
SSP-2
SOFTWARE SUPPORT PACKAGE
FOR UNIDEX™ 1
USER'S MANUAL
P/N EDO100



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PREFACE

The information presented in this document provides a detailed explanation of the Unidex 1 Software Support Package (SSP-2). The SSP-2 is a DOS-compatible software program designed to support Unidex 1 motion controller from a host such as a personal computer.

It is recommended that the user read the following list of documents in the order shown to gain insight into all operational features of the Unidex 1.

- Unidex 1 Programmable Motion Controller Overview
- Unidex 1 Programmable Motion Controller User's Manual
- Unidex 1 Software Support Package User's Manual (SSP-2)

DISCLAIMER

The information contained in this manual is subject to change due to improvements in design.

Though this document has been checked for inaccuracies, Aerotech does not assume responsibility for any errors contained herein.

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CHAPTER 1: INTRODUCTION

SECTION 1-1 SOFTWARE CONVENTIONS

The following software conventions are used in this manual.

DISPLAY FORMAT

Most menu and display samples shown in this manual are enclosed in blocks. For example, the communication softkey menu is shown below:

1Help 2Immed 3Run 4Status 5Dir 6Tfx 7Xfer 8Sync 9Main

MENU SELECTIONS

The software menu selections, such as the one shown above, are made by pressing the appropriate functions keys (F1 - F10).

DATA

This manual uses <ENTER> when discussing the function of entering data. It is the same as <RETURN> or <CR> <LF>.

FILE NAME AND PROGRAM NUMBER

A file name will always refer to a program on the host computer's storage drive, while a program number will always refer to a program within Unidex 1's memory.

ABORTING A FUNCTION

When a softkey function takes you to a point in the program where there are no softkey displays and you want to go back to the previous menu without performing the present function, press < ENTER > in response to the first prompt of that mode.

TERMINATING A PROGRAM

The SSP-2 Program may be terminated by depressing and holding the < CTRL > key, then depressing the < BREAK > key. The Program will terminate and exit to the DOS command prompt.

SECTION 1-2 SOFTWARE OVERVIEW

The Software Support Package (SSP-2) is a program development aid which enables you to increase the capabilities of your Unidex 1 from those of a point-to-point motion controller with minimal user memory, to those of a more sophisticated controller.

The SSP-2 software package also provides a more efficient means of controlling multiple Unidex 1s configured in the RS-232C "daisy-chain" mode. Daisy chaining allows multiple Unidex 1s to be "centrally" controlled from a host device such as a PC (personal computer).

The communications mode provides functions for motion program transfer and execution. The transfer function provides for motion program transfer between the Unidex 1 and the host's disk drive. Several other modes of program execution are also provided.

The Software Support Package features softkey selections such as:

- Help
- Setup
- Edit
- Communication (Run, Status, Transfer, Etc.)
- Directory
- Print

The selections above are from the main menu. Selecting any of these will cause a new set of softkeys to be displayed. Each selection and its subsequent selections will be covered in this manual.

Other Software Support Package (SSP-2) features include:

- Help Screens (with motion command summary)
- Free editing software package (includes its own help screens)
- Program transfer between Unidex 1 and disk drive
- Auto or Block mode program execution
- Immediate command execution
- Slew capability from IBM pc keyboard (PC-AT only)
- Status information on-screen (input/output, errors, axis information)
- TFX mode with menu-assist screens

Refer to Figure 1-1, for the screen displayed at Power Up.

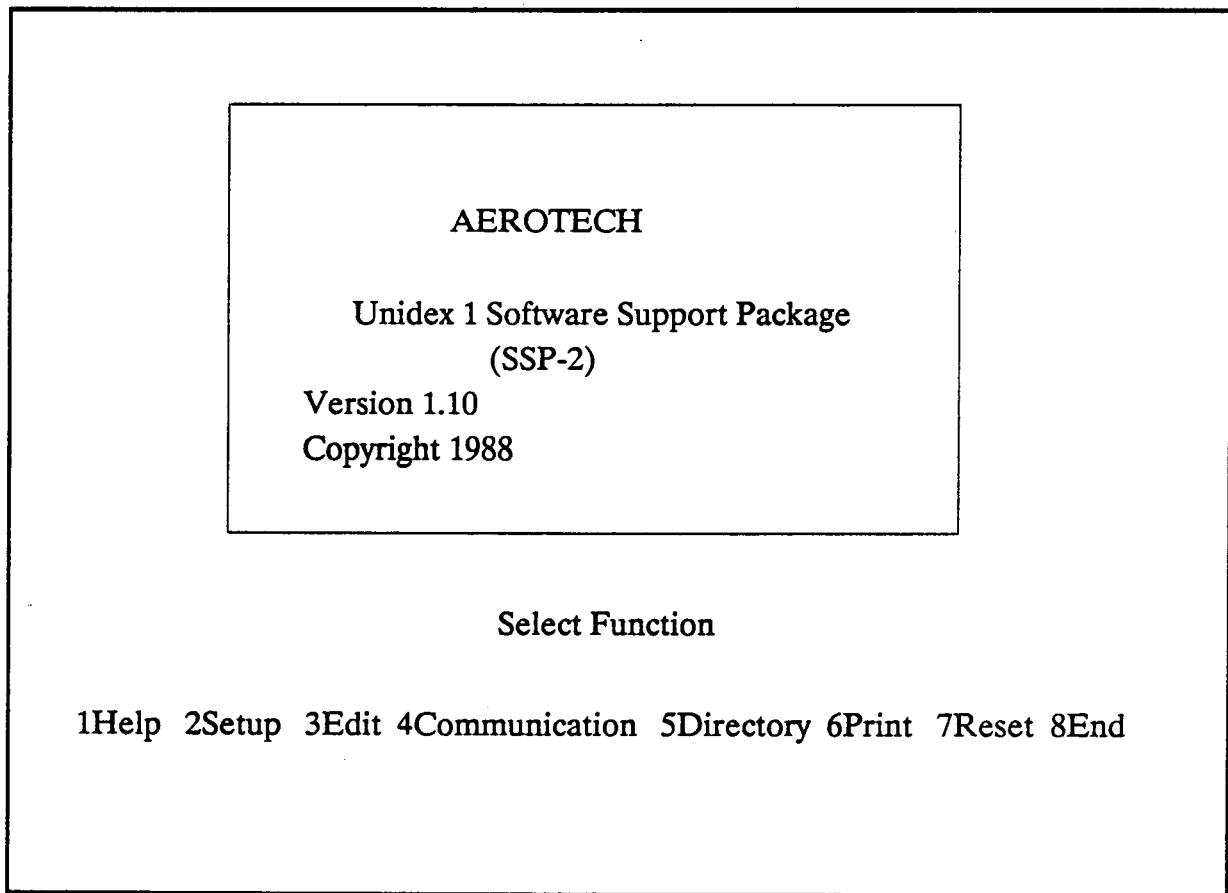


FIGURE 1-1: SCREEN DISPLAYED AT POWER UP (MAIN MENU)

CHAPTER 2: INSTALLATION

The SSP-2 software package can be installed on any IBM (or compatible) PC-AT or PC-XT computer, containing:

- (1) one 360K or a 1.2M 5 1/4" floppy disk drive and a hard disk, or
- (2) a two floppy disk drive system.

Also required is PC-DOS or MS-DOS, 2.10 version or later.

SECTION 2-1 COPYING YOUR DISKS

IMPORTANT: The SSP-2 Master disk is "write protected" against accidental alteration. Do not use the SSP-2 software Master disk as the working disk. Always make a copy of the Master disk prior to software use. The Master disk **must** be used whenever the software is installed on another computer. The first time the software is run it internally calibrates itself in accordance with machine speed and stores this calibration parameter in the Setup file, hence becoming "machine specific". This feature is required for the accurate time delays needed by the software but should not be transferred between machines.

SECTION 2-2 INSTALLATION ONTO A HARD DISK DRIVE

Copy the Master disk as follows:

Using the DOS "FORMAT" command, format a new disk.

Using the DOS "COPY" command, copy all files from the SSP-2 Master disk to the newly formatted disk.

Store the SSP-2 Master disk in a safe place. You are now ready to install the Unidex software.

To install the Unidex 1 Software onto a hard disk drive, make a subdirectory using the DOS "MAKE DIRECTORY" command, followed by the subdirectory name. The following example makes a subdirectory called SSP:

md SSP

Change to that subdirectory with a DOS "CHANGE DIRECTORY" command:

cd\SSP

When in your new subdirectory, use the DOS "COPY" command to copy the SSP-2 software files from your work disk (normally in drive A) to the subdirectory. (The following examples assume your hard disk is labeled C and your floppy drive is labeled A. If they are labeled differently, use the appropriate label.)

copy a:*. * c:

The following files will be copied:

ED.EXE (Editor)
SETUP.CFG
UNIDEX1.EXE
ED.HLP (Editor help file)
ED.DEF (Editor config. file)

You may now run the program by entering **UNIDEX1** and pressing **<RETURN>**.

To run the program after a boot up, enter the subdirectory with a **cd** command. For example, at the **C>** (the DOS prompt), enter:

CD \SSP <ENTER>

Then enter Unidex 1:

UNIDEX1 <ENTER>

The ED.EXE and ED.HLP files are universal text editor programs developed by Quicksoft. Help screens are incorporated into the file for ease of use. Additional information for this editor program can be acquired by contacting:

Quicksoft, Inc.
219 First North #224
Seattle, WA 98109
Phone: (206)282-0452

The ED.EXE and ED.HLP is invoked automatically by way of the main menu screen (the edit softkey) of the Unidex 1 SSP-2 software support package.

SECTION 2-3: INSTALLATION WITH TWO FLOPPY DISK DRIVES

(The following section assumes that your drives are labeled A and B. If not, make the appropriate substitutions.)

Copy the Master disk as follows:

Using the DOS "FORMAT" command, format a new disk as follows:.

format b:\s

The "/s" is used to put DOS commands onto your copy of the SSP-2 software disk. (This will allow you to boot your system from this disk.)

Store the SSP-2 Master disk in a safe place. You are now ready to install the Unidex software.

Once formatting is complete, place the SSP-2 master disk in drive A and your blank, formatted disk into drive B. Enter the DOS Copy command:

copy a:*. * b:

All SSP-2 software files will be copied from your Master disk in drive A to your work disk in drive B. The following files will be copied:

ED.EXE (Editor)
SETUP.CFG
UNIDEX1.EXE
ED.HLP (Editor help file)
ED.DEF (Editor config. file)

You may now run the SSP-2 software by booting with the SSP-2 software disk in drive A, and then entering the Unidex1 command.

The ED.EXE and ED.HLP files are universal text editor programs developed by Quicksoft. Help screens are incorporated into the file for ease of use. Additional information for this editor program can be acquired by contacting:

Quicksoft, Inc.
219 First North #224
Seattle, WA 98109
Phone: (206)282-0452

The ED.EXE and ED.HLP is invoked automatically by way of the Main Menu screen (the edit softkey) of the Unidex 1 SSP-2 software support package.

SECTION 2-4 RS-232C CONNECTIONS

Figures 2-1 and 2-2 illustrate the RS-232C connections necessary to connect the Unidex 1 to the IBM PC or compatible. Some computers have a standard 25 pin RS-232C connector. Others have a 9 pin connector. The following figures show the proper connections for each.

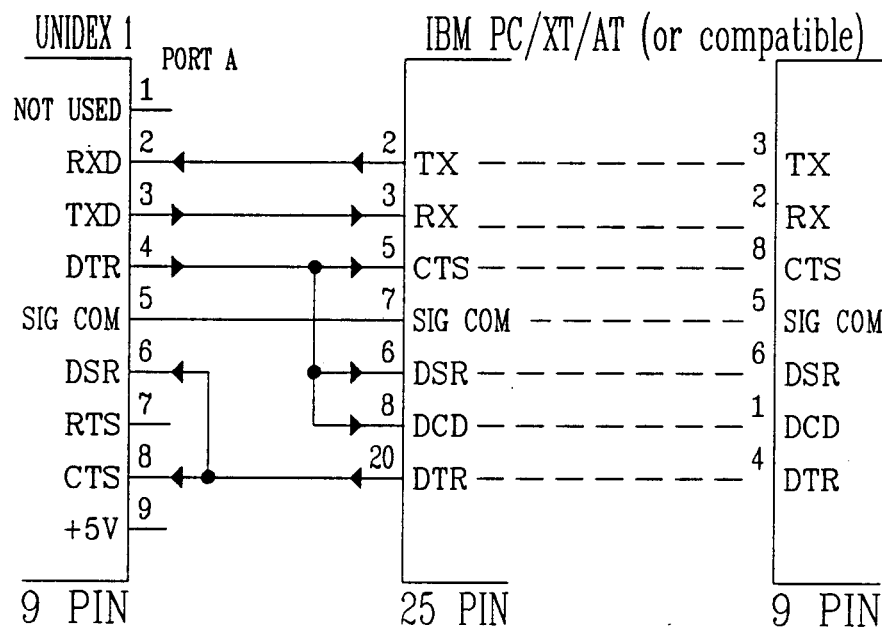


FIGURE 2-1: RS-232C SINGLE-AXIS CONNECTION

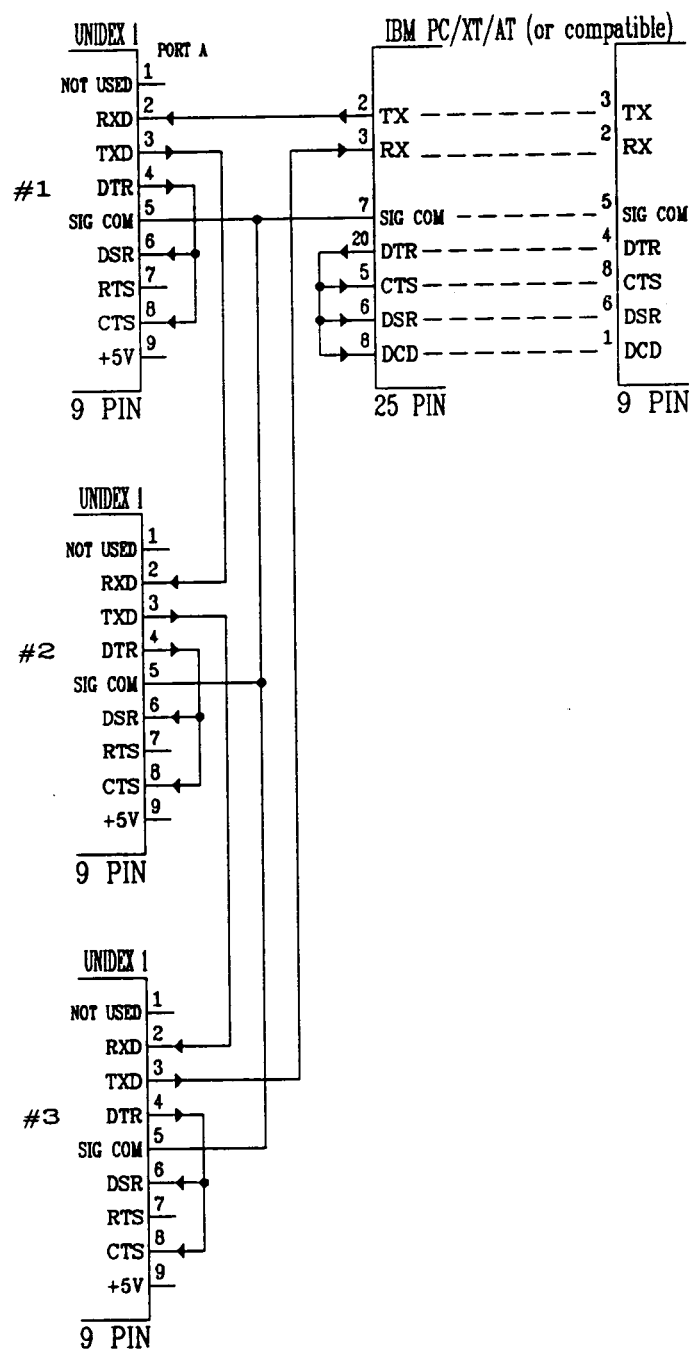


FIGURE 2-2: RS-232C MULTI-AXIS (DAISY CHAIN) CONNECTION

At the conclusion of the Unidex 1/computer connections, communication may be verified by selecting F7 RESET from the Unidex 1 Main Menu. The RESET LED on each of the Unidex 1 Motion Controllers must flicker. If no flicker is observed, examine the cabling for wiring errors or defects.

CHAPTER 3: SETUP

IMPORTANT: The SSP-2 Master disk is "write protected" against accidental alteration. Do not use the SSP-2 software Master disk as the working disk. Always make a copy of the Master disk prior to software use. The Master disk **must** be used whenever the software is installed on another computer. The first time the software is run it internally calibrates itself in accordance with machine speed and stores this calibration parameter in the Setup file, hence becoming "machine specific". This feature is required for the accurate time delays needed by the software but should not be transferred between machines.

Invoke the UNIDEX1 (same as UNIDEX1.EXE) program. The main menu will appear with the following selections:

1Help 2Setup 3Edit 4Communication 5Directory 6Print 7Reset 8End

Press the F2 key to enter the Setup mode and you will see the following setup menu selections:

1Device Address Map	2Com. Parameters	3Main Menu
---------------------	------------------	------------

NOTE: The Help menu (F1 of the main menu) will provide the following additional setup mode information. (This information will be explained later.)

- Valid Devices
- Device Labels
- Program Storage
- RS-232C Parameters
- Configure Unidex 1

SECTION 3-1 UNIDEX 1 CONFIGURATION

Unidex 1 has a setup mode for setting it's own internal parameters. Each Unidex 1 defaults to device address 01. If multiple Unidex 1s in the daisy chain mode are being used, each Unidex 1 must have a unique device address and assigned a label in the device address map such that it may be addressed for communication (see Section 3-2).

NOTE: No Unidex 1 should be configured to run a program upon power-up (Boot program-BP), when using the SSP-2 software package.

Each Unidex 1 has several parameters that may be configured by the user. Selecting F3 from the Setup menu will allow configuration of the Unidex 1's internal parameters (one unit at a time). A prompt will appear requesting insertion of a jumper onto Port B at Pin 6 and Pin 8 to enable the Setup mode. Then you will be placed in the TFX mode with Unidex 1's internally generated Setup menu displayed on the screen. At this point the Unidex 1s internal parameters, displayed as mnemonics (defined in the Unidex Motor Controller Manual, Chap. 3), may be viewed or modified. For example, to change Unidex 1's Device Address the entry would be DA09*. DA is the mnemonic for Device Address, 09 is the new Device Address.

SECTION 3-2 DEVICE ADDRESS MAP

The device address map serves two purposes. The first purpose is to identify the device addresses that exist in your system. This allows the software package to address each device and properly coordinate communication among the devices. The second purpose is to allow the user to assign a meaningful name to each device. This name, or label, will be requested from you each time you wish to communicate with a Unidex 1. Spaces within the labels are significant, however since all letters are converted to upper case, case is not. Correctly identifying each valid device will allow the host computer to maintain proper communication.

To configure the Device Address Map, press the F1 key (while in the Setup menu screen). The following address map will be displayed:

VALID DEVICE ADDRESS MAP

Device 1	Label is	Device 16	Label is
Device 2	Label is X-Axis	Device 17	Label is
Device 3	Label is Y-Axis	Device 18	Label is
Device 4	Label is	Device 19	Label is
Device 5	Label is	Device 20	Label is
Device 6	Label is	Device 21	Label is
Device 7	Label is	Device 22	Label is
Device 8	Label is	Device 23	Label is
Device 9	Label is	Device 24	Label is
Device 10	Label is	Device 25	Label is
Device 11	Label is	Device 26	Label is
Device 12	Label is	Device 27	Label is
Device 13	Label is	Device 28	Label is
Device 14	Label is	Device 29	Label is
Device 15	Label is	Device 30	Label is

Use cursor keys to select and label valid devices.

Press the ESC key when finished.

NOTE: Labels previously stored in the setup file will be displayed.

This map defines the Unidex 1 device addresses available to your system (when using RS-232 daisy chain) and also allows them to be referenced by their labels. Device address 00 is not shown, it is defined for use in Unidex 1's internal setup mode.

It is possible to address up to thirty devices (number 1 through 30). Each device number can be assigned a label for easy referencing. If more than one device is used, address 01 should not be assigned because any or all Unidex 1's will default to address 01 if a fatal error condition should occur.

For example, if a Unidex 1 that has been assigned the device address of 4, is connected to the computer, and you would like to assign its label as Axis 4, proceed as follows:

1. Move the cursor (using the UP/DOWN ARROW keys) to device #4.
2. Type in Axis 4 for device #4 label.

NOTE: Different devices may not use the same label.

When the address map has been completed, use the <ESC> Key to return to the setup menu.

SECTION 3-3 COMMUNICATION PARAMETERS

While in the Setup menu, press the F2 key (Setup Menu), to set the Communications Parameters.

A. PROGRAM STORAGE DRIVE

When the Communication Parameter Setup Menu is selected, the first screen to appear will be the Program Storage Device screen. This screen allows you to specify the disk drive on which motion programs will be stored.

<p>PROGRAM STORAGE DRIVE Enter program storage drive letter (default A)?</p>

If the <ENTER> key is pressed, the default value will be used. To change the program storage drive, enter the drive letter (A,B,C,D OR E if applicable) on which the programs are to be stored. Press <ENTER> to enter the program storage drive and obtain the next prompt from the Communications Setup Mode (Communication Parameters).

B. COMMUNICATION PARAMETERS

The selections for the screen are as follows:

Enter IBM Com. port number (Default 1)?
Enter baud rate - 9600 max. (Default 9600)?
Enter parity - odd, even, none (Default E)?
Enter number of data bits - 7,8 (Default 7)?
Enter number of stop bits - 1,2 (Default 1)?

NOTE: Default values shown are normally used by Unidex 1. (See *Unidex 1 Programmable Motion Controller User's Manual*, Chapter 3.)

The first prompt requests the communications port number from the host computer, through which Unidex 1 will communicate. This is the only communication parameter that will normally be changed by the user. It is possible to modify the others but it can only be accomplished by deleting the SETUP.CFG configuration file which initiates additional prompts for the remaining parameters.

The communications parameter must be set the same in the Unidex 1 for the proper communication. The Unidex 1's communication parameters may be changed using its own setup mode as described in Chapter 3 of the *Unidex 1 Programmable Motion Controller User's Manual*, or Section 3-1 of this manual.

NOTE: The baud rates from which you may select include: 300, 600, 1200, 1800, 2400, 4800, and 9600 (9600 required for TFX mode described later in this manual).

C. SLEW PARAMETERS

Following the communication parameter setup, you will be asked if the computer you are using is a PC-AT. If it is, you will have the additional capability of slewing. (Slewing is the capability of manually moving the axis in either direction.) Answer Y or N according to your PC type. If the answer is Y for yes, you will be asked to enter the slew feedrate (step/sec). Enter a slew rate from 1 to 125000 followed by pressing <ENTER>.

D. MAIN MENU

After setting all parameters, selecting F3 will return you to the main menu. At this time all setup parameters are stored on the disk in a file called SETUP.CFG. Each time the Unidex 1 program is started, this file is used to restore all internal parameters. If this file cannot be found at this time, an information message will be displayed indicating "Set-up file not found! Let's create one.", and the setup menu will be displayed, indicating that you should now create one by answering the setup prompts.

CHAPTER 4: EDIT

From the main menu screen, to select the EDIT mode, press the F3 key.

SECTION 4-1 FILENAME

When EDIT mode is selected through the main menu (F3) key, the directory of available motion programs, if any exist, will be displayed. A filename will be requested as shown below:

Enter filename to Edit?

A filename will always refer to a file in the program storage drive selected (as described in Section 3-2, Subsection A). A program number always refers to a program in the Unidex 1 memory.

Enter the filename of a new or existing file (use the <BACKSPACE> key to erase incorrectly entered characters). The filename is limited to eight letters and/or numbers. The 3 file extension .CNC is automatically appended. Press <ENTER> to enter the filename. **The characters ? and * should not be used within the filenames.**

After the filename has been entered, a check will be made to see if the file already exists. If the file does not exist, the first line at the top of the screen will display:

File not found; Esc to retype, or F9 to create "d:xxxxxxx.CNC"

(where "d:" is the drive set up to receive the file and "xxxxxxx" is the file name you are creating or editing.)

NOTE: All motion program files operated with the SSP-2 software package automatically append ".CNC" to the filename. Back-up files generated by the editor of the SSP-2 software package automatically append "&CN".

SECTION 4-2 ENTERING OR CHANGING PROGRAMS

Press F9 to create the new file. The program is entered (or edited) through the following EDIT screen:

```
ESC:Menu-Pnum Wrap + Sp- 99% Free. 0% thru. Read "d:xxx.CNC"
```

The screen shown above is the main screen for Quicksoft's universal text editor (see Section 2-2 or 2-3). (The program commands will also be displayed if an existing program is invoked.)

At this time, programs may be entered or altered. The valid Unidex 1 program commands are listed in Section 4-3. Listed below is an example program:

```
ESC:Menu-Push Wrap + Sp - 99% Free. 0% thru. Read "A:f3.CNC"
```

```
HX *  
XF10000 D100000 *  
OT 1000 *  
XD-100000 *  
OT0000 *  
PS *
```

Use the cursor (arrow) keys to position the cursor. Use the <INSERT>, <DELETE> and <BACKSPACE> keys to edit text. After editing is complete, press the F1 key to display the Main Editor menu softkey listing. Press F2 to save the program and exit the editor. The main menu screen will appear. Press F3 to save the most recently edited portion of file and remain in the current program file, or press F9, unsave, or to abandon the changes.

SECTION 4-3 UNIDEX 1 COMMAND SUMMARY

The following is the program command summary for Unidex 1. Detailed information for each command listed below may be found in section 5-8 of the *UNIDEX 1 PROGRAMMABLE MOTION CONTROLLER USER'S MANUAL*. (Refer to Chapter 7 of same manual for an example program consisting of these commands.)

* or /	: End of block (terminates the block commands listed below)
X F fffff Dvddddddddd * (see Note1)	: X axis move at feedrate fffff steps/sec a distance of dddddddddd steps, CW (v = "+") or CCW (v = "-")
X F fffff Rv *	: X axis free run at feedrate fffff steps/sec, CW (v = "+") or CCW (v = "-")
DW nnn.n *	: Dwell nnn.n seconds
H X *	: X axis home
OT 10XX *	: Output O1, O2, O3, O4 (Opto-coupler outputs) 1: True 0: False X: Don't care
IT X001 *	: Wait until input state I1,I2,I3,I4 (Opto-coupler inputs) matches X001
OS 0011 *	: OUT/STOP state (drive outputs to 0011 on activation of feedhold input)
OR XXXX *	: OUT/RUN state (drive output to XXXX on deactivation of feedhold input)
RS nnnn *	: Repeat loop start, nnnn repetitions
RE *	: Repeat loop end
CO* (see Note 2)	: Corner Rounding Mode
NC* (see Note 2)	: Non-Corner Rounding Mode
RC 10X0 *	: End Repeat loop on input condition 10X0
RT XX01 *	: Remain in Remote mode until condition XX01
RX *	: Start free run axis X after Stop (S X)
SX *	: Stop free run axis X
RP *	: Repeat program
LXvddddddddd *	: Load position register X with dddddddddd, v = + or -

IN *	: Set Incremental mode programming
AB *	: Set Absolute mode programming
LB nn *	: Label # nn (assign block to label #nn)
GT nn *	: GoTo label #nn
GS nn *	: GoSub label #nn
SR *	: Subroutine Return
PS *	: Program Stop (end of program execution)
CT nn 10X0 *	: GoTo label #nn if condition input state is 10X0, else continue
CS nn 1XXX *	: GoSub label #nn if input state is 1XXX, else continue
MT nn *	: GoTo label #nn on marker
MS nn *	: GoSub label #nn on marker
BI nn I XXX1 *	: Branch to label #nn on interrupt input condition XXX1
SI nn I X1X0 *	: GoSub label #nn on interrupt input condition X1X0
EI *	: Enable interrupt
DI *	: Disable interrupt
EH * (see Note 3)	: Enable high/low motor operating current
DH * (see Note 3)	: Disable high/low motor operating current
AD nnnn *	: Accel/Decel ramp time in milliseconds (parabolic or linear ramp profile is selected in Setup Mode)
LP dddddddddd *	: Load positive limit with dddddddddd
LM dddddddddd *	: Load minus limit with dddddddddd
EP *	: Enable positive limit
EM *	: Enable minus limit
EL *	: Enable both limits
DP *	: Disable positive limit
DM *	: Disable minus limit
DL *	: Disable both limits
;	: Program comment may begin after ; (comments terminated by <CR>)
%	: End edit (downloading)

- NOTE 1:** "X" axis designated to maintain consistency with the Unidex 11 series Controllers.
- NOTE 2:** Unidex 1 DC and Aerodrive only.
- NOTE 3:** Unidex 1 Stepper Controller only

SECTION 4-4 PROGRAM COMMENTS

Comments may be placed in programs at the end of commands or between commands. The comment must be preceded by a semicolon (;) and terminated by <CR>. For example:

HX * ; Home axis <CR>

These comments will be stored within the Motion Program of the Program Storage drive for later editing, however they are ignored by the Unidex 1 as it receives the program and will not store them within its user memory.

The following characters must not be used for comments since they will reset or alter the communication status of Unidex 1:

##, >, <, <CTRL>A, <CTRL>B, <CTRL>D and Hex code 7F

SECTION 4-5 FILE SAVE AND EDITOR EXIT

As mentioned earlier, an edited program may be saved on disk by first pressing the F1 key while in the EDIT screen. This will cause another Editor menu screen to appear. The "SAVE" function will be the F3 key. Pressing F3 will save the current edited file. After the save has been completed, the screen will return to the current file being edited. Where the file is stored is specified in the Setup Mode (see Section 3-2).

Pressing the F2 key will also SAVE the current file. However, the edit session will end and control will be turned over to the main menu screen of the SSP-2 support program.

To end the edit session and abandon the changes just made, press F9 and < ENTER > to "unsave", and then F2 and < ENTER > to exit to the Main Menu.

CHAPTER 5: COMMUNICATIONS MODE

From the Main menu, select function F4 (Communication) to enter the Communication menu. When this mode is selected, you will be asked to enter the Unidex 1 to be addressed through the following screen:

Enter device label?

(The assignment of Device Labels is explained in Section 3-2 of this manual.)

After a Unidex 1 Device Label has been entered (use < BACKSPACE > to undo incorrectly entered data), the following Communication menu will be displayed:

1Help 2Immed. 3Run 4Status 5Dir. 6Tfx 7Xfer 8Sync 9Main

The communication mode enables the transfer of information between Unidex 1 and the PC. This information may include:

- **Files (motion programs)**
- **Axis position**
- **Statuses**
- **Motion commands**
- **System commands**

SECTION 5-1 HELP MODE

In the Communication menu screen, press F1, Help, for information concerning all Communication menus. F1 and F2 scroll the pages, and F3 returns you to the Main Communication menu.

Please review this "help" information before continuing with the Communication mode.

SECTION 5-2 IMMEDIATE MODE

In the Communication Menu screen, press F2, Immediate mode. The immediate mode allows a command to be sent to Unidex 1 from the controller and executed immediately, without the need for an entire program to be sent or retained in memory. By pressing F2 when in the communication screen, you will see:

Device currently
addressed

Position Display

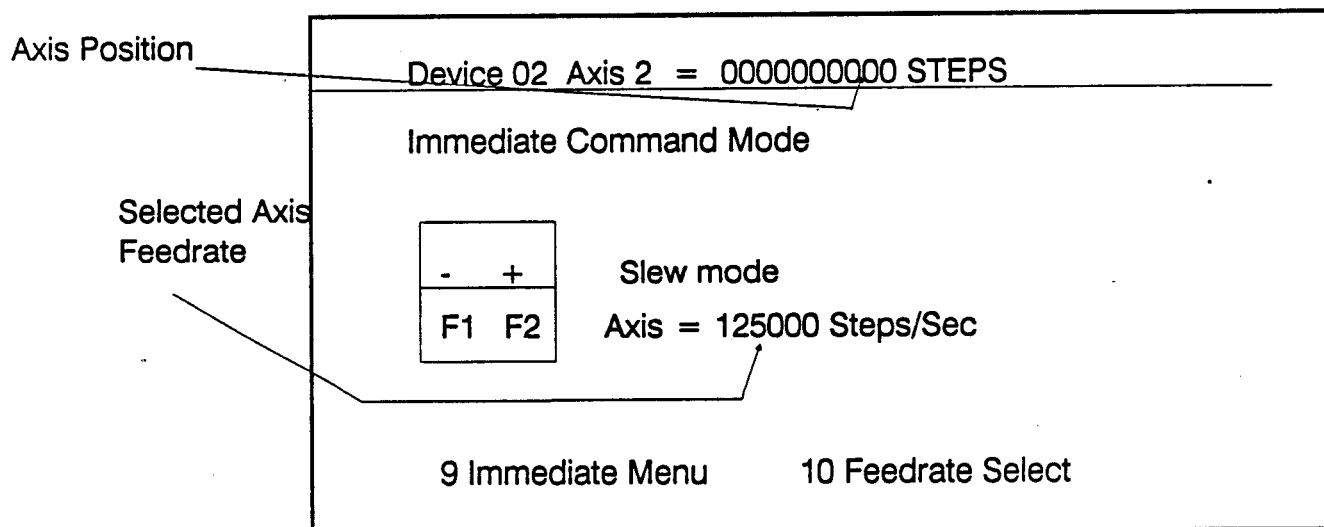
Device 02	AXIS 2 = 0000000000 STEPS
Immediate Command Mode	
Command?	
1Help 7Slew 9Communication Menu ESC-Abort Command	

Upon entering the Immediate Command mode, you will be prompted for a Unidex 1 Motion command. A list of these commands can be obtained by pressing F1 (Help). After entering a command and pressing <ENTER>, your host computer will wait for a Service Request from Unidex 1, indicating that the command has been executed. (The Service Request routine is automatically set up by the Unidex 1 SSP-2 software when the communication mode is invoked. See Section 5-5 of the *UNIDEX 1 PROGRAMMABLE MOTION CONTROLLER USER'S MANUAL*.)

Upon receiving this acknowledgment, the position will be updated and the command prompt will again be displayed. While waiting for the User to enter a motion command the Position display will be updated once per second with the current Unidex 1 position. While in the process of a Motion command the Unidex1 cannot provide position information. While the Unidex 1 is executing the command, the <ESC> key may be used to reset the Unidex 1, and abort the command. In this mode, the function keys are treated as direct commands, and should therefore only be selected at the "COMMAND ?" prompt. Selecting F9 (Communication mode) will return you to the Communication menu.

A. SLEW MODE (PC-AT ONLY)

While in the immediate mode menu, selecting the Slew function (F7), allows you to slew the selected Unidex 1 via the function keys F1 and F2. However, this is a hardware-specific function and is only available to PC-AT users. The default slew feedrate is selected and set up as discussed in section 3-2C of this manual. When the slew function is enabled, you will see the following screen:



Press F1 to slew CCW and F2 to slew CW. The axis position will be updated during slew. To change feedrate, press F10, enter the feedrate, and press <ENTER>. To return to the Immediate mode menu, press F9.

SECTION 5-3 RUN MODE

From the main Communication menu, press F3 for Run. The Run mode allows you to run a program from the program storage drive or from Unidex 1 (in Auto or Block mode). Press F3, Run, to see:

1From Disk 2From Unidex 3Com. Menu

(Pressing F3 returns you to the main Communication menu.)

Each Run mode will report any errors occurring during program execution. The error itself terminates the program.

Three basic types of errors may be indicated: Program Syntax, Limit, or Illegal Program Number. The Limit error, both Hardware and Software is the most prevalent. The Program Syntax errors represent the broadest category of errors.

A. RUNNING A PROGRAM FROM THE DISK

(Using the disk as program storage is discussed in Section 3-3, Subsection A of this manual.)

Press F1, From Disk, to transfer a file from the disk drive to the Unidex 1 and run it in the Auto or Block mode. This function is a combination of two modes and serves as a shortcut. First you will be prompted to enter the filename you wish to download from the program storage drive to Unidex 1. You will be asked:

<p>Enter file name you wish to download from disk? Enter program number you wish to download it to ? Auto or block run mode (A/B)?</p>
--

If you select "A" for Auto or Block Run mode and press <ENTER>, the program will be displayed on the screen as it downloads. It will then begin to run and execute until completion. While executing the following screen is displayed:

Program execution has begun
Waiting for program completion
00:00:00

ESC - Abort Command

Once program execution has begun, the program may be stopped by depressing the <ESC> key.

When the program is complete, the message "Program Execution Complete" will appear directly under the clock line which indicates the time it has taken the program to execute. If an error has occurred the program will stop and an error message will be displayed.

After a particular program has been transferred to the Unidex 1's memory, it will reside there. In the future it may be run directly "From Unidex" (discussed next). However, if you edit the program from the host and wish to transfer the updated version, do a "From Disk" function again, or you may download the program without execution via the "Transfer" function described later.

If you select "B" for Block Execution and press <ENTER>, the program will scroll as it is downloaded. Each block will execute individually and the display will show:

Block is executing

When each Motion Command Block is complete, you will see:

Block is complete
Press any key to execute next program block

The message "Program complete" will appear when the program execution is complete. Press F3, Run, to see the run menu again.

1From Disk 2From Unidex 3Com. Menu

B. RUNNING A PROGRAM FROM UNIDEX 1

Press F2, From Unidex. You will be asked the following questions:

Enter program number you would like to run?
Auto or block run mode (A/B)?

If you ask for a program in Unidex 1 memory, you will see a display similar to:

Enter program number you would like to run? 20
Auto or block run mode (A/B)? A
Waiting for program completion
00:00:10
ESC - Abort Command

Pressing the <ESC> key will stop program execution.

When the program execution is complete, you will see a screen similar to:

```

Enter program number you would like to run? 20
Auto or block run mode (A/B)? A
Waiting for program completion
00:03:09
Program execution complete.
    
```

If an error terminated the program prematurely, an error message will be displayed.

If you enter "B" for block mode execution and press <ENTER>, you will see:

```

Block executing
    
```

When the Motion Command block is complete the following screen will be displayed:

```

Block complete
Press any key to execute the next program block.

ESC - Abort Command
    
```

To return to the Main Communications screen from the Run mode, press F3 (Com. Menu).

SECTION 5-4 STATUS BYTES FROM UNIDEX 1

From the main Communications screen, press F4 (Status). The first status byte of Unidex 1 is displayed on the screen, as well as a sub-menu of the other status information categories. These categories are:

- **Position Status**
- **Input/Output Status**
- **Error Status**
- **Motion Status**

Each time the status mode is selected (by pressing F4 of the main Communications menu), all status information will be updated with the current status data from the Unidex 1 Controller.

The main Status screen is as follows:

Status Bytes From UNIDEX 1

Incremental Mode active.

Unidex is NOT running a program.

Unidex is NOT executing a command in the immediate mode.

There are NO errors present.

1Position 2Input/Output 3Error 4Motion 5Com. Menu

(F5 of the Status menu will take you back to the main Communications menu.)

This screen displays the primary status conditions of the selected Unidex 1. (Refer to Section 5-5A and 5-6 of the *Unidex 1 Programmable Motion Controller User's Manual* for more information concerning Status Bytes.)

A. POSITION STATUS

Press F1, Position, from the main Status menu. This screen will display the absolute position for Unidex 1.

Unidex Axis Position	
Device 2	Axis 2 = 0000000000 steps
1Position 2Input/Output 3Error 4Motion 5Com. Menu	

B. INPUT/OUTPUT STATUS

From the main Status menu, press F2, Input/Output. This screen will display the status of the system's inputs and outputs, where a "1" indicates a logic high state (+5 volts) on that input or output, and a 0 indicates a logic low state. The output states are the actual output conditions (1 = 5 volts and 0 = 0 volts), independent of the setup parameters (OT) programmed in the Setup mode of Unidex 1 (see Section 3-9 *Unidex 1 Programmable Motion Controller User's Manual*). The following illustration is an example.

Input / Output Status Bytes							
Inputs				Outputs			
I1	I2	I3	I4	O1	O2	O3	O4
1	1	1	1	0	0	0	0
1Position 2Input/Output 3Error 4Motion 5Com. Menu							

For information on Input/Output connections, see Section 8-9 of the *Unidex 1 Programmable Motion Controller User's Manual*.

C. ERROR STATUS

From the main Status menu, press F2, (Error), to see the current error status of the selected Unidex 1. You will typically see no indication of errors. However, all of the Unidex 1 error status bytes are fully interpreted, and will be displayed when valid. Errors may be reported when transferring a program to the Unidex 1, sending immediate commands, or executing a program. For a full explanation of error status information, see Section 5-6 and 9-1 of the *Unidex 1 Programmable Motion Controller User's Manual*.

NOTE: Early versions of the Unidex 1 Stepper Controller (containing firmware with version numbers prior to USI-30) could erroneously indicate a "Position Loop" error due to a later implementation of this bit in the Unidex 1 DC Servo Motion Controller.

Error Status

There are no editor errors.

1Position 2Input/Output 3Error 4Motion 5Com. Menu

D. MOTION STATUS

From the main Status screen, press F3 (Motion) to see:

Axis Status Information

Axis is NOT in Motion

Axis is NOT Free Running

1Position 2Input/Output 3Error 4Motion 5Com. Menu

In the previous illustration, current motion status (motion or stationary) as well as type of motion (index or free run), can be determined.

Press F5, Communication Menu, to go back to the main Communications menu.

SECTION 5-5 DIRECTORY

The directory menu allows you to view the program directory of the specified memory program storage (see Section 3-3) of the selected Unidex 1 Controller. You may also delete a program from either of the directories.

From the main Communications screen, press F5 (Directory) to see:

1Disk Dir 2Unidex Dir 3Program Delete 4Com. Menu
--

A. DISK DIRECTORY

From the directory menu, press F1, Disk Directory, for the directory of the host computer's program storage drive. You will see a listing of all files and the amount of memory remaining on the disk holding the displayed files. For example:

Disk Directory c:*.CNC				
c:\				
FILE1	FILE2	FILE3	FILE4	
FILE5				
24795136 Bytes free				
1Help 2Immed 3Run 4Status 5Dir 6Tfx 7Xfer 8Sync 9Main				

Note that the main Communication menu screen will reappear. Note also that File 1, 2, 3, 4 and 5 represent user-generated motion programs (see Sections 4-1 and 4-2). A file name extension .CNC is automatically appended to the root file name. The directory of back up files for a given program is **not** displayed on the screen. Back-up files are located in the directory (or sub-directory) in which the SSP-2 software resides. However, if the program storage drive (Set-up, described in Section 3-2), differs from the drive containing the SSP-2 software program, the back-up files reside in the root directory of the selected program storage drive.

B. UNIDEX 1 DIRECTORY

Press F5 for the Directory menu. Now press F2, Unidex Directory. Enter the Unidex 1 Device Label and press <RETURN>. You will see a directory listing of the selected Unidex 1, which will show each of the programs in the unit, memory, their length, and the amount of user memory remaining. Example:

Unidex Program Directory	
PROGRAM # 33	LENGTH : 00003 BYTES
PROGRAM # 01	LENGTH : 00023 BYTES
PROGRAM # 02	LENGTH : 02585 BYTES
PROGRAM # 45	LENGTH : 00032 BYTES
PROGRAM # 46	LENGTH : 00032 BYTES
FREE : 03357 BYTES	
1Help 2Immed 3Run 4Status 5Dir 6Tfx 7Xfer 8Sync 9Main	

C. PROGRAM DELETE

Press F5 for the Directory menu again.
Now press F3, Program Delete. You will see:

1Disk Program 2Unidex Program 3Com. Menu
--

Press F1, Disk Program. You will see:

Enter file name that you wish to delete?
--

When you enter a file name and press <RETURN>, the file will be deleted and the main Communication Menu will be displayed again.

If you decide not to delete a file once F1 (or F2) has been pressed, just press <ENTER>. The message "File not found" will be displayed, just as if you had entered the name of a file not in the directory.

Press F2, Unidex Program, to delete a file in the Unidex 1 memory. Enter the desired device label and press <ENTER> if prompted to do so. You will see:

Enter 100 to delete all programs in memory.
Enter program number that you wish to delete?

Enter the program number (selected from the screen shown in Subsection B above). The program will be deleted. Press <ENTER> and the Communications Menu will be displayed.

SECTION 5-6 TFX MODE (HAND HELD TERMINAL EMULATION MODE)

The TFX Hand Held Terminal mode will allow the user to simulate the Hand Held Terminal, using the host computer. This mode is described in detail in Sections 4-1 and 4-5 of the *Unidex 1 Programmable Motion Controller User's Manual*. (It is recommended that the user review these sections in detail before continuing with this section.) The TFX mode allows the user to communicate directly with Unidex 1.

Press F6 (TFX) from the main Communication Menu to select this mode. After this mode has been selected, you will be asked to enter the Unidex device label. After the device label has been entered, the following screen will appear.

Enter device address or label?

1Edit 2Display 3Run 4Etc

F1 - F5 Select Menu's 9Com. Menu 10Dev. Sel.

The enclosed screen:

1Edit 2Display 3Run 4Etc

is the first screen that appears. Refer to Sections 4-1 to 4-5 of the *Unidex 1 Programmable Motion Controller User's Manual* for an explanation of each TFX menu.

Note, the format of this screen differs slightly with the first screen described in Section 4-1 of the *Unidex 1 Programmable Motion Controller User's Manual*.

Other screens depicted in this section are also slightly altered with respect to the illustrations in Section 4-1 through 4-5 of the *Unidex 1 Programmable Motion Controller User's Manual*. These alterations do not affect the operation described in Section 4-1 through 4-5 of the Programming manual.

A. FUNCTION KEYS F1 THROUGH F5 SELECT SUBMENUS

You may return to the main Communication Menu at any time by pressing the function key F9.

Any one of the Unidex 1 Controllers may be selected at any time by pressing the function key F10. When this key is pressed, the cursor will prompt for the new desired Unidex 1 device label (See Section 3-2).

Typing in the new label and pressing < ENTER > will reset the TFX display to the first TFX menu block (shown above). Communication with the new device is now activated.

SECTION 5-7 PROGRAM TRANSFER

The Transfer function will send a file:

From Disk to Unidex

From Unidex to Disk

From the main Communication screen, press F7 (Xfer) to see the Transfer menu.

A. DISK TO UNIDEX PROGRAM TRANSFER

Press F1, From disk to Unidex. You will see:

Enter file name you wish to download from disk?

Enter the file name and press <ENTER> (or press <ENTER> with no file name to abort). You will be asked:

Enter program number you wish to download it to?

Type the program number (1 thru 99) where it is to be stored in the Unidex 1, and press <ENTER>.

The program will scroll. If errors are found, it will display the error status, such as:

Error Status

Unidex 1 has received a BAD CHARACTER.
There are no limits active.

If a Bad Character message appears, there has either been a transmission error, or your program has a motion command syntax error. (Refer to Section 5-5, 5-6 and 9-1 of the *Unidex 1 Programmable Motion Controller User's Manual* for more information concerning error messages.)

When the transfer is done, the main Communication Menu will be displayed.

B. UNIDEX TO DISK PROGRAM TRANSFERS

Press F2, (Unidex to Disk). You will see:

Enter program number you wish to upload from Unidex 1 to disk?

Enter the program number and press <ENTER>. You will see:

Enter file name you wish to store on a disk?

Enter the file name and press <ENTER>. The program will scroll as it uploads. When it is done, the Communication Menu will be displayed again.

SECTION 5-8 SYNCHRONIZATION MODE

The Synchronization mode allows multiple Unidex 1 Controllers (on the "daisy chain" RS-232C link) to begin execution of pre-defined programs simultaneously.

This mode utilizes the "Hold" and "Trigger" commands discussed in Section 5-7 (System Commands) of the *Unidex 1 Programmable Motion Controller User's Manual*.

The Hold and Trigger commands are handled automatically by the Synchronization mode. After all devices are triggered, the host computer will begin to query the devices, and update the screen as the programs complete execution.

From the main Communication menu, press F8 (Sync) to see:

Program # to execute		Status Character	Unidex device address #	Device Label	
Valid Device Address Number					
##				##	
12	D	Device 2	Label is AXIS 1	Device 17	Label is
		Device 3	Label is	Device 18	Label is
		Device 4	Label is	Device 19	Label is
20	E	Device 5	Label is AXIS 2	Device 20	Label is
		Device 6	Label is	Device 21	Label is
		Device 7	Label is	Device 22	Label is
		Device 8	Label is	Device 23	Label is
		Device 9	Label is	Device 24	Label is
		Device 10	Label is	Device 25	Label is
		Device 11	Label is	Device 26	Label is
		Device 12	Label is	Device 27	Label is
		Device 13	Label is	Device 28	Label is
		Device 14	Label is	Device 29	Label is
		Device 15	Label is	Device 30	Label is
		Device 16	Label is	Device 31	Label is

Use cursor keys to enter program number
for each device to be triggered.
Press the ESC key when finished.

This screen is similar to the screen illustration in Section 3-2 (Device Address Map) except for the additional pound sign (##) characters and status character (S) for each column.

The device label names displayed are the same names that were selected in the Device Address Map of Section 3-2.

Use the up/down and left/right cursor keys to select the device to which to assign a given program number (##).

The < BACKSPACE > key will delete a program number for the selected device.

The Status Character column (S) indicates program status. (This function will be described later in this section.)

To synchronize program execution, type the appropriate program number (##) for the given device. (A device which is not assigned a program number will not be activated.)

When the program numbers have been entered, press < ESC > . The following question will appear:

Would you like to abort execution on an error? (Y/N)
--

If any selected Unidex 1 encounters an error during execution, type "Y" for yes, the execution will be **immediately** stopped and canceled for **all** selected devices.

If Yes is entered when an error occurs, an error message and Device Label will appear on the screen.

Type "N" for no, if it is desired to continue the execution of **all** enabled devices, regardless of any error condition encountered by any one of the selected Unidex Controllers during execution.

If No, is entered when an error occurs, an "E" will appear in the Status Character column next to the device in error. **However, no error messages will appear to indicate a specific error.**

If a given device successfully executes a specified program, the Status Character "D" (Done) will appear next to that device.

The Synchronization mode cannot be re-initiated until **all** devices have either normally completed program execution or have terminated in an error condition.

An indication of a completed Synchronization command is denoted by the appearance of the main Communication menu at the bottom of the screen.

CHAPTER 6: DIRECTORY ACCESS

Pressing F5 from the Main Menu screen will enable the Directory function. (A discussion of the Directory function has already been covered in Section 5-5 of this manual.) The only difference is that when the Directory mode is enabled through the Main menu, a Unidex Directory access requires that you first specify a Device Label (i.e., specify which Unidex 1's directory on the RS-232 daisy chain you wish to access).

A disk drive Directory Access for this mode works exactly as that described in Section 5-5A, (Disk Directory).

CHAPTER 7: PRINT MODE

The Print function will produce a hard copy of programs on the default (designated in DOS) line printer (LPT1). (Be sure your printer is ON LINE before using the print function.)

The Unidex 1 Controller and the host computer each store programs differently. For example, program comments are not stored in the Unidex memory, so a program containing comments must be printed from the program storage disk.

Program block numbers may be used in conjunction with the "Get Block" function of the Unidex internal menu-driven editor (see TFX Operating Mode, Section 5-6 of this manual). These block numbers are not contained within files on the program storage disk. If block numbers are desired in the listing, the program should be printed from the Unidex memory.

Press F6 of the Main Menu for the Print function. You will see:

1From Unidex 2From Disk Drive 3Main Menu

SECTION 7-1 FROM UNIDEX

Now press F1, (From Unidex), and you will see:

1Unidex Dir 2Unidex Pgm 3Current Position

Press F1 for Unidex Directory. Enter the Unidex device label and press <ENTER>. The Unidex directory listing of programs and free memory remaining will be output to the line printer.

For example:

```

* UNIDEX 1 DIRECTORY LISTING *
PROGRAM # 33 LENGTH : 00003 BYTES
PROGRAM # 01 LENGTH : 00023 BYTES
PROGRAM # 02 LENGTH : 02585 BYTES
PROGRAM # 46 LENGTH : 00032 BYTES
PROGRAM # 47 LENGTH : 00184 BYTES
PROGRAM # 45 LENGTH : 00184 BYTES
    
```

```

FREE : 03021 BYTES
    
```

Or press F2, (Unidex Program), to be asked:

```

Enter 100 to print all programs.
Enter program number you would like to print ?
Would you like the block numbers printed (Y/N) ? Y
Enter device address or label ?
    
```

The program requested will be printed. For example:

```

                                E45*
0001 IN *
0002 X F 0012195 D 0000023405 *
0003 X F 0017241 D -0000016580 *
0004 X F 0002703 D 0000000797 *
0005 X F 0001984 D -0000001429 *
0006 X F 0004950 D -0000001667 *
    
```

(Where E45 indicates that this is program number 45 to the Editor.)

Or, you may choose F3 for Current Position. Enter a device label to see the axis current position (absolute position register). For instance:

X position = 0000000797 steps

After any of the above information has been printed, the main menu will again be displayed:

1Help 2Setup 3Edit 4Communication 5Directory 6Print 7End

SECTION 7-2 FROM DISK

Now press F6, (From Main Menu), and F2, (From Disk Drive). You will see:

1Disk Pgm 2Disk Dir 3Main Menu

Press F1, Disk Program, and you will be asked to enter the file name to be printed:

Enter file name you would like to print?

Enter the file name and that program will be printed.
For example:

HX * ; GO HOME
X F10000 D50000 * ; MOVE TO CENTER OF TABLE
OT 1XXX * ; PEN DOWN

The Main Menu will again be displayed, once the program has been printed. From the main menu, press F6, (Print), and then F2, (From Disk Drive). Then press F2, Disk Directory. A standard DOS directory, listing programs and remaining memory, will be printed. For example:

Volume in drive C is DISKC			
Directory of C:			
TEST	18	2-20-88	3:55P
LINEAR	2867	2-15-88	1:55P
DIGIT	118	2-18-88	2:00P
TEST2	32716	2-29-88	11:05A
SCAN	3379	2-26-88	5:55P
DEMO	6031	3-01-88	9:56A
TEST3	20220	2-20-88	10:30A
STEPPER	8656	3-05-88	1:55P
TEST4	1030	2-22-88	5:30P
TEST5	8949	2-17-88	1:20P
TEST6	458	3-04-88	2:30P
SQUARE	4990	3-10-88	3:55P
14 File(s) 24797184 bytes free			

Once the directory has been printed, the Main Menu will be displayed.

NOTE: When you select the Print function, either from Unidex or disk, and then decide not to print, press <ENTER>. This will take you back to the Main Menu, without requiring that you print a program first.

CHAPTER 8: RESET

Pressing F8 from the main menu will reset all Unidex 1s to their power-up state. This may be used to verify communication among all Unidex 1s and the host computer. When F8 is selected, all Unidex 1s' RESET LEDs will blink upon receipt of the Reset command. This may also be used to halt a boot program (AutoStart) before entering the Communications mode.

CHAPTER 9: END

The final function of the Main Menu is End. Press F7 to leave the Main Menu and return to DOS.

Re-booting of the SSP-2 Software Support Package can only be accomplished through the procedure outlined in Chapter 2 (Installation) of this manual.

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