer to Serial Terminal Port Protocol Interface for further information.

7.0 TOOL BAR SPEED BUTTONS

The following Menu items are available under the Tool Bar Speed Buttons:

Figure 3 - Tool Bar

Open   Speed Button opens a Log File when the Terminal mode is active. All commands entered and all data sent by the WSC/MWC will be saved to a user-specified file.

Close   Speed Button closes any opened Log File.

Send   Speed Button opens the Open PLC File Dialog and allows the user to select a stored PLC data file. After specifying the PLC File the program will send data to the WSC/MWC. This function will use the PLC text file and download the specific commands to the WSC/MWC controller. While sending the data a Cancel Download Dialog will be displayed. To cancel the download, click the cancel button. When all of the data has been sent the program will return to the terminal screen.

Edit   Speed Button invokes the PLC Editor Edit dialog and allows the user to modify and to generate a new PLC program. The user can use the Editor Pull down menus to invoke PLC setup wizards. The PLC Wizards are used to build application specific PLC programs.

Clear   Speed Button invokes the Clear PLC code function. This routine will clear all of the PLC memory and load a simple two-line PLC program. After clearing the PLC code the program will reset the WSC/MWC PLC.

Reset   Speed Button invokes the Reset PLC function. The program will issue a reset to the WSC/MWC PLC. PLC program execution will begin at Sequence 1.

Monitor   Speed Button invokes the PLC monitor program. To exit the monitor program press the Monitor speed button. During the monitor mode the Analog DAC sliders will reflect the operating DAC values.   The Input and Output LED's will show the current Input and Output status. The PLC SEQ window will display the current executing PLC command. The Encoder window will display the current encoder count. The displayed status is updated approximately 10 times per second.

Save   Speed Button invokes the Save PLC Data to EEPROM function. The program will issue a Save PLC command (^W) to the WSC/MWC PLC.

Sched   Speed Button invokes the Weld Schedule editor. From this program the user can Read/ or Write weld schedule data from or to a WSC/MWC. The parameters can be edited, printed and stored in user specified files.   Stored schedule files can be opened then down loaded to the WSC/MWC user defined schedule. A weld procedure sheet is provided with each file to document pertinent process setup data.

8.0 COMM PORT PROPERTIES

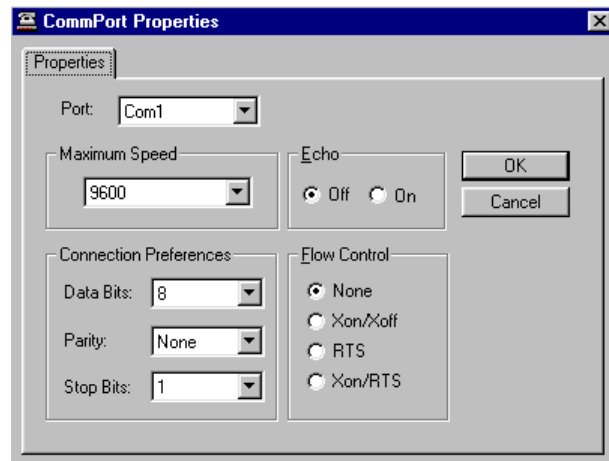The following Communications option items are available in the Comm Port Properties Dialog window:

Figure 4 - CommPort Properties

Port   Option window specifies the Communications port to be used by the terminal program. (Default Com1)

Maximum Speed   Option window specifies the Communications port Baud rate to be used by the terminal program serial protocol. (Default 9600)

Connection Preferences   Option window specifies the serial data bits (Default: 8), the Parity Bits (Default: None) and the number of stop bits (Default: 1) used by the terminal program serial protocol.

Echo   Check box specifies the Echo mode for the Terminal Program (Default: Off). If the Echo mode is enabled the program will echo data typed on the keyboard directly to the screen. In normal operation the WSC/MWC will echo each character back to the screen.

Flow Control   This check box indicates the type of flow control to be used by the program (Default: None).

9.0 CONTROL STATUS PANEL

The Control Status Panel provides an easy way to use interface to the WSC/MWC control. If the monitor function is enabled the Status panel will indicate the current status of each DAC output, External switch inputs and output relay status. The PLC SEQ window will display the PLC sequence number being executed and the Encoder window will display the WSC/MWC encoder count. When the program is in the Terminal mode the user can use the components to activate the I/O control functions of the WSC/MWC. The following is a description of the control components:
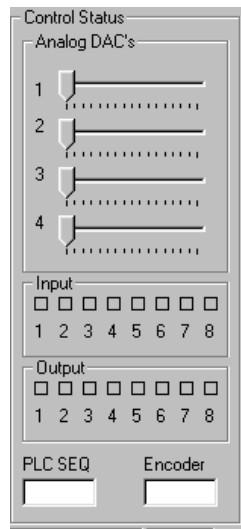

Figure 5 - Control Status Panel

Analog DAC's   Slider controls can be used to send DAC values to the WSC/MWC DAC outputs. To set a DAC value, move the cursor over the desired DAC slider. Press and Hold the right mouse button and move the slider to the desired position. Release the right mouse button and the program will send the specified value to the WSC/MWC DAC output. The value may also be incremented by placing the mouse cursor on either end of the DAC scale and clicking the right mouse button.

Input   Place the cursor over the Input number and press the right mouse button to toggle the selected input. The Status indicator will illuminate when the input is active.   This is a simulate I/O function and will be a logical AND with any physical inputs.

Output   Place the cursor over the Output number and press the right mouse button to toggle the selected Output Relay. The Status indicator will illuminate when the Output is active.

10.0 PLC EDITOR DIALOG

The PLC Editor is used to edit existing PLC Program files or to generate new PLC files. The Editor is a full-featured editor with specialized editor wizard to help generate PLC and system configuration files for the WSC/MWC weld controllers. The Editor uses a pop-up menu that allows the user to perform basic editing functions such as, Undo, Cut, Copy, Paste and delete. To activate the pop-up menus with the cursor over the editor window, press the Right mouse button. Select the desired function using the mouse or by pressing the indicated key on the keyboard.
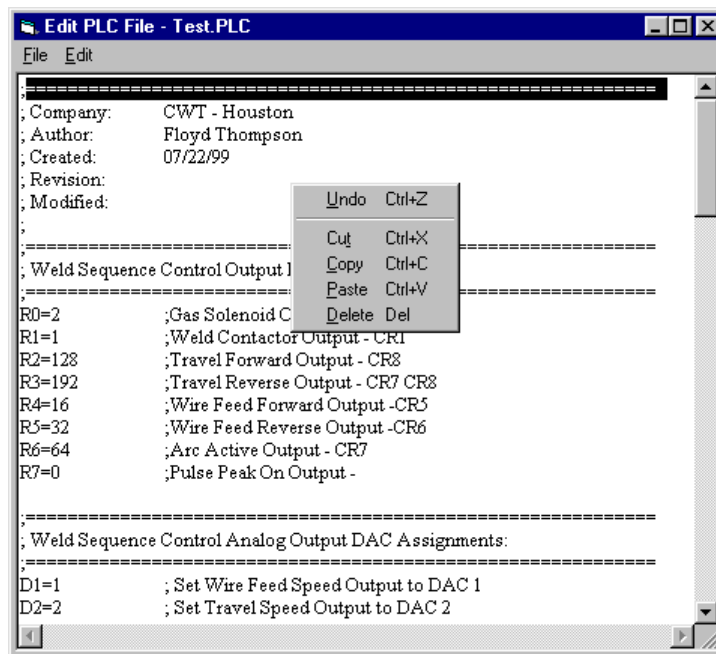
Figure 6 – PLC Editor Dialog

The following keyboard commands can be used directly:

Ctrl+Z	Undo last command
Ctrl+X	Cut selected text
Ctrl+C	Copy selected text to clipboard
Ctrl+V	Paste selected text from clipboard
Delete	Delete selected text

11.0 PLC EDITOR FILE PULL-DOWN MENU

The following Menu items are available under the PLC Editor Screen:

```
Edit PLC File - Test.PLC                              _ □ X
File  Edit
   New...     ============================================  ▲
   Open...    CWT - Houston
   Save...    Floyd Thompson
   Save As... 07/22/99
   Print...
   Exit       ============================================
; Weld Sequence Control Output Relay Assignments:
;============================================
R0=2            ;Gas Solenoid Output - CR2
R1=1            ;Weld Contactor Output - CR1
R2=128          ;Travel Forward Output - CR8
R3=192          ;Travel Reverse Output - CR7 CR8
R4=16           ;Wire Feed Forward Output -CR5
R5=32           ;Wire Feed Reverse Output -CR6
R6=64           ;Arc Active Output - CR7
R7=0            ;Pulse Peak On Output -

;============================================
; Weld Sequence Control Analog Output DAC Assignments:
;============================================
D1=1            ; Set Wire Feed Speed Output to DAC 1
D2=2            ; Set Travel Speed Output to DAC 2      ▼
```
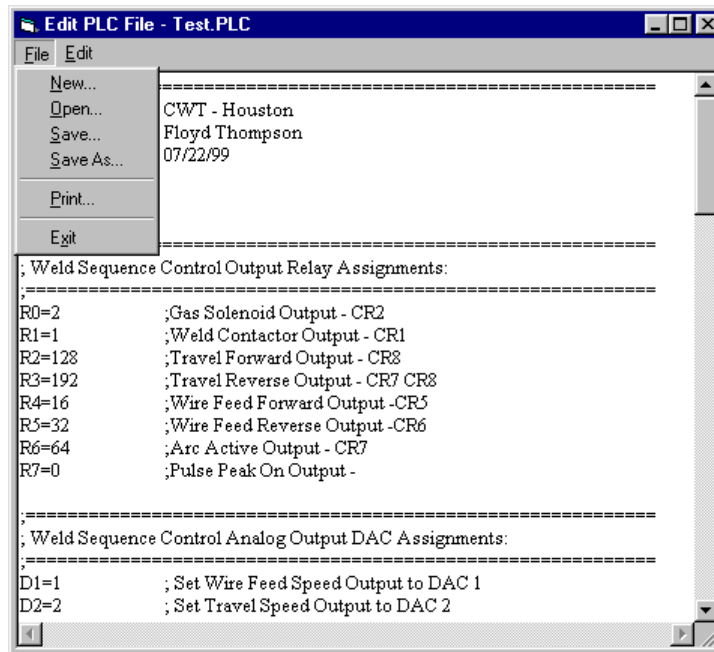
Figure 7 – PLC Editor Pull-down Menu

New…   Clears the current screen and opens a new PLC screen

Open…   Opens the PLC File open Dialog window and allows the user to
                    select an existing file. After selecting the file the PLC file will be
                    loaded into the editor.

Save…   Saves the currently opened PLC File.

Save As…   Invokes the PLC File save Dialog and allows the user to save the
                    current PLC code to a new file name.

Print…   Invokes the Printer Dialog and allows the user to print the
                    currently displayed file.

Exit   Terminates the WELDSEQ Plus Edit program.

12.0 PLC EDITOR EDIT PULL-DOWN MENU

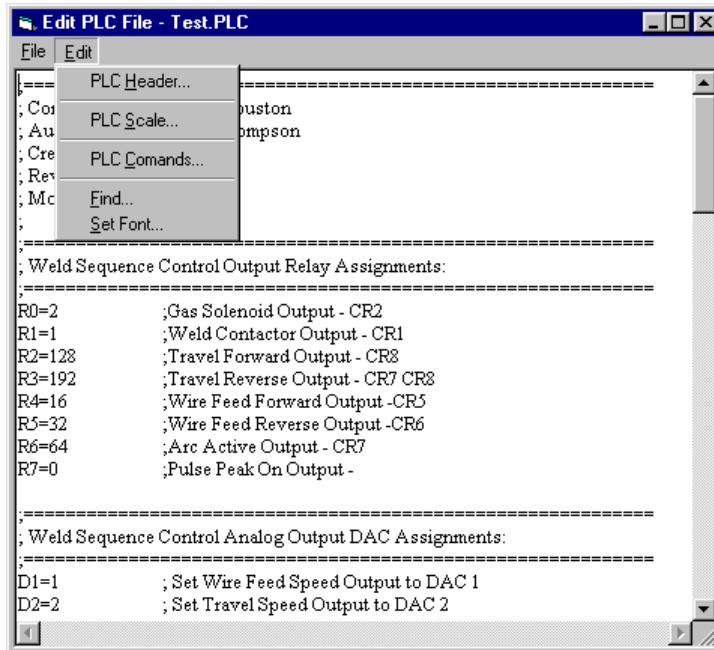The following items are available in the Edit Pull Down Menu:

Figure 8 - PLC Editor Edit Pull-Down Menu

PLC <u>H</u>eader…   Invokes the PLC program Header Wizard and allows the user to configure the Basic Analog and relay assignments for the WSC/MWC controller.

PLC <u>S</u>cale…   Invokes the PLC DAC Scale Wizard and allows the user to configure the Analog DAC scaling for the WSC/MWC controller.

PLC <u>C</u>ommands…   Invokes the PLC command Wizard editor and allows the user to build PLC programs using direct entry or user selected standard routines.

<u>F</u>ind…   Opens a Search and replace dialog that allows the user to find specified text strings in the PLC file.

<u>S</u>et Font…   Allows the user to define the font type and size used by the editor.

13.0 PLC HEADER SETUP DIALOG WIZARD

The following is the Header setup dialog wizard. The wizard allows the user to configure the basic WSC/MWC DAC Assignments, Enable Axis Drives and configure Weld Sequence output relay assignments.
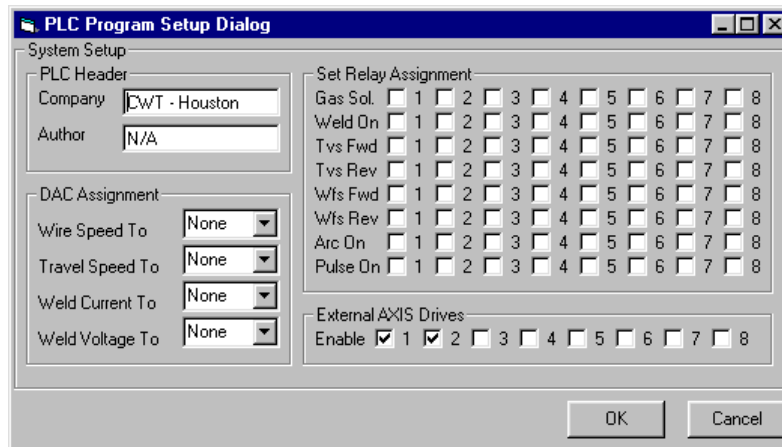

Figure 9 - PLC Header Setup Dialog Wizard

There are four setup panels. The following is a description of each panel:

PLC <u>H</u>eader…   Allows the user to specify a 40 Character Company name for the PLC file and identify the author of the PLC program.

DAC Assignment…   Allows the user to configure the four Analog outputs from the weld sequence controller and to specify which DAC or AXIS drive will be connected to the Analog output. To select the Device use the Drop down option list to select the output device. If the weld output function is not used set the device to None.

Relay Assignment…   Allows the user to specify which relay output will be activated by the indicated weld sequence output event. To select a relay, click on the desire relay window. More than one relay may be assigned to any event.

External Axis drives   Allows the user to specify which axis drives are connected to the WSC/MWC Locale Area Network (LAN) port. To enable a AXIS drive device click on the desired AXIS window.

To exit and save the new values press the OK button. The Window will close and the wizard will copy specified data to the Editor clipboard. To insert the new data, at the current cursor location, press the *Ctrl+V* key. Or press the right mouse button and use the paste option in the pop-up menu. To exit without saving, press the Cancel button.

14.0 PLC DAC SCALING WIZARD

The following DAC Scaling wizard is used to calculate the Slope and Offset values that are used for various Weld sequence analog outputs. Enter the Maximum and Minimum value for each parameter. After entering the values press the Calculate Button and the wizard will display the calculated values for the Slope and offset for each parameter.

Figure 10 - PLC DAC Scaling Wizard

To exit and save the new values press the OK button. The Window will close and the wizard will copy specified data to the Editor clipboard. To insert the new data, at the current cursor location, press the *Ctrl+V* key. Or press the right mouse button and use the paste option in the pop-up menu. To exit without saving, press the Cancel button.

15.0 PLC CODE EDITOR WIZARD

The following is the PLC code editor wizard. This wizard provides assistance to the user in generating PLC programs for the WSC/MWC controllers. The wizard consists of 5 text windows, two options dialogs and five command buttons.
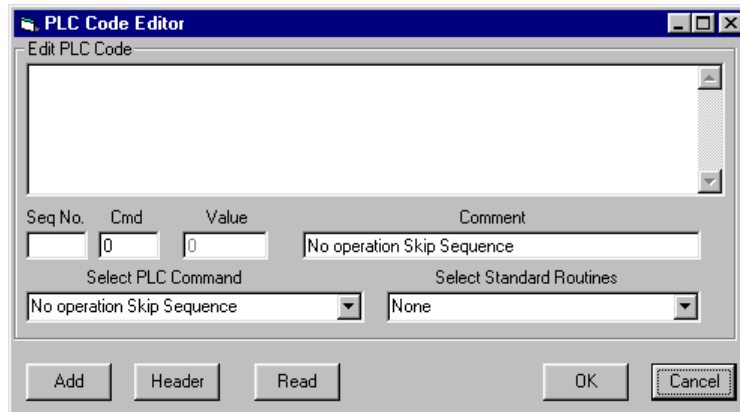

Figure 11 - PLC Code Editor Wizard

Edit PLC Code…	This Text window is a full function editor and the user may enter text directly into the window, or edit code entered via the wizard. Using the one of the Option dialogs.
Seq No.…	This Text window is used to specify the PLC sequence number. When a value has been set the wizard will increment this number as new commands are entered.
Cmd…	This text Window is used to enter a specific sequence command number. As the number is entered the Select PL Command dialog Text will reflect the functional description for the value being entered.
Value/ MSB/LSB…	The Value window will change based on the PLC command entered. If the Selected PLC command requires an MSB and LSB byte then the two windows will appear. If the command uses only a LSB byte then the LSB window will appear. If the PLC command requires a word value then the Value window appears. If the PLC Command does not require value then the window will be disabled and a value of zero will be set.
PLC Command…	This Select Option dialog allows the user to select the desired PLC command by selecting the desired function from a Pull-Down list. To invoke the Pull-Down list place the cursor over the Down arrow button. Press the left mouse button to display the list. Use the Scroll bar to scan the list. To select the entered value, place the cursor over the item and press the Left mouse button.

Standard Routine…   This select option Dialog allows the user to insert standard PLC code routines. To use this option set the PLC Sequence number to the desired starting sequence number. To invoke the Pull-Down list place the cursor over the Down arrow button. Press the left mouse button to display the list. Use the Scroll bar to scan the list. To select the entered value, place the cursor over the item and press the Left mouse button. The wizard will insert the selected routine with the specified starting sequence number.

Add Button…   To add a selected PLC command to the Edit PLC Code window, press this command button. The new line will appear and the sequence number will be incremented.

Header Button…   Press this command button to insert a separator header to the PLC Code editor. This header makes the code easier to read.

Read Button…   This command button will read the active PLC program stored in the WSC/PLC to the PLC Code editor. The WSC/MWC must be connected to the PC.

Note: *The WSC/MWC does not store PLC text Comments. When using this option the program will append the default command text to each PLC as it is read from the WSC/MWC. This text is for reference only.*

Ok Button…   To exit and save the new values press the OK button. The Window will close and the wizard will copy specified data to the Editor clipboard. To insert the new data, at the current cursor location, press the *Ctrl+V* key. Or press the right mouse button and use the paste option in the pop-up menu.

Cancel Button…   To exit without saving, press the Cancel button.

16.0 WELD SCHEDULE EDITOR

The following is the Weld Schedule editor. This Tab Dialog window allows the user to generate weld schedules for the WSC/MWC controllers. The editor consists of 4 Tab's which contain the various schedule parameters.
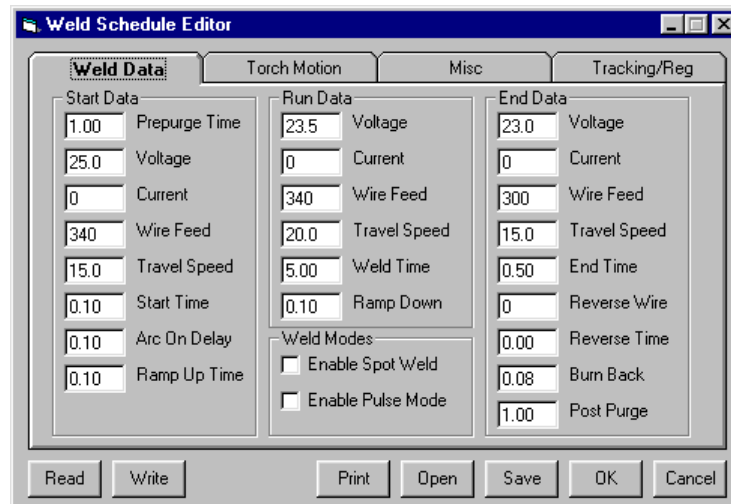

Figure 12 – Weld Schedule Editor Weld Data Tab

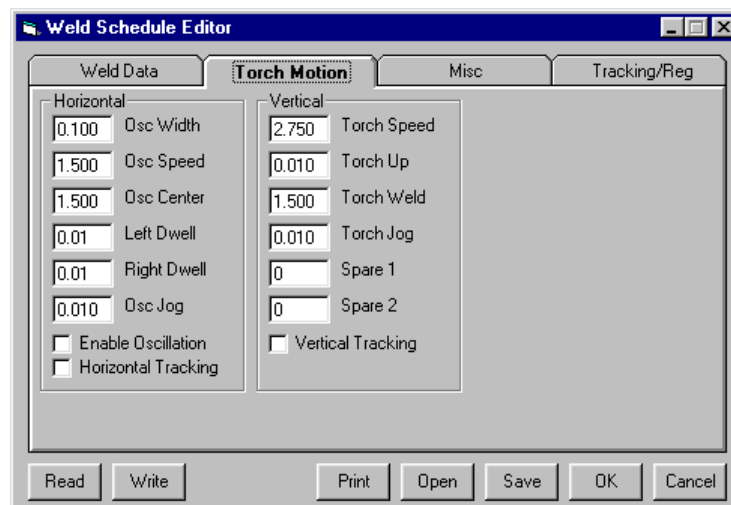The "Weld Data" Tab displays the basic weld parameters.

Figure 13 – Weld Schedule Editor Torch Motion Tab

The "Torch Motion" Tab display's the Vertical and Horizontal axis drive parameters.
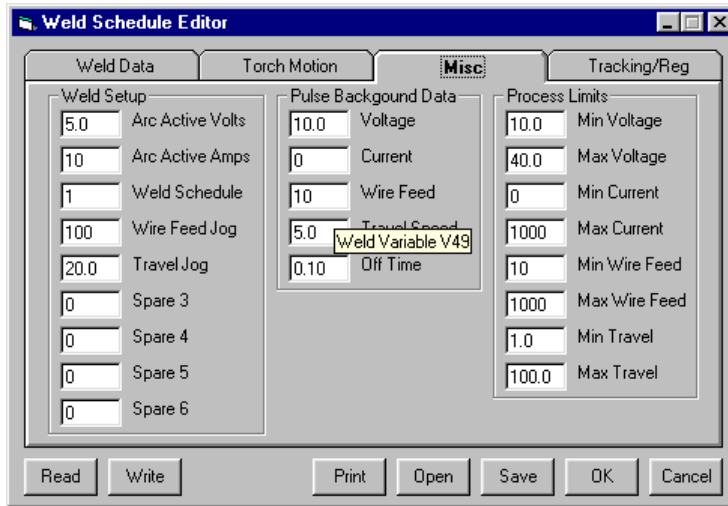

Figure 14 – Weld Schedule Editor Misc Tab

The "Misc." Tab displays the miscellaneous parameter settings such as weld schedule and setup parameters.
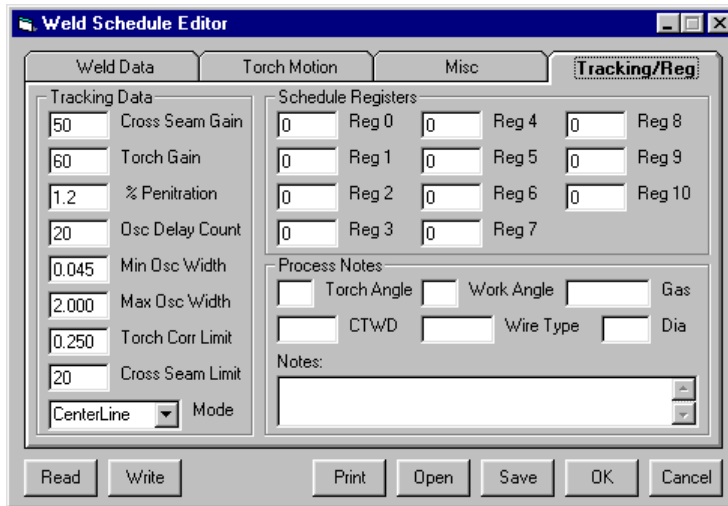

Figure 15 – Weld Schedule Editor Tracking/Reg Tab

The "Tracking/Reg." Tab displays tracking data and modes, schedule registers and process notes.

To enter a new value place the cursor over the parameter test window and click the left mouse button. Using the keyboard enter the new value. To select a new Tab place the cursor on the desired Tab and click the left mouse button.

There are seven (7) command buttons on the bottom of the Schedule editor. The buttons allow the user to Read/Write schedule data to the WSC/MWC control, print the weld schedule, Open a stored weld schedule file, Save the current schedule data to a file,

Save the current configuration and exit the editor and cancel the editor dialog without saving the data. The following is a description of the command buttons:

Read…   Read weld schedule data from the WSC-1000 or MWC control. Set the weld schedule number to read in the Misc. Tab window. Press the ***Read*** button and a Read Schedule Dialog will appear. The dialog window will display the Variables being read. As the data is read it will be displayed.

Write…   Write the selected weld schedule to the WSC-1000 or MWC control. Set the weld schedule number to write in the Misc. Tab window. Press the ***Write*** button and a Write Schedule Dialog will appear. The dialog window will display the Variables being written.

Print…   Print schedule data. Press this button to invoke the printer dialog. Select the destination printer and the program will print the displayed schedule data and process notes.

Open…   To open a stored weld schedule press this button. The Open file dialog will be displayed. Select the desired file and press the open button. The new schedule data will be displayed.

Save…   To save the current schedule data to a file, press the ***Save*** button. The Save file dialog will appear. Enter the new file name and press the save button. The weld schedule data will be written to the selected file.

Ok…   To save the current changes and exit the editor, press the ***Ok*** button.

Cancel…   To exit the editor without saving the changes press the ***Cancel*** button.