

APPENDIX I

**WJ-860X/MCS-1, WJ-8809/MCS-1, WJ-8654/MCS-1
WJ-8700/MCS-1 MINICEPTOR CONTROL SOFTWARE**

VERSION 5.00

P/N 181185-001, Revision D

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Refer to the warranty information supplied with the WJ-860X/MCS-1, WJ-8809/MCS-1, WJ-8654/MCS-1, WJ-8700/MCS-1 disk.

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WJ-8700/MCS-1 MINICEPTOR CONTROL SOFTWARE
VERSION 5.00****I.1 OVERVIEW**

The Signia-IDT, Inc. MCS-1 Miniceptor Control Software program is an MS-DOS application which is used to control the Signia-IDT, Inc. Miniceptor receiver family (including the WJ-860X-XX, WJ-860XA-XX, the WJ-8809-XX, the WJ-8654-XX, and the WJ-8700-XX). The MCS-1 Software also supports the WJ-9168 Signal Monitor when used in conjunction with a WJ-860X-XX, WJ-860XA-XX, or a WJ-8654-XX receiver. The MCS-1 can operate in a Single-Device mode whereby it controls only one receiver per PC communications (COM) port or it can operate in a Multiple-Device mode whereby it can control up to six Multi-drop RS-232 receivers per COM port. The user can select the MCS operational mode during installation. Installation can be changed anytime by running the INSTALL program. This program provides the following menu-driven control environments:

- a. Real-time RECEIVER CONTROL - allows the operator to control manual, sweep, and step operations, and also provides an RF spectral display of the controlled Miniceptor.
- b. MNEMONIC - allows the operator to manually send commands or queries to the Miniceptor.
- c. FREQUENCY OFFSET - allows the operator to select a new operating frequency range when the MCS-1 is controlling a WJ-8609-XX or a WJ-8609A-XX receiver.
- d. RESET RECEIVER - allows the operator to reset a Miniceptor to its default parameters and to reinitialize memory.
- e. MISSIONS Storage and Retrieval - allows the operator to upload or download mission data between a Miniceptor and a disk or diskette.
- f. DATA LOGGING - allows the operator to automatically collect and store Miniceptor manual, sweep, and step information (such as tuned frequencies, Log Display Detector value in dB above the theoretical noise floor (0 to 60 dB), and Date/Time) on a disk or diskette. It also allows the operator to view real-time data on two other displays: 3-D and Waterfall.
- g. DATA ANALYSIS - allows analysis and playback of data collected by the DATA LOGGING function.
- h. Shell to DOS - allows the operator to temporarily access DOS without terminating the MCS-1 program.

- i. QUIT the MCS-1 - allows the operator to terminate the MCS-1 program and return to DOS.
- j. Multiple-Devices SYSTEM CONFIGURATION - allows the operator to configure up to 16 receivers using number and name, designating the COM port, baud rate, type (either single, multiple device, or multiple frame), frame, and device address (as applicable).
- k. System LEARN - allows the operator to poll the system's receivers to learn the system status.
- l. ADVANCE - allows the operator to restart a suspended operation of a selected receiver.
- m. SUSPEND - allows the operator to suspend an operation of a selected receiver.
- n. FREQUENCY LOGGING - allows the operator to enable or disable frequency logging in the Multiple-Device RCV_CTL environment.

I.2 **SOFTWARE SUPPLIED**

The MCS-1 software is supplied on one 3.5" double-sided, high-density mini-diskette. The MCS-1 disk contains 13 files:

- a. MCS_S.EXE - the Miniceptor Control Software Single-Device main menu executable file
- b. MCS_M.EXE - the Miniceptor Control Software Multiple-Device main menu executable file
- c. MDISK.EXE - the executable file for the MISSIONS Storage and Retrieval environment
- d. MMCS.EXE - the executable file for the RECEIVER CONTROL environment
- e. MLOG.EXE - the executable file for the DATA LOGGING environment
- f. MPLAY.EXE - the executable file for the DATA ANALYSIS environment
- g. M8609.EXE - the executable file for the FREQUENCY OFFSET environment
- h. MMNE.EXE - the executable file for the MNEMONIC environment
- i. MSYS.EXE - the executable file for the MULTIFRAME SYSTEM CONFIGURATION environment
- j. INSTALL.EXE - the executable file used to install the MCS-1 program on the operator's computer

- k. HELVA.FON - Helvetica A font file
- l. HELVB.FON - Helvetica B font file
- m. MCS.BAT - batch file to run either the MCS_S.EXE or the MCS_M.EXE executable files. Default MCS.BAT runs MCS_S.EXE file.

I.3 **EQUIPMENT SUPPLIED**

Equipment supplied consists of one 3.5" double-sided, high-density mini-disk.

I.4 **EQUIPMENT REQUIRED BUT NOT SUPPLIED**

To obtain full use of the MCS-1 software, the following hardware is required:

- a. An IBM or IBM-compatible personal computer (PC) with an asynchronous serial (RS-232) interface communication port; an EGA, VGA, or SVGA monitor; and a minimum of 1.250 MBytes of free RAM (a 386/16 MHz PC/AT or better is recommended).
- b. A Signia-IDT, Inc. Miniceptor Receiver (WJ-860X-XX, WJ-860XA-XX, WJ-8654-XX, WJ-8809-XX, or WJ-8700-XX with RS-232 remote interface selected).
- c. An RS-232 interface cable.
- d. A Signia-IDT, Inc. WJ-9168 Signal Monitor with RS-232 and coaxial interface cabling for use in conjunction with any WJ-860X-XX, WJ-860XA-XX, or WJ-8654-XX receiver when a signal monitor window is desired in conjunction with the RF panoramic display.

I.5 **INSTALLATION**

Installation consists of configuring the Signia-IDT, Inc. Miniceptor receiver, connecting the receiver interface cable; configuring the WJ-9168 Signal Monitor, if used; connecting the signal monitor interface cables; and installing the MCS-1 software.

I.5.1 **Signia-IDT, Inc. MINICEPTOR RECEIVER CONFIGURATION**

In order to provide a functioning RS-232 communications link between the controlling computer and the receiver, both devices must be set for the same RS-232 protocol. The MCS_S.EXE file or the MCS_M.EXE file on the MCS-1 Program Disk sets the computer interface to a specified default setting. The receiver and the computer must be configured to match each other. Refer to Section II of the receiver manual for receiver configuration details.

The default RS-232 protocol set by either the MCS_S.EXE or the MCS_M.EXE program is:

BAUD RATE: 9600
DATA BITS: 8
STOP BIT: 1
PARITY: NONE

I.5.2 **RECEIVER INTERFACE CABLE**

An RS-232 interface cable is used to connect the receiver to its controlling computer. For specific cabling instructions, refer to **Section II** of the receiver manual.

I.5.3 **WJ-9168 SIGNAL MONITOR CONFIGURATION**

In order to provide a functioning RS-232 communications link between the controlling computer and the WJ-9168 Signal Monitor, both devices must be set for the same RS-232 protocol. The MCS_S.EXE file or MCS_M.EXE file on the MCS-1 Program Disk sets the computer interface to a specified default setting. The signal monitor and the computer must be configured to match each other.

The default RS-232 protocol set by either the MCS_S.EXE file or the MCS_M.EXE file is:

BAUD RATE: 9600
DATA BITS: 8
STOP BIT: 1
PARITY: NONE

I.5.4 **SIGNAL MONITOR INTERFACE CABLES**

An RS-232 interface cable is used to connect the signal monitor to an unused COM port on the controlling computer. When the signal monitor is operated in the pass-thru mode, a special interface cable brings the associated receiver's RS-232 control signals plus a spectrum invert signal to the signal monitor. The signal monitor is then connected to the controlling computer thru a second RS-232 interface cable. When operated in the multi-drop mode, the receiver's RS-232 interface cable is connected directly to an unused COM port on the controlling computer. A coaxial cable is used to connect the receiver's 21.4 MHz IF output signal to the signal monitor. For specific cabling instructions, refer to **Section II** of the signal monitor and receiver manuals.

I.5.5 **INSTALLING THE MCS-1 SOFTWARE**

Before the MCS-1 software can be run, it must be properly installed on the operator's computer. An installation program, INSTALL.EXE, is provided on the MCS-1 diskette. When executed, this program ensures that all MCS-1 software is properly installed by copying all necessary MCS-1 files to the operator's disk, and by creating configuration files that store configuration information for use by the MCS-1 software. The installation program allows the user to select the operational mode of the MCS-1 software, either the Single-Device Mode or the Multiple-Device Mode.

To install the MCS-1 software:

NOTE

Once started, the installation program can be interrupted and terminated by pressing the <CTRL> and <Break> keys simultaneously although doing so is not recommended.

- a. Insert the MCS-1 software disk into the selected floppy diskette drive.
- b. Ensure that the drive from which the MCS-1 disk is inserted is the current drive (the prompt on the display shows the letter of that drive).
- c. Type "INSTALL" (without the quotes) and press the <Enter> key on the keyboard (this key may be labeled <RETURN>).

NOTE

If the MCS-1 diskette is to be used as the operator's operational disk, do not enter a drive letter at the "DISK DRIVE" prompt, and make sure to remove the 'disk writing protector' from the disk.

- d. At the "DISK DRIVE" prompt, enter the letter of the drive on which the MCS-1 software is to be installed [e.g.: "C:" (without the quotes)].

NOTE

Entering a path in the "PATH NAME" field is optional.

- e. At the "PATH NAME" prompt, enter the path to the directory in which the MCS-1 software is to be installed [e.g.: "C:\MCS" (without the quotes)].
- f. At the "MCS OPERATIONAL MODE" prompt, enter either a "0" for the Single-Device Mode, or a "1" for the Multiple-Device Mode (without the quotes).
- g. At the "DISPLAY MONITOR TYPE" prompt, enter either a "0" or a "1" (without the quotes):
 - "0" - If the display is a VGA monochrome monitor (most black and white with gray scale monitors and NOTEBOOK computers)
 - "1" - EGA, VGA, or SVGA color monitor
- h. When the message "Finished installing MCS program, Press any key to exit" is displayed, press any key. The installation has been successfully completed.

I.5.6 **CONFIGURATION FILES**

The following configuration files are either created by the installation program or are created as needed while running in the various MCS-1 environments:

- a. RS232.CFG - contains the controlling computer's RS-232 communication port setup information obtained via the Set Up MCS-1 control window (refer to paragraph I.7.1), and is used by the MCS_S.EXE, MCS_M.EXE, MMCS.EXE, MLOG.EXE, MDISK.EXE, M8609.EXE, and MMNE.EXE programs when they are running.
- b. MLOG.CFG - contains the DATA LOGGING control parameters that were in effect at the time when DATA LOGGING was exited (this file is created with defaults used by the DATA LOGGING environment when it is entered for the first time). MLOG.EXE uses these parameters to re-setup the DATA LOGGING environment.
- c. MLOGWF.CFG - contains the waterfall color scaling preset data that were in effect at the time when DATA LOGGING was exited (this file is created with defaults used by the DATA LOGGING environment when it is entered for the first time). MLOG.EXE uses these parameters to re-setup the DATA LOGGING environment.
- d. MPLAY.CFG - contains the DATA ANALYSIS control parameters that were in effect at the time when DATA ANALYSIS was exited (this file is created with defaults used by the DATA ANALYSIS environment when it is entered for the first time). MPLAY.EXE uses these parameters to re-setup the DATA ANALYSIS environment.

- e. MPLAYWF.CFG - contains the waterfall scaling preset data that were in effect at the time when DATA ANALYSIS was exited (this file is created with defaults used by the DATA ANALYSIS environment when it is entered for the first time). MLOG.EXE uses these parameters to re-setup the DATA ANALYSIS environment.
- f. MDISK.CFG - contains the MISSIONS control parameters that were in effect at the time when MISSIONS was exited (this file is created with defaults used by the MISSIONS environment when it is entered for the first time). MDISK.EXE uses these parameters to re-setup the MISSIONS environment.
- g. MDSPL.CFG - contains information on the display monitor type, and is used by the DATA LOGGING and DATA ANALYSIS environments when they are activated.
- h. MCS_FILE.TMP - contains temporary data used in the RECEIVER CONTROL environment by MMCS.EXE, MLOG.EXE, MPLAY.EXE, and MDISK.EXE.
- i. FRQ.PRN - contains frequency data logged when the Log_Frq function key (F9) is pressed while in the RCV_CTL environment or when the Auto_Log function is enabled.
- j. MSYS.CFG - contains system configuration data for the MCS_M.EXE program. The data includes the COM port set-up, receiver identification, the frame address, and the receiver address. This configuration file is created by the MSYS.EXE program.

I.6 **EQUIPMENT MALFUNCTION**

The MCS-1 software was thoroughly tested prior to shipment. If an apparent malfunction is encountered after installation:

- a. Verify that the PC has enough free RAM to load and run correctly (500 kBytes).
- b. Ensure that the interface cable is securely connected to both the computer and the receiver.
- c. If a WJ-9168 Signal Monitor is installed, ensure that the RS-232 interface cables and the coaxial IF output signal cable are securely connected. If operated in the pass-thru mode, an RS-232 interface cable should be connected from the signal monitor to the receiver and a second should be connected to the controlling computer. In the multi-drop mode, an RS-232 cable should be connected from the signal monitor to the controlling computer. No RS-232 connection to a receiver is permitted. An IF output cable will be connected between the receiver's IF output jack and either input 1 or 2 on the signal monitor. If operating in the multi-drop mode, ensure that the signal monitor's input is assigned to the output of the proper receiver.

2. Name - Enter the name or number of the equipment assigned to the Device number. Any supported Signia-IDT, Inc. receiver or a WJ-9168 Signal Monitor can be assigned to any device number. Up to 12 alphanumeric characters may be used in this column. If only a space is entered, the entry is cleared.
3. COM - Enter the communications or COM port on the controlling computer assigned to communicate with that device. Only COM 1 and COM 2 are supported. Enter a 1 for COM1 or a 2 for COM2. When a 1 or a 2 is entered, the Baud column is set to a default value of 9600 and the Type column is set to the default of Single Device. If a 0 is entered, all other entries associated with the device number, except the name, are erased.
4. Baud - Enter the baud or data rate for communications between the device and the controlling computer. The available data rates are 2400, 4800, 9600, 19200, 38400, 56000, and 115200 baud. The default is 9600 baud. Enter 1 for 2400 baud, 2 for 4800 baud, 3 for 9600 baud, 4 for 19200 baud, 5 for 38400 baud, 6 for 56000 baud, or 7 to select 115200 baud. Operation above 19200 baud is not recommended and is subject to hardware limitations of the controlling computer. Both the device and the controlling computer must be set to the same rate. See **Section II** of the receiver or signal monitor manual for information on setting the device baud rate.
5. Type - Enter the type of connection between the device and the controlling computer. If a single receiver is connected directly to the controlling computer via a dedicated COM port, then use the Single Device selection. If a signal monitor, either alone or in pass thru mode with a single receiver, is connected directly to a controlling computer's dedicated COM port, then use the Single Device selection. When more than one device is connected to a single COM port on the controlling computer, then use one of the two Multi-selections. If the device requires a frame address, then use the Multi-Frames selection. Otherwise, use the Multi-Devices selection. When Multi-Frames is selected, both the Frame column and the Address column are set to the default value of 00. Enter 1 for Single device, 2 for Multi-Devices, or 3 to select Multi-Frames.
6. Frame - Enter the frame address of the device. This column is automatically available whenever the Multi-Frames device type is selected. Any number from 0 to 31 is allowed. Enter the one or two digit frame number. This column is not available if the device type selected is Single-Device or Multi-Devices. The default software frame address is 00. See **Section II** of the device manual for information on setting the frame address.
7. Addr - Enter the bus address of the device. This column is automatically available whenever Multi-Devices or Multi-Frames is selected as the device type. Any number from 0 to 31 is allowed. Enter the one or two digit device address. This column is not available if the device type selected is Single-Device. The default software bus address is 00. See **Section II** of the device manual for information on setting the frame address.

2. Connect the receiver(s) to the controlling computer(s) per **paragraphs I.5.1** and **I.5.2**.
 3. Connect the WJ-9168 Signal Monitor, if used, to the controlling computer and to the receiver(s) and per **paragraphs I.5.3** and **I.5.4**.
 4. Turn on all hardware and the controlling computer. At the controlling computer, change to the hard disk directory that contains the MCS-1 programs (MCS_M.EXE and MCS_S.EXE) or insert the MCS-1 Program floppy disk into the floppy disk drive and change to that drive. Type MCS and press the <ENTER> key. This starts the MCS-1 program.
- b. Navigation - Depending on system configuration, operator access is obtained through either the Single-Device Main Menu or the Multiple-Device Main Menu.
1. MCS-1 Single-Device Main Menu - provides operator access to MCS-1 setup (COM#, Baud rate, and Pan Display), MCS-1 system Help, and to system functions F1-F10 as shown in **Table I-1**.
 2. MCS-1 Multiple-Device Main Menu - provides operator access to all system functions, F1-F10 and shift F1-shift F5 as shown in **Table I-1**.

Table I-1. MCS-1 Main Menu Function Keys

Function Key	Associated Environment/Function
<F1 Rev_CTL>	Real-time RECEIVER CONTROL
<F2 Mnemonic>	MNEMONIC
<F3 Frq_Offset>	Frequency OFFSET (WJ-8609-XX or WJ-8609A-XX only)
<F5 Reset_Rcv>	RESET RECEIVER
<F6 Missions>	MISSIONS storage and retrieval
<F7 Data_Log>	DATA LOGGING
<F8 Analysis>	DATA ANALYSIS
<F9 DOS>	Shell to DOS
<F10 Quit>	QUIT the MCS-1
<sF1 Sys_Config>	Multiple-Devices SYSTEM CONFIGURATION
<sF2 Sys_Learn>	System LEARN
<sF3 Advance>	ADVANCE
<sF4 Suspend>	SUSPEND
<sF5 Frq_Log>	FREQUENCY LOGGING

1.7.1 MAIN MENU FUNCTIONS

The following paragraphs provide information regarding main menu functions.

- a. RECEIVER CONTROL - provides different layers of interactive menu-driven displays used to control Miniceptor receiver operation. The operation menus accessed through this environment include:
 1. IMMEDIATE - allows control of Miniceptor manual and sweep immediate operations.
 2. EDIT LOCKOUT - allows examination, editing, and entry of all Miniceptor lockouts.
 3. EDIT MEMORY CHANNEL - allows examination, editing, and entry of all Miniceptor memory channels.
 4. EXECUTE SWEEP SECTOR - allows the Miniceptor to be swept through RF sectors that have been selected by the operator and stored in memory.
 5. EXECUTE STEP SECTOR - allows the Miniceptor to be stepped through discrete frequencies that have been selected by the operator and stored in memory.
- b. MNEMONIC - allows the operator to enter remote mnemonic commands and send them directly to the receiver.
- c. FREQUENCY OFFSET - (only valid for the WJ-8609-XX or WJ-8609A-XX Miniceptor) allows the operator to set an offset frequency to the receiver's tuning range.
- d. RESET RECEIVER - allows the operator to clear all of the receiver memories, clear all lockout information, and reset receiver operating parameters to their default states.
- e. MISSIONS - allows the operator to create various "missions" by storing current receiver control parameters on the PC's disk or diskette, to transfer these parameters directly to the receiver when desired, and to view the stored data. The operation menus accessed through this environment include:
 1. Manual - only the current receiver setup is processed.
 2. Sweep Immediate - only the current sweep immediate setup is processed.
 3. Sweep Sector - the receiver sweep list and all receiver parameters from memory that comprise the sweep are processed.
 4. Step Sector - the receiver step list and associated memory data are processed.

5. Lockout - only the specified lockout channels are processed.
6. Memory - only the specified receiver memories are processed.
- f. DATA LOGGING - allows the operator to automatically collect and store on disk receiver setup and signal data from the controlled Miniceptor. It also provides three additional types of displays, which can be used to view either real-time or retrieved data.
- g. DATA ANALYSIS - allows the operator to play back, display, and analyze data that was collected in the DATA LOGGING environment and was stored on disk.
- h. DOS - allows the operator to temporarily access DOS without terminating the MCS-1 program.
- i. QUIT - allows the operator to terminate the MCS-1 program and return to DOS.
- j. Multiple-Devices SYSTEM CONFIGURATION - allows the operator to configure up to 16 receivers and/or signal monitors using number and name, designating the COM port, baud rate, type (either single device, multiple devices, or multiple frames), frame, device address (as applicable), and, if using a signal monitor, the signal monitors' device number and input number.
- k. System LEARN - allows the operator to poll all receivers to learn their status.
- l. ADVANCE - allows the operator to restart a suspended operation of a selected receiver.
- m. SUSPEND - allows the operator to suspend an operation of a selected receiver.
- n. FREQUENCY LOGGING - allows the operator to enable or disable frequency logging in the Multiple-Device RCV_CTL environment.

1.7.2 MCS-1 MAIN MENU

There are two Main Menus in the MCS-1, a Single-Device Main Menu and a Multiple Device Main Menu. Which Main Menu is operational depends on how the system is configured. The following paragraphs describe these two Main Menus.

I.7.2.1 The MCS-1 Single-Device Main Menu

The MCS-1 Single-Device Main menu (shown in **Figure I-1**) is made up of five windows:

- a. Software Version Number and Release Date window - located in the upper left-hand corner of the screen, this window displays the MCS-1 software version number and release date.
- b. Current Date/Time window - located in the upper right-hand corner of the screen, this window displays the date and time currently set in the PC (these values may not be changed by the MCS-1 program).
- c. Set Up MCS-1 window - locate on the left-hand side of the screen, the Set Up MCS-1 window consists of three fields: "COM#", "Baud rate", and "Log_Freq to Auto_Log". These fields are selected using the <Up Arrow> and <Down Arrow> keys. The selected field has an "<--" arrow to its right.

The COM# field contains the number of the PC's RS-232 port that is being used to communicate with the Miniceptor. This value is set from one to four using the <Left Arrow> or <Right Arrow> keys. If the RS232.CFG file does not exist, the COM# default setting is "1". If the RS232.CFG file does exist, the COM# is set to the value of the parameter stored in the file.

The Baud Rate field contains the rate of communication between the controlling computer and the Miniceptor. This rate must be the same as the Miniceptor baud rate set in **paragraph I.5.1**. Available settings are 300, 600, 1200, 2400, 4800, 9600, 19200, 38400, 56000, and 115200 with the normal setting being 9600. Operation above a baud rate of 19200 is not recommended and is subject to hardware limitations of the controlling computer. The setting is selected using the <Left Arrow> or <Right Arrow> keys. If the RS232.CFG file does not exist, the default setting is "9600". If the RS232.CFG file does exist, the baud rate is set to the value of the parameter stored in the file.

The Log_Freq_To, Auto_Log field comprises two subfields: the Log_Frq_to subfield and the Auto_Log subfield. The frequency logging function operates only in the RCV_CTL environment. The function logs the intercepted signal's frequency, signal strength, and the date and time of the intercept. This data can be logged to two different targets: a file named FRQ.PRN or directly to a printer through the LPT1 printer port. The following subparagraphs describe the two subfields.

1. The Log_Freq_To subfield allows the operator to choose between the two targets; either the file, FRQ.PRN or the printer port, LPT1. If the <ENTER> key is pressed while the Log_Freq_To subfield is pointed to with the left arrow (see **Figure I-1**), the contents of the FRQ.PRN file are displayed (see **Figure I-2**). If there is more than one page of data, the display indicates so by the message "{<other Key> = See more data}".

- 2. The Auto_Log subfield enables the operator to toggle the Auto_Log feature ON or OFF. When Auto_Log is enabled, every time the receiver intercepts a signal, its frequency, signal strength, and the date and time of the intercept is logged to the selected target.
- d. Help window - located directly below the current Date/Time window, this window contains a series of Help information fields. Each field is accessed using the <Page Up> and <Page Down> keys.
- e. Function selection window - located at the very bottom of the screen, this window associates various environments and commands with the function keys <F1> through <F10> on the PC keyboard. By pressing the appropriate function key, a control environment can be directly entered, the DOS shell can be brought up, or the MCS-1 program can be terminated. The function keys and their associated functions are shown in **Table I-1**.

WJ-MCS-1 APPLICATION PROGRAM ..				
Software V 5.00; Released 10/01/94; Copyright 1994 WJ-MCS-1 can control: [WJ860x-xx], [WJ8809-xx], [WJ8654-xx], [WJ8700-xx]				Date: 09-26-1994 Time: 15:42:39
Set_up MCS:		<PgUp> <PgDn> keys for more help:		
COM#	2	***** WARNING ***** It is very important to terminate this program thru a QUIT to DOS or select Utilities menu before disconnect the interface cable. If the WARNING is ignored, receiver may suspend its sweep operation upon detecting that there is no message from a controller.		
Baud rate	9600			
Log_Freq_To Auto_Log	FRQ.PRN ← OFF			
<↑/↓/←/→> to select field/value <ENTER> to view FRQ.PRN file				
F1 Rcv_CTL	F3 Frq_Offset	F5 Reset_Rcv	F7 Data_Log	F9 DOS
F2 Mnemonic	F4	F6 Missions	F8 Analysis	F10 Quit

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Figure I-1. MCS-1 Main Menu

```

View the content of FRQ.PRN file:

"Frq_MHz","dBm","Time","Date","Auto"
00094.9000,-081,"12:01:09","11/17/93",0
00094.9000,-082,"12:01:10","11/17/93",0
00094.9000,-084,"12:01:10","11/17/93",0
00094.9000,-085,"12:01:10","11/17/93",0
00089.3000,-074,"15:37:40","11/17/93",1
00089.3200,-072,"15:50:54","11/17/93",0
00089.3200,-072,"15:50:55","11/17/93",0
00101.0650,-059,"16:03:24","11/17/93",0
00101.0650,-060,"16:03:25","11/17/93",0
00101.0650,-060,"16:03:25","11/17/93",0
00101.0650,-060,"16:03:26","11/17/93",0
00101.0650,-060,"16:03:26","11/17/93",0
00092.0000,-089,"16:10:11","11/17/93",0
00099.1750,-183,"16:11:29","11/17/93",0
00130.0000,-093,"09:34:39","11/18/93",1
00130.0400,-090,"09:34:40","11/18/93",1
00130.0600,-090,"09:34:49","11/18/93",1
00130.8000,-097,"09:34:49","11/18/93",1
00137.4600,-090,"09:35:02","11/18/93",1
00139.9600,-084,"09:35:04","11/18/93",1

{<F10> = QUIT} {<Other Key> = See more data}
    
```

NOTE

- 0 - Data is logged by pressing Log_Frq function key
- 1 - Data is automatically logged by Auto_Log function

Figure I-2. Display of FRQ.PRN File

I.7.2.2 Multiple-Device Main Menu

The Multiple-Device Main Menu (Multi-Frame APPLICATION Menu)(shown in **Figure I-3**) is made up of three windows:

- a. The Application/Version Number Window - located at the top of the screen, this window shows the type of application (e.g., Multi-Frame) and the Software Version number of the MCS-1.

- b. The Receiver Configuration Window - located directly below the version number window, this window shows the list of 16 possible receivers with their device number, name, operation, frequency, IF bandwidth, detection mode, and signal strength.
- c. Function selection window - located at the very bottom of the screen, this window associates various environments and commands with the function keys <F1> through <F10> and <sF1> (shift-F1) through <sF5> (shift-F5) on the PC keyboard. By pressing the appropriate function key, a control environment can be directly entered, the DOS shell can be brought up, or the MCS-1 program can be terminated. The function keys and their associated functions are shown in **Table I-1**. The following paragraphs describe the function keys unique to the Multiple-Device Main Menu.
 - 1. <sF1> Sys_Config> - SYSTEM CONFIGURATION - Pressing this function key enables the Multi Frame System Configuration Menu (**Figure I-4**). While in this menu, the operator can enter or change the name of a receiver or signal monitor, COM port, baud rate, receiver type, frame address, device address, or the relationship between a receiver and a signal monitor. See **paragraph I.7.2.2.1** to configure the Multiple-Device MCS-1 software for installed hardware.

WJ-MCS-1/Multi-Frame Application, Version 5.00									
Dev	ID/Name	Operation	Freq	IF BW	Det	Sgs			
01	WJ-8607	Sweep Imm	00097.10000	0000.25000	FM	-084 *			
02	WJ-9168								
03									
04									
05									
06									
07									
08									
09									
10									
11									
12									
13									
14									
15									
16									
sF1	Sys_Config	sF2	Sys_Learn	sF3	Advance	sF4	Suspend	sF5	Frq_Log
F1	Rcv_CTL	F2	Mnemonic	F3	Frq_Offset	F4		F5	Reset_Rcv
F6	Missions	F7	Data_Log	F8	Analysis	F9	Dos	F10	Quit

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Figure I-3. Multiple-Device Main Menu

MCS-1 Multi Frame System Configuration, V 5.00							
D#	Name	Com:	Baud	Type	Frame	Addr	Sig Mon SM Input
1	WJ-8607	2	9600	S-Device			2 1
2	WJ-9168	1	9600	S-Device			
3							
4							
5							
6							
7							
8							
9							
10							
11							
12							
13							
14							
15							
16							

Enter Device Name:

F10 EXIT

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Figure I-4. Multi Frame System Configuration Menu

2. <sF2 Sys_Learn> - Pressing this function key updates the status of the receivers shown on the Multi-Frame APPLICATION menu of **Figure I-3**. If a receiver stops responding to communications from the MCS-1, the Multi-Frame APPLICATION menu indicates this with a "Receiver not Responding" report in the receiver status row. At this time, the MCS-1 stops polling the non-responding receiver. Consequently, if the receiver communications return to normal, the menu is not updated to reflect the return to normal status. Pressing this function key updates the status.
3. <sF3 Advance>- Pressing this function key starts up again a suspended operation.
4. <sF4 Suspend> - Pressing this function key suspends a receiver operation.
5. <sF5 Frq_Log> - (Only available in the RCV_CTL environment). Pressing this function key switches the screen to the Frequency Log Configuration menu (**Figure I-5**) and enables the operator to control the Frequency Logging function of the MCS-1 while in the Multi-

Frame mode. While in the Frequency Log Configuration menu, pressing F1 enables the operator to toggle the Auto_Log feature ON or OFF. When Auto_Log is enabled, every time the receiver intercepts a signal, its frequency, signal strength, and the date and time of the intercept is logged to the selected target. Pressing F2 allows the operator to choose between the two targets: either the print file, FRQ.PRN or the printer port, LPT1. Pressing F3 displays the contents of the FRQ.PRN file (see **Figure I-2**). Pressing F10 returns the screen to the Multi-Frame APPLICATION menu.

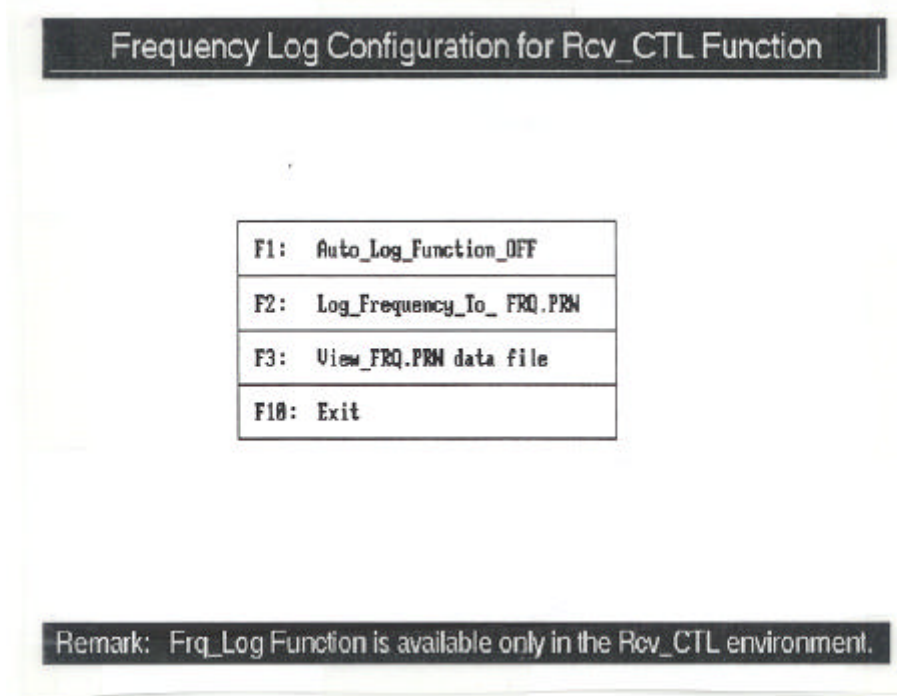


Figure I-5. Frequency Log Configuration Menu

I.7.2.2.1 Configuring the Multiple-Device MCS-1 Software

When using the Multiple-Device version of the MCS-1 software, it is necessary to configure the software to reflect the installed hardware. The Multi Frame System Configuration Menu allows the operator to configure the software. To make or change an entry, use the arrow keys on the controlling computer to place the highlighting box over the entry to be modified. When the entry to be changed has been selected, an information box at the bottom of the screen provides the available options for that entry. Enter the new data and press the <ENTER> key. The following paragraphs explain the information required for each column.

1. D# - This indicates the device number of the equipment to be assigned. This column cannot be changed.

2. Name - Enter the name or number of the equipment assigned to the Device number. Any supported Signia-IDT, Inc. receiver or a WJ-9168 Signal Monitor can be assigned to any device number. Up to 12 alphanumeric characters may be used in this column. If only a space is entered, the entry is cleared.
3. COM - Enter the communications or COM port on the controlling computer assigned to communicate with that device. Only COM 1 and COM 2 are supported. Enter a 1 for COM1 or a 2 for COM2. When a 1 or a 2 is entered, the Baud column is set to a default value of 9600 and the Type column is set to the default of Single Device. If a 0 is entered, all other entries associated with the device number, except the name, are erased.
4. Baud - Enter the baud or data rate for communications between the device and the controlling computer. The available data rates are 2400, 4800, 9600, 19200, 38400, 56000, and 115200 baud. The default is 9600 baud. Enter 1 for 2400 baud, 2 for 4800 baud, 3 for 9600 baud, 4 for 19200 baud, 5 for 38400 baud, 6 for 56000 baud, or 7 to select 115200 baud. Operation above 19200 baud is not recommended and is subject to hardware limitations of the controlling computer. Both the device and the controlling computer must be set to the same rate. See **Section II** of the receiver or signal monitor manual for information on setting the device baud rate.
5. Type - Enter the type of connection between the device and the controlling computer. If a single receiver is connected directly to the controlling computer via a dedicated COM port, then use the Single Device selection. If a signal monitor, either alone or in pass thru mode with a single receiver, is connected directly to a controlling computer's dedicated COM port, then use the Single Device selection. When more than one device is connected to a single COM port on the controlling computer, then use one of the two Multi-selections. If the device requires a frame address, then use the Multi-Frames selection. Otherwise, use the Multi-Devices selection. When Multi-Frames is selected, both the Frame column and the Address column are set to the default value of 00. Enter 1 for Single device, 2 for Multi-Devices, or 3 to select Multi-Frames.
6. Frame - Enter the frame address of the device. This column is automatically available whenever the Multi-Frames device type is selected. Any number from 0 to 31 is allowed. Enter the one or two digit frame number. This column is not available if the device type selected is Single-Device or Multi-Devices. The default software frame address is 00. See **Section II** of the device manual for information on setting the frame address.
7. Addr - Enter the bus address of the device. This column is automatically available whenever Multi-Devices or Multi-Frames is selected as the device type. Any number from 0 to 31 is allowed. Enter the one or two digit device address. This column is not available if the device type selected is Single-Device. The default software bus address is 00. See **Section II** of the device manual for information on setting the frame address.

8. Sig Mon - If the IF output and spectrum invert signals from this device are connected to a WJ-9168 Signal Monitor, enter the device number of the associated signal monitor in this column. Any number from 1 to 16 is allowed. Enter the one- or two-digit number representing the associated signal monitor. If this device is not connected to a signal monitor, no entry is required in this column.
9. SM Input - Enter the input on the signal monitor which receives the IF output and spectrum inversion signals from this device. Either input 1 or input 2 is allowed. Enter the number representing the input number on the signal monitor. If this device is not connected to a signal monitor, no entry is required in this column.

To totally delete any device entry, go to the Name column and enter a single space and press the <ENTER> key on the controlling computer. Then enter a 0 in the COM column and press the <ENTER> key.

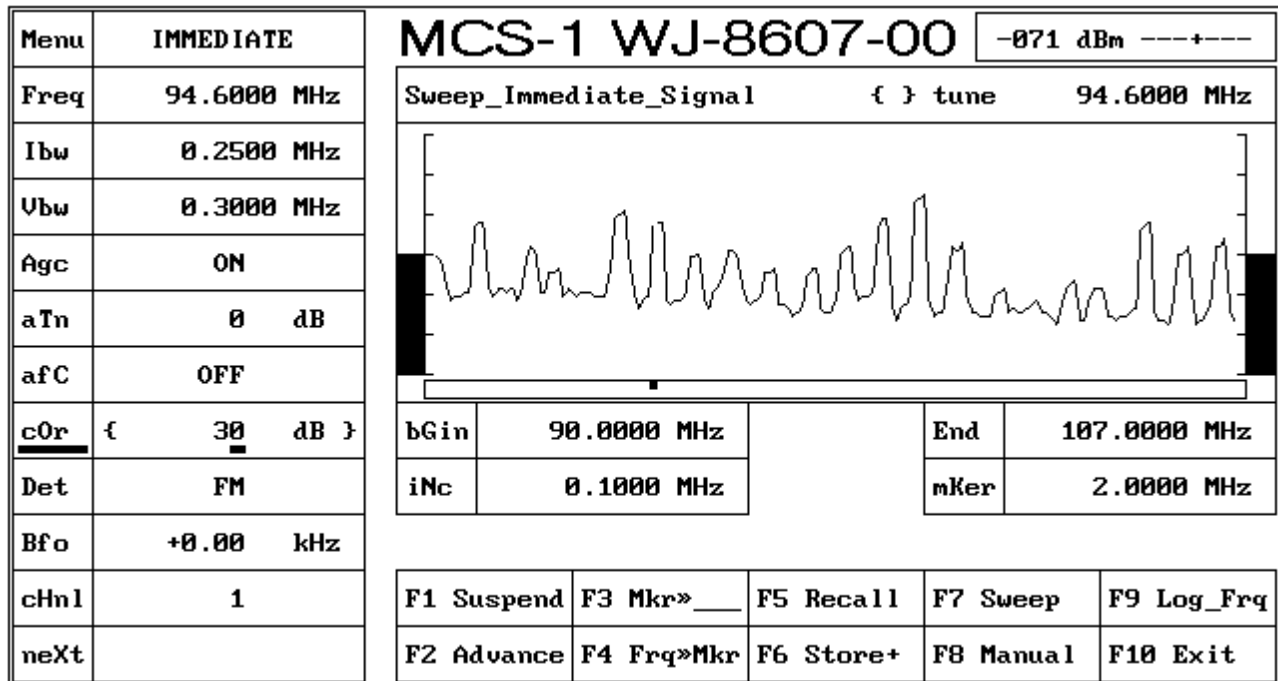
I.7.3 RECEIVER CONTROL

The Receiver Control environment is entered from the MCS-1 Main menu by pressing the <F1 Rcv_CTL> function key. This environment provides different layers of interactive menu-driven control displays. The operation menus supported by this environment include:

- a. IMMEDIATE - allows control of Miniceptor manual and sweep immediate operations.
- b. EDIT LOCKOUT - allows examination, editing, and entry of all Miniceptor lockouts.
- c. EDIT MEMORY CHANNEL - allows examination, editing, and entry of all Miniceptor memory channels.
- d. EXECUTE SWEEP SECTOR - allows the Miniceptor to be swept through RF sectors that have been selected by the operator and stored in memory.
- e. EXECUTE STEP SECTOR - allows the Miniceptor to be stepped through discrete frequencies that have been selected by the operator and stored in memory.

I.7.3.1 Screen Format

All of the operation menus available in the Receiver Control environment have two control screens except for the EDIT LOCKOUT menu which has only one. All control screens share the same general format as that shown in **Figure I-6**. The figure, showing the first of the two IMMEDIATE menus, is used for the general discussion of screen format contained in **paragraphs I.7.3.1.1 through I.7.3.1.3**.



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Figure I-6. First IMMEDIATE Control Window

I.7.3.1.1 **Control Window**

The Control Window is located on the left-hand side of the screen and consists of up to twelve command controls. Each command control comprises a control field (e.g.: Freq) and a parameter field (e.g.: 143.1800 MHz). The command controls allow examination and/or control of various Miniceptor operating parameters.

I.7.3.1.2 **Function Key Window**

The function key window is located on the lower right-hand side of the screen and consists of ten function fields, that correspond to the function keys on the PC. Function fields provide control of various Miniceptor preprogrammed operations.

I.7.3.1.3 **RF Panoramic Display**

On the upper right-hand side of each screen is the RF panoramic (pan) display. This display consists of:

- a. MCS-1 & Receiver Model being controlled logo - shows that the MCS-1 software is the program currently being run by the PC and that the software is currently controlling the designated receiver type or model.

- b. Digital signal strength meter - gives the signal strength in dBm of an acquired signal. This meter is blank during sweep and step operations. The signal strength and tuning meters are located together, to the right of the WJ-Miniceptor logo.
- c. Tuning meter - provided to aid in fine tuning the Miniceptor. The Miniceptor is properly tuned when the indicator on the meter is centered. If the indicator is to the right of center, the Miniceptor is below signal frequency. If the indicator is to the left of center, the Miniceptor is above signal frequency. This meter is blank during sweep and step operations or when a received signal is below the COR setting. The signal strength and tuning meters are located together, to the right of the WJ-Miniceptor logo.
- d. Miniceptor operation status display - Located just below the WJ-Miniceptor logo, this display gives the current operating mode of the Miniceptor. The different operating modes are:

- Manual
- Sweep Immediate
- Sweep Sector
- Step Sector

Each operating mode, except for Manual mode, is followed by a message that indicates the status of the operational mode. "Active" indicates that the current operation is active. "Suspend" indicates that the operation is suspended but is still currently selected. "Signal" indicates that the Miniceptor is tuned to a received signal.

- e. Compression status indicator - To the right of the Miniceptor operation status indicator is the compression status indicator. The compression status indicator is used to indicate the accuracy of the RF spectral display. There are three values for this indicator:

{ } indicates that there is no RF spectral compression.

{C} indicates that there is RF spectral compression.

{O} indicates that there is RF spectral overcompression.

Compression occurs when the number of sweep points exceeds the number of display points on the screen. During compression, a number of sweep points are grouped together into a sweep increment, and sweep increments are mapped to display points. The largest amplitude signal within a sweep increment is displayed at the display point for that sweep increment.

When the RF spectral display is not compressed, it represents the true RF spectrum as seen by the Miniceptor. An overcompression condition occurs when there are too many sweep increments to be represented by the RF

spectral display. Because some sweep increments are lost, the RF spectrum is misrepresented on the display. It is important to avoid overcompression of the RF spectral display.

To determine whether or not a set of sweep parameters will cause a compression condition or an overcompression condition use the formula:

$$(\text{End Frequency} - \text{Begin Frequency}) / \text{Sweep Increment} = A$$

where:

If $A = < 400$, then no compression exists;

If $A > 400 < 101799$ then compression exists;

If $A > 101799$ then overcompression exists.

- f. Tuned frequency display - Located to the right of the compression status indicator is the tuned frequency display. The tuned frequency display gives the Miniceptor frequency. This display is only present in Manual mode or in a suspended Sweep or Step mode.
- g. RF spectral display - the largest of the RF pan displays, This display gives the operator a visual representation of the RF spectrum as seen by the Miniceptor. The spectrum is drawn from left to right corresponding to beginning frequency to ending frequency. The bottom of the display represents the theoretical noise floor of the Miniceptor. The RF spectrum display deflects vertically to indicate the signal strength of a received signal. The higher the strength of a received signal, the higher the deflection of the RF spectral display. The seven graduations on either side of the RF spectral display represent 10 dB increments.
- h. COR threshold level indicator - On either side of the RF spectral display is a bar indicating the COR (carrier-operated-relay) threshold level. This indicator gives the operator a visual representation of the Miniceptor COR level in dBm. There are seven graduations on each bar each spaced 10 dB from the other. The lowest graduation represents a level equal to the theoretical noise floor. The next graduation represents a level 10 dB greater than the noise floor. All signals on the RF spectral display that have a greater amplitude than the COR threshold level indicator have broken the COR level. The COR threshold level is controlled by the COR control command (see **paragraph I.7.3.2.1**).
- i. Current frequency marker - The current frequency marker and the movable frequency analysis marker are both located in the long horizontal box just beneath the RF spectral display. The current frequency marker provides a visual representation of where the current Miniceptor tuned frequency is in relation to the RF spectral display. The current frequency marker is the marker that is attached to the roof of the box. The horizontal length of this marker changes in direct relation to the sweep increment size. A larger sweep increment causes a longer frequency marker. The current frequency marker is not visible when the Miniceptor tuned frequency is not between the currently selected beginning and ending frequencies of the RF spectral display.

- j. Mobile frequency analysis marker - The mobile frequency analysis marker allows the operator to determine the frequency of a signal of interest. The current frequency marker and the mobile frequency analysis marker are both located in the long horizontal box just beneath the RF spectral display. The mobile frequency marker is the marker that is attached to the floor of the box. The horizontal length of this marker changes in direct relation to the sweep increment size. A larger sweep increment causes a longer frequency marker. The mobile frequency analysis marker is not visible when the marker frequency is not between the currently selected beginning and ending frequencies of the RF spectral display.
- k. Frequency controls - Located beneath the RF spectral display and above the function control window, the four frequency controls allow the operator to control the RF spectral display's beginning frequency <bGin>, ending frequency <End>, sweep increment size <iNc>, and mobile frequency analysis marker frequency <mKer>.

Each of these frequency controls is made up of a control field and a parameter field, and all are controlled in a similar manner. To access one of the controls, press the key that corresponds to the capitalized letter of the desired control. For example, the beginning frequency control field [bGin] is accessed by pressing the "G" key. When accessed, the parameter field value is encased in brackets indicating that the value can be changed.

The parameter field value can be changed in one of two ways: by using the numeric keys, or by using the arrow keys.

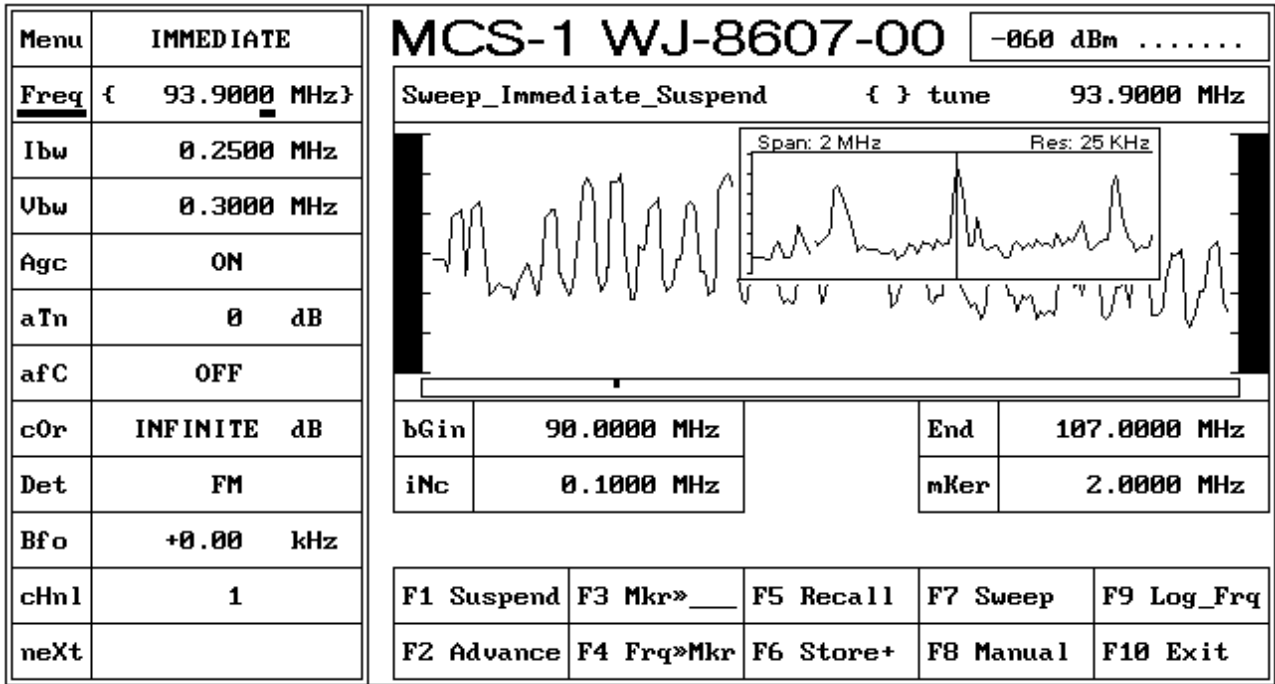
To change the value by using the numeric keys, press the keys that correspond to the desired value and press the <Enter> key. The desired value remains in the parameter field and the brackets disappear.

To change the value by using the arrow keys (once the brackets are around the parameter field), move the cursor to the digit to be changed using the <Left Arrow> or <Right Arrow> key, then increment or decrement the digit using the <Up Arrow> or <Down Arrow> key respectively.

- l. If a WJ-9168 Signal Monitor has been installed and associated with the receiver, whenever a sweep operation is suspended or the receiver is in the manual mode, a Signal Monitor Pop-Up Window partially overwrites the RF spectral display. See **paragraph I.7.3.1.3.1**.

I.7.3.1.3.1 **Signal Monitor Pop-Up Window**

MCS-1 software is capable of displaying the digitized output from a WJ-9168 Signal Monitor. The source of the information in the display is the 21.4 MHz IF output from the associated receiver. This display, in the form of a pop-up window, appears in a portion of the RF spectral display area whenever the receiver is in manual tune or in any of the suspended modes. The Pop-Up Window will appear in all five of the Receiver Control displays. See **Figure I-7**.



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Figure I-7. Signal Monitor Pop-Up Window

When using the Single Device version of the MCS-1 software, the software automatically checks for a signal monitor when invoked. When using the Multiple Device version of the MCS-1 software, the operator must configure the software for the WJ-9168 Signal Monitor and associate it with up to two receivers.

The Pop-Up Window has seven Sweep Span / Resolution Bandwidth combinations available to the operator. The combinations are:

- Span / Resolution
- 100 kHz / 2.5 kHz
- 200 kHz / 5 kHz
- 500 kHz / 5 kHz
- 1 MHz / 12.5 kHz
- 2 MHz / 25 kHz
- 5 MHz / 50 kHz
- 10 MHz / 100 kHz

The default combination is 2 MHz / 25 kHz. The Sweep Span / Resolution Bandwidth is adjustable using the PgUp and PgDn keys on the controlling computer.

The operator may retune the receiver to another signal of interest while monitoring the Pop-Up Window. The receiver's tune frequency is represented by the vertical line at the center of the Pop-Up

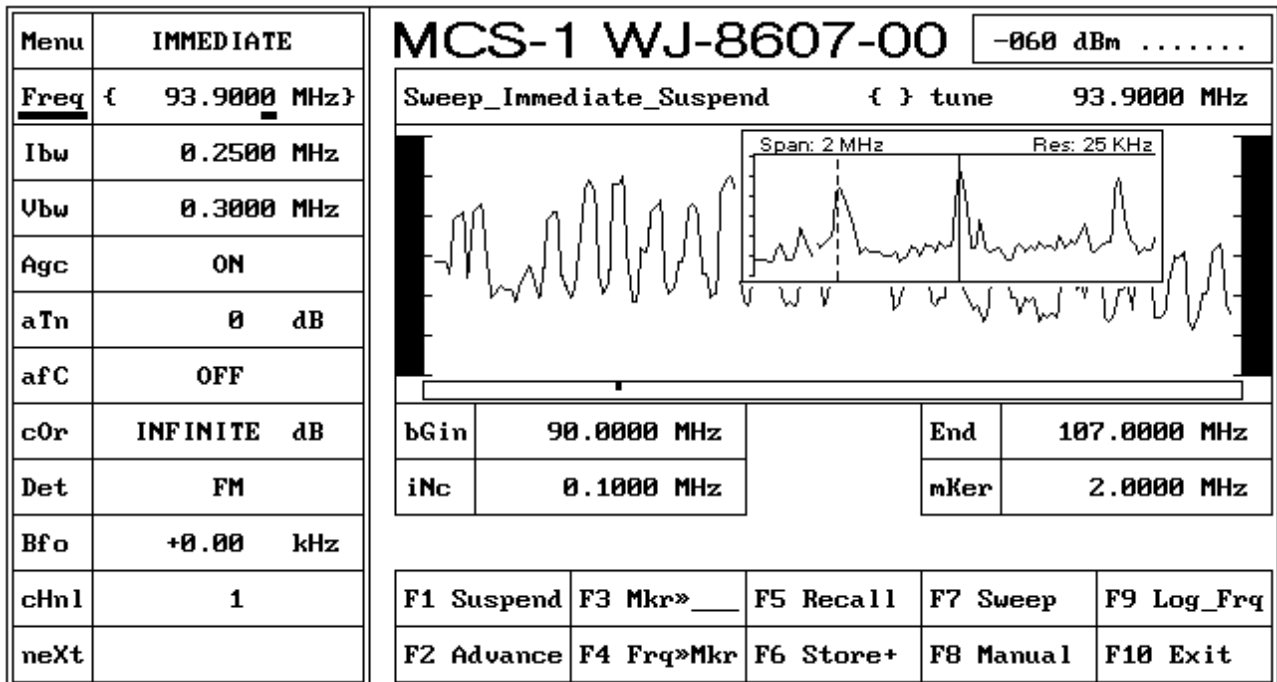
Window. To retune the receiver to any other frequency within the Pop-Up Window, the operator needs only to press the left or right arrow key on the controlling computer several times. When either key is pressed for the first time, a dashed vertical retune line appears from behind the center frequency line. Each time an arrow key is pressed, the retune line moves one resolution bandwidth increment in the direction of the arrow key. When the retune line is superimposed over the new signal, merely press the Home key on the controlling computer to retune the receiver. **Figure I-8** shows the retune line moved to the left to a new signal prior to performing a retune command.

I.7.3.2 IMMEDIATE Menus

The IMMEDIATE menus provide control of the Miniceptor's manual and sweep immediate functions and of the RF Pan Display. There are two IMMEDIATE menus (**Figures I-6 and I-9**), both of which have a control window, a function key window, and an RF Pan Display.

I.7.3.2.1 First IMMEDIATE Menu Control Window

The IMMEDIATE menu control window allows operator control of various Miniceptor parameters. There are eighteen different Miniceptor parameters that are controlled by the two IMMEDIATE menu control windows. Ten Miniceptor parameters are controlled on the first IMMEDIATE menu control window. The remaining eight Miniceptor parameters are controlled by the second IMMEDIATE menu control window.



94-032

Figure I-8. Pop-Up Window with Retune Line

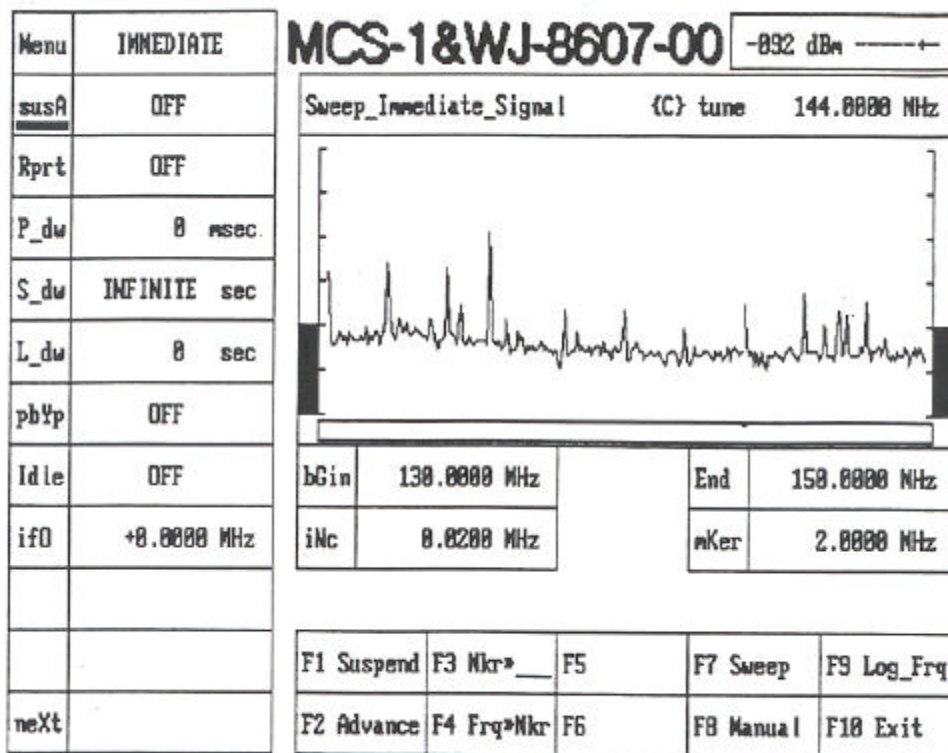


Figure I-9. Second IMMEDIATE Menu

The first IMMEDIATE menu control window contains the control fields shown in **Figure I-2**. The Minicaptor parameters controlled by the first IMMEDIATE menu control window are:

Menu	[Menu]
Frequency	[Freq]
IF bandwidth	[Ibw]
Video bandwidth	[Vbw]
Automatic gain control	[Agc]
RF attenuation	[aTn]
Automatic frequency control	[afC]
Carrier-operated-relay threshold	[cOr]
Detection mode	[Det]
Beat frequency oscillator	[Bfo] [Pamp]*
Memory channel	[cHnl]
Next menu screen	[neXt]

* With a WJ-8809 Receiver or WJ-8809A/SYS System, the [Bfo] field is replaced with [Pamp] for Microwave preamplifier control.

The first set of IMMEDIATE menu control fields may be accessed in one of two ways. Pressing the key that corresponds to the capitalized letter of a control field gives the operator control of that parameter. Moving the cursor with the <Up Arrow> and <Down Arrow> keys to the desired control field and pressing the <Enter> key also delivers control of the desired parameter. Once a control field is in use, that control field becomes underlined (as the [COR] control field is in **Figure I-6**).

The [Menu] control command allows the operator to select different control menus.

The [Freq] control command allows the operator to set the Miniceptor tuned frequency. The frequency allowed is dependent upon the frequency range of the Miniceptor configuration.

The [Ibw] control command allows operator selection of Miniceptor IF bandwidth size. The sizes available depend upon Miniceptor configuration.

The [Vbw] control command allows operator selection of Miniceptor video bandwidth size. The sizes available depend upon Miniceptor configuration.

The [Agc] control command turns the Miniceptor automatic gain control (AGC) "ON" or "OFF". "ON" lets the AGC control Miniceptor gain. "OFF" lets the Miniceptor manual gain level control Miniceptor gain.

The [aTn] control command sets the Miniceptor manual gain level in dB. The range is from 0 to 111 dB in 1 dB steps (0 to 115 dB in 1 dB steps for the WJ-8654).

The [afC] control command allows selection of automatic frequency control (AFC). AFC may be turned "ON" or "OFF".

The [cOr] control command sets the Miniceptor COR threshold level (above the theoretical noise floor of the selected bandwidth) in dB. The COR range is from 0 to 55 dB (0 to 70 dB for the WJ-8654). A COR setting of -1 turns the COR off.

The [Det] control command allows operator selection of the Miniceptor detection mode. Detection modes available depend upon the Miniceptor model.

The [Bfo] control command sets the Miniceptor beat frequency oscillator (BFO) in kHz. The BFO range is +4.00 kHz to -4.00 kHz in .25 kHz steps (.01 kHz steps for the WJ-8654 and the WJ-8607A). If a WJ-8809 Receiver is being controlled, this field is labeled [Pamp], and controls the microwave preamplifier selection.

The [cHnl] control command allows the operator to retrieve or store parameters held in a Miniceptor memory channel. This will change all Miniceptor parameters to those stored in the memory channel. There are 100 memory channels available for the WJ-860X-XX and the WJ-8809-XX. There are 200 memory channels available for the WJ-8654 and the WJ-8607A.

I.7.3.2.1.1 **Selection of Frequency [Freq], Automatic Gain Control [Agc], Attenuation [aTn], Carrier-Operated Relay [cOr], Beat Frequency Oscillator [Bfo] and Channel [cHnl] Control Commands**

The parameter fields associated with the [Freq], [Agc], [aTn], [afC], [cOr], [Bfo] and [cHnl] control commands become encased in brackets once controlled. In the case of a numeric parameter field, such as [Freq], [aTn], [cOr], [Bfo] or [cHnl], the value is changed using the numeric entry keys and pressing the <Enter> key once the desired selection has been made. There is also a cursor under one digit of the parameter field value. This allows the value to be changed using the arrow keys. The <Right Arrow> and <Left Arrow> keys move the cursor along the length of the value, while the <Up Arrow> and <Down Arrow> keys increment or decrement that value. A manually-entered value of "-1" represents infinity.

Non-numeric parameter fields ([Agc] and [afC]) are controlled using the <Up Arrow> and <Down Arrow> keys only. The parameter fields are toggled between "ON" and "OFF".

I.7.3.2.1.2 **Selection of IF Bandwidth [Ibw] and Video Bandwidth [Vbw] Control Commands**

When the [Ibw] or [Vbw] control command is selected, a submenu appears in front of the chosen control field. In either case, a list of numbered bandwidths (IF or video, all sizes dependent upon Miniceptor configuration) appears along with an arrow which points to the currently-selected bandwidth. Bandwidth selection is performed by either pressing the numeric key associated with the desired bandwidth, or by moving the arrow (using the <Up Arrow> and <Down Arrow> keys) to the desired bandwidth.

I.7.3.2.1.3 **Selection of Detection Mode [Det] Control Command**

When the [Det] control command is selected, a submenu appears in front of the [Det] control field. The submenu contains a list of selectable detection modes. The detection modes available depend upon the Miniceptor model. There is a number to the left of each detection mode, as well as an arrow which points to the currently-selected detection mode. Detection mode selection is performed by either pressing the numeric key associated with the desired detection mode, or by moving the arrow (using the <Up Arrow> and <Down Arrow> keys) to the desired detection mode.

I.7.3.2.1.4 **Selection of [Menu] and [neXt] Control Commands**

The two remaining control commands, [Menu] and [neXt], do not control any Miniceptor function. The [Menu] control command allows the operator to access the various menus (Immediate, Edit_Lockout, Edit_mem_chnl, Exec_Swp_sctr, and Exec_Stp_sctr). The [neXt] control command allows the operator to access the second menu screens of the applicable menus (all but Edit_Lockout). The [neXt] control command also allows the operator to move from the second menu screen back to the first menu screen.

When the [Menu] control command is selected, either by pressing "M" or pressing the <Enter> key while [Menu] is underlined, a submenu appears in front of the [Menu] control field. This submenu is made up of a list of all menus. All submenu fields are numbered and may be selected by pressing the appropriate numeric key or by using the <Up Arrow> and <Down Arrow> keys to move pointer under to the desired number and pressing the <Enter> key. The IMMEDIATE menu disappears and is replaced by the chosen menu.

The [neXt] control command is activated by either pressing the letter key "X" (which corresponds with the capitalized letter in [neXt]) or by moving the cursor to the [neXt] control field and pressing the <Enter> key. The first IMMEDIATE menu screen disappears and is replaced by the second IMMEDIATE menu screen.

I.7.3.2.2 **Second IMMEDIATE Menu Control Window**

The second IMMEDIATE menu control window, shown in **Figure I-9**, contains both the [Menu] and [neXt] control commands as well as eight more Miniceptor control commands. All second IMMEDIATE menu control commands are selected in the same manner as were the first IMMEDIATE menu control commands. The second IMMEDIATE menu command controls are:

Menu	[Menu]
Auto suspend action	[susA]
Report action	[Rprt]
Pre-dwell timer	[P_dw]
Signal-dwell timer	[S_dw]
Lost-dwell timer	[L_dw]
Preselector bypass	[pbYp]
Idle mode	[Idle]
IF downconverter	
oscillator frequency	[ifO] *
Audio volume control	[Vol]**
Next menu screen	[neXt]

* Field blank with WJ-8809 Receiver.

** Field available with WJ-8654 Receiver.

I.7.3.2.2.1 **[susA] and [Rprt] Control Commands Operation**

The [susA] and [Rprt] control commands control the Miniceptor's suspend actions and report actions, respectively. The [susA] and [Rprt] control commands present submenus when selected. Each submenu contains a list of numbered actions. These actions are selected by pressing the numeric key associated with the desired action. A "+" symbol appears to the left of the selected action to indicate that the action has been selected. Pressing the same numeric key again causes the "+" symbol to disappear, deselecting the action. The suspend action control command is used to select the parameters that determine when the sweep or step function is suspended. The selectable sweep or step parameters that can suspend the current sweep or step are:

End sweep	-	Suspend sweep on end of sweep.
End Swp_list	-	Suspend on end of sweep sector.
End Stp_list	-	Suspend on end of step sector.
On signal	-	Suspend on reported signal acquisition.

The report action command control is used to select the parameters that determine what type of RF signal the Miniceptor will respond to during a sweep or step operation. The report action can be controlled by the following selectable signal parameters:

New Signal -- The Miniceptor only stops on signals that did not exist during the last sweep or step list.

Ignore lckout -- Locked out frequencies are included in sweep operations.

Skip adjacent -- The Miniceptor does not stop on adjacent signals in sweep mode. This is useful to ensure that the Miniceptor does not see a large bandwidth signal as many smaller bandwidth signals.

I.7.3.2.2 [P_dw], [S_dw] and [L_dw] Control Command Operation

The [P_dw], [S_dw] and [L_dw] control commands are used to set up the Miniceptor's pre-dwell, signal dwell and lost-signal dwell timers, respectively. These timers determine the amounts of time the Miniceptor spends listening for a signal, listening to a signal, and listening for a once-active signal during a sweep or step operation.

The [P_dw] control command sets the time that the Miniceptor waits at a frequency for a signal to break the COR threshold level. If a signal does not break the COR threshold level, then the Miniceptor sweeps or steps (depending on the operation selected) to the next frequency to wait for a signal. In a sweep operation, the next frequency is determined by the sweep increment ([iNc]) set on the RF pan display (see **paragraph I.7.3.1.3**). In a step operation, the next frequency is the next sequential step. If a signal does break the COR threshold level, the signal dwell timer takes over.

The [S_dw] control command sets the amount of time that the Miniceptor listens to an active signal (a signal greater than the COR threshold level). Once an active signal dips below the COR threshold level the signal dwell timer holds its count until the lost-signal dwell timer times out. If the signal breaks COR before the lost-signal dwell timer times out, the signal dwell timer begins to count down again from where it stopped when the signal disappeared.

The [L_dw] control command sets the amount of time that the Miniceptor waits at a frequency for a once-active signal to reappear. If the signal does reappear (again breaking the COR threshold level), the signal dwell timer takes over and the lost-signal timer is reset. If the signal does not reappear, then the Miniceptor sweeps to the next frequency.

The values of the [P_dw], [S_dw] and [L_dw] control commands are changed in the same manner as are the [Freq] and [cOr] control commands in **paragraph I.7.3.2.1.1** via the numeric entry or arrow keys. These control commands are used to determine the amount of time the Miniceptor waits before, during and after a signal is acquired in sweep or step operations.

The [P_dw] control command sets the Miniceptor pre-dwell timer from 0 to 996 milliseconds in 4-millisecond increments. The [S_dw] control command sets the Miniceptor signal dwell timer from 0 to 600 seconds. The [L_dw] control command sets the Miniceptor lost-signal dwell timer from 0 to 60 seconds. Entering a value of "-1" sets the selected timer to infinity. For [P_dw] and [L_dw] this means that the Miniceptor stays in a dwell condition until receipt of the advance function command. For [S_dw] this means that the Miniceptor remains on an active signal for as long as that signal is greater than the COR threshold level.

I.7.3.2.2.3 *Selection of [pbYp], [Idle] and [ifO] Control Commands*

The [pbYp] and [Idle] control commands are selected in the same way as the [Age] and [afC] control commands in **paragraph I.7.3.2.1.1**. The parameter fields associated with these control commands are toggled to either "ON" or "OFF" using the <Up Arrow> and <Down Arrow> keys.

The [pbYp] control command controls the status of the Miniceptor tracking preselector. "ON" means the preselector is bypassed. "OFF" means the preselector is not bypassed and is in the RF signal path.

The [Idle] control command sets Miniceptor manual idle mode. "ON" means Miniceptor normal operations are halted without change and the IDM flag is set. The AFC, AGC, and COR processes are aborted, and the COR status output line and status bit are inactive. The Miniceptor no longer reacts to RF signal stimuli. When in step mode, if a memory channel is encountered with the IDM flag set, the memory channel is skipped. "OFF" means that the Miniceptor is in normal operation.

The [ifO] (also [ifoS] in later menus) control command sets the IF downconverter oscillator frequency (IFO) from +2.000 to -2.000 MHz in 1 kHz steps for the WJ-860X-XX, the WJ-8607A, and the WJ-8809-XX. The range for the WJ-8654 is ?150 kHz in 1 kHz steps. This oscillator is only used in the IFT mode of detection. The WJ-8809 Receiver does not support this control command, and the field is blank.

The [Vol] which is only available for WJ-8654, allows increasing or decreasing audio level of the headphone output.

Two control fields are separate from the other eighteen control fields but are common to both IMMEDIATE menu screens. They are the [Menu] control field and the [neXt] control field. See **paragraph I.7.3.2.1.4** for a complete description of these control commands.

I.7.3.2.3 **IMMEDIATE Menu Function Key Window**

There are ten function keys available in the function key windows of the two IMMEDIATE menus. These function keys allow control of sweep functions, the RF pan display and also access into Miniceptor memory. Both IMMEDIATE menus have identical function keys with the exception of the <F6 Store+> and <F5 Recall> function keys. These are only available on the first IMMEDIATE menu screen. The ten function keys and their associated functions are:

<F1 Suspend> <F6 Store+>
 <F2 Advance> <F7 Sweep>
 <F3 Mkr>>_> <F8 Manual>
 <F4 Frq>>Mkr <F9 Log_Frq>>
 <F5 Recall> <F10 Exit>

I.7.3.2.3.1 <F1 Suspend> and <F2 Advance> Function Keys

The <F1 Suspend> and <F2 Advance> keys allow the operator to suspend or advance a Miniceptor sweep operation at any time during the sweep operation. The <F1 Suspend> function key, when pressed, stops the sweep or step operation and places the Miniceptor into a sweep suspend state. A suspended sweep operation, shown in **Figure I-10**, causes the Miniceptor operation status to be displayed as "Sweep_Immediate_Suspend".

The <F2 Advance> function key is pressed to resume the sweep operation. The advance function starts the sweep operation exactly where the operation was suspended. The Miniceptor operation status is Sweep_Immediate_Active.

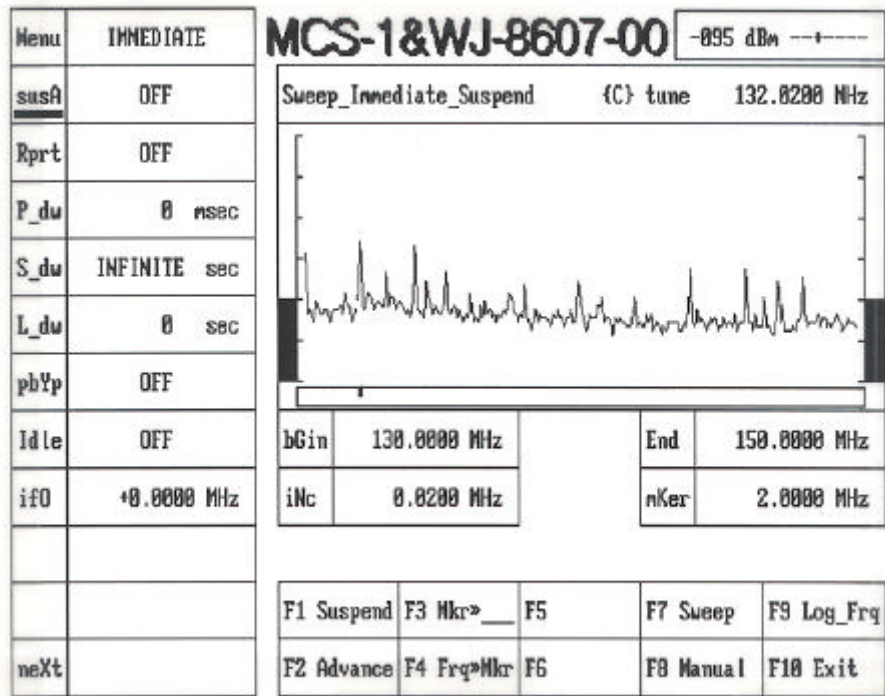


Figure I-10. Suspend Sweep Status

I.7.3.2.3.2 <F3 Mkr>>_ and <F4 Frq>>Mkr> Function Keys

The <F3 Mkr>>_ and <F4 Frq>>Mkr> function keys allow the operator to position the mobile frequency analysis marker and the frequency marker. The <F3 Mkr>>_ function key provides a means for the mobile frequency analysis marker to be handed off to one of three locations. They are: the beginning frequency of the RF pan display, the ending frequency of the RF pan display, and the Miniceptor tuned frequency. For the <F3 Mkr>>_ function to work, one of the [Freq], [bGin] or [End] controls must be selected prior to the <F3 Mkr>>_ function key being pressed. (See **paragraph I.7.3.1.3** for information on the RF pan display.)

The <F4 Frq>>Mkr> function key allows the operator to hand off the Miniceptor tuned frequency to the movable frequency analysis marker. Once the <F4 Frq>>Mkr> key is pressed, the Miniceptor mobile frequency analysis marker frequency changes to the tuned frequency and the mobile frequency analysis marker also moves to the location of the frequency marker.

I.7.3.2.3.3 <F5 Recall> and <F6 Store+> Function Keys

The <F5 Recall> function key, when pressed, causes the Miniceptor to recall and execute the currently displayed memory channel parameters. (See **paragraph I.7.3.2.1** for [cHnl] description.) All Miniceptor parameters change to those held within the recalled memory channel.

When the <F6 Store+> function key is pressed, all of the current IMMEDIATE menu Miniceptor parameters are stored in the current displayed memory channel. The number of the displayed memory channel is also increased by one after the parameters are stored.

I.7.3.2.3.4 <F7 Sweep> and <F8 Manual> Function Keys

The <F7 Sweep> key allows the operator to place the Miniceptor in the Sweep Immediate mode. The Miniceptor begins sweeping from the RF pan display's beginning frequency. The sweep occurs in increments selected on the RF pan display (see **paragraph I.7.3.1.3**). The RF Spectral display gives a graphic presentation of the RF environment as seen by the Miniceptor. The frequency marker disappears and the tuned frequency display, signal strength meter, and tuning meter all go blank. The Miniceptor operation status is Sweep_Immediate_Active, indicating that the Miniceptor is sweeping.

Additionally, sweep operation depends on the [susA] and [Rprt] control commands. See **paragraph I.7.3.2.2.1** for more detail.

The <F8 Manual> key allows the operator to take the Miniceptor out of Sweep Immediate mode and place the Miniceptor in Manual mode. When the <F8 Manual> key is pressed, the RF spectral display is no longer updated. The tuned frequency display and the frequency marker indicate the last frequency the Miniceptor encountered during its sweep. The Miniceptor operation status is Manual.

I.7.3.2.3.5 <F9 Log_Frq> and <F10 Exit> Function Keys

Pressing the <F9 Log_Frq> key logs the current frequency data to the FRQ.PRN file or to the LPT1 printer port. If the frequencies are logged into the FRQ.PRN file, its contents may be viewed by returning to the Main Menu and selecting the Log_Frq_To field and pressing <Enter>.

Pressing the <F10 Exit> key returns the program to the Main menu.

I.7.3.3 EDIT LOCKOUT Menu

The EDIT LOCKOUT menu allows examination, entry, and editing of all frequency lockouts in the Miniceptor memory. Up to 200 lockouts can be stored in the Miniceptor. The lockout parameters consist of a channel number, a start frequency and a stop frequency. A lockout is entered using either the control commands or function keys. The EDIT LOCKOUT menu is shown in **Figure I-11**.

The EDIT LOCKOUT menu appears exactly as the IMMEDIATE menu appears, with minor differences in the control window and the function key window. The EDIT LOCKOUT RF pan window operates exactly as does the IMMEDIATE RF pan window (see **paragraph I.7.3.1.3**). The EDIT LOCKOUT menu also has only one screen.

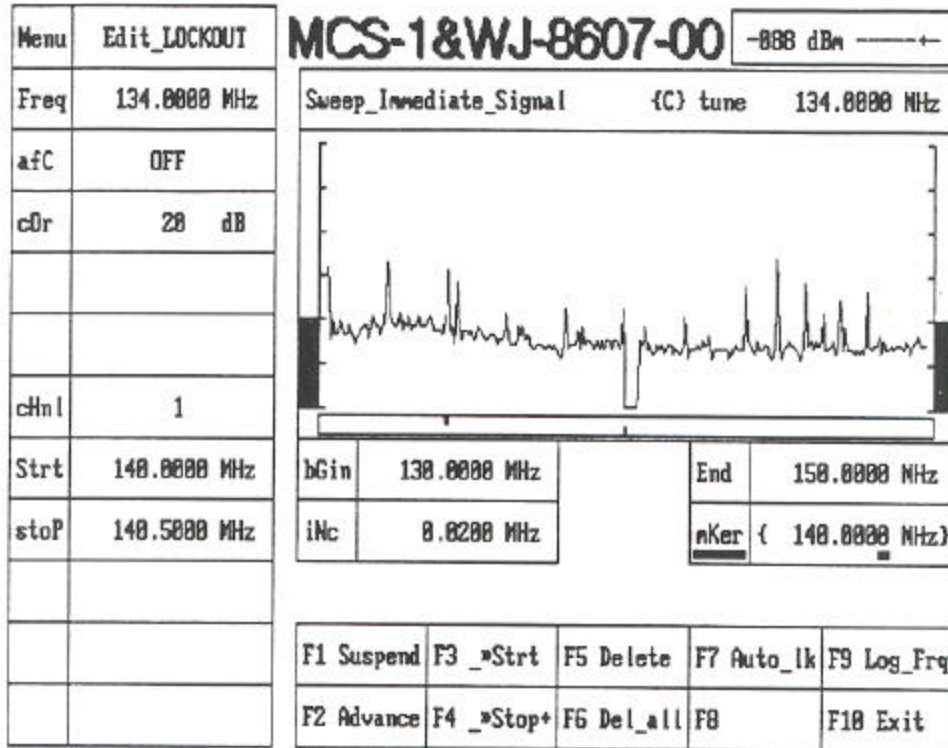


Figure I-11. EDIT LOCKOUT Menu

I.7.3.3.1 **EDIT LOCKOUT Menu Control Window**

The EDIT LOCKOUT menu has seven control commands available in the control window, some of which are used to control the parameters of the locked out frequencies. The controlled parameters are the lockout start frequency and lockout stop frequency. Other Miniceptor controls are provided as well.

The control commands available in the EDIT LOCKOUT control window are:

Menu	[Menu]
Frequency	[Freq]
Automatic frequency control	[afC]
Carrier operated relay	[cOr]
Lockout memory channel	[cHnl]
Lockout start frequency	[Strt]
Lockout stop frequency	[stoP]

The [Menu], [Freq], [afC] and [cOr] control commands operate exactly as they do in the IMMEDIATE menu. See **paragraph I.7.3.2.1**. The [Freq] control command also suspends the Miniceptor in sweep or step sector operations.

The [Strt] and [stoP] control commands define the start and stop frequencies of the locked out frequency band of the accessed lockout memory channel. The [Strt] frequency is the first locked out frequency of that particular lockout memory channel. The [stoP] frequency is the last locked out frequency of that particular memory channel. In **Figure I-6**, the lockout memory channel is channel 1, the first locked out frequency in lockout channel 1 is 140.0000 MHz, and the last locked out frequency in lockout channel 1 is 140.5000 MHz.

If a start frequency higher than the stop frequency is entered, the stop frequency is automatically adjusted to the value of the start frequency. Likewise, attempting to enter a stop frequency lower than the start frequency changes the start frequency to the value of the stop frequency. When both start and stop frequencies are zero, the lockout memory channel is empty.

Changing the locked-out start and stop frequencies using the [Strt] and [stoP] control commands is done in the same manner as changing the frequency using the [Freq] control command: via numerical entry or by using the arrow keys (see **paragraph I.7.3.2.1.1**).

The 200 lockout memory channels are accessed just as the memory channels in the IMMEDIATE menu are accessed: via numerical entry or by using the arrow keys (see **paragraph I.7.3.2.1.1**).

I.7.3.3.2 **EDIT LOCKOUT Function Key Window**

The EDIT LOCKOUT function key window allows editing of the lockout memory channel and also any current sweep or step operation. There are nine function keys in the EDIT LOCKOUT function key window. They are:

<F1 Suspend>	<F5 Delete>
<F2 Advance>	<F6 Del_all>
<F3 _>>Strt>	<F7 Auto_lk>
<F4 _>>Stop+>	<F9 Log_Frq>
<F10 Exit>	

Function keys <F1 Suspend> and <F2 Advance> control any current sweep or step operation in the same way they do in the IMMEDIATE menu (see **paragraph I.7.3.2.3.1**).

I.7.3.3.2.1 <F3 _>>Strt> and <F4 _>>Stop+> Function Keys

The <F3 _>>Strt> and <F4 _>>Stop+> function keys allow the operator to use the frequency of the Miniceptor and the frequency of the mobile frequency analysis marker as lockout start and stop frequencies. To do this, the [Freq] or [mKer] control must be selected. See **paragraph I.7.3.2.1** for [Freq] selection information. See **paragraph I.7.3.1.3** for [mKer] selection information. Once one of these is selected, pressing the <F3 _>>Strt> function key causes that frequency to become the lockout start frequency of the currently selected lockout memory channel. The <F4 _>>Stop+> function key works in the same manner. Once the <F4 _>>Stop+> function key is pressed, the lockout stop frequency of the currently selected lockout memory channel is set.

If the lockout start frequency is assigned a greater value than the current lockout stop frequency, the stop frequency automatically adjusts to the value of the start frequency. Likewise, when the stop frequency is assigned a lesser value than that of the start frequency, the start frequency automatically adjusts to the value of the stop frequency.

After the lockout stop frequency is assigned by use of the <F4 _>>Stop+> function key, the lockout memory channel is increased by one. This allows rapid setup of lockout bands.

I.7.3.3.2.2 <F5 Delete> and <F6 Del_all> Function Keys

The <F5 Delete> function key, when pressed, deletes the locked out start and stop frequencies in the current memory channel, effectively emptying that lockout memory channel. Both start and stop frequencies are assigned a value of zero.

The <F6 Del_all> function key, when pressed, blanks all 200 lockout memory channels. All start and stop frequencies are assigned a value of zero.

I.7.3.3.2.3 <F7 Auto lk>, <F9 Log Frq>, and <F10 Exit> Function Keys

The <F7 Auto_lk> key allows the operator to enter lockout start and stop frequencies automatically. When this function key is pressed, the MCS-1 program automatically searches for the upper and lower frequency boundaries of the intercepted signal and stores these frequencies into the lockout channel shown in the [cHnl] data field if it is empty. If the displayed channel contains data, the lockout frequencies are stored in the next channel in sequence, disregarding its contents. Auto-lockout function works only if the intercepted signal remains stable during the search for the upper and lower frequency boundaries. If an Auto-lockout operation is unsuccessful, the computer emits an audio tone to notify the operator. Additionally, for an Auto-lockout to be successful, the bandwidth of the intercepted signal can be no greater than ten times the selected increment size.

The <F9 Log_Frq> and <F10 Exit> keys function exactly as they do on the IMMEDIATE menu (see **paragraph I.7.3.2.3.5**).

I.7.3.4 **EDIT MEMORY CHANNEL Menus**

There are two EDIT MEMORY CHANNEL menus that allow the inspection and editing of signal parameters in Miniceptor memory. There are 100 memory channels available (200 memory channels are available for the WJ-8654 and the WJ-8607A). The sector step frequencies are available on the first EDIT MEMORY CHANNEL menu. The sector sweep frequencies are available on the second EDIT MEMORY CHANNEL menu. All other signal parameters, available on either menu affect sector step scans and sector sweep scans. The two EDIT MEMORY CHANNEL menus are displayed in **Figures I-12** and **I-13**.

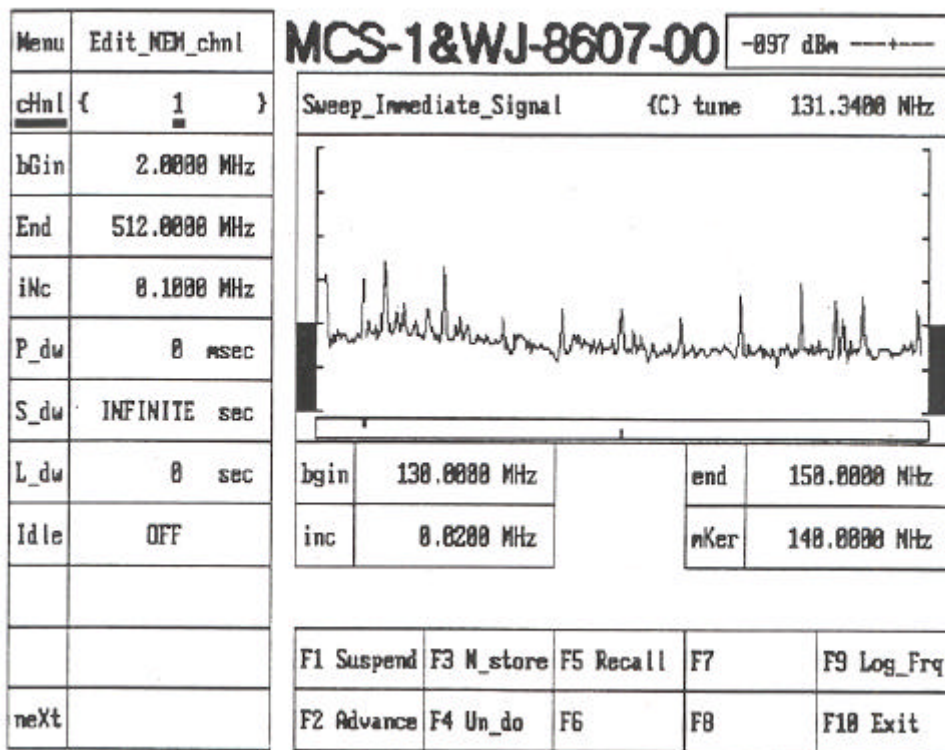


Figure I-12. First EDIT MEMORY CHANNEL Menu

I.7.3.4.1 **First EDIT MEMORY CHANNEL Menu Control Window**

The first EDIT MEMORY CHANNEL menu control window (**Figure I-12**) looks and operates much like the IMMEDIATE menu control window. The major difference is that the first EDIT MEMORY CHANNEL menu control window is used to store sector step frequencies as well as other signal parameters for use in both sweep and step operations. Video bandwidth ([Vbw]) selection is also unavailable. The control commands available on the first EDIT MEMORY CHANNEL menu control window are:

Menu	[Menu]
Memory channel	[cHnl]
Frequency	[Freq]
IF bandwidth	[Ibw]

Automatic gain control	[Agc]
Manual gain control	[aTn]
Automatic frequency control	[afC]
Carrier operated relay	[cOr]
Detection mode	[Det]
Beat frequency oscillator	*[Bfo]
IF downconverter	
oscillator frequency	*[ifoS]
Next Menu Screen	[neXt]

* Not supported by the WJ-8809 Receiver or WJ-8809A/SYS System.

For descriptions of most of the above control commands, see **paragraph I.7.3.2.1**. For operation information on most of the above control commands, see **paragraphs I.7.3.2.1.1** and **paragraph I.7.3.2.2.3**. See **paragraph I.7.3.2.2.3** for information on the [ifoS] control command.

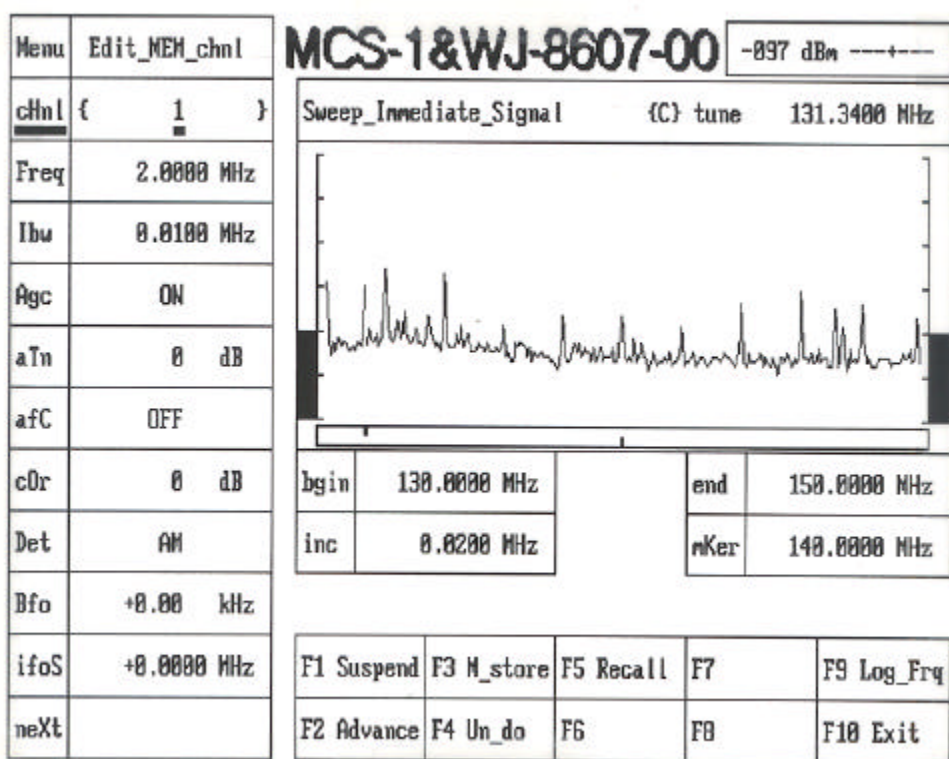


Figure I-13. Second EDIT MEMORY CHANNEL Menu

I.7.3.4.2 **Second EDIT MEMORY CHANNEL Menu Control Window**

The second EDIT MEMORY CHANNEL menu control window (**Figure I-13**) is used to set up frequencies for use in a sector sweep operation. This menu screen allows the operator to enter up to 100 frequency bands in Miniceptor memory (200 frequency bands are available in the WJ-8654 and the WJ-8607A). The size of sweep increment is also entered on this menu screen. All of the dwell timers for both sector step and sector sweep operations are set on this menu.

Ten control commands are available on the second EDIT MEMORY menu control window.

They are:

Menu	[Menu]
Memory channel	[cHnl]
Sector sweep beginning frequency	[bGin]
Sector sweep ending frequency	[End]
Sector sweep increment	[iNc]
Pre-dwell timer	[P_dw]
Signal dwell timer	[S_dw]
Lost-signal dwell timer	[L_dw]
Idle mode	[Idle]
Next menu screen	[neXt]

The [Menu] and [neXt] control commands advance the operator interface to another menu or to the next screen. See **paragraph I.7.3.2.1.4**. [P_dw], [S_dw] and [L_dw] control the dwell timers. See **paragraph I.7.3.2.2.2**. [bGin], [End] and [iNc] control the RF pan display behavior. See **paragraph I.7.3.1.3**. [cHnl] controls the selection of memory channels and is changed via numeric entry keys or the arrow keys. See **paragraph I.7.3.2.1.1**. [Idle] control command is toggled on and off with the up/down keys as described in **paragraph I.7.3.2.2.3**.

I.7.3.4.3 **EDIT MEMORY CHANNEL Function Key Window**

The EDIT MEMORY CHANNEL function key windows on both menus are identical. Seven function keys are provided. Two of the functions control the current scan, the remaining three control memory channel functions. The EDIT MEMORY CHANNEL function keys and their associated functions are:

```
<F1 Suspend>
<F2 Advance>
<F3 M_Store>
<F4 Un_do>
<F5 Recall>
<F9 Log_Frq>
<F10 Exit>
```

The first two function keys, <F1 Suspend> and <F2 Advance>, are used to suspend or to restart a scan. See **paragraph I.7.3.2.3.1**.

The <F3 M_Store> function key, when pressed, sends all new memory channel data to the Miniceptor. New memory channel data is also sent when a new control menu or a new memory channel is selected.

The <F4 Un_do> function key, when pressed, causes the former memory channel data to replace the latest memory channel data. This function provides a way to easily erase incorrect memory channel data that has not yet been stored.

The <F5 Recall> function key, when pressed, tunes the Miniceptor to the frequency held in the current memory channel. The <F5 Recall> function key also recalls all other signal parameters to the Miniceptor as well.

The <F9 Log_Frq> and <F10 Exit> keys function exactly as they do on the IMMEDIATE menu (see **paragraph I.7.3.2.3.5**).

I.7.3.5 EXECUTE SWEEP SECTOR Menus

The EXECUTE SWEEP SECTOR menus (**Figures I-14** and **I-15**) allow the operator to perform a sector sweep. The controlled Miniceptor sweeps each sector sequentially, from a start frequency to a stop frequency. The Miniceptor sweeps frequencies in discrete operator-selected increments. Up to ten sweep sectors are included in the sector sweep. Only one of those sectors is displayed on the RF pan display at any time. A sector is an operator-assigned memory channel.

The first menu, shown in **Figure I-3** allows examination of the sector sweep frequencies in a specific memory channel. The second menu, shown in **Figure I-4** allows examination of all ten sectors. Using the first menu, the operator can see exactly what start and stop frequencies are in a memory channel. Using the second menu, the operator can see exactly which memory channels are being swept during a sector sweep.

The RF spectral display includes the RF spectral display sector control. This control displays which of the sectors is currently being swept. When a sector sweep is initiated the RF spectral display sector control will contain a one. This represents the first sector in the sector sweep operation. The control allows the displayed sector to be changed by altering the display sector field.

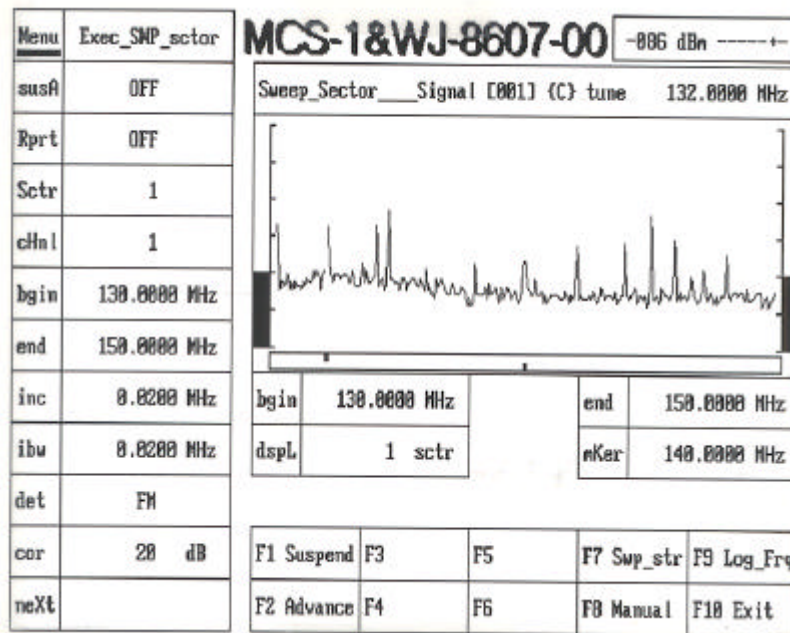


Figure I-14. First EXECUTE SWEEP SECTOR Menu

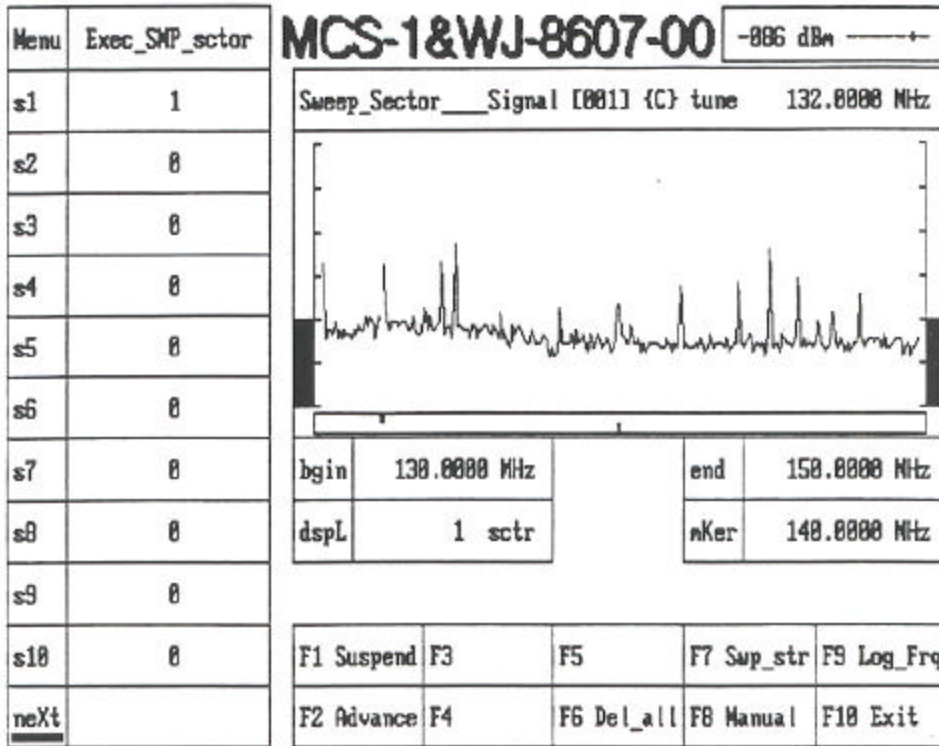


Figure I-15. Second EXECUTE SWEEP SECTOR Menu

I.7.3.5.1 First EXECUTE SWEEP SECTOR Menu Control Commands

The first EXECUTE SWEEP SECTOR menu allows the operator to assign memory channels to sectors. The sectors are utilized during sector sweep operations. Of the twelve available control commands on the first EXECUTE SWEEP SECTOR menu screen, only six are true active control commands. The remaining six provide no control of any Minicaptor parameter, they provide only a means of monitoring Minicaptor parameters. The control commands without a capitalized letter in their respective control fields provide no control. The control commands available on the first EXECUTE SWEEP SECTOR menu screen are:

Menu	[Menu]
Suspend action	[susA]
Report action	[Rprt]
Sector	[Sctr]
Memory channel	[cHn]
Sweep sector start frequency	[bgin]
Sweep sector stop frequency	[end]
Sweep sector increment	[inc]
Sweep sector IF bandwidth	[ibw]
Sweep sector detection mode	[det]
Sweep sector COR threshold level	[cor]
Next menu screen	[neXt]

The [Sctr] control command allows the operator to assign the data from different memory channels to any of the ten available sectors. The parameters held in the memory channel are displayed in the control window. Memory channel assignments need not be done so that each higher numbered sector has a higher numbered memory channel. This means that if sector one is assigned memory channel twenty, sector two may be assigned memory channel one.

During a sector sweep, sectors are swept sequentially. Sector one is swept first, then sector two, then sector three and so on. When an operator assigns a memory channel to a sector, the memory channel remains in that sector only if all lower numbered sectors already have memory channels assigned to them. This means that if sector one is empty, and sector two is assigned a memory channel, that memory channel is automatically assigned to sector one and sector two remains empty.

The [Sctr] control values are changed via numerical entry or by use of arrow keys in the same manner as the [cHnl] control command is accessed in **paragraph I.7.3.2.1.1**.

The [Menu] and [neXt] control command descriptions are found in **paragraph I.7.3.2.1.4**. The [bgin], [end] and [inc] control commands behave similarly to the [bGin], [End] and [iNc] frequency controls of the RF pan display but provide no means of control, only a means to monitor, and are described in **paragraph I.7.3.1.3**. The [cHnl] control command description is found in **paragraph I.7.3.2.1.1**. The [susA] and [Rprt] control commands are described in **paragraph I.7.3.2.2.1**. The [ibw], [det] and [cor] control command descriptions are found in **paragraph I.7.3.2.1**.

I.7.3.5.2 **Second EXECUTE SWEEP SECTOR Menu Control Commands**

There are twelve second EXECUTE SWEEP SECTOR menu control commands. Ten of these control commands offer no means of control, only a means to monitor. These ten control commands represent the ten available sectors. The parameter field associated with each sector control command contains the number of a specific Miniceptor memory channel. This allows the operator to see which memory channel is in which sector.

Menu	[Menu]
Sweep sector one	[s1]
Sweep sector two	[s2]
Sweep sector three	[s3]
Sweep sector four	[s4]
Sweep sector five	[s5]
Sweep sector six	[s6]
Sweep sector seven	[s7]
Sweep sector eight	[s8]
Sweep sector nine	[s9]
Sweep sector ten	[s10]
Next menu screen	[neXt]

The sweep sector control commands [s1] through [s10] provide no means of control, only a means to monitor the parameter field. The parameter field in each of the sweep sector control commands represents the memory channel assigned to that sweep sector. As shown in **Figure I-15**, sweep sector one is assigned memory channel one. Sweep sectors two through ten are empty. The [Menu] and [neXt] control command descriptions are found in **paragraph I.7.3.2.1.4**.

I.7.3.5.3 **EXECUTE SWEEP SECTOR Function Key Window**

There are seven function keys associated with the EXECUTE SWEEP SECTOR menu. The same function keys are used in both of the two EXECUTE SWEEP SECTOR menu screens with the exception of the <F6 Del_all> function command. This function is available only in the second EXECUTE SWEEP SECTOR menu screen. The function keys allow the operator to control a sector sweep and to delete all memory channels assigned to sectors. The seven function keys are:

- <F1 Suspend>
- <F2 Advance>
- <F6 Del_all>
- <F7 Swp_str>
- <F8 Manual>
- <F9 Log_Frq>
- <F10 Exit>

The first two function keys are <F1 Suspend> and <F2 Advance>. Their descriptions are found in **paragraph I.7.3.2.3.1**.

The <F6 Del_all> function command, when pressed, allows the operator to delete all sector assignments. All sweep sector parameter fields change to display zero. This represents a sector with no memory channel assigned to it.

The <F7 Swp_str> and <F8 Manual> function keys operate exactly like the sweep and manual function keys in **paragraph I.7.3.2.3.4** with the exception that the Miniceptor is involved in sector sweeping as opposed to the sweep immediate function controlled by the sweep function key. The Miniceptor operation status display reads Sweep Sector Active when the <F7 Swp_str> function key is pressed.

The <F9 Log_Frq> and <F10 Exit> keys function exactly as they do on the IMMEDIATE menu (see **paragraph I.7.3.2.3.5**).

I.7.3.6 **EXECUTE STEP SECTOR Menus**

The EXECUTE STEP SECTOR menus (**Figures I-16** and **I-17**) allow the operator to perform a sector step operation during which the controlled Miniceptor steps directly from one frequency to another. The steps are dictated by the selected memory channels, and up to ten step sectors may be included in the sector sweep. Each of these step sectors is loaded with up to 100 memory channels (200 memory channels for the WJ-8654 and the WJ-8607A). The RF pan display is blanked during a sector step operation.

There are two EXECUTE STEP SECTOR menus. The first menu (**Figure I-16**) allows entry of up to ten different step sectors, and the second menu (**Figure I-17**) allows suspend and report action selection.

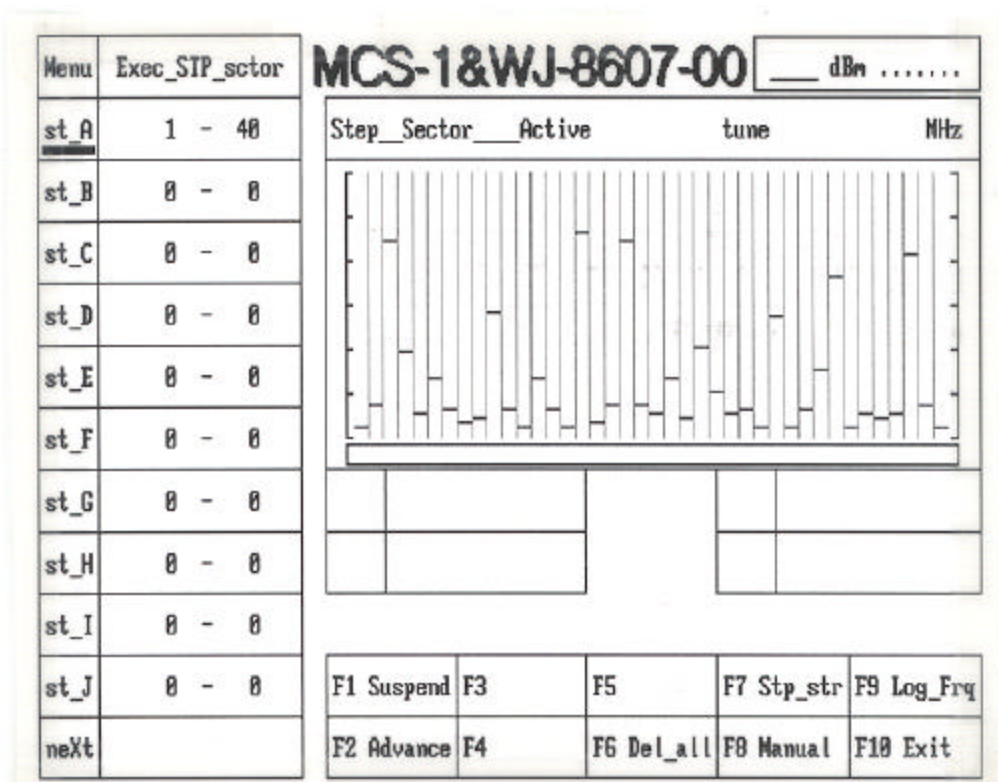


Figure I-16. First EXECUTE STEP SECTOR Menu

I.7.3.6.1 First EXECUTE STEP SECTOR Menu Control Window

The first EXECUTE STEP SECTOR menu control window allows the operator to enter up to ten step sectors. A step sector is a group of frequencies that are located in consecutive memory channels. The lowest numbered memory channel is entered first and then the highest memory channel of the group is entered. During a sector step operation the Minicaptor steps through the aforementioned frequencies from lowest numbered memory channel to the highest.

The ten sectors are labeled A through J. Each associated parameter field has two numbers in it. The left-hand side one indicates the start memory channel for that sector. The right-hand side number indicates the stop memory channel for that sector. In **Figure I-16**, the start memory channel is memory channel one and the stop memory channel is memory channel ten. The remaining sectors are empty. Zeros in a step sector indicates an empty step sector.

The control commands from the first EXECUTE STEP SECTOR menu screen are:

- | | |
|---------------|--------|
| Menu | [Menu] |
| Sector step A | [st A] |
| Sector step B | [st B] |
| Sector step C | [st C] |
| Sector step D | [st D] |
| Sector step E | [st E] |

Sector step F	[st F]
Sector step G	[st G]
Sector step H	[st H]
Sector step I	[st I]
Sector step J	[st J]
Next menu screen	[neXt]

All of the [st A] through [st J] control commands are accessed in the same manner. The control commands used to enter the step sectors can be accessed in either of two ways: Either (1) press the key that corresponds to the desired sector, or (2) use the <Up Arrow> and <Down Arrow> keys to move the control window cursor to the appropriate control command and press the <Enter> key. Either method results in the parameter field being enclosed in brackets indicating that the desired sector has been successfully accessed. Press the numeric key that corresponds to the lowest numbered desired memory channel and press the <Enter> key. The cursor moves to the right-hand number. The right-hand number assumes the value of the left-hand number. This occurs to avoid having a lesser stop memory channel than a start memory channel. Enter the highest numbered desired memory channel and press the <Enter> key. The brackets disappear and the sector is entered.

The spectrum display shows the contents of the memory locations programmed in this operation. In the example of **Figure I-16**, the display is divided into 40 "bins". Each "bin" displays the real-time, relative signal strength reading while tuning to the frequency. The possible number of divisions or "bins" correspond to the number of memory locations, 100.

The [Menu] and [neXt] control command descriptions are found in **paragraph I.7.3.2.1.4**.

I.7.3.6.2 **Second EXECUTE STEP SECTOR Menu Control Window**

The second EXECUTE STEP SECTOR menu (**Figure I-17**) control commands control the sector step suspend action and report action parameters. There are four control commands:

Menu	[Menu]
Suspend action	[susA]
Report action	[Rprt]
Next menu screen	[neXt]

The [Menu] and [neXt] control commands are described in **paragraph I.7.2.2.1.4**. The [susA] and [Rprt] control commands are described in **paragraph I.7.2.2.2.1**.

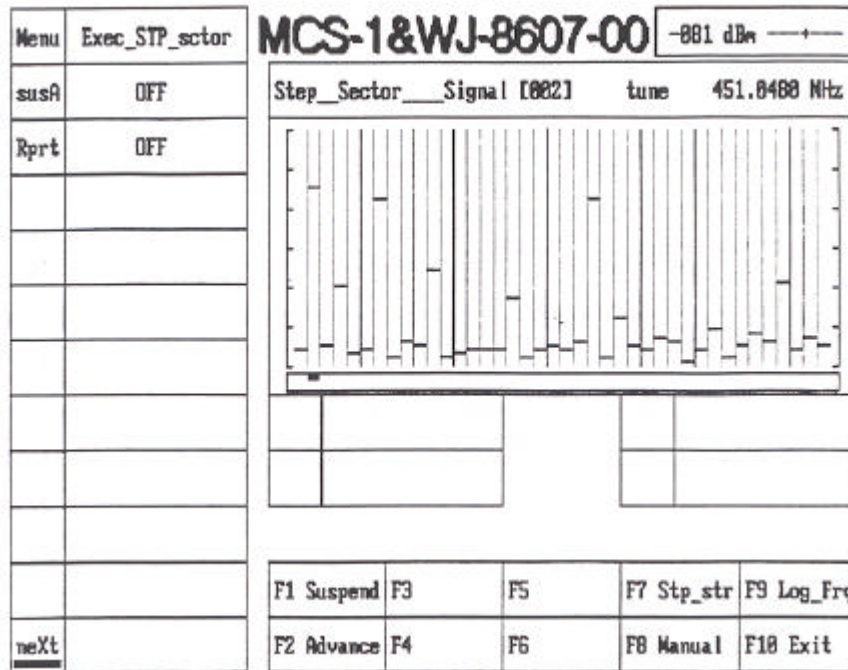


Figure I-17. Second EXECUTE STEP SECTOR Menu

I.7.3.6.3 EXECUTE STEP SECTOR Function Key Window

There are seven function keys associated with the EXECUTE STEP SECTOR menu. The same function keys are used in both of the two EXECUTE STEP SECTOR menu screens with the exception of the <F6 Del_all> function command. This function is available only in the first EXECUTE STEP SECTOR menu screen. The function keys allow the operator to control a sector step and to delete all memory channels assigned to sectors. The seven function keys are as follows:

- <F1 Suspend>
- <F2 Advance>
- <F6 Del_all>
- <F7 Stp_str>
- <F8 Manual>
- <F9 Log_Frq>
- <F10 Exit>

A description of the first two function keys, <F1 Suspend> and <F2 Advance>, is found in **paragraph I.7.3.2.3.1.**

The <F6 Del_all> function command, when pressed, allows the operator to delete all sector assignments. All sweep sector parameter fields change to display zero. This represents a sector with no memory channel assigned to it.

The <F7 Stp_str> key allows the operator to place the Miniceptor in the Sector Step mode. The Miniceptor begins stepping from the first step sector. The frequency marker disappears and the RF spectral display, the tuned frequency display, the signal strength meter, the tuning meter and all RF pan display frequency controls go blank. The Miniceptor operation status is Sector Step Active, indicating that the Miniceptor is stepping.

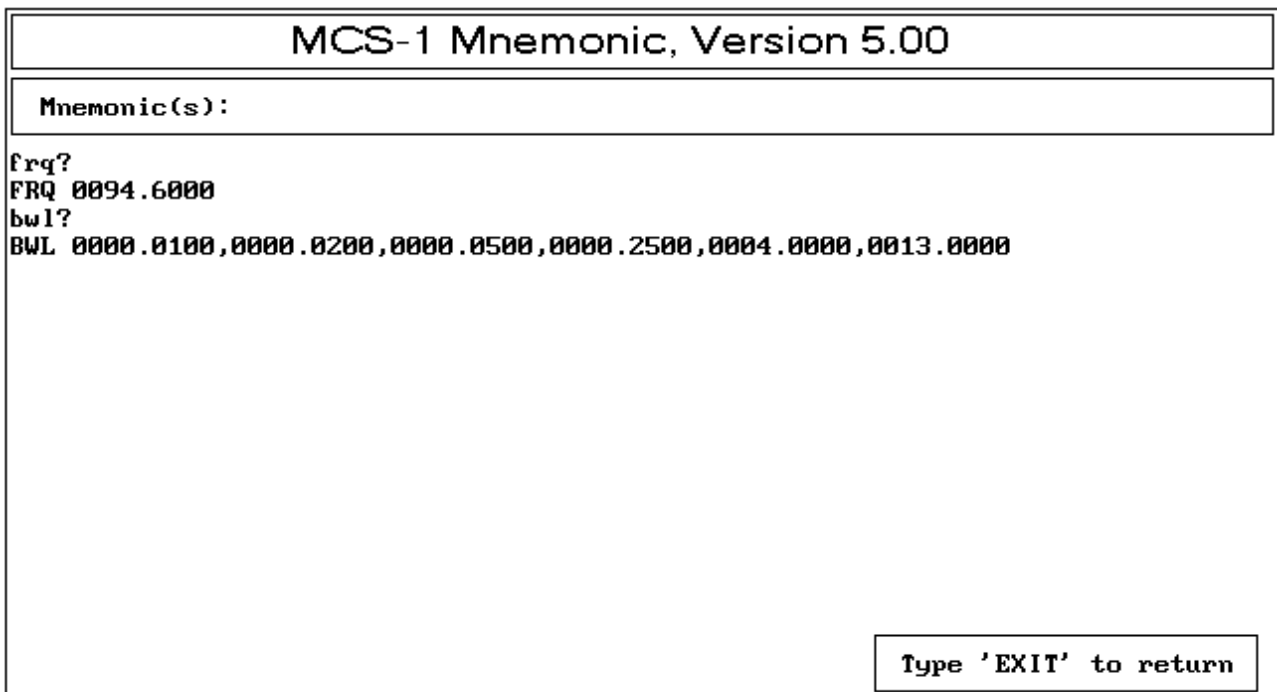
The stepping operation is modified by the [susA] and [Rprt] control commands. See **paragraph I.7.3.2.2.1** for more detail.

The <F8 Manual> function command operates exactly like the manual function command in **paragraph I.7.3.2.3.4** with the exception that the <F8 Manual> function command in the EXECUTE STEP SECTOR menu is used to take the Miniceptor out of the sector step operation mode.

The <F9 Log_Frq> and <F10 Exit> keys function exactly as they do on the IMMEDIATE menu (see **paragraph I.7.3.2.3.5**).

I.7.4 MNEMONIC

To enter the MNEMONIC control environment, press the <F2 Mnemonic> function key from the MCS-1 Main menu. The MNEMONIC menu, shown in **Figure I-18**, permits the operator to communicate with the receiver by directly sending remote mnemonic commands. This menu is designed to provide greater operational flexibility for an operator familiar with the receiver's remote command set (refer to the receiver manual for a complete listing of the receiver's remote commands). It permits the operator to command or query the receiver for information that the normal MCS-1 operational menus do not provide. This menu is terminated by typing "EXIT" and then pressing the <Enter> key.



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Figure I-18. MNEMONIC Menu

I.7.5 FREQUENCY OFFSET

The FREQUENCY OFFSET control environment is entered from the MCS-1 Main menu by pressing the <F3 F_Offset> function key but is only available if the controlled Miniceptor is either a WJ-8609-XX or a WJ-8609A-XX. If any other receiver is being controlled, pressing the <F3 F_Offset> results in a "beep" being heard, and the MCS-1 Main menu continuing to be displayed.

The FREQUENCY OFFSET control environment, shown in **Figure I-19**, allows the operator to set an offset frequency to the WJ-8609-XX or WJ-8609A-XX receiver's tuning range. The ability to change the offset frequency is essential when there is an RF or microwave block converter attached to the front end of the receiver. The selection of the offset frequency can be accomplished either by selecting pre-defined offset values, or by entering an offset value manually. The pre-defined values are derived from the currently available Signia-IDT, Inc. microwave block converter units (WJ-9290/XXXX). Choosing the correct block converter guarantees the correct pre-defined offset frequency values. The <Up Arrow>, <Down Arrow>, and <numeric 0 to 9> keys can be used to select the frequency offset selection fields. The "-->" character in the "Select" column indicates the current offset field selection. To leave the FREQUENCY OFFSET control environment, press the <F10 Exit> function key.

WJ-8609 WIDE BAND MINICEPTOR			
Select Offset Freq Menu:			
Select	Block Converter	Offset freq	IF output
0	Enter offset freq manually	----- . ---- MHz	Inverted
1	No offset	00000.0000 MHz	Upright
2	WJ-9290/3542 (3.5 to 4.2 GHz)	05504.0000 MHz	Inverted
3	WJ-9290/6875 (6.8 to 7.5 GHz)	05504.0000 MHz	Upright
→ 4	WJ-9290/5968 (5.9 to 6.8 GHz)	04928.0000 MHz	Upright
5	WJ-9290/7589 (7.5 to 8.9 GHz)	06912.0000 MHz	Upright
6	WJ-9290/1722 (1.7 TO 2.2 GHz)	02688.0000 MHz	Inverted
7	WJ-9290/1011 (10.7 TO 11.7 GHz)	09728.0000 MHz	Upright
8	WJ-9290/1112 (11.7 TO 12.5 GHz)	10624.0000 MHz	Upright
9			

<↑/↓> keys to select the fields

f10 Exit

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Figure I-19. FREQUENCY OFFSET Menu

I.7.6 RESET RECEIVER

To enter the RESET RECEIVER control environment, press the <F5 Reset_Rcv> function key from the MCS-1 Main menu. This environment, shown in **Figure I-20**, allows the operator to clear all of the receiver memories, clear all lockout information, and reset receiver operating parameters to their default states quickly and easily.

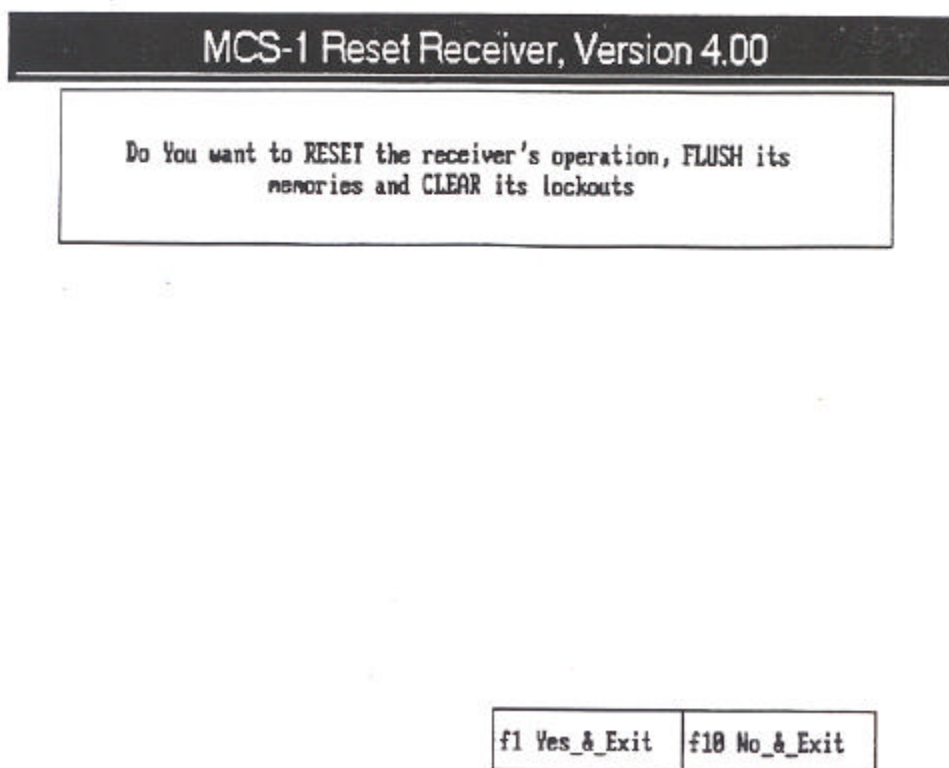


Figure I-20. RESET RECEIVER Menu

I.7.7 MISSIONS

To enter the MISSIONS control environment, press the <F6 Missions> function key from the MCS-1 Main menu. This environment allows the operator to create various "missions" by storing current receiver control parameters on the PC's disk or diskette, to transfer these parameters directly to the receiver when desired, and to view the stored data.

The MISSIONS Menu shown in **Figure I-21**, contains:

- a. Mission "Type" selection window
- b. "Path" selection window
- c. "Files available" window
- d. "Receiver ID" window
- e. "Date & Time" window
- f. Function keys window

The Tab key is used to select between the "Type", "Path", and "Files Available" windows. The <Up> and <Down> followed by the <Enter> keys are used to enter the control field of the currently-selected control block.

MCS-1 Missions Storage & Retrieval, Version 5.00		
Type: SWEEP IMM <hr/> MANUAL SWEEP IMM SWEEP SECTOR STEP LOCKOUT MEMORY	SWEEP IMM Data files: TEST MA6 133 09-15-94 SWEEPING MA6 133 09-26-94 SWEEP2 MA6 133 09-26-94	Receiver ID: WJ-8607-00 <hr/> Date & Time 09-26-1994 15:50:14 <hr/> Function Keys: f1: Load f2: Save f3: View f4: f10: Exit
Path: C:\MCS\05 <hr/> . .. A [A:] [B:] [C:]		
Use <UP>, <DOWN> or <TAB> key to select path/file. use <ENTER> key to execute the selection		

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Figure I-21. MISSIONS Menu

I.7.7.1 Mission Types

The six types of mission storage and retrieval provided by the MISSIONS control environment are:

- a. Manual - the current receiver manual setup parameters are processed (i.e., stored, retrieved, or listed).
- b. SWEEP IMM - only the current receiver sweep immediate parameters are processed.
- c. SWEEP SECTOR - the receiver sweep list and all receiver parameters from memory that comprise the sweep are processed.
- d. STEP - the receiver step list and associated memory data are processed.
- e. LOCKOUT - only the specified lockout channels are processed.
- f. MEMORY - only the specified receiver memories are processed.

These missions are selectable through the "Type" window via a list. To select an option from the list, use the <Up Arrow> and/or <Down Arrow> keys to point to the desired selection, then press the <Enter> key.

I.7.7.2 **Path Selection**

The "Path" window allows the operator to select the disk drive and/or path name for where the MISSIONS data is to be stored or from where it is to be retrieved.

I.7.7.3 **"Files available" Window**

The "Files available" window displays the names of mission files that are stored on the selected disk drive. Only the names of files that are matched to the currently-controlled Miniceptor type and currently-selected mission type are shown.

I.7.7.4 **Function Keys Window**

There are four function keys associated with MISSIONS:

- <F1 Load> When pressed, retrieves data from the specified disk and downloads it to the receiver.
- <F2 Save> When pressed, retrieves data from the Miniceptor and saves it to the specified disk drive. When this function is activated, the operator is prompted to enter a mission filename to which the data will be stored (see **Figure I-22**). This filename cannot exceed eight alphanumeric characters and does not want an extension since the extension is supplied automatically. If no characters are entered, the Save operation is terminated. When a correct filename has been entered, data being stored to the file is displayed as shown in **Figure I-23**.
- <F3 View> When pressed, allows the operator to view mission data stored on the selected disk drive (as shown in **Figure I-24**).
- <F10 Exit> To return to the MCS-1 Main menu, press the <F10 Exit> function key.

I.7.7.5 **Filename Extension Format**

The MISSION control environment automatically appends the correct filename extension to each mission filename. The data structure of the file extension is encoded to represent not only the type of mission file that is being created, but also the type of Miniceptor from which the data was retrieved. The filename extension always consists of three characters. The first character is always "M" (for MISSION), the second represents the type of Miniceptor, and the third represents the type of mission file.

Miniceptor Type - the Miniceptor receiver family has developed and expanded greatly in the recent past, and some receiver parameters may not be compatible with other members of the family. For example, the WJ-8809 Microwave Miniceptor has a tuning range from 100 MHz to 18 GHz, while the standard WJ-8607 Miniceptor receiver has a tuning range from 2 to 512 MHz. In order to prevent transferring incompatible data between Miniceptors, the type of Miniceptor is encoded in the filename extension. Encoded characters and the Miniceptors they relate to are shown in **Table I-2**.

Save WJ-8607-00's SWEEP IMM Mission to C:\MCS\W5
File name: █
File name should not exceed 8 characters; <ENTER> without filename to exit

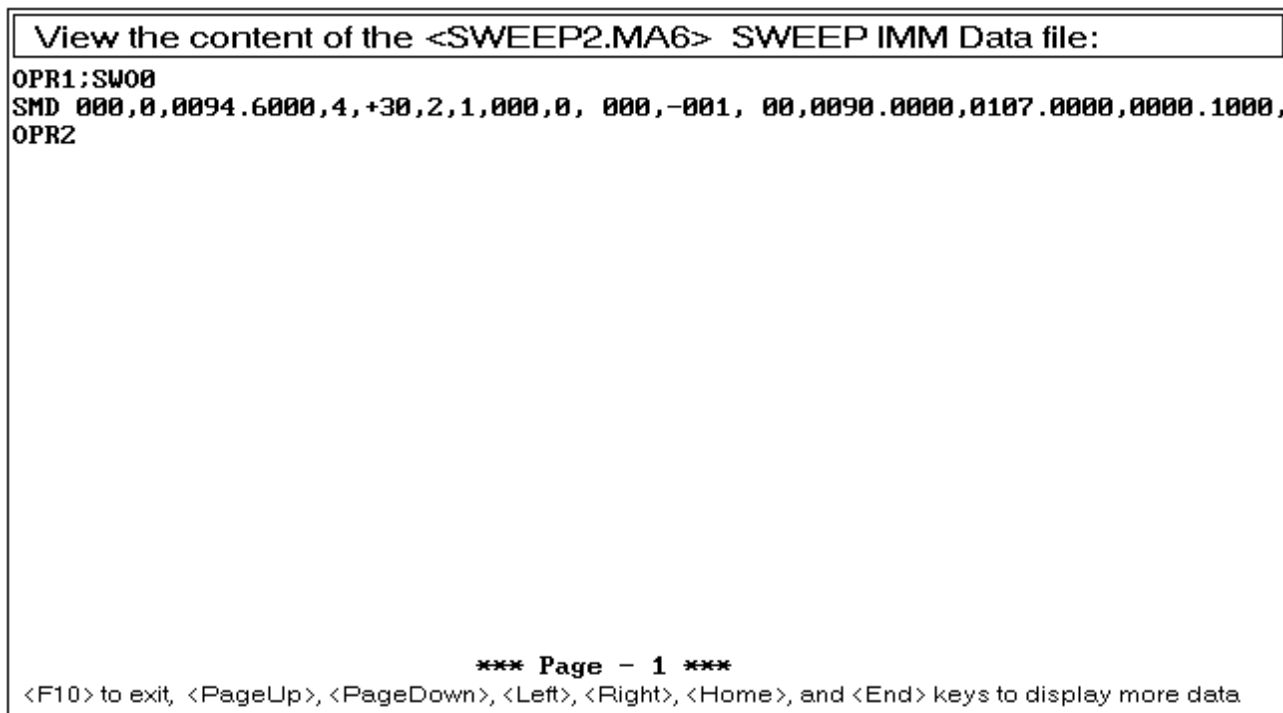
94-029

Figure I-22. MISSIONS "Save" Filename Entry Display

Save WJ-8607-00's SWEEP IMM Mission to C:\MCS\W5
File name: sweep2
OPR1:SW00 SMD 000,0,0094.6000,4,+30,2,1,000,0, 000,-001, 00,0090.0000,0107.0000,0000.1000, 1,+0.00,+0000.0000;SAC 000;RAC 000 OPR2
File SWEEP2 has been created; Press <any key> to exit

94-030

Figure I-23. MISSIONS "Save" Data Display



94-031

Figure I-24. MISSIONS "View" Display

Table I-2. Miniceptor-Type/Character Cross-Reference

Encoded Character	Miniceptor(s)
A	WJ-8607, WJ-8607-5, WJ-8607-6, WJ-8607-88, WJ-8607A WJ-8608, WJ-8608-1 WJ-8604, WJ-8604-1, WJ-8604-2 WJ-8604-3
B	WJ-8809
C	WJ-8609, WJ-8609-1, WJ-8609A, WJ-8609A-1
D	WJ-8607-4
E	WJ-8607-2
F	WJ-8654
G	WJ-8700

Mission Type - to differentiate between mission types, encoded characters are also used as shown in **Table I-3**.

Table I-3. Mission Type/Character Cross-Reference

Encoded Character	Mission Type
0	LOG DATA from DATA LOGGING function
1	Manual MISSION file
2	Sweep sector MISSION file
3	Step sector MISSION file
4	Lockout MISSION file
5	Memory MISSION file
6	Sweep Immediate MISSION file

As an example, a file named "MISSION1.MB1" represents an Manual MISSION file with data collected from a WJ-8809 receiver.

NOTE

MISSION files created by MCS V0.01's DISK ACCESS function cannot be used "as is" by MCS-1 V3.00's MISSIONS environment and vice versa. By correctly renaming filename extensions, however, the mission files can be interchanged.

I.7.8 DATA LOGGING

The Data Logging function gives the user the ability to automatically collect and store minicaptor information such as Tuned frequencies, Relative Signal-Strength, and Date-Time, onto a floppy disk or a hard disk of a Personal Computer (PC). This data can be later post-processed and thoroughly analyzed on a PC. Data Logging supports manual, sweep immediate and step modes of operation.

The Data logging function is accessible through the MCS's menu window. Upon entering this function, the user is provided options to specify the disk drive, the file name and the data directory path to be used with data logging. If the user activates the Data logging operation by pushing a pre-defined Run function key without specifying the file name, data will be displayed but not stored. If the existing file name is used, the program will flag a confirmation message and wait for the user to respond before overwriting the existing file.

There are nine function keys defined in the Data logging menu, SUSPEND data logging, ADVANCE data logging, Stop data logging, change waterfall color scale (WFcolor), download new mission (Mission), Run data logging, change data logging display type, select waterfall display type (WF_Type) and Exit data logging.

While in this menu, the data log file size and the receiver operational status are displayed. The data log file size display informs the operator of disk usage. The receiver operational status provides the operator with real time confirmation of the current receiver operations.

During data logging, a real-time three-dimensional or one of five waterfall graphical representations of signal logging is presented. The display is selectable by the user. On the real-time three-dimensional display, x-axis represents frequency, y-axis represents amplitude, and z-axis represents time. On the waterfall displays, x-axis represents frequency, y-axis represents time, and a color-coded waterfall represents signal amplitude. The amplitude color code representation can be scaled and re-assigned by the user. Up to ten user's preset waterfall color scaling can be stored and recalled. When a Manual Mode data logging is activated, a two-dimensional display is used. The time is represented on the x-axis and amplitude on the y-axis.

Data logging also supports Mission downloading as well as Marker operation. Mission downloading allows the user to down-load the receiver setup from a disk. This convenience not only helps speed up the receiver setup but also allows the user to create missions in advance. Marker operation provides a tool to identify a frequency of a signal of interest without disrupting the receiver operation. By walking a marker across the display, the user can read its frequency value.

To enter the DATA LOGGING control environment, press the <F7 Data_Log> function key from the MCS-1 Main menu. This environment, shown in **Figures I-25** through **I-31**, allows the operator to automatically collect and store on disk receiver setups and signal data from the controlled Minicaptor. This data can be post-processed and analyzed using the DATA ANALYSIS control environment after the logging mission is over. Data logging can be used with manual, Sweep, and Step modes of operation. All activities within this environment are controlled by File Control commands, Signal Activities Display Control commands, and predefined function keys.

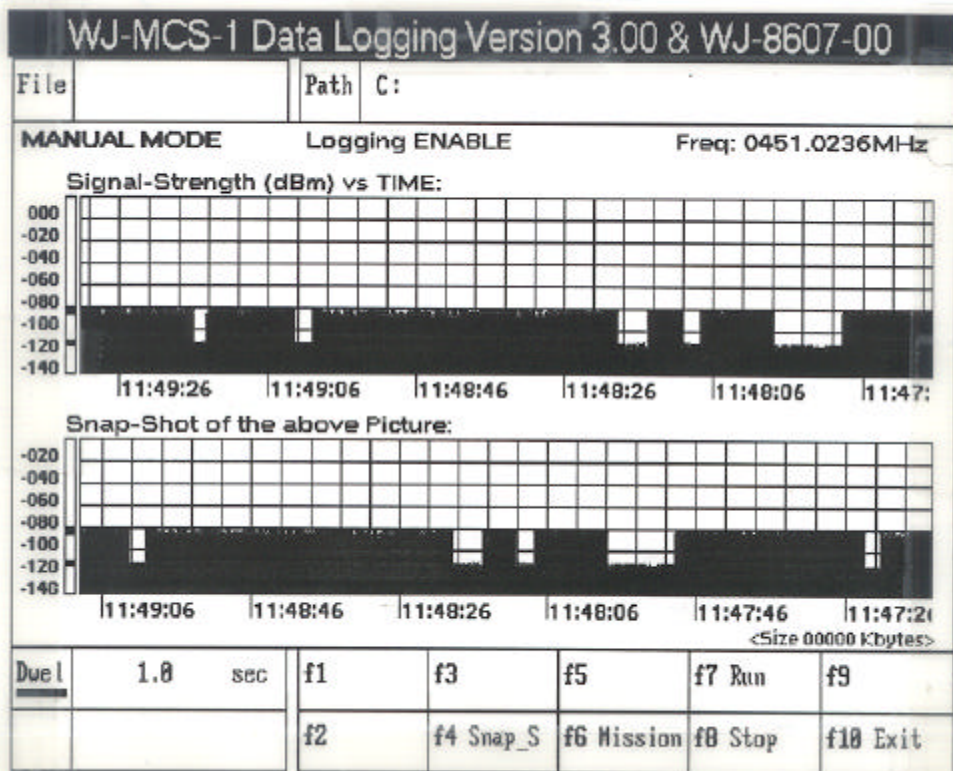


Figure I-25. DATA LOGGING Menu (Manual Mode)

I.7.8.1 **File Control Commands**

There are two file control commands in the DATA LOGGING environment:

- a. "File" - used for filename entry. When this command is activated by placing the cursor under the word "File" and pressing the <Enter> key, brackets appear in the filename field. Enter either "MANUAL" (for Manual Mode) or the name of the file to which the data will be stored (e.g.: DATALOG1) and press the <Enter> key. This filename cannot exceed eight alphanumeric characters and is entered without an extension. If more than eight characters are entered, only the first eight are used. If no characters are entered, logged data is discarded and no data is stored. If the filename already exists, a warning message is displayed which asks the operator to confirm that the existing file should be overwritten with the new data. If the operator enters "Y", the existing file is replaced. If any other key is pressed, the operator is asked to enter a different filename.
- b. "Path" - When this command is activated by placing the cursor under the word "Path" and pressing the <Enter> key, brackets appear in the path field. Enter the path to the directory in which the data will be stored (e.g.: C:\MCS) and press the <Enter> key. The path must consist of at least a disk drive name.

I.7.8.2 **Signal Activities Display Control Commands**

The MANUAL MODE Signal Activities Display provides the operator with:

- a. Filename of file being logged to.
- b. Path to logged file.
- c. Mode.
- d. Logging Operation Status (ENABLE or DISABLE).
- e. Frequency being logged.
- f. Signal-Strength vs. Time visual display.
- g. If desired, a snapshot of the visual display at the time the operator invokes the Snap-S function.
- h. Dynamically-updated size (in kilobytes) of the log file.

The SWEEP or STEP MODE Signal Activities Displays provide the operator with:

- a. Filename of file being logged to.
- b. Path to logged file.
- c. Mode
- d. Logging operation status (ENABLE or DISABLE)

- e. Display type ("3-D" or "Waterfall" type)

NOTE

SWEEP SECTOR does not allow "3-D" display.

- f. Multiple traces of signal activity vs. frequency (or channel number if Step Mode) vs. Time.
- g. Marker frequency (SWEEP or STEP Modes only).
- h. Number of Sweep points (SWEEP MODE only).
- i. Dynamically-updated size (in kilobytes) of the log file.

There is one Signal Activities Display Control Command in the MANUAL MODE Data Logging environment:

"Dwel" - (Dwell) allows the operator to specify the length of time between samples of the specified frequency.

There are two Signal Activities Display control commands in the SWEEP or STEP MODE DATA LOGGING environment:

- a. "mKer" - In the Sweep data logging, "mKer" (Marker) allows the operator to enter the frequency where the marker is to be displayed on the trace baseline. When this command is activated by placing the cursor under the word "mKer" and pressing the <Enter> key, brackets appear in the "MHz" field. Enter the desired frequency (e.g.: 930.12500) and press the <Enter> key. When the sweep is started, the marker will be displayed under the trace baseline (provided that the entered marker frequency is within the sweep limits). If the marker is above the sweep limits, an arrow ("-->") appears below the trace baseline to indicate that the marker is set higher than the upper sweep limit. If the marker is below the sweep limits, an arrow ("<--") appears below the trace baseline to indicate that the marker is set lower than the lower sweep limit. In the Step data logging, "mKer" represents the step channel number. Its related frequency is shown on top of the trace baseline. In SWEEP SECTOR mode, while selecting the "mker" control field, pressing the <TAB> key moves the marker baseline from one sector to the other.
- b. "Trac" - (Trace)/"Colr" - (Color) field displays the "Trac" command field while showing the "3-D" display and display the "Colr" command field while in the Waterfall display mode. The Trace command field allows the operator to enter the number of 3-D traces (**Figure I-26**) to be displayed on the screen. When this command is activated by placing the cursor under the word "Trac" and pressing the <Enter> key, brackets appear in the trace field. Enter the desired number of traces (from 2 to 15) and press the <Enter> key. When the 3-D display is selected and the sweep is started, the first 3-D trace is

displayed and moves up as the second trace begins. Subsequent traces continue to move up previous traces until the selected number of traces are displayed. Each new trace appears at the bottom of the display, and the oldest trace is "bumped" off the top. The Color command field allows the operator to change the waterfall display color.

There are two different display types provided by the DATA LOGGING environment:

- a. "3-D" - (three-dimensional, shown in **Figure I-26**) uses the x-axis for frequency, the y-axis for signal amplitude, and the z-axis for time. The number of traces displayed depends on the "Trac" entry provided by the operator. The SWEEP SECTOR mode does not allow the "3-D" display.

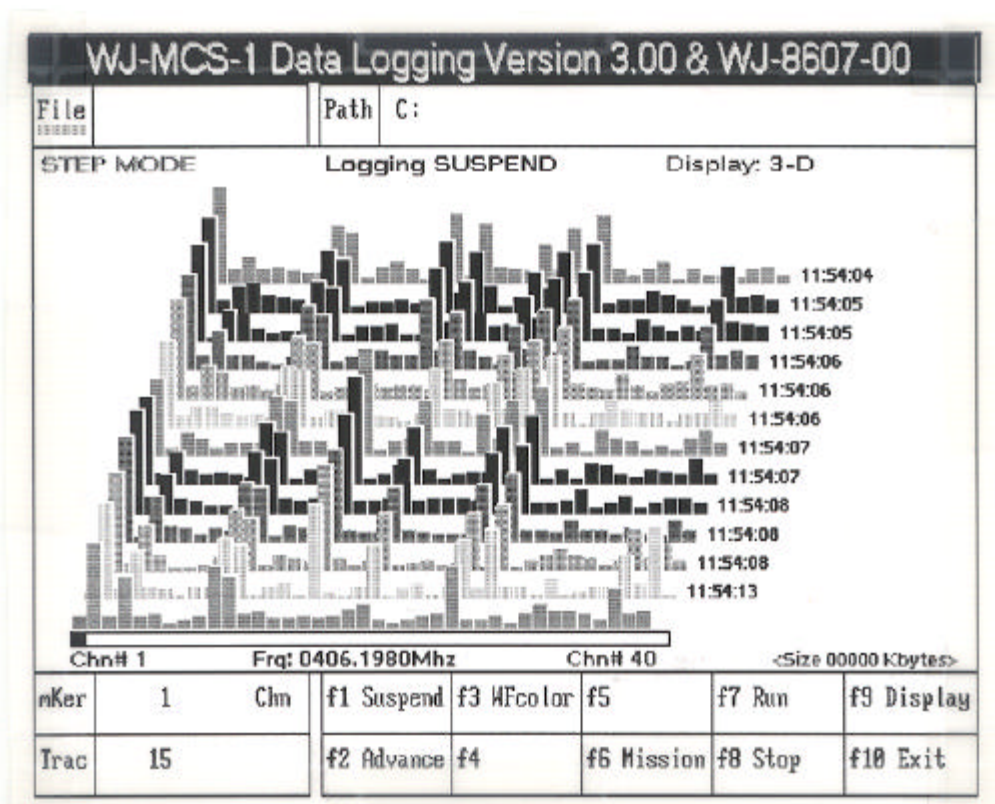


Figure I-26. DATA LOGGING Menu (SWEEP or Step Mode)

- b. "WF" - (waterfall). There are five different types of waterfall display discussed in the following paragraphs.
 - 1. "WF_Line 1" - (Waterfall Line 1, shown in **Figure I-27**) uses a combination of two-dimensional and three-dimensional displays. The two-dimensional display represents frequency (x-axis) versus signal amplitude (y-axis) in a block format display. The three-dimensional display represents frequency (x-axis) versus time (y-axis) versus signal amplitude (color code). The two-dimensional display is cleared prior to each sweep, while the three-dimensional display retains sweep data.

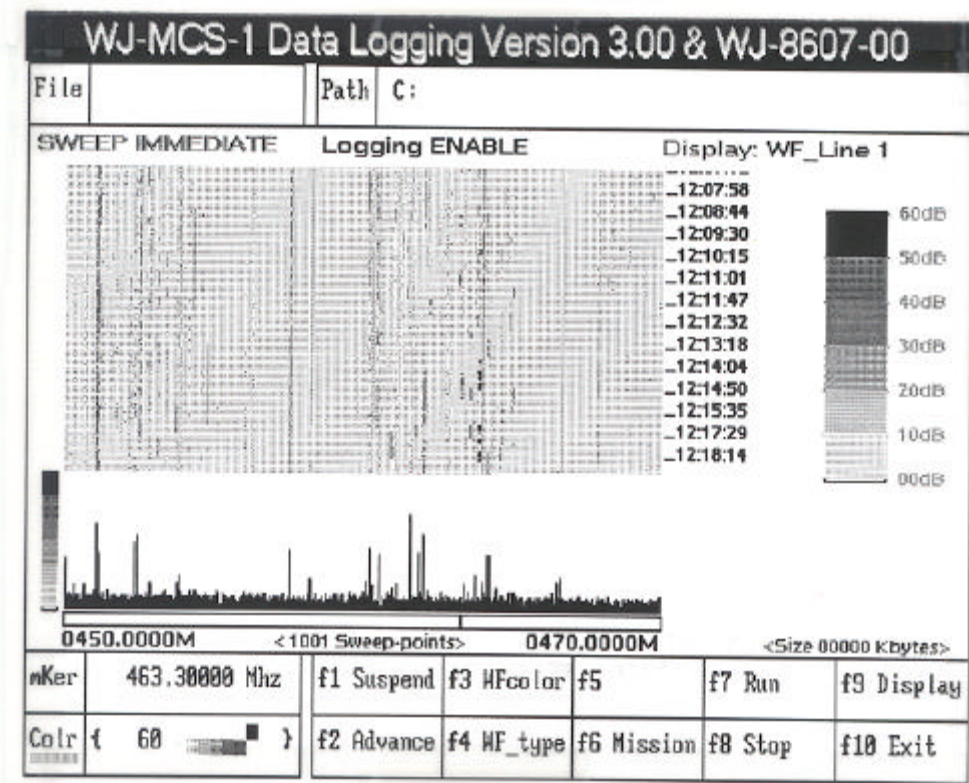


Figure I-27. DATA LOGGING WF_Line 1 Display

2. "WF_Line 2" - (Waterfall Line 2, shown in **Figure I-28**) uses a similar combination of two-dimensional and three-dimensional displays, the three-dimensional display being the same as WF_Line 1. While the two-dimensional display uses the same block format display as WF_Line 1, the peaks of the signal amplitude are color coded for easy recognition.

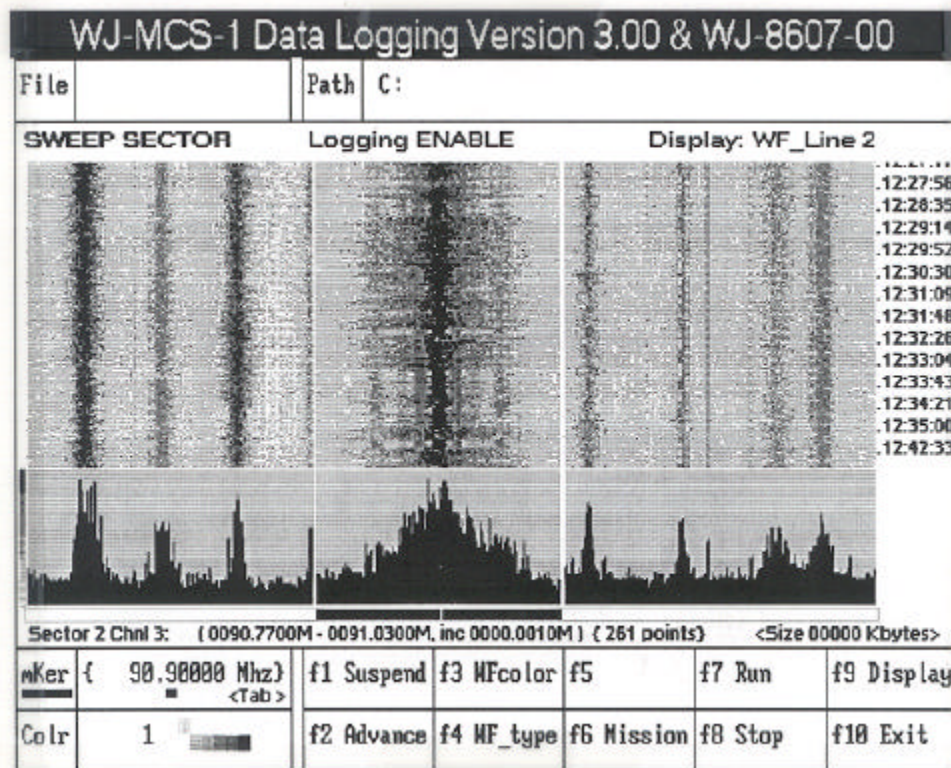


Figure I-28. DATA LOGGING WF_Line 2 Display

3. "WF_Line 3" - (Waterfall Line 3, shown in **Figure I-29**) provides a similar display to those of WF_Line 1 and WF_Line 2 in that the three-dimensional display is the same. The two-dimensional display uses a line format to connect the peaks of the signal amplitude to give a line graph type display. As in the previous two WF_Line displays, the two-dimensional display is cleared prior to each sweep, while the three-dimensional display retains sweep data.

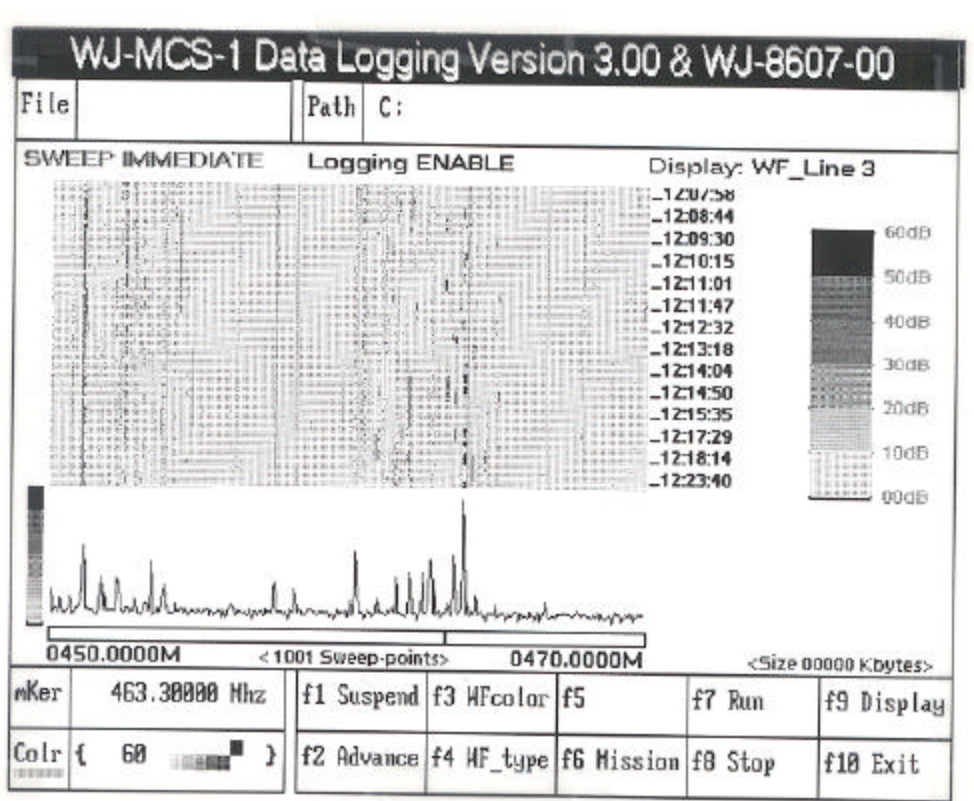


Figure I-29. DATA LOGGING WF_Line 3 Display

4. "WF_Cumulative" - (waterfall cumulative, shown in **Figure I-30**) provides the cumulative captured signal activities on the two-dimensional display. This display option shows the signal amplitude of the logged spectrum in a line graph format similar to WF_Line 3 for each sweep. It does not clear the display between sweeps thereby presenting an accumulation of sweep data for the sector swept. This display allows the operator to evaluate the density of the monitored frequency range, and by allowing the display to update for a reasonable period of time, the operator can readily determine which sections of the monitored spectrum are unused.

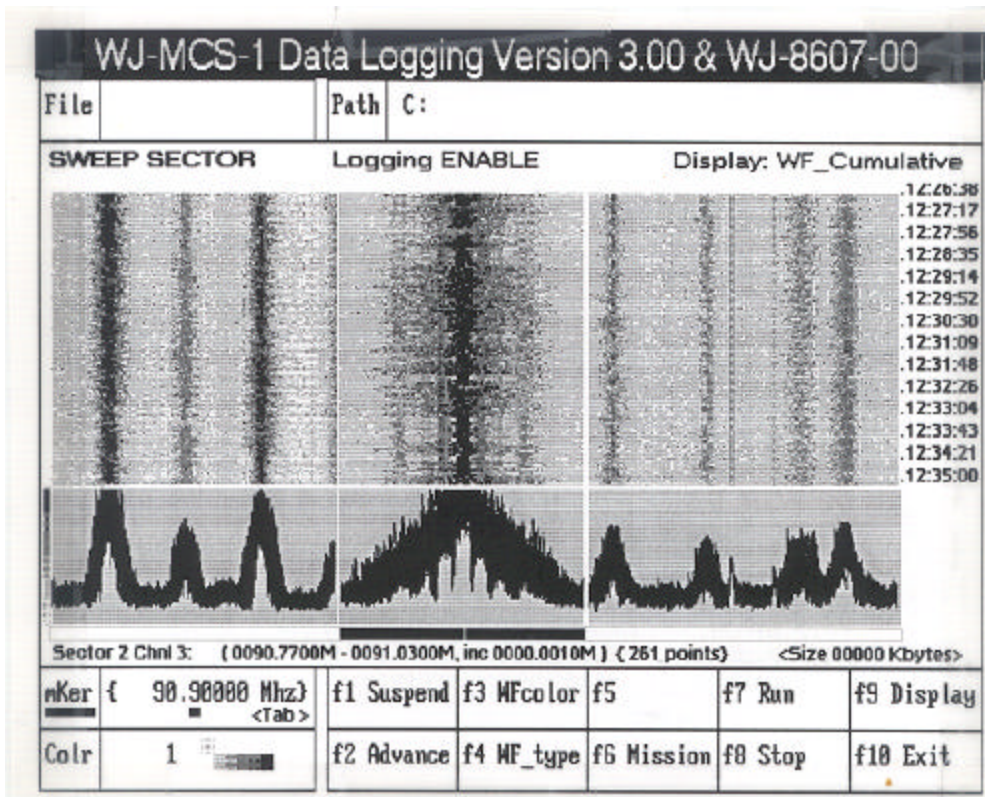


Figure I-30. DATA LOGGING WF_Cumulative Display

- "WF_Scatter" - (waterfall scatter, shown in **Figure I-31**) provides the cumulative captured signal activities on the two-dimensional display by plotting points for each captured signal, color coded to show amplitude. The display is not cleared between sweeps, thus enabling the operator to view the signal activity over time.

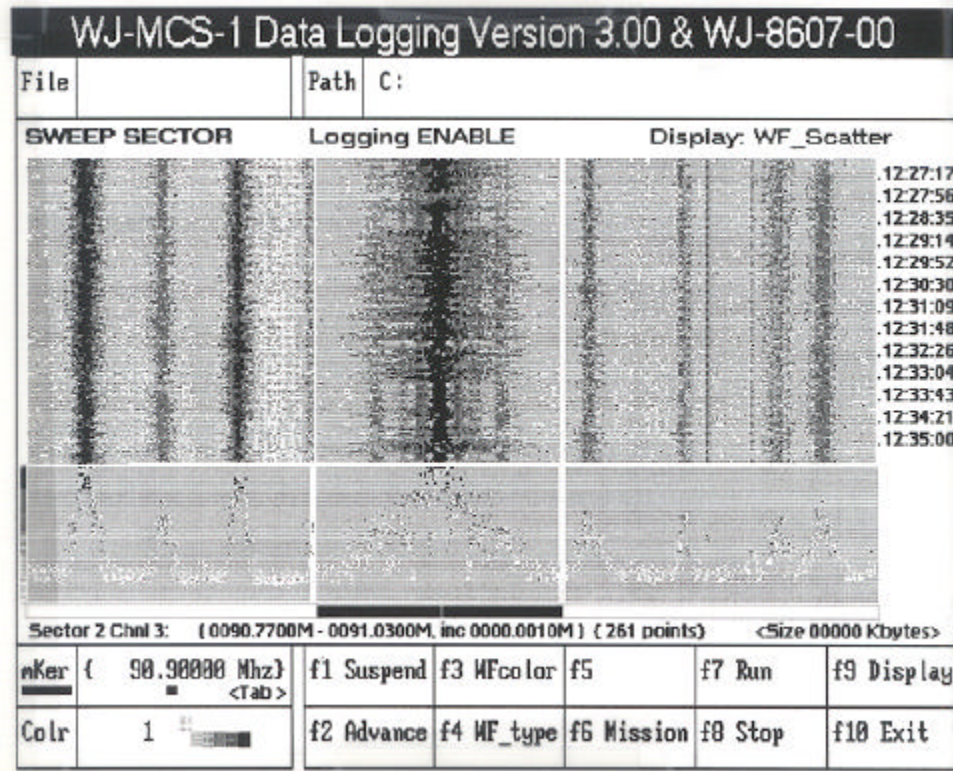


Figure I-31. DATA LOGGING WF_Scatter Display

I.7.8.3 **Predefined Function Keys**

There are five predefined function keys associated with the MANUAL MODE DATA LOGGING environment. These function keys and their associated functions are shown in **Table I-4**.

There are eight function keys associated with the SWEEP and STEP MODE Data LOGGING ENVIRONMENT. These function keys and their associated functions are shown in **Table I-5**.

Table I-4. MANUAL MODE DATA LOGGING Environment Function Keys

Function Key	Associated Environment/Function
<F4 Snap-S>	Provides snapshot of current display on snapshot trace
<F6 Mission>	Allows selection of mission to be loaded to receiver
<F7 Run>	Begins logging operation
<F8 Stop>	Terminates logging operation
<F10 Exit>	Exits the DATA LOGGING environment and returns to the MCS-1 Main Menu.

Table I-5. SWEEP/STEP MODE DATA LOGGING Environment Function Keys

Function Key	Associated Environment/Function
<F1 Suspend>	Temporarily suspends logging operation without terminating it
<F2 Advance>	Resumes logging operation
<F3 WF Color>	Allows the operator to adjust scale of displayed signals
<F4 WF Type>	Allows selection of the type of Waterfall display
<F6 Mission>	Allows selection of mission to be loaded to receiver
<F7 Mission>	Begins logging operation
<F8 Stop>	Terminates logging operation
<F9 Display>	Allows selection of 3-D, WF/Real, or WF/Peak display
<F10 Exit>	Exits the DATA LOGGING environment and returns to the MCS-1 Main Menu

Pressing the <F6 Mission> key in either MANUAL MODE or SWEEP/STEP MODES results in the mission selection screen shown in **Figure I-32** being displayed. This display contains two windows, one for "File" and one for "Path". Pressing the <Tab> key toggles between these two windows. Within either window, using the <UP ARROW> and <DOWN ARROW> keys moves the highlight up and down through the selectable files or paths. Once the desired path and filename have been highlighted, pressing the <ENTER> key selects the highlighted choices and loads the mission. Pressing the <F10> key returns the screen to the previous display.

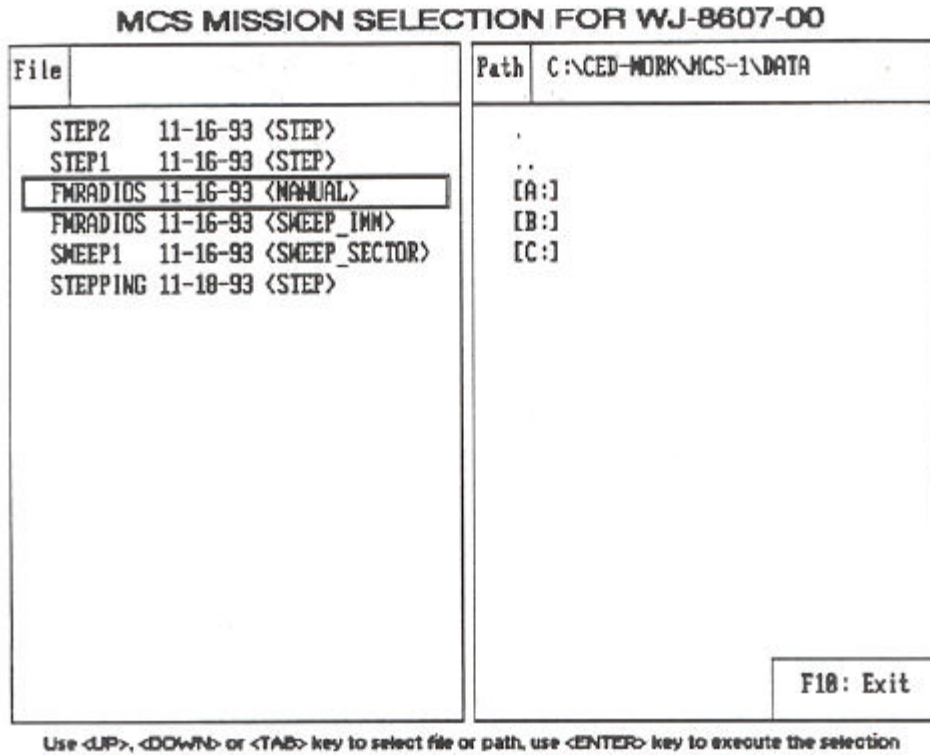


Figure I-32. DATA LOGGING "MISSION" Selection Display

Pressing the <F3 WFCOLOR> key in SWEEP or STEP MODE results in the Waterfall Color vs. Amplitude Selection screen shown in **Figure I-33** being displayed. This display contains color scale and amplitude selection. Pressing the <Left Arrow> and <Right Arrow> keys moves the cursor among the amplitude selections. Pressing the <Up Arrow> and <Down Arrow> keys selects new amplitude values. Once values have been set, pressing the <F10> key returns the screen to the previous display.

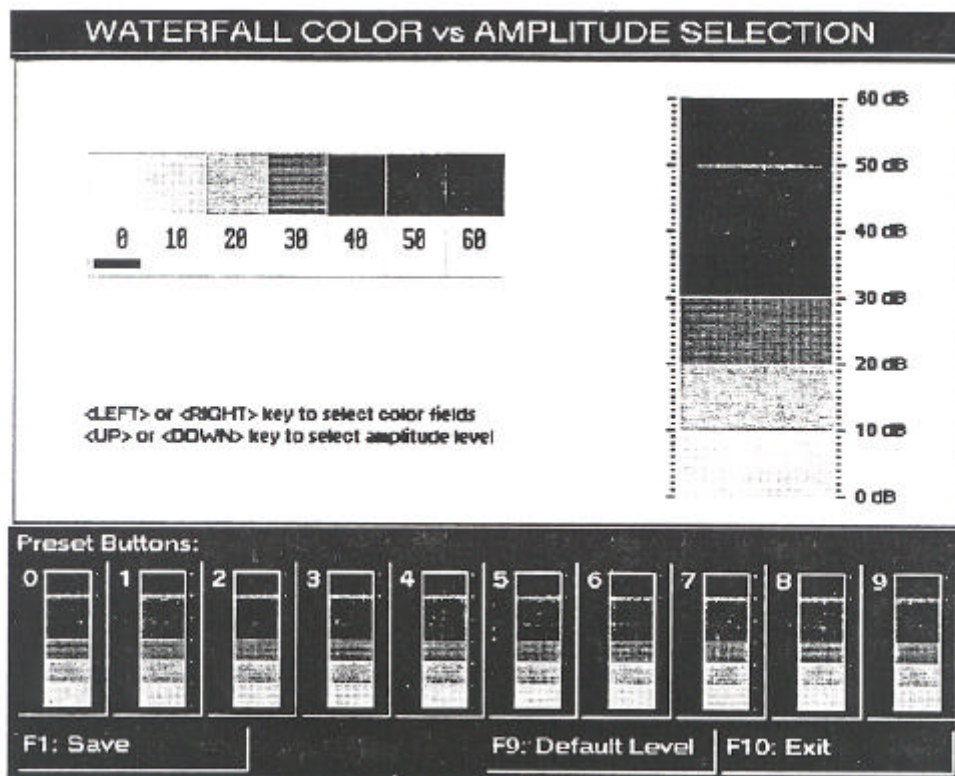


Figure I-33. Waterfall Color vs Amplitude Selection Display

I.7.9 DATA ANALYSIS

To enter the DATA ANALYSIS control environment, press the <F8 Analysis> function key from the MCS-1 Main menu to display the File Selection Screen shown in **Figure I-34**. The display contains two windows, one for filename and one for path. Pressing the <Tab> key toggles between the two windows. Pressing the <Up Arrow> and <Down Arrow> keys moves the highlight between selections within a window. After the desired path and filename have been highlighted, press the <ENTER> key to retrieve the highlighted selection. This environment, allows the operator to play back, display, and analyze data that was collected in the DATA LOGGING environment and was stored on disk. The same types of displays available in the DATA LOGGING environment are available in DATA ANALYSIS. All activities within this environment are controlled by Signal Activities Display Control commands, and predefined function keys.

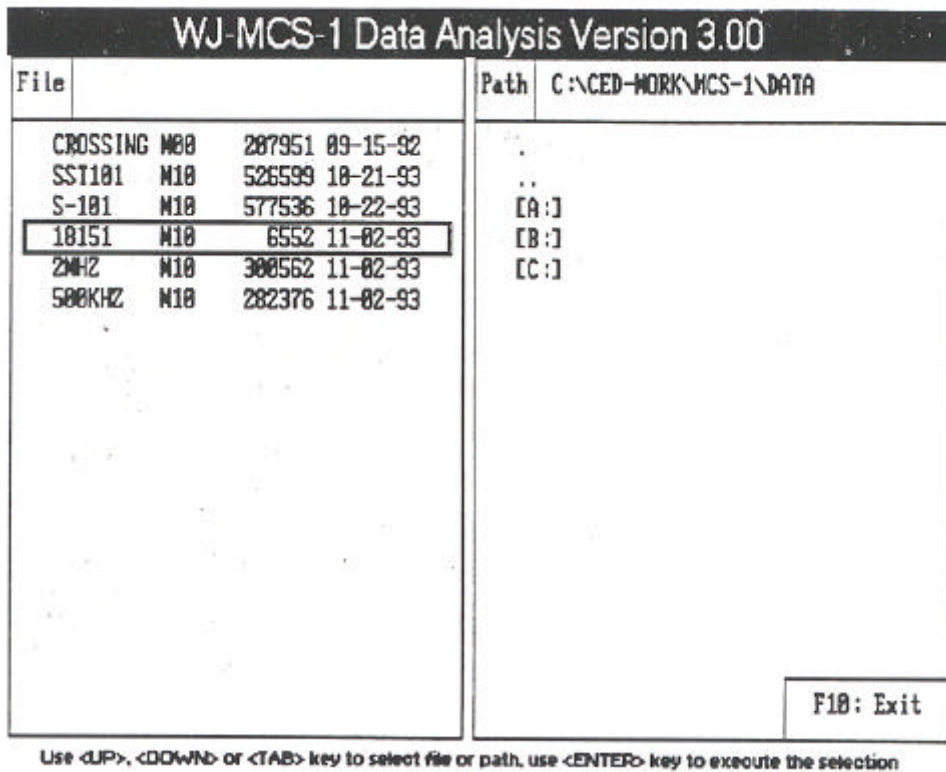


Figure I-34. DATA ANALYSIS Environment File/Path Selection Display

I.7.9.1 Signal Activities Display Control Commands

The MANUAL MODE Signal Activities Display shown in **Figure I-35** provides the operator with:

- a. Data file name
- b. Date of collection
- c. Frequency
- d. Receiver type, serial number, and firmware version number
- e. Operation mode
- f. Play Status (Play, Paused, Complete)
- g. Signal Activities display (Signal-Strength vs. Time)
- h. If desired, a snapshot of the display for any given time

The SWEEP/STEP MODE Signal Activities displays shown in **Figure I-36** provide the operator with:

- a. Data file name
- b. Date of collection
- c. Display type ("3-D" or "Waterfall" type) (SWEEP SECTOR does not allow "3-D" display)
- d. Receiver type, serial number and firmware version number
- e. Operation mode
- f. Play status (Play, Paused, Complete)
- g. Signal activities display - frequency (SWEEP Mode) or channel number (STEP Mode) vs. signal strength vs. time.
- h. Resolution (WF displays)

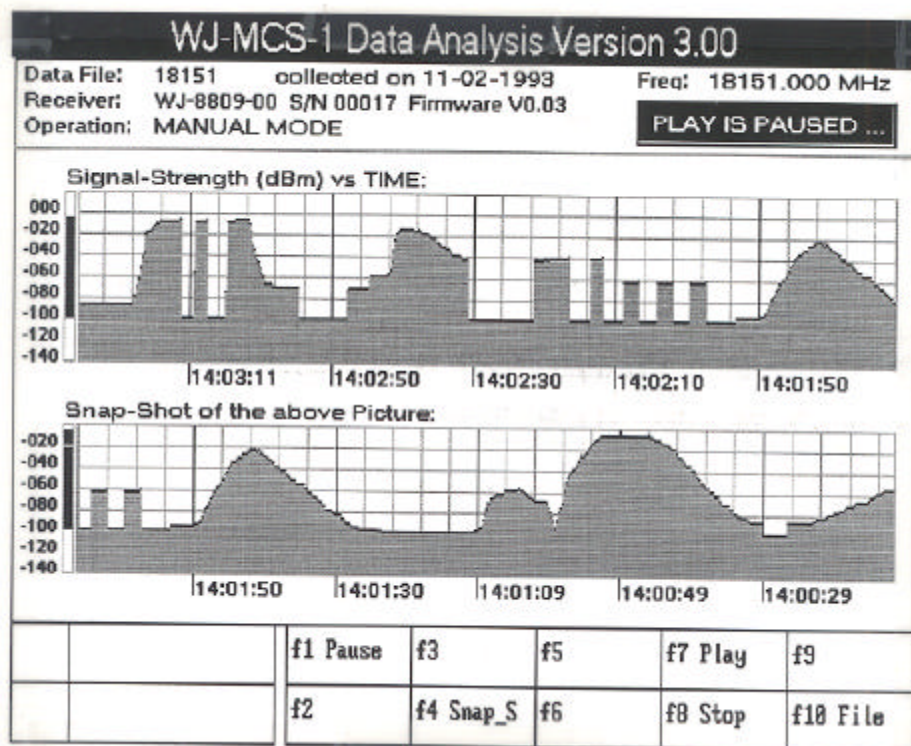


Figure I-35. MANUAL Mode Data Analysis Display

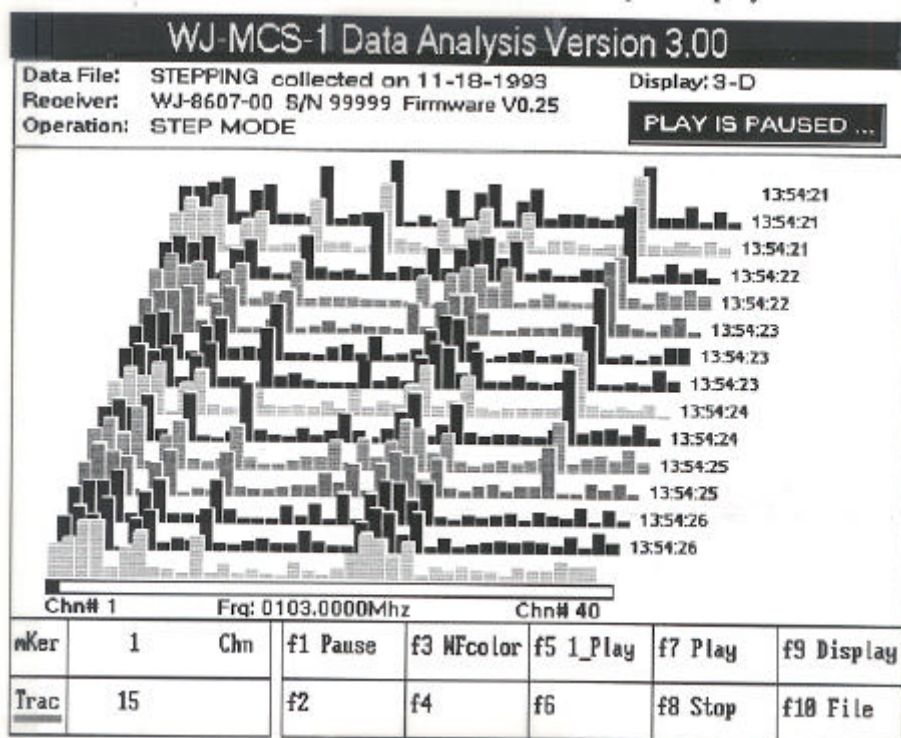


Figure I-36. DATA ANALYSIS Menu (SWEEP or Step Mode)

There are two Signal Activities Display control commands in the SWEEP or STEP DATA ANALYSIS environment:

- a. "mKer" - In Sweep data analysis, "mKer" (Marker) allows the operator to enter the frequency where the marker is to be displayed on the trace baseline. When this command is activated by placing the cursor under the word "mKer" and pressing the <Enter> key, brackets appear in the "MHz" field. Enter the desired frequency (e.g.: 930.12500) and press the <Enter> key. When the sweep is started, the marker will be displayed under the trace baseline (provided that the entered marker frequency is within the sweep limits). If the marker is above the sweep limits, an arrow ("-->") appears below the trace baseline to indicate that the marker is set higher than the upper sweep limit. If the marker is below the sweep limits, an arrow ("<--") appears below the trace baseline to indicate that the marker is set lower than the lower sweep limit. In step data analysis, "mKer" represents the step channel number. Its related frequency is displayed right on top of the trace baseline. In SWEEP SECTOR mode, while selecting the "mker" control field, pressing the <TAB> key moves the marker baseline from one sector to another.
- b. "Trac" - (Trace)/"Colr" - (Color) field displays the "Trac" command field while in the "3-D" display mode and display the "Colr" command field while in the Waterfall display mode. The Trace command field allows the operator to enter the number of 3-D traces (**Figure I-37**) to be displayed on the screen. When this command is activated by placing the cursor under the word "Trac" and pressing the <Enter> key, brackets appear in the trace field. Enter the desired number of traces (from 2 to 15) and press the <Enter> key. When the 3-D display is selected and the sweep is started, the first 3-D trace is displayed and moves up as the second trace begins. Subsequent traces continue to move up previous traces until the selected number of traces are displayed. Each new trace appears at the bottom of the display, and the oldest trace is "bumped" off the top. The "Colr" command field allows the operator to change the waterfall display color.

There are two different display types provided by the SWEEP or STEP Mode DATA ANALYSIS environment:

- a. "3-D" - (three-dimensional, shown in **Figure I-36**) uses the x-axis for frequency, the y-axis for signal amplitude, and the z-axis for time. The number of traces displayed depends on the "Trac" entry provided by the operator. SWEEP SECTOR mode does not allow "3-D" display.

- b. "WF" - (waterfall). There are five different types of waterfall displays discussed in the following paragraphs.
1. "WF_Line 1" - (Waterfall Line 1, shown in **Figure I-37**) uses a combination of two-dimensional and three-dimensional displays. The two-dimensional display represents frequency (x-axis) versus signal amplitude (y-axis) in a block format display. The three-dimensional display represents frequency (x-axis) versus time (y-axis) versus signal amplitude (color code). The two-dimensional display is cleared prior to each sweep, while the three-dimensional display retains sweep data.
 2. "WF_Line 2" - (Waterfall Line 2, shown in **Figure I-38**) uses a similar combination of two-dimensional and three-dimensional displays, the three-dimensional display being the same as WF_Line 1. While the two-dimensional display uses the same block format display as WF_Line 1, the peaks of the signal amplitude are color coded for easy recognition.
 3. "WF_Line 3" - (Waterfall Line 3, shown in **Figure I-39**) provides a similar display to those of WF_Line 1 and WF_Line 2 in that the three-dimensional display is the same. The two-dimensional display uses a line format to connect the peaks of the signal amplitude to give a line graph type display. As in the previous two WF_Line displays, the two-dimensional display is cleared prior to each sweep, while the three-dimensional display retains sweep data.
 4. "WF_Cumulative" - (waterfall cumulative, shown in **Figure I-40**) provides the cumulative captured signal activities on the two-dimensional display. This display option shows the signal amplitude of the logged spectrum in a line graph format similar to WF_Line 3 for each sweep. It does not clear the display between sweeps thereby presenting an accumulation of sweep data for the sector swept. This display allows the operator to evaluate the density of the monitored frequency range. By allowing the display to update for a reasonable period of time, the operator can readily determine which sections of the monitored spectrum are unused.
 5. "WF_Scatter" - (waterfall scatter, shown in **Figure I-41**) provides the cumulative captured signal activities on the two-dimensional display by plotting points for each captured signal, color coded to show amplitude. The display is not cleared between sweeps, thus enabling the operator to view the signal activity over time.

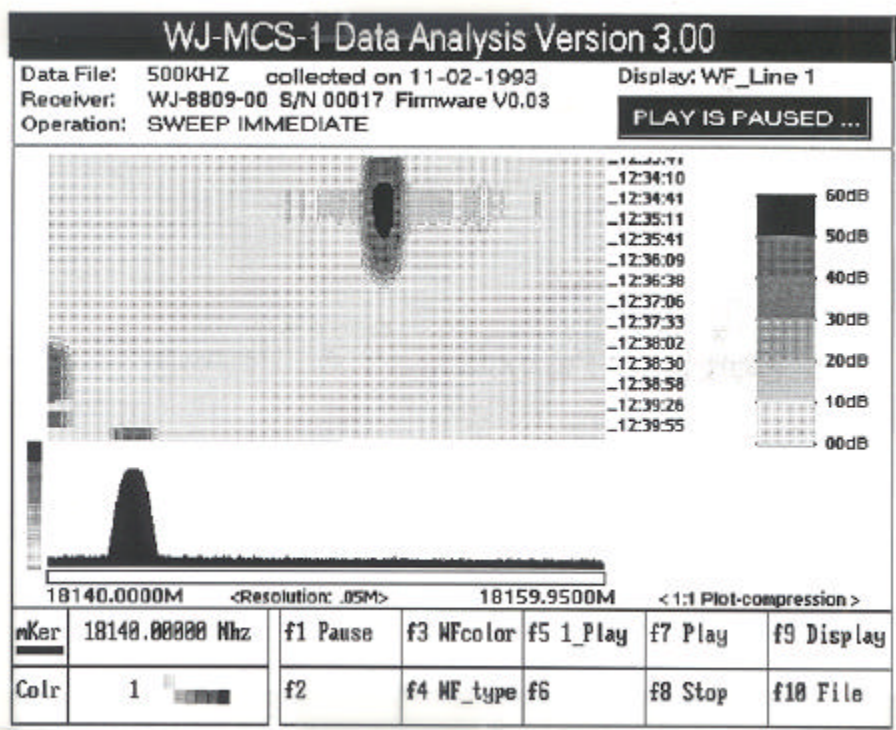


Figure I-37. DATA ANALYSIS WF_Line 1 Display

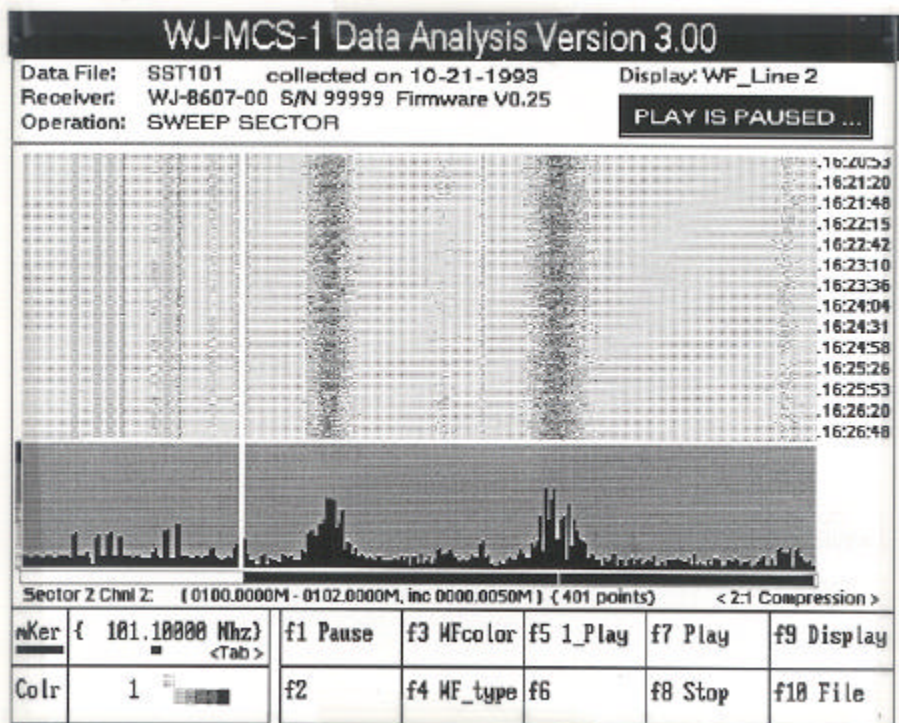


Figure I-38. DATA ANALYSIS WF_Line 2 Display

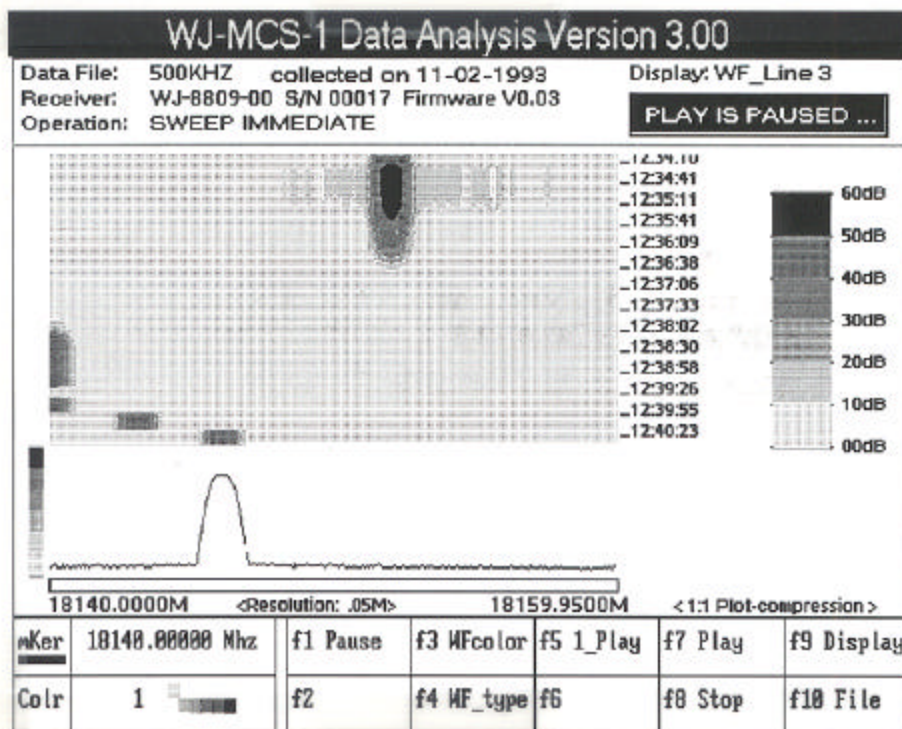


Figure I-39. DATA ANALYSIS WF_Line 3 Display

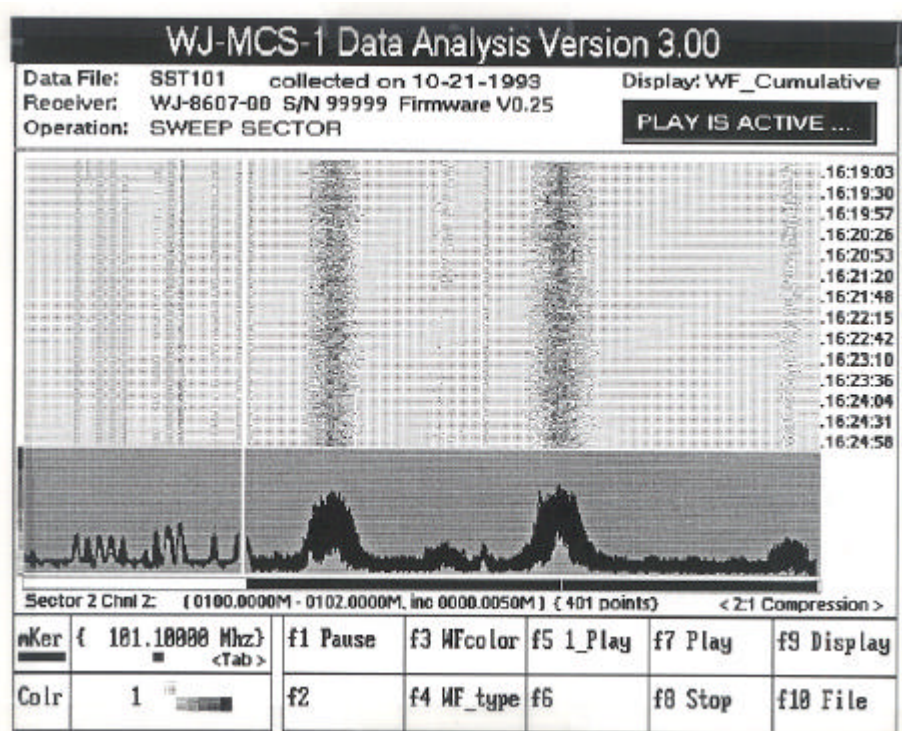


Figure I-40. DATA ANALYSIS WF_Cumulative Display

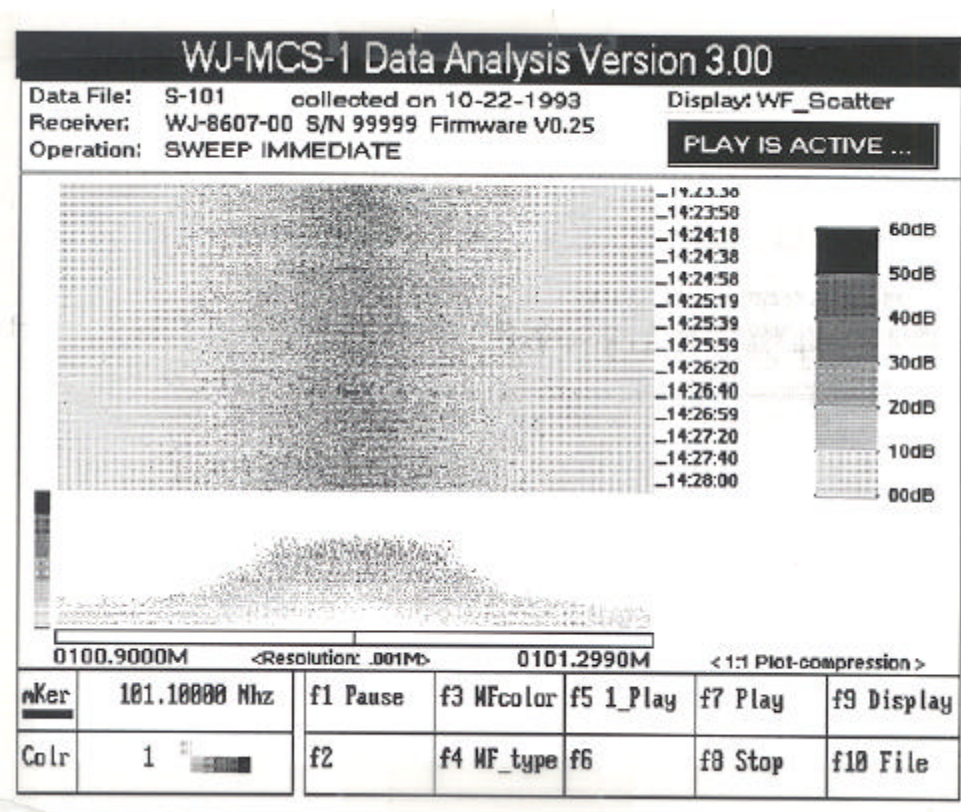


Figure I-41. DATA ANALYSIS WF_Scatter Display

I.7.9.2 Predefined Function Keys

There are five predefined function keys associated with the MANUAL MODE DATA ANALYSIS environment and seven associated with the SWEEP/STEP MODE DATA ANALYSIS environments. These function keys and their associated functions are shown in **Tables I-6** and **I-7**.

Table I-6. MANUAL MODE DATA ANALYSIS Environment Function Keys

Function Key	Associated Function
<F1 Pause>	Temporarily suspends playback operation without terminating it.
<F4 Snap-S>	Allows the operator to display a snapshot of the display as it was when the key was pressed.
<F7 Play>	Initiates playback operation
<F8 Stop>	Terminates playback operation
<F10 File>	Displays the file/path selection screen

Table I-7. SWEEP/STEP MODES DATA ANALYSIS Environment Function Keys

Function Key	Associated Function
<F1 Pause>	Temporarily suspends playback operation without terminating it.
<F3 WF Color>	Allows operator to scale signal strength on the WF displays (see Paragraph 1.7.7.3)
<F4 WF Type>	Allows selection of type of Waterfall display
<F5 1-Play>	Allows the operator to initiate a single sweep of the display.
<F7 Play>	Initiates playback operation
<F8 Stop>	Terminates playback operation
<F9 Display>	Allows selection of display type (3-D, WF/REAL, WF/PEAK)
<F10 File>	Displays the file/path selection screen

I.8 ERRORS

There two types of errors detected by the MCS-1 application program: Miniceptor errors and illegal key entries.

If an error is detected from the Miniceptor, the error message is displayed on the open space between the RF Pan display and the function key window. The possible error messages are either: "Failure(s).. <err1> <err2>..." or "Warning: errors @ CDE #####". The first error message spells out a list of seven possible receiver hardware failures (see **Table I-8**).

Table I-8. Miniceptor Hardware Errors

Error List	Description
<+12>	+12 Volts DC fault
<+7.5>	+7.5 Volts DC fault
<-7.5>	-7.5 Volts DC fault
<+30>	+30 volts DC fault
<1lo>	1st LO unlocked
<2lo>	2nd LO unlocked
<tlp>	2nd LO translation loop unlocked

The second error message provides a decimal value equivalent of a bit-mapped 16-bit word (see **Table I-9**) that indicates the error conditions that are not covered by the first error message. The error message is cleared five seconds after error conditions are no longer present in the Miniceptor.

Illegal keys are those keys that are not supported by the current menu. If an illegal key is pressed, the PC beeps for .3 seconds and the key is ignored.

Table I-9 Miniceptor Bit-Mapped Errors

Bit	Decimal Value	Description
0	1	Power supply fault
1	2	+12 Volts DC fault
2	4	+7.5 Volts DC fault (n/u for WJ-8654)
3	8	-7.5 Volts DC fault (-5V for WJ-8654)
4	16	+30 Volts DC fault (+24V for WJ-8654)
5	32	1st LO unlocked
6	64	2nd LO unlocked
7	128	2nd LO translation loop unlocked
8	256	A/D error
9	512	Not used
10	1024	Not used
11	2048	Frequency extender LO unlocked (n/u for WJ-8654)
12	4096	EEPROM failure to be written
13	8192	Not used (3rd LO unlock for WJ-8654)
14	16384	Not used
15	32768	Not used