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WAVETEK

WaveTest™ Runtime 488-RT



PREFACE

WaveTest Runtime (488-RT) enables you to run already developed and debugged automatic test programs. Clear, easy-to -use screens with pull-down menus guide you through program execution.

Programs developed with WaveTest (488) can be loaded and executed. The operator will have available all of the operator dialogs and runtime output that have been included in the test program. There are no editing capabilities.

Chapter 1. Configuring

Chapter 1 tells you how to setup WaveTest Runtime. This includes ways to automatically load and run a test program. Chapter 1 also has useful information regarding how to effectively use the runtime environment of Windows.

Chapter 2. Reference

Chapter 2 describes the windows and menus available for accessing test programs and controlloing their execution. Chapter 2 is not meant to be read through, but rather referred to for help with questions as they arise.

Appendix A. Configuring with IBCONF.EXE

Appendix A describes the use of the program IBCONF.EXE. You use IBCONF to edit the description, located in the program called GPIB.COM, of the characteristics of the boards installed in the system.

Wavetek Software Limited Warranty

Wavetek San Diego, Inc., warrants these components of WaveTest for 90 days from the date of purchase;

- The WaveTest diskettes are free from defects in material and workmanship, assuming normal use, for the warranty period.
- This manual contains the information that Wavetek San Diego, Inc. deems necessary to operate the software.
- The software functions substantially as described in the manual.

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WaveTest and Microsoft Windows

WaveTest Runtime operates in a graphics environment called Microsoft ® Windows™, created by Microsoft Corporation. An extension of the MS-DOS operating system, Microsoft Windows gives a standard look and feel to WaveTest Runtime and all other Windows applications.

The WaveTest Runtime package contains all of the software necessary to run WaveTest Runtime. You can also run WaveTest Runtime under Microsoft Windows version 2.03 or higher.

With Microsoft Windows, you can take advantage of these additional features of the Windows environment:

- Running multiple applications: You can run several applications under Windows at one time and easily switch between them, creating an integrated work environment.
- Data exchange between applications: You can transfer data between WaveTest and other standard DOS applications as well as other Windows applications.
- Windows control of the DOS environment: From the Windows environment you can easily access all Windows and non-Windows applications, files, directories, and disks, and control all DOS-related tasks such as directory or file management and formatting disks.

To run WaveTest Runtime under Microsoft Windows, you need to license and install Microsoft Windows version 2.03 or higher.

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Appendix A - Configuring with IBCONF.EXE

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Chapter 1
GETTING STARTED

WaveTest Runtime requires an IBM-compatible computer running under MS-DOS or PC-DOS version 3 or later, with at least 640K of memory, graphics adapter and display. A windows-compatible mouse is required. A GPIB interface board is supplied with WaveTest.

WaveTest Runtime runs under Microsoft Windows. When you install Runtime you will be specifying the display, mouse and printer you will use.

NOTE

You must install HIMEM.SYS during the windows install procedure in order for WaveTest to operate correctly.

MINIMUM SYSTEM REQUIREMENTS

- Computer: IBM PC/AT or true compatible.
- Memory: 640K
- Disk Drives: 1.2 Mbyte Floppy, 10 Mbyte Hard Disk
- Graphics Display: Extended Graphics Adapter or equivalent; high-resolution monochrome or color display.
- Mouse: Any mouse that is supported by Microsoft Windows.
- GPIB Card: Supplied

MATH COPROCESSOR SUPPORT

A math coprocessor is automatically detected by WaveTest if installed. The coprocessor is used to enhance the performance of you computer by speeding up math functions (add, subtract, multiply and divide) and transcendental functions (e.g., SIN, COS, TAN).

EXPANDED MEMORY

The Program Generator (WTPG) version 2.5 and later uses expanded memory in your PC compatible system to give you access

to more memory for your WaveTest programs. Expanded memory is computer RAM (random access memory) that can be accessed as conventional memory, giving your computer the ability to use more than the normally available 640 kB. Expanded memory can be used by WaveTest for programs and program data.

NOTE

> Without expanded memory you can write effective WaveTest programs of about 100 kB (100,000 bytes). With expanded memory this limit is increased by the amount of your expanded memory up to the maximum operating system file size allowed.

Expanded memory is often confused with extended memory. The extended memory can normally only be used as a RAM-disk or for print spooling. Extended memory cannot be directly accessed by WaveTest as can expanded memory. Expanded memory works by using hardware to access memory as if it were all directly accessible as conventional memory. Therefore, expanded memory can work just as fast as the memory in your computer. Conventional memory is the memory recognizable by applications and the operating system as usable RAM.

Expanded Memory Requirements

Expanded memory usually requires a special memory board such as the Intel Above Board; or the AST Rampage 286; and driver software that comes from the board manufacturer. In machines using the Intel 80386 processor it is possible to use expanded memory without the use of a special hardware board. It does, require an expanded memory driver or the use of Windows/386. To use expanded memory with WaveTest requires an expanded memory driver that supports 4.0 or later EMS (Expanded Memory Specification). WaveTest supports EMS boards/drivers that fully implement the EMS 4.0 specification. WaveTest cannot directly access extended memory (different than expanded memory.)

Enabling Expanded Memory

WaveTest will automatically use expanded memory if it detects that it is installed in your computer and the version of EMS is 4.0 or later.

Disabling Expanded Memory

You can tell WaveTest to not use EMS, even if it is installed, by using the following command in the Windows WIN.INI file.

```
EMM=0
```

This command should appear in a section for WaveTest. WaveTest program information is entered in the WIN.INI file in the section with the WaveTest header "[WTPG]". For example,

```
[WTPG]
EMM=0
```

See your Windows manual for information on how to edit your WIN.INI file to customize your system. By default WaveTest assumes you want to use EMS if it is installed and will only use the "EMM" command to change default operation. A command of "EMM=1" with EMS installed would have the same effect as the default.

Disabling EMS can be useful if your expanded memory is not working properly. It can also be used to force WaveTest to load all of your program into conventional memory.

How WaveTest Uses Expanded Memory

WaveTest's use of expanded memory will not disallow the use of expanded memory by other applications or by Windows. WaveTest will use whatever is available as needed. If WaveTest cannot access enough expanded memory it will attempt to use conventional memory.

USING SMARTDRV.SYS WITH WAVETEST

SMARTDRV.SYS is a disk caching program that speeds up execution by allowing the memory of the computer to be used to speed up hard disk access. This can enhance the performance of your system while running WaveTest or your test programs.

To use SMARTDRV.SYS you must do the following:

1. Add the line DEVICE=SMARTDRV.SYS < memory in kilobytes > to the CONFIG.SYS file.
2. Make sure to copy the SMARTDRV.SYS file from the Utility Disk to your hard disk's root directory.

For example,

DEVICE = SMARTDRV.SYS 384

can be used in a computer with 1 megabyte of memory. 640 kilobytes will be used for main memory and 384 kilobytes will be used for disk cache.

For more information about SMARTDRV.SYS see your Windows manuals.

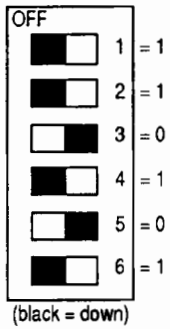
GPIB CARD CONFIGURATION

There is a DIP switch assembly on the GPIB card that is used to set the I/O port address. Set the six switches as shown in figure 1-1 for the factory default address of 2B0 hexadecimal. Default setting for the IRQ and DMA pins is jumpers removed.

If you need to use a different address, determine the switch settings and the IRQ and DMA pin settings as required, and then run the IBCONF.EXE program included on the Program disk and also installed onto your hard disk.

NOTE

See Appendix A for information on the Card Configuration Program IBCONF.EXE.



The DIP switch sets the middle 1's and 0's of a 12 bit binary value shown below (hex 2B0)

Hes	2	B	0
Binary	00	101011	0000
	Fixed	DIP Swtich Selectable (6,5,4,3,2,1)	Fixed

Hexadecimal	Binary
0	0000
1	0001
2	0010
3	0011
4	0100
5	0101
6	0110
7	0111
8	1000
9	1001
A	1010
B	1011
C	1100
D	1101
E	1110
F	1111

Figure 1-1

Installing A Second GPIB Card

To install a second GPIB card, set its switches as shown in figure 1-2. This corresponds to an address of 02C0 hexadecimal.

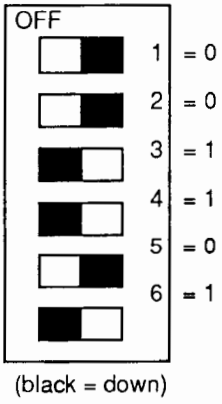


Figure 1-2

OVERVIEW OF THE RUNTIME SYSTEM

The WaveTest Runtime (488-RT) disks supplied to you contain the runtime version of Microsoft Windows in addition to WTRT.EXE, GPIB.COM and README.TXT files. (No .ILF (Instrument Library Files) or .ATS (Automatic Test System) files have been included. These are part of the full WaveTest system.) To run your test programs under this environment, you must first transfer your test program, along with the library files that it accesses, to the same directory that WTRT is in.

The runtime version of Windows allows the execution of stand-alone programs under Windows. It does not include, however, the Windows System Executive. Therefore, when you leave the runtime version of WaveTest, you also leave Windows and get returned to the DOS level. In this way, the user of a WaveTest test program running under WaveTest Runtime will not have to learn how to use the Windows System Executive. The following section shows how to fully automate your test environment so that a minimum of operator intervention is required.

AUTOLOAD AND EXECUTE: WITH DOS COMMANDS

To have your computer boot up in the proper directory, include the line cd [\path] in your AUTOEXEC.BAT file. Using the default, this line would be:

```
cd \WTRT
```

To have your computer boot up into the program, add the line "WTRT" after the cd\WTRT line. This will start the execution of WaveTest Runtime.

To have your computer boot up into the program and load a specific test program, add instead the line "WTRT name.ATS" where name is the name of your test program. To have this test program also start executing, append the flag "-r" to the line. These steps allow you to basically create a turnkey system that would require little or no operator intervention. Some possible examples of an AUTOEXEC.BAT follow:

Example 1: Boot up in WaveTest Runtime.

```
;Set the path to include DOS and WTRT.
PATH=C:\DOS;C:\WTRT
;change directories to the WTRT directory
CD \WTRT
;now start the runtime version of WaveTest
WTRT
```

Example 2: Boot up in WaveTest Runtime with test program loaded.

```
;Set the path to include DOS and WTRT.
PATH=C:\DOS;C:\WTRT
;change directories to the WTRT directory
CD\WTRT
;now start the runtime version of  WaveTest,
;and load the test program TEST.ATS
WTRT TEST.ATS
```

Example 3: Boot up in WaveTest Runtime with test program loaded and running.

```
;Set the path to include DOS and WTRT.
PATH=C:\DOS;C:\WTRT
;change directories to the WTRT directory
CD \WTRT
;now start the runtime version of WaveTest,
;load and run the test program TEST.ATS
WTRT TEST.ATS -R
```

Again, the test program and any required library files must be in the same directory as the program.

ON WINDOWS RUNTIME ENVIRONMENT

For further details, refer to the Windows manual of the WaveTest (488) package.

CHANGING SETTINGS IN THE CONFIG.SYS FILE

The following notes relate to changing command lines in the CONFIG.SYS file.

Using SMARTDrive

Appendix C, "Speeding Up Windows with SMARTDrive" in the Windows User's Guide contains detailed instructions on installing the disk-caching program SMARTDrive provided with Windows 2.1. The following is updated information on adding SMARTDRV.SYS to your CONFIG.SYS file:

- Set the buffers= command line to 20. Setting buffers= to higher values uses memory without additional performance benefits; setting it lower reduces performance benefits.
- Put the "device=SMARTDRV.SYS" command line after the "device=" command line for any expanded memory manager you may be using (i.e. EMM.SYS, REMM.SYS, PS2EMM.SYS, etc.).
- If you have a Compaq Deskpro and ENHDISK.SYS is listed in your CONFIG.SYS file, and you wish to use SMARTDrive, you must list the SMARTDRV.SYS command line after ENHDISK.SYS.
- If you intend to use expanded memory for SMARTDrive, be sure to use the /A flag.

Using RAMDrive

In general, SMARTDrive gives better overall performance than RAMDrive. One exception is output performance for frequently written files. We recommend that you use SMARTDrive; however, a new version of RAMDrive is included with Windows 2.1. This version performs significantly better than older versions and is the ONLY version that works with Windows 2.1. For detailed documentation on RAMDrive, see RAMDRIVE.TXT located on your Utilities 2 Disk.

Using EGA.SYS with an EGA Display Adapter

If your display adapter is an EGA (Enhanced Graphics Adapter), you can improve the quality of standard applications by using the

device driver file EGA.SYS included on the Displays Disk. Here's what to do:

1. Copy EGA.SYS from the Displays Disk to your hard disk.
2. Add a line of the following form to your CONFIG.SYS file:

device=[drive:][path]EGA.SYS

If you have a mouse installed on your computer, be sure to add the EGA.SYS line before the MOUSE.SYS line.

Adding the EGA.SYS device driver is optional; it will enhance the performance of standard applications, but it is not required.

NOTES ON USING EXPANDED MEMORY

Windows 2.1 can utilize any expanded memory board which implements the LIM 4.0 expanded memory specification in its memory management software.

To determine if your expanded memory board implements LIM 4.0, see your board's documentation or contact the manufacturer.

Windows 2.1 contains software supporting the AST RAMpage, the IBM PS/2 80286 Memory Expansion Option, the AT&T Expanded Memory Adapter, and the Intel Above Board. This software is located in four files, REMM.SYS, PS2EMM.SYS, AEMM.SYS and EMM.SYS located on the Utilities 2 Disk.

The software for the AST RAMpage is named REMM.SYS. For detailed instructions on how to install REMM.SYS, see the file REMM.TXT on the Utilities 2 Disk.

The software for the IBM Personal System/2 80286 Memory Expansion Option is named PS2EMM.SYS. For detailed instructions on how to install PS2EMM.SYS, see the file PS2EMM.TXT on the Utilities 2 Disk.

NOTE

This driver does NOT work with the "IBM 80286 Expanded Memory Adapter /A", also known as the XMA board. If you wish to use the XMA board with

Windows 2.1, you need a LIM 4.0 compatible expanded memory manager, which is not supplied with Windows 2.1.

The software for the AT&T Expanded Memory Adapter is named AEMM.SYS. For detailed instructions on how to install AEMM.SYS, see the file AEMM.TXT on the Utilities 2 Disk.

The software for the Intel Above Board is named EMM.SYS. For detailed instructions on how to install EMM.SYS, see the file EMM.TXT on the Utilities 2 Disk.

The performance of expanded memory boards is enhanced by disabling some of your computer's main memory, and replacing that memory with some of your expanded memory board's memory. If your computer supports the disabling of main memory, and your expanded memory board supports the use of its memory as main memory, then you should disable your computer's main memory down to 256Kb, and use your expanded memory board's memory to fill main memory back up to 640Kb.

THINGS TO AVOID

Using APPEND During Setup

Do not use the DOS command, APPEND, before running the Windows Setup process. Doing so may confuse Setup and cause it to fail.

Using TSR (Terminate and Stay Resident) Applications with Windows

Most TSR applications, such as Borland's SideKick, do not function properly under Windows, especially if they modify the screen. We do not recommend using TSR applications with Windows. If you choose to risk using a TSR, be sure to start it BEFORE starting Windows.

Running with Low Memory

As you run out of memory, Windows' graphics will deteriorate, e.g. icons become black, menu bars do not display. Also, the clipboard may malfunction, and Windows may give "Not enough memory" messages. In this situation, close an unused application to enhance performance.

Using Display Drivers Designed for Earlier Windows Versions

Most display drivers designed for earlier Windows versions will not work with Windows 2.1. If a driver for your display is not included, then contact your display's manufacturer for an updated driver.

If no driver is available, try installing your old one. Install your old driver by choosing "Other" when Setup asks you to choose a display adapter. If you are installing a Windows 1.0 display driver, once Setup is finished, replace files in your Windows directory having a .FON extension with the corresponding files from your Windows 1.0 Fonts Disk. For example, replace HELVA.FON with the HELVA.FON file on your Windows 1.0 Fonts Disk.

Setting Up Windows 2.1 Over Earlier Versions of Windows

We do not recommend setting up over an earlier version of Windows. Instead, copy files you wish to keep to a temporary directory (be sure to copy modified PIF files), delete the old version of Windows, set up Windows 2.1, and then copy the temporary files into the new Windows directory.

If you do set up over an earlier version of Windows, the WIN.INI file will be renamed WIN.OLD. You may wish to rename this file to WIN.INI if you had important information in your old WIN.INI file. Optionally, you may want to use Notepad to copy information from WIN.OLD into your new WIN.INI file.

Having Multiple Versions of Windows on the Same Fixed Disk

Windows 2.1 and other versions of Windows have many filenames in common. If you have multiple versions of Windows on your computer, avoid problems by including the path to only one version in your PATH environment variable.

Using EGA.SYS with Compaq EGA Cards Running DOS 3.0

EGA.SYS does not function properly with a Compaq EGA card running under IBM DOS 3.0. If you experience this problem, either upgrade your DOS, or do not use EGA.SYS.

Using HIMEM.SYS on 286/386 Machines with Extended Memory

On 286 or 386 machines with extended (NOT expanded) memory, it is possible to gain between 45Kb and 60Kb of additional conventional memory. To gain this memory, the driver, HIMEM.SYS, must be installed in your CONFIG.SYS file. If enough extended memory was available during Setup, then HIMEM.SYS was automatically installed. If not, then you may install this software by running the program, MEMSET.EXE. Consult the booklet, "Microsoft Windows: Questions and Answers," for details on how to run MEMSET.EXE

If HIMEM.SYS is installed and you do not have at least 64Kb of available extended memory, it is either because you don't have enough extended memory mapped to segment FFFE, or because SMARTDRV.SYS or RAMDRIVE.SYS have already allocated that memory. In these cases, HIMEM.SYS will report, "WARNING: High Memory Area Unavailable" at boot time (e.g., when you restart your computer). If you experience this problem, the following information may help:

- Make sure that RAMDRIVE.SYS and/or SMARTDRV.SYS do not allocate all of your extended memory. At least 64Kb must be reserved for HIMEM.SYS. To reduce the amount of memory that RAMDrive uses, see RAMDRIVE.TXT on the Utilities 2 Disk. To

reduce the amount of memory SMARTDrive uses, see Appendix C, "Speeding Up Windows with SMARTDrive" in the Windows User's Guide.

- If you have an EXPANDED memory card which you plan to use for HIMEM.SYS, you must configure the expanded memory hardware such that at least 64Kb of the memory on the card will be used as EXTENDED memory. You can usually acheive this by adjusting switch settings or jumpers. Try to configure exactly 64Kb as extended memory as any amount over this would be more effieciently used as expanded memory. However, several memory boards only allow you to configure extended memory in 128Kb increments. If this is the case with your board, then you may want to make use of the extended memory beyond 64Kb by installing a RAMDrive or SMARTDrive.

RUNTIME SOFTWARE INSTALLATION

Type A:
Press Enter key.
Type Setup.
Press Enter key.

Installing the Security Key

The external security key that comes with WaveTest Runtime must be installed on LPT1 for the Program Generator to be able to run your test programs.

Chapter 2
REFERENCE

PROGRAM GENERATOR MAIN WINDOW

How You Get To It

The Program Generator main window is displayed when you first begin running Runtime, and each time you close a program file.

What it Does

The Program Generator Main window is your means of controlling the operation of Program Generator. You can manipulate the main window itself, stop program generator operation, load program files, and control test program execution.

The Menus

The Main window has three menus: a Control menu, a File menu, and a Runtime menu.

Control Menu

Using the Control menu, you can:

1. Change the size of the window if another window is present.
2. Move the window to another position on the screen.
3. Stop running the Program Generator, but keep it available for immediate resumption.
4. Expand the window to fill the whole screen.
5. Stop running the Program Generator.

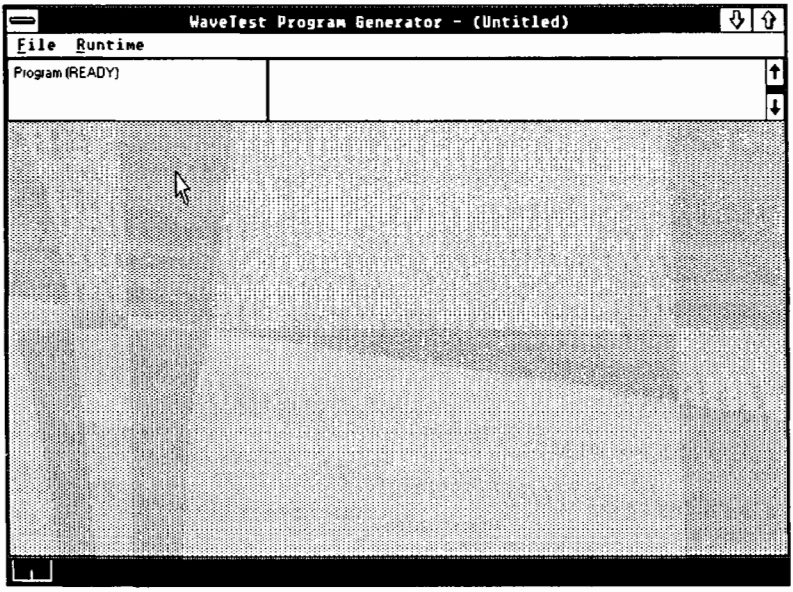
File Menu

Using the File menu, you can:

1. Open an existing WaveTest program file.
2. Stop running the program generator.
3. Get the version number and memory usage of WaveTest.

Runtime Menu

The runtime menu controls execution of the test program. Using it, you can reset, run, continue, or stop the test program.



RT0000

Main Window

CONTROL MENU

Move

When you select 'Move', the mouse pointer changes to a move pointer: a four-pointed arrow. To move the window, use the arrow keys to move the window to the new location, then press <Enter>.

NOTE

You can also move a window by clicking on and dragging the title bar of the window.

Size

When you select 'Size', the mouse pointer changes to a size pointer: a four-headed arrow. To change the window size, press one of the arrow keys to select the window border you want to move. Use the arrow keys to move the border up or down, or right or left. When you have finished, press <Enter>.

NOTE

You can also adjust the size of a window by clicking on and dragging the border you want to move.

Minimize

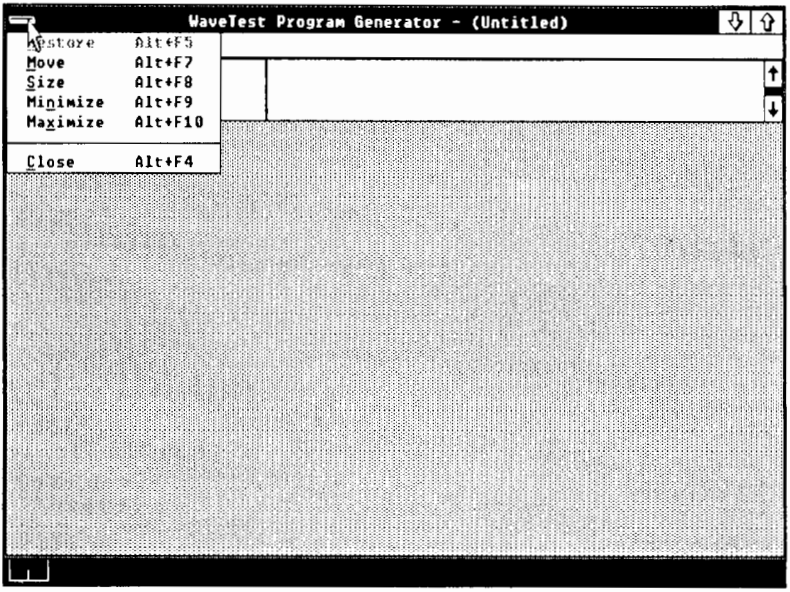
When you select 'Minimize,' the system shrinks the Main window into an icon in the icon area at the bottom of the screen. Each icon in that area represents a program that is already in the computer's memory, immediately available to you. To resume displaying one of the programs, double-click on its icon, or drag the icon into the work area of the window.

Maximize

When you select 'Maximize,' the Main Window expands to fill the whole screen. In its expanded size, the Main Window covers the icon area at the bottom of the window, as well as any other program windows on the screen.

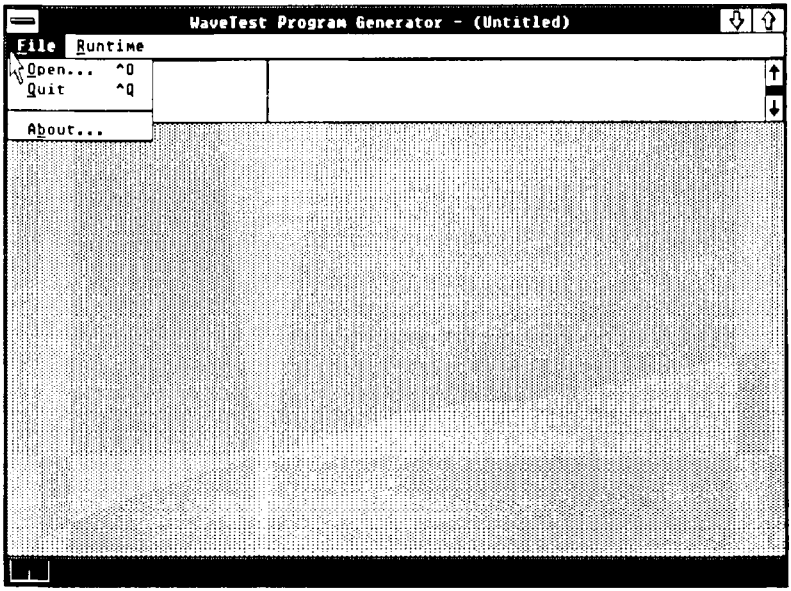
Close

When you select 'Close,' WaveTest terminates.



RT00001

Control Menu Window



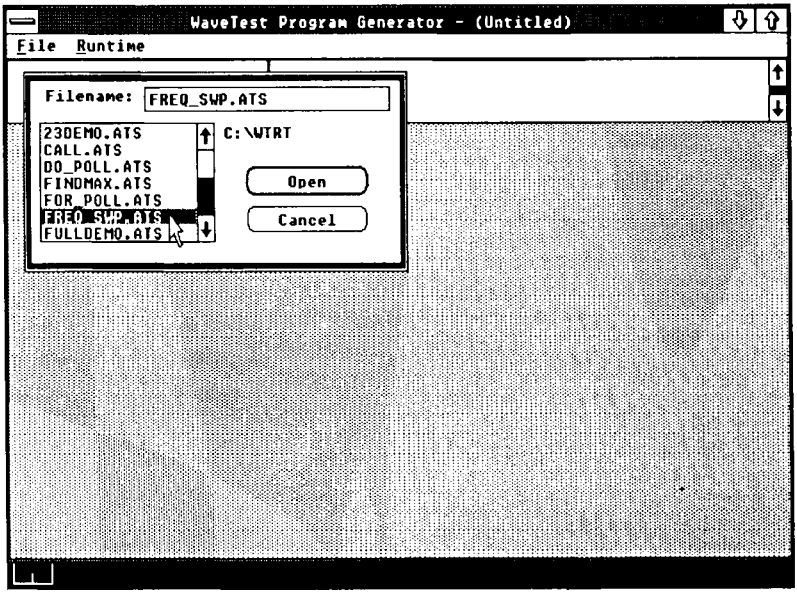
RT00002

File Menu Window

FILE MENU

Open

When you select 'Open,' WaveTest displays a dialog box that contains a list of the program files (files with extension . ATS) in the current directory. There are three ways to specify the file you want to load: you can double-click on its name on the list, or you can select it, then click on the Open button, or you can type the filename. You can load any program file using this command. You can discard the present program file by selecting 'Open' again and



RT00004

File Menu "Open" Dialog Box

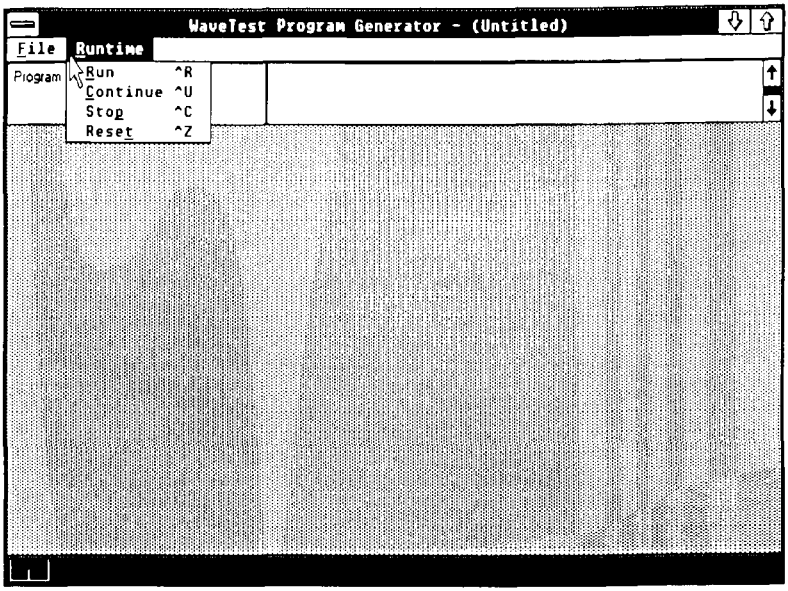
choosing another file. You can use control-O instead of the File menu to select this function.

Quit

When you select 'Quit,' WaveTest terminates. You can use control-Q instead of the File menu to select this function.

About WaveTest

When you select this item, WaveTest displays the version number of the software and the memory usage.



RT00003

Runtime Menu Window

RUNTIME MENU

Run

When you select 'Run,' WaveTest executes the current program. You can use control-R instead of the runtime menu to select this function.

Continue

When you select 'Continue,' WaveTest resumes execution of a previously stopped program. All variables and pointers are left as they were when the program was stopped. You can use control-U instead of the runtime menu to select this function.

Stop

When you select 'Stop,' WaveTest stops execution of the current program. If the program was not running when you selected 'Stop,' the selection has no effect. You can use control-C instead of the runtime menu to select this function.

Reset

When you select 'Reset,' WaveTest resets all of the variables in the current program, resets all debug flags to OFF, and deletes all arrays and variables created at runtime. You can use control-Z instead of the runtime menu to select this function.

Appendix A
Configuring with IBCONF.EXE

THE GPIB SOFTWARE

Device Handler

GPIB.COM is loaded at system start-up by the DOS operating system. Handler is a term used to refer to a loadable device driver.

Installation Tests

IBDIAG.EXE tests the hardware installation before the GPIB software is configured and installed. After the handler is installed, IBTEST.BAT confirms that both the software and hardware are installed and functioning properly. The test is executed in two parts using IBTSTA.EXE and IBTSTB.EXE.

Software Configuration

IBCONF.EXE allows you to change the software parameters and other data used by the handler.

ABOUT IBCONF

IBCONF is a screen oriented, interactive program that is located on the Program disk of your WaveTest Runtime package. You use IBCONF to edit the description, in the handler, of the characteristics of the boards in the system.

IBCONF passes two groups of features to the handler. The first group consists of the characteristics of the instruments or devices attached to your GPIB-PC. This information is not used by WaveTest but is described here for completeness. The second group consists of the characteristics of each GPIB-PC installed in the computer.

Characteristics of the Instruments

- A symbolic name of each device on the GPIB (such as DEV5 or PS5010).
- The GPIB-PC access board for each device (e.g., GPIB0). The access board is discussed in "Device Map Concepts and Terms".

- The primary and, if used, the secondary address for each device.
- The time limit that is to be imposed when executing certain functions. This is to ensure that accessing a powered off device does not hang up the GPIB indefinitely.
- How I/O transmissions to and from the device terminate. Some devices require or append an end-of-string character, such as the ASCII line feed character, to data strings. Others use the GPIB END message, which is sent or received via the EOI signal line. Still others use both. Some terminate only when a predetermined number of bytes are sent or received.

Characteristics of each GPIB-PC

- Its symbolic name (such as GPIB0 and GPIB1).
- Its computer I/O or port address.
- Whether it is the System Controller of the devices on its bus.
- The time limit to be imposed when executing certain functions.
- How I/O transmissions to and from the board terminate when executing board calls, i.e., by end-of-string character, END message, and/or byte count.
- What interrupt level the board uses.
- What DMA channel, if any, the board uses.
- Whether it uses high speed or normal timing when transmitting data to a device. With normal timing there is a delay of at least two microseconds after the data is placed on the GPIB before the Data Valid (DAV) line asserted. With high speed timing, this delay is decreased to about 500 nanoseconds.

DEFAULT CONFIGURATIONS

Just as the hardware has factory default settings for switches and jumpers, the software also has factory default configurations.

You can also use IBCONF simply to look at the current default settings in the handler file. If you don't make changes using IBCONF, the software default characteristics remain in effect.

Primary Default Characteristics

The following are the primary default characteristics of the handler.

- There are 16 active devices with symbolic names DEV1 through DEV16.
- GPIB addresses of these devices are the same as the device number; for example, DEV1 is at address 1.
- The 16 devices are assigned to GPIB0 as their access board. GPIB0 is the symbolic name of the first GPIB-PC board in your system. If you have an additional GPIB-PC in your system, its symbolic name is GPIB1.
- Each GPIB-PC is System Controller of its independent bus and has a GPIB address of 0.
- The END message is sent with the last byte of each data message to a device. Each data message that is read from a device is automatically terminated when END is received. No end-of-string character is recognized.
- The time limit on I/O and wait function calls is approximately 10 seconds.
- GPIB0 is a Model GPIB-PCIIB (equivalent to GPIB-PCII), is at base I/O address hex 2BØ, and disables DMA and Interrupts.
- You must run IBCONF if you are not using a GPIB-PCIIB as a second GPIB card or if you have changed the hardware switches/jumpers on any GPIB-PC from factory settings. Otherwise, it is unnecessary to run IBCONF.

RUNNING IBCONF

To run IBCONF, go to the root directory of the boot drive and enter:

ibconf

IBCONF scans the handler file, GPIB.COM, and reads its data structures into memory. After you press a key, the program then displays the Device Map for board GPIB0.

Modify only the copy of GPIB.COM installed in your boot directory by always running IBCONF from your boot directory. Never modify the master copy on the distribution disk. This would happen if you ran IBCONF from the distribution disk and if the distribution disk were not write-protected.

Upper and Lower Levels of IBCONF

IBCONF operates at both an upper and a lower level. The upper level consists of the Device Maps and gives an overview of the GPIB system as defined within the handler being configured. The lower level consists of screens describing each individual board and device that makes up the system.

Upper Level: Device Map for Board GPIBx

This screen displays the names of all devices defined in the handler file and indicates which devices, if any, are accessed through the interface board GPIBx. At this level, you may:

- Rename a device.
- Disconnect a device from its assigned GPIB-PC access board or connect (reassign) it to a different access board.
- Proceed to the lower level to edit or examine the characteristics of a particular board or device.

Instructions are given on the screen for selecting the individual devices and for changing from one device map to another, for example, from the map for GPIB0 to that for GPIB1.

Device Map Concepts and Terms

- Device Name - contains up to seven characters. The rules for naming devices are the same as DOS rules for naming files, except that suffixes (.xxx) are not allowed. DOS treats upper case and lower case letters identically, the string "PLOTTER" is treated the same as the string "plotter". For this reason, the configuration program maps all lower case letters to upper case.

Device names must not be given the same names as files, directories, and/or subdirectories. If you name a device PLTR and your file system contains the file PLTR.DAT or a subdirectory PLTR, a conflict results.

- Access Board - all devices on the GPIB require an access board within the computer. The access board is the GPIB-PC interface board that provides the hardware link to the computer. The access board name is of the form GPIBx, where x is a digit 0 or 1 representing the appropriate GPIB board number. The access board name is not alterable.

Lower Level: Device/Board Characteristics

The lower level screens display the currently defined values for characteristics of a device or board such as addressing and timeout information. Instructions are available on the screen for selecting a specific field and for modifying the current settings. The configuration settings selected for each device and each board are a means of customizing the communications and other options to be used with that board or device.

The settings for devices specify the characteristics to be used by the access board for that device when device functions are used.

The settings for boards specify the characteristics to be used with each board when board functions are used.

In the following explanations of device and board characteristics, notice that some characteristics apply to both devices and boards and some apply only to boards.

Device and Board Characteristics

Primary GPIB Address

(Not used by WaveTest) All devices and boards must be assigned unique primary addresses in the range hex 00 to hex 1E. The GPIB primary address of any device is set within that device, either with hardware switches, or, in some cases, a software program. This address and the address listed in IBCONF must be the same. Refer to the device documentation for instructions about that device's address.

Secondary GPIB Address

(Not used by WaveTest) Any device or board using extended addressing must be assigned a secondary address in the range hex 60 to hex 7E, or the option "NONE" may be selected to disable

secondary addressing. As with primary addressing, the secondary GPIB address of any device is set within that device, either with hardware switches, or, in some cases, a software program. This address and the address listed in IBCONF must be the same. Refer to the device documentation for instructions.

Timeout Setting

The timeout value is the approximate length of time that may elapse before I/O functions complete.

This field is set to a code mnemonic which specifies the time limit as follows:

Table A-1. Timeout Settings

Minimum Code	Actual Value	Timeout
TNONE	0	disabled
T10us	1	10 µs
T30us	2	30 µs
T100us	3	100 µs
T300us	4	300 µs
T1ms	5	1 ms
T3ms	6	3 ms
T10ms	7	10 ms
T30ms	8	30 ms
T100ms	9	100 ms
T300ms	10	300 ms
T1s	11	1 s
T3s	12	3 s
T10s	13	10 s
T30s	14	30 s
T100s	15	100 s
T300s	16	300 s
T1000s	17	1000 s

Note that if you select TNONE, no limit will be in effect.

EOS Byte

(Not used by WaveTest) Some devices can be programmed to terminate a read operation when a selected character is detected. A linefeed character (hex 0A) is a popular one. Note that to send

the EOS character to a device in a write operation, you must explicitly include that byte in your data string.

EOS Modes

(Not used by WaveTest)

- Terminate a Read on EOS - Some devices sent an EOS byte signaling the last byte of a data message. A yes response will cause the GPIB-PC to terminate read operations when it receives the EOS byte.
- Set EOI with EOS on Write - A yes response will cause the GPIB-PC to assert the EOI (send END) line when the EOS character is sent.
- 7 or 8-bit compare on EOS - Along with the designation of an EOS character, you may specify whether all eight bits are compared to detect EOS or just the seven least significant bits (ASCII or ISO format).

Set EOI with last byte of Write

(Not used by WaveTest) Some devices, as Listeners, require that the Talker terminate a data message by asserting the EOI signal line (sending END) with the last byte. A yes response will cause the GPIB-PC to assert EOI on the last data byte.

GPIB - PC Model

The GPIB - PC Model must be specified so that the handler will use the appropriate hardware addressing scheme.

Board is System Controller (Boards Only)

Do NOT modify. Should be "Yes".

Local Lockout on all Devices (Board Only)

(Not used by WaveTest)

Disable Auto Serial Polling (Boards Only)

(Not used by WaveTest)

High-Speed Timing (Boards Only)

Some devices cannot read data messages at high-speed (3-state) timing. If your GPIB system has slower devices, you may want to select a longer data settling time by selecting no for this field.

Interrupt Jumper Settings (Boards Only)

This field must be set to the same value as the interrupt level jumper setting on the GPIB-PC board itself. For most personal computers, this jumper setting reflects the actual interrupt level selected. Any valid interrupt level may be selected, providing that that level does not conflict with other equipment.

Base I/O Address (Boards Only)

The GPIB-PC may be assigned any one of the legal base I/O or port addresses as described in the beginning of this manual. The value entered must match the hardware setting selected during hardware configuration. If it does not match, the handler cannot communicate with the GPIB-PC.

DMA Channel (Boards Only)

This field appears only on computers supporting DMA capability. The GPIB-PC may use any of the three DMA channels, 1, 2, or 3, provided that another device is not already using that channel. If a DMA channel is not available, programmed I/O can be enabled by selecting NONE.

EXITING IBCONF

Once all changes have been made, you may exit IBCONF by typing the function key indicated on the screen. The program will first ask if it should save any changes before exiting. Typing a "y" response causes the changes to be written to the file on disk. After exiting, the system MUST be rebooted for the new values to take effect.

USING A PRINTER WITH THE GPIB-PC

Our IBM GPIB-PC software allows you to replace default printer drivers so that output can be redirected to your GPIB printers. Your GPIB printers can then be accessed using system calls and other language commands (e.g., PRINT#).

Installation

When installing the IBM GPIB-PC software, you can run an interactive program called IBCONF. This program allows you to change pre-defined device names and addresses. Your software internally calls a DOS device which corresponds to the port where it expects the printer to be. If you define the device name your software expects in IBCONF, it will fool DOS and send the data to the GPIB printer. Since LPT1 is a commonly used printer driver, the following examples will use LPT1. Other printer drivers you might use instead are:

PRN, LPT2, LPT3

To install the software follow these steps:

- Run IBCONF and follow all instructions.
- IN IBCONF, define dev1:
  - — change the name dev1 to LPT1.
  - — change the primary address to the GPIB address of your printer.
- Exit IBCONF.
- Reboot the System.
- Run IBTEST to verify correct software installation.

Examples:

System

```
PRINT FILE
COPY FILE LPT1
```

BASIC

```
OPEN #1:"LPT1","w"
PRINT #1:"It works!"
```

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