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WARNING

The 5500A Calibrator can produce voltages up to 1000 V rms and must be programmed with caution to prevent hazardous voltages from being produced without sufficient warning to the operator.

Programs should be written carefully and tested extensively to ensure safe operation of the 5500A Calibrator. Fluke suggests that you include error catching routines in your programs. These error catching routines will assist in detecting programming errors that could result in the instrument behaving differently to your intention. By setting the Service Request Enable (SRQ) register, described in paragraph 5-60, the 5500A Calibrator can be programmed to cause an SRQ when an error is detected. The following program example shows a skeleton program including error catching:

```
10 PRINT @4, "CLS" ! Clear status
20 PRINT @4, "SRE 8" ! Set SRE Error Avail.
30 ON SRQ GOTO 1000 ! Enable SRQ Function
100 ! Body of program here
900 STOP ! End of program
1000 REM Start of SRQ Handler ! Start routine
1010 PRINT @4, "FAULT?" ! Request fault code
1020 INPUT @4, A$ ! Input fault code
1030 PRINT @4, "EXPLAIN? ";A$ ! Request fault text
1040 INPUT @4, A$ ! Input fault text
1050 PRINT "Fault ";A$; " detected" ! Print message
1060 PRINT @4, "STBY" ! Place 5500A in standby
1070 STOP
```
TYPES OF COMMANDS

Device-Dependent Commands
Commands unique to 5500A.

Common Commands
Commands defined by the IEEE 488.2 standard.

Query Commands
Commands ending with an ?.

Compound Commands
Two or more commands in a single command line.

Coupled Commands
Commands that could interfere with each other.

Overlapped Commands
Commands requiring more time to execute.

Sequential Commands
Commands that execute immediately.

Commands for RS-232 Only

<table>
<thead>
<tr>
<th>IEEE-488</th>
<th>RS-232 Equivalent</th>
</tr>
</thead>
<tbody>
<tr>
<td>GTL</td>
<td>LOCAL command</td>
</tr>
<tr>
<td>GTR</td>
<td>REMOTE command</td>
</tr>
<tr>
<td>LLO</td>
<td>LOCKOUT command</td>
</tr>
<tr>
<td>SRQ</td>
<td>SRQSTR command</td>
</tr>
<tr>
<td>SDC, DCL</td>
<td>^C (&lt;Cntl&gt; C) character [clear the device]</td>
</tr>
<tr>
<td>GET</td>
<td>^T (&lt;Cntl&gt; T) character [execute a group trigger]</td>
</tr>
<tr>
<td>SPE, SPD</td>
<td>^P (&lt;Cntl&gt; P) character [print the serial poll string]</td>
</tr>
</tbody>
</table>

Also:

SP_SET  SPLSTR  SRQSTR
SP_SET? SPLSTR? SRQSTR?
## COMMAND SYNTAX

**Parameter Syntax**

<table>
<thead>
<tr>
<th>Units</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>HZ</td>
<td>Frequency in units of hertz</td>
</tr>
<tr>
<td>KHZ</td>
<td>Frequency in units of kilohertz</td>
</tr>
<tr>
<td>MHZ</td>
<td>Frequency in units of megahertz</td>
</tr>
<tr>
<td>UV</td>
<td>Volts in units of microvolts</td>
</tr>
<tr>
<td>MV</td>
<td>Volts in units of millivolts</td>
</tr>
<tr>
<td>V</td>
<td>Volts in units of volts</td>
</tr>
<tr>
<td>KV</td>
<td>Volts in units of kilovolts</td>
</tr>
<tr>
<td>UA</td>
<td>Current in units of microamperes</td>
</tr>
<tr>
<td>MA</td>
<td>Current in units of milliamps</td>
</tr>
<tr>
<td>A</td>
<td>Current in units of amps</td>
</tr>
<tr>
<td>PCT</td>
<td>Percent</td>
</tr>
<tr>
<td>PPM</td>
<td>Parts-per-million</td>
</tr>
<tr>
<td>DBM</td>
<td>Volts referenced to 1 mW into 600Ω load.</td>
</tr>
<tr>
<td>OHM</td>
<td>Resistance in units of ohms</td>
</tr>
<tr>
<td>KOHM</td>
<td>Resistance in units of kilohms</td>
</tr>
<tr>
<td>MOHM</td>
<td>Resistance in units of megohms</td>
</tr>
<tr>
<td>NF</td>
<td>Capacitance in units of nanofarads</td>
</tr>
<tr>
<td>PF</td>
<td>Capacitance in units of picofarads</td>
</tr>
<tr>
<td>UF</td>
<td>Capacitance in units of microfarads</td>
</tr>
<tr>
<td>MF</td>
<td>Capacitance in units of millifarads</td>
</tr>
<tr>
<td>F</td>
<td>Capacitance in units of farads</td>
</tr>
<tr>
<td>CEL</td>
<td>Temperature in degrees Celsius</td>
</tr>
<tr>
<td>FAR</td>
<td>Temperature in degrees Fahrenheit</td>
</tr>
</tbody>
</table>
COMMAND SYNTAX (cont)

General Rules
1. Separate parameters with commas.
2. Numeric parameters up to 15 significant digits and exponents in the range +/-1.0E+/-.20.
3. Null parameters cause an error, e.g., the adjacent commas in OUT 1V, ,2A.
4. Expressions, for example 4+2*13, are not allowed as parameters.
5. Binary Block Data can be in one of two IEEE 488.2 formats:
   - **Indefinite Length Format**  Accepts data bytes after #0 until the ASCII Line Feed character is received with an EOI signal (for RS-232, a line feed or carriage return will terminate the block).
   - **Definite Length Format**  The non-zero digit specifies the number of characters that will follow in the <digits> field.

Extra Space or Tab Characters
One space after a command is required. You can insert extra spaces or tabs as desired.

Terminators

<table>
<thead>
<tr>
<th>Terminator Characters</th>
<th>ASCII</th>
<th>Control</th>
<th>C Code</th>
</tr>
</thead>
<tbody>
<tr>
<td># Carriage Return</td>
<td>13</td>
<td>&lt;Cntl&gt; M</td>
<td>\n</td>
</tr>
<tr>
<td>Line Feed</td>
<td>10</td>
<td>&lt;Cntl&gt; J</td>
<td>\r</td>
</tr>
<tr>
<td>Backspace</td>
<td>8</td>
<td>&lt;Cntl&gt; H</td>
<td>\b</td>
</tr>
<tr>
<td>Form Feed</td>
<td>12</td>
<td>&lt;Cntl&gt; L</td>
<td>\f</td>
</tr>
</tbody>
</table>
COMMAND SYNTAX (cont)

IEEE-488 Interface  The 5500A sends the ASCII character Line Feed with the EOI control line held high as the terminator for response messages.

RS-232 Interface  The 5500A Calibrator returns an EOL (End of Line) character with each response, selectable as CR, LF or both CRLF.

Incoming Character Processing
1. The most significant data bit (DIO8) is ignored.
2. All data is taken as 7-bit ASCII.
3. Lower-or upper-case characters.
4. ASCII characters less than 32 (Space) are discarded, except for characters 10 (LF) and 13 (CR) and in the *PUD command argument.

Response Message Syntax

Response Data Types

<table>
<thead>
<tr>
<th>DATA TYPE</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Integer</td>
<td>Decimal numbers to 32768.</td>
</tr>
<tr>
<td>Floating</td>
<td>Numbers plus an exponent.</td>
</tr>
<tr>
<td>String</td>
<td>ASCII characters within double quotes (“string”).</td>
</tr>
<tr>
<td>Binary Block Data</td>
<td>Defined by the IEEE-488.2.</td>
</tr>
</tbody>
</table>
## CHECKING 5500A STATUS

### Status Register Summary

<table>
<thead>
<tr>
<th>Status Register</th>
<th>Read</th>
<th>Write</th>
</tr>
</thead>
<tbody>
<tr>
<td>Serial Poll Status Byte (STB)</td>
<td>*STB?</td>
<td>—</td>
</tr>
<tr>
<td>Service Request Enable Register (SRE)</td>
<td>*SRE?</td>
<td>*SRE</td>
</tr>
<tr>
<td>Event Status Register (ESR)</td>
<td>*ESR?</td>
<td>—</td>
</tr>
<tr>
<td>Event Status Enable Register (ESE)</td>
<td>*ESE?</td>
<td>*ESE</td>
</tr>
<tr>
<td>Instrument Status Register (ISR)</td>
<td>ISR?</td>
<td>—</td>
</tr>
<tr>
<td>Instrument Status Change Register (ISCR)</td>
<td>ISCR?</td>
<td>—</td>
</tr>
<tr>
<td>ISCR 1 to 0 transition</td>
<td>ISCR0?</td>
<td>—</td>
</tr>
<tr>
<td>ISCR 0 to 1 transition</td>
<td>ISCR1?</td>
<td>—</td>
</tr>
<tr>
<td>Instrument Status Change Enable Register (ISCE)</td>
<td>ISCE?</td>
<td>ISCE</td>
</tr>
<tr>
<td>ISCE 1 to 0 transition</td>
<td>ISCE0?</td>
<td>ISCE0</td>
</tr>
<tr>
<td>ISCE 0 to 1 transition</td>
<td>ISCE1?</td>
<td>ISCE1</td>
</tr>
</tbody>
</table>
### CHECKING 5500A STATUS (cont)

#### STB and SRE

<p>| | | | | | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>RQS</td>
<td>MSS</td>
<td>ESB</td>
<td>MAV</td>
<td>EAV</td>
<td>ISCB</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0</td>
</tr>
</tbody>
</table>

**RQS** Requesting Service. Set to 1 whenever bits ESB, MAV, EAV, or ISCB change from 0 to 1 and are enabled (1) in the SRE. When RQS is 1, asserts the SRQ control line.

**MSS** Master Summary Status. Set to 1 whenever bits ESB, MAV, EAV, or ISCB are 1 and enabled (1) in the SRE. This bit can be read using the *STB?* command in serial remote.

**ESB** Event Status. Set to 1 when one or more enabled ESR bits are 1.

**MAV** Message Available. The MAV bit is set to 1 whenever data is available in the 5500A’s IEEE-488 interface output buffer.

**EAV** Error Available. An error has occurred and an error is available to be read from the error queue by using the ERR? query.

**ISCB** One or more enabled ISCR bits are 1.

For RS-232, transmitting the ^P character (hold down the <Cntl> key and press P) returns the SPLSTR (Serial Poll String) and the status byte.

#### Service Request (SRQ) Line

**IEEE-488** Bus control line that asserts to notify the controller that it requires some type of service.

**RS-232** Sends the SRQSTR string over the serial interface when the SRQ line is set.

#### Service Request Enable Register (SRE)

The SRE enables or masks the bits of the Serial Poll Status Byte. The SRE is cleared at power up.
CHECKING 5500A STATUS (cont)

**ESR and ESE**

<table>
<thead>
<tr>
<th>15</th>
<th>14</th>
<th>13</th>
<th>12</th>
<th>11</th>
<th>10</th>
<th>9</th>
<th>8</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>7</th>
<th>6</th>
<th>5</th>
<th>4</th>
<th>3</th>
<th>2</th>
<th>1</th>
<th>0</th>
</tr>
</thead>
<tbody>
<tr>
<td>PON</td>
<td>0</td>
<td>CME</td>
<td>EXE</td>
<td>DDE</td>
<td>QYE</td>
<td>0</td>
<td>OPC</td>
</tr>
</tbody>
</table>

- **PON**  Power on. Line power has been turned off and on.
- **CME**  Command error. An incorrectly formed command has occurred.
- **EXE**  Execution error. An error occurred while the 5500A tried to execute the last command.
- **DDE**  Device-dependent error. An error related to a device-dependent command has occurred.
- **QYE**  Query error. No response data was available or appropriate.
- **OPC**  Operation complete. All commands previous to "OPC command have been executed."
## CHECKING 5500A STATUS (cont)

### ISR, ISCE, and ISCR

<table>
<thead>
<tr>
<th>15</th>
<th>14</th>
<th>13</th>
<th>12</th>
<th>11</th>
<th>10</th>
<th>9</th>
<th>8</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>0</td>
<td>RPTBUSY</td>
<td>SETTLED</td>
<td>REMOTE</td>
<td>0</td>
<td>UUTBFUL</td>
<td>UUTDATA</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>7</th>
<th>6</th>
<th>5</th>
<th>4</th>
<th>3</th>
<th>2</th>
<th>1</th>
<th>0</th>
</tr>
</thead>
<tbody>
<tr>
<td>HIVOLT</td>
<td>MAGCHG</td>
<td>TMPCAL</td>
<td>0</td>
<td>IBOOST</td>
<td>VBOOST</td>
<td>0</td>
<td>OPER</td>
</tr>
</tbody>
</table>

- **RPTBUSY**: Set to 1 when a calibration report is being printed to the serial port.
- **SETTLED**: Set to 1 when the output has settled or the TC measurement has settled.
- **REMOTE**: Set to 1 when the 5500A is under remote control.
- **UUTBFUL**: Set to 1 when data from the UUT port has filled up the UUT buffer.
- **UUTDATA**: Set to 1 when there is data available from the UUT port.
- **HIVOLT**: Set to 1 when the 5500A is programmed to voltage above 33 V.
- **MAGCHG**: Set to 1 when the output magnitude has changed. Always 0 in the ISR.
- **TMPCAL**: Set to 1 when the 5500A is using temporary calibration data.
- **IBOOST**: Set to 1 when a 5725A Amplifier is sourcing a current.
- **VBOOST**: Set to 1 when a 5725A Amplifier is sourcing a voltage.
- **OPER**: Set to 1 when the 5500A is in operate; 0 to when it is in standby.
Output Queue
The output queue is loaded whenever a query is processed, and holds up to 800 characters. If the queue is empty, the 5500A Calibrator does not respond to the INPUT statement. The Message Available (MAV) bit in the Serial Poll Status Byte is 1 if there is something in the output queue and 0 if the output queue is empty.

Error Queue
When a command error, execution error, or device-dependent error occurs, its error code is placed in the error queue where it can be read by the \texttt{ERR?} command. The error queue contains up to 16 entries.
## COMMAND SUMMARY

<table>
<thead>
<tr>
<th>Error Mode Commands</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>EDIT</strong></td>
</tr>
<tr>
<td><strong>EDIT?</strong></td>
</tr>
<tr>
<td><strong>INCR</strong></td>
</tr>
<tr>
<td><strong>MULT</strong></td>
</tr>
<tr>
<td><strong>NEWREF</strong></td>
</tr>
<tr>
<td><strong>OLDREF</strong></td>
</tr>
<tr>
<td><strong>OUT_ERR?</strong></td>
</tr>
<tr>
<td><strong>REFOUT?</strong></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>External Connection Commands</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>CUR_POST</strong></td>
</tr>
<tr>
<td><strong>CUR_POST?</strong></td>
</tr>
<tr>
<td><strong>EARTH</strong></td>
</tr>
<tr>
<td><strong>EARTH?</strong></td>
</tr>
<tr>
<td><strong>LOWS</strong></td>
</tr>
<tr>
<td><strong>LOWS?</strong></td>
</tr>
<tr>
<td><strong>RTD_TYPE</strong></td>
</tr>
<tr>
<td><strong>RTD_TYPE?</strong></td>
</tr>
<tr>
<td><strong>TC_REF</strong></td>
</tr>
<tr>
<td><strong>TC_REF?</strong></td>
</tr>
<tr>
<td><strong>TC_TYPE</strong></td>
</tr>
<tr>
<td><strong>TC_TYPE?</strong></td>
</tr>
<tr>
<td><strong>TSENS_TYPE</strong></td>
</tr>
<tr>
<td><strong>TSENS_TYPE?</strong></td>
</tr>
</tbody>
</table>
### Command Summary (cont)

<table>
<thead>
<tr>
<th>Common Commands</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>*CLS</td>
<td>Clears ESR, ISCR0, ISCR1, error queue, RQS, and terminates pending *OPC or *OPC?</td>
</tr>
<tr>
<td>*ESE</td>
<td>Loads ESE register.</td>
</tr>
<tr>
<td>*ESE?</td>
<td>Returns ESE contents.</td>
</tr>
<tr>
<td>*ESR?</td>
<td>Returns ESR contents.</td>
</tr>
<tr>
<td>*IDN?</td>
<td>Returns instrument identification.</td>
</tr>
<tr>
<td>*OPC</td>
<td>Sets OPC bit in ESR to 1 when device operations are complete.</td>
</tr>
<tr>
<td>*OPC?</td>
<td>Returns 1 after operations are done.</td>
</tr>
<tr>
<td>*OPT?</td>
<td>Returns hardware/software options.</td>
</tr>
<tr>
<td>*PUD</td>
<td>Stores a string in nonvolatile memory.</td>
</tr>
<tr>
<td>*PUD?</td>
<td>Returns contents of *PUD memory.</td>
</tr>
<tr>
<td>*RST</td>
<td>Resets to power-up state.</td>
</tr>
<tr>
<td>*SRE</td>
<td>Loads SRE register.</td>
</tr>
<tr>
<td>*SRE?</td>
<td>Returns SRE contents.</td>
</tr>
<tr>
<td>*STB?</td>
<td>Returns the status byte.</td>
</tr>
<tr>
<td>*TRG</td>
<td>Triggers a TC measurement return value.</td>
</tr>
<tr>
<td>*TST?</td>
<td>Initiates self test. return 0 for pass.</td>
</tr>
<tr>
<td>*WAI</td>
<td>Waits until commands are executed.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Output Commands</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>BOOST</td>
<td>Activates/deactivates 5725A.</td>
</tr>
<tr>
<td>BOOST?</td>
<td>Returns 5725A use and output.</td>
</tr>
<tr>
<td>CFREQ?</td>
<td>Frequency for capacitance modes.</td>
</tr>
<tr>
<td>DC_OFFSET</td>
<td>Applies DC offset to AC output.</td>
</tr>
<tr>
<td>DC_OFFSET?</td>
<td>Returns the DC offset voltage.</td>
</tr>
</tbody>
</table>
COMMAND SUMMARY (cont)

<table>
<thead>
<tr>
<th>Output Commands (cont)</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>DPF</td>
<td>Sets displacement power factor.</td>
</tr>
<tr>
<td>DPF?</td>
<td>Returns displacement power factor.</td>
</tr>
<tr>
<td>DUTY</td>
<td>Sets squarewave duty cycle.</td>
</tr>
<tr>
<td>DUTY?</td>
<td>Returns duty cycle.</td>
</tr>
<tr>
<td>FUNC?</td>
<td>Returns output function.</td>
</tr>
<tr>
<td>HARMONIC</td>
<td>Sets harmonic output.</td>
</tr>
<tr>
<td>HARMONIC?</td>
<td>Returns harmonic location.</td>
</tr>
<tr>
<td>OPER</td>
<td>Activates 5500A output.</td>
</tr>
<tr>
<td>OPER?</td>
<td>Returns operate/standby setting.</td>
</tr>
<tr>
<td>OUT</td>
<td>Sets output and reference point.</td>
</tr>
<tr>
<td>OUT?</td>
<td>Returns output.</td>
</tr>
<tr>
<td>PHASE</td>
<td>Sets phase for dual outputs.</td>
</tr>
<tr>
<td>PHASE?</td>
<td>Returns phase output.</td>
</tr>
<tr>
<td>POWER?</td>
<td>Returns power for power outputs.</td>
</tr>
<tr>
<td>RANGE?</td>
<td>Returns output ranges.</td>
</tr>
<tr>
<td>RANGELCK</td>
<td>Locks range or set autorange.</td>
</tr>
<tr>
<td>RANGELCK?</td>
<td>Returns locked or autorange.</td>
</tr>
<tr>
<td>STBY</td>
<td>Puts 5500A in standby.</td>
</tr>
<tr>
<td>WAVE</td>
<td>Sets waveforms for AC outputs.</td>
</tr>
<tr>
<td>WAVE?</td>
<td>Returns output waveform.</td>
</tr>
<tr>
<td>ZCOMP</td>
<td>Activate/deactivate impedance compensation.</td>
</tr>
<tr>
<td>ZCOMP?</td>
<td>Returns status of impedance compensation.</td>
</tr>
</tbody>
</table>
## COMMAND SUMMARY (cont)

### RS-232 Host Port Commands

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>LOCAL</td>
<td>Puts 5500A into local.</td>
</tr>
<tr>
<td>LOCKOUT</td>
<td>Puts 5500A into lockout state</td>
</tr>
<tr>
<td>REMOTE</td>
<td>Puts 5500A into remote.</td>
</tr>
<tr>
<td>SPLSTR</td>
<td>Sets Serial Poll response string.</td>
</tr>
<tr>
<td>SPLSTR?</td>
<td>Returns Serial Poll response.</td>
</tr>
<tr>
<td>SRQSTR</td>
<td>Sets serial mode SRQ response.</td>
</tr>
<tr>
<td>SRQSTR?</td>
<td>Returns serial mode SRQ response.</td>
</tr>
<tr>
<td>^P (&lt;cntl&gt;p)</td>
<td>Prints serial poll string.</td>
</tr>
<tr>
<td>^C (&lt;cntl&gt;c)</td>
<td>Clears device.</td>
</tr>
<tr>
<td>^T (&lt;cntl&gt;t)</td>
<td>Executes group trigger.</td>
</tr>
</tbody>
</table>

### Setup and Utility Commands

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>FORMAT</td>
<td>Restores default nonvolatile memory.</td>
</tr>
<tr>
<td>LIMIT</td>
<td>Sets maximum output magnitudes.</td>
</tr>
<tr>
<td>LIMIT?</td>
<td>Returns maximum output magnitudes.</td>
</tr>
<tr>
<td>ONTIME?</td>
<td>Returns time since last powered up.</td>
</tr>
<tr>
<td>RTD_TYPE_D</td>
<td>Set the default RTD sensor.</td>
</tr>
<tr>
<td>RTD_TYPE_D?</td>
<td>Returns default RTD sensor.</td>
</tr>
<tr>
<td>SP_SET</td>
<td>Sets serial HOST port settings.</td>
</tr>
<tr>
<td>SP_SET?</td>
<td>Returns serial HOST port settings.</td>
</tr>
<tr>
<td>SRC_PREF</td>
<td>Sets source preference.</td>
</tr>
<tr>
<td>SRC_PREF?</td>
<td>Returns source preference.</td>
</tr>
<tr>
<td>TC_TYPE_D</td>
<td>Sets default TC sensor.</td>
</tr>
<tr>
<td>TC_TYPE_D?</td>
<td>Returns default TC sensor.</td>
</tr>
<tr>
<td>TEMP_STD</td>
<td>Sets temperature standard.</td>
</tr>
</tbody>
</table>
## COMMAND SUMMARY (cont)

<table>
<thead>
<tr>
<th>Status Commands</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>ERR?</strong></td>
</tr>
<tr>
<td><strong>EXPLAIN?</strong></td>
</tr>
<tr>
<td><strong>FAULT?</strong></td>
</tr>
<tr>
<td><strong>ISCE</strong></td>
</tr>
<tr>
<td><strong>ISCE?</strong></td>
</tr>
<tr>
<td><strong>ISCE0</strong></td>
</tr>
<tr>
<td><strong>ISCE0?</strong></td>
</tr>
<tr>
<td><strong>ISCE1</strong></td>
</tr>
<tr>
<td><strong>ISCE1?</strong></td>
</tr>
<tr>
<td><strong>ISCR?</strong></td>
</tr>
<tr>
<td><strong>ISCR0?</strong></td>
</tr>
<tr>
<td><strong>ISCR1?</strong></td>
</tr>
<tr>
<td><strong>ISR?</strong></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Thermocouple (TC) Measurement Commands</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>TC_MEAS</strong></td>
</tr>
<tr>
<td><strong>TC_OFFSET</strong></td>
</tr>
<tr>
<td><strong>TC_OFFSET?</strong></td>
</tr>
<tr>
<td><strong>TC_OTCD</strong></td>
</tr>
<tr>
<td><strong>TC_OTCD?</strong></td>
</tr>
<tr>
<td><strong>VAL?</strong></td>
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<table>
<thead>
<tr>
<th>RS-232 UUT Port Commands</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>UUT_FLUSH</strong></td>
</tr>
<tr>
<td><strong>UUT_RECV?</strong></td>
</tr>
<tr>
<td><strong>UUT_SEND</strong></td>
</tr>
<tr>
<td><strong>UUT_SET</strong></td>
</tr>
<tr>
<td><strong>UUT_SET?</strong></td>
</tr>
</tbody>
</table>
## COMMAND LIST

<table>
<thead>
<tr>
<th>Command</th>
<th>Parameters</th>
<th>Responses</th>
</tr>
</thead>
<tbody>
<tr>
<td>BOOST</td>
<td>ON, OFF</td>
<td>VOLTAGE, CURRENT, OFF</td>
</tr>
<tr>
<td>BOOST?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CFREQ?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>*CLS</td>
<td>(None)</td>
<td></td>
</tr>
<tr>
<td>CUR_POST</td>
<td>AUX, BOOST</td>
<td></td>
</tr>
<tr>
<td>CUR_POST?</td>
<td>AUX, BOOST</td>
<td></td>
</tr>
<tr>
<td>DC_OFFSET</td>
<td>&lt;value&gt;</td>
<td></td>
</tr>
<tr>
<td>DC_OFFSET?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>DPF</td>
<td>&lt;value&gt;, LEAD, LAG</td>
<td></td>
</tr>
<tr>
<td>COMMAND LIST (cont)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>---------------------</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>DPF?</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Responses:</strong></td>
<td>&lt;value&gt;, LEAD</td>
<td></td>
</tr>
<tr>
<td></td>
<td>&lt;value&gt;, LAG</td>
<td></td>
</tr>
<tr>
<td><strong>DUTY</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Parameter:</strong></td>
<td>&lt;value&gt; with optional PCT</td>
<td></td>
</tr>
<tr>
<td><strong>DUTY?</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Response:</strong></td>
<td>&lt;value&gt;</td>
<td></td>
</tr>
<tr>
<td><strong>EARTH</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Parameters:</strong></td>
<td>OPEN</td>
<td></td>
</tr>
<tr>
<td></td>
<td>TIED</td>
<td></td>
</tr>
<tr>
<td><strong>EARTH?</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Responses:</strong></td>
<td>OPEN</td>
<td></td>
</tr>
<tr>
<td></td>
<td>TIED</td>
<td></td>
</tr>
<tr>
<td><strong>EDIT</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Parameters:</strong></td>
<td>PRI</td>
<td></td>
</tr>
<tr>
<td></td>
<td>SEC</td>
<td></td>
</tr>
<tr>
<td></td>
<td>FREQ</td>
<td></td>
</tr>
<tr>
<td></td>
<td>OFF</td>
<td></td>
</tr>
<tr>
<td><strong>EDIT?</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Responses:</strong></td>
<td>PRI</td>
<td></td>
</tr>
<tr>
<td></td>
<td>SEC</td>
<td></td>
</tr>
<tr>
<td></td>
<td>FREQ</td>
<td></td>
</tr>
<tr>
<td></td>
<td>OFF</td>
<td></td>
</tr>
<tr>
<td><strong>ERR?</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Response:</strong></td>
<td>&lt;value&gt;, &lt;string&gt;</td>
<td></td>
</tr>
<tr>
<td>Command</td>
<td>Parameter</td>
<td>Response</td>
</tr>
<tr>
<td>---------</td>
<td>-----------</td>
<td>----------</td>
</tr>
<tr>
<td><code>*ESE</code></td>
<td><code>&lt;value&gt;</code></td>
<td><code>&lt;value&gt;</code></td>
</tr>
<tr>
<td><code>*ESE?</code></td>
<td></td>
<td><code>&lt;value&gt;</code></td>
</tr>
<tr>
<td><code>*ESR?</code></td>
<td></td>
<td><code>&lt;value&gt;</code></td>
</tr>
<tr>
<td><code>EXPLAIN?</code></td>
<td><code>&lt;value&gt;</code></td>
<td><code>&lt;string&gt;</code></td>
</tr>
<tr>
<td><code>FAULT?</code></td>
<td></td>
<td><code>&lt;value&gt;</code></td>
</tr>
<tr>
<td><code>FORMAT</code></td>
<td><code>ALL</code></td>
<td><code>CAL</code> <code>SETUP</code></td>
</tr>
<tr>
<td><code>FUNC?</code></td>
<td><code>DCV</code> <code>ACV</code> <code>DCI</code> <code>ACI</code> <code>RES</code> <code>CAP</code> <code>RTD</code> <code>TC_OUT</code> <code>DC_POWER</code> <code>AC_POWER</code> <code>DCV_DCV</code> <code>ACV_ACV</code> <code>TC_MEAS</code></td>
<td></td>
</tr>
</tbody>
</table>
### HARMONIC
Parameters: `<value>, PRI`<br>`<value>, SEC`

### HARMONIC?
Response: `<value>, PRI`<br>`<value>, SEC`

### *IDN?*
Response: `<manufacturer>,`<br>`<model>,`<br>`<serial number>,`<br>`<main firmware>+,`<br>`<encoder firmware>+,`<br>`<inguard firmware>+,`<br>`<5725A CPU> (or *)`

### INCR
Parameters: `<+ value>`<br>`<- value>`

### ISCE
Parameter: `<value>`

### ISCE?
Response: `<value>`

### ISCE0
Parameter: `<value>`

### ISCE0?
Response: `<value>`

### ISCE1
Parameter: `<value>`
### COMMAND LIST (cont)

<table>
<thead>
<tr>
<th>Command</th>
<th>Response</th>
</tr>
</thead>
<tbody>
<tr>
<td>ISCE1?</td>
<td>&lt;value&gt;</td>
</tr>
<tr>
<td>ISCR?</td>
<td>&lt;value&gt;</td>
</tr>
<tr>
<td>ISCR0?</td>
<td>&lt;value&gt;</td>
</tr>
<tr>
<td>ISCR1?</td>
<td>&lt;value&gt;</td>
</tr>
<tr>
<td>ISR?</td>
<td>&lt;value&gt;</td>
</tr>
<tr>
<td>LIMIT</td>
<td>Parameters: &lt;positive value&gt;, &lt;negative value&gt;</td>
</tr>
<tr>
<td>LIMIT?</td>
<td>Response: &lt;positive value voltage&gt;,</td>
</tr>
<tr>
<td></td>
<td>&lt;negative value voltage&gt;,</td>
</tr>
<tr>
<td></td>
<td>&lt;positive value current&gt;,</td>
</tr>
<tr>
<td></td>
<td>&lt;negative value current&gt;</td>
</tr>
<tr>
<td>LOCAL</td>
<td>Parameter: (None)</td>
</tr>
<tr>
<td>LOCKOUT</td>
<td>Parameter: (None)</td>
</tr>
<tr>
<td>LOWS</td>
<td>Parameter: OPEN TIED</td>
</tr>
<tr>
<td>Command</td>
<td>Description</td>
</tr>
<tr>
<td>-------------</td>
<td>-------------------------</td>
</tr>
<tr>
<td>LOWS?</td>
<td>Response: OPEN, TIED</td>
</tr>
<tr>
<td>MULT</td>
<td>Parameter: &lt;value&gt;</td>
</tr>
<tr>
<td>NEWREF</td>
<td>Parameter: (None)</td>
</tr>
<tr>
<td>OLDREF</td>
<td>Parameter: (None)</td>
</tr>
<tr>
<td>ONTIME?</td>
<td>Response: &lt;days&gt;,&lt;hours&gt;</td>
</tr>
<tr>
<td>*OPC</td>
<td>Parameter: (None)</td>
</tr>
<tr>
<td>*OPC?</td>
<td>Response: 1</td>
</tr>
<tr>
<td>OPER</td>
<td>Parameter: (None)</td>
</tr>
<tr>
<td>OPER?</td>
<td>Response: 1 (Operate) 0 (Standby)</td>
</tr>
<tr>
<td>*OPT?</td>
<td>Responses: &lt;option string&gt;, &lt;option string&gt;, ... 0 (no options)</td>
</tr>
</tbody>
</table>
### COMMAND LIST (cont)

#### OUT
Parameters:
- `<value> V`
- `<value> DBM`
- `<value> V, <value> Hz`
- `<value> DBM, <value> Hz`
- `<value> A`
- `<value> A, <value> Hz`
- `<value> OHM`
- `<value> F`
- `<value> CEL`
- `<value> FAR`
- `<value> HZ`
- `<value> V, <value> A`
- `<value> DBM, <value> A`
- `<value> V, <value> A, <value> Hz`
- `<value> DBM, <value> A, <value> Hz`
- `<value> V, <value> V`
- `<value> DBM, <value> DBM`
- `<value> V, <value> V, <value> HZ`
- `<value> DBM, <value> DBM, <value> HZ`

#### OUT?
Parameters:
- `V`
- `A`
- `DBM`
- `CEL`
- `FAR`
- `OHM`
Response:
- `<primary amplitude value>, <primary units>, <secondary amplitude value>, <secondary units>, <fundamental frequency value>`

#### OUT_ERR?
Response:
- `<value of error>, <units>`
**COMMAND LIST (cont)**

<table>
<thead>
<tr>
<th>Command</th>
<th>Parameter</th>
<th>Response</th>
</tr>
</thead>
<tbody>
<tr>
<td>PHASE</td>
<td>&lt;phase value&gt; optional DEG</td>
<td></td>
</tr>
<tr>
<td>PHASE?</td>
<td></td>
<td>&lt;phase value&gt;</td>
</tr>
<tr>
<td>POWER?</td>
<td></td>
<td>&lt;value&gt;</td>
</tr>
<tr>
<td>*PUD</td>
<td>#2&lt;nn&gt;&lt;nn characters string&gt;</td>
<td>#0&lt;character string&gt;</td>
</tr>
<tr>
<td></td>
<td></td>
<td>&quot;&lt;character strings&gt;&quot;</td>
</tr>
<tr>
<td>*PUD?</td>
<td></td>
<td>#2nn&lt;nn characters&gt;</td>
</tr>
<tr>
<td>RANGE?</td>
<td></td>
<td>&lt;primary output&gt;, &lt;secondary output&gt;</td>
</tr>
<tr>
<td>RANGELCK</td>
<td>ON</td>
<td>OFF</td>
</tr>
<tr>
<td>RANGELCK?</td>
<td></td>
<td>ON</td>
</tr>
<tr>
<td></td>
<td></td>
<td>OFF</td>
</tr>
<tr>
<td>REFOUT?</td>
<td></td>
<td>&lt;reference value&gt;</td>
</tr>
<tr>
<td>REMOTE</td>
<td>(None)</td>
<td></td>
</tr>
</tbody>
</table>
**COMMAND LIST (cont)**

<table>
<thead>
<tr>
<th>Command</th>
<th>Parameters</th>
<th>Responses</th>
</tr>
</thead>
<tbody>
<tr>
<td>*RST</td>
<td></td>
<td>(None)</td>
</tr>
<tr>
<td>RTD_TYPE</td>
<td>PT385</td>
<td>PT3926</td>
</tr>
<tr>
<td></td>
<td>PT3926</td>
<td>NI120</td>
</tr>
<tr>
<td>RTD_TYPE?</td>
<td>PT385</td>
<td>PT3926</td>
</tr>
<tr>
<td></td>
<td>PT3926</td>
<td>NI120</td>
</tr>
<tr>
<td>RTD_TYPE_D</td>
<td>PT385</td>
<td>PT3926</td>
</tr>
<tr>
<td></td>
<td>PT3926</td>
<td>NI120</td>
</tr>
<tr>
<td>RTD_TYPE_D?</td>
<td>PT385</td>
<td>PT3926</td>
</tr>
<tr>
<td></td>
<td>PT3926</td>
<td>NI120</td>
</tr>
<tr>
<td>SP_SET</td>
<td>300, 600, 1200, 2400, 4800, 9600&gt;,</td>
<td></td>
</tr>
<tr>
<td></td>
<td>&lt;TERM, COMP&gt;,</td>
<td></td>
</tr>
<tr>
<td></td>
<td>&lt;XON, NOSTALL, RTS&gt;,</td>
<td></td>
</tr>
<tr>
<td></td>
<td>&lt;DBIT7, DBIT8&gt;,</td>
<td></td>
</tr>
<tr>
<td></td>
<td>&lt;SBIT1, SBIT2&gt;,</td>
<td></td>
</tr>
<tr>
<td></td>
<td>&lt;PNONE, PODD, PEVEN&gt;,</td>
<td></td>
</tr>
<tr>
<td></td>
<td>&lt;CR, LF, CRLF&gt;</td>
<td></td>
</tr>
</tbody>
</table>
### COMMAND LIST (cont)

<table>
<thead>
<tr>
<th>Command</th>
<th>Responses</th>
</tr>
</thead>
<tbody>
<tr>
<td>SP_SET?</td>
<td>&lt;300, 600, 1200, 2400, 4800, 9600&gt;,</td>
</tr>
<tr>
<td></td>
<td>&lt;TERM, COMP&gt;,</td>
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<tr>
<td></td>
<td>&lt;XON, NOSTALL, RTS&gt;,</td>
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<tr>
<td></td>
<td>&lt;DBIT7, DBIT8&gt;,</td>
</tr>
<tr>
<td></td>
<td>&lt;SBIT1, SBIT2&gt;,</td>
</tr>
<tr>
<td></td>
<td>&lt;PNONE, PODD, PEVEN&gt;,</td>
</tr>
<tr>
<td></td>
<td>&lt;CR, LF, CRLF&gt;</td>
</tr>
</tbody>
</table>

| SPLSTR    | Parameter: “<string>
”                      |
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>SPLSTR?</td>
<td>Response: &lt;string&gt;</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>SRC_PREF</th>
<th>Parameters: P5500 P5725</th>
</tr>
</thead>
<tbody>
<tr>
<td>SRC_PREF?</td>
<td>Responses: P5500 P5725</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>*SRE</th>
<th>Parameter: &lt;value&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td>*SRE?</td>
<td>Response: &lt;value&gt;</td>
</tr>
</tbody>
</table>

| SRQSTR    | Parameter: “<string>
”                           |
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>SRQSTR?</td>
<td>Response: &lt;string&gt;</td>
</tr>
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</table>
## COMMAND LIST (cont)

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
<th>Parameters</th>
<th>Response</th>
</tr>
</thead>
<tbody>
<tr>
<td>*STB?</td>
<td></td>
<td></td>
<td>&lt;value&gt;</td>
</tr>
<tr>
<td>STBY</td>
<td></td>
<td>(None)</td>
<td></td>
</tr>
<tr>
<td>TC_MEAS</td>
<td></td>
<td>CEL, FAR</td>
<td></td>
</tr>
<tr>
<td>TC_OFFSET</td>
<td></td>
<td>&lt;value&gt; CEL, &lt;value&gt; FAR</td>
<td></td>
</tr>
<tr>
<td>TC_OFFSET?</td>
<td></td>
<td>&lt;value&gt; CEL, &lt;value&gt; FAR</td>
<td></td>
</tr>
<tr>
<td>TC_OTCD</td>
<td></td>
<td>ON, OFF</td>
<td></td>
</tr>
<tr>
<td>TC_OTCD?</td>
<td></td>
<td>ON, OFF</td>
<td></td>
</tr>
<tr>
<td>TC_REF</td>
<td></td>
<td>INT, EXT, CEL (or FAR)</td>
<td></td>
</tr>
<tr>
<td>TC_REF?</td>
<td></td>
<td>INT, &lt;value&gt;, CEL (or FAR)</td>
<td></td>
</tr>
</tbody>
</table>
### COMMAND LIST (cont)

#### TC_TYPE

**Parameters:**

| B | C | E | J | K | N | R | S | T | X (10 µV/^°C) |

#### TC_TYPE?

**Responses:**

| B | C | E | J | K | N | R | S | T | X (10 µV/^°C) |

#### TC_TYPE_D

**Parameters:**

| B | C | E | J | K | N | R | S | T | X (10 µV/^°C) |
### TC_TYPE_D?
**Responses:**
- B
- C
- E
- J
- K
- N
- R
- S
- T
- X (10 µV/^°C)

### TEMP_STD
**Parameters:**
- IPTS_68
- ITS_90

### TEMP_STD?
**Responses:**
- IPTS_68
- ITS_90

### *TRG
**Responses:**
- <measurement value>, CEL
- <measurement value>, FAR
- 0.00E+00, OVER
- 0.00E+00, OPENTC
- 0.00E+00, NONE

### TSENS_TYPE
**Parameters:**
- TC
- RTD

### TSENS_TYPE?
**Responses:**
- TC
- RTD

### *TST?
**Response:**
- 0 (pass)
- 1 (fail)
**COMMAND LIST (cont)**

<table>
<thead>
<tr>
<th>Command</th>
<th>Parameters</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>UUT_FLUSH</strong></td>
<td>Parameter: (None)</td>
</tr>
<tr>
<td><strong>UUT_RECV?</strong></td>
<td>Response: &lt;data&gt;</td>
</tr>
</tbody>
</table>
| **UUT_SEND** | Parameter: 
2<nn><nn characters string>  
0<character string>  
"<character string>"  
Special Case: The character string sent to a UUT must end in a carriage return (CR) or line feed (LF) command or both.  
Carriage Return: ^J \n  
Line Feed: ^M \r  
Tab: Tab \t  
Backspace: ^H \b  
Form Feed: ^L ^f |
| **UUT_SET**  | Parameters: <300, 600, 1200, 2400, 4800, 9600>,  
               <XON, NOSTALL, RTS>,  
               <DBIT7, DBIT8>,  
               <SBIT1, SBIT2>,  
               <PNONE, PODD, PEVEN> |
| **UUT_SET?** | Responses: <300, 600, 1200, 2400, 4800, 9600>,  
               <XON, NOSTALL, RTS>,  
               <DBIT7, DBIT8>,  
               <SBIT1, SBIT2>,  
               <PNONE, PODD, PEVEN> |
### COMMAND LIST (cont)

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
<th>Parameters</th>
<th>Responses</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>VAL?</strong></td>
<td>&lt;measurement value&gt;, CEL</td>
<td>-</td>
<td>&lt;measurement value&gt;, CEL</td>
</tr>
<tr>
<td></td>
<td></td>
<td>-</td>
<td>FAR</td>
</tr>
<tr>
<td></td>
<td></td>
<td>-</td>
<td>0.00E+00, OVER</td>
</tr>
<tr>
<td></td>
<td></td>
<td>-</td>
<td>0.00E+00, OPENTC</td>
</tr>
<tr>
<td></td>
<td></td>
<td>-</td>
<td>0.00E+00, NONE</td>
</tr>
<tr>
<td><strong>WAI</strong></td>
<td>(none)</td>
<td>-</td>
<td>(none)</td>
</tr>
<tr>
<td><strong>WAVE</strong></td>
<td>&lt;1st waveform&gt;, (SINE, TRI, SQUARE, TRUNCS, NONE)</td>
<td>-</td>
<td>&lt;1st waveform&gt;, (SINE, TRI, SQUARE, TRUNCS, NONE)</td>
</tr>
<tr>
<td></td>
<td>&lt;2nd waveform&gt; (SINE, TRI, SQUARE, TRUNCS, NONE)</td>
<td>-</td>
<td>&lt;2nd waveform&gt; (SINE, TRI, SQUARE, TRUNCS, NONE)</td>
</tr>
<tr>
<td><strong>WAVE?</strong></td>
<td>&lt;1st waveform&gt;, (SINE, TRI, SQUARE, TRUNCS, NONE)</td>
<td>-</td>
<td>&lt;1st waveform&gt;, (SINE, TRI, SQUARE, TRUNCS, NONE)</td>
</tr>
<tr>
<td></td>
<td>&lt;2nd waveform&gt; (SINE, TRI, SQUARE, TRUNCS, NONE)</td>
<td>-</td>
<td>&lt;2nd waveform&gt; (SINE, TRI, SQUARE, TRUNCS, NONE)</td>
</tr>
<tr>
<td><strong>ZCOMP</strong></td>
<td>NONE</td>
<td>-</td>
<td>NONE</td>
</tr>
<tr>
<td></td>
<td>WIRE2</td>
<td>-</td>
<td>WIRE2</td>
</tr>
<tr>
<td></td>
<td>WIRE4</td>
<td>-</td>
<td>WIRE4</td>
</tr>
<tr>
<td><strong>ZCOMP?</strong></td>
<td>NONE</td>
<td>-</td>
<td>NONE</td>
</tr>
<tr>
<td></td>
<td>WIRE2</td>
<td>-</td>
<td>WIRE2</td>
</tr>
<tr>
<td></td>
<td>WIRE4</td>
<td>-</td>
<td>WIRE4</td>
</tr>
</tbody>
</table>