# Physical Property
# Measurement System

# Commands Manual
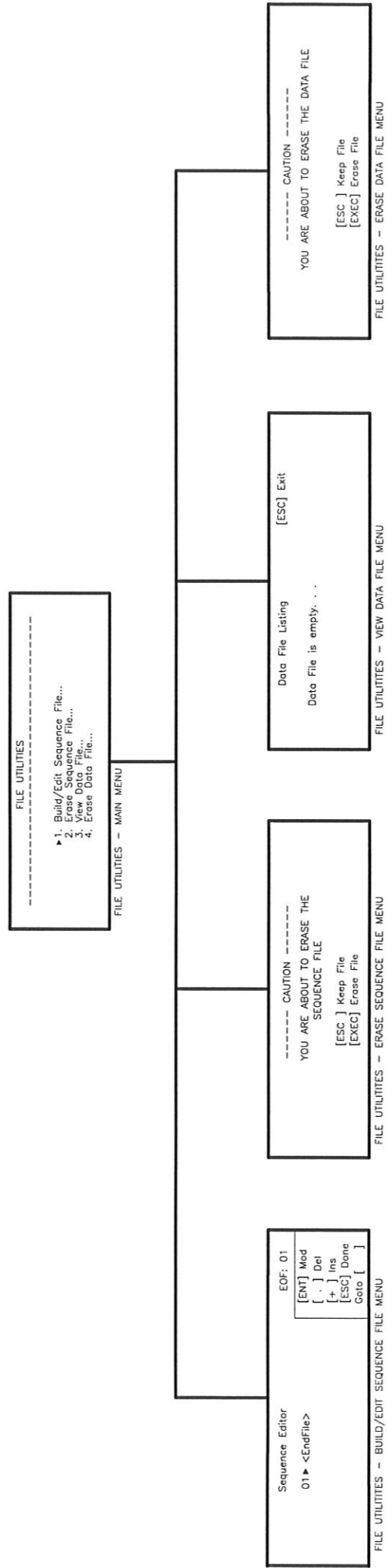
**Quantum Design**
**San Diego, CA**

# PPMS Commands Quick-Reference
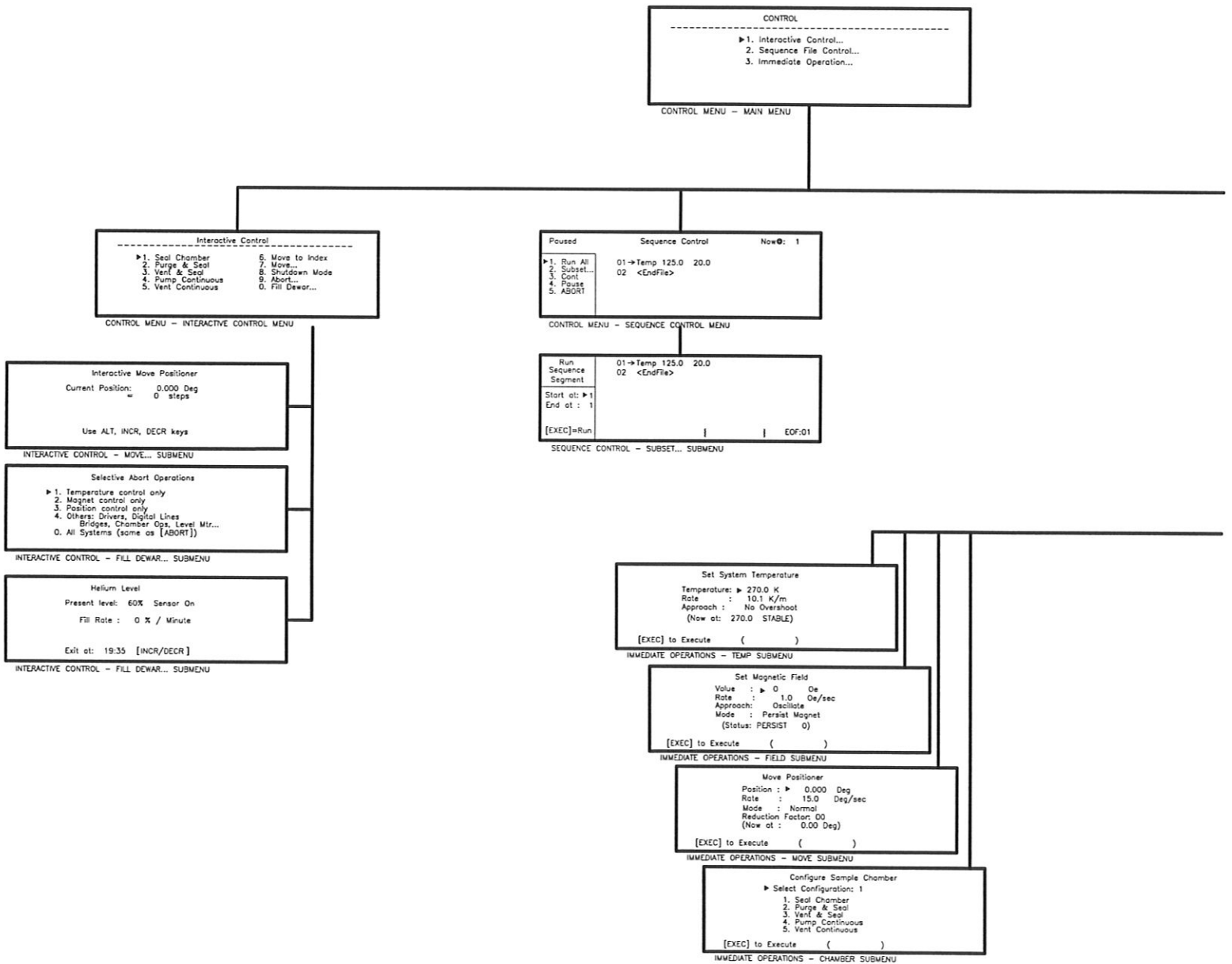
# MODEL 6000 FILES MENU STRUCTURE

```
------ CAUTION ------

YOU ARE ABOUT TO ERASE THE DATA FILE


[ESC ] Keep File
[EXEC] Erase File
```
FILE UTILITIES – ERASE DATA FILE MENU

```
Data File Listing          [ESC] Exit

Data File is empty. . .
```
FILE UTILITIES – VIEW DATA FILE MENU

```
FILE UTILITIES
----------------------------

▶1.  Build/Edit Sequence File...
  2.  Erase Sequence File...
  3.  View Data File...
  4.  Erase Data File...
```
FILE UTILITIES – MAIN MENU

```
------ CAUTION ------

YOU ARE ABOUT TO ERASE THE
SEQUENCE FILE


[ESC ] Keep File
[EXEC] Erase File
```
FILE UTILITIES – ERASE SEQUENCE FILE MENU

```
Sequence Editor          EOF: 01
                         [ENT] Mod
01▶ <EndFile>            [ . ] Del
                         [ + ] Ins
                         [ESC] Done
                         Goto [   ]
```
FILE UTILITIES – BUILD/EDIT SEQUENCE FILE MENU

# MODEL 6000 CONTROL MENU STRUCTURE

```
                    CONTROL
    -------------------------------------------
        ▶1.  Interactive Control...
          2.  Sequence File Control...
          3.  Immediate Operation...

CONTROL MENU – MAIN MENU
```

```
              Interactive Control
    --------------------------------------------
    ▶1. Seal Chamber       6. Move to Index
      2. Purge & Seal      7. Move...
      3. Vent & Seal       8. Shutdown Mode
      4. Pump Continuous   9. Abort...
      5. Vent Continuous   0. Fill Dewar...

CONTROL MENU – INTERACTIVE CONTROL MENU
```

```
Paused          Sequence Control        Now◑: 1

▶1. Run All       01→Temp 125.0  20.0
  2. Subset...    02  <EndFile>
  3. Cont
  4. Pause
  5. ABORT

CONTROL MENU – SEQUENCE CONTROL MENU
```

```
           Interactive Move Positioner

    Current Position:      0.000 Deg
                    ≈       0   steps


            Use ALT, INCR, DECR keys

INTERACTIVE CONTROL – MOVE... SUBMENU
```

```
   Run          01→Temp 125.0  20.0
 Sequence       02  <EndFile>
 Segment

Start at: ▶1
End at :  1

[EXEC]=Run              |          |    EOF:01

SEQUENCE CONTROL – SUBSET... SUBMENU
```

```
            Selective Abort Operations

    ▶1. Temperature control only
      2. Magnet control only
      3. Position control only
      4. Others: Drivers, Digital Lines
         Bridges, Chamber Ops, Level Mtr...
      0. All Systems (same as [ABORT])

INTERACTIVE CONTROL – FILL DEWAR... SUBMENU
```

```
              Helium Level

    Present level:  60%   Sensor On

    Fill Rate :  0 %  / Minute


    Exit at:  19:35  [INCR/DECR]

INTERACTIVE CONTROL – FILL DEWAR... SUBMENU
```

```
            Set System Temperature

    Temperature: ▶ 270.0 K
    Rate       :   10.1 K/m
    Approach   :   No Overshoot
    (Now at: 270.0 STABLE)

[EXEC] to Execute      (          )
IMMEDIATE OPERATIONS – TEMP SUBMENU
```

```
             Set Magnetic Field

    Value    : ▶  0      Oe
    Rate     :    1.0   Oe/sec
    Approach:     Oscillate
    Mode    :     Persist Magnet
    (Status: PERSIST   0)

[EXEC] to Execute      (          )
IMMEDIATE OPERATIONS – FIELD SUBMENU
```

```
                Move Positioner

    Position : ▶  0.000   Deg
    Rate     :    15.0   Deg/sec
    Mode     :    Normal
    Reduction Factor: 00
    (Now at :   0.00 Deg)

[EXEC] to Execute      (          )
IMMEDIATE OPERATIONS – MOVE SUBMENU
```

```
            Configure Sample Chamber
    ▶ Select Configuration: 1

       1. Seal Chamber
       2. Purge & Seal
       3. Vent & Seal
       4. Pump Continuous
       5. Vent Continuous

[EXEC] to Execute      (          )
IMMEDIATE OPERATIONS – CHAMBER SUBMENU
```

```
-------------------------------------
            Immediate Operations
-------------------------------------
01:▶ Temp          06:  Bridge        11:  Measure
02:  Field         07:  DigSet        12:  Link
03:  Move          08:  DrvOut        13:  MagRst
04:  Chamber       09:  ExtSet
05:  Comment       10:  SigOut

                          [  ] Select
```
CONTROL MENU – IMMEDIATE OPERATIONS MENU

```
            Put Comment in Data File

--------

[EXEC] to Execute        (        )
```
IMMEDIATE OPERATIONS – COMMENT SUBMENU

```
            Set External Select Lines

Select    #1: ▶ Off
Select    #2:   Off
Select    #3:   Off

[EXEC] to Execute        (        )
```
IMMEDIATE OPERATIONS – EXTSET SUBMENU

```
            Setup Bridge Channel
-------------------------------------
  ▶ Chan 1  User
-------------------------------------
Excitation :  –off– μA            Mode: AC
Pwr Limit :  0.00  μW
Calibration Mode:  Standard

[EXEC] to Execute        (        )
```
IMMEDIATE OPERATIONS – BRIDGE SUBMENU

```
            Set Voltage Ouput
              at BNC Connector

Channel :  ▶ 1
Voltage :    0.0

[EXEC] to Execute        (        )
```
IMMEDIATE OPERATIONS – SIGOUT SUBMENU

```
            Set Digital Outputs
Aux. Drive #1 : ▶ Off
Aux. Drive #2 :   Off
Aux. Drive #3 :   Off
Actuator Drive :  Off

[EXEC] to Execute        (        )
```
IMMEDIATE OPERATIONS – DIGSET SUBMENU

```
            Data File Measurements      x0007
-------------------------------------
▶♦ Status     Brg1Res      Brg3Res      Sig1
 ♦ Temp       Brg1Exc      Brg3Exc      Sig2
 ♦ Field      Brg2Res      Brg4Res      DigIn
   Pos        Brg2Exc      Brg4Exc      More...

[EXEC] to Execute        (        )      ♦ –> Selected
```
IMMEDIATE OPERATIONS – MEASURE SUBMENU

```
            Set Driver Outputs

Chan      : ▶ 1
Current   :     0.0  mA
Power Limit :   0.0  mW

[EXEC] to Execute        (        )
```
IMMEDIATE OPERATIONS – DRVOUT SUBMENU

```
            Link BNC to Parameter

Output Channel   ▶:  1
Link to Parameter #:  –off–
Value at +10 V    :  0
Value at 0 V      :  0

[EXEC] to Execute        (        )
```
IMMEDIATE OPERATIONS – LINK SUBMENU

```
            Magnet Quench

Drive to Field:  Oa▶
Rate        :    Oe/sec
(Status: Persist 00.0 )

[EXEC] to Execute        (        )
```
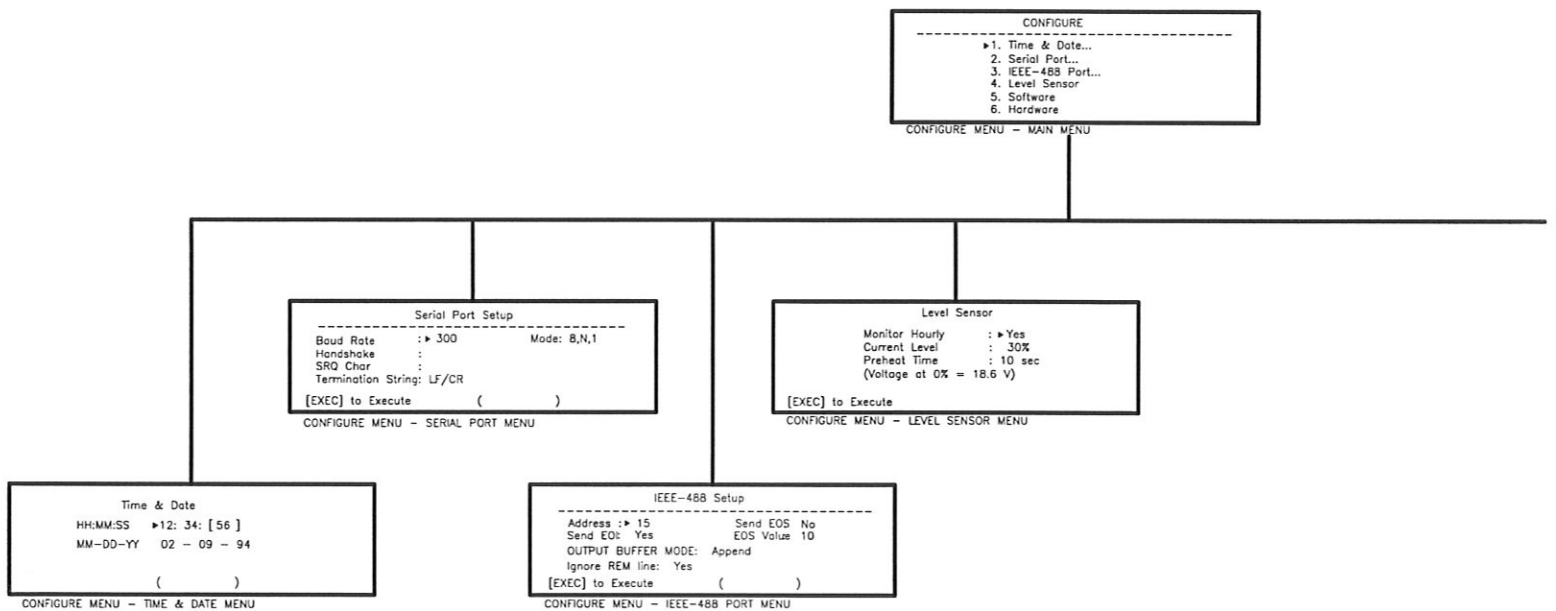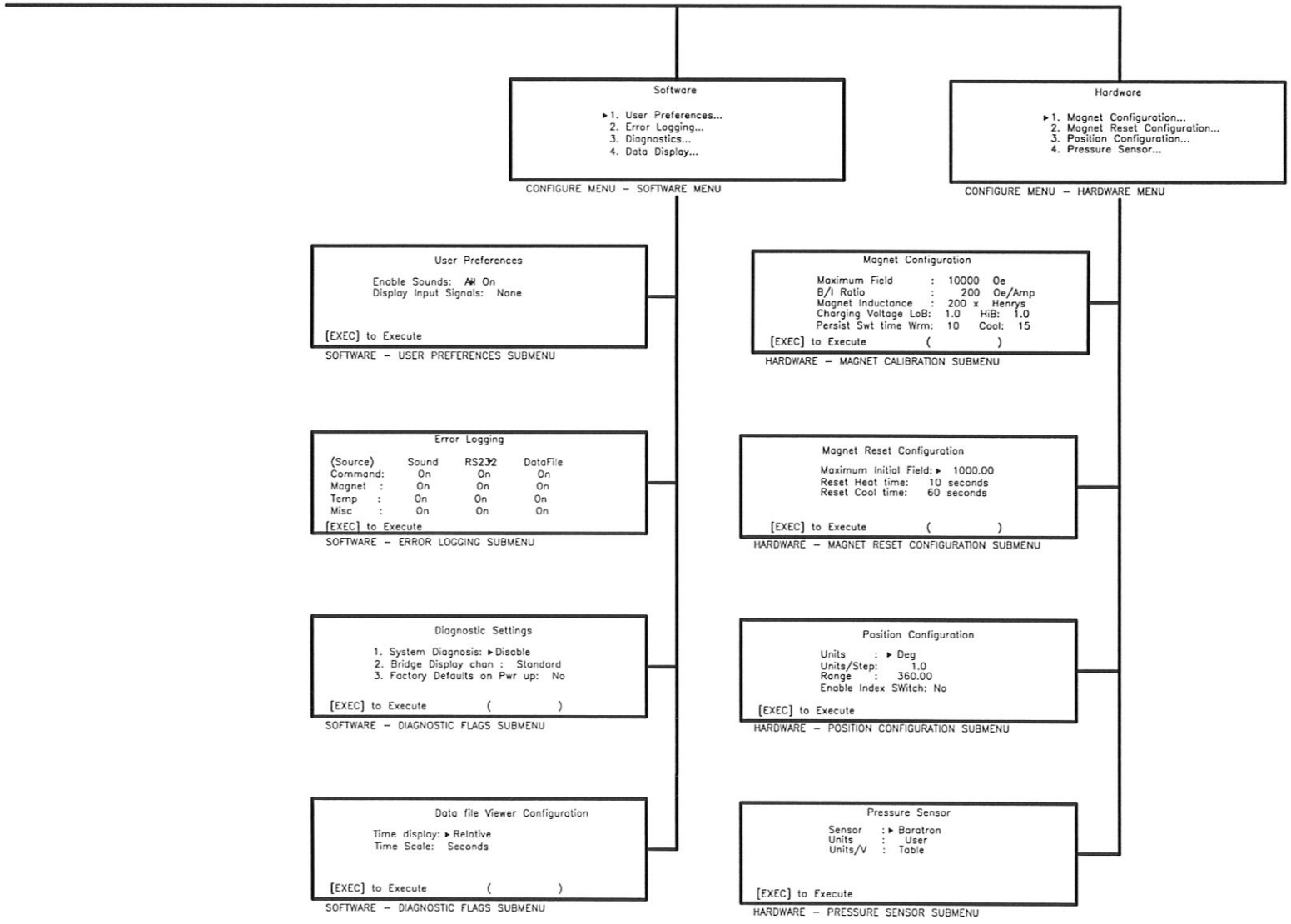IMMEDIATE OPERATIONS – QUENCH SUBMENU

# MODEL 6000 CONFIG MENU STRUCTURE

```
                    CONFIGURE
        --------------------------------
        ▸1. Time & Date...
         2. Serial Port...
         3. IEEE-488 Port...
         4. Level Sensor
         5. Software
         6. Hardware
        CONFIGURE MENU – MAIN MENU
```

```
              Serial Port Setup
    -----------------------------------
    Baud Rate      : ▸ 300      Mode: 8,N,1
    Handshake      :
    SRQ Char       :
    Termination String: LF/CR

    [EXEC] to Execute          (          )
    CONFIGURE MENU – SERIAL PORT MENU
```

```
                Level Sensor
    -----------------------------------
    Monitor Hourly    : ▸ Yes
    Current Level     :   30%
    Preheat Time      :   10 sec
    (Voltage at 0% = 18.6 V)

    [EXEC] to Execute
    CONFIGURE MENU – LEVEL SENSOR MENU
```

```
            Time & Date
    HH:MM:SS   ▸12: 34: [ 56 ]

    MM–DD–YY   02 – 09 – 94


            (          )
    CONFIGURE MENU – TIME & DATE MENU
```

```
                IEEE-488 Setup
    -----------------------------------
    Address :▸ 15          Send EOS  No
    Send EOI: Yes          EOS Value 10
    OUTPUT BUFFER MODE: Append
    Ignore REM line:  Yes
    [EXEC] to Execute          (          )
    CONFIGURE MENU – IEEE-488 PORT MENU
```

```
                                    ┌─────────────────────────────────┐          ┌─────────────────────────────────┐
                                    │            Software             │          │            Hardware             │
                                    │                                 │          │                                 │
                                    │  ▸1. User Preferences...        │          │  ▸1. Magnet Configuration...     │
                                    │   2. Error Logging...           │          │   2. Magnet Reset Configuration...│
                                    │   3. Diagnostics...             │          │   3. Position Configuration...   │
                                    │   4. Data Display...            │          │   4. Pressure Sensor...          │
                                    │                                 │          │                                 │
                                    └─────────────────────────────────┘          └─────────────────────────────────┘
                                       CONFIGURE MENU – SOFTWARE MENU                CONFIGURE MENU – HARDWARE MENU
```

┌─────────────────────────────────┐
│        User Preferences         │
│                                 │
│   Enable Sounds:  All On        │
│   Display Input Signals:  None  │
│                                 │
│ [EXEC] to Execute               │
└─────────────────────────────────┘
  SOFTWARE – USER PREFERENCES SUBMENU

┌───────────────────────────────────────┐
│         Magnet Configuration          │
│                                       │
│   Maximum Field    :  10000  Oe       │
│   B/I Ratio        :   200  Oe/Amp    │
│   Magnet Inductance :  200 x  Henrys  │
│   Charging Voltage LoB:  1.0   HiB:  1.0 │
│   Persist Swt time Wrm:  10   Cool:  15 │
│ [EXEC] to Execute        (        )   │
└───────────────────────────────────────┘
  HARDWARE – MAGNET CALIBRATION SUBMENU

┌───────────────────────────────────────┐
│            Error Logging              │
│                                       │
│ (Source)      Sound    RS232   DataFile│
│ Command:       On       On      On     │
│ Magnet  :      On       On      On     │
│ Temp    :      On       On      On     │
│ Misc    :      On       On      On     │
│ [EXEC] to Execute                     │
└───────────────────────────────────────┘
  SOFTWARE – ERROR LOGGING SUBMENU

┌───────────────────────────────────────┐
│       Magnet Reset Configuration      │
│                                       │
│   Maximum Initial Field: ▸ 1000.00    │
│   Reset Heat time:   10 seconds       │
│   Reset Cool time:   60 seconds       │
│                                       │
│ [EXEC] to Execute        (        )   │
└───────────────────────────────────────┘
  HARDWARE – MAGNET RESET CONFIGURATION SUBMENU

┌───────────────────────────────────────┐
│          Diagnostic Settings          │
│                                       │
│  1. System Diagnosis: ▸Disable        │
│  2. Bridge Display chan :  Standard    │
│  3. Factory Defaults on Pwr up:  No   │
│                                       │
│ [EXEC] to Execute        (        )   │
└───────────────────────────────────────┘
  SOFTWARE – DIAGNOSTIC FLAGS SUBMENU

┌───────────────────────────────────────┐
│         Position Configuration        │
│                                       │
│   Units    : ▸ Deg                    │
│   Units/Step:     1.0                 │
│   Range    :   360.00                 │
│   Enable Index SWitch: No             │
│ [EXEC] to Execute                     │
└───────────────────────────────────────┘
  HARDWARE – POSITION CONFIGURATION SUBMENU

┌───────────────────────────────────────┐
│     Data file Viewer Configuration    │
│                                       │
│   Time display: ▸ Relative            │
│   Time Scale:  Seconds                │
│                                       │
│ [EXEC] to Execute        (        )   │
└───────────────────────────────────────┘
  SOFTWARE – DIAGNOSTIC FLAGS SUBMENU

┌───────────────────────────────────────┐
│            Pressure Sensor            │
│                                       │
│   Sensor   : ▸ Baratron               │
│   Units    :   User                   │
│   Units/V  :   Table                  │
│                                       │
│ [EXEC] to Execute                     │
└───────────────────────────────────────┘
  HARDWARE – PRESSURE SENSOR SUBMENU

# Abort

| | |
|---|---|
| **Introduction** | The **Abort** command is used to terminate execution of a sequence file or system operations. Selected systems may be aborted from the Model 6000 controller **Selective Abort Operations** screen or all PPMS control systems may be aborted by using the front panel **Abort** key. |
| **Model 6000 Keystrokes** | Press the following keys to view the Model 6000 **Selective Abort Operations** screen:<br><br> CTRL , **1** , **9**<br><br>Control, Interactive Control, Abort |
| **Screen Description** | The Model 6000 **Selective Abort Operations** screen is shown below: |

```
                  Selective Abort Operations
         ▶1. Temperature Control only
           2. Magnet Control only
           3. Position Control only
           4. Others: Drivers, Digital Lines,
                   Bridges, Chamber Ops, Level Mtr . . .
           5. All Systems (same as [ABORT])
```
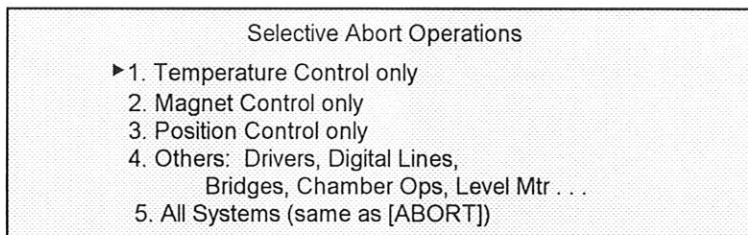
**Selection Items**

The following table describes the selection items of the **Selective Abort Operations** screen:

| Select . . . | In Order To Abort . . . |
|---|---|
| 1. Temperature Control Only | all temperature control operations. |
| 2. Magnet Control Only | all magnet control operations. |
| 3. Position Control Only | all position control operations. |
| 4. Others: Drivers, Digital Lines . . . | systems not listed above. |
| 5. All Systems (same as [ABORT]) | all PPMS control systems. This has the same effect as pressing the front panel **ABORT** key  (**ALT** and +/-). |

**To Abort Control Operation**

The following instructions explain how to abort a PPMS control system:

1. Enter the **Selective Abort Operations** screen.

2. Place the cursor at the selected menu item.

   **WARNING:** When an **ABORT** command is entered, the aborted sub-system will be aborted immediately.

3. Press the **ENTER** key to abort operation of the selected system.

**NOTE:** To terminate sequence file execution, use the **Abort** command found on the **Sequence Control** screen (**CTRL,2**).  (See **Sequence Files**).

| | |
|---|---|
| **Alternative Abort Method** | To abort all system operations, rather than select item **5. All Systems**, the **ABORT** key on the Model 6000 front panel may be used:<br><br>Press **ALT** and **+/-** to abort all PPMS control system. |
| **To Resume Operation** | To re-enable the system following an **ABORT** command, enter a command that requires the aborted system. If **All Systems** were aborted, all commands will be required to restore the system. |
| **Related Topics** | • Sequence Files |

# Analog (Voltage) Output at BNC Connector

| | |
|---|---|
| **Introduction** | The Model 6000 rear panel has four BNC Connectors, which may be configured to supply a fixed output voltage. This section explains the setting of these outputs. |
| **GPIB Equivalent** | The GPIB SIGOUT command may also be used to set the BNC voltage output. Refer to Appendix B for additional information. |
| **Analog Outputs** | The four Model 6000 BNC connectors labelled A1 through A4 may be configured to supply a fixed voltage of -10 to +10 volts, or linked to a selected system parameter (see Link). The A1 output is duplicated on the Model 6000 front panel for easy access. |
| **Selection Items** | The following table describes the parameters of the analog output setting: |

| The Item. . . | Specifies . . . | Allowed Values |
|---|---|---|
| Channel | which of the four rear panel BNC connectors (A1 through A4) is to be set. | 1 to 4 |
| Voltage | the output voltage at the specified channel. | -10 to +10 volts |

| | |
|---|---|
| **Model 6000 Keystrokes** | Press the following keys to view the **Set Voltage Output at BNC Connector** screen: |

$$\boxed{\text{CTRL}} \;,\, 3 \;,\; 10$$

Control, Immediate Operations, 10: SigOut

| | |
|---|---|
| **PPMS Control Panel** | The analog outputs are set from the **Analog Output** panel of the PPMS Control Panel. This panel is opened by pressing the **Analog Out** button of the PPMS Control Panel. The analog output values are set from the **Signal Channels** portion of this panel. |
| **Setting the BNC Output Voltage** | **Note:** The minimum recommended load resistance for these channels is 10 kohms.<br><br>1. Specify the **Channel** number to be set (Channel 1 through 4 for Connectors A1 through A4, respectively).<br>2. Specify the output voltage (from -10V to +10V). |
| **Removing a Parameter Link** | If a channel was previously "Linked" to a system parameter, the existing link will be terminated by the set voltage command. |
| **Related Topics** | • Link BNC to Parameter<br>• Status - Other |

# Bridge Channel Setup

| | |
|---|---|
| **Introduction** | The Model 6000 **Resistance Bridge** offers four channels which may be configured to measure the resistance with specific current drive and measurement parameters. |
| **GPIB Equivalent** | The GPIB BRIDGE command may also be used to set the resistance bridge parameters. Refer to Appendix B for additional information. |
| **About the Resistance Bridge** | The four channel resistance bridge may be configured to perform a four-wire resistance measurement. The bridge actually has up to eight channels available, however, channels 5-8 are reserved for internal calibrations. The bridge offers an optional square wave excitation of approximately 7.5 Hz synchronized to the AC line frequency (50 or 60 Hz) to reject AC line noise. |
| **Selection Items** | The following table explains each of the entry fields for the **Resistance Bridge** configuration: |

| The Item . . . | Specifies. . . | Allowed Values |
|---|---|---|
| Excitation Current | the maximum excitation to be applied to the external device. | 0.00, 0.01 to 5000.00 μA |
| Power Limit | the maximum power to be applied to the external device. | 0.0, 0.001 to 1000.0 μA |
| Calibration Mode (Measure Mode) | how frequently the analog-to-digital converter will read the internal precision resistors to recalibrate its readings. | •Fast<br>•Standard (default)<br>•High Resolution |
| Mode (Drive Mode) | excitation type for the resistance measurement. | •AC<br>•DC |

| | |
|---|---|
| **Model 6000 Keystrokes** | Press the following keys to view the Model 6000 Setup Bridge Channel screen:<br><br> `CTRL` , **3** , **06**<br><br>Control, Immediate Operations, 06:Bridge |
| **PPMS Control Panel** | The bridge channel is configured from the **4-Channel Resistance Bridge** screen of the PPMS Control Panel. This panel is opened by pressing the **Resis. Bridge** button of the PPMS Control Panel. |
| **Configuring the Resistance Bridge** | 1. Select a Resistance Bridge **Channel** and enter an **Excitation Current** and **Power Limit**.<br>2. Select the **Calibration Mode** and **(Drive) Mode.**<br><br>**Note:** If either the **Power Limit** or **Excitation Current** are set to zero for a channel, the channel will be automatically turned off. |
| **Current and Power Limits** | • When the bridge channel is in operation, the **Excitation Current** will be limited by either the maximum **Excitation Current** or **Power Limit**, whichever limits the current to a lower value. |

| **Calibration (Measure) Mode** | • In **Standard Calibration Mode** the internal analog-to-digital calibration is updated approximately once each hour to account for thermal and other long-term drifts in the bridge electronics.<br>• In **Fast Calibration Mode** bridge channel readings are performed as quickly as possible and no analog-to-digital calibration readings are performed. |
| --- | --- |
| **Excitation Mode** | • The **AC** excitation is a square wave excitation of approximately 7.5 Hz synchronized to the AC line frequency (50 or 60 Hz) to reject AC line noise.<br>• In **AC** mode, the excitation current is reversed between the first and second measurements, and one-half of the difference between the two readings is reported.<br>• In **DC** mode, two readings are made with the same polarity and then averaged. |

# Configure Menu (Top-Level)

**Description**     The **Configure** menu is a Model 6000 top-level menu that allows access to various Model 6000 system configuration settings.

```
┌─────────────────────────────────────────────┐
│          CONFIGURE                           │
│   ▶1. Time & Date...                         │
│    2. Serial Port. . .                       │
│    3. IEEE-488 Port...                       │
│    4. Level Sensor                           │
│    5. Software                               │
│    6. Hardware                               │
└─────────────────────────────────────────────┘
```
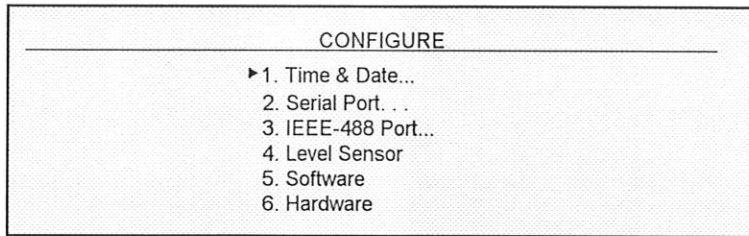
**Model 6000 Keystrokes**     Press the following key to access the **Configure** menu:

| CONFIG |

Configure

**Menu Items**     The following table explains each of the menu items found on the **Configure** screen:

| Select . . . | In Order To . . . |
|---|---|
| 1. Time & Date | set the system time and date. |
| 2. Serial Port | configure the serial port. |
| 3. IEEE-488 Port | configure the IEEE-488 port. |
| 4. Level Sensor | set the helium level sensor parameters. |
| 5. Software | set User Preferences, Error Logging, and Diagnostic Flags. |
| 6. Hardware | set the Magnet Configuration, Magnet Quench Configuration, Position Configuration, and Pressure Sensor. |

**Related Topics**
- Time & Date
- Serial Port
- IEEE-488 Port
- Level Sensor
- Software
- Hardware

# Control Menu (Top-Level)

| | |
|---|---|
| **Description** | The **Control** menu is a Model 6000 top-level menu that allows access to various system control menus. |

```
                          CONTROL
            ─────────────────────────────────────
            ▶1. Interactive Control . . .
             2. Sequence File Control . . .
             3. Immediate Operation . . .
```
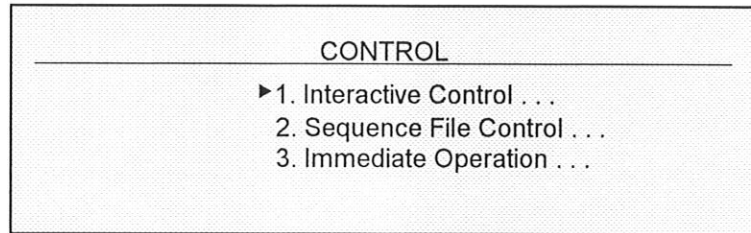
| | |
|---|---|
| **Model 6000 Keystrokes** | Press the following key to access the Control menu: |

```
 CTRL
```

Control

**Menu Items**

The following table explains each of the menu items found on the **Control** screen:

| Select . . . | In Order to . . . |
|---|---|
| 1. Interactive Control | perform chamber and sample motion operations. |
| 2. Sequence File Control | run and stop sequence file execution. |
| 3. Immediate Operations | immediately perform system operations. |

**Related Topics**

- Interactive Control
- Sequence File Control
- Immediate Operations

## Data File: Overview

| | |
|---|---|
| **Introduction** | This section explains how measurement data are handled by the Model 6000 and the PPMS Control Panel. |
| **About PPMS Data Files** | When commanded to create a data file, PPMS data records are stored to the Model 6000 data file. This file may then be uploaded to a host computer, or viewed directly from the **Data File Listing** screen on the Model 6000. |
| **File Size** | The Model 6000 data file can hold up to 2000 empty records or about 100 full records. The actual number of records will depend upon record size. (In the future, this number may be expanded.) The data file size is displayed on the **Status - System** screen of the Model 6000. |
| **File Structure** | The data file consists of records of information presented in sequential order. Each line represents a record. The following table describes each field that will appear (from left to right) in the data file: |

| Field | Description |
|---|---|
| Bit Flag | This is a bit flag which reports which system parameters are represented in the data record.<br><br>Note: For a full listing of the bit flag parameters, and the data file structure, see Appendix C: section C.2. |
| Timestamp | Timestamp: This is the time, in seconds, since midnight, January 1st of this year. |
| Parameters | This will be the first parameter selected for display. Parameters will be displayed in the order that they are represented on the Table in section C.2 |

# Data File:  Comment

| Introduction | Frequently it is desirable to place a string comment in the data file at a specific line.  The comment may be used to identify the sample, experiment, or experimenter. |
|---|---|

**Using the Different Interfaces**

Data file comments are inserted differently depending upon the interface option in use.  The following table lists where specific information about this procedure is located:

| If You Are Using . . . | Refer To Section. . . | On Page |
|---|---|---|
| Model 6000 Menu System | Data File: Comment, Model 6000 | 10 |
| PPMS Control Panel | Data File:  Comment, PPMS Control Panel | 11 |
| GPIB | Appendix B: COMMENT | B-5 |

# Data File: Comment, Model 6000 Instructions

| | |
|---|---|
| **Description** | The Model 6000 **Data File Comment** screen is used to insert a comment into the Model 6000 data file. |
| **Model 6000 Keystrokes** | Press the following keys to view this screen: |

              | CTRL | , **3** , **05**

              Control, Immediate Operations, 05:Comment

| | |
|---|---|
| **Selection Items** | |
| **Placing a Comment In the Data File** | |
| **Related Topics** | |

# Data File:  Comment, PPMS Control Panel Instructions

**In This Section**

This section describes how to place a comment into the Model 6000 data file when using the PPMS Control Panel.

**Description**

The **Comment DataFile** command of the Sequence File Editor allows the user to enter a comment for insertion into the data file.  This panel is shown below:
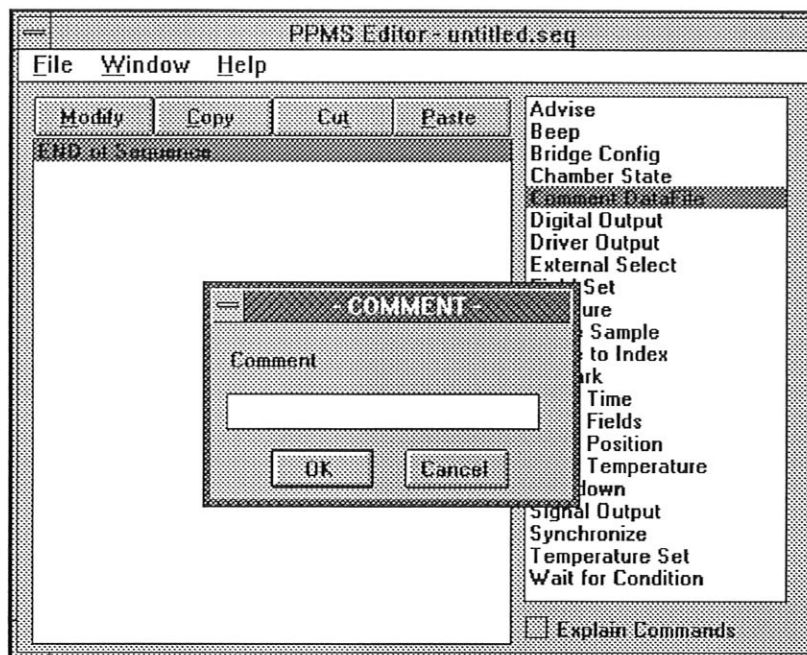


**Opening the Comment Panel**

Open the **Comment** panel from the **Sequence File Editor** screen of the PPMS Control Panel.  The following instructions explain how to open this screen:

1.  From the **PPMS Control Panel**, open the **Window** menu and select **Editor**.
2.  With the **Editor** panel opened, select **Comment** from the command list on the right side of the screen.  Double-click the left mouse button to open the **Comment** panel.

**Inserting a Comment into the Data File**

In order to place a comment in the data file, it is necessary to write a sequence file that includes the **Comment** command.  The file may contain only the **Comment** command to immediately  place the comment into the data file, or it may contain a series of system commands with the **Comment** command placed at specific points of interest.  For information about writing a sequence file, see "Sequence Files."

The following instructions explain how to insert a comment into the data file using the PPMS Control Panel.

1.  Open the **Editor panel (see above).**
2.  Place the cursor at the line of the Sequence file where you want data to be collected.
3.  Select **Comment** from the command list by placing the cursor on **Comment** and double-clicking the left mouse button.
4.  The **Comment panel** will now be displayed.  Type in your comment using the keyboard.  Note that it is not necessary to use quotation ("") marks around the comment.
5.  When you are done press the **OK button** to place the comment line into the sequence file.  To leave without making any changes, press **Cancel**.

# Data File:  Creating a Data File

**Introduction**   A data file is not autmatically generated during a measurement, instead, it is necessary to specify which system information should be placed into the data file.  This section explains this proceedure.

**Using the Different Interfaces**   The **Measure** command is used to specify which system parameters are to be placed into the data file.  The following table lists where specific information about this command is located:

| If You Are Using . . . | Refer To Section. . . | On Page |
|---|---|---|
| Model 6000 Menu System | Creating a Data File From the Model 6000 | 14 |
| PPMS Control Panel | Creating a Data File From the PPMS Control Panel | 15 |
| GPIB | Appendix B: Measure, and Appendix C | B-17, C-1 |

**Data Selection Items**

The following table describes each item that may be placed into the data file. (Specific information about each parameter is provided under the parameter description elsewhere in this manual.)

| Select . . . | | To Insert the . . . | For More Information See Section . . . |
|---|---|---|---|
| **Model 6000 Screen** | **PPMS Control Panel** | | |
| Status | General Status | system status code. | Appendix C, page C-7 |
| Temp | Temperature | system temperature. | Temperature |
| Field | Magnetic Field | magnetic field. | Magnetic Field |
| Brg#Res | Brg Ch-# Resistance | resistance of the specified bridge number. | Setup Bridge Channel |
| Brg#Exc | Brg Ch-# Excitation | excitation current at the specified bridge. | Setup Bridge Channel |
| Sig# | Sig Ch-# Input Voltage | signal input for Signal 1 or Signal 2. | Signal Inputs |
| DigIn | Digital Inputs | 8-bit status of selected inputs. | Digital Inputs |
| MORE . . . | | To access the second set of selection items. | |
| Drv# ma | Dr Ch-# Current | current (mAmps) being delivered by the User Driver Output, Channel 1. | Set Driver Outputs |
| Drv# W | Dr Ch-# Power | power (Watts) being delivered by the User Driver Output, Channel 1. | Set Driver Outputs |
| Press | Sample Pressure | sample chamber pressure. Units depend on user configuration. | Pressure Sensor |
| Map 20-29 | Map 20-29 | user mapped item which is mapped to positions 20-29, respectively. | Appendix B, MADAT and TABLE Commands |
| BACK . . . | | To return to the first display screen. | |

**Note:**   To place a comment in the data file, see Data File: Comment.

# Data File: Creating a Data File With the Model 6000

| | |
|---|---|
| **In This Section** | This section describes how to designate data items for placement into the Model 6000 data file when using the Model 6000 menu system. |
| **Description** | The Model 6000 **Data File Measurements** screen is used to select items to be inserted into the data file. |

```
        Data File Measurements              x0007

   ◆Status    Brg1Res     Brg3Res     Sig1
   ◆Temp      Brg1Exc     Brg3Exc     Sig2
   ◆Field     Brg2Res     Brg4Res     DigIn
    Pos       Brg2Exc     Brg4Exc     MORE. . .

   [EXEC] to Execute    (            )      ◆ -> Selected
```

```
            Measurements  Page 2

   Drv1 ma      Press       Map 23      Map 27
   Drv1 W       Map 20      Map 24      Map 28
   Drv2 ma      Map 21      Map 25      Map 29
   Drv2 W       Map 22      Map 26      BACK . . .

   [EXEC] to Execute    (            )      ◆ -> Selected
```

| | |
|---|---|
| **Model 6000 Keystrokes** | Press the following keys to view the **Data File Measurements** screen:<br><br>[ CTRL ] , **3** , **11**<br><br>Control, Immediate Operations, 11:Measure |
| **Inserting an Item into the Data File** | The following instructions explain how to insert a system parameter into the data file.<br>1.  Enter the Immediate Operations screen (**CTRL, 3**).<br>2.  Select the **Measure** item by placing the cursor (▶) in front of the item "**11: Measure**" and pressing the **ENTER** key. You can also use the number keys by entering **"11"**.<br>3.  The **Data File Measurements** screen will now be displayed. Select parameters for insertion into the data file by placing the cursor in front of the item and pressing **ENTER**. Selected items will have a ◆ symbol next to them. (Press **ENTER** again to de-select an item.)<br>4.  When you are done selecting items, press the **ALT** and **ENTER** keys to execute the command. To leave without making any changes, press **ESC**.<br>5.  Repeat the procedure for items listed on the second screen.<br><br>The selected items will be placed immediately into the data file. |

# Data File:  Creating a Data File With the PPMS Control Panel

**In This
Section**

This section describes how to designate data items for placement into the Model 6000 data file when using the PPMS Control Panel.

**Description**

The **Measure** panel is used to select items to be inserted into the data file.  This panel is shown below:
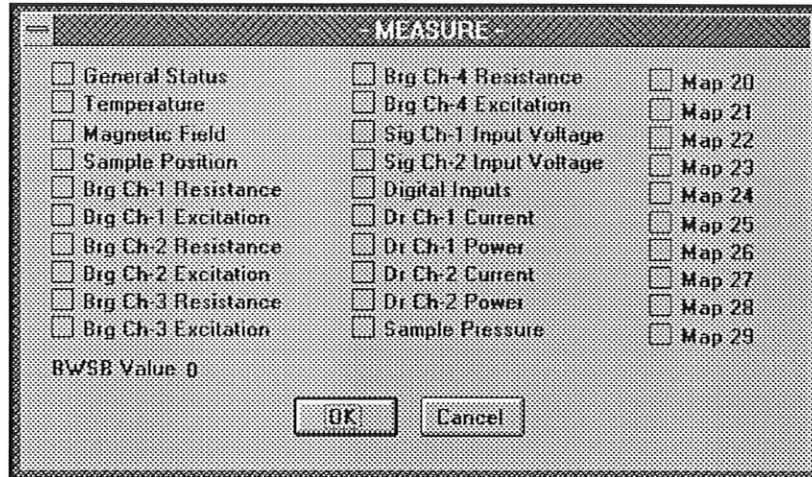


**Opening the
Measure
Panel**

The **Measure** panel is opened from the **Sequence File Editor** screen of the PPMS Control Panel.  The following instructions explain how to open this screen:
1.   From the **PPMS Control Panel**, open the **Window** menu and select **Editor**.
2.   With the **Editor** panel opened, select **Measure** from the command list on the right side of the screen.  Double-click the left mouse button to open the **Measure** panel.

**Inserting an
Item into the
Data File**

In order to create a data file, it is necessary to write a sequence file that includes the **Measure** command.  The file can contain only the **Measure** command to immediately place information into a data file, or it may contain a series of system commands with the **Measure** command placed at specific points of interest.  For information about writing a sequence file, see "Sequence Files."

The following instructions explain how to insert a system parameter into the data file using the PPMS Control Panel.
1.   Open the **Editor panel (see above).**
2.   Place the cursor at the line of the Sequence file where you want data to be collected.
3.   Select **Measure** from the command list by placing the cursor on **Measure** and double-clicking the left mouse button.
4.   The **Measure panel** will now be displayed.  Select parameters for insertion into the data file by clicking the mouse with the cursor on the corresponding box.  Selected items will have an x in the selection box.
5.   When you are done selecting items, press the **OK button** to place the command line into the sequence file.  To leave without making any changes, press **Cancel**.

**Data File**

# Data File:  Erase Data File

**Introduction**   The erase data file command is used to clear the Model 6000 data file buffer.  This section explains the use of this screen.

**Description**   The Model 6000 **Erase Data File** screen is used to erase the data file currently in the Model 6000.

```
------CAUTION------
YOU ARE ABOUT TO ERASE THE DATA FILE


[ESC  ] Keep File
[EXEC] Erase File
```

**Model 6000
Keystrokes**   Press the following keys to view the **Erase Data File** screen:

   | FILE |  , 4

   File, Erase Data File

**Selection
Items**   The **Erase Data File** screen has only two selection items:
   • Keep File, and
   • Erase File.

**How to Erase
the Data File**   Erase the data file by pressing the **ENTER** key.

   **WARNING:**   The data file will be erased immediately after you press **ENTER**.

   To exit this screen without erasing the data file, press the **ESC** key.

   **Note:**   This command will only erase the data file on the Model 6000.  Data files outside of the Model 6000 may be erased using the DOS "DEL filename"  command.

**Related
Topics**   • Data File
   • Data File:  View Data File
   • Data File:  Uploading the Data File

# Data File:  Uploading the Data File

| **Why Upload Data?** | All PPMS measurement data is collected and stored in the Model 6000, which has a limited data file capacity.  Therefore, in order to graph or store the Model 6000 data file, the file must be uploaded to a computer. |
|---|---|
| **Uploading Options** | Data may be uploaded using GPIB commands or, more simply, using the **Upload** utility which is included with the PPMS Control Panel. |
| **Using the Upload Utility** | The following instructions explain how to upload a data file using the PPMS Control Panel:<br><br>1.  Open the PPMS Control Panel.<br>2.  Open the **File** menu and select **Upload**.  The **Upload** panel will be opened.<br>3.  Open the **File** menu and select **Open**.<br>4.  You will be prompted to select an output file.  Either select an existing file, or create a new file. The file should have a .DAT extension.<br>5.  If the file name you have entered does not exist, you will be asked if you want to create a new file. Answer yes by pressing the **Yes** button.<br>6.  Press the **Upload** button to begin the upload procedure.  If it is necessary to stop the process, press the **Stop** button.<br><br>When Upload is completed, the data will be contained in the data file you have specified and will be ready for viewing. |
| **Using GPIB to Upload** | The GPIB **DATA?** command may be used to upload the data file one line at a time.  In order to upload the entire file, it is recommended that the **DATA?** command be placed inside a DO loop, which will stop when an empty record is returned (indicating the end of the file).  A full description of the **DATA?** and other GPIB commands is provided in Appendix B of this manual. |

# Data File: View Data File

| | |
|---|---|
| **Introduction** | Data files may be viewed from the Model 6000 or after uploading. This section of the manual will explain both viewing techniques. |
| **Viewing the Model 6000 Data File** | In order to view the Model 6000 data file, you may use either the Data File Listing screen or the GPIB DATA? command described in Appendix B. |
| **Model 6000 Keystrokes** | Press the following keys to view the **Data File Listing** screen: |

<div>

         | FILE | , **3**

         File, View Data File

</div>

| | |
|---|---|
| **Model 6000 Data File Listing Screen** | The Model 6000 **Data File Listing** screen is shown below: |

| Time   | 0         | 0.5       | 1.0       |
|--------|-----------|-----------|-----------|
| Status | 62239     | 62239     | 62239     |
| Temp   | 4.1605    | 4.1606    | 4.1614    |
| Field  | 10550.994 | 10551.053 | 10551.968 |

| | |
|---|---|
| **Using the Data File Listing Screen** | When the **Data File Listing** screen is opened, the data file records will be displayed with each parameter described along the left side of the screen. Each data record is displayed so that the first record appears to the left of the next. |
| **Using Grapher to View Uploaded Data** | The uploaded data file may be viewed by using the **Grapher** utility of the PPMS Control Panel. The following instructions describe this procedure: |

1. If the Model 6000 data file has not already been uploaded, upload it to the host computer before proceding (see **Data File: Uploading Data).**
2. Open the **Grapher** utility by selecting **Graph** from the PPMS Control Panel**Window** menu.
3. Open the **File** menu of the **Grapher** panel and select **Open Data File**.
4. Select the data file from the **Open Data File** panel and press the **OK** button.

The **Grapher** panel will now display a graph of the selected data file. (The data file name will be displayed across the top of the panel.)

5. Place the cursor on any graphed data point and double click the left mouse button to open the **Identify Data Point** panel.

The data record corresponding to the selected data point will be listed with the plotted fields highlighted.

6. Use the vertical scroll bar to scroll through the data record or use the horizontal scroll bar to view other records of the same file.

# Diagnostic Settings (Diagnostics)

| | |
|---|---|
| **Description** | The Model 6000 **Diagnostic Settings** screen is used to set the Model 6000 diagnostic and default parameters. |

```
                        Diagnostic Settings
            1. System Diagnosis:  ▶  Disable
            2. Bridge Display chan :  Standard
            3. Factory Defaults on Pwr up:  No

    [EXEC] to Execute              (           )
```
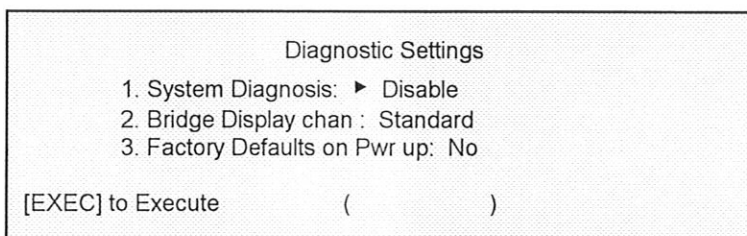
| | |
|---|---|
| **Model 6000 Keystrokes** | Press the following keys to view the **Diagnostic Settings** screen: |

|CONFIG| , 5 , 3

Configure, Software, Diagnostic Settings

| | |
|---|---|
| **Configuration Items** | The following Model 6000 configuration items may be set from this screen: |

- System Diagnostics
- Bridge Display Channel
- Factory Defaults on Power Up

**WARNING:** The items in this menu are provided for diagnostic purposes only. In general, it is not recommended that users reset these flags unless specifically directed to do so by a Quantum Design service technician.

| | |
|---|---|
| **System Diagnostics** | The **System Diagnostics** feature allows the user to access system control channels (system bridge and heater driver) and hardware normally used for temperature or other system control.

**System Diagnostics** may be **enabled** or **disabled** (default). |

| | |
|---|---|
| **Bridge Channel Display** | The **Bridge Channel Display** setting determines which bridge (**System** or **User Bridge**) will be displayed on the **Status-Bridge** screen. |

| | |
|---|---|
| **Factory Defaults on Power Up** | When enabled (**Yes**), the **Factory Defaults on Power Up** setting will cause all configuration information, downloaded tables, and sequence files to be erased when the system is turned on. |

| | |
|---|---|
| **Related Topics** | |

## Driver Outputs

| | |
|---|---|
| **Introduction** | The Model 6000 features two current drivers that may be set by the user. These outputs may be set from the Model 6000 or the PPMS Control Panel. This section explains the use of this feature. |
| **GPIB Equivalent** | The GPIB DRVOUT command may also be used to set the Current Drivers. Refer to Appendix B for additional information. |
| **Current Driver Outputs** | The **Driver Outputs** setting results in an output current across the System Bridge channels 1 and 2. Driver channels 3 and 4 are reserved for the system chamber and neck heaters. |
| **Entry Items** | The following table describes each of the parameters that are set from the **Set Driver Outputs** screen: |

| The Item . . . | Specifies . . . | Allowed Values |
|---|---|---|
| Channel | the driver output channel; channels 3 and 4 are reserved for use by the PPMS temperature control system. | 1 or 2 |
| Current | the maximum current that will drive this channel. | 0.0 to 1000.0 mA |
| Power Limit | the maximum power that will be allowed across this channel. | 0.0 to 20.0 mW |

| | |
|---|---|
| **Model 6000 Keystrokes** | Press the following keys to view the Model 6000 **Set Driver Outputs** screen:<br><br>`CTRL` , **3** , 08<br><br>Control, Immediate Operations, 08:DrvOut |
| **PPMS Control Panel** | The Current Driver Outputs are set from the **Analog Output** panel of the PPMS Control Panel. This screen is opened by pressing the **Analog Out** button on the PPMS Control Panel. |
| **Setting Driver Output** | The output current and maximum voltage may be set from the Model 6000 **Set Driver Outputs** screen or from the PPMS Control Panel **Analog Output** panel.<br><br>Specify the driver channel, current (milliamps), and power limit (watts). If either the **Current** or **Power Limit** are set to zero, the corresponding driver channel will be automatically turned off. |

# Error Logging

| | |
|---|---|
| **Description** | The Model 6000 **Error Logging** screen allows you to specify how errors are logged within the Model 6000 and PPMS systems. |

<div style="border:1px solid #000; padding:20px; text-align:center; background:#e8e8e8;">

Error Logging

THIS MENU IS NOT YET IMPLEMENTED

</div>
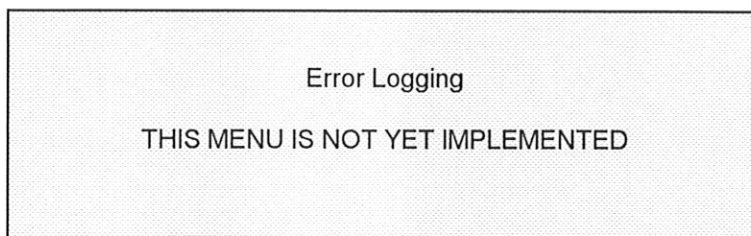
| | |
|---|---|
| **Model 6000 Keystrokes** | Press the following keys to view the **Error Logging** screen: |

CONFIG , 5 , 2

Configure, Software, Error Logging

| | |
|---|---|
| **How To Use** | This feature is not yet available |

| | |
|---|---|
| **Notes** | • The **Error Logging** feature is not implemented yet. |

**Related Topics**

# External Select Lines

| | |
|---|---|
| **Introduction** | The External Select Lines are accessed by the Model 6000 rear panel and may be activated from the Model 6000 menu system or from the PPMS Control Panel. |
| **GPIB Equivalent** | The GPIB EXTSET command may also be used to set the **External Select** lines. Refer to Appendix B for additional information. |
| **External Select Lines** | External Select lines are accessed from the **P11 External** connector on the Model 6000 rear panel. These optically-isolated transistor switches require a nominal 10K pull-up resistor on the collector. The emitter should be tied to ground.<br><br>Specific pinout details are provided in Appendix A. |
| **Selection Items** | The following table provides the rear panel pinouts for the external select lines. |

| External Port | Pin Number | |
|---|---|---|
| **(P11)** | **Collector** | **Emitter** |
| Select 1 | 1 | 14 |
| Select 2 | 2 | 15 |
| Select 3 | 3 | 16 |

| | |
|---|---|
| **Model 6000 Keystrokes** | Press the following keys to view the **Set External Select Lines** screen:<br><br>CTRL , **3** , **09**<br><br>Control, Immediate Operation, ExtSet |
| **PPMS Control Panel** | The **External Select Lines** are set from the **Digital I/O** panel of the PPMS Control Panel. This panel is opened by pressing the **Digital Out** button of the PPMS Control Panel. |
| **Setting External Select Lines** | The **External Select Lines** are activated from the Model 6000 **Set External Select Lines** screen or from the PPMS Control Panel **Digital I/o** panel. The External Select Lines may be either On (asserted) or Off. |

# File Utilities (Top-Level)

| | |
|---|---|
| **Description** | The **File Utilities** screen is a Model 6000 top-level menu used to access Model 6000 data and sequence file utilities. |

```
                    FILE UTILITIES
          ▶1. Build/Edit Sequence File . . .
           2. Erase Sequence File . . .
           3. View Data File. . .
           4. Erase Data File . . .
```
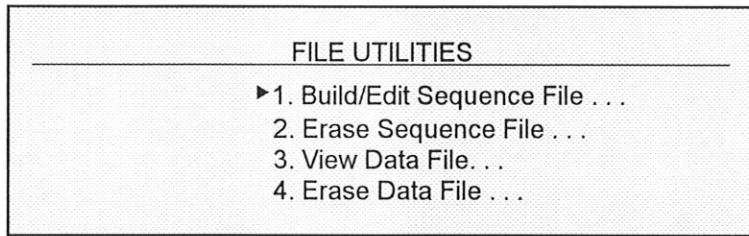
| | |
|---|---|
| **Model 6000 Keystrokes** | Press the following key to display the **File Utilities** menu: |

|  FILE  |
|---|

File

| | |
|---|---|
| **Menu Items** | The following table describes of the menu items found on the **File Utilities** screen: |

| Select . . . | In order to . . . |
|---|---|
| 1. Build/Edit Sequence File. . . | create or edit a sequence file with the Model 6000. |
| 2. Erase Sequence File. . . | erase the present Model 6000 sequence file. |
| 3. View Data File. . . | view the present Model 6000 data file. |
| 4. Erase Data File. . . | erase the present Model 6000 data file. |

| | |
|---|---|
| **Related Topics** | For additional information on these selection items, refer to the following sections: |

- Sequence Editor
- Erase Sequence File
- Data Files
- Data File Listing
- Erase Data File

# Hardware

| | |
|---|---|
| **Description** | The Model 6000 **Hardware** menu allows the user to access the configuration screens for the PPMS magnet and the optional magnet quench, sample positioner, and external pressure sensor. |

> Hardware
>
> ▶1. Magnet Configuration...
> 2. Magnet Quench Configuration...
> 3. Position Configuration...
> 4. Pressure Sensor...
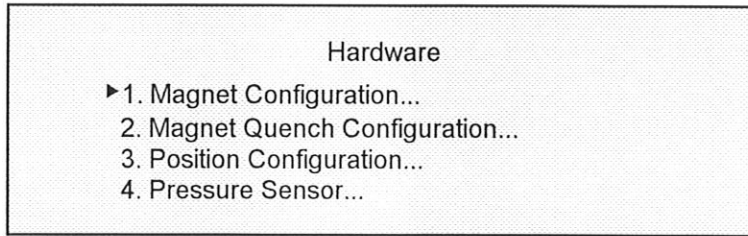
| | |
|---|---|
| **Model 6000 Keystrokes** | This menu is accessed by pressing the following keys:<br><br>CONFIG , 6<br><br>Configure, Hardware |
| **GPIB Equivalent** | MAGCNF (magnet configure), MOVECFG (positioner configure) |
| **Menu Items** | The following table explains each of the menu items found on the **Hardware** screen: |

| Select . . . | In Order To . . . |
|---|---|
| 1. Magnet Configuration. . . | set or check the system magnet parameters. |
| 2. Magnet Reset Configuration . . . | set the maximum initial field, and reset heat and cool times. |
| 3. Position Configuration. . . | select the sample motion units, units/step, and range of motion. |
| 4. Pressure Sensor. . . | specify an external pressure gauge. |

| | |
|---|---|
| **Related Topics** | • Magnet Configuration<br>• Magnet Reset Configuration<br>• Position Configuration<br>• Pressure Sensor |

# Helium Level

| | |
|---|---|
| **Description** | The Model 6000 **Helium Level** screen is a display-only screen used to monitor the dewar helium level and helium flow during helium transfers or to manually insert a new helium level. |

```
                    Helium Level

            Present level:  60% Metering
            Fill Rate :  0 % / Minute

            Exit at:  19:35     [INCR/DECR]
```
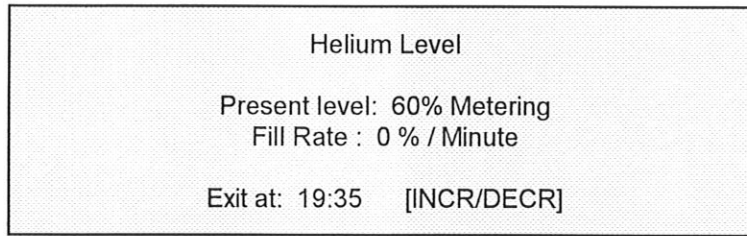
| | |
|---|---|
| **Model 6000 Keystrokes** | Press the following keys to view the **Helium Level** screen:<br><br>[ CTRL ] , 1 , 0<br><br>Control, Interactive Control, Fill Dewar |
| **GPIB Equivalent** | LEVEL? |
| **Display Items** | The following table information is displayed on this screen: |

| The Item . . . | Displays . . . |
|---|---|
| Present Level | the level of the helium in the dewar as a percentage of full. |
| Fill Rate | the rate of helium transfer into the dewar given as percent per minute. |
| Exit at | the time remaining before the level sensors will turn off.<br><br>**Note:**  This value may be changed by using the **INCR** or **DECR** keys. |

| | |
|---|---|
| **Level Display** | • The level meter is automatically turned on when this screen is opened.  Readings will be taken approximately every five seconds until the sensors are turned off.<br>• The level sensors are automatically turned off when this screen is exited.<br>• The dewar should be filled when it approaches a 60% level reading since this indicates that the helium level is just above the superconducting magnet and the dewar is nearly empty.  In general, the dewar should not be allowed to become completely empty. |
| **Related Topics** | • Level Sensor<br>• Status - System |

# Helium Level:  Level Sensor

**Description**   The Model 6000 **Level Sensor** screen is used to set the parameters of the helium level sensor.

```
                              Level Sensor
                   Monitor Hourly       :►Yes
                   Current Level        :  30%
                   Preheat Time         :  10 sec
                   (Voltage at 0% = 18.6 V)
          [EXEC] to Execute
```
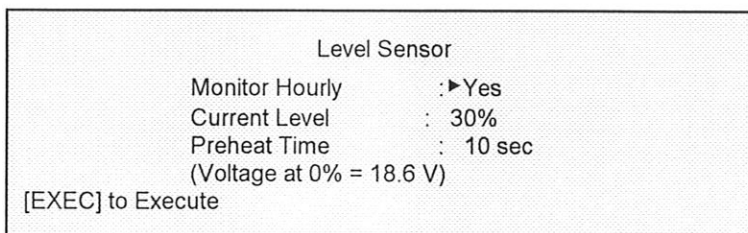
**GPIB Equivalent**   **LEVCNF**

**Model 6000 Keystrokes**   Press the following keys to view this screen:

   [ CONFIG ] , 4

   Configure, Level Sensor

**Configuration Items**   The following table describes each of the **Level Sensor** configuration items:

| Menu Item | Allowed Values | Description |
|-----------|----------------|-------------|
| Monitor Hourly | •Yes<br>•No | When **Yes** is selected, the sensor will measure the level on the hour. Otherwise, the sensor will only be activated when the **Helium Level** screen is opened. |
| Current Level | numeric, percent of full | Enter the current helium level.  The level sensor is normally set to read zero when the helium level is at the top of the superconducting magnet in the dewar. |
| Preheat Time | numeric, seconds | This is the length of time that the sensor will warm before making the reading. |

**Level Sensor Calibration**   <u>Note:</u>   For accurate calibration, the calibration helium level should be less than about 50%.  Also, due to the small voltages associated with level readings above 90%, the Model 6000 will not accept level sensor calibrations when the helium level is greater than 90%.

**To calibrate the sensor:** Enter the current helium level as percent of full.  A voltage value will then be determined which corresponds to this level.  The output voltage of the level sensor is zero when the helium level is at 100% (when the dewar is full) and the voltage increases linearly as the level drops.  Therefore, the helium level may be calibrated by specifying the voltage at any specific level.

**Related Topics**   • Helium Level (Fill Dewar)

**Helium Level Sensor**

# IEEE-488 Setup (IEEE-488 Port)

| | |
|---|---|
| **Description** | The Model 6000 **IEEE-488 Setup** screen is used to set the parameters of the IEEE-488 port located on the Model 6000 rear panel. |

```
                         IEEE-488 SETUP
         Address :▸15              Send EOS    No
         Send EOI:    Yes         EOS Value   10
         OUTPUT BUFFER MODE:        Append
         Ignore REM line:  Yes

     [EXEC] to Execute
```

| | |
|---|---|
| **Model 6000 Keystrokes** | Press the following keys to view this screen:<br><br>CONFIG , **3**<br><br>**Configure, IEEE-488 Setup** |
| **Configuration Items** | The following IEEE-488 Port configuration items may be set from this screen:<br>• Address,<br>• Send EOI (End-Or-Identify),<br>• Send EOS (End-Of-String),<br>• EOS Value, and<br>• Output Buffer Mode.<br><br>**Note:** Users not familiar with the IEEE protocol should refer to additional documentation. |
| **Address** | The **Address** specifies the bus address for this device. This value must be known by the control software and may have any value from 1 to 15 (15 is the default). |
| **Send EOI (End-Or-Identify)** | The **Send EOI** (End-Or-Identify) is recommended for use with the IEEE interface. The default value is **Yes**. |
| **Send EOS (End-Of-String)** | The **Send EOS** (End-Of-String) is a bolean flag that sends a specified character at the end of each string (see **EOS Value**). This may be either on (Yes) or off (No). |
| **EOS Value** | This is an ASCII value that will be appended to string values when **Send EOS** is selected (Yes). This may be an ASCII character that may range from 0 to 255. |
| **Output Buffer Mode** | The **Output Buffer Mode** setting determines how the buffer will handle unanswered requests. The IEEE (and Model 6000) default value for this setting is **Overwrite,** in which unanswered requests are overwritten as new requests are received. The **Append** mode is provided as an added option for those users who may wish to use it. The PPMS Server option will automatically reconfigure this setup when the PPMS Control Panel Software is first opened. |
| **Related Topics** | |

# Immediate Operations

**Description**       The Model 6000 **Immediate Operations** menu is used to directly issue a system command.

```
                    Immediate Operations
      01:▶ Temp          06:  Bridge       11:  Measure
      02:  Field         07:  DigSet        12:  Link
      03:  Move          08:  DrvOut        13:  MagRst
      04:  Chamber       09:  ExtSet
      05:  Comment       10:  SigOut
                                       [  ] Select
```

**Model 6000**       Press the following keys to view this menu:
**Keystrokes**

CTRL , 3

**Control, Immediate Operations**

**GPIB**          TEMP        BRIDGE      MEASURE
**Equivalent**    FIELD       DIGSET      LINK
                  MOVE        DRVOUT      MAGRST
                  CHAMBER     EXTSET
                  COMMENT     SIGOUT

**Menu Items**       The following table explains each of the menu items found on this screen:

| Select . . . | In Order To. . . |
|---|---|
| 01: Temp | set the system temperature. |
| 02: Field | set the magnetic field. |
| 03: Move | move the sample positioner. |
| 04: Chamber | perform a chamber operation (vent, seal, etc.). |
| 05: Comment | place a comment into the data file. |
| 06: Bridge | set bridge channel excitation currents, calibration modes, modes (AC/DC), and power limits. |
| 07: DigSet | activate Model 6000 rear panel digital outputs |
| 08: DrvOut | set either of the two driver output channels. |
| 09: ExtSet | set either of the three external select lines. |
| 10: SigOut | set the voltage output at the rear panel BNC connectors. |
| 11: Measure | place specific system status information into the data file. |
| 12: Link | link the rear panel BNC connectors to a system parameter. |
| 13: MagRst | reset the magnet to release trapped flux. |

| | |
|---|---|
| **About Immediate Operations** | Selection of an item listed in the **Immediate Operations** menu will open a corresponding entry screen that will allow you to specify the parameters of the command. This command will be issued immediately upon execution. |
| **Related Topics** | |

- Temperature (Temp)
- Magnetic Field (Field)
- Move Positioner (Move)
- Configure Sample Chamber
- Data File Measurement (Measure)
- Link BNC to Parameter (Link)
- Magnet Reset

- Set Driver Outputs (DrvOut)
- Set External Select Lines (ExtSet)
- Set Voltage Output at BNC Connector (SigOut)
- Put Comment in Data File (Comment)
- Setup Bridge Channel (Bridge)
- Set Digital Outputs (DigOut)

# Interactive Control

**Description**  The Model 6000 **Interactive Control** menu contains menu items that allow the user to perform various chamber and positioner, as well as other operations.

```
                    Interactive Control
    ▶1. Seal Chamber           6. Move to Index
     2.Purge & Seal            7. Move...
     3.Vent & Seal             8. Shutdown Mode
     4. Pump Continuous        9. Abort...
     5. Vent Continuous        0. Fill Dewar...
```

**GPIB Equivalent**  CHAMBER, MOVE, SHUTDOWN, ABORT, LEVEL?

**Model 6000 Keystrokes**  Press the following keys to view this screen:

[ CTRL ] , 1

**Control, Interactive Control**

**Menu Items**  The following table explains each of the menu items found on this screen:

| Select . . . | In Order To . . . |
|---|---|
| 1. Seal Chamber | immediately seal the chamber in its present state. |
| 2. Purge & Seal | pump and backfill the sample chamber for three cycles and then seal it closed. |
| 3. Vent & Seal | vent the sample chamber with helium and then seal it closed. |
| 4. Pump Continuous | pump on the sample chamber continuously until another chamber command is given. |
| 5. Vent Continuous | allow helium from the dewar to flow into the sample chamber until another chamber command is given. |
| 6. Move to Index | move the sample to the index position switch. The index switch is a fixed position in the sample tube. |
| 7. Move. . . | access the **Interactive Move Positioner** screen to define the sample position index. |
| 8. Shutdown Mode | activate **Shutdown** Mode. |
| 9. Abort . . . | access the **Selective Abort Operations** menu. |
| 0. Fill Dewar. . . | access the **Helium Level** (Fill Dewar) screen. |

| | |
|---|---|
| **Chamber Commands** | The **Chamber Commands** (items 1 through 5) will be performed immediately after the command is executed by selecting the menu item, either by pressing **ENTER** with the cursor at the item, or by keying in the item number.<br><br>**Note**: It is <u>NOT</u> necessary to press **ENTER** to invoke these commands when the menu item number has been keyed in. |
| **Move To Index** | The **Move to Index** command will be performed immediately after the command is executed by selecting the menu item. |
| **Shutdown Mode** | **Shutdown Mode** is recommended whenever the PPMS system will be left unused for an extended period. This command places the temperature controller in standby mode: both drivers used to control the system temperature are turned off to minimize helium flow (and hence, helium consumption) and the magnet is placed in persistent mode. |
| **Related Topics** | • Interactive Move Positioner<br>• Selective Abort Operations<br>• Helium Level<br>• Level Sensor<br>• Position Configuration<br>• Sequence File Control<br>• Sample Chamber |

# Link BNC to Parameter:  Overview

| | |
|---|---|
| **Introduction** | The PPMS allows you to link a system parameter to one of the four Model 6000 rear panel Analog Output (BNC) jacks (labeled A1 through A4).  This section explains how to create this link. |
| **Parameter Link Choices** | The following is a list of each of the system parameters that may be linked using the **Link** command:<br>• Temperature    • Magnetic Field    • Sample Position<br>• Bridge Channel Resistance    • Bridge Channel Current    • Signal Input Voltage<br>• Sample Chamber Pressure    • Driver Channel Current/Power    • Sample Heater Power<br>• Sample Heater Current |
| **About Linking Parameters** | The Link to Parameter results in a voltage output at the Model 6000 rear panel BNC connectors labelled Analog Ouputs, A1 through A4.  This output will correspond to the linked parameter value, according to your specification of zero- and ten-volt output values.  In addition to the rear panel outputs, the front panel BNC connector shares the A1 output for operation convenience.<br><br>When a parameter is selected for the link, you are asked to specify a zero-volt value and a ten-volt value.  These values will be used to report the parameter so, in general, the zero-volt value should correspond to the lower limit, and the ten-volt value to the higher limit, of the parameter.  If **Value at +10V** and **Value at 0V** are equal, a zero reading will result.<br><br>**Example:** If the System Temperature is selected for the link, enter a value of 0 (zero) for the zero volt value, and 325 for the 10 volt value.  This will ensure that the reported value will be within the range of the output.<br><br>The **Output Channel selection** remains active until the channel is turned **Off** or until a new link is specified for that channel. |
| **Using the Different Interfaces** | The **Link** command is used to link a system parameter to the Model 6000 rear panel BNC jacks.  This command is issued according to the interface option in use.  The following table lists where specific information about this procedure is located: |

| If You Are Using . . . | Refer To Section . .. | On Page |
|---|---|---|
| Model 6000 Menu System | Link BNC to Parameter:  Using Model 6000 | 33 |
| PPMS Control Panel | Link BNC to Parameter:  Using PPMS Control Panel | 35 |
| GPIB | Appendix B:  LINK | B-15 |

# Link BNC to Parameter: Using the Model 6000

| | |
|---|---|
| **In This Section** | This section describes how to link system parameters to the BNC connectors using the Model 6000 menu system. |
| **Description** | The Model 6000 **Link BNC to Parameter** screen is shown below: |

```
                    Link BNC to Parameter

            Output Channel ► : 1
            Link to Parameter #:  --off--
            Value at +10 V  : 105
            Value at  0 V   :  0
    [EXEC] to Execute       (        )
```

| | |
|---|---|
| **Model 6000 Keystrokes** | Press the following keys to view this screen:<br><br>[ CTRL ] , **3** , **12**<br><br>Control, Immediate Operations, 12: Link |
| **Entry Fields** | The following table describes each of the entry fields of the **Link BNC to Parameter** screen: |

| The Entry Field ... | Specifies. . . | Allowed Values |
|---|---|---|
| Output Channel | which Model 6000 rear panel BNC connector (A1 through A4) will contain this link. | 1 to 4, off |
| Link to Parameter # | which parameter will be linked to the BNC connector . | Pressure Temperature Field Position Bridge#Res Bridge#Exc |
| Value at +10V | the parameter output value that corresponds to a BNC output of +10V. | numeric |
| Value at 0V | the parameter output value that corresponds to a BNC output of 0V. | numeric |

**Linking a System Parameter**

The following instructions explain how to link a system parameter to the Model 6000 rear panel BNC connectors.

1. Enter the **Link BNC to Parameter** screen (CTRL, 3, 12).
2. Select the Output Channel (1 through 4, corresponding to A1 through A4, respectively) by placing the cursor in front of **Output Channel** and using the **INCR** or **DECR** key to increment the channel value.
3. Press the down arrow key to advance to the **Link Parameter #** field and select the parameter to link by using the **INCR** or **DECR** key to scroll through the choices.
4. Press the down arrow key again to set the **Value at +10 V** field, and use the number keys to key this value.
5. Set the **Value at 0 V** field using the same procedure.
6. When you have verified that the values you have entered are correct, press the **ALT** and **ENTER** keys to execute this link.

Note: It is necessary to execute each channel link individually. Therefore, to link several channels, you will need to repeat these steps (1 through 6) for each channel.

**Link BNC to Parameter**

# Link BNC to Parameter:  Using the PPMS Control Panel

| | |
|---|---|
| **In This Section** | This section describes how to link system parameters to the BNC connectors using the PPMS Control Panel. |
| **Description** | The **Analog Output** panel of the PPMS Control Panel is used to link system parameters to the BNC connectors.  This panel is shown below: |



| | |
|---|---|
| **Opening the Analog Output Panel** | The **Analog Output** screen is opened by pressing the **Analog Out** button of the PPMS Control Panel. |

**Entry Fields**

Each channel is listed as a separate item. The following table describes each of the entry fields of the **Analog Output** panel:

| Entry Field . . . | Specifies. . . | Allowed Values |
|---|---|---|
| Ch # (channel number) | which Model 6000 rear panel BNC connector (A1 through A4) will contain this link. | 1 to 4 |
| Link Channel to: | which parameter will be linked to the BNC connector . | Nothing<br>Temperature<br>Magnetic Field<br>Sample Position<br>Bridge#Res<br>Bridge#Exc<br>Signal Channel # Voltage Input<br>Sample Heater Power<br>Neck Heater Power |
| 0 Volts out at: | the parameter output value that corresponds to a BNC output of 0 V. | numeric |
| 10 Volts out at: | the parameter output value that corresponds to a BNC output of +10V. | numeric |

The current output voltage will be displayed in the **Output Volts** field.

**Linking a System Parameter**

The following instructions explain how to link a system parameter to the Model 6000 rear panel BNC connectors.

\*\*\* These are PPMS Control Panel Instructions\*\*\*
1. Open the **Analog Outputs** panel.
2. For each channel you want to link, select the Link-to parameter by pressing the down arrow button to the right of the entry field. An unlinked channel will display the word **nothing** in this field.
3. Press the tab key, or use the cursor, to advance to the **0 Volts out at:** field and key in (using your computer keyboard) the zero-volts value for the selected parameter.
4. Advance to the **10 Volts out at:** field and enter this value.
5. Press the **Exec** button at the far right of the entry line. This button will be enabled when a link to parameter has been selected.

Once executed, the link will be immediately invoked. The output voltage will be displayed in the now-green **Output Volts** field.

**Link BNC to Parameter**

# Magnet Control: Setting the Field, Overview

**Introduction**     The magnetic field of the PPMS may be set directly by the user, or may be programmed as part of a sequence file using either of the interface options.

**Magnetic Field Values**     When setting the magnetic field, the <u>value of the magnetic field is not directly measured by the system</u>; the <u>current through the magnet coil</u> is set according to the particular magnet installed in your system. This method of field setting does not account for remanent fields that may be present in the magnet (depending upon the recent history of the magnet).

**Magnetic Field Parameters**     The following table explains each of the magnetic field parameters you will be asked to specify:

| The Item... | Specifies... | Allowed Values |
|---|---|---|
| Value | the target system field. Once executed, the system will attempt to set this field. | Depends on system magnet.[†] |
| Rate | The charging rate (oersted/second) of the magnetic field when ramping from the present value to the new target value. | Depends upon **B/I Ratio**, maximum charging voltage, and inductance of the system magnet[†]. |
| Approach | The process by which the magnet charges to the new field value.<br><br>Note: See **Magnetic Field**: **Approach Mode** for details of this parameter. | • Linear<br>• No Overshoot<br>• Oscillate |
| Mode | The mode in which the magnet is to be left at the end of the charging process.<br><br>Note: See **Magnetic Field**: **Mode** for details of this parameter. | • Persist<br>• Drive |

† The maximum magnetic field and charging rate depend upon the magnet configuration and are displayed in the **Magnet Configuration** menu of the Model 6000.

In addition to the entry fields, the magnet status code and current field value are displayed at the bottom of the screen.

> ## WARNING!
>
> The potential for harming the equipment is very high when the helium level drops low enough to expose the superconducting magnet. An uncontrolled magnet quench can occur when the charged superconducting magnet is not completely immersed in liquid helium.

**For More Information**

This section provides information about field approach modes, magnetic control operation modes, how to set the magnetic field, and the magnet quench option. Use the following table to locate the information you need:

| For Information About . . . | Refer to the Section . . . | On Page |
|---|---|---|
| How to Set the Field Using the Model 6000 | Magnet Control: Setting the Field, Model 6000 | 39 |
| How to Set the Field Using the PPMS Control Panel | Magnet Control: Setting the Field, PPMS Control Panel | 40 |
| Magnet Approach Mode | Magnet Control: Approach Mode | 41 |
| Magnet Mode | Magnet Control: Mode | 42 |
| Magnet Reset Option | Magnet Control: Reset | 43 |
| Magnet Status Codes | Magnet Status Codes | 44 |
| GPIB Magnet Commands | Appendix B: MAGCNF, MAGCNF? | B-16,17 |

**Magnet Control**

# Magnet Control:  Setting the Field, Model 6000

| | |
|---|---|
| **In this section** | This section describes how to set the magnetic field using the Model 6000 menu system. |
| **Description** | The Model 6000 Set Magnetic Field screen is used to set the magnetic field: |

```
                    Set Magnetic Field
            Value      ► :  1000  Oe
            Rate         :     10  Oe/sec
            Approach :           Oscillate
            Mode         :       Persist Magnet
               (Status:  Persist    1000)

         [EXEC]  to Execute      (       )
```

| | |
|---|---|
| **Model 6000 Keystrokes** | Press the following keys to view the Model 6000 **Set Magnetic Field** screen:<br><br>        **CTRL** , **3** , **02**<br><br>Control, Immediate Operations, 02: Field |
| **How to Set the Magnetic Field** | The following instructions explain how to set the magnetic field using the Model 6000 menu system:<br><br>1.    Enter the **Set Magnetic Field** screen (**CTRL, 3, 02**).<br>2.    Key in a field **Value** (in oersted).  The allowed range will depend on the system magnet.<br>3.    Press the down arrow key to advance to the **Rate** field.<br>4.    Key in a **Rate** value (in oersted per second).  This is the rate at which the system will change to the new field.<br>5.    Press the down arrow to advance to the **Approach** field.<br>6.    Use the **INCR** or **DECR** key to select an approach mode.<br>7.    Advance to the **Mode** field and select a magnet mode.<br>8.    Press the **ALT** and **ENTER** keys at the same time to execute this command.  The magnet control system will invoke this field change immediately.<br><br>To exit without saving any changes, press the **ESC** key. |

**Magnet Control**

# Magnet Control: Setting the Field, PPMS Control Panel

**In this section**    This section describes how to set the magnetic field using the PPMS Control Panel.

**Description**    The **Field** panel is used to set the magnetic field from the PPMS Control Panel:

```
┌─────────────────────────────┐
│  ═    ▓▓▓ FIELD ▓▓▓          │
├─────────────────────────────┤
│  Field:                     │
│  ┌──────────────────┐       │
│  │ 0                │       │
│  └──────────────────┘       │
│                             │
│  Rate, Oe/sec               │
│  ┌──────────────────┐       │
│  │ 300.             │       │
│  └──────────────────┘       │
│                             │
│  Approach                   │
│  ┌──────────────┐ ┌──┐      │
│  │ Linear       │ │▼ │      │
│  └──────────────┘ └──┘      │
│                             │
│  Mode                       │
│  ┌──────────────┐ ┌──┐      │
│  │ Persistent   │ │▼ │      │
│  └──────────────┘ └──┘      │
│                             │
│  ┌────────┐  ┌────────┐     │
│  │   OK   │  │ Cancel │     │
│  └────────┘  └────────┘     │
└─────────────────────────────┘
```
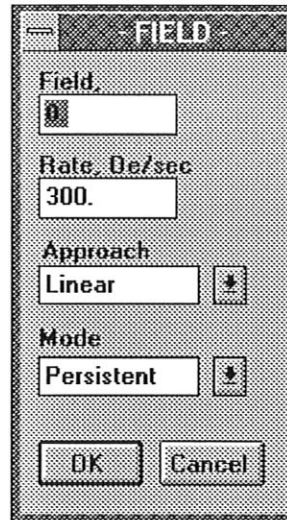
**Opening the Field Panel**    The **Field** panel is opened from the **Control Panel** of the PPMS Control Panel. The following instructions explain how to open this panel:

1.    From the **PPMS Control Panel**, place the cursor on the **Field** display. The cursor will change from an arrow to a hand.
2.    Press the left mouse button once. The panel will now be opened.

**Note:**    To open the **Field** panel with the cursor at a specific parameter, place the cursor on the parameter display of the **Control Panel** and click the mouse.

**How to Set the Magnetic Field**    The following instructions explain how to set the magnetic field using the PPMS Control Panel:

1.    Open the **Field** panel (see above).
2.    Key in a field **Value (in oersted)**. The allowed range will depend on the system magnet.
3.    Press the **Tab** key to advance to the **Rate** field.
4.    Key in a **Rate** value (in oersted per second). This is the rate at which the system will change to the new field.
5.    Press the **Tab** key to advance to the **Approach** field.
6.    Press the down arrow button to display the approach modes. Select an approach mode by placing the cursor on the mode and clicking the mouse.
7.    Advance to the **Mode** field and select a magnet mode using the same technique as above.
8.    Press the **OK** button to execute this command. The magnet control system will invoke this field change immediately.

To exit without saving any changes, press the **Cancel** button.

# Magnet Control:  Approach Mode

| | |
|---|---|
| **Description** | The **Magnet Approach Mode** determines the final approach used by the system to reach the target magnetic field. |
| **Magnet Approach Mode** | The PPMS Magnet Control System follows a specific algorithm to reach a set point (target) field value. When the magnet is charging to this value,  the **Approach Mode** determines how the field is approached. Once the field is near the target value, an iterative process is used that sets the magnet <u>current</u> to the value that corresponds the requested magnetic <u>field</u>.  This current is set within the limitations of the PPMS hardware:  approximately 1 milliamp for currents above 5 amps, and about 100 microamps for currents below 5 amps with High Resolution enabled. |
| **Approach Mode Definitions** | The following table describes each of the magnet **Approach Modes** used during the magnet field charging process: |

| Approach Mode | Description |
|---|---|
| Linear | The field approaches the target value at the rate specified by the **Rate** parameter.  The charging rate is fixed throughout the field change, the iterative approach process described above is not used. |
| No Overshoot | The field value is approached by discrete steps small enough to ensure that the target value is never exceeded.  The specified **Rate** will be used to the extent possible when field change steps are large enough to produce the charging voltage required to satisfy the **Rate**. |
| Oscillate | The target value is approached by a series of oscillations with successively decreasing amplitude.<br><br>**Note:**  If magnetic hysteretic effects are important in the sample to be measured, this mode should not be used. |

| | |
|---|---|
| **Using Linear Mode** | • Since the iterative approach process is not used to reach the target value when the **Linear Approach Mode** is used, the final field will not be precise as compared to other approach modes. |
| **Using No Overshoot Mode** | • The **No Overshoot**  mode should be used if magnetic hysteretic effects will degrade the experiment. |
| **Using Oscillate Mode** | • The **Oscillate** approach mode is designed to minimize flux movement in the superconducting magnet after the final field value has been reached.<br>• The **Oscillate** approach eliminates most of the magnetic relaxation effects normally found in superconducting magnets and makes it possible to achieve a very stable magnetic field large, even after large changes in magnetic field.<br>• If magnetic hysteretic effects may degrade the experiment or affect the sample, the **Oscillate** mode should not be used. |

# Magnet Control:  Mode

**Description**    The **Magnet Mode** specifies the mode in which the magnet is to be left at the end of the charging process.

**Magnet Mode Definitions**    The following table describes each of the **Magnet Modes** available on the PPMS:

| Magnet Mode | Description |
|---|---|
| Persist | The magnet is placed in persistent mode, with the persistent switch heater and magnet power supply turned off, placing the magnet's persistent switch in the persistent (superconducting) state.  The magnet power supply unit is turned off. |
| Drive | The magnet current is continuously supplied by the magnet power supply.  The persistent switch remains open (switch heater on) and the current through the superconducting magnet is provided directly by the power supply. |

**Persist Mode**    • The **Persist** mode will provide the most stable magnetic field available.

**Drive Mode**    • In **Drive** mode, 60 Hz ripple and low frequency drifts in the magnet power supply will contribute to fluctuations in the magnetic field.
   • The **Drive** mode allows the magnetic field to change much more rapidly than when using Persist Mode. Therefore, this mode is recommended for situations in which frequent and brief field changes will be required.
   • **Drive** mode is not recommended for samples that are field hysteretic.

# Magnet Control:  Magnet Reset

| | |
|---|---|
| **Description** | The Model 6000 **Magnet Reset** screen is used to quench the superconducting magnet coil. The **Reset** heater is a PPMS option. |

```
                        Magnet Reset
                  Drive to Field:►  Oe
                  Rate :       Oe/sec

         [EXEC] to Execute   (        )
```

| | |
|---|---|
| **Model 6000 Keystrokes** | Press the following keys to view this screen:<br><br>[ CTRL ] , **3** , **13**<br><br>Control, Immediate Operations, 13: MagRst |

| | |
|---|---|
| **Entry Fields** | The following table describes the two entry fields of the **Magnet Reset** screen that specify the parameters of the magnet quench: |

| The Entry Field . . . | Determines . . . |
|---|---|
| Drive to Field | the field (oersted) to which the system will drive the magnet before initiating the reset (turning on the reset heater).<br><br>Note:   The reset will begin when the field is within 10 oersted of the **Drive to Field**. |
| Rate | the rate (oersted per second) at which the system will be driven to the **Drive to Field** value. |

| | |
|---|---|
| **Magnet Reset** | The **Magnet Reset** is an option which allows the user to purge the system magnet of trapped magnetic flux, restoring it to a state similar to that achieved when the magnet is first cooled down.  Although trapped flux may be insignificant at high field values it can become more significant at low field values. |

# Magnet Status Codes

**Description**  The **Magnet Status Code** is displayed on the Model 6000 **Status - System** and **Set Magnetic Field** screens, and on the PPMS Control Panel.  The status code indicates the present state of the magnet control system.

**Code Definitions**  The following table provides the meaning of each of the magnet status codes.

| Magnet Status Code | | Meaning |
|---|---|---|
| **Model 6000** | **PPMS Control Panel** | |
| Charging | Charging | Magnet is Charging |
| Charging | Discharging | Magnet is Discharging |
| Chrg Err | Chrg Err | Magnet Charging Error |
| Curr Err | Curr Err | Incorrect current in magnet |
| Failure | Failure | General Magnet Failure |
| Holding | Holding | Holding Magnetic Field; Driven mode |
| Iterate | Iterate | Iterating; Driven mode |
| Persist | Persist | Persistent Mode |
| PSU Err | PSU Error | Power Supply Error |
| SW-Cool | SW-Cool | Persist Switch Cooling |
| SW-Warm | SW-Warm | Persist Switch Warming |
| SWTC Err | SWTC Err | Persist Switch Error |
| Quench | Quench | Uncontrolled Magnet Quenching (Reset) |
| Unknown | | Unknown Error |

**About Failure Status**  **Failure** status will result from a hardware failure.  If the **Failure** status persists, contact Quantum Design with details of the system operation prior to the failure.

**Magnet Control**

# Model 6000 Front Panel

| | |
|---|---|
| **Description** | The Model 6000 Front Panel display and key pad may be used to control most aspects of the PPMS. The front panel features and keys are described below. |
| **Key Groups Overview** | The Model 6000 provides a display screen, entry keys, and a BNC output jack. For the purpose of explanation, the keys are grouped according to function. The following table provides a summary of the use of these keys: |

| Key Group... | Is Used To ... |
|---|---|
| Menu | access the top-level menus (Status, Control, Files, and Config). |
| Arrows | move the cursor (with the arrow ▶ ) and to increase (or decrease) entry values (**INCR** or **DECR**). |
| Number | to enter number values for entry fields or to select numbered menu items. Also to **ABORT** system operation or to place the system into **LOCAL** mode. |

| | |
|---|---|
| **Display Items** | The Model 6000 front panel, in addition to the main display screen, includes **Remote** and **Error** display lights. These will light when the system is in **Remote** mode or when an error condition exists. |

**Magnet Control**

# Model 6000 Front Panel:  Using the Keys

| | |
|---|---|
| **Description** | In this section, the use of the Model 6000 is explained.  It is recommended that this section be read before using the Model 6000 front panel.  For additional information and a tutorial, refer to Chapter Two:  An Example Measurement. |

**Using the Menu Keys**

The **Menu Keys** are located to the left of the display screen.  Press any of these keys to immediately display the corresponding top-level menu.  The top-level menu will be displayed regardless of the current display screen.  This feature allows the user to access any screen by using the same key sequence.

> **Example 1:**  In order to display the **Status-Bridge** screen at any time, press the **STATUS** key three times from anywhere in the Model 6000 menu system.

> **Example 2:**  If you are in the third-level Setup Bridge Channel screen, and want to look at the **Helium Level** screen, press the following key sequence:

> > | CTRL | , 1 , 0

> To select **CONTROL**, **1. Interactive Control**, and **Fill Dewar**.

**Using the Arrow Keys**

The **Arrow Keys** are used to move the cursor around on the screen, to increase or decrease entry values, or to toggle through entry choices (**INCR** or **DECR** keys only).

The **ALT** key is used to accelerate any of the other Arrow keys.  Therefore, when any of the Up, Down, Left, or Right arrows are pressed with the **ALT** key, the cursor will move faster or the entry value will change faster.  Similarly, if **ALT** and **INCR** are pressed together (or **ALT** and **DECR**) the entry value will change in larger increments (increments equivalent to one eighth of the total value range).

**Using Enter, Execute, and Escape**

To the right of the arrow keys are the **ESC** and **ENTER** keys.  The **ENTER** key also acts as the **EXECUTE** key by pressing **ALT** and **ENTER** together.  The following table explains the use of each of these commands:

| Use the Key . . . | In Order To. . . |
|---|---|
| ENTER | activate an entry that does not require the **Execute** command.  This is primarily used for menu item selection. |
| EXECUTE [EXEC] | **Execute** a command, configuration setting, or another entry that requires the **Execute** command.  Screens that require the **Execute** command will have the line "**[EXEC] to execute**" along the bottom.  Changes made to these screens without execution will not be implemented. |
| ESC | leave a screen or entry value without affecting any change. |

**Using the Number Keys**

To use number keys, key in a number value and press the **Enter** key.  In addition to the ten digits, this key pad also includes a decimal ( **.** ) and a plus/minus ( **+/-** ) key.

When the decimal key is pressed with the **ALT** key, **LOCAL** mode will be activated (the system will be taken out of **Remote** mode).

When the plus/minus key is pressed with the **ALT** key, the **ABORT** command is issued and all system operations are immediately terminated.

**Model 6000 Front Panel**

# Pressure Sensor

| | |
|---|---|
| **Description** | The Model 6000 **Pressure Sensor** screen is used to specify the sensor type and units of measurement for an external pressure gauge. |

```
                        Pressure Sensor
                Sensor  :▶  Baratron
                Units   :   Mictrons
                Units/V :      10.0

        [EXEC] to Execute
```

| | |
|---|---|
| **Using a Pressure Sensor** | The PPMS is designed to allow the user to connect an external pressure gauge to the system. This Sensor output may be directed to one of the Model 6000 rear panel BNC connectors by using the **LINK** command (see **Link BNC to Parameter**). |
| **Model 6000 Keystrokes** | Press the following keys to view the Model 6000 **Pressure Sensor** screen:<br><br> `CONFIG` , **6** , **4** <br><br>Configure, Hardware, Pressure Sensor |
| **Configuration Items** | The following table describes each of the items set from the Model 6000 **Pressure Sensor** screen. |

| Menu Item | Allowed Values | Description |
|---|---|---|
| Sensor | •Baratron<br>•Pirani<br>•Internal | This is the type of external pressure gauge that you have connected to the Model 6000 rear panel **Pressure** port. |
| Units | •Microns<br>•Pascals<br>•Bars<br>•mm Hg<br>•Torr | These are the units used to report the sensor pressure. Since the sensor will actually be reporting a calibrated voltage change, this value is for display purposes only. |
| Units/V | numeric | This is the value of **Units** that corresponds to one volt of change. |

| | |
|---|---|
| **About Sensor Settings** | • When using a **Pirani** (or any non-Baratron) sensor, the **Units/V** field will read **Table** and the user must manually load a conversion table by using the **GPIB TABLE** command.<br>• When a **Baratron** sensor is selected, the Model 6000 will automatically create a conversion table based on the value entered in the **Units/V** field.<br>• If **Baratron** is entered after a **Pirani** sensor has been in place, the Pirani table will be overwritten.<br>• When either sensor is selected, the pressure will be displayed in the **Status** screen. |
| **Related Topics** | • Status - Other<br>• Link BNC to Parameter<br>• Appendix B: GPIB TABLE command |

**Pressure Sensor**

# Sample Chamber: Commands

| | |
|---|---|
| **Introduction** | The sample chamber may be vented, purged, or sealed from either of the PPMS interfaces. This section explains how to configure the sample chamber using the Model 6000 menu system and the PPMS Control Panel. |
| **Chamber Commands** | The following table explains each of the sample chamber commands: |

| Chamber Menu Item | | In Order To . . . |
|---|---|---|
| **Model 6000** | **PPMS Control Panel** | |
| 1. Seal Chamber | Seal | immediately seal the sample chamber in its present state. |
| 2. Purge & Seal | Purge/Seal | cause the system to pump and backfill the sample chamber for three cycles and then seal it closed. |
| 3. Vent & Seal | Vent/Seal | vent the sample chamber with helium and then seal it closed. |
| 4. Pump Continuous | Evac | pump on the sample chamber continuously until another chamber command is given. |
| 5. Vent Continuous | Vent | allow helium from the dewar to flow into the sample chamber until another chamber command is given. |

| | |
|---|---|
| **Caution** | The system temperature should always be near room temperature (275 to 300 K) before venting the sample chamber. This will prevent condensation from forming inside the chamber. Condensation can introduce foreign particles into the system, which will ultimately cause the impedance tube to become blocked, resulting in temperature control failure or other problems. |
| **About Chamber Commands** | **Chamber Commands** are performed immediately after the command is executed by selecting the menu item and pressing **ALT** and **ENTER** (Model 6000), or by pressing the command button (PPMS Control Panel). |
| **More Information** | Specific information on using the chamber commands with the different interfaces is provided in the following sections: |

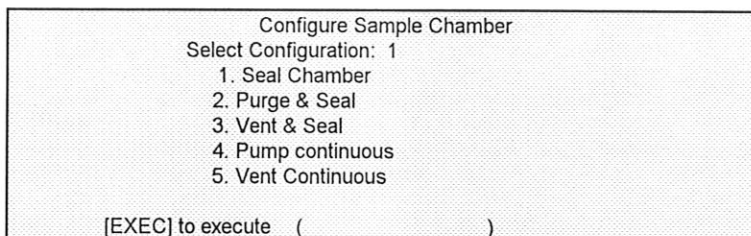| For Information About . . . | Refer to Section. . . | On Page |
|---|---|---|
| Using the Model 6000 | Sample Chamber: Commands, Model 6000 | 49 |
| Using the PPMS Control Panel | Sample Chamber: Commands, PPMS Control Panel | 50 |
| Using GPIB | Appendix B: CHAMBER | B-4 |
| Sample Chamber Status Codes | Sample Chamber: Status Codes | 51 |

# Sample Chamber:  Commands, Model 6000

| | |
|---|---|
| **In This Section** | This section describes how to perform sample chamber operations using the Model 6000 Menu System. |
| **Description** | The Model 6000 **Configure Sample Chamber** screen is used to perform sample chamber operations.  The selection items on this screen are identical to those on the Model 6000 Interactive Control menu and the PPMS Control Panel. |

```
                    Configure Sample Chamber
                  Select Configuration:  1
                      1. Seal Chamber
                      2. Purge & Seal
                      3. Vent & Seal
                      4. Pump continuous
                      5. Vent Continuous

              [EXEC] to execute   (              )
```

| | |
|---|---|
| **Model 6000 Keystrokes** | Access this screen by pressing the following keys:<br><br>**CTRL** , **3** , **04**<br><br>Control, Immediate Operations, 04:Chamber |
| **Performing Sample Chamber Operations** | The following instructions explain how to perform any of the five chamber operations:<br><br>**Caution:**  The system temperature should always be near room temperature (275 to 300 K) before venting the sample chamber.<br><br>1.  Enter the **Configure Sample Chamber** screen (**CTRL, 3, 04**).<br>2.  Key in the number of the command you want performed.<br>3.  Press **ALT** and **ENTER** to execute the command.  The chamber operation will be performed immediately. |

# Sample Chamber:  Commands, PPMS Control Panel

**In This Section**    This section describes how to perform sample chamber operations using the PPMS Control Panel.

**Description**    Sample Chamber operations are performed from the PPMS Control Panel, shown below:
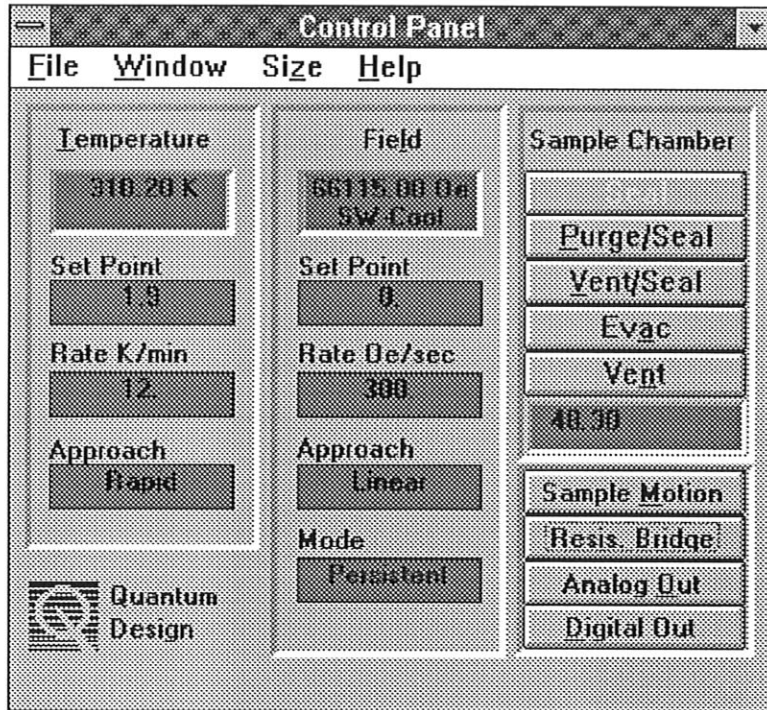


**Performing Sample Chamber Operations**    The following instructions explain how to perform any of the five chamber operations:

**Caution:**  The system temperature should always be near room temperature (275 to 300 K) before venting the sample chamber.

1.  Open the **PPMS Control Panel**.
2.  Press the button that corresponds to the command you want performed.  The chamber peration will be performed immediately.

**Sample Chamber**

# Sample Chamber:  Status Codes

| | |
|---|---|
| **Description** | The **Sample Chamber Status Code** indicates the present state of the sample chamber. |
| **Display** | The **Chamber Status Codes** are displayed on the Model 6000 **Status - System**  screen and on the PPMS Control Panel to report the current state of the system sample chamber. |
| **GPIB Equivalent** | The GPIB CHAMBER? command may be used to obtain the sample chamber status. |
| **Code Definitions** | During normal operation, the sample chamber will cycle through various states.  The following table explains each of the **Chamber Status** codes: |

| Status Code | Meaning |
|---|---|
| Failure | General chamber failure |
| Flooding | Chamber is being vented continuously |
| Pumping | Chamber is being pumped continuously |
| Purged | Chamber is purged |
| Purging | Purging in "Evacuate & Seal" process |
| Sealed | Chamber is sealed |
| Vented | Chamber is vented |
| Venting | Venting in "Vent & Seal" process |

| | |
|---|---|
| **About Failure Status** | **Failure** status will usually result when the chamber status is in an unknown state.  This status may be resolved by sending any **Chamber** command (seal, purge, vent, etc.) or by **Aborting** the **Chamber Ops**. |
| **Related Topics** | • Status - System<br>• Interactive Control<br>• Configure Sample Chamber<br>• Selective Abort Operations |

## Sample Motion: Overview

| | |
|---|---|
| **Introduction** | The Sample Positioners are PPMS options that either rotate the sample on a vertical axis or move the sample longitudinally within the sample space. This section explains how to configure and use the sample positioner. (Note: this is different from the ACMS Option positioner.) |
| **About using the Sample Positioner** | In order to use the positioner you will need to enter Position Configuration information into the Model 6000. Sample positioning commands may then be issued from either the Model 6000 or from the PPMS Control Panel. |
| **Sample Motion Parameters** | Once the positioner is installed and configured, the following parameters will be used to move the sample: |

| Select .. | To Specify . . . | Allowed Values |
|---|---|---|
| Position | the position to which you want the sample moved.<br><br>Note: The units for this field are set from the **Position Configuration** menu. | depends on **Range** set in **Position Configuration** and on positioner type. |
| Mode | how the sample is to be repositioned.<br><br>Note: See below. | • Normal<br>• Move to Index<br>• Define Current Position |
| Reduction Factor | the rate of motion; zero is fastest, 14 is slowest. | 0 to 14 |
| Now at: | the current sample position. | display only |

| | |
|---|---|
| **Mode Definitions** | The following table explains each of the three **Positioner Modes**: |

| Mode | What It Does | Example |
|---|---|---|
| Normal | Moves the sample to the specified **Position** with respect to the present (**Now at:**) position. | If the sample is currently at 10° and the **Position** is set to 15°, the sample will be moved to 25° (10 + 15). |
| Move to Index | Moves the sample to the index switch. | The sample will be moved to the fixed index switch position on the positioner. |
| Define Current Position | Redefines the present location of the sample according to your specifications. | If the sample is presently at 5° and you want this position to be called 0°, set the **Position** to zero, and the **Mode** to Define Current Position. |

**Index and Limit Switches**

The following table explains the **Index** and **Limit** switches of the sample positioner:

| Switch | Definition |
|--------|------------|
| Index | The calibrated "zero" position. This is a hardware switch located on the positioner unit. When calibrated, a rotator will have the Index at the zero degree position. |
| Limit | The "upper limit" position. This is a defined limit that applies to non-rotational positioner systems. On a linear positioner, for example, this switch would be 12 cm above the index. |

**Specific Information**

Specific information on the use of the Sample Positioner is provided in the following sections:

| For Information About . . . | Refer to Section . . . | On Page |
|------------------------------|-------------------------|---------|
| Configuring the Sample Positioner | Sample Motion: Configuration | 54 |
| Using the Sample Positioner with the Model 6000 | Sample Motion: Model 6000 | 55 |
| Using the Sample Positioner with the PPMS Control Panel | Sample Motion: PPMS Control Panel | 57 |
| GPIB | Appendix B: MOVE?, MOVECFG, MOVE LIM? | B-16,17 |

## Sample Motion:  Configuration

| In This Section | This section explains how to configure the PPMS Sample Positioner option using the Model 6000 menu system. |
| --- | --- |
| Description | The Model 6000 **Position Configuration** screen is used to define the units and range of motion of the sample positioner. |

```
                     Position Configuration
            Units        :  ▶ Deg
            Units/Step :       1.0
            Range        :    360.00

     [EXEC] to Execute
```
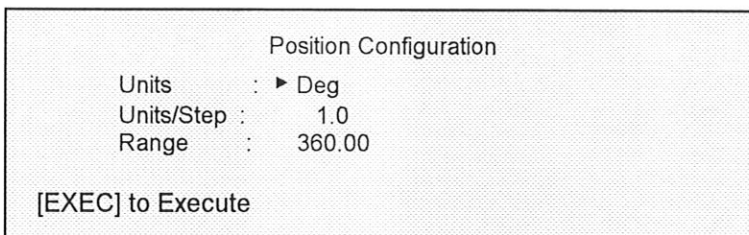
| Model 6000 Keystrokes | Press the following keys to view the **Position Configuration** screen: |
| --- | --- |

<div style="margin-left: 2em;">

CONFIG , **6** , **3**

Configure, Hardware, Position Configuration

</div>

| Configuration Items | The following table describes each of the items that are set from the **Position Configuration** screen: |
| --- | --- |

| Item | Allowed Values | Description |
| --- | --- | --- |
| Units | • Degrees<br>• Inches<br>• Mils<br>• Millimeters<br>• Radians<br>• Centimeters<br>• User-Defined | These are the units that will be used to report the sample position.  The appropriate selection will depend on the configuration of the sample positioner. |
| Units/Step | numeric | This value determines the unit distance (as defined above) that the sample will be moved for each step of motion. |
| Range | numeric | This is the maximum distance over which the sample may be moved.<br><br>**Note:** The **Range** is not the same as the **Limit**.  The **Limit** is a hardware switch, which the positioner cannot pass.  The **Range** is a software setting. |
| Enable Index Switch | • Yes<br>• No (default) | When **Yes** is selected for this field, the **Index** switch becomes a hard limit for the positioner and the sample may not be moved beyond (below) the **Index** position. |

# Sample Motion: Model 6000, Move Positioner

| | |
|---|---|
| **In This Section** | Once the sample positioner has been installed and configured, the sample may be moved using the Model 6000 menu system or the PPMS Control Panel. This section explains how to use the Model 6000 menu system to control sample motion. |
| **Description** | The Model 6000 **Move Positioner** screen is used to move the sample within the sample chamber using the Sample Motion option. |

```
                         Move Positioner

               Position :  ▶0.000  Deg
               Mode    :  Normal
               Reduction Factor:  00
               (Now at :    .00 Deg)
        [EXEC] to Execute           (           )
```

| | |
|---|---|
| **Model 6000 Keystrokes** | Press the following keys to view this screen: |

        | CTRL | , **3** , 03

Control, Immediate Operations, 03: Move

| | |
|---|---|
| **Moving the Sample** | The use of this feature will depend upon the type of positioner in use on your system. The following instructions are based on a sample rotator: |

1. Configure the rotator from the **Position Configuration** menu. The configuration process should be performed each time the rotator is installed.
2. Enter the **Move Positioner** screen (CTRL, 3, 3).
3. Key in a value for **Position**. Note that the current position is displayed in the bottom **Now at:** field. The allowed range for this field will depend upon that set in the **Position Configuration** screen.
4. Enter a **Mode** value. This value is selected by pressing the **INCR** or **DECR** keys to toggle through each of the three modes. To move the sample to a new position, select **Normal.** See **Sample Motion: Mode** for details about this field.
5. Enter a **Reduction Factor** value by using the number keys or the **INCR/DECR** keys.
6. Press **ALT** and **ENTER** to execute this command set. Sample motion will begin immediately.
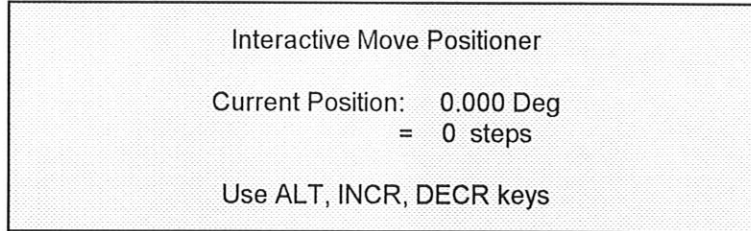
## Sample Motion: Model 6000, Interactive Move Positioner

| | |
|---|---|
| **In This Section** | This section explains the use of the Model 6000 **Interactive Move Positioner** screen. |
| **Description** | The Model 6000 **Interactive Move Positioner** menu is used to control the PPMS sample positioner option. |

```
                Interactive Move Positioner

        Current Position:    0.000 Deg
                         =   0  steps

               Use ALT, INCR, DECR keys
```

| | |
|---|---|
| **Model 6000 Keystrokes** | Press the following keys to view this screen: |

       | CTRL | , **1** , **7**

Control, Interactive Control, 7. Move

| | |
|---|---|
| **Display Items** | The **Interactive Move Positioner** screen displays the following information: |

| The Item . . . | Displays . . . |
|---|---|
| Current Position (units) | the position of the sample positioner in specific units. |
| Steps | the position of the sample positioner in steps. The number of units per step is set from the **Position Configuration** screen. |
| Index/Limit | when the positioner is at the **Index** or **Limit** switch by displaying the corresponding word.<br><br>**Note:** Both the **Index** and **Limit** words will be displayed to indicate an error condition, such as an improperly installed positioner. |

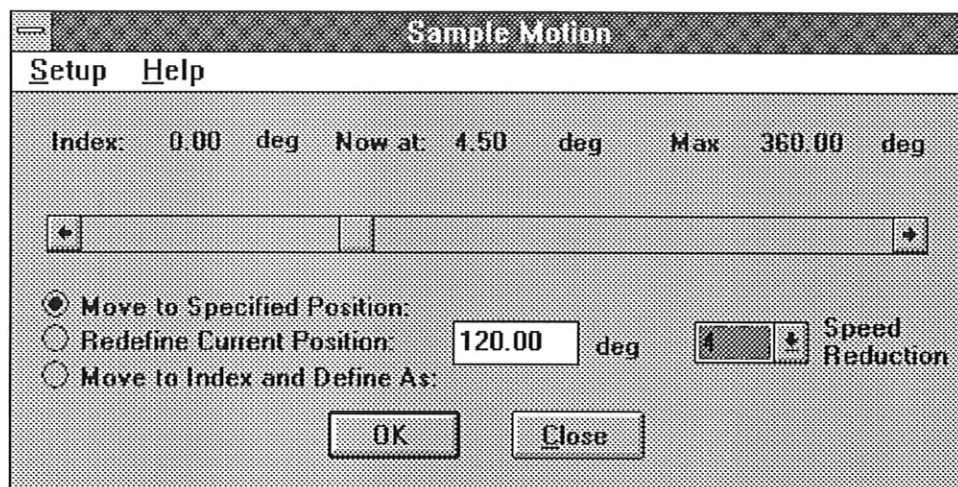| | |
|---|---|
| **Moving the Sample Positioner** | This screen allows you to move the positioner in incremental steps, rather than by indicating a **Move to** value. Press the **INCR** or **DECR** key to move the positioner one step at a time. Press the **ALT** key and the **INCR** or **DECR** key to move the positioner at a rate of 15 steps at a time. |
| **Related Topics** | • Interactive Control /Move to Index<br>• Move Positioner<br>• Position Configuration |

## Sample Motion: PPMS Control Panel

| | |
|---|---|
| **In This Section** | Once the sample positioner has been installed and configured, the sample may be moved using the Model 6000 menu system or the PPMS Control Panel. This section explains how to use the PPMS Control Panel to control sample motion. |
| **Description** | The PPMS Control Panel Sample Motion panel is used to move the sample within the sample chamber using the Sample Motion option. |



| | |
|---|---|
| **Opening the Sample Motion Panel** | The Sample Motion screen is opened by pressing the **Sample Motion** button located on the bottom right of the PPMS Control Panel. |
| **Moving the Sample** | The use of this feature will depend upon the type of positioner in use on your system. The following instructions are based on a sample rotator: |

1. Configure the rotator from the Model 6000 **Position Configuration** menu. The configuration process should be performed each time the rotator is installed.
2. Open the **Sample Motion** panel (see above).
3. Select **Move to Specified Position** by placing the cursor on the selection circle and clicking the left mouse button once. The selected circle will be filled in.
4. Place the cursor in the box to the right of the **Move to Specified Position** space. This box will have the configured units displayed to the right of the entry field. (See diagram above.)
5. Select a **Speed Reduction** value by pressing the down arrow button next to the **Speed Reduction** box.
6. Press **OK** to execute this command set. Sample motion will begin immediately.

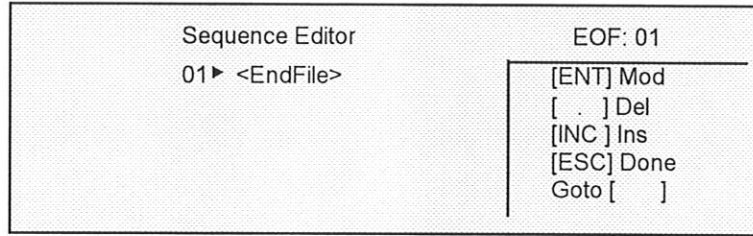| | |
|---|---|
| **Moving the Sample, Alternate Method** | In addition to the procedure described above, the sample may be moved by using the sliding bar of the Sample Motion panel. Simply place the cursor on the sliding bar button and press the left mouse button. Hold the mouse button down and drag the slider to move the sample positioner. The blue lines above and below the slider bar indicate the actual position of the sample and the button is placed at the target value. The **Now at:** display will show where the sample is in the configured units. |

# Sequence Files: Overview

| | |
|---|---|
| **Introduction** | This section describes sequence files and their use. The first section provides an overview of sequence files, followed by specific instructions for creating, editing, and running the sequence. |
| **What is a Sequence File?** | A **sequence file** is a command file that contains one or more instructions for the system to carry out. It can be written to incorporate PPMS options such as the AC Measurement Option as well as other external devices. By using a sequence file, the PPMS will perform all instructions automatically and systematically, according to your commands. |
| **Why Use a Sequence File?** | Sequence files allow the user to specify explicit instructions to be performed in a set order, providing consistent sample processing and automated operation. Once the sequence is written, the PPMS will automatically process the commands, freeing the experimenter to perform other tasks. |
| **Writing a Sequence** | The sequence file is written using either the Model 6000 or the PPMS Control Panel. The sequence file commands are the same as those used for routine PPMS operation. |
| **More Information** | For additional information on writing and using sequence files, refer to the following sections of this manual: |

# Sequence Files:  Writing a Sequence Using the Model 6000

**Description**

The Model 6000 **Sequence Editor** screen is used to create and edit a sequence for use with the PPMS.

```
        Sequence Editor               EOF: 01
        01 ▶ <EndFile>            ┌──────────────────
                                  │ [ENT] Mod
                                  │ [  . ] Del
                                  │ [INC ] Ins
                                  │ [ESC] Done
                                  │ Goto [    ]
```

**Model 6000 Keystrokes**

Press the following keys to view the **Sequence Editor** screen:

[ FILE ] , **1**

File Utilities, Build/Edit Sequence File

**Selection Items**

The following table describes each of the selection items found on the **Sequence Editor** screen:

| Select . . . | In Order To . . . |
|---|---|
| ENTER | modify an existing command line. |
| . (decimal) | delete the selected command line. |
| INC (INCR) | insert a command at the selected line. |
| ESC | leave the editor screen. |
| Line Number | go to the specified line number. |

**Creating a New Sequence**

In order to create a new sequence, erase the current sequence file (see above) and press the **INCR** key to insert the first line.  The command listing will be displayed, from which you may select a specific system command and related parameters.

**Editing a Sequence Line**

To change an existing sequence line, move the cursor (using the arrow keys) to the line to be edited.  Press the **ENTER** key to modify the command parameters.

To delete a sequence line, place the cursor on the selected line and press the" **.** " (decimal) key.

To insert a command line, place the cursor on the line <u>before</u> the new command and press the **INCR** key.  When **Insert** is selected, the sequence command listing will be displayed and the new command should be specified as usual.

**Viewing Command Parameters**

A summary of specific command parameters will be displayed on each command line of the sequence file.  However, the **Modify** command can be used to view the details of the selected command line.  This is done by selecting the command line and pressing **Enter**.  The parameters of the command will be displayed.  Press **ESC** to leave the screen without saving any changes.

**Erasing a Sequence File**

In order to erase the current sequence file, use the **Erase Sequence File** screen (FILE, 2).

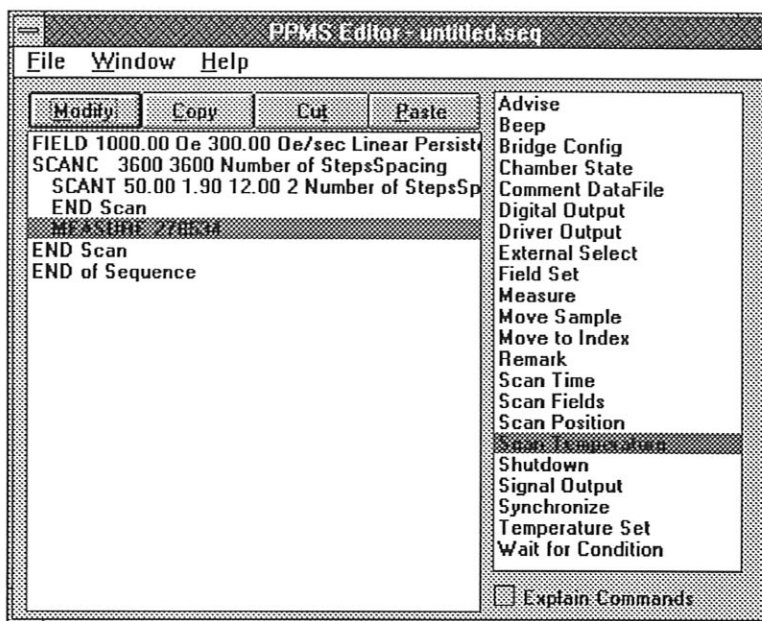# Sequence Files: Writing a Sequence Using the PPMS Control Panel

| | |
|---|---|
| **In This Section** | This section explains how to use the **Editor** to create and edit a sequence for use with the PPMS. |
| **Opening the Editor Panel** | The **Editor** panel is opened from any of the PPMS Control Panel panels. Simply open the **Window** menu and select **Editor.** |
| **Description** | The **Editor** panel is shown below. This screen provides a display of the current sequence file (left side) and a command listing on the right. |



PPMS Editor - untitled.seq

File   Window   Help

Modify   Copy   Cut   Paste

FIELD 1000.00 Oe 300.00 Oe/sec Linear Persist
SCANC   3600 3600 Number of StepsSpacing
    SCANT 50.00 1.90 12.00 2 Number of StepsSp
    END Scan
MEASURE 27853
END Scan
END of Sequence

Advise
Beep
Bridge Config
Chamber State
Comment DataFile
Digital Output
Driver Output
External Select
Field Set
Measure
Move Sample
Move to Index
Remark
Scan Time
Scan Fields
Scan Position
Scan Temperature
Shutdown
Signal Output
Synchronize
Temperature Set
Wait for Condition

☐ Explain Commands

| | |
|---|---|
| **Action Buttons** | Along the top of the displayed file, there are four action buttons which are used to edit the file. The following table describes each of these buttons: |

| Press . . . | In Order To . . . |
|---|---|
| Modify | modify the highlighted command line. |
| Copy | copy the highlighted command line. |
| Cut | remove the highlighted command line. |
| Paste | paste an item which was selected using **copy** or **cut** at the current line. |

**Creating a New Sequence**

The following instructions explain how to create a new sequence using the PPMS Editor:

1. Enter the **Editor** screen of the PPMS Control Panel (see above).
2. Open the **File** menu and select **New**.
3. Place the cursor on a command from the command list on the right side of the screen.
   **Note:** For an explanation of commands, select **Explain Commands** at the bottom of the panel. This will result in a display of information about the highlighted command. This feature may be selected or deselected at any time.
4. Double-click the command to open the command information screen. This screen is used to enter the various parameters about the selected command.
5. When you are done entering the command parameters, press the **OK** button to place the command in the sequence, or press **Cancel** to continue without saving this command.
6. Select the next command and repeat this process until you have entered all of your commands.

**Using Cut, Copy, and Paste**

When editing or creating a sequence file, it is convenient to be able to move or copy one or more lines to a different part of the file. The **Copy**, **Cut**, and **Paste** buttons are used to do this. The following table explains the use of these buttons:

| Action Button | How to Use It |
|---|---|
| Copy | 1. Highlight the line to be copied and press the copy button. 2. Move the cursor to the line where you want the copied line to appear. 3. Press **Paste** and the copied line will be inserted above the line you have selected. |
| Cut (or move) | 1. Highlight the line you want to cut and press the **Cut** button. 2. The highlighted line will be removed. 3. To place the cut line in a new position, move the cursor to the new position and press the **Paste** button. The cut line will be inserted above the line you have selected. |
| Paste | The **Paste** button is used only with the **Cut** and **Copy** buttons as described above. Paste will always insert the pasted line above the current line. |

**Note:** To select multiple, sequential lines for **Cut** or **Copy**, press the **Shift** key while holding down the left mouse button. This will allow you to select several lines at a time. To deselect these lines, click on any line without holding down the shift key.

**Editing a Sequence Line**

To change an existing sequence line, move the cursor (using the arrow keys) to the line to be edited. Press the Modify button to display the command parameters.

To delete a sequence line, place the cursor on the selected line and press the **Cut** button.

To insert a command line, place the cursor on the line after the new command and select the command from the command listing.

**Sequence Files**

| | |
|---|---|
| **Viewing Command Parameters** | A summary of specific command parameters will be displayed on each command line of the sequence file. For additional information, the **Modify** command can be used to view the details of the selected command line. This is done by highlighting the command line and pressing **Enter**. The parameters of the command will be displayed. Press **ESC** to exit the screen without making any changes. |
| **Saving a Sequence File** | To save the sequence file, select **Save** or **Save As** from the **File** menu of the **Sequence File Editor** panel. The file name may be up to eight characters and will have the suffix ".SEQ". |
| **Erasing a Sequence File** | The sequence file is stored just like any other file on the host computer. To erase a file use the DOS "DEL" command. |

## Sequence Editor: Example

**Description**    This example demonstrates how to write a sequence file.  For general information about writing sequence files, refer to the previous section.

**Erasing a Sequence File**    If you are using the Model 6000 to write a new sequence file, it may be necessary to delete or clear an existing file.  This is done by the following procedure:

| Step | Command | Key Sequence |
|------|---------|--------------|
| 1 | Enter the **Erase Sequence File** screen. | FILE , 2 |
| 2 | Press **Execute** to erase the file. | **ALT + ENTER** |

**Writing a New Sequence File**    The following steps will demonstrate how a simple sequence file is written.  Commands are provided for the Model 6000 menu system.

| Step | Procedure | Model 6000 Keystrokes |
|------|-----------|------------------------|
| 1 | Enter the **Sequence Editor** screen. | FILE , 1 |
| 2 | Press Insert to add a line to the file. | INCR (insert) |
| 3 | Select **Temp** to set the system temperature. | |
| 4 | Set the following temperature parameters: <br> • Temp: 250 K <br> • Rate: 10 K/min <br> • Approach: Fast Settle | 250, ENTER , ▼ <br><br> 10, ENTER , ▼ <br><br> INCR , INCR |
| 5 | Execute the temperature command to return to the editor screen. | ALT + ENTER |
| 6 | Press **Insert** to add another line to the file | INCR |
| 7 | Select **Field** to set the magnetic field. | |
| 8 | Set the following magnetic field parameters: <br> • Field: 2000 Oe <br> • Rate: 10 Oe/min <br> • Approach: No Overshoot | 2000, ENTER , ▼ <br><br> 10, ENTER , ▼ <br><br> INCR , INCR |
| 9 | Execute the field command to return to the editor screen. | ALT + ENTER |
| 10 | Exit the editor screen. | ESC |

**Editing an Existing Sequence File**

The following instructions demonstrate how to edit an existing sequence. This example uses the file that was written in the previous example.

| Step | Command | Key Sequence |
|------|---------|--------------|
| 1 | Enter the **Sequence Editor** screen. | FILE , 1 |
| 2 | Move the cursor to line 2. This should be the line having the **FIELD** command. | ▼ , ▼ |
| 3 | Press the **ENTER** key to **Modify** the line. | ENTER |
| 4 | Change the **Approach Mode** to **Oscillate** | ▼ , ▼ , INCR , INCR |
| 5 | Execute the **Field** command to return to the editor screen. | ALT + ENTER |
| 6 | Move the cursor up to line 1. This should be the line with the **TEMP** command. | ▲ |
| 7 | Press **Insert** to add a new line to the file after the **TEMP** command. | INCR |
| 8 | Select the command **WaitFor** and press **ENTER.** | , ENTER |
| 9 | Select **Temperature** from the **WaitFor** screen. This will cause the system to wait until the temperature is stable before continuing to the next command. | |
| 10 | Press **Execute** to return to the editor screen. | ALT + ENTER |

**Sequence Commands**

The following table lists the commands that may be placed into a sequence file. Some commands are straight-forward and are discussed more fully in other sections of this manual (e.g., Temp, Field, etc.), however, the following commands are only used within sequences:
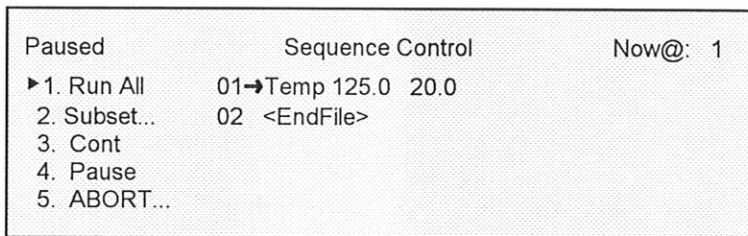
| Command | Purpose |
|---------|---------|
| WaitFor | Causes the system to wait until the specified control system (temperature, field, etc.) is stable before continuing to the next command line. |
| Scan | Scan commands work similarly to programming "Do" loops. The command will allow you to designate a starting and ending value, as well as step increments. Additional commands may also be placed inside the Scan loop by using the **Insert** command. There are four Scan commands on the PPMS:<br>• ScanC: Chronological (time) scan<br>• ScanH: Magnetic Field scan<br>• ScanP: Pressure scan<br>• ScanT: Temperature scan |
| Beep | This command will cause the system to sound a tone (at your specified frequency and duration) when the command line is executed. |
| Advise | The **Advise** command is used to alert the system (or operator) when a specific line of the sequence has been reached. This command may also used (with the ACDC-Mag software) to invoke ACMS measurements. |
| Sync | This command is used to synchronize external hardware to the Model 6000. |

**Related Topics**

- File Utilities
- Erase Sequence File
- Sequence Control
- Sequence Editor: Example

# Sequence Files:  Running a Sequence Using the Model 6000

**Description**  The Model 6000 **Run Sequence Segment** screen is used to run a portion of the system Sequence File.

```
Paused                Sequence Control          Now@:  1
►1. Run All       01→Temp 125.0  20.0
 2. Subset...     02  <EndFile>
 3. Cont
 4. Pause
 5. ABORT...
```

**Model 6000
Keystrokes**

Press the following keys to view the Sequence Control screen:

CTRL , 2

Control, Sequence File Control

**Menu Items**  The following table describes the menu items found on the **Sequence Control** screen:

| Select . . . | In Order To . . . |
|---|---|
| 1. Run All | run all lines of the sequence file. |
| 2. Subset. . . | open the Run Sequence Segment screen to run selected lines of the sequence. |
| 3. Cont. (continue) | resume sequence execution following a **Pause** command. |
| 4. Pause | pause sequence execution. |
| 5. ABORT | halt all sequence operation.  Note that continue will not resume execution following an ABORT command. |

**Display Items**  The **Sequence Control** screen provides the following display items:

| The Item . . . | Displays . . . |
|---|---|
| Now @: 1 | the command line that is being executed.  Line 1 will be displayed by default. |
| Main Display Area | the current sequence file.  As the file is executed, the display will scroll through the file. |

**Running a
Sequence**

In order to run the entire sequence, select **Run All** from the menu on this screen and sequence execution will begin immediately.

If you want to run only a portion of the file, select **Subset...** to open the **Run Sequence Segment** screen. The use of this screen is described below.

| | |
|---|---|
| **Running Part of a Sequence** | The following instructions explain how to run selected, sequential lines of the sequence file: |

1.  Open the Sequence Control screen (**CTRL, 2**).
2.  Select the menu item **2. Subset. . .** to open the **Run Sequence Segment** screen. The sequence file will be displayed in the main area of the screen.
3.  Enter a **Start at:** line number by either keying in the line number or by pressing the **INCR** or **DECR** key to scroll through the file lines. This is the first line that will be executed. When this value is entered, the corresponding line will be displayed.
4.  Using the same technique as in step three, enter an **End at:** line number. This is the last line that will be executed.

**Note:** Scan commands may not be partially selected for a run. The **Start at:** and **End at:** line numbers must fully include any scan command.

**Note:** The system will not allow you to enter an ending line number that occurs before the starting line number. If a starting line number is entered that is greater than the ending line number, the system will automatically change the ending line number to the same value as the starting line number.

5.  Verify that you have entered the correct starting and ending line numbers and press **ALT** and **ENTER** to execute the sequence file run. Sequence execution will begin immediately.

# Sequence Files: Running a Sequence Using the PPMS Control Panel

**Description**    The **Run Sequences** panel of the PPMS Control Panel is used to execute and monitor sequence file activities.
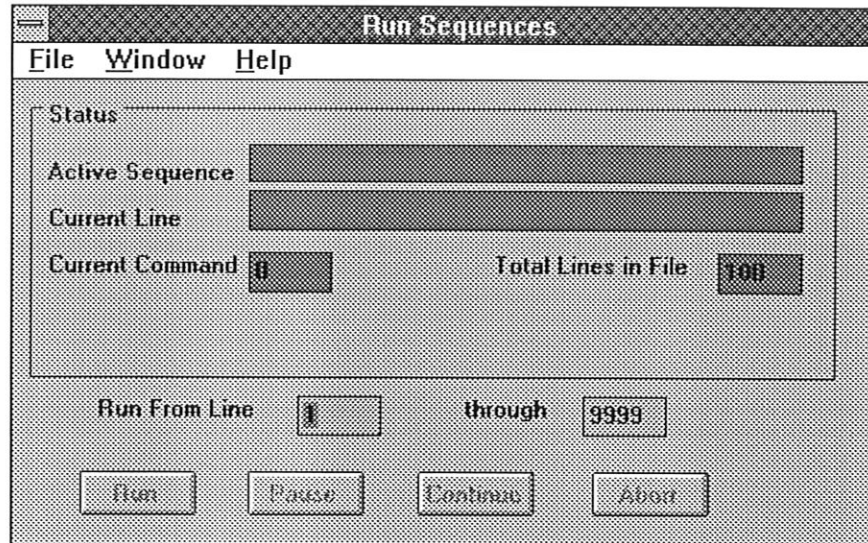


**Opening the Run Sequences Panel**    The **Run Sequences** panel may be opened from any of the PPMS Control Panel panels by selecting **Run** from the **Window** menu.

**Entry Items**    The following table describes the entry items found on the **Run Sequence** panel:

| The Item ... | Specifies ... |
|---|---|
| Run From Line | the starting line number for the sequence run. This is the first line that will be executed. |
| through | the ending line number. The sequence will stop running after this line is completed. |

**Sequence Files**

**Action Buttons**

The following table describes the four action buttons located along the bottom of the **Run Sequence** panel:

| Press . . . | In Order To . . . |
|---|---|
| Run | run the sequence file. |
| Pause | pause sequence execution after the current line is completed. Execution can be resumed using the **Continue** command. |
| Continue | resume sequence execution following a **Pause** command. |
| Abort | stop sequence execution entirely. |

**Display Items**

The **Run Sequence** panel displays the following items:

| The Item . . . | Displays . . . |
|---|---|
| Active Sequence | the name of the current sequence file. |
| Current Line | the current sequence file command line. |
| Current Command | the current line number under execution. |
| Total Lines in File | the total number of lines in the sequence file. |

**How to Run a Sequence**

Although you may create a sequence file from either the Model 6000 menu system or the PPMS Control Panel, the sequence file must be loaded onto the Model 6000 in order to run. The following instructions explain how to download a sequence file to the Model 6000 using the PPMS Control Panel. If your sequence was written from the Model 6000, you may skip steps 2 through 4.

1. Open the **Run Sequences** panel by selecting **Run** from the **Window** menu.
2. Open the **File** menu of the **Run Sequences** panel.
3. Select **Download Sequence File and Overwrite**. If you want the selected file to be appended to the current Model 6000 sequence file, select **Download Sequence File and Append**.
4. An **open file** panel will open. Select the sequence file to download and press **OK**. A display panel will open to indicate the status of the download as the file is downloaded. When this panel is closed, the sequence file name will be displayed in the field **Active Sequence** and you may proceed to the next step.
5. If you want to run a portion of the file, key in the starting and ending lines in the **Run From Line** and **Through** entry fields.
6. Press the **Run** button to begin sequence execution.

At any time during the sequence run, you may press the **Pause** button to halt the sequence execution. The current sequence line will be completed and the system will pause execution. Press the **Continue** button to resume execution.

The **Abort** button should only be used to completely stop execution of the file. The **Continue** button will not resume execution following the **Abort** command.

# Serial Port Setup

**Description**   The Model 6000 **Serial Port Setup** screen is used to set the parameters of the RS-232 serial port located on the Model 6000 rear panel.

```
                              Serial Port Setup
     Baud Rate              :▶300              Mode:  8,N,1
     Handshake             :
     SRQ Char              :
     Termination String    : LF/CR

     [EXEC] to Execute                    (            )
```

**GPIB Equivalent**   SPTS  (Termination String)
SPMD (Mode)

**Model 6000 Keystrokes**   Press the following keys to view this screen:

┌─────────┐
│ CONFIG  │ , 2
└─────────┘

Configure, Serial Port Setup

**Configuration Items**   The following table describes each of the RS-232 port configuration items that may be set from this screen:

| Parameter | Allowed Values[†] | Specifies . . . |
|---|---|---|
| Baud Rate | up to 38.4 Kbps | rate of information flow in bits per second. |
| Handshake | None  (0)<br>XONXOFF (1)<br>RTS  (2)<br>Both  (3) | Flow Control mode. |
| SRQ Character [‡] | ASCII 0 to 255 | service request character.  When a bad command is entered, this character will be returned. |
| Termination String | NONE (0)<br>CR/LF (1)<br>LF/CR (2)<br>CR    (3)<br>LF    (4)<br>FF    (5) | the termination string value. |
| Mode | 8,N,1  (0)<br>8,O,1  (1)<br>8,E,1  (2)<br>8,N,2  (3) | port mode.<br>bit size  (8), parity (**N**one, **O**dd, **E**ven), com# (1 or 2). |

† Values in parenthesis indicate the GPIB bit representation for each parameter.
‡ A zero-valued **SRQ Character** will turn off the service request.  Also, Microsoft Windows' Terminal mode does not support the SRQ command.

**Serial Port Setup**

# Set Digital Outputs (DigSet)

| | |
|---|---|
| **Description** | The Model 6000 **Set Digital Outputs** screen is used to set the Model 6000 rear panel digital outputs to control external equipment. |

```
                          Set Digital Outputs
                     Aux. Drive #1 : ▶ Off
                     Aux. Drive #2 :   Off
                     Aux. Drive #3 :   Off
                     Actuator Drive :  Off

  [EXEC] to Execute              (          )
```

| | |
|---|---|
| **GPIB Equivalent** | DIGSET |

| | |
|---|---|
| **Model 6000 Keystrokes** | Press the following keys to view this screen:<br><br>┌─────────┐<br>│ **CTRL** │  , 3 , 07<br>└─────────┘<br><br>Control, Immediate Operations, 07:DigSet |

| | |
|---|---|
| **Selection Items** | The **Set Digital Outputs** screen allows you to specify a drive line for activation. The following table provides the corresponding rear panel pinouts for the **Digital Output** lines: |

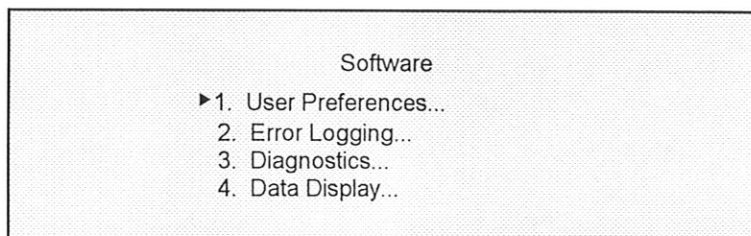| Digital Output | Rear Panel Port | Pin Number | |
|---|---|---|---|
| | | **Drive** | **Return** |
| Auxiliary Drive #1 | Auxiliary (P8) | 1 | 14 |
| Auxiliary Drive #2 | Auxiliary (P8) | 2 | 15 |
| Auxiliary Drive #3 | Auxiliary (P8) | 3 | 16 |
| Actuator Drive | Motor (P10) | 3 | 8 |

| | |
|---|---|
| **How to Set Digital Output Lines** | These digital output lines may be set to control external 24 volt DC relays, valves and other devices.  Press the **INCR** or **DECR** key to turn the selected output **ON** to activate the line, or **OFF** to turn it off. |

| | |
|---|---|
| **Related Topics** | • Appendix B: DIGSET |

# Software (Model 6000 Software Menu)

| | |
|---|---|
| **Description** | The Model 6000 **Software** menu allows the user to configuration specific features of the Model 6000 firmware. |

```
                          Software
                   ►1. User Preferences...
                    2. Error Logging...
                    3. Diagnostics...
                    4. Data Display...
```

| | |
|---|---|
| **Model 6000 Keystrokes** | This menu is accessed by pressing the following keys: |

      **CONFIG** , 5

Configure, Software

**Menu Items**

The following table explains each of the selection items found on the **Software** menu:

| Select . . . | In Order To . . . |
|---|---|
| 1. User Preferences | set the system sound settings. |
| 2. Error Logging | specify where and how error logging is performed. |
| 3. Diagnostics | enable system diagnostics, bridge channel display, and factory defaults on power up. |
| 4. Data Display | specify data file display parameters used in the Data File Listing screen. |

**Related Topics**

- User Preferences
- Error Logging
- Diagnostic Settings
- Data File Listing

# Status - Bridge

**Description**    The Model 6000 **Status - Bridge** screen provides a display of bridge channels 1 through 4.

```
                STATUS - BRIDGE              System external
      Chan  1:    ---invalid---        ±      0.000   µA
      Chan  2:                         ±      0.000   µA
      Chan  3:                         ±      0.000   µA
      Chan  4:                         ±      0.000   µA
```

**GPIB
Equivalent**    BRIDGE?

**Model 6000
Keystrokes**    Press the following keys to view the **Status - Bridge** screen:

| STATUS | , | STATUS | , | STATUS |

**Display Items**    The **Status - Bridge** screen provides a display of the status of each of the four bridge channels. The following table describes this display:

| Item ... | Is Displayed... | And Reports ... |
|---|---|---|
| Channel Status | to the right of the channel number (Chan 1:). | the current status of the corresponding channel.<br><br>**Note:** An "invalid" display indicates that the specified excitation current is not adequate to produce a reading. |
| ± (Mode Indicator) | to the right of the channel status. | that the channel is in AC mode. Otherwise, this symbol will not appear. |
| Excitation Current | at the left end of the channel display line. | the actual current through the channel. This value is reported in microamps (µA). |
| Bridge Display Indicator | at the top right of the display screen. | which bridge is being displayed. This value may be changed from the **Diagnostic Settings** screen (CONFIG, 5, 3). |

**Note:**    The values shown on this screen are set from the **Setup Bridge Channel** screen.

**Related
Topics**
- Setup Bridge Channel
- Set Digital Outputs

**Status - Bridge**

# Status - Other

**Description**

The Model 6000 **Status - Other** screen provides a status display of the following systems:
- Driver Channel Current
- Analog Output Signal Voltage
- Digital Output Status

```
                    STATUS - OTHER
                 -1-    -2-    -3-    -4-
     Drivers:    0.0    0.0    0.0    0.0    mA
     Signals:    0.00   0.00   0.00   0.00   V

     Digital:                  LM  NX
```

**GPIB Equivalent**

DRVOUT?, SIGOUT?

**Model 6000 Keystrokes**

Press the following keys to view the **Status - Other** screen:

| STATUS | , | STATUS |

**Display Items**

The **Status - Other** screen provides a display of the status of the four Driver and Signal Outputs, and Digital Output status. The following table describes this display:

| The Item . . . | Displays . . . |
|---|---|
| Drivers: | the current through each of the four driver channels (milliamps). |
| Signals: | the voltage output for each of the four rear panel BNC connectors (A1 through A4). |
| Digital: | two-letter codes that describe the state of the sample positioner, drive and select lines, and the motor actuator. |

**Digital Display Codes**

The following table explains the codes displayed to the right of the **Digital:** field (the code is displayed to indicate that the item is asserted):

| Code | Meaning | Connector Port |
|------|---------|----------------|
| HL | Hold | External Port (P11) Hold line (pin 9) is asserted |
| UR | User | External Port (P11) User line (pin 5) is asserted |
| A1 | Aux In 1 | Auxiliary Port (P8) Drive Line #1 is asserted |
| A2 | Aux In 2 | Auxiliary Port (P8) Drive Line #2 is asserted |
| LM | Limit | The sample positioner is at the Limit switch |
| NX | Index | The sample positioner is at the Index position |
| S1 | Select 1 | External Port (P11) Select Line 1 is asserted |
| S2 | Select 2 | External Port (P11) Select Line 2 is asserted |
| S3 | Select 3 | External Port (P11) Select Line 3 is asserted |
| AC | Actuator Drive | Motor Port (P10) Actuator Drive Line is asserted |

**Related Topics**

- Appendix A: Model 6000 Rear Panel Pinouts
- Sample Positioner
- Set Driver Outputs (DrvOut)
- Set Voltage Output at BNC Connector (SigOut)

# Status - System

| Description | The Model 6000 **Status -System** screen provides a display of general system status information as well as the ability to quickly maneuver to system entry screens. |
|---|---|

| GPIB Equivalent | TEMP?, FIELD?, MOVE?, CHAMBER?, SEQSTAT?, DATA?, LEVEL? |
|---|---|

**Model 6000 Keystrokes**

Press the following key to view the **Status - System** screen:

| STATUS |
|---|

**Display Items**

The following table describes each of the items displayed on the **Status - System** screen:

| The Item . . . | Displays the current . . . |
|---|---|
| Temp | system temperature in kelvin. To the right of this value is the target temperature, in brackets [ ], followed by the temperature control status. |
| Field | magnetic field in oersted. To the right of this value is the target field value, in brackets [ ], followed by the field control status. |
| Position | sample positioner position. |
| Chamber | sample chamber status. |
| Sequence | sequence file status. When a sequence is running, the sequence line currently under execution will be displayed here. |
| Data file | data file size as percent-of-full. To the right of this value is the number of lines in the data file, in brackets [ ]. |
| Level | helium level in the dewar as percent-of-full. |

**Fast Keys**

The **Status-System** screen has a feature that allows quick access to different entry screens, that bypasses the menu system. This screen includes a cursor that may be moved from field to field. Place the cursor on a field and press the **ENTER** key to open the entry screen that corresponds to that field.

**Related Topics**

- Set System Temperature
- Set Magnetic Field
- Temperature Status Codes
- Magnet Status Codes
- Chamber Status Codes
- Interactive Control
- Build/Edit Sequence File
- Helium Level
- Move Positioner
- Sequence Control

# Temperature: Setting the Temperature, Overview

| | |
|---|---|
| **Introduction** | The PPMS system temperature may be set directly by the user or temperature commands may be programmed as part of a sequence file using either of the interface options. |
| **Temperature Reporting** | The PPMS temperature is reported continuously on the **Status - System** screen of the Model 6000 and on the PPMS Control Panel. The target and actual temperatures are reported along with the status code which reports on the current state of the temperature control system. |
| **Temperature Parameters** | The following table explains each of the parameters used to set the system temperature: |

| The Item . . . | Specifies. . . | Allowed Values |
|---|---|---|
| Temperature | the system target temperature. Once executed, the system will attempt to reach this temperature. | 1.7 to 325 kelvin |
| Rate | how quickly the system will approach the target temperature. | 0 to 10 kelvin per minute |
| Approach | the final approach used to reach the target temperature. When appropriate **Approach** will override the **Rate** setting.<br><br>Note: see **Temperature: Approach Mode** for a full explanation of these modes. | •No Overshoot<br>•Fast Settle |

| | |
|---|---|
| **For More Information** | This section of the manual provides information about temperature approach modes, how to set the system temperature, and temperature status codes. Use the following table to locate the information you need: |

| For Information About. . . | Refer to the Section . . . | On Page |
|---|---|---|
| how to set the temperature using the Model 6000 | Temperature: Setting the Temperature Using the Model 6000 | 79 |
| how to set the temperature using the PPMS Control Panel | Temperature: Setting the Temperature Using the PPMS Control Panel | 80 |
| temperature approach modes | Temperature: Approach Modes | 81 |
| temperature status codes | Temperature: Status Codes | 82 |
| GPIB temperature comands | Appendix B: TEMP | B-24, 25 |

# Temperature: Setting Temperature Using the Model 6000

| | |
|---|---|
| **In This Section** | This section describes how to set the system temperature using the Model 6000 menu system |
| **Description** | The Model 6000 **Set System Temperature** screen, shown below, is used to set the system temperature. |

```
                    Set System Temperature
              Temperature: ▶ 270.0 K
              Rate        :    10.1 K/m
              Approach   :    No overshoot
              (Now at:  270.0  STABLE)

         [EXEC] to Execute        (            )
```

| | |
|---|---|
| **Model 6000 Keystrokes** | Press the following keys to view this screen:<br><br>[ CTRL ] , 3 , 01<br><br>Control, Immediate Operations, 01: Temp |
| **Setting the System Temperature** | The following instructions describe how to set the temperature using the Model 6000 menus system:<br><br>1. Enter the **Set System Temperature** screen (**CTRL, 3, 01**).<br>2. Key in a value for the Temperature in kelvin.<br>3. Press the down arrow key to advance to the **Rate** field.<br>4. Key in a value for the **Rate** in kelvin per minute.<br>5. Press the down arrow again to advance to the **Approach Mode** field.<br>6. Use the **INCR** or **DECR** key to select an **Approach Mode**.<br>7. Press the **ALT** and **ENTER** keys to execute this command. The temperature control system will invoke this command immediately.<br><br>To exit without saving any changes press the **ESC** key.<br><br>**Note:** The value you enter in the **Temperature** field is the *target* or *setpoint* temperature. This is the temperature that the system will attempt to reach and maintain until a new temperature command is issued. |

**Temperature**

# Temperature: Setting Temperature Using the PPMS Control Panel

**In This Section**
This section describes how to set the system temperature using the PPMS Control Panel.

**Description**
The **Temperature** panel, shown below, is used to set the system temperature.
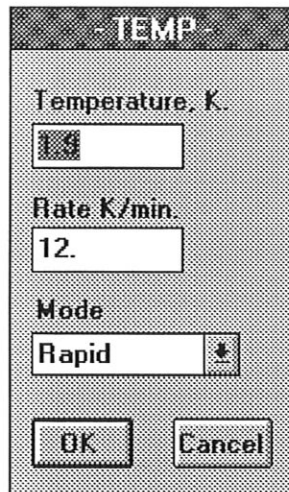


**Opening the Temperature Panel**
The **Temperature** panel is opened from the **Control Panel** of the PPMS Control Panel. The following instructions explain how to open this panel:

1. From the PPMS Control Panel **Control Panel**, place the cursor on the **Temperature** display. The cursor will change from an arrow to a hand.
2. Press the left mouse button once. The panel will now be opened.

**Note:** To open the **Temperature** panel with the cursor at a specific parameter, place the cursor on the parameter display of the **Control Panel** and click the mouse.

**Setting the System Temperature**
The following instructions describe how to set the temperature using the PPMS Control Panel:

1. Open the **Temperature** panel (see above).
2. Key in a value for the Temperature in kelvin.
3. Press the **TAB** key to advance to the **Rate** field.
4. Key in a value for the **Rate** in kelvin per minute.
5. Press the **TAB** key again to advance to the **Approach Mode** field.
6. Press the down arrow button to display the Approach Modes. Select an Approach Mode by placing the cursor on the mode and clicking the mouse.
7. Press the **OK** button to execute this command. The temperature control system will invoke this command immediately.

To exit without saving any changes press the **Cancel** button.

**Note:** The value you enter in the **Temperature** field is the *target* or *setpoint* temperature. This is the temperature that the system will attempt to reach and maintain until a new temperature command is issued.

**Temperature**

# Temperature: Approach Mode

| Description | The **Temperature Approach Mode** determines the final approach used by the system to reach the target temperature. |
|---|---|

**Temperature Approach Mode Definitions**

The following table describes the two **Approach Modes** used to reach the target temperature:

| Approach Mode† | Description |
|---|---|
| No Overshoot | The new temperature will be achieved with minimal overshoot of the target temperature. |
| Fast Settle | The new temperature will be approached by slightly overshooting the target temperature to minimize the time required to settle. |

† When appropriate, the **Approach Mode** will override the **Rate** setting.

**Using No Overshoot Mode**

- The **No Overshoot** mode will normally require longer settling times before reaching the target temperature.
- **No Overshoot** mode attempts to minimize any overshoot as the temperature settles, however, it is not guaranteed that there will be absolutely no overshoot of the final temperature.

**Using Fast Settle Mode**

- In **Fast Settle** mode, the target temperature will typically be reached more quickly than in the **No Overshoot** mode.
- **Fast Settle** mode is not recommended for use with samples that are temperature hysteretic.

# Temperature: Status Codes

**Description**    The **Temperature Status Code** is displayed on the Model 6000 **Status - System** and **Set System Temperature** screens, and on the PPMS Control Panel to report the present status of the temperature control system.

**Code Definitions**    During normal operation, the temperature control system will cycle through various states. The following table provides the meaning for each of the temperature status codes that are displayed through these states:

| Status Code | Meaning |
|---|---|
| Fault | General Temperature System Failure |
| Chasing | System is chasing the target temperature |
| Diag | System is in diagnostic mode |
| Impedfail | Impedance failure |
| Near | Near target temperature |
| Potops | Filling or emptying pot |
| Stable | Temperature is stable at set point |
| Standby | System is in standby mode |
| Tracking | Tracking target temperature |
| Unknown | Unknown status, contact Quantum Design |

**About Broken Status**    A **Fault** status display will usually occur when the flow rate table is not properly calibrated or if there is a sensor malfunction.

# Time & Date

| Description | The Model 6000 **Time & Date** screen is used to set the Model 6000 time and date. |

```
                        Time & Date

            HH:MM:SS      ►12: 34: [ 56 ]
            MM-DD-YY        02 - 09 - 94

                          (          )
```

| **GPIB Equivalent** | TIME |

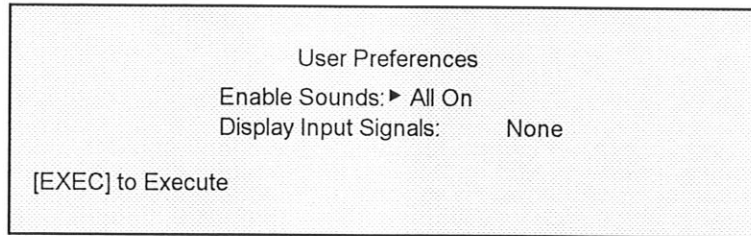| **Model 6000 Keystrokes** | Press the following keys to view this screen:<br><br>CONFIG , **1**<br><br>Configure, Time & Date |

| **Setting the System Date and Time** | 1. Enter the time in hour:minutes:seconds format. The hour is set in military time (for example, 3:00 pm is entered as 15:00). The seconds field resets to zero when the new minute value is entered.<br><br>2. The date is set in Day-Month-Year format. Each field requires two digits, thus, February 9, 1994 would be entered as 02-09-94.<br><br>3. It is not necessary to press **[EXEC]** to save changes to this screen. The system time is updated when the ENTER key is pressed.<br><br>To exit without making any changes, press the **ESC** key. |

# User Preferences

| Description | The Model 6000 **User Preferences** screen is used to specify sound options on the Model 6000. |
|---|---|

```
                          User Preferences
                    Enable Sounds: ▶ All On
                    Display Input Signals:      None

          [EXEC] to Execute
```

| **Model 6000 Keystrokes** | Press the following keys to view this screen: |
|---|---|

CONFIG , 5 , 1

Configure, Software, User Preferences

| **Configuration Items** | The **User Preferences** screen allows the user to enable different levels of sound options for the Model 6000. |
|---|---|

| **About Enable Sounds** | The Model 6000 will sound when error conditions exist, during the course of a sequence file run, and when an invalid key is pressed. Press the **INCR or DECR** key to select from the three sound options. These options are explained in the following table: |
|---|---|

| Select . . . | To Enable . . . |
|---|---|
| All On | all system sounds. |
| Limited | all system sounds with no sounds repeated; error sounds, which are normally repeated until the condition is resolved, will only sound one time. |
| Keys Only | key pad sounds only. All error and batch file sounds will be blocked. |
| None | no sounds. |

**Note:** Sounds are distinguished by tone and tone combinations rather than by cause. Therefore, when **Limited** is selected, the system will not repeat the same sound even when a newer or different error condition exists.

To exit without making any changes, press the **ESC** key.