HP3421A
Quick Reference Card

The 3421A command set consists of Standard Commands and Advanced Commands. Each Standard Command performs a complete measurement or function while two or more Advanced Commands are generally required to perform a measurement. Refer to the blue pages in the center of the 3421A Operating, Programming, and Configuration Manual for more information and program examples on each command.

Standard Commands

[] means optional channel or bit list   <> means mandatory channel or bit list

DCV[x,y,...,z]	DC Volts. Sets the voltmeter to DCV (F1), Autorange (RA1), Autozero on (Z1), 5 ½ digits resolution (N5). If no channel list is sent, the channel list is not changed but software single trigger is executed (T2). If channel list is sent, they are loaded in order received then a reading is made and stored from each channel in sequence (T3). DCV always opens the last channel before closing the next channel in the list. It exits with the last channel in the list closed unless no numbers were received then it exits with the channels in same state they were in prior to the command. When the 3421A is addressed to talk, all readings will be sent in the sequence they were taken.
ACV[x,y,...,z]	Same as DCV but for AC Volts (F2) and 4 ½, digit resolution (N4).
TWO[x,y,...,z]	Same as for DCV but for 2-wire ohms (F3) measurements.
FWO[x,y,...,z]	Same as for DCV except for 4-wire Ohms (F4) measurements. Channels are automatically paired with x+10, y+10….z+10 unless x,y,…,z are between 20 and 29 in which case they are paired with x–20, y–20,…,z–20. Pairs are closed simultaneously.
TEM[x,y,...,z]	Same as for DCV but for TEMperature measurements (F6) and does a software compensated T-type thermocouple conversion. Result returned is in Degrees C. TEM will take a REF temperature measurement on the 44462A assembly in the lowest numbered slot if no channel numbers are sent.
REF[x]	Measures the temperature of the REFerence junction (F5) on 44462A assembly where channel 'x' is. If 'x' is not sent, then defaults to assembly where a multiplexer channel is closed. If no channel is closed, then selects 44462A assembly in lowest numbered slot. Result returned in Degrees C.
FRQ[x,y,...,z]	Measures FReQuency (F7) with a 1 second gate time (G0), 5 ½ digits resolution (N5). If no channel numbers are sent, the channel list is not changed and no channels are opened or closed. A software single trigger (T2) is executed. If channel list is sent they are loaded in the order received and a reading is made and stored from each channel in sequence. When addressed to talk, all readings will be sent in the sequence they were taken.
TOT[x]	TOTalizes events (F7) up to a maximum count of 65,535. If channel 'x' is sent, all channels will be opened before closing channel 'x'. The counter will be zeroed and then starts totalizing. If 'x' is not sent, then the counter is zeroed and starts totalizing without changing channels. Channel 'x' will re- main closed until another command opens it. When the 3421A is addressed to talk, it will send out the current subtotal without disrupting the counter. NOTE: if a TRIGGER command is received, the TOT is aborted and a frequency reading is made.
CLS<x>	CLose Single channel 'x'. The 3421A first identifies the type of channel at 'x' and then if 'x' is:

	• an Actuator – closes channel x. Possible actuator channel numbers are: 00, 01, 10, 11, 20, 21. • a Digital Output – closes switch 'x'. • a Multiplexer – opens all multiplexer relays and closes channel 'x'.
CLP\<x>	CLose a Pair of channels. The 3421A will open all multiplexer relays and then close channels x and x+10. If x>=20, then x and x–20 will be closed. If either x or its pair is not a multiplexer channel, then no channels are closed or opened and an error is generated.
OPN[x]	OPeN channel(s). If channel 'x' is not sent then the OPN command will open all channels – digital outputs, actuators, and multiplexers. If 'x' is sent, the 3421A identifies the channels and if 'x' is: • an Actuator – opens it. • a Digital Output – clears bit 'x' • a Multiplexer – opens it. This includes channels closed by the UC command. If 'x' was closed as a pair (i.e., CLPx) then its pair will be opened also.
REDi	REaDs the digital input byte from slot i and replies with a decimal number from 0 to 255. This decimal number represents the values of the bits that were set.
WRTi,[ab]c	WRiTe the decimal value [ab]c to slot i. The value [ab]c≤255. If a and/or b are not received then the 3421A assumes leading zeroes.
BIT\<x>[,y,...,z]	Reads the digital input BITs (up to 30 in the bit list) and sends +0.000E+0 if the bit is low or +1.000E+0 if the bit is high. Invalid bit numbers are 08, 09, 18, 19, 28, and 19.

Advanced Commands

AN[decimal value 0-255]	ANd mask, used with MN command.
C[cal value]	Calibrate, see 3421A Service Manual.
DC[slot number, decimal value 0-255]	Digital Clear specified output bits.
DS[slot number, decimal value 0-255]	Digital Set specified output bits.
DN[number0-29]	Display Number, note: send DN alone to turn off mode.
LS <channel list>	Load Single channels into channel list.
LP <channel list>	Load channel Pairs into channel list.
M[decimal number]	Set SRQ Mask.
MH<digital bit>	Monitor digital input bit and SRQ interrupt when bit goes high.
ML<digital bit>	Monitor digital input bit and SRQ interrupt when bit goes low.
MN<slot number>	Monitor slot and compare to AN mask and XR mask. SRQ interrupt when result = 0.
RL	Read channel List.
RS	ReSet.
SI<0 or 1>	SI0 = Initialize channel list pointer to beginning of list. SI1 = opens channel and closes next channel in list.
SR	Read Status Registers.
UC<channel number>	Unconditionally Close specified channel.
XR[decimal value 0-255]	eXclusive-Or mask, used with the MN command.
Z<0 or 1>	Voltmeter Autozero Z0 = Autozero off, Z1 = Autozero on.
N<3, 4, or 5>	Number of digits of resolution N3 = 3 ½, N4 = 4 ½, N5 = 5 ½
T<0,1,2, or 3>	Trigger T0 = Hold trigger and enable channel list scan T1 =Internal trigger T2 =Software single trigger T3 =Triggers measurements from channel list and stores readings
DT<a>	Digital Trigger DTa = triggers voltmeter when digital input bit 'a' goes low.

Function	Command	Range Codes (RA0 – Auto Range OFF, RA1 – Auto Range ON)								
		R-1	**R0**	**R1**	**R2**	**R3**	**R4**	**R5**	**R6**	**R7**
All functions off	**F0**	*	*	*	*	*	*	*	*	*
DC Volts	**F1**	0.3V	3V	30V	300V	*	*	*	*	*
AC Volts	**F2**	*	3V	30V	*	*	*	*	*	*
Two Wire Ohms	**F3**	*	*	*	300Ω	3kΩ	30kΩ	300kΩ	3MΩ	30MΩ
Four Wire Ohms	**F4**	*	*	*	300Ω	3kΩ	30kΩ	300kΩ	3MΩ	30MΩ
REFerence	**F5**	The range is automatically set by the REF command								
TEMperature	**F6**	The range is automatically set by the TEM command								
FReQuency	**F7**	Gate times: G-1=0.1 sec, G0=1 sec., G1=10 sec.								

* indicates an invalid combination of function and range.