

**Installation and
Quick Start Instructions
for
Matrix CATV Equipment Control Program
Version 6.5
(ASX-16, AFS-12, R-75/76, et al)
for Windows 95, 98, 2000, XP, and NT4.0**

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**This document may be found on file:
READASX.TXT**

This information is intended to provide guidance and useful tips in the installation and operation of the Matrix Test Equipment CATV Equipment Control (ASX16) software. It is not a comprehensive document on the detailed aspects of the software. Specific help on the operation of the ASX16 control programs may be obtained by selecting the HELP menu and then the CONTENTS item or by pressing the F1 function key and using the mouse to navigate through the descriptions of the functions.

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1. INSTALLATION NOTES

1.1 System Requirements

1.1.1 Disk Storage

To successfully install and use all the software included in this package, you will need a hard disk with at least 8 megabytes (MB) of free disk space. The setup program will not install the software unless this minimum configuration is available.

1.1.2 Memory

To successfully operate this software you will need at least 32 MB of RAM (64 MB preferred). With Win 2000 and later Operating Systems this requirement may be greater because of the Operating System software.

1.1.3 PC Platform and Windows Operating System Version

This software requires Windows 95, 98, NT4.0, Windows 2000 or later operating system on a Pentium 133 MHz or higher PC. Later Operating systems will require a faster CPU to run the Operating system.

1.1.4 Video Capability

The PC's video must have a resolution of at least 640 X 480 and 16 colors to run properly. Screen colors will look better and more solid at color resolution settings greater than 256 colors (> 8 bits). A resolution of at least 800 X 600 is recommended and 1024 X 768 is preferred.

1.1.5 Communication Boards

The ASX16 Control software will work with the CEC PC<>488, National Instruments NI-488.2, Hewlett Packard HP 82335B and HP SICL I/O for HP 82340 and HP82341 Series HPIB Interfaces, or Iotech Micro 488/P Serial IEEE 488, NB488 parallel, and GP488 IEEE488 interfaces.

1.2 Saving and Restoring Your Data Files

If this is the first installation of the Manual Control Panel Program on your computer, skip ahead to the "Installation Procedures" section.

If you have previously installed and used the Manual Control Panel Program, you have probably created one or more Control Panel Program data files. These files will NOT be overwritten when the new version is installed in the same directory as your previous version, but you may wish to make copies anyway for safety.

Before installing the new version of the program, copy your data files to an empty formatted floppy diskette. To do this, type the following instructions (these instructions assume your Manual Control Panel Program is installed in the C:\ASX16 application directory, and that you will be saving your data to drive A:). You may also want to copy these files to a new directory to which you will be installing an upgraded version of the CATV Control software. In that case, substitute the name of the directory the upgrade is to be installed in, for "A:" below.

C:

If your data files are in the application directory type: CD \ASX16

If your data files are in the application directory and cfgdata subdirectory, type: CD\ASX16\cfgdata

COPY USER.INI A:
COPY *.BLV A:
COPY *.CFG A:
COPY *.LVL A:
COPY *.FRQ A:
COPY *.TOF A:
COPY SCRIPT.INI A:

If you do not have a Model ASX-16B or ASX-16C, you may eliminate the ".BLV" and ".FRQ" lines.

In the event you need to restore your data files, from the floppy diskette, or wish to transfer them to a directory where you will be installing a new version of the software, type the following instructions:

C:
CD \Name of directory where software is or is to be installed\cfgdata

COPY A:*. * or COPY A:*filename.xxx* where filename is a specific *filename* and xxx is a file type suffix for one of the data file types listed above that you would like to restore.

1.3 Installation Procedures

The Matrix CATV Equipment Control software set ("The Control Program") is provided on CD, download file from our website, or floppy diskettes, usually in the 3.5-inch format. Insert diskette number 1 in your A: or B: drive. The instructions given here assume that you will be using the A: drive. Modify the instructions if you use another drive, e.g. D: if installing from CD.

The SETUP.EXE program attempts to load into your computer, every file your computer needs to run the Matrix CATV Equipment Control Program. If the executable program to be installed is NOT newer than the one already installed, it does not overwrite it. It does not overwrite any existing configuration files that you have created for calibration of the equipment. If the install program does not find cfgdata subdirectory, it will create a cfgdata subdirectory and move all of the configuration files to this directory. The SETUP.EXE program will not damage any of the critical files in your computer. Special drivers for IEEE interface boards should be installed separately. **Note that at any time you wish to abort the installation, just click CANCEL.**

- 1) Start Windows, Windows 95/NT4.0 or later, click on "START" in the lower left of the "Desktop" window, then click on Run.

If you are using Windows 3.1 (for CATV control software versions 4.3 or earlier only) use the pull-down "File" option from the Program Manager, and select "Run." Alternatively, you can hold down the "Alt" key, then press the "F", then the "R" key.

In the appropriate box on the screen, type the following to run the installation program:

A:\SETUP.EXE (where A:\ may be replaced by a relevant drive letter)

Click on the "OK" button. Windows will now run the SETUP.EXE program which is contained on the floppy diskette, or CD.

- 2) A Welcome screen will appear describing the version that will be installed. Click "Next" to proceed with the installation. If you wish to abort the installation click "Cancel".
- 3) The setup program will ask you for the name of the directory into which it should place the files. It will suggest:

C:\CATVxx, where xx is a 2 digit number representing the version number, under which to install the ASX16 executable file, all of its initialization and calibration data files and the diagnostic programs. (See Fig. 1 for a typical screen). It is **recommended** to use the suggested directory in order to easily identify the software version you are using. If you are upgrading the software and already have created configuration and calibration files, it will be necessary to manually copy these files to the directory that you have installed the new software. (See Section 1.2 Saving and Restoring your Data Files). If you select the directory of your old version, you will not have to copy these files, but you will have to re-install your old program to revert back to your previous version. To select a different directory to install the software, click on the browse button and either select a directory from the list or type in the path to a folder in which to install the software.

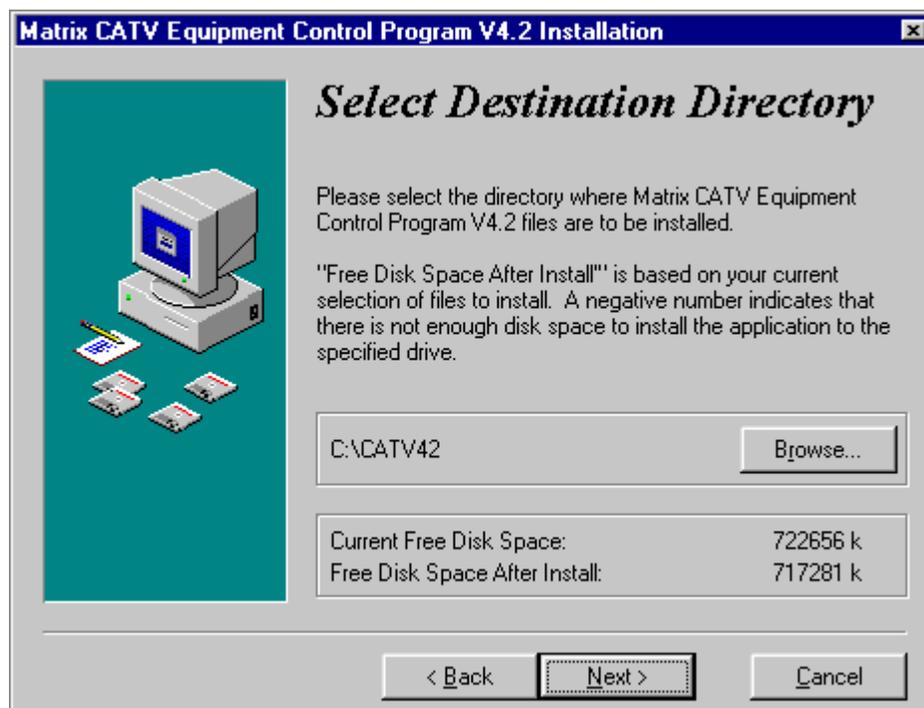


Fig. 1

The setup program will look for these files, and if the executable file on your hard drive, is the same or a later version, it will not overwrite it. If you wish to install an older version over an existing program, or restore the current version, then delete the program executable file ASX16.exe before installing the software. The setup procedure will NOT overwrite the configuration or calibration data files, mentioned in the first section, if they already exist.

Click "Next" to proceed with the installation. If you wish to abort the installation click "Cancel".

- 4) You will see a menu to select an IEEE interface (See Fig. 2). This will provide the setup program with information to automatically set up your USER.INI file with the correct interface configuration, and to create a windows icon to the manual diagnostic software, if selected and available, for the communications interface you will be using . The default is the Capital Equipment Corp. interface. Select one of the GPIB interfaces supported by the software. If your interface does not appear here, then you may not be able to control the Matrix equipment with this software. If you don't know which interface you will be using, or if you are only installing for demonstration purposes, select “**Don't Know**”.

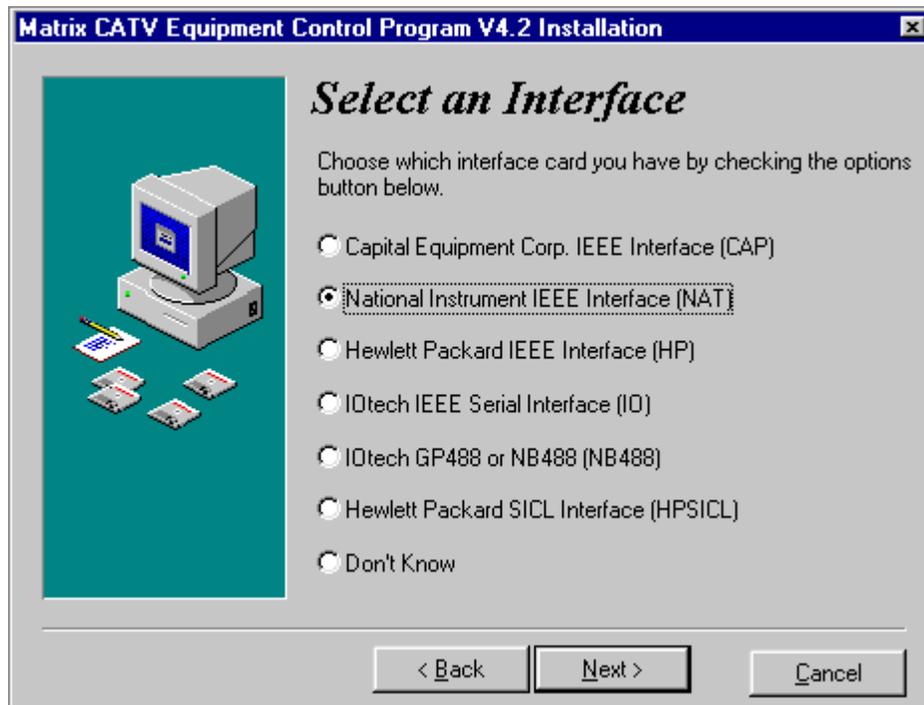


Fig. 2

Click "Next" to proceed with the installation. If you wish to abort the installation click "Cancel".

- 5) At the Select Components dialog you have the following installation: Install CATV Equipment Control, and Install Manual Diagnostics Programs. If you accept the default with both options checked a full installation will occur, with the CATV Control program, initialization and sample calibration data files, **only if they do not already exist**, the on-line documentation files, and manual diagnostic programs all being installed. To install only one of the components, check the box next to the one to be installed.

Click "Next" to proceed with the installation or "Cancel" to abort the installation.

- 6) You will be prompted for the window group name. You may accept the default: “Matrix Software”, or select or enter a different windows group under which to store the program icons. *(If you are upgrading from a previous version of the ASX16 software, you will find the program icons in this new group. If you wish to have the icons created in your old group name, then replace the default with the name of your current group.)*

Click "Next" to proceed with the installation or "Cancel" to abort the installation.

After the files from diskette 1 are installed you will be prompted to “**Insert disk number two.**” Insert this disk and then click OK.

- 7) When the “The installation completed” message window appears, click **Finish** to complete the installation.

1.4 Description of Data files

All the configuration data files installed by this installation software are now located in cfgdata subdirectory under application directory where the software is installed. For example, if the CATV control software is installed in the C:\CATV44 directory, the configuration files are located in C:\CATV44\cfgdata.

1.4.1 Initialization files

The initialization file for the ASX16 program is USER.INI. This file contains all of the profile information modifiable through the Setup menu choice from the main panel of the ASX16 program. It is possible to view and change this file via a standard text editor, but care must be used to preserve its format. See paragraph 1.8 for more information on doing this. It is highly recommended that a backup copy be made of the USER.INI file if you plan to make any changes this way. If this file is corrupted, the ASX16 program will not startup properly.

You can archive a number of versions of the USER.INI file by renaming the USER.INI file as CONFn.CFG where n is the next higher number of any other files with this name pattern and modifying the first line of the file with a text editor to identify the data file. By using this naming convention it will appear on the list of available setup files in the Setup Panel.

1.4.2 Configuration and Calibration Data Files

The special files used by the ASX16 program to hold calibration and setup data are:

- BASLn.BLV - Base level calibration data files
- FREQn.FRQ - Frequency trim calibration data for each module
- FREQn.FRP - Frequencies read from a frequency measuring device - along with the target randomized values and deviation of resulting measured frequency from the designated channel frequency.
- CONFn.CFG - Alternate USER.INI setup files
- LEVLn.LVL - The Carrier leveling data for flat or tilt patterns. Ver. 4.2 also includes the attenuator setting at which the level data were saved.
- AFSn.CFG - AFS Filter Frequency assignments
- TOFFn.TOF - Contains “turn off” status of selected carriers to turn off in Distortion Test Setup panel, where n is an integer to distinguish between different file versions.
- SCRIPT.INI - Defines the data columns to be displayed in the Distortion Test screen - See Distortion Measurement Script Control section.

The above files are in now in CFGDATA folder.

FOLDERS/DIRECTORIES (Created as necessary)

- SCRIPT - Contains the user created spectrum analyzer script files to be run by the Distortion Measurement Control Program function.
- RESULTS - The folder where distortion measurement results are stored when SAVE is selected.
- LEVEL - Contains data files from the Module Linearity Test functions.
- MANDIAG Contains manual diagnostics testing scripts.

1.4.3 Other files installed during setup

During installation of the ASX16 software various .OCX (Visual Basic Extension) and library files will be loaded to the Windows System directory if they are newer than those found. The GPIB files usually come with the communication board, and you should use the software that comes with the hardware to ensure compatibility.

1.5 Running the Programs

After the SETUP.EXE program is finished, your Windows screen will contain a **Matrix Software** program group. Double click the **Matrix CATV Equipment Control** program icon, marked with a small version of the program's Main Screen, to run the program to control the Matrix equipment. There will be an icon called **ReadASX** which when double clicked will present installation and operational notes -- the same information in this document. Another icon, **CATV HELP** when double clicked will display help in using the CATV Equipment Control program. If installed, the **Manual Diag Prog (Interface)** icon (where *Interface* is one of the selected IEEE interface boards) when double clicked will run the manual diagnostics program from DOS. In addition, a **DIAG HELP** icon can be double clicked to provide help in selecting and running the diagnostic program in DOS. For Windows 95, the software may be run by selecting the START/PROGRAMS/MATRIX SOFTWARE menu item and clicking on the CATV Equipment Control Program entry.

1.6 Interface Notes

Each of the four available IEEE-488 interfaces has some peculiar characteristics which can cause "The Control Program" to malfunction. In general, once you get an interface to work properly, it will continue to work without any problems. The problems to watch for are:

1.6.1 CEC<>488 board:

Although this is the most reliable and trouble-free of the interfaces, you must follow the installation instructions (which come with the board) to set its DIP switches correctly. The GPIB address is set to 21 by default by the software. This address may be changed in the **System Setup** screen. Also check the DMA, memory, and IRQ resource assignments to make certain that there are no conflicts with other devices in your computer.

1.6.2 National Instruments NI-488.2:

Before you use this board, follow the installation instructions that come with the National Instruments board. We have received reports that the NI board does not work well with some of the older non Plug and Play GPIB equipment, which were designed by Hewlett-Packard before the IEEE-488 standard was established. Because of potential interrupt request conflicts, the NI board seems to work, in a "fully-stuffed" computer, only if the NI board's interrupt request setting is: "NOT USED."

You may select the National Instruments interface from the System Setup panel when using the NI PCMCIA GPIB card for laptops. The GPIB board index is set to 0 by default and may be changed in the **System Setup** screen.

1.6.3 Hewlett-Packard HPIB Boards:

1.6.3.1 HP 82335B Interface

Before you use this board, you should check the DIP switch settings to be sure there are no hardware conflicts. After setting the switches, you must modify your computer's CONFIG.SYS file, as explained in the HP manual. For many users, this involves adding the following line to the CONFIG.SYS file:

```
DEVICE=C:\DOS\EMM386.EXE NOEMS X=DC00-DFFF
```

This board is **not recommended on Pentiums or on very fast 486 PCs** as it is unable to fully keep up with their speed. If the board does not come up in system controller mode, then it is an indication that there is a timing problem. However, there is an HP utility that can be run to make it come up in system controller mode. The HP 82335B will partially work on these faster computers, but it will work erratically, and is not recommended if any automatic leveling is planned to be done.

1.6.3.2 HP 82340B Interface and SICL Libraries

After installing the HP SICL software drivers, you must configure the board parameters. Follow the directions from the manufacturer to invoke the configuration utility. By default "**hpib7**" is selected as the logical name for the board. A different logical name may be selected in the **System Setup** screen under the **Remote Interface** tab. The GPIB address must not conflict with any other device on the bus. You should also be careful with the IRQ and Base Address settings so that they do not conflict with any other peripherals in your PC. The Base Address setting must also be consistent with the switch settings on your GPIB board.

1.6.4 IOtech Micro 488/P Serial Module:

This module is designed to operate with very low power, and does not contain its own power source. It "steals" its power from the data lines of the computer's serial interface. Because of this, the IOtech module has a very limited drive capability. You should use the shortest possible serial and IEEE-488 cables, and you should have no more than three peripherals on the IEEE-488 bus. Before attempting to use the IOtech module with "The Control Program," you must set up the serial port using the Windows "Control Panel" "Ports" "Settings" "Advanced..." to set up the "Base I/O Port Address" and "Interrupt Request Line" which match your computer's hardware. You cannot use the same serial port for the IOtech module as you use for your computer's "mouse." Make sure that the interrupt request line of your serial interface does not conflict with the interrupts used by other plug-in cards.

Be advised that once communications has failed between the computer's serial port and the Micro 488/P, there is no way for software recovery of the Micro 488/P. The only known way to recover is to unplug the Micro 488/P from the computer's serial port for a few seconds, allowing the circuitry inside the Micro 488/P to power-down. Because of this, the Micro 488/P cannot use the Manual Control Panel Program to control a Model AR-12, R-76, or R-76 unless an ASX-16 or ASX-16B is present on the IEEE-488 bus.

WINDOWS 95 NOTE: When using Windows 95 make sure that the COM port is configured with FIFO buffering enabled, if the PC is capable of this, to prevent port over-run.

1.6.5 IOtech Micro 488 serial interface handling fixed

In version 2.3 of the CATV Equipment Control (ASX16 Control Panel) program, buffer control was enhanced for improved performance of the IO Tech serial IEEE bus controller interface

It has been discovered when using this interface device with HP 8590A spectrum analyzers that the Micro 488 bus controller hangs up causing program timeouts. This was attempted to be fixed in version 2.5, but assurance cannot be made of it working properly due to the unpredictable, and erratic nature of this problem.

1.6.6 IOtech IEEE 488 interfaces

For the NB488, designed to attach to the parallel port, and the various Personal488 card type GPIB controllers please note the following configuration requirements. The proper windows IEEE interface driver files must be installed and configured such that a driver named “**IEEE**” is defined (note that for some driver installations it defaults to “**IEEE0**”, “**IEEE1**”, etc. and one of these must be renamed to “**IEEE**”). In addition the default device named “**wave**” must be present in the configuration. The 4-bit parallel interface configuration may have to be specified for the NB488 parallel interface bus controller. The **IN** and **OUT** termination characters should be set to **CRLF** which is the default. The Matrix software will dynamically establish the necessary driver configuration for the different devices it uses such as ASX16, spectrum analyzer, etc.

If the CATV program terminates abnormally, the IOtech software drivers may be left in memory and you may see a message: “Cannot set address for ASX...”. To resolve this, either look for the task “**Driver 488**” and terminate it before starting the CATV program, or if already started, exit the CATV program normally and then restart it after correcting the bus communication problem.

1.7 Supported Measurement Instruments

The following instruments can be used for automated generator calibration and carrier leveling.

1.7.1 Spectrum Analyzers

HP ESA 4400 series SCPI command interface analyzers.

HP 8560E series, includes HP 8590A, 8591C, 8591E, 8593E, ESA-L1500

HP 8568B, includes HP 8566B (note select group type HP 8568BL if using the 75 ohm (left side) input or select HP 8568BR if using the 50 ohm (right side) input)

HP 70000, all analyzers in that series with ROM version 7.04 or greater. (select input channel 1 for 75 ohm input or input channel 2 for 50 ohm input)

Rohde & Schwarz FSE family of spectrum analyzers

1.7.2 Power Meters

HP 436A (Tested with sensor model 8481A)

HP 437B, includes HP 438A (Tested with sensor model 8481A), HP EPM-4418 in HP437 Command Language emulation mode.

SCPI For all SCPI compatible power meters – tested with the Agilent EPM 4418B power meter.

Gigatronics GIGA8540 series, includes Gigatronics 8541B, 8541C single sensor (Sensor - 80320A)

1.7.3 Frequency Counters

HP 5316B

HP 53181A

HP 70000, HP8560 series, and HP8568B are really spectrum analyzers but can be selected for measuring frequency by the frequency calibration program

1.8 Customizing the USER.INI File

The installation process places several files in the selected directory. One of these is the "USER.INI" file, which determines how "The Control Program" will operate with your equipment. For major changes, you will probably want to customize the USER.INI file using a word processor program or similar text-editing software. For minor changes, you can use the System Setup mode of "The Control Program" to customize the USER.INI file. To activate this mode, click **on System Setup** on the menu at the top of the main screen. When the System Setup screen is displayed, select the **Channel Setup** tab to change channel assignment parameters. Use the Help file for full instructions. To activate the Help file, click the mouse on any box you want to learn about, or use the tab key to highlight a command button without causing the action to take place, then press the "F1" key.

Instructions are provided in a later section for using a word processor to customize the USER.INI file.

1.8.1 Setup automatically invoked on initialization

The System Setup panel is displayed if an invalid device name (IEEE interface, spectrum analyzer, power meter, or frequency counter), or an invalid COM port is detected during initialization. If you are not sure of the valid code values to enter for the **Interface=**, **SAGroup=**, or **FCGroup=** parameters below, you may leave the string to the right of the "=" blank and "The Control Program" Setup screen will appear during the initialization step when you run the Matrix CATV Equipment Control program. The Setup screen will permit you to select a valid code from the list, and when you click on **Return**, it will complete the program initialization. Defaults will be selected for all invalid or missing parameters if a selection is not made. The IEEE interface defaults to **VIRTUAL** mode after which all subsequent operations will be simulated..

The Setup screen will also be invoked at startup when the number of modules defined in the USER.INI file does not agree with the specified number of expected modules. In this event, a message will first display indicating the number of modules that were counted did not agree with the expected count, and the count was changed to agree with the counted number of modules.

1.8.2 Using a Word Processor to Change the USER.INI File

A simple USER.INI file is shown here for an ASX-16B with five channels. The USER.INI file for your generator (ASX-16 series) will be nearly identical.

The USER.INI file is shown here in two columns. The left-hand column does not appear in a real USER.INI file, and is shown here for reference purposes only. Also for reference purposes only, those lines and characters which should not be altered are indicated in bold print.

For the current software version, a general purpose text file editor such as NotePad, WordPad, or Dos Edit may be easier for inserting or deleting channel entries in the middle of the frequency plan list in the USER.INI. For all other items, it is preferable to use the program controlled Setup screen to ensure proper selections of the configuration data.

1 **USER.INI**

2 [IEEE-488]
 3 Interface=CEC
 4 Port=COM1
 4A BoardAddress=21 (GPIB board address or index – added in CATV v5.1)
 5 [PowerDevice]
 6 PDevice=Spectrum Analyzer
 7 PIeeeAddress=18
 7A SAIeeeAddress=18 (Spectrum Analyzer GPIB Address – added in DTS-C V1.1
 and CATV Equipment V2.6 control software)
 7B PMIeeeAddress=13 (Power Meter GPIB Address – added in DTS-C V1.1 and
 CATV Equipment V2.6 control software)
 8 SAGroup=HP8560E
 8A SAInChan=1 (Only in CATV program version 2.5 and later)
 9 PMGroup=HP436A
 9A PMimped = 50 (Power Meter impedance added in V3.1)
 10 [FreqDevice]
 11 FIeeeAddress=20
 12 FCGroup=HP5316B
 12A FCInChan=1 (Only in CATV program version 2.5 and later)
 12B FRQInCmd=GFIN (CATV V4.2 and later)
 12C FRQOutCmd=GFOUT (CATV V4.2 and later)
 13 [ASX-16]
 14 ASXIeeeAddress=24
 14A AttenControlIeeeAddr=24 (Introduced in DTS-C v2.4.2)
 14B RelayControlIeeeAddr=24 (For DTS System only)
 15 ASXMaxChan=5
 16 1 =55.25[=65] 2nd "=" optional - used to map Dist. Anal chan to ASX chan - V4.0
 17 2 =61.25[=] Note: [, and] are not typed, only used to indicate optional field
 18 3 =67.25[=81]
 19 4 =77.25[=] When no channel specified after "=", then assume Dist Analyzer
 chan maps to ASX chan
 20 5 =83.25 When "=" omitted, chan is skipped in Dist. Anal. Program - V4.0
 21 ASXMaxdBmV=48
 22 ASXFreqtol=10
 23A ASXRFRes=1
 23B ATTENCMD=AA (Added in V6.5)
 23C READATTNCMD=AVA (Added in V6.5)
 23D ASX-16C/DFreqRand=5 (Added in V6.1)
 24 ASXModulation=15750
 25 ASXMod1KHz=False
 26 SafeStart=1
 27 [Multi Plan] (Added in V3.0 for specifying multiple frequency plans)
 28 Combine1=conf1.cfg=basl0.blv=A (ASX command scripting capability added
 in V3.1)
 28A Plan1=conf2.cfg=basl1.blv=AA=QOFF;P0;A15;C*=levl2.lvl (ASX command
 script - V3.1; Level File V4.2)
 28B Plan2=conf3.cfg=basl2.blv=AB=P*;A20;FH*,550;C42 (ASX command script - V3.1)
 28C (Standard Gen1)=conf4.cfg=NOBLV=A=M* (ASX command capability - V3.1)

29 [System Losses] (Revised in V5.3)
29A LOWFREQ=55.25
29B HIFREQ=997.25
29C RFOUTOSALFLOSS=0.7
29D RFOUTOSAHFLOSS=1.5
29E RFOUTOPMLFLOSS=0
29F RFOUTOPMHFLOSS=0
29G RFINTOSALFLOSS=0
29H RFINTOSAHFLOSS=0
29I RFINTOPMLFLOSS=0
29J RFINTOPMHFLOSS=0
29K COMMENT=DTS #10 LOSSES
30 [CABLELOSSES] (Added in V5.3)
30A 0=0=0
30B 1=0.3=2
30C 2=0.2=1.5
30D 3=0.2=1.5
30E 4=0.2=1.5
31 [Distortion>Loading_CW] (Added in V4.4 for storing channels to put in CW mode.)
31A 2
31B 4
31C 10
32 [Shut Down Mode]
/* 1=Enable Plan Shut Down Script. 0= Disable Shut down Script
32A PlanShutDown =1
32B ShutDownScript=QLOW;P0
33 [Processing]

Line 1 is the name of the file.

Line 2 marks the beginning of the interface data.

Line 3 identifies the type of interface. The supported interfaces options for line 3 are:

CEC	Capital Equipment Corp PC<>488
NI	National Instruments NI-488.2
HP	Hewlett-Packard 82335B HPIB
HPSICL	HP Standard Instrument Control Library - HP 82340 series
IOT	IOtech Micro 488/P
NB488	IOtech NB488
GP488	Iotech GP488
VIRTUAL	Virtual mode where generator operations are simulated

NOTE: If VIRTUAL is specified the software will not look for a generator but will simulate some of the operations of one.

(See Boardaddress line that specifies either the GPIB address, board index, or logical name of the GPIB interface.)

Line 4 identifies the serial interface port to be used if the IOT serial interface is selected. For all other interfaces, the default is "COM1". The options are:

COM1	COM2
COM3	COM4

Line 4A **BoardAddress** represents the GPIB address of the board (default is "21") for the CEC interface, the board index (default is "0") for the National Instrument, or the logical name for the HP SICTL (default is "hpib7") interface

Line 5 marks the beginning of the power measuring device's data.

Line 6 indicates the type of device to be used for making RF power measurements. The options are:

Spectrum Analyzer
Power Meter

Line 7 indicates the IEEE-488 address of the specified device from line 6. If your system does not have a device for measuring RF power, use the default data, as shown in this example.

Line 7A specifies the IEEE-488 address for the Spectrum Analyzer. This entry is created if a USER.INI was created by an older program version, by using the value from line 7 if the device type described in line 6 is a Spectrum Analyzer.

Line 7B specifies the IEEE-488 address for the Power Meter. This entry is created if a USER.INI was created by an older program version, by using the value from line 7 if the device type described in line 6 is a Power Meter.

Lines 8 and 9 specify the Group Type for the Spectrum Analyzer and Power Meter, respectively. Information about Group Types is provided on the System Setup screen and in section 1.7 of this document.

Line 8A specifies the input channel for the spectrum analyzer if applicable.

Line 9A indicates power meter impedance – 50 ohm directs program to use + 47 to convert dbm to dbmv and 75 uses + 48.6 to convert to dbmv. This value is set to 75 only if the 75 ohm box is checked in the Setup screen

Line 10 marks the beginning of the frequency measuring device's data.

Line 11 indicates the IEEE-488 address of the frequency counter. If your system does not have a frequency counter, use the default data, as shown in this example.

Line 12 specifies the Group Type for the Frequency Counter. Information about Group Types is provided on the System Setup screen and in section 1.7 of this document.

Line 12A specifies input channel for frequency device if applicable.

Lines 12B - 12C Specifies the command to issue to insert or remove frequency counter from RF path.

Line 13 identifies the type of ASX-16 to be controlled. The options are:

[ASX-16]
[ASX-16B]
[ASX-16C]
[ASX-16C/D]

Line 14 indicates the IEEE-488 address of the ASX-16. If your system has more than one ASX-16 or ASX-16B (and, therefore, more than one ASX-16 IEEE-488 address) on its IEEE-488 bus, each ASX-16 will require a different USER.INI file.

Line 14A **AttenControlIeeeAddress** allows specifying the GPIB address that controls the RF attenuators if different than the address of the ASX generator (default is same address as **ASXIeeeAddress**).

Line 14A **RelayControlIeeeAddress** allows specifying the GPIB address that controls the RF relays (for a DTS system) if different than the address of the ASX generator (default is same address as **ASXIeeeAddress**).

Line 15 indicates the number of channels (generator modules) in the device specified in lines 13 and 14.

Line 16 indicates the data for the first channel (module) in the generator. The data to the left of the "=" provides the channel designation. In most ASX-16 and ASX-16B generators, the channels are

identified as 1, 2, 3, 4, 5, et cetera. In some models, the channels have custom designations, such as 160, 161, 162, 163, 2, 3, et cetera. Consult the table of frequencies channel designations which came with your ASX-16 or ASX-16B. The data to the right of the "=" indicates the nominal operating frequency of the channel. Some units are provided with special frequencies, such as 121.2495 MHz. If you have an ASX-16B channel with a special frequency, you should enter the accurate frequency.

The data to the right of the optional **second** "=" specifies the channel of the distortion analyzer that maps to the generator channel. If the second "=" is not present, then if the distortion analysis program is run in automatic mode, these channels will be ignored. Lines 16 and 18 cause module 1 and 3 to map to analyzer channel 65 and 81 respectively. Lines 17 and 19 in the example, map the distortion analyzer channels 2 and 4 to the same channels (2 and 4) as the generator. Line 20 (channel 5) is skipped in the automatic distortion analysis program because it does not have a second "=".

Line 17 through line 20 (in this example) contain the data for the remaining channels. The number of lines with channel data should equal the data entered in line 15.

(The lines indicated as lines 21 to 31 in this example will be placed at the end of the USER.INI file, right after the last line of data for the channels.)

Line 21 indicates the maximum RF output power available from a generator module. This level represents the most power obtainable from a module with 0 dB in the RF attenuator and with the module set for its highest operating level. This value is not critical, and is used for reference purposes, only.

Line 22 indicates the desired frequency tolerance (in parts per million) to be used for the frequency trim calibration, for the model ASX-16B only, for those units equipped with a frequency counter. For all other units, use the default value as shown in this example.

Line 23A indicates the resolution of the RF attenuator. In most units, the RF attenuator moves in 1 dB steps. For those units with a 0.5 dB option, this value will allow access to that feature. The available options are: **1, 0.5**

Line 23B Specifies the attenuator command to use to set the RF attenuator at start up (for systems configured with more than one attenuator).

Line 23C Specifies the attenuator command used to read the attenuator at start up.

Line 23D indicates the ASX-16C/D frequency randomization offset range. In this case, it is between +/- 5KHz.

Line 24 indicates the frequency (in hertz) of the modulation frequency available in the ASX-16 or ASX-16B. Most units are equipped with 15.750 KHz, as shown here.

Line 25 indicates, for the Model ASX-16B portion of a Model DTS, whether the 1 KHz modulation option has been installed. The options are:

True, False

Line 26 indicates whether to leave the modules on or to turn them off, when starting the program.

When **SafeStart=1** the modules will be left on, but when **SafeStart=0** they will be turned off on startup.

Line 27 defines the section for multiple frequency plan parameters. The presence of the **[Multi Plan]** group and at least one plan description enables the Load Frequency Plan control box to be displayed on the Main Panel. Up to 16 frequency plan entries may be entered.

Lines 28-28C describes the frequency plans. The format is:

**Plan Description=Configuration File=Base Level Data File=Attenuator Control Command
for plan group=ASX Generator Command String=Level Data File**

Definition of the components of the plan entries: (Note that the multiple plan configuration can be easily set up via the Setup screen in Version 4.2 – see Section 2.2.2 ASX16 Setup and Initialization)

Plan Description - the description (up to 13 characters that **must NOT contain an "="**) that will display in the **Load Frequency Plan** Control located on the lower center portion of the CATV Equipment Control Program Main Screen.. In the examples on lines 27 - 28C, the **plan descriptions** are: **Combine1, Plan1, Plan2, and (Standard Gen1)**.

Configuration File - is the name of a file under the \ASX16 directory that contains the module identifier numbers and the frequencies for the specified plan. It contains the same information as the USER.INI file and is typically named CONF n .CFG where n is a sequential integer. In the examples on lines 27 - 28C, the **configuration files** are: **conf1.cfg, conf2.cfg, conf3.cfg, and conf4.cfg**. Note: **conf0.cfg cannot be used** and the software will not accept plans with **conf0**.

Base Level Calibration Data - a file that contains the base level steps to base level the generator. If no base level file is to be loaded then **NOBLV** must be entered. In the examples, the **base level file** entries are: **basl0.blv, basl1.blv, basl2.blv, and NOBLV**. Note that for the (Standard Gen1) plan **no** base level files will be loaded and **no** COMBINE or SPLIT commands will be issued.

Attenuator Control Command - the Matrix command to control the RF Attenuators for a frequency band. This command depends on the specific generator. In the examples, the **attenuator commands** that will be used for the listed plans are: **A, AA, AB** and **A** respectively.

ASX Generator Command String - a string of valid ASX16 or ASX16B commands separated by “;”. These commands are executed automatically when the corresponding plan is loaded. The pseudo wild card character “*” can be used to specify all modules in a plan for commands that require a module number. In the example, Line 28A will cause all the carriers in the generator to be turned off, the attenuator to be set to 15 and all carriers in Plan1 to be turned on. Line 28B turns off modules specified in Plan 2, sets the attenuator to 20, sets the power level for all modules in Plan 2 to 550 steps, and turns on channel 42 in CW. Line 28C will put all channels in the (standard Gen1) plan into the modulation state.

Level Data File - a file that contains the carrier level step and attenuator settings to set the levels of all modules in the frequency plan automatically when the plan is selected. An entry of **NOLEV**, instead of the file name, will leave the levels unchanged. In line 28A in the example (Plan1),the **levl2.lvl** file will be loaded when Plan1 is selected.

Line 29 The section name [System Losses] denotes the start of a sequence of parameters defining a high and low frequency and the corresponding measured loss at those frequencies. This information is saved here if requested, from the loss correction setting screen that can be invoked from the carrier leveling form.

Line 29A-B These contain the low and high frequencies at which cable loss has been measured.

Line 29C-D These contain the low and high frequency losses between GenRF Out and Spectrum Analyzer.

Line 29E-F These contain the low and high frequency losses between GenRF Output and PowerMeter.

Line 29G-H These contain the low and high frequency losses between RF Input Port and Spectrum Analyzer.

Line 29I-J These contain the low and high frequency losses between RF Input Port and Power Meter.
Line 29 K Used to store a comment to describe what these loss values relate to.

Line 30 This section name [Cable Loss] denotes the start of sequence of parameters defining a high and low frequency losses corresponding to the cables.

Line 30A-E These contain cable Losses for no cable(item 0) and cable losses for 1-4.

Line 31 The section name [Distortion>Loading_CW] contains a list of channels that are to be kept in CW mode when making distortion measurements where the carriers are to be modulated. This is necessary for maintaining proper operation of certain optical devices.

Line 31A-C The channel numbers that are to remain in CW.

Line 32 The section name [Shut Down Mode] contains the script to be sent to the generator when the program ends.

Line 32A Indicates whether the script will be executed. 1=Enable Plan Shut Down Script. 0= Disable Shut down Script

Line 32B Contains a set of commands to be sent to the generator when the program is shut down.

Line 33 indicates that all the USER.INI data has been read, and that "The Program" should now begin processing the data.

2. OPERATIONAL NOTES

2.1 Startup and Hardware Simulation

The Matrix CATV Equipment Control program, referred to as "The Control Program" for short, will operate in two modes: "real" and "simulation." If your computer is equipped with an appropriate IEEE-488 interface card, and if it is connected properly to an operating Model ASX-16 (or later model), "The Control Program" will operate in its "real" mode. In this mode, actual IEEE-488 communications take place, to and from the ASX-16. When "The Control Program" is run, if IEEE-488 communications to the ASX-16 are not possible, a dialog box will appear informing you that the program will enter into simulation mode. If you respond **OK**, (the only choice) it will simulate all subsequent I/O to the generator. You can pre-select simulation mode by choosing the "**Virtual**" interface type in the System Setup panel, to avoid error messages and immediately enter simulation. This "simulation" mode is an excellent way to learn to use "The Control Program", because, in this mode, you cannot harm your RF equipment, nor do you need to connect any of your equipment to the computer.

Note that after simulation mode has been entered, to initiate online operation with the generator, it will be necessary to terminate then restart the program, or reload a configuration file from the System Setup screen, or select a frequency plan from the main panel.

Instructions on using all the controls and features of "The Control Program" are contained in its "Help" file. To activate the Help file, Click the mouse on, or tab to any control you want to learn about, then press the "**F1**" key.

During initialization, the "The Control Program" reads the USER.INI file and initializes operational parameters according to the settings in USER.INI.

2.1.1 Setup automatically invoked on initialization

If an invalid device name (for IEEE interface, spectrum analyzer, power meter, or frequency counter) or any other invalid setting is detected during initialization, the setup panel is displayed to select a valid

setting. The Setup screen is also called if the number of modules entered does not equal the expected number of modules specified in the USER.INI file. This allows a correct name or a revised number to be selected from the panel and to continue with the initialization without having to restart the initialization procedure. (Note that in most cases a default choice will be proposed if a parameter is missing or invalid.)

2.2 ASX16 Panel Functions

The first control panel of “The Control Program” after initialization is complete, is the main ASX16 Control Panel (See Fig. 3) for initiating all operations and calibrations of the ASX16 generator. Modules may be turned on or off in continuous wave (CW) or modulated, attenuation may be set, and control panels for: system setup, manual command entry, AFS-12 filter selection, carrier leveling, re-calibration, and distortion test set up may be selected.

2.2.1.1 Multiple Module Control

Multiple modules may be selected for control by holding the <CONTROL> key while clicking the channels to be selected. To select a contiguous group of frequencies, click on the first frequency, then hold down the <SHIFT> key and click on the last frequency in the range to be selected, all of the frequencies in that range should be highlighted. To select all modules, click on the **Select All Modules** button. To control all of the selected modules, use one of the buttons in the **Multiple Module Select** frame. When the model ASX-16C generator is selected, the module adjustment button are labeled as +/- 2.5, 0.25, and 0.025 dB, for all other model generators these buttons are labeled as +/- 100, 10, and 1 level steps. Consult the on-line help documentation using the F1 function key to access the detailed descriptions of these operations.

2.2.1.2 Status Indicators

A status box at the top center of the screen will display the generator model configured for the program on the first line, and will indicate "Simulation Mode" if unable to communicate with the generator, or if the "Virtual" interface is selected. If other devices such as: AR-12, R-75, or R-76 reach the simulated state, then a message will appear below the generator status line. For some devices such as power meters, spectrum analyzers, and frequency counters, simulation does not go into effect. Instead, a dialog message is issued requesting whether to Retry or Cancel the operation. After a certain number of these messages occur, they will be suppressed and all operations requiring communication will be canceled. The status box will display the fact that **Error Messages are Suppressed. Reloading a configuration or plan, or restarting the program will reset it to the normal mode.**

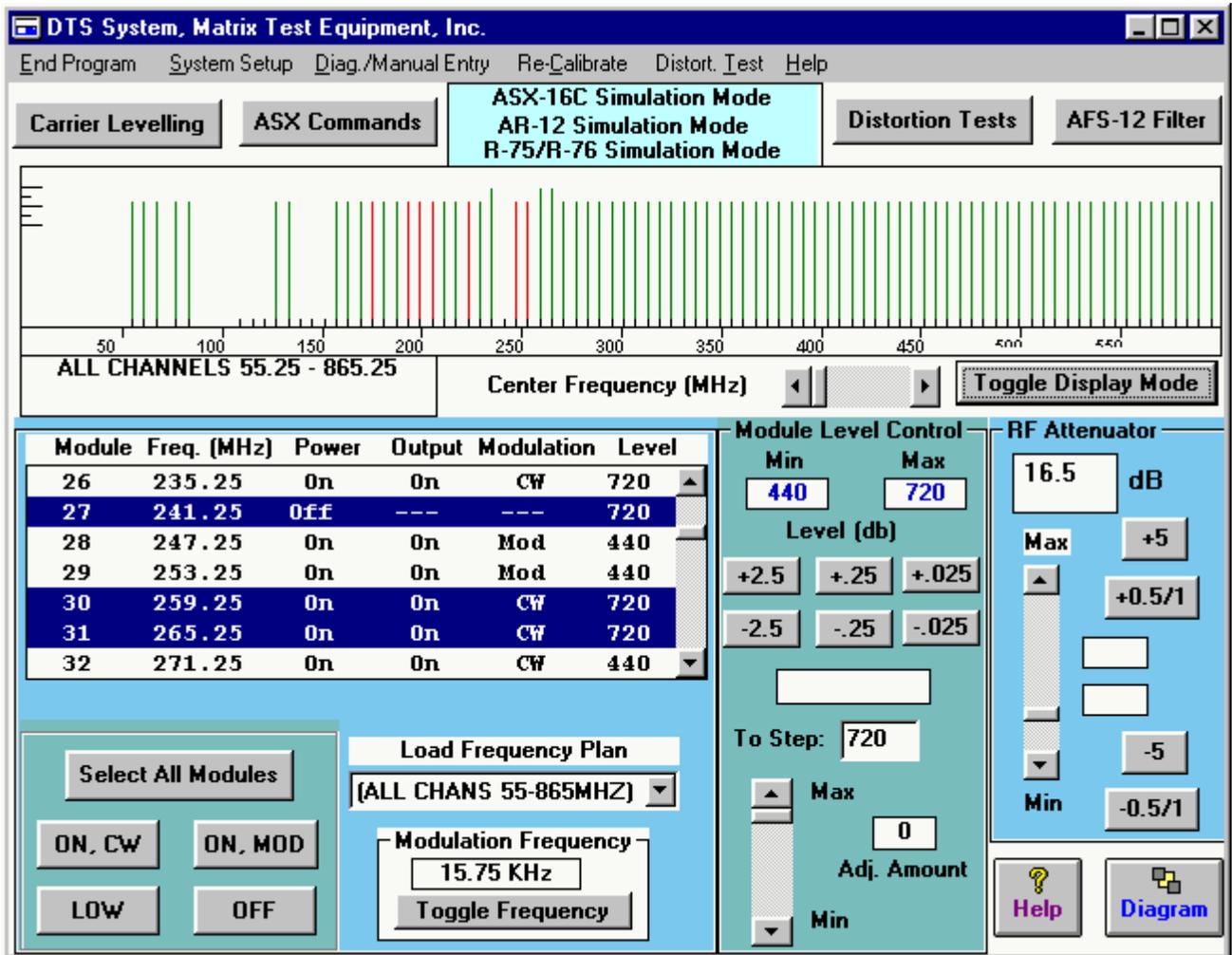


Fig. 3

2.2.2 ASX16 Setup and initialization

To get to this panel select the **System Setup** option on the top menu bar of the Main Control Panel. (Fig. 3). This panel presents a group of tabs to select from (see Fig. 4a). Fig. 4a illustrates how to select the Remote interface. The list of interfaces is displayed after clicking on the arrow, and the mouse pointer selects the **Virtual/Simulation Mode** indicating that the program is to be run without any test equipment.

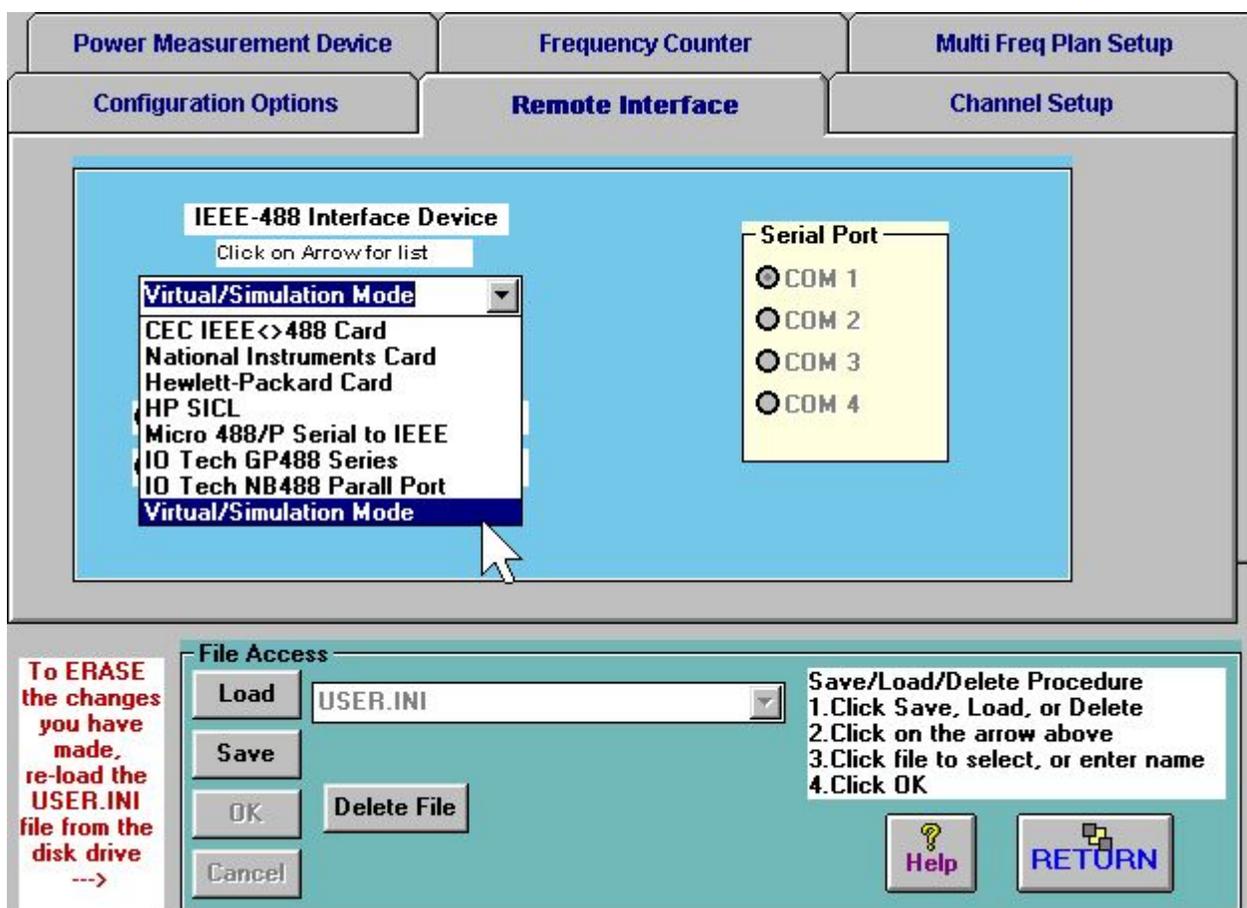


Fig. 4a

Under the **Channel Setup** tab the module designations and frequencies are defined. It allows modification, insertion, or deletion of any module entry in the plan.

The **Configuration Options** tab allows for entry of the **Maximum Output** in dBmV - this is an approximate number after compensating for losses due to special circuit components and attenuator pads. This number is used in setting the initial value of attenuation to apply in leveling the generators. The generator **model type** and **IEEE address** may be specified here. You can also specify the option to automatically **shut off or leave carriers on** at start-up (applies to the ASX16B and ASX16C only).

The **Frequency Counter** tab is used to select the frequency measuring device and the tolerance in PPM for frequency calibration. If the frequency measuring device allows switchable inputs, then the Input Channel control will be activated. Select the appropriate input channel number by clicking on the up or down arrow. The IEEE address of the frequency device can also be specified.

The ASX-16C/D Freq Randomization textbox specifies the limit for calculation random offset to frequency trim. This is for ASX-16C/D module types only.

The selection of power measuring devices is entered under the **Power Measurement Device** tab shown in Fig. 4b. To select a device, click on the arrow in the box to the right of either the Spectrum Analyzer or Power meter. This will cause a list of devices to appear, choose one with the left mouse button. The IEEE addresses of these devices are also entered from this screen. If the 75 ohm box is

checked then the conversion factor of 48.6 is used to convert from dbm to dbmv when using the power meter for leveling. If the box is left unchecked then 47 will be used as the conversion factor.

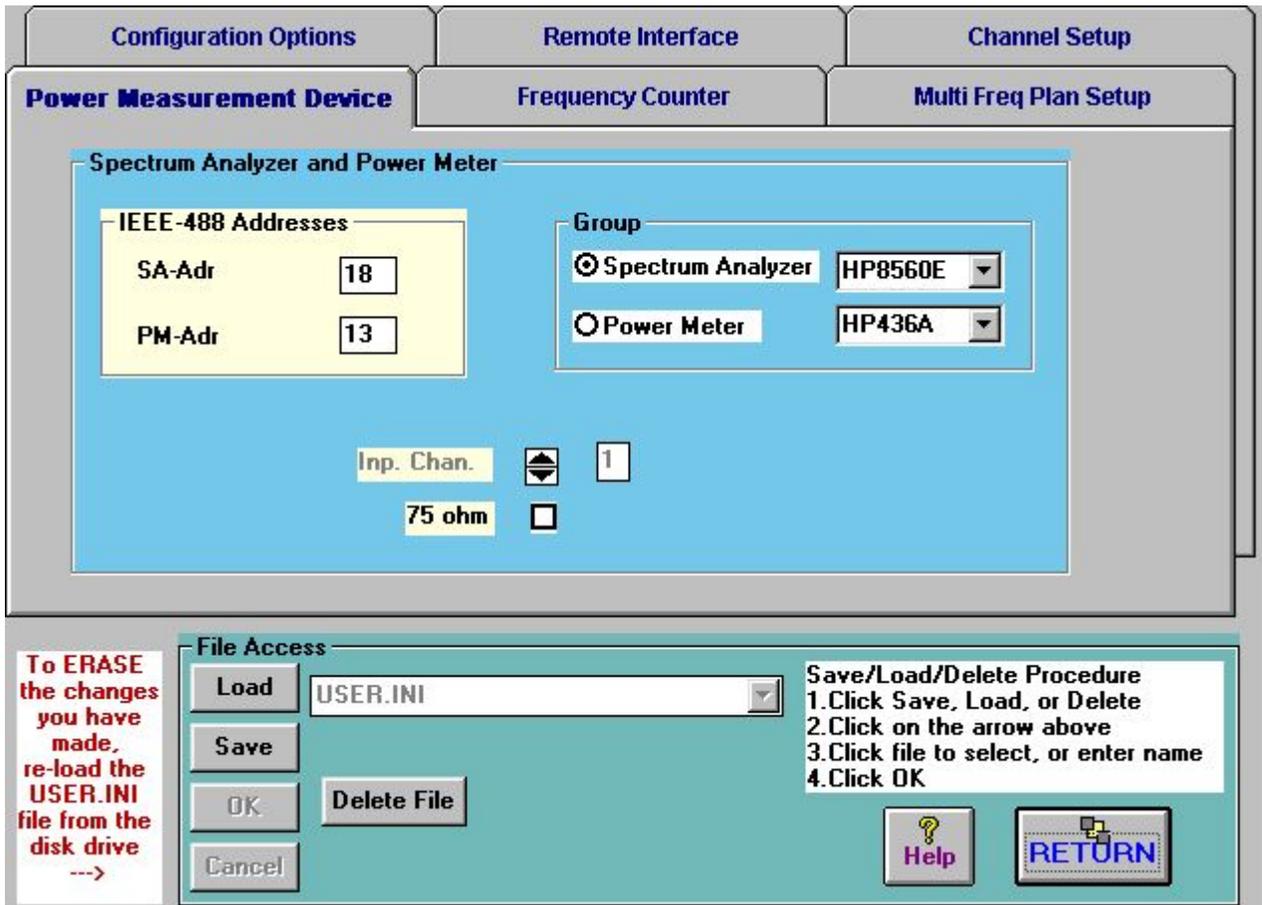


Fig. 4b

Fig. 4c shows an example of the **Multi Freq Plan Setup**. These parameters can only be accessed if the user.ini file is loaded. A new frequency plan entry can be defined and added, or an existing one removed or modified. The frequency plan (config), base level, and level configuration files are selected by means of drop down lists as illustrated in Fig 4c for the **Level Config** file. For modification of an existing plan to take effect, click **Edit**. See the help file for details of operation (depress function key F1 when in this screen). Also refer to section **2.3 Multi Plan Operation** for a more detailed discussion.

If any of the configuration parameters are changed then you will be reminded to save these to a file when you exit this form, or load a new configuration file. If you select **Yes**, then this Setup screen will be displayed to allow you to Save the data before exiting. Consult the CATV Control Program Help files for how to Save and Load these files.

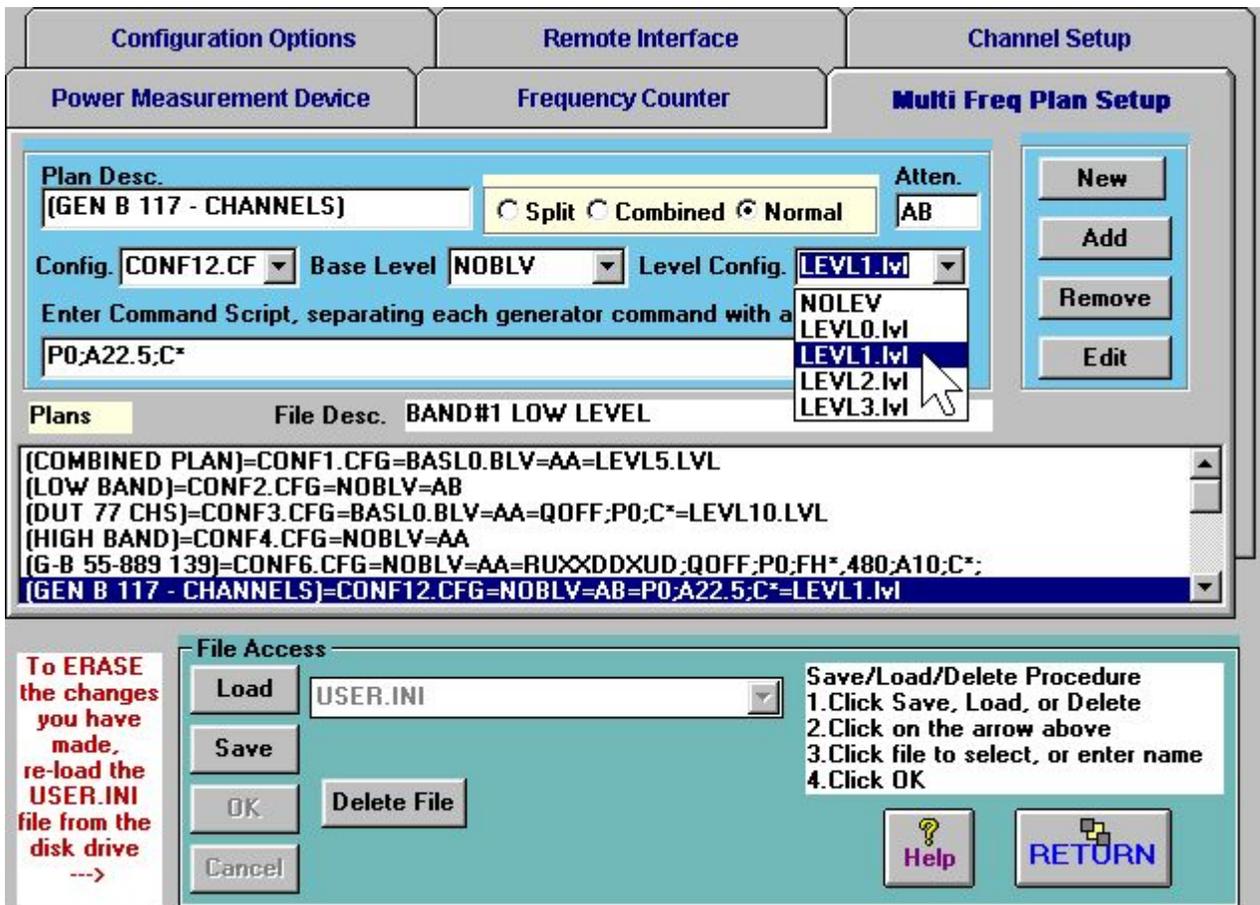


Fig. 4c

2.2.3 Re-calibration

The base level and frequency trim functions are selected from the "Re-Calibrate" menu.

2.2.3.1 Notes on Base Leveling the ASX16 Generators

Base levels have been set at the factory and should rarely need to be re-calibrated. If the RAM containing these stored values becomes corrupted, you can re-load the base levels from a file using the **LOAD** options on the lower right panel of the Automatic Base Leveling panels. To prevent accidental corruption of the generator's factory calibrated base levels, most of the newer generators have included *a base lockout switch that overrides the base flag clearing command unless the proper code is set* (Switches S3 & S4 on the microcontroller board). If the base flag cannot be cleared, a message will display informing you to make sure the switches are set to the proper enable code.

There are 2 base leveling programs. One is fully automatic (**Fully Automatic Base Level**), which sets the attenuators, finds the lowest level module, and sets all modules to a calculated base level .35 dbmv below the lowest level. The other is entered by selecting "**Auto/Manual Calibrate ASX16B Base Levels**" where you will be prompted for a level to use for setting the attenuator. It also allows manually adjusting base level for selected modules.

2.2.3.2 Notes on Frequency Trim Calibration of the ASX16 Generators

The frequency trim calibration can be selected from the Re-Calibrate panel by selecting "**Calibrate ASX16 Frequency Trim Settings**", then selecting "**Automatic Frequency Trim**". The program will

try to adjust the frequency within the value entered into the frequency tolerance on the System Setup screen, or to a randomized offset from the specified module frequency if **Random On** is checked.

If the HP 53181A frequency counter is being used, then either the IEEE address of the frequency counter must be set to that of the frequency counter (the HP 53181A comes set at address 3 from the factory). Note that the software reads frequencies below 100 MHz from input #1 and frequencies above 100 MHz from input channel #2. A resistive splitter is recommended to connect the output of the ASX generator to input channels 1 and 2 on the frequency counter to run the automatic frequency trim.

To use the HP 70000 spectrum analyzer, select **HP70000** in the Frequency Counter Group in System Setup screen.

2.2.4 Notes on Setting Carriers to Flat or Tilt patterns

To set the carriers to specified level or tilt pattern, select “**Carrier Leveling**” from the Main Panel. Then select “**Set Up Leveling**” and enter the target carrier levels for the low and high frequency ends of the spectrum and select **Automatic Leveling**. If **Man Atten Ctl** is checked, the attenuators are not adjusted during leveling. This allows control in leveling different frequency segments relative to a common reference level. The selected carriers in the range of the spectrum selected, will automatically be set to the base calibrated power settings (level step 120 for low, 480 for high resolution) prior to performing automatic carrier leveling.

2.2.5 Selecting Filters From the CATV Control Program

To select the AFS-12 filter from the ASX16 Main panel, select the “**Filter Control**” button on the upper right of the panel. A filter selector type may be selected to control the different behaviors of different equipment. The following types are currently available: AFS-12, APFS-24WB, Trilithic DCVF-5, and VIRTUAL (to simulate a filter selector if one does not exist.). The GPIB address of the filter selector may be specified and will be stored and activated when the configuration file is loaded. The filters defined in file AFS0.CFG will automatically be loaded on initial entry to this screen. To load a different configuration, select the **Load** button, click the pointer on the arrow at the right, select the file in the list and then select **OK**. The filter frequencies corresponding to the filter numbers will be loaded. To turn on a filter click the mouse pointer on the row containing the desired filter frequency in the table.

2.2.6 Entering Manual Commands via the CATV Control Program

To enter this panel click the mouse pointer on either the **ASX Commands** button or the “**Diag./Manual Entry**” menu option on the upper middle portion of the ASX16 Main Panel. A submenu appears in which you can select **ASX Generator Commands** or **Other Devices Entry**. If you select **ASX Generator Commands** the screen shown in Fig. 5 appears. If **Other devices Entry** is selected, a panel appears which allows you to enter commands for the power measuring device, frequency counter, or AFS or Receiver. Refer to the appropriate manuals for a complete description of the commands.

This screen allows an ASX-16 or ASX-16B command to be entered in the Command box in the upper left of the screen. The most common commands for the generator being used will be listed in the Command list box. Use the scroll bar to bring the command into view or type the first character of the command to immediately scroll to commands that begin with that letter. You may also move through the list with the **UP** and **DOWN** arrows. As you highlight each command, a description, syntax

definition, and example of how to use the command will be displayed in the box below the command list. By clicking the mouse button on the command, it will be placed in the Command box at the top left with the cursor positioned at the end of the command to allow appending to the command. Some commands require additional data such as a module number and or data such as a step level or attenuation value.

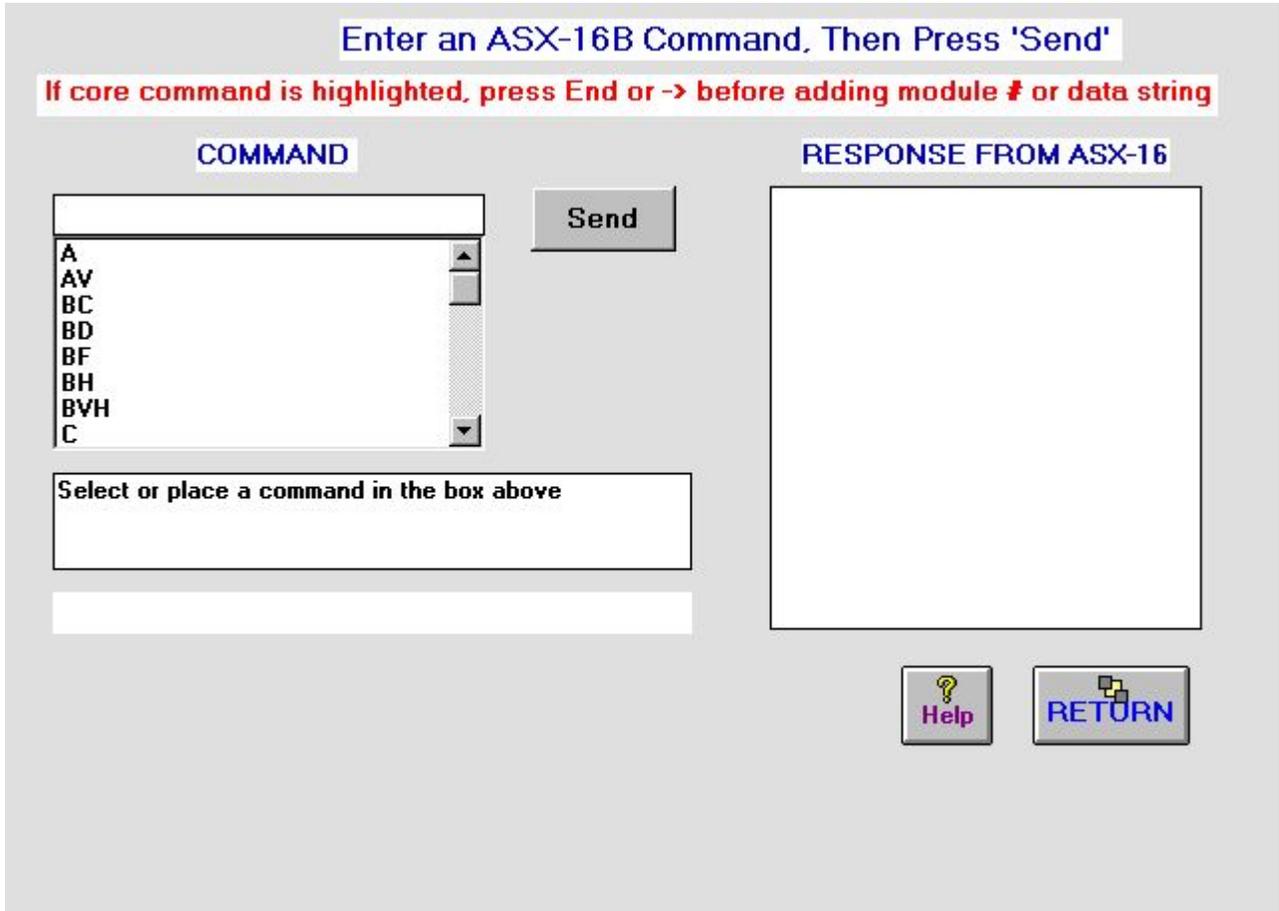


Fig. 5

As examples:

To turn CW ON for module 9 use: “**C9**”.

To turn all modules off, insert into the Command box the command: “**P0**” (note: for commands that accept a module designation such as the “P” and “C” commands, module 0 stands for - all generators).

To set all ASX16B high resolution modules to a power level in the middle of the operating range issue: “**FH0,480**” then select “**SEND**”.

The **RESET** command will reset the ASX generator and will also reset the simulation flag so that online communication can resume if any communication problems are resolved. Invoking this command will cause a wait state of 25 seconds to allow the generator to re-initialize. During this time no commands from the screen will be responded to as the generator is not listening to any commands during this period.

2.2.6.1 Using the range of modules Manual Commands feature

A new feature allows entering a range of modules wherever a generator module number may be specified. For a command format such as CMD[module number] (note: the [] are not typed) e.g. CMD5, it is now possible to enter CMD[module start] - [module stop] (spaces are not necessary around the -). For example, to turn off modules 5 thru 22 you may use the P command as **P5-22**. The program will expand this into the commands **P5, P6,.....P22** and output each of these in succession. To read the module levels of modules 1-55 you may use **LMH1-55** and the results will be returned in the Response list box at the right of the screen. Note that whenever a range command is used, even if no data is to be returned, the expanded commands are displayed in the list box at the right of the screen. To use a command that accepts data as well as a module number, such as the LH[module number],[level change] (changes the step level of a module), enter for example **LH20-100,-50** to reduce the step level of modules 20 thru 100 by 50 steps.

The command is highlighted in the control box after it is sent, so that if you wish to send a different command you may just type or select the next command and it will replace the previous one.

2.2.7 Spectrum Analyzer Dump Utility

A spectrum analyzer screen capture utility is available under the **Utility** menu and the **Carrier Leveling** form to capture, save into a file, or print an analyzer screen via the GPIB bus. The following figure (Figure 6) depicts the screen that provides this functionality.

This utility provides support for HP 8560 series, Hp8590 series, HP 8568B, HP 70900, HP ESA series, and Rhode & Schwartz FSE series spectrum analyzers for screen capture and print.

To capture and print screen:

- 1). Select the **Spectrum Analyzer Group** to be used in the **System Setup** Screen under the **Power Measurement** tab.
- 2). Type the screen caption in the **Title** text box
- 3).. The minor grid subdivisions defaults to 5 gridlines per box, to suppress this and display only the major grid divisions check the **Suppress Grid Subdivisions** box.
- 4)Check **Display Line** if your spectrum analyzer screen is displaying a reference line.
- 5).. Click on "**Dump Spectrum**" button
- 6). Select one of the following options for outputting the screen capture:
To print the image directly to a printer Click "**Print Screen**" button.

To save the plot data points to a file that may be plotted by a plot program Click **Save File**

To save the image of the screen capture into a bit mapped file Click **Save Image**.

To View a previously saved file, select **View File**.

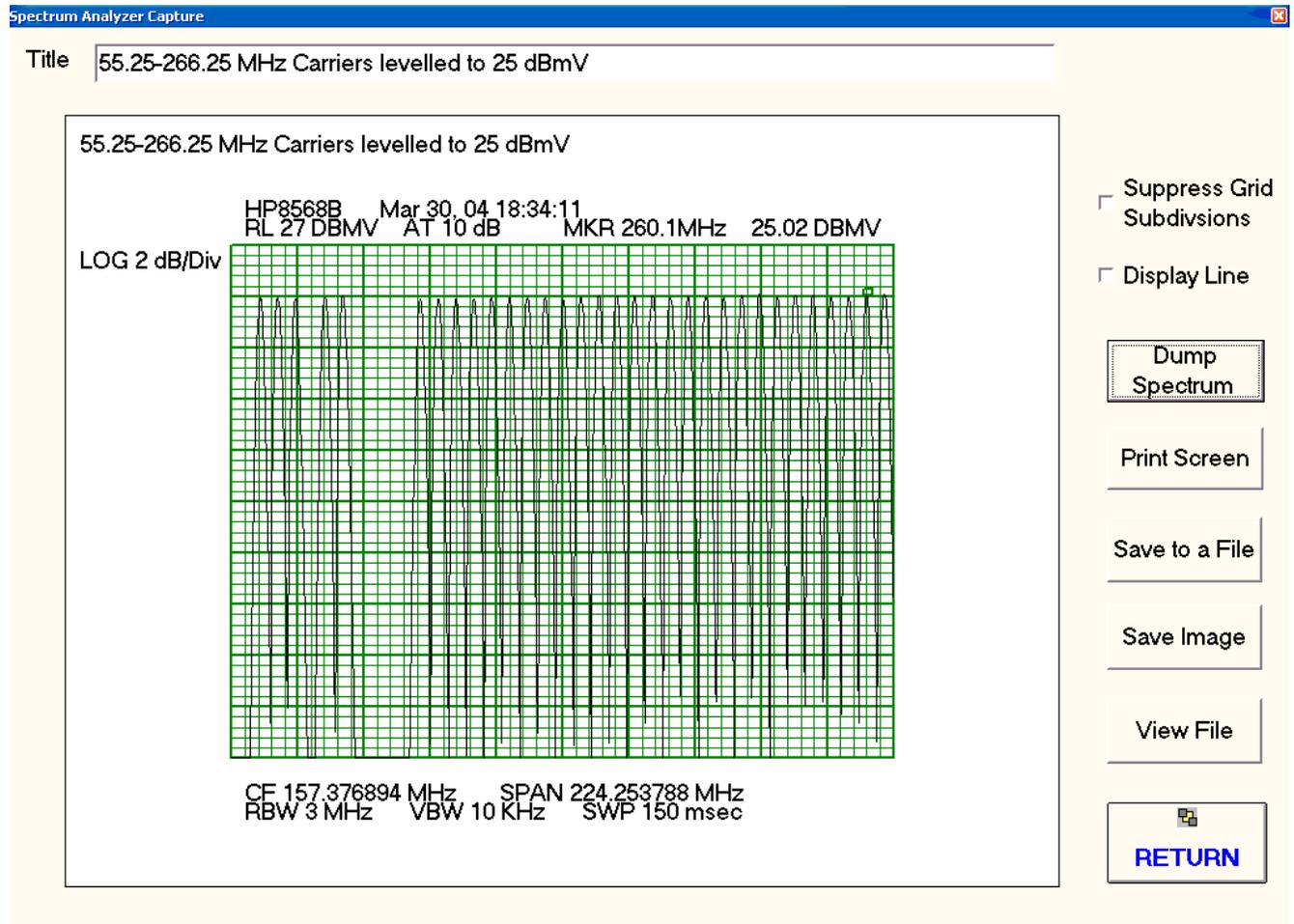


Fig. 6

2.3 Multi Plan Operation

The purpose of the Multiple Frequency Plan Control is to allow selecting between multiple frequency bands when either a multiple output generator is being used, multiple generators are to be controlled by a single computer, or frequencies are to be logically grouped in bands in a single output generator for convenience. (Note: for the Multiple Plan control to appear, the USER.INI file must be specially configured. See **Setup Notes** below).

To Select a Frequency Plan:

From the Main panel of the CATV Equipment Control Program, click on the arrow on the list box control on the lower right portion of the screen above the label "**Load Frequency Plan**" (See Fig. 3). A list of frequency plans should pop up. Click on one of the plans to select it. Note: If you have a multiple output generator, it may be necessary to connect your power measuring device to the appropriate output jack on the Matrix generator to observe the signals in the desired group of carriers.

2.3.1 Description of What Happens When a Plan is Selected:

After a plan is chosen:

- 1 The configuration file containing the frequencies specified for that plan is automatically loaded.

- 2 The Base level calibration data file corresponding to the active plan will be automatically loaded to the generator RAM, unless this is disabled (see **Setup Notes** below).
- 3 The **RF attenuator** (for the appropriate band, if so equipped) will be controlled by and displayed in the controls in the RF Attenuator frame on the Main Panel. The **Attenuator Control Command for Plan Group**, specified for the selected plan entry in the [**Multi Plan**] section of the USER.INI file, will be used.
- 4 If any ASX generator commands are specified, they will be executed.
- 5 If a carrier level data file was specified, it will be used to set the carrier levels and attenuator as specified on that file.

Note: The attenuator command "A" for the combined mode, sets *ALL* of the separate band attenuators to the *same* value. Thus, when switching from a **SPLIT** mode to **COMBINE** mode, the attenuator settings for all plans will change. However, when switching between "split" frequency plans, the individual attenuator settings are preserved.

If the **Leave Carriers On** option (default for ASX-16B) is selected as the Start Up Mode in the configuration files (see **System Setup**) for each of the frequency plans, then the state of the outputs may be preserved when switching between plans if no ASX commands were issued to disturb the other settings. The status of the above steps is displayed as they occur, in the status box above the **Channel Frequency and Status** display. When completed successfully, the description (as defined in the first line of the configuration file) of the frequency plan that is in effect will be displayed in the status box.

2.3.2 Setup Notes:

The easiest way to setup multiple frequency plan operation is to use the **Multi Freq Plan Setup** tab in the **System Setup** screen to specify plan characteristics. A **Multi Plan Wizard** button is available to guide you through the process of adding or editing Multi Plan entries. (Consult help files, or section **2.2.2 ASX16 Setup and Initialization** of this guide). The basic format of the multi plan configuration parameters is summarized below (more details can be found in 1.8.2)

**Plan Description=Configuration File=Base Level Data File=Attenuator Control Command
for plan group=ASX Generator Command String=Level Data File**

Plan Description

The Plan Description is a textual identification of the plan and it can be any sequence of characters and numbers except the "=".

Configuration File

The configuration file that contains the channel assignments for the plan group is specified after the first "=".

This file should reside in the ASX16 directory and use the naming conventions CONFn.CFG, where n is an integer. The easiest way to create a new configuration file is to open another confn.cfg or user.ini file with an editor and edit the channels, then **Save As** a CONFx.CFG file, where x is a unique value of n (i.e. one that does not already exist). If you also make all of the n's contiguous (i.e. no gaps) then these files can be viewed and modified via the System Setup screen.

Base Level Data File

File containing base level calibration data. To avoid loading the base levels each time a plan is selected, as in the case of logically grouping frequencies in a single output generator without the "split" feature, the entry **NOBLV** is entered in place of the name of the base level file.

Attenuator Control Command

The attenuator control is specified next – “A” is the basic attenuator command for single generator configuration and controls all attenuators if unit is equipped with more than one attenuator. A generator equipped with multiple attenuators would have commands such as AA, AB, AC, etc. to control attenuators for split groups A, B, C, etc. The attenuator command for the corresponding band is specified in the **Attenuator Control** parameter.

ASX Generator Command String

The last parameter can contain a series of ASX generator commands that are automatically executed when a plan is selected. See the next section for more details.

Level Data File

A file containing the carrier level and attenuator settings to be loaded when the plan is selected. To avoid changing any level settings, select the **NOLEV** entry.

2.3.3 Automatic Execution of ASX Commands on Plan Selection

When a series of valid ASX generator commands are inserted in the lines corresponding to a frequency plan in the [Multi Plan] section of the USER.INI file, they are executed when the plan is selected. The syntax for these commands can be found in the ASX-16 or ASX-16B operating manual and also on the ASX Commands screen of the CATV program. Each command must be separated by a “;”. For example:

Plan1 =conf1.cfg=NOBLV=A=QOFF;P0;A10;C5;C9

After Plan1 frequency assignments and settings are loaded – base levels will not be loaded and the attenuator command that will be used is **A** (single attenuator generator), all carriers in the generator are turned off (**QOFF;P0** commands), the attenuator setting is set to 10 db (**A10** command), and carriers 5 and 9 are turned on in CW (**C5;C9** commands).

Problem when setting Level with Carriers Modulated

When using the Multi Plan scripting functionality, be aware of a problem with older firmware when setting the levels with the **F**, or **FH** commands of carriers that are already being modulated. This may cause disruption of the module levels. ***This problem has been resolved in microcontrollers manufactured after September 1997, and new EPROMS with the correction are available to upgrade your microcontroller.*** Until you upgrade your EPROM, one workaround is to turn off all modules in the plan (accomplished by the **P*** command) **before** issuing the **F**, or **FH** command. (For explanation of the "*" -- wild card character in the **P***, **FH***, **C*** commands, see the next section). For example:

(Plan A)=conf2.cfg=NOBLV=A=P*;FH*,480;C*	(To turn carriers on in CW at level 480)
Or	
(Plan B)=conf2.cfg=NOBLV=A=P*;FH*,480;M*	(To turn carriers on in Mod. at level 480)

2.3.3.1 Wild Card Character to select all channels in a Plan

Most of the generator commands that require actions on a module number (e.g. Cmodule#) can accept the number 0 to indicate that the command should apply to all modules in the generator. However, in many instances it is required to **only** affect the modules in a **plan**, which is generally a subset of the frequencies in a generator.

In order to accomplish this, a wild card character “*” has been designated to represent all modules in the currently loaded plan. Thus “C*” will turn on only the modules specified in the plan in CW mode. *This feature only works in the Multi Plan configuration, and is not a generator command keyword.*

Let’s examine the following example:

(Plan2) = CONF4.CFG=NOBLV=A=QLOW;P0;FH*,500;M*

For Plan2 all modules in the generator will be placed in the low state (**QLOW;P0**), all modules in the frequency Plan 2 only will be set to level step 500 (**FH*,500**), and only the modules in Plan2 will be turned on with 100% modulation (**M***).

Note: the syntax for specifying a range of modules through the ASX commands screen cannot be used as part of this syntax for entering commands to be executed for a plan.

2.4 Automatic Distortion Measurements

2.4.1 With the Use of Matrix Distortion Analyzers

1. From the Main Panel select the **Distortion Tests** button or **Distort Test** from the menu line, then select the AR-12 or R-75/R-76 analyzer option.
2. Select the test to be performed (**Cross Modulation, Composite Triple Beat, Composite Second Order, or Carrier to Noise**), then select the ASX **channel/frequency** at which to start.
3. Click on the **Automatic Distortion Test** button. (Note: for the Automatic Distortion feature to work, the ASX channels must be mapped to the distortion analyzer channels in the USER.INI file. **See explanation in Section 1.8.2 for lines 16-20**).
4. When all channels are completed a message is displayed reminding you to save the data.
5. To save the data, click on the **Save** button then select or enter the file name in the dialog box. Select an existing file name to append to that file, or enter a new file name to save the current data in a new file.
6. To print a file to a printer, click on the **Print** button, select the file to be printed, then click **OK** (make sure a printer is attached or networked to the PC).
7. To view a saved file, click on **View File** then open the file to be viewed in the editor.

2.4.2 With User Customizable Scripts

This feature allows the user to create and run script files of spectrum analyzer commands, select frequency, filter, script to run, control the generator functions and display the results through a single computer screen. The capability to perform computations in the script for calculating distortion measures is also provided. To invoke this form select **Distort. Test** from the menu line on the Main Panel, then select the **Distortion Meas. Script Control** item in the menu list. Consult the **Distortion Measurement Script Control user guide**, or the help file for detailed information on how to set up and use this feature.

2.4.3 With Automated Distortion Characterization and Information System

This advanced software package is available for fully automated distortion measurement that controls the Matrix generators, filter selectors, and spectrum analyzers to make measurements, store

the results in a database and analyze the results to highlight results that are out of specifications.
Please contact Matrix Test Equipment, Inc. or check out our web site at:
http://www.matrixtest.com/tech/AutoDist_Toc.htm