HIOKI

9518-02

Instruction Manual

GB-IB INTERFACE

For 3157 AC GROUNDING HiTESTER

EN

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Contents

Introduction

Thank you for purchasing this HIOKI "9518-02 GP-IB INTERFACE."
To get the maximum performance from the unit, please read this manual first, and keep this at hand.

This Instruction Manual provides information and warnings essential for operating this equipment in a safe manner and for maintaining it in safe operating condition. Before using this equipment, be sure to carefully read the following safety notes.

The following symbols are used in this Instruction Manual to indicate the relative importance of cautions and warnings.

◯ WARNING	Indicates that incorrect operation presents significant danger of accident resulting in death or serious injury to the user.
◯ CAUTION	Indicates that incorrect operation presents possibility of injury to the user or damage to the equipment.
NOTE	Denotes items of advice related to performance of the equipment or to its correct operation.

* The "3157" in this Instruction Manual includes the "3157-01."

Chapter 1
Before Use

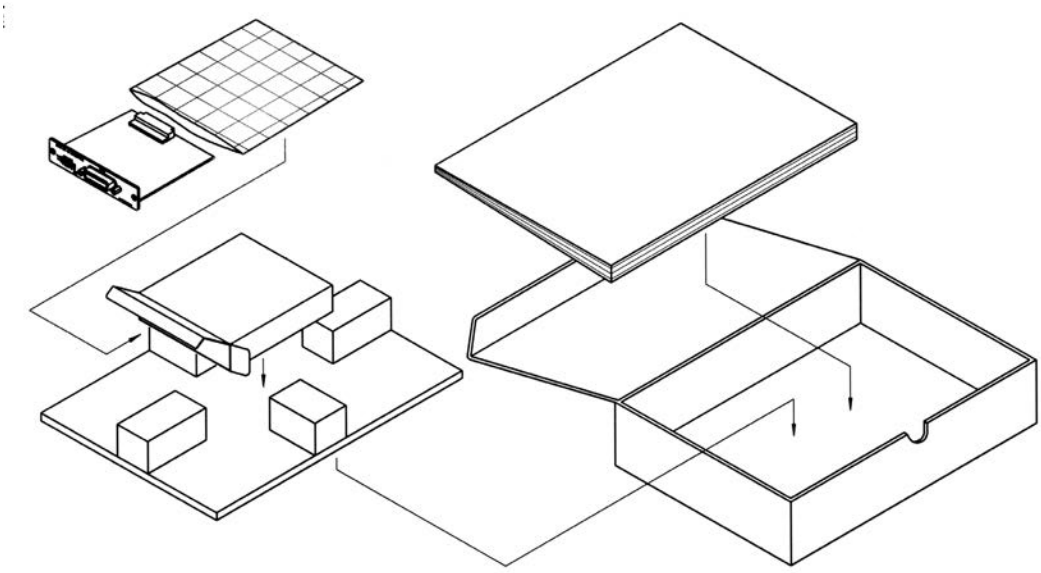
1.1 Check of External Appearance and Accessories

When the unit is delivered, check and make sure that it has not been damaged in transit. If the unit is damaged, or fails to operate according to the specifications, contact your dealer or HIOKI representative.

(1) 9518-02 GP-IB INTERFACE
(2) This instruction manual

1.2 Shipping Precautions

If reshipping the unit, preferably use the original packing.



If this is not available, use the following procedure.

(1) Wrap the unit in plastic sheeting.

(2) After wrapping cushioning material around the unit, pack it into a cardboard box, and then seal up the box with adhesive tape.

1.3 Notes on Use

(1) If you change the device address of the 3157 while using it, you should immediately turn the power off and on again. If you do not do so, the address change will not be registered by the bus, and problems will occur.

(2) Always be sure to secure the GP-IB cable to the 9518-02 unit by tightening up the fixing screws provided.

(3) Program messages sent just after the power has been turned on are executed after the self test has terminated.

(4) It is vital that the proper data format is used when inputting commands with data values to the 3157 unit.

(5) For details of the various functions, refer to the instruction manual for the 3157 unit.

1.4 Installing the GP-IB Interface

WARNING

- **To prevent electrical shock, before adding or replacing the GP-IB interface, check that the power for the unit is off and the power cord and connectors are disconnected. [The fixing screws must be firmly tightened or the input unit may not function up to specification, or may even fail.]**
- **To avoid the danger of electric shock, never operate the unit with a GP-IB interface removed. If you should wish to use the unit after removing an interface, fit a blank panel over the opening of the removed unit.**

CAUTION

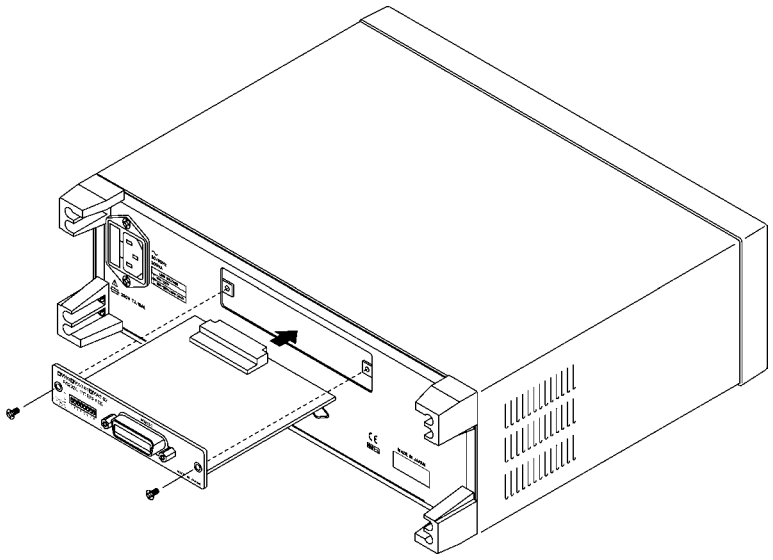
When inserting in the interface, hold the metal plate. Directly touching the board may cause static electricity and lead to damage of the instrument. (Using the wrist strap for preventing static electricity when inserting is recommended.)

The space for fitting the 9518-02 GP-IB INTERFACE in the rear panel of the 3157 is covered with a blank panel. Follow these three steps to install the 9518-02 interface:

(1) Remove the fixing screws, and take off the blank panel.

(2) Insert the 9518-02 GP-IB INTERFACE into the exposed slot in the rear of the unit in the figure below.

(3) Push the 9518-02 firmly into place, and fix with the screws removed in step 1.



Chapter 2
Overview

2.1 Introduction to the GP-IB Interface

By connecting the 9518-02 GP-IB INTERFACE to the 3157 AC GROUNDING HiTESTER, it is possible to control all the functions of the main unit (except for powering on and off) via the GP-IB bus. This unit is compliance with the following standard.

Compliance standard : IEEE 488.1-1987

Further, the 9518-02 is designed with reference to the following standard:

Reference standard : IEEE 488.2-1987

NOTE

On the 9518-02, if the output queue becomes full, it is cleared and a query error is generated. This differs from the IEEE 488.2 specification, which only stipulates the clearing of the output queue and the outputting of a query error when a deadlock state occurs, that is, when both the input buffer and the output queue have become full, and continuation of processing has become impossible.

2.2 Features

(1) All of the functions of the 3157 main unit, except for powering on and off, can be controlled via the GP-IB interface. However, the ":STARt" command works in a state in which the momentary OUT settings are disabled even though the momentary OUT settings have been set.

(2) The beeper sound can be turned on and off.

(3) The unit can be reset.

(4) IEEE 488.2-1987 standard (essential) commands can be used.

2.3 Specifications

Interface functions

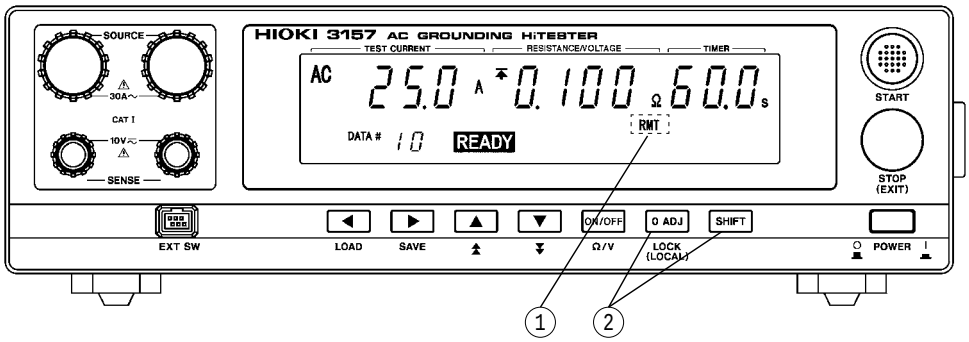
SH1	All source handshake functions
AH1	All acceptor handshake functions
T6	Basic talk functions Serial poll function No talk-only mode The talker cancellation function with MLA (My Listen Address)
L4	Basic listener functions No listen-only mode The listener cancellation function with MTA (My Talk Address) is provided.
SR1	All service request functions
RL1	All remote/local functions
PP0	No parallel polling function
DC1	All device clear functions
DT0	No device trigger function
C0	No controller function

ASCII codes are used.

Chapter 3
Names of Parts

3.1 Controls and Connections

(1) 3157 front panel



① Display of GP-IB status

Each lamp displays the state of control by the GP-IB.

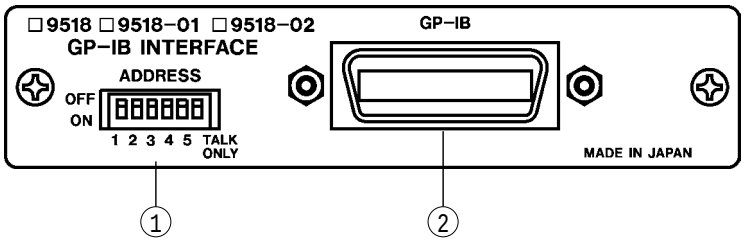
RMT: Remote

② Remote state releasing keys

Press the [0ADJ] key while holding down the [SHIFT] key to release the remote state by the GP-IB and resume the local state. However, this key operation is disabled if the GP-IB controller has put the unit into the local lock out state. (Pressing [SHIFT] + [0ADJ] has no effect.)

When the unit enters the remote state because of a command message, it is forcibly returned to the READY state.

(2) 9518-02 GP-IB interface outer panel



① Address switches

These are used to set the device address of the 3157 unit on the GP-IB bus. For how to set these switches, refer to Section 4.1, "Setting the GP-IB Device Address."

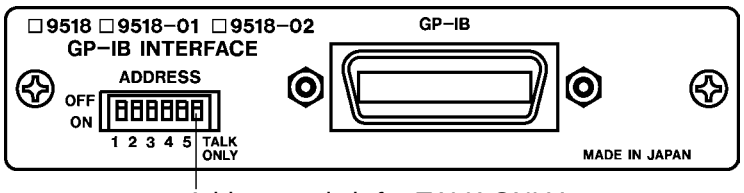
② GP-IB connector

Connect the GP-IB cable to this connector.

Chapter 4
Operation

4.1 Setting the GP-IB Device Address

- The address of the 3157 unit (called the device) on the GP-IB bus can be set to any number from 0 to 30.
- Use the Address switches on the GP-IB panel to set the device address.
- On dispatch from the factory, this address is initially set to 1.
- If this address is (apparently) set to 31, i.e. if all the switches are in the ON position, then the bus lines of the 3157 are disabled.
- Always the Address switch for TALK ONLY is in the OFF position, since it is not used.



Address switch for TALK ONLY

0: OFF, 1: ON

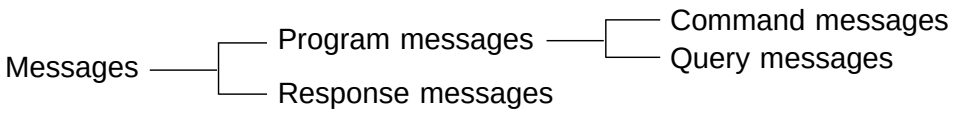
Address	Switch settings 12345	Address	Switch settings 12345	Address	Switch settings 12345
0	00000	11	11010	22	01101
1	10000	12	00110	23	11101
2	01000	13	10110	24	00011
3	11000	14	01110	25	10011
4	00100	15	11110	26	01011
5	10100	16	00001	27	11011
6	01100	17	10001	28	00111
7	11100	18	01001	29	10111
8	00010	19	11001	30	01111
9	10010	20	00101		
10	01010	21	10101		

NOTE

If you change the bus address while the 3157 is being used, then you should immediately turn the power off and on again.
If this is not done, the address will not be changed to the new one.

4.2 Communication Methods by the GP-IB

In order to control the 3157 by the GP-IB, there are several kinds of messages. Of these, program messages are those received by the 3157 from the computer, while response messages are those sent from the 3157 to the computer.



(1) Program messages

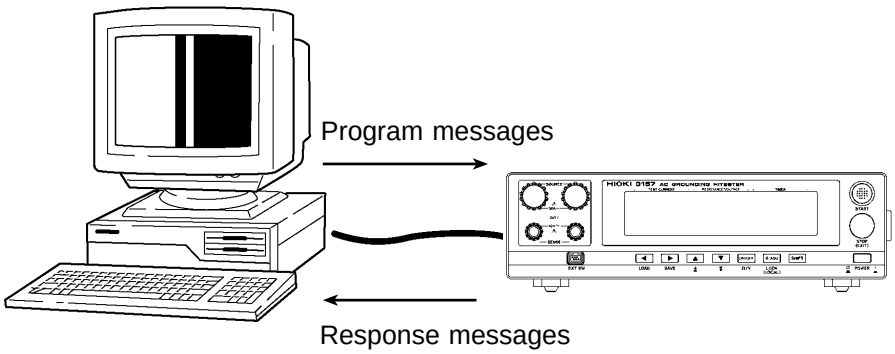
Program messages are command messages or query messages.

- Command messages are orders for controls of the 3157, such as for making unit settings or for reset or the like.
  Example :TIMER_<data>
  (Command message which enables and disables the test time)
- Query messages are orders for responses relating to results of operation, results of measurement, or the state of 3157 settings. A question mark "?" is suffixed at the end of the command.
  Example :TIMER?
  (Queries the current test time enablement)

(2) Response messages

It represents the response data for query messages from the 3157.
Example :TIMER_ON
(Test time is currently enabled.)

NOTE A space is represented by "_" in the examples.



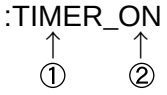
4.3 Message Format

The commands for the 3157 are as far as possible mnemonic. Furthermore, all commands have a long form, and an abbreviated short form.

4.3.1 Program Message

The program message is made up from header and data portions.

Example Command message to set test time to ON



①: Header portion
②: Data portion (ASCII-format text or numeric values. Some messages have no data portions...query messages, etc.)

A command header can be abbreviated. The whole command form is referred to as the "long form" and the abbreviated form as the "short form."

In this manual, the short form is written in upper case letters, and then this is continued in lower case letters so as to constitute the long form. Either of these forms will be accepted during operation, but intermediate forms will not be accepted. Further, during operation both lower case letters and upper case letters will be accepted without distinction.

For "TIMER", either "TIMer" (the long form) or "TIM" (the short form) will be accepted. However, any one of "TIME", or "TI" is wrong and will generate an error.

4.3.2 Response Messages

It represents the response message for query messages from the 3157. Response messages generated by the 3157 are in long form and in upper case letters.

Example :TIMER_ON
(Test time is currently enabled.)

NOTE If an error occurs when the query message is received, the query does not produce response message.

4.4 Headers

(1) Program message headers

There are three types of header: simple commands, compound commands, and standard common commands.

- Simple command header

  A header consisting of a single word beginning with a letter.
  Examples :HEADer etc.

- Compound commands header

  A header consisting of a sequence of words separated by colons.
  Examples :CONFigure:CURRent, MEASure:RESistance?, etc.

- Standard command header

  A header begins with an asterisk (*) to indicate that it is a standard command, and continues with a standard command stipulated by IEEE 488.2.
  Examples *RST etc.

(2) Response message

Headers in response messages can be enabled or disabled by using the "HEADer" command.

Example When test time is enabled:

:TIMER?
(Query message asking for the current enablement state of the test time)

Response message when headers are on.

:TIMER_ON
↑ ↑
① ②

①: Header portion
②: Data portion

Response message when headers are off.

ON
Data portion only

4.5 Data Formats

The 3157 uses character string data and decimal numeric data, and the type used varies according to the command in question.

(1) Character data

Character string data must always begin with an alphabetic character, and the characters following can be either alphabetic characters or numerals. Although in character data either upper case letters or lower case letters are accepted, response messages output by the 3157 are always in upper case letters.

Example :STATe_reaDY

(2) Decimal data

The numeric data values are all represented in decimal, in three formats identified as NR1, NR2 and NR3, and each of these can appear as either a signed number or an unsigned number. Unsigned numbers are taken as positive. Further, if the accuracy of a numerical value exceeds the limit which the 3157 can deal, it is rounded off (5 and above is rounded up; 4 and below is rounded down).

NR1 format: Integer data
Examples +3000, -50000, 210

NR2 format: Fixed point numbers
Examples +2.56, -30.45, 300.28

NR3 format: Floating point numbers.
Examples +3E-2, -1.2E3

The term "NRf format" includes all these three formats. When the 3157 is receiving it accepts NRf format, but when it is sending response messages it utilizes whichever one of the formats NR1 to NR3 is indicated in the specified command.

Examples :CONFigure:CURRent_25
:CONFigure:CURRent_+25.012
:CONFigure:CURRent_0.0025E4

4.6 Message Terminators

The 3157 recognizes either a linefeed character (LF) or the EOI signal, or both, as message terminators.
To terminate a response message, the 3157 always provides the appropriate EOI signal, and also sends a terminating character sequence. By the use of the ":TRANsmit:TERMinator" command either of the following can be selected as response message terminator sequence:
(1) LF (linefeed only)
(2) CR + LF (carriage return plus linefeed)
The initial selection is (1).

A detailed explanation of the "TRANsmit:TERMinator" command is given in Section 5.4.

4.7 Separators

(1) Message unit separator

A semicolon (;) is used as a message unit separator when it is desired to set out several messages on a single line.
Example :UNIT_OHM;:UPPER_ON;:CONFIGURE:RUPPER_0.100

NOTE When messages are combined in this way, if a syntax error occurs, all subsequent messages up to the next terminater will be ignored.

(2) Header separator

In a message which has a header and data, a space (represented by "_ " in the examples) is used as the header separator to separate the header from the data.
Example :ADjust_ON

(3) Data separator

If a message has several data items, commas (,) are required as data separators for separating these data items from one another.
Example :KEY_< first byte>, <second byte>

4.8 Abbreviation of Compound Commands

When several compound commands have a common head portion (for example, :CONFigure:CURRent and :CONFigure:RUPPer, etc.), then, when and only when writing them directly following on from one another, this common portion (:CONFigure in this example) can be omitted from each command except for the first one.
This common portion is called "the current path", by analogy with the general concept of the current directory in the directory structure of UNIX or MSDOS, and until it is cleared the analysis of following commands is performed by deeming them to be preceded by the current path which has been curtailed in the interests of brevity. This manner of using the current path is shown in the following example:

Normal expression
:CONFigure:CURRent_25.0;:CONFigure:RUPPer_0.100

Abbreviated expression
:CONFigure:CURRent_25.0;RUPPer_0.100

This becomes the current path, and can be curtailed from the following commands.

The current path is cleared when the power is turned on, when a colon (:) appears at the start of a command, and when a message terminator is detected.
Messages of standard command form can be executed without relation to the current path. Further, they have no effect upon the current path.

It is not necessary to prefix a colon (:) at the start of headers of simple commands and compound commands. However, in order to prevent confusion with abbreviated forms and mistakes in operation, it is recommended practice always to prefix ":" to headers.

With the 3157, there are 4 possible current paths:
:CONFigure:
:MEASure:
:MEMory:
:SYSTem:

4.9 Output Queue

Response messages accumulate in the output queue and are read out as data and cleared by the controller.
The output queue is also cleared in the following circumstances:

- When a device clear is issued.
- When the power is turned off and turned on again.

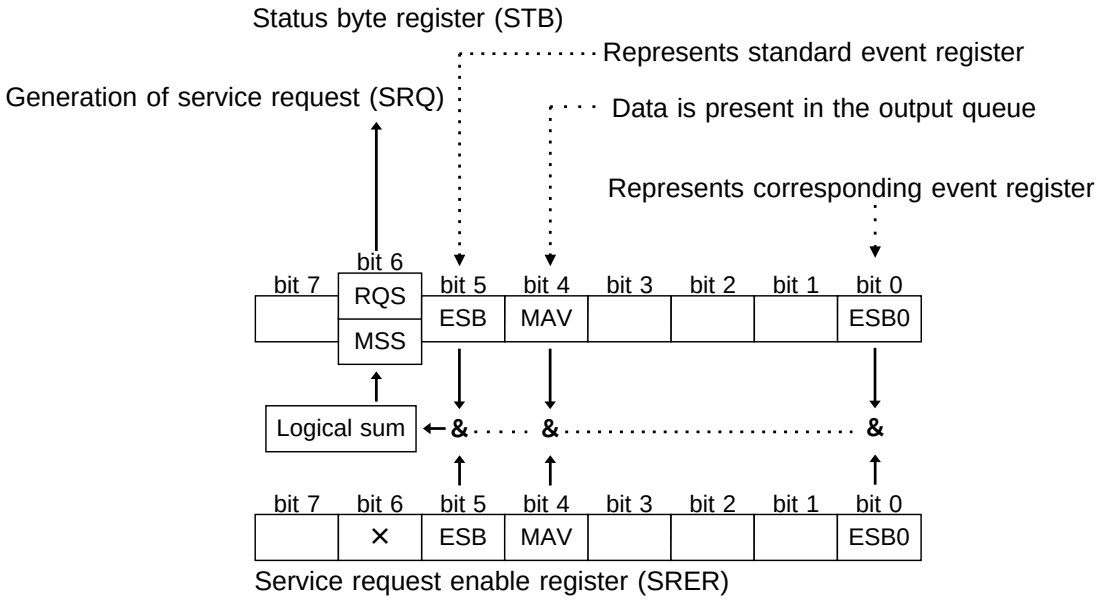
The 3157 has an output queue of 300 bytes capacity. If the response messages overflow this limit of 300 bytes, a query error is generated, and the output queue is cleared. Further, if a new message is received while the output queue still contains data, the output queue is cleared, and a query error is generated.

4.10 Input Buffer

The 3157 has an input buffer of 300 bytes capacity. Messages which are received are put into this buffer and executed in order. If the data accumulated in this buffer exceeds 300 bytes the buffer becomes full, and until a space again becomes available in the buffer the GP-IB interface bus goes into the waiting state.

4.11 Status Model

In its implementation of the serial polling function using service requests, the 3157 employs the status model specified by IEEE 488.2.
The term "event" refers to any phenomenon which generates a service request.



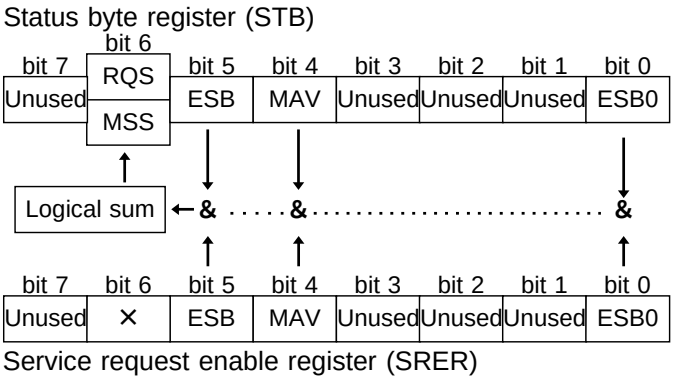
Generation of service requests

The status byte register holds information relating to the event registers and the output queue.
It is further possible to use the service request enable register as a mask to select the items required. If any of the bits selected by the mask becomes 1, bit 6 (the master summary status or MSS bit) is also set to 1, an RQS message is generated, and this generates a service request.

4.12 Status Byte Register

(1) Status byte register (STB)

The status byte register is an 8-bit register whose contents are output from the 3157 to the controller, when serial polling is being performed.
If any bit in the status byte register has changed from 0 to 1 (provided that it is a bit which has been set in the service request enable register as a bit which can be used), then the MSS bit is set to 1. Simultaneously with this the RQS bit is also set to 1, and a service request is generated.



The RQS bit is synchronized with service requests, and is read out and simultaneously cleared when serial polling is being performed. Although the MSS bit is only read out on an "*STB?" query, on a "*CLS" command for example it is not cleared until the event is cleared.

Status byte register bit assignments

Bit 7	Unused.
Bit 6 RQS	Set to 1 when a service request is issued.
MSS	Logical sum of the other bits of the status byte register
Bit 5 ESB	Standard event summary (logical sum) bit Shows a logical sum of the standard event status register.
Bit 4 MAV	Message available. Shows that there is at least one message in the output queue.
Bit 3	Unused.
Bit 2	Unused.
Bit 1	Unused.
Bit 0 ESB0	Event summary bit 0 Shows a logical sum of event status register 0.

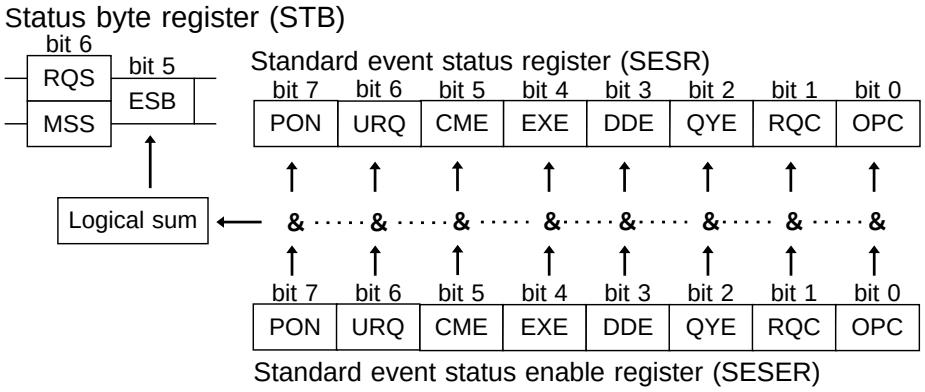
(2) Service request enable register (SRER)

This register masks the status byte register. Setting a bit of this register to 1 enables the corresponding bit of the status byte register to be used.

4.13 Event Registers

(1) Standard event status register (SESR)

The standard event status register is an 8-bit register. If any bit in the standard event status register is set to 1 (after masking by the standard event status enable register), bit 5 (ESB) of the status byte register is set to 1.



The standard event status register is cleared in the following three situations:

① When a "*CLS" command is received.

② When an "*ESR?" query is received.

③ When the unit is powered on.

(2) Standard event status enable register (SESER)

Setting any bit of the standard event status enable register to 1 enables the corresponding bit of the standard event status register to be accessed.

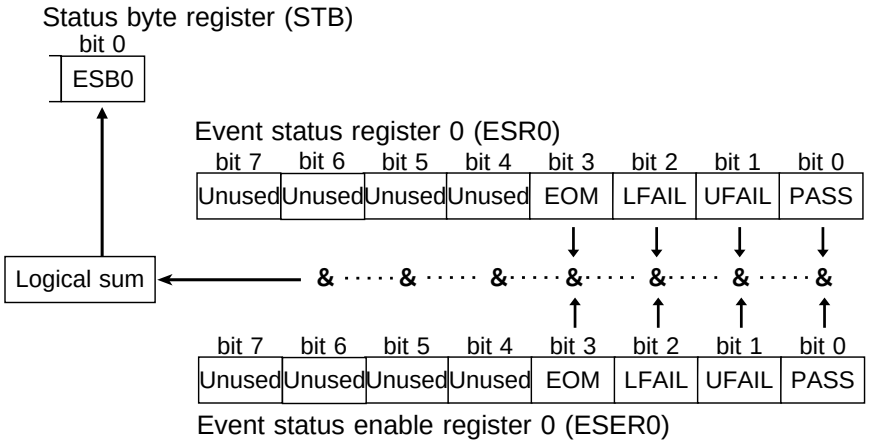
Standard event status register (SESR) bit assignments

Bit 7 PON	Power on flag. When the power is turned on, or on recovery from a power cut, this bit is set to 1.
Bit 6 URQ	User request. Not used by the 3157.
Bit 5 CME	Command error. When a command which has been received contains a syntactic or semantic error, this bit is set to 1. ・The command is not supported by the 3157. ・There is a mistake in a program header. ・The number of data parameters is wrong. ・The format of the parameters is wrong.
Bit 4 EXE	Execution error. When for some reason a command which has been received cannot be executed, this bit is set to 1. ・The designated data value is outside the set range. ・The designated data value is not acceptable. ・Execution is impossible because some other function is being performed.
Bit 3 DDE	Device dependent error. When a command cannot be executed due to some cause other than a command error, a query error, or an execution error, this bit is set to 1. Execution is impossible due to an abnormality inside the 3157.
Bit 2 QYE	Query error. This bit is set to 1 when a query error is detected by the output queue control. ・When an attempt has been made to read the output queue when it is empty. ・When the data overflows the output queue. ・When data in the output queue has been lost.
Bit 1 RQC	Request for controller authority. Not used by the 3157.
Bit 0 OPC	Operation terminated. This bit is set to 1 when an "∗OPC" command is executed, when the operation of all the messages up to the "∗OPC" command has been completed.

(3) Event status register specific to the 3157 (ESR0)

An 8-bit event status register is provided for managing events on the 3157. If any bit in this event status register is set to 1 (after masking by the corresponding event status enable register), the following happens:

・For event status register 0, bit 0 of the status byte register (ESB0) is set to 1.



Event status register 0 is cleared in the following three situations:

① When a "*CLS" command is received.

② When an ":ESR0?" query is received.

③ When the unit is powered on.

Event status register 0 (ESR0) bit assignments

Bit 7	Unused
Bit 6	Unused
Bit 5	Unused
Bit 4	Unused
Bit 3 EOM	Test completed
Bit 2 LFAIL	Below lower limit of comparator
Bit 1 UFAIL	Above upper limit of comparator
Bit 0 PASS	Within limits of comparator

(4) Event status enable register specific to the 3157 (ESER0)

This event status enable register masks the corresponding event status register.

(5) Summary of commands for writing and reading each of the registers

Register	Read	Write
Status byte register	*STB?	——
Service request enable register	*SRE?	*SRE
Standard event status register	*ESR?	——
Standard event status enable register	*ESE?	*ESE
Event status register 0	:ESR0?	——
Event status enable register 0	:ESE0?	:ESE0

4.14 GP-IB Commands

The following commands are used for performing interface functions:

Command	Function
GTL	Go To Local The remote state is canceled,, and the system goes into the local state.
LLO	Local Lock Out All keys, including the LOCAL key, become inoperable.
DCL	Device Clear Clears the input buffer and the output queue.
SDC	Selected Device Clear Clears the input buffer and the output queue.

Chapter 5
Command Reference

5.1 Command Summary

Standard commands

Command	Explanation	Ref page
∗CLS	Clears event register.	29
∗ESE	Sets standard event status enable register (SESER).	29
∗ESE?	Queries standard event status enable register (SESER).	30
∗ESR?	Queries standard event status register (SESR).	30
∗IDN?	Queries device ID.	30
∗OPC	Issues service request (SRQ) after execution completion.	31
∗OPC?	Queries execution completion.	31
∗RST	Device initialization.	31
∗SRE	Sets service request enable register (SRER).	32
∗SRE?	Queries service request enable register (SRER).	32
∗STB?	Queries status byte register (STB).	33
∗TST?	Queries the result of the self-test.	33
∗WAI	Waits until all execution is fully completed.	33

Commands specific to the 3157

Command	Explanation	Ref page
:ADJust	Enables and disables the zero adjustment function.	34
:ADJust?	Queries the zero adjustment function enablement.	34
:CONFigure?	Queries the test settings.	35
:CONFigure:CURRent	Sets the output current value.	35
:CONFigure:CURRent?	Queries the output current value.	36
:CONFigure:DATA	Sets the number of test data.	36
:CONFigure:DATA?	Queries the number of test data.	36
:CONFigure:RLOWer	Sets the minimum test value (resistance).	37
:CONFigure:RLOWer?	Queries the minimum test value (resistance).	37
:CONFigure:RUPPer	Sets the maximum test value (resistance).	38
:CONFigure:RUPPer?	Queries the maximum test value (resistance).	38
:CONFigure:TIMer	Sets the test time.	39
:CONFigure:TIMer?	Queries the test time.	39
:CONFigure:VLOWer	Sets the minimum test value (voltage).	40
:CONFigure:VLOWer?	Queries the minimum test value (voltage).	40
:CONFigure:VUPPer	Sets the maximum test value (voltage).	41
:CONFigure:VUPPer?	Queries the maximum test value (voltage).	41
:ESE0	Sets event status enable register 0.	42
:ESE0?	Queries event status enable register 0.	42
:ESR0?	Queries event status register 0.	43
:HEADer	Enables and disables headers for the response messages.	43
:HEADer?	Queries whether or not headers on response messages are enabled.	43
:KEY	Sets key entry.	44
:LOWer	Enables and disables the minimum test value.	44
:LOWer?	Queries the minimum test value enablement.	45
:MEASure:CURRent?	Queries the measured current value.	45
:MEASure:RESistance?	Queries the measured resistance value.	46
:MEASure:TIMer?	Queries the test time elapsed.	46
:MEASure:VOLTage?	Queries the measured voltage value.	47
:MEASure:RESult:VOLTage?	Queries the measured value and result (voltage).	47
:MEASure:RESult:RESistance?	Queries the measured value and result (resistance).	48
:MEMory:CLEar	Clears Setting memory.	48
:MEMory:FILE?	Queries the contents of Setting memory.	49
:MEMory:LOAD	Loads Setting memory.	49
:MEMory:SAVE	Saves in Setting memory.	50
:STARt	Starts a test.	50
:STATe?	Queries the state.	50

Command	Explanation	Ref page
:STOP	Performs forcible ending of a test and releases the hold state.	51
:SYSTem:OPTion:BUZZer	Sets the buzzer.	51
:SYSTem:OPTion:BUZZer?	Queries the buzzer.	51
:SYSTem:OPTion:CCHange	Sets the current changeability in the TEST state.	52
:SYSTem:OPTion:CCHange?	Queries the current changeability in the TEST state.	52
:SYSTem:OPTion:CDATa	Sets the maximum number of test data in the test data count function.	53
:SYSTem:OPTion:CDATa?	Queries the maximum number of test data in the test data count function.	53
:SYSTem:OPTion:COUNt	Sets the test data count function.	54
:SYSTem:OPTion:COUNt?	Queries the test data count function.	54
:SYSTem:OPTion:ENDLess	Sets the endless timer function.	55
:SYSTem:OPTion:ENDLess?	Queries the endless timer function.	55
:SYSTem:OPTion:FREQuency	Sets the output current frequency.	56
:SYSTem:OPTion:FREQuency?	Queries the output current frequency.	56
:SYSTem:OPTion:HOLD	Sets the hold function.	57
:SYSTem:OPTion:HOLD?	Queries the hold function.	57
:SYSTem:OPTion:LOWer	Sets the minimum test value.	58
:SYSTem:OPTion:LOWer?	Queries the minimum test value.	58
:SYSTem:OPTion:MOMentary	Sets the momentary OUT function.	59
:SYSTem:OPTion:MOMentary?	Queries the momentary OUT function.	59
:SYSTem:OPTion:PFHold	Sets the PASS/FAIL hold function.	60
:SYSTem:OPTion:PFHold?	Queries the PASS/FAIL hold function.	60
:SYSTem:OPTion:PRINter	Sets the printer output function.	61
:SYSTem:OPTion:PRINter?	Queries the printer output function.	61
:SYSTem:OPTion:TMODe	Sets the test mode.	62
:SYSTem:OPTion:TMODe?	Queries the test mode.	62
:TIMer	Enables and disables the test time.	63
:TIMer?	Queries the test time enablement.	63
:TRANsmit:TERMinator	Sets the data terminator for response messages.	63
:TRANsmit:TERMinator?	Queries the data terminator for response messages.	64
:UNIT	Sets the unit of the maximum and minimum test values.	64
:UNIT?	Queries the unit of the maximum and minimum test values.	64
:UPPer	Enables and disables the maximum test value.	65
:UPPer?	Queries the maximum test value enablement.	65

5.2 Format of Command Explanations

Syntax Specifies the syntax for the command (a space is represented by "_" in this syntax).

<data> For a command that has parameters, specifies their format.

Function Specifies the function of the command.

Note Specifies precautions to be taken when using the command.

Example These are simple examples of the use of the command.
Note that all transmission messages are expressed in a "short form."

Error Specifies what types of error may occur.
Any spelling error in a message results in a command error.

NOTE For details of each function, refer to the instruction manual for the 3157 unit.

5.3 Standard Commands

*CLS

■ Clears the status byte register and the event registers.

Syntax *CLS

Function
- Clears all the event registers (SESR, ESR0) associated with the bits of the status byte register. Accordingly, also clears the status byte register.
- This has no effect upon the output queue, the various enable registers, or bit 4 (the MAV bit) of the status byte register.

Error If the data parameters are set after this command, a command error occurs.

*ESE

■ Sets the standard event status enable register.

Syntax *ESE_<data>

<data> Numerical data in NR1 format between 0 and 255

Function
- Sets the standard event status enable register (SESER) to a bit pattern which is used to mask the standard event status register (SESR).
- The numerical value can be in NRf format, but any digits after the decimal point will be rounded.
- When the power is turned on, the data is reinitialized to zero.

128	64	32	16	8	4	2	1
bit 7	bit 6	bit 5	bit 4	bit 3	bit 2	bit 1	bit 0
PON	URQ	CME	EXE	DDE	QYE	RQC	OPC

Standard event status enable register (SESER)

Example Transmission *ESE 20
Bits 2 and 4 of SESER are set to 1.

Error If <data> is other than numerical value described above, an execution error occurs.

*ESE?

■ Queries the standard event status enable register.

Syntax *ESE?

Function Returns the setting contents of SESER as a numerical value in NR1 format between 0 and 255.

Example Response
If headers are on *ESE 20
If headers are off 20
Bits 2 and 4 of SESER have been set to 1.

128	64	32	16	8	4	2	1
bit 7	bit 6	bit 5	bit 4	bit 3	bit 2	bit 1	bit 0
PON	URQ	CME	EXE	DDE	QYE	RQC	OPC

Standard event status enable register (SESER)

Error If the response message is longer than 300 bytes, a query error is generated.

*ESR?

■ Queries the contents of the standard event status register (SESR).

Syntax *ESR?

Function
- Returns the contents of the standard event status register (SESR) as a numerical value in NR1 format between 0 and 255, and then clears standard event status register.
- No header is affixed to the response message.

Example Response 32
Bit 5 of SESR has been set to 1.

128	64	32	16	8	4	2	1
bit 7	bit 6	bit 5	bit 4	bit 3	bit 2	bit 1	bit 0
PON	URQ	CME	EXE	DDE	QYE	RQC	OPC

Standard event status register (SESR)

Error If the response message is longer than 300 bytes, a query error is generated.

*IDN?

■ Queries manufacturer's name, model name, and software version.

Syntax *IDN?

Function
- The response consists of the name of the manufacturer of the unit, the model name, and the software version.
- No header is affixed to the response message.

First field Manufacturer's name
Second field Model name
Third field Serial number (Not used - always zero)
Fourth field Software version

Example Response HIOKI,3157,0,V01.01

Error If the response message is longer than 300 bytes, a query error is generated.

∗OPC

■ After all action has been completed during execution, performs an SRQ request.

Syntax ∗OPC

Function Sets bit 0 (the OPC bit) of the standard event status register (SESR) to 1 at the instant the previous commands which is on the same line with *OPC have been completed.

Error If the data parameters are set after this command, a command error occurs.

∗OPC?

■ Queries whether or not all action has been completed during execution.

Syntax ∗OPC?

Function
- The same as the *OPC command, except in that, at the instant that the previous commands have been completed.
- Returns the response message "1", instead of bit 0 (the OPC bit) of the standard event status register (SESR) being set to 1.
- No header is affixed to the response message.

Error If the response message is longer than 300 bytes, a query error is generated.

∗RST

■ Performs device initial setting.

Syntax ∗RST

Function Resets the 3157. The items which are reset are listed below.

Voltage or resistance indicator (unit)	Resistance
Test time enablement	ON
Maximum test value enablement	ON
Minimum test value enablement	OFF
Output current value	25.0 A
Maximum test value (resistance)	0.100 Ω
Minimum test value (resistance)	0.000 Ω
Maximum test value (voltage)	2.50 Ω
Minimum test value (voltage)	0.00 Ω
Test time	60.0 s

Error If the data parameters are set after this command, a command error occurs.

*SRE

■ Sets the service request enable register.

Syntax *SRE_<data>

<data> Numerical data in NR1 format between 0 and 255

Function
- Sets a pattern which is used to mask the status byte register (STB) to the service request enable register (SRSR).
- The numerical value can be in NRf format, but any digits after the decimal point will be rounded.
- The settings of unused bits (bits 1, 2, 3, and 7) and bit 6 are disregarded.
- When the power is turned on, the data is reinitialized to zero.

128	64	32	16	8	4	2	1
bit 7	bit 6	bit 5	bit 4	bit 3	bit 2	bit 1	bit 0
Unused	×	ESB	MAV	Unused	Unused	Unused	ESE0

Service request enable register (SRER)

Example Transmission *SRE 33
Bits 0 and 5 of SRER are set to 1.

Error If <data> is other than numerical value described above, an execution error occurs.

*SRE?

■ Queries the service request enable register (SRER).

Syntax *SRE?

Function Returns the set contents of the service request enable register (SRER) as a numerical value in NR1 format between 0 and 255.

Example Response
If headers are on *SRE 33
If headers are off 33
Bits 0 and 5 of SRER have been set to 1.

128	64	32	16	8	4	2	1
bit 7	bit 6	bit 5	bit 4	bit 3	bit 2	bit 1	bit 0
Unused	×	ESB	MAV	Unused	Unused	Unused	ESE0

Service request enable register (SRER)

Error If the response message is longer than 300 bytes, a query error is generated.

*STB?

■ Queries the status byte register.

Syntax *STB?

Function
- Returns the set contents of the status byte register (STB) as a numerical value in NR1 format between 0 and 1, 16 and 17, 32 and 33, 48 and 49, 64 and 65, 80 and 81, 96 and 97, 112 and 113.
- No header is affixed to the response message.

Example Response 16
Bit 4 of STB has been set to 1.

128	64	32	16	8	4	2	1
bit 7	bit 6	bit 5	bit 4	bit 3	bit 2	bit 1	bit 0
Unused	MSS	ESB	MAV	Unused	Unused	Unused	ESE0

Status byte register (STB)

Error If the response message is longer than 300 bytes, a query error is generated.

*TST?

■ Requests execution of, and queries the result of, the self test.

Syntax *TST?

Function
- Performs the self test of the 3157, and returns the result thereof as a numerical value in NR1 format between 0 and 3.
- No header is affixed to the response message.

Bit 0: A ROM error occurred.
Bit 1: A RAM error occurred.
Bits 2 to 7: Unused

Example Response 3
A ROM error (bit 0) and a RAM error (bit 1) have occurred.

Error If the response message is longer than 300 bytes, a query error occurs.
The execution of this command in a state other than the READY state causes an execution error.

*WAI

■ Waits until all execution is fully completed.

Syntax *WAI

Function The unit goes into waiting state until the operation of the previous command has been completed.

Note The *WAI command is accepted by the 9518-02 interface because it is a standard command as specified by IEEE-488.2 1987. However, since all of the commands specific to the 3157 are in any case sequential commands, using this *WAI command never has any effect.

Error If the data parameters are set after this command, a command error occurs.

5.4 Commands Specific to the 3157

:ADJust

■ Enables and disables the zero adjustment function.

Syntax :ADJust_<data>

<data> ON/OFF (character data)

Function ・Turns the zero adjustment function on and off.

Example Transmission :ADJust ON
The zero adjustment function is turned on.

Error If <data> is other than character data and numerical value described above, a command error occurs.
The execution of this command in a state other than the READY state causes an execution error.

:ADJust?

■ Queries the zero adjustment function enablement.

Syntax :ADJust?

Function Returns the current enablement state of the zero adjustment function as character data.

<data> ON/OFF (character data)

Example Response
If headers are on :ADJUST ON
If headers are off ON

Error If the response message is longer than 300 bytes, a query error is generated.

:CONFigure?

■ Queries the test settings.

Syntax :CONFigure?

Function Returns as data the test settings as <output current value>, <maximum test value>, <minimum test value>, <test time> in order.
If the unit of the maximum and minimum test values is set to "OHM" (resistance), the maximum and minimum test values are expressed as resistance values.
If the unit of the maximum and minimum test values is set to "VOLT" (voltage), the maximum and minimum test values are expressed as voltage values.

<data> Output current value: Numerical value in NR2 format
Maximum test value, minimum test value, test time: OFF, --- (character data), or numerical value in NR2 format
When the minimum test value is not set, returns "---."
When the minimum test value is set and set to OFF, returns "OFF."
When the endless timer function is set, returns "---."
When the endless timer function is not set, and the test time is set to OFF, returns "OFF."

Example Response
If headers are on :CONFIGURE 25.0,0.100,0.000,60.0
If headers are off 25.0,0.100,0.000,60.0

Error If the response message is longer than 300 bytes, a query error is generated.

:CONFigure:CURRent

■ Sets the output current value.

Syntax :CONFigure:CURRent_<data>

<data> Numerical data in NR2 format between 3.0 and 31.0

Function Sets the output current value.
The numerical value can be in NRf format, but rounding is performed for figures beyond the last valid decimal place.

Example Transmission :CONFigure:CURRent 25.0
The output current value is set to 25.0 A.

Error If <data> is other than numerical value described above, an execution error occurs.
The execution of this command in a state other than the READY state causes an execution error.
However, when the current value can be changed in the TEST state, this command is executed even in the TEST state.

:CONFigure:CURRent?

■ Queries the output current value.

Syntax :CONFigure:CURRent?

Function Returns the output current value setting as a numerical value in NR2 format.

<data> Numerical data in NR2 format between 3.0 and 31.0

Note If the output current value is reset in the TEST state (test in progress), the reset value is returned. On completion of the test, however, the value that was set before the test is returned.

Example Response
If headers are on :CONFIGURE:CURRENT 25.0
If headers are off 25.0

Error If the response message is longer than 300 bytes, a query error is generated.

:CONFigure:DATA

■ Sets the number of test data.

Syntax :CONFigure:DATA_<data>

<data> Numerical data in NR1 format between 1 and 99

Function Sets the number of test data.
The numerical value can be in NRf format, but any digits after the decimal point will be rounded.

Example Transmission :CONFigure:DATA 10
The number of test data is set to 10.

Error If <data> is other than numerical value described above, an execution error occurs.
The execution of this command in a state other than the READY state causes an execution error.
If a number exceeding the maximum number of test data in the test data count function is set, an execution error occurs.

:CONFigure:DATA?

■ Queries the number of test data.

Syntax :CONFigure:DATA?

Function Returns the setting for the number of test data as a numerical value in NR1 format.

<data> Numerical data in NR1 format between 1 and 99

Example Response
If headers are on :CONFIGURE:DATA 10
If headers are off 10

Error If the response message is longer than 300 bytes, a query error is generated.

:CONFigure:RLOWer

■ Sets the minimum test value (resistance).

Syntax :CONFigure:RLOWer_<data>

<data> Numerical data in NR2 format between 0.000 and 2.000

Function Sets the minimum test value (resistance).
The numerical value can be in NRf format, but rounding is performed for figures beyond the last valid decimal place.

Note The minimum test value (resistance) can be used as the basis for the test only when the maximum and minimum test values are set to be expressed in "OHM" (resistance) and when the minimum test value setting is not disabled, and when "ON" is selected in the ON/OFF setting for the minimum test value.

Example Transmission :CONFigure:RLOWer 0.000
The minimum test value (resistance) is set to 0.000 Ω.

Error If <data> is other than numerical value described above, an execution error occurs.
The execution of this command in a state other than the READY state causes an execution error.

:CONFigure:RLOWer?

■ Queries the minimum test value (resistance).

Syntax :CONFigure:RLOWer?

Function Returns the minimum test value (resistance) setting as a numerical value in NR2 format.

<data> Numerical data in NR2 format between 0.000 and 2.000

Example Response
If headers are on :CONFIGURE:RLOWER 0.000
If headers are off 0.000

Error If the response message is longer than 300 bytes, a query error is generated.

:CONFigure:RUPPer

■ Sets the maximum test value (resistance).

Syntax :CONFigure:RUPPer_<data>

<data> Numerical data in NR2 format between 0.000 and 2.000

Function Sets the maximum test value (resistance).
The numerical value can be in NRf format, but rounding is performed for figures beyond the last valid decimal place.

Note The maximum test value (resistance) can be used as the basis for the test only when the maximum and minimum test values are set to be expressed in "OHM" (resistance) and when "ON" is selected in the ON/OFF setting for the maximum test value.

Example Transmission :CONFigure:RUPPer 0.100
The maximum test value (resistance) is set to 0.100 Ω.

Error If <data> is other than numerical value described above, an execution error occurs.
The execution of this command in a state other than the READY state causes an execution error.

:CONFigure:RUPPer?

■ Queries the maximum test value (resistance).

Syntax :CONFigure:RUPPer?

Function Returns the maximum test value (resistance) setting as a numerical value in NR2 format.

<data> Numerical data in NR2 format between 0.000 and 2.000

Example Response
If headers are on :CONFIGURE:RUPPER 0.200
If headers are off 0.200

Error If the response message is longer than 300 bytes, a query error is generated.

:CONFigure:TIMer

■ Sets the test time.

Syntax :CONFigure:TIMer_<data>

<data> Numerical data in NR1 or NR2 format between 0.5 and 999

Function Sets the test time.
The numerical value can be in NRf format, but rounding is performed for figures beyond the last valid decimal place.

Note The test time can be used as the basis for the test only when the endless timer function setting is disabled and when "ON" is selected in the ON/OFF setting for the test time.

Example Transmission :CONFigure:TIMer 60.0
The test time is set to 60.0 s.

Error If <data> is other than numerical value described above, an execution error occurs.
The execution of this command in a state other than the READY state causes an execution error.

:CONFigure:TIMer?

■ Queries the test time.

Syntax :CONFigure:TIMer?

Function Returns the test time setting as a numerical value in NR1 or NR2 format.

<data> Numerical data in NR1 or NR2 format between 0.5 and 999

Example Response
If headers are on :CONFIGURE:TIMER 60.0
If headers are off 60.0

Error If the response message is longer than 300 bytes, a query error is generated.

:CONFigure:VLOWer

■ Sets the minimum test value (voltage).

Syntax :CONFigure:VLOWer_<data>

<data> Numerical data in NR2 format between 0.00 and 6.00

Function Sets the minimum test value (voltage).
The numerical value can be in NRf format, but rounding is performed for figures beyond the last valid decimal place.

Note The minimum test value (voltage) can be used as the basis for the test only when the maximum and minimum test values are set to be expressed in "VOLT" (voltage) and when the minimum test value setting is not disabled, and when "ON" is selected in the ON/OFF setting for the minimum test value.

Example Transmission :CONFigure:VLOWer 0.00
The minimum test value (voltage) is set to 0.00 V.

Error If <data> is other than numerical value described above, an execution error occurs.
The execution of this command in a state other than the READY state causes an execution error.

:CONFigure:VLOWer?

■ Queries the minimum test value (voltage).

Syntax :CONFigure:VLOWer?

Function Returns the minimum test value (voltage) setting as a numerical value in NR2 format.

<data> Numerical data in NR2 format between 0.00 and 6.00

Example Response
If headers are on :CONFIGURE:VLOWER 0.00
If headers are off 0.00

Error If the response message is longer than 300 bytes, a query error is generated.

:CONFigure:VUPPer

■ Sets the maximum test value (voltage).

Syntax :CONFigure:VUPPer_<data>

<data> Numerical data in NR2 format between 0.00 and 6.00

Function Sets the maximum test value (voltage).
The numerical value can be in NRf format, but rounding is performed for figures beyond the last valid decimal place.

Note The maximum test value (voltage) can be used as the basis for the test only when the maximum and minimum test values are set to be expressed in "VOLT" (voltage) and when "ON" is selected in the ON/OFF setting for the maximum test value.

Example Transmission :CONFigure:VUPPer 2.50
The maximum test value (voltage) is set to 2.50 V.

Error If <data> is other than numerical value described above, an execution error occurs.
The execution of this command in a state other than the READY state causes an execution error.

:CONFigure:VUPPer?

■ Queries the maximum test value (voltage).

Syntax :CONFigure:VUPPer?

Function Returns the maximum test value (voltage) setting as a numerical value in NR2 format.

<data> Numerical data in NR2 format between 0.00 and 6.00

Example Response
If headers are on :CONFIGURE:VUPPER 2.50
If headers are off 2.50

Error If the response message is longer than 300 bytes, a query error is generated.

:ESE0

■ Sets event status enable register 0.

Syntax :ESE0

Function Sets event status enable register 0 (ESER0) to the bitmask for controlling access to events in event status register 0 (ESR0).
The numerical value can be in NRf format, but any digits after the decimal point will be rounded.
When the power is turned on, the data is reinitialized to zero.

128	64	32	16	8	4	2	1
bit 7	bit 6	bit 5	bit 4	bit 3	bit 2	bit 1	bit 0
Unused	Unused	Unused	Unused	EOM	LFAIL	UFAIL	PASS

Event status enable register 0 (ESER0)

Example Transmission :ESE0 4
Bit 2 of ESER0 is set to 1.

Error If <data> is other than numerical value described above, an execution error occurs.

:ESE0?

■ Queries event status enable register 0.

Syntax :ESE0?

Function Returns the value of event status enable register 0 (ESER0) as a numerical value in NR1 format between 0 and 15.

128	64	32	16	8	4	2	1
bit 7	bit 6	bit 5	bit 4	bit 3	bit 2	bit 1	bit 0
Unused	Unused	Unused	Unused	EOM	LFAIL	UFAIL	PASS

Event status enable register 0 (ESER0)

Example Response
If headers are on :ESE0 4
If headers are off 4

Error If the response message is longer than 300 bytes, a query error is generated.

:ESR0?

■ Queries event status register 0.

Syntax ESR0?

Function Returns the value of event status register 0 (ESR0) as a numerical value in NR1 format between 0 and 255, and then clears event status register 0.
No header is prefixed to the response message.

128	64	32	16	8	4	2	1
bit 7	bit 6	bit 5	bit 4	bit 3	bit 2	bit 1	bit 0
Unused	Unused	Unused	Unused	EOM	LFAIL	UFAIL	PASS

Event status register 0 (ESR0)

Example Response 4
Bit 2 of ESR0 has been set to 1.

Error If the response message is longer than 300 bytes, a query error is generated.

:HEADer

■ Enables and disables headers for the response messages.

Syntax :HEADer_<data>

<data> ON/OFF (character data)

Function Sets whether or not the 3157 will prefix headers to its response messages.
When powering on, <data> is initially set to OFF.

Example Transmission :HEADer ON
Headers are prefixed to response messages.

Error If <data> is other than character data described above, an execution error occurs.

:HEADer?

■ Queries whether or not headers on response messages are enabled.

Syntax :HEADer?

Function Returns whether or not headers on response messages are enabled as character data.

<data> ON/OFF (character data)

Example Response
If headers are on :HEADER ON
If headers are off OFF

Error If the response message is longer than 300 bytes, a query error is generated.

:KEY

■ Sets key entry.

Syntax :KEY_<data 1>, <data 2>

<data 1> Numerical data in NR1 format between 0 and 1

<data 2> Numerical data in NR1 format of 1, 2, 4, 8, 16, 32, 64 to 66, 68, 72, 80, 96, 128

Function Sets the key registers 0 and 1 (KEY0 and KEY1).

<data 1>

128	64	32	16	8	4	2	1
bit 7	bit 6	bit 5	bit 4	bit 3	bit 2	bit 1	bit 0
Unused	Unused	Unused	Unused	Unused	Unused	Unused	STOP

Key register 0 (KEY0)

<data 2>

128	64	32	16	8	4	2	1
bit 7	bit 6	bit 5	bit 4	bit 3	bit 2	bit 1	bit 0
START	SHIFT	0 ADJ	ON/OFF	DOWN	UP	RIGHT	LEFT

Key register 1 (KEY1)

Note Whether key entry is possible or not depends on the state of the unit. For more information, see the instruction manual for the 3157.

Example Transmission :KEY 0,2
The right arrow key entry is set.

Error If <data 1> and <data 2> are other than numerical values described above, an execution error occurs.

:LOWer

■ Enables and disables the minimum test value.

Syntax :LOWer_<data>

<data> ON/OFF (character data)

Function Enables and disables the minimum test value.

Note When the minimum test value setting is disabled, the ON/OFF setting for the minimum test value is not reflected in the test.

Example Transmission :LOWer ON
The minimum test value is set to ON.

Error If <data> is other than character data and numerical value described above, a command error occurs.
The execution of this command in a state other than the following states causes an execution error:
・READY state
・Optional function setting screen

:LOWer?

■ Queries the minimum test value enablement.

Syntax :LOWer?

Function Returns the current enablement state of the minimum test value as character data.

<data> ON/OFF (character data)

Example Response
If headers are on :LOWER ON
If headers are off ON

Error If the response message is longer than 300 bytes, a query error is generated.

:MEASure:CURRent?

■ Queries the measured current value.

Syntax :MEASure:CURRent?

Function Returns the measured current value as a numerical value in NR2 format.

<data> Numerical data in NR2 format between 0.0 and 35.0

Note The measured current value is returned in the TEST state (test in progress), and the result of the previous test is returned in the other states.
In the stand-by state (as indicated by a blinking TEST lamp), the following values are returned.
In the soft start mode: Measured value
In the continuous test mode: Result of the previous test

Example Response
If headers are on :MEASURE:CURRENT 25.0
If headers are off 25.0

Error If the response message is longer than 300 bytes, a query error is generated.

:MEASure:RESistance?

■ Queries the measured resistance value.

Syntax :MEASure:RESistance?

Function Returns the measured resistance value as a numerical value in NR2 format.

<data> O.F. (character data)
Numerical data in NR2 format between 0.0 and 35.0

Note The measured current value is returned in the TEST state (test in progress), and the result of the previous test is returned in the other states.
In the stand-by state (as indicated by a blinking **TEST** lamp), the following values are returned.
In the soft start mode: Measured value
In the continuous test mode: Result of the previous test
In the case of an overflow for the measured resistance, "O.F." is returned.

Example Response
If headers are on :MEASURE:RESISTANCE 0.200
If headers are off 0.200

Error If the response message is longer than 300 bytes, a query error is generated.

:MEASure:TIMer?

■ Queries the test time elapsed.

Syntax :MEASure:TIMer?

Function Returns the test time elapsed as a numerical value in NR2 format.

<data> --- (character data)
Numerical data in NR2 format between 0.0 and 999.0

Note The measured current value is returned in the TEST state (test in progress), and the result of the previous test is returned in the other states.
The test time elapsed is returned regardless of the ON/OFF setting for the test time. Thus, the value displayed on the GP-IB interface may differ from that displayed on the main body.
The test time elapsed is returned regardless of the ON/OFF setting for the test time. However, when the endless timer function is set, "---" is returned.
In the stand-by state (as indicated by a blinking **TEST** lamp), the following values are returned.
In the soft start mode: Measured value
In the continuous test mode: Result of the previous test

Example Response
If headers are on :MEASURE:TIMER 10.0
If headers are off 10.0

Error If the response message is longer than 300 bytes, a query error is generated.

:MEASure:VOLTage?

■ Queries the measured voltage value.

Syntax :MEASure:VOLTage?

Function Returns the measured voltage value as a numerical value in NR2 format.

<data> Numerical data in NR2 format between 0.00 and 6.00

Note The measured current value is returned in the TEST state (test in progress), and the result of the previous test is returned in the other states.
In the stand-by state (as indicated by a blinking **TEST** lamp), the following values are returned.
In the soft start mode: Measured value
In the continuous test mode: Result of the previous test

Example Response
If headers are on :MEASURE:VOLTAGE 2.50
If headers are off 2.50

Error If the response message is longer than 300 bytes, a query error is generated.

:MEASure:RESult:VOLTage?

■ Queries the measured value and result (voltage).

Syntax :MEASure:RESult:VOLTage?

Function Returns as data the measured value and result as <measured current value>, <measured voltage value>, <test time elapsed>, <screening result> in order.
If the unit of the maximum and minimum test values is set to "OHM" (resistance), the measured voltage value and screening result are OFF.

<data> Measured current and voltage values: Numerical value in NR2 format
Test time elapsed: --- (character data) or numerical value in NR2 format
Screening results: PASS, UFAIL (UPPER FAIL), LFAIL (LOWER FAIL), ULFAIL (FAIL due to the protection function), OFF (other than PASS and FAIL) (character data)

Note The previous measured value and result are returned until the next test is completed.
If the measured resistance value is required, query using the ":MEASure:RESistance?" command until the next test starts.
The test time elapsed is returned regardless of the ON/OFF setting for the test time. However, when the endless timer function is set, "---" is returned.

Example Response
If headers are on :MEASURE:RESULT:VOLTAGE 25.0,2.50,60.0,PASS
If headers are off 25.0,2.50,60.0,PASS

Error If the response message is longer than 300 bytes, a query error is generated.

:MEASure:RESult:RESistance?

■ Queries the measured value and result (resistance).

Syntax :MEASure:RESult:RESistance?

Function Returns as data the measured value and result as <measured current value>, <measured resistance value>, <test time elapsed>, <screening result> in order. If the unit of the maximum and minimum test values is set to "VOLT" (voltage), the measured resistance value and screening result are OFF.

<data> Measured current value: Numerical value in NR2 format
Measured resistance value: O.F. (character data) or numerical value in NR2 format
Test time elapsed: --- (character data) or numerical value in NR2 format
Screening results: PASS, UFAIL (UPPER FAIL), LFAIL (LOWER FAIL), ULFAIL (FAIL due to the protection function), OFF (other than PASS and FAIL) (character data)

Note The previous measured value and result are returned until the next test is completed.
If the measured voltage value is required, query using the ":MEASure:VOLTage?" command until the next test starts.
In the case of an overflow for the measured resistance, "O.F." is returned.
The test time elapsed is returned regardless of the ON/OFF setting for the test time. However, when the endless timer function is set, "---" is returned.

Example Response
If headers are on :MEASURE:RESULT:RESISTANCE 25.0,0.100,60.0,PASS
If headers are off 25.0,0.100,60.0,PASS

Error If the response message is longer than 300 bytes, a query error is generated.

:MEMory:CLEar

■ Clears Setting memory.

Syntax :MEMory:CLEar_<data>

<data> Numerical data in NR1 format between 1 and 20

Function Clears Setting memory numbered <data>.
The numerical value can be in NRf format, but any digits after the decimal point will be rounded.

Note The specified Setting memory is initialized.
For the items which are initialized, see the "*RST" command.

Example Transmission :MEMory:CLEar 10
Setting memory numbered 10 is cleared.

Error If <data> is other than numerical value described above, an execution error occurs.
The execution of this command in a state other than the READY state causes an execution error.

:MEMory:FILE?

■ Queries the contents of Setting memory.

Syntax :MEMory:FILE?_<data 1>

<data 1> Numerical data in NR1 format between 1 and 20

Function Returns as data (<data2>) the contents of Setting memory numbered <data 1> as <output current value>, <maximum test value>, <minimum test value>, <test time> in order.
If the unit of the maximum and minimum test values is set to "OHM" (resistance), the maximum and minimum test values are expressed as resistance values.
If the unit of the maximum and minimum test values is set to "VOLT" (voltage), the maximum and minimum test values are expressed as voltage values.

<data 2> Output current value: Numerical value in NR2 format
Maximum test value, minimum test value, test time: OFF, --- (character data), or numerical value in NR2 format
When the minimum test value is not set, returns "---."
When the minimum test value is set and set to OFF, returns "OFF."
When the endless timer function is set, returns "---."
When the endless timer function is not set, and the test time is set to OFF, returns "OFF."

Example Transmission :MEMory:FILE? 1
Response
If headers are on :MEMORY:FILE 25.0,0.100,0.000,60.0
If headers are off 25.0,0.100,0.000,60.0

Error If the response message is longer than 300 bytes, a query error is generated.
The execution of this command in a state other than the READY state causes an execution error.

:MEMory:LOAD

■ Loads Setting memory.

Syntax :MEMory:LOAD_<data>

<data> Numerical data in NR1 format between 1 and 20

Function Loads Setting memory numbered <data>.
The numerical value can be in NRf format, but any digits after the decimal point will be rounded.

Example Transmission :MEMory:LOAD 10
Setting memory numbered 10 is loaded.

Error If <data> is other than numerical value described above, an execution error occurs.
The execution of this command in a state other than the READY state causes an execution error.

:MEMory:SAVE

■ Saves in Setting memory.

Syntax :MEMory:SAVE_<data>

<data> Numerical data in NR1 format between 1 and 20

Function Saves the current settings in Setting memory numbered <data>.
The numerical value can be in NRf format, but any digits after the decimal point will be rounded.

Example Transmission :MEMory:SAVE 10
The current settings are saved in Setting memory numbered 10.

Error If <data> is other than numerical value described above, an execution error occurs.
The execution of this command in a state other than the READY state causes an execution error.

:STARt

■ Starts a test.

Syntax :STARt

Function Starts a test in the READY state (except the optional function setting screen).

Note The ":STARt" command works in a state in which the momentary OUT settings are disabled even though the momentary OUT settings have been set.

Example Transmission :STARt

Error The execution of this command in a state other than the READY state causes an execution error.
If the data parameters are set after this command, a command error occurs.

:STATe?

■ Queries the state.

Syntax :STATe?

Function Returns the state as data.

<data> Screening results: PASS, UFAIL, LFAIL, ULFAIL, READY, TEST, OFF (character data)
PASS: PASS state
UFAIL: FAIL state (UPPER FAIL)
LFAIL: FAIL state (LOWER FAIL)
ULFAIL: FAIL state (FAIL due to the protection function)
OFF: Hold state (in a state other than the PASS and FAIL states), save screen, load screen, optional function setting screen

Example Response
If headers are on :STATE PASS
If headers are off PASS

Error If the response message is longer than 300 bytes, a query error is generated.

:STOP

■ Performs forcible ending of a test and releases the hold state.

Syntax :STOP

Function In the TEST state (test in progress), performs forcible ending of a test.
When retaining the test result, returns to the READY state.
In the save screen, returns to the READY state without saving.
In the load screen, returns to the READY state without loading.

Example Transmission :STOP

Error If the data parameters are set after this command, a command error occurs.

:SYSTem:OPTion:BUZZer

■ Sets the buzzer.

Syntax :SYSTem:OPTion:BUZZer_<data>

<data> Numerical data in NR1 format between 0 and 3

Function Sets the buzzer.
1: ON at screening, ON at error
2: OFF at screening, OFF at error
3: OFF at screening, ON at error
4: ON at screening, OFF at error
The numerical value can be in NRf format, but any digits after the decimal point will be rounded.

Example Transmission :SYSTem:OPTion:BUZZer 3
The buzzer is set to ON at screening, OFF at error.

Error If <data> is other than numerical value described above, an execution error occurs.
The execution of this command in a state other than the following states causes an execution error:
・READY state
・Optional function setting screen

:SYSTem:OPTion:BUZZer?

■ Queries the buzzer.

Syntax :SYSTem:OPTion:BUZZer?

Function Returns the buzzer setting as a numerical value in NR1 format.

<data> Numerical data in NR1 format between 0 and 3

Example Response
If headers are on :SYSTEM:OPTION:BUZZER 3
If headers are off 3

Error If the response message is longer than 300 bytes, a query error is generated.

:SYSTem:OPTion:CCHange

■ Sets the current changeability in the TEST state.

Syntax :SYSTem:OPTion:CCHange_<data>

<data> Numerical data in NR1 format between 0 and 1

Function Sets the current changeability in the TEST state.
0: Not changeable
1: Changeable
The numerical value can be in NRf format, but any digits after the decimal point will be rounded.

Example Transmission :SYSTem:OPTion:CCHange 1
The current changeability in the TEST state is set to "Changeable."

Error If <data> is other than numerical value described above, an execution error occurs.
The execution of this command in a state other than the following states causes an execution error:
・READY state
・Optional function setting screen

:SYSTem:OPTion:CCHange?

■ Queries the current changeability in the TEST state.

Syntax :SYSTem:OPTion:CCHange?

Function Returns the setting for the current changeability in the TEST state as a numerical value in NR1 format.

<data> Numerical data in NR1 format between 0 and 1

Example Response
If headers are on :SYSTEM:OPTION:CCHANGE 1
If headers are off 1

Error If the response message is longer than 300 bytes, a query error is generated.

:SYSTem:OPTion:CDATa

■ Sets the maximum number of test data in the test data count function.

Syntax :SYSTem:OPTion:CDATa_<data>

<data> Numerical data in NR1 format between 1 and 99

Function Sets the maximum number of test data in the test data count function.
The numerical value can be in NRf format, but any digits after the decimal point will be rounded.

Note When the test data count function is not set, the setting for the maximum number of test data is not reflected in the test.

Example Transmission :SYSTem:OPTion:CDATa 10
The maximum number of test data is set to 10.

Error If <data> is other than numerical value described above, an execution error occurs.
If a smaller value than that set for the number of test data is set, an execution error occurs.
The execution of this command in a state other than the following states causes an execution error:
・READY state
・Optional function setting screen

:SYSTem:OPTion:CDATa?

■ Queries the maximum number of test data in the test data count function.

Syntax :SYSTem:OPTion:CDATa?

Function Returns the setting for the maximum number of test data in the test data count function as a numerical value in NR1 format.

<data> Numerical data in NR1 format between 1 and 99

Example Response
If headers are on :SYSTEM:OPTION:CDATA 10
If headers are off 10

Error If the response message is longer than 300 bytes, a query error is generated.

:SYSTem:OPTion:COUNt

■ Sets the test data count function.

Syntax :SYSTem:OPTion:COUNt_<data>

<data> Numerical data in NR1 format between 0 and 1

Function Sets the test data count function.
0: Not set
1: Set
The numerical value can be in NRf format, but any digits after the decimal point will be rounded.

Note When the test data count function is not set, the setting for the maximum number of test data is not reflected in the test.

Example Transmission :SYSTem:OPTion:COUNt 1
The test data count function is set.

Error If <data> is other than numerical value described above, an execution error occurs.
The execution of this command in a state other than the following states causes an execution error:
・READY state
・Optional function setting screen

:SYSTem:OPTion:COUNt?

■ Queries the test data count function.

Syntax :SYSTem:OPTion:COUNt?

Function Returns the test data count function setting as a numerical value in NR1 format.

<data> Numerical data in NR1 format between 0 and 1

Example Response
If headers are on :SYSTEM:OPTION:COUNT 1
If headers are off 1

Error If the response message is longer than 300 bytes, a query error is generated.

:SYSTem:OPTion:ENDLess

■ Sets the endless timer function.

Syntax :SYSTem:OPTion:ENDLess_<data>

<data> Numerical data in NR1 format between 0 and 1

Function Sets the endless timer function.
0: Not set
1: Set
The numerical value can be in NRf format, but any digits after the decimal point will be rounded.

Note When the endless timer function is set, the ON/OFF setting for the test time is not reflected in the test.

Example Transmission :SYSTem:OPTion:ENDLess 1
The endless timer function is set.

Error If <data> is other than numerical value described above, an execution error occurs.
The execution of this command in a state other than the following states causes an execution error:
・READY state
・Optional function setting screen

:SYSTem:OPTion:ENDLess?

■ Queries the endless timer function.

Syntax :SYSTem:OPTion:ENDLess?

Function Returns the endless timer function setting as a numerical value in NR1 format.

<data> Numerical data in NR1 format between 0 and 1

Example Response
If headers are on :SYSTEM:OPTION:ENDLESS 1
If headers are off 1

Error If the response message is longer than 300 bytes, a query error is generated.

:SYSTem:OPTion:FREQuency

■ Sets the output current frequency.

Syntax :SYSTem:OPTion:FREQuency_<data>

<data> Numerical data in NR1 format between 0 and 1

Function Sets the output current frequency.
0: 50 Hz
1: 60 Hz
The numerical value can be in NRf format, but any digits after the decimal point will be rounded.

Example Transmission :SYSTem:OPTion:FREQuency 1
The output current frequency is set to 60 Hz.

Error If <data> is other than numerical value described above, an execution error occurs.
The execution of this command in a state other than the following states causes an execution error:
・READY state
・Optional function setting screen

:SYSTem:OPTion:FREQuency?

■ Queries the output current frequency.

Syntax :SYSTem:OPTion:FREQuency?

Function Returns the output current frequency setting as a numerical value in NR1 format.

<data> Numerical data in NR1 format between 0 and 1

Example Response
If headers are on :SYSTEM:OPTION:FREQUENCY 1
If headers are off 1

Error If the response message is longer than 300 bytes, a query error is generated.

:SYSTem:OPTion:HOLD

■ Sets the hold function.

Syntax :SYSTem:OPTion:HOLD_<data>

<data> Numerical data in NR1 format between 0 and 1

Function Sets the hold function.
0: Not held
1: Held
The numerical value can be in NRf format, but any digits after the decimal point will be rounded.

Example Transmission :SYSTem:OPTion:HOLD 1
The hold function is set to "Held."

Error If <data> is other than numerical value described above, an execution error occurs.
The execution of this command in a state other than the following states causes an execution error:
・READY state
・Optional function setting screen

:SYSTem:OPTion:HOLD?

■ Queries the hold function.

Syntax :SYSTem:OPTion:HOLD?

Function Returns the hold function setting as a numerical value in NR1 format.

<data> Numerical data in NR1 format between 0 and 1

Example Response
If headers are on :SYSTEM:OPTION:HOLD 1
If headers are off 1

Error If the response message is longer than 300 bytes, a query error is generated.

:SYSTem:OPTion:LOWer

■ Sets the minimum test value.

Syntax :SYSTem:OPTion:LOWer_<data>

<data> Numerical data in NR1 format between 0 and 1

Function Sets the minimum test value.
0: Not set
1: Set
The numerical value can be in NRf format, but any digits after the decimal point will be rounded.

Note The ":STARt" command works in a state in which the momentary OUT settings are disabled even though the momentary OUT settings have been set.

Example Transmission :SYSTem:OPTion:LOWer 1
The minimum test value is set.

Error If <data> is other than numerical value described above, an execution error occurs.
The execution of this command in a state other than the following states causes an execution error:
・READY state
・Optional function setting screen

:SYSTem:OPTion:LOWer?

■ Queries the minimum test value.

Syntax :SYSTem:OPTion:LOWer?

Function Returns the minimum test value setting as a numerical value in NR1 format.

<data> Numerical data in NR1 format between 0 and 1

Example Response
If headers are on :SYSTEM:OPTION:LOWER 1
If headers are off 1

Error If the response message is longer than 300 bytes, a query error is generated.

:SYSTem:OPTion:MOMentary

■ Sets the momentary OUT function.

Syntax :SYSTem:OPTion:MOMentary_<data>

<data> Numerical data in NR1 format between 0 and 1

Function Sets the momentary OUT function.
0: Not set
1: Set
The numerical value can be in NRf format, but any digits after the decimal point will be rounded.

Note The ":STARt" command works in a state in which the momentary OUT settings are disabled even though the momentary OUT settings have been set.

Example Transmission :SYSTem:OPTion:MOMentary 1
The momentary OUT function is set.

Error If <data> is other than numerical value described above, an execution error occurs.
In the continuous test mode, setting the momentary OUT function causes an execution error.
The execution of this command in a state other than the following states causes an execution error:
・READY state
・Optional function setting screen

:SYSTem:OPTion:MOMentary?

■ Queries the momentary OUT function.

Syntax :SYSTem:OPTion:MOMentary?

Function Returns the momentary OUT function setting as a numerical value in NR1 format.

<data> Numerical data in NR1 format between 0 and 1

Example Response
If headers are on :SYSTEM:OPTION:MOMENTARY 1
If headers are off 1

Error If the response message is longer than 300 bytes, a query error is generated.

:SYSTem:OPTion:PFHold

■ Sets the PASS/FAIL hold function.

Syntax :SYSTem:OPTion:PFHold_<data>

<data> Numerical data in NR1 format between 0 and 3

Function Sets the PASS/FAIL hold function.
0: PASS not held, FAIL held
1: PASS held, FAIL held
2: PASS not held, FAIL not held
3: PASS held, FAIL not held
The numerical value can be in NRf format, but any digits after the decimal point will be rounded.

Example Transmission :SYSTem:OPTion:PFHold 3
The PASS/FAIL hold function is set to "PASS held, FAIL not held."

Error If <data> is other than numerical value described above, an execution error occurs.
The execution of this command in a state other than the following states causes an execution error:
・READY state
・Optional function setting screen

:SYSTem:OPTion:PFHold?

■ Queries the PASS/FAIL hold function.

Syntax :SYSTem:OPTion:PFHold?

Function Returns the PASS/FAIL hold function setting as a numerical value in NR1 format.

<data> Numerical data in NR1 format between 0 and 3

Example Response
If headers are on :SYSTEM:OPTION:PFHOLD 3
If headers are off 3

Error If the response message is longer than 300 bytes, a query error is generated.

:SYSTem:OPTion:PRINter

■ Sets the printer output function.

Syntax :SYSTem:OPTion:PRINter_<data>

<data> Numerical data in NR1 format between 0 and 2

Function Sets the printer output function.
0: Not used
1: Automatically print for PASS/FAIL screening.
2: Print selectively when the PASS/FAIL state is held.
The numerical value can be in NRf format, but any digits after the decimal point will be rounded.

Example Transmission :SYSTem:OPTion:PRINter 0
The printer output function is set to "Not used."

Error If <data> is other than numerical value described above, an execution error occurs.
The execution of this command in a state other than the following states causes an execution error:
・READY state
・Optional function setting screen

:SYSTem:OPTion:PRINter?

■ Queries the printer output function.

Syntax :SYSTem:OPTion:PRINter?

Function Returns the printer output function setting as a numerical value in NR1 format.

<data> Numerical data in NR1 format between 0 and 2

Example Response
If headers are on :SYSTEM:OPTION:PRINTER 0
If headers are off 0

Error If the response message is longer than 300 bytes, a query error is generated.

:SYSTem:OPTion:TMODe

■ Sets the test mode.

Syntax :SYSTem:OPTion:TMODe_<data>

<data> Numerical data in NR1 format between 0 and 2

Function Sets the test mode.
0: Soft start mode
1: Normal mode
2: Continuous test mode
The numerical value can be in NRf format, but any digits after the decimal point will be rounded.

Note When the momentary OUT function is set, if the continuous test mode is set, the momentary OUT function is automatically set to "Not set."

Example Transmission :SYSTem:OPTion:TMODe 2
The test mode is set to Continuous test mode.

Error If <data> is other than numerical value described above, an execution error occurs.
The execution of this command in a state other than the following states causes an execution error:
・READY state
・Optional function setting screen

:SYSTem:OPTion:TMODe?

■ Queries the test mode.

Syntax :SYSTem:OPTion:TMODe?

Function Returns the test mode setting as a numerical value in NR1 format.

<data> Numerical data in NR1 format between 0 and 2

Example Response
If headers are on :SYSTEM:OPTION:TMODE 2
If headers are off 2

Error If the response message is longer than 300 bytes, a query error is generated.

:TIMer

■ Enables and disables the test time.

Syntax :TIMer_<data>

<data> ON/OFF (character data)

Function Enables and disables the test time.

Note When the endless timer function is set, the ON/OFF setting for the test time is not reflected in the test.

Example Transmission :TIMer ON
The test time is set to ON.

Error If <data> is other than character data and numerical value described above, a command error occurs.
The execution of this command in a state other than the following states causes an execution error:
・READY state
・Optional function setting screen

:TIMer?

■ Queries the test time enablement.

Syntax :TIMer?

Function Returns the current enablement state of the test time as character data.

<data> ON/OFF (character data)

Example Response
If headers are on :TIMER ON
If headers are off ON

Error If the response message is longer than 300 bytes, a query error is generated.

:TRANsmit:TERMinator

■ Sets the data terminator for response messages.

Syntax :TRANsmit:TERMinator_<data>

<data> Numerical data in NR1 format between 0 and 255

Function Sets the data terminator for response messages.
The numerical value can be in NRf format, but any digits after the decimal point will be rounded.
If <data> = 0, the terminator is set to LF (line feed) + EOI signal.
If <data> = 1 through 255, the terminator is set to CR (carriage return) + LF and EOI signal.
When powering on, <data> is initially set to 0 (LF+EOI).

Example Transmission :TRANsmit:TERMinator 0
The data terminator is set to LF + EOI.

Error If <data> is other than numerical value described above, an execution error occurs.

:TRANsmit:TERMinator?

■ Queries the data terminator for response messages.

Syntax :TRANsmit:TERMinator?

Function Returns the data terminator for response messages as a numerical value (0 or 1) in NR1 format.
If <data> = 0, the terminator is LF and EOI signal.
If <data> = 1, the terminator is CR + LF and EOI signal.

Example Response
If headers are on :TRANSMIT:TERMINATOR 0
If headers are off 0

Error If the response message is longer than 300 bytes, a query error is generated.

:UNIT

■ Sets the unit of the maximum and minimum test values.

Syntax :UNIT_<data>

<data> OHM: resistance (character data)
VOLT: voltage (character data)

Function Sets the unit of the maximum and minimum test values.

Note If the unit of the maximum and minimum test values is set to "OHM" (resistance), the maximum and minimum test values (resistance) settings are reflected in the test.
If the unit of the maximum and minimum test values is set to "VOLT" (voltage), the maximum and minimum test values (voltage) settings are reflected in the test.

Example Transmission :UNIT OHM
The unit of the maximum and minimum test values is set to OHM.

Error If <data> is other than character data and numerical value described above, a command error occurs.
The execution of this command in a state other than the following states causes an execution error:
・READY state
・Optional function setting screen

:UNIT?

■ Queries the unit of the maximum and minimum test values.

Syntax :UNIT?

Function Returns the setting for the unit of the maximum and minimum test values as character data.

<data> OHM/VOLT (character data)

Example Response
If headers are on :UNIT OHM
If headers are off OHM

Error If the response message is longer than 300 bytes, a query error is generated.

:UPPer

■ Enables and disables the maximum test value.

Syntax :UPPer_<data>

<data> ON/OFF (character data)

Function Enables and disables the maximum test value.

Example Transmission :UPPer ON
The maximum test value is set to ON.

Error If <data> is other than character data and numerical value described above, a command error occurs.
The execution of this command in a state other than the following states causes an execution error:
・READY state
・Optional function setting screen

:UPPer?

■ Queries the maximum test value enablement.

Syntax :TIMer?

Function Returns the current enablement state of the maximum test value as character data.

<data> ON/OFF (character data)

Example Response
If headers are on :UPPER ON
If headers are off ON

Error If the response message is longer than 300 bytes, a query error is generated.

5.5 Response Format for Queries as Numerical Value

The response formats are as follows.

(1) Output current value and measured current value

□.□

□□.□

Two or three digits (in NR2 format)

(2) Maximum test value (voltage), minimum test value (voltage) and measured voltage value

□.□□

Three digits (in NR2 format)

(3) Maximum test value (resistance), minimum test value (resistance) and measured resistance value

□.□□□

Four digits (in NR2 format)

(4) Test time and test time elapsed

□.□

□□.□

□□□.□

Two, three or four digits (in NR2 format)

(5) Number of test data

□

□□

One or two digits (in NR1 format)

5.6 Initialization Items

The following table shows which items are initialized and which not, under various conditions.

Item \ Initialization method	Powering on	*RST command	Device clear	*CLS command
GP-IB device address	—	—	—	—
Device specific functions (ranges etc.)	—	●	—	—
Output queue	●	—	●	—
Input buffer	●	—	●	—
Status byte register	●	—	—*1	●*2
Event registers	●*3	—	—	●
Enable registers	●	—	—	—
Current path	●	—	●	—
Headers on/off	●	●	—	—
Terminator for response messages	●	—	—	—
Measurement resister	●	●	—	—

*1: Only the MAV bit (bit 4) is cleared.

*2: All bits except the MAV bit are cleared.

*3: Except the PON bit (bit 7)

Chapter 6
Sample Programs

The following sample programs are all written for the Hewlett-Packard HP9000 Series 300, using BASIC 4.0.
All commands in the sample programs are used in the short form, and the GP-IB device address of the 3157 is taken as 1.

(1) Basic settings and testing

This program sets the 3157 to the following test values:

- Output current value: 25.0 A
- Maximum test value: 0.100 Ω
- Test time: 60.0 s

It carries out a single test measurement, and displays the result on the screen.

Program List

```
100   DIM A$[10],B$[10],C$[40]
110 Statecheck1:   !
120   OUTPUT 701;":STAT?"
130   ENTER 701;A$
140   IF A$="READY" THEN GOTO Setting
150   OUTPUT 701;":STOP"
160   GOTO Statecheck1
170 Setting:   !
180   OUTPUT 701;"HEAD OFF"
190   OUTPUT 701;"CONF:CURR 25.0"
200   OUTPUT 701;"UNIT OHM"
210   OUTPUT 701;"UPP ON"
220   OUTPUT 701;"CONF:RUPP 0.100"
230   OUTPUT 701;"TIM ON"
240   OUTPUT 701;"CONF:TIM 60.0"
250   OUTPUT 701;":ESE0 8;*SRE 1"
260   ON INTR 7 GOSUB Interrupt
270   D=0
280   F=0
290   OUTPUT 701;"*CLS"
300   ENABLE INTR 7;2
310 Keyin:   !
320   INPUT "PRESS ANY KEY TO START",B$
330   OUTPUT 701;":STAR"
340 Statecheck2: !
350   IF F=0 THEN GOTO Statecheck2
360 Result: !
370   OUTPUT 701;":ESE0 0;*SRE 0"
```

```
380   OUTPUT 701;":MEAS:RES:RES?"
390   ENTER 701;C$
400   PRINT C$
410   IF BINAND(D,2)=2 THEN
420     OUTPUT 701;":STOP"
430   END IF
440   GOTO Exit1
450 Interrupt: !
460   P=SPOLL(701)
470   OUTPUT 701;":ESR0?"
480   ENTER 701;D
490   IF BINAND(D,8)=8 THEN F=1
500   DISABLE INTR 7
510   OUTPUT 701;"*CLS"
520   RETURN
530 Exit1:  !
540   END
```

Program comments

Line	Comment
110-160	Confirm that the 3157 is in the READY state.
170-240	Make test settings.
250	Set SRQ generation conditions(an SRQ interrupt is produced whether comparator result is "EOM").
260	Attach interrupt handler to SRQ interrupt.
310-330	Check that a test has started.
340-350	Check that a test has finished.
360-440	Query the test results.
450-520	SRQ interrupt

Sample display

25.0,0.020,60.0,PASS

(2) Saving the basic settings

This program sets the 3157 to the following test values, and then save them in Setting memory.

Setting memory 1
Output current value: 25.0 A Maximum test value: 0.100 **Ω** Test time: 60.0 s

Setting memory 2
Output current value: 10.0 A Maximum test value: 1.00 V Test time: 10.0 s

Setting memory 3
Output current value: 25.0 A Maximum test value: 0.100 **Ω** Test time: 5.0 s

Setting memory 4
Output current value: 15.0 A Maximum test value: 1.50 V Test time: OFF

Setting memory 5
Output current value: 10.0 A Maximum test value: 0.100 **Ω** Test time: 5.0 s

Program List

```
100   DIM A$[10],B$[10],C$[10],D$[10],E$[10]
110 Statecheck1:   !
120   OUTPUT 701;":STAT?"
130   ENTER 701;A$
140   IF A$="READY" THEN GOTO Setting1
150   OUTPUT 701;":STOP"
160   GOTO Statecheck1
170 Setting1:   !
180   OUTPUT 701;":CONF:CURR 25.0"
190   OUTPUT 701;":UNIT OHM"
200   OUTPUT 701;":UPP ON"
210   OUTPUT 701;":CONF:RUPP 0.100"
220   OUTPUT 701;":TIM ON"
230   OUTPUT 701;":CONF:TIM 60.0"
240   OUTPUT 701;":MEM:SAVE 1"
250 Statecheck2:   !
260   OUTPUT 701;":STAT?"
270   ENTER 701;B$
280   IF B$<>"READY" THEN GOTO Statecheck2
290 Setting2:   !
300   OUTPUT 701;":CONF:CURR 10.0"
310   OUTPUT 701;":UNIT VOLT"
320   OUTPUT 701;":UPP ON"
330   OUTPUT 701;":CONF:VUPP 1.00"
340   OUTPUT 701;":TIM ON"
350   OUTPUT 701;":CONF:TIM 10.0"
360   OUTPUT 701;":MEM:SAVE 2"
370 Statecheck3:   !
380   OUTPUT 701;":STAT?"
390   ENTER 701;C$
400   IF C$<>"READY" THEN GOTO Statecheck3
410 Setting3:   !
420   OUTPUT 701;":CONF:CURR 25.0"
430   OUTPUT 701;":UNIT OHM"
440   OUTPUT 701;":UPP ON"
450   OUTPUT 701;":CONF:RUPP 0.100"
460   OUTPUT 701;":TIM ON"
470   OUTPUT 701;":CONF:TIM 5.0"
480   OUTPUT 701;":MEM:SAVE 3"
490 Statecheck4:   !
500   OUTPUT 701;":STAT?"
510   ENTER 701;D$
520   IF D$<>"READY" THEN GOTO Statecheck4
530 Setting4:   !
540   OUTPUT 701;":CONF:CURR 15.0"
550   OUTPUT 701;":UNIT VOLT"
560   OUTPUT 701;":UPP ON"
570   OUTPUT 701;":CONF:VUPP 1.50"
580   OUTPUT 701;":TIM OFF"
590   OUTPUT 701;":MEM:SAVE 4"
600 Statecheck5:   !
610   OUTPUT 701;":STAT?"
620   ENTER 701;E$
630   IF E$<>"READY" THEN GOTO Statecheck5
640 Setting5:   !
650   OUTPUT 701;":CONF:CURR 10.0"
660   OUTPUT 701;":UNIT OHM"
670   OUTPUT 701;":UPP ON"
680   OUTPUT 701;":CONF:RUPP 0.100"
690   OUTPUT 701;":TIM ON"
700   OUTPUT 701;":CONF:TIM 5.0"
710   OUTPUT 701;":MEM:SAVE 5"
720   END
```

Program comments

Line	Comment
110-160	Confirm that the 3157 is in the READY state.
170-240	Perform test settings in Setting memory 1.
250-280	Make sure that saving has been completed.
290-360	Perform test settings in Setting memory 2.
370-400	Make sure that saving has been completed.
410-480	Perform test settings in Setting memory 3.
490-520	Make sure that saving has been completed.
530-590	Perform test settings in Setting memory 4.
600-630	Make sure that saving has been completed.
640-710	Perform test settings in Setting memory 5.

(3) Inquiry on, and the loading of, the contents of memory

This program loads the contents of Setting memory in the 3157 after making this inquiry

Program List

```
100   DIM A$[10],B$[40],C$[10]
110 Statecheck1:   !
120   OUTPUT 701;":STAT?"
130   ENTER 701;A$
140   IF A$="READY" THEN GOTO Filecheck
150   OUTPUT 701;":STOP"
160   GOTO Statecheck1
170 Filecheck:  !
180   OUTPUT 701;":MEM:FILE? 1"
190   ENTER 701;B$
200   PRINT B$
210 Keyin:   !
220   INPUT "LOAD?(Y/N)",C$
230   IF C$="Y" THEN GOTO Fileload
240   IF C$="N" THEN GOTO Exit1
250   GOTO Keyin
260 Fileload:   !
270   OUTPUT 701;":MEM:LOAD 1"
280 Exit1:   !
290   END
```

Program comments

Line	Comment
110-160	Confirm that the 3157 is in the READY state.
170-200	Query the contents of Setting memory 1.
210-250	Check if loading is workable.
260-270	Load Setting memory 1.

Sample display

```
25.0,0.100,0.000,60.0
Load?(Y/N)
```

(4) Testing at five positions and outputting of a text data file

After test settings, five tests are made, and their results are outputted in a text data file.

Program List

```
100   DIM R$[10],T$[40],Te$[10],K$[10],Res$[40]
110   N=0
120   CREATE ASCII "FILE1",100
130   ASSIGN @Path TO "FILE1"
140 Stateready:   !
150   OUTPUT 701;":STAT?"
160   ENTER 701;R$
170   IF R$="READY" THEN GOTO Setting
180   OUTPUT 701;":STOP"
190   GOTO Stateready
200 Setting: !
210   OUTPUT 701;":HEAD OFF"
220   OUTPUT 701;":CONF:CURR 25.0"
230   OUTPUT 701;":UNIT OHM"
240   OUTPUT 701;":UPP ON"
250   OUTPUT 701;":CONF:RUPP 0.100"
260   OUTPUT 701;":TIM ON"
270   OUTPUT 701;":CONF:TIM 5.0"
280 Testing:   !
290   INPUT "PRESS ANY KEY TO START",A$
300   OUTPUT 701;":STAR"
310 Statetest:   !
320   OUTPUT 701;":STAT?"
330   ENTER 701;T$
340   IF T$="TEST" THEN Statetestend
350   GOTO Statetest
360 Statetestend:   !
370   OUTPUT 701;":STAT?"
380   ENTER 701;Te$
390   IF Te$="TEST" THEN GOTO Statetestend
400 Result:   !
410   N=N+1
420   OUTPUT 701;":MEAS:RES:RES?"
430   ENTER 701;Res$
440   PRINT Res$
450   OUTPUT @Path;Res$
460   IF Te$="UFAIL" THEN OUTPUT 701;":STOP"
470   IF N=5 THEN GOTO Exit1
480   GOTO Testing
490 Exit1:   !
500   ASSIGN @Path TO *
510   END
```

Program comments

Line	Comment
120-130	Open a file
140-190	Confirm that the 3157 is in the READY state.
200-270	Make test settings.
280-300	Check that a test has started.
310-350	Confirm that the 3157 is in the TEST state.
360-390	Check that a test has finished.
400-480	Display the test results and outputs them to a file.

Sample display

```
25.1,0.090,5.0,PASS
25.2,0.098,5.0,PASS
24.6,0.101,0.1,UFAIL
24.7,0.102,0.1,UFAIL
5,24.7,0.101,0.1,UFAIL
```

Sample output

```
1,25.1,0.090,5.0,PASS
2,25.2,0.098,5.0,PASS
3,24.6,0.101,0.1,UFAIL
4,24.7,0.102,0.1,UFAIL
5,24.7,0.101,0.1,UFAIL
```

Chapter 7
Device Compliance Statement

The following information relates to compliance with the IEEE 488.2 standard.

(1) IEEE 488.1 interface functions
These are detailed in Section 2.3, "Specifications."

(2) Operation with a device address other than 0 through 30
The bus is disabled.

(3) Timing of changed device address recognition
A change of address is recognized immediately after powering on.

(4) Device settings at power on, including all commands which further restrict the initial setting.
The status information is cleared, and all other items are preserved. However, the header on/off setting, and response message separator and terminator are all reinitialized.

(5) List of message exchange options

1. Input buffer capacity and operation:
These are detailed in Section 4.10, "Input Buffer."
2. Queries to which multiple response message units are returned:
:CONFigure?
:MEASure:RESult:VOLTage?
:MEASure:RESult:RESistance?
:MEMory:FILE?
3. Queries producing responses as syntax checking is performed:
On the 3157, all queries produce responses when syntax checking is performed.
4. Whether any queries produce responses when read:
There are no queries which produce response messages at the instant they are read in by the controller.
5. Whether any commands are coupled:
There are no relevant commands

(6) Summary of functional elements for use when constructing device specific commands, and whether compound commands or program headers can be used:
- Program message, program message terminator, program message unit, program message unit separator, command message unit, query message unit, command program header, query program header, program data, character program data, and decimal program data.
- Compound commands and program headers can be used.

(7) Buffer capacity limitations for block data
Block data is not used.

(8) Summary of program data elements used in expressions, and deepest nesting level allowable in sub-expressions, including syntax restrictions imposed by the device.
Sub-expressions are not used. Character data and decimal data are the only program data elements used.

(9) Response syntax for queries
Response syntax is detailed in Chapter 5, "Command Reference."

(10) Transmission congestion relating to device-to-device messages which do not conform to the general principles for basic response messages
There are no device to device messages.

(11) Response capacity for block data
Block data does not appear in responses.

(12) Summary of standard commands and queries used
This appears in Chapter 5, "Command Reference."

(13) Device state after a calibration query has been completed without any problem
The "*CAL?" query is not used.

(14) When using the "*DDT" command, the maximum length of block used in a trigger macro definition
The "*DDT" command is not used.

(15) When a macro command is being executed, the maximum length of macro label, the maximum length of block for defining a macro, and how echoing is managed when expanding a macro
Macros are not used.

(16) For queries related to identification, explanation of the response to the "*IDN?" query
This is detailed in Section 5.3 "Standard Commands."

(17) Capacity of the user data storage area reserved for when the "*PUD" command and the "*PUD?" query are being executed
The "*PUD" command and the "*PUD?" query are not used. Further, there is no user data storage area.

(18) Resources when the "*RDT" command and the "*RDT?" query are being used
The "*RDT" command and the "*RDT?" query are not used.

(19) Conditions which are influenced when "*RST", "*LRN?", "*RCL", and "*SAV" are used
"*LRN?", "*RCL", and "*SAV" are not used. The"*RST" command returns the 3157 to its initial state. (Refer to Section 5.3, "Standard Commands", and Section 5.6, "Initialization Items".)

(20) Scope of the self-testing executed as a result of the "*TST?" query
This is detailed in Section 5.3, "Standard Commands."

(21) Additional organization of the status data used in a device status report
This is detailed in Section 4.13, "Event Registers."

(22) Whether commands are overlap or sequential type
All the commands are sequential commands.

(23) Criterion relating to the functions required at the instant that the termination message is produced, as a response to each command
Termination occurs when the command has been parsed.

Chapter 8
Troubleshooting

If the GP-IB appears to be malfunctioning, refer to the information below before calling for servicing.

Symptom	Cause / Treatment
The GP-IB has stopped working completely.	Are the cables properly connected?
	Is the device address for the 3157 set correctly?
	Does some other device have the same device address?
	Are all the devices powered on?
After transmission on the GP-IB bus, the keys on the 3157 freeze up and have no effect.	Press the LOCAL key on the front panel of the 3531･3522 to release the remote state.
	Has a LLO (Local Lock-Out) command been transmitted? Transmit a GTL command to put the 3531･3522 into the local state.
When attempting to read data using a HP-Basic ENTER statement, the GP-IB bus hangs.	Be sure to transmit one query before each ENTER statement.
	Have any of these transmitted queries resulted in an error?
Although a command has been transmitted, nothing has happened.	Using the "∗ESR?" query, inspect the standard event status register, and check what type of error has occurred.
Sending several queries, produces only one response.	Has an error occurred?
	Send the queries one at a time, and read the responses individually. When you want to read them in all at once, try doing so by putting them all on one line separated by the message separator character.
	Have you used the "∗IDN?" query?

Symptom	Cause / Treatment
Sometimes service requests are not generated.	Have the service request enable register and the various event status enable registers been correctly set?
	Clear all the event registers at the end of SRQ processing subroutines by using the "∗CLS" command. If an event bit is not cleared, no service request will be generated for that event.
The response message to a query differs from the display on the front panel of the 3157.	Due to the response message being produced at the instant that the 3157 receives the query, there is a possibility that it may not agree with the display at the instant that the controller reads it in.

Service

If the unit is not functioning properly, check the "Troubleshooting" list. If a problem is found, contact your dealer or HIOKI representative.

Warranty Certificate

HIOKI

Model	Serial number	Warranty period Three (3) years from date of purchase (___ / ___)

Customer name: _____

Customer address: _____

Important

- Please retain this warranty certificate. Duplicates cannot be reissued.
- Complete the certificate with the model number, serial number, and date of purchase, along with your name and address. The personal information you provide on this form will only be used to provide repair service and information about Hioki products and services.

This document certifies that the product has been inspected and verified to conform to Hioki's standards.
Please contact the place of purchase in the event of a malfunction and provide this document, in which case Hioki will repair or replace the product subject to the warranty terms described below.

Warranty terms

1. The product is guaranteed to operate properly during the warranty period (three [3] years from the date of purchase). If the date of purchase is unknown, the warranty period is defined as three (3) years from the date (month and year) of manufacture (as indicated by the first four digits of the serial number in YYMM format).
2. If the product came with an AC adapter, the adapter is warrantied for one (1) year from the date of purchase.
3. The accuracy of measured values and other data generated by the product is guaranteed as described in the product specifications.
4. In the event that the product or AC adapter malfunctions during its respective warranty period due to a defect of workmanship or materials, Hioki will repair or replace the product or AC adapter free of charge.
5. The following malfunctions and issues are not covered by the warranty and as such are not subject to free repair or replacement:
   -1. Malfunctions or damage of consumables, parts with a defined service life, etc.
   -2. Malfunctions or damage of connectors, cables, etc.
   -3. Malfunctions or damage caused by shipment, dropping, relocation, etc., after purchase of the product
   -4. Malfunctions or damage caused by inappropriate handling that violates information found in the instruction manual or on precautionary labeling on the product itself
   -5. Malfunctions or damage caused by a failure to perform maintenance or inspections as required by law or recommended in the instruction manual
   -6. Malfunctions or damage caused by fire, storms or flooding, earthquakes, lightning, power anomalies (involving voltage, frequency, etc.), war or unrest, contamination with radiation, or other acts of God
   -7. Damage that is limited to the product's appearance (cosmetic blemishes, deformation of enclosure shape, fading of color, etc.)
   -8. Other malfunctions or damage for which Hioki is not responsible
6. The warranty will be considered invalidated in the following circumstances, in which case Hioki will be unable to perform service such as repair or calibration:
   -1. If the product has been repaired or modified by a company, entity, or individual other than Hioki
   -2. If the product has been embedded in another piece of equipment for use in a special application (aerospace, nuclear power, medical use, vehicle control, etc.) without Hioki's having received prior notice
7. If you experience a loss caused by use of the product and Hioki determines that it is responsible for the underlying issue, Hioki will provide compensation in an amount not to exceed the purchase price, with the following exceptions:
   -1. Secondary damage arising from damage to a measured device or component that was caused by use of the product
   -2. Damage arising from measurement results provided by the product
   -3. Damage to a device other than the product that was sustained when connecting the device to the product (including via network connections)
8. Hioki reserves the right to decline to perform repair, calibration, or other service for products for which a certain amount of time has passed since their manufacture, products whose parts have been discontinued, and products that cannot be repaired due to unforeseen circumstances.

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HIOKI

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