The user’s guide of IPS-B Series

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PLEASE READ BEFORE USING

◆ Request to users

This product, VUPOWER, must be used only by qualified personnel who understand the contents of this user's guide and have electrical knowledge.

If it is handled by unqualified personnel, electrical hazards may result.

Be sure to handle it under supervision of qualified personnel.

◆ AC Input

Make sure the followings before the installation.

1) AC Line mark (■) on the rear panel should be identified with your AC power.

2) Ground-terminal should be connected on ac input.

3) If there is no connection with ground-terminal AC socket.

4) It could be possible to permit some tolerance for the specifications.

5) Be sure to use the input power cable that is included along with this product from factory.

6) If other cable is to be used by some reason, please use the cable, over 250V/7A for a standard.

◆ Maintenance and Inspection.

To prevent electric hazards, be sure to unplug the power cable before performing maintenance or inspection.

Do not remove the cover as performing maintenance or inspection.

Consult INTERACT or INTERACT AGENT before uncover the product in case if it is so necessary.

◆ Warranty

This INTERACT product, VUPOWER, is warranted for two years from date of shipment (no compensation service included is one year).

The warranty shall not apply to defects resulting from improper or inadequate maintenance by users.

For warranty service, this product must be returned to INTERACT or INTERACT AGENT.

The Buyer shall cover the delivery charges to INTERACT,

INTERACT shall pay shipping charges to return the product to the Buyer.

However, the Buyer shall pay all shipping charges, duties and taxes for products returned to INTERACT form another country.

◆ Safety

Do not install substitute parts or perform any unauthorized modification to the product.

They could possibly cause bodily injury or death, INTERACT does not have any responsibility for that reasons.

◆ Safety Symbols

Warning & Caution.

This product makes dangerous electric output.

To avoid electric shock, users must use this product very carefully and be protected from electric hazards.

Improper use makes some damages on the product.

Followings are the safety symbols for user’s reference.

	CAUTION (Refer to accompanying Documents)
	Earth(ground) Terminal
	Protective Conductor Terminal
	In-position of bistable push control
	Out-position of bistable push control
	On (Power Supply)
	Off (Power Supply)

◆ **Specification Guarantee**

All tests are performed from the front output before its delivery.

So, the specification depends on its front output.

If you want to use the rear output, please refer to the **page 22**.

Please make sure that a new calibration is required for using rear output.

WARRANTY

INTERACT Co., Ltd., warrants that the products that it manufactures and sells will be free from defects in materials and workmanship for a period of two(2) years from the date of shipment. If a product proves defective during this warranty period, INTERACT, at its option, either will repair the defective product without charge for parts and labor, or will provide a replacement in exchange for the defective product.

In order to obtain service under this warranty, Customer must notify INTERACT of the defect before the expiration of the warranty period and make suitable arrangements for the performance of service. Customer shall be responsible for packaging and shipping the defective product to the service center designated by INTERACT, with shipping charges prepaid. INTERACT shall pay for the return of the product to Customer if the shipment is to a location within the country in which the INTERACT service center is located. Customer shall be responsible for paying all shipping charges, duties, taxes, and any other charges for products returned to any other locations.

This warranty shall not apply to any defect, failure or damage caused by improper use or improper or inadequate maintenance and care. INTERACT shall not be obligated to furnish service under this warranty a) to repair damage resulting from attempts by personnel other than INTERACT representatives to install, repair or service the product; b) to repair damage resulting from improper use or connection to incompatible equipment; c) to repair any damage or malfunction caused by the use of non-INTERACT supplies; or d) to service a product that has been modified or integrated with other products when the effect of such modification or integration increases the time or difficulty of servicing the product.

This warranty is given by INTERACT instead of any other warranties, express or implied. INTERACT and its vendors disclaim any implied warranties of merchantability or fitness for a particular purpose. INTERACT's responsibility to repair or replace defective products is the sole and exclusive remedy provided to the customer for breach of this warranty. INTERACT and its vendors will not be liable for any indirect, special, incidental, or consequential damages irrespective of whether INTERACT or the vendor has advance notice of the possibility of such damages.

INTERACT Co., Ltd.
1688-5, Shinil-dong, Daeduk-ku
Daejon, KOREA, 306-230

http://www.vupower.com
E-mail : interact@vupower.com

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Section 1

General Information

The IPS-B Series dc power supplies feature a combination of programming capabilities and linear power supply performance that makes them ideal for power systems applications. The power supply is programmable locally from the front-panel or remotely over the GPIB and RS-232 interfaces.

	MODEL	Output	Output Form	Display type
1	IPS-12B05	12V / 5A (60W)	Single Output	Single Display
2	IPS-15B07	15V / 7A (105W)	Single Output	Single Display
3	IPS-18B10	18V / 10A (180W)	Single Output	Single Display
4	IPS-25B07	25V / 7A (175W)	Single Output	Single Display
5	IPS-30B03	30V / 3A (90W)	Single Output	Single Display
6	IPS-30B05	30V / 5A (150W)	Single Output	Single Display
7	IPS-30B10	30V / 10A (300W)	Single Output	Single Display
8	IPS-50B04	50V / 4A (200W)	Single Output	Single Display
9	IPS-60B03	60V / 3A (180W)	Single Output	Single Display
10	IPS-12B05D	12V / 5A (120W)	Dual Output	Dual Display
11	IPS-30B03D	30V / 3A (180W)	Dual Output	Dual Display
12	IPS-30B05D	30V / 5A (300W)	Dual Output	Dual Display
13	IPS-60B03D	60V / 3A (360W)	Dual Output	Dual Display

Operating mode : constant voltage (CV) mode and constant current (CC) mode
State storage memory : 10 user-configurable stored states
System self-test : automatic turn-on self-test
User calibration from the front panel(Closed-Case Electronic Calibration)
Remote sensing the load voltage at the front panel
Track operation(for dual output model)

The front panel operation permits:
Easy-to-use of knob control
Setting and displaying the voltage and current limit values
Saving and recalling operating states

Beeping and displaying error messages
Calibrating the power supply from the front panel, including changing the calibration secure code (password)
Configuring the power supply for remote interfaces
Enabling or disabling the output
Track operation(for dual output model)

Remote Operation using an external controller includes the following features:
Voltage and current programming
Voltage and current readback
Programming syntax error detection
Present and stored status readback

The front-panel VFD(Vacuum-Fluorescent Display) includes:
Displaying actual values of output voltage and current
Displaying the limit values of voltage and current
Checking the operating status from the annunciators
Checking the error messages from the error codes
Displaying the operating messages of the front function keys

Circumstance Condition;
This product operate properly under the conditions.
- Temperature : 0 ~ 40 °c
- Humidity : 80% RH
- Altitude : 0 ~ 2000m

Cleaning
To make the best use of this product, periodically maintenance is necessary.
When the panels of the product has become dirty, clean them by wiping them with a soft cloth moistened with neutral soapsuds or alcohol.

International Quality Standard
UL, C-UL : IPS-30B03, IPS-30B05.
CE : All of the model on prior page.

Section 2

Preparing for Use

This section contains instruction for initial inspection, location and cooling for bench and rack operation, and input power requirements. And also this section describes front-panel, rear-panel and communication configurations.

Initial Inspection

When you receive your power supply, inspect it for any obvious damage that may have occurred during shipment. If any damage is found, notify INTERACT Sales Office immediately. Warranty information is shown in the front of this manual. If you return the power supply for service, note a brief description of the problem.

You may inspect your power supply as following procedures:

Check the list of supplied items. Verify that you have received the following items with your power supply. If anything is missing, contact your INTERACT Sales Office.

One power cord.
One User's Guide.
Test Sheet and/or Certificate of Calibration.

Mechanical check

This check confirms that there are no broken keys or knob, that the cabinet and panel surface are free of dents and scratches, and that the display is not scratched or cracked.

Electrical check

This check verifies the confidence that the power supply is operating in accordance with its specifications.

Cooling fan check

The power supply can operate without loss of performance within the temperature range of 0℃ to 40℃, and with derated output current from 40℃ to 55℃. Two fans cool the power supply by drawing air through the rear panel from the power module inside and exhausting it out the sides.

Bench operation

Your power supply must be installed in a location that allows sufficient space at the sides and rear of power supply for adequate air circulation. The rubber bumpers must be removed for rack mounting.

Rack mounting

The power supply can be mounted in a standard 19-inch rack cabinet. To rack mount the power supply, remove the front and rear bumpers before rack-mounting the power as Figure 2-1 below.

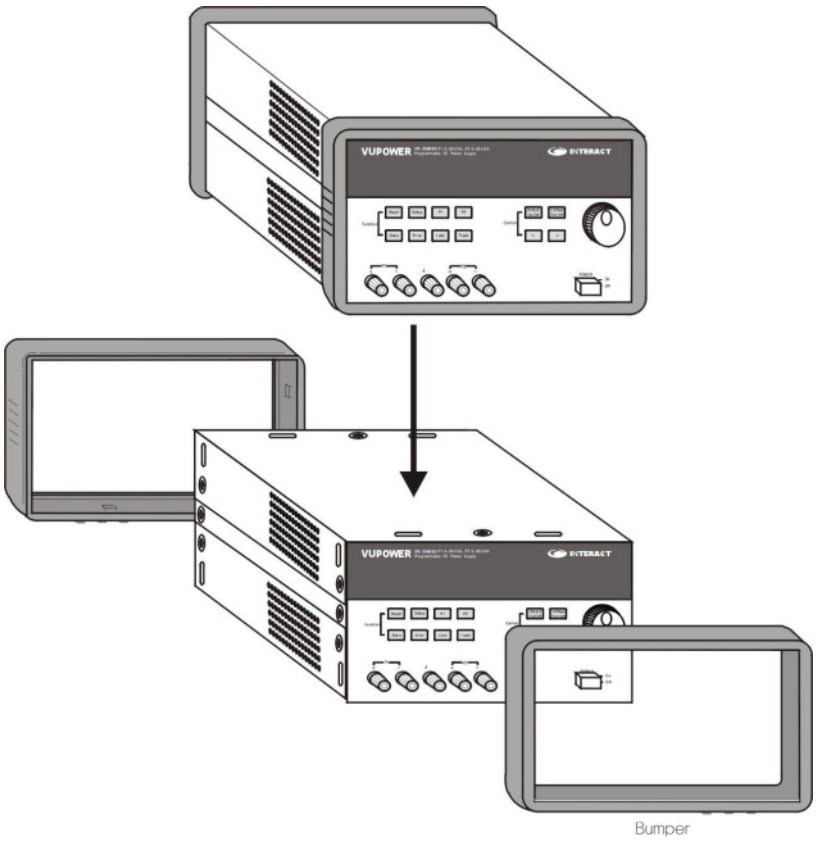
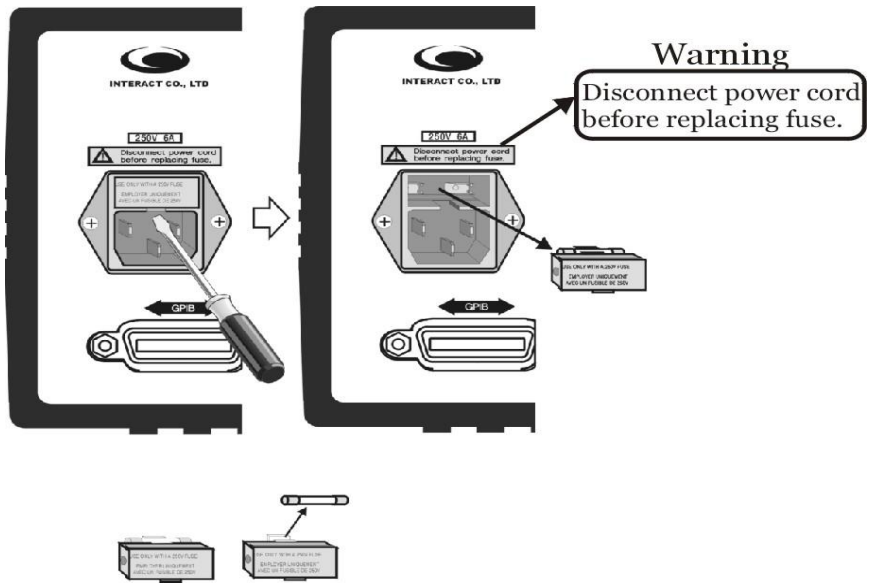


Figure 2-1. To mount the power supply on the rack.

Input Power Requirements

When you operate your power supply, the AC Line mark (■) on the rear panel should be identified with your AC power source. Verify that the correct power-line voltage and that the correct power-line fuse is installed. Figure 2-2 shows the installation of the correct fuse.



Fuse capacity			
Rating	Model		
~250V 3.15A	IPS-B series	Single output	IPS-12B05, IPS-15B07, IPS-18B10, IPS-25B07, IPS-30B03, IPS-30B05, IPS-30B10, IPS-50B04, IPS-60B03
		Dual output	IPS-12B05D, IPS-30B03D, IPS-30B05D, IPS-60B03D

Figure 2-2. Installation of the correct fuse

Front-Panel Configuration

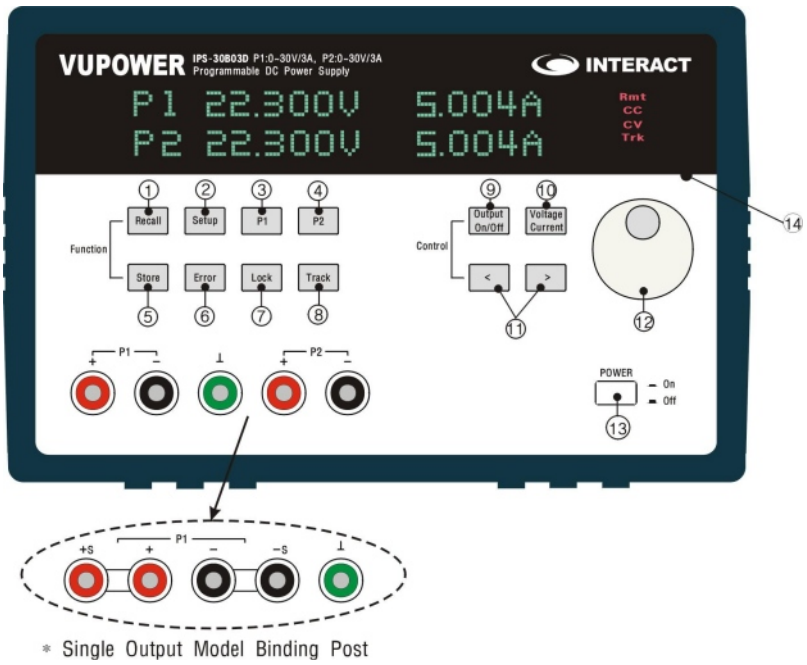
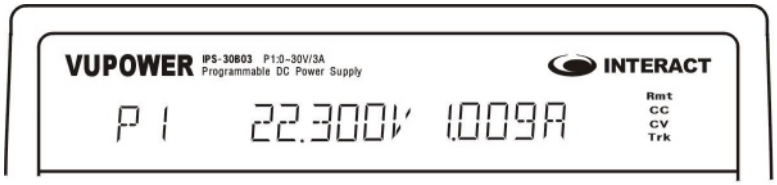


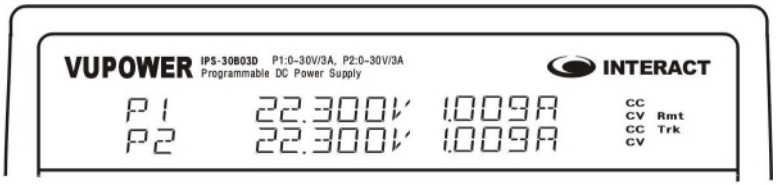
Figure 2-3. Front panel

① Recall key : Recalling the stored value / returning to the operating state
② Setup key : Selection the initialization menu
③ P1 key : Setting the output
④ P2 key : Setting the output (for dual output model)
⑤ Store key : Storing the operating state
⑥ Error key : Checking the error message / canceling the present procedure
⑦ Lock key : Lock-in / Lock-out the front key operation
⑧ Track key : Selecting the track mode operation (for dual output model)
⑨ Output On/Off key : Selecting the output enable / disable
⑩ Voltage/Current key : Selecting Voltage / Current adjustment
⑪ Resolution selection key : Moving the blinking digit the right or left
⑫ Control knob : Increasing / decreasing the value of the blinking digit by turning clockwise or counter clockwise
⑬ Power switch : Power On / Off
⑭ VFD display window : Displaying the present state of operation

Displays



① Single Output Model



② Dual Output Model(Double Display)

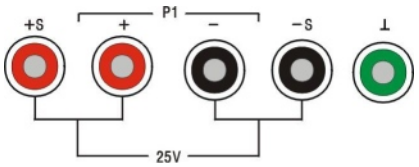
Figure 2-4. Displays

* Annunciators : Display the state of operation

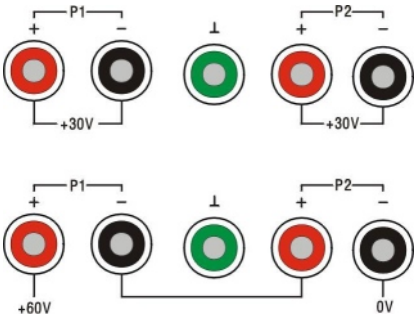
Rmt	The power supply receives the user-defined command over the GPIB or RS-232 remote interface.
CC	The power supply is operating in the constant current (CC) mode.
CV	The power supply is operating in the constant voltage (CV) mode.
Trk	P2 channel is subordinated to P1(only for dual output models)

Connection to the output

Connections to the power supply's output and to chassis ground are made to binding posts on the front-panel and to the rear output terminals.



① Single Output Model



② Dual Output Model

Figure 2-5. Connection to the output

Remote Voltage Sensing Connections(Single output model only)

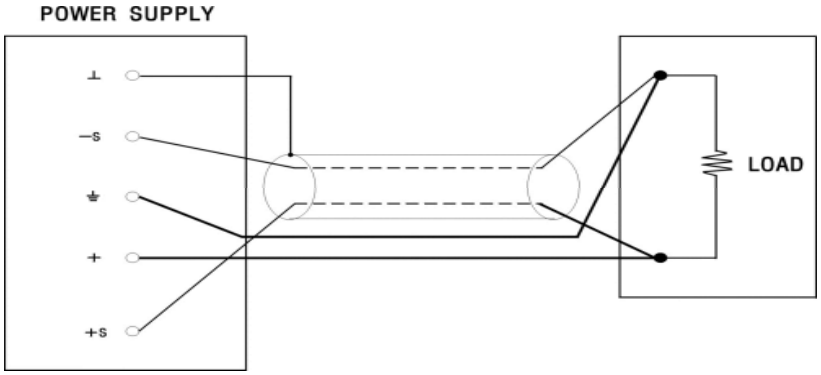


Figure 2-6. Remote voltage sensing connections

Remote Sensing is available from either front output or rear output as above.
When the load is away from power supply, please remove short bars on the front and make the connection as above.

Caution : When the user wants to use rear terminal, the short bars on the front between +/- and –s/+s should be removed (In case of shrouded sockets on front terminal and dual output models, the short bars are located in the inside of the front panel).

Connection to the Rear Output(Single output model only)

The rear output is available, but it is not guaranteed by the specification.
Before using the rear output, a new calibration is also required.

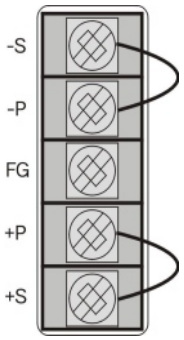
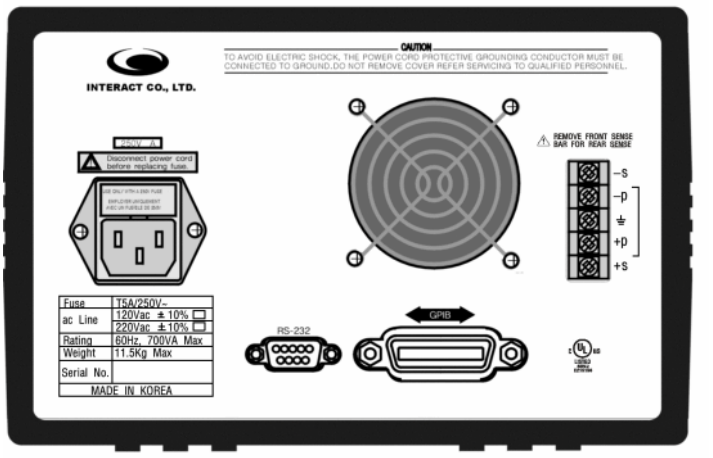
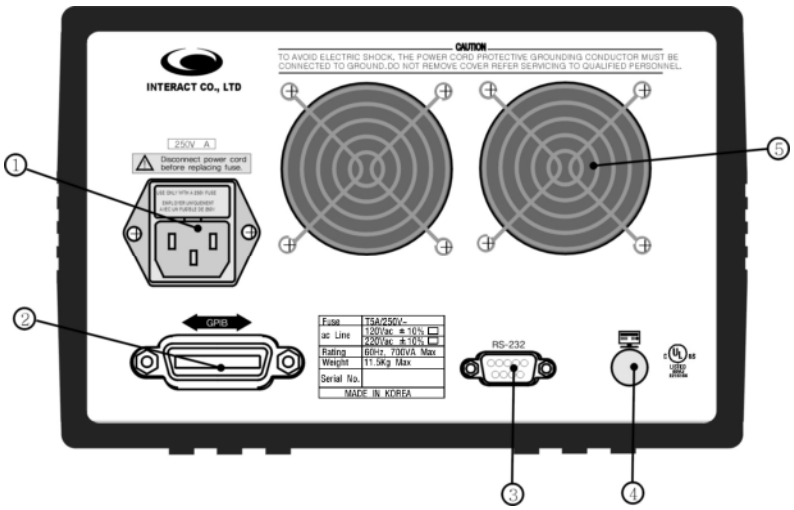


Figure 2-7. Connection to the Rear Output

Rear-Panel Configuration



ⓐ Single Output Model



ⓑ Dual Output Model

Figure 2-8. Rear panel

① AC power-line module (including fuse-holder assembly)
② IEEE-488.2 interface connector
③ RS-232 interface connector
④ Qualification mark : CE, c-UL
⑤ Cooling fan

GPIB(IEEE-488.2) Interface Configuration

A GPIB hardware setup consists of two or more GPIB devices (instruments and/or interface boards) that are connected by a GPIB cable. The cable assembly consists of a shielded 24-conductor cable with a plug and a receptacle (male/female) connector at each end. With this design, you can link devices in a linear configuration (Figure 2-9), a star configuration (Figure 2-10), or a combination of these two configurations.

Physical and Electrical Specifications

To achieve the GPIB's high data transfer rate, you must limit the physical distance between devices and the number of devices on the bus. This limitation is necessary because the GPIB is a transmission line system. Any distance beyond the maximum allowable cable length, as well as any excess GPIB device loads, can surpass interface circuit drive capability.

The IEEE-488.2 standard dictates the following limits:

The total number of devices including the computer is no more than 15.
The total length of all cables is less than or equal to 2 meter times the number of connected devices, up to a maximum of 20 meters. If you must exceed these limits, you can purchase bus extenders and expanders.

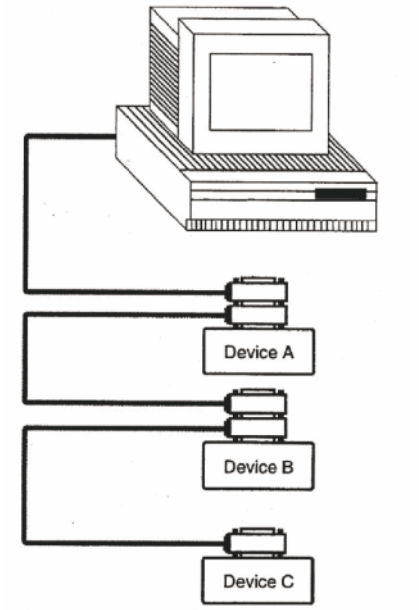


Figure 2-9. Linear Configuration

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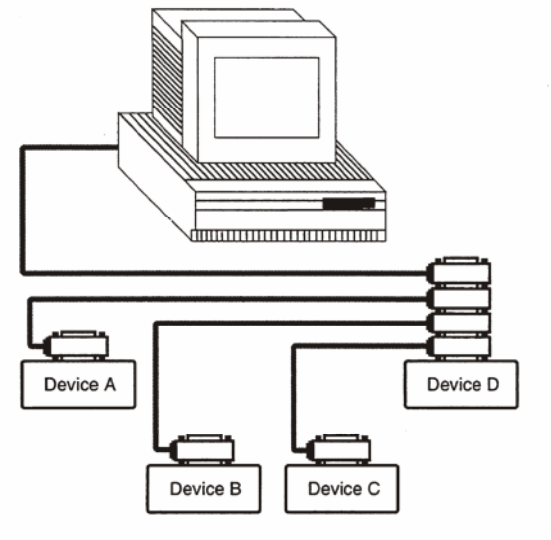

Figure 2-10. Star Configuration

GPIB Signals and Lines

The GPIB has 16 signals and 8 ground return or shield drain lines. All GPIB devices share the same 24 bus lines. The 16 signal lines fall into three groups:

8 data lines (DIO1 through DIO8)

The 8 data lines carry the command and data messages on the GPIB. All commands and most data use the 7-bit ASCII or ISO code set; thus, the eighth bit, DIO8, is not used or used for parity.

5 interface management lines

The following lines manage the flow of information across the GPIB:

- ◊ Interface Clear(IFC)
- ◊ Attention(ATN)
- ◊ Remote Enable(REM)
- ◊ End-or-Identify(EOI)
- ◊ Service Request(SRQ)

3 handshake lines

Three lines asynchronously control the transfer of message bytes among devices:

- ◊ Not Ready For Data(NRFD)
- ◊ Not Data Accepted(NDAC)
- ◊ Data Valid(DAV)

The GPIB uses a three-wire interlocking handshake scheme. The handshake scheme guarantees that message bytes on the data lines are sent and received without transmission error.

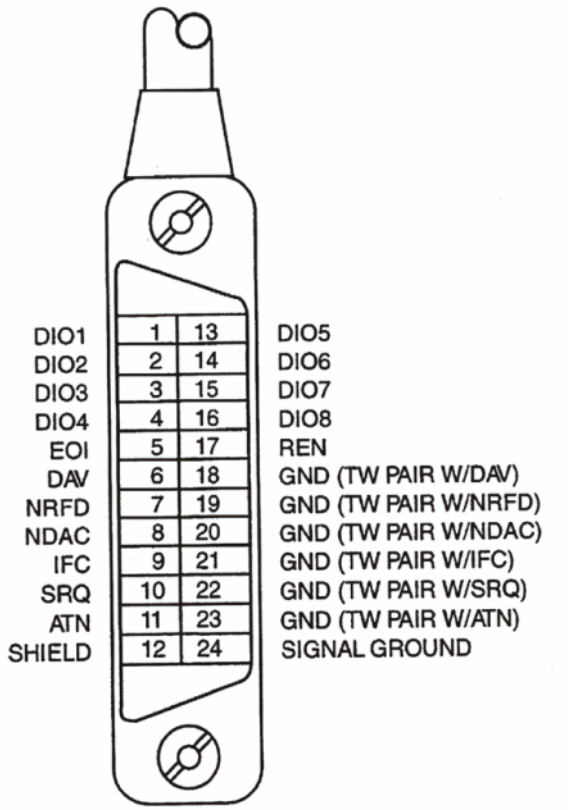

Figure 2-11. GPIB Connector and Pin Assignments

RS-232 Interface Configuration

You may connect the power supply to the RS-232 interface using the 9-pin(DB-9) serial connector on the rear panel. The power supply is configured as a DTE(Data Terminal Equipment) device. For all communi- cations over the RS-232 interface, the power supply uses two handshake lines: RTS(Request To Send, Pin #7) and CTS(Cancel To Send, Pin #8).

RS-232 Configuration Overview

Configure the RS-232 interface using the following parameters.

Baud Rate:
300, 600, 1200, 2400, 4800, 9600 (d*efault setting*), or 19200 baud
Parity Bit:
None (d*efault setting*), Even or Odd
Data Bit:
8 data bits (d*efault setting*)
7 data bits
Number of Stop Bit:
1 bit (*fixed setting*)
Number of Stop Bit:
1 bit (d*efault setting*)
2 bits
Handshaking:
RTS/CTS Handshake (*fixed setting*)

Serial Connection

If your computer or terminal has a 9-pin serial port with a male connector, use the null-modem cable. This cable has a 9-pin female connector on each end. The cable pin diagram is shown below.

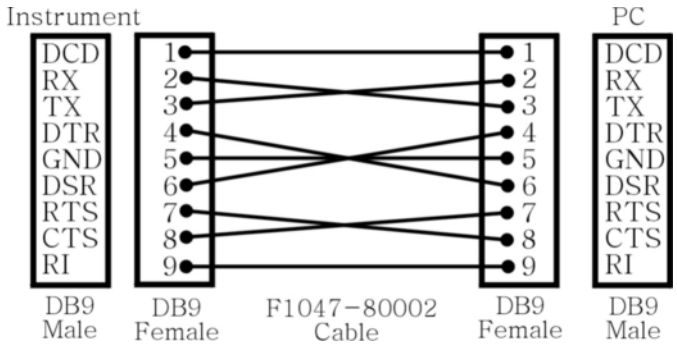

Figure 2-12. RS-232 Serial Connection

Section 3

Front-Panel Operation

This section contains procedures of the IPS-B Series DC Power Supply for use and familiarize you with the front-panel operations. One of the first things you will want to do with your power supply is to become acquainted with its front panel. Written procedures in this section provide you with quick start. Procedures is divided into the followings:

Getting Started
Using the function keys
Using the control keys and knob
Checking the rated voltages of the power supply
Checking the rated currents of the power supply
Using the power supply in constant voltage mode
Using the power supply in constant current mode
Store and recall the instrument state
Calibration Overview
Calibration Recover (factory default)

Getting Started

When you operate your power supply, the AC Line mark (■) on the rear panel should be identified with your AC power source.

1. Connect the power cord and turn on the power supply.

The power supply is shipped from the factory configured in the front-panel operation mode. At power-on POWER, the power supply is automatically set to operate in the front-panel operation mode and remote operation mode. When the power supply is in remote operation mode, you can return to front-panel operation mode at any time by pressing the Lock key if you did previously send the front-panel lock-in command and then the front-panel keys can be used. A change between front-panel and remote operation modes will not result in a change in the output parameters.

A power-on self-test occurs automatically when you turn on the power supply. The front-panel display will light up while the power supply performs its power-on self-test. After performing the self-test, the power supply will go into the power-on and all output are enabled. The output channel is selected for the supply (P1 key will turn on); the knob is selected for voltage control.

2. Enable the outputs

All outputs of the power supply can be enabled or disabled from the front-panel using the Output On/Off key. If you want to disable the outputs, press the Output On/Off key. "**OUTPUT OFF**" is displayed and the Output On/Off key will turn on. If you want to enable the outputs, press the Output On/Off key. The outputs are displayed on the display panel and the Output On/Off key will turn off and "CV" annunciator is lit. The blinking digit can be adjusted by turning the knob. Notice that the display shows the meter mode. "Meter mode" means that the display shows the actual output voltage and current.

The display provides the present operating status of the power supply with annunciators and also informs the user of error codes. For example, the supply is operating in CV (Constant Voltage) mode and controlled from the front-panel, then the "CV" annunciator and P1 key will turn on. If, however, the power supply is remotely controlled, the "Rmt" annunciator will also turn on and off.

Using the function keys

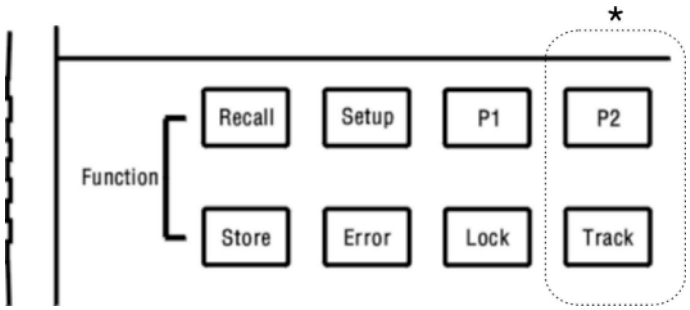

Figure 3-1. Function Keys

**** For dual output model***

1. Recall Key

When you need the different operating state which is stored before, this key is useful. To use this function, follow these procedures.

(1) Press Recall key. "**RECALL 01**" is displayed on the display panel.
(2) Turn the knob clockwise or counter clockwise to change the displayed storage number.
(3) If you press Recall key again, the operating states (voltage and current) selected is displayed on the display panel.
(4) But, if you press Error key instead of Recall key, this function is canceled and the display is not changed.

2. Store Key

10 memory locations (numbered 1,2, ... ,10) are available to store the operating states. The operating states are stored in non-volatile memory and are remembered when being recalled. And you can use this key for "Enter" function when other function key is selected. To use this function, follow these procedures.

(1) Press Store key. "**STORE 01**" is displayed on the display panel.
(2) Turn the knob clockwise or counter clockwise to change the displayed storage number.
(3) If you press Store key again, the operating states (Voltage and current) selected is saved in the displayed storage number.
(4) But, if you press Error key instead of Store key, this function is canceled and the voltage and current are not stored.

3. Error Key

System Error Messages are shown on the display panel. Error messages are stored in the register memory, and are displayed one by one from the memory whenever Error key is depressed. If Error message is empty in the memory, the display panel represents "NO ERROR". On the other hand, Error key is “cancel” function while the Setup key goes on. To return the normal operation mode, let the display time-out after 3 seconds or press other key (P1/P2).

4. Setup Key

The Setup key represents 9 functions as follows. You can choose one of 9 functions by pressing < key and > key.

(1) **SETUP-LIMIT** : Set the voltage and current value in the limit setup mode.

When the display is in the limit setup mode, you can see the voltage and current limit values of the selected supply. You make an adjustment of the voltage and current value as follows.

Press Setup key. "SETUP-LIMIT" is displayed on the display panel.

Press Setup key again for the confirmation and entering into the setup mode of its limit voltage and current.
Press Voltage Current key to select what you want to change. You can move the cursor on the display by pressing < or > key, and adjust the limit by turning the knob.
Press Error or P1 key to save it and escape from the setup mode.
(In this case, Error key means “save and out”)

If your product is dual model and you want to change the setup limit of P2 output, P2 port should be currently used.
(Select P2 Channel before you press Setup key for "SETUP-LIMIT", and follow the same procedure above)

(2) **SETUP-POWER FAIL** : Set the output state after the power-on.

Press Setup key.

You can choose "SETUP-POWER FAIL" by pressing < key and > key.
Press Setup key again. You can choose ON/OFF of POWER FAIL by turning the knob. If you choose "POWER FAIL ON", the outputs are enabled right after the power-on. In case of selecting "POWER FAIL OFF", “OUTPUT OFF” will be displayed when you turn on the power supply. It means the outputs are disable right after the power-on to protect your property. And then press Store key to save your choice.

(3) **SETUP-PASSWORD** : Setup the password.

This feature allows you to enter a security code (password) to prevent accidental or unauthorized calibrations of the power supply. When you first receive your power supply, it is secured. Before you can calibrate the power supply, you must unsecure it by entering the correct security code (password).

Press Setup key.

"PASSWORD ****" is displayed. The character of password is number and is up to 4 characters. You can change the new pass- word by pressing < key, > key and by turning the knob. If you success the entering of password, you can see the word "NEW PSW ****" and change the old password into the new password.

Press Setup key.

NOTE : The password is first given from the factory is "1-2-3-4". The character of password is number and is up to 4 characters.

(4) **SETUP-COMM** : To set the serial or parallel communication port.

Press Setup key.
You can choose "COMM-RS232" or "COMM-GPIB" by turning the knob.

Press Setup key.
In case of "COMM-RS232", the display shows one of the settings of serial communication as follows.

"300 8-N-1"	"300 8-O-1"	"300 8-E-1"	"600 8-N-1"
"600 8-O-1"	"600 8-E-1"	"1200 8-N-1"	"1200 8-O-1"
"1200 8EN-1"	"2400 8-N-1"	"2400 8-O-1"	"2400 8-E-1"
"4800 8-N-1"	"4800 8-O-1"	"4800 8-E-1"	"9600 8-N-1"
"9600 8-O-1"	"9600 8-E-1"	"19200 8-N-1"	"19200 8-O-1"
"19200 8-E-1"			

If you want to use the GPIB interface, choose "COMM-GPIB", and then the display shows "ADDR - 05". This address number is the identification of power supply or other system. This address can be changed by turning the knob.

Press Store key. : “INITIAL COMM” is displayed.

(5) **CAL-VOLTAGE** : To set the voltage calibration.

At least 30 min warm-up is required before operating this function.

Select the output channel(P1 or P2) to be calibrated and the press Setup key. Choose " CAL-VOLTAGE" by using < key, > key and then press the Setup key again. The display represents "PASSWORD ****". You may input the password by pressing < key, > key and by turning the knob.

NOTE : The password is first given from the factory is "1-2-3-4"

Press Store key. "00.000V-some numbers" is displayed. And then connect DVM to VUPOWER outputs and then read the DVM.

Adjust VUPOWER to meet close to 0.000V of DVM by using < key, > key and by turning the knob. (the left-end digit on VUPOWER display is the critical digit)

Press Store key. The setting voltage is stored and "WAIT FOR AD CAL" is displayed. And then "Max Voltage-some numbers" is shown on the display.

Compare the DVM voltage with Max Voltage of VUPOWER.

Press Store key. The setting voltage is stored and "WAIT FOR AD CAL" is displayed. And then "COMPLETE" is shown on the display panel.
The display returns to the meter mode. In the meter mode, the display shows the actual output voltage and current of the selected supply.

(6) **CAL-CURRENT** : To set the current calibration, electronic load is required.

At least 30 min warm-up is required before operating this function.

Select the output channel(P1 or P2) to be calibrated.
Connect the (-) of VUPOWER to the (-) of an electronic load directly.
And then, connect the (+) of VUPOWER to the A (+) of DVM.
Connect the (+) of electronic load to the Com (-) of DVM.

NOTE : Recommendable resistor (load) for its current calibration.

30V/3A : ≤ 9.5 ohm / 100W
30V/5A : ≤ 5.5 ohm / 150W
40V/5A : ≤ 7.5 ohm / 200W

Press Setup key.
And then choose " CAL-CURRENT" by using < key or > key.
Press the Setup key again. The display represents "PASSWORD ****".

You may input the password by pressing [<], [>] key and turning knob.

NOTE : The password is first given from the factory is "1-2-3-4"

Press [Store] key. “00.000A -some numbers” is displayed.
Read the DVM.
Adjust VUPOWER to meet close to 0.000A of DVM by using [<] key, [>] key and by turning the knob. (the left-end digit on VUPOWER display is the critical digit)

NOTE : During its current calibration, CC indicator should light on. Otherwise, check the resistor capacity and its connection.

Press [Store] key. The setting voltage is stored and "WAIT FOR AD CAL" is displayed. And then "Max Amp-some numbers" is shown on the display.

Compare the DVM current with Max Amp of VUPOWER.

Press [Store] key. The setting current is stored and "WAIT FOR AD CAL" is displayed. And then "COMPLETE" is shown on the display panel.
The display returns to the meter mode. In the meter mode, the display shows the actual output voltage and current of the selected supply.

(7) **CAL-VOLT RECOVER** :

“CAL-VOLT RECOVER” function is useful when the user made a mistake in his set-up or calibration.
This function is to return voltage calibration values to the state of having been set by the manufacturer. In other words, it is a reset function of voltage calibration.

How to recover the voltage calibration :

Operating Process	What’s on Display
1. Press [Setup] key	SET-LIMIT
2. Press [<] or [>] key and Select “CAL-VOLT RECOVER” by Press [Setup] key again	CAL-VOLT RECOVER
3. Change the digit by Press [<] or [>] key and Enter the number at each digit by turning [Jog-Switch] Default password is 1-2-3-4. (if the user did not change its password)	PASSWORD **** number

4. Press Store key	CAL-V-RECOVERED
5. Voltage calibration & Display will return to its origin in few seconds.	P1 00.000V 0.000A

(8) **CAL-CURR RECOVER**

"CAL-CURR RECOVER" function is useful when the user made a mistake in his set-up or calibration.
This function is to return voltage calibration values to the state of having been set by the manufacturer. In other words, it is a reset function of voltage calibration.

How to recover the current calibration :

Operating Process	What's on Display
1. Press Setup key	SET-LIMIT
2. Press < or > key and Select "CAL-CURR RECOVER" by Press Setup key again	CAL-CURR RECOVER
3. Change the digit by Press < or > key and Enter the number at each digit by turning Jog-Switch Default password is 1-2-3-4. (if the user did not change its password)	PASSWORD **** number
4. Press Store key	CAL-C-RECOVERED
5. Current calibration & Display will return to its origin in few seconds.	P1 00.000V 0.000A

(9) **SETUP-KNOB BEEP** : Set the beep for Knob

Press "setup" key and choose "SETUP-KNOB BEEP" by pressing < , > key. And then press "setup" key again. You can choose ON/OFF of KNOB BEEP by turning the knob.
Press "store" key.

5. Lock Key

To prevent any mistakes from pressing other keys.
In the case of Lock-in state, the Lock light will turn on and most keys are locked except Lock key and Output On/Off key.

Note : The Output On/Off key is available anytime to cut the power from output port. It is for user's prompt action to prevent any damage on user's property.
We open this key for emergency purpose.
(To return to the normal mode from "OUTPUT OFF" condition under Lock-in state, depress the Lock key first.)

6. P1 Key : output channel

7. P2 Key : output channel (Only available on dual model)

8. Track Key (Only available on dual model)

Set the desired voltage to the P1 channel (or P2 channel).
Press Track Key.
The "Trk" annunciator lights on the display.
Now, the other channel is subordinated to active channel.
So, you can control both channel at the same time with only one channel.
(The other channel will be set to the same voltage level as the active channel).

The current limit is independently set for each of the P1 channel or P2 channel, so it is not affected by the track mode.

Using the control keys and knob

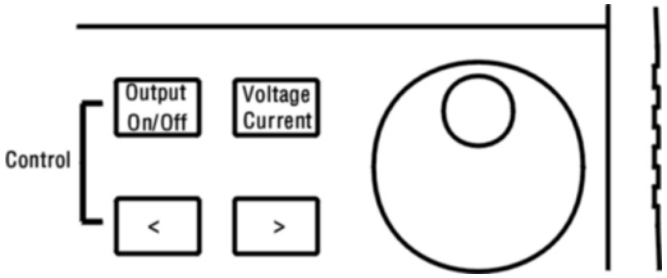

Figure 3-2. Control Keys and Knob

1. Output On/Off key

Set the outputs on or off.

If you want to disable the outputs, press the Output On/Off key. “**OUTPUT OFF**” is displayed and the Output On/Off key will turn on.

If you want to enable the outputs, press the Output On/Off key. The outputs are displayed on the display panel and the Output On/Off key will turn off and “CV” annunciator is lit. The blinking digit can be adjusted by turning the knob.

2. Voltage Current key

Set the control of voltage or current.

The location of cursor is changed the voltage digit or the current digit on the display panel.

3. < , > key

Set the digit to change.

The pressing of < key shifts the cursor left digit and > key shifts right.

4. : knob

Change the number at the cursor position.

Set the knob to the voltage control or the current control, and turn the knob clockwise or counter clockwise. The digit number is increased by turning the knob clockwise and is decreased by turning the knob counter clockwise.

Checking the rated voltages of the power supply

The following procedures check to ensure that the power supply develops its rated voltage outputs with no load and properly responds to operation from the front-panel.

1. Turn on the power supply.

Press POWER key.
The power supply will go into the power-on and all output are enabled if 'power fail' setup is POWER FAIL ON. The output channel is selected for the supply (P1 key will turn on); the knob is selected for voltage control.

2. Enable the outputs

If you want to disable the outputs, press the Output On/Off key. “**OUTPUT OFF**” is displayed and the Output On/Off key will turn on. If you want to enable the outputs, press the Output On/Off key. The outputs is displayed on the display panel and the Output On/Off key will turn off and “CV” annunciator is lit. The output channel is selected for the supply (P1 key will turn on); the knob is selected for voltage control. The blinking digit can be adjusted by turning the knob. Notice that the display shows the meter mode. “Meter mode” means that the display shows the actual output voltage and current.

3. Check that the front-panel voltmeter properly responds to knob control for the supply.

Turn the knob clockwise or counterclockwise to check that the voltmeter responds to knob control and the ammeter indicates nearly zero.

4. Ensure that the voltage can be adjusted from zero to the maximum rated value.

Adjust the knob until the voltmeter indicates 0 volts and then adjust the knob until the voltmeter indicates the rated limit volts.

5. Check the voltage function for the supply.

Select the meter and adjust selection key for the P1 channel supply. The “CV” annunciator is still lit and the P1 key will turn on. Repeat steps (3) and (4) to check the voltage function for the supply.

6. Check the voltage function for the supply.

Select the meter and adjust selection key for the P2 channel supply. The “CV” annunciator is still lit and the P2 key will turn on. Repeat steps (3) and (4) to check the voltage function for the supply.

Checking the rated currents of the power supply

The following procedures check to ensure that the power supply develops its rated current outputs with a short and properly responds to operation from the front-panel

1. Turn on the power supply.

Press [POWER] key.

The power supply will go into the power-on and all output are enabled. The output channel is selected for the supply ([P1] key will turn on); the knob is selected for voltage control.

2. Connect a short across (+) and (-) output terminals of the supply with an insulated test lead.

3. Enable the outputs.

If you want to disable the outputs, press the [Output On/Off] key. “**OUTPUT OFF**” is displayed and the [Output On/Off] key will turn on. If you want to enable the outputs, press the [Output On/Off] key. The outputs is displayed on the display panel and the [Output On/Off] key will turn off and “CV” annunciator is let. The output channel is selected for the supply ([P1] key will turn on); the knob is selected for voltage control.

The "CV" or "CC" annunciator is lit depending on the resistance of the test lead. The blinking digit can be adjusted by turning the knob. The blinking digit can be adjusted by turning the knob.

4. Adjust the voltage and current limit values in the limit setup mode.

Set the voltage and current value to the limit setup mode. You make a adjustment of the voltage and current value as follows.

(1) Press [Setup] key. “SETUP-LIMIT V/A” is displayed on the display panel.

(2) Press [Setup] key again. The setup limit voltage and current are displayed on the display panel like as the actual outputs in the meter mode.

(3) Press [Voltage Current] key, if you want to set the voltage limit and the digit cursor is located at the current value on the display panel. You can adjust the voltage limit to assure CC operation by pressing [<] key, [>] key and by turning the knob

(4) Press [Voltage Current] key, if you want to set the current limit and the digit cursor is located at the voltage value on the display panel. You can adjust the

voltage limit to assure CV operation by pressing [<] key, [>] key and by turning the knob

(5) Press [Store] key and set the number (1 to 10) to store by turning the knob. And then the outputs is displayed on the display panel.

5. Check that the front-panel ammeter properly responds to knob control for the supply.

Set the knob to the current control, and turn the knob clockwise or counter clockwise. Check that the ammeter responds to knob control and the voltmeter indicates nearly zero (actually, the voltmeter will show the voltage drop caused by the test lead).

6. Ensure that the current can be adjusted from zero to the maximum rated value.

Adjust the knob until the ammeter indicates 0 amps and then until the ammeter indicates rated limit amps.

7. Check the current function for the supply.

Disable the outputs by pressing [Output On/Off] key and connect a short across (+) and (-) output terminals of the supply with an insulated test lead. Repeat steps (3) through (6) after selecting the meter and adjust selection key for the supply.

8. Check the current function for the supply.

Disable the outputs by pressing [Output On/Off] key and connect a short across (+) and (-) output terminals of the supply with an insulated test lead. Repeat steps (3) through (6) after selecting the meter and adjust selection key for the supply.

Using the power supply in constant voltage mode

To set up the power supply for constant voltage (CV) operation, proceed as follows.

1. Connect a load to the desired output terminals.
With power-off, connect a load to the desired output terminals.

2. Turn on the power supply.

Press [POWER] key.
The power supply will go into the power-on and all outputs are enabled; the display is selected for the supply; and the knob is selected for voltage control.

3. Enable the outputs.

If you want to disable the outputs, press the [Output On/Off] key. “**OUTPUT OFF**” is displayed and the [Output On/Off] key will turn on.

If you want to enable the outputs, press the [Output On/Off] key. The outputs is displayed on the display panel and the [Output On/Off] key will turn off and “CV” annunciator is lit. The output channel is selected for the supply ([P1] key will turn on); the knob is selected for voltage control. The blinking digit can be adjusted by turning the knob.

4. Adjust the voltage and current limit values in the limit setup mode.

Set the voltage and current value in the limit setup mode. When the display is in the limit setup mode, you can see the voltage and current limit values of the selected supply.
You make a adjustment of the voltage and current value as follows.

(1) Press [Setup] key. "SETUP-LIMIT V/A" is displayed on the display panel.

(2) Press [Setup] key again. The setup limit voltage and current are displayed on the display panel like as the actual outputs in the meter mode.

(3) Press [Setup] key, if you want to set the voltage limit and the digit cursor is located at the current control on the display panel. Set the knob for voltage control. You can adjust the voltage limit to assure CC operation by pressing [<] key, [>] key and by turning the knob.

(4) Press [Voltage Current] key, if you want to set the current limit and the digit cursor is located at the voltage control on the display panel. Set the knob for current control. You can adjust the voltage limit to assure CV operation by pressing [<] key, [>] key and by turning the knob.

5. Return to the meter mode.

Press Store key and set the number (1 to 10) to store by turning the knob.
And then the outputs are displayed on the display panel. The “CV” annunciator will light.

The display returns to the meter mode. In the meter mode, the display shows the actual output voltage and current of the selected supply.

6. Verify that the power supply is in the constant voltage mode.

If you operate the supply in the constant voltage (CV) mode, verify that “CV” annunciator and P1 key are lit. If the “CC” annunciator is lit, choose a higher current limit.

**** for dual output model : applicable as P1 key operation***

Using the power supply in constant current mode

To set up the power supply for constant current (CC) operation, proceed as follows.

1. Connect a load to the output terminals of the desired supply.
With power-off, connect a load to the desired output terminals.

2. Turn on the power supply.

Press POWER key

The power supply will go into the power-on and all outputs are enabled; the display is selected for the supply; and the knob is selected for voltage control.

3. Enable the outputs.

If you want to disable the outputs, press the Output On/Off key. “**OUTPUT OFF**” is displayed and the Output On/Off key will turn on.

If you want to enable the outputs, press the Output On/Off key. The outputs is displayed on the display panel and the Output On/Off key will turn off and “CV” annunciator is lit. The output channel is selected for the supply (P1 key will turn on); the knob is selected for voltage control. The blinking digit can be adjusted by turning the knob.

4. Adjust the voltage and current limit values in the limit setup mode.

Set the voltage and current value to the limit setup mode. When the display is in the limit setup mode, you can see the voltage and current limit values of the selected supply.
You make a adjustment of the voltage and current value as follows.

(1) Press Setup key. "SETUP-LIMIT V/A" is displayed on the display panel.

(2) Press Setup key again. The setup limit voltage and current are displayed on the display panel like as the actual outputs in the meter mode.

(3) Press Setup key, if you want to set the voltage limit and the digit cursor is located at the current control on the display panel. Set the knob for voltage control. You can adjust the voltage limit to assure CC operation by pressing < key, > key and by turning the knob.

(4) Press Voltage Current key, if you want to set the current limit and the digit cursor is located at the voltage control on the display panel. Set the knob for current control. You can adjust the current limit to assure CV operation by pressing < key, > key and by turning the knob.

5. Return to the meter mode.

Press Store key and set the number (1 to 10) to store by turning the knob. And then the outputs is displayed on the display panel. The CC annunciator will light.

The display returns to the meter mode. In the meter mode, the display shows the actual output voltage and current of the selected supply.

6. Verify that the power supply is in the constant current mode.

If you operate the supply in the constant current (CC) mode, verify that "CC" annunciator and P1 key are lit. If the "CV" annunciator is lit, choose a higher voltage limit.

**** for dual output model : applicable as P1 key operation***

Store and recall the instrument state

You can store up to 10 different operating states in non-volatile memory. This also enables you to recall the entire instrument state with just a few key presses from the front panel.

1. Set up the power supply for the desired operating state.

The storage feature "remembers" the limit values of voltage and current for the output channel.

2. Turn on the storage mode.

Press Store key.

10 memory locations (numbered 1,2, ... ,10) are available to store the operating states. The operating states are stored in non-volatile memory and are remembered when being recalled.

"STORE 01" is displayed on the display panel.

3. Select a storage number of memory locations.

Select the number (1 to 10) to store by turning the knob clockwise or counter clockwise.

4. Save the operation state.

Press Store key.

The operating state is now stored in the selected storage number. To recall the stored state, go to the following steps.

5. Turn on the recall mode.

Press Recall key.

"RECALL 01" is displayed on the display panel.

6. Recall the stored operating state.

Turn the knob clockwise or counter clockwise to change the displayed storage number.

Press Recall key again. The operating state selected is displayed on the display panel.

Calibration Overview

This section gives an overview of the calibration procedures of the power supply. For more detailed information of the calibration procedures, see the *Service Manual*.

*caution : Calibration must be performed by qualified personnel who understand the user's guide and have electrical knowledge.
This product should be calibrated at appropriate intervals.
(normal use : every 1 year, accurate use : every 6 month)
If you make a mistake in calibration, it could be possible to permit some tolerance for the outputs.

Calibration Security Code

This feature allows you to enter a security code (electronic key) to prevent accidental or unauthorized calibrations of the power supply. When you first receive your power supply, it is secured. Before you can calibrate the power supply, you must unsecure it by entering the correct security code.

The security code is set to "1-2-3-4" when the power supply is shipped from the factory. The security code is stored in non-volatile memory, and does not change when power has been off. The code contains 4 numeric characters.

To unsecure the power supply for calibration, you may turn on the calibration mode by pressing Setup key, resolution keys(< key and > key) and by turning the knob. Select "CAL-VOLTAGE" or "CAL- CURRENT". You may use all 4 characters as shown below, and then press Store key.

1-2-3-4 (4 characters)

To secure the power supply from the accidental or unauthorized calibrations, you may set new password by pressing Setup key, resolution keys and by turning the knob. See Section 2, "Using the function keys" for the detailed information.

General Calibration/Adjustment Procedure

The calibration procedures from the front panel are described in this section. For output voltage calibration, disconnect all loads from the power supply and connect a DVM across the output terminals to be calibrated. For output current calibration, disconnect all loads from the power supply, connect an appropriate current monitoring resistor across the output terminals to be calibrated, and connect a DVM across the terminals of the monitoring resistor.

Voltage Calibration

The most tests are performed at the front terminals. Connect a probe of DVM(Digital Voltage Meter) with the voltage mode to the desired output terminal after setting the output channel (P1/P2). If more than one meter and an oscilloscope are used, connect each to the (+) and (-) terminals by a separate pair of leads to avoid mutual coupling effects. Use coaxial cable or shielded 2-wire cable to avoid noise pick-up on the test leads. Measure the dc voltage directly at the (+) and (-) terminals on the front panel.

Refer to the page 35

To calibrate the output voltages of the power supply from the front panel, proceed as follows:

1. Set the voltage value in the calibration mode. You make a adjustment of the voltage value as follows.

Disconnect all loads from the power supply and connect a DVM across output terminals of the output. Make sure that the power supply is in "CV" mode. If the power supply is not in "CV" mode, an error occurs.

Press [Setup] key. “SETUP-LIMIT V / A” is displayed on the display panel.

2. Select the word “CAL-VOLTAGE” by using [<] key , [>] key and press [Setup] key.
To calibrate the output voltage, you must unsecure the power supply as follows.
The display represents "PASSWORD ****". You may input the password of user by pressing [<], [>] key to shift its digit and by turning the knob to change its number.

Press [Store] key. “00.000V-00000” is displayed.

3. Set the voltage of DVM to 0.00V by using [<] key , [>] key and by turning the knob.

Read the DVM and change the first voltage value on the display to match the measured voltage. For example, if the DVM reading is 0.1230V, adjust the DVM voltage to 0.00 V using the knob, [<] key and [>] key. The digit on the display panel is hexadecimal.

Notice that you should wait for the DVM reading to stabilize for accurate calibration for a while.

Press [Store] key. The setting voltage is sotre and “WAIT FOR AD CAL” is displayed. And then “30.000V-1FFF”(in case of its max. voltage is 30V) is shown on the display panel.

4. Set the voltage of DVM to 30.00V(in case of its max. voltage is 30V) by using [<] key , [>] key and by turning the knob.

Read the DVM and change the second current value on the display to match the measured current. For example, if the DVM reading is 30.230 V, adjust the DVM current to 30.00 V using the knob, [<] key and [>] key.

Notice that you should wait for the DVM reading to stabilize for accurate calibration.

Press [Store] key. The setting voltage is stored and "WAIT FOR AD CAL" is displayed. And then "COMPLETE" is shown on the display panel.

5. Return to the meter mode.

The display returns to the meter mode. In the meter mode, the display shows the actual output voltage and current of the selected supply. You can see "P1 00.000V - 0.000A" on the display panel.

Current Calibration

Connect a probe of DVM (Digital Voltage Meter) with the current mode to the desired output terminal after setting the output channel (P1/P2). If more than one meter and an oscilloscope are used, connect each to the (+) and (-) terminals by a separate pair of leads to avoid mutual coupling effects. Use coaxial cable or shielded 2-wire cable to avoid noise pick-up on the test leads. Measure the dc voltage directly at the (+) and (-) terminals on the front panel.

Refer to the page 35

To calibrate the output currents of the power supply from the front panel, proceed as follows:

1. Test load is recommended for IPS-B Series DC Power Supply as follows.

Voltage	Current	Load	Model
+30V	3A	≤ 9.5Ω/150W	IPS-30B03 IPS-30B03D
+30V	5A	≤ 5.8Ω/200W	IPS-30B05 IPS-30B05D

Disconnect all loads from the power supply and connect a DVM across output terminals of the output. Make sure that the power supply is in "CV" mode. If the power supply is not in "CV" mode, an error occurs.

2. Set the current value in the calibration mode. You make a adjustment of the current value as follows.

Press Setup key. "SETUP-LIMIT V/A" is displayed on the display panel.

3. Select the word "CAL-CURRENT" by using < key , > key and press the Setup key.

To calibrate the output current, you must unsecure the power supply as follows. The display represents "PASSWORD ****". You may the password of user by pressing < key , > key and by turning the knob.

Press Store key. “00.000A-00000” is displayed.

4. Set the current of DVM to 0.00A by adjusting the power supply.
< , > key and knob of the power supply are available for its adjustment.

(Read the DVM and change the first current value on the display to match the measured current. For example, if the DVM reading is 0.1230A, make the DVM current to 0.00 A by adjusting the power supply.)

Notice that you should wait for the DVM reading to stabilize for accurate calibration.

Press Store key. The setting current is stored and "WAIT FOR AD CAL" is displayed. And then "05.000A(Its rated max amp)-some numbers" is shown on the display panel.

5. Read the current of DVM and adjust the power supply to meet the DVM.
< , > key and turning knob are available for its adjustment.

(Read the DVM and change the second current value on the display to match the measured current. For example, if the DVM reading is 5.230A, adjust the DVM current to 5.00 A using the knob**,** < key and > key.)

Notice that you should wait for the DVM reading to stabilize for accurate calibration for a while.

Press Store key. The setting current is stored and "WAIT FOR AD CAL" is displayed. And then "COMPLETE" is shown on the display panel.

6. Return to the meter mode.

The display returns to the meter mode. In the meter mode, the display shows the actual output voltage and current of the selected supply. You can see "P1 00.000V - 0.000A" on the display panel.

Aborting a Calibration in Progress

Sometimes it may be necessary to abort a calibration after the procedure has already been initiated. You can abort a calibration at any time by depressing Error key or turning the power supply off from the front panel.

Calibration Recover

This is a return function to the production default value on its calibration.
This only belongs to the front output, which was adjusted before its delivery.

CAL-VOLT RECOVER

“CAL-VOLT RECOVER” function is useful when the user made a mistake in his set-up or calibration.
This function is to return voltage calibration values to the state of having been set by the manufacturer. In other words, it is a reset function of voltage calibration.

How to recover the voltage calibration :

Operating Process	What’s on Display
1. Press Setup key	SET-LIMIT
2. Press < or > key and Select “CAL-VOLT RECOVER” by Press Setup key again	CAL-VOLT RECOVER
3. Change the digit by Press < or > key and Enter the number at each digit by turning Jog-Switch Default password is 1-2-3-4. (if the user did not change its password)	PASSWORD **** number
4. Press Store key	CAL-V-RECOVERED
5. Voltage calibration & Display will return to its origin in few seconds.	P1 00.000V 0.000A

CAL-CURR RECOVER

"CAL-CURR RECOVER" function is useful when the user made a mistake in his set-up or calibration.
This function is to return voltage calibration values to the state of having been set by the manufacturer. In other words, it is a reset function of voltage calibration.

How to recover the current calibration :

Operating Process	What's on Display
1. Press Setup key	SET-LIMIT
2. Press < or > key and Select "CAL-CURR RECOVER" by Press Setup key again	CAL-CURR RECOVER
3. Change the digit by Press < or > key and Enter the number at each digit by turning Jog-Switch Default password is 1-2-3-4. (if the user did not change its password)	PASSWORD **** number
4. Press Store key	CAL-C-RECOVERED
5. Current calibration & Display will return to its origin in few seconds.	P1 00.000V 0.000A

Section 4

Remote Interface Reference

Remote Control Protocol

RS-232C and GPIB interfaces are provided for the remote control between the power supply and other system (for instance, PC system). The protocol as follows is ready for the remote control. The capital and small letter are enabled for the command. The command is transferred to the power supply one by one.

1. Output Control Commands

These commands enables or disables the output of the power supply.

- **OUTP:STAT?** : This command requests the output state of power supply.
  If the response is "1", the power supply runs at the state of output enable and
  if the response is "0", the power supply runs at the state of output disabled.

- **OUTP:STAT OFF** : This command prevents the outputs of the power supply.

- **OUTP:STAT ON** : The outputs is enabled. The power supply outputs the voltage and current pre-determined.

2. Voltage/Current/Flow Control Commands

These commands program the immediate voltage or current value of the power supply.

Note: For P2 channel control in dual models, P2 can replace P1 in following.

- **SOUR:CURR P1, 1.000** : Set the current of P1 channel to +1.000A.

- **SOUR:CURR P1, MIN** : Set the current of P1 channel to minimum value.

- **SOUR:CURR P1, MAX** : Set the current of P1 channel to maximum value.

- **SOUR:CURR? P1** : Read the current of P1 channel supply.

- **SOUR:VOLT P1, 10.000** : Set the voltage of P1 channel to +10.000V.

- **SOUR:VOLT P1, MIN** : Set the voltage of P1 channel to minimum value.

- **SOUR:VOLT P1, MAX** : Set the voltage of P1 channel to maximum value.

- **SOUR:VOLT? P1** : Read the voltage of P1 channel supply.

- **SOUR:FLOW? P1** : Read the operating mode of P1 channel supply.
  If the response is "1", the power supply runs at the state of constant voltage and
  if the response is "0", the power supply runs at the state of constant current.

3. Voltage/Current Compound Commands

The APPL command provides the most direct method to program the power supply over the remote interface. You can select the output voltage and current in one command. The APPL? command queries the power supply's present voltage and current setting values and returns a responding data string.

Note: For P2 channel control in dual models, P2 can replace P1 in following.

- **APPL P1, 10.000, 1.000** : Set the voltage and current of P1 channel to each of +10.000V, +1.000A respectively.
- **APPL P1, MIN,MIN** : Set the voltage and current of P1 channel to each of minimum voltage(0.000V), minimum current(0.000A).
- **APPL P1, MAX,MAX** : Set the voltage and current of P1 channel to each of maximum voltage, maximum current.
- **APPL? P1** : Read the voltage and current of P1 channel.

4. Voltage/Current Measurement Commands

These commands queries the voltage measured at the sense terminals of the power supply or the current measured across the current sense resistor inside the power supply.

Note: For P2 channel control in dual models, P2 can replace P1 in following.

- **MEAS:VOLT? P1** : Read the actual voltage of P1 channel at the point of time.
- **MEAS:VOLTA? P1** : Read the average voltage of P1 channel for 500msec. This value is the same as its front display.
- **MEAS:VOLTS? P1,n** : Read the actual voltage of P1 channel every 2 msec until “n” reading.
  You can limit the reading record by “n”, (n = 1 ~ 20).
- **MEAS:CURR? P1** : Read the actual current of P1 channel at the point of time.
- **MEAS:CURRA? P1** : Read the average current of P1 channel for 500msec. This value is the same as its front display.
- **MEAS:CURRS? P1,n** : Read the actual current of P1 channel every 2 msec until “n” reading.
  You can limit the reading record by “n”, (n = 1 ~ 20).

5. Output Track Commands

These commands are not applied for single output model, but for dual model.

- **OUTP:TRACK ON** : Set the track mode for the dual outputs
- **OUTP:TRACK OFF** : Set the normal mode for the dual outputs.
- **OUTP:TRACK?** : Read the operating mode. The return is "1", the power supply runs at the track mode, and the return is "0", the power supply runs at the normal mode.

6. System Control Commands

- **SYST:ERR?** : Read the error message of power supply(refer to section 5, p61).
- **SYST:VERS?** : Read the CPU version of power supply.

7. System Local Commands

These are pre-reserved commands.

- **SYST:REM** : This command places the power supply in the local mode during RS-232 operation.
- **SYST:LOC** : This command places the power supply in the local mode during RS-232 operation.

8. Key Lock Commands

- **KEYB:LOC ON** : All keys on the front panel are locked except "Lock" key, which is for return function. So front keyboard input is not permitted.
- **KEYB:LOC OFF** : All keys on the front-panel are unlocked. So front keyboard input is permitted.
- **KEYB:LOC?** : Read the state of keyboard. If the return is "1", the power supply runs under the lock state, otherwise, the return is "0", the power supply runs under unlock state.

9. IEEE-488.2 Common Commands

◆ IDN?

This query command reads the power supply's identification string. The command returns a string with the following format. The dimension of the string is within 26 characters

INTERACT,VUPOWER-XXXXXXXXX

The power supply returns 2 fields separated by comma. The first field is the manufacturer's name, the second field is its brand name. The part "XXXXXXXXX" of second field is a revision code, which contains three/four codes. The first code is the power supply maximum voltage; the second code is the series of mode; the third code is the maximum current; and the fourth code is the indicator of output. For example, 30B05D represents the VUPOWER-B Series model with 30V 5A, and dual output.

◆ RST

This command resets the power supply to its power-on state as follows:

Command	State
SOUR:VOLT P1	0V
SOUR:VOLT P2	0V
SOUR:CURR P1	Max. Current
SOUR:CURR P2	Max. Current
OUTP:TRACK OFF	OFF
OUTP:STAT OFF	OFF
Output channel selection	P1 channel
POWER FAIL	OFF
ERROR REGISTER	Clear

◆ CLS

This command clears error register and the error key will turn off.

Section 5

Error Messages

Error Messages

The following tables are abbreviated lists of error messages for the IPS-B Series Power Supply. The errors listed are the most likely errors to be encountered during calibration and adjustment. When any error is occurred, Error key will be turn on and the power supply beeps at the same time. Errors are stored in FIFO(First-In-First-Out) with 10 storage memory. The first error returned is the first error that was stored. Errors are cleared as you read them over the remote interface or by pressing Error key. When you have read all errors from the queue, the Error key will turn off and displayed "NO ERROR" on the front panel. If no errors have occurred when you read the error queue, the power supply responds with "NO ERROR" from the front panel or with "0(zero)" over the remote interface.

Read Error Messages

On the front panel :
If the Error key is turn on, press the key to view the errors. If the key is not yet turn off, you may press the key until the message is "NO ERROR" on the front panel. If any key is not pressed after 3 seconds displaying the message, the message is disappeared and the DVM state is returned.

Over the remote interface :
You may read one error message over the remote interface and the following format is applied.

SYST:ERR?
(Read and clear one error from the error queue)

The responding error message have the error number as follows.

0
(This means that the error queue is empty.)

Automatic Self-Test Error Messages

A power-on self-test occurs automatically when you turn on the power supply. The front-panel display will light up while the power supply performs its power-on self-test.
If the communication module to perform the remote interface is not ordinary, the following error message is displayed on the front panel.

100 "BAD COMMUNICATION" is displayed.

Communication microprocessor does not respond. The power supply operates without regard to communication module.

Automatic Execution Self-Test Error Messages

The power supply monitors the cooling fans while the supply runs. This test checks if the fan current is flowing. Fan #1 cools the power modules to generate regulated power output and Fan #2 blow the warm air through the power module's heat-sink outside the power supply case.

1 "ERROR - 1" is displayed.
Cooling Fan #1 test failed.
The Fan #1 current is not detected. The power modules may be overheated.

2 "ERROR - 2" is displayed.
Cooling Fan #2 test failed.
The Fan #2 current is not detected. The power modules may be overheated.

Monitoring Functions Test Error Messages

This test is performed over the remote interface.

100 "ERROR - 100" is displayed.
Communication microprocessor does not respond.

101 "ERROR - 101" is displayed.
Command Syntax Error.
Invalid syntax was found in the command string. You may have inserted a blank space before or after a colon in the command header, or before comma.

102 "ERROR - 102" is displayed.
Invalid Parameter Error.
More parameters were received than expected for the command. You

may have entered an extra parameter, or you added a parameter to a command that does not accept a parameter.

103 "ERROR - 103" is displayed.
Mismatch Parameter Argument Error.
Parameters that were received were mismatched with the expected parameter arguments for the command. You may have entered an argument that is not defined.

104 "ERROR - 104" is displayed.
Invalid Output Port Error. Only 'P1' port is enabled for IPS-30B03/30B05 single model.

**Notice : 'P2' port is accepted for IPS-30B03D/30B05D dual model.*

105 "ERROR - 105" is displayed.
Max. Value Error.
The parameter value you may have entered is larger than the predefined maximum voltage value or current value.

106 "ERROR - 106" is displayed.
Min. Value Error.
The parameter value you may have entered is smaller than the predefined minimum voltage value or current value.

Section 6

Application Programs

This section contains two application programs over the remote interface to help you develop programs for your own application. Section 4, "Remote Interface Reference", lists the syntax for the SCPI(Standard Commands for Programmable Instruments) commands available to program the power supply.
The test programs in this section have been tested on a PC running Windows 95. The programs are written for use over GPIB(IEEE-488.2) or RS-232.

Test Programs for Visual Basic

The following Visual Basic programs show you how to send commands and receive responding data. These programs was written in Microsoft Visual Basic version 5.0.

** Notice : These programs applied the command and responding data format as follows.*

Sending Command Format : [Command string] + [LF character]
Receiving Responding Data Format : [Responding Data string] + [LF character]

GPIB Test Program

This program require a VISA(Virtual Instrument Software Architecture) driver for use with your GPIB interface card in your PC. You should have the "visa32.dll" for Windows 95 in your c:\windows\system directory to have this runs properly. The GPIB PCI board of CyberResearch was used for test this program. You should have also the "gpib-32.dll" that CyberResearch provides for Windows 95 in your c:\windows\system directory to run this program successfully.

```
Option Explicit
Const BUFSIZE = 256              ' Size of IBRD buffer
Const NULLCHAR = 2               ' Character to fill IBRD buffer with

Const GPIB0 = 0                  ' GPIB Board Address
Const IPS = 5                    ' IPS Address

' Status bits (in ibsta%) and their names
    Dim StatBits(16):
    Dim StatBitStrs$(16)
' Error bits (in iberr%) and their names
    Dim ErrCodes(25):
    Dim ErrCodeStrs$(25)
' GPIB Read buffer
    Dim buffer$(BUFSIZE)
    Dim rdbuf$
' Handle for open GPIB device
    Dim Device%
' Semaphore to prevent multiple simultaneous calls into the GPIB library
     Dim GPIBCallInProgress%, ReadStat%
     Dim CmdStringWrite, CmdStringRead, DeviceName As String
     Dim ErrorStr$, ErrStr$
     Dim counts, chk_count As Long
     Dim powersupply As Integer
     Dim Numbers As Boolean
     Dim Number As Long
```

```
Private Sub CmdClear_Click()
    TextMonitor.Text = ""
End Sub

Private Sub CmdClose_Click()
    ibsta% = ilstop(Device%)
End Sub

Private Sub CmdInitGPIB_Click()
' DEV = GPIB0
    Call ibdev(GPIB0, IPS, 0, T1s, 1, REOS + 10, powersupply)
End Sub

Private Sub CmdNoDelay_Click()
    Number = 1
    While Number = 1
        If GPIBCallInProgress = 0 Then
            GPIBCallInProgress = 1
            'Commands Transferring
            CmdStringWrite = TextWrite2.Text & Chr(13) & Chr(10)
            If CmdStringWrite <> "" Then
                WriteCommand (CmdStringWrite)
            End If
            TextMonitor.SelText = CmdStringWrite & Chr(13) & Chr(10)
            GPIBCallInProgress = 0
            Number = 0
        End If
        If GPIBCallInProgress = 0 Then
            GPIBCallInProgress = 1
            'Data Reading
            ReadStat% = ReadValue%(rdbuf$, BUFSIZE)        ' Read from GPIB
            TextMonitor.SelText = rdbuf$ & Chr(13) & Chr(10)        ' print the value
            counts = counts + 1
            LabelCount.Caption = counts
            GPIBCallInProgress = 0
            Number = 1
        End If
        DoEvents
            chk_count = chk_count + 1
            If chk_count > 100 Then
                chk_count = 0
                TextMonitor.Text = ""
            End If
    Wend
End Sub
```

```
Private Sub CmdNoDelayStop_Click()
      Number = 0
      counts = 0
End Sub
Private Sub CmdOpen_Click()
   GPIBCallInProgress = 0
' Initialize status bit array
     StatBits(0) = DCAS:          StatBitStrs$(0) = "DCAS"
     StatBits(1) = DTAS:          StatBitStrs$(1) = "DTAS"
     StatBits(2) = LACS:          StatBitStrs$(2) = "LACS"
     StatBits(3) = TACS:          StatBitStrs$(3) = "TACS"
     StatBits(4) = AATN:          StatBitStrs$(4) = "AATN"
     StatBits(5) = CIC:           StatBitStrs$(5) = "CIC"
     StatBits(6) = RREM:          StatBitStrs$(6) = "RREM"
     StatBits(7) = LOK:           StatBitStrs$(7) = "LOK"
     StatBits(8) = CMPL:          StatBitStrs$(8) = "CMPL"
     StatBits(9) = eevent:        StatBitStrs$(9) = "EEVENT"
     StatBits(10) = SPOLL:        StatBitStrs$(10) = "SPOLL"
     StatBits(11) = RQS:          StatBitStrs$(11) = "RQS"
     StatBits(12) = SRQI:         StatBitStrs$(12) = "SRQI"
     StatBits(13) = EEND:         StatBitStrs$(13) = "EEND"
     StatBits(14) = TIMO:         StatBitStrs$(14) = "TIMO"
     StatBits(15) = EERR:         StatBitStrs$(15) = "EERR"
     StatBits(16) = 0:            StatBitStrs$(16) = ""

     ' Initialize error code array
     ErrCodes(0) = EDVR:     ErrCodeStrs$(0) = "EDVR"
     ErrCodes(1) = ECIC:     ErrCodeStrs$(1) = "ECIC"
     ErrCodes(2) = ENOL:     ErrCodeStrs$(2) = "ENOL"
     ErrCodes(3) = EADR:     ErrCodeStrs$(3) = "EADR"
     ErrCodes(4) = EARG:     ErrCodeStrs$(4) = "EARG"
     ErrCodes(5) = ESAC:     ErrCodeStrs$(5) = "ESAC"
     ErrCodes(6) = EABO:     ErrCodeStrs$(6) = "EABO"
     ErrCodes(7) = ENEB:     ErrCodeStrs$(7) = "ENEB"
     ErrCodes(8) = EOIP:     ErrCodeStrs$(8) = "EOIP"
     ErrCodes(9) = ECAP:     ErrCodeStrs$(9) = "ECAP"
     ErrCodes(10) = EFSO:    ErrCodeStrs$(10) = "EFSO"
     ErrCodes(11) = EBUS:    ErrCodeStrs$(11) = "EBUS"
     ErrCodes(12) = ESTB:    ErrCodeStrs$(12) = "ESTB"
     ErrCodes(13) = ESRQ:    ErrCodeStrs$(13) = "ESRQ"
     ErrCodes(14) = ETAB:    ErrCodeStrs$(14) = "ETAB"
     ErrCodes(15) = EINT:    ErrCodeStrs$(15) = "EINT"
     ErrCodes(16) = EWMD:    ErrCodeStrs$(16) = "EWMD"
     ErrCodes(17) = EVDD:    ErrCodeStrs$(17) = "EVDD"
     ErrCodes(18) = EOVR:    ErrCodeStrs$(18) = "EOVR"
     ErrCodes(19) = ESML:    ErrCodeStrs$(19) = "ESML"
```

```
    ErrCodes(20) = ECFG:    ErrCodeStrs$(20) = "ECFG"
    ErrCodes(21) = ETMR:    ErrCodeStrs$(21) = "ETMR"
    ErrCodes(22) = ESLC:    ErrCodeStrs$(22) = "ESLC"
    ErrCodes(23) = EBRK:    ErrCodeStrs$(23) = "EBRK"
    ErrCodes(24) = 0:       ErrCodeStrs$(24) = ""

     DeviceName = "IPS"
     If Device = 0 Then
        Device = OpenDevice%()
     End If
End Sub
Private Sub CmdReceive_Click()
     Dim MyPos As String
        If GPIBCallInProgress = 0 Then
           GPIBCallInProgress = 1
           'DATA Reading
           ReadStat% = ReadValue%(rdbuf$, BUFSIZE)        ' Read from GPIB
           TextMonitor.SelText = rdbuf$ & Chr(13) & Chr(10)      ' print the value
           counts = counts + 1
           LabelCount.Caption = counts
           GPIBCallInProgress = 0

        End If
End Sub

Private Sub CmdSend_Click()
        If GPIBCallInProgress = 0 Then
           GPIBCallInProgress = 1
           'Commands Transferring
           CmdStringWrite = TextWrite.Text & Chr(13) & Chr(10)
           If CmdStringWrite <> "" Then
              WriteCommand (CmdStringWrite)
           End If
           TextMonitor.SelText = CmdStringWrite & Chr(13) & Chr(10)
           GPIBCallInProgress = 0

        End If
End Sub

Private Sub CmdSend_Recv1_Click()
     Dim MyPos As String
        If GPIBCallInProgress = 0 Then
           GPIBCallInProgress = 1
           'DATA Reading
           ReadStat% = ReadValue%(rdbuf$, BUFSIZE)        ' Read from GPIB
           TextMonitor.SelText = rdbuf$ & Chr(13) & Chr(10)      ' print the value
```

```
            ReadStat% = ReadValue%(rdbuf$, BUFSIZE)        ' Read from GPIB
            TextMonitor.SelText = rdbuf$ & Chr(13) & Chr(10)      ' print the value
            ReadStat% = ReadValue%(rdbuf$, BUFSIZE)        ' Read from GPIB
            TextMonitor.SelText = rdbuf$ & Chr(13) & Chr(10)      ' print the value
            ReadStat% = ReadValue%(rdbuf$, BUFSIZE)        ' Read from GPIB
            TextMonitor.SelText = rdbuf$ & Chr(13) & Chr(10)      ' print the value
            ReadStat% = ReadValue%(rdbuf$, BUFSIZE)        ' Read from GPIB
            TextMonitor.SelText = rdbuf$ & Chr(13) & Chr(10)      ' print the value
            ReadStat% = ReadValue%(rdbuf$, BUFSIZE)        ' Read from GPIB
            TextMonitor.SelText = rdbuf$ & Chr(13) & Chr(10)      ' print the value
            counts = counts + 1
            LabelCount.Caption = counts
            GPIBCallInProgress = 0

        End If
End Sub
Private Sub CmdSend_Set_Redo_Click()
    Numbers = False
    Timer3.Interval = Val(TextTime2.Text)
    counts = 0
End Sub

Private Sub CmdSend_Set_Stop_Click()
    Timer3.Interval = 0
End Sub

Private Sub CmdSend_Set1_Click()
        If GPIBCallInProgress = 0 Then
            GPIBCallInProgress = 1
            'Commands Transferring
            CmdStringWrite = TextWrite.Text & Chr(13) & TextWrite.Text & Chr(13)
            CmdStringWrite = CmdStringWrite & TextWrite.Text & Chr(13) & TextWrite.Text & Chr(13) & Chr(10)
            CmdStringWrite = CmdStringWrite & TextWrite.Text & Chr(13) & TextWrite.Text & Chr(13) & Chr(10)
'           CmdStringWrite = CmdStringWrite & TextWrite.Text & Chr(13) & TextWrite.Text & Chr(13) & Chr(10)
            If CmdStringWrite <> "" Then
                WriteCommand (CmdStringWrite)
            End If
            TextMonitor.SelText = CmdStringWrite & Chr(13) & Chr(10)
            GPIBCallInProgress = 0

        End If
End Sub

Private Sub CmdSend_Set2_Click()
        If GPIBCallInProgress = 0 Then
            GPIBCallInProgress = 1
```

```
            'Commands Transferring
            CmdStringWrite = TextWrite2.Text & Chr(13) & TextWrite2.Text & Chr(13)
            CmdStringWrite = CmdStringWrite & TextWrite2.Text & Chr(13) & TextWrite2.Text & Chr(13) & Chr(10)
            CmdStringWrite = CmdStringWrite & TextWrite2.Text & Chr(13) & TextWrite2.Text & Chr(13) & Chr(10)
            If CmdStringWrite <> "" Then
                WriteCommand (CmdStringWrite)
            End If
            TextMonitor.SelText = CmdStringWrite & Chr(13) & Chr(10)
            GPIBCallInProgress = 0

        End If
End Sub

Private Sub CmdSend1_Click()
        If GPIBCallInProgress = 0 Then
            GPIBCallInProgress = 1
            'Commands Transferring
            CmdStringWrite = TextWrite.Text & Chr(13) & Chr(10)
            If CmdStringWrite <> "" Then
                WriteCommand (CmdStringWrite)
            End If
            TextMonitor.SelText = CmdStringWrite & Chr(13) & Chr(10)
            GPIBCallInProgress = 0

        End If
End Sub

Private Sub CmdSend2_Click()
        If GPIBCallInProgress = 0 Then
            GPIBCallInProgress = 1
            'Commands Transferring
            CmdStringWrite = TextWrite2.Text & Chr(13) & Chr(10)
            If CmdStringWrite <> "" Then
                WriteCommand (CmdStringWrite)
            End If
            TextMonitor.SelText = CmdStringWrite Chr(13) & Chr(10)
            GPIBCallInProgress = 0

        End If
End Sub

Private Sub Form_Load()
'GPIB Initialization
' Semaphore to prevent multiple simultaneous calls into the GPIB library
   GPIBCallInProgress = 0
' Initialize status bit array
```

```
StatBits(0) = DCAS:          StatBitStrs$(0) = "DCAS"
StatBits(1) = DTAS:          StatBitStrs$(1) = "DTAS"
StatBits(2) = LACS:          StatBitStrs$(2) = "LACS"
StatBits(3) = TACS:          StatBitStrs$(3) = "TACS"
StatBits(4) = AATN:          StatBitStrs$(4) = "AATN"
StatBits(5) = CIC:           StatBitStrs$(5) = "CIC"
StatBits(6) = RREM:          StatBitStrs$(6) = "RREM"
StatBits(7) = LOK:           StatBitStrs$(7) = "LOK"
StatBits(8) = CMPL:          StatBitStrs$(8) = "CMPL"
StatBits(9) = eevent:        StatBitStrs$(9) = "EEVENT"
StatBits(10) = SPOLL:        StatBitStrs$(10) = "SPOLL"
StatBits(11) = RQS:          StatBitStrs$(11) = "RQS"
StatBits(12) = SRQI:         StatBitStrs$(12) = "SRQI"
StatBits(13) = EEND:         StatBitStrs$(13) = "EEND"
StatBits(14) = TIMO:         StatBitStrs$(14) = "TIMO"
StatBits(15) = EERR:         StatBitStrs$(15) = "EERR"
StatBits(16) = 0:            StatBitStrs$(16) = ""
' Initialize error code array
ErrCodes(0) = EDVR:     ErrCodeStrs$(0) = "EDVR"
ErrCodes(1) = ECIC:     ErrCodeStrs$(1) = "ECIC"
ErrCodes(2) = ENOL:     ErrCodeStrs$(2) = "ENOL"
ErrCodes(3) = EADR:     ErrCodeStrs$(3) = "EADR"
ErrCodes(4) = EARG:     ErrCodeStrs$(4) = "EARG"
ErrCodes(5) = ESAC:     ErrCodeStrs$(5) = "ESAC"
ErrCodes(6) = EABO:     ErrCodeStrs$(6) = "EABO"
ErrCodes(7) = ENEB:     ErrCodeStrs$(7) = "ENEB"
ErrCodes(8) = EOIP:     ErrCodeStrs$(8) = "EOIP"
ErrCodes(9) = ECAP:     ErrCodeStrs$(9) = "ECAP"
ErrCodes(10) = EFSO:    ErrCodeStrs$(10) = "EFSO"
ErrCodes(11) = EBUS:    ErrCodeStrs$(11) = "EBUS"
ErrCodes(12) = ESTB:    ErrCodeStrs$(12) = "ESTB"
ErrCodes(13) = ESRQ:    ErrCodeStrs$(13) = "ESRQ"
ErrCodes(14) = ETAB:    ErrCodeStrs$(14) = "ETAB"
ErrCodes(15) = EINT:    ErrCodeStrs$(15) = "EINT"
ErrCodes(16) = EWMD:    ErrCodeStrs$(16) = "EWMD"
ErrCodes(17) = EVDD:    ErrCodeStrs$(17) = "EVDD"
ErrCodes(18) = EOVR:    ErrCodeStrs$(18) = "EOVR"
ErrCodes(19) = ESML:    ErrCodeStrs$(19) = "ESML"
ErrCodes(20) = ECFG:    ErrCodeStrs$(20) = "ECFG"
ErrCodes(21) = ETMR:    ErrCodeStrs$(21) = "ETMR"
ErrCodes(22) = ESLC:    ErrCodeStrs$(22) = "ESLC"
ErrCodes(23) = EBRK:    ErrCodeStrs$(23) = "EBRK"
ErrCodes(24) = 0:       ErrCodeStrs$(24) = ""

 DeviceName = "IPS"
 If Device <= 0 Then
```

```
        Device = OpenDevice%
    End If
End Sub

Private Sub Form_Unload(Cancel As Integer)
    ibsta% = ilstop(Device%)
End Sub

Private Sub CmdRun_Click()
    DeviceName = "IPS"
    If Device = 0 Then
        Device = OpenDevice%()
        If Device = 0 Then
            MsgBox "Failed to open " & DeviceName
            Exit Sub
        End If
    End If

    CmdStringWrite = TextWrite.Text & Chr(13) & Chr(10)

    If Val(TextTime.Text) > 0 Then
        Timer1.Interval = Val(TextTime.Text)
    Else
        Timer1.Enabled = False
        MsgBox "Invalid Time Interval"
        Exit Sub
    End If

    counts = 0
    Timer1.Enabled = True
End Sub

Private Sub CmdRun2_Click()
    DeviceName = "IPS"
    If Device = 0 Then
        Device = OpenDevice%()
        If Device = 0 Then
            MsgBox "Failed to open " & DeviceName
            Exit Sub
        End If
    End If

    Numbers = False
    CmdStringWrite = TextWrite2.Text & Chr(13) & Chr(10)

    If Val(TextTime2.Text) > 0 Then
```

```
        Timer2.Interval = Val(TextTime2.Text)
    Else
        Timer2.Enabled = False
        MsgBox "Invalid Time Interval"
        Exit Sub
    End If

    counts = 0
    Timer2.Enabled = True
End Sub

Private Sub TextWrite2_KeyPress(KeyAscii As Integer)
    If KeyAscii = 13 Then
        If GPIBCallInProgress = 0 Then
            GPIBCallInProgress = 1
            'Commands Transferring(6 commands)
            CmdStringWrite = TextWrite.Text & Chr(13) & Chr(10) & TextWrite2.Text & Chr(13) & Chr(10)
            CmdStringWrite = CmdStringWrite + TextWrite.Text & Chr(13) & Chr(10) & TextWrite2.Text & Chr(13) &
Chr(10)
            CmdStringWrite = CmdStringWrite + TextWrite.Text & Chr(13) & Chr(10) & TextWrite2.Text & Chr(13) &
Chr(10)
            If CmdStringWrite <> "" Then
                WriteCommand (CmdStringWrite)
            End If
            counts = counts + 1
            LabelCount.Caption = counts
            GPIBCallInProgress = 0
        End If
    End If
End Sub
Private Sub TextWrite_KeyPress(KeyAscii As Integer)
    Dim MyPos As String

    If KeyAscii = 13 Then

        If GPIBCallInProgress = 0 Then
            GPIBCallInProgress = 1
            'Commands Transferring
            CmdStringWrite = TextWrite.Text & Chr(13) & Chr(10)
            If CmdStringWrite <> "" Then
                WriteCommand (CmdStringWrite)
            End If
            ReadStat% = ReadValue%(rdbuf$, BUFSIZE)         ' Read from GPIB
            TextMonitor.SelText = rdbuf$ & Chr(13) & Chr(10)       ' print the value
            MyPos = InStrB(1, rdbuf$, Chr(13))
            counts = counts + 1
```

```
            LabelCount.Caption = counts
            GPIBCallInProgress = 0
        End If
    End If
End Sub

Private Sub Timer1_Timer()

    If GPIBCallInProgress = 0 Then
        GPIBCallInProgress = 1
        'Commands Transferring
        If CmdStringWrite <> "" Then
            WriteCommand (CmdStringWrite)
            TextMonitor.SelText = CmdStringWrite & Chr(13) & Chr(10)
        End If
        chk_count = chk_count + 1
        If chk_count > 100 Then
            chk_count = 0
            TextMonitor.Text = ""
        End If
        counts = counts + 1
        LabelCount.Caption = counts
        GPIBCallInProgress = 0

    End If
End Sub

Private Sub Timer2_Timer()

    If GPIBCallInProgress = 0 Then
        GPIBCallInProgress = 1
        'Commands Transferring
        If Numbers = False Then
            If CmdStringWrite <> "" Then
                WriteCommand (CmdStringWrite)
                TextMonitor.SelText = CmdStringWrite & Chr(13) & Chr(10)
                Numbers = True
            End If
        Else
            ReadStat% = ReadValue%(rdbuf$, BUFSIZE)         ' Read from GPIB
            TextMonitor.SelText = rdbuf$ & Chr(13) & Chr(10)       ' print the value

            chk_count = chk_count + 1
            If chk_count > 100 Then
                chk_count = 0
                TextMonitor.Text = ""
```

```
                End If
                counts = counts + 1
                LabelCount.Caption = counts
                Numbers = False
            End If
            GPIBCallInProgress = 0

        End If
End Sub

Private Sub CmdEnd_Click()
        Timer1.Interval = 0
        If GPIBCallInProgress = 0 Then
            GPIBCallInProgress = 1
            ibsta% = ilclr(Device%)
            ibsta% = illoc(Device%)        '
            GPIBCallInProgress = 0
        End If
End Sub

Private Sub CmdEnd2_Click()
        Timer2.Interval = 0
        If GPIBCallInProgress = 0 Then
            GPIBCallInProgress = 1
            ibsta% = ilclr(Device%)
            ibsta% = illoc(Device%)        '
            GPIBCallInProgress = 0
        End If
        counts = 0
End Sub

Private Function OpenDevice%()
    Device = ilfind%(DeviceName)          ' Open the device
    If Device < 0 Then
        If iberr% = EDVR Then
            ErrorStr$ = "Couldn't find device named " + "IPS"
        ElseIf iberr = ECFG Then
            ErrorStr$ = "Board type is configured incorrectly"
        Else
            ErrorStr$ = "Error #" + Str$(iberr%) + " occurred"
        End If
        TextMonitor.SelText = ErrorStr$ & Chr(13) & Chr(10)
        Device = 0
    Else
        ibsta% = ILTMO%(Device, T10s)          ' Set the timeout
    End If
```

```
    OpenDevice% = Device
End Function

Private Sub PrintErrors(ErrStr$)
    Dim e$
    Dim i As Long
    Print Chr$(7);              ' Beep the speaker
    e$ = "*** ERROR " + ErrStr$ & Chr(13) & Chr(10)
    e$ = e$ + "ibsta% = " + Hex$(ibsta%) + " ("
    i = 0
    Do While StatBitStrs$(i) <> ""          ' Print names for status bits
        If ibsta% And StatBits(i) Then
            e$ = e$ + StatBitStrs$(i) + " "
        End If
        i = i + 1
    Loop
    e$ = e$ + ") " + Chr$(13) & Chr(10)
    e$ = e$ + "iberr% =" + Str$(iberr%) + " ("
    i = 1
    Do While ErrCodeStrs$(i) <> ""
        If iberr% = ErrCodes(i) Then
            e$ = e$ + ErrCodeStrs$(i) + ") "
        End If
        i = i + 1
    Loop
    e$ = e$ + Chr$(13) & Chr(10)
    e$ = e$ + "ibcnt% =" + Str$(ibcnt%)
    TextMonitor.SelText = e$ & Chr(13) & Chr(10)
End Sub

'************************************************************************
' Name:             ReadValue%
' Arguments:     rdbuf$ - String buffer for return value
'                   bufsize - size of buffer
' Returns:       TRUE (-1) for success, FALSE (0) if it fails
'                   Fills up buffer$
' Description: Fills the string with spaces, Reads a string from the
'                   GPIB device and checks for errors.
'************************************************************************
Private Function ReadValue%(rdbuf$, BUFSIZE&)
    Dim i As Long

    If (Device = 0) Then
        rdbuf$ = "Unknown Device"
    Else
        rdbuf$ = String$(BUFSIZE, NULLCHAR)    ' Clear string
```

```
        Call ibrd(Device, rdbuf$)

        If (ibsta% And EERR) Then                    ' Check for erros
            PrintErrors ("IBRD failed")
            Device = 0
            rdbuf$ = "Unknown Device"
            ReadValue% = 0
            Timer1.Enabled = False
        Else
            i = 1
            Do While Mid$(rdbuf$, i, 1) <> Chr$(NULLCHAR)
                i = i + 1
            Loop
            rdbuf$ = Left$(rdbuf$, i - 2)
            TextMonitor.SelText = ""
            ReadValue% = -1
        End If
    End If
End Function

'*************************************************************************
' Name:             WriteCommand
' Arguments:     cmd$ - String containing command
' Description: Writes the command to the GPIB device and then checks for
'                    errors.
'*************************************************************************
Private Sub WriteCommand(Cmd$)
    If Device <> 0 Then
        Call ibwrt(Device, Cmd$)
'           ibsta% = ilwrt(Device, Cmd$, Len(Cmd$))
         ' ibsta% = ilwrta(Device, cmd$, 4098)
        If (ibsta% And EERR) Then
            ErrStr$ = "IBWRT failed while writing " + Cmd$
            PrintErrors (ErrStr$)
            Timer1.Enabled = False
            Device = 0
        End If

        ibsta% = ilwait(Device, CMPL + EERR)
        If (ibsta% And EERR) Then
            ErrStr$ = "IBWAIT failed while writing " + Cmd$
            PrintErrors (ErrStr$)
            Device = 0
        End If
    End If
End Sub
```

```
Private Sub Timer3_Timer()
    If GPIBCallInProgress = 0 Then
        GPIBCallInProgress = 1
        'Commands Transferring
        If Numbers = False Then
            CmdStringWrite = TextWrite2.Text & Chr(13) & TextWrite2.Text & Chr(13) & Chr(10)
            CmdStringWrite = CmdStringWrite & TextWrite2.Text & Chr(13) & TextWrite2.Text & Chr(13) & Chr(10)
            CmdStringWrite = CmdStringWrite & TextWrite2.Text & Chr(13) & TextWrite2.Text & Chr(13) & Chr(10)
            If CmdStringWrite <> "" Then
                WriteCommand (CmdStringWrite)
                TextMonitor.SelText = CmdStringWrite & Chr(13) & Chr(10)
                Numbers = True
            End If
        Else
            ReadStat% = ReadValue%(rdbuf$, BUFSIZE)         ' Read from GPIB
            TextMonitor.SelText = rdbuf$ & Chr(13) & Chr(10)     ' print the value
            ReadStat% = ReadValue%(rdbuf$, BUFSIZE)         ' Read from GPIB
            TextMonitor.SelText = rdbuf$ & Chr(13) & Chr(10)     ' print the value
            ReadStat% = ReadValue%(rdbuf$, BUFSIZE)         ' Read from GPIB
            TextMonitor.SelText = rdbuf$ & Chr(13) & Chr(10)     ' print the value
            ReadStat% = ReadValue%(rdbuf$, BUFSIZE)         ' Read from GPIB
            TextMonitor.SelText = rdbuf$ & Chr(13) & Chr(10)     ' print the value
            ReadStat% = ReadValue%(rdbuf$, BUFSIZE)         ' Read from GPIB
            TextMonitor.SelText = rdbuf$ & Chr(13) & Chr(10)     ' print the value
            ReadStat% = ReadValue%(rdbuf$, BUFSIZE)         ' Read from GPIB
            TextMonitor.SelText = rdbuf$ & Chr(13) & Chr(10)     ' print the value

            chk_count = chk_count + 1
            If chk_count > 100 Then
                chk_count = 0
                TextMonitor.Text = ""
            End If
            counts = counts + 1
            LabelCount.Caption = counts
            Numbers = False
        End If
        GPIBCallInProgress = 0
    End If
End Sub
```

RS-232 Test Program

The following Visual Basic program shows you how to send commands to RS-232 port of PC and receive responding data from RS-232 port.

```
------------------------------------------------------------
"Module1.bas"
Static Sub Response_IPS_Test(inputText As String)
    Form1.TxtRECEIVE.SelText = inputText + Chr(13) + Chr(10)
End Sub
------------------------------------------------------------

Option Explicit
Private Sub MSComm1_OnComm()
    Dim EVMsg As String

    Select Case MSComm1.CommEvent
    Case comEvSend
                EVMsg = "Data Transferring"
    Case comEvReceive
                EVMsg = "Data Receiveing"
                Response_IPS_Test (MSComm1.Input)
    End Select
End Sub

Option Explicit
Private time_interval, COUNT_TEXT As Long

Private Sub CmdClear_Click()
    TxtRECEIVE.Text = ""
    COUNT_TEST = 0
    TxtCount.Text = "0"
    COUNT_TEXT = 0
    Beep
End Sub

Private Sub CmdRUN_Click()
    Command_Send = TxtSEND.Text & Chr(10)
    Timer1.Interval = time_interval
    counts = 0
    Beep
End Sub

Private Sub CmdSend_2_Click()
    Command_Send = TxtSEND2.Text & Chr(10)
    DialPad.MSComm1.Output = Command_Send
```

```
    TxtCounter
    Beep
End Sub

Private Sub CmdSend_One_Click()
    Command_Send = TxtSEND.Text & Chr(10)
    DialPad.MSComm1.Output = Command_Send
    TxtCounter
    Beep
End Sub

Private Sub CmdSend_Set_Click()
    Command_Send2 = TxtSEND.Text & Chr(10) & TxtSEND2.Text & Chr(10)
    Command_Send2 = Command_Send2 + TxtSEND.Text & Chr(10) & TxtSEND2.Text & Chr(10)
    Command_Send2 = Command_Send2 + TxtSEND.Text & Chr(10) & TxtSEND2.Text & Chr(10)
    DialPad.MSComm1.Output = Command_Send2
    TxtCounter
    Beep
End Sub

Private Sub CmdSend_Set_Start_Click()
    counts = 0
    Command_Send2 = TxtSEND.Text & Chr(10) & TxtSEND2.Text & Chr(10)
    Command_Send2 = Command_Send2 + TxtSEND.Text & Chr(10) & TxtSEND2.Text & Chr(10)
    Command_Send2 = Command_Send2 + TxtSEND.Text & Chr(10) & TxtSEND2.Text & Chr(10)
    Timer2.Interval = time_interval
    Beep
End Sub

Private Sub CmdSend_Set_Stop_Click()
    Timer2.Interval = 0
    Beep
End Sub

Private Sub CmdSTOP_Click()
    Timer1.Interval = 0
    Beep
End Sub

Private Sub Form_Load()
    TxtTimeInterval.Text = "50"
    time_interval = CLng(Val(TxtTimeInterval.Text))
    TxtCount.Text = "0"
End Sub

Private Sub TxtCounter()
```

```
    COUNT_TEXT = COUNT_TEXT + 1
    If COUNT_TEXT > 100 Then
        TxtRECEIVE.Text = ""
        COUNT_TEXT = 0
    End If
End Sub
Private Sub Counter()
    TxtCount.Text = counts
End Sub

Private Sub Timer1_Timer()
    counts = counts + 1
    DialPad.MSComm1.Output = Command_Send
    Counter
    TxtCounter
End Sub

Private Sub Timer2_Timer()
    counts = counts + 1
    DialPad.MSComm1.Output = Command_Send2
    Counter
    TxtCounter
End Sub

Private Sub TxtSEND_KeyPress(KeyAscii As Integer)
    If KeyAscii = 13 Then
        Command_Send = TxtSEND.Text & Chr(10)
        DialPad.MSComm1.Output = Command_Send
        TxtCounter
        Beep
    End If
End Sub

Private Sub TxtSEND2_KeyPress(KeyAscii As Integer)
    If KeyAscii = 13 Then
        Command_Send2 = TxtSEND.Text & Chr(10) & TxtSEND2.Text & Chr(10)
        Command_Send2 = Command_Send2 + TxtSEND.Text & Chr(10) & TxtSEND2.Text & Chr(10)
        Command_Send2 = Command_Send2 + TxtSEND.Text & Chr(10) & TxtSEND2.Text & Chr(10)
        DialPad.MSComm1.Output = Command_Send2
        TxtCounter
        Beep
    End If
End Sub

Private Sub TxtTimeInterval_KeyPress(KeyAscii As Integer)
    If KeyAscii = 13 Then
```

```
        time_interval = CLng(Val(TxtTimeInterval.Text))
        TxtRECEIVE.SelText = "Time Interval = " & time_interval & Chr(13) & Chr(10)
        TxtCounter
        Beep
    End If
End Sub
```

Section 7

Specifications

The performance specifications are listed in the following pages. Specifications are warranted in the temperature range of 0 to 40℃ with a resistive load, Supplemental characteristics, which are not warranted but are descriptions of performance determined either by design or testing purpose.

Performance Specifications

Output Ratings (@ 0℃ - 40℃)

Model			Voltage	Current
Single Output	IPS-12B05	P1	0～12V	0~5A
	IPS-15B07	P1	0～15V	0~7A
	IPS-18B10	P1	0～18V	0~10A
	IPS-25B07	P1	0～25V	0~7A
	IPS-30B03	P1	0～30V	0~3A
	IPS-30B05	P1	0～30V	0~5A
	IPS-30B10	P1	0～30V	0~10A
	IPS-50B04	P1	0～50V	0~4A
	IPS-60B03	P1	0～60V	0~3A
Dual Output	IPS-12B05D	P1	0～12V	0~5A
		P2	0～12V	0~5A
	IPS-30B03D	P1	0～30V	0~3A
		P2	0～30V	0~3A
	IPS-30B05D	P1	0～30V	0~5A
		P2	0～30V	0~5A
	IPS-60B03D	P1	0～60V	0~3A
		P2	0～60V	0~3A

Programming Accuracy (@ 25℃±5℃), ±(% of output + offset)
It is measured from its front output terminals after an hour warm-up and recalibration at 25℃.

Model			Voltage	Current
Single Output	IPS-12B05	P1	0.03% + 15mV	0.1% + 5mA
	IPS-15B07	P1	0.05% + 15mV	0.1% + 10mA
	IPS-18B10	P1	0.05% + 15mV	0.1% + 10mA
	IPS-25B07	P1	0.05% + 15mV	0.1% + 10mA
	IPS-30B03	P1	0.03% + 15mV	0.1% + 5mA
	IPS-30B05	P1	0.03% + 15mV	0.1% + 5mA
	IPS-30B10	P1	0.05% + 15mV	0.1% + 10mA
	IPS-50B04	P1	0.05% + 20mV	0.1% + 5mA
	IPS-60B03	P1	0.05% + 20mV	0.1% + 5mA
Dual Output	IPS-12B05D	P1	0.03% + 15mV	0.1% + 5mA
		P2	0.10% + 25mV	0.1% + 10mA
	IPS-30B03D	P1	0.03% + 15mV	0.1% + 5mA
		P2	0.10% + 25mV	0.1% + 10mA
	IPS-30B05D	P1	0.03% + 15mV	0.1% + 5mA
		P2	0.10% + 25mV	0.1% + 10mA
	IPS-60B03D	P1	0.05% + 20mV	0.1% + 5mA
		P2	0.10% + 25mV	0.1% + 10mA

Readback Accuracy (@ 25℃±5℃), ±(% of output + offset)
It is measured from its front output terminals after an hour warm-up and recalibration at 25℃.

Model			Voltage	Current
Single Output	IPS-12B05	P1	0.03% +10mV	0.1% + 3mA
	IPS-15B07	P1	0.05% +12mV	0.1% + 7mA
	IPS-18B10	P1	0.05% +12mV	0.1% + 7mA
	IPS-25B07	P1	0.05% +12mV	0.1% + 7mA
	IPS-30B03	P1	0.03% +10mV	0.1% + 3mA
	IPS-30B05	P1	0.03% +10mV	0.1% + 3mA
	IPS-30B10	P1	0.05% +12mV	0.1% + 7mA
	IPS-50B04	P1	0.05% +15mV	0.1% + 3mA
	IPS-60B03	P1	0.05% +15mV	0.1% + 3mA
Dual Output	IPS-12B05D	P1	0.03% + 10mV	0.1% + 3mA
		P2	0.10% + 20mV	0.1% + 7mA
	IPS-30B03D	P1	0.03% + 10mV	0.1% + 3mA
		P2	0.10% + 20mV	0.1% + 7mA
	IPS-30B05D	P1	0.03% + 10mV	0.1% + 3mA
		P2	0.10% + 20mV	0.1% + 7mA
	IPS-60B03D	P1	0.05% + 15mV	0.1% + 3mA
		P2	0.10% + 20mV	0.1% + 7mA

Ripple and Noise (@ 25℃±5℃), (20Hz to 20MHz)

Model			Voltage	Current
Single Output	IPS-12B05	P1	<3mV p-p	<1mA rms
	IPS-15B07	P1	<4mV p-p	<2mA rms
	IPS-18B10	P1	<4mV p-p	<2mA rms
	IPS-25B07	P1	<4mV p-p	<2mA rms
	IPS-30B03	P1	<3mV p-p	<1mA rms
	IPS-30B05	P1	<3mV p-p	<1mA rms
	IPS-30B10	P1	<5mV p-p	<2mA rms
	IPS-50B04	P1	<4mV p-p	<1mA rms
	IPS-60B03	P1	<4mV p-p	<1mA rms
Dual Output	IPS-12B05D	P1	<3mV p-p	<1mA rms
		P2	<4~8mV p-p	<1mA rms
	IPS-30B03D	P1	<3mV p-p	<1mA rms
		P2	<4~8mV p-p	<1mA rms
	IPS-30B05D	P1	<3mV p-p	<1mA rms
		P2	<4~8mV p-p	<1mA rms
	IPS-60B03D	P1	<4mV p-p	<1mA rms
		P2	<4~8mV p-p	<1mA rms

Load Regulation, ±(% of output + offset)
Change in output voltage or current for any load change within ratings

Model			Voltage	Current
Single Output	IPS-12B05	P1	0.01% +2mV	0.01% + 0.2mA
	IPS-15B07	P1	0.01% +2mV	0.01% + 0.2mA
	IPS-18B10	P1	0.01% +2mV	0.01% + 0.2mA
	IPS-25B07	P1	0.01% +2mV	0.01% + 0.2mA
	IPS-30B03	P1	0.01% +2mV	0.01% + 0.2mA
	IPS-30B05	P1	0.01% +2mV	0.01% + 0.2mA
	IPS-30B10	P1	0.01% +3mV	0.01% + 0.2mA
	IPS-50B04	P1	0.01% +2mV	0.02% + 0.3mA
	IPS-60B03	P1	0.01% +2mV	0.02% + 0.3mA
Dual Output	IPS-12B05D	P1	0.01% +2mV	0.01% + 0.2mA
		P2	0.01% +2mV	0.01% + 0.2mA
	IPS-30B03D	P1	0.01% +2mV	0.01% + 0.2mA
		P2	0.01% +2mV	0.01% + 0.2mA
	IPS-30B05D	P1	0.01% +2mV	0.01% + 0.2mA
		P2	0.01% +2mV	0.01% + 0.2mA
	IPS-60B03D	P1	0.01% +2mV	0.02% + 0.3mA
		P2	0.01% +2mV	0.02% + 0.3mA

Line Regulation, ±(% of output + offset)
Change in output voltage or current for any input change within ratings

Model			Voltage	Current
Single Output	IPS-12B05	P1	0.01% +2mV	0.01% + 0.2mA
	IPS-15B07	P1	0.01% +2mV	0.01% + 0.2mA
	IPS-18B10	P1	0.01% +2mV	0.01% + 0.2mA
	IPS-25B07	P1	0.01% +2mV	0.01% + 0.2mA
	IPS-30B03	P1	0.01% +2mV	0.01% + 0.2mA
	IPS-30B05	P1	0.01% +2mV	0.01% + 0.2mA
	IPS-30B10	P1	0.01% +3mV	0.01% + 0.2mA
	IPS-50B04	P1	0.01% +2mV	0.02% + 0.3mA
	IPS-60B03	P1	0.01% +2mV	0.02% + 0.3mA
Dual Output	IPS-12B05D	P1	0.01% +2mV	0.01% + 0.2mA
		P2	0.01% +2mV	0.01% + 0.2mA
	IPS-30B03D	P1	0.01% +2mV	0.01% + 0.2mA
		P2	0.01% +2mV	0.01% + 0.2mA
	IPS-30B05D	P1	0.01% +2mV	0.01% + 0.2mA
		P2	0.01% +2mV	0.01% + 0.2mA
	IPS-60B03D	P1	0.01% +2mV	0.02% + 0.3mA
		P2	0.01% +2mV	0.02% + 0.3mA

Programming Resolution & Readback Resolution

Model			Voltage	Current
Single Output	IPS-12B05	P1	1mV	1mA
	IPS-15B07	P1		
	IPS-18B10	P1		
	IPS-25B07	P1		
	IPS-30B03	P1		
	IPS-30B05	P1		
	IPS-30B10	P1		
	IPS-50B04	P1		
	IPS-60B03	P1		
Dual Output	IPS-12B05D	P1		
		P2		
	IPS-30B03D	P1		
		P2		
	IPS-30B05D	P1		
		P2		
	IPS-60B03D	P1		
		P2		

Meter Resolution

Model			Voltage	Current
Single Output	IPS-12B05	P1	1mV	1mA
	IPS-15B07	P1		
	IPS-18B10	P1		
	IPS-25B07	P1		
	IPS-30B03	P1		
	IPS-30B05	P1		
	IPS-30B10	P1		
	IPS-50B04	P1		
	IPS-60B03	P1	10mV	
Dual Output	IPS-12B05D	P1	1mV	
		P2		
	IPS-30B03D	P1		
		P2		
	IPS-30B05D	P1		
		P2		
	IPS-60B03D	P1	10mV	
		P2		

Transient Response Time

Less than 50μsec for output recover to within 15mV following a change in output current from full load to half load (Typical, IPS-30B05).

Command Processing Time

Programming Commands : Maximum time for output to change after receipt of APPL and SOUR commands : < 50 msec

Readback Command : Maximum time to readback output by MEAS? command : <100 msec

The Other commands : < 50 msec

Supplementary Characteristics

Output Programming Range (Maximum programmable values)

Model			Voltage	Current
Single Output	IPS-12B05	P1	0 ~ 12.6V	0 ~ 5.25A
	IPS-15B07	P1	0 ~ 15.75V	0 ~ 7.35A
	IPS-18B10	P1	0 ~ 18.9V	0 ~ 10.5A
	IPS-25B07	P1	0 ~ 26.25V	0 ~ 7.35A
	IPS-30B03	P1	0 ~ 31.5V	0 ~ 3.15A
	IPS-30B05	P1	0 ~ 31.5V	0 ~ 5.25A
	IPS-30B10	P1	0 ~ 31.5V	0 ~ 10.5A
	IPS-50B04	P1	0 ~ 52.5V	0 ~ 4.2A
	IPS-60B03	P1	0 ~ 63V	0 ~ 3.15A
Dual Output	IPS-12B05D	P1	0 ~ 12.6V	0 ~ 5.25A
		P2	0 ~ 12.6V	0 ~ 5.25A
	IPS-30B03D	P1	0 ~ 31.5V	0 ~ 3.15A
		P2	0 ~ 31.5V	0 ~ 3.15A
	IPS-30B05D	P1	0 ~ 31.5V	0 ~ 5.25A
		P2	0 ~ 31.5V	0 ~ 5.25A
	IPS-60B03D	P1	0 ~ 63V	0 ~ 3.15A
		P2	0 ~ 63V	0 ~ 3.15A

Temperature Coefficient, ±(% of output + offset)
Maximum change in output/readback per ℃ after a 30-minute warm-up

Model			Voltage	Current
Single Output	IPS-12B05	P1	0.02% + 3mV	0.02% + 2mA
	IPS-15B07	P1		
	IPS-18B10	P1		
	IPS-25B07	P1		
	IPS-30B03	P1		
	IPS-30B05	P1		
	IPS-30B10	P1		
	IPS-50B04	P1		
	IPS-60B03	P1		
Dual Output	IPS-12B05D	P1	0.02% + 3mV	
		P2	0.02% + 5mV	
	IPS-30B03D	P1	0.02% + 3mV	
		P2	0.02% + 5mV	
	IPS-30B05D	P1	0.02% + 3mV	
		P2	0.02% + 5mV	
	IPS-60B03D	P1	0.02% + 3mV	
		P2	0.02% + 5mV	

Stability, ±(% of output + offset)
Following a 30-minute warm-up, change in output over 8 hours under constant load, line, and ambient temperature

Model			Voltage	Current
Single Output	IPS-12B05	P1	0.02% + 2mV	0.10% + 1mA
	IPS-15B07	P1		
	IPS-18B10	P1		
	IPS-25B07	P1		
	IPS-30B03	P1		
	IPS-30B05	P1		
	IPS-30B10	P1		
	IPS-50B04	P1		
	IPS-60B03	P1		
Dual Output	IPS-12B05D	P1		
		P2		
	IPS-30B03D	P1		
		P2		
	IPS-30B05D	P1		
		P2		
	IPS-60B03D	P1		
		P2		

Voltage Programming Speed

Maximum time required for output voltage to settle within 10 % of its total excursion (for resistive load) excluding command processing time.

Model			Full Load		No Load	
			Up	Down	Up	Down
Single Output	IPS-12B05	P1	12msec	15msec	12msec	110msec
	IPS-15B07	P1	15msec	20msec	15msec	200msec
	IPS-18B10	P1	15msec	20msec	15msec	200msec
	IPS-25B07	P1	15msec	20msec	15msec	210msec
	IPS-30B03	P1	12msec	15msec	12msec	110msec
	IPS-30B05	P1	12msec	15msec	12msec	110msec
	IPS-30B10	P1	15msec	20msec	15msec	250msec
	IPS-50B04	P1	15msec	20msec	15msec	250msec
	IPS-60B03	P1	15msec	20msec	15msec	250msec
Dual Output	IPS-12B05D	P1	12msec	15msec	12msec	110msec
		P2	12msec	15msec	12msec	110msec
	IPS-30B03D	P1	12msec	15msec	12msec	110msec
		P2	12msec	15msec	12msec	110msec
	IPS-30B05D	P1	12msec	15msec	12msec	110msec
		P2	12msec	15msec	12msec	110msec
	IPS-60B03D	P1	15msec	20msec	15msec	250msec
		P2	15msec	20msec	15msec	250msec

Operating Temperature
0 to 40 ℃ for full rated output. At higher temperatures, the output is derated linearly to 50% at 55℃ maximum temperature.

Output Voltage Overshoot
During turn-on or turn-off of AC power, output plus overshoot will not exceed 1V if the output control is set to less than 1V. If the output control is set to 1V or higher, there is no overshoot.

Programming Language
SCPI(Standard Commands for Programmable Instruments)

State Storage Memory
Ten (10) user-configurable stored states

Recommended Calibration Interval
1 year

Cooling
Fan cooled (12 Vdc)

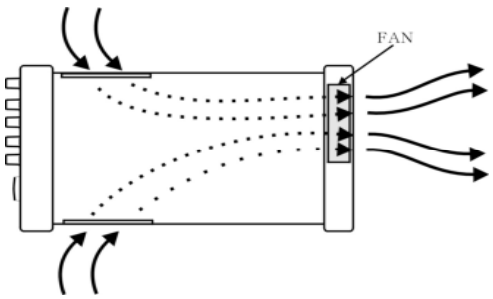

Figure 7-1. Cooling of IPS-B Series DC Power Supply

AC Input Ratings

Please refer to the AC Line mark (■) on the rear panel

~115V, 50Hz / ~220V, 60Hz / ~230V, 50Hz

IPS-B Series			
Model	VA	Model	VA
IPS-12B05	220	IPS-12B05D	350
IPS-15B07	350	IPS-30B03D	400
IPS-18B10	450	IPS-30B05D	500
IPS-25B07	500	IPS-60B03D	600
IPS-30B03	300		
IPS-30B05	390		
IPS-30B10	635		
IPS-50B04	450		
IPS-60B03	420		

Net Weight

IPS-B Series			
Model	Weight	Model	Weight
IPS-12B05	9.0 Kg	IPS-12B05D	12.3 Kg
IPS-15B07	9.0 Kg	IPS-30B03D	12.3 Kg
IPS-18B10	10.0 Kg	IPS-30B05D	12.3 Kg
IPS-25B07	10.5 Kg	IPS-60B03D	12.3 Kg
IPS-30B03	9.0 Kg		
IPS-30B05	9.0 Kg		
IPS-30B10	10.9 Kg		
IPS-50B04	10.5 Kg		
IPS-60B03	9.0 Kg		

Dimensions*

212 mm(W) × 132 mm(H) × 330 mm(D) / (8.3'× 5.2'× 13.0')

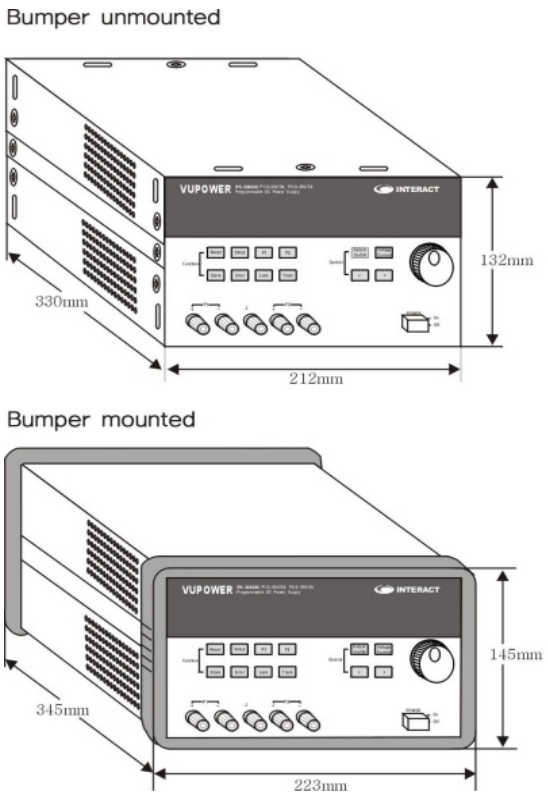

Figure 7-2. Dimensions of IPS-B Series DC Power Supply