HEWLETT® PACKARD

Quick Reference Card

for
HP Models 6812A, 6813A, 6814B, 6834B
AC Power Source/Analyzers

and
HP Models 6841A, 6842A, 6843A
Harmonic/Flicker Test Systems
(Normal Mode Operation)

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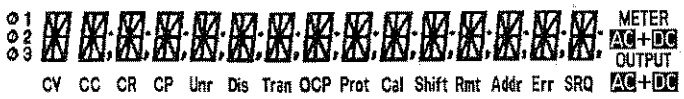
Display Annunciators



ϕ_1 ϕ_2 ϕ_3	The three phase annunciators indicate which phase is being controlled or metered. In a single-phase instrument only the Phase 1 annunciator will light. In a 3-phase instrument the Phase Select key can be used to select one of the three phases or all three phases simultaneously. When simultaneous control is selected, all three-phase annunciators are illuminated.
CV	This annunciator is lit when the output voltage is regulated.
CC	Indicates that the output is in rms current limit.
CR & CP	Not used.
Unr	Indicates that the output is unregulated.
Dis	Indicates that the output state is OFF.
Tran	Indicates that an output transient (step, pulse, or list) is initiated.
OCP	Indicates that the over-current protection state is ON.
Prot	Indicates that the output has been disabled by one of the protection features.
Cal	Cal indicates that calibration mode is ON.
Shift	Indicates that the Shift key has been pressed.
Rmt	Indicates that the selected Remote programming interface (either HP-IB or RS-232) is active.
Addr	Indicates that the interface is addressed to talk or listen.
Err	Indicates that there is an error in the SCPI error queue.
SRQ	Indicates that the interface is requesting service.
Meter	Indicates the front panel measurement functions.
Output	Indicates the output coupling.

SYSTEM Keys

Local

Press to change the ac source's selected interface from remote operation to local (front panel) operation. Pressing this key has no effect if the interface state is already Local, Local-with - Lockout, or Remote-with-Lockout.

Error

Address

Error Functions	
ERROR<value>	Displays the system error codes stored in the SCPI error queue. If no errors exist, a 0 is displayed. The Err annunciator is lit when there are errors.

Address Functions	
ADDRESS <value>	Set HP-IB address
INTF HPIB | RS232	Set interface
BAUDRATE 300 | 600 | 1200 2400 | 4800 | 9600	Set baud rate
PARITY NONE | EVEN | ODD	Set parity
LANG SCPI | E9012	Set language
NOUTPUTS 1 | 3	Select number of output phases (1)

Save

Recall

Save Functions
Press to save an existing ac source state in nonvolatile memory. Up to 16 states can be saved (0-15).

Recall Functions
Press to place the ac source into a previously saved state. Up to 16 states can be recalled (0-15).

First press and release this blue shift key to select a SHIFT function. The Shift annunciator lights when this key is pressed.

FUNCTION Keys

Harmonic

Meter

Harmonic Functions	
<reading>**A** I:MAG: <index>	Current harmonic magnitude
<reading> ° I:PHASE: <index>	Current harmonic phase
<reading>**V** V:MAG: <index>	Voltage harmonic magnitude
<reading> ° V:PHASE: <index>	Voltage harmonic phase
<reading>**A** N:MAG: <index>	Neutral current harmonic magnitude
<reading> ° N:PHASE: <index>	Neutral current harmonic phase
<reading> CURR: THD	Current total % harmonic distortion
<reading> VOLT: THD	Voltage total % harmonic distortion

Meter Functions		
<reading>**V**	<reading>**Hz**	rms voltage & frequency
<reading>**V**	<reading>**A**	rms voltage & rms current
<reading>**A**	<reading>**Hz**	rms current & frequency
<reading>**V**	<reading>**W**	rms voltage & power
<reading>	CREST F	Current crest factor
<reading>**A**	PK REP	Peak current, repetitive
<reading>**A**	PK NR	Peak current, non repetitive
<reading>**VA**		Apparent power
<reading>	VAR	Reactive power
<reading>W	TOTAL	Total power all phases (1)
<reading>	PFACTOR	Power factor
<reading>**A**	NEUTRAL	Neutral rms current (1)

Trigger

Trigger
Control

Trigger Function
Pressing the Shift **Trigger** key generates an immediate trigger.

Trigger Control Functions	
INIT:IMMED	Initiate trigger immediately
INIT:CONT ON | OFF	Initiate trigger continuously
TRIG:SOUR BUS | EXT | IMM	Set trigger source
DELAY <value>	Set trigger delay
ABORT	Abort all trigger sequences
SYNC:SOUR PHASE | IMM	Set synchronous source
SYNC:PHAS <value>	Set synchronous phase reference

FUNCTION Keys

Status

Protect

Status Functions	
*CLS	Execute *CLS command
STATUS:PRESET	Execute STATUS:PRESET command
*ESR? <value>	Return Event Status register
*STB <value>	Return Status Byte Register
OPER:EVEN? <value>	Return STAT:OPER:EVENT?
OPER:COND <value>	Return STAT:OPER:COND?
QUES:EVEN? <value>	Return STAT :QUES: EVENT?
QUES:COND <value>	Return STAT :QUES: COND?

Protect Functions	
PROT:CLEAR	Clear latched protection
CURR:PROT ON | OFF	Set over-current protection
VOLT:PROT ON | OFF	Set over-voltage protection (3)
VOLT:PROT <value>	Set over-voltage protection level
DELAY <value>	Set time delay for activating protection fault

Output

Input

Output Functions	
OUTP:COUP AC | DC	Set output coupling (3)
*RST	Execute *RST command
TTLT:SOUR BOT | EOT | LIST	Set Trigger Out source
TTLT:STATE ON | OFF	Set Trigger Out state
IMP:STATE ON | OFF	Set output impedance programming (3)
IMP:REAL <value>	Set real part of output impedance (3)
IMP:REAC <value>	Set reactive part of output impedance (3)
PON:STATE RST | RCLO	Select power-on state
RI LATCHING | LIVE | OFF	Set remote inhibit mode
DFI ON | OFF	Set DFI state
DFI:SOUR QUES | OPER ESB | RQS | OFF	Set DFI source

Input Functions	
INP:COUP AC | DC | ACDC	Meter coupling
CURR:RANGE HIGH | LOW	Current measurement range (3)
WINDOW KBESSEL | RECT	Select harmonic measurement window

FUNCTION Keys

Current

Voltage

Current Functions	
CURR:LEV <value>	Set output rms current limit (4)
CURR:PEAK <value>	Set immediate peak current limit (3)
CURR:PEAK:T <value>	Set triggered peak current limit (3)
CURR:PEAK:M FIXED I STEP PULSE I LIST	Set peak current limit mode (3)

Voltage Functions	
VOLT <value>	Set AC output voltage (4)
VOLT:T <value>	Set triggered voltage (4)
VOLT:M FIXED I STEP PULSE I LIST	Set voltage mode (4)
RANGE 150 I 300	Set voltage range (2, 4)
OFFSET <value>	Set dc offset voltage (3)
OFFSET:T <value>	Set triggered dc offset voltage (3)
OFFSET:M FIXED I STEP PULSE I LIST	Set dc offset voltage mode (3)
SLEW <value>	Set voltage slew in V/Sec (4)
SLEW :T <value>	Set triggered voltage slew (4)
SLEW: M FIXED I STEP PULSE I LIST	Set voltage slew mode (4)
OFF:SLW <value>	Set immediate DC offset voltage slew V/Sec (3)
OFF:SLW :T <value>	Set triggered DC offset voltage slew (3)
OFF:SLW: M FIXED I STEP PULSE I LIST	Set DC offset voltage slew mode (3)
ALC INT I EXT	Set voltage sense source
ALC:DET RTIME I RMS	Set voltage sense detector (3)

Shape

Shape Functions		
SHAPE	SINE I SQUARE CSIN I <user>	Set immediate shape
SHAPE:T	SINE I SQUARE CSIN I <user>	Set triggered shape
SHAPE:M	FIXED I STEP PULSE I LIST	Set shape mode
CLIP <value>		Set clipping level

FUNCTION Keys

List

Pulse

List Functions	
COUNT <value>	List repeat count
DWEL: <index><value>	Dwell list
FREQ: <index><value>	Frequency list
FSLW: <index><value>	Frequency slew rate list
IPK: <index><value>	Peak current limit list (3)
OFFS: <index><value>	DC voltage list (3)
OSLW: <index><value>	DC offset voltage slew rate list (3)
PHASE: <index><value>	Phase list(4)
SHAP: <index> SINE I SQUARE CSIN I <user>	List of shapes
STEP ONCE I AUTO	Set response of list to triggers
TTLT: <index> ON I OFF	Trigger Out pulse list
VOLT: <index><value>	AC voltage list (4)
VSLW: <index><value>	Voltage slew rate list (4)

Pulse Functions	
WIDTH <value>	Set pulse width
COUNT <value>	Set number of output pulses
DCYCLE <value>	Set pulse duty cycle
PER <value>	Set pulse period count
HOLD WIDTH I DCYCLE	Set parameter held constant

Output on/off

This key toggles the Output on and off. When off, the source out output is disabled and the **Dis** annunciator is on.

Notes:

(1) Valid for Model HP 6834B only.
(2) Valid for Models HP 6814B/6834B/6843A only.
(3) Valid for Models HP 6812A/6813A/6841A/6842A only.
(4) Phase selectable on HP 6834B.

FUNCTION Keys

Phase

Freq

Phase Functions	
PHASE <value>	Set output phase (4)
PHASE:T <value>	Set triggered phase (4)
PHASE:M FIXED I STEP PULSE I LIST	Set phase mode (4)

Frequency Functions	
FREQ <value>	Set output frequency
FREQ:T <value>	Set triggered output frequency
FREQ:M FIXED I STEP PULSE I LIST	Set frequency mode
SLEW <value>	Set frequency slew in Hz/sec
SLEW:T <value>	Set triggered frequency slew
SLEW:M FIXED I STEP PULSE I LIST	Set frequency slew mode

▼ Index

▲ Index

▼▲ Index Functions

These are Shift Index keys which are used to scroll through indexed functions. Press these keys to step through integers 0-50 for a harmonic list, or 0-99 for list points. Holding these keys down lets you rapidly scroll to any harmonic or list point.

▼ ▲ Functions

These keys let you move through the choices in a command list. Command lists are circular, you can return to the starting position by pressing either key.

Phase Select

This key applies to 3-phase ac sources only. Pressing this key successively selects phase one first, then phase two, then phase three, and then all three phases.

ENTRY Keys

↑ ↓

These keys let you scroll through different choices in a parameter list that apply to a specific function. If the function command has a numeric range, these keys automatically increment or decrement the existing value.

0 through 9

The numeric keys 0 through 9 are used to enter numeric values.

—
.

Press Shift and this key to enter a minus . Press this key alone to enter a decimal point.

Enter

Until you press the Enter key, the values or parameters you enter with the other Entry keys are displayed but not entered into the ac source.

E
0

Press Shift and this key to enter an exponent.

Clear Entry
←

Press Shift and this key to abort a keypad entry and clear the value. When editing a list, pressing Clear Entry truncates or clears the list at the presently displayed list point. Press this key alone to backspace and delete the last digit entered.

Calibration
7

Press Shift and this key to access the calibration menu. Refer to appendix B in the User's Guide for more information.

SCPI Commands

SCPI Common Commands

*CLS	*IDN?	*PSC <bool>	*SAV <value>	*TRG
*ESE <value>	*OPC	*PSC?	*SRE <value>	*TST?
*ESE?	*OPC?	*RCL <value>	*SRE?	*WAI
*ESR?	*OPT?	*RST	*STB?	

ABORt

CALibrate

```
:CURRent
        :AC
        :MEASure
:DATA <n>
:IMPedance
:LEVel P1 | P2 | P3 | P4
:PASSword <n>
:PWM
        :FREQuency <n>
        :RAMP <n>
:SAVE
:STATe <bool> [, <n>]
:VOLTage
        :AC
        :DC
        :OFFSet
        :PROTection
        :RTIMe
```

DATA | TRACe

```
:CATalog?
[:DATA] <trace_name>, <n> {, <n>}
:DEFine <trace_name>[,<trace_name> | 1024]
:DELete
        [:NAME] <trace_name>
```

DISPlay

```
[:WINDow]
        [:STATe] <bool>
        :MODE NORMal | TEXT
        :TEXT
                [:DATA] <display_string>
```

SCPI Commands

INITiate

```
[:IMMediate]
        :SEQuence[1|3]
        :NAME TRANsient | ACQuire
:CONTinuous
        :SEQuence[1] <bool>
        :NAME TRANsient, <bool>
```

INSTrument

```
:COUPle ALL | NONE
:NSELect 1|2|3
:SELect OUTPut1 | OUTPut2 | OUTPut3
```

FETCh | MEASure

```
[:SCALar]
        :CURRent
                [:DC]?
                :AC?
                :ACDC?
                :AMPLitude
                        :MAX?
                :CRESTfactor?
                :HARMonic
                        [:AMPLitude]? <n>
                        :PHASe? <n>
                        :THD?
                :NEUTral
                        [:DC]?
                        :AC?
                        :ACDC?
                        :HARMonic
                                [:AMPLitude]? <n>
                                :PHASe? <n>
        :FREQuency?
        :POWer
                [:DC]?
                :AC
                        [:REAL]?
                        :APParent?
                        :REACtive?
                        :PFACtor?
                        :TOTal?
        :VOLTage
                [:DC]?
                :AC?
                :ACDC?
                :HARMonic
                        [:AMPLitude]? <n>
                        :PHASe? <n>
                        :THD?
```

FETCh | MEASure (Continued)

```
:ARRay
        :CURRent
                [:DC]?
                :HARMonic
                        [:AMPLitude]?
                        :PHASe?
                :NEUTral
                        [:DC]?
                        :HARMonic
                                [:AMPLitude]?
                                :PHASe?
        :VOLTage
                [:DC]?
                :HARMonic
                        [:AMPLitude]?
                        :PHASe?
```

OUTPut

```
[:STATe] <bool>
:COUPling DC | AC
:DFI
        [:STATe] <bool>
        :SOURce QUES | OPER | ESB | RQS | OFF
:IMPedance
        [:STATe] <bool>
        :REAL <n>
        :REACtive <n>
:PON
        :STATe RST | RCL0
:PROTection
        :CLEar
        :DELay <n>
:RI
        :MODE LATCHing | LIVE | OFF
:TTLTrg
        [:STATe] <bool>
        :SOURce BOT | EOT | LIST
```

SENSe

```
:CURRent
        :ACDC
                :RANGe
                        [:UPPEr] <n>
:SWEep
        :OFFSet
                :POINts <n>
        :TINTerval <n>
:WINDow
        [:TYPE] KBESsel | RECTangular
```

SCPI Commands

[SOURce:]

```
CURRent
        [:LEVel]
                [:IMMediate]
                        [:AMPLitude] <n>
        :PEAK
                [:IMMediate] <n>
                :MODE FIXed | STEP | PULSe | LIST
                :TRIGgered <n>
        :PROTection
                :STATe <bool>

FREQuency
        [:CW | :IMMediate] <n>
        :MODE FIXed | STEP | PULSe | LIST
        :SLEW
                [:IMMediate] <n> | INFinity
                :MODE FIXed | STEP | PULSe | LIST
                :TRIGgered <n> | INFinity
        :TRIGgered <n>

FUNCtion
        [:SHAPe]
                [:IMMediate] SINusoid | SQUare | CSINusoid | <user>
                :MODE FIXed | STEP | PULSe| LIST
                :TRIGgered SINusoid | SQUare | CSINusoid | <user>
                :CSINusoid <n> [THD]

LIST
        :COUNt <n> | INFinity
        :CURRent <n> {, <n>}
                :POINts?
        :DWELl <n> {,<n>}
                :POINts ?
        :FREQuency
                [:LEVel] <n> {,<n>}
                        :POINts?
                :SLEW <n> {,<n>}
                        :POINts?
        :PHASe <n> {,<n>}
                :POINts?
        :SHAPe <shape> {, <shape>}
                :POINts?
        :STEP ONCE | AUTO
        :TTLTrg <bool> {,<bool>}
                :POINts?
```

[SOURce:] LIST (Continued)

```
        :VOLTage
                [:LEVel] <n> {,<n>}
                        :POINts?
                :SLEW <n> {,<n>}
                        :POINts?
                :OFFSet <n> {,<n>}
                        :POINts?
                        :SLEW <n> {,<n>}
                                :POINts?

PHASe
        [:IMMediate | :ADJust] <n>
        :MODE  FIXed | STEP | PULSe | LIST
        :TRIGgered <n>

PULSe
        :COUNt <n> | INFinity
        :DCYCle <n>
        :HOLD WIDTh | DCYCle
        :PERiod <n>
        :WIDTh <n>

VOLTage
        [:LEVel]
                [:IMMediate]
                        [:AMPLitude] <n>
                :TRIGgered
                        [:AMPLitude] <n>
        :SENSe | :ALC
                :DETector RTIMe | RMS
                :SOURce INT | EXT
        :MODE  FIXed | STEP | PULSe | LIST
        :OFFSet <n>
                [:IMMediate] <n>
                :MODE  FIXed | STEP | PULSe | LIST
                :TRIGgered <n>
                :SLEW
                        [:IMMediate] <n> | INFinity
                        :MODE  FIXed | STEP | PULSe | LIST
                        :TRIGgered <n> | INFinity
        :PROTection
                [:LEVel] <n>
                :STATe <bool>
        :RANGe  150  | 300
        :SLEW
                [:IMMediate] <n> | INFinity
                :MODE  FIXed | STEP | PULSe | LIST
                :TRIGgered <n> | INFinity
```

SCPI Commands

STATus

```
        :OPERation
                [:EVENt]?
                :CONDition?
                :ENABle <n>
                :NTRansition <n>
                :PTRansition <n>
        :PRESet
        :QUEStionable
                [:EVENt]?
                :CONDition?
                :ENABle <n>
                :NTRansition <n>
                :PTRansition <n>
                :INSTrument
                        :ISUMmary
                                [:EVENt]?
                                :CONDition?
                                :ENABle <n>
                                :NTRansition <n>
                                :PTRansition <n>
```

SYSTem

```
        :CONFigure
                :NOUTputs 1 | 3
        :ERRor?
        :VERSion?
        :LANGuage SCPI | E9012
        :LOCal
        :REMote
        :RWLock
```

TRIGger

```
        [:TRANsient | :SEQuence1]
                [:IMMediate]
                :SOURce BUS | EXTernal | IMMediate
                :DELay <n>
        :SYNChonize | :SEQuence2
                :SOURce PHASe | IMMediate
                :PHASe <n>
        :ACQuire | :SEQuence3
                [:IMMediate]
                :SOURce BUS | EXTernal | TTLTrg
        :SEQuence1
                :DEFine TRANsient
        :SEQuence2
                :DEFine SYNChronize
        :SEQuence3
                :DEFine ACQuire
```

Error Messages

Error	Description
0	No error
-100	Command error
-101	Invalid character
-102	Syntax error
-103	Invalid separator
-104	Data type error
-105	GET not allowed
-108	Parameter not allowed
-109	Missing parameter
-112	Program mnemonic too long
-113	Undefined header
-121	Invalid character in number
-123	Numeric overflow
-124	Too many digits
-128	Numeric data not allowed
-131	Invalid suffix
-138	Suffix not allowed
-141	Invalid character data
-144	Character data too long
-148	Character data not allowed
-150	String data error
-151	Invalid string data
-158	String data not allowed
-160	Block data error
-161	Invalid block data
-168	Block data not allowed
-170	Expression error
-171	Invalid expression
-178	Expression data not allowed
-200	Execution error
-221	Settings conflict
-222	Data out of range
-223	Too much data
-224	Illegal parameter value
-225	Out of memory
-270	Macro error
-272	Macro execution error
-273	Illegal macro label
-276	Macro recursion error
-277	Macro redefinition not allowed
-310	System error
-350	Too many errors
-400	Query error
-410	Query INTERRUPTED
-420	Query UNTERMINATED
-430	Query DEADLOCKED
-440	Query UNTERMINATED after indefinite response

Error	Description
1	Non-volatile RAM RDO section checksum failed
2	Non-volatile RAM CONFIG section checksum failed
3	Non-volatile RAM CAL section checksum failed
4	Non-volatile RAM WAVEFORM section checksum failed
5	Non-volatile RAM STATE section checksum failed
6	Non-volatile RAM LIST section checksum failed
10	RAM selftest
11 - 31	DAC selftest error, expected <n>, read <value>
40	Voltage selftest error, output 1
41	Voltage selftest error, output 2
42	Voltage selftest error, output 3
43	Current selftest error, output 1
44	Current selftest error, output 2
45	Current selftest error, output 3
70	Fan voltage failed
80	Digital I/O selftest error
200	Outgrd not responding
201	Front panel not responding
210	Ingrd receiver framing error
211	Ingrd uart overrun status
212	Ingrd received bad token
213	Ingrd receiver buffer overrun
214	Ingrd input buffer overrun
215	Outgrd output buffer overrun
216	RS-232 receiver framing error
217	RS-232 receiver parity error
218	RS-232 receiver overrun error
219	Ingrd inbuf count sync error
220	Front panel uart overrun
221	Front panel uart framing
222	Front panel uart parity
223	Front panel buffer overrun
224	Front panel timeout
401	CAL switch prevents calibration
402	CAL passcode is incorrect
403	CAL not enabled
404	Computed readback cal constants are incorrect
405	Computed programming cal constants are incorrect
406	Incorrect sequence of calibration commands
600	Systems in mode:list have different list lengths
601	Requested voltage and waveform exceeds peak voltage capability
602	Requested voltage and waveform exceeds xfmr volt-second rating
603	Command only applies to RS-232 interface
604	Trigger received before requested number of pre-trigger readings.
605	Requested RMS current too high for voltage range
606	Waveform data not defined
607	VOLT, VOLT:SLEW, and FUNC:SHAPe modes incompatible

Status Model