

HP 3852A
Data Acquisition/Control
Unit

Quick Reference Guide



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Addressing Conventions

An address identifies where the accessory is installed (mainframe, extender), the slot the accessory is installed in, and the channel that is selected. Address information is represented using the convention ESCC; where E is the mainframe or extender number, S is a mainframe or extender slot number, and CC is the accessory channel number. Under the ESCC convention:

E = Extender number.

E = 0 for the HP 3852A mainframe.

E = 1-7 for an HP 3853A extender.

S = Slot number.

S = 0-7 for the HP 3852A mainframe.

S = 0-9 for an HP 3853A extender.

CC = Channel on the accessory installed in slot S

Examples

To specify a slot (form = **ES00**)

200 Specifies slot 2 in the mainframe
(leading 0's are optional).

1700 Specifies slot 7 in extender number 1.

To specify a channel (form = **ESCC**)

5 Specifies channel 5 in slot 0 of the
mainframe.

1315 Specifies channel 15 of an accessory in
slot 3 of extender number 1.

To specify a channel list (form = **ESCC [-ESCC]
[ESCC [-ESCC]...]**)

305-310 Specifies channels 5-10 on an ac-
cessory in slot 3 of the mainframe.

0,5-9 Specifies channel 0 **and** channels 5
through 9 on an accessory in slot 0 of
the mainframe.

Addressing Conventions

Slot Addresses

Slot addresses have the form ES00. Slot addresses can be represented by a variable or array name, or number (see Syntax Rules).

Channel Addresses

Channel addresses have the form ESCC. A channel address can be represented by a variable or array name, or number (see Syntax Rules).

Channel List Addresses

Channel list addresses have the form ESCC [-ESCC] [ESCC [-ESCC]...]. This form shows that a channel list can be a single channel (ESCC), a list of channels (ESCC-ESCC), a combination of single channels and channel lists (ESCC, ESCC-ESCC) or a group of channel lists (ESCC-ESCC, ESCC-ESCC). Channels can be specified in increasing or decreasing order. A channel list can also be represented by a variable or array name, or number (see Syntax Rules).

The USE Channel

USE *ch*

TRIG [*source*][**USE** *ch*]

The USE Channel is a command and a command parameter that specifies a particular accessory or accessory channel to perform the function as directed by a series of commands or by a single command. The “channel” entered in the USE channel command or parameter is the slot or channel address of the accessory.

Addressing Conventions



The USE Command



The accessory or channel specified by the USE command is the selected accessory or channel on which a series of functions will be performed. This becomes the default accessory or channel for all commands that follow in which the **USE *ch*** is a command parameter and is not specified.



The USE *ch* Parameter



The accessory or channel specified by the **USE *ch*** parameter is selected for that command only. All other preceding or following commands have the USE channel as set by the USE command unless specified otherwise by the **USE *ch*** parameter.



The Power-on USE Channel



At power-on or following a reset, the channel selected is the lowest channel number for which the USE command is valid. For example, if an HP 44721A is installed in slot 2 of the mainframe, the power-on USE channel is 200 (slot 2, channel 0), provided no other accessory that accepts the USE command is installed in mainframe slots 0 or 1.



The Default USE Channel



The default USE channel is either the last slot or channel specified by the USE command or the power-on value if the USE command has not been executed.



Specifying Voltmeters with the USE Channel



When an HP 44701A or HP 44702A/B voltmeter accessory is installed in a mainframe or extender, it is considered as channel 0 of the given slot. As such, the "voltmeter channel" is addressed using the slot addressing form.



Addressing Conventions

The Use Channel in the Multitasking Mode

In the multitasking mode, the USE channel specified by the USE command is local to the task. Thus, a USE channel specified in a particular task applies only to the commands in that task. All other tasks which do not specify a USE channel will use the channel SET following a reset or power-on.



Syntax Rules

These rules describe the command format and programming conventions associated with the HP 3852A command set.

PACER *period* [*count*]

1. Commands generally consist of a header and one or more parameters. Headers can be entered in upper or lower case, however, they appear in the command statement in upper case and usually in bold (e.g. **PACER**).

2. Parameters can be entered in upper or lower case, but appear in the command statement in lower case italics (e.g. *period* [*count*]).

3. Parameters in a command statement not enclosed in brackets are required parameters - and must be specified each time the command is executed (*period*). Parameters enclosed in brackets ([*count*]) are optional parameters and can be omitted when executing the command.

If an optional parameter is not specified, a default value for that parameter is used if one exists.

4. Numeric parameters can be in either integer, floating point, or exponential format. Numbers in floating point format are rounded to the nearest integer if the command requires an integer.

Any parameter requiring a number, or slot or channel address can be specified as a free field ASCII number, an array, array element, variable, or a parenthesized numeric expression (similar to those allowed in BASIC) formed by combining numbers or arrays with math functions (+, -, *, /, ^, PI, ABS, EXP, FRACT, INT, LGT, LOG, SGN, SQR), trigonometric operations (ATN, COS, SIN), and binary functions (BINAND, BINCOMP, BINEOR, BINIOR, BIT, SHIFT, ROTATE).

Syntax Rules

5. Command headers and parameters must be separated by either a space or a comma. Multiple commas, spaces, or combinations of both are accepted when commands are entered from either the front panel or HP-IB.

6. The ; (semicolon), <LF> (line feed), and EOI (HP-IB) are accepted as end of command delimiters. The ENT key signals the end of a command entered from the front panel.

Any characters following the end of message delimiter will not be processed until the command is executed. This means that the HP 3852A always completes execution of the current command before processing another command.

To use only the semicolon (;) as a command delimiter the carriage return <CR> and line feed <LF> must be suppressed. Two ways to do this with HP Series 200/300 (or equivalent) controllers follow. In line 10, note that the semicolon must follow the command header TEST.

```
10 OUTPUT 709 USING "#,K";"TEST;"
```

or

```
10 ASSIGN @HP3852 TO 709;EOL ""
```

```
20 OUTPUT @HP3852;"TEST;"
```

To use only the EOI as a command delimiter <CR> and <LF> must again be suppressed. Two ways to do this with HP Series 200/300 (or equivalent) controllers follow.

```
10 OUTPUT 709 USING "#,K";"TEST",END
```

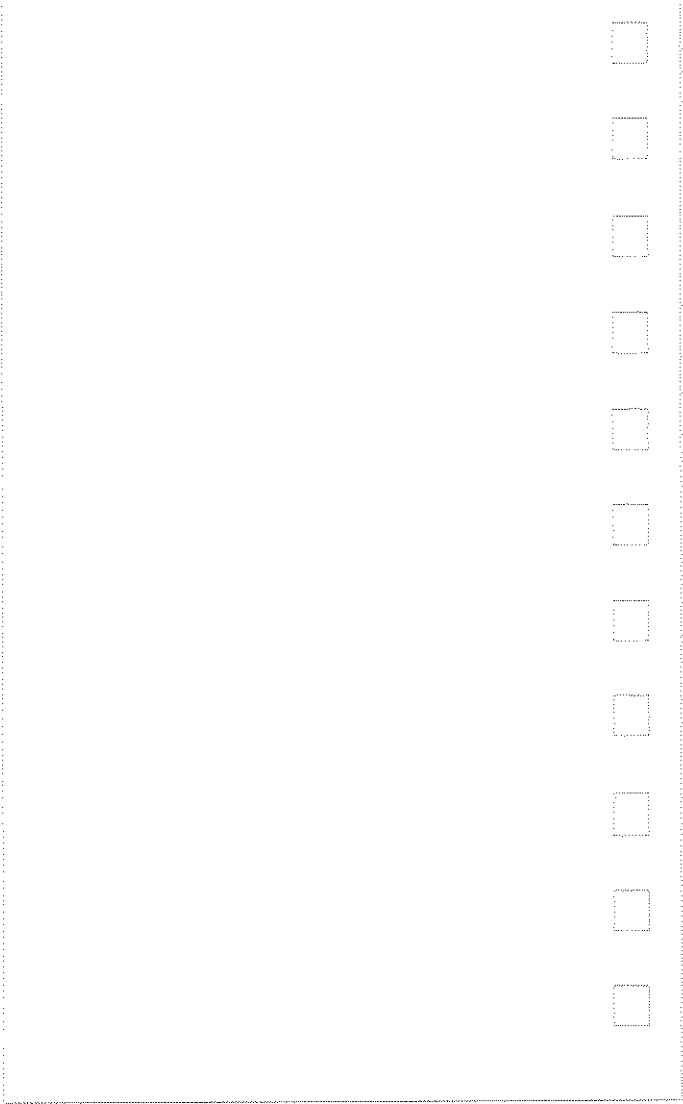
or

```
10 ASSIGN @HP3852 TO 709; EOL END
```

```
20 OUTPUT @HP3852;"TEST"
```

Syntax Rules

7. Multiple commands separated by a semicolon can be sent in a single command string. Enabling the HP 3852A's input buffer (INBUF ON) prior to sending multiple commands in a string, frees the interface (HP-IB) immediately. Note, however, with the input buffer enabled, you lose synchronization between the controller and the HP 3852A.



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Using Subroutines

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Using Subroutines

The following guidelines apply when using HP 3852A subroutines:

1. Subroutines can be entered into mainframe memory from the front panel keyboard or downloaded into memory from a controller.
2. Subroutines are erased from memory at power-down, or following the SCRATCH, RST, or RST HARD command.
3. The execution of a subroutine can be viewed by sending the FASTDISP OFF command prior to calling the subroutine. The STEP command also controls execution speed.
4. Variables and arrays are global. They can be dimensioned inside or outside a subroutine then used inside or outside a subroutine.
5. Math functions, trigonometric operations, and binary functions can be used inside subroutines.
6. The following BASIC language constructs and extensions can only be used inside subroutines:

FOR...NEXT

IF...END IF

WHILE...END WHILE

The relational operators =, <, >, <>, ≤, and ≥ can be used in the IF and WHILE statements. The maximum number of nested constructs is 10.

7. The following commands cannot be used inside subroutines: DELSUB, SCRATCH, STEP, CONT, or a second SUB...SUBEND statement.
8. A subroutine must be paused or in the step mode to use CONT or STEP. A PAUSE command cannot be located inside a nested subroutine or inside a subroutine called more than once.

Using Subroutines

If a subroutine called from the HP-IB is paused, then continued from the front panel, the destination of the data returned is the display, if the data is not being stored internally. This means that data previously returned to the output buffer will now be returned to the display.

9. In the power-on mode, a subroutine runs to completion before another subroutine or a command outside of a subroutine executes. In the multitasking mode, a subroutine can be interrupted or preempted following the currently executing command.

10. You can exit a subroutine in process by using the CLR or system RST command inside the subroutine, pressing the CLEAR key on the front panel, or by sending Device Clear over the HP-IB. Executing RST erases the subroutine from memory. Executing CLR stops the subroutine from executing but does not erase it. It also cannot be continued.

11. To use the ON *event* CALL *name* command with an interrupt as the event that calls the subroutine, the interrupt must be enabled.

12. If an error occurs inside a subroutine, the subroutine is aborted. If a nested subroutine is aborted, the calling subroutine continues.

**Data Destinations
and
Formats**

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Data Destinations and Formats

Data Destinations

The destination of data returned by a command depends on where the command originated (front panel, HP-IB, subroutine) and on your response to the **INTO name** parameter within those commands. Data destinations include the mainframe's display the HP-IB output buffer, and internal memory.

Commands Entered from the Front Panel

When a command is entered from the front panel, the destination of the data returned is the mainframe's display or its internal memory. Data is displayed only if the display has been enabled by the **DISPlay** command and the data is in a mainframe display format.

Commands Entered over the HP-IB

When a command is entered from a controller over the HP-IB, the destination of the data is the HP-IB output buffer and display, or mainframe memory. Data is displayed if it is in a mainframe display format, the display is enabled (**DISP**), and the data is routed to the display with the **MONitor** command.

Commands Executed within Subroutines

When a command that returns data is executed within an HP 3852A subroutine, the destination of the data depends on where the subroutine was called from (**CALL** command). If the subroutine is called from the front panel, the destination is the mainframe's display or internal memory as described above. If the subroutine is called over the HP-IB, the destination is the HP-IB output buffer and display, or internal memory as also described above.

Data Destinations and Formats

If a subroutine is called by the ON ALRM, ON LMT, or ON INTR command, the destination(s) depends on whether the command (ON ...) was entered from the front panel or over the HP-IB.

Destination = Mainframe Memory

The [INTO *name*] Parameter

Most of the HP 3852A commands that return data contain [INTO *name*] as a parameter. Specifying this parameter indicates an array, array element, or variable is the destination for the data returned. Note that the data goes directly into the array or variable "*name*" and is not displayed or sent to the HP-IB output buffer. This occurs regardless of where the command originated.

The brackets [] that enclose INTO *name* indicate that it is an optional parameter. If INTO *name* is not specified, the destination of the data then becomes a function of where the command originates.

Mainframe Storage Prerequisites

A prerequisite for commands that return data in which INTO *name* is specified is that the variable or array name must have been previously declared by the mainframe's DIM, REAL, INTEGER, or PACKED command. These commands determine the storage format in the mainframe's memory.

Array and Variable Names

When declaring arrays and variables in the HP 3852A, the following name conventions are used:

1. Names cannot exceed eight characters.
2. Names can consist of letters, numbers, ?, or _.
3. Names must begin with a letter, ?, or _. Names cannot begin with a number.

Data Destinations and Formats

4. The name assigned cannot be the same as an HP 3852A command header or command parameter.

Global Arrays

Variables and arrays declared by the DIM, REAL, INTEGER, and PACKED commands are global. They can be declared inside or outside a subroutine and used inside or outside a subroutine.

Redeclaring Arrays

An existing array or variable can be redeclared, however, you cannot change the type of the array or variable. For example, you can execute REAL J(2) and then later execute REAL J(10). You could not have executed INTEGER J(10).

Data Formats

The *[fmt]* Parameter

Most of the commands that return data to the mainframe contain *[fmt]* along with **[INTO name]** as a command parameter. When *fmt* is specified, data is returned in that particular format to the front panel, HP-IB output buffer, or both; depending on where the command originated. Data is not returned to mainframe memory when *fmt* is specified as *fmt* and **INTO name** cannot be specified together in the same command. See the "Useful Tables" section of this guide for a description of the formats specified by *fmt*.

Mainframe Output Formats

Data can be returned to the HP-IB output buffer in any of four ASCII formats (IASC, LASC, RASC, DASC), or in any of two binary formats (IN16, RL64) specified by the user. Data can also be returned in several packed formats (PACK) which are command and accessory dependent.

Data Destinations and Formats

See the "Useful Tables" section of this guide for a description of the output data formats and packed formats associated with the HP 3852A.

Mainframe Display Formats

Data displayed by the mainframe is displayed in the ASCII formats IASC, LASC, RASC, DASC as specified by *fmt*. Note that data in ASCII formats is either displayed or sent to the HP-IB output buffer but can not be stored in the mainframe.

Mainframe Storage Formats

Data stored in mainframe memory is stored in the binary formats IN16, RL64, or PACK as determined by the DIM, REAL, INTEGER, or PACKED command. Note that data in binary formats is either stored or sent to the HP-IB output buffer but can not be displayed.

Command Reference

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Command Reference

ABORT

Mainframe

Aborts the currently executing subroutine called/activated by the specified task. Queued subroutines are not aborted.

ABORT [*task*]

<u>Parameters</u>	<u>Description</u>
-------------------	--------------------

task

Task from which the subroutine to be aborted was called. If *task* is not specified, the subroutine containing the ABORT command is aborted.

HP-IB - currently executing subroutine called from the HP-IB task is aborted.

KYBD - currently executing subroutine called from the front panel task is aborted.

INTR - currently executing subroutine called in response to an interrupt is aborted.

run task number - number of the active/scheduled run task subroutine that is aborted.

Prerequisites: ABORT is only used when the HP 3852A is in the multitasking mode. Multitasking is available with firmware revision 3.0 or greater.

ABS

Math Function

Math function. Returns the absolute value of its argument.

ABS (*number*)

Command Reference



<u>Parameters</u>	<u>Description</u>
<i>number</i>	Number or numeric expression.

Prerequisites: The ABS function is only available with firmware revision 3.0 or greater.

ADDR *Mainframe*

Sets the HP 3852A HP-IB address. ADDR is executed from the front panel only.

ADDR *number*
or
ADDRESS *number*

<u>Parameter</u>	<u>Description</u>
<i>number</i>	HP 3852A HP-IB address. Range is an integer from 0 to 30. The HP 3852A factory set address is 9.

Prerequisite: The HP 3852A has to be in the **local** mode before the address can be set.

ADDRESS

See ADDR.

ADDR? *Mainframe*

Reads the HP 3852A HP-IB address.

ADDR? [INTO *name*] or [*fmt*]

Command Reference



Parameters

Description



INTO *name* See Destination = Mainframe Memory.

fmt See Data Formats.



The default format for ADDR? is IASC.



ALRM

Mainframe

Reads the current setting of the real-time alarm.



ALRM [**INTO** *name*] or [*fmt*]

Parameters

Description



INTO *name* See Destination = Mainframe Memory.

fmt See Data Formats.



The default format for ALRM is DASC.



AND

Logical Operator



Returns a 1 (TRUE) or 0 (FALSE) depending on the logical AND of the numbers.

number AND number



Command Reference

<u>Parameters</u>	<u>Description</u>
<i>number</i>	Constant, variable, or numeric expression. If it evaluates to a non-zero number, 1 is returned. If it evaluates to zero, 0 is returned.
Prerequisites: The AND statement is only used in an IF...END IF or in a WHILE...END WHILE construct which, in turn, must be included in an HP 3852A subroutine.	

APPLY DCI

HP 44727B/C

Sets the level of output current on the specified current DAC channel.

APPLY DCI *ch number*

<u>Parameters</u>	<u>Description</u>
<i>ch</i>	Address of channel. Channel range for HP 44727B = ES00-ES03. Channel range for HP 44727C = ES02-ES03.
<i>number</i>	Output current. 0 to 0.0201675 for 0 to 20 mA range. 0.004 to 0.0201675 for 4 to 20 mA range.
Prerequisite: For output currents <4 mA, channel must be set for the 0 to 20 mA range.	

APPLY DCV

HP 44726A

Sets the voltage level on the DAC OUT BNC terminal for the specified channel.

APPLY DCV *channel voltage*

Command Reference

<u>Parameters</u>	<u>Description</u>
<i>channel</i>	Address of the channel on which the voltage is applied. The channel range is ES00 through ES01.
<i>voltage</i>	Voltage to be applied from the specified DAC channel. The range for voltage is -10.2396875V to +10.2396875V rounded up or down to the nearest 0.3125 mV.

Prerequisites: Requires firmware revision 3.5 or greater and TARM OFF must be set.

APPLY DCV HP 44727A/C

Sets the level of output voltage on the specified voltage DAC channel.

APPLY DCV *ch number*

<u>Parameters</u>	<u>Description</u>
<i>ch</i>	Address of channel. Channel range for HP 44727A = ES00-ES03. Channel range for HP 44727C = ES00-ES01.
<i>number</i>	Output voltage. Voltage range is -10.235 to +10.235V for $\pm 10V$ range and 0 to 10.235V for 0 to +10V range.

Prerequisites: For output voltages < 0V, channel must be set for the -10V to +10V range.

Command Reference

APPLY PERC

HP 44726A

Sets the voltage level on the DAC OUT BNC terminal to a percentage of the DACs maximum range.

APPLY PERC *channel percentage*

<u>Parameters</u>	<u>Description</u>
<i>channel</i>	Address of the channel on which the voltage is applied. The channel range is ES00 through ES01.
<i>percentage</i>	Percentage of the DACs maximum range that is applied to the specified DAC channel. The following percentages yield the following voltages. Note that the voltage is rounded up or down to the nearest 0.3125 mV.

PERCENTAGE	OUTPUT
0 to 100	0V to 10V
0 to -100	0V to -10V
100 to 102.35	10.0V to 10.235V
-100 to -102.35	-10.0V to -10.235V

Prerequisites: Requires firmware revision 3.5 or greater and TARM OFF must be set.

APPLY PERC

HP 44727A/B/C

Sets the level of output current or voltage on the specified DAC channel to a percentage of full scale output.

APPLY PERC *ch number*

Command Reference

<u>Parameters</u>	<u>Description</u>
<i>ch</i>	Channel address. Channel range = ES00-ES03.
<i>number</i>	Percentage of maximum output for the selected range.

<u>Range</u>	<u>Output</u>
-10 to +10V	$number = -102.35 \text{ to } +102.35$ Output = $0.1V \times number$
0 to +10V	$number = 0 \text{ to } +102.35$ Output = $0.1V \times number$
0 to 20 mA	$number = 0 \text{ to } 100.8375$ Output = $0.2 \text{ mA} \times number$
4 to 20 mA	$number = 0 \text{ to } 101.046875$ Output = $4 \text{ mA} + 0.16 \text{ mA} \times number$

Prerequisites: For output voltages <0V, channel must be set for -10V to +10V range. For output currents <4 mA, channel must be set to 0 to 20 mA range.

APPLY WFV

HP 44726A

Selects the waveform in channel memory to be output from the DAC.

APPLY WFV *channel waveform_number* [FIRST point] [LAST point]

Command Reference

<u>Parameters</u>	<u>Description</u>	<input type="checkbox"/>
<i>channel</i>	Channel from which the waveform is selected. The range for <i>channel</i> is ES00 to ES01.	<input type="checkbox"/>
<i>waveform___ number</i>	Number of the waveform which is selected in memory. Waveforms are numbered 0 to 63 per channel.	<input type="checkbox"/>
FIRST point	Portion of the waveform selected in memory beginning with the point specified through the LAST point specified, or through the end of the waveform. Waveform points are numbered starting with 0.	<input type="checkbox"/>
LAST point	Portion of the waveform selected in memory starting with the beginning of the waveform or from the FIRST point specified, through the last point specified.	<input type="checkbox"/>
	If neither FIRST point or LAST point is specified, the entire waveform is selected.	<input type="checkbox"/>
Prerequisites:	Requires firmware revision 3.5 or greater and TARM OFF or TARM AUTO must also be set.	<input type="checkbox"/>
ARANGE	<i>HP 44701A</i>	<input type="checkbox"/>
	Turns the autorange mode of the voltmeter on and off.	<input type="checkbox"/>
ARANGE [<i>mode</i>] [USE <i>ch</i>]		<input type="checkbox"/>
		<input type="checkbox"/>

Command Reference

<u>Parameters</u>	<u>Description</u>
<i>mode</i>	ON - autorange on. OFF - autorange off. The power-on and default setting for ARANGE is ON.
USE <i>ch</i>	Slot where voltmeter is installed.

ARMODE

HP 44702A/B

Sets the Autorange mode. ARMODE specifies whether autoranging will occur before or after the measure trigger is received.

ARMODE *mode* [**USE** *ch*]

<u>Parameters</u>	<u>Description</u>
<i>mode</i>	BEFORE - for ribbon cable scans, autorange when channel advanced but before measure trigger is received. AFTER - autorange after measure trigger is received.
USE <i>ch</i>	Slot where voltmeter is installed.

Prerequisites: When in the Scanner mode, SCTRIG must be set to HOLD.

Command Reference

ASCAN

HP 44702A/B

Sets the autoscan function. With the voltmeter in the Scanner mode, ASCAN specifies whether a scan trigger (SCTRIG) is required for each pass through a scan list, or whether a single scan trigger can be used for multiple passes through the scan list.

ASCAN [*mode*] [**USE** *ch*]

<u>Parameters</u>	<u>Description</u>
<i>mode</i>	ON - scan trigger required for the first pass only. OFF - scan trigger required for each pass. At power-on, ASCAN is OFF. The default setting for ASCAN is ON.
USE <i>ch</i>	Slot where voltmeter is installed.

Prerequisites: SCTRIG must be set to HOLD.

ASSIGN

HP 44788A

Used to assign an I/O path name and attributes to a device or mass storage file or close an I/O path name.

ASSIGN @*I/O path name* **TO** *device selector* or *
[**FORMAT** ON or OFF] [**EOL** OFF]

<u>Parameters</u>	<u>Description</u>
@ <i>I/O path name</i>	The name of the path assigned to a device or mass storage file.
<i>device selector</i>	The HP-IB select code (i.e. Snn) for the device the data is to be output to. S = slot, nn = device address.

Command Reference

* Asterick is used to close a path.

FORMAT Allows internal bit representation when OFF or ASCII representation when ON.

EOL When OFF, no CR/LF is sent.

Prerequisites: Requires firmware revision 3.5 or greater.

ATN *Trigonometric Operation*

Numeric expression evaluated as a command parameter. Returns (in radians) the arctangent of the specified number.

ATN (*number*)

<u>Parameter</u>	<u>Description</u>
<i>number</i>	Number or numeric expression.

AUTOST IS *HP 44788A*

Defines the file name and disc drive address for the auto start program.

AUTOST IS "{*file__name*[:*msus*]}"

<u>Parameters</u>	<u>Description</u>
<i>file__name</i>	The name of the file containing the commands.
<i>msus</i>	Mass storage unit specifier. ESnn, n,n where ES is extender number (mainframe=0) and slot number and nn is the address set on the drive. ,n,n identifies the drive and volume number.

Command Reference

Prerequisites: Requires firmware revision 3.5 or greater.

AZERO *HP 44701A, HP 44702A/B*

Autozero the voltmeter. AZERO cannot be used with the ACV function.

AZERO [*mode*] [**USE** *ch*]

<u>Parameters</u>	<u>Description</u>
<i>mode</i>	ON - autozero following every reading. For the HP 44701A, the power-on <i>mode</i> is ON. OFF - autozero once. ONCE - autozero once. For the HP 44701A and HP 44702A/B, the default <i>mode</i> is OFF/ONCE. (ONCE is the only <i>mode</i> available for the HP 44702A/B.)
USE <i>ch</i>	Slot where voltmeter is installed.

Prerequisites: If the HP 44702A/B is in the Scanner mode, SCTRIG must be set to HOLD.

AZERO *HP 44730A, HP 44732A, HP 44733A*

Performs an autozero on the specified channel.

AZERO [*mode*] [**USE** *ch*]

<u>Parameters</u>	<u>Description</u>
<i>mode</i>	Autozero control mode. Only <i>mode</i> is ONCE. After AZERO, amplifier contribution to channel offset errors is minimized.

Command Reference

USE *ch* Specifies channel to be used for AZERO. Channel number range is ES00 through ES03.

Prerequisites: Requires firmware revision 3.5 or greater and system must not be scanning with an HP 44702A/B when AZERO is executed.

BEEP *Mainframe*

Enables and disables the mainframe's beeper. When enabled, the mainframe will beep on command or when an error occurs. With the beeper disabled, error messages are still displayed but the beep is suppressed.

BEEP [*mode*]

Parameter

Description

mode

ON - beeper enabled. At power-on, *mode* is ON.

OFF - beeper disabled.

ONCE - beep once whether enabled or disabled. The default *mode* is ONCE.

BINAND *Binary Function*

Numeric expression evaluated as a command parameter. Returns the value of a bit-by-bit logical AND of the specified numbers.

BINAND (*number number*)

Command Reference

<u>Parameter</u>	<u>Description</u>
<i>number</i>	Number or parenthesized numeric expression that must evaluate within the range: -32768 to +32767.

BINCMP

Binary Function

Numeric expression evaluated as a command parameter. Returns the value that is the complement of the number specified.

BINCMP (*number*)

<u>Parameter</u>	<u>Description</u>
<i>number</i>	Number or parenthesized numeric expression that must evaluate within the range -32768 to +32767.

BINEOR

Binary Function

Numeric expression evaluated as a command parameter. Returns the value of the bit-by-bit exclusive-OR of the numbers specified.

BINEOR (*number number*)

<u>Parameter</u>	<u>Description</u>
<i>number</i>	Number or parenthesized numeric expression that must evaluate within the range -32768 to +32767.

Command Reference

BINIOR

Binary Function

Numeric expression evaluated as a command parameter. Returns the value of a bit-by-bit inclusive-OR of the numbers specified.

BINIOR (*number number*)

<u>Parameter</u>	<u>Description</u>
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number

Number or parenthesized numeric expression that must evaluate within the range: -32768 to +32767.

BIT

Binary Function

Numeric expression evaluated as a command parameter. Returns a 1 or 0 corresponding to the specified bit in the number.

BIT (*number bit__position*)

<u>Parameters</u>	<u>Description</u>
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number

Number or numeric expression that must evaluate within the range: -32768 to +32767.

bit__position

Number or parenthesized numeric expression that must evaluate within the range: 0 to 15.

BLOCKOUT

Mainframe

Sets the Block Output mode. When enabled, binary data is preceded by an IEEE 728 Block A header. The four byte header consists of the # sign, the letter A, and two bytes indicating the number of bytes which follow.

Command Reference

BLOCKOUT [*mode*]

<u>Parameter</u>	<u>Description</u>
<i>mode</i>	ON - Block A header precedes all binary data. The default <i>mode</i> is ON. OFF - No header, output is data only. At power-on, <i>mode</i> is OFF.

CAL *HP 44701A, HP 44702A/B*

Calibrates the voltmeters. Refer to the HP 3852A Assembly Level Service Manual for procedures and further information.

CAL *HP 44730A, HP 44732A, HP 44733A*

Perform gain and offset calibration on the specified channel.

CAL *true* **LO** *meas* **HI** *meas* [**USE** *ch*] (*gain*)

CAL **0** (*offset*)

<u>Parameters</u>	<u>Description</u>
<i>true</i>	Actual voltage input to CAL terminals. For calibration, $9.00 \text{ Vdc} \leq (\text{true}) * (\text{channel gain}) \leq 10.24 \text{ Vdc}$.
LO <i>meas</i>	Voltage measured on channel after FUNC CALLO is executed. LO <i>meas</i> must be $\leq (\text{true}) * (\text{channel gain})$.

Command Reference

HI meas Voltage measured on channel after FUNC CALHI is executed. HI meas must be $\geq (true) * (\text{channel gain})$.

USE ch Specifies channel to be used for CAL. Channel number range is ES00 through ES03.

Prerequisites: Requires firmware revision 3.5 or greater and system must not be scanning with an HP 44702A/B when CAL is executed.

CALL *Mainframe*

Calls the specified HP 3852A subroutine.

CALL *name* [*number*]

<u>Parameters</u>	<u>Description</u>
<i>name</i>	Name of the subroutine to be called.
<i>number</i>	The number of times the subroutine is called. A subroutine can be called a maximum of 2147483647 times.

Prerequisites: The specified subroutine must currently be stored in the mainframe.

CAT *Mainframe*

Returns a catalog list of all mainframe variables, arrays, and subroutines.

CAT

Data Returned: The CAT command returns data as shown and described for the example sequence that follows (mainframe display sequence is shown):

Command Reference

	3
C	
INT	0
RJ	
RARR	10
JD	
SUB	166

The CAT command returns the number of variables, arrays, and subroutines stored in the mainframe (3), followed by the name (C,RJ,JD), type (INT,RARR,SUB), and size (0,10,166) of the variable, array, or subroutine. The order in which storage items are cataloged is the reverse order in which they were defined (i.e. the subroutine JD was defined first).

If a PACKED array has been declared, the size returned by the CAT command will be the number of bytes allocated to that array if no data is currently in the array. If data is in the array, the size returned will be the maximum number of readings that can be stored in the array based on the number of bytes per reading.

CAT

HP 44788A

Lists all the contents of a mass storage directory on the HP 3852A display.

CAT “[*media specifier*]”

Parameters

media specifier

Description

The name of the mass storage device containing the directory. If no media specifier is stated (“”), the current MSI is categorized.

Command Reference

Prerequisites: Requires firmware revision 3.5 or greater.

CHREAD *HP 44701A, HP 44702A/B*

Transfers a single reading from the voltmeter. CHREAD transfers one reading from the voltmeter specified to either the HP-IB output buffer/display or to mainframe memory. This command works with the HP 44702A/B in either the System or Scanner Mode.

CHREAD *ch* [**INTO** *name*] or [*fmt*]

<u>Parameters</u>	<u>Description</u>
<i>ch</i>	Slot where voltmeter is installed.
INTO <i>name</i>	See Destination = Mainframe Memory.
<i>fmt</i>	See Data Formats. The default format for CHREAD is RASC.

Prerequisites: The voltmeter must have been triggered and data must be available before CHREAD will return a reading.

CHREAD *HP 44715A*

Reads the current count or level on the specified channel. When a count is returned, the counting function is not disturbed.

CHREAD *ch* [**INTO** *name*] or [*fmt*]

Command Reference

<u>Parameters</u>	<u>Description</u>
<i>ch</i>	Address of the channel to be read. Channel range depends on the hardware configuration.
INTO <i>name</i>	See Destination = Mainframe Memory.
<i>fmt</i>	See Data Formats. The default format for CHREAD is RASC.

Prerequisites: The channel specified must have been triggered and data must be available before CHREAD will return a reading.

CHREAD

HP 44721A, HP 44722A

Reads the current count or current state of the specified channel.

CHREAD *ch* [**INTO** *name*] or [*fmt*]

<u>Parameters</u>	<u>Description</u>
<i>ch</i>	Address of the channel to be read. If a channel from ES00-ES15 (ES00-ES07 on 8-channel digital input) is specified, the number of edge transitions are returned. If a channel from ES16-ES31 (ES08-ES15 on 8-channel) is specified, the current state (e.g. HI,LOW,1,0) is returned.
INTO <i>name</i>	See Destination = Mainframe Memory.
<i>fmt</i>	See Data Formats. The default format for CHREAD is RASC.

Command Reference

CHREAD

HP 44723A

Returns the state of the specified input channel as read from the second rank input register.

CHREAD *ch* [*INTO name*] or [*fmt*]

<u>Parameters</u>	<u>Description</u>
<i>ch</i>	Address of input channel. Channel number range = ES00 through ES15.
<i>INTO name</i>	See Destination = Mainframe Memory.
<i>fmt</i>	See Data Formats. The default format for CHREAD is IASC.

Prerequisites: Requires mainframe firmware revision 3.0 or greater.

CHREADM

HP 44721A, HP 44722A

Returns state of specified channel(s).

CHREADM *ch_list* [*INTO name*] or [*fmt*]

<u>Parameters</u>	<u>Description</u>
<i>ch_list</i>	Channel list of digital input channel(s). Channel number range = ES15 through ES31 (HP 44721A) or ES08 through ES15 (HP 44722A).
<i>INTO name</i>	See Destination = Mainframe Memory.
<i>fmt</i>	See Data Formats. The default format for CHREADM is IASC.

Command Reference

Prerequisites: Requires mainframe firmware revision 3.0 or greater.

CHREADM

HP 44723A

Returns the state of the specified input channel(s) as read from the second rank input register.

CHREADM *ch_list* [**INTO** *name*] or [*fmt*]

<u>Parameters</u>	<u>Description</u>
<i>ch_list</i>	Address of input channel(s). Channel number range = ES00 through ES15.
INTO <i>name</i>	See Destination = Mainframe Memory.
<i>fmt</i>	See Data Formats. The default format for CHREADM is IASC.

Prerequisites: Requires mainframe firmware revision 3.0 or greater.

CHREADZ

HP 44715A

Reads and zeros the channel count on the specified channel. The counting function is not disturbed when CHREADZ is executed. CHREADZ does not apply to the accessory's **FREQ** configuration.

CHREADZ *ch* [**INTO** *name*] or [*fmt*]

<u>Parameters</u>	<u>Description</u>
<i>ch</i>	Address of the channel to be read and zeroed. Channel range depends on the hardware configuration.

Command Reference

INTO name See Destination = Mainframe Memory.

fmt See Data Formats.
The default format for CHREADZ is RASC.

Prerequisites: The channel specified must have been triggered and data must be available before CHREADZ will return a reading.

CHREADZ *HP 44721A, HP 44722A*

Reads and zeros the channel count on the specified channel. The counting function is not disturbed when CHREADZ is executed.

CHREADZ *ch* [**INTO name**] or [*fmt*]

<u>Parameters</u>	<u>Description</u>
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<i>ch</i>	Address of the channel to be read and zeroed. Channel range is ES00-ES15 (ES00-ES07 for 8-channel accessory). Channels 16-31 (8-15 for 8-channel digital input) are not valid for this command.
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INTO name	See Destination = Mainframe Memory.
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<i>fmt</i>	See Data Formats. The default format for CHREADZ is RASC.
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Prerequisites: Data must be available before the command will return a reading.

Command Reference

CHWRITE

HP 44723A

Write the state (0/1) to the specified output channel. State is written to the first rank output register. A second rank output trigger is required to transfer the new state to the user outputs.

CHWRITE *ch state*

<u>Parameters</u>	<u>Description</u>
<i>ch</i>	Address of output channel. Channel number range = ES16 through ES31.
<i>state</i>	Specifies state for output channel. Any nonzero integer for <i>state</i> between -32768 and +32767 is interpreted as a "1" (HIGH). Zero is interpreted as a "0" (LOW).

Prerequisites: Requires mainframe firmware revision 3.0 or greater.

CHWRITE

HP 44724A, HP 44725A
HP 44728A, HP 44729A

Writes a number to a single channel to open or close that channel.

CHWRITE *ch number*

<u>Parameters</u>	<u>Description</u>
<i>ch</i>	Address of channel. Channel range = ES00-ES15 for 16-channel accessories, ES00-ES07 for 8-channel accessories.

Command Reference

number Opens or closes the channel specified. *number* = 0 opens channel, *number* > or < 0 closes channel.

CHWRITEM

HP 44723A

Write the state (0/1) to each specified output channel in the channel list. States are written to the first rank output register. A second rank output trigger is required to transfer the new state to the user outputs.

CHWRITEM *ch_list* **DATA** *state_list*

Parameters

Description

ch_list Address of output channel list. Channel number range = ES16 through ES31.

DATA
state_list Specifies state(s) (0/1) for corresponding output channels specified by *ch_list*. Any nonzero value for *state_list* between -32768 and +32767 is interpreted as a "1" (HIGH). Zero is interpreted as a "0" (LOW). CHWRITEM uses one item from *state_list* for each channel OR channel range in *ch_list*.

Prerequisites: Requires mainframe firmware revision 3.0 or greater.

CHWRITEM

HP 44724A, HP 44725A,
HP 44728A, HP 44729A

Write the state (0/1) to open or close specified channel(s).

Command Reference

CHWRITEM *ch_list* DATA *state_list*

<u>Parameters</u>	<u>Description</u>
<i>ch_list</i>	Address of channel list. Channel number range = ES00 through ES15 (HP 44724A and HP 44725A) or ES00 through ES07 (HP 44728A and HP 44729A).
DATA <i>state_list</i>	Specifies the state (open or closed) for the corresponding channels specified by <i>ch_list</i> . A "0" for <i>state_list</i> opens the associated channel(s), while any nonzero integer between -32768 and +32767 closes the associated channel(s). CHWRITEM uses one item from DATA <i>state_list</i> for each channel OR channel range in <i>ch_list</i> .

Prerequisites: Requires mainframe firmware revision 3.0 or greater.

CLEAR

HP 44788A

Allows the mainframe to put selected HP-IB devices into a defined, device-dependent state.

CLEAR @I/O path name or device selector

<u>Parameters</u>	<u>Description</u>
@I/O path name	The name of the path assigned to a device or mass storage file.
device selector	The HP-IB select code (i.e. Snn) for the device the data is to be output to. S = slot, nn = device address.

Command Reference

Prerequisites: Requires firmware revision 3.5 or greater.

CLOSE *HP 44705A, HP 44705H, HP 44706A,
HP 44708A, HP 44708H, HP 44709A,
HP 44710A, HP 44711A, HP 44712A,
HP 44713A, HP 44717A, HP 44718A,
HP 44719A, HP 44720A, HP 44730A,
HP 44732A, HP 44733A*

Closes multiplexer channels. This command is intended for individual switch control. Tree switches are not automatically configured when performing measurements.

CLOSE *ch_list*

<u>Parameters</u>	<u>Description</u>
<i>ch_list</i>	Address of the channel list. See "Useful Tables" for channel ranges of the various multiplexer accessories.

Prerequisites: The HP 44717A, HP 44718A, HP 44719A, and HP 44720A accessories require firmware revision 2.0 or greater. The HP 44730A, HP 44732A, and HP 44733A accessories require firmware revision 3.5 or greater.

CLOSE *HP 44724A, HP 44725A,
HP 44728A, HP 44729A*

Closes digital output and actuator channels.

CLOSE *ch_list*

Command Reference

<u>Parameter</u>	<u>Description</u>
<i>ch_list</i>	Address of the channel list. Channel range = ES00-ES15 for 16-channel accessories, ES00-ES07 for 8-channel accessories.

CLOSE? *HP 44705A, HP 44705H, HP 44706A, HP 44708A, HP 44708H, HP 44709A, HP 44710A, HP 44711A, HP 44712A, HP 44713A*

Returns the state (opened/closed) of the specified channels. The data returned also indicates whether or not a closed channel is connected to the Sense or Source bus.

CLOSE? *ch_list* [**INTO** *name*] or [*fmt*]

<u>Parameters</u>	<u>Description</u>
<i>ch_list</i>	Address of the channel list. See "Useful Tables" for channel ranges and definitions for the various multiplexers. For 20, 24, and 48-channel accessories, the following data is returned: 0 Channel Open 1 Channel Closed 2 Closed - connected to Sense Bus 3 Closed - connected to Source Bus 4 Closed - connected to both buses For the 60-channel accessory, the following data is returned: 0 Channel Open 1 Channel Closed - Source Bus tree switch (channel 91) 2 Closed - connected to Sense Bus 4 Closed - connected to both buses

Command Reference

INTO *name* See Destination = Mainframe Memory.

fmt See Data Formats.
The default format for CLOSE? is IASC.

CLOSE? *HP 44724A, HP 44725A, HP 44728A, HP 44729A*

Returns the state (opened/closed) of the specified channels.

CLOSE? *ch_list* [**INTO** *name*] or [*fmt*]

<u>Parameters</u>	<u>Description</u>
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<i>ch_list</i>	Address of the channel list. Channel range = ES00-ES15 for 16-channel accessories, ES00-ES07 for 8-channel accessories. A 0 is returned when a channel is open, a 1 is returned when a channel is closed.
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INTO *name* See Destination = Mainframe Memory.

fmt See Data Formats.
The default format for CLOSE? is IASC.

CLOSE? *HP 44730A, HP 44732A, HP 44733A*

Returns the state (opened/closed) of the specified channels. The data returned also indicates whether a closed channel is connected to the Sense bus.

Command Reference

CLOSE? *ch_list* [*INTO name*] or [*fmt*]

<u>Parameters</u>	<u>Description</u>
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ch_list

Address of the channel list. Channel number range is ES00 - ES03 for user inputs, ES04 - ES07 for excitation voltage measurements, and ES90 for the isolation relay. A 0 is returned for channel open (ES00 - ES07), a 1 is returned for channel closed (ES90 only), and a 2 is returned if the channel is closed and connected to the sense bus (ES00 - ES07).

INTO name

See Destination = Mainframe Memory

fmt

See Data Formats. The default format for CLOSE? is IASC.

Prerequisites: Requires firmware revision 3.5 or greater. If the ribbon cable is connected between an HP 44730A, HP 44732A, or HP 44733A, and an HP 44702A/B voltmeter, the system must not be scanning with the HP 44702A/B when CLOSE? is executed.

CLR

Mainframe

Clears the HP 3852A mainframe. CLR is equivalent to pressing the front panel CLEAR key, or sending the HP-IB DCL (device clear) or SDC (selected device clear) command.

CLR

When executed, the CLR command sets the following conditions:

Command Reference

- halts commands and subroutines currently executing
- clears partially entered commands (front panel and HP-IB)
- disables accessory interrupt, limit interrupt, and alarm interrupt recognition. Accessory channel interrupts and channel logging remain enabled.
- sets RQS ON and RQS NONE
- clears the service request bit (bit 6) in the status register, the SRQ annunciator, and the HP-IB SRQ line
- clears HP-IB input and output buffers
- displays "READY" (if display is enabled)
- minimizes other state changes (relay settings, output states, memory, etc.)

CLROUT

Mainframe

Clears the HP-IB output buffer.

CLROUT

It is often not necessary to clear the output buffer when OUTBUF is off since new data overwrites data currently in the buffer.

Note that if input buffering is on (INBUF ON), commands following CLROUT may be accepted and executed before CLROUT resulting in invalid data being returned. The data that is returned depends on how soon data was entered in the controller versus how soon the mainframe executed the CLROUT command.

CLWRITE

HP 44702A/B

Sets the channel list and ranges to be scanned and used by the voltmeter.

CLWRITE [*ribbon_bus*] *ch_list* [**RANGE** *range_list*] [**USE** *ch*]

Command Reference

<u>Parameters</u>	<u>Description</u>
<i>ribbon_bus</i>	<p>Specifies the interface cable connections between the voltmeter and the high-speed multiplexers.</p> <p>SENSE - connects the SENSE bus between voltmeter and multiplexers. (DC voltage measurements only.)</p> <p>COM - connects the SENSE bus and SOURCE bus between voltmeter and multiplexers. (2-wire ohms measurements only.)</p> <p>SEP - both buses are connected between voltmeter and multiplexer and are available for user wiring. SENSE bus is connected to Bank A, SOURCE bus is connected to BANK B. Only BANK A channels are specified as the respective channels in Bank B are closed automatically. (4-wire ohms measurements only.)</p>
<i>ch_list</i>	<p>Address of the channel list to be scanned. See "Useful Tables" for the channel ranges of the various high-speed FET multiplexers. Note that for measurements over the ribbon cable: NRDGS x (# of channels - 1) must be < 4095.</p>
RANGE <i>range_list</i>	<p>Voltmeter ranges that correspond to the channels in <i>ch_list</i> to be scanned. The range specified is the maximum expected signal amplitude or resistance to be measured. The voltmeter then selects the correct range. One range can be specified</p>

Command Reference

for the entire *ch_list* or one range for each channel and/or channel sequence in the list (i.e. ESCC uses one range from the range list as does ESCC-ESCC). If more channels are specified than ranges, the channels without a corresponding range use the default (autorange) range.

Autorange can be selected by specifying AUTO or 0 for the *range_list* parameter.

The default range is AUTO.

USE *ch* Slot where voltmeter is installed.

Prerequisites: When the voltmeter is in the Scanner mode, TERM must be set to RIBBON, and SCTRIG must be set to HOLD.

CNTSET

HP 44715A

Presets the counter channel to begin counting from a specified number of counts, or to rollover after a specified number of counts. CNTSET aborts counts in progress. Unless the channel is set for TRIG AUTO, a trigger if required after the CNTSET command to start the totalizing function.

CNTSET [*number*] [**USE *ch***]

Parameters

Description

number

Count totalizing function will start from if starting count is < 2147483648.

If the count the totalizing function starts from is \geq 2147483648,
number = **counts** - 4294967296.

Command Reference

If counter is to rollover after a number of counts < 2147483648 ,
 $number = - counts$.

If counter is to rollover after a number of counts ≥ 2147483648 ,
 $number = 4294967296 - counts$.

The default value for $number$ is 0.

USE ch

Channel that is to be preset or rollover after the specified number of counts. Channel range depends on the hardware configuration.

Prerequisites: The channel on which CNTSET will be executed must be set to the TOTAL function.

CNTSET

HP 44721A, HP 44722A

Presets the input channel to begin counting from a specified number of counts, or to rollover after a specified number of counts.

CNTSET [$number$] [**USE** ch]

Parameters

Description

$number$

Count the totalizing function starts from if the starting count is < 2147483648 .

If the count the totalizing function starts from is ≥ 2147483648 ,
 $number = counts - 4294967296$.

If input is to rollover after a number of counts < 2147483648 , $number = - counts$.

Command Reference

If input is to rollover after a number of counts ≥ 2147483648 , *number* = 4294967296 - **counts**.

The default value for *number* is 0.

USE *ch*

Channel to be preset or rollover after the specified number of counts. Channel range = ES00-ES15 (ES00-ES07 for the 8-channel digital input).

COMPEN

Mainframe

Post process temperature and strain conversion. COMPEN enables you to measure the electrical parameters (i.e. resistance, voltage) of a thermistor, thermocouple, or strain gage, and later convert those parameters to corresponding temperatures or strain.

COMPEN *thermistor or RTD ohms__array* [**GAIN corr**] [**INTO name**] or [*fmt*]

COMPEN *thermocouple volts__array REF ref__array* [**GAIN corr**] [**INTO name**] or [*fmt*]

COMPEN *strain__function bridge__volts STRVEX ex__array REF ref__buf* [**GF factor**] [**NU ratio**] [**GAIN corr**] [**INTO name**] or [*fmt*]

Parameters

Description

thermistor or RTD

Thermistor or RTD whose resistance is converted to temperature. Thermistors and RTDs supported by this command include:

THM2252
THM5K
THM10K
RTD85
RTD92

Command Reference

ohms_array Real, Integer, or Packed array containing the resistance measurements of the thermistor or RTD used.

thermocouple Thermocouple whose voltage is converted to temperature. Thermocouples supported by this command include:

TEMPB
TEMPE
TEMPJ
TEMPK
TEMPN14
TEMPN28
TEMPR
TEMPS
TEMPT

volts_array Real, Integer, or Packed array containing the voltage measurements of the thermocouple used.

REF
refl_array Real or Integer array or a number containing the measurement(s) of the isothermal block (REFT).

strain_function Bridge configuration whose output voltage is converted to strain. The strain functions which represent these configurations and which are supported by this command are:

STRQ
STRHB
STRFB
STRHP
STRFBP
STRFP

Command Reference

<i>bridge__volts</i>	Real, Integer, or Packed array containing the bridge output voltage measurements.
STRVEX <i>ex__array</i>	Real or Integer array or a number containing the measurement(s) of the bridge excitation voltage.
REF <i>ref__buf</i>	Real or Integer array or a number containing the unstrained reference measurement(s).
GF <i>factor</i>	Real or Integer array or a number containing a gage factor. Specifying a gage factor with an exponent of -6 returns the converted readings in microstrain.
NU <i>ratio</i>	Real or Integer array or a number containing a Poisson ratio. For strain functions STRHP, STRFBP, and STRFP, NU <i>ratio</i> is a required parameter.
GAIN <i>corr</i>	Real or Integer array or a number containing values by which the readings in <i>ohms__array</i> , <i>volts__array</i> , or <i>bridge__volts</i> are divided. If a number is specified, the value is divided into each of the array readings. If an array is specified, there is a 1-for-1 correspondence between the correction array and <i>ohms__array</i> , <i>volts__array</i> , or <i>bridge__volts</i> . If necessary, the correction array will wraparound and the correction factors will be used again.
INTO <i>name</i>	See Destination = Mainframe Memory.

Command Reference

fmt See Data Formats.

The default format for COMPEN is RASC.

Prerequisites: Requires firmware revision 3.5 or greater.

CONF *HP 44701A, HP 44702A/B*

Configures an HP 44701A or HP 44702A/B voltmeter for a specified measurement function and selects preset values for voltmeter operation.

CONF function [USE *ch*]

<u>Parameters</u>	<u>Description</u>
<i>function</i>	HP 44701A or HP 44702A/B voltmeter measurement function. ACV applies only to HP 44701A. OHM10K, OHMF10K, OHM100K, OHMF100K, OHM1M, and OHMF1M apply only to HP 44702A/B.
<i>function</i>	Measurement
ACV	AC voltage
DCV	DC voltage
OHM	2-wire ohms
OHM10K	2-wire ohms up to 10 k Ω
OHM100K	2-wire ohms up to 100 k Ω
OHM1M	2-wire ohms up to 1 M Ω
OHMF	4-wire ohms
OHMF10K	4-wire ohms up to 10 k Ω
OHMF100K	4-wire ohms up to 100 k Ω
OHM1M	4-wire ohms up to 1 M Ω

Command Reference

TEMPtype	Thermocouple temperature type = B, E, J, K, N14, N28, R, S, and T
REFT	Reference temperature (isothermal block)
THMtype	Thermistor (2-wire ohms) type = 2252, 5K, and 10K
THMFtype	Thermistor (4-wire ohms) type = 2252, 5K, and 10K
RTDtype	RTD (2-wire ohms) type = 85, 92
RTDFtype	RTD (4-wire ohms) type = 85, 92
STRVEX	Bridge exc voltage
STRUN	Unstrained bridge output
STRQ	¼ bridge strain
STRHB	Bending ½ bridge strain
STRFB	Bending full bridge strain
STRQTEN	Tension shunt
STRQCOMP	Compression shunt
STRHP	½ bridge Poisson strain
STRFBP	Full bridge bending Poisson
STRFP	Full bridge Poisson strain
USE <i>ch</i>	Slot where the voltmeter is installed.

Prerequisites: Requires mainframe firmware revision 2.0 or greater for use with the strain functions (STRxx). The system must not be scanning with an HP 44702A/B voltmeter when CONF is executed.

Command Reference

CONF

HP 44715A

Configures the counter channel for the specified counting/measurement function. See "Useful Tables" for a list of the counter parameters set by the CONF command.

CONF *function* [USE *ch*]

<u>Parameters</u>	<u>Description</u>
<i>function</i>	Accessory counting/measurement function. TOTAL - Channel(s) configured to measure Total Counts. TOTALM - Channel(s) configured to measure Total Count Modulo. UDC - Channel(s) configured to measure Up/Down Counts. UDCM - Channel(s) configured to measure Up/Down Count Modulo. CD - Channel(s) configured to measure Counts with Direction. CDM - Channel(s) configured to measure Counts with Direction Modulo. RAT - Channel(s) configured to measure Ratio. PER - Channel(s) configured to measure Period. PERD - Channel(s) configured to measure Delayed Period. FREQ - Channels configured to measure Frequency.

Command Reference

USE *ch* Channel to be configured. Channel range depends on the hardware configuration.

Prerequisites: Double input functions (all functions except TOTAL and TOTALM) can only be programmed on channels configured for double inputs.

CONF HP 44721A, HP 44722A

Configure digital input function. The digital inputs can be configured to sense the input level (high or low) or detect the presence of an AC signal (HP 44722A). The digital inputs can also be set to totalize inputs. See "Useful Tables" for a list of the digital input parameters set by the CONF command.

CONF *function* [USE *ch*]

<u>Parameters</u>	<u>Description</u>
<i>function</i>	Digital input function. LVL - channel(s) configured to measure input logic levels. TOTAL - totalize inputs on the specified channel.
USE <i>ch</i>	Channel to be configured. For function LVL, channel range = ES16-ES31 (ES08-ES15 for the 8-channel digital input). For function TOTAL, range = ES00-ES15 (ES00-ES07 for the 8-channel digital input).

CONF MEAS

See the CONFMEAS command.

Command Reference

CONFMEAS

HP 44701A, HP 44702A/B

Configures an HP 44701A or HP 44702A/B voltmeter for a specified measurement function and then initiates a scan and measurement of specified channels. Equivalent to sending CONF immediately followed by MEAS.

CONFMEAS *function1* *ch__list* [**GAIN** *corr*]
[**NSCAN** *number*] [**USE** *ch*] [**INTO** *name*] or [*fmt*]

CONFMEAS *function2* *ch__list* **REF** *ref__buf* [**GF**
factor] [**GAIN** *corr*] [**NSCAN** *number*] [**USE** *ch*]
[**INTO** *name*] or [*fmt*]

CONFMEAS *function3* *ch__list* **REF** *ref__buf* [**GF**
factor] **NU** *ratio* [**GAIN** *corr*] [**NSCAN** *number*]
[**USE** *ch*] [**INTO** *name*] or [*fmt*]

Parameters

Description

function HP 44701A or HP 44702A/B voltmeter measurement function. ACV applies only to an HP 44701A voltmeter. OHM10K, OHMF10K, OHM100K, OHMF100K, OHM1M, and OHMF1M apply only to an HP 44702A/B voltmeter. The strain functions (STRxx) apply only to strain measurements.

function1

Measurement

ACV	AC voltage
DCV	DC voltage
OHM	2-wire ohms
OHM10K	2-wire ohms up to 10 k Ω
OHM100K	2-wire ohms up to 100 k Ω
OHM1M	2-wire ohms up to 1 M Ω

Command Reference

<input type="checkbox"/>		
<input type="checkbox"/>	OHMF	4-wire ohms
	OHMF10K	4-wire ohms up to 10 k Ω
<input type="checkbox"/>	OHMF100K	4-wire ohms up to 100 k Ω
	OHM1M	4-wire ohms up to 1 M Ω
<input type="checkbox"/>	TEMPtype	Thermocouple temperature type = B, E, J, K, N14, N28, R, S, and T
<input type="checkbox"/>	REFT	Reference temperature (isothermal block)
<input type="checkbox"/>	THMtype	Thermistor (2-wire ohms) type = 2252, 5K, 10K
<input type="checkbox"/>	THMfType	Thermistor (4-wire ohms) type = 2252, 5K, 10K
<input type="checkbox"/>	RTDtype	RTD (2-wire ohms) type = 85, 92
<input type="checkbox"/>	RTDFtype	RTD (4-wire ohms) type = 85, 92
<input type="checkbox"/>	STRVEX	Bridge exc voltage
	STRUN	Unstrained bridge output
<input type="checkbox"/>	<i>function2</i>	Measurement
<input type="checkbox"/>	STRQ	¼ bridge strain
	STRHB	Bending ½ bridge strain
	STRFB	Bending full bridge strain
<input type="checkbox"/>	STRQTEN	Tension shunt
	STRQCOMP	Compression shunt
<input type="checkbox"/>	<i>function3</i>	Measurement
<input type="checkbox"/>	STRHP	½ bridge Poisson strain
	STRFBP	Full bridge bending Poisson
	STRFP	Full bridge Poisson strain
<input type="checkbox"/>	<i>ch_list</i>	Address of channel(s) to be measured.
<input type="checkbox"/>		

Command Reference

REF <i>ref_buf</i>	Array or number containing the unstrained bridge output voltage (reference voltage) measurements for the corresponding channel list.
GF factor	Array or number containing or representing a gage factor. Default <i>GF factor</i> = 2.0. When a gage factor is specified with an exponent of -6 (e.g., <i>GF 2.E-6</i>), the result is returned in microstrain.
NU ratio	Array or number containing or representing a Poisson ratio (Poisson arrangements only).
GAIN corr	Real or Integer array or a number containing value(s) by which the measured readings are divided. The corrected values are stored in the mainframe or are sent to the output buffer and/or display in RASC format. Default <i>GAIN corr</i> = no correction.
NSCAN number	Number of scans to be made through the channel list. Default <i>number</i> = 1. NSCAN is only available with mainframe firmware revision 2.2 or greater. (<i>NSCAN number</i>)*(number of channels in channel list)* (<i>NRDGS number</i>) must result in 67,108,863 readings or less. For an HP 44702A/B in Scanner mode and RDGS GPIO set, <i>NSCAN number</i> range = 1 to 2147483647.
USE ch	Slot where the voltmeter is installed.

Command Reference

INTO *name* See Destination = Mainframe Memory.

fmt See Data Formats. The default format for CONFMEAS is RASC.

Prerequisites: Requires mainframe firmware revision 2.0 or greater for use with an HP 44717A, HP 44718A, HP 44719A, or HP 44720A or requires revision 3.5 or greater for use with an HP 44730A, HP 44732A, or HP 44733A. NSCAN is available for revision 2.2 or greater and GAIN is available for revision 3.5 or greater. The system must not be scanning with an HP 44702A/B voltmeter when CONFMEAS is executed.

CONT

Mainframe

Continues a paused (PAUSE command) or stepped (STEP command) HP 3852A subroutine.

CONT [*target*]

<u>Parameters</u>	<u>Description</u>
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target

Run task containing the subroutine to be continued. The range for *target* is 0 to 7. If *target* is not specified, the subroutine that was paused without the *target* parameter is continued. A stepped subroutine is also continued if *target* is not specified.

Prerequisites: The *target* parameter is used when the HP 3852A is in the multitasking mode. This parameter and multitasking are available with firmware revision 3.0 or greater.

Command Reference

CONV

Mainframe

Linear interpolation of measurement data using user-defined look-up tables.

CONV *domain range var* [INTO *name*] or [*fmt*]

<u>Parameters</u>	<u>Description</u>
<i>domain</i>	Real array of x-coordinates on the graph of the measurements to be interpolated. This array must have the same maximum index as the <i>range</i> array and its values must be entered in increasing order.
<i>range</i>	Real array of y-coordinates on the graph of the measurements to be interpolated. These values correspond to the x values with the same array indices. The <i>range</i> array must have the same maximum index as the <i>domain</i> array.
<i>var</i>	Array containing measurements which will be interpolated according to the x to y mapping defined by the <i>domain</i> and <i>range</i> arrays.
INTO <i>name</i>	See Destination = Mainframe Memory.
<i>fmt</i>	See Data Formats. The default format for CONV is RASC.

Prerequisites: The *domain*, *range*, and *var* arrays must be separate arrays. Also, the *domain* and *range* arrays must be Real arrays with the same maximum index.

Command Reference



COS *Trigonometric Operation*



Numeric expression evaluated as a command parameter. Returns the cosine of the specified number.



COS (*number*)



<u>Parameter</u>	<u>Description</u>
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number

Numeric expression in radians. Range = $\pm 2.98156824429204E + 8$ radians.



CREATE ASCII *HP 44788A*

Creates an ASCII file on the mass storage media.



CREATE ASCII *file specifier, number of records*



<u>Parameters</u>	<u>Description</u>
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file specifier

The name that the newly created file will have.

number of records

Defines the length of the file.



Prerequisites: Requires firmware revision 3.5 or greater.



CREATE BDAT *HP 44788A*

Creates a BDAT (binary data file) on the mass storage media.



CREATE BDAT *file specifier, number of records [,record size]*



Command Reference

<u>Parameters</u>	<u>Description</u>
<i>file specifier</i>	The name that the newly created file will have.
<i>number of records</i>	Defines the length of the file.
<i>record size</i>	Defines the length of a record.

Prerequisites: Requires firmware revision 3.5 or greater.

CREATE RUN

Mainframe

Sets the urgency (priority) of a run task environment before a subroutine is directed to that task by the RUN command. This enables the subroutine to start execution sooner once it has been directed to the task.

CREATE RUN *task__number* [*urgency*]

<u>Parameters</u>	<u>Description</u>
<i>task__number</i>	Run task whose urgency is set. The range for <i>task__number</i> is 0 to 7.
<i>urgency</i>	Urgency assigned to the specified run task. The range for <i>urgency</i> is 1 to 253, where 1 is the highest priority and 253 is the lowest priority. The default <i>urgency</i> is 85.

Prerequisites: Requires firmware revision 3.5 or greater and the HP 3852A must be in the multitasking mode.

Command Reference

DELAY

HP 44701A

Designates a time interval that is inserted into the measurement cycle. If there is one reading per trigger, the delay is inserted between the trigger event and the reading. If there are multiple readings per trigger, the delay is between the trigger and the first reading and between successive readings.

DELAY *trig_delay* [USE *ch*]

Parameters

Description

trig_delay

Delay time in seconds between the trigger and the reading. The *trig_delay* range is between 0 and 4294.967295 seconds. Due to hardware constraints, a specified delay between 1 μ sec and 58 μ sec will result in an actual delay of approximately 35 μ sec. *trig_delay* = AUTO restores default delays used at power-up or following a reset.

USE *ch*

Slot where voltmeter is installed.

Prerequisites: The AUTO parameter requires main-frame firmware revision 2.2 or greater.

DELAY

HP 44702A/B

Sets the delay between the trigger and the start of the first measurement and the period of successive measurements on the same channel. The DELAY command is only used with the voltmeter in the System mode.

DELAY *trig_delay* [*sample_period*] [USE *ch*]

Command Reference

Parameters

Description

trig_delay

Delay time in seconds between the trigger and the first measurement. *trig_delay* must be a number between 0 and 16.38375 msec. At power-on, *trig_delay* = 0.

sample_period

Time in seconds of each successive measurement. *sample period* must be a number between 0 and 1073.74182375 seconds. At power-on, *sample_period* = 10 μ sec.

USE *ch*

Slot where voltmeter is installed.

DELAY

HP 44714A

Causes the TRIG command to be delayed by the time specified for triggering a MOVE or SUSTAIN command.

DELAY *time* [USE *ch*]

Parameters

Description

time

Sets the amount of delay between the trigger and the generation of pulses. Can be set from 0.000 to 65.536 seconds in one millisecond increments.

USE *ch*

Channel the trigger is delayed. Channel range is ES00 to ES02.

Prerequisites: Requires mainframe firmware revision 3.0 or greater.

Command Reference



DELSUB

Mainframe



Recovers mainframe memory by deleting the contents of the HP 3852A subroutine stored in memory.

DELSUB *name*



Parameter

Description



name

Name of the subroutine whose contents will be deleted. The name is still defined and cannot be re-assigned as a variable or array name.



DELVAR

Mainframe



Recovers mainframe memory by releasing the memory allocated to the specified array.

DELVAR *name*



Parameter

Description



name

Name of the array whose memory will be released. The name is still defined and cannot be used for another array that is of a different storage type.



DIM

Mainframe



Defines a REAL (RL64) array in mainframe memory. DIM defines arrays only.



DIM *name (max__index) [name (max__index) ...]*

Command Reference

<u>Parameters</u>	<u>Description</u>
<i>name</i>	Name of the REAL array.
<i>(max__index)</i>	Maximum index of the array. Arrays defined by DIM have a starting index of 0 (parenthesis are required).

DISABLE

Mainframe

Disables event recognition and servicing.

DISABLE *event*

<u>Parameter</u>	<u>Description</u>
<i>event</i>	Interrupt or exception (alarms, limits) which causes an interrupt that is serviced by the mainframe. INTR SYS - disables the mainframe from recognizing an interrupt on an accessory. At power-on INTR SYS is enabled. INTR [USE ch] - disables an accessory channel from interrupting. At power-on, all channels and slots are disabled. LMT - disables real-time limit testing. At power-on, LMT is disabled. ALRM - disables the HP 3852A alarm from interrupting the mainframe or a controller. At power-on, ALRM is disabled. LOGCHAN - disables measurement channel logging. At power-on, LOGCHAN is disabled.

Command Reference



DISABLE EOL SWAP

Mainframe



Disables end of command swapping when the time-slice period expires and prevents the immediate execution of high priority commands.



DISABLE EOL SWAP

Prerequisites: DISABLE EOL SWAP is used only in the multitasking mode. Multitasking is available with firmware revision 3.0 or greater.



DISABLE INTR

HP 44701A, HP 44702A/B



Disables the voltmeter from interrupting when a reading is available.

DISABLE INTR [USE *ch*]



<u>Parameter</u>	<u>Description</u>
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USE <i>ch</i>	Slot where voltmeter is installed.
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DISABLE INTR

HP 44714A



Disables the channel specified from interrupting when a move is completed.

DISABLE INTR [USE *ch*]



<u>Parameters</u>	<u>Description</u>
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USE <i>ch</i>	Channel on which the interrupt is disabled. Channel range is ES00 to ES02.
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Prerequisites: Requires mainframe firmware revision 3.0 or greater.



Command Reference

DISABLE INTR

HP 44715A

Disables the specified counter channel from interrupting on an overflow or when a reading is available.

DISABLE INTR [USE *ch*]

<u>Parameter</u>	<u>Description</u>
USE <i>ch</i>	Channel on which the interrupt is disabled. Channel range depends on the hardware configuration.

DISABLE INTR

HP 44721A, HP 44722A

Disables the specified digital input channel from interrupting on an overflow or when the specified edge transition occurs.

DISABLE INTR [USE *ch*]

<u>Parameter</u>	<u>Description</u>
USE <i>ch</i>	Channel on which the interrupt is disabled. If channel ES00-ES15 (ES00-ES07 for 8-channel digital input) is specified, the channel is disabled from interrupting on an overflow. If channel ES16-ES31 (ES08-ES15) is specified, the channel will be disabled from interrupting when the specified edge occurs.

DISABLE INTR

HP 44723A

Disables interrupts for the specified channel. Types of interrupts which can be disabled are edge (channel range ES00-ES15 and ES93), pattern (ES90), input (ES91), and output (ES92).

Command Reference

DISABLE INTR [USE *ch*]

Parameters

Description

USE *ch*

Sets the applicable channel/function for interrupts to be disabled. The types of interrupts which can be **enabled** by ENABLE INTR and the action of DISABLE INTR for each type follow. At power-on or following a RST or RST *slot* command, all interrupts are disabled. All interrupts are also cleared except for output interrupts which are set.

USE <i>ch</i>	Type	Description
ES00-ES15	Edge	When enabled, edge interrupts occur when the edge programmed by EDGE is seen at the channel input. DISABLE INTR disables and clears edge interrupts.
ES90	Pattern	When enabled, pattern interrupts occur when user inputs match the pattern/mask condition set by PATTERN. DISABLE INTR disables and clears pattern interrupts.
ES91	Input	When enabled, input interrupts occur on a first rank input trigger and are cleared by a second rank input trigger.
		DISABLE INTR disables but does not clear input interrupts. Input interrupts are cleared only by a second rank input trigger, at power-on, or by a RST or RST <i>slot</i> command.

Command Reference

ES92	Output	When enabled, output interrupts occur on a second rank output trigger and are cleared by a write to the first rank output register (with CHWRITE, CHWRITEM, WRITE, or WRITEM).
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DISABLE INTR disables but does not clear output interrupts. Output interrupts are cleared only by a write to the first rank output register.

ES93	Edge	When enabled, edge interrupts occur when the edge programmed by EDGE is seen at any input channel. DISABLE INTR disables and clears edge interrupts.
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Prerequisites: Requires mainframe firmware revision 3.0 or greater.

DISABLE INTR

HP 44726A

Channel interrupt disable. DISABLE INTR prevents the DAC accessory from generating an interrupt after NSCAN cycles of the waveform have occurred. Executing DISABLE INTR will also clear an interrupt that has not yet been serviced.

DISABLE INTR [USE *ch*]

Command Reference

Parameters

Description

USE *ch*

Channel disabled from interrupting after NSCAN cycles of the waveform have occurred. The range for *ch* is ES00 to ES01. The default **USE *ch*** is channel 0. At power-on or following a reset, interrupt capability is disabled.

Prerequisites: Requires firmware revision 3.5 or greater.

DISABLE MULTI

Mainframe

Disables the HP 3852A's multitasking capability. A system reset also occurs on execution of the command.

DISABLE MULTI

Prerequisites: Multitasking is only available with firmware revision 3.0 or greater.

DISABLE PROBE

Mainframe

Disables the operating system probe (PROBE command).

DISABLE PROBE

Prerequisites: Requires firmware revision 3.5 or greater.

DISABLE/ENABLE DAC

HP 44726A

DISABLE DAC sets the output of the DAC OUT BNC to 0V. ENABLE DAC allows the DAC to output a value other than 0V.

Command Reference

DISABLE DAC [USE *ch*]

ENABLE DAC [USE *ch*]

<u>Parameters</u>	<u>Description</u>
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USE *ch*

Channel whose output is disabled and set to 0V, or the channel whose output is enabled. The default **USE *ch*** is channel 0. At power-on or following a reset, both channels are enabled.

Prerequisites: Requires firmware revision 3.5 or greater.

DISABLE/ENABLE LABELS

Mainframe

DISABLE LABELS prevents command headings (labels) and data from appearing in the display as commands are executed.

ENABLE LABELS stores command headings internally which are then displayed along with the data as the commands execute.

DISABLE LABELS

ENABLE LABELS

Prerequisites: Requires firmware revision 3.5 or greater.

DISP

Mainframe

Enables/disables the mainframe's display or displays a user-defined message.

Command Reference

DISP *mode*
or
[MSG] [*message*]

<u>Parameters</u>	<u>Description</u>
<i>mode</i>	ON - enables the display. Commands and results appear in the front panel display if MON ON or MON ALL is set. At power-on, display is ON. OFF - disables the display. Annunciators are suppressed and nothing is displayed; however, the keyboard continues to function normally. MSG - indicates a message follows.
<i>message</i>	Quoted string of characters to be displayed or numeric expression to be evaluated.

DIV

Math Function

Returns the integer portion of a number obtained by the division of one number by another.

dividend **DIV** *divisor*

<u>Parameters</u>	<u>Description</u>
<i>dividend</i>	Constant, variable, or numeric expression.
<i>divisor</i>	Constant, variable, or numeric expression.

Prerequisites: Requires firmware revision 3.5 or greater.

Command Reference

DONE?

HP 44714A

Queries the controller to determine if a move has completed and if so, under what conditions the move terminated.

DONE? [USE *ch*] [INTO *name*] or [*fmt*]

Parameters

Description

USE *ch*

Channel being queried. Channel range is ES00 to ES02.

INTO *name*

Data returned by the command is stored in mainframe array "name" previously allocated by DIM, REAL, INTEGER, or PACKED command.

fmt

Specifies the type of data format the data returned is to be in.

Prerequisites: Requires mainframe firmware revision 3.0 or greater.

DONE?

HP 44715A

Determines if the counter measurement is complete. By monitoring the measurement, other HP 3852A operations can occur rather than sending a command to retrieve the data and having to wait until the data is available.

Based on the status of the measurement, the following data is returned:

- 1 Measurement is complete
- 0 Measurement is not complete
- 1 Measurement has not been triggered

DONE? [USE *ch*] [INTO *name*] or [*fmt*]

Command Reference

<u>Parameters</u>	<u>Description</u>
USE <i>ch</i>	Counter channel on which the measurement is being performed.
INTO <i>name</i>	See Destination = Mainframe Memory.
<i>fmt</i>	See Data Formats. The default format for DONE? is IASC.

Prerequisites: Requires firmware revision 3.5 or greater.

EDGE *HP 44715A*

Sets the edge that the specified channel will count or the level on which the gate is enabled. Edge aborts any measurement in progress and discards any previous measurement results.

EDGE *trans* [*trans*] [**USE** *ch*]

<u>Parameters</u>	<u>Description</u>
<i>trans</i>	Transition on the A input. LH - low-to-high transitions (equivalent to HI). For directional counts with the B input set to LH, A input counts are up-counts when B input is high, down-counts when B input is low. At power-on, <i>trans</i> = LH. HL - high-to-low transitions (equivalent to LO). For directional counts with B input set to HL, A input counts are down-counts when B input is high, up-counts when B input is low. HI - high level (equivalent to LH). Used for functions that use inputs as gates or direction.

Command Reference

LO - low level (equivalent to HL).
Used for functions that use inputs
as gates or direction.

[*trans*] Transitions on the B input (see
above). Not used for single channel
functions. If [*trans*] is not set for
2-input functions, the transition
specified for *trans* is used for both
inputs.

USE *ch* Channel that will count the edge
transitions or gate other
measurements. Channel range
depends on the hardware con-
figuration.

EDGE

HP 44721A, HP 44722A

Sets the edge(s) (positive, negative, or both) which
the specified channel will count or sets the edge tran-
sition which will cause an interrupt. No loss of count
occurs.

EDGE *trans* [USE *ch*]

Parameters

Description

trans

Sets the edge(s) to be counted or the
transition which will cause an inter-
rupt. Power-on and reset *trans* =
OFF.

trans

Description

OFF

Neither edge.

LH

Count or interrupt on
low-to-high edge.

Command Reference

HL Count or interrupt on high-to-low edge.
BOTH* Count or interrupt on either edge.

* = Valid only for mainframe firmware revision 3.0 or greater.

USE *ch* Sets the channel(s) on which edge(s) are to be counted or detected.

ES00-ES15 [1]

Count specified edge(s) on channel specified by *USE ch*. When enabled, channel specified by *USE ch* interrupts on counter overflow (counter interrupt).

ES16-ES31 [2]

Detect specified edge(s) on channel specified by *USE ch*. When enabled, channel specified by *USE ch* interrupts when the specified edge occurs (event interrupt).

ES90 [3]

When enabled, event interrupt is generated when the specified edge(s) occur on any channel in range ES16-ES31 (ES08-ES15 for the HP 44722A).

[1] = ES00-ES07 for the HP 44722A.

[2] = ES08-ES15 for the HP 44722A.

[3] = Valid only for mainframe firmware revision 3.0 and greater.

Prerequisites: EDGE BOTH requires mainframe firmware revision 3.0 or greater plus an HP 44721A with serial number 2711A01765 or greater or an HP 44722A with serial number 2711A00178 or greater.

Command Reference

Also, USE *ch* = ES90 requires mainframe firmware revision 3.0 or greater.

EDGE

HP 44723.A

Sets the edge(s) (positive, negative, or both) of the specified input channel which will generate an edge interrupt when enabled.

EDGE *trans* [USE *ch*]

<u>Parameters</u>	<u>Description</u>
<i>trans</i>	Sets the edge transition that will cause an interrupt when enabled. Power-on and reset <i>trans</i> = OFF. OFF - Neither edge. LH - Interrupt on low-to-high edge. HL - Interrupt on high-to-low edge. BOTH - Interrupt on either edge.
USE <i>ch</i>	For <i>ch</i> = ES00-ES15, when enabled by ENABLE INTR, an edge interrupt occurs when the edge(s) specified by <i>trans</i> is seen at the input channel specified by <i>ch</i> . For <i>ch</i> = ES93, when enabled by ENABLE INTR, an edge interrupt occurs when the edge(s) specified by <i>trans</i> is seen at any input channel.

Prerequisites: Requires mainframe firmware revision 3.0 or greater.

EDIT KEY

Mainframe

Assigns softkey definitions to front panel keys 0 through 9.

Command Reference

EDIT KEY *key string*

<u>Parameters</u>	<u>Description</u>
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<i>key</i>	Number of the key (0 through 9) which is defined.
<i>string</i>	Softkey definition assigned. The maximum length of the string is 27 characters, not including the quotation marks which enclose the string.

Prerequisites: Requires firmware revision 3.5 or greater.

ELSE

See IF...END IF.

ENABLE

Mainframe

Enables event recognition and servicing.

ENABLE *event*

<u>Parameter</u>	<u>Description</u>
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<i>event</i>	Interrupt or exception (alarm, limits) which causes an interrupt that is serviced by the mainframe. INTR SYS - enables the HP 3852A to recognize an interrupt on an accessory channel or slot. At power-on INTR SYS is enabled. INTR [USE ch] - enables an accessory channel or slot to interrupt. At power-on, all channels and slots are disabled from interrupting.
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Command Reference

LMT - enables real-time limit exception testing. At power-on, LMT is disabled.

ALRM - enables the HP 3852A alarm to interrupt the mainframe or a controller. At power-on, ALRM is disabled.

LOGCHAN - enables measurement channel logging. At power-on, LOGCHAN is disabled.

ENABLE EOL SWAP

Mainframe

Enables end of command swapping. Thus, swapping occurs when the time-slice period expires and higher priority commands are allowed to execute immediately. The swap time from one task to another is approximately 550 usec.

ENABLE EOL SWAP

Prerequisites: ENABLE EOL SWAP is only used in the multitasking mode. Multitasking is available with firmware revision 3.0 or greater.

ENABLE INTR

HP 44701A, HP 44702A/B

Enables the specified voltmeter to generate an interrupt when a reading is available.

ENABLE INTR [USE *ch*]

<u>Parameter</u>	<u>Description</u>
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USE *ch*

Slot where voltmeter is installed.

Prerequisites: System interrupt capability must be enabled with ENABLE INTR SYS before a voltmeter interrupt is recognized. (Also see "Using Interrupts".)

Command Reference

ENABLE INTR

HP 44714A

Enable the specified channel to interrupt when a move or pulse train is complete.

ENABLE INTR [USE *ch*]

<u>Parameters</u>	<u>Description</u>
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USE <i>ch</i>	Channel on which the interrupt is enabled. Channel range is ES00 to ES02.
---------------	---

Prerequisites: Requires mainframe firmware revision 3.0 or greater. Also, system interrupt capability must be enabled with ENABLE INTR SYS before an interrupt is recognized. (Also see "Using Interrupts".)

ENABLE INTR

HP 44715A

Enable the specified counter channel to interrupt on an overflow or when a reading is available.

ENABLE INTR [USE *ch*]

<u>Parameter</u>	<u>Description</u>
------------------	--------------------

USE <i>ch</i>	Channel that is enabled to interrupt. Channel range depends on the hardware configuration.
---------------	--

Prerequisites: System interrupt capability must be enabled with ENABLE INTR SYS before a counter interrupt is recognized. (Also see "Using Interrupts".)

Command Reference

ENABLE INTR

HP 44721A, HP 44722A

Enables specified digital input channel(s) to interrupt on counter overflow or when specified edge transition occurs.

ENABLE INTR [USE *ch*]

<u>Parameters</u>	<u>Description</u>
-------------------	--------------------

USE *ch*

Specifies channel(s) to be enabled for counter or event interrupts.

ES00-ES15 [1]

Enables channel specified by USE *ch* to interrupt on counter overflow (counter interrupt).

ES16-ES31 [2]

Enables channel specified by USE *ch* to interrupt when the edge specified by EDGE occurs (event interrupt).

ES90 [3]

Enables event interrupt to be generated when the edge(s) specified by EDGE occurs on any channel in range ES16-ES31 (ES08-ES15 for the HP 44722A).

ES91 [3]

Enables counter interrupt to be generated when counter overflow occurs on any channel in range ES00-ES15 (ES00-ES07 for HP 44722A).

[1] = ES00-ES07 for the HP 44722A.

[2] = ES08-ES15 for the HP 44722A.

Command Reference

[3] = Valid only for mainframe firmware revision 3.0 or greater.

Prerequisites: ENABLE INTR USE ES90 or ES91 requires mainframe firmware revision 3.0 or greater. System interrupt capability must be enabled with ENABLE INTR SYS for a digital input interrupt to be recognized. (Also see "Using Interrupts".)

ENABLE INTR

HP 44723A

Enables interrupts for the specified channel. Types of interrupts enabled are edge (channel range ES00-ES15 and ES93), pattern (ES90), input (ES91), and output (ES92).

ENABLE INTR [USE *ch*]

Parameters

Description

USE *ch* Sets the applicable channel/function for interrupts to be enabled. At power-on or following a RST or RST *slot* command, all interrupts are disabled. All interrupts are also cleared, except output interrupts which are set.

USE <i>ch</i>	Type	Description
ES00-ES15	Edge	When enabled, edge interrupts occur when the edge programmed by EDGE is seen at the channel input.
ES90	Pattern	When enabled, pattern interrupts occur when user inputs match the pattern/mask condition set by PATTERN.

Command Reference

ES91	Input	When enabled, input interrupts occur on a first rank input trigger and are cleared by a second rank input trigger.
ES92	Output	When enabled, output interrupts occur on a second rank output trigger and are cleared by a write to the first rank output register (with CHWRITE, CHWRITEM, WRITE, or WRITEM).
ES93	Edge	When enabled, edge interrupts occur when the edge programmed by EDGE is seen at any input channel.

Prerequisites: Requires mainframe firmware revision 3.0 or greater.

ENABLE INTR

HP 44726A

Channel interrupt enable. ENABLE INTR allows the DAC accessory to generate an interrupt after NSCAN cycles of the waveform have occurred. Executing ENABLE INTR will also clear an interrupt which has not been serviced.

ENABLE INTR [USE *ch*]

<u>Parameters</u>	<u>Description</u>
USE <i>ch</i>	Channel which will interrupt after NSCAN cycles have occurred. The range for <i>ch</i> is ES00 to ES01. The default USE <i>ch</i> is channel 0.

Command Reference

Prerequisites: System interrupt capability must be enabled (ENABLE INTR SYS) before an interrupt will be recognized (see "Using Interrupts"). Requires firmware revision 3.5 or greater when used with the HP 44726A.

ENABLE MULTI *Mainframe*

Enables the HP 3852A's multitasking capability. A system reset also occurs on execution of the command.

ENABLE MULTI

Prerequisites: Multitasking is only available with firmware revision 3.0 or greater.

ENABLE/DISABLE INTR BNC *Mainframe*

Connects the backplane interrupt line to the CHANNEL CLOSED BNC. This enables backplane (accessory) interrupts to function as a trigger source for other accessories.

ENABLE INTR BNC

DISABLE INTR BNC

Prerequisites: Requires firmware revision 3.5 or greater and the 03852-66523 controller module.

ENABLE/DISABLE PWIDE *Mainframe*

Changes the width of the pacer pulse from 0.5 μ s to 5.0 μ s.

ENABLE PWIDE

DISABLE PWIDE

Command Reference

Prerequisites: Requires firmware revision 3.5 or greater and the 03852-66523 controller module.

END

Mainframe

Suppress or assert the End-or-Identify (EOI) signal concurrent with the last byte of data returned by an individual command. When EOI is suppressed and OUTBUF ON is set, the data returned by several commands can be entered from the mainframe's output buffer into the controller with a single ENTER statement.

END mode

<u>Parameter</u>	<u>Description</u>
<i>mode</i>	OFF - Suppresses EOI. ON - EOI is asserted with the last byte of data returned by the command. At power-on, mode is ON.

Prerequisites: The END command requires mainframe firmware revision 2.2 or greater.

END IF

See IF...END IF.

END WHILE

See WHILE...END WHILE

ENTER

HP 44788A

Used to input data from a device or file and assign the values entered to variables.

Command Reference

ENTER *@I/O path name* or *device selector*,
enter_items

<u>Parameters</u>	<u>Description</u>
<i>@I/O path name</i>	The name of the path assigned to a device or mass storage file.
<i>device selector</i>	The HP-IB select code (i.e. Snn) for the device the data is to be output to. S = slot, nn = device address.
<i>enter_items</i>	The variables that the items received will be entered into.

Prerequisites: Requires firmware revision 3.5 or greater.

ERR? *Mainframe*

Reads the error code stored in the mainframe's error buffer.

ERR? [*INTO name*] or [*fmt*]
or
ERROR? [*INTO name*] or [*fmt*]

<u>Parameters</u>	<u>Description</u>
<i>INTO name</i>	See Destination = Mainframe Memory.
<i>fmt</i>	See Data Formats. The default format for ERR? is IASC.

ERROR?

See ERR?

Command Reference

ERRSTR?

Mainframe

Reads the error code and error message stored in the mainframe's error buffer.

ERRSTR?

EXOR

Logical Operator

Returns a 0 or a 1 based on the logical exclusive-or of the arguments.

number EXOR number

<u>Parameters</u>	<u>Description</u>
-------------------	--------------------

number

Constant, variable, or numeric expression. If one argument specified is a non-zero value, a 1 is returned. If both arguments are 0, or both are non-zero, a 0 is returned.

Prerequisites: Requires firmware revision 3.5 or greater.

EXP

Math Function

Numeric expression evaluated as a command parameter. Raises the base e to the specified power.

EXP (*number*)

<u>Parameter</u>	<u>Description</u>
------------------	--------------------

number

Number or numeric expression. Range is -708.396418532264 to +709.7827128933838.

Command Reference



EXTEND?

Mainframe



Identifies the HP 3853A Extenders connected to the mainframe. The command returns seven numbers representing the numbers of the extenders connected to the mainframe.



EXTEND? [**INTO** *name*] or [*fmt*]



Parameters

Description

INTO *name*

See Destination = Mainframe Memory.



fmt

See Data Formats.

The default format for EXTEND? is IASC.



FASTDISP

Mainframe



Enables/disables the mainframe's fast display mode.

FASTDISP [*mode*]



Parameter

Description

mode

ON - fast display mode is enabled.
At power-on *mode* = ON. The default *mode* = ON.



OFF - fast display mode is disabled.



FASTOUT

Mainframe



Sets the fast output mode.

FASTOUT [*mode*]

Command Reference

<u>Parameter</u>	<u>Description</u>
<i>mode</i>	Sets the maximum output data rate. ON - maximum output data rate = 140 kbytes/sec for specific HP-IB configuration. The default <i>mode</i> is ON. OFF - maximum output data rate = 120 kbytes/sec for standard HP-IB configuration. At power-on, <i>mode</i> = OFF.

Prerequisites: The maximum output data rate with FASTOUT ON is achieved under the following HP-IB conditions:

- Power applied to all devices on the bus.
- < 50 pF capacitive loading at each device.
- ≤ 15 metres of HP-IB cable.
- At least one device load per metre of cable.

FILTER

HP 44726A

Switches the channel's anti-aliasing filter into the signal path of special function and arbitrary waveforms. Filtering increases the waveform's settling time from 12 μ s to approximately 30 μ s.

FILTER [*mode*] [USE *ch*]

<u>Parameters</u>	<u>Description</u>
<i>mode</i>	ON - switches the filter into the signal path. The default <i>mode</i> is ON. OFF - removes the filter from the signal path. The power-on <i>mode</i> is OFF.

Command Reference

USE *ch* Channel whose filter is switched into the signal path. The default **USE *ch*** is channel 0.

Prerequisites: Requires firmware revision 3.5 or greater.

FILTER *HP 44730A, HP 44732A, HP 44733A*

Adds a filter to the specified channel.

FILTER *function* [**USE** *ch*]

<u>Parameters</u>	<u>Description</u>
<i>function</i>	Adds a 4-pole Bessel filter to the specified channel. Power-on/reset <i>function</i> = OFF.

<i>function</i>	Description
OFF	Filter removed from channel.
ON	Filter added to channel.

USE *ch* Specifies channel to be used for **FILTER**. Channel number range is ES00 through ES03.

Prerequisites: Requires firmware revision 3.5 or greater and system must not be scanning with an HP 44702A/B when **FILTER** is executed.

FOR...NEXT *Mainframe*

Defines a loop that is repeated until the loop counter passes a specific value.

FOR *loop_counter* = *initial_value* **TO** *final_value* [**STEP** *step_size*]

program segment

Command Reference

NEXT *loop_counter*

<u>Parameters</u>	<u>Description</u>
<i>loop_counter</i>	Name of the numeric variable that acts as the loop counter.
<i>initial_value</i>	Numeric expression that is the beginning value of the loop counter.
<i>final_value</i>	Numeric expression that is the ending value of the loop counter.
<i>step_size</i>	Numeric expression that specifies the amount to increment or decrement the loop counter for each pass through the loop. The default <i>step size</i> = 1.

Prerequisites: The loop counter variable must have been previously defined. The FOR...NEXT construct can only be used within an HP 3852A subroutine.

FRACT

Math Function

Math function. Returns the fractional part of the value of the argument. For all X, $X = \text{INT}(X) + \text{FRACT}(X)$.

FRACT (*number*)

<u>Parameters</u>	<u>Description</u>
<i>number</i>	Number or numeric expression.

Prerequisites: The FRACT function is only available with firmware revision 3.0 or greater.

Command Reference

FUNC

HP 44701A, HP 44702A/B

Selects the specified voltmeter's function and range.

FUNC *function* [*range*] [**USE** *ch*]

<u>Parameters</u>	<u>Description</u>
<i>function</i>	Voltmeter measurement function. <u>HP 44701A</u> DCV DC voltage measurements (At power-on, <i>function</i> = DCV.) ACV AC voltage measurements OHMF 4-wire ohms measurements <u>HP 44702A/B</u> DCV DC voltage measurements (At power-on, <i>function</i> = DCV.) OHMF10K 4-wire ohms up to 10k Ω OHMF100K 4-wire ohms up to 100k Ω OHMF1M 4-wire ohms up to 1M Ω
<i>range</i>	Voltmeter measurement range. The <i>range</i> specified is the maximum expected signal amplitude or resistance you expect to measure. The voltmeter then selects the correct range. To select autorange, "AUTO" or 0 is specified for the range parameter. The power-on and default <i>range</i> is AUTO.
USE <i>ch</i>	Slot where voltmeter is installed.

Command Reference

FUNC

HP 44715A

Sets the function of the selected counter channel. FUNC resets totalizing functions to 0, aborts measurements in progress, and erases previous readings.

FUNC *function* [*tbase*] [**USE** *ch*]

<u>Parameters</u>	<u>Description</u>
<i>function</i>	Counter channel function. With the accessory configuration jumper set to TOTAL, 3-CH, or 4-Ch, the power-on function = TOTAL. TOTAL - Channel(s) configured to measure Total Counts. TOTALM - Channel(s) configured to measure Total Count Modulo. UDC - Channel(s) configured to measure Up/Down Counts. UDCM - Channel(s) configured to measure Up/Down Count Modulo. CD - Channel(s) configured to measure Counts with Direction. CDM - Channel(s) configured to measure Counts with Direction Modulo. RAT - Channel(s) configured to measure Ratio. PER - Channel(s) configured to measure Period. PERD - Channel(s) configured to measure Delayed Period. FREQ - Channels configured to measure Frequency.

Command Reference

tbase Period of the HP 44715A internal clock which is counted during the time it takes the number of periods of the input signal supplied by the user to occur (NPER). *tbase* values are 1 μ s, 100 μ s, 1 ms, and 10 ms. The power-on and default *tbase* is AUTO. *tbase* is valid for the PER and PERD functions only.

USE *ch* Channel on which the function is set. Channel range depends on the hardware configuration.

Prerequisites: Double-input functions (all functions except TOTAL and TOTALM) can only be programmed on channels configured for double inputs.

FUNC *HP 44730A, HP 44732A, HP 44733A*

Sets the function on the specified channel.

FUNC *function* [*gain*] [**USE** *ch*]

<u>Parameters</u>	<u>Description</u>
<i>function</i>	Set specified channel to one of the following functions. Power-on/reset <i>function</i> = AMPLIFY.
<i>function</i>	Description
AMPLIFY	Amplify with gain = 1,10,100.
SAMPLE	Sample input signal.
POSPEAK	Detect positive peak of input.
NEGPEAK	Detect negative peak of input.
CALHI	Set <i>ch</i> to measure input HI.
CALLO	Set <i>ch</i> to measure input LO.

Command Reference

gain Set channel gain to 1, 10, or 100. Range of *gain* is ≥ 0 to ≤ 100 . Values are rounded up to the next allowable value (1, 10, or 100). Default *gain* = 1.

USE *ch* Specifies channel to be used for FUNC. Channel number range is ES00 through ES03.

Prerequisites: Requires firmware revision 3.5 or greater and system must not be scanning with an HP 44702A/B when FUNC is executed.

GAIN *HP 44730A, HP 44732A, HP 44733A*

Sets the gain on the specified channel.

GAIN *gain* [USE *ch*]

<u>Parameters</u>	<u>Description</u>
<i>gain</i>	Set channel gain to 1, 10, or 100. Range of <i>gain</i> is ≥ 0 to ≤ 100 . Values are rounded up to the next allowable value (1, 10, or 100). Default <i>gain</i> = 1.
USE <i>ch</i>	Specifies channel to be used for GAIN. Channel number range is ES00 through ES03.

Prerequisites: Requires firmware revision 3.5 or greater and system must not be scanning with an HP 44702A/B when GAIN is executed.

GET *Mainframe*

Mainframe Group Execute Trigger. Causes a backplane trigger when the system trigger command (TRG) is set to TRG GET.

Command Reference

GET

Prerequisites: The system trigger command TRG must be set to TRG GET before a mainframe group execute trigger can occur.

HALT

HP 44714A

Specifies the conditions under which a stepper motor or a pulse train is to be brought to an abrupt stop.

HALT mode [USE *ch*]

<u>Parameters</u>	<u>Description</u>
<i>mode</i>	Specifies whether a high or low state initiates the halt, whether the HALTn input is disabled or enabled, and if an immediate halt is to be activated.
USE <i>ch</i>	Channel on which the halt will occur. Channel range is ES00 to ES02.

Prerequisites: Requires mainframe firmware revision 3.0 or greater. Also, a halt switch must be connected to the HALTn input to be monitored by the channel used.

HARDLIM

HP 44714A

Determines how the positive and negative hard limit inputs will operate.

HARDLIM PLIMn__sense [NLIMn__sense] [USE *ch*]

Command Reference

Parameters

Description

<i>PLIM</i> n__sense	Specifies whether the positive limit is recognized by a high or low state.
NLIM n__sense	Specifies whether the negative limit is recognized by a high or low state.
USE <i>ch</i>	Channel which contains the hard limit inputs. Channel range is ES00 to ES02.

Prerequisites: Requires mainframe firmware revision 3.0 or greater. Also, must have limit switch inputs connected to the PLIMn and NLIMn inputs.

ID?

Mainframe

Returns the identity of the accessories installed in the mainframe or extender.

ID? [*slot*]

Parameter

Description

<i>slot</i>	Slot where accessory is installed. If no slot is specified, HP 3852A is returned.
-------------	--

IDN?

Mainframe

Returns the identity of the system.

IDN?

IDN? returns the following sequence:

- Hewlett-Packard (company name)
- 3852A (model number)
- 0
- Firmware revision number (e.g. 2.2)

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Command Reference

IF...END IF

Mainframe

Conditional branching within an HP 3852A subroutine.

IF *expression* **THEN**

program segment

[**ELSE** program segment]

END IF

Parameters

Description

expression

Boolean expression that is evaluated as true if it is non-zero, false if it is zero. OR or AND can be combined with >, <, =, ≥, ≤, or <> to form boolean expressions.

Prerequisites: The IF...END IF construct can only be used within an HP 3852A subroutine.

INBUF

Mainframe

Enables/disables command input buffering and sets the size of the input buffer.

INBUF [*mode*] or [*size*]

Parameters

Description

mode

ON - enables the input buffer. When enabled, the buffer stores multiple commands sent over the HP-IB while executing the current command. The HP-IB is not held off. When the buffer is full, no new bytes are accepted until there is room in the buffer. The default *mode* is ON.

Command Reference

OFF - disables the input buffer. When disabled, the HP-IB is held off after the end of each command until the command has been executed (or stored if a subroutine entry). At power-on, *mode* is OFF.

size

Sets the size of the input buffer. The minimum size allowed is 5 bytes. The maximum size depends on the amount of mainframe memory available. Once a size has been entered, the mainframe must be reset to load the value into the operating system. Anytime power is cycled, the buffer size is set to 198 bytes.

Prerequisites: The *size* parameter is only available with firmware revision 3.0 or greater.

INDEX

Mainframe

Sets the starting location in an array where the next reading will be stored.

INDEX *name number*

<u>Parameters</u>	<u>Description</u>
<i>name</i>	Name of the array in which the index will be set.
<i>number</i>	Starting location (element) in the array where the next reading will be stored.

Command Reference

INDEX?

Mainframe

Reads the location of the index pointer in the specified array.

INDEX? *name* [**INTO** *name*] or [*fmt*]

<u>Parameters</u>	<u>Description</u>
<i>name</i>	Array whose index is read.
INTO <i>name</i>	See Destination = Mainframe Memory.
<i>fmt</i>	See Data Formats. The default format for INDEX? is LASC.

INITIAL

HP 44788A

Prepares mass storage media for use by the computer or HP-IB Controller. Purges any data on a disc when initialized.

INITIAL "*media specifier*"[,interleave factor[,format option]]

<u>Parameters</u>	<u>Description</u>
<i>media specifier</i>	The name of the mass storage device containing the directory.
<i>interleave factor</i>	Establishes the distance in physical records between consecutively numbered records.
<i>format option</i>	Allows selection of the format to which the disc is initialized.

Prerequisites: Requires firmware revision 3.5 or greater.

Command Reference

INT

Math Function

Math function. Returns the largest integer that is less than or equal to the number or expression specified.

INT (*number*)

<u>Parameters</u>	<u>Description</u>
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<i>number</i>	Number or numeric expression.
---------------	-------------------------------

Prerequisites: The INT function is only available with firmware revision 3.0 or greater.

INTEGER

Mainframe

Declares an INTEGER (IN16) variable or array in mainframe memory.

INTEGER *name* [(*max__index*)] [*name* [(*max__index*)]...]

<u>Parameters</u>	<u>Description</u>
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<i>name</i>	Name of the INTEGER variable or array.
-------------	--

(<i>max__index</i>)	Maximum index (# of elements) in the array. <i>name</i> without (<i>max__index</i>) specifies an INTEGER variable. Arrays declared by INTEGER have a starting index of 0 (parentheses are required).
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INTR?

Mainframe

Returns the address of the last channel whose interrupt was serviced. If no interrupt has been serviced since power-on or following a system reset, -1 is returned.

Command Reference

INTR? [*INTO name*] or [*fmt*]

<u>Parameters</u>	<u>Description</u>
<i>INTO name</i>	See Destination = Mainframe Memory.
<i>fmt</i>	See Data Formats. The default format for INTR? is IASC.

[LET] *Mainframe*

Assigns a value to a variable or array element. The value can be a number assigned directly, the result of a numeric expression, or the value copied from one variable or array element to another.

[LET] *variable or array(index) = number*

<u>Parameters</u>	<u>Description</u>
<i>variable</i>	Real or Integer variable.
<i>array (index)</i>	Specific element of a Real or Integer array.
<i>number</i>	Constant, variable, or numeric expression. Numeric expressions can be math functions, trigonometric operations, or binary functions. Expressions used with the [LET] command do not have to be enclosed in parentheses. [LET] can also copy the value of one variable to another or the value of one array element to another.

Prerequisites: The variable or array (element) must have been previously defined. [LET] cannot be used with PACKED arrays.

Command Reference

LGT

Math Function

Numeric expression evaluated as a command parameter. Returns the logarithm (base 10) of the specified number.

LGT (*number*)

<u>Parameter</u>	<u>Description</u>
<i>number</i>	Number or numeric expression that must evaluate to a range > 0 .

LMT (post processing)

Mainframe

Post processing limit testing. LMT compares readings stored in an array (*var*) to minimum and maximum limits (*min*, *max*). The indices of any reading out of limit are also stored (*index_store*).

LMT *min max index_store var*

<u>Parameters</u>	<u>Description</u>
<i>min</i>	REAL or INTEGER variable or array containing the lower limit(s).
<i>max</i>	REAL or INTEGER variable or array containing the upper limit(s).
<i>index_store</i>	REAL or INTEGER array that will store index numbers for readings out of the specified limits. The index numbers correspond to the index numbers of the stored readings.
<i>var</i>	Array containing the stored readings to be compared against the limits.

Command Reference

Prerequisites: The *min*, *max*, *index_store*, and *var* arrays or variables must have been previously declared.

LMT (real time)

Mainframe

Real time limit testing. LMT sets up readings taken to be compared to minimum and maximum limits stored in variables or arrays. The indices of any reading out of limits are then stored. A reading out of limit will set the LMT bit in the status register.

LMT *min max index_store*

<u>Parameters</u>	<u>Description</u>
<i>min</i>	REAL or INTEGER variable or array containing the lower limit(s).
<i>max</i>	REAL or INTEGER variable or array containing the upper limit(s).
<i>index_store</i>	REAL or INTEGER array that will store index numbers for readings out of the specified limits. The index numbers correspond to the order of the readings taken by each command returning data.

Prerequisites: The *min*, *max*, and *index_store* arrays or variables must have been previously declared. ENABLE LMT must be executed before checking will occur.

LOCAL

Mainframe

Restores front panel control of the mainframe. If control was restored by pressing the front panel LOCAL key, the LCL bit in the status register is set. The bit is not set if the command is sent over the HP-IB.

Command Reference

LOCAL

Prerequisites: In order to execute the LOCAL command, LOCK OFF must be sent over the HP-IB if the front panel has been disabled by LOCK ON. If the HP-IB is in the remote with lockout state (RWLS), front panel control must be re-established over the HP-IB (e.g. LOCAL 7 or LOCAL 709).

LOCK

Mainframe

Enables and disables the front panel keyboard.

LOCK [*mode*]

<u>Parameter</u>	<u>Description</u>
<i>mode</i>	Enables and disables the front panel keyboard. ON - disables the keyboard entirely. OFF - enables the keyboard. At power-on, <i>mode</i> is OFF. The default value for <i>mode</i> is also OFF.

LOG

Math Function

Numeric expression evaluated as a command parameter. Returns the natural logarithm (base e) of the specified number.

LOG (*number*)

<u>Parameter</u>	<u>Description</u>
<i>number</i>	Number or numeric expression that must evaluate to a range > 0 .

Command Reference

LOGCHAN

Mainframe

Designates the array in which channel numbers are stored as a result of the ENABLE LOGCHAN command. When using CONFMEAS or MEAS, multiplexer channels are logged. When using CHREAD or XRDGS, the voltmeter slot, or counter or digital input channel is logged.

LOGCHAN *var*

<u>Parameter</u>	<u>Description</u>
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var

Name of the REAL or INTEGER array that will store the channel numbers.

MAT

Array Operator

Array Operator. MAT enables you to initialize arrays and perform arithmetic operations with arrays or with arrays and numeric expressions.

MAT *array3* = (*expression*)

MAT *array3* = *array1* operator *array2*

MAT *array3* = (*expression*) operator *array2*

MAT *array3* = *array2* operator (*expression*)

<u>Parameters</u>	<u>Description</u>
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array1,array2,
array3

Real or Integer arrays on which the operation is performed. All arrays must be the same size.

(*expression*)

See Syntax Rule 4 under "Addressing Conventions".

Command Reference

operator Math operation performed on the arrays. Operators include +, -, *, /. The operation is performed on every array element, and the results are placed in the corresponding elements of the result array.

Prerequisites: Requires firmware revision 3.5 or greater. Only Real or Integer arrays can be used and the arrays must be the same size.

MEAS

HP 44701A, HP 44702A/B

Selects HP 44701A or HP 44702A/B voltmeter measurement function and then initiates a scan and measurement of specified channels.

MEAS *function1* *ch_list* [**GAIN** *corr*] [**NSCAN** *number*] [**USE** *ch*] [**INTO** *name*] or [*fmt*]

MEAS *function2* *ch_list* **REF** *ref_buf* [**GF** *factor*] [**GAIN** *corr*] [**NSCAN** *number*] [**USE** *ch*] [**INTO** *name*] or [*fmt*]

MEAS *function3* *ch_list* **REF** *ref_buf* [**GF** *factor*] **NU** *ratio* [**GAIN** *corr*] [**NSCAN** *number*] [**USE** *ch*] [**INTO** *name*] or [*fmt*]

Parameters

Description

<i>function</i>	HP 44701A or HP 44702A/B voltmeter measurement function. ACV applies only to an HP 44701A voltmeter. OHM10K, OHMF10K, OHM100K, OHMF100K, OHM1M, and OHMF1M apply only to the HP 44702A/B voltmeter. The strain functions (STRxx) apply only to strain measurements.
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Command Reference

<input type="checkbox"/>		
	<i>function1</i>	Measurement
<input type="checkbox"/>	ACV	AC voltage
<input type="checkbox"/>	DCV	DC voltage
	OHM	2-wire ohms
<input type="checkbox"/>	OHM10K	2-wire ohms up to 10 k Ω
<input type="checkbox"/>	OHM100K	2-wire ohms up to 100 k Ω
<input type="checkbox"/>	OHM1M	2-wire ohms up to 1 M Ω
	OHMF	4-wire ohms
<input type="checkbox"/>	OHMF10K	4-wire ohms up to 10 k Ω
<input type="checkbox"/>	OHMF100K	4-wire ohms up to 100 k Ω
<input type="checkbox"/>	OHM1M	4-wire ohms up to 1 M Ω
<input type="checkbox"/>	TEMPtype	Thermocouple temperature type = B, E, J, K, N14, N28, R, S, and T
<input type="checkbox"/>	REFT	Reference temperature (isothermal block)
<input type="checkbox"/>	THMtype	Thermistor (2-wire ohms) type = 2252, 5K, 10K
<input type="checkbox"/>	THMFtype	Thermistor (4-wire ohms) type = 2252, 5K, 10K
<input type="checkbox"/>	RTDtype	RTD (2-wire ohms) type = 85, 92
<input type="checkbox"/>	RTDFtype	RTD (4-wire ohms) type = 85, 92
<input type="checkbox"/>	STRVEX	Bridge excitation voltage
<input type="checkbox"/>	STRUN	Unstrained bridge output
	<i>function2</i>	Measurement
<input type="checkbox"/>	STRQ	¼ bridge strain
<input type="checkbox"/>	STRHB	Bending ½ bridge strain
<input type="checkbox"/>	STRFB	Bending full bridge strain
<input type="checkbox"/>	STRQTEN	Tension shunt
<input type="checkbox"/>	STRQCOMP	Compression shunt
<input type="checkbox"/>		

Command Reference

<i>function3</i>	Measurement
STRHP	½ bridge Poisson strain
STRFBP	Full bridge bending Poisson
STRFP	Full bridge Poisson strain
<i>ch_list</i>	Address of channel(s) to be measured.
REF <i>ref_buf</i>	Array or number containing the unstrained bridge output voltage (reference voltage) measurements for the corresponding channel list.
GF factor	Array or number containing or representing a gage factor. Default <i>GF factor</i> = 2.0. When a gage factor is specified with an exponent of -6 (e.g., GF 2.E-6), the result is returned in microstrain.
NU ratio	Array or number containing or representing a Poisson ratio (Poisson arrangements only).
GAIN corr	Real or Integer array or a number containing value(s) by which the measured readings are divided. The corrected values are stored in the mainframe or are sent to the output buffer and/or display in RASC format. Default <i>GAIN corr</i> = no correction.
NSCAN <i>number</i>	Number of scans to be made through the channel list. Default <i>NSCAN</i> = 1. <i>NSCAN</i> is only available with mainframe firmware revision 2.2 or greater. (<i>NSCAN number</i>)*(number of channels in channel list)*(<i>NRDGS number</i>) must result in 67,108,863 readings

Command Reference

or less. For an HP 44702A/B in Scanner mode and RDGS GPIO set, NSCAN *number* range = 1 to 2147483647.

USE *ch* Slot where the voltmeter is installed.

INTO *name* See Destination = Mainframe Memory.

fmt See Data Formats. The default format for CONFMEAS is RASC.

Prerequisites: Requires mainframe firmware revision 2.0 or greater for use with an HP 44717A, HP 44718A, HP 44719A, or HP 44720A or requires revision 3.5 or greater for use with an HP 44730A, HP 44732A, or HP 44733A. NSCAN is available for revision 2.2 or greater and GAIN is available for revision 3.5 or greater. The system must not be scanning with an HP 44702A/B voltmeter when CONFMEAS is executed.

MOD *Math Function*

Returns the remainder of a division.

dividend MOD divisor

<u>Parameters</u>	<u>Description</u>
<i>dividend</i>	Constant, variable, or numeric expression.
<i>divisor</i>	Constant, variable, or numeric expression.

Prerequisites: Requires firmware revision 3.5 or greater.

Command Reference

MON

Mainframe

Enables and disables the mainframe's monitoring mode.

MON [*ch*] or [*mode*]

or

MONITOR [*ch*] or [*mode*]

<u>Parameters</u>	<u>Description</u>
<i>ch</i>	Address of the channel to be monitored. The display is then dedicated to that channel from which numerical data only is returned.
<i>mode</i>	Enables and disables the monitor mode. ON or ALL - monitor mode enabled. All channels are monitored. Commands and data appear in the display when executed if DISP ON is set. At power-on, <i>mode</i> is ON. The default <i>mode</i> is also ON. OFF - monitor mode disabled. Commands and data are displayed if the commands are entered from the front panel and DISP ON is set. Neither commands or data are displayed if the command is entered over the HP-IB.

MONITOR

See MON.

Command Reference

MON MEAS

See MONMEAS.

MONMEAS

HP 44701A, HP 44702A/B

Sets the voltmeter measurement function then initiates the scan and measurement of the specified multiplexer channels. Repeated measurements are made on the channels in the list with SADV KEY used to advance the scan. Readings are sent to the mainframe display only. See "Useful Tables" for a list of the voltmeter parameters checked/changed by the MONMEAS command.

MONMEAS *function ch_list* [USE *ch*]

or

MON MEAS *function ch_list* [USE *ch*]

<u>Parameters</u>	<u>Description</u>
-------------------	--------------------

function

Voltmeter measurement function. See the MEAS commands. Note that thermocouple (TEMPtype) temperature measurements CANNOT be made using MONMEAS. STRVEX is the ONLY strain gage function that can be measured with MONMEAS.

ch_list

Address of the channel list to be monitored. See "Useful Tables" for the channel ranges of the various multiplexer accessories.

USE *ch*

Slot where voltmeter is installed.

Prerequisites: The HP 44701A or HP 44702A/B voltmeter should be previously configured with the CONF command. The STRVEX function requires mainframe firmware revision 2.0 or greater.

Command Reference

MOVE

HP 44714A

Specifies a distance to be moved and determines the number of pulses required for the move from data of the PROFILE and PSCALE commands.

MOVE *distance* [*mode*] [**NOWAIT**] [**USE** *ch*]

<u>Parameters</u>	<u>Description</u>
<i>distance</i>	Specifies the distance to be moved.
<i>mode</i>	Specifies whether the move is to be an absolute or a relative move. Default is relative.
NOWAIT	Frees the processor to go to other activities after a MOVE command is set-up.
USE <i>ch</i>	Channel on which the move will occur. Channel range is ES00 to ES02.

Prerequisites: Requires mainframe firmware revision 3.0 or greater.

MSI

HP 44788A

Specifies the system mass storage device.

MSI “[*media specifier*]”

<u>Parameters</u>	<u>Description</u>
<i>media specifier</i>	The name of the mass storage device containing the directory.

Prerequisites: Requires firmware revision 3.5 or greater.

Command Reference

NEXT

See FOR...NEXT.

NLOCKS

Mainframe

Specifies the number of locks that can be requested within a multitasking system.

NLOCKS *number*

<u>Parameters</u>	<u>Description</u>
-------------------	--------------------

number

Maximum number of locks that can be requested. The range for *number* is 0 to 10.

Prerequisites: Requires firmware revision 3.5 or greater.

NOT

Logical Operator

Returns a 1 if the specified argument equals 0. Otherwise, a 0 is returned.

NOT *number*

<u>Parameter</u>	<u>Description</u>
------------------	--------------------

number

Constant, variable, or numeric expression. If the argument specified has a value of zero, 1 is returned. Otherwise, 0 is returned.

Prerequisites: Requires firmware revision 3.5 or greater.

Command Reference

NP_{ER}

HP 44715A

Sets the number of periods over which an input is measured, or the value minus 1 at which a counting sequence resets to zero. The parameter set by NP_{ER} depends on the channel (and function) specified.

NP_{ER} *number* [USE *ch*]

Parameters

Description

number

Number of periods or value - 1 where the count sequence resets to zero. At power-on, *number* = 10 for all functions.

TOTALM, UDCM, CDM - NP_{ER}-1 is where the counting sequence resets to 0. NP_{ER} range is 2 to 65535.

RAT - ratio of A input counts to B input counts over NP_{ER} gated periods of the B input. NP_{ER} range is 1 to 65535.

PER - measures the average of NP_{ER} periods of the A input. NP_{ER} range is 1 to 65535.

PERD - single period measurement taken on the NP_{ER}th gated period of the A input. NP_{ER} range is 1 to 65534.

USE *ch*

Channel (and function) to use the NP_{ER} command. Channel range depends on the hardware configuration.

Prerequisites: NP_{ER} is not used with the frequency configuration.

Command Reference

NPLC

HP 44701A

Sets the number of power line cycles (integration time) during which the voltmeter samples the input signal.

NPLC *number* [USE *ch*]

Parameters

Description

number Number of power-line cycles of integration time. Must be a number between 0 to 16. Numbers other than those shown are rounded to acceptable values. At power-on, *number* = 1 based on a line frequency of 60 Hz.

Number	Int. Time		RESOL	NMR
	60 Hz	50 Hz		
0.0005	10 μ s	10 μ s	3½	0 dB
0.005	100 μ s	100 μ s	4½	0 dB
0.1	1.66 msec	2.0 msec	5½	0 dB
1	16.6 msec	20 msec	6½	60 dB
16	267 msec	320 msec	6½	60 dB

USE *ch* Slot where voltmeter is installed.

NRDGS

HP 44701A, HP 44702A/B

Sets the number of readings per trigger or the number of readings per channel.

NRDGS *number* [USE *ch*]

Command Reference

Parameters

Description

number

For the HP 44701A, *number* is the number of readings per trigger. The range for *number* is 1 to 65535. At power-on, *number* = 1.

For the HP 44702A/B in System mode, *number* is the number of readings per trigger. The range for *number* is 1 to 65535. At power-on, *number* = 1.

For the HP 44702A/B in the Scanner mode with TERM RIBBON set, *number* is the number of readings per channel. The range for *number* is $number \times (\# \text{ of channels} - 1)$ must be < 4095 .

When in the Scanner mode and TERM RIBBON is NOT set, *number* is interpreted by the MEAS command as the number of readings per channel. At power-on, *number* = 1.

USE *ch*

Slot where voltmeter is installed.

NSCAN

HP 44726A

Specifies the number of waveform cycles output from the DAC. A complete cycle is when the last amplitude point of the waveform is reached, regardless of the number of time base intervals the point is held.

NSCAN *number_of_cycles* [USE *ch*]

Command Reference

Parameters

Description

*number__
of__cycles*

Number of waveform cycles output from the DAC. Channel 0 can be programmed for 1 to 65,536 cycles, or for a continuous output by specifying CONT. Channel 1 can be programmed for 1 cycle, or for a continuous output by specifying CONT. The power-on setting for *number__of__cycles* is CONT.

USE *ch*

Channel programmed for the specified number of cycles. The default **USE *ch*** is channel 0.

Prerequisites: Requires firmware revision 3.5 or greater. For more than one cycle, TARM OFF or TARM AUTO must also be set.

NTASKS

Mainframe

Specifies the number of run tasks and the size of the program queue. Once specified, you must reset the mainframe or cycle power to load these parameters into the operating system.

NTASKS *number* [*size*]

Parameters

Description

number

Number of run task environments the system is to allow. The range for *number* is 0 to 8.

size

Size of the program queue in which subroutine names are held until they begin execution in a run task. The range for *size* is 0 to 20. If *size* is not specified, the size of the queue is set equal to the number of run tasks.

Command Reference

Prerequisites: NTASKS is only used in the multitasking mode. Multitasking is available with firmware revision 3.0 or greater.

NULL *HP 44730A, HP 44732A, HP 44733A*

Nulls offset voltage on the specified channel.

NULL [USE *ch*]

<u>Parameters</u>	<u>Description</u>
USE <i>ch</i>	Specifies channel to be used for NULL. Channel number range is ES00 through ES03.

Prerequisites: Requires firmware revision 3.5 or greater. System must not be scanning with an HP 44702A/B when NULL is executed.

OCOMP *HP 44701A*

Enables and disables the offset compensation function on the 30 through 30k ranges. Offset compensation can be used for both 2-wire and 4-wire measurements.

OCOMP [*mode*] [USE *ch*]

<u>Parameters</u>	<u>Description</u>
<i>mode</i>	Offset compensation control modes. ON - Offset compensation enabled. External offset voltage is measured after the ohms measurement then subtracted from the reading. The default setting for <i>mode</i> is ON.

Command Reference

OFF - Offset compensation disabled. The power-on setting for *mode* is OFF.

USE *ch* Slot where voltmeter is installed.

OFF *Mainframe*

Prevents a subroutine from being called following an interrupt or exception.

OFF *event*

<u>Parameter</u>	<u>Description</u>
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<i>event</i>	Interrupt or exception (alarm, limit) which calls an HP 3852A subroutine.
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INTR [USE *ch*] - prevents a subroutine from being called following an interrupt from an accessory channel.

LMT - prevents a subroutine from being called when a limit is exceeded.

ALRM - prevents a subroutine from being called when an alarm occurs.

ON *Mainframe*

Allows a subroutine to be called following an interrupt or exception.

ON *event* CALL *name*

Command Reference

Parameters

Description

event

Interrupt or exception (alarm, limit) which calls an HP 3852A subroutine.

INTR [USE ch] - allows a subroutine to be called following an interrupt from an accessory channel.

LMT - allows a subroutine to be called when a limit is exceeded.

ALRM - allows a subroutine to be called when an alarm occurs.

name

Name of the subroutine to be called.

Prerequisites: The *event* which causes the interrupt must be enabled by the ENABLE ALRM, ENABLE LMT, or ENABLE INTR command. ENABLE INTR SYS must be set in order for the mainframe to recognize an interrupt from an accessory (ENABLE INTR) channel.

ON ... RUN

Mainframe

Directs a subroutine to the specified run task when a backplane interrupt, alarm interrupt, or limit interrupt occurs.

ON event RUN task__number name

Parameters

Description

event

Interrupt (backplane, alarm, limit) which directs the specified subroutine to the specified run task.

INTR [USE ch] - Directs a subroutine to a run task when a backplane interrupt occurs on the USE channel specified.

Command Reference

ALRM - Directs a subroutine to a run task when an alarm occurs.

LMT - Directs a subroutine to a run task when a limit is exceeded during real-time limit testing.

task_number Run task to which the subroutine is directed when the interrupt occurs. The range for *task_number* is 0 to 7.

name Name of the subroutine directed to the run task.

Prerequisites: Requires firmware revision 3.5 or greater and the HP 3852A must be in the multitasking mode.

OPEN *HP 44705A, HP 44705H, HP 44706A, HP 44708A, HP 44708H, HP 44709A, HP 44710A, HP 44711A, HP 44712A, HP 44713A, HP 44717A, HP 44718A, HP 44719A, HP 44720A, HP 44730A, HP 44732A, HP 44733A*

Opens multiplexer channels. This command is intended for individual switch control. Tree switches are not automatically configured when performing measurements.

OPEN *ch_list*

<u>Parameters</u>	<u>Description</u>
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<i>ch_list</i>	Address of the channel list. See "Useful Tables" for channel ranges of the various multiplexer accessories.
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Command Reference

Prerequisites: The HP 44717A, HP 44718A, HP 44719A, and HP 44720A accessories require firmware revision 2.0 or greater. The HP 44730A, HP 44732A, and HP 44733A accessories require firmware revision 3.5 or greater.

OPEN

*HP 44724A, HP 44725A,
HP 44728A, HP 44729A*

Opens digital output and actuator channels.

OPEN *ch_list*

<u>Parameter</u>	<u>Description</u>
<i>ch_list</i>	Address of the channel list. Channels are opened in the order listed. Channel range = ES00-ES15 for 16-channel accessories, ES00-ES07 for 8-channel accessories.

OR

Logical Operator

Returns a 1 (TRUE) or a 0 (FALSE) depending on the logical inclusive-OR of the numbers.

number OR number

<u>Parameters</u>	<u>Description</u>
<i>number</i>	Constant, variable, or numeric expression. If it evaluates to a non-zero number, 1 is returned. If it evaluates to zero, 0 is returned.

Prerequisites: The OR statement is only used in an IF...END IF or in a WHILE...END WHILE construct which, in turn, must be included in an HP 3852A subroutine.

Command Reference

OUTBUF

Mainframe

Specifies whether new data will overwrite, or be appended to the data currently in the buffer. OUTBUF also sets the size of the buffer.

OUTBUF [*mode*] or [*size*]

<u>Parameters</u>	<u>Description</u>
<i>mode</i>	Overwrite, or append data to the data in the output buffer. ON - append data. Data sent to the buffer is appended to the data currently in the buffer. The default <i>mode</i> is ON. OFF - overwrite data. Data sent to the buffer overwrites data in the buffer from the previous command. At power-on, <i>mode</i> is OFF.
<i>size</i>	Sets the size of the output buffer. The minimum size allowed is 5 bytes and the maximum size depends on the amount of mainframe memory available. Once a size has been entered, the mainframe must be reset to load the value into the operating system. Anytime power is cycled, the buffer size is set to 1029 bytes.

Prerequisites: The size parameter is only available with mainframe firmware revision 3.0 or greater.

OUTPUT

HP 44788A

Outputs items to the specified destination.

Command Reference

OUTPUT *destination output_items* [,NOEOL]

<u>Parameters</u>	<u>Description</u>
<i>destination</i>	Can be either @I/O path name or device selector.
<i>@I/O path name</i>	The name of the path assigned to a device or mass storage file.
<i>device selector</i>	The HP-IB select code (i.e. Snn) for the device the data is to be output to. S = slot, nn = device address.
<i>output_items</i>	Text or variables that you wish to output to a device.
NOEOL	No end of line.

Prerequisites: Requires firmware revision 3.5 or greater.

PACER

Mainframe

Sets the repetition period and number of pacer pulses output from the PACER OUT BNC connector.

PACER *period* [*count*]

<u>Parameters</u>	<u>Description</u>
<i>period</i>	Repetition period of multiple pacing pulses in seconds. The range for <i>period</i> is 1 μ sec to 4.19430375 seconds. The value entered is rounded to 250 nsec steps. At power-on, <i>period</i> = 1 μ sec.

Command Reference

count Number of output pulses to occur following a pacer trigger (PTRIG). The default and power-on *count* is a continuous train of pulses. *count* = 0 will stop the pacer. *count* range is 0 to 65535.

PACKED

Mainframe

Declares a PACKEd array in mainframe memory. PACKED declares arrays only.

PACKED *name (max__index) [name (max__index)...]*

Parameters

Description

<i>name</i>	Name of the PACKED array.
<i>(max__index)</i>	Number of bytes required to store data in the desired packed format. <i>max__index</i> is determined by multiplying the bytes per reading for the packed format you are going to receive, times the maximum number of readings you plan to take. PACKED arrays have a starting index of 0.

PATTERN

HP 44723A

Specifies the input pattern and mask which will generate a pattern interrupt when enabled.

PATTERN [*mode*] *pattern [mask] [USE ch]*

Command Reference

<u>Parameters</u>	<u>Description</u>
<i>mode</i>	<p>Sets the pattern interrupt mode. Valid modes are EQU (power-on, reset, and default) and NEQ. When enabled, <i>mode</i> = EQU generates a pattern interrupt when the input channel bit pattern for the channels specified by <i>mask</i> is the same as the bit pattern specified by <i>pattern</i>.</p> <p>When enabled, <i>mode</i> = NEQ generates a pattern interrupt when the input channel bit pattern for the channels specified by <i>mask</i> is not the same as the bit pattern specified by <i>pattern</i>.</p>
<i>pattern</i>	<p>Sets the bit pattern required to generate a pattern interrupt when enabled. Power-on and reset <i>pattern</i> = 0.</p>
<i>mask</i>	<p>Sets the mask for pattern interrupts. A 1 bit in the <i>mask</i> includes the corresponding channel in the <i>pattern</i>, while a 0 bit omits the channel. Power-on and reset <i>mask</i> = 0. Default <i>mask</i> = -1 (all channels included).</p>
USE <i>ch</i>	<p>For <i>ch</i> = ES90, sets the HP 44723A in the slot specified by ES for pattern interrupt.</p>

Prerequisites: Requires mainframe firmware revision 3.0 or greater.

Command Reference

PAUSE

Mainframe

Pauses HP 3852A subroutine execution.

PAUSE [*target*]

<u>Parameters</u>	<u>Description</u>
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target

Number of the run task containing the subroutine to be paused. The range for *target* is 0 to 7. If *target* is not specified, the subroutine in which the PAUSE command was executed is paused.

Prerequisites: If *target* is not specified, the PAUSE command must be executed inside a subroutine. In the power-on mode or in the front panel, HP-IB, and interrupt tasks of the multitasking mode, PAUSE without *target* cannot be located in a nested subroutine or in a subroutine called more than once. PAUSE without *target* can be located in a nested run task subroutine. The *target* parameter and multitasking are available with firmware revision 3.0 or greater.

PDELAY

Mainframe

Sets the delay between the pacer trigger (PTRIG command) and the first pacer pulse.

PDELAY *trigger__delay*

Command Reference

<u>Parameter</u>	<u>Description</u>
<i>trigger__delay</i>	Time in seconds between the trigger and the output of the first pacer pulse. The <i>trigger__delay</i> range is 500 nsec to 4.19430375 seconds. The values entered are rounded to 250 nsec steps. At power-on, <i>trigger__delay</i> is 500 nsec.

PERC

HP 44702A/B

Sets the trigger threshold level to the specified percentage of the voltmeter's full scale range.

PERC *threshold* [USE *ch*]

<u>Parameters</u>	<u>Description</u>
<i>threshold</i>	Input threshold value as a percentage of the voltmeter full scale range. <i>threshold</i> must be a number between -128 and +127. Resolution is 1%. At power-on, <i>threshold</i> = 0.
USE <i>ch</i>	Slot where voltmeter is installed.

Prerequisites: The threshold trigger mode must be enabled (see the SCTRIG, STTRIG, and TRIG commands). SCTRIG must be set to HOLD before setting PERC if the voltmeter is in the Scanner mode.

POS

HP 44714A

Loads a position value, in units specified by the PSCALE command, in the internal position counter.

POS *pos__value* [USE *ch*]

Command Reference

<u>Parameters</u>	<u>Description</u>
<i>pos__value</i>	The position value to be loaded into the internal counter.
USE <i>ch</i>	Channel to which the position value is loaded. Channel range is ES00 to ES02.

Prerequisites: Requires mainframe firmware revision 3.0 or greater.

POS? *HP 44714A*

Requests the current position value present in the internal position counter.

POS? [**USE** *ch*] [**INTO** *name*] or [*fmt*]

<u>Parameters</u>	<u>Description</u>
USE <i>ch</i>	Channel queried for position. Channel range is ES00 to ES02.
INTO <i>name</i>	Data returned by the command is stored in mainframe array "name" previously allocated by DIM, REAL, INTEGER, or PACKED command.
<i>fmt</i>	Specifies the type of data format the data returned is to be in. The default format is IASC.

Prerequisites: Requires mainframe firmware revision 3.0 or greater.

Command Reference

POSTSCAN

HP 44702A/B

Sets the number of passes the voltmeter will make through its scan list after a stop trigger is accepted. POSTSCAN is used only when the voltmeter is in the Scanner mode.

POSTSCAN *number* [USE *ch*]

Parameters

Description

number

Number of passes through the scan list that will be made after a stop trigger is received. *number* range is 0 to 65535. At power-on, *number* = 0.

USE *ch*

Slot where voltmeter is installed.

Prerequisites: SCTRIG must be set to HOLD before POSTSCAN is executed.

POWEROFF

Mainframe

Returns the Julian date and time of day in seconds of the most recent mainframe power down.

POWEROFF [INTO *name*] or [*fmt*]

Parameters

Description

INTO *name*

See Destination = Mainframe Memory.

fmt

See Data Formats.

The default format for POWEROFF is DASC.

Command Reference

PRESCAN

HP 44702A/B

Sets the minimum number of passes the voltmeter will make through its scan list before a stop trigger is accepted. PRESCAN is used only when the voltmeter is in the Scanner mode.

PRESCAN *number* [USE *ch*]

<u>Parameters</u>	<u>Description</u>
<i>number</i>	Number of passes through the scan list that will be made before a stop trigger is accepted. <i>number</i> range is 0 to 65535. At power-on, <i>number</i> = 1.
USE <i>ch</i>	Slot where voltmeter is installed.

Prerequisites: SCTRIG must be set to HOLD before PRESCAN is executed.

PRINT

HP 44788A

Sends items to the PRINTER IS device.

PRINT *output items* [NOEOL]

<u>Parameters</u>	<u>Description</u>
<i>output items</i>	Items to be printed.
NOEOL	No end of line.

Prerequisites: Requires firmware revision 3.5 or greater.

Command Reference

PRINTER IS

HP 44788A

Specifies the system printing device.

PRINTER IS *device selector*

Parameters

Description

device selector The designation of the printing device to be used. A numeric expression rounded to an integer.

Prerequisites: Requires firmware revision 3.5 or greater.

PROBE/ENABLE PROBE

Mainframe

Traces the swapping of tasks during execution of a program, and reports the status of the active task at the time of the swap. PROBE designates the arrays which will store the data returned by the probe. ENABLE PROBE activates the probe.

PROBE *prev__stat new__task swap__time*

ENABLE PROBE

Parameters

Description

prev__stat Array in which the status of the task from which the swap occurred is stored. The status is represented by the following seven bit code:

BIT	VALUE	STATUS
0	1	Task has been created.
1	2	Task has been activated and is running.
2	4	Task has been suspended (SUSPEND or SUSPEND UNTIL).

Command Reference

3	8	Error occurred within the task.
4	16	Task has been paused (PAUSE command).
5	32	Task has been suspended (WAITFOR SIGNAL).
6	64	Task has been suspended pending the release of a lock.

The *prev__stat* array must be an Integer array and should be the same size as the *new__task* and *swap__time* arrays.

new__task Array which stores the number of the task as it is swapped to. For the probe, the tasks are numbered as follows:

NUMBER	TASK
0 through 7	Run tasks 0 through 7.
-2	Keyboard task.
-3	HPIB task.
-4	Interrupt task.
-5	Instrument ready.
-1	Device clear.

The *new__task* array must also be an Integer array and should be the same size as the *prev__stat* and *swap__time* arrays.

swap__time Array which stores the reading of the mainframe's clock at the time a swap occurs. The *swap__time* array must be a Real array and should be the same size as the *prev__stat* and *new__task* arrays.

Prerequisites: Requires firmware revision 3.5 or greater. For revisions 3.5 and 3.51, executing PROBE activates the probe, as ENABLE PROBE is not a valid command.

Command Reference

PROFILE

HP 44714A

Defines a trapezoidal motion profile that defines the frequency range, acceleration/deceleration rate, and pulse width of pulses generated by the MOVE and SUSTAIN commands and the deceleration and stopping of a motor with a SOFTLIM command.

PROFILE *mode min max slope dual* [USE *ch*]

<u>Parameters</u>	<u>Description</u>
<i>mode</i>	Specifies whether the profile is a frequency profile or a pulse width profile by declaring FREQ or WIDTH .
<i>min</i>	Specifies minimum frequency/velocity or pulse width.
<i>max</i>	Specifies maximum frequency/velocity or pulse width.
<i>slope</i>	Specifies the rate of change from one frequency/velocity or pulse width to another.
<i>dual</i>	Specifies the pulse width in FREQ mode or frequency in WIDTH mode.
USE <i>ch</i>	Specifies the channel the motion profile is set up for. Channel range is ES00 to ES02.

Prerequisites: Requires mainframe firmware revision 3.0 or greater.

Command Reference

PSCALE

HP 44714A

Specifies the distance of motion that one step of the motor causes.

PSCALE *scale_factor* [**USE** *ch*]

<u>Parameters</u>	<u>Description</u>
-------------------	--------------------

<i>scale_factor</i>	The number that specifies the distance moved by one step of the motor.
---------------------	--

USE <i>ch</i>	Specifies the channel that the scale factor applies to. Channel range ES00 to ES02.
----------------------	---

Prerequisites: Requires mainframe firmware revision 3.0 or greater.

PTRIG

Mainframe

Sets the trigger source which initiates the output of pacer pulses. Any ongoing (continuous) pacer pulse output is halted.

PTRIG [*source*]

<u>Parameter</u>	<u>Description</u>
------------------	--------------------

<i>source</i>	Trigger source which starts a group of output pulses.
---------------	---

EXT - pacer trigger source is the PACER TRIGGER IN BNC.

SGL - internal trigger is issued at the time of command execution. The default *source* is SGL.

Command Reference

HOLD - holds pacer triggering off. Disables the PACER TRIGGER IN BNC and stops any continuing pacer pulses. At power-on, *source* is HOLD.

PULSE

HP 44714A

Sets which outputs the pulses appear at and whether the pulses are positive going or negative going.

PULSE *mode* **PSTP***n_sense* [**NDIR***n_sense*] [**USE** *ch*]

Parameters

Description

mode
(SD or SS)

SD = Step/Direction. Pulses appear on the PSTPn output while the NDIRn output controls direction.

SS = Step/Step. Pulses for motion in one direction appear on the PSTPn output while pulses for motion in the opposite direction appear on the NDIRn output.

PSTP
n_sense

HI or LH In idle state, PSTPn output is low. Pulses have leading edge low-to-high.

LO or HL In idle state, PSTPn output is high. Pulses have leading edge high-to-low.

NDIR
n_sense

Same as PSTPn_sense.

Command Reference

USE *ch* Specifies the channel the pulse set-up applies to. Channel range is ES00 to ES02.

Prerequisites: Requires mainframe firmware revision 3.0 or greater.

PURGE *HP 44788A*

Deletes a file entry from the directory of the mass storage media.

PURGE "*file specifier*"

<u>Parameters</u>	<u>Description</u>
-------------------	--------------------

<i>file specifier</i>	The name of the file to be purged with disc address.
-----------------------	--

Prerequisites: Requires firmware revision 3.5 or greater.

QINDEX *HP 44714A*

Specifies how the quadrature counter is to be indexed (counter reset and enables the counter to count).

QINDEX *mode* [**USE *ch***]

<u>Parameters</u>	<u>Description</u>
-------------------	--------------------

<i>mode</i>	OFF - Counter ignores the QI input; no reset of counter occurs.
-------------	---

Command Reference

ONCE - Causes the counter to be immediately reset and begin counting at the next index pulse generated by the encoder. Successive index pulses are ignored.

SGL - Causes the quadrature counter to be reset and immediately begin counting. QINDEX then goes to the OFF mode.

USE *ch* Specifies the channel to be indexed. Channel range is ES00 to ES02.

Prerequisites: Requires mainframe firmware revision 3.0 or greater. Also, must have an optical encoder with index pulse capability connected to the QI inputs of the HP 44714A if ONCE parameter is to be used.

QPOS? *HP 44714A*

Requests the current position value present in the quadrature counter.

QPOS? [**USE *ch***] [**INTO *name***] or [***fml***]

<u>Parameters</u>	<u>Description</u>
USE <i>ch</i>	Specifies the channel to be queried. Channel range is ES00 to ES02.
INTO <i>name</i>	Data returned by the command is stored in mainframe array "name" previously allocated by DIM, REAL, INTEGER, or PACKED command.

Command Reference

fmt Specifies the type of data format the data returned is to be in. The default format is IASC.

Prerequisites: Requires mainframe firmware revision 3.0 or greater.

QSCALE HP 44714A

Specifies the distance of motion that one quadrature count corresponds to.

QSCALE *qfactor* [**USE** *ch*]

<u>Parameters</u>	<u>Description</u>
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<i>qfactor</i>	The number that specifies the distance moved for one quadrature count.
----------------	--

USE <i>ch</i>	Specifies the channel to be scaled by <i>qfactor</i> . Channel range is ES00 to ES02.
----------------------	---

Prerequisites: Requires mainframe firmware revision 3.0 or greater. Also, must have an optical encoder connected to the QA, QB, and QI inputs of the HP 44714A.

RANGE HP 44701A, HP 44702A/B

Sets the voltmeter's measurement range or the autorange mode.

RANGE [*range*] [**USE** *ch*]

Command Reference

Parameters

Description

range

Selects a measurement range or the autorange mode. A measurement range is selected by specifying the maximum expected signal amplitude or maximum expected resistance. The voltmeter then selects the correct range.

Autorange is selected by entering the word **AUTO** or the value 0 for *range*. The power-on and default *range* is **AUTO**.

USE *ch*

Slot where voltmeter is installed.

Prerequisites: If the HP 44702A/B is in the Scanner mode, **SCTRIG** must be set to **HOLD** before **RANGE** is executed.

RDGS

HP 44702A/B

Specifies the mainframe or the voltmeter's GPIO port as the destination for measurement data and interrupt signals returned by the voltmeter.

RDGS *dest* [**USE** *ch*]

Parameters

Description

dest

Reading destination.

SYS - readings and interrupts are sent to the mainframe. At power-on, *dest* = **SYS**.

GPIO - readings and interrupts are sent to the voltmeter's GPIO port:

USE *ch*

Slot where voltmeter is installed.

Command Reference

Prerequisites: If the voltmeter is in the Scanner mode, SCTRIG must be set to HOLD before setting RDGS. Because RDGS disables voltmeter interrupts, RDGS should be set before the interrupt is enabled.

RDGSMODE HP 44702A/B

Specifies the voltmeter's reading storage mode and when an interrupt will occur based on the availability of data.

RDGSMODE *mode* [USE *ch*]

Parameters

mode

Description

Specifies when data from the voltmeter can be read by the main-frame. This also specifies when an interrupt will occur and whether or not new readings will overwrite readings currently in the voltmeter's buffer.

DAV - data can be read from the voltmeter when any reading is in the buffer. Data is not overwritten as the scan is aborted when the buffer is full. An interrupt occurs when data is available. At power-on, *mode* is DAV.

BURST - data can be read from the voltmeter when the scan sequence completes or when the buffer has room for only 4096 more readings. Data is not overwritten as the scan is aborted when the buffer is full. An interrupt occurs when the scan sequence completes or when the buffer has room for only 4096 more readings.

Command Reference

END - data can be read from the voltmeter when any reading is in the buffer. Data is not overwritten as the scan is aborted when the buffer is full. An interrupt occurs at the end of the scan sequence.

COMPLETE - data can be read from the voltmeter when the scan sequence completes. Data will be overwritten. Buffer content consists of the data acquired by the number of PRESCANS immediately preceding the stop trigger plus the number of POSTSCANS immediately after. An interrupt occurs at the end of the scan sequence.

USE *ch* Slot where voltmeter is installed.

Prerequisites: If the voltmeter is in the Scanner mode, SCTRIG must be set to HOLD before setting RDGSMODE. Since setting RDGSMODE disables a voltmeter interrupt, RDGSMODE should be set before the interrupt is enabled.

RDGSMODE

HP 44723A

Selects the mode for the READ, READM, WRITE, and WRITEM commands.

RDGSMODE *mode* [USE *ch*]

<u>Parameters</u>	<u>Description</u>
<i>mode</i>	Selects the mode for READ/READM and WRITE/WRITEM. Valid <i>mode</i> = DAV or IMMED (power-on/reset). Specifying any input channel (ES00 - ES15)

Command Reference

sets the mode for READ and READM. Specifying any output channel (ES16 - ES31) sets the mode for WRITE and WRITEM. (RDGSMODE does not affect CHREAD, CHREADM, CHWRITE, or CHWRITEM).

- READ/READM mode:

For USE *ch* = ES00-ES15, RDGSMODE sets the mode for the READ and READM commands. With RDGSMODE IMMED, READ/READM always immediately reads the contents of the second rank input register. With RDGSMODE DAV, READ waits until new data is stored in the first rank input register and then reads the second rank input register.

- WRITE/WRITEM mode:

For USE *ch* = ES16-ES31, RDGSMODE sets the mode for the WRITE and WRITEM commands. With RDGSMODE IMMED, WRITE/WRITEM always immediately writes data to the first rank output register. With RDGSMODE DAV, if the last data written to the first rank output register has not been transferred to the second rank output register, WRITE/WRITEM waits for a second rank output trigger before writing new data.

Command Reference

USE *ch* For *ch* = ES00-ES15, RDGSMODE sets the mode for READ/READM. For *ch* = ES16-ES31, RDGSMODE sets the mode for WRITE/WRITEM.

Prerequisites: Requires mainframe firmware revision 3.0 or greater.

READ *HP 44721A, HP 44722A*

Reads the state of the digital input channels in the slot specified a specified number of times.

READ *slot* [*INTO name*] or [*fmt*]

or

READ *slot* [*number*] [*INTO name*] or [*fmt*]

<u>Parameters</u>	<u>Description</u>
<i>slot</i>	Slot where accessory is installed.
<i>number</i>	Number of times the slot specified by slot is read. Default <i>number</i> = 1. The <i>number</i> parameter is valid only for mainframe firmware revision 3.0 and greater.
<i>INTO name</i>	See Destination = Mainframe Memory.
<i>fmt</i>	See Data Formats. The default format for READ is IASC.

Prerequisites: The [*number*] parameter is valid only for mainframe firmware revision 3.0 and greater.

Command Reference

READ HP 44723A

Returns the contents of the second rank input register a specified number of times.

READ *slot* [*number*] [**INTO** *name*] or [*fmt*]

<u>Parameters</u>	<u>Description</u>
<i>slot</i>	Address of slot.
<i>number</i>	Specifies the number of times the second rank input register is read. Default <i>number</i> = 1.
INTO <i>name</i>	See Destination = Mainframe Memory.
<i>fmt</i>	See Data Formats. The default format for READ is IASC.

Prerequisites: Requires mainframe firmware revision 3.0 or greater.

READ HP 44724A, HP 44725A, HP 44728A, HP 44729A

Reads the state of the digital output and actuator channels in the slot specified a specified number of times.

READ *slot* [**INTO** *name*] or [*fmt*]

or

READ *slot* [*number*] [**INTO** *name*] or [*fmt*]

<u>Parameters</u>	<u>Description</u>
<i>slot</i>	Slot where accessory is installed.
<i>number</i>	Number of times the slot specified by slot is read. Default <i>number</i> = 1. The <i>number</i> parameter is valid

Command Reference

only for mainframe firmware revision 3.0 and greater.

INTO name See Destination = Mainframe Memory.

fmt See Data Formats. The default format for READ is IASC.

Prerequisites: The *[number]* parameter is valid only for mainframe firmware revision 3.0 and greater.

READM

HP 44721A, HP 44722A

Reads the state of the digital input channels in the slot(s) specified and returns the decimal equivalent of channel bit pattern(s).

READM *slot_list* [**INTO name**] or [*fmt*]

Parameters

Description

slot_list Slot(s) where accessory is installed.

INTO name See Destination = Mainframe Memory.

fmt See Data Formats. The default format for READM is IASC.

Prerequisites: Requires mainframe firmware revision 3.0 or greater.

READM

HP 44723A

Returns the contents of the second rank input register(s) for all HP 44723A accessories in specified slot(s).

READM *slot_list* [**INTO name**] or [*fmt*]

Command Reference

<u>Parameters</u>	<u>Description</u>
<i>slot__list</i>	Address of slot(s) to be read.
INTO <i>name</i>	See Destination = Mainframe Memory.
<i>fmt</i>	See Data Formats. The default format for READM is IASC.

Prerequisites: Requires mainframe firmware revision 3.0 or greater.

REAL *Mainframe*

Declares a REAL (RL64) variable or array in mainframe memory.

REAL *name* [(max__index)] [*name* [(max__index)]...]

<u>Parameters</u>	<u>Description</u>
<i>name</i>	Name of the REAL variable or array.
<i>max__index</i>	Maximum index (# of elements) in the array. <i>name</i> without (<i>max__index</i>) specifies a REAL variable. Arrays declared by REAL have a starting index of 0 (parentheses are required).

REQUEST/RELEASE *Mainframe*

Dedicates resources (e.g. voltmeters, arrays, etc.) to the task which requests a lock. Other tasks which request the same lock (i.e. resources) must wait until the lock is released.

Command Reference

REQUEST *number*

RELEASE *number*

<u>Parameters</u>	<u>Description</u>
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number

Number of the lock which is requested or released. Up to 10 locks can exist. The range for *number* is 0 to 9.

Prerequisites: Requires firmware revision 3.5 or greater and the HP 3852A must be in the multitasking mode. Also, the number of locks to be requested must have been made available by the NLOCKS command.

RESET

See RST.

RESET HARD

See RST HARD

ROTATE

Binary Function

Binary function. Returns an integer which equals the value obtained by rotating the 16-bit binary representation of the argument the number of bit positions specified. As the bits rotate, they wraparound. The ROTATE function does not change the original value of the argument.

ROTATE (*number bit__displacement*)

Command Reference

Parameters

Description

number

Number or numeric expression that must evaluate within the range - 32768 to + 32767.

*bit__
displacement*

Number or numeric expression that must evaluate within the range - 32768 to + 32767. The recommended range is - 15 to + 15.

Prerequisites: The ROTATE function is only available with firmware revision 3.0 or greater.

RQS

Mainframe

Enables the mainframe to send an SRQ message to the controller and sets the RQS mask over the status register to allow only selected conditions to generate an SRQ message. See "Using Interrupts" for Status Register bit definitions, mnemonics, and weights.

RQS mode or unmask

Parameters

Description

mode

Enables the mainframe to send an SRQ message to the controller when the specified condition occurs.

ON - mainframe SRQ capability enabled. At power-on, *mode* is ON.

OFF - mainframe SRQ capability disabled.

unmask

Specifies the bit(s) in the mainframe status register that will be unmasked. Setting an unmasked bit also sets the service request bit (if *mode* ON) and sends an SRQ message to the

Command Reference

controller. The bits to be unmasked are specified by a mnemonic or by their binary weight. Several bits can be unmasked at the same time by listing each bit's mnemonic or by entering the sum of their binary weights.

RQS?

Mainframe

Returns the decimal sum of all unmasked Status Register bits. 64 (bit 6) is part of the sum if RQS ON has been issued.

RQS? [INTO *name*] or [*fmt*]

<u>Parameters</u>	<u>Description</u>
INTO <i>name</i>	See Destination = Mainframe Memory.
<i>fmt</i>	See Data Formats. The default format for RQS? is IASC.

RST

Mainframe

Resets the HP 3852A system or the specified accessory to its power-on state. If a slot is not specified, the HP 3852A and all slots are reset. Note that a reset has the following exceptions:

- HP-IB addressed state (i.e. LOCS, LWLS, REMS, RWLS) is not changed.
- The RQS mask and mode are not changed.
- The self-test routine is not performed.
- The power-on "beep" does not occur.
- Power-on messages are not displayed.

Command Reference

- The LCL bit (bit 3) in the Status Register is not set.

RST [*slot*]

or

RESET [*slot*]

Parameter

Description

slot

Slot containing the accessory to be reset.

RST HARD

Mainframe

Places the HP 3852A and all plug-in accessories in their power-on state. Executing this command is equivalent to cycling power.

RST HARD

or

RESET HARD

Prerequisites: Requires firmware revision 3.0 or greater.

RUN

Mainframe

Directs a subroutine to a run task and specifies the number of times and how often the subroutine is to execute. RUN also activates the run task which starts subroutine execution.

RUN *task__number name* [*number*] [**EVERY** *seconds*]

Parameters

Description

task__number

Run task to which a subroutine is directed. The range for *task number* is 0 to 7.

Command Reference

<i>name</i>	Name of the subroutine directed to the run task.
<i>number</i>	Number of times the subroutine is to execute. If <i>number</i> = 0, the subroutine executes continuously. If <i>number</i> is > 0, the subroutine executes the number of times specified. If number is not specified and the EVERY parameter is not specified, the default number is 1. If number is not specified and the EVERY parameter is specified, the subroutine executes continuously.
EVERY <i>seconds</i>	Interval at which subsequent subroutine executions begin following the RUN command. The range for <i>seconds</i> is 0 to 4,294,967,296/tic_interval. (See the TSLICE command for tic_interval values.) If EVERY seconds is not specified, there is no waiting between executions.

Prerequisites: Requires firmware revision 3.0 or greater and the **EVERY seconds** parameter requires revision 3.5 or greater. The HP 3852A must also be in the multitasking mode.

RUN?

Mainframe

Returns the operating status of run task subroutines in a multitasking system.

RUN? (INTO *name*) or [*fmt*]

Command Reference

Returned are 11 integers which indicate the following:

INTEGER	DESCRIPTION
1st	Number of run tasks available (NTASKS command).
2nd	Size of the queue (NTASKS command).
3rd	Number of subroutines in the queue.
4th	Status of run task 0.
5th	Status of run task 1.
6th	Status of run task 2.
7th	Status of run task 3.
8th	Status of run task 4.
9th	Status of run task 5.
10th	Status of run task 6.
11th	Status of run task 7.

The status that is returned for each of the subroutines (4th through 11th integers) is the sum of the following seven bit code:

BIT	VALUE	STATUS
0	1	Run task is created.
1	2	Run task subroutine is executing.
2	4	Subroutine is suspended (SUSPEND command).
3	8	Subroutine generated an error.
4	16	Subroutine is paused (PAUSE command).
5	32	Subroutine is suspended (WAITFOR SIGNAL command).
6	64	Subroutine is suspended (pending the release of a lock).

Parameters

Description

INTO *name* See Destination = Mainframe Memory.

fml See Data Formats.

The default format for RUN? is IASC.

Command Reference

Prerequisites: RUN? is only used when the HP 3852A is in the multitasking mode. Multitasking is available with firmware revision 3.0 or greater.

SADV

Mainframe

Sets the channel scan advance source. SADV is used for backplane scanning with either a voltmeter accessory or an external voltmeter using the CONF, MEAS, MONMEAS, and SCAN commands.

SADV *source*

<u>Parameter</u>	<u>Description</u>
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<i>source</i>	Scan advance source.
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SCAN - when used with MEAS, scan is advanced when NRDGS are available. When used with SCAN, scan is advanced as soon as the channel is closed. At power-on, *source* is SCAN.

CHADV - the CHANNEL ADVANCE BNC.

KEY - front panel SADV KEY.

PACER - Pacer pulse.

SCALE

Mainframe

Post processing function. The specified offset is subtracted from the stored reading, the quantity is then divided by the specified scale value ((reading - offset)/scale).

SCALE *offset scale readings* [INTO *name*] or [*fmt*]

Command Reference

<u>Parameters</u>	<u>Description</u>
<i>offset</i>	INTEGER or REAL variable or array containing offset(s) to be subtracted from the reading(s).
<i>scale</i>	INTEGER or REAL variable or array containing scale factor(s) to be divided into the quantity: reading - offset.
<i>readings</i>	INTEGER or REAL array containing readings to be scaled.
INTO <i>name</i>	See Destination = Mainframe Memory.
<i>fmt</i>	See Data Formats. The default format for SCALE is RASC.

Prerequisites: The *offset*, *scale*, *readings*, and *name* arrays must have been previously defined.

SCAN *Mainframe, External Voltmeter*

Scans a list of multiplexer channels using an external voltmeter to measure and store the results.

SCAN [*backplane__bus*] *ch__list* [**NSCAN** *number*]

<u>Parameters</u>	<u>Description</u>
<i>backplane__bus</i>	Backplane bus connections made by the multiplexer channels during the measurement.
	SENSE - multiplexer channels connect to the SENSE bus (voltage measurements). The default <i>backplane__bus</i> connection is SENSE.

Command Reference

COM - SENSE bus and SOURCE bus are connected together at the multiplexer (2-wire ohms measurements).

SEP - Valid for HP 44705A, HP 44709A, and HP 44711A multiplexers only. SENSE bus and SOURCE bus are separate to user wiring. SENSE bus is connected to Bank A, SOURCE bus is connected to Bank B. Only Bank A channels are specified since the corresponding channels in Bank B are closed automatically (4-wire ohms measurements only).

ch_list Address of the channel list. See "Useful Tables" for channel ranges and definitions of the various multiplexers.

NSCAN
number Specifies the number of scans to be made through the channel list. *number* range is 1 to 2147483647. The default NSCAN is 1.

Prerequisites: The NSCAN parameter requires mainframe firmware revision 2.2 or greater.

SCAN *HP 44717A, HP 44718A,
HP 44719A, HP 44720A*

Scans a list of multiplexer channels using an external voltmeter to make and store related strain measurements.

SCAN *backplane__bus ch_list [NSCAN number]*

Command Reference

<u>Parameters</u>	<u>Description</u>
<i>backplane__bus</i>	Backplane bus connections made by the strain gage multiplexer channels during the measurement. STRVEX - bridge excitation voltage is connected to the backplane for measurement by the voltmeter. SENSE - Multiplexer channels connect to the SENSE bus on the backplane enabling the voltmeter to measure the bridge output voltage (strain). COM - Multiplexer channels connect to the SENSE bus and SOURCE bus on the backplane enabling the voltmeter to perform 2-wire resistance measurements. DCV - Bridge output voltage is connected to the backplane for measurement by the voltmeter.
<i>ch__list</i>	Address of the channel list. See "Useful Tables" for strain gage accessory channel ranges and definitions.
NSCAN <i>number</i>	Specifies the number of scans to be made through the channel list. <i>number</i> range is 1 to 2147483647. The default NSCAN is 1.

Prerequisites: The strain gage accessories require mainframe firmware revision 2.0 or greater. The NSCAN parameter requires mainframe firmware revision 2.2 or greater.

Command Reference

SCANMODE

HP 44702A/B

Selects the voltmeter operating mode.

SCANMODE [*mode*] [**USE** *ch*]

<u>Parameters</u>	<u>Description</u>
<i>mode</i>	Specifies the voltmeter operating mode. ON - Scanner mode enabled. The user has access to all operating parameters of the voltmeter. When TERM RIBBON is set, scanning is under the control of the voltmeter through the dedicated ribbon cable. When TERM INT, EXT, or ZERO is selected, scanning is under the control of the mainframe. The default <i>mode</i> is ON. OFF - System mode enabled. User has access to a limited number of the operating parameters available. All scanning is under the control of the mainframe. At power-on, <i>mode</i> is OFF.
USE <i>ch</i>	Slot where voltmeter is installed.

SCDELAY

HP 44702A/B

Sets the delay between the scan trigger and when the first measurement can be triggered, and sets the time between successive scan triggers. SCDELAY is only used when the voltmeter is in the Scanner mode.

SCDELAY *trig_delay* [*scan_pace*] [**USE** *ch*]

Command Reference

Parameters

Description

trig__delay Delay time in seconds between the scan trigger and when the first measurement can be triggered. *trig__delay* range is 0 to 16.38375 msec. At power-on, *trig__delay* is 0.

scan__pace Time in seconds between successive scan triggers. *scan__pace* is used only if SCTRIG INT is set. *scan__pace* range is 0 to 1073.74182375 seconds. At power-on, *scan__pace* is 2 msec.

USE *ch* Slot where voltmeter is installed.

Prerequisites: SCTRIG must be set to HOLD before setting SCDELAY.

SCRATCH

Mainframe

Deletes all subroutines, arrays, and variables stored in the mainframe and removes the name and type. SCRATCH also disables all ON INTR conditions (but accessory interrupts remain enabled).

SCRATCH

SCRATCH KEY

Mainframe

Deletes the softkey definition of the numeric key specified.

SCRATCH KEY [*key*]

Command Reference

<u>Parameters</u>	<u>Description</u>
<i>key</i>	Number of the key (0 through 9) whose softkey definition is erased. If <i>key</i> is not specified, then all softkey definitions are erased.
Prerequisites: Requires firmware revision 3.5 or greater.	

SCSLOPE

HP 44702A/B

Specifies the edge of the scan trigger signal that will trigger voltmeter scans. The specified edge is used when SCTRIG is set to EXT0, EXT1, MEAS, or GPIO. SCSLOPE is used with the voltmeter in the Scanner mode only.

SCSLOPE *mode* [USE *ch*]

<u>Parameters</u>	<u>Description</u>
<i>mode</i>	Scan trigger signal edge that will trigger the voltmeter. LH - trigger on the low-to-high transition. At power-on, <i>mode</i> is LH. HL - trigger on the high-to-low transition.
USE <i>ch</i>	Slot where voltmeter is installed.

Prerequisites: SCSLOPE is used only when SCTRIG is set to EXT0, EXT1, MEAS, or GPIO.

SCTRIG

HP 44702A/B

Specifies the scan trigger source for the voltmeter. SCTRIG is used with the voltmeter in the Scanner mode.

Command Reference

SCTRIG [*source*] [**USE** *ch*]

<u>Parameters</u>	<u>Description</u>
-------------------	--------------------

source

Voltmeter trigger source.

SCAN - backplane scan. Trigger when multiplexer channel is closed.

SGL - single trigger when command is executed. The default *source* is SGL.

HOLD - no trigger. Trigger is held off and scanning is halted. At power-on, *source* is HOLD.

EXT0 - trigger the voltmeter through its rear panel BNC 0.

EXT1 - trigger the voltmeter through its rear panel BNC 1.

SYS - system trigger pulse from the TRG command.

INT - voltmeter's internal trigger.

MEAS - trigger when input signal crosses the threshold level as set by the PERC command.

GPIO - GPIO trigger.

USE *ch*

Slot where voltmeter is installed.

Prerequisites: If TERM RIBBON is set, the scan list must be defined (by CLWRITE or MEAS) before SCTRIG is set to a source other than HOLD.

SERIAL

Mainframe

Eliminates wait time for some commands sent to multiplexers and switching accessories.

Command Reference

SERIAL [*mode*]

Parameters

mode

Description

For listed accessories, enables or disables wait time for commands shown. *mode* = OFF (wait time eliminated) or ON (wait time not eliminated). Power-on/reset/default *mode* = ON.

For an HP 44724A, SERIAL OFF eliminates settling time for CHWRITE and WRITE. For an HP 44705A, HP 44706A, HP 44708A, HP 44725A, HP 44728A, or HP 44729A, SERIAL OFF eliminates wait time for OPEN and CLOSE.

CAUTION

With SERIAL OFF, repeatedly using OPEN and CLOSE can cause damage to an HP 44725A, HP 44728A, or HP 44729A.

Prerequisites: Requires firmware revision 3.5 or greater.

SET ALRM

Mainframe

Sets the alarm to occur at a specified real-time clock setting in seconds since midnight.

SET ALRM *seconds*

Parameter

seconds

Description

Seconds since midnight. Range is 0 to 86399.999.

Command Reference

Prerequisites: The system real time clock must be set to local time as the alarm reference. For an alarm to occur, the alarm must be enabled with ENABLE ALRM.

SET TIME *Mainframe*

Sets the real-time clock in seconds since midnight.

SET TIME *seconds*

<u>Parameter</u>	<u>Description</u>
<i>seconds</i>	Seconds since midnight. Range is 0 to 86399.999.

SET TIMEDATE *Mainframe*

Sets the Julian time and date for the real-time clock.

SET TIMEDATE *seconds*

<u>Parameter</u>	<u>Description</u>
<i>seconds</i>	Julian time expressed in seconds. Range is 2.08662912E+11 (midnight March 1, 1900) to 4.768629999E+11 (11:59:59.999 February 29, 10400).

SETTLE *HP 44727A/B/C*

Sets the time the APPLY DCI, APPLY DCV, or APPLY PERC command will wait for the DAC output to settle before completing. The settling time specified applies to all channels in the slot addressed.

SETTLE *slot time*

Command Reference

<u>Parameters</u>	<u>Description</u>
<i>slot</i>	Slot were the DAC accessory is installed.
<i>time</i>	DAC settling time. The range for <i>time</i> is 0 to 0.209712 seconds. Settings between 0 and 6.4 μ s default to 6.4 μ s. At power-on, <i>time</i> is set to 74.5472 msec.

Prerequisites: To vary DAC programming time, the SETTLE command must precede the first APPLY DCI, APPLY DCV, or APPLY PERC command which addresses a different slot.

The SETTLE command requires mainframe firmware revision 2.2 or greater.

SGN

Math Function

Math function. Returns a 1 if the argument is positive, 0 if it equals zero, and -1 if it is negative.

SGN (*number*)

<u>Parameters</u>	<u>Description</u>
<i>number</i>	Number or numeric expression.

Prerequisites: The SGN function is only available with firmware revision 3.0 or greater.

SHIFT

Binary Function

Binary function. Returns an integer which equals the value obtained by shifting the 16-bit binary representation of the argument the number of bit positions specified. The shift does not wraparound. The

Command Reference

SHIFT function does not change the original value of the argument.

SHIFT (*number bit__displacement*)

<u>Parameters</u>	<u>Description</u>
<i>number</i>	Number or numeric expression which must evaluate within the range -32768 to +32767.
<i>bit__displacement</i>	Number or numeric expression which must evaluate within the range -32768 to +32767. The recommended range is -15 to +15.

Prerequisites: The SHIFT function is only available with firmware revision 3.0 or greater.

SIGNAL

Mainframe

Signals the task suspended by WAITFOR SIGNAL to resume command/subroutine execution.

SIGNAL *task*

<u>Parameters</u>	<u>Description</u>
<i>task</i>	Task which is signaled and which was previously suspended by WAITFOR SIGNAL
	HP-IB - re-enables command/subroutine execution in the HP-IB task.
	KYBD - re-enables command/subroutine execution in the front panel task.

Command Reference

INTR - resumes the execution of an interrupt-called subroutine.

run task number - resumes execution of the subroutine in the specified run task.

Prerequisites: SIGNAL is only used when the HP 3852A is in the multitasking mode. Multitasking is available with firmware revision 3.0 or greater.

SIN

Trigonometric Operation

Numeric expression evaluated as a command parameter. Returns the SIN of the number that is expressed in radians.

SIN (*number*)

<u>Parameter</u>	<u>Description</u>
<i>number</i>	Number or numeric expression in radians that must evaluate to a range that is an absolute value < 2.98156826E + 8 radians.

SIZE?

Mainframe

Returns the size (maximum index + 1) of the specified array. See CAT for the data returned if a PACKED array is specified.

SIZE? *name* [INTO *name*] or [*fmt*]

<u>Parameters</u>	<u>Description</u>
<i>name</i>	Name of the array whose size is returned.

Command Reference

INTO *name* See Destination = Mainframe Memory.

fmt See Data Formats.
The default format for SIZE? is LASC.

SLOPE *HP 44702A/B*

Specifies the edge of the input signal that will trigger the voltmeter. In the System mode, SLOPE specifies the voltmeter trigger edge. In the Scanner mode, SLOPE specifies the Measure Trigger edge.

SLOPE *mode* [USE *ch*]

<u>Parameters</u>	<u>Description</u>
<i>mode</i>	Edge of the input signal that will trigger the voltmeter. LH - trigger on the low-to-high transition. At power-on, <i>mode</i> is LH. HL - trigger on the high-to-low transition.

USE *ch* Slot where voltmeter is installed.

Prerequisites: The edge set by SLOPE is only used with the EXT0, EXT1, MEAS, or GPIO trigger source as set by the TRIG and SCTRIG commands. If the voltmeter is in the Scanner mode, SCTRIG must be set to HOLD before setting SLOPE.

SPER *HP 44702A/B*

Sets the sample period (time between successive measurement triggers) of the voltmeter. SPER is used with the voltmeter in the Scanner mode.

Command Reference

SPER *sample__period* [USE *ch*]

<u>Parameters</u>	<u>Description</u>
<i>sample__period</i>	Time in seconds between successive measurement triggers. The <i>sample__period</i> range is 0 to 1073.74182375 seconds. <i>sample__period</i> settings from 0 to 10 μ s are rounded to 10 μ s.) At power-on, <i>sample__period</i> is 10 μ s.
USE <i>ch</i>	Slot where voltmeter is installed.

Prerequisites: SPER is only used when TRIG INT is set. SCTRIG must be set to HOLD before setting SPER.

SPER HP 44715A

Sets the period over which the input signal is sampled. Input signals that do not remain at the required level during the sample period are ignored. The period set by SPER applies to all counter channels.

SPER *number* [USE *ch*]

<u>Parameters</u>	<u>Description</u>
<i>number</i>	Period during which the input signal is sampled. The <i>number</i> range is 1 μ sec to 160 msec with the increments shown. Actual sampling period used is rounded up to a valid number closest to the number specified. At power-on, <i>number</i> = 1 μ sec.

Command Reference

SPER Number Range	Incr.
1 μ sec to 16 μ sec	1 μ sec
20 μ sec to 160 μ sec	10 μ sec
200 μ sec to 1.6 msec	100 μ sec
2 msec to 16 msec	1 msec
20 msec to 160 msec	10 msec

USE *ch*

Channel specified for the SPER command. Note that all accessory channels will have the same sample period regardless of the channel specified. Channel range depends on the hardware configuration.

SPOLL

HP 44788A

Returns an integer containing the serial poll response from the addressed device.

SPOLL (*@I/O path name or device selector*)

<u>Parameters</u>	<u>Description</u>
<i>@I/O path name</i>	The name of the path assigned to a device or mass storage file.
<i>device selector</i>	The HP-IB select code (i.e. Snn) for the device the data is to be output to. S = slot, nn = device address.

Prerequisites: Requires firmware revision 3.5 or greater.

SQR

Math Function

Numeric expression evaluated as a command parameter. Returns the square root of the number specified.

Command Reference

SQR (number)

<u>Parameter</u>	<u>Description</u>
<i>number</i>	Number or numeric expression that must evaluate to a value ≥ 0 .

SREAD

HP 44702A/B

Reads the specified voltmeter register and returns a decimal value equivalent to the current state of information it provides.

CAUTION

Reading HP 44702A/B registers other than those specifically identified as read registers may result in invalid data or lost data, may set the voltmeter to an unknown state, or may cause system errors. Refer to the HP 44702A/B Configuration and Programming Manual for information on using the SREAD command.

SRQ

Mainframe

Programmed service request. If bit 2 (FPS) in the Status Register has been cleared by STA? and unmasked by RQS, executing SRQ (setting bit 2) will signal the controller that the mainframe has requested service.

SRQ

Prerequisites: For a service request (SRQ) message to be sent over HP-IB, the RQS mode must be enabled (RQS ON) and bit 2 (FPS) in the Status Register must be unmasked (RQS FPS or RQS 4) and have previously been cleared.

Command Reference

SRTRIG

HP 44723A

Specifies the trigger source for second rank input triggers or for second rank output triggers. When a second rank input trigger is received, the contents of the first rank register are copied into the second rank register.

SRTRIG *source* [USE *ch*]

Parameters

Description

source

Selects the source or mode for second rank input triggers or for second rank output triggers. For channel numbers ES00-ES15, *source* specifies the source for second rank input triggers. For channel numbers ES16-ES31, *source* specifies the source for second rank output triggers. Valid SRTRIG *source* parameters follow. Power-on/reset value = SRTRIG INT for both input and output. Default value = SRTRIG SGL for both input and output.

source/mode	Description
SGL	Immediate single trigger when command executes.
SYS	System trigger (see TRG command).
EXT	Terminal module trigger input.
INT	Trigger when a read or write command executes.*
HOLD	No triggering.

Command Reference

- * = read commands are CHREAD, CHREADM, READ, and READM.
- = write commands are CHWRITE, CHWRITEM, WRITE, and WRITEM.

USE *ch* For *ch* = ES00-ES15, SRTRIG *source* specifies the source for second rank input triggers. For *ch* = ES16-ES31, SRTRIG *source* specifies the source for second rank output triggers.

Prerequisites: Requires mainframe firmware revision 3.0 or greater.

STANDBY

HP 44714A

Used to completely or partially power down a motor between moves.

STANDBY [*mode*] [*sense*] [**USE** *ch*]

<u>Parameters</u>	<u>Description</u>
<i>mode</i>	Specifies whether the STBYn output is off, on, or operates automatically (OFF, ON, or AUTO).
<i>sense</i>	Specifies whether the STBYn output is high or low when it is on (HI or LO).
USE <i>ch</i>	Specifies the channel that standby is set up for. Channel range is ES00 to ES02.

Prerequisites: Requires mainframe firmware revision 3.0 or greater.

Command Reference

STAT

Mainframe

Perform statistical analysis on stored readings.

STAT *min max mean std var*

<u>Parameters</u>	<u>Description</u>
<i>min</i>	Name of the REAL or INTEGER variable or array to receive the lowest value(s).
<i>max</i>	Name of the REAL or INTEGER variable or array to receive the highest value(s).
<i>mean</i>	Name of the REAL or INTEGER variable or array to receive the mean of all values.
<i>std</i>	Name of the REAL or INTEGER variable or array to receive the standard deviation of all values.
<i>var</i>	Name of the variable or array containing values from which the statistics are generated.

STA?

Mainframe

Reads the system status register and clears the FPS, LCL, INTR, LMT, and ALRM bits in the register. STA? returns the weighted sum of all bits set in the register. 64 is included in the sum if an SRQ message is being asserted when STA? is executed. STA? returns 0 if none of the status register bits are set. See "Using Interrupts" for Status Register bit definitions.

STA? [*INTO name*] or [*fml*]

Command Reference

Parameters

Description

INTO <i>name</i>	See Destination = Mainframe Memory.
<i>fmt</i>	See Data Formats. The default format for STA? is IASC.

STATE?

Mainframe

Returns the state of the HP 3852A system. The state identifies the presence of extended memory, the Controller module installed, and the power line frequency setting. STATE? returns a "1" followed by the sum of the features listed below.

1	256 kbyte extended memory installed (HP 44703A)
4	1 Mbyte extended memory installed (HP 44703B)
8	2 Mbyte extended memory installed
16	4 Mbyte extended memory installed
64	03852-66523 Controller module installed
128	power line frequency = 60 Hz

STATE? {INTO *name*} or [*fmt*]

Parameters

Description

INTO <i>name</i>	See Destination = Mainframe Memory.
<i>fmt</i>	See Data Formats. The default format for STATE? is IASC.

Command Reference

STB? *Mainframe*

Reads the system status byte and clears the service request bit (bit 6, weight = 64) in the Status Register. Returned is the weighted sum of the bits set in the register. 64 (weight of bit 6) is included in the sum if an SRQ message is being asserted when STB? is executed. STB? returns 0 if none of the bits in the Status Register are set. See "Using Interrupts" for Status Byte bit definitions.

STB? [*INTO name*] or [*fnt*]

<u>Parameters</u>	<u>Description</u>
<i>INTO name</i>	See Destination = Mainframe Memory.
<i>fnt</i>	See Data Formats. The default format for STB? is IASC.

STEP *Mainframe*

Steps through each command of the specified subroutine.

STEP [*name*]

<u>Parameter</u>	<u>Description</u>
<i>name</i>	Name of the subroutine to be stepped through. STEP <i>name</i> calls the subroutine. Subsequent STEPs without <i>name</i> step through the subroutine. As the subroutine is stepped through, the STEP command must be entered each time by pressing STEP ENT.

Command Reference

Prerequisites: STEP cannot be stored inside a subroutine.

STRIG

Mainframe

Sets the source of the mainframe scan trigger. The source specified by STRIG is used during backplane scanning when measurements are made with either a voltmeter accessory using the MEAS command, or with an external voltmeter using the SCAN command.

STRIG *source*

<u>Parameter</u>	<u>Description</u>
<i>source</i>	Scan trigger source. SCAN - close first channel automatically at beginning of scan. At power-on, <i>source</i> = SCAN. CHADV - rear panel CHANNEL ADVANCE BNC. KEY - front panel SADV KEY (scan advance key). PACER - pacer pulse.

STSLOPE

HP 44702A/B

Sets the edge of the Stop Trigger input signal that will trigger the voltmeter. STSLOPE is used with the voltmeter in the Scanner mode.

STSLOPE *mode* [USE *ch*]

<u>Parameters</u>	<u>Description</u>
<i>mode</i>	Specifies the stop trigger slope. LH - stop triggering on the low-to-

Command Reference

high transition of the stop trigger input signal. At power-on, mode is LH.

HL - stop triggering on the high-to-low transition of the stop trigger input signal.

USE *ch* Slot where voltmeter is installed.

Prerequisites: The edge set by STSLOPE is used only for the EXT0, EXT1, MEAS, and GPIO settings of the STTRIG command. SCTRIG must be set to HOLD before setting STSLOPE.

STTRIG

HP 44702A/B

Specifies the Stop Trigger source. STTRIG is used with the voltmeter in the Scanner mode.

STTRIG [*source*] [**USE** *ch*]

<u>Parameters</u>	<u>Description</u>
<i>source</i>	Stop Trigger source.
	SCAN - trigger when multiplexer channel closed.
	SGL - issue an immediate single trigger. The default <i>source</i> is SGL.
	HOLD - triggering off.
	EXT0 - trigger the voltmeter through its rear panel BNC 0.
	EXT1 - trigger the voltmeter through its rear panel BNC 1.
	SYS - system trigger (see the TRG command).
	INT - trigger at end of pass through scan list. At power-on, <i>source</i> = INT.

Command Reference

MEAS - trigger when input signal crosses the threshold level as set by the PERC command.
GPIO - GPIO trigger.

USE *ch* Slot where voltmeter is installed.

Prerequisites: SCTRIG must be set to HOLD.

SUB...SUBEND

Mainframe

Downloads a subroutine into mainframe memory. All commands between SUB and SUBEND form the subroutine.

SUB *name*
subroutine commands

SUBEND

Parameter

Description

name

Name of the subroutine. See Using Subroutines.

SUBEND

See SUB...SUBEND.

SUSPEND

Mainframe

Suspends or defers the execution of commands/ subroutines within a task for a specified number of seconds.

SUSPEND *seconds*

Command Reference

Parameters

Description

seconds

Number of seconds the task is suspended. The range for *seconds* depends on the tic interval set by the TSLICE command. Refer to the TSLICE command for the range which applies.

Prerequisites: Requires firmware revision 3.0 or greater and the HP 3852A must be in the multitasking mode.

SUSPEND UNTIL

Mainframe

Suspends or defers the execution of commands/ subroutines within a task until a specified Julian date and time.

SUSPEND UNTIL *seconds*

Parameters

Description

seconds

The Julian date and time (expressed in seconds) at which the task is no longer suspended. Note that the setting of the mainframe clock is subtracted from the *seconds* specified, and the difference is the length of time the task is suspended.

The range for *seconds* depends on the tic interval set by the TSLICE command. Refer to the TSLICE command for the range which applies.

Prerequisites: Requires firmware revision 3.5 or greater and the HP 3852A must be in the multitasking mode. The mainframe's internal clock should also be set to the current date and time.

Command Reference

SUSTAIN

HP 44714A

A pulse output command that when triggered, will generate pulses continuously at the velocity or pulse width specified by the velocity or width parameter but limited by the PROFILE command min and max limits.

SUSTAIN *velocity or width* [NOWAIT] [USE *ch*]

<u>Parameters</u>	<u>Description</u>
<i>velocity/width</i>	The frequency or pulse width, whichever mode the PROFILE command is in, that the pulse output changes to when triggered.
NOWAIT	Allows the processor to go on to other tasks (such as TRIG SGL) after setting up the command.
USE <i>ch</i>	Specifies the channel the pulse output applies to. Channel range is ES00 to ES02.

Prerequisites: Requires mainframe firmware revision 3.0 or greater.

SWRITE

HP 44702A/B

Writes a value to the specified voltmeter register.

CAUTION

Writing to HP 44702A/B registers may result in invalid data or lost data, may set the voltmeter to an unknown state, or may cause system errors. Refer to the HP 44702A/B Configuration and Programming Manual for information on using the SWRITE command.

Command Reference

SYMSIZE

Mainframe

Specifies the number of array, variable, and subroutine names that can be stored in the symbol table in mainframe memory.

SYMSIZE *size*

<u>Parameters</u>	<u>Description</u>
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size

Specifies the size of the symbol table. The minimum size allowed is 0 and the maximum size depends on the amount of mainframe memory available. Once a size has been entered, the mainframe must be reset in order to load the value into the operating system. Anytime power is cycled, the size of the symbol table is set to 150 entries.

Prerequisites: SYMSIZE is available with firmware revision 3.0 or greater.

SYNC

HP 44726A

Specifies the condition in which a negative-going pulse will appear on the SYNC OUT BNC.

SYNC *source* [USE *ch*]

<u>Parameters</u>	<u>Description</u>
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source

WF - outputs a pulse at the beginning of each waveform cycle. The pulse goes low when the trigger for the first amplitude point is received and remains low until the first trigger for the last amplitude is received.

Command Reference

TRIG - outputs a pulse each time a TRIG pulse is received once the channel has been armed. Pulse width is approximately 600 ns.

DAC - outputs a pulse each time a new amplitude point is clocked into the DAC. Pulse width is approximately 350 ns.

HOLD - no pulses are output under any condition. The power-on *source* is HOLD.

USE *ch* Channel from which the SYNC pulse is applied. SYNC pulses appear only when the waveform is applied from the same channel. The default **USE *ch*** is channel 0.

Prerequisites: Requires firmware revision 3.5 or greater.

SYSOUT

Mainframe

Sets the system output mode.

SYSOUT [*mode*]

<u>Parameter</u>	<u>Description</u>
<i>mode</i>	Determines whether data output over the HP-IB will be preceded by a data header. OFF - data with no header is output. At power-on, <i>mode</i> is OFF. ON - output data is preceded by a header indicating the number of readings taken, the format of the data to follow the header, and the

Command Reference

number of bytes per reading. The default *mode* is ON.

Data Fmt	Bytes/Rdg
IN16 = ±1	IN16 = 2
RL64 = ±2	RL64 = 8
PACK = ±5	PACK = a
IASC = ±6	IASC = 6
LASC = ±7	LASC = 11
RASC = ±8	RASC = 13
string = ±9	string = b
DASC = ±11	DASC = 22

a - Bytes/reading for packed data is accessory dependent.

b - Number of characters in the string including quotes (if any), but not including CR/LF.

The format returned is positive (+) for BLOCKOUT OFF, negative (-) for BLOCKOUT ON.

TARM

HP 44726A

Sets the source of the negative-going pulse which arms the channel's trigger circuit. Arming the channel allows the channel to accept trigger signals which advance the output of the DAC.

TARM [*source*] [USE *ch*]

Parameters

Description

source

OFF - prevents recognition of any arming or trigger pulses. TARM OFF stops the active waveform at the last amplitude point triggered. When re-armed, the waveform starts from the first amplitude point.

Command Reference

TARM OFF or TARM AUTO must be set before any commands which access channel memory are executed. At power-on, TARM OFF is set.

HOLD - prevents recognition of any arming pulses without stopping the active waveform.

SGL - issues an immediate arming pulse when the command is executed. The default *source* is SGL.

AUTO - issues an immediate arming pulse when the command is executed. In the TARM AUTO mode, TARM OFF is set automatically when a command which accesses channel memory is received. Following execution, TARM AUTO is re-asserted and another arming pulse is issued. The waveform then starts from the first amplitude point.

SYS - the arming pulse is the system trigger (see the TRG command).

EXT - the arming pulse is applied through the channel's EXT IN BNC.

When changing from any source to either SYS or EXT, TARM OFF is set momentarily while the change is made. The waveform then starts from the first amplitude point when re-armed.

USE *ch*

Channel which is armed. The default **USE *ch*** is channel 0.

Command Reference

Prerequisites: Requires firmware revision 3.5 or greater.

TARMED?

HP 44726A

Indicates whether or not the channel has been armed and if trigger pulses have been received. Returned is one of the following numbers which represents the condition that exists:

- 0 = TARM OFF is set.
- 1 = TARM is set to a source other than OFF and is waiting for an arming signal.
- 2 = An arming signal has been received and the circuit is waiting for a trigger to start the waveform.
- 3 = Waveform is running. Arming and triggering signals have been received.

TARMED? [*USE ch*] [*INTO name*] or [*fnt*]

<u>Parameters</u>	<u>Description</u>
<i>USE ch</i>	Channel whose arming and triggering status is returned. The default <i>USE ch</i> is channel 0.
<i>INTO name</i>	See Destination = Mainframe Memory.
<i>fnt</i>	See Data Formats. The default format for TARMED? is IASC.

Prerequisites: Requires firmware revision 3.5 or greater.

Command Reference

TBASE

HP 44715A

Sets the time base used with the PER and PERD functions, and with the FREQ configuration. Setting TBASE aborts measurements in progress.

TBASE [*tbase*] [USE *ch*]

<u>Parameters</u>	<u>Description</u>
<i>tbase</i>	<p>For the PER and PERD functions, <i>tbase</i> is the period of the HP 44715A internal clock that is counted during the time it takes the number of periods of the input signal supplied by the user to occur (NPER). For the FREQ function, <i>tbase</i> is the period of the HP 44715A internal clock during which the period of the input signal supplied by the user is counted.</p> <p><i>tbase</i> settings for the PER and PERD functions are 1 μs, 10 μs, 100 μs, 1 ms, and 10 ms.</p> <p><i>tbase</i> settings for the FREQ function are 10 ms, 100 ms, and 1s.</p> <p>When <i>tbase</i> = AUTO or 0 (power-on and default setting), the HP 44715A automatically selects the time base.</p>
USE <i>ch</i>	<p>Channel for which the TBASE command is used. Channel range depends on the hardware configuration.</p>

Command Reference

Prerequisites: To use TBASE with the period or delayed period functions, the channel function must be set to PER or PERD respectively. To use TBASE with the FREQ configuration, the configuration jumper must be set to FREQ.

TBASE

HP 44726A

Changes the time base of the active waveform. TBASE allows you to change the time base without stopping the waveform. The time base interval set by the TBASE command is not stored in channel memory. Thus, the time base is not used when the waveform is re-selected nor is it associated with the WFTBASE? or WPPER? commands.

TBASE *seconds* [USE *ch*]

<u>Parameters</u>	<u>Description</u>
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<i>seconds</i>	Length of the time base interval. The range for <i>seconds</i> is 1.25E-6 to 16.384E-3. Resolution is 0.25E-6.
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USE <i>ch</i>	Channel from which the waveform is being applied. The default USE <i>ch</i> is channel 0.
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Prerequisites: Requires firmware revision 3.5 or greater.

TERM

HP 44701A, HP 44702A/B

Selects the voltmeter input terminals.

TERM *terminal* [USE *ch*]

Command Reference

<u>Parameters</u>	<u>Description</u>	<input type="checkbox"/>
<i>terminal</i>	Specifies the input terminal. <u>HP 44701A</u> BOTH - selects the backplane bus and rear panel terminals as input terminals. EXT - selects the rear panel input terminals. At power-on, <i>terminal</i> = EXT. <u>HP 44702A/B</u> INT - selects the backplane bus as the input terminal. EXT - selects the rear panel input terminals. At power-on, <i>terminal</i> = EXT. ZERO - selects an internal zero volt reference. RIBBON - selects the ribbon cable (Scanner mode only).	<input type="checkbox"/>
USE <i>ch</i>	Slot where voltmeter is installed.	<input type="checkbox"/>
Prerequisites: If the HP 44702A/B is in the Scanner mode, SCTRIG must be set to HOLD before setting TERM. TERM RIBBON can only be set when the voltmeter is in the Scanner mode.		<input type="checkbox"/>
TERM	<i>HP 44715A</i>	<input type="checkbox"/>
Selects isolated or non-isolated input terminals for the specified channel. TERM aborts measurements in progress.		<input type="checkbox"/>
TERM <i>terminal</i> [<i>terminal</i>] [USE <i>ch</i>]		<input type="checkbox"/>

Command Reference

Parameters

Description

terminal

Specifies isolated or non-isolated input terminals.

ISO - isolated input terminals. The power-on/default *terminal* = ISO for single-input functions. The power-on/default *terminal* = ISO, ISO for double input functions.

NON - non-isolated input terminals.

For single-input functions and for the frequency configuration, the first *terminal* applies to the A input and the second *terminal* is not allowed.

For double input functions, the first *terminal* applies to the A input, the second *terminal* to the B input. If the second *terminal* is not specified for a channel with a double-input function, the terminals specified for the first *terminal* parameter is used for both inputs.

USE *ch*

Channel used with TERM command. Channel range depends hardware configuration.

TEST

Mainframe, All Accessories

Performs a self test on the HP 3852A system or on the specified accessory. TEST does not change any preprogrammed state or condition of the mainframe. TEST does alter the state of the HP 44701A, HP 44702A/B, and the HP 44715A. A reset of these accessories is recommended following the self test.

Command Reference

TEST [*slot*]

<u>Parameter</u>	<u>Description</u>
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slot

Slot address of accessory to be tested. If *slot* is not specified, the HP 3852A and all accessories are tested.

TEST

HP 44714A

Initiates a pass/fail self test.

TEST *slot*

<u>Parameters</u>	<u>Description</u>
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slot

Specifies which mainframe slot is to be tested.

Prerequisites: Requires mainframe firmware revision 3.0 or greater. Also, for complete testing, the test jumper on the terminal card must be set to "TEST".

TEST

HP 44726A

Initiates an accessory self test. Following the test, the accessory is reset and all WAVEFORMS STORED IN CHANNEL MEMORY ARE ERASED.

TEST [*slot*]

<u>Parameters</u>	<u>Description</u>
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slot

Address of the slot where the HP 44726A is installed. If no slot is specified, the mainframe self test is initiated.

Command Reference

Prerequisites: Requires firmware revision 3.5 or greater and TARM OFF must be set.

TIME *Mainframe*

Returns the current real-time clock reading in seconds since midnight.

TIME [*INTO name*] or [*fmt*]

<u>Parameters</u>	<u>Description</u>
<i>INTO name</i>	See Destination = Mainframe Memory.
<i>fmt</i>	See Data Formats. The default format for TIME is DASC.

TIMEDATE *Mainframe*

Returns the current Julian date and time from the HP 3852A real-time clock.

TIMEDATE [*INTO name*] or [*fmt*]

<u>Parameters</u>	<u>Description</u>
<i>INTO name</i>	See Destination = Mainframe Memory.
<i>fmt</i>	See Data Formats. The default format for TIMEDATE is DASC.

Command Reference

TRG

Mainframe

Sets the system trigger source and mode.

TRG [*source*]

<u>Parameter</u>	<u>Description</u>
<i>source</i>	System trigger source. EXT - source is the SYSTEM TRIGGER IN BNC. SGL - source is a single internal trigger occurring at the time TRG SGL is executed. TRG HOLD is then set. The default <i>source</i> is SGL. GET - source is the HP 3852A GET command or the HP-IB Group Execute Trigger. HOLD - disables system trigger. At power-on, <i>source</i> is HOLD.

Prerequisites: Only plug-in accessories in which commands specify the SYS parameter will respond to the system trigger.

TRIG

HP 44701A, HP 44702A/B

Specifies the voltmeter's trigger source or mode.

TRIG [*source*] [**USE** *ch*]

<u>Parameters</u>	<u>Description</u>
<i>source</i>	Voltmeter trigger source or mode. HP 44701A SCAN - trigger when multiplexer channel is closed.

Command Reference

SGL - immediate single trigger when TRIG SGL is executed. The default *source* is SGL.

HOLD - disables trigger. At power-on, *source* is HOLD.

SYS - system trigger (see TRG).

AUTO - voltmeter's internal trigger.

HP 44702A/B

SCAN - backplane scan. Trigger when multiplexer channel is closed.

SGL - single trigger when command is executed. The default *source* is SGL.

HOLD - no trigger. Trigger is held off and scanning is halted.

EXT0 - trigger the voltmeter through its rear panel BNC 0.

EXT1 - trigger the voltmeter through its rear panel BNC 1.

SYS - system trigger (see the TRG command).

INT - voltmeter's internal trigger. At power-on, *source* = INT.

MEAS - trigger when input signal crosses the threshold level as set by the PERC command (System mode only).

GPIO - GPIO trigger.

USE *ch*

Slot where voltmeter is installed.

Command Reference

TRIG

HP 44714A

Determines how a move specified by a MOVE or SUSTAIN command is triggered.

TRIG *mode* [USE *ch*]

<u>Parameters</u>	<u>Description</u>
<i>mode</i>	Specifies what source generates the trigger.
HOLD	= The trigger is disabled.
SYS	= Connect mainframe's backplane trigger as source.
AUTO	= Trigger automatically generated.
CHAN0	= Channel 0 is the trigger source.
SGL	= Initiates an immediate trigger.
USE <i>ch</i>	Specifies the channel the trigger applies to. Channel range is ES00 to ES02.

Prerequisites: Requires mainframe firmware revision 3.0 or greater.

TRIG

HP 44715A

Sets the counter trigger mode or source. When the card configuration jumper is set to **FREQ**, the trigger mode/source applies to all five channels.

TRIG [*source*] [USE *ch*]

Command Reference

<u>Parameters</u>	<u>Description</u>
<i>source</i>	Specifies the trigger source or mode. SGL - immediate single trigger when TRIG SGL is executed. The default <i>source</i> is SGL. AUTO - counter's internal trigger. HOLD - disables trigger. Aborts any ongoing measurement and discards the existing count. At power-on, <i>source</i> = HOLD. SYS - system trigger (see TRG). EXT - external trigger source (requires hardware connection from source to XTRG terminals).
USE <i>ch</i>	Channel specified for the TRIG command. Channel range depends on hardware configuration.

Prerequisites: TRIG should follow TBASE, NPER, SPER, EDGE, TERM, and CNTSET as these commands abort any ongoing measurement.

TRIG

HP 44723A

Specifies the trigger source for first rank input triggers. When a first rank input trigger is received, the channel input states are sampled and the result stored in the first rank input register.

TRIG [*source*] [**USE** *ch*]

<u>Parameters</u>	<u>Description</u>
<i>source</i>	Selects the trigger source or mode for first rank input triggers. The channel number must be ES00-

Command Reference

ES15. Valid *source* parameters follow. Power-on/reset value = TRIG INT. Default value = TRIG SGL.

source/mode	Description
SGL	Immediate single trigger when command executed.
SYS	System trigger (see TRG command).
EXT	Terminal module trigger input.
INT	Trigger when a read command is executed.*
HOLD	No triggering.

* = read commands are CHREAD, CHREADM, READ, and READM.

USE *ch* For *ch* = ES00-ES15, TRIG *source* specifies the source for first rank input triggers.

Prerequisites: Requires mainframe firmware revision 3.0 or greater.

TRIG

HP 44726A

Sets the source of the trigger signals which load the waveform's amplitude points into the DAC.

TRIG [*source*] [USE *ch*]

Parameters

Description

<i>source</i>	INT - source is the internal trigger. The power-on <i>source</i> is INT.
	EXT - source is an external trigger applied through the channel's EXT IN BNC. Must be a negative-going pulse with a pulse width ≥ 400 ns.

Command Reference

SGL - issues an immediate trigger on command execution. The default *source* is SGL.

SYS - source is the system trigger (see the TRG command).

CHAN0 - channel 1 trigger source. CHAN0 locks channel 1 to channel 0. When channel 0 receives a trigger, channel 1 is also triggered. If this source is selected, it is recommended that neither channel is armed by TARM AUTO. In TARM AUTO mode, TARM OFF is set automatically when a command which accesses channel memory is received. Following execution, TARM AUTO is re-asserted and the waveform on that channel re-starts at the first amplitude point. The waveform on the other channel, however, will not be at its first point, thus, the channels will re-lock at an unknown phase.

HOLD - stops the waveform at the last triggered amplitude point and prevents the recognition of subsequent trigger pulses. When the source is changed, the waveform will resume from the same point.

USE *ch*

Channel on which the waveform is stored and from which it will be applied. The default **USE *ch*** is channel 0.

Prerequisites: Requires firmware revision 3.5 or greater. The channel must also be armed (TARM) before trigger pulses will advance the output of the DAC.

Command Reference

TRIG *HP 44730A, HP 44732A, HP 44733A*

Sets the trigger source for all channels on an accessory.

TRIG [*source*] [**USE** *ch*]

<u>Parameters</u>	<u>Description</u>
<i>source</i>	Sets trigger source for all channels on an HP 44730A, HP 44732A, or HP 44733A. Power-on/reset <i>source</i> = RIBBON. Default <i>source</i> = SGL.
<i>source</i>	Description
RIBBON	Triggering via ribbon cable.
SYS	System trigger (see TRG).
SGL	Trigger via backplane.
EXT	External trigger via EXT TRG.
HOLD	No triggering.
USE <i>ch</i>	Specifies channel to be used for TRIG. Channel number range is ES00 through ES03.

Prerequisites: Requires firmware revision 3.5 or greater and system must not be scanning with an HP 44702A/B when TRIG is executed.

TRIGGER *HP 44788A*

Sends a trigger message to a selected device.

TRIGGER @*I/O path name* or *device selector*

Command Reference

Parameters

Description

<i>@I/O path name</i>	The name of the path assigned to a device or mass storage file.
<i>device selector</i>	The HP-IB select code (i.e. Snn) for the device the data is to be output to. S = slot, nn = device address.

Prerequisites: Requires firmware revision 3.5 or greater.

TRIGMODE

HP 44723A

Specifies the trigger mode for first rank input triggers and for second rank output triggers.

TRIGMODE *mode* [USE *ch*]

Parameters

Description

<i>mode</i>	Selects the trigger mode for first rank input triggers and second rank output triggers. Valid <i>mode</i> = FIRST or ALL (power-on/reset). Specifying any input channel (ES00-ES15) affects the mode for first rank input triggers. Specifying any output channel (ES16-ES31) affects the mode for second rank output triggers.
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Input Trigger Mode:

Update First Rank Input Register

TRIGMODE FIRST	TRIGMODE ALL
----------------	--------------

Updated only by the first rank input trigger after a second rank trigger.	Updated by all first rank input triggers.
---	---

Command Reference

Transfer Data to Second Rank Input Register.

A second rank input trigger causes the earliest sampled data to be transferred.	Each second rank input trigger causes the most recently sampled data to be transferred.
---	---

Trigger Output for First Rank Input Triggers.

Set HIGH by a second rank input trigger. Set LOW by a first rank input trigger.	Each first rank input trigger sources an ~ 2 μ sec negative pulse output.
---	--

* = For either TRIGMODE FIRST or TRIGMODE ALL, an ~ 2 μ sec negative pulse trigger output is generated for each second rank input trigger received.

• Output Trigger Mode:

Trigger Output for Second Rank Output Triggers

TRIGMODE FIRST	TRIGMODE ALL
Set HIGH by a write to the first rank output register. Set LOW by a second rank output trigger.	Each second rank output trigger sources an ~ 2 μ sec negative pulse output.

USE *ch*

For *ch* = ES00-ES15, TRIGMODE sets the mode for first rank input triggers. For *ch* = ES16-ES31, TRIGMODE sets the mode for second rank output triggers.

Prerequisites: Requires mainframe firmware revision 3.0 or greater.

Command Reference

TRIGOUT

HP 44702A/B

Specifies whether or not the voltmeter's EXT0 BNC will function as a measure trigger source. When enabled, the port outputs a trigger signal that can be used to trigger other HP 44702A/B voltmeters.

TRIGOUT [*mode*] [**USE** *ch*]

Parameters

Description

mode

Specifies whether the EXT0 BNC will output or receive trigger signals.

ON - EXT0 BNC outputs a negative-going pulse which is a valid measure trigger signal. The default *mode* is ON.

OFF - EXT0 BNC can receive trigger signals. At power-on, *mode* is OFF.

USE *ch*

Slot where voltmeter is installed.

Prerequisites: If TRIGOUT is ON, no trigger source (TRIG, SCTRIG, STTRIG) can be set to EXT0 and vice versa.

TSLICE

Mainframe

Sets the length of time (time-slice) commands will execute within a specific task before the system swaps to another task of equal priority. Once specified, you must reset the mainframe or cycle power to load the time-slice period into the operating system.

TSLICE *seconds* [*tic__interval*] [**INT/EXT**]

Command Reference

Parameters

Description

seconds

Time-slice period. The range for *seconds* is 0 to 16.71 seconds. To obtain time-slice periods less than 65.536 ms, the *tic_interval* must be set equal to, or faster than the time-slice period.

tic_interval

Interval at which the HP 3852A operating system determines whether a task is to be swapped, a suspended task is to be activated, a task is to begin, or whether operation is to continue in the current state.

The tic interval also determines the maximum time-slice period allowed, the maximum period a task can be suspended by either SUSPEND or SUSPEND UNTIL, and the interval at which run task execution begins as directed by the RUN command. These values, based on the tic intervals available are given below:

TIC__INT	MAX.T-S (TIC__INT * 255)	MAX.PER SUSP
1.024 ms	0.261 s	4398046.51 s (50.9 days)
2.048 ms	0.522 s	8796093.02 s (101.8 days)
4.096 ms	1.044 s	17592186.04 s (203.6 days)
8.192 ms	2.088 s	35184372.08 s (407.2 days)
16.384 ms	4.177 s	70368744.161 s (814.4 days)

Command Reference

32.768 ms	8.355 s	140737488.322 s (1628.9 days)
65.536 ms	16.71 s	281474976.645 s (3257.8 days)

The default *tic_interval* is 65.536 ms. Should a time-slice period shorter than 65.536 ms be specified and the default tic interval used, the time-slice is set equal to the interval.

INT/EXT Source of the clock from which the tic interval is derived. INT selects the mainframe's internal clock. EXT selects an external clock applied through the CHANNEL ADVANCE BNC on the HP 3852A's rear panel. The default source is INT.

Prerequisites: TSLICE is used in the multitasking mode which requires firmware revision 3.0 or greater. The *tic_interval* and INT/EXT parameters require revision 3.5 or greater and the 03852-66523 controller module. The *tic_interval* and INT/EXT parameters will be ignored on earlier version controller modules running 3.5 firmware.

URGENCY

Mainframe

Sets task priorities within the HP 3852A multitasking system.

URGENCY [*task*] *number*

Command Reference

Parameters

Description

task

Task (environment) whose command priority is raised or lowered. If *task* is not specified, the priority set pertains to the commands in the task from which the URGENCY command was executed.

HP-IB - sets the priority for all commands and subroutines in the HP-IB task.

KYBD - sets the priority for all commands and subroutines in the front panel task.

INTR - sets the priority for all interrupt-called subroutines (interrupt task).

run task number - sets the priority of the run task specified.

number

Priority of the task specified. The range for *number* is 1 to 253, with 1 being the highest priority and 253 being the lowest priority.

Prerequisites: URGENCY is only used in the multitasking mode. Multitasking is available with firmware revision 3.0 or greater.

USE

HP 44701A, HP 44702A/B, HP 44714A,
HP 44715A, HP 44721A, HP 44722A,
HP 44723A, HP 44730A, HP 44732A,
HP 44733A

Specifies the accessory or accessory channel to receive subsequent commands (see The USE Channel).

Command Reference

USE *ch*

<u>Parameters</u>	<u>Description</u>
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ch

Slot address where the voltmeter is installed or channel address for the counter/digital/multiplexer accessories listed. Channel range depends on the accessory and the configuration. See "Useful Tables" for channel ranges of the accessories.

USE?

Mainframe

Returns the current USE channel address as set by the USE command.

USE? [INTO *name*] or [*fmt*]

<u>Parameters</u>	<u>Description</u>
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INTO *name*

See Destination = Mainframe Memory.

fmt

See Data Formats.

The default format for USE? is IASC.

VREAD

Mainframe

Reads the contents of an array or variable.

VREAD *array* [(*index*)] or *variable* or *number*
[INTO *name*] or [*fmt*]

Command Reference

<u>Parameters</u>	<u>Description</u>
<i>array [(index)]</i>	Reads the contents of the array or array element. <i>array</i> without <i>(index)</i> reads the entire array. Index pointer is set to zero. <i>array (index)</i> reads the array element specified by <i>(index)</i> but does not affect the index pointer.
<i>variable</i>	Reads the contents of the variable.
<i>number</i>	Number or numeric expression that is evaluated and read into an array, array element, or variable. <i>number</i> can also be returned to the display and HP-IB output buffer.
INTO <i>name</i>	See Destination = Mainframe Memory.
<i>fmt</i>	See Data Formats. The default format for VREAD is RASC.

VWRITE

Mainframe

Writes data to an array, array element, or variable; or writes data from one array to another. VWRITE does not work with PACKED arrays.

VWRITE *array item__list* or *array(index) number* or *array(d){(index)}* *array(s){(index)}* or *variable number* or *variable(d) variable(s)*

<u>Parameters</u>	<u>Description</u>
<i>array</i>	Name of the array data is written to. Index pointer is set to 1 + last element written to.

Command Reference

<i>array(index)</i>	Specific array element data is written to. Index pointer is set to 1 + specified array element.
<i>array(d)</i> [[<i>index</i>]]	Destination array written to by the source array (<i>array(s)</i>). The destination array must be the same size or larger than the source array. Specifying (<i>index</i>) writes data to a specific element in the destination array from a specific element in the source array. The index pointer is set to 1 + the last element written to, or 1 + the specified element.
<i>array(s)</i> [[<i>index</i>]]	Source array whose contents are written to the destination array (<i>array(d)</i>). Specifying (<i>index</i>) writes data from a specific element in the source array to a specific element in the destination array.
<i>variable</i>	Variable data is written to.
<i>variable(d)</i>	Destination variable written to from the source variable (<i>variable(s)</i>).
<i>variable(s)</i>	Source variable from which data is written to the destination variable.
<i>item__list</i>	Data written to the array. Entries in the item list must be separated by either a space or a comma. <i>item__list</i> must be ≤ 10 items. Entries can be numbers or parenthesized numeric expressions.
<i>number</i>	Data written to array element or variable. Can be a number or a parenthesized numeric expression.

Command Reference

VWRITEB

Mainframe

Writes binary data from the computer to the specified mainframe array, starting at the current position of the index pointer.

VWRITEB *array number*

<u>Parameters</u>	<u>Description</u>
<i>array</i>	REAL or INTEGER array to which the data is written. The binary data sent from the computer must match the storage type of the array.
<i>number</i>	Number of array elements data will be written to. The number specified must equal the number of elements sent from the computer.

Prerequisites: To achieve the maximum transfer rate, the input buffer should be on (INBUF ON) and the size of the buffer should exceed the number of binary data bytes transferred. The VWRITEB command is only available with firmware revision 3.0 or greater.

WAIT

Mainframe

Wait the number of seconds specified.

WAIT [*number*]

<u>Parameter</u>	<u>Description</u>
<i>number</i>	Number of seconds to wait. Range is 0 to 86400 seconds. The default <i>number</i> = 0.

Command Reference

WAIT FOR

See WAITFOR.

WAITFOR

Mainframe

Waits for a specified condition before executing subsequent commands.

WAITFOR *condition*

or

WAIT FOR *condition*

<u>Parameters</u>	<u>Description</u>
-------------------	--------------------

condition

Condition that must occur before command execution continues.

EVENT - signal on the EVENT IN BNC or pressing the front panel EVENT key.

INTR - interrupt from accessory channel.

ALRM - alarm from real-time clock.

PACER - pacer pulse.

WAITFOR SIGNAL

Mainframe

Suspends the execution of commands/subroutines within a task until a signal (SIGNAL command) is received.

Command Reference

WAITFOR SIGNAL

Prerequisites: WAITFOR SIGNAL is only used in the multitasking mode. Multitasking is available with firmware revision 3.0 or greater.

WF?

HP 44726A

Returns the number of the waveform currently selected. If no waveform is selected, -1 is returned.

WF? [**USE** *ch*] [**INTO** *name*] or [*fmt*]

<u>Parameters</u>	<u>Description</u>
USE <i>ch</i>	Channel from which the waveform is being applied. The default USE <i>ch</i> is channel 0.
INTO <i>name</i>	See Destination = Mainframe Memory.
<i>fmt</i>	See Data Formats. The default format for WF? is IASC.

Prerequisites: Requires firmware revision 3.5 or greater and TARM OFF or TARM AUTO must also be set.

WFDELETE

HP 44726A

Deletes the specified waveform from channel memory.

WFDELETE *waveform_number* [**USE** *ch*]

Command Reference

Parameters

Description

*waveform__
number* Number of the waveform which is deleted. The range for *waveform__number* is 0 to 63 per channel.

USE *ch* Channel on which the waveform is stored. The default **USE *ch*** is channel 0.

Prerequisites: Requires firmware revision 3.5 or greater. TARM OFF or TARM AUTO must also be set. If the currently active waveform is to be deleted, TARM OFF must be set.

WFMOD

HP 44726A

Changes the amplitude of, or the number of time base intervals a waveform point or series of points are held. The new values are stored with the waveform in channel memory.

WFMOD [*waveform__number*] **ELEM** *element__number* **AMPL** or **NPER** *number* or *array* [**USE *ch***]

Parameters

Description

*waveform__
number* Number of the waveform which is changed. The range for *waveform__number* is 0 to 63 per channel. If no waveform number is specified, the active waveform is changed.

ELEM *element__
number* First point in the waveform which is changed.

Command Reference

AMPL
number/array

Specifies that amplitude changes will be made to the amplitude points in the waveform. When a *number* is specified, only one amplitude point is changed. That point is specified by **ELEM** *element__number*. When an array (*array*) is specified, the number of amplitude points changed depends on the size of the array. The amplitude points changed begin with the point specified by **ELEM** *number*, and include successive points equal to the number of new amplitudes in *array*. Thus, **ELEM** must specify a starting point such that the number of new amplitudes does not exceed the number of successive points available.

NPER
number/array

Specifies that changes will be made to the number of time base intervals an amplitude point is held. When a *number* is specified, only the number of time base intervals a single amplitude point is held is changed. That point is specified by **ELEM** *element__number*. When an array (*array*) is specified, the number of amplitude points whose number of time base intervals is changed depends on the size of the array. The amplitude points changed begin with the point specified by **ELEM** *number*, and include successive points equal to the number of new time base intervals in *array*. Thus, **ELEM** must specify a starting point such that the number of new

Command Reference

time base intervals does not exceed the number of successive points available.

USE *ch* Channel on which the waveform being modified is stored. The default **USE** *ch* is channel 0.

Prerequisites: Requires firmware revision 3.5 or greater and TARM OFF or TARM AUTO must also be set. If an array is specified, the array must be defined and contain new data prior to the execution of WFMOD.

WFMOD

HP 44726A

Changes the time base of the specified waveform and stores the value in channel memory.

WFMOD [*waveform__number*] **TBASE** *seconds*
[USE *ch*]

Parameters

Description

*waveform__
number*

Number of the waveform whose time base is changed. The range foris 0 to 63 per channel. If no waveform number is specified, the time base of the active waveform is changed.

TBASE
seconds

Length of a single time base interval. The range for *seconds* is 1.25E-6 to 16.384E-3. Resolution is 0.25E-6.

USE *ch*

Channel on which the waveform is stored. The default **USE** *ch* is channel 0.

Prerequisites: Requires firmware revision 3.5 or greater. TARM OFF or TARM AUTO must also be set.

Command Reference

WPPER?

HP 44726A

Returns the period of the waveform or of the portion of the waveform specified, based on the time base stored when the waveform was defined or modified (with WFWRITE or WFMOD).

WPPER? [*waveform__number*] [**FIRST** *point*] [**LAST** *point*] [**USE** *ch*] [**INTO** *name*] or [*fmt*]

<u>Parameters</u>	<u>Description</u>
<i>waveform__number</i>	Waveform whose period is returned. The range for <i>waveform__number</i> is 0 to 63 per channel. If no waveform number is specified, the period of the active waveform is returned.
FIRST <i>point</i>	Portion of the waveform beginning with the point specified through the LAST point specified, or through the end of the waveform whose period is returned. Waveform points are numbered starting with 0.
LAST <i>point</i>	Portion of the waveform starting with the beginning of the waveform or from the FIRST point specified, through the last point specified whose period is returned.
USE <i>ch</i>	If neither FIRST <i>point</i> or LAST <i>point</i> is specified, the period of the entire waveform is returned. Channel on which the waveform (and time base) is stored. The default USE <i>ch</i> is channel 0.

Command Reference

INTO *name* See Destination = Mainframe Memory.

fmt See Data Formats. The default format for WPPER? is RASC.

Prerequisites: Requires firmware revision 3.5 or greater and TARM OFF or TARM AUTO must also be set.

WFREAD HP 44726A

Reads the amplitude points or the number of time base intervals each amplitude point of the specified waveform is held. The data can be returned to either the mainframe display, output buffer, or to mainframe memory.

WFREAD [*waveform__number*] [**FIRST** *point*] [**LAST** *point*] **AMPL** or **NPER** [**USE** *ch*] [**INTO** *name*] or [*fmt*]

Parameters

Description

waveform__number Number of the waveform whose amplitude or time base data is read. The range for *waveform__number* is 0 to 63 per channel. If no waveform number is specified, the amplitude or time base data of the active waveform is returned.

FIRST *point* Portion of the waveform read beginning with the point specified through the LAST point specified, or through the end of the waveform. Waveform points are numbered starting with 0. Default = 0.

Command Reference

LAST *point* Portion of the waveform read starting with the beginning of the waveform or from the **FIRST** point specified, through the last point specified. Default = last point in waveform.

If neither **FIRST** point or **LAST** point is specified, the entire waveform is read.

AMPL or **NPER** **AMPL** - returns the amplitudes of the points specified.

NPER - returns numbers in which 2, raised to those numbers, equals the number of time base intervals the corresponding amplitude points are held.

USE *ch* Channel on which the waveform is stored. The default **USE** *ch* is channel 0.

INTO *name* See Destination = Mainframe Memory.

fmt See Data Formats.

When **AMPL** is specified, the default format for **WFREAD** is **RASC**. When **NPER** is specified, the default format is **IASC**. If the **PACK** format is used, the data remains in an internal format used by the DAC. For any other format, the amplitudes returned are first converted to voltages and the time base data represents powers of 2.

Prerequisites: Requires firmware revision 3.5 or greater. **TARM OFF** or **TARM AUTO** must also be set.

Command Reference

WFSIZE?

HP 44726A

Returns the total number of amplitude points in the specified waveform.

WFSIZE? [*waveform__number*] [**USE** *ch*] [**INTO** *name*] or [*fmt*]

Parameters

Description

waveform__number

Number of the waveform whose size is returned. The range for *waveform__number* is 0 to 63 per channel. If a waveform number is not specified, the size of the active waveform is returned. If the waveform has not been defined, 0 is returned.

USE *ch*

Channel on which the waveform is stored. The default **USE** *ch* is channel 0.

INTO *name*

See Destination = Mainframe Memory.

fmt

See Data Formats.

The default format for WFSIZE? is IASC.

Prerequisites: Requires firmware revision 3.5 or greater. TARM OFF or TARM AUTO must also be set.

WFTBASE?

HP 44726A

Returns the time base of the specified waveform. The time base returned is the value stored in memory by either the WFWRITE or a subsequent WFMOD command.

Command Reference

WFTBASE? [*waveform__number*] [**USE** *ch*] [**INTO** *name*] or [*fmt*]

<u>Parameters</u>	<u>Description</u>
<i>waveform__number</i>	Number of the waveform whose time base is returned. The range for <i>waveform__number</i> is 0 to 63 per channel. If no waveform number is specified, the time base (stored) for the active waveform is returned.
USE <i>ch</i>	Channel on which the waveform is stored. The default USE <i>ch</i> is channel 0.
INTO <i>name</i>	See Destination = Mainframe Memory.
<i>fmt</i>	See Data Formats. The default format for WFTBASE? is RASC.

Prerequisites: Requires firmware revision 3.5 or greater. TARM OFF or TARM AUTO must also be set.

WFWRITE ACV

HP 44726A

Defines a special function sine wave and stores the waveform in the channel memory of the DAC.

WFWRITE ACV *waveform__number*
volts__pk__to__pk [**OFFSET** *volts*] [**PHASE** *radians*]
[**PTS** *number*] **TBASE** *seconds* [**USE** *ch*]

Command Reference



Parameters

Description



waveform_
number

Number assigned to the waveform. The range for *waveform_number* is 0 to 63 per channel. The **USE ch** parameter determines whether the waveform is stored on channel 0 or channel 1.



volts_pk
to_pk

Peak-to-peak amplitude of the sine wave. The maximum amplitude is 20.4793750.



OFFSET
volts

DC offset added to the sine wave. The maximum DC offset allowed depends on the peak-to-peak amplitude of the waveform. Specifically,



DC offset + [peak amplitude] must be ≤ 10.2396875



or



DC offset - [peak amplitude] must be ≥ -10.2396875



PHASE
radians

Angle in radians that the waveform is shifted. The maximum number of radians which can be specified is +188,495.559215. Values can be specified in increments of $2*PI/PTS$, where **PTS** are the number of points in the waveform. The default **PHASE** is 0 radians. Waveforms are defined such that the first point is at $\sin((2*PI/PTS) + \text{phase})$ and the last point is at $\sin(\text{phase})$.



Command Reference

PTS *number* Number of amplitude points which comprise the waveform. The number of points which can be specified are 8, 20, 40, 100, 200, 500, and 1000. The default *number* is 1000.

TBASE
seconds Time interval between the points on the waveform. The range for *seconds* is 1.25E-6 to 16.384E-3. Resolution is 0.25E-6.

USE *ch* Channel on which the waveform is stored and from which it will be applied. The range for *ch* is ES00 to ES01. The default **USE** *ch* is channel 0.

Prerequisites: Requires firmware revision 3.5 or greater and TARM OFF or TARM AUTO must also be set.

WFWRITE ARB

HP 44726A

Defines an arbitrary waveform and stores that waveform in the channel memory of the DAC.

WFWRITE ARB *waveform__number*
amplitude__array [**SCALE** *factor*] [**OFFSET** *volts*]
[**NPER** *array*] **TBASE** *seconds* [**USE** *ch*]

Parameters

Description

waveform__number Number assigned to the waveform. The range for *waveform__number* is 0 to 63 per channel. The **USE** *ch* parameter determines whether the waveform is stored on channel 0 or channel 1.

Command Reference

*amplitude__
array* Real array containing the amplitude (voltage) points of the arbitrary waveform. The array can have a maximum index from 1 (2 points) to 32399 (32400 points). The maximum voltage allowed in the amplitude array is +10.2396875.

SCALE
factor Factor by which the values in the amplitude array are multiplied. The maximum scale factor allowed depends on the amplitude points in the amplitude array. Specifically, $\text{scale factor} * (\text{amplitude point})$ must be ≤ 10.2396875 and $\text{scale factor} * (\text{amplitude point})$ must be ≥ -10.2396875 .

OFFSET
volts DC offset added to the waveform. The maximum DC offset allowed depends on the amplitude points in the amplitude array. Specifically, $\text{DC offset} + |\text{amplitude point} * \text{scale factor}|$ must be ≤ 10.2396875 and $\text{DC offset} + |\text{amplitude point} * \text{scale factor}|$ must be ≥ -10.2396875 .

NPER *array* Real or Integer array containing numbers in which 2, raised to that number, equals the number of time base intervals the corresponding amplitude point is held. The range for the numbers in the NPER array is 0 to 31. The NPER array must be the same size as the amplitude array. If an NPER array is not specified, each amplitude point is held for one time base interval.

Command Reference

TBASE Length of a single internal time base
seconds interval. The range for *seconds* is
1.25E-6 to 16.384E-3. Resolution is
0.25E-6.

USE *ch* Channel on which the waveform is
stored and from which it will be ap-
plied. The range for *ch* is ES00 to
ES01. The default **USE** *ch* is chan-
nel 0.

Prerequisites: Requires firmware revision 3.5 or
greater and TARM OFF or TARM AUTO must also
be set.

WFWRITE BIN

HP 44726A

Defines an arbitrary waveform and stores that
waveform in the channel memory of the DAC.
WFWRITE BIN is the fastest method of storing a
waveform since the data stored is in a format which
can be used directly by the DAC.

WFWRITE BIN *waveform__number*
amplitude__array [*NPER array*] **TBASE** *seconds*
[USE *ch*]

Parameters

Description

waveform__
number Number assigned to the waveform.
The range for *waveform__number*
is 0 to 63 per channel. The **USE** *ch*
parameter determines whether the
waveform is stored on channel 0 or
channel 1.

amplitude__
array Integer or Packed array containing
waveform amplitude data. If an In-
teger array is specified, the values
in the array must represent the

Command Reference

amplitude point/0.0003125. The array can have a maximum index from 1 (2 points) to 32399 (32400 points). The data in the array must correspond to amplitudes between $\pm 10.2396875V$.

If a Packed array is specified, the data in the array must be in the DAC format (converted by WFWRITE ARB). With firmware revision 3.52 or greater, a Packed array can be specified in which the data is in the HP 44702 A/B Packed format. In either case, the Packed array should have a maximum index that is twice the number of amplitude points, less one.

NPER *array*

Integer array containing numbers in which 2, raised to that number equals the number of time base intervals the corresponding amplitude point is held. The range for the numbers in the NP

TBASE *seconds*

array is 0 to 31. The NP

Length of a single internal time base interval. The range for *seconds* is 1.25E-6 to 16.384E-3. Resolution is 0.25E-6.

USE *ch*

Channel on which the waveform is stored and from which it will be applied. The range for *ch* is ES00 to ES01. The default **USE** *ch* is channel 0.

Command Reference

Prerequisites: Requires firmware revision 3.5 or greater and TARM OFF or TARM AUTO must be set.

Note - due to the rate at which the waveform is stored, amplitude errors and time base interval errors are not checked or reported by an error message. However, data in an integer array which corresponds to an amplitude of -10.24V is changed to an amplitude of -10.2396875V . If a number greater than 31 is found in the NPER array, the corresponding amplitude point is held mod 32 time base intervals.

WFWRITE RPV

HP 44726A

Defines a special function triangle wave and stores the waveform in the channel memory of the DAC.

WFWRITE RPV *waveform__number*
volts__pk__to__pk [**OFFSET** *volts*] [**SLOPE** *direction*] [**DUTY** *percent*] [**PTS** *number*] **TBASE** *seconds*
[**USE** *ch*]

Parameters

Description

<i>waveform__number</i>	Number assigned to the waveform. The range for <i>waveform__number</i> is 0 to 63 per channel. The USE <i>ch</i> parameter determines whether the waveform is stored on channel 0 or channel 1.
<i>volts__pk__to__pk</i>	Peak-to-peak amplitude of the triangle wave. The maximum amplitude is 20.4793750.
OFFSET <i>volts</i>	DC offset added to the triangle wave. The maximum DC offset

Command Reference



allowed depends on the peak-to-peak amplitude of the waveform. Specifically,

DC offset + |peak amplitude| must be ≤ 10.2396875

or

DC offset - |peak amplitude| must be ≥ -10.2396875



SLOPE
direction

Direction of the first ramp in the waveform. For *direction* = LH, the ramp initially increases in voltage with time. For *direction* = HL, the ramp initially decreases in voltage with time.



DUTY
percent

Duty cycle of the triangle waveform expressed as a percentage. The duty cycle is defined as the ratio of the period of the first ramp to the period of the waveform. The minimum and maximum duty cycle depends on the number of points in the waveform and are given as follows:



PTS	MIN	MAX	RES
8	50%	50%	-
20	20%	80%	10%
40	10%	90%	5%
100	4%	96%	2%
200	2%	98%	1%
5000	.8%	99.2%	.4%
1000	.4%	99.6%	.2%



PTS *number*

Number of amplitude points which comprise the waveform. The number of points which can be specified are 8, 20, 40, 100, 200, 500, and 1000. The default *number* is 1000.



Command Reference

TBASE Time interval between the points on the waveform. The range for *seconds* is 1.25E-6 to 16.384E-3. Resolution is 0.25E-6.

USE *ch* Channel on which the waveform is stored and from which it will be applied. The range for *ch* is ES00 to ES01. The default **USE** *ch* is channel 0.

Prerequisites: Requires firmware revision 3.5 or greater and TARM OFF or TARM AUTO must also be set.

WFWRITE SQV

HP 44726A

Defines a special function square wave and stores the waveform in the channel memory of the DAC.

WFWRITE SQV *waveform__number*
volts__pk__to__pk [**OFFSET** *volts*] [**SLOPE** *direction*] **TBASE** *seconds* [**USE** *ch*]

Parameters

Description

waveform__number Number assigned to the waveform. The range for *waveform__number* is 0 to 63 per channel. The **USE** *ch* parameter determines whether the waveform is stored on channel 0 or channel 1.

volts__pk__to__pk Peak-to-peak amplitude of the square wave. The maximum amplitude is 20.4793750.

OFFSET *volts* DC offset added to the square wave. The maximum DC offset allowed depends on the peak-to-peak

Command Reference

amplitude of the waveform. Specifically,

DC offset + |peak amplitude| must be ≤ 10.2396875

or

DC offset - |peak amplitude| must be ≥ -10.2396875

SLOPE
direction

Direction of the first transition of the waveform. For *direction* = LH, the transition is from a lower voltage to a higher voltage. For *direction* = HL, the transition is from a higher voltage to a lower voltage.

TBASE
seconds

Time interval between the points on the waveform. The range for *seconds* is 1.25E-6 to 16.384E-3. Resolution is 0.25E-6.

USE *ch*

Channel on which the waveform is stored and from which it will be applied. The range for *ch* is ES00 to ES01. The default **USE** *ch* is channel 0.

Prerequisites: Requires firmware revision 3.5 or greater and TARM OFF or TARM AUTO must also be set.

WHILE...END WHILE

Mainframe

Defines a loop that is executed as long as the expression in the WHILE statement evaluates to a non-zero (true) value.

WHILE *expression*

program segment

END WHILE

Command Reference

<u>Parameter</u>	<u>Description</u>
<i>expression</i>	A Boolean expression evaluated as true if non-zero, false if zero.

Prerequisites: WHILE...END WHILE can only be used in an HP 3852A subroutine.

WRITE

HP 44723A

Writes data to the first rank output register in the specified slot. A second rank output trigger is required to copy the data from the first rank output register to the second rank output register and to the user output terminals.

WRITE *slot data_list* or *array*

<u>Parameters</u>	<u>Description</u>
<i>slot</i>	Address of slot.
<i>data_list</i>	Decimal equivalent of desired state of the channels in the slot specified by slot. The LSB goes to channel ES16, the MSB to channel ES31. A "0" sets the channel LOW, a "1" sets the channel HIGH.
<i>array</i>	Defines array of decimal equivalent values to be written to the slot specified by slot. For maximum write rate, <i>array</i> must define an INTEGER array.

Prerequisites: Requires mainframe firmware revision 3.0 or greater.

Command Reference

WRITE

HP 44724A, HP 44725A,
HP 44728A, HP 44729A

Writes data to the specified slot to open or close channels.

WRITE *slot number*

or

WRITE *slot data_list* or *array*

<u>Parameters</u>	<u>Description</u>
<i>slot</i>	Slot where accessory is installed.
<i>number</i>	Decimal equivalent of desired channel bit pattern. The range for the HP 44724A and HP 44725A is -32768 to +32767 (0 to +65535 unsigned). The range for the HP 44728A and HP 44729A is -128 to +127 (0 to +255 unsigned). The LSB sets channel ES00 state and the MSB sets channel ES15 state (for the HP 44724A and HP 44725A) or sets channel ES07 state (for the HP 44728A and HP 44729A).
<i>data_list</i>	For mainframe firmware revision 3.0 and greater, <i>data_list</i> is the same as <i>number</i> .
<i>array</i>	For mainframe firmware revision 3.0 and greater, <i>array</i> defines an array of decimal equivalent values to be written to the slot specified by <i>slot</i> .

Prerequisites: The *data_list* and *array* parameters are valid only for mainframe firmware revision 3.0 and greater.

Command Reference

WRITEM

HP 44723A

Write data to the first rank output register(s) in specified slot(s). A second rank output trigger is required to copy data from the first rank output register to the second rank output register and to the user output channels.

WRITEM *slot_list* **DATA** *data_list*

<u>Parameters</u>	<u>Description</u>
<i>slot_list</i>	Address of slot(s).
DATA <i>data_list</i>	Decimal equivalent of the desired state of the channel(s) in the slot(s) specified by <i>slot_list</i> . The LSB goes to channel ES16, the MSB to channel ES31. A "0" sets the channel LOW, a "1" sets the channel HIGH.

Prerequisites: Requires mainframe firmware revision 3.0 or greater.

WRITEM

HP 44724A, HP 44725A,
HP 44728A, HP 44729A

Write the state (0/1) to open or close specified channel(s) in specified slot(s).

WRITEM *slot_list* **DATA** *data_list*

<u>Parameters</u>	<u>Description</u>
<i>slot_list</i>	Address of slot(s). Channel number range = ES00 through ES15 (HP 44724A and HP 44725A) or ES00 through ES07 (HP 44728A and HP 44729A).

Command Reference

DATA
data_list

Decimal equivalent of the desired state of the channels in the slot(s) specified by *slot_list*. The LSB goes to channel ES00, the MSB goes to channel ES15 (HP 44724A and HP 4725A) or to channel ES07 (HP 44728A and HP 44729A). WRITEM uses one item from DATA *data_list* for each slot OR slot range in *slot_list*.

Prerequisites: Requires mainframe firmware revision 3.0 or greater.

XRDGS

HP 44701A, HP 44702A/B

Transfers a specified number of readings from the voltmeter to the HP-IB output buffer/display or to mainframe memory.

XRDGS *ch* [*number*] [*INTO name*] or [*fmt*]

Parameters

Description

ch

Slot where voltmeter is installed.

number

Number of readings to transfer. The *number* range is 1 to 2147483647. The default *number* = 1 for the HP 44701A.

For the HP 44702A/B in the System mode, the default *number* is the number of readings specified by NRDGS. If some readings have been read from the buffer with other commands (i.e. CHREAD), XRDGS will return the readings which remain. If no readings are in

Command Reference

the buffer when XRDGS is executed, the command will wait until the next NRDGS are in the buffer and then transfer them.

For the HP 44702A/B in Scanner mode, the default *number* is the number of readings in the buffer when the scan sequence completes.

INTO *name* See Destination = Mainframe Memory.

fnt See Data Formats.
The default format for XRDGS is RASC.

XRDGS

HP 44715A

Transfers a specified number of readings from a counter channel to the HP-IB output buffer/display or to mainframe memory. XRDGS transfers each reading as it becomes available without disturbing the counting function.

XRDGS *ch* [*number*] [*INTO name*] or [*fnt*]

Parameters

Description

ch Address of channel from which readings are transferred. Channel range depends on hardware configuration.

number Number of readings to be transferred. Range is 1 to 2147483647. The default *number* = 1.

Command Reference

INTO *name* See Destination = Mainframe Memory.

fmt See Data Formats.
The default format for XRDGS is RASC.

Prerequisites: The channel addressed must be triggered and a reading must be available before it is returned. For the TOTAL, TOTALM, UDC, UDCM, CD, and CDM functions, only one trigger is required. For the RAT, PER, and PERD functions and for the Frequency configuration, the number of valid triggers must be the same as the number of readings transferred. Also, RAT, PER, and PERD functions require NPER input periods per measurement.

XRDGS *HP 44721A, HP 44722A*

Transfers a specified number of readings from a digital input channel to the HP-IB output buffer/display or to mainframe memory. XRDGS transfers each reading as it becomes available without disturbing the counting or state sensing function.

XRDGS *ch* [*number*] [**INTO** *name*] or [*fmt*]

<u>Parameters</u>	<u>Description</u>
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<i>ch</i>	Address of channel from which readings are transferred. Channels ES00-ES15 (ES00-ES07 on 8-channel digital input) return counts on the channel. Channels ES16-ES31 (ES08-ES15) return channel state.
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Command Reference

- number* Number of readings to be transferred. Range is 1 to 2147483647. The default *number* = 1.
- INTO** *name* See Destination = Mainframe Memory.
- fmt* See Data Formats.
The default format for XRDGS is RASC.



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— **Commands by Functional Group**

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Commands by Functional Group

This section lists all HP 3852A mainframe and all plug-in accessory commands by functional group. Indicated next to each command is whether or not the command is allowed within a subroutine (SUBROUTINE), if the command can be executed from the front panel while the mainframe is in remote (ALLOWED IN REMOTE), and if executing the command requires the current or ongoing measurement to be re-triggered (MODE CHANGE).

MAINFRAME COMMANDS

	SUBROUTINE	ALLOWED IN REMOTE	MODE CHANGE
HP-IB Communication			
ADDR	x		x*
ADDR?	x		
BLOCKOUT	x		
CLROUT	x		
END	x		
FASTOUT	x		
INBUF	x		
OUTBUF	x		
SYSOUT	x		
Front Panel Operation			
BEEP	x		x
DISP	x		x
DISABLE/ENABLE LABELS	x		
EDIT KEY	x		x
FAST DISP	x		x
LOCAL	x		x
LOCK	x		
MON	x		x**
SCRATCH KEY	x		
Interrupts/Service Requests/Triggering			
DISABLE	x		
DISABLE INTR BNC	x		
ENABLE	x		
ENABLE INTR BNC	x		
GET	x		
OFF	x		

Commands by Functional Group

	SUBROUTINE	ALLOWED IN REMOTE	MODE CHANGE
ON	x		
RQS	x		
RQS?	x	x	
SRQ	x	x	
TRG	x	x	
Status and Identification			
CLR	x	x***	
ERR?	x	x	
ERRSTR?	x	x	
EXTEND?	x	x	
ID?	x	x	
IDN?	x	x	
INTR?	x	x	
POWEROFF	x	x	
RST			x
RST HARD			x
STA?	x		
STATE?	x	x	
STB?	x		
TEST	x		x
USE?	x	x	
System Clock/Alarm/Pacer			
ALRM	x	x	
DISABLE PWIDE	x		
ENABLE PWIDE	x		
PACER	x		
PDELAY	x		
PTRIG	x		
SET ALRM	x		
SET TIME	x		
SET TIMEDATE	x		
TIME	x	x	
TIMEDATE	x	x	
Subroutine and Data Storage			
CAT	x	x	
DELSUB	x		
DELVAR	x		
DIM	x		
INDEX	x		
INDEX?	x	x	
INTEGER	x		
LET	x		
MAT	x		

Commands by Functional Group

		SUBROUTINE	ALLOWED IN REMOTE	MODE CHANGE
<input type="checkbox"/>	PACKED	x		
	REAL	x		
<input type="checkbox"/>	SCRATCH	x		
	SIZE?	x	x	
	SUB		x	
	SUBEND		x	
<input type="checkbox"/>	SYMSIZE	x		
	VREAD	x	x	
	VWRITE	x		
	VWRITEB	x		
<input type="checkbox"/>	Program Control and Synchronization			
	CALL	x		
	CONT			
	FOR...NEXT	x****	x	
<input type="checkbox"/>	IF...END IF	x****	x	
	PAUSE	x	x	
	STEP			
	WAIT	x	x	
	WAITFOR	x	x	
<input type="checkbox"/>	WHILE...END WHILE	x****	x	
<input type="checkbox"/>	Data Processing			
	COMPEN	x		
	CONV	x		
<input type="checkbox"/>	LMT(pp)	x		
	LMT(rt)	x		
	LOGCHAN	x		
	SCALE	x		
	STAT	x		
<input type="checkbox"/>	Measurement Functions and Scanning			
	SADV	x		
	SCAN	x		
	STRIG	x		
<input type="checkbox"/>	USE	x		
<input type="checkbox"/>	Multitasking			
	ABORT	x		
	CREATE RUN	x		
<input type="checkbox"/>	DISABLE EOL SWAP	x		
	DISABLE MULTI	x		
	DISABLE PROBE	x		
	ENABLE EOL SWAP	x		
<input type="checkbox"/>	ENABLE MULTI	x		
	NLOCKS			

Commands by Functional Group

	SUBROUTINE	ALLOWED IN REMOTE	MODE CHANGE
NTASKS			
ON ... RUN	x		
PROBE/ENABLE PROBE	x		
RELEASE	x		
REQUEST	x		
RUN	x		
RUN?	x	x	
SIGNAL	x		
SUSPEND	x		
SUSPEND UNTIL	x		
TSLICE			
URGENCY	x		
WAITFOR SIGNAL	x		

PLUG-IN ACCESSORY COMMANDS

HP 44701A Integrating Voltmeter

ARANGE	x		x
AZERO	x		x
CAL	x		x
CHREAD	x		x
CONF	x		x
CONFMEAS	x		x
DELAY	x		x
DISABLE INTR	x		
ENABLE INTR	x		
FUNC	x		x
MEAS	x		x
MONMEAS	x		x
NPLC	x		x
NRDGS	x		x
OCOMP	x		x
RANGE	x		x
RST			x
TERM	x		x
TEST	x		x
TRIG	x		x
USE	x		x
XRDGS	x		x

HP 44702A/B High-Speed Voltmeter

ARMODE	x		x
ASCAN	x		x
AZERO	x		x
CAL	x		x
CHREAD	x		x

Commands by Functional Group



	SUBROUTINE	ALLOWED IN REMOTE	MODE CHANGE
CLWRITE	x		x
CONF	x		x
CONFMEAS	x		x
DELAY	x		x
DISABLE INTR	x		
ENABLE INTR	x		
FUNC	x		x
MEAS	x		x
MONMEAS	x		x
NRDGS	x		x
PERC	x		x
POSTSCAN	x		x
PRESCAN	x		x
RANGE	x		x
RDGS	x		x
RDGSMODE	x		x
RST			x
SCANMODE	x		x
SCDELAY	x		x
SCSLOPE	x		x
SCTRIG	x		x
SLOPE	x		x
SPER	x		x
STSLOPE	x		x
STTRIG	x		x
TERM	x		x
TEST	x		x
TRIG	x		x
TRIGOUT	x		x
USE	x		x
XRDGS	x		x

HP 44705A 20-Channel Relay Multiplexer
 HP 44705H 20-Channel High-Voltage Relay Multiplexer
 HP 44706A 60-Channel Relay Multiplexer
 HP 44708A 20-Channel Relay Multiplexer/TC
 HP 44708H 20-Channel High-Voltage Relay Multiplexer/TC

HP 44709A 20-Channel FET Multiplexer
 HP 44710A 20-Channel FET Multiplexer/TC

Commands by Functional Group

	SUBROUTINE	ALLOWED IN REMOTE	MODE CHANGE
HP 44711A 24-Channel High-Speed FET Multiplexer			
HP 44712A 48-Channel High-Speed FET Multiplexer			
HP 44713A 24-Channel High-Speed FET Multiplexer/TC			
CLOSE	x		x
CLOSE?	x	x	
OPEN	x		x
SCAN	x		x
TEST	x		x
HP 44714A 3-Channel Stepper Motor Controller/Pulse Output			
DELAY	x		x
DISABLE INTR	x		
DONE?	x	x	
ENABLE INTR	x		
HALT	x		x
HARDLIM	x		x
MOVE	x		x
POS	x		x
POS?	x	x	
PROFILE	x		x
PSCALE	x		x
PULSE	x		x
QINDEX	x		x
QPOS?	x	x	
QSCALE	x		x
STANDBY	x		x
SUSTAIN	x		x
TEST	x		x
TRIG	x		x
HP 44715A 5-Channel Counter/Totalizer			
CHREAD	x		x
CHREADZ	x		x
CNTSET	x		x
CONF	x		x
DISABLE INTR	x		
DONE?	x	x	
EDGE	x		x
ENABLE INTR	x		
FUNC	x		x
NPER	x		x
SPER	x		x
TBASE	x		x
TERM	x		x
TEST	x		x

Commands by Functional Group

	SUBROUTINE	ALLOWED IN REMOTE	MODE CHANGE
<input type="checkbox"/>	TRIG	x	x
<input type="checkbox"/>	USE	x	x
<input type="checkbox"/>	XRDGS	x	x
	HP 44717A 10 Bridge 120 Static Strain Gage Relay Multiplexer		
	HP 44718A 10 Bridge 350 Static Strain Gage Relay Multiplexer		
<input type="checkbox"/>	HP 44719A 10 Bridge 120 Static Strain Gage FET Multiplexer		
	HP 44720A 10 Bridge 350 Static Strain Gage FET Multiplexer		
	CLOSE	x	x
<input type="checkbox"/>	CONF	x	x
	CONFMEAS	x	x
	MEAS	x	x
	MONMEAS	x	x
	OPEN	x	x
	SCAN	x	x
<input type="checkbox"/>	TEST	x	x
	HP 44721A 16-Channel Digital Input		
	HP 44722A 8-Channel Digital Input		
<input type="checkbox"/>	CHREAD	x	x
	CHREADM	x	x
	CHREADZ	x	x
	CNTSET	x	x
	CONF	x	x
<input type="checkbox"/>	DISABLE INTR	x	
	EDGE	x	x
	ENABLE INTR	x	
	READ	x	x
	READM	x	x
	TEST	x	x
<input type="checkbox"/>	USE	x	x
	XRDGS	x	x
	HP 44723A 16-Channel High-Speed Digital Sense/Control		
<input type="checkbox"/>	CHREAD	x	x
	CHREADM	x	x
	CHWRITE	x	x
	CHWRITEM	x	x
<input type="checkbox"/>	DISABLE INTR	x	
	EDGE	x	x
	ENABLE INTR	x	
	PATTERN	x	x
	RDGSMODE	x	x
	READ	x	x
<input type="checkbox"/>	READM	x	x
	SRTRIG	x	x

Commands by Functional Group

	SUBROUTINE	ALLOWED IN REMOTE	MODE CHANGE
TRIG	x		x
TRIGMODE	x		x
USE	x		x
WRITE	x		x
WRITEM	x		x
HP 44724A 16-Channel Digital Output			
HP 44725A 16-Channel General Purpose Switch			
HP 44728A 8-Channel Relay Actuator			
HP 44729A 8-Channel Power Controller			
CHWRITE	x		x
CHWRITEM	x		x
CLOSE	x		x
CLOSE?	x	x	
OPEN	x		x
READ	x		x
TEST	x		x
WRITE	x		x
HP 44726A 2-Channel Arbitrary Waveform DAC			
APPLY DCV	x		x
APPLY PERC	x		x
APPLY WFM	x		x
DISABLE DAC	x		
DISABLE INTR	x		
ENABLE DAC	x		
ENABLE INTR	x		
FILTER	x		
NSCAN	x		x
SYNC	x		x
TARM	x		x
TARMED?	x	x	
TBASE	x		x
TEST	x		x
TRIG	x		x
WF?	x		
WFDELETE	x		x
WFMOD	x		x
WFPER?	x		
WFREAD	x		x
WFSIZE?	x		
WFTBASE?	x		

Commands by Functional Group



	SUBROUTINE	ALLOWED IN REMOTE	MODE CHANGE
WFWRITE ACV	x		x
WFWRITE ARB	x		x
WFWRITE BIN	x		x
WFWRITE RPV	x		x
WFWRITE SQV	x		x



HP 44727A/B/C 4-Channel DACs

APPLY DCI	x		x
APPLY DCV	x		x
APPLY PERC	x		x
SETTLE	x		x
TEST	x		x



HP 44730A Track/Hold with Signal Conditioning

HP 44732A 120 Ω Dynamic Strain Gage FET Multiplexer

HP 44733A 350 Ω Dynamic Strain Gage FET Multiplexer



AZERO	x		x
CAL	x		x
CLOSE	x		x
CLOSE?	x	x	x
CONF	x		x
CONFMEAS	x		x
FILTER	x		x
FUNC	x		x
GAIN	x		x
MEAS	x		x
NULL	x		x
OPEN	x		x
TRIG	x		x
USE	x		x



HP 44788A HP-IB Controller

ASSIGN	x		
AUTOST IS	x		
CAT	x		
CLEAR	x		
CREATE ASCII	x		
CREATE BDAT	x		
ENTER	x		
INITIAL	x		
INPUT	x		
MSI	x		
OUTPUT	x		



Commands by Functional Group

	SUBROUTINE	ALLOWED IN REMOTE	MODE CHANGE
PRINT	x		
PRINTER IS	x		
PURGE	x		
SPOLL	x		
TRIGGER	x		

LOGICAL OPERATORS

AND	x		
EXOR	x		
NOT	x		
OR	x		

BINARY FUNCTIONS

BINAND	x		
BINCMP	x		
BINEOR	x		
BINIOR	x		
BIT	x		
ROTATE	x		
SHIFT	x		

TRIGONOMETRIC OPERATIONS

ATN	x		
COS	x		
SIN	x		

MATH FUNCTIONS

+	x		
-	x		
*	x		
/	x		
^	x		
PI	x		
ABS	x		
DIV	x		
EXP	x		
FRACT	x		
INT	x		
LGT	x		
LOG	x		
MOD	x		
SGN	x		
SQR	x		

Commands by Functional Group

SUBROUTINE	ALLOWED IN REMOTE	MODE CHANGE
------------	----------------------	----------------

COMPARISON OPERATORS

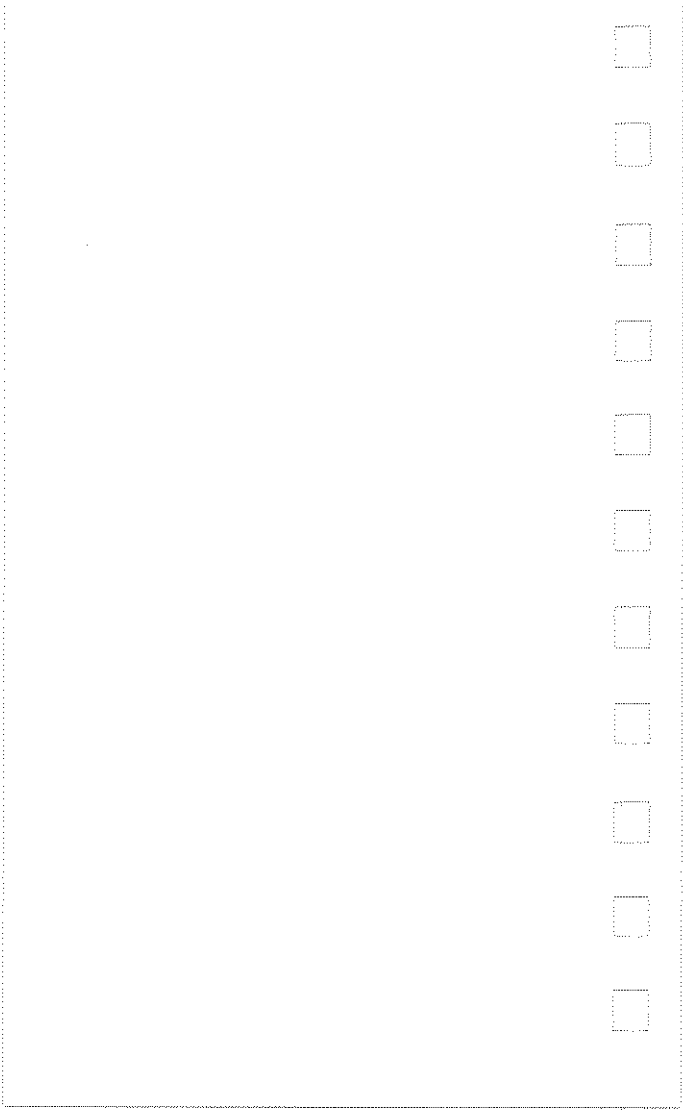
≡	X	
<	X	
>	X	
≠	X	
≡	X	
≡	X	

* ADDR can only be executed from the front panel and the mainframe must be in the local mode.

** Allowed in remote if executed as MONITOR .

*** The front panel CLEAR key is active while in remote.

**** Command can only be executed inside a subroutine.



0 1 2 3 4 5 6 7 8 9 A B C D E F

Using Interrupts

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Using Interrupts

Using Interrupts

Ongoing operation of the HP 3852A or the controller can be stopped by an accessory interrupt or by a real-time limit or alarm exception. All interrupts are serviced by the mainframe; however, both mainframe and controller handle interrupts.

Interrupt servicing is a two phase process. During phase 1, the HP 3852A's processor senses the interrupt and its source and sets the appropriate bit in the mainframe Status Register. If the mainframe's service request (SRQ) capability is enabled, an SRQ message is immediately sent to the controller.

When the interrupt source is an alarm (ALRM), the mainframe also disables the alarm which prevents it from causing another interrupt. This is equivalent to the user issuing the DISABLE ALRM command.

The first backplane interrupt that occurs will set the INTR Status Register bit indicating an accessory channel interrupt occurred. When this happens, the mainframe disables its backplane (e.g. accessory) interrupt sensing capability. This is equivalent to the user issuing the DISABLE INTR SYS command. Note that while this sensing capability is disabled, other accessory interrupts can occur which were not responsible for setting the bit in the status register. These interrupts will be detected during the polling routine of the accessories and accessory channels that occurs during phase 2 of the servicing routine.

Phase 2 begins when the mainframe first enters an idle state. An idle state is when the mainframe completes the command it was executing when the interrupt occurred or when it finishes the subroutine that was executing when the interrupt occurred. For interrupts where the source is an alarm or a limit that

Using Interrupts

was exceeded, phase 2 calls an HP 3852A subroutine (if) previously defined to respond to the interrupt.

For backplane (accessory) interrupts, phase 2 begins with a polling routine initiated by the mainframe to determine the specific accessory channel(s) on which there is an interrupt. The routine begins by polling the mainframe and each extender (if any) to determine the frame the interrupt came from. Once the frame is known, each slot is polled beginning with slot 0 and continuing in increasing order. Once the slot has been determined, each channel is polled beginning with channel 0. Once the interrupting channel is found, the mainframe disables its interrupt capability. This is equivalent to the user issuing `DISABLE INTR USE ch`, where `ch` is the channel that interrupted. At this point, the mainframe's backplane interrupt sensing capability temporarily disabled in phase 1 is re-enabled (equivalent to sending `ENABLE INTR SYS`). Phase 2 concludes by calling the HP 3852A subroutine defined to respond to the interrupt (if the mainframe is to handle the interrupt).

For alarm and limit interrupts handled by the controller and for error, mainframe ready, return to local, front panel service request, mainframe power loss, and data available interrupts, there is no phase 2 servicing on the part of the mainframe.

Interrupt Priorities

The interrupt with the highest priority is the interrupt which is serviced first. In an HP 3852A based system where the mainframe will also handle the interrupt, interrupt priority is as follows:

Using Interrupts

1. Alarm interrupts.
2. Backplane (accessory) interrupts.
3. Limit interrupts.

When interrupts are handled by the controller, interrupt priority is established by the controller.

Backplane Interrupt Priority

Recall that the phase 2 polling routine locates the interrupting channel by polling the mainframe, any extenders, each slot beginning with slot 0, then each channel beginning with channel 0. Thus the highest priority channel for an accessory interrupt is channel 0 in slot 0 of the mainframe.

Multiple Accessory Interrupts

When an interrupt occurs on an accessory channel and sets the bit in the status register, the mainframe disables its backplane interrupt sensing capability. While this capability is disabled, however, additional accessory interrupts may occur. The first channel interrupt encountered during the polling routine is serviced then handled by the mainframe or the controller. Once the interrupt has been handled, (i.e. the mainframe returns to an idle state) the polling routine begins again to locate another interrupt. Note that the routine starts at the beginning of the sequence and not where it stopped after the first channel interrupt was located. The polling routine is repeated until all accessory interrupts are located and serviced.

Since the polling routine restarts at the beginning once a channel interrupt is serviced and handled, it is possible that interrupts occurring on higher numbered

Using Interrupts

channels would not get serviced if interrupts on lower numbered channels occur frequently enough, thus resetting the polling sequence. Therefore, interrupts with a high priority or those which occur very infrequently should be enabled on the lower channels of an accessory with a low slot number.

Responding to Interrupts with the Mainframe

The HP 3852A mainframe can handle only those interrupts whose source is an alarm, limit, or accessory channel. To handle an interrupt from any of these sources, the following conditions must be set:

- Specify the accessory channel that is to interrupt with the USE command (accessory interrupts only).
- Enable the HP 3852A to respond to the interrupt by setting up a subroutine and sending the ON *event* CALL *name* command, where *event* is an alarm (ALRM), limit (LMT), or accessory (INTR) interrupt and *name* is an HP 3852A subroutine.
- Configure the accessory channel to interrupt on the specified condition.
- Set the alarm, set up limit testing, or enable the accessory channel to interrupt.
- Enable alarm interrupt capability, initiate limit testing, or enable the mainframe to sense a backplane interrupt.

Using Interrupts

Responding to Interrupts with a Controller

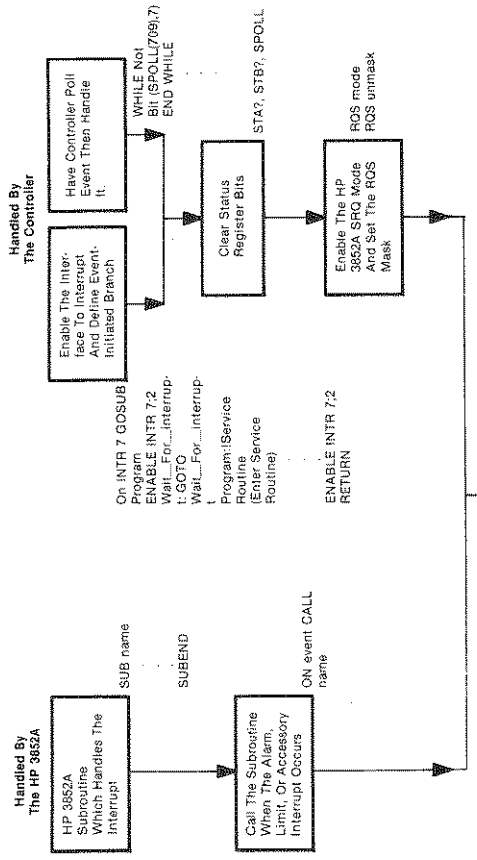
A controller can handle an HP 3852A interrupt from any source (see "The Status Register" as the bits represent HP 3852A interrupt sources). For the controller to handle an interrupt, the following conditions must be set:

- Provide and enable interrupt routines within the controller.
- Ensure the Status Register bit which represents the source of the interrupt is cleared.
- Enable HP 3852A SRQ capability with the RQS ON command.
- Unmask the appropriate bit(s) in the Status Register with the RQS command.
- Specify the accessory channel that is to interrupt with the USE command.
- Configure the accessory channel to interrupt on the specified condition.
- If the interrupt source is an alarm, limit, or accessory channel, set the alarm, set up limit testing, or enable the accessory channel to interrupt.
- Enable the alarm, initiate limit testing, or enable the mainframe to sense a backplane interrupt.
- Clear the service request bit (bit 6 in the Status Register) using STB? or the HP Series 200/300 SPOLL command so that the controller can respond to multiple interrupts.

The flowchart which follows summarizes the sequence of steps listed above which enable the mainframe or the controller to handle an interrupt.

HANDLING INTERRUPTS

6-6



Using Interrupts



SET INTERRUPT CONDITIONS AND EXCEPTIONS

HP 3852A Plug-In Accessories with Interrupt Capability:
 HP 44701A Integrating Voltmeter
 HP 44702AB 13-Bit High-Speed Voltmeter
 HP 44714A Stepper Motor Controller/Pulse Output
 HP 44715A 5-Channel Counter
 HP 44721A/44722A 16-Channel/8-Channel Digital Input
 HP 44723A 16-Channel High-Speed Digital Sense/Control
 HP 44726A 2-Channel Arbitrary Waveform DAC

Refer to the accessory manual for information on setting the appropriate interrupt condition.

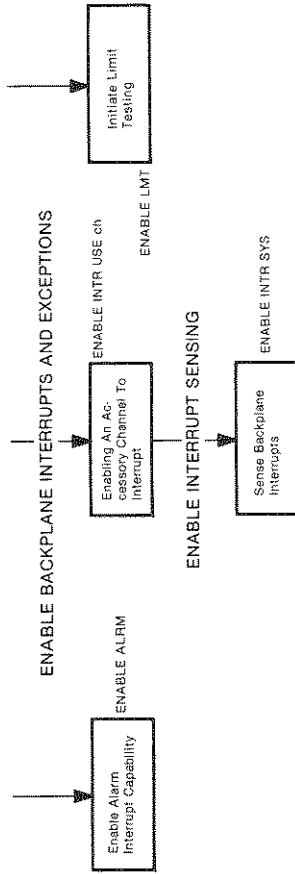
Set The Alarm

Set Up Limit Testing

LMT_{min} max
 order _zero
 (Real Time)

SET ALRM time

Using Interrupts



F. 8. 2



Using Interrupts

The Status Register

The mainframe's Status Register is a 16-bit register that constantly monitors interrupt conditions. Whenever an interrupt condition occurs, the appropriate bit in the Status Register is set true (1), and if the bit is unmasked, an SRQ message is sent to the controller. Status Register bit definitions are given below along with the decimal numbers and mnemonics used by the RQS command to unmask the bits.

Bit	Mnem	Dec	Condition
15-12	-	-	Not used.
11	ALRM	2048	Set when alarm occurs. Cleared by STA?
10	LMT	1024	Set when a limit is reached. Cleared by STA?
9	INTR	512	Set when an accessory interrupt occurs if ENABLE INTR SYS and ENABLE INTR [USE <i>ch</i>] are set. Cleared by STA?
8-7	-	-	Not used.
6	-	64	Service request bit, Set when RQS is ON and when any other bit in the status register is set. A serial poll (SPOLL) or STB? clears the bit.
5	ERR	32	Set when a programming or configuration error occurs. Execute ERR? or ERRSTR? until the error buffer is empty which then clears the bit.

Using Interrupts

4	RDY	16	Set when the mainframe input buffers (HP-IB, front panel) are empty and no command or subroutine is executing or being accepted. Bit is cleared when the mainframe is "busy".
3	LCL	8	Set when the mainframe is turned on or when the LOCAL key restores front panel control. Cleared by STA?
2	FPS	4	SET when the SRQ command is executed. Cleared by STA?
1	PWR	2	Set when the mainframe or an extender loses power. Cleared when power is restored.
0	DAV	1	Set when data is in the output buffer. Cleared by CLROUT or when data is read from the buffer.

Reading the Status Register

The RQS? Command

The RQS? command is used to determine which bits in the status register are unmasked. The command returns the weighted sum of all unmasked bits. Bit weights are the decimal values of the bits in the register as described previously. If RQS ON has been issued, 64 (bit 6) is included in the sum.

Using Interrupts

The STA? Command

The STA? command is used to determine which bits in the Status Register are set following interrupt conditions that have occurred. The command returns the weighted sum of all bits set in the register whether they are masked or unmasked. 64 (bit 6) is included in the sum if an SRQ message is being asserted when STA? is executed. When STA? is executed, the FPS, LCL, INTR, LMT, and ALRM bits are cleared.

The STB? Command

The STB? command reads the system status byte and is similar to the HP-IB Serial Poll command. STB? returns the weighted sum of all bits set in the register whether they are masked or unmasked. 64 (bit 6) is included in the sum if an SRQ message is being asserted when STB? is executed. When STB? is executed, bit 6 in the Status Register is also cleared. Since STB? returns a status "byte", the INTR, LMT, and ALRM bits are represented by a single bit in the byte. The bit definitions for the status byte are given below:

Bit	Mnem	Dec	Condition
7	INTR LMT ALRM	128	Set by a channel interrupt or by a limit or alarm exception
6	-	64	Set when any other bit is set and if RQS ON has been issued.
5	ERR	32	Set when a programming or configuration error occurs.
4	RDY	16	Set when input buffer is empty and no commands are executing.*

Using Interrupts

3	LCL	8	Set when mainframe is turned on, reset, cleared, or when front panel control is restored.
2	FPS	4	Set when the SRQ command is executed.
1	PWR	2	Set when the mainframe or extender loses power.
0	DAV	1	Set when data is in the output buffer.

* STB? always returns a 0 for the RDY bit since the HP 3852A is busy when STB? is executing. (This is not true for an HP-IB serial poll.)



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Useful Tables

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Useful Tables

Executing CONF is equivalent to executing the following voltmeter, counter, or digital input accessory commands in the sequence shown. These accessory configurations can be subsequently altered by their respective low level commands.

Table 1. HP 44701A and HP 44702A/B Parameters set with the CONF Command

HP 44701A Integrating Voltmeter			
Command	Description	Preset Value	Notes
STRIG	Scan trigger source	SCAN	
SADV	Scan advance source	SCAN	
TRIG	Trigger mode	HOLD	
DELAY	Measurement delay	set by CONF	[a]
AZERO	Autozero	ON	
FUNC	Measurement function	set by CONF	[b]
RANGE	Voltmeter range	AUTO	[c]
TERM	Input terminals	BOTH	
NRDGS	Number of readings	1	
NPLC	Power line cycles	1	
OCOMP	Offset compensation	OFF	
DISABLE INTR	Disable interrupt	disabled	

[a] = Built-in default delays based on function/range/NPLC

[b] = Function set depends on function parameter of CONF command.

[c] = For mainframe firmware revisions 2.2 and greater, CONF TEMPtype sets RANGE AUTO. For earlier firmware revisions, the 30 mV range is selected for B, N28, R, S, and T type thermocouples, and the 300 mV range is selected for E, J, K, and N14 thermocouples.

Useful Tables

Table 1. HP 44701A and HP 44702A/B Parameters set with the CONF Command (Cont'd)

HP 44702A/B High-Speed Voltmeter (System Mode)

Command	Description	Preset Value	Notes
STRIG	Scan trigger source	SCAN	
SADV	Scan advance source	SCAN	
TRIG	Trigger mode	HOLD	
FUNC	Measurement function	set by CONF	[a]
RANGE	Voltmeter range	AUTO	[b]
TERM	Input terminals	INT	
NRDGS	Number of readings	1	
RDGS	Reading destination	SYS	
RDGSMODE	Interrupt condition	DAV	
ARMODE	Autorange mode	AFTER	
DELAY	Trig delay/sample rate	1 ms/10 μ s	[c]
AZERO	Autozero mode	ONCE	

[a] = Function set depends on function parameter of CONF command.

[b] = For mainframe firmware revisions 2.2 and greater, CONF TEMPTtype sets RANGE AUTO. For earlier firmware revisions, the 40 mV range is selected for B, N28, R, S, and T type thermocouples, and the 320 mV range is selected for E, J, K, and N14 thermocouples.

[c] = OHMIM and OHMFIM functions set a 6 msec delay.

Useful Tables

Table 1. HP 44701A and HP 44702A/B Parameters set with the CONF Command (Cont'd)

HP 44702A/B High-Speed Voltmeter (Scanner Mode)			
Command	Description	Preset Value	Notes
SADV	Scan advance source	SCAN	
STRIG	Scan trigger source	SCAN	
SCTRIG	Scan trigger (Scanner Mode)	HOLD	
TRIG	Measure trigger mode	INT	
STTRIG	Stop trigger source	INT	
FUNC	Measurement function	set by CONF	[a]
RANGE	Voltmeter range	AUTO	[b]
TERM	Input terminals	RIBBON	
NRDGS	Number of readings	1	
RDGS	Reading destination	SYS	
RDGSMODE	Interrupt condition	DAV	
ARMODE	Autorange mode	AFTER	
ASCAN	Autoscan mode	OFF	
SCDELAY	Scan trigger delay	1 ms	[c]
SPER	Sample period	1 ms	[c]
PRESCAN	Scans before stop trig	1	
POSTSCAN	Scans after stop trig	0	
AZERO	Autozero mode	ONCE	

[a] = Function set depends on function parameter of CONF command.

[b] = For mainframe firmware revisions 2.2 and greater, CONF TEMType sets RANGE AUTO. For earlier firmware revisions, the 40 mV range is selected for B, N28, R, S, and T type thermocouples, and the 320 mV range is selected for E, J, K, and N14 thermocouples.

[c] = OHM1M and OHMF1M set a 6 msec scan trigger delay and a 6 msec sample period.

Useful Tables

Table 2. HP 44715A Parameters set with the CONF Command

All Functions Except FREQ			
Command	Description	Preset Value	Notes
TRIG	Counter trigger mode	HOLD	
FUNC	Counter function	set by CONF	[a]
TERM	Counter input terminals	ISO	
EDGE	Counted/gated edge	HL,HL	
NPER	Measurement period/reset	10	
CNTSET	Start count/rollover	0	[b]
DISABLE INTR	Disable interrupt	Disabled	
SPER	Sample period	1 μ s	

[a] = TBASE = AUTO is also set. TBASE is specified for the PER and PERD functions only.

[b] = Command applies to the TOTAL function only.

FREQ Function

Command	Description	Preset Value
TRIG	Counter trigger mode	HOLD
TBASE	Time base	AUTO
TERM	Counter input terminals	ISO
EDGE	Counted/gated edge	HL
DISABLE INTR	Disable interrupt	Disabled
SPER	Sample period	1 μ s

Table 3. HP 44721A and HP 44722A Parameters set with the CONF Command

Command	Description	Preset Value	Notes
DISABLE INTR	Disable interrupt	Disabled	
EDGE	Count/interrupt edge	LH	
CNTSET	Begin count/rollover	0	[a]

[a] = Set for the TOTAL function only.

Useful Tables

If the MEAS command detects that certain voltmeter parameters are incompatible for the measurement function specified, the voltmeter is re-configured as necessary and autorange is set. Additionally, MEAS checks/changes the following voltmeter parameters (some of which are set by CONF).

Table 4. Voltmeter Parameters Checked/Changed by the MEAS Command

HP 44701A Integrating Voltmeter

Function	Setting
TRIG	TRIG HOLD or TRIG AUTO is changed to TRIG SCAN.
DISABLE INTR	DISABLE INTR is set.

HP 44702A/B High-Speed Voltmeter (System Mode)

Function	Setting
TRIG	TRIG HOLD or TRIG INT is changed to TRIG SCAN.
TERM	TERM ZERO is changed to TERM INT.
DISABLE INTR	DISABLE INTR is set if RDGS SYS is set.

Useful Tables

Table 4. Voltmeter Parameters Checked/Changed by the MEAS Command (Cont'd)

HP 44702A/B High-Speed Voltmeter (Scanner Mode)	
Function	Setting
TERM	TERM ZERO is changed to TERM RIBBON.
SCTRIG	SCTRIG HOLD or SCTRIG INT is changed to SCTRIG SCAN if TERM EXT or TERM INT is set. SCTRIG HOLD or SCTRIG SCAN is changed to SCTRIG INT if TERM RIBBON is set.
TRIG	TRIG HOLD is changed to TRIG INT.
STTRIG	STTRIG INT is set.
PRESCAN	PRESCAN 1 is set.
POSTSCAN	POSTSCAN 0 is set.
DISABLE INTR	DISABLE INTR is set if RDGS SYS is set.

Useful Tables

If the MONMEAS command detects that certain voltmeter parameters are incompatible for the measurement function specified, the voltmeter is re-configured as necessary and autorange is set. Additionally, MONMEAS checks/changes the following voltmeter parameters (some of which are set by CONF).

Table 5. Voltmeter Parameters Checked/Changed by the MONMEAS Command

HP 44701A Integrating Voltmeter

Function	Setting
TRIG	TRIG SGL is set.
DISABLE INTR	DISABLE INTR is set.

HP 44702A/B High-Speed Voltmeter (System Mode)

Function	Setting
TRIG	TRIG SGL is set.
TERM	TERM ZERO is changed to TERM INT.
RDGS	RDGS SYS is set.
RDGSMODE	RDGSMODE DAV is set.
NRDGS	NRDGS 1 is set.
DISABLE INTR	DISABLE INTR is set.

Useful Tables

Table 5. Voltmeter Parameters Checked/Changed by the MONMEAS Command (Cont'd)

Function	Setting
SCTRIG	SCTRIG SGL is set.
TRIG	TRIG INT is set.
STTRIG	STTRIG INT is set.
TERM	TERM ZERO is changed to TERM RIBBON.
PRESCAN	PRESCAN 1 is set.
POSTSCAN	POSTSCAN 0 is set.
RDGS	RDGS SYS is set.
RDGSMODE	RDGSMODE DAV is set.
NRDGS	NRDGS 1 is set.
DISABLE INTR	DISABLE INTR is set.

Useful Tables

Table 6. HP 3852A Data Formats

Format	Name	Representation
IASC	Short ASCII Integer	<div style="border: 1px solid black; padding: 2px; display: inline-block; margin-bottom: 5px;"> Bytes 0-5 Bytes 6-7 </div> <p>Bytes 0-5: integer number, includes (-) sign and/or preceding spaces. Bytes 6-7: CR/LF Display Format: - 12345 Range: - 32768 to 32767</p>
LASC	Long ASCII Integer	<div style="border: 1px solid black; padding: 2px; display: inline-block; margin-bottom: 5px;"> Bytes 0-10 Bytes 11-12 </div> <p>Bytes 0-10: integer number, includes (-) sign and/or preceding spaces. Bytes 11-12: CR/LF Display Format: - 1234567890 Range: - 2147483646 to 2147483647</p>
RASC	Real ASCII Number	<div style="border: 1px solid black; padding: 2px; display: inline-block; margin-bottom: 5px;"> Byte 0 Bytes 1-6 Byte 9 Bytes 10-12 Bytes 13-14 </div> <p>Byte 0: (-) sign or space Bytes 1-8: normalized 7-digit mantissa Byte 9: E Bytes 10-12: sign and 2-digit exponent Bytes 13-14: CR/LF Display Format: - 1.234567E + 12 Range: - 1.000000E + 38 to - 1.000000E - 37, 0, + 1.000000E - 37 to + 1.000000E + 38</p>
DASC	Double Real ASCII Number	<div style="border: 1px solid black; padding: 2px; display: inline-block; margin-bottom: 5px;"> Byte 0 Bytes 1-17 Byte 18 Bytes 19-22 Bytes 23-24 </div> <p>Byte 0: (-) sign or space Bytes 1-17: normalized 16-digit mantissa Byte 18: E Bytes 19-22: sign and 3-digit exponent Bytes 23-24: CR/LF Display format: - 1.234567890123456E + 123 Range: - 1.797693134862315E + 308 to - 2.225073858507202E - 307, 0, + 2.225073858507202E - 307 to + 1.797693134862315E + 308</p>
IN16	16-Bit Integer	<div style="border: 1px solid black; padding: 2px; display: inline-block; margin-bottom: 5px;"> 16-bit 2's Complement Integer </div>
RLB4	64-Bit Real Number	<div style="border: 1px solid black; padding: 2px; display: inline-block; margin-bottom: 5px;"> Significant Exponent Significant Exponent Significant </div>
PACK	Packed Data	Accessory Dependent Format.

Useful Tables

Table 7. Packed Data Conversion Routines (Cont'd)

Assembly	Comment	Function	Bill Pattern	Conversion Formula and Routine
				327 DAI 2,3,4,5,32,74, 328 REAR 2,3, 329 M,32,74, 330 F FPK <0 OR M = 4029 THEN 331 SET 332 TURS 1,1 = 3E 333 V = M - 025888MAGDSHFTPEAK,32,31 334 M = 025888MAGDSHFTPEAK,32,31 335 RETURN Y 336 END 337
				Routine CHMTRK,CHMTRK Change Line 385 in 320V Routine to 385 Y = M - 025888MAGDSHFTPEAK,32,31/60 Routine CHMCHMTRK,CHMCHMTRK Change Line 386 in 320V Routine to 386 Y = M - 025888MAGDSHFTPEAK,32,31/60 Routine CHMTRK,CHMTRK Change Line 389 in 320V Routine to 389 Y = M - 025888MAGDSHFTPEAK,32,31/60/2001

Useful Tables

Table 7. Packed Data Conversion Routines (cont)

Accessory	Command	Function	Bit Pattern	Conversion Formula and Routine
HP 4127A, HP 4172A, HP 4172B, HP 4172BA	CLOSE?	-	Byte 0: 0x Byte 1: 1 or 0 on bit 0 indicates input level on the sampling channel Bits 2-7: Complement Integer	-
HP 4172A, HP 4172B, HP 4172BA	READ	-	Byte 0: always 0x for the HP 4172A and HP 4172BA Bits 2-7: Complement Integer	-
HP 855A Mainframe	MODE?, MODE, EXTEND?, RST?, RST, STAT, STATE?, STB?, USE?	-	Returns seven readings in the above format	-
HP 855A Mainframe	EXTEND?	-	Returns two readings in the above format	-
HP 855A Mainframe	STAT?	-		-
HP 855A Mainframe	MODE, CONV, POWER?, SCALE STAT, TIME, USE?/SAVE	-		-
HP 855A Mainframe	SIZE: MODE?	-	Bits 2-7: Complement Integer	320 WATER PAK(0:3) • MAINFRAME SIZE? OR INDEX? COMMAND 270 ENTER JOB USING "A.W." Pack 1 280 PRINT PWR(2,...,congprodPack0) Pack 1(1) 300 DEF FN(32,...,congprodTEER Pack0) Pack 1(1) 310 PWR(2,...,congprodPack0) Pack 1(1) 320 PWR(0) Pack 1(0) Pack 1(0) Pack 1(0)
HP 855A Mainframe	READ	-	Determined by the Data Post	-

Useful Tables

Table 8. Multiplexer Channel Ranges and Definitions

This table contains channel ranges and definitions for the HP 3852A multiplexer accessories.

**HP 44705A/HP 44705H/HP 44709A
(20-Channel Multiplexers)**

Channel Range	Definitions
0 - 9	Bank A Switches
10 - 19	Bank B Switches
90	Isolation Relays (HP 44709A only)
91	Sense Bus Tree Switch (Bank A)
92	Sense Bus Tree Switch (Bank B)
93	Source Bus Tree Switch (Bank A)
94	Source Bus Tree Switch (Bank B)

HP 44706A (60-Channel Multiplexer)

Channel Range	Definitions
0 - 59	Bank Switches/Sense Bus Tree Switch
91	Source Bus Tree Switch

**HP 44708A/HP 44708H/HP 44710A
(20-Channel Multiplexers/TC)**

Channel Range	Definitions
0 - 9	Bank A Switches
10 - 19	Bank B Switches
90	Isolation Relays (HP 44710A only)
91	Sense Bus Tree Switch (both banks)
92	Sense Bus Tree Switch (thermistor)
93	Source Bus Tree Switch (thermistor)
94	Source Bus Tree Switch (both banks)

Useful Tables

Table 8. Multiplexer Channel Ranges and Definitions (Cont'd)

HP 44711A/HP 44713A (24-Channel Multiplexers)	
Channel Range	Definitions
0 - 11	Bank A Switches
12 - 23	Bank B Switches
90	Isolation Relays
91	Source Bus Tree Switch (Bank A or Bank B)
92	Sense Bus Tree Switch (Bank A or Bank B)
93	2-Wire Ohms Configuration
94	4-Wire Ohms Configuration

HP 44712A (48-Channel Multiplexer)	
Channel Range	Definitions
0 - 47	Bank Switches
90	Isolation Relays
91	Source Bus Tree Switch
92	Sense Bus Tree Switch
93	2-wire ohms configuration

HP 44717A/HP 44718A/HP 44719A/HP 44720A (20-Channel Multiplexers-Strain Gage)	
Channel Range	Definitions
0 - 9	Bridge Completion Channels
10	Bridge Excitation Voltage Diagnostic
11 - 12	Shunt Verification Diagnostic
13	Gage Isolation Diagnostic
14	Guard Voltage Diagnostic
15 - 16	Internal Half Bridge Voltage Diagnostic
17 - 19	Leadwire Resistance Diagnostic
90	FET Isolation Relay
91	Volts Tree Relay/Switch
94	Resistance Tree Relay/Switch

Useful Tables

**Table 8. Multiplexer Channel Ranges
and Definitions (Cont'd)**

**HP 44730A/HP 44732A/HP 44733A
(4-Channel Track/Hold/Strain Gage
Multiplexers)**

Channel Range	Definitions
0 - 3	User Inputs
4 - 7	Excitation Voltages
90	Isolation Relay

Useful Tables

Table 9 shows the power-on state for the HP 3852A mainframe.

Table 9. HP 3852A Mainframe Power-On State

Front Panel/HP-IB Modes

- Display Modes: - DISP ON,
FASTDISP ON,
MON ON
- Keyboard Modes: - LOCK OFF,
BEEP ON
- HP-IB Modes: - BLOCKOUT OFF,
FASTOUT OFF,
SYSOUT OFF

Rear Panel BNC Ports

- EVENT IN: - disabled (enabled by
WAIT FOR event)
- CHANNEL ADVANCE: - disabled (enabled by
STRIG CHADV or
SADV CHADV)
- CHANNEL CLOSED: - idle (outputs a
negative-going TTL
level pulse when a
channel is closed)
- SYSTEM TRIGGER IN: - disabled (enabled by
TRG EXT)
- PACER OUT: - idle (sends
continuous pulse
train, 500 ns negative
going pulses
occurring every 1 μ s
when pacer trigger is
received)
- PACER TRIGGER IN: - disabled (enabled by
PTRIG EXT)

Useful Tables

**Table 9. HP 3852A Mainframe
Power-On State (Cont'd)**

Internal

- MEMORY:** - all memory is cleared except HP-IB address, POWEROFF state, and the LCL bit in the Status Register
- SYSTEM TRIGGER:** - disabled (see TRG)
- REAL TIME CLOCK:** - not affected (ALRM and CALENDAR is disabled)
- SERVICE REQUEST MODE (RQS):** - enabled
- BUFFERS:** - input buffer, output buffer, and error buffer are cleared
- BUFFER MODES:** - INBUF OFF, OUTBUF OFF
- USE Channel:** - the lowest slot number and accessory channel number in that slot for which the USE command is valid

Useful Tables

**Table 10. HP 3852A Plug-In Accessory
Power-On States**

NOTE

The Relative Power Consumption shown for each accessory applies to an HP 3852A or HP 3853A with power supply part number 03852-66212. See the HP 3852A Mainframe Manual for power limitations when power supply part number 03852-66202 is used.

HP 44701A Integrating Voltmeter

PARAMETER	SETTING
ARANGE	ON
AZERO	ON
DELAY	variable
FUNC	DCV
Interrupt Capability	disabled
NPLC	1 (based on a 60 Hz line frequency)
NRDGS	1
OCOMP	OFF
RANGE	AUTO
TERM	EXT
TRIG	HOLD

HP 44701A Relative Power Consumption = 1.2

HP 44702A/B High-Speed Voltmeter

SYSTEM MODE		SCANNER MODE	
PARAMETER	SETTING	PARAMETER	SETTING
ARMODE	AFTER	ARMODE	AFTER
DELAY	0 μ s trig-delay	ASCAN	OFF
	10 μ s sample____period	FUNC	DCV
FUNC	DCV	Interrupts	disabled
Interrupts	disabled	NRDGS	1 (without TERM RIBBON)
NRDGS	1	PERC	0%
PERC	0%	POSTSCAN	0
RANGE	AUTO	PRESCAN	1
RDGS	SYS	RANGE	AUTO
RDGSMODE	DAV	RDGS	SYS
SCANMODE	OFF	RDGSMODE	DAV
SLOPE	LH	SCANMODE	OFF
TERM	EXT	SCDELAY	0 ms trig_delay
TRIG	HOLD		2 ms scan_pace

Useful Tables

**Table 10. HP 3852A Plug-In Accessory
Power-On States (Cont'd)**

SCSLOPE	LH
SCTRIG	HOLD
SLOPE	LH
SPER	10 μ s
STSLOPE	LH
SSTRIG	INT
TERM	EXT
TRIG	INT

HP 44702A/B Relative Power Consumption = 1.5

HP 44705A 20-Channel Relay Multiplexer
HP 44705H 20-Channel High-Voltage Relay Multiplexer
HP 44708A 20-Channel Relay Multiplexer/TC
HP 44708H 20-Channel High-Voltage Relay Multiplexer/TC
HP 44717A 10 Bridge 120 Ω Static Strain Gage Relay Multiplexer
HP 44718A 10 Bridge 350 Ω Static Strain Gage Relay Multiplexer

All Bank Switches Open
All Tree Switches Open

HP 44705A, HP 44705H, HP 44708A,
HP 44708H, HP 44717A, and HP 44718A
Relative Power Consumption = 0.1

HP 44706A 60-Channel Relay Multiplexer

All Bank Switches Open
All Tree Switches Open

HP 44706A Relative Power Consumption = 0.1

Useful Tables

**Table 10. HP 3852A Plug-In Accessory
Power-On States (Cont'd)**

HP 44709A 20-Channel FET Multiplexer
HP 44710A 20-Channel FET Multiplexer/TC
HP 44719A 10 Bridge 120 Ω Static Strain Gage FET
Multiplexer
HP 44720A 10 Bridge 350 Ω Static Strain Gage FET
Multiplexer

All Bank Switches Open
All Tree Switches Open
Isolation Relay Open

HP 44709A, HP 44710A, HP 44719A, and
HP 44720A Relative Power Consumption = 0.1

HP 44711A 24-Channel High-Speed FET Multiplexer
HP 44713A 24-Channel High-Speed FET Multiplexer/TC

All Bank Switches Open
All Tree Switches Open
Isolation Relay Open

HP 44711A and HP 44713A Relative Power Con-
sumption = 0.1

HP 44712A 48-Channel High-Speed FET Multiplexer

All Bank Switches Open
All Tree Switches Open
Isolation Relay Open

HP 44712A Relative Power Consumption = 0.1

Useful Tables

**Table 10. HP 3852A Plug-In Accessory
Power-On States (Cont'd)**

**HP 44714A 3-Channel Stepper Motor
Controller/Pulse Output**

PARAMETER	SETTING
STANDBY	AUTO HI
PULSE	SS LO LO
PROFILE	FREQ 0 Hz (min) 250 Hz (max) 500 Hz/sec (slope) 50 μ s (dual)
PSCALE	1.0
DELAY	0 s
TRIG	AUTO
HALT	LO
HARDLIM	LO LO
SOFTLIM	OFF OFF
QSCALE	1.0
QINDEX	OFF
Interrupt Capability	disabled
HP 44714A Relative Power Consumption = 0.3	

Useful Tables

**Table 10. HP 3852A Plug-In Accessory
Power-On States (Cont'd)**

HP 44715A 5-Channel Counter/Totalizer	
PARAMETER	SETTING
CNTSET	0
EDGE	LH
FUNC	TOTAL
Interrupt Capability	disabled
NPER	10
SPER	1 μ s
TBASE	AUTO
TERM	ISO
TRIG	HOLD
HP 44715A Relative Power Consumption = 0.8	
HP 44721A 16-Channel Digital Input HP 44722A 8-Channel Digital Input	
PARAMETER	SETTING
CNTSET	0
EDGE	OFF
Interrupt Capability	disabled
HP 44721A and HP 44722A Relative Power Consumption = 0.3	
HP 44723A 16-Channel High-Speed Digital Sense/Control	
PARAMETER	SETTING
EDGE	OFF
PATTERN	EQU,0,0
TRIGMODE	ALL
TRIG	INT
SRTRIG	INT
RDGSMODE	IMMED
Interrupt Capability	disabled
HP 44723A Relative Power Consumption = 0.7	

Useful Tables

**Table 10. HP 3852A Plug-In Accessory
Power-On States (Cont'd)**

HP 44724A 16-Channel Digital Output

All Channels Open

HP 44724A Relative Power Consumption = 0.2

HP 44725A 16-Channel General Purpose Switch

All Channels in Normally Closed (NC) State

HP 44725A Relative Power Consumption = 1.0

**HP 44726A 2-Channel Arbitrary Waveform
DAC**

PARAMETER	SETTING
DAC Output	enabled - 0V
FILTER	OFF
Interrupt Capability	disabled
NSCAN	CONT
SYNC	HOLD
TARM	OFF
TRIG	INT

HP 44726A Relative Power Consumption = 1.1

Useful Tables

**Table 10. HP 3852A Plug-In Accessory
Power-On States (Cont'd)**

HP 44727A/B/C 4-Channel DACs

PARAMETER	SETTING
SETTLE	74.5472 ms

All Channels Open

Voltage/Current Output:

0 for 0V to +10V or -10V to +10V range

0 for 0 mA to 20 mA range

4 mA for 4 mA to 20 mA range

HP 44727A/B/C Relative Power Consumption: 1.4

HP 44728A 8-Channel Relay Actuator

All Channels in Normally Closed (NC) State

HP 44728A Relative Power Consumption = 0.5

HP 44729A 8-Channel Power Controller

All Channels Open

HP 44729A Relative Power Consumption = 0.9

Useful Tables

**Table 10. HP 3852A Plug-In Accessory
Power-On States (Cont'd)**

**HP 44730A/HP 44732A/HP 44733A
Track/Hold/Strain Gage Multiplexers**

PARAMETER	SETTING
FILTER	OFF
FUNC	AMPLIFY
GAIN	1
TRIG	RIBBON

All channel inputs open
Isolation relay open

HP 44730A Relative Power Consumption = 1.0

HP 44732, HP 44733A Relative Power Consumption = 1.1

HP 44788A HP-IB Controller

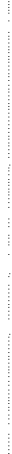
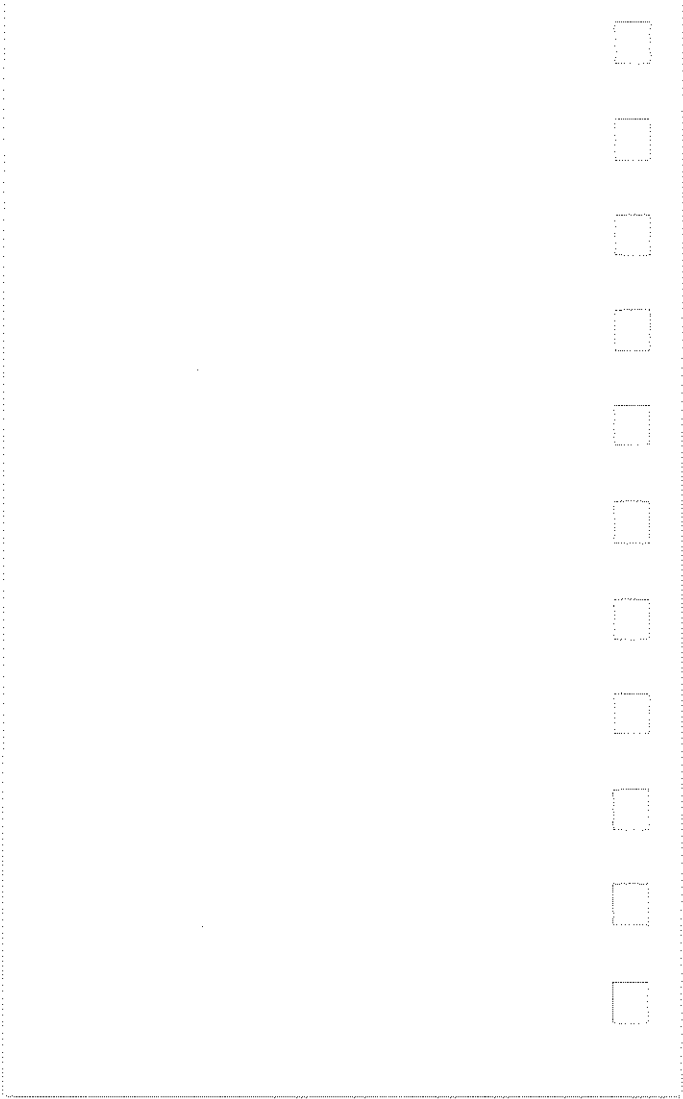
PARAMETER	SETTING
------------------	----------------

PRINTER ISI (HP 3852A display)

MSI":,S00,0,0" (S = lowest numbered slot an
HP-IB Controller is installed. Cannot be slot 0.
Device selector = S00, unit number = 0, volume
number = 0)

ASSIGN	FORMAT ON
EOL	ON

HP 44788A Relative Power Consumption = 0.1



Error Messages

Error Messages.....8-1

Error Messages

An error message is displayed when a command specifies a parameter, defines a condition, or sets an operating state that is not allowed or recognized by the HP 3852A. Error messages consist of an error code and a message. Messages have the format

ERROR dd: command: message, where:

dd = a two digit error code.

command = command which caused error to occur. (Command appears only if it is syntactically correct.)

message = message for the corresponding error code. The string of characters which caused the error is appended to the message. Message also includes additional information describing the error.

Error Code	Message	Description
0	NO ERROR	No error messages in the buffer when the error buffer is read.
1	OUT OF MEMORY	Not enough memory to do command listed in the error message.
2	SYMBOL TOO LONG	Array, variable, subroutine name, or displayed message is too long. Number specified is too long.
3	BAD NUMBER FORMAT	Number incorrectly specified (e.g. 1+.).

Error Messages

- | | | | |
|----|---------------------|--|--------------------------|
| 4 | SYNTAX | Parameter specified is not a valid word, number, or character for that particular command. | <input type="checkbox"/> |
| 5 | SUBEND WITHOUT SUB | SUBEND command was encountered before the SUB command. | <input type="checkbox"/> |
| 6 | MISSING FOR | NEXT statement was encountered before the FOR statement. | <input type="checkbox"/> |
| 7 | NOT ALLOWED IN SUB | A command not allowed within a subroutine was encountered when the subroutine is being loaded. | <input type="checkbox"/> |
| 8 | ALLOWED ONLY IN SUB | Command allowed only within a subroutine was entered outside a subroutine. | <input type="checkbox"/> |
| 9 | SUB CODE TOO LONG | Not enough available memory for the subroutine currently being entered. | <input type="checkbox"/> |
| 10 | SUB WAS DELETED | Subroutine that was called was previously deleted. | <input type="checkbox"/> |
| 11 | NO ACTIVE SUB | A subroutine was stepped or continued before it was paused or set up to be stepped. | <input type="checkbox"/> |

Error Messages

- | | | |
|----|---|--|
| 12 | CANNOT RETYPE
A VARIABLE | Variable or array was assigned a format different from its original format. |
| 13 | MISSING IF | END IF or ELSE statement was encountered before the IF statement. |
| 14 | MISSING WHILE | END WHILE statement is encountered before the WHILE statement. |
| 15 | IMPROPER
FOR/NEXT
MATCHING | Loop counter variable names not the same (e.g. FOR I...NEXT J). |
| 16 | SUBSCRIPT OUT
OF BOUNDS | Reading or writing to an array element greater than its maximum index. |
| 17 | END OF
COMMAND
INSIDE STRING | Message associated with the DISP command does not have ending quotes. |
| 18 | SYSTEM ERROR | Internal processor is in an illegal state. |
| 19 | INVALID CHAR
RECEIVED | Programming character not recognized by the HP 3852A. |
| 20 | COMMAND
BUFFER
OVERFLOW | Too many parameters are specified or the parameter is specified by a complex numeric expression. |

Error Messages

- | | | | |
|----|--------------------------|---|--------------------------|
| 21 | TOO MANY
ARGS | Command used with multiple accessories where too many parameters are specified for that particular accessory. | <input type="checkbox"/> |
| 22 | CANNOT
EXECUTE | Command cannot be executed as the HP 3852A is in local lockout. | <input type="checkbox"/> |
| 23 | SETTINGS
CONFLICT | Command specifies a condition that is incompatible with the previously programmed accessory state. | <input type="checkbox"/> |
| 24 | ARGUMENT OUT
OF RANGE | Parameter value specified is out of the valid range. | <input type="checkbox"/> |
| 25 | DEVICE FAILURE | Hardware failure. | <input type="checkbox"/> |
| 26 | POWER ON
TEST FAILURE | Mainframe or an accessory failed the power on self test. | <input type="checkbox"/> |
| 27 | SELF TEST
FAILED | Mainframe or an accessory failed the self test initiated by the TEST command. This message may occur if the self test is performed on an accessory that was installed with the power on. The HP 44701A may fail if the voltmeter is busy when the TEST command is issued. | <input type="checkbox"/> |

Error Messages

- | | | |
|----|--------------------------------|---|
| 28 | INVALID SLOT | Slot address is incorrectly specified. |
| 29 | SPURIOUS FAST SCAN INTERRUPT | Can occur when the HP 44702A/B is installed with HP 3852A or HP 3853A power on, or may indicate a possible hardware failure. |
| 30 | SPURIOUS NORMAL SCAN INTERRUPT | Can occur when the HP 44701A is installed with HP 3852A or HP 3853A power on, or may indicate a possible hardware failure. |
| 31 | INVALID COMMAND FOR ACCESSORY | Command is not used by the accessory whose slot or channel address was specified. Can also occur if a high-speed multiplexer is used for a backplane measurement while the ribbon cable is connected. |
| 32 | NO ACCESSORY PRESENT | Syntactically correct command is sent to an empty slot. |
| 33 | INVALID CHANNEL | Channel address is incorrectly specified. |
| 34 | INVALID REGISTER | Register address is incorrectly specified. |

Error Messages

- | | | | |
|----|--------------------------------|---|--------------------------|
| 35 | DIFFERENT
PACKED TYPES | Data cannot be stored into a PACKED array containing readings with a different bit pattern or whose bytes per reading are not the same. | <input type="checkbox"/> |
| 36 | DATA LOST DUE
TO FORMAT | Magnitude of the data returned cannot be represented in the format specified. | <input type="checkbox"/> |
| 37 | TRIGGER TOO
FAST | Not reported. | <input type="checkbox"/> |
| 38 | CHECK POWER | An HP 3853A Extender is powered down or there are fluctuations in the line power. | <input type="checkbox"/> |
| 39 | MEMORY LOST | Occurs at power-on. Battery backed up memory lost power while the instrument was off. | <input type="checkbox"/> |
| 40 | CANNOT
EXECUTE IN
REMOTE | Command entered from the front panel cannot be executed while the HP 3852A is in remote. | <input type="checkbox"/> |
| 41 | CAN EXECUTE
FROM FP ONLY | Command sent over the HP-IB can only be entered and executed from the front panel. | <input type="checkbox"/> |
| | | | <input type="checkbox"/> |

Error Messages

- | | | |
|----|----------------------------------|---|
| 42 | MATH ERROR | Indicates one of the following conditions: Real overflow, Real underflow, divide by zero, Integer overflow, SIN or COS argument, logarithm argument, square root argument, invalid Real number, BCD conversion, TYPE conversion. |
| 43 | END OF ARRAY REACHED | Amount of data written to the array is greater than the size of the array; however, the condition could not have been detected previously by the main-frame (e.g. error code 44). Error message is usually associated with real-time and post processing limit testing. |
| 44 | NOT ENOUGH VARIABLE SPACE | Array is not large enough or starting index is at a position where there isn't enough room left to store the data. |
| 45 | ARRAY NOT REAL | The domain and range arrays associated with the CONV command must be REAL arrays. |

Error Messages

- | | | | |
|----|----------------------|--|--------------------------|
| 46 | VARIABLE NOT DEFINED | Channel logging or real-time limit testing was enabled (ENABLE LOGCHAN, ENABLE LMT) before the necessary arrays were defined (LOGCHAN, LMT). | <input type="checkbox"/> |
| 47 | PACKED NOT ALLOWED | A packed array cannot be written into via the command. | <input type="checkbox"/> |
| 48 | ARRAY SIZES DIFFER | When performing post processing data conversions (CONV), the domain and range arrays must be the same size. | <input type="checkbox"/> |
| 49 | DATA OUT OF BOUNDS | Data associated with post processing data conversions (CONV) is outside the domain array. | <input type="checkbox"/> |
| 50 | EMPTY ARRAY | Referencing or reading from a deleted array. Also occurs when you read a packed array that has not been written to. | <input type="checkbox"/> |
| 51 | SYMBOL TABLE FULL | Too many variables, arrays, and subroutines are presently defined. | <input type="checkbox"/> |
| 52 | SCAN IN PROGRESS | Voltmeter configuration cannot be changed while it's scanning a list of channels. | <input type="checkbox"/> |

Error Messages

<input type="checkbox"/>	53	NO SCAN LIST	The list of channels to be scanned were not specified in previous commands.
<input type="checkbox"/>	54	NO VALID CHANNEL IN LIST	Channel or channel list did not include any channel for which this command is valid.
<input type="checkbox"/>	55	STRUCTURED COMMANDS NESTED TOO DEEP	The maximum number of nested BASIC constructs (FOR...NEXT, IF...END IF, WHILE...END WHILE) is 10.
<input type="checkbox"/>	56	SUBEND IN STRUCTURED COMMAND	The SUBEND command cannot reside within a FOR...NEXT, IF...END IF, or WHILE...END WHILE BASIC construct.
<input type="checkbox"/>	57	LIST TOO LONG	Too many items of a parameter were specified (e.g. more than 10 channels were listed individually - 1,2,3,...)
<input type="checkbox"/>	58	SUBS NESTED TOO DEEP	The maximum number of nested subroutines is 10.
<input type="checkbox"/>	59	SUB ALREADY EXISTS	The subroutine name specified already exists.
<input type="checkbox"/>			

Error Messages

- | | | | |
|----|--|--|--------------------------|
| 60 | ACCESSORY
INTERFACE
ERROR | Mainframe/accessory
interface or configura-
tion error. Indicates a
potential hardware
failure. | <input type="checkbox"/> |
| 61 | CALIBRATION
RAM ERROR | Bad CAL RAM or
voltmeter out of
calibration. | <input type="checkbox"/> |
| 62 | CALIBRATION
FAILURE | Accessory unable to be
calibrated. | <input type="checkbox"/> |
| 63 | SCAN LIST TOO
BIG | Follows the CLWRITE
or MEAS command with
TERM = RIBBON for
the HP 44702A/B where
NRDGS x (# of channels
- 1) is > 4095. | <input type="checkbox"/> |
| 64 | MUST USE
DIFFERENT
VARIABLES | When using the data
processing commands
CONV, LMT, and
SCALE, the respective
variables or arrays
must have unique
names. | <input type="checkbox"/> |
| 65 | NO RESPONSE -
ACCESSORY
REMOVED? | Accessory did not
respond to command.
Can be caused by
removing an accessory
with the power on. | <input type="checkbox"/> |
| 66 | INVALID
CHANNEL FOR
COMMAND | Channel address
specified was not
capable of executing
the command. | <input type="checkbox"/> |
| | | | <input type="checkbox"/> |

Error Messages

- | | | | |
|--------------------------|----|--------------------------------------|---|
| <input type="checkbox"/> | 67 | OVERVOLTAGE
ON BACKPLANE | Indicates a voltage on the backplane approximately equal to $\pm 25V$ was sensed by the HP 44702A/B when TERM was set to INT. Its inputs are then disconnected. |
| <input type="checkbox"/> | 68 | SUB NAME NOT
EXPECTED | A subroutine name appeared in a command where a subroutine name is not allowed. |
| <input type="checkbox"/> | 69 | SCALAR NAME
NOT EXPECTED | A variable name appeared in a command where a variable is not allowed. |
| <input type="checkbox"/> | 70 | ARRAY NAME
NOT EXPECTED | An array name appeared in a command where an array is not allowed. |
| <input type="checkbox"/> | 71 | UNDEFINED
WORD | A word that is not a variable, array, or subroutine name, or a command header appeared in the command. |
| <input type="checkbox"/> | 72 | THIS KEYWORD
NOT EXPECTED | Command header appeared in a command where another command header is not allowed. |
| <input type="checkbox"/> | 73 | NO READINGS
TO TRANSFER | No readings were available when the XRDGS command was executed. |

Error Messages

- | | | | |
|----|--|--|--------------------------|
| 74 | COMMAND END
NOT EXPECTED | Incomplete command sent (too many or too few parameters). | <input type="checkbox"/> |
| 75 | INSIDE SUB
CALLED MORE
THAN ONCE | Cannot have a PAUSE statement that is inside a subroutine which is called more than once. | <input type="checkbox"/> |
| 76 | INSIDE NESTED
SUB | A PAUSE statement cannot be used inside a nested subroutine. | <input type="checkbox"/> |
| 77 | NOT ALLOWED
WHILE STORING
SUB | SCRATCH command cannot be executed over the HP-IB while a subroutine is being stored from the front panel. | <input type="checkbox"/> |
| 78 | NOT ALLOWED
DURING HP-IB
COMMAND | SCRATCH command cannot be executed from the front panel while a command is partially entered over the HP-IB. | <input type="checkbox"/> |
| 79 | STANDARD
DEVIATION
NOT DEFINED | STAT command is executed and the <i>var</i> array has a maximum index of 1. | <input type="checkbox"/> |
| 80 | — | Power on test failed; instrument locks up. See the HP 3852A Assembly Level Service Manual. | <input type="checkbox"/> |
| 81 | TOO MANY
READINGS
REQUESTED | Command requested > 134217727 readings. | <input type="checkbox"/> |

Error Messages

- | | | |
|----|-------------------------------|---|
| 82 | SYMBOL
ALREADY
EXISTS | Variable, array, or subroutine being defined from the front panel and over the HP-IB at the same time will only be accepted from one source. This message is returned to the other. |
| 83 | PROGRAM
QUEUE FULL | The program queue cannot hold another subroutine name. Occurs on execution of the RUN command when the queue set by NTASKS is full. |
| 84 | RUN TASK
DOES NOT
EXIST | The run task number specified has not been created by the RUN command. |
| 85 | SUB ACTIVE | A subroutine executing in a task environment cannot be deleted (DELSUB command). |
| 86 | MULTITASKING
NOT ENABLED | The command entered can only execute in the multitasking mode. |
| 87 | TASK NOT
PAUSED | The run task targeted by the CONT command is not paused. |
| 88 | TOO MANY
RUN TASKS | The number of run tasks created by the RUN command exceeds the number of run task environments specified by NTASKS. |

Error Messages

89	ACCESSORY BUSY	A move is in progress.	<input type="checkbox"/>
90	NO ACTION DEFINED	TRIG SGL encounter without a correspond- ing MOVE or SUS- TAIN command preceeding it.	<input type="checkbox"/>
91	MUST STOP TO CHANGE DIRECTION	A running SUSTAIN command must be stopped with HALT or SUSTAIN 0 before a command to reverse direction can be executed.	<input type="checkbox"/>
92	NOT VALID IN WIDTH MODE	A MOVE command cannot be executed when the PROFILE command is in the width mode.	<input type="checkbox"/>
93	TERMINAL CARD TEST JUMPER SET	Will not execute a MOVE or SUSTAIN command when test jumper is in the TEST position.	<input type="checkbox"/>
94	CANNOT MOVE WHILE STANDBY ON	Standby is powering down the motor.	<input type="checkbox"/>
95	POWER OUTPUT IS CURRENT LIMITING	QPWR output is current limiting.	<input type="checkbox"/>
96	REQUIRED PARAMETER MISSING	Required parameter was not specified.	<input type="checkbox"/>
			<input type="checkbox"/>

Error Messages

- | | | |
|-----|--|---|
| 97 | INSUFFICIENT
ACCESSORY
MEMORY | There is not enough unused memory on the accessory channel to perform the requested task. |
| 98 | WAVEFORM
ALREADY
EXISTS | A waveform cannot be overwritten. The existing waveform must first be deleted. |
| 99 | WAVEFORM
NOT DEFINED | The waveform specified cannot be applied or used as a source of information since it has not been defined and stored. |
| 100 | INVALID
ELEMENT
SUBRANGE | The subrange specified or implied exceeds the number of successive waveform points available. Or, the LAST point specified in the command precedes the FIRST point specified. |
| 101 | WAVEFORM
IN USE | The waveform cannot be deleted because it is currently the active waveform. Setting TARM OFF or selecting a different waveform will enable the waveform to be deleted. |

Error Messages

- | | | | |
|-----|--|---|--------------------------|
| 102 | NO WAVEFORM
SELECTED | The waveform specified
in the command has
not been selected
(APPLY WFV), or was
previously deleted. | <input type="checkbox"/> |
| 103 | WRONG ARRAY
TYPE | The type (Real,
Integer, Packed) of ar-
ray specified cannot be
used by the command. | <input type="checkbox"/> |
| 104 | WRONG PACKED
TYPE | The data in the Packed
array specified is in a
format that cannot be
used by the accessory. | <input type="checkbox"/> |
| 105 | SINGLE ELEMENT
WAVEFORM NOT
ALLOWED | Waveforms must
contain at least two
amplitude points. | <input type="checkbox"/> |
| 106 | DATA ALTERED -
WAS OUT OF
RANGE | One or more amplitudes
or number of time base
intervals received was
outside of the
allowable range. An
acceptable value is used
in place of each such
value and the
waveform is modified
accordingly. | <input type="checkbox"/> |
| 107 | HARDWARE
DOES NOT
SUPPORT
COMMAND | The command requires
the 03852-66523
controller module. | <input type="checkbox"/> |
| 108 | ARRAY NOT
INTEGER | An array required by
the command must be
an Integer array. | <input type="checkbox"/> |
| | | | <input type="checkbox"/> |

Error Messages

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|--------------------------|-----|------------------------------------|--|
| <input type="checkbox"/> | 109 | PATH NAME
NOT EXPECTED | Attempting to use a path name where not allowed. |
| <input type="checkbox"/> | 110 | IMPROPER FILE
NAME | File names are limited to 10 characters. Foreign characters are allowed, but punctuation is not. |
| <input type="checkbox"/> | 111 | IMPROPER
DEVICE TYPE | The msus has the correct general form, but the characters used for a device are not recognized. |
| <input type="checkbox"/> | 112 | IMPROPER MSUS | The characters used for a msus do not form a valid specifier. |
| <input type="checkbox"/> | 113 | UNSUPPORTED
DRIVE TYPE | Drive does not use the CS/80 or SS/80 command set. |
| <input type="checkbox"/> | 114 | UNSUPPORTED
SECTOR SIZE | Sector size too large. Must be 256 bytes/record. Sectors larger are not supported. |
| <input type="checkbox"/> | | | |
| <input type="checkbox"/> | | | |
| <input type="checkbox"/> | | | |
| <input type="checkbox"/> | | | |
| <input type="checkbox"/> | | | |
| <input type="checkbox"/> | | | |

Error Messages

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|-----|--------------------------------------|--|
| 115 | DRIVE NOT
FOUND OR
BAD ADDRESS | The msus contains an
improper device
selector, or no external
disc is connected. |
| 116 | INVALID UNIT
NUMBER | The msus contains a
unit number that does
not exist on the
specified device. |
| 117 | INVALID MASS
STORAGE
PARAMETER | A mass storage
statement contains a
parameter that is out
of range, such as a
negative record number
or an out of range
number of records. |
| 118 | MEDIA CHANGED
OR NOT IN
DRIVE | Either there is no disc
in the drive or the
drive door was opened
while a file was
assigned. |
| 119 | MEDIA IS WRITE
PROTECTED | Attempting to write to
a write-protected disc. |
| 120 | DIRECTORY
FULL | Although there may be
room on the media for
the file, there is no
room in the directory
for another file name. |
| 121 | NO ROOM ON
DISK | There is not enough
contiguous free space
for the specified file
size. The disc is full. |

