Extron Electronics
INTERFACING, SWITCHING AND DISTRIBUTION

User's Manual

RGB 300
Universal Digital Interface

Using Windows® Control Panel Software

Appendix A - Programmer's Guide

Appendix B - Reference Material

RGB 300 User's Manual
68-149-01
Rev. A-1
69-06

Rev. B
79-04
New style format

1

Chapter One

Introduction to RGB 300 **Features**

LCD Menu Driven Control

Auto-Select and Memory Blocks

Image Display Controls

Automatic Sync Output Selection

Security Lockout

RS 232 Control Interface

Front Panel Controls

The Extron RGB 300 is a digitally controlled Universal Analog/ECL Computer-Video Interface. It can connect most any computer to a video presentation device, such as a large screen projector or data monitor. The RGB 300's built-in intelligence automatically selects sync settings and other parameters for quick, easy setup.

RGB 300 Features

The RGB 300 features allow video output to be controlled in several ways:

- *Automatic detection and setup for quick installation*
- *Custom setup and adjustments made from the Front Panel*
- *RGB 300 Windowsâ software, through an RS-232 interface*
- *User-written programs, through the RS-232*

LCD Menu Driven Controls

The RGB 300 does not have "knobs" or "switches" to control its operation. Instead, the "controls" are displayed and adjusted using the Front Panel LCD display and six buttons.
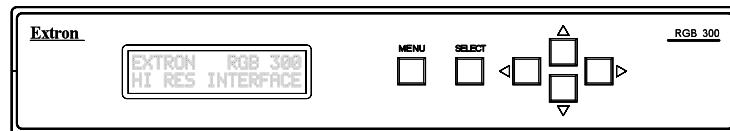
The Front Panel can be used in any of four languages: English, French, Spanish and German. The display has two main functions:

1. The RGB 300 automatically detects and displays vital troubleshooting information, such as the presence of Red, Green and Blue video input signals, as well as the horizontal and vertical scan frequencies.

2. The user can step through, and display any of the controls or features in the interface.

___ *Chapter 3 has details on using the Front Panel.*

Auto-Select and Memory Blocks

There are 25 memory blocks for storing video format information, such as video and sync and control settings. Each block represents one video format configuration (e.g. memory block #06 = VESA3, or #10 = MAC16", etc.). Extron has pre-loaded several memory blocks with configurations that match most video requirements. The RGB 300 automatically loads the first memory block that most closely matches the computer's video output.

Level Control (picture)

This feature is similar to a contrast control on a data monitor, which is used to adjust the intensity of the video level on the projector/monitor screen. There are 255 levels for this Control.

Peaking Control (sharpness)

This control is similar to a sharpness control on a data monitor. It is also used to compensate for long cable runs. There are eight Peaking levels.

Horizontal Shift Control (centering)

This feature shifts the displayed image to the left or right on the projector/monitor screen. There are 255 positions for this control.

Vertical Shift Control (centering)

This feature shifts the displayed image up or down on the projector/monitor screen. There are 255 positions for this control.

Automatic Sync Output Selection

The RGB 300 automatically detects which cables are connected, and sends the Sync On Green, Composite, or Separate Horizontal and Vertical sync signals to the correct output cables. This function can be overridden through menu controls.

Automatic Sync Stripping

The RGB 300 automatically strips all incoming sync from the red, green, and blue channels for clean, crisp signal processing. Sync may be recombined with the green channel if necessary.

Security Lockout

Built into the RGB 300 is a universal passcode which allows the user to "lock out" the front panel controls after setup. This feature makes it impossible to change the controls after setup.

Auto-switching Power Supply

The RGB 300 is equipped with an internal auto-switching power supply that operates from any input voltage in the 90 to 270 VAC, 50/60 Hz. range. No equipment changes are necessary.

RS-232 Control Interface for Remote Control

The RGB 300 has a built-in RS-232 interface to allow the unit to be controlled remotely, in either of two ways:

1. Use the Windows® RGB 300 Control Panel software provided by Extron. Benefite are listed below.

2. The user may write software to control the RGB 300 from a PC, or other system. See the Programmer's Guide is in Appendix A.

The RS-232 protocol is fixed at 9600 baud, no parity, 8 data bits and 1 stop bit.

Benefits of Windows® RGB 300 software

Using the Windows® software provided with the RGB 300 adds several advantages over Front Panel operation.

All of the controls are quicker and easier to use with the on-screen control panel.

Application setups can be stored as disk files, therefore an unlimited number of setups can be stored and reloaded from the PC's hard drive or floppy disk.

See Chapter 5 for details on using this software.

Front Panel Controls

The Front Panel LCD display is normally in a 3-menu default cycle, displaying important video input information:

· The Red, Green and Blue video input signals detected
· The Video Format currently being used
· The horizontal and vertical scan frequencies
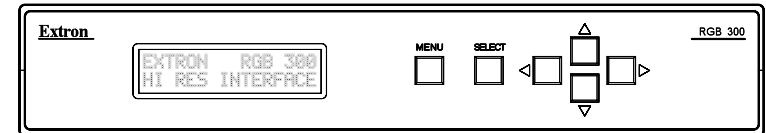
The Front Panel buttons have many functions, depending on what the panel is being used for at any particular time. For example, the user can display, and adjust any controls or switches to adjust the video display. The specific functions for these buttons are described in later procedures. General descriptions follow.

There is a built in time-out function which will return back to the default menus if no buttons are pressed for 20 seconds. If a mistake was made, this is a convenient way out.

Menu button

The **Menu** button is used to break out of the default mode and step through the menus, to view or change the operation. Repeated pressing will loop back to the default menus.

Cursor buttons

The cursor buttons are typically used to step through the options, before making a choice. These options could be alpha characters, numeric settings, load choices, etc. The user may want to change the value of the current setting. (i.e. increase or decrease level, horizontal, shift, peaking etc.) These buttons will also toggle the sync options on and off.

Select button

The **Select** button is used to break out of the default mode and often used to choose the setting, or condition that is currently being displayed in the LCD window.

LCD Display

While using the front panel, the LCD display provides helpful information, such as which buttons to use for choices.

RGB 300 Specifications

Part Number .. 60-148-01
User's Manual .. 68-149-01

Dimensions .. 9.75" W x 7.0" D x 1.75" H

Weight .. 2 lb, 8 oz

Power Supply .. 115/230 volt, auto-switchable, internal

Video:
Analog .. 0.35 to 1.2 volts, peak-to-peak
ECL .. 0.8 to 1 volt, peak-to-peak

Sync:
.. Separate H & V Sync TTL (±)
.. Composite H & V TTL (±)
.. Sync on Green TTL (±)
.. Sync on Red, Green & Blue TTL (±)

Output Signal:
Video .. Analog 0.3 to 1 volt peak-to-peak (variable)
Sync .. Sync on Green (-)
.. Composite Sync (-)
.. Separate H & V (±)

Frequency Compatability:
Horizontal .. 15 - 125 kHz (automatically)
Vertical .. 30 - 170 Hz (automatically)

RGB Video .. Bandwidth 220 MHz (2nS rise time)

LCD Scan Rate Range:
Horizontal .. 15 - 150 kHz
Vertical .. 30 - 150 Hz

LCD Menu (Front Panel):
.. Back-lit alpha-numeric display
.. (English, German, Spanish or French)

Warranty: Two years, parts and labor

Chapter Two

Quick Setup and Installation Check

Before Installing the Extron RGB 300

_____ *Do not connect the power cord until instructed to do so in the following installation procedure. There is no power switch.*

For quick, automatic setup, use the following **Basic Installation** steps. The RGB 300 will detect the scan rate from the computer and automatically 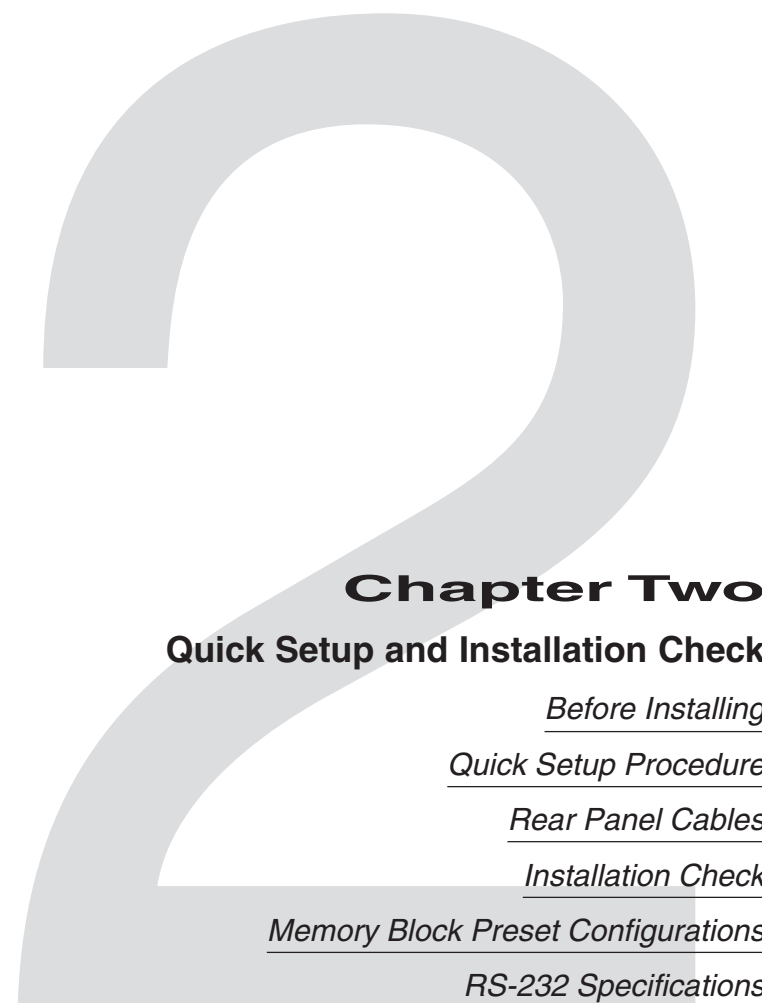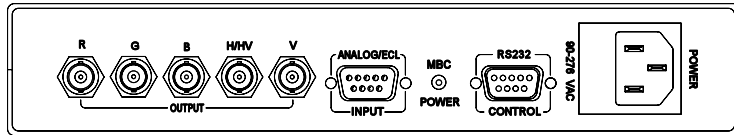load a video format from a preset memory block. For most applications, the installation should be complete. The Front Panel may be used later for custom installation, or to make changes **after** completion of the basic installation.

Quick Setup Procedure (rear panel cables)

1. Turn Computer and Monitor Power OFF
   Do not connect the RGB 300 Power Cable yet. (There is no power switch.)

2. Disconnect the Local Computer Monitor Video Cable.

3. Connect BNC Output Cables to the Data Monitor/Projector - All BNC outputs are RGB analog. The BNC connectors are marked R, B, G, H/V and V. They may be connected any of three ways:

• *Red, Green/sync and Blue, for RGB with sync on green. (3-cable hook up)*
• *Red, Green, Blue and H/HV, for RGB with composite Horizontal and Vertical Sync signals. (4-cable hook up)*
• *Red, Green, Blue, H/HV and V, for RGB with separate Horizontal and Vertical Sync signals. (5-cable hook up)*

The Extron RGB 300 automatically detects which cables are connected and sends sync signals to the correct output.

_____ *The output cables must have 75 W termination at the Data Monitor/ Projector; if not, the automatic setup may not work. Look for a switch on the Data Monitor.*

4. Connect the MBC video cable from the computer (Power PC, PC, Mac or workstation) to this Analog/ECL Input connector, and to the Local Monitor.

4a. MBC Power Connector If the Analog/ECL, MBC video cable has a small, phono jack attached to it, plug it into this female connector.

5. RS-232 Control (optional) -If using a PC, or other system to program the RGB 300, connect the cable here. (pin-outs and interface specifications are given under Installation Check, after this procedure.)

6a. Turn Power ON for the Computer supplying the video input. - (Power PC, PC, Mac or workstation)

6b. Turn Power ON for the Data Monitor/Projector.

6c. Connect power to the RGB 300.

7. Observe that the RGB 300 LCD display lights up, and cycles through three default menus.

7a. The ID, or Title Menu - Displays the name of the unit. To change this display, see the *Editing The ID Screen*, in Chapter 3.
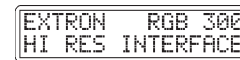
7b. The Scan Rate Menu - From the monitor breakout cable, the RGB 300 detects the scan rate frequencies and displays them. This is an example.
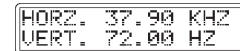
7c. The Video Input Menu **-** If the RGB 300 has detected Red, Green & Blue inputs, the first line displays the letters RGB. The second line displays the Memory Block # and video format that was loaded, either manually or automatically. This is an example.
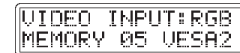
Installation Check

To be sure the installation is complete, do the following:

1. Check that the LCD default menus show the correct information. (as described in Step 7, above). Use the menus as a troubleshooting aide.

If, for example, green input is missing, the RGB display would show the "G" missing. For this example, the second line shows the RGB 300 is using settings stored in Memory 05, which is preset for a VESA2. Check to be sure the correct block was loaded. (See Memory Block table.)

_____ *The memory block that is loaded automatically is the first match the RGB 300 finds. If there is a specialized block with a higher block number, it may not load automatically because the scan for a match begins with block #1.*

```
VIDEO INPUT:...
MEMORY 00 _____
```
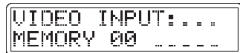
If no video input was detected, no memory block was loaded, and the display will show spaces.

The scan rate menu may be used for troubleshooting as follows:
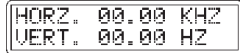
The timing for the RGB 300 is derived from the vertical sync signal. If the vertical sync signal is not present, **both** the vertical and horizontal frequencies will be zeros, even if there is a horizontal signal present.

```
HORZ. 00.00 KHZ
VERT. 00.00 HZ
```

```
HORZ. 00.00 KHZ
VERT. 72.00 HZ
```
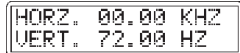
If a vertical sync signal is detected, and the horizontal sync is **not** detected, the vertical frequency is displayed, but the horizontal frequency is zeros.

2. Recheck the **Basic Installation** steps for correct cable connections, etc.

3. Fourteen memory blocks have been loaded with preset video formats to match most computers. Check the following memory preset table to see if the format specifications match those required by the computer video signal.

Memory Block Preset Configurations

The following table shows the memory blocks that are pre-loaded with video scan formats.

Mem #	Format	Pixel x Line	Hor. kHz	Ver. Hz
01	VGA1	640 x 350	31.5	70
02	VGA2	640 x 400	31.5	70
03	VGA3	640 x 480	31.5	60
04	VESA1	800 x 600	35.2	56
05	VESA2	640 x 480	37.9	72
06	VESA3	1024 x 768	48.4	60
07	VESA4	1024 x 768	56.4	70
08	Mac 12"	512 x 384	24.5	60
09	Mac 13"	640 x 480	35.0	60
10	Mac 16"	832 x 624	49.7	75
11	Mac 21"	1152 x 870	68.7	75
12	Sun1	1152 x 900	71.7	76
13	Sun2	1280 x 1024	81.0	76
14	SGI	1280 x 1024	63.9	60

If adjustments are required, go to Chapter 3 for custom installation, to view settings, adjust the current settings, or load a different memory block.

Chapter 5 describes how to use the Windows® RGB 300 Control Panel to do the same functions.

RS-232 interface specifications

9600 baud, no parity, 8 data bits and 1 stop bit.

RS-232 Connector Pins are as follows:
Pin 1 N/C (not connected)
Pin 2 TD Transmit Data (data out of the RGB 300)
Pin 3 RD Receive Data (data into the RGB 300)
Pin 4 N/C
Pin 5 Ground
Pin 6 N/C
Pin 7 Reserved
Pin 8 N/C
Pin 9 N/C

Power Supply

The RGB 300 is equipped with an internal auto-switching power supply that operates from any input voltage in the 90 to 270 VAC, 50/60 Hz range. No equipment changes are necessary. The fuse should only be a 250V 0.5A Slo-Blo type.
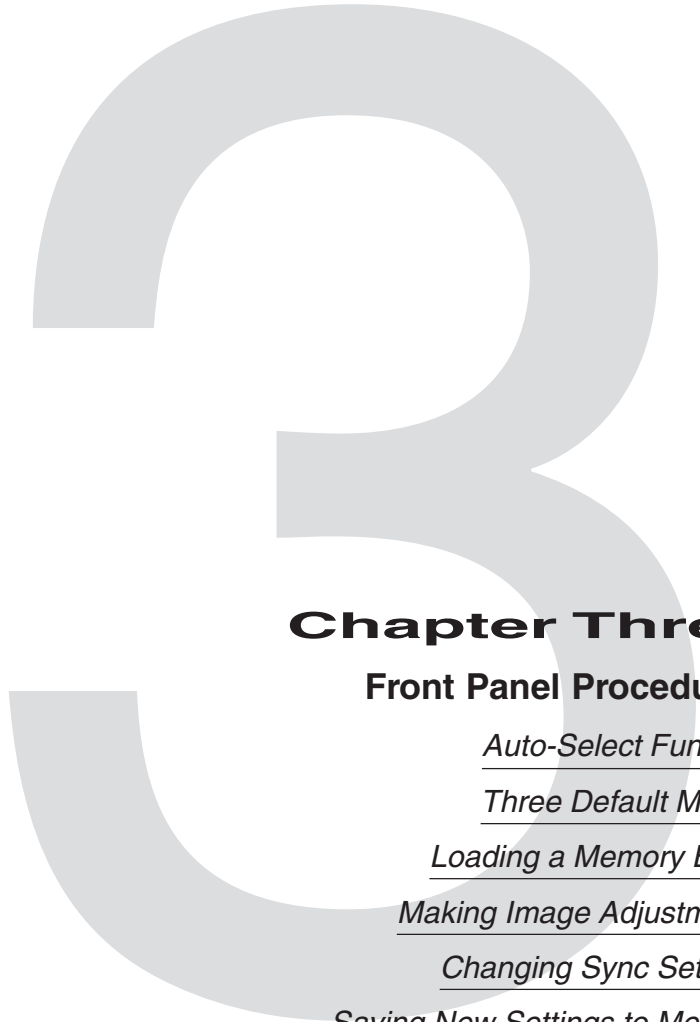
Application Diagram

The diagram below shows possible uses for the RGB 300.
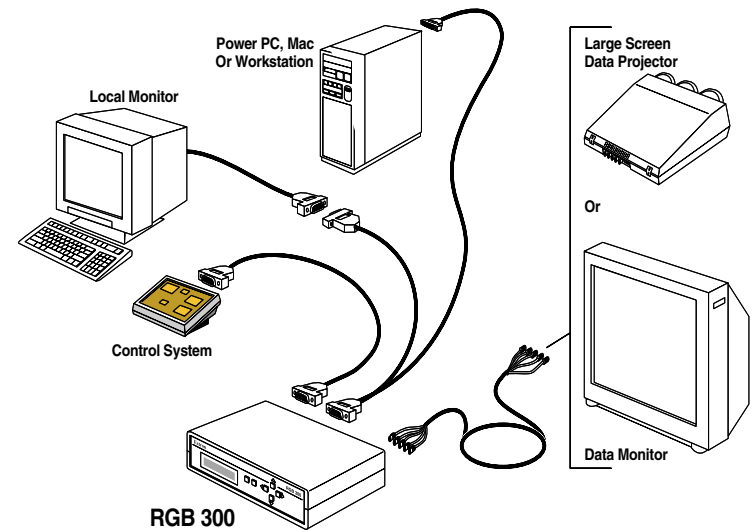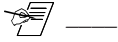
Chapter Three

Front Panel Procedures

✍ ____ *This chapter give procedures for setting up the RGB 300. For the over-all picture, as well as details about each menu, see Chapter 4.*

Auto-Select Function

The Auto-Select function takes place on power up, as well as any time the input scan rate changes. Auto-Select searches all the saved memory blocks for a scan rate match. When a match is found, all the settings from that memory block are automatically loaded. If the input scan rate is within ± 5% of a configuration stored in a memory block, is considered to be a "match". If no match is found then no changes in the settings take place. (It keeps the last configuration.)

In most installations, the Auto-**Select** feature takes care of the setup. If changes in settings are necessary, use the procedure and descriptions that follow. If the installation uses a PC with Windows®, see Chapter 5 to install and use this software.

The Three Default Menus

✍ ____ *These three menus are also described in Chapter 2, Installation Check. Refer to that section if the displays are suspected to be incorrect.*

When the RGB 300 is not in **menu mode**, it is considered to be in the default mode. In this mode the LCD displays 3 default menus for about 2 seconds each.

```
EXTRON    RGB 300
HI RES INTERFACE
```
The first menu is the ID screen, and is factory programmed as shown here. To change this menu, see Editing the ID screen, in Chapter 4.

```
HORZ. 37.90 KHZ
VERT. 72.00 HZ
```
The second menu displays the scan rate detected from the video input. See example here.

```
VIDEO INPUT:RGB
MEMORY 05 VESA2
```
The third menu shows that RGB input signals are present, and which memory block and video format is being used.

This 3-menu default cycle can be broken by pressing either **Select**, or **Menu** keys. The RGB 300 will go from "default" mode to "menu" mode. If using the Windows RGB 300 software, the unit is "busy" to the software when it is in "menu" mode.

To stop on any one of the three default menus, press ▼ + ◄ + ► + and **Select** simultaneously, when the desired menu appears. When stopped, use the ▲ ▼ keys to step through the three menus manually. This action does not affect other RGB 300 functions. Press ▼ + ◄ + ► and **Select** again to return to the 3-menu cycle.

Front Panel Operation

The RGB 300 "controls" are accessed through the Front Panel. Use the LCD display, together with front panel keys to view, or make changes to the current settings. Observe the monitor or projector screen while making adjustments. The menu flow chart on page 3-5 may be used as a guide, while stepping through the menus.

☾ ____ *When using the panel, a pause of 20 seconds causes the RGB 300 to return to the 3-menu default cycle.*

The Front Panel may be used to customize the installation in the following ways:

1. Select and load a preset memory block. (Table on page 3-4.)

2. Make adjustments and save the changes by overwriting the current memory block. (Procedure in this chapter.)

3. Make adjustments and save them in a new memory block, with a new name. (Procedure in this chapter.)

4. Make temporary adjustments that will go away when power is removed. (See Chapter 4.)

5. Make adjustments that remain in local storage when power is removed. (See Chapter 4.)
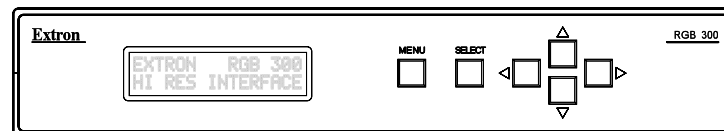
Example steps follow. Each menu is described in Chapter 4.

Load a Configured Memory Block

See Memory Block table, page 3-4, for the configuration choices.

```
LOAD MEM#
01 VGA1
```
1. From the 3-menu default cycle, press **Select** to view the first memory block.

2. Use the ▲ or ► cursor keys to step through the preset blocks; press ▼ or ◄ to backup. Empty blocks will not display.

```
LOAD MEM#
05 VESA2
```
3. When the desired memory block appears, press **Select** to load it. (For this example, block #5.)

4. Observe that the RGB 300 goes back to the 3-menu cycle, this time displaying the new memory block

```
VIDEO INPUT:RGB
MEMORY 05 VESA2
```
5. Check for correct Data Monitor/Projector operation.

Adjust Current Settings

1. From the 3-menu display cycle, press **Menu** to step through, and view the following control menus. Use the cursor keys (⬆ ⬇ ◄□ □►) to change the setting. These are only examples:

```
LEVEL CONTROL
↓     +005      ↑
```
2. Level Control - Use **Cursor** keys to change, and **Menu** to accept and go on.

```
PEAKING CONTROL
↓MIN    ▓     MAX↑
```
3. Peaking Control - Use **Cursor** keys to change, and **Menu** to accept and go on.

```
HORIZONTAL SHIFT
↓     -007      ↑
```
4. Horizontal Shift Control - Use **Cursor** keys to change, and **Menu** to accept and go on.
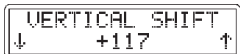
```
VERTICAL SHIFT
↓     +117      ↑
```
5. Vertical Shift Control - Use **Cursor** keys to change, and **Menu** to accept and go on.

✍ ____ *If the image does not move when the shift control is changed, centering options may have been turned Off, or the unit has been set to the **Original Sync** mode. See Sync Option Menus to change this condition.*

```
SYNC ON GREEN
SELECT FOR OPTNS
```
This menu could read: Sync On Green, Sync On Comp, or Sync On Sep. H&V, depending on the setup. Press **Menu** to continue on to save menus (path 6-8a), or press **Select** to go to sync menus (path 6-10b).
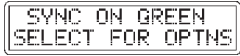
Save Settings

✍ ____ *This menu will not appear if an input scan rate was not detected.*
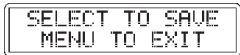
```
SELECT TO SAVE
MENU TO EXIT
```
6-a. There are two paths to choose from: **Menu** will exit to default menus, without saving. **Select** goes to the save menus. (7-a)
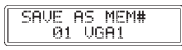
```
SAVE AS MEM#
01 VGA1
```
7-a. Use the **cursor** keys to step to the memory block number where the new settings are to be saved. Use cursor keys to make changes, and then press **Select** to continue.

If the block is already used, the new settings will overwrite the old ones.
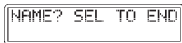
```
NAME? SEL TO END
```
8-a. Use an existing name, or use the ⬆ ⬇ cursor keys to scroll through the alphabet for the character position with the blinking cursor. Use the ◄□ □► cursor keys to move to another character position. When finished with the name, press **Select** to save and exit to the default menus.

✍ ____ *The new information is now displayed in the default menus.*

Change Sync Settings

The sync menu chart below is taken from the over-all flowchart in Chapter 4. It is shown here to illustrate the relationship between the sync menus.

```
SYNC OUTPUT ON:
GREEN CHANNEL
```
6-b. Use the cursor keys ◄□ □► to step through the three output sync choices. Press **Select** to choose one, and go to the next sync option. This path will step through the sync settings.

```
S ON G OPTIONS
SERRATIONS <ON>
```
```
S ON G OPTIONS
ORIG. SYNC <OFF>
```
7,8-b. The next two menus depend on which sync output is in effect. Use any Cursor key (⬆ ⬇ ◄□ □►) to switch between <On> and <Off>. Press **Select** to accept the displayed condition and go to steps 9-b and 10-b.
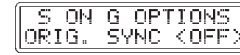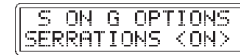
```
CENTERING OPTNS:
HORZ. SHIFT<ON>
```
9,10-b. These two menus allow the horizontal and vertical shift adjustment to be turned <On> or <Off> (allowed or disallowed). Use any cursor key to change the setting, and press **Select** to accept and continue.

```
CENTERING OPTNS:
VERT. SHIFT<ON>
```
Go back to step 6-a (page 3-3) to save new settings and exit.
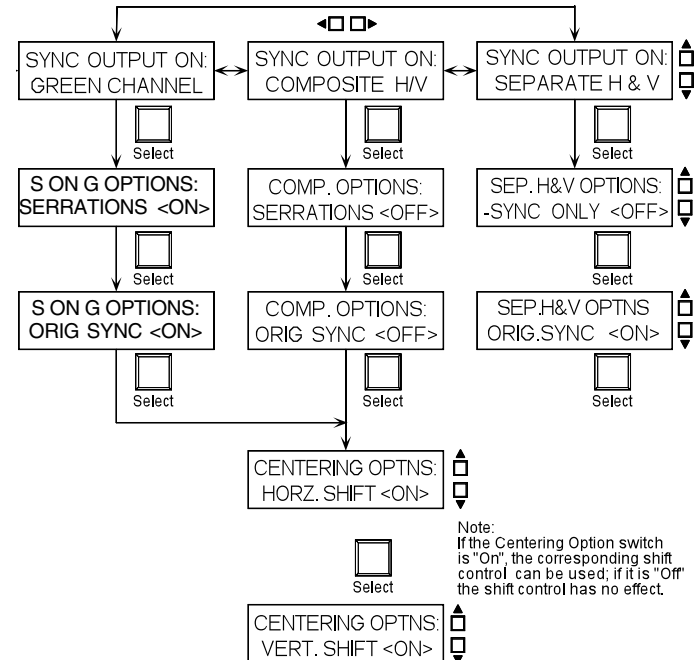
☞ ____ *If cables are not connected, changes cannot be saved.*

Memory Block Preset Configurations

Record any new video format configurations in the
appropriate block numbers in the table below.

☞ ____ *When the RGB 300 scans the memory blocks, it starts with*
Mem #1 and loads the first block it sees that matches the video
input. For this reason, a customized block in a higher memory
location may not load automatically. In this case, the user may
have to load it.

Mem#	Format	Pixel x Line	Hor.kHz	Ver.Hz
01	VGA1	640 x 350	31.5	70
02	VGA2	640 x 400	31.5	70
03	VGA3	640 x 480	31.5	60
04	VESA1	800 x 600	35.2	56
05	VESA2	640 x 480	37.9	72
06	VESA3	1024 x 768	48.4	60
07	VESA4	1024 x 768	56.4	70
08	Mac 12"	512 x 384	24.5	60
09	Mac 13"	640 x 480	35.0	60
10	Mac 16"	832 x 624	49.7	75
11	Mac 21"	1152 x 870	68.7	75
12	Sun1	1152 x 900	71.7	76
13	Sun2	1280 x 1024	81.0	76
14	SGI	1280 x 1024	63.9	60
15				
16				
17				
18				
19				
20				
21				
22				
23				
24				
025				

RGB 300 Digital Universal Interface
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4

LCD Menu Descriptions

Menu Sequence Flowchart

Adjustment Menus

Sync Menus

Save Menus
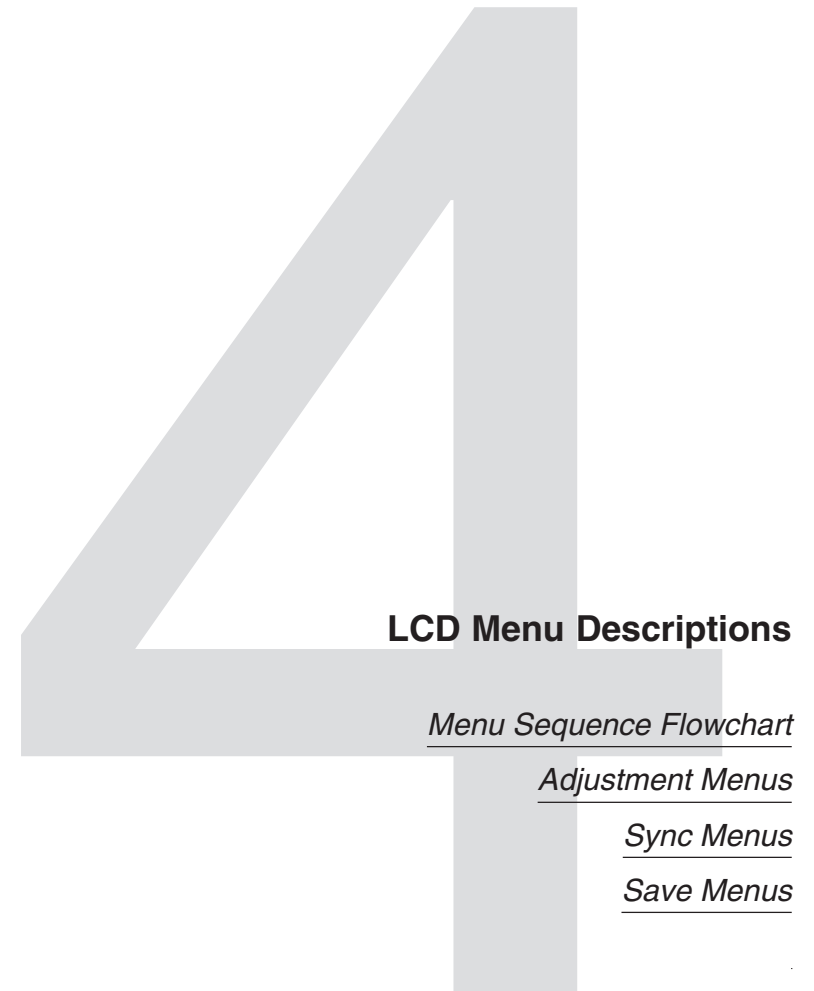
RGB 300 Menu Sequence

Chapter 3 gives procedures for setting up specific functions. This chapter is intended to provide detailed description of all menus, not necessarily in a sequence. Use the menu flowchart to locate the menu you want described.

Actual information displayed in the LCD menus will depend on settings. The individual menus are described on the following pages.

Power Up

Default
EXTRON RGB 300
HI RES INTERFACE

Select

LOAD MEM#
01 VGA1

Default   after 2 seconds
HORZ 00.00KHz
VERT. 00.00Hz

Notation:
To make changes
To step to next position

Default   after 2 seconds
VIDEO INPUT:RGB
MEMORY 00

after 2 seconds

Menu

LEVEL CONTROL
↓   +005   ↑

Menu

PEAKING CONTROL
↓   I   ↑

SYNC OUTPUT ON:
GREEN CHANNEL

SYNC OUTPUT ON:
COMPOSITE H/V

SYNC OUTPUT ON:
SEPARATE H & V

Select   Select   Select

S ON G OPTIONS:
SERRATIONS <ON>

COMP. OPTIONS:
SERRATIONS <OFF>

SEP.H&V OPTIONS:
-SYNC ONLY <OFF>

Menu

HORIZONTAL SHIFT
↓   –007   ↑

See note for
Centering Options.

Select   Select   Select

S ON G OPTIONS:
ORIG SYNC <ON>

COMP. OPTIONS:
ORIG SYNC <OFF>

SEP.H&V OPTNS
ORIG.SYNC <ON>

Menu

VERTICAL SHIFT
↓   +117   ↑

See note for
Centering Options

Select   Select   Select

Menu   Select

SYNC ON GREEN
SELECT FOR OPTNS

CENTERING OPTNS:
HORZ. SHIFT <ON>

Menu

Sync On Green
Sync On Comp
or
Sync On Sep. H&V

Note:
If the Centering Option switch is "On", the corresponding shift control can be used; if it is "Off" the shift control has no effect.

Select

CENTERING OPTNS:
VERT. SHIFT <ON>

No Input
Scan Rate   Scan Rate
Detected

Select

SELECT TO SAVE
MENU TO EXIT

Select

SAVE AS MEM#
01 VGA1

Select

NAME? SEL TO END
01 VGA1

Menu   Select

Any time the front panel is being used, a pause of 20 seconds releases the menu mode, and the RGB 300 goes back to the default cycle, **without** storing the changes. If the user gets lost in the menus, or, if a mistake was made, this is the easy way out. When making temporary adjustments, stop when that adjustment is complete, and allow the time-out to occur.

Editing the ID Screen

The ID menu is one of the displays in the three-menu default cycle. The RGB 300 ships with the ID screen as shown here. However, it can be changed to display any information.

EXTRON RGB 300
HI RES INTERFACE

MENU   SELECT   RGB 300

EXTRON RGB 300
HI RES INTERFACE
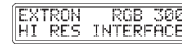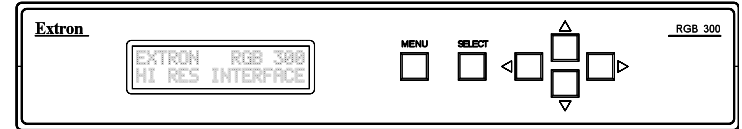
To access the ID screen at any time, press ◄□□► and ▲ and **Select**.

The first character on the ID screen will flash. When entering text, use the ▲ ▼ keys to scroll through the alphabet and change the character, and then ▷ to go to the next character position, or use ◁ to back up. When the new message is finished press **Select** to save it, and return to the 3-menu cycle. The new information will display in the ID screen.

The other two menus of the default cycle display detected RGB and scan input signals (see Chapter 3) These two menus cannot be modified by the user.

Loading a Configured Memory Block

This is described on page 3-2.

Changing the Menu Language

The user may change the menu language by doing the following: When in the 3-menu default cycle, hold the arrow key for the desired language and press **Select**.

▲ + SELECT   Up and **Select**   English

▼ + SELECT   Down and **Select** Spanish

◄ + SELECT   Left and **Select**   French

► + SELECT   Right and **Select** German

Locking/Unlocking The Front Panel

To lock the front panel press and hold the ▲ ▼ keys at the same time, for about 2 seconds, until the display reads as shown. To unlock the keyboard repeat the procedure until the display reads as shown to the left.

```
KEYBOARD IS
 L O C K E D
```

```
KEYBOARD IS
U N L O C K E D
```
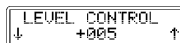
Note: Once the keyboard is locked it will remain locked even if the power is removed. To alert the user upon power up if the keyboard has been locked the unit will show the locked message

Image Adjustment Menus

The four menus used to adjust the display image are used in Chapter 3 procedures, and are explained in detail here. The arrows at each end of these menus remind you which keys to use to make the adjustment.

Notes: The adjustments made can be in three states:
1. Temporary - lost when power is removed.
2. Temporarily saved - automatically stored when power is removed.
If adjustments are to be temporarily stored, you must step through all five menus (Level, Peaking, H-shift, V-shift and Sync On menus)
3. Permanently saved - Stored by the user in a memory block.

```
LEVEL CONTROL
↓     +005     ↑
```

Level (picture) Control menu

The level control is similar to the contrast control on a data monitor. With this menu the user can change the video level with the ▼ cursor key to lower the level or the ▲ key to raise the level. Pressing the key once changes the setting by 001. Holding the key for 2 seconds makes the setting change faster, and holding it longer makes the setting change even faster. (There are 256 steps for this control.)

When the desired video level is displayed, release the cursor key and press **Menu** to go to the next menu, or allow the time-out to occur.

```
PEAKING CONTROL
↓MIN  ▥   MAX↑
```

Peaking (sharpness) Control Menu

The Peaking control allows compensation for losses in signal quality due to cable capacitance. Use this control to adjust the **sharpness** of the picture on the presentation screen. Use the cursor keys to move the indicator to the left or right. Observe the results on the monitor/projection screen while making the adjustment. (The Peaking Control has eight possible settings.)

When the adjustment is complete, release the cursor key and press **Menu** to go to the next menu, or allow the time-out to occur.

Horizontal Shift (centering) menu

Use the cursor keys to move the image left and right, while observing the results on the monitor/projection screen. If no results, see note 1. (There are 256 steps for this control.)

```
HORIZONTAL SHIFT
↓     -007     ↑
```

When the adjustment is complete, release the cursor key and press **Menu** to go to the next menu, or allow the time-out to occur.

Vertical Shift (centering) control menu.

This control moves the displayed image up and down on the presentation screen. While observing (see note 1) the video screen, use the cursor keys to adjust the vertical centering. (There are 256 steps for this control.)
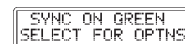
```
VERTICAL SHIFT
↓     +117     ↑
```

When the adjustment is complete, release the cursor key and press **Menu** to go to the next menu, or allow the time-out to occur.

*Note 1: If the image does not move when the shift control (horizontal or vertical) is changed, centering options may have been turned Off, or the unit has been set to the **Original Sync** mode. See Sync Option Menus to change this condition.*

Sync Menus

As shown in the menu flowchart, there are three sets of sync menus, one set for each source. The LCD will display one of three: Sync On Green (example), Sync On Comp, or Sync On Sep H&V.

Sync On (green) menu

```
SYNC ON GREEN
SELECT FOR OPTNS
```

This menu displays where the sync is being sent and allows the user to enter the **Sync Options** menu.

The two choices here are: **Select** key, if sync options are to be viewed/changed, or the **Menu** key to save settings and exit.

```
MENU
```

If the **Menu** key is pressed, one of two things will happen:

a. If there is no signal detected from the video input, the unit returns to the 3-menu default mode, without allowing changes to be saved.

```
SELECT TO SAVE
MENU TO EXIT
```

b. If a video input signal is present, the RGB 300 displays this menu:

Sync Options

There are three possible menu paths entered through the Sync On xxxx menu. Each path goes through five menus related to sync option switches. The **Select** key is used to step through the menus, while the cursor keys are used to toggle the settings.

Sync Output Menu

The first sync menu displayed allows the user to change the sync output. This menu shows the sync defaults to the green video channel. However, it can be changed to **Composite Sync** or **Separate H & V** sync by pressing the ◄□□► **Cursor** keys.

> SYNC OUTPUT ON:
> GREEN CHANNEL

☞ ____ *When set to Sync On Green, automatic sync selection will take place. Auto-Sync means, the RGB 300 will select one of the other output sync settings, if it sees the need. Sync On Composite H/V or Separate H&V should only be forced on if the cable termination impedance is not low enough to trigger the auto-select circuitry in the RGB 300.*

Sync Option Menus

Press **Select** for sync options. The next menu to appear depends on which **Sync Output On** menu was chosen. The two sync menus that follow allow the user to change options related to the type of sync selected. Use the **Select** key to advance to the next menu.

Each of the three sync output choices has a set of menus, shown as three paths in the flowchart (right side) on page 4-1.

If **Sync Output On: Green Channel**, the options will be: Serrations On/Off and Original Sync On/Off. Press cursor keys to change and **Select** to step to the next menu.

If **Sync Output On: Composite H/V**, the options will be: Serrations On/Off and Original Sync On/Off. Press cursor keys to change and **Select** to step to the next menu.

If **Sync Output On: Separate H & V**, the options will be: (negative) - Sync Only On/Off and Original Sync On/Off. Press cursor keys to change and **Select** to step to the next menu.

> S ON G OPTIONS
> SERRATIONS <ON>

The descriptions for these sync options follow.

Serrations Menu (for Sync On Green, or Comp. Options)

This function is normally turned **<On>.** This means if serrations are present in the original sync signal then they will be passed on to the presentation display. Turning this function **<Off>** will cause the serrations to be removed from the sync signal.

Original Sync Menu (for all three sync choices)

This function is normally turned <Off>. This means the incoming sync will be processed, shifted, and then sent to the presentation display. This example shows the menu for Sync On Green, a similar menu appears for Composite H/V or for Separate H and V selections.

> S ON G OPTIONS
> ORIG. SYNC <OFF>

If this function is **<On>,** the sync will pass directly to the presentation display without being processed, and the horizontal and vertical shift controls will have **no** effect.

Negative Sync Only Menu (for Separate H & V)

This option forces the sync polarity on the outputs to be **negative**, even if the incoming sync is positive. This function is normally turned <**Off**>.

> SEP H&V OPTNS:
> -SYNC ONLY <OFF>

Centering Options Menus

After the sync options, two **Centering Options** menus will appear. These two menus allow the user to turn the horizontal or vertical shift <**On**> or <**Off**>. The **Select** key will step through these menus.

> CENTERING OPTNS:
> HORZ. SHIFT<ON>

> CENTERING OPTNS:
> VERT. SHIFT<ON>

Note: If the Centering Option switch is "On", the corresponding Shift Control adjustment can be used; if the Centering Option switch is "Off", the shift adjustment has no effect.

Save Menus

This is the same save/exit menu as described in Chapter 3. As the menu suggests, pressing the **Menu** key will cause the RGB 300 to exit to the 3-cycle default mode (without saving changes.) If the **Select** key is pressed, unit goes to "save as" menu.

> SELECT TO SAVE
> MENU TO EXIT

With the " Save As" menu displayed, press ▲ ▼ to step to the memory block where the current settings are to be stored. It could be to overwrite a preset block, or to choose an empty one.

> SAVE AS MEM#
> 01 VGA1

*Note: If there is no signal present the RGB 300 will return to the default mode without showing this menu. Pressing **Menu** at this point will return the user to the default mode.*

Naming Memory Blocks

When saving new settings to a memory block, the user may enter a six character name for that block using the ▲ ▼ keys to select the alphabetic character and the ◄□□► keys to move the cursor. When finished entering the new name, press **Select** to save the settings to that memory block.

> NAME? SEL TO END

Using Windows® Control Panel Software

Installing the RGB 300 Software

Starting The Software

Using The Control Panel Window

Using The Utility Menu

Using The File Menu

The software provided by Extron runs under Windows® for controlling the RGB 300 through the RS-232 port. This software uses a control panel in a Window, with easy-to-operate controls. This panel may be used to do any of the Front Panel operations, as well as load, change, store and restore video format information in the memory blocks. See picture on next page.

Installing the RGB 300 Software

To install the windows driver software, do the following:

1. Start Windows®

2. Insert the RGB 300 disk into a floppy drive.

3. From the **File** menu in the program manager select **Run**

4. Type the letter of the disk drive and SETUP, for example:

A:\SETUP

5. Follow the on-screen prompts.

✐ _____ *This Setup loads a file called vbrun300.dll. If another Windows® application uses this file, a message may appear concerning a conflict, and the RGB 300 software will **not** load. If this occurs, use Windows File Manager to go to the \windows\system\vbrun300.dll file and rename it. (for example, vbrun300.sav) Start the Setup procedure again - it should work this time. With both vbrun300 files loaded, check the version dates. You may want the file with the later date. This requires renaming the files again.*

6. The software will create a new program group called RGB 300, containing the RGB 300 icon.

Starting the Software
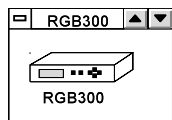
To start the software, double-click (or click & **Enter**) on the RGB 300 icon. When the program loads, all the controls will be inactive until a Comm port is selected. Click on **Comm** from the menu bar, and then click on **Comm1** or **Comm2**, depending on which Comm port is connected to the RGB 300. Once the Comm port is selected, the **File** and **Utilities** functions become active in the menu bar. The software uploads all the current RGB 300 settings and displays them in the control panel Window, and the controls become active. See picture of control window on next page.

✐ _____ *If the RGB 300 front panel is being used, it is in Menu Mode, and is "busy" to the Windows® software. When it is in the 3-menu default mode, it is "ready", and the Remote Mode indicator will appear in the control window.*

Using the RGB 300 Control Panel Window

The RGB 300 window is a control panel, with the controls and displays clearly marked. (See picture.) Four controls use sliding scroll bars to show where the control is currently set, and allow the user to adjust the settings.

Observe the data monitor/projector screen while making adjustments, using the mouse. The controls operate like standard Windows scroll bars, can be used three ways:

· *Click on arrow at end of bar.*
  Click and hold the arrow button to continue scrolling.
· *Click in space between button and arrow at end of bar. This will scroll 10 steps at a time instead of one.*
· *Click and drag the button in either direction to the new position. The selected button blinks.*
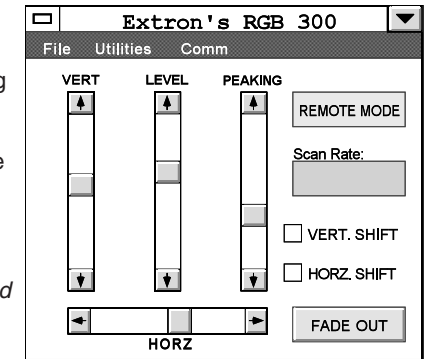
✐ _____ *Although the button moves fast, there is a delay on the monitor, or projector screen because the RGB 300 is not updated until the mouse button is released and the adjustment is complete.*

Remote/Local Mode

This window displays either Local Mode or Remote Mode. In remote mode, the Host can access the RGB 300; in local mode, the Host cannot access it because the front panel is being used.

Scan Rate Display

This window displays the current horizontal and vertical scan rates.

Horizontal and Vertical Shift

These controls allow the corresponding shift controls to be used. If the box is selected, the scroll bar control (described above) will have no effect. This is like the Centering Options menus shown in the flowchart on page 4-1.

Fade In/Fade Out

When this button says "Fade Out" clicking it makes the video display fade to black, and the button changes to say "Fade In". Clicking the button again fades the picture back and changes the button name. This feature is not available from the front panel.
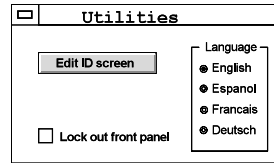
Using the Utility Menu

The utility menu is opened by clicking the **Utilities** item on the menu bar. This screen allows the user to make the following changes in the RGB 300.

· *Click the circle next to the desired language to change the language used by the menu.*
· *Click the box next to Lockout front panel to Lock or Unlock the RGB 300 keyboard.*
· *Click on Edit ID Screen to display the current ID screen text. "Edit ID screen" becomes "Save ID screen" and two text boxes appear below it. Each box allows up to 16 character spaces. The first box is for the top line of the ID display and the second box is for the bottom line. New text can be entered in the two boxes. Click on Save ID Screen to store changes.*
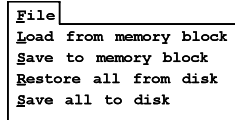
Using the File Menu

The File menu allows the user to load and save any presets to/from the RGB 300 memory. It can also save and restore the memory (all 25 blocks) to/from a disk file.

As described in Chapters two and three, the RGB 300 has 25 memory blocks, each of which can store a preset for a specific scan rate. This includes the resolution, horizontal and vertical frequencies, level, peaking, shift and sync settings. In addition to the 25 blocks of memory presets, the RGB 300 software allows these blocks to be stored to a disk file. The number of stored disk files is up to the user.

Extron has provided a file called "default.300" that is loaded with the software. This file contains all the information required to restore the RGB 300 to condition it was in when it shipped.

Load from a memory block

To load a memory block, click on the **File** item on the menu bar, and then click on **Load from a memory block**. A box will appear showing the current preset memory blocks in the RGB 300. Click on the desired memory block and then click **Ok**.

____ *Using the following features to save and restore scan rate configurations to/from disk allows for a virtually unlimited number of configurations to be saved, and loaded when needed.*

Save All Memory Blocks To Disk
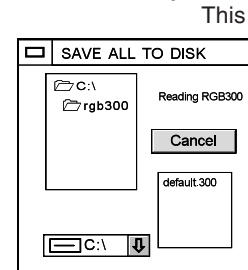
This function allows the user to save all the presets in the RGB 300 memory blocks, together with the ID screen. To use this function click on the **File** menu then click on **Save all to disk**. A dialog box will appear showing any files already saved on the current drive. A different drive (floppy or hard drive) may be selected for saving the memory blocks, and a new filename may be entered. When the data is loaded from the RGB 300, a **Save** button appears. Click **Save** to write the file to disk.
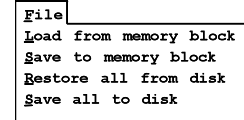
____ *When saving a set of memory blocks to a file, give the file a name that fits the application. This will make it easier to identify for future use. The software adds ".300" to the filename.*

Restore All Memory Blocks From Disk
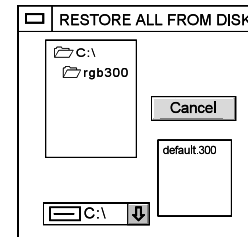
This function loads the RGB 300 with presets and ID screen from a disk file, such as those saved using the previous utility. This can be used to "clone" an RGB 300. Click on the **File** item in the menu bar, and then click on **Restore all from disk**. A dialog box will appear showing any files that were previously saved. Click on the desired **filename**, and then on **Load**. The process takes about 30 seconds.

Note: The RGB 300 will **not** select a new scan format until it detects a change in the input sync, or the unit is reset (powered off and on).
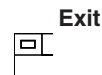
Exit

The RGB 300 software uses standard Windows® operation. To close a Window, double-click on dash in a box in the upper left corner of that Window. To exit the Utilities Menu, or the RGB 300 program, double-click on the close button.

Programmer's Guide

Communication Format

Command Structure

Host-Initiated Commands

RGB 300-Initiated Commands

Command Descriptions

This detailed programming guide is for the user who plans to write his/her own software for controlling the RGB 300. It is not related to do with the Windows software described in Chapter 4. Knowledge of hexadecimal and binary numbers is recommended when writing programs for the RGB 300. Number conversion is discussed on A-5.

Communication Format

The information exchange between the RGB 300 and a Host system (connected to the RS- 232 control port) is based on a proprietary format and protocol. The information is byte oriented. The numeric value of each byte determines how it is interpreted, in one of three categories:

1. Communication control. 00 thru 1F hex (0 thru 31 decimal)

2. Command codes. 20 thru 7F hex (32 thru 127 decimal)

3. Specific data. 80 thru FF hex (127 thru 255 decimal)

Command Structure

Commands from the Host system are made up as follows:
1. Command Code, followed by:
2. Data (if any), followed by:
3. Checksum, followed by:
4. End of transmission mark

Command Codes (20 thru 7F hex)

The command code is one byte, having a value ranging from 20 to 7F hex. However, the command codes used by the RGB 300 are:
30 thru 48 hex for Commands, and 70 thru 73 for Reports. They are listed and described later.

Data Bytes (80 thru FF hex)

Data can follow the Command Code for three reasons:

1. If the Host is sending new settings to the RGB 300, data bytes will contain that new information.

2. Data byte(s) may be needed to make the command more specific. For example, to tell the RGB 300 to load a new block number, a data byte is needed to specify the block number.

3. When the RGB 300 responds to a request for information, it returns the original command code, followed by data bytes.

A data byte always has bit 7 set. Bits 0 thru 6 may be binary encoded, or they may represent numbers 00 thru 7F hex (decimal 0 thru 127) In the examples that follow, the value 80 hex (or 128 decimal) is often added to the information. This makes it a data byte.

Checksum

The checksum is a two byte field (CKS1 & CKS2) built according to the following procedure:

1. The binary sum (2-bytes) is calculated for all command code and data bytes.
   Example: A2B7 hex. is: `1010 0010 1011 0111` binary

2. The two most significant bits (15 & 14) are dropped. (lsb = bit zero) Example: `--10 0010 1011 0111` binary

3. The remaining 14 bits are split into two 7-bit fields
   Example: `--10 0010 1` & `011 0111` binary (45/37 hex)

4. Both 7-bit fields are padded with a "1" in the most significant bit position, thus creating two "data type" bytes. Example: `110 0010 1` & `1011 0111` binary (C5 & B7 hex)

5. CKS1 is the most significant byte (C5), and is transmitted first, followed by CKS2, the least significant byte (B7) of the Checksum.

Alternate Checksum Calculation in Decimal

1. Add all transmitted bytes starting with the command code and ending with the last data byte.
   Example: 41, 655 decimal

2. If the sum is more than 16, 384 then subtract 16, 384 from it.
   Example: 41, 655 - 16, 384 = 25, 271

   2.a. Repeat this step until the sum is less than 16, 384.
       Example: 25, 271 - 16, 384 = 8, 887

3. Divide the result from step 2 by 128
   Example: 8, 887/128 = 69.429

4. Take the integer portion of the result (69) from step 3 and add 128 Example: 69 + 128 = 197 decimal This is the first checksum byte CKS1.

5. Take the integer portion of the result (69) from step 3 and multiply by 128. Example: 69 x 128 = 8, 832

7. Take the result from step 5 (8, 832) and subtract it from the result of step 2 (8, 887), and add 128 to the result.
   Example: 8, 887 - 8, 832 = 55, + 128 = 183 decimal. This becomes the second byte CKS2

End Of Transmission

This is always the single character EOT (04h).

Disabling the Checksum feature

The Checksum feature can be disabled by using the following procedure.

☞ ____ *Although checking of the Checksum can be overridden, the Checksum bytes must be there. Since they are not checked, they can be 80h-FFh.*

1. Remove power from the RGB 300 and disconnect any cables.
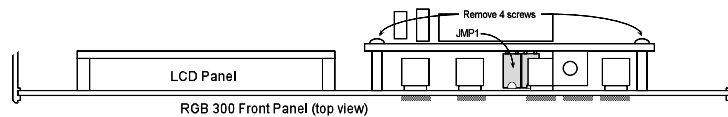
2. Turn the case up-side-down and remove the four screws holding the case together.

3. Turn the case right-side-up and carefully remove the top half of the case. This exposes the main board and the back of the front panel (shown below).
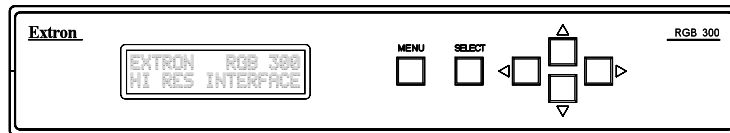
4. Slide the Front Panel upward and out of the grooves in the side of the case.

5. Locate the four (4) screws that hold the circuit board for the panel buttons and remove them. (See picture above.)

6. Pull the circuit board away from the panel and remove jumper JMP1. **Do not remove JMP2.**

7. Use the four screws to reattach the button circuit board to the panel and insert the panel back into the grooves in the side of the case.

8. Put the top cover on the case. Note that the cover can only go on one way, because of the slots in the upper and lower halves of the case.

9. Holding the case tightly together, turn it up-side-down and assemble it with the four screws removed in step 2.

10. Put the RGB 300 back in working order by attaching cables, power, etc.

Host Initiated Communication (CMDn)

Commands originating with the Host, can either send information **to** the RGB 300, or request information **from** the RGB 300. After receiving a command, the RGB 300 executes it and sends a **Response** back to the Host. The Response format (below) repeats the command code, followed by an error code and any data requested. The format of the Response is similar to the that of the original Command, with the added error code (ERC).

1. Command code   CMD
2. Error code   ERC
3. Data (if any)
4. Checksum   CKS1+CKS2
5. End of transmission   EOT

RGB 300 Initiated Communication (RPRTn)

Commands originating with the RGB 300 are called "reports" If the RGB 300 detects certain changes in status, it reports this to the Host system. For example: when the scan rate has changed, the unit has been turned off-line; etc. These reports follow the same general command format, except that no response is expected from the Host.

Timing

When Commands are sent to the RGB 300, the Response will always be delayed due to normal processing time. This delay has two components:

1. Communications delay on the RS-232 bus.
2. RGB 300 processing time.

The total delay is typically less than 100 msec.

RS-232 Connector Pin-outs

RS-232 Connector Pins are as follows:

Pin 1 N/C (not connected)
Pin 2 TD Transmit Data (data out of the RGB 300)
Pin 3 RD Receive Data (data into the RGB 300)
Pin 4 N/C
Pin 5 Ground
Pin 6 N/C
Pin 7 Reserved
Pin 8 N/C
Pin 9 N/C

Command List

Command	Hex	Page	Description
CMD0	30	A-7	Report measured scan rate
CMD1	31	A-8	Report contents of ID screen
CMD2	32	A-9	Report RGB code (video detector)
CMD3	33	A-10	Report programmed sync code
CMD4	34	A-10	Report software version
CMD5	35	A-11	Report actual sync code (auto-selected)
CMD6	36	A-11	Report video level
CMD7	37	A-12	Set video level
CMD8	38	A-12	Report horizontal shift
CMD9	39	A-13	Set horizontal shift
CMD10	3A	A-13	Report vertical shift
CMD11	3B	A-14	Set vertical shift
CMD12	3C	A-14	Report peaking level
CMD13	3D	A-14	Set peaking level
CMD14	3E	A-15	Report menu language
CMD15	3F	A-15	Set menu language
CMD16	40	A-15	Report current block number
CMD17	41	A-16	Select new block number
CMD18	42	A-16	Report fade to black status
CMD19	43	A-16	Set fade to black status
CMD20	44	A-17	Report keyboard lock status
CMD21	45	A-17	Set keyboard lock status
CMD22	46	A-18	Program ID screen
CMD23	47	A-19	Save current in memory block
CMD24	48	A-19	Read name of memory block

Reports

RPRT0	70	A-20	Signal change
RPRT1	71	A-20	New block selected
RPRT2	72	A-20	Entered menu mode (local)
RPRT3	73	A-20	Exited menu mode (remote)

Communications Control

EOT	04	End of transmission
XON	11	Resume transmission
XOFF	13	Interrupt transmission

Binary/hex/decimal Conversion Table

The table below shows how to convert data bytes from one numbering system to another. One byte is 8 bits, or 2 hex characters. In RGB 300 communications, all data bytes are identified by having bit 7 = 1, therefore it is not included in the following computations. The first hex value shows the number as a data byte and the second is data value (example: 86/06h).

Bit #s in byte:		7	6	5	4	3	2	1	0
Decimal value =		n/a	64	32	16	8	4	2	1
Dec.	Hex	Add the decimal values above for equivalents.							
0	80/00h	n/a	0	0	0	0	0	0	0
1	81/01h	n/a	0	0	0	0	0	0	1
2	82/02h	n/a	0	0	0	0	0	1	0
3	83/03h	n/a	0	0	0	0	0	1	1
4	84/04h	n/a	0	0	0	0	1	0	0
5	85/05h	n/a	0	0	0	0	1	0	1
6	86/06h	n/a	0	0	0	0	1	1	0
7	87/07h	n/a	0	0	0	0	1	1	1
8	88/08h	n/a	0	0	0	1	0	0	0
9	89/09h	n/a	0	0	0	1	0	0	1
10	8A/0Ah	n/a	0	0	0	1	0	1	0
11	8B/0Bh	n/a	0	0	0	1	0	1	1
12	8C/0Ch	n/a	0	0	0	1	1	0	0
13	8D/0Dh	n/a	0	0	0	1	1	0	1
14	8E/0Eh	n/a	0	0	0	1	1	1	0
15	8F/0Fh	n/a	0	0	0	1	1	1	1
16	90/10h	n/a	0	0	1	0	0	0	0
etc.									
32	A0/20h	n/a	0	1	0	0	0	0	0
etc.									
64	C0/40h	n/a	1	0	0	0	0	0	0
etc.									
99	E3/63h	n/a	1	1	0	0	0	1	1
100	E4/64h	n/a	1	1	0	0	1	0	0
etc.									
127	FF/7Fh	n/a	1	1	1	1	1	1	1

Example:	Bit #s in byte:	7	6	5	4	3	2	1	0
	Dec. value =	n/a	64	32	16	8	4	2	1

Ignore bit 7 and add the binary values for decimal equivalents.

		7	6	5	4	3	2	1	0
Hex D3/53h =		n/a	1	0	1	0	0	1	1

Decimal equivalent = 64 + 16 + 2 + 1 = 83d.

Using Commands

The command descriptions that follow use hexadecimal and binary numbering systems. The command breakdown is explained on page A-1 and numbering conversion is explained on A-5. If it is necessary to convert to decimal, review to those sections.

CMD0 (30) - Report Scan Rate

The Host asks RGB 300 to report the current scan rate frequencies. The RGB 300 responds with the frequencies detected from the video input. Of the 12 data bytes, six are for horizontal and six for vertical frequency. One data byte represents one digit, or the decimal point.

Format:
    CMD0, CKS1, CKS2, EOT
    (30h), (80h), (B0h), (04h)

Response: CMD0, ERC, data1, data2, data3, data4, data5, data6, data7, data8, data9, data10, data11, data12, CKS1, CKS2, EOT

Where:

Horizontal Frequency, in kHz
data1 = ascii code for hundreds position, + 80h i.e.,   X00.00 kHz
data2 = ascii code for tens position, + 80h i.e.,   0X0.00 kHz
data3 = ascii code for ones position, + 80h i.e.,   00X.00 kHz
data4 = ascii code for a decimal point + 80h
data5 = ascii code for tenths position, +80h i.e.,   000.X0 kHz
data6 = ascii code for hundredths position, + 80h i.e.,   000.0X kHz

Vertical Frequency in Hz
data7 = ascii code for hundreds position, + 80h i.e.,   X00.00 Hz
data8 = ascii code for tens position, +80h i.e.,   0X0.00 Hz
data9 = ascii code for ones position, + 80h i.e.,   00X.00 Hz
data10 = ascii code for decimal point + 80h
data11 = ascii code for tenths position, + 80h i.e.,   000.X0 Hz
data12 = ascii code for hundredths position, + 80h i.e., 000.0X Hz

CMD1 (31) - Report Contents of ID Screen

The Host asks the RGB 300 to send the text that is programmed to the ID screen. The RGB 300 responds with the information shown in the LCD display. Bits 0-6 of each data byte represents one alpha-numeric digit, and bit 7 is set.

Format:
    CMD1, CKS1, CKS2, EOT
    (31h), (80h), (B1h), (04h)

Response:
    CMD1, ERC, data1, data2, ..., data32, CKS1, CKS2, EOT
    Data bytes always have bit 7 = 1.

Where: data1 = ascii code of character 1 (on the first line of display) + 80h
    data2 = ascii code of character 2 + 80h
    data3 = ascii code of character 3 + 80h
    data4 = ascii code of character 4 + 80h
    data5 = ascii code of character 5 + 80h
    data6 = ascii code of character 6 + 80h
    data7 = ascii code of character 7 + 80h
    data8 = ascii code of character 8 + 80h
    data9 = ascii code of character 9 + 80h
    data10 = ascii code of character 10 + 80h
    data11 = ascii code of character 11 + 80h
    data12 = ascii code of character 12 + 80h
    data13 = ascii code of character 13 + 80h
    data14 = ascii code of character 14 + 80h
    data15 = ascii code of character 15 + 80h
    data16 = ascii code of character 16 + 80h
    data17 = ascii code of character 1
            (on the 2nd line of display) + 80h
    data18 = ascii code of character 2 + 80h
    data19 = ascii code of character 3 + 80h
    data20 = ascii code of character 4 + 80h
    data21 = ascii code of character 5 + 80h
    data22 = ascii code of character 6 + 80h
    data23 = ascii code of character 7 + 80h
    data24 = ascii code of character 8 + 80h
    data25 = ascii code of character 9 + 80h
    data26 = ascii code of character 10 + 80h
    data27 = ascii code of character 11 + 80h
    data28 = ascii code of character 12 + 80h
    data29 = ascii code of character 13 + 80h
    data30 = ascii code of character 14 + 80h
    data31 = ascii code of character 15 + 80h
    data32 = ascii code of character 16 + 80h

CMD2 (32) Report RGB Code (video input detector)

The Host asks the RGB 300 which video signals are detected on the R, G, and B inputs. The RGB 300 sends one data byte, with a bit assigned to each color.

Format:
CMD2, CKS1, CKS2, EOT
(32h), (80h), (B2h), (04h)

Response:
CMD2, ERC, data1, CKS1, CKS2, EOT

Where:
data1 is bit encoded as follows:
If bit 0 = 0, Red is detected, if 1, Red is not detected.
If bit 1 = 0, Green is detected, if 1, it is not detected.
If bit 2 = 0 Blue is detected, if 1, it is not detected.
bits 3 - 6 = not defined (can be 0's or 1's).
bit 7 = 1

Bit #s in byte:	7	6	5	4	3	2	1	0
Hex 8xh =	1	n/a	n/a	n/a	n/a	B	G	R

If Red, Green and Blue are detected, data1 = 80d.

If bits 3-6 =0s, the result will give one of the following results:
80h = Red, Green, and Blue are all detected
81h = Green and Blue are detected
82h = Red and Blue are detected
83h = Blue is detected
84h = Red and Green are detected
85h = Green is detected
86h = Red is detected
87h = None is detected

CMD3 (33) - Report Programmed Sync Code

The Host asks the RGB 300 to report which sync code has been set. The RGB 300 responds with a data byte containing sync information.

Format:
CMD3, CKS1, CKS2, EOT
(33h), (80h), (B3h), (04h)

Response:
CMD3, ERC, data1, CKS1, CKS2

Where:
data1 is bit encoded as follows:
bit0 = if 0, serrations are removed; if 1, they are passed.
bit1 = if 0, sync is forced negative; if 1, polarity follows input.
bit2 = if 0, original sync is active; if 1, sync is processed.
bit3 = if 0, no sync is added to green; if 1, composite sync is added to the green video channel.
bit4 = if 0, composite sync is output on the H/HV connector; if 1, horizontal sync only appears at the H/HV connector.
bit5-6 = reserved (can be 1's or 0's)
bit 7 = 1 must be set.)

✍ _____ *These are the programmed sync options and will be overridden by the RGB 300's termination detection circuit. This circuit can change where the sync is sent, regardless of bits 3 and 4.*

CMD4 (34) - Report Software Version

The Host asks the RGB 300 for the software version number. The RGB 300 responds with the version encoded in a data byte.

Format:
CMD4, CKS1, CKS2, EOT
(34h), (80h), (B4h), (04h)

Response:
CMD4, ERC, data1, CKS1, CKS2, EOT

Where:
data1 = software version times 10, + 128

Bit #s in byte:	7	6	5	4	3	2	1	0
Dec. value =	128	64	32	16	8	4	2	1
If data1 = 8Dh =	1	0	0	0	1	1	0	1

Decimal equivalent = 128 + 8 + 4 + 1 = 141d.

To convert this use the where data1 = 141:
1. disregard bit 7 (or subtract 128 from data1). (141 - 128 = 13)
2. divide step 1 result by ten. (13/10 1.3, this is version)

CMD5 (35) - Report Actual Sync Code

The Host asks the RGB 300 for the sync code being used. (This is the programmed code modified by the sync auto-select circuit.) The RGB 300 sends a data byte containing the sync code.

Format:
    CMD5, CKS1, CKS2, EOT
    (35h), (80h), (B5h), (04h)

Response:
    CMD5, ERC, data1, CKS1, CKS2, EOT

Where:
    data1 is encoded same as CMD3.

CMD6 (36) - Report Video Level

The Host asks the RGB 300 for the current video level. The RGB 300 responds with two data bytes: one for the ± sign, and the other is a number for the level.

Format:
    CMD6, CKS1, CKS2, EOT
    (36h), (80h), (B6h), (04h)

Response:
    CMD6, ERC, data1, data2, CKS1, CKS2, EOT

Where:
    data1= sign byte: 81h = level is positive; 82h = level is negative.
    data2 = the number for the level, + 80h

Note: If data2 is 80h, the level number is zero and the level adjustment is in the middle of its range.

Example:
    if Level = -67 then response will be:
    CMD6, ERC, data1, data2, CKS1, CKS2, EOT
    (36h), (80h), (82h), (C3h), (83h), (FBh), (04h)

CMD7 (37) - Set Video Level

The Host tells the RGB 300 to set the video level. The command includes two data bytes that provide this information. The data bytes are codes the same as in CMD6.

Format:
    CMD7, data1, data2, CKS1, CKS2, EOT
    (37h), (xx), (xx), (xx), (xx), (04h)

Where:
    data1 = sign byte, 81h sets a positive video level;
                    82h sets a negative level.
    data2 = the number for the level, + 80h

Example:
    To set the video level to +50d (see table on page A-5) then:
    a. data1 = 81h (sign is positive)
    b. data2 = B2h, or, (50 = 32+16+2 = 32h + 128)
    c. send the following transmission:
        CMD7, data1, data2, CKS1, CKS2, EOT
        (37h), (81h), (B2h), (82h), (EAh), (04h)

Response:
    CMD7, ERC, CKS1, CKS2, EOT

CMD8 (38) - Report Horizontal Shift

The Host asks the RGB 300 for the horizontal information. The RGB 300 responds with three data bytes: one for "enabled" status, one for polarity (±) and one for the numeric value.

Format:
    CMD8, CKS1, CKS2, EOT
    (38h), (80h), (B8h), (04h)

Response:
    CMD8, ERC, data1, data2, data3, CKS1, CKS2, EOT

Where:
    data1 = enable byte, if 81h, shift is on, if 80h, shift is off.
    data2 = sign byte: 81h = shift is positive; 82h = shift is negative.
    data3 = horizontal shift value, plus 80h

If data3 is 80h, the level number is zero and the horizontal shift adjustment is in its center position.

Example: if Horz. Shift = +22 and **On**, then response will be:
    CMD8, ERC, data1, data2, data3, CKS1, CKS2, EOT
    (38h), (80h), (81h), (81h), (96h), (84h), (D0h), (04h)

CMD9 (39) - Set Horizontal Shift

The Host tells the RGB 300 to set the horizontal shift. This command is like CMD8, but the data is going the other way. The command includes three data bytes for the horizontal shift information.

Format:
CMD9, data1, data2, data3, CKS1, CKS2, EOT
(39h), (xx), (xx), (xx), (ck), (ck), (04h)

Where:
data1 = enable byte, 80h turns off shift, 81h turns on shift.
data2 = sign byte, 81h sets a positive horizontal shift;
         82h sets a negative horizontal shift.
data3 = shift number, + 80h

Example:
CMD9, data1, data2, data3, CKS1, CKS2, EOT
(39h), (81h), (81h), (A2h), (83h), (DDh), (04h)
To set the horizontal shift to +34 (34d = 32+2 =22h) then:
a. data2 = 81h (sign is positive)
b. data3 = 34 (22h) + bit7 = A2h
c. send the following transmission

Response:
CMD9, ERC, CKS1, CKS2, EOT

CMD10 (3A) - Report Vertical Shift

The Host asks the RGB 300 for the current vertical shift information. The RGB 300 responds with three data bytes: one for "enabled" status, one for polarity (±) and one for the numeric value.

Format:
CMD10, CKS1, CKS2, EOT
(3Ah) , (80h), (B8h), (04h)

Response:
CMD10, ERC, data1, data2, data3, CKS1, CKS2, EOT

Where:
data1 = enable byte: 80h = shift is off; 81h = shift is on.
data2 = sign byte: 81h = shift is positive; 82h = shift is negative.
data3 = vert. shift + 80h

☞ _____ *If data3 is 80h, the level number is zero and the vertical adjustment is in its center position.*

Example:
if Vert. Shift = +22 and On then response will be:
CMD10, ERC, data1, data2, data3, CKS1, CKS2, EOT
(3Ah), (80h), (81h), (81h), (96h), (84h), (D2h), (04h)

CMD11 (3B) - Set Vertical Shift

The Host tells the RGB 300 to set the vertical shift information. This is like CMD10, but the data is going the other direction. The command includes three data bytes to provide the vertical settings.

Format:
CMD11, data1, data2, data3, CKS1, CKS2, EOT
(3Bh), (xx), (xx), (xx), (xx), (xx), (04h)

Where:
data1 = enable byte: 80h = shift is off; 81h = shift is on.
data1 = sign byte ; 81h = positive shift; 82h = negative shift.
data2 = shift + 80h

Response:
CMD11, ERC, CKS1, CKS2, EOT

Example:
To set the vertical shift to +34 (34d = 32+2 =22h) then:
a. data2 = 81h (sign is positive)
b. data3 = 34 (22h) + bit7 = A2h
c. send the following transmission
CMD11, data1, data2, data3, CKS1, CKS2, EOT
(3Bh), (81h), (81h), (A2h), (83h), (DFh), (04h)

CMD12 (3C) - Report Peaking Level

The Hosts asks the RGB 300 for the current peaking level. The RGB 300 responds with a data byte containing the peaking level value.

Format:
CMD12, CKS1, CKS2, EOT
(3Ch) , (80h), (BCh), (04h)

Response:
CMD12, ERC, data1, CKS1, CKS2, EOT

Where:
data1 = peaking level (0-7) + bit7 = 80-87h

CMD13 (3D) - Set Peaking Level

The Host tells the RGB 300 to set the peaking level. This is like CMD12, but the Host sends the peaking level value in a data byte.

Format:
CMD13, data1, CKS1, CKS2, EOT
(3Dh), (xx), (xx), (xx), (04h)

Where:
data1 = peaking level (0-7) + 80h

Response:
    CMD13, ERC, CKS1, CKS2, EOT

CMD14 (3E) - Report Menu Language
The Host asks the RGB 300 which language is currently being used to display the menus. The RGB 300 responds with one data byte with the language mode encoded.

Format:
    CMD14, CKS1, CKS2, EOT
    (3Eh), (80h), (BEh), (04h)

Response:
    CMD14, data1, CKS1, CKS2, EOT

Where:
    data1 =   80h for English
           81h for Spanish
           82h for German
           83h for French

CMD15 (3F) - Set Menu Language
The host tells the RGB 300 change menu displays to a different language. This command includes a data byte to tell the RGB 300 which language mode to set.

Format:
    CMD15, data1, CKS1, CKS2, EOT
    (3Fh), (xx), (xx), (xx), (04h)

Where:
    data1 =   80h to set to English
           81h to set to Spanish
           82h to set to German
           83h to set to French

Response:
    CMD15, ERC, CKS1, CKS2, EOT

CMD16 (40) - Report Current Block Number
The Host asks the RGB 300 which memory block number is currently being used. The RGB 300 responds with a data byte containing the memory block number.

Format:
    CMD16, CKS1, CKS2, EOT
    (40h), - (80h), (C0h), (04h)

Response:
    CMD16, data1, CKS1, CKS2, EOT

Where:
    data1 = current memory block number + 80h

CMD17 (41) - Select New Block Number
The Host tells the RGB 300 to load a preset configuration from a memory block number. The block contains settings for a different video format. See table for pre-loaded memory blocks on page 3-4.

Format:
    CMD17, data1, CKS1, CKS2, EOT
    (41h), (xx), (ck), (ck), (04h)

Where:
    data1= block number to load + 80h

Response:
    CMD17, ERC, CKS1, CKS2, EOT

Video Fade Mode
Through RS-232 programming, or through Windows® software, the RGB 300 can make the picture fade to black, or from black to picture.

☞ ____ *Because there is no front panel control for this function, the user must take care **not** to leave the RGB 300 in the fade mode. If the unit is disconnected from power and reset then the fade will default to off.*

CMD18 (42) - Report Fade to Black Status
The Host asks the RGB 300 if the video is in the "fade" mode. The RGB 300 responds with a data byte telling if this is true or false.

Format:
    CMD18, CKS1, CKS2, EOT
    (42h), - (80h), (C2h), (04h)

Response:
    CMD18, data1, CKS1, CKS2, EOT

Where:
    data1 = 80h if video is **not** in the fade-to-black mode.
           81h if video **is** fade-to-black mode.

CMD19 (43) - Set the Video Fade Status
The Host tells the RGB 300 to fade the video in or out.

Format:
    CMD19, data1, CKS1, CKS2, EOT
    (43h), - (xx), - (xx), - (xx), (04h)

Where:
    data1 = 80h to fade the video in
           81h to fade video out (to black)

Response:
   CMD19, ERC, CKS1, CKS2, EOT

CMD20 (44) - Report Keyboard Lock Status
   The Host asks the RGB 300 if the keyboard is locked or
   unlocked. The RGB 300 responds with a data byte containing
   this information.

   Format:
      CMD20, CKS1, CKS2, EOT
      (44h), (80h), (C4h), (04h)

   Response:
      CMD20, data1, CKS1, CKS2, EOT

   Where:
      data1 = 80h if keyboard is unlocked;
            81h if keyboard is locked

CMD21 (45) - Set Keyboard Lock Status
   The Host tells the RGB 300 to lock or unlock the keyboard.
   The command includes a data byte to provide this
   information.

   Format:
      CMD21, data1, CKS1, CKS2, EOT
      (45h), - (xx), (cc), (cc), (04h)

   Where:
      data1= 80h to Unlock the keyboard;
            81h to Lock the keyboard

   Response:
      CMD21, ERC, CKS1, CKS2, EOT

CMD22 (46) - Program ID Screen
   The Host tells the RGB 300 to change the contents of the ID
   screen. The command includes 32 data bytes of ascii
   information - 16 bytes for the first line and 16 for the second
   line.

Note: Refer to an ASCII table for the necessary codes and set bit7 on.

   Format:
      CMD22, data1, data2, .- - - , data32, CKS1, CKS2, EOT

   Where:
      data1 = ascii code of character 1 (on 1st line of display) +
   80h
      data2 = ascii code of character 2 + 80h
      data3 = ascii code of character 3 + 80h
      data4 = ascii code of character 4 + 80h
      data5 = ascii code of character 5 + 80h
      data6 = ascii code of character 6 + 80h
      data7 = ascii code of character 7 + 80h
      data8 = ascii code of character 8 + 80h
      data9 = ascii code of character 9 + 80h
      data10 = ascii code of character 10 + 80h
      data11 = ascii code of character 11 + 80h
      data12 = ascii code of character 12 + 80h
      data13 = ascii code of character 13 + 80h
      data14 = ascii code of character 14 + 80h
      data15 = ascii code of character 15 + 80h
      data16 = ascii code of character 16 + 80h

      data17 = ascii code of character 1 (2nd line of display) +
   80h
      data18 = ascii code of character 2 + 80h
      data19 = ascii code of character 3 + 80h
      data20 = ascii code of character 4 + 80h
      data21 = ascii code of character 5 + 80h
      data22 = ascii code of character 6 + 80h
      data23 = ascii code of character 7 + 80h
      data24 = ascii code of character 8 + 80h
      data25 = ascii code of character 9 + 80h
      data26 = ascii code of character 10 + 80h
      data27 = ascii code of character 11 + 80h
      data28 = ascii code of character 12 + 80h
      data29 = ascii code of character 13 + 80h
      data30 = ascii code of character 14 + 80h
      data31 = ascii code of character 15 + 80h
      data32 = ascii code of character 16 + 80h

   Response:
      CMD22, ERC, CKS1, CKS2, EOT

CMD23 (47) - Save Current In Memory Block

        The Host tells the RGB 300 to save the current settings in a specific memory block, and give it a name. This command includes seven data bytes to provide the memory block number, and the ascii characters that make up the name.

Note: Refer to an ASCII table for the necessary codes and set bit7 on.

        Format:
            CMD23, data1, data2, data3, data4, data5, data6, data7, CKS1, CKS2, EOT
            (47h), - (xx), (xx), (xx), (xx), (xx), (xx), (xx), (xx), (xx), (04h)

        Where:
            data1 = block number to save in (1-25) + 80h
            data2 = ascii code of first character of name + 80h
            data3 = ascii code of second character of name + 80h
            data4 = ascii code of third character of name + 80h
            data5 = ascii code of forth character of name + 80h
            data6 = ascii code of fifth character of name + 80h
            data7 = ascii code of sixth character of name + 80h

        Response:
            CMD23, ERC, CKS1, CKS2, EOT

CMD24 (48) - Read Name Of Memory Block

        The Host asks the RGB 300 send the name of a specific memory block #xx. The RGB 300 responds with six data bytes containing the ascii code for the characters that make up the block name.

📝 ____ *There are 25 memory blocks. The first 14 are loaded at the factory with some popular video configurations. See list on page 3-4.*

        Format:
            CMD24, data1, CKS1, CKS2, EOT
            (48h), - (xx), (xx), (xx), (04h)

        Where:
            data1 = number of the block from which to read name.

        Response:
            CMD24, data2, data3, data4, data5, data6, data7, CKS1, CKS2, EOT

        Where:
             data2 = ascii code of first character + 80h
             data3 = ascii code of second character + 80h
             data4 = ascii code of third character + 80h
             data5 = ascii code of forth character + 80h
             data6 = ascii code of fifth character + 80h
             data7 = ascii code of sixth character + 80h

        RPRT commands are generated when something changes in the RGB 300. These status change commands are described here.

RPRT0 (70) - Signal Change

        The RGB 300 has detected a change in the incoming **Sync** signals, causing it to automatically select a new memory block. The report includes a data byte containing the number of the new memory block.

        Format:
            RPRT0, data1, CKS1, CKS2, EOT
            (70h), (xx), (xx), (xx), (04h)

        Where:
            data1 = the number of the selected memory block (1-25) + 80h

RPRT1 (71) - New Block Selected

        The RGB 300 is informing the Host that the user has manually selected a new memory block from the Front Panel. The report includes a data byte containing the number of the new memory block.

        Format:
            RPRT1, data1, CKS1, CKS2, EOT
            (71h), (xx), (xx), (xx), (04h)

        Where:
            data1 = the number of the new memory block (1-25) + 80h

RPRT2 (72) - Entered Menu Mode (local)

        The RGB 300 is informing Host that it has entered local menu mode (someone is using the Front Panel) and no remote commands can be honored until it returns to default mode.

        Format:
            RPRT2, CKS1, CKS2, EOT
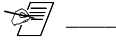   (72h), (80h), (F2h), (04h)

RPRT3 (73) - Exited Menu Mode (remote mode)

        The RGB 300 is informing Host it has exited menu mode and is now ready to accept commands from the Host.

        Format:
            RPRT3, CKS1, CKS2, EOT
            (73h), (80h), (F3h), (04h)

        This concludes the programming information.