

3301A

使用手冊 (E)

S/N: 90033013 rev:A

3301A Mainframe Operation Manual

Table of contents

Chapter 1 Introduction	1
1-1.Features	1
1-2.Option	1
1-3.Specifications	1
1-4.System block diagram	2
Chapter 2 Installation	3
2-1.Inspection	3
2-2.Check line voltage	3
2-3.Grounding requirements	4
2-4.Adjust the feet	4
2-5.Rack mount	4
2-6.Environmental requirements	4
2-7.Repairing	4
2-8.Accessories	5
2-9.GPIB connection	5
2-10.Remote control Port	6
2-11.Master/Slave operating mode	7
Chapter 3 Mainframe operation.....	9
3-1.Feet stands	9
3-2.Power switch	9
3-3.STORE/RECALL operation	10
Chapter 4 GPIB programming operation.....	11
4-1.The summary of GPIB command	11
4-2.The description of abstraction	11
4-3.GPIB command description	13
4-4.3301A Operation flowchart	21
4-5.GPIB Command listing	22
Figure	
Figure 1-1 Block diagram	2
Figure 2-1 Set of the power switch	3
Figure 2-2 AC line receptacle socket	4
Figure 2-3 rear panel	5
Figure 2-4 Address switch	6
Figure 2-5 Diagram of Remote Control Port	6
Figure 2-6 The channel number of Master/Slave operation	7
Figure 2-7 25PIN "D" type cable	8
Figure 3-1 3301A front panel	9
Figure 4-1 3301A Operation flowchart	21

Table

Table 1-1 Specification	1
Table 4-1 GPIB Command listing	11
Table 4-2 GPIB command terminator	12
Table 4-3 Maximun load current level	16
Table 4-4 Slew rate code for SLOW, MID, and FAST	17
Table 4-5 specification code for 3320 series load module	19

Chapter 1 Introduction

The 3301A Electronic load mainframe is designed to install up to 4 channels 3320 series plug-in load module, 3320 (60V/30A 150W), 3321 (60V/60A 300W) or 3322 (250V/10A, 300W) plug-in module can be installed to any slot of the 3301A mainframe. A total 1200W maximum capacity can be implemented in 3301A mainframe.

1-1.Features

3301A mainframe provides easy operation and cost effective solution for power source testing, the features of the 3301A Electronic load mainframe is described in the following:

- 1.Plug-in design, it is easy to replace different specifications load module.
- 2.Flexible configuration, each slot of 3301A mainframe can be installed one of 3320, 3321 or 3322 load module.
- 3.STORE/RECALL up to 5 states, it can reduce the testing time in incoming inspection as well as production line.
- 4.Master/Slave operation two 3301A mainframe only occupy one GPIB address when operating in Master/Slave mode.
- 5.Built-in GPIB interface.

1-2.Option

1. Blank panel
2. GPIB cable 1M
3. GPIB cable 2M
4. 25 pins "D" type cable 1M
5. Model 9931 Remote Controller

1-3.Specifications

The detail specifications of 3301A mainframe is shown in Table 1-1.

AC INPUT	LINE	100V/115V \pm 10%	200V/230V \pm 10%
	FREQUENCY	50/60 Hz	
	FUSE	2A/250V (5*20mm)	1A/250V (5*20mm)
	MAX.POWER CONSUMPTION	100W	
DIMENSIONS (W*H*D)		440mm * 177mm * 445mm	
WEIGHT		NET : 9.3Kg	

Table 1-1 Specification

1-4. System block diagram

The system block diagram is shown in Fig 1-1, there are five power supplies in 3301A mainframe one for 3301A mainframe, and others are for each channel respectively. The 3301A mainframe is optically isolated with each load module.

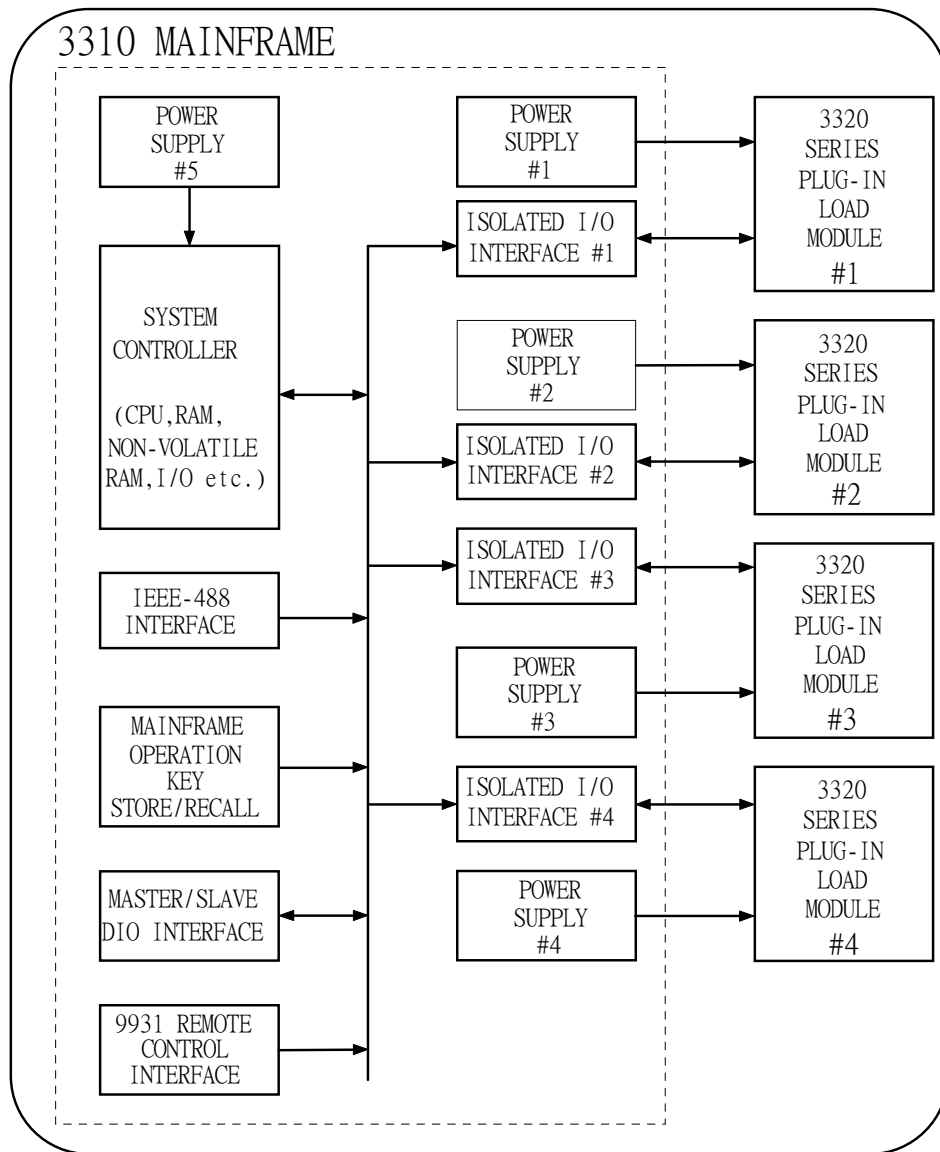


Figure 1-1 Block diagram

Chapter 2 Installation

2-1. Inspection

The 3301A mainframe was carefully inspected before shipment. If instrument damage has occurred during transport, please inform Prodigit's sales and service office or representative. Your 3301A mainframe was shipped with a power cord for the type of outlet used at your location. If the appropriated cord was not included, please contact your nearest Prodigit sales office to obtain the correct cord. Refer to " check line voltage " to check the line voltage selection and fuse type.

2-2. Check line voltage

The 3301A mainframe and 3320 series Electronic load can operation with 100, 115, 200, 230Vac input as indicated on the label on the rear panel.

Make sure that the factory check mark correspond to your nominal line voltage. Skip this procedure if the label is corrected marked.

1. With the 3301A mainframe power OFF, disconnect the power cord, and remove two bottom cover screws.
2. Turn the 3301A mainframe up side down, remove the bottom cover.
3. Refer the drawing on the PC board in Fig 2-1, set the switches to the proper voltage as describe in the following:
 - a. 115Vac : Set SW1 to left side (SW1←).
 - b. 230Vac : Set SW1 to right side (SW1→).

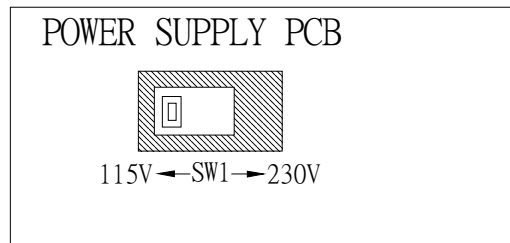


Figure 2-1 Set of the power switch

4. Replace the cover and mark the correct voltage on the rear panel of 3301A mainframe.
5. Check the rating of the line fuse and replace it with the correct fuse if necessary.
6. The line fuse is located below the AC line receptacle see Fig 2-2. With the power cord removed, use a small screwdriver to extract the fuse holder from under the AC socket. Replace the fuse with the appropriate type as indicated in table 1-1. These fuses are normal-blow fuses.

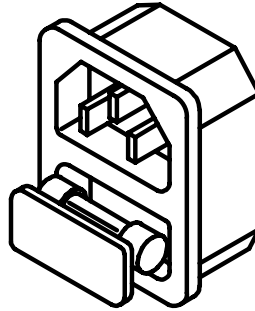


Figure 2-2 AC line receptacle socket

7.Reinstall fuse holder and connect the power cord.

2-3.Grounding requirements

Model 3301A mainframe and 3320 series Plug-in load is equipped with three conductor cable which plugs in an appropriate receptacle to ground the instrument's cover.

2-4.Adjust the feet

The 3301A Electronic load mainframe is equipped with feet and tilt stands installed and is ready for used as a bench instrument. The feet provide a good viewing angle for bench-top use.

2-5.Rack mount

The 3301A mainframe is designed to permit mounted in a standard 19 inches rack for system application.

2-6.Enviremental requirements

The operating temperature should keep etween 0 degree and 40 degree, while the ideal operating temperature 25 ± 5 degree.

2-7.Repairing

If the instrument is damaged, please attach a tag to the instrument to identify the owner and indicated the require service or repairing. And inform the Prodigit sales and service office or representative.

2-8. Accessories

The following parts should be include in the shipment.

1. Three conductor power cord 1pc
2. 3301A mainframe operation manual 1pc

2-9. GPIB connection

The GPIB connector on the rear panel connects the 3301A mainframe to the controller and to other GPIB devices. An GPIB system can be connected in any configuration (star, linear, or both) as long as ;

1. The maximum number of devices including the controller is no more than 15.
2. The maximum length of all cable in no more than 2 meters times the number of devices connected together, up to 20 meters maximum.

Please make sure the lock screws are firmly hand - tightened, use a screwdriver only for the removal of screws.

Fig 2-3 shows the rear panel of 3301A mainframe, the GPIB connector and GPIB address setting switch is located on the rear panel of 3301A mainframe.

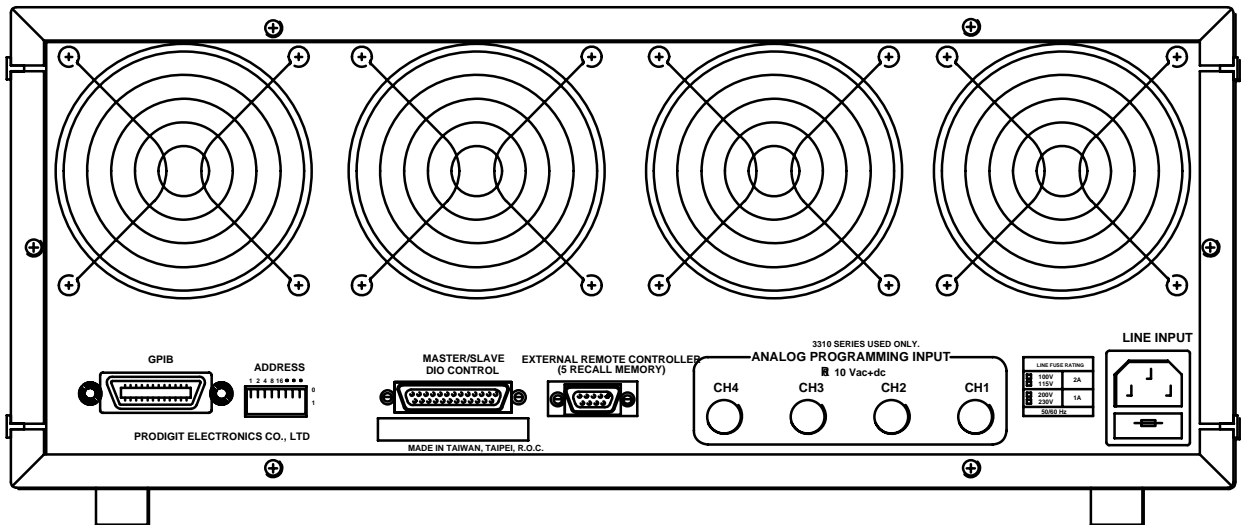


Figure 2-3 rear panel

The GPIB address of the 3301A mainframe is factory set to address 05. The GPIB address can be set by adjust the GPIB address switch setting the weighting of the address switch is following from left to right in 1, 2, 4, 8, 16 sequence.

The unused switch should set to OFF position.

The switch 1 and 3 are in ON position for address 05 when the 3301A mainframe is shipped from Prodigit. Fig 2-4 shows the detail outlook of the address switch.

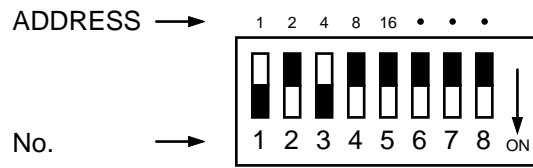


Figure 2-4 Address switch

2-10.Remote control Port

The D-sub 9 pin connector on the rear panel connects the 3301A mainframe to the PRODIGIT mode 9931 remote controller and to replace the RECALL option key 1 to 5 on the front panel of 3301A mainframe.

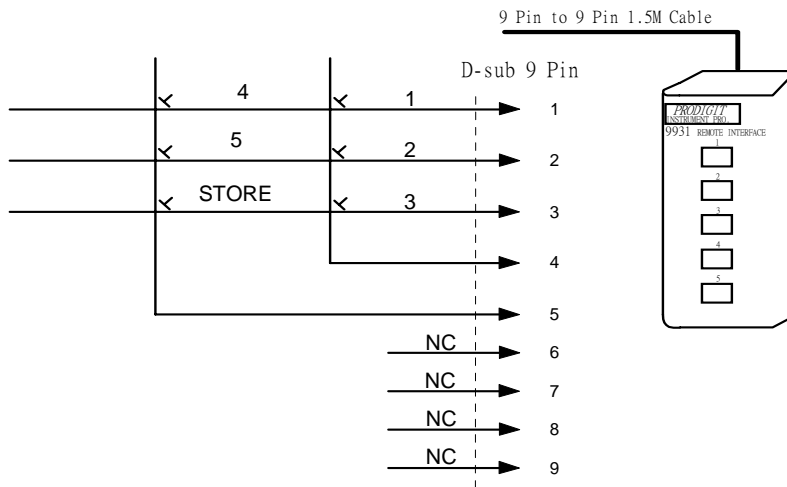


Figure 2-5 Diagram of Remote Control Port

2-11.Master/Slave operating mode

Fig 2-6 shows the connection of two 3301A mainframe in Master/Slave operating mode. The connection method is shown below :

- 1.The Master unit of 3301A mainframe's rear panel connects the GPIB cable to the controller (computer)
- 2.Use 25 pin "D" type cable to connect two 3301A mainframe (Master and Slave unit)
- 3.The channel number of Master / Slave operating is shown in Fig 2-7, i.e.; in the Master unit from left to right : ch1, ch2, ch3 and ch4, and in Slave unit from left to right: ch5, ch6, ch7 and ch8 respectively.
- 4.Please disconnect the 25 pin "D" type cable when Master / Slave operating mode is not used.

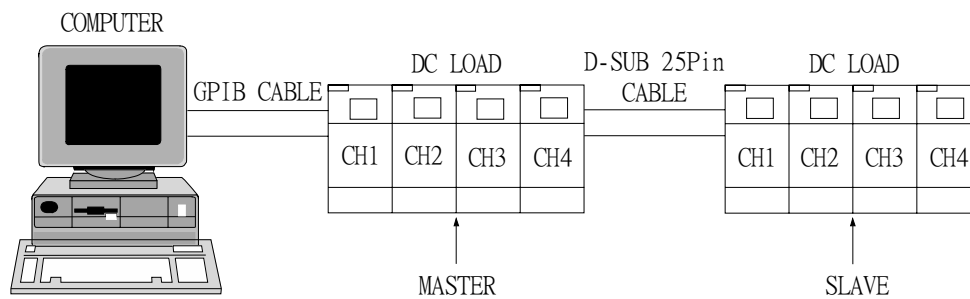


Figure 2-6 The channel number of Master/Slave operation

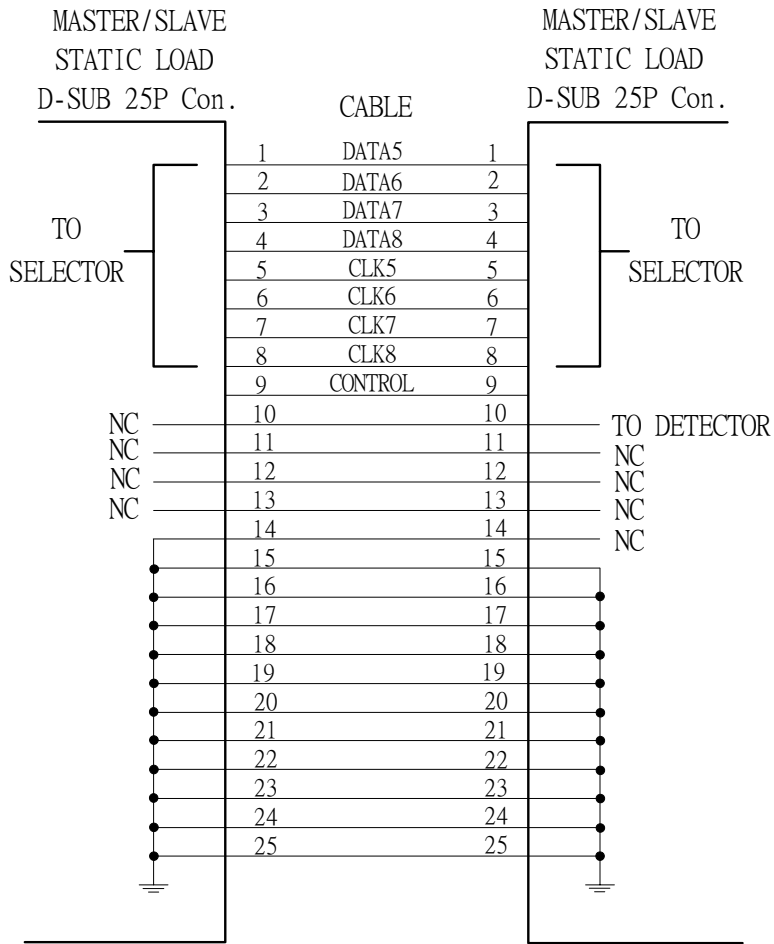


Figure 2-7 25PIN "D" type cable

Chapter 3 Mainframe operation

The front panel of 3301A mainframe is shown in Fig 3-1.

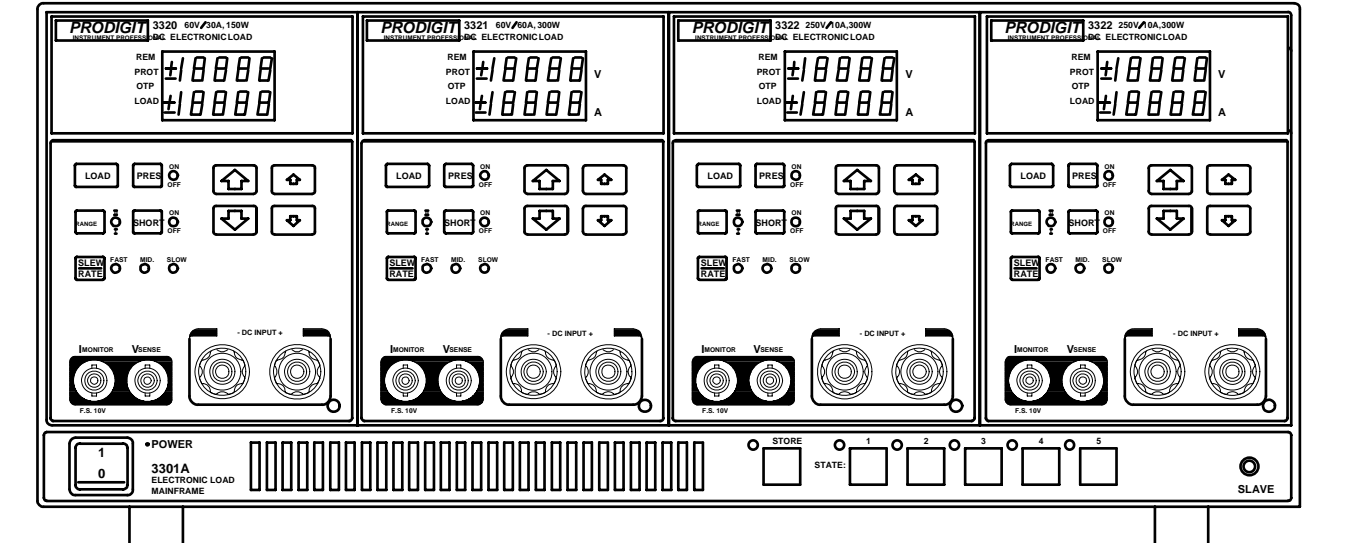


Figure 3-1 3301A front panel

3-1. Feet stands

There are four feet which are located in each corner of the 3301A bottom plate.

The two feet on the front panel side are equipped with stainless tilt stands, you can pull up the tilt stands to provide a good view angle of the 3320 series Electronic load module in the manual operation.

3-2. Power switch

Before connecting AC power to the 3301A mainframe, make sure the power source matches the power requirements of the 3301A Electronic load mainframe (as mark on the rear panel) Power switch turns 3301A mainframe and 3320 series Electronic load module ON or OFF, when the 3301A mainframe is first turn ON, the 3301A mainframe and 3320 series Electronic load module's front panel status is indicated with the following configuration.

3301A: 1. Local manual operation mode.

2. STORE / RECALL: No function; 3320 series Electronic load is in power on initial state.

3320: 1. Load OFF

2. Preset OFF

3. Range I

4. Short OFF

5. Slew rate: SLOW

6. Load current level: 0A

3-3.STORE/RECALL operation

The six function keys on the front panel of 3301A mainframe are designed for high testing throughput purpose. There are five operating states or testing steps can be stored in the non-volatile memory of 3301A mainframe, each state can save or recall the load status and load level four 3320 series Electronic load modules simultaneously.

STORE procedure:

- 1.Set the load status and load level from channel 1 to channel 4 respectively.
- 2.Press the STORE key on the 3301A mainframe, the STORE LED annunciator is flashing. (about two times *every second)
- 3.Press one of the state 1-5 key, the appropriate state key's LED annunciator will be lit immediately, the load level and status of 4 channel's 3320 load module is stored into the non-volatile memory this time. Then, the STORE LED annunciator turn to blank, it means the STORE procedure is completed.

Note :

- 1.After press the STORE key, the STORE LED annunciator will flash for 10 seconds, if the STATE 1-5 key is not pressed within this 10 seconds, the STORE LED annunciator will be blank, it indicated the STORE process is not available now, please repeat the STORE procedure for a new STORE operation.
- 2.After press the STORE LED key, then press the STORE key again, the STORE LED annunciator will be blank, it indicate the STORE process in not available.
- 3.After press the STORE key, it is available and useful to operate the front panel key on the 3320 series Electronic load module.

STORE function :

Please refer Chapter section on the 3320 series Electronic load module operation manual to more detail operating flow chart for the store and recall operation.

It can store up to 5 states of four channel's load module setting simultaneously, if you store 2 different states in the same state key, then the later state will overcome the previous state, it acts as update the new data.

RECALL operation :

Press one of the state 1 through 5 key, the appropriate LED annunciator will be lit, the store state on the 3301A mainframe is sending to the 4 channel's 3320 series Electronic load module simultaneously. Before press the state key, you press any key on any channel, then the state LED annunciator is blank immediately, it indicates the STORE state has been changed by readjustment on the load module's front panel.

Chapter 4 GPIB programming operation

4-1.The summary of GPIB command

Table 4-1 GPIB command listing

COMMAND	FUNCTION
CHAN	Channel selecting
CLE	Clear to initial state
CURR	Current level programming
LOAD	Set load input ON OFF condition
MASTER	Select Master or Slave operation mode
PRES	Preset load current level to be display on DCM and Imonitor
RANGE	Select the full scale current range
RECALL	Recall the store state
SHOR	Set load input to short circuit
SLEW	Load current slew rate control
SPEC	Set the specification for each load module
STORE	Store the present load state and load level
TRIG	Excecute the commands which is waiting for trigger

Table 4-1 GPIB Command listing

4-2.The description of abstraction

- 1.SP : Space, the ASCII code is 20 Hexadecimal.
- 2. ; : Semicolon, Program line terminator, the ASCII code is OA Hexadecimal.
- 3.NL : New line, Program line terminator, the ASCII code is OA Hexadecimal.
- 4.N : Integer number from 1 tp 8.
- 5.NR2 : Digits with decimal point. It can be accepted in the range and formate of ##.#####.

For example : 30,12345, 5.0

The description of GPIB programming command syntax.

- 1. { } : The contents of the { } symbol must be used as a part or data of the GPIB command, it can not be omitted.
- 2. [] : The contents of the [] symbol indicts the command can be used or not. It depends on th testing application.
- 3. | : This symbol means option. For example "A | B" means it can only use A or B as the command, it can choose only one as the setting command.

-
4. "TRIG" : The command will not be executed immediately until the GPIB TRIG command is sent by computer, the load level or load status are stored in the data buffer before the GPIB TRIG command program line is executed.
 5. Terminator : You have to send the program line terminator character after send the GPIB command, the available command terminator characters which can be accepted in 3301A mainframe is listed in table 4-2.

LF
LF WITH EOI
CR , LF
CR , LF WITH EOI

Table 4-2 GPIB command terminator

A terminator informs GPIB that it has reached the end of statement. Normally, this is sent automatically by your GPIB programming statements. In this manual, the terminator is assumed at the end of each example line of code. If it needs to be indicated, it is shown by symbol (nl); which stand for " new line "and represents ASCII code byte the 0A Hexadecimal or 10 decimal.

6. Semicolon ";" : The semicolon " ; " is a back-up command, it instructs the parser to return to the previous colon, the semicolon allows you to combine command statement on one line to create command message.
7. GTL : The REM LED annunciator of each load module will turn ON when the 3320 series Electronic load module is in remote operation mode. The GTL (GO TO LOCAL) command returns the Electronic load module to manual or front panel operation, the LED annunciator will turn OFF as well in the manual operation mode. The ASCII code for GTL command is 01 Hexadecimal.

4-3.GPIB command description

CHAN

Purpose :

" CHAN " selects the multiple Electronic load channel to which all subsequent channel specific command will be directed.

Command syntax :

CHAN {SP}{N}{;NL}

Description :

" CHAN " command selects the specified Electronic load module from 1 through 8 as the Electronic load module number. It can be installed up to 4 channels of the Electronic load module in one mainframe or up to 8 channels of the Electronic load module if the Master / Slave 25 pin "D" type cable is connected between two 3301A mainframe.

The load channel number is arranged as 1,2,3,4 from left hand side to the right hand side respectively, or 1,2,3,4 for from the left hand side to the right hand side of the Master 3301A mainframe, and 5,6,7,8 for from the left hand side to the right hand side of the Slave 3301A mainframe.

Example :

Select Channel 1
CHAN 1
Select Channel 5
CHAN 5

CLE

Purpose :

Clear to the initial state

Command syntax :

CLE{;NL}

Description :

This command clear the Electronic load's load status and load level to the initial power ON state.

The power ON state of the 3320 Electronic load module is Load OFF Preset OFF Range I Short OFF Slew rate : Slow Load current level OA

The CLE command does not clear or effect the data which is stored by STORE command, for the data is stored in the non-volatile memory on the 3301A mainframe.

Example :

a.CLE

CURR

Purpose :

Constant load current setting.

Command syntax :

CURR[:TRIG]{SP}{NR2}{;NL}

Description :

This command is used to set the load current level of 3320 series Electronic load module.

Note :

- 1.The load current data must include decimal point, otherwise this command is unable to excute.
- 2.Unit for load current is ampere.
- 3.Please make sure the SPEC command and range I / II command before excute the load current setting command.
- 4.If the programming load current level over the maximum specification of 3320 series load module, the full scale current will be sent to the load module.
- 5.The most effective load current level can be set is the fifth digit after the decimal point.

Example :

- 1.CURR : TRIG 10.20
- 2.CURR : 3.0
- 3.CURR : 5.123

LOAD

Purpose :

Turn the Electronic load module input ON or OFF.

Command syntax :

LOAD[:TRIG]{SP}{ON | OFF}{;NL}

Description :

This command sets the Electronic load to sink current from DC power source.

LOAD ON : Electronic load is ready to sink current from DC power source.

LOAD OFF : Electronic load can not sink current from DC power source.

Example :

- a.LOAD ON
- b.LOAD : TRIG ON
- c.LOAD : TRIG OFF

MASTER

Purpose :

Select 4 or 8 channel load modules to be controlled when Master/Slave "D" type cable is connected between two 3301A mainframe and only one GPIB interface is used.

Command syntax :

```
MASTER{SP}{ON | OFF}{;NL}
```

Note :

Default Master OFF

Description :

MASTER ON control up to 8 channels of the Electronic load module if the Master/Slave "D" type cable is connected on real panel of the two 3301A mainframe. At this time, the second unit of 3301A mainframe (it is connected by 25 pin "D" type connector only, the GPIB cable is not connected in this unit). SLAVE LED annunciator on the lower and right hand corner of the 3301A mainframe is lit, and the REM LED annunciator of each load module is lit also to indication remote programming operation.

MASTER OFF controls up to 4 channels of the Electronic load module in 3301A mainframe.

Example :

Master ON; Control channel 5 - channel 8 of another slave 3301A mainframe.

PRES

Purpose :

Set the 4 1/2 digit current Meter to display the programming load current level.

Command syntax :

```
PRES[:TRIG]{SP}{ON | OFF}{;NL}
```

Description :

The PRESET ON command set the 4 1/2 DCM and Imonitor BNC output to display or output the programming load current level.

PRES OFF Command set the 4 1/2 DCM to display the actual load current which current is down through the load input, and the Imonitor BNC output signal is proportional to the actual load current.

Example :

- a.PRES ON
- b.PRES OFF
- c.PRES : TRIG ON

RANG**Purpose :**

Select the operating full scale current range.

Command syntax :

RANG{SP}{1 | 2}{;NL}

Description :

This command selects the full scale current range of the Electronic load. There are two full scale current range for each 3320 series Electronic load module. Table 4-3 shows the range I/II full scale current for each 3320 series load module.

When RANG command is executed, the values of the current level are adjusted as follow:

1. IF the existing current setting is within the new range. Then the current level does not change.
2. IF the existing current is setting in not within the new range. Then the current level is set to the maximum of new range.

The maximum load current level is shows in table 4-3. Table 4-3 maximum full scale current level for each module. When the programming load level setting is greater than the maximum current level of each range of each module, then the load current will adjust to the maximum current level which is listed in table 4-3.

MODEL	3320	3321	3322	3323	3324	3325
RANGE I	3.072	6.142	1.024	1.024	0.511	1.535
RANGE II	30.72	61.42	10.24	10.24	5.11	15.36

Table 4-3 Maximum load current level

RECALL**Purpose :**

Recall the state of load level and load status which is stored by GPIB STORE command.

Command syntax :

RECALL{SP}{1 | 2 | 3}{;NL}

Description :

This command is used to recall the non-volatile memory state which is stored into the memory by GPIB store command, up to 5 states can be recalled.

Example :

- a. RECALL 1
- b. RECALL 4

SHOR

Purpose :

Short the DC input of Electronic load.

Command syntax :

SHOR[:TRIG]{SP}{ON | OFF}{;NL}

Description :

This command applies the short across the input of the Electronic load. The maximum short resistance is 0.03, 0.02 and 0.04 ohms for 3320, 3321 and 3322 Electronic load module respectively. Executing SHOR does not effect any programmed settings and the Electronic load will return to them when the short is removed.

Example :

- a. SHOR ON
- b. SHOR OFF
- c. SHOR : TRIG ON

SLEW

Purpose :

SET the slew rate of load current change.

Command syntax :

SLEW{SP}{1 | 2}{;NL}

Description :

This command selects the load current slew rate SLOW, MIDDLE and FAST with its code 1, 2 and 3 respectively. The code for each slew rate is shown in Table 4-4. For detail load current slew rate for SLOW, MIDDLE, FAST, and each model of 3320 series Electronic load module, please refer the 3320 series Electronic load operation manual. Table 4-4 slew rate code for SLOW, MID, AND FAST.

SLEW RATE	CODE
SLOW	1
MIDDLE	2
FAST	3

Table 4-4 Slew rate code for SLOW, MID, and FAST

Example :

- a. SLEW 1
- b. SLEW 2
- c. SLEW 3

TRIG

Purpose :

Start to execute the GPIB command that are waiting for trigger.

Command syntax :

TRIG{;NL}

Description :

This TRIG command executes all of the operation simultaneously for all of the (xxxx : TRIG xxx) GPIB command.

Example :

a.Load : TRIG ON
PRES ON
TRIG

SPEC

Purpose :

Setting the specifications of the Electronic load module.

Command syntax :

SPEC{SP}{C1}{C2}{C3}{C4}{C5}{C6}{C7}{C8}]{;NL}

Note :

This command is necessary for programming the 3320 series Electronic load module through 3301A mainframe. Send the SPEC command before programming other GPIB command.

Description :

" SPEC " is used to set the Electronic load module's specification of the 3301A mainframe, you must set the specification code for each load module follow by channel 1, channel 2, Channel 3 and channel 4 for one 3301A mainframe operation, or channel 1 to channel 4 for Master unit of 3301A mainframe and channel 5 to channel 8 for slave unit of 3301A mainframe if the Master/Slave "D" type cable is connected. The specification code is shown in table 4-5.

SPECification	CODE
Blank	X
3320	0
3321	1
3322	2
3323	3
3324	4
3325	5

Table 4-5 specification code for 3320 series load module

Example :

The configuration of 3301A mainframe is channel 1 - 3320, channel 2 - Blank channel, channel 3 and channel 4 - 3321. the specification code is following :

SPEC OX11

The configuration of channel 1 through channel 4 is 3321, for the Master 3301A mainframe and channel 5 through channel 8 is 3322 for the slave 3301A mainframe. the specification code is following :

SPEC 11112222

STORE

Purpose :

STORE the load level and load status into the non-volatile memory of the 3301A mainframe.

Command syntax :

STORE{SP}{1 | 2 | 3}{;NL}

Description :

5 different states with up to 8 channels Electronic load module's load status and load current into the non-volatile memory in the 3301A mainframe in Master/Slave mode operation, or up to 4 channels load status and load level in Master OFF mode.

This command does the same function like the STORE key on the 3301A mainframe, but it has the following different features :

- 1.The non-volatile memory location of GPIB STORE and STORE key on the 3301A mainframe is seperated, they have its own memory location.
- 2.Every STORE state of GPIB STORE command can store up to 8 Electronic load module, but STORE key on the 3301A mainframe only can store up to four channels load module.

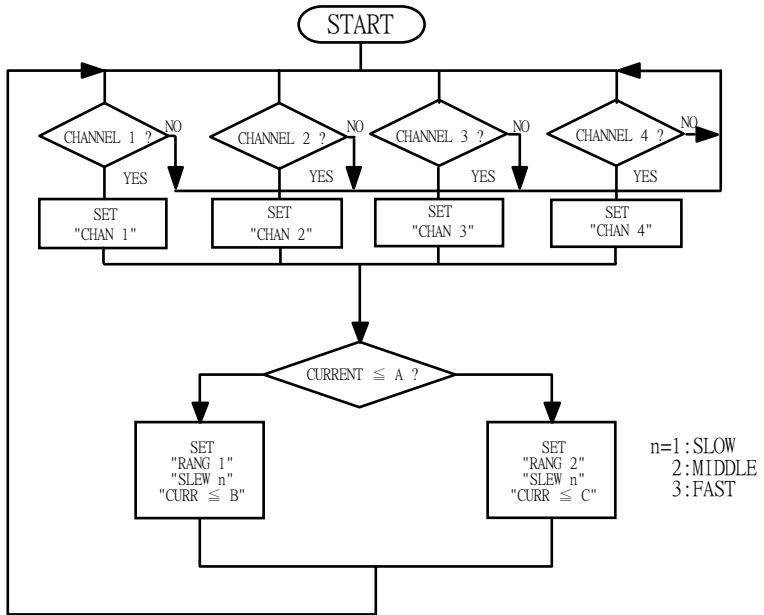
Note :

The new load level and load status can overcome the load level and status if STORE new state number on the same state number, because the memory location is the same for same STORE state number.

Example :

STORE 1
STORE 5

4-4.3301A Operation flowchart



	3320	3321	3322	3323	3324	3325
A	3.0	6.0	1.0	1.0	0.5	1.5
B	3.0	6.0	1.0	1.0	0.5	1.5
C	30.0	60.0	10.0	10.0	5.0	15.0

Figure 4-1 3301A Operation flowchart

4-5.GPIB Command listing

3301A STATIC LOAD GPIB COMMAND
SPEC {C1} {C2} {C3} {C4} {C5} {C6} {C7} {C8}
CHAN {N}
CLE
LOAD[:TRIG]{SP}{ON | OFF}
PPES[:TRIG]{SP}{ON | OFF}
SHOR[:TRIG]{SP}{ON | OFF}
CURR:[:TRIG]{SP}{NR2}
RANG{SP}{1 | 2}
SLEW{SP}{1 | 2 | 3}
MASTER{SP}{ON | OFF}
STORE{SP}{1 | 2 | 3 | 4 | 5}
RECALL{SP}{1 | 2 | 3 | 4 | 5}
TRIG

NOTE :

- 1.N = 1 ~ 8
- 2.NR2 = NUMBER OF FLOATING
- 3.C1 - C8 SEE TABLE 4-5