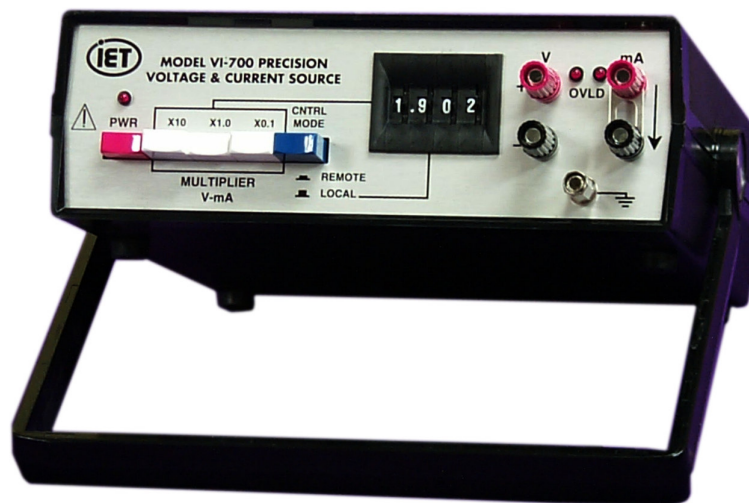


Operation Manual
MODEL VI-700
Precision
Manual or Programmable
Voltage and Current Source



VI-700 IM/Rev K2
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WARRANTY

We warrant that this product is free from defects in material and workmanship and, when properly used, will perform in accordance with applicable IET specifications. If within one year after original shipment, it is found not to meet this standard, it will be repaired or, at the option of IET, replaced at no charge when returned to IET. Changes in this product not approved by IET or application of voltages or currents greater than those allowed by the specifications shall void this warranty. IET shall not be liable for any indirect, special, or consequential damages, even if notice has been given to the possibility of such damages.

THIS WARRANTY IS IN LIEU OF ALL OTHER WARRANTIES, EXPRESSED OR IMPLIED, INCLUDING BUT NOT LIMITED TO, ANY IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR ANY PARTICULAR PURPOSE.



WARNING



OBSERVE ALL SAFETY RULES
WHEN WORKING WITH HIGH VOLTAGES OR LINE VOLTAGES.

**Dangerous voltages may be present inside this instrument. Do not open the case
Refer servicing to qualified personnel**

HIGH VOLTAGES MAY BE PRESENT AT THE TERMINALS OF THIS INSTRUMENT

WHENEVER HAZARDOUS VOLTAGES (> 45 V) ARE USED, TAKE ALL MEASURES TO
AVOID ACCIDENTAL CONTACT WITH ANY LIVE COMPONENTS.

USE MAXIMUM INSULATION AND MINIMIZE THE USE OF BARE
CONDUCTORS WHEN USING THIS INSTRUMENT.

Use extreme caution when working with bare conductors or bus bars.

WHEN WORKING WITH HIGH VOLTAGES, POST WARNING SIGNS AND
KEEP UNREQUIRED PERSONNEL SAFELY AWAY.



CAUTION



DO NOT APPLY ANY VOLTAGES OR CURRENTS TO THE TERMINALS OF THIS
INSTRUMENT IN EXCESS OF THE MAXIMUM LIMITS INDICATED ON
THE FRONT PANEL OR THE OPERATING GUIDE LABEL.

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Chapter 1

INTRODUCTION

The IET Model **VI-700** (Figure 1.1) is a versatile precision dialable or remotely programmable voltage and current source. Its three ranges provide up to 20 V full scale (200 V with the HV option), and down to 100 μ V resolution; and 20 mA full scale down to 0.1 mA resolution. Both voltage and current outputs are available simultaneously. The output is set by a range selector and thumbwheel switches in the **LOCAL** mode, or by a digital input at the rear panel. The **REMOTE** mode control can be a BCD parallel or IEEE-488 interface.

The optional **HV** output extends the range of the output voltage to 200 V at 10 mA. It provides an output at the rear panel 10 times higher-than that at the front panel. The optional **HI** feature extends the output current to 200 mA.

The optional, **HP** output extends the output load current capacity to 200 mA for all the voltage ranges. This makes the VI-700 suitable for many precision low to moderate power applications.

The VI-700 offers many full performance features. It fulfills a variety of laboratory needs. Its wide output range (up to 200 V), very low output impedance (5 m Ω , typical), low noise and ripple, and 200 mA load current capability suit the VI-700 to a variety of applications, such as simulation, calibration, A/D and D/A converter evaluations, and product development.

Front panel overload indicator lamps warn of exceeding of voltage load or current compliance limits. This feature assures the user that the output is within specifications without having to make any measurement or computations. The standard model may still be used within the overload condition and will function for approximately 50-100% overload with only a slight degradation of specifications.



Figure 1.1: VI-700 Manual or Programmable Voltage and Current Source

Chapter 2

SPECIFICATIONS

For convenience to the user, the pertinent specifications are given in an **OPERATING GUIDE**, shown in Figure 2. 1, affixed to the case of the instrument.

2.1 Voltage - Standard

Output Ranges:

200 mV, 2 V, 20 V, (200 V with HV Option).

Resolution:

100 μ V, 1 mV, 10 mV,
(100 mV with HV Option).

Accuracy:

$\pm(75 \text{ ppm} + 50 \mu\text{V})$, 200 mV range;
 $\pm(75 \text{ ppm} + 0.25 \text{ mV})$, 2 V range;
 $\pm(75 \text{ ppm} + 2.5 \text{ mV})$, 20 V range;
at 23°C, no load, after warmup.

Output Current:

70 mA (200 mA with HP Option), maximum load, with LED overload indicator, for conformance with accuracy specifications; 50-100% current overload output is available with slightly reduced accuracy.

Output Impedance:

5 m Ω typical, 40 m Ω for 20 V range.

Noise and Ripple:

50 μ V_{rms} on 200 mV and 2 V ranges, 100 μ V_{rms} on 20 V range; exclusive of random transients.

Temperature Coefficient:

10 ppm/°C typical, 15 ppm/°C maximum.

2.2 HP - High Power Option - 200 mA Load Current Capacity

Output Current: 200 mA, maximum load, with LED overload indicator, on all ranges.

Since significant current may be drawn from this unit, it is advisable to leave the **mA** terminals open. The current **OVLD** LED will remain on if the **mA** terminals are open, and this indicator may be disregarded. The **OVLD** indicator will be off and will behave normally under normal operation.

2.3 HV - High Voltage Option - 200 V Output

Output Voltage:

0 to 200 V.

Resolution:

1 mV, 10 mV, 100 mV.

Output Current:

10 mA (may be increased).

Accuracy:

$\pm(0.01\% + 0.5 \text{ LSD})$; applies to >20 V.

2.4 Current -Standard

Output Ranges:

200 μ A, 2 mA, 20 mA.

Resolution:

0.1 μ A, 1 μ A, 10 μ A.

Accuracy:

$\pm(75 \text{ ppm} + .05 \mu\text{A})$; 200 μ A;
 $\pm(75 \text{ ppm} + 0.25 \mu\text{A})$, 2 mA;
 $\pm(75 \text{ ppm} + 2.5 \mu\text{A})$, 20 mA;
at 23°C, no load, after warmup.

Compliance:

0-20 V; with LED overload indicator.

VI-700 OPERATING GUIDE

CONSULT INSTRUCTION MANUAL FOR PROPER INSTRUMENT OPERATION

VOLTAGE	
OUTPUT RANGES	200 mV, 2 V, 20 V
RESOLUTION	100 μ V, 1 mV, 10 mV
ACCURACY	\pm (75 ppm + 50 μ V); 200 mV range; \pm (75 ppm + 0.25 mV), 2 V range; \pm (75 ppm + 2.5 mV), 20 V range; at 23°C, no load, after warmup.
OUTPUT CURRENT	70 mA, maximum load; with LED overload indicator
OUTPUT IMPEDANCE	5 m Ω typical, 40 m Ω for 20 V range
NOISE and RIPPLE	50 μ Vrms on 200 mV and 2 V ranges, 100 μ Vrms on 20 V range (exclusive of random transients)
TEMPCO	\pm 10ppm/°C typical, \pm 15ppm/°C max.

Traceable to SI

POWER 105-125 V, 50-60 Hz; 5 W.

FUSE 0.25 A

CURRENT	
OUTPUT RANGES	200 μ A, 2 mA, 20 mA
RESOLUTION	0.1 μ A, 1 μ A, 10 μ A
ACCURACY	\pm (75 ppm + .05 μ A); 200 μ A; \pm (75 ppm + 0.25 μ A), 2 mA; \pm (75 ppm + 2.5 μ A), 20 mA; at 23°C, no load, after warmup.
COMPLIANCE	0-20 V; with LED overload indicator

OPERATION

1. **CNTRL MODE** button has no effect for non programmable units.
2. Make the most secure connection to the V terminals if significant current is drawn.
3. Current **OVLD** LED indicator is on if **mA** terminals are open. **This is of no concern** or leads may be shorted together.
4. The ground terminal is connected to earth ground and may be connected to either **VOLTAGE** terminal.

MODEL: VI-700 SN: J1-0540317



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CAGE CODE: 62015 www.ietlabs.com

VILBL/p2/VI-700Rev J3/90-100%12-04

Figure 2.1: Typical OPERATING GUIDE Affixed to Unit

2.5 HI - High Current Option - 200 mA Output

Output Current: 200 mA.
Resolution: 0.1 mA.
Accuracy: \pm (0.01%+0.75 LSD)

Compliance:

0- 18 V; with LED overload indicator.

2.6 REMOTE Features:

Front panel switch selects **REMOTE** (digital interface) or **LOCAL** (front panel thumbwheel switch) operation. All front panel controls except **POWER** are programmable.

IEEE-488.2 Interface Option:

IEEE-488.2-1987; SCPI 1994.0;
"*IDN" for S/N, Model & REV;
"CAL:DATE?" for last calibration date.

RS232 Interface Option:

RS232.SCIPI 1994.0;
"*IDN" for S/N, Model & REV;
"CAL:DATE?" for last calibration date;
25 pin male interface conforming to EIA-STD-RS-530.

2.7 General

Digital Input:

3-1/2 digit parallel BCD or IEEE-488 interface; a front panel pushbutton selects **REMOTE** or front panel thumbwheel operation.

Operating Temperature Range:

-20°C to +40°C.
-20°C to +28°C, for HP -High Power Option.

Power Requirement:

105-125 V or 210-250 V; 50-60 Hz; 5 W.

Recommended Calibration Interval:

12 months.

Dimensions:

7.1 cm W x 22.9 cm D x 12.6 cm H
(8.5"x9.0"x2.8")

with IEEE-488 option:

22 cm W x 24 cm D x 12 cm H
(8.5"x9.25"x4.44")

Weight:

1.6 kg (3.5 lb) with no options;
4.1 kg (9 lb) with HV and IEEE options.

Chapter 3

OPERATION

3.1 Initial Inspection and Setup

This instrument was carefully inspected before shipment. It should be in proper electrical and mechanical order upon receipt.

An **OPERATING GUIDE**, shown in Figure 2.1, is attached to the bottom of the instrument to provide ready reference to specifications.

3.2 Power

3.2.1 AC Line Operation

For a line powered unit, connect the VI-700 to a sounded power outlet. Operation at either 110 or 220 Vac is possible by selecting internal straps. Press the **PWR** switch which is push-on push-release button; the **PWR LED** indicator will light.

3.3 Operation Mode: Local or Remote

Operation of the VI-700 Precision Voltage and Current Source is straightforward and is graphically indicated on the front panel.

1. Plug the unit into a sounded ac outlet.
2. Pull out and set the handle for convenient operation.
3. Turn on the **PWR** switch. The **PWR** lamp (as well as the **READY** and **LOCAL** lamps if present with the IEEE-488 option) should come on.

3.3.1 Local Operation

1. Set the **CNTRL MODE** switch to **LOCAL**, i.e. pointing to the thumbwheel switches. The associated **LOCAL** lamp (if present with IEEE-488 option) should come on. For units, without a remote programming option, this switch has no effect.
2. Program the output level manually as described in subsection “Setting of Output Level” below.

3.3.2 Remote Operation, Optional

The VI-700 provides convenient optional remote control operation through a choice of optional IEEE-488 bus control or a parallel BCD signal input.

Optical isolation allows the outputs to be floating and gives the user the option of using the voltage and current outputs in either polarity. They may also be tied to the ground terminal on the front panel.

3.3.2.1 IEEE-488 Control

The VI-700 includes a **REMOTE/LOCAL** switch on the front panel. The **REMOTE** position is a remote *enable*. When in **LOCAL** mode, the VI-700 supplies the output value selected using the front panel thumbwheel switches.

When the switch is in the **REMOTE** position, the VI-700 will supply the remote output value *only if* that option asserts remote control. If the option does

not assert control, the front panel thumbwheel output value is supplied. The **REMOTE** and **LOCAL LEDs** always indicate which interface is controlling the output value.

Setting the front panel **REMOTE/LOCAL** switch to **LOCAL** overrides the **REMOTE** option settings and *always* sets the output to the value selected using the front panel thumbwheels, regardless of the **REMOTE** option's assertion of control.

For IEEE and RS232 units, the **LOCAL** indicator remains on until communication with the unit is initialized. The mode changes to **REMOTE** after controller commands are received.

Set the **MULTIPLIER** on the front panel manually. The **MULTIPLIER** is not under **REMOTE** control.

Set the output level remotely, replacing the front panel thumbwheel setting. See Chapter on IEEE-488 programming.

3.3.2.2 BCD Control

Units with a **BCD** option provide a connector on the rear panel for inputting a 3-1/2 digit BCD equivalent of the thumbwheel setting. This digital input is operative whenever the **CNTRL MODE** switch is set to **REMOTE**. The **MULTIPLIER** switches must be manually set.

The digital output pin assignments are given below in Table 3. 1. The digital output connector is a 26 pin header on the rear panel. It may be mated to many popular female connectors such as *3M Company Model 3399*, *GTE Sylvania Inc. Model 6BAXX-26-1XX-Y.X*, *T&B/Ansley Corp. Model 609-2600M* or equivalent. The rear panel connector pin numbering, as the connector is viewed straight on, is also shown in Table 3. 1.

The required input is a 5 V, positive true TTL compatible source.

3.4 Setting of Output Level

IMPORTANT: The VI-700 must be allowed to warm up for 15 minutes to reach specified accuracy. For maximum stability and minimum drift, allow the unit to warm up for at least one hour.

The front panel controls simultaneously set both the voltage and current output levels. This output may be conveniently and directly read on the front panel. The output in volts and milliamperes is exactly the **MULTIPLIER** setting times the number shown on the thumbwheel switches. For example, a setting of X10 and 1.335 outputs 13.35 V and 13.35 mA; a setting of X0.1 and .025 outputs 2.5 mV and 2.5 μ A. The range used, i.e. X10, X1, or X0.1, should be the one providing the highest resolution. If 10 mV is required, for example, it should be obtained on the X0.1 range even though it is available on the X1 range. This allows for maximum accuracy even though all settings on an ranges will meet performance specifications.

In the case of a **REMOTE** input being used, it overrides the thumbwheel setting.

3.5 Connection to Terminals

Both voltage and current outputs are floating, and in the case of line operated units, may be connected to the earth ground terminal on the front panel.

A voltage of the indicated polarity will be present across the red and black **V** terminals. Be aware that the specified voltage exists **right at the terminals only**. If leads are used to bring this voltage to some remote load, then a voltage drop develops across these leads. Whether this drop is significant or not depends on the amount of current flowing. If, for example, the load is a high input impedance meter or other such device, then the lead potential is safely ignored. If, however, a large amount of current is drawn through the connecting leads, then a significant drop may develop across the leads and various contact resistances. The user should be aware of this and note the following procedures.

Whenever high currents are to be drawn, connections should be made with heavy cables and heavy duty spade terminals or banana plugs securely attached

to the binding posts. If the output voltage is being monitored, then the voltage at the posts *and* at the load should be measured to determine the potential drop between them. These precautions are especially important whenever the X0.1 range is being used, because even very small resistances can result in a significant voltage relative to the least significant digit resolution of that range, i.e. 100 μ V.

If sensing at the load is desired to virtually eliminate this lead drop, consult IET Labs for instructions on implementing this technique.

In the case of the current output, no such problem exists. The current indicated on the front panel is exactly the current flowing through the test load.

3.6 Overload Indicators

In order to provide the user with certainty that the output load capability is not being exceeded and that the VI-700 is performing within specifications, two **OVL**D indicator LED lamps are provided. As long as the appropriate indicator is off, its associated output is accurate as specified.

In the case of the current output, note that it is the *voltage or compliance* across the terminals, which cannot be exceeded, 20 volts in particular. An open circuit is therefore an overload condition and will cause that indicator to go on. This condition can be ignored, or, if desired, a short circuit strap may be placed across the current terminals to turn off this lamp.

In the case of the **HP** - High Power Option - where up to 200 mA may be drawn, a shorting link will cause this current to be constantly drawn from the current terminals if the unit is on a high setting. This could cause overheating, and it is advisable to leave the **mA** terminals open. The current **OVL**D LED will remain on if the **mA** terminals are open, and this indicator may be disregarded. The **OVL**D indicator will behave normally under normal operation.

It is important to realize that the **OVL**D indicators are conservatively set. The output in the overload region may be used as long as care is exercised. The voltage output remains precise for 50-100% current

overload with only a slight degradation in accuracy, of the order of one LSD (least significant digit.) The VI-700 can actually be used as a low power programmable power supply.

If both voltage and current connectors are used to supply power simultaneously to outside loads, one or both overload indicators may come on sooner than at the limits indicated above since they are determined by the total output capability of the instrument.

There is a small amount of hysteresis built into the overload indicator circuits in order to prevent them from flickering as the limit threshold is approached. This requires reducing the load substantially below the limit whenever it is necessary to reset or turn off the indicator.

3.7 HP - High Power Option - 200 mA Load Current Capacity (Optional)

A unit with this option may be used in the same way as a standard unit. Caution should be exercised since a significant current is available and could overheat the item under load. The current overload indicator will be on; see the Overload Indicators section above.

3.8 HV - High Voltage Option - 200 V Output (optional)

WARNING
OBSERVE ALL SAFETY RULES
WHEN WORKING WITH HIGH VOLTAGES OR LINE
VOLTAGES.

HIGH VOLTAGE MAY BE PRESENT AT REAR PANEL WITH HV OPTION.

The rear output voltage is precisely 10 times the voltage set at the front panel. Up to 10 mA may be drawn. Exceeding that current will **not** turn on the **OVL**D indicator. Consult IET Labs if more current is required.

It is up to the user to consider placing a fuse or a current limiting resistor in series with the **X10 200 V OUTPUT** terminals as a safety measure.

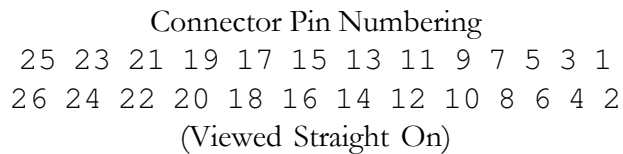
3.9 HI - High Current Option - 200 mA Output (optional)

To obtain an X10 higher output current, set the VI-

700 to the X10 Range, and either toggle the 200 mA toggle switch or depress the **200 mA OUTPUT** button switch to **200 mA**. The effective current multiplier becomes X100. The **200 mA** switch must be OFF in order to use the X0.1 and X1 current range.

Table 3.1 Digital Input Connector Pin Assignments

PIN NO.	FUNCTION
10	1 bit
12	2 bit
8	4 bit
24	8 bit
5	10 bit
7	20 bit
6	40 bit
20	80 bit
26	100 bit
14	200 bit
16	400 bit
18	800 bit
22	1000 bit
1	No connection
3	Ground
9	No connection
11	No connection
13	No connection
15	No connection
17	No connection
19	No connection
21	No connection
23	No connection
25	No connection
2	No connection
4	No connection



Chapter 4

IEEE INTERFACE OPTION

4.1 Introduction

The IEEE interface option makes the VI-700 an IEEE-488.2-1987 and SCPI 1994.0 compatible instrument.

The IEEE STD 488.2 covers the electrical and mechanical bus specifications, and state diagrams for each GPIB bus function. It also establishes data formats, common commands for each 488.2 device and controller protocols. The standard is available on-line at <http://www.ieee.org> or by contacting the IEEE at:

IEEE Corporate Office
3 Park Avenue, 17th Floor
New York, New York
10016-5997 U.S.A.
Tel: +1 212 419 7900

The SCPI standard provides a tree like series of standard commands for programmable instruments so that similar instruments by different manufacturers can be controlled by the same program. SCPI information and a command reference are located in Appendix A.

Other tutorials are available on-line; consult IET for additional information. A software GPIB “keyboard” may be requested from IET to perform elementary commands for training and testing. See Section 5.5.

4.2 Capabilities

The IEEE option provides remote control over the output value; it does not control the range.

Decimal Address	SWITCH SETTINGS 5-4-3-2-1	Decimal Address	SWITCH SETTINGS 5-4-3-2-1
0	0-0-0-0-0	16	1-0-0-0-0
1	0-0-0-0-1	17	1-0-0-0-1
2	0-0-0-1-0	18	1-0-0-1-0
3	0-0-0-1-1	19	1-0-0-1-1
4	0-0-1-0-0	20	1-0-1-0-0
5	0-0-1-0-1	21	1-0-1-0-1
6	0-0-1-1-0	22	1-0-1-1-0
7	0-0-1-1-1	23	1-0-1-1-1
8	0-1-0-0-0	24	1-1-0-0-0
9	0-1-0-0-1	25	1-1-0-0-1
10	0-1-0-1-0	26	1-1-0-1-0
11	0-1-0-1-1	27	1-1-0-1-1
12	0-1-1-0-0	28	1-1-1-0-0
13	0-1-1-0-1	29	1-1-1-0-1
14	0-1-1-1-0	30	1-1-1-1-0
15	0-1-1-1-1	31	Reserved, do not use

Table 4.1 IEEE Bus Address Settings

4.3 Address Switch and Communications Settings

Each GPIB bus device is identified by a five-bit binary address. There are 32 possible primary addresses 0 through 31; addresses 0 and 31 are reserved. The VI-700 **BUS ADDRESS** switch on the rear panel establishes the GPIB address of the unit. Bus address settings are read at power up. Refer to table 4.1.

4.4 IEEE Option Operation

The IEEE controller asserts the remote mode upon receipt of a valid command. The **REMOTE LED** will light and impedance settings will be controlled

through the IEEE interface if the **REMOTE/LOCAL** switch is in the **REMOTE** position. Remote control may be dropped by issuing an IEEE GTL command. Dropping remote sets the VI-700 output to the value set on the front thumbwheel switches. See Chapter 3 for information about **REMOTE/LOCAL** functionality.

4.5 GPIB Test Keyboard

To aid the user in operating the VI-700, a GPIB “Keyboard” Controller program - the easiest way to control GPIB devices without writing a program - is available from IET. This GPIB Keyboard program automatically finds your device at start-up and it lets you enter just the data that you want to send to the device. This program works with ICS, Measurement Computing and National Instruments controllers.

To implement, request a download of **ICS_GPIBkybd_Install.zip** from IET Labs Tech Support.

Unzip the file and follow instructions to install.

Open the application. You may use the **Find Listeners** button to confirm that the VI-700 unit is recognized. Other instruments may also be recognized at this time.

Enter and set the **Address** to the VI-700 address. Use the window to send a **command string** to the VI-700, where the command string is constructed as described in Chapter 7. A command string might be, for example:

SOURce:DATA output string

Chapter 5

SERIAL INTERFACE OPTION

5.1 Introduction

The SERIAL option adds RS-232C and SCPI 1994.0 capability to the VI-700 series instruments. The SCPI standard provides a tree like series of standard commands for programmable instruments so that similar instruments by different manufacturers can be controlled by the same program. A VI-700 SCPI command reference is included in Appendix A.

Tutorials are available on-line; consult IET for additional information. A software Serial “keyboard” may be requested from IET to perform elementary commands for training and testing. See Section 5.5.

5.2 Capabilities

The SERIAL option provides remote control over the output value; it does not control the range.

5.3 Signal Interface and Communications Settings

A 25 pin male DTE interface connector conforming with EIA-STD-RS-530 is located on the rear-panel. The default communications parameters are:

Parameter	Default	Range/Choices
Baud	9600	300 - 115,200
Data Bits	8	7 or 8
Stop Bits	1	1 or 2
Parity	None	Odd, Even, None

Connection of a PC to the VI-700 SERIAL option is typically made through a simple null-modem or “LapLink” cable.

IET Pin	RS232	Signal Name	Direction <i>In / Out</i>
1	AA	Chassis	n/a
2	BA	Send Data	⇒
3	BB	Receive Data	⇐
4	CA	Request to Send	⇒
5	CB	Clear to Send	⇐
8	CF	Signal Detected	⇐
20	CD	Data Terminal Rdy	⇒

5.4 SERIAL Option Operation

The SERIAL option uses the same command set as the IEEE option. Additional commands exist for configuring the serial interface. Changes to the serial UART take place at power-on or after a reset.

SCPI command strings must be followed by a <CR> to terminate the message. Every command returns a response that includes a message terminator. The program/operator should wait for this message terminator before sending additional commands.

Command characters are not echoed to the interface on power up. Send <CTRL-E> to force the controller to echo commands back to the interface or <CTRL-F> to disable echo.

By default, the controller returns ">" and <LF> as a prompt after executing any command. When echo is turned 'On', the controller returns <CR><LF> and ">" as a prompt after executing any command.

<u>Echo-back</u> <u>Mode</u>	<u>RS232</u> <u>Prompt</u>	<u>Message</u> <u>Terminator</u>
On	CR LF >	CR LF
Off	>LF	LF

5.5 Serial Test Keyboard

To aid the user in operating the VI-700, a Serial “Keyboard” Controller program - the easiest way to control serial devices without writing a program - is available from IET. This Serial Keyboard program automatically finds your device at start-up and it lets you enter just the data that you want to send to the device. This program works with ICS, Measurement Computing and National Instruments controllers.

To implement, request a download of:
ICS_Serkybd_Install.zip, from IET Labs Tech Support

Unzip the file and follow instructions to install.

Open the application. Initialize the COM PORT and use the Device Command window to send a **command string** to the VI-700, where the command string is constructed as described in Chapter 7. A command string might be, for example:

SOURce:DATA output string

Chapter 6

PROGRAMMING

6.1 Introduction

VI-700 units equipped with IEEE or SERIAL options implement a consistent SCPI interface. A SCPI command reference is included in Appendix A.

6.2 Command String Structure

Output is controlled in the form of a single SCPI command followed by a space and a 4 character) **Output String**. Each character in the string represents the value of one decade, equivalent to one possible manual thumbwheel switch on the front of the unit.

This **Output String** is constructed as:

- The number is in units as in the thumbwheel switch for the range that is selected, e.g. for the X1.0 range, 1 unit represents 1 mV.
- All 4 characters must be provided; they represent 3-1/2 digits; The most significant character may be 0 or 1 (all odd digits in the most significant position will result in a 1 command; all even digits in the most significant position will result in a 0 command)
- The decade values are straight-reading, from left to right. All preceding and trailing zeros must be included to complete 4 characters; any other characters in those spaces will be ignored.
- A decimal point may not be included.
- Combine with the “SOURce:DATA ” command.

For example:

<u>Value</u>	<u>Command</u>
195 mV	SOURce:DATA 0195 in Range X1.0
100.1 mV	SOURce:DATA 1001 in Range X0.1

6.3 Determining the VI-700 Configuration

The IEEE 488.2 specification defines the *IDN string as containing 4 sections separated by commas; the manufacturer, the model, the serial number and the revision of the instrument.

The Model section of the *IDN string of the VI-700 has been encoded to provide information about the characteristics of the specific instrument being used. For example, a *IDN query to a VI-700 might return:

```
IET Labs,VI-700-F-4-100m-0-0,K2-0551324,K2
```

In our example above, the Manufacturer section contains “IET Labs”, the Model section contains “VI-700-F-4-100m-0-0”, the Serial Number section “K2-0551324” and the Revision section “K2”.

6.3.1 Instrument Initialization

Reset the unit to power up defaults using *RST

Check that the instrument is “in cal” by reading the calibration date and compare it to current date/time using CALibrate:DATE?