NOTES

datron WAVETEK

Datron 4920 Alternating Voltage Measurement Standard

Operating Instructions *and* *IEEE-488.2 Programming Instructions*

Quick Reference Guides

STARTUP

SAFETY: **Beware Inputs** (up to 1100V).
Line Voltage: Ensure 4920 Line Volts Setting correct.
Line Fuse: Ensure correct value for line voltage (115V - 1A; 230V - 500mA).
CAL Disable: Ensure 'CALIBRATION' switch set to DISABLE.
Power Cable: Connect between 4920 and Line Supply.
Power Switch: Press to power up.
Warm up: Allow 90 minutes to develop full specification.

POWER-ON DEFAULT STATUS

Function: ACV **Range:** 1KV **RMS Low Freq:** 100Hz
AC/DC: Off **mV:** Off **Input:** Chan B
Dig Filt: Off **Monitor:** Off **Math:** Off

Menus: To speed operation, menus generally do not need to be closed or exited before going on to the next selection. The exception is that a hard or soft 'Quit' key is provided to exit from use of the numeric keyboard.

N.B. References shown in *italics* refer to the relevant sections and pages of the **4920 User's Handbook**.

MEASUREMENT DEFINITION

MAJOR FUNCTIONS

ACV *Section 4, Page 4-4*

Low Ranges 300mV; 1V; 3V; 10V; Up (to high ranges).
High Ranges 30V; 100V; 300V; 1kV; Down (to low ranges).

mV (Option 10) *Section 4, Page 4-6*

Gain Characterizes x30 Amp Gain (external 100mV)
Ranges 3mV; 10mV, 30mV, 100mV.

AC/DC *Section 4, Page 4-9*

Ranges As selected in ACV (no AC/DC Transfer in mV)
Transfer dc+, dc-, dcrms: store DC RMS equivalent
tfer: displays AC/DC difference

TRIGGER SOURCES *Section 4, Page 4-22*

Ext' trig not selected. 'Ext' annunciator not lit. Triggered from internal source.
Select Ext' Trig 'Ext' annunciator lit. Triggered from front panel 'Sample' key or via 'Ext Trig' BNC connector on rear panel.

'Internal' selected at Power On.

SIGNAL INPUT CHANNELS *Section 4, Page 4-12*

INPUT Key & Menu
ChA Selects Chan. A (Precision N-type).
ChB Selects Chan. B (4mm Terminal Posts).
'Channel B' selected at Power On.

DIGITAL FILTERING *Section 4, Page 4-13*

ACV *or* **mV** *or* **AC/DC** Menu; *select* **Filt**
DIGITAL FILTER Menu
Sets rolling average of number of readings: Off, AV4, AV8, AV16.
'Off' selected at Power On.

RMS LOW FREQUENCY LIMITS *Section 4, Page 4-14*

ACV *or* **mV** *or* **AC/DC**; *then* **Config Key**:
RMS LOW FREQUENCY Menu
Sets RMS converter min. freq. limit: 100Hz, 40Hz, 10Hz, 1Hz.
'100Hz' selected at Power On.

SPOT FREQUENCY OPERATION *Section 4, Page 4-15*

ACV *or* **AC/DC** Menu; *select* **Spot**:
SPOT Menu; *press* **Up** *or* **Down** to cycle through calibrated spot frequencies until the required spot frequency is selected.
'None' selected at Power On.

EXECUTE TRIGGER

Section 4, Page 4-22

Ext' trig selected. 'Ext' annunciator lit. Use '**Sample**' key **or** '**Ext Trig**' connector on rear panel.
Ext' trig not selected. 'Ext' annunciator not lit. Automatic internal source triggers.

READING RESULTS

FREQUENCY OF READING *Section 4, Page 4-17*

Monitor Key: **FREQ=/DEV=** Display. The frequency of each subsequent reading is shown following **'FREQ:'**.

DEVIATION OF READING *Section 4, Page 4-17*

Monitor Key: **FREQ=/DEV=** Display.

Store Key Press to store reference reading.

For each subsequent reading, ppm deviation from stored reference reading is shown following **'DEV:'**.

N.B. See the User's Handbook for differences between ACV, mV and AC/DC Transfer interpretations

FACILITIES

STATUS REPORTING

STATUS *Section 3, Page 3-16*

Reports active state from the following:

Function:	ACV; mV.
Range (ACV):	0.3V; 1V; 3V; 10V; 30V; 100V; 300V; 1kV.
(mV):	3mV; 10mV, 30mV, 100mV.
RMS LF Limit:	1Hz; 10Hz; 40Hz; 100kHz.
Filter (Digital):	Rolling average: Off; AV4; AV8; AV16.
Input:	ChA; ChB.

DCPOS; DCNEG; DCRMS; TFER:
If present, AC/DC transfer mode is active.

STATUS CONFIG *Section 3, Page 3-17*

Addr	Opens ADDRESS menu.
Date	Opens DATE display.
Cal?	Opens LAST CAL and calstore code display.
Due?	Opens CAL DUE display.
Ser#	Opens SER# display.

STATUS REPORTING (Contd.)

ADDRESS *Section 3, Page 3-18*

Shows current IEEE 488 address. Use numeric keyboard to change the address (0-30).

Enter	Registers the displayed IEEE 488 address.
Quit	Reverts to the existing IEEE 488 address.

'Enter' or 'Quit' exits back to the STATUS CONFIG menu.

DATE *Section 3, Page 3-19*

Shows today's date and time (can be altered only in a calibration menu).

LAST CAL *Section 3, Page 3-20*

Shows date of most-recent calibration (entered in a calibration menu on that date), and the calibration store security code.

CAL DUE *Section 3, Page 3-21*

Shows when next calibration is due (calculated by summing Last Cal date with 'Cal Interval' - also entered in a calibration menu).

SERIAL NUMBER / SOFTWARE ISSUE *Section 3, Page 3-22*

SER#	Shows instrument serial number, issue and update numbers (entered in a calibration menu).
SW/ISS	Shows software issue number (embedded in firmware and not user-alterable).

Status Menus Summary In User's Handbook: *Page 3-23*

FACILITIES (Contd.)

MATH *Section 4, Page 4-19*

Opens the **MEAN=/SIGMA=** display.

Both display areas remain blank until a block of readings has been started (via **Math Config**). Then the **mean** and **standard deviation** of the block of readings are displayed.

MATH CONFIG *Section 4, Page 4-20*

Opens **BLOCK SIZE =** menu.

Numeric Keyboard:
Enter the number of readings to be taken in the block.

Press **Enter** to start the block of readings.

Press **Quit** to cancel.

Enter and **Quit** revert to the MEAN/SIGMA display.

TEST FACILITIES

TEST *Section 4, Page 4-24/25*

Allows selection of type of test:

Oper	Initiates Operational Test; Opens OPER TEST display.
Diag	Initiates Diagnostic Test; Opens DIAG TEST display.
Disp	Sets up Display Test and opens reminder screen. Repeatedly press any key except Test to send walking strobes around the main and menu display segments for visual inspection.
Keys	Sets up Keyboard Test and opens KEYBOARD TEST display. Press any key excpt Test to see key matrix position, switch ident number and key name.
Spcl	*Refer to Servicing Handbook Section 1.*

OPER TEST display *Section 4, Page 4-25*

While the Operational Test is running, the current test is named.

COMPLETE Operational Test is successfully completed.

OPER FAIL *Section 4, Page 4-25*

If a test failure is discovered, the Operational Test stops and the individual test which failed is named on this menu.

Cont After noting the failure, pressing the Cont key continues the test.

DIAG TEST display *Section 4, Page 4-26*

While the Diagnostic Test is running, each test in the sequence is named on this display as it becomes current.

COMPLETE Diagnostic Test is successfully completed.

DIAG FAIL *Section 4, Page 4-26*

If a test failure is discovered, the Diagnostic Test stops and the individual test which failed is named on this menu. No continuation is provided.

To Exit Press any major function key.

CALIBRATION FACILITIES

Refer to User's Handbook, Section 4 Page 4-27, or Section 8.

MENU SUMMARIES *References to User's Handbook*

Function Menus:	**ACV**	*Page 3-9*
	mV	*Page 3-11*
	AC/DC	*Page 3-13*
Status Menus:		*Page 3-23;*
Math Menus:		*Page 4-19*
Test Menus:		*Page 4-24*
Calibration Menus:		*Page 4-28*
Error Codes List:		*Sect 4, Appendix A.*
IEEE Command Codes:		*Page 5-28...91*
Power-On Settings:		*Sect 5, Appendix B.*

Error Messages:	'Error OL':	Signal too large for selected range.
	'Error Ur':	Signal too small for selected range.

Other Messages: *Refer to User's Handbook, Appendix A to Section 4.*

IEEE-488.2 Programming Instructions

Note: *Page numbers in italics refer to the User's Handbook.*

FUNCTION AND RANGE SELECTION

AC Voltage

ACV *Nrf* selects ACV Range *5-28* (*Example:* ACV 10)

AC Millivolts

MVAC GAIN characterizes the gain of the x30 millivolt preamp. *5-30*
MVAC *Nrf* selects mV range (after gain is characterized).

AC/DC Transfer Ranges as ACV *5-32*

TFER DCPOS reads value of positive DC reference signal.
TFER DCNEG reads value of negative DC reference signal.
TFER DCRMS computes RMS equivalent of DCPOS and DCNEG if each has been stored using REF command.
TFER ON computes ppm difference between input signal and stored DCRMS value.
TFER OFF Stops AC/DC transfers, but mode behaves as if ACV selected.
REF Stores values of DCPOS, DCNEG and DCRMS.

MEASUREMENT PARAMETERS

TRIGGER SOURCE *5-34*

TRG_SRCE INT/EXT Select trigger source.

SIGNAL INPUT CHANNEL SELECTION *5-35*

INPUT CH_A Select Channel A (Precision 'N')
CH_A Select Channel B (4mm terminals)

SPOT FREQUENCY SELECTION *5-36*

SPOT *Nrf* Select spot frequency of *Nrf* Hz.
OFF Deselect spot frequency mode.

RMS COMPUTATION - LOW FREQUENCY LIMITS *5-38*

RMS FILT1HZ / FILT10HZ / FILT40HZ / FILT100HZ
Select low frequency limit as sent.
Default: RMS FILT100HZ.

DIGITAL FILTERING *5-39*

AVG AV4/AV8/AV16
Select Rolling Average and window size.
AVG OFF Deselect Digital Filtering (Single Readings)
Default: AVG OFF.

MEAN and STANDARD DEVIATION: SET BLOCK SIZE and START THE BLOCK *5-40*

BLOCK *Nrf* Set block size of Nrf readings.
(Nrf triggers will be required).

STORE MOST-RECENT READING AS REFERENCE *5-41*

REF Stores the reading as reference for mV Gain; AC/DC Transfer or Deviation calculation.
REF? Returns the stored reference value.

MEASUREMENT DEFINITION - SRQ ORIGINATION

ENABLE MEASUREMENT EVENTS *5-42*

MESE *Nrf* Nrf sets measurement event enable bits.

ENABLE STANDARD-DEFINED EVENTS *5-42*

*ESE *Nrf* Nrf sets Standard-defined event enable bits.

ENABLE SERVICE REQUEST *5-42*

*SRE *Nrf* Nrf sets Standard and Measurement event enable summary bits in the Status Byte.

TRIGGERS AND READINGS

EXECUTE TRIGGER *5-43*

*TRG Execute trigger
Signal Acquisition Times *Sect. 6 - Specifications* *6-2*

READING RECALL

RDG? Return RMS value of most-recent reading *5-44*
FREQ? Return frequency of most-recent reading *5-45*

STORE LATEST READING AS REFERENCE *5-41*

REF Store latest reading (Rdg) as reference (Ref).
REF? Return present reference value (Ref).

READING DEVIATION CALCULATION *5-48*

DEV? Return deviation of present reading from stored reference: [10^6 x (Rdg - Ref)] / Ref

MATH

BLOCK MEAN CALCULATION *5-46*

MEAN? Return the **Arithmetic Mean** of the block of measurements stored by the **BLOCK** command.

BLOCK STANDARD DEVIATION CALCULATION *5-47*

SIGMA? Return the **Standard Deviation** of the block of measurements stored by the **BLOCK** command.

GENERAL QUERIES

PROG? Return Instrument Settings in order Function, Range, RMS LF Limit, Digital Filtering, Transfer on/off, Trig Source, Input Channel. *5-59*
*IDN? Recall manufacturer, model number, serial number and firmware level. *5-63*
*OPT? Recall instrument's option configuration, "1,0 nl" = Opt. 10 (mV) fitted; "0,0 nl" = Opt. 10 (mV) not fitted; *5-64*
DATE? Return today's Date and Time ("mm.dd.yy.hh.MM"). *5-65*
CAL_WAS? Recall date of most-recent calibration. *5-66*
CODE? Return Calstore write count code *5-67*
CAL_DUE? Calculate and return Calibration Due Date *5-68*
CALINT? Recalls Calibration Interval (User-entered). *5-69*
REF? Recall stored Reference Reading *5-70*
*PUD? Recall user entered data *5-71*

TEST OPERATIONS

*TST? Operational Selftest - (0 if OK, else 1). *5-72*
RTST? Resume Oper. Selftest - (0 if OK, else 1). *5-73*
DTST? Diagnostic Selftest - (0 if OK, else 1). *5-74*
BTST? "string" Bus Driver Test - ("Return String"). *5-75*
DDQ? Recall device errors from queue *5-61*
EXQ? Recall latest execution error from queue *5-62*

STATUS REPORTING

MEASUREMENT EVENT STATUS REGISTERS

MESE 0 to 255	Set MES register enable mask	*5-50*
MESE?	Return Enable register mask value	*5-50*
MESR?	Read MES register	*5-51*

STANDARD-DEFINED EVENT STATUS REGISTER

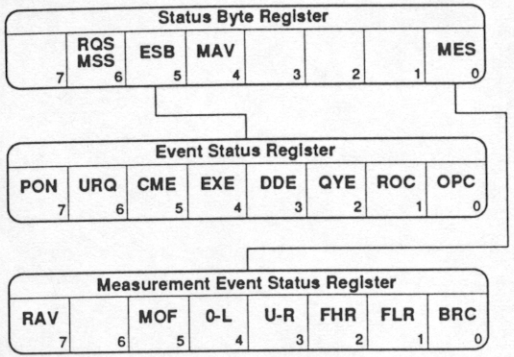
*ESE 0 to 255	Set Std ES register enable mask	*5-52*
*ESE?	Return Enable register mask value	*5-52*
*ESR?	Read Standard ES Register	*5-53*

SERVICE REQUEST REGISTER

*SRE 0 to 255	Set Status Byte register enable mask	*5-54*
*SRE?	Return Enable register mask value	*5-54*
*STB?	Read Status Byte	*5-55*

ASSOCIATED COMMANDS AND QUERIES

*PSC 0/1	Set Power On Status Clear condition ('1' if registers are to be cleared at power on: - no SRQ at power on. '0' if registers are not to be cleared at power on: - SRQ generated at power on)	*5-56*
*PSC?	Return Power On Status Clear condition (returns 1 if registers are to be cleared at power on, 0 if not)	*5-57*
*CLS	Clear status	*5-58*
DDQ?	Recall device error(s) from queue	*5-61*
EXQ?	Recall execution error(s) from queue	*5-62*



INTERNAL OPERATIONS

*RST	Resets instrument to Power On state	*5-76*
*OPC, *OPC?, *WAI	Conform to IEEE-488.2 requirements (Little relevance to 4920 as there are no parallel operations)	*5-77/78*

CALIBRATION OPERATIONS

Refer to User's Handbook; Section 56, pages 5-79 to 5-91.