



KRAMER ELECTRONICS LTD.

# USER MANUAL

MODEL:

**FC-340**

SDI Scaler/Embedder/Scan  
Converter

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P/N: 2900-000768 Rev 4

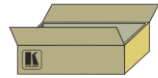
# FC-340 SDI Scaler/Embedded/Scan Converter Quick Start Guide



This guide helps you install and use your product for the first time. For more detailed information, go to [http://www.kramerelectronics.com/support/product\\_downloads.asp](http://www.kramerelectronics.com/support/product_downloads.asp) to download the latest manual or scan the QR code on the left.

## Step 1: Check what's in the box

- FC-340** SDI Scaler/Embedder/Scan Converter
- Power cord
- 4 Rubber feet
- 1 Quick Start Guide
- 2 Rack "ears"



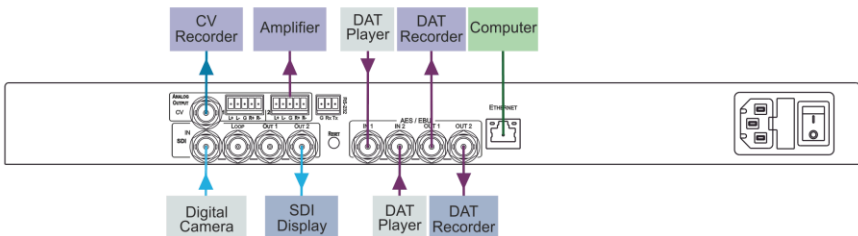
Save the original box and packaging materials in case your Kramer product needs to be returned to the factory for service.

## Step 2: Install the FC-340

Mount the device in a rack (using the supplied rack "ears") or place it on a shelf.

## Step 3: Connect the inputs and outputs

Switch off the power to all devices before connecting them to your **FC-340**.



When connecting AV equipment to the **FC-340** we recommend that you use Kramer high-performance cable for best results.

## Step 4: Connect the power

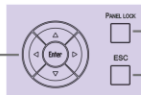
Connect the **FC-340** to the mains supply using the supplied power cord.



## Step 5: Operate the device

Operate the device using the front panel controls, RS-232 and Ethernet

Use the keypad to navigate the menu and modify parameters



Press and hold to lock the front panel buttons. Press and hold again to unlock the buttons

Press ESC to move back one level in the menu

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# 1 Introduction

Welcome to Kramer Electronics! Since 1981, Kramer Electronics has been providing a world of unique, creative, and affordable solutions to the vast range of problems that confront the video, audio, presentation, and broadcasting professional on a daily basis. In recent years, we have redesigned and upgraded most of our line, making the best even better!

Our 1,000-plus different models now appear in 11 groups that are clearly defined by function: GROUP 1: Distribution Amplifiers; GROUP 2: Switchers and Routers; GROUP 3: Control Systems; GROUP 4: Format/Standards Converters; GROUP 5: Range Extenders and Repeaters; GROUP 6: Specialty AV Products; GROUP 7: Scan Converters and Scalers; GROUP 8: Cables and Connectors; GROUP 9: Room Connectivity; GROUP 10: Accessories and Rack Adapters and GROUP 11: Sierra Products.

Congratulations on purchasing your **FC-340** *SDI Scaler/Embedder/Scan Converter* which is ideal for broadcast and production studios as well as digital and analog AV authoring.

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## 2 Getting Started

We recommend that you:

- Unpack the equipment carefully and save the original box and packaging materials for possible future shipment
- Review the contents of this user manual



Go to [http://www.kramerelectronics.com/support/product\\_downloads.asp](http://www.kramerelectronics.com/support/product_downloads.asp) to check for up-to-date user manuals, application programs, and to check if firmware upgrades are available (where appropriate).

### 2.1 Achieving the Best Performance

To achieve the best performance:

- Use only good quality connection cables (we recommend Kramer high-performance, high-resolution cables) to avoid interference, deterioration in signal quality due to poor matching, and elevated noise levels (often associated with low quality cables)
- Do not secure the cables in tight bundles or roll the slack into tight coils
- Avoid interference from neighboring electrical appliances that may adversely influence signal quality
- Position your Kramer **FC-340** away from moisture, excessive sunlight and dust



This equipment is to be used only inside a building. It may only be connected to other equipment that is installed inside a building.

### 2.2 Safety Instructions



**Caution:** There are no operator serviceable parts inside the unit

**Warning:** Use only the power cord that is supplied with the unit

**Warning:** Do not open the unit. High voltages can cause electrical shock! Servicing by qualified personnel only

**Warning:** Disconnect the power and unplug the unit from the wall before installing

## 2.3 Recycling Kramer Products

The Waste Electrical and Electronic Equipment (WEEE) Directive 2002/96/EC aims to reduce the amount of WEEE sent for disposal to landfill or incineration by requiring it to be collected and recycled. To comply with the WEEE Directive, Kramer Electronics has made arrangements with the European Advanced Recycling Network (EARN) and will cover any costs of treatment, recycling and recovery of waste Kramer Electronics branded equipment on arrival at the EARN facility. For details of Kramer's recycling arrangements in your particular country go to our recycling pages at <http://www.kramerelectronics.com/support/recycling/>.

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## 3 Overview

The **FC-340 SDI Scaler/Embedder/Scan Converter** is ideal as a broadcast-quality video scaler and audio embedder/de-embedder for digital signals up to 3G HD-SDI.

All mentions of SDI in this manual include signals up to and including 3G HD-SDI.

The **FC-340** features:

- A maximum data rate of 3Gpbs
- 1 SDI video input and 2 SDI video outputs
- 1 re-clocked, looping video output
- 1 composite video output
- 1 balanced audio output
- 2 AES/3id audio inputs and 2 AES/3id audio outputs



Note: Some machines may have AES/EBU printed instead of AES-3id.

- The option to select either the embedded audio or to embed two independent audio groups
- Kramer reKlocking™ & Equalization Technology that rebuilds the digital signal to travel longer distances
- An LCD text display for easy configuration and operation

## 4 Defining the FC-340

[Figure 1](#) defines the front panel of the **FC-340**.

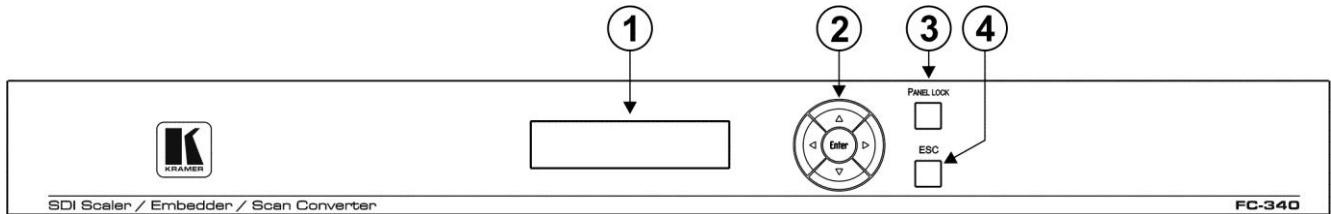


Figure 1: FC-340 SDI Scaler/Embedder/Scan Converter Front Panel

| # | Feature                 | Function   |
|---|-------------------------|--|
| 1 | LCD Readout             | Displays either the input/output resolution currently selected or the menu during configuration  |
| 2 | Menu Navigation Buttons | Press the Enter, up (▲), down (▼), left (◀) and right (▶) buttons to navigate the menu, and modify parameters or values (see <a href="#">Section 7.2</a> ) |
| 3 | PANEL LOCK Button       | Press and hold to lock the front panel buttons. Press and hold again to unlock the buttons (see <a href="#">Section 7.4</a> )                              |
| 4 | ESC Button              | Press to move back one level through the menu (see <a href="#">Section 7.2</a> )   |

[Figure 2](#) defines the rear panel of the **FC-340**.



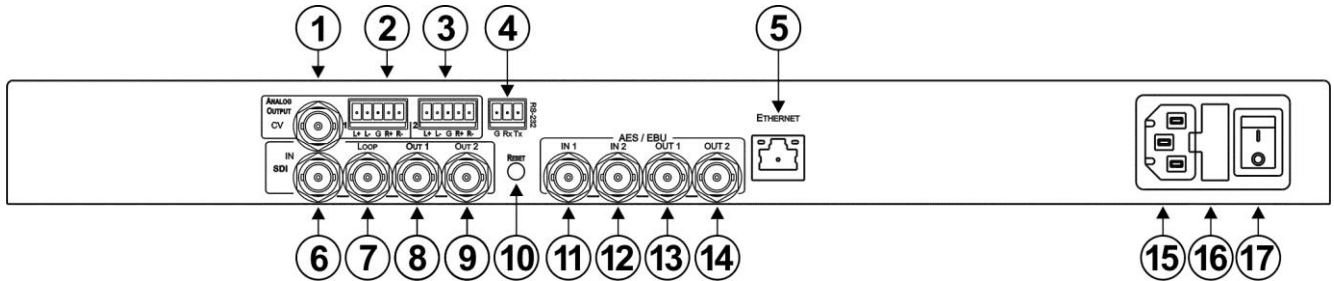


Figure 2: FC-340 SDI Scaler/Embedder/Scan Converter Rear Panel

| #  | Feature                                  | Function   |
|----|--|--|
| 1  |  | CV BNC Video Connector   |
| 2  | ANALOG OUTPUT                            | Audio 1 5-pin Terminal Block   |
| 3  |  | Audio 2 5-pin Terminal Block   |
| 4  | RS-232 3-pin Serial Port Terminal Block  | Connect to a serial controller (see <a href="#">Section 6.1</a> )  |
| 5  | ETHERNET RJ-45 Connector                 | Connect to a PC controller via a LAN (see <a href="#">Section 6.2</a> )  |
| 6  | IN SDI BNC Connector                     | Connect to an SDI signal source  |
| 7  | LOOP BNC Connector                       | Connect to an SDI acceptor   |
| 8  | OUT 1 BNC Connector                      | Connect to an SDI acceptor   |
| 9  | OUT 2 BNC Connector                      | Connect to an SDI acceptor   |
| 10 | RESET Button                             | Press and hold while switching on the device to reset to factory default parameters (see <a href="#">Section 9</a> ) |
| 11 | AES/3id<br>(AES/EBU in<br>some machines) | IN 1 BNC Connector   |
| 12 |  | IN 2 BNC Connector   |
| 13 |  | OUT 1 BNC Connector  |
| 14 |  | OUT 2 BNC Connector  |
| 15 | AC Mains                                 | Power Socket   |
| 16 |  | Fuse   |
| 17 |  | Power Switch   |

## 5 Installing the FC-340 in a Rack

**Before installing in a rack**, be sure that the environment is within the recommended range:

|                        |                                |
|------------------------|--------------------------------|
| OPERATING TEMPERATURE: | 0° to +40°C (32° to 104°F)     |
| STORAGE TEMPERATURE:   | -40° to +70°C (-40° to 158°F)  |
| HUMIDITY:              | 10% to 90%, RHL non-condensing |



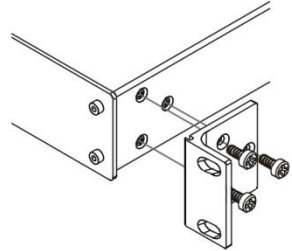
### CAUTION!

When installing on a 19" rack, avoid hazards by taking care that:

1. It is located within the recommended environmental conditions, as the operating ambient temperature of a closed or multi unit rack assembly may exceed the room ambient temperature.
2. Once rack mounted, enough air will still flow around the machine.
3. The machine is placed straight in the correct horizontal position.
4. You do not overload the circuit(s). When connecting the machine to the supply circuit, overloading the circuits might have a detrimental effect on overcurrent protection and supply wiring. Refer to the appropriate nameplate ratings for information. For example, for fuse replacement, see the value printed on the product label.
5. The machine is earthed (grounded) in a reliable way and is connected only to an electricity socket with grounding. Pay particular attention to situations where electricity is supplied indirectly (when the power cord is not plugged directly into the socket in the wall), for example, when using an extension cable or a power strip, and that you use only the power cord that is supplied with the machine.

### To rack-mount a machine:

1. Attach both ear brackets to the machine. To do so, remove the screws from each side of the machine (3 on each side), and replace those screws through the ear brackets.



2. Place the ears of the machine against the rack rails, and insert the proper screws (not provided) through each of the four holes in the rack ears.

#### Note:

- In some models, the front panel may feature built-in rack ears
- Detachable rack ears can be removed for desktop use
- Always mount the machine in the rack before you attach any cables or connect the machine to the power
- If you are using a Kramer rack adapter kit (for a machine that is not 19"), see the Rack Adapters user manual for installation instructions available from our Web site

## 6 Connecting the FC-340



Switch off the power to all devices before connecting them to your **FC-340**. After connecting your **FC-340**, connect its power and then switch on the power to the other devices.

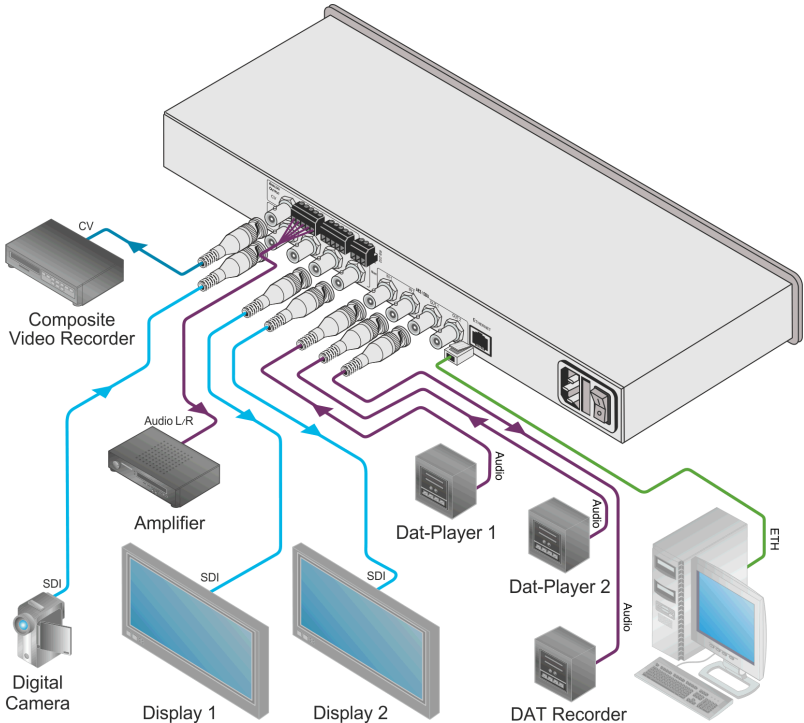


Figure 3: Connecting the FC-340 SDI Scaler/Embedder/Scan Converter

To connect the FC-340 as illustrated in the example in [Figure 3](#):

1. Connect an SD/HD/3G HD-SDI source (for example, an HD digital video camera) to the SDI IN BNC connector.
2. Connect the SDI OUT 1 BNC connector to an SDI acceptor (for example, an SDI display).

3. Connect the SDI OUT 2 BNC connector to an SDI acceptor (for example, an SDI display).
4. Connect the CV ANALOG OUTPUT BNC connector to a composite video acceptor (for example, a composite video recorder). See the Note in [Section 7.1](#).
5. Connect the CV 5-pin terminal block to a balanced audio acceptor (for example, an amplifier).
6. Connect AES digital audio sources (for example, DAT players) to the AES/3id IN 1 and IN 2 BNC connectors.
7. Connect the AES/3id OUT 1 BNC connector to an AES digital audio acceptor (for example, a DAT recorder).  
Some machines may have AES/EBU printed instead of AES-3id.
8. Optional—Connect a controller via either RS-232 or a LAN to the Ethernet RJ-45 connector.

## 6.1 Connecting a Serial Controller to the FC-340

You can connect to the **FC-340** via an RS-232 connection using, for example, a PC.

### To connect to the FC-340 via RS-232:

- Connect the 3-pin terminal block on the rear panel port of the **FC-340** (pin G to pin 5, pin Rx to pin 3, pin Tx to pin 2) to the RS 232 9-pin D-sub port on your PC

## 6.2 Connecting to the FC-340 via Ethernet

You can connect the **FC-340** via Ethernet via either of the following methods:

- A crossover cable (see [Section 6.2.1](#)) for direct connection to the PC
- A straight through cable (see [Section 6.2.2](#)) for connection via a network hub or network router

After connecting the Ethernet port, you have to install and configure your Ethernet Port. For detailed instructions, see the Ethernet Configuration Guide (Lantronix) in the technical support section on our Web site <http://www.kramerelectronics.com>.

## 6.2.1 Connecting the Ethernet Port Directly to a PC

You can connect the Ethernet port on the **FC-340** to the Ethernet port on your PC via a crossover cable with RJ-45 connectors. This type of connection is recommended for identification of the factory default IP Address of the **FC-340** during the initial configuration.

### To configure your PC after connecting the Ethernet port:

1. Right-click the **My Network Places** icon on your desktop.
2. Select **Properties**.
3. Right-click **Local Area Connection Properties**.
4. Select **Properties**.

The **Local Area Connection Properties** window appears.

5. Select the **Internet Protocol (TCP/IP)** and click the **Properties** Button.

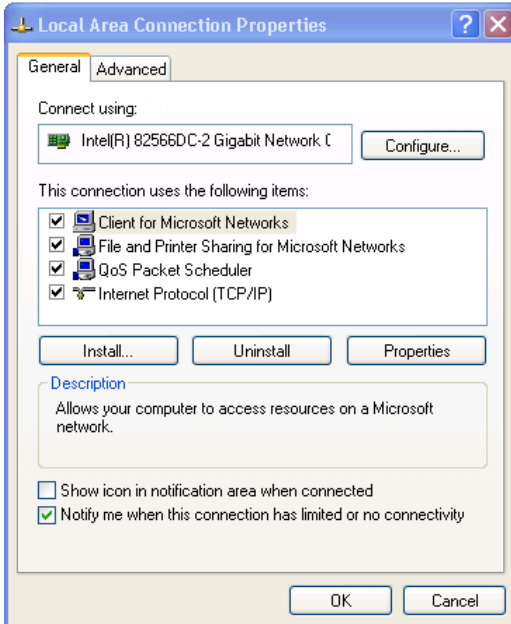


Figure 4: Local Area Connection Properties Window

6. Select **Use the following IP Address** and enter the details as shown in [Figure 5](#). You can use any IP address in the range 192.168.1.1 to 192.168.1.255 (excluding 192.168.1.39) that is provided by your IT department.

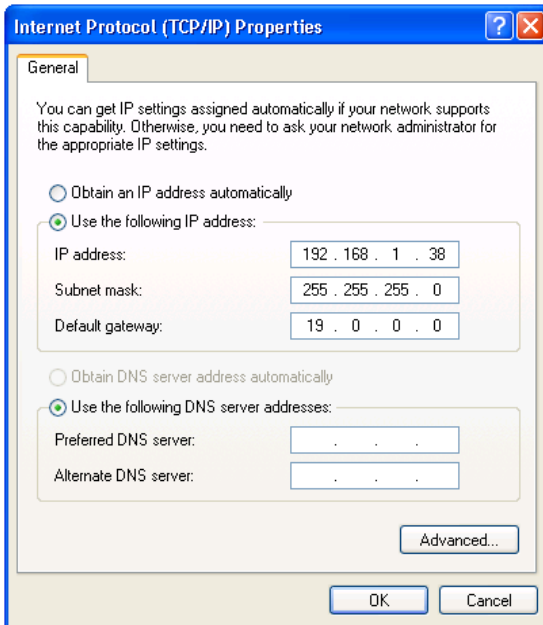


Figure 5: Internet Protocol (TCP/IP) Properties Window

7. Click **OK**.

## 6.2.2 Connecting to the Ethernet Port via a Network Switch/Hub

**To connect to the Ethernet port on the FC-340 via a network switch/hub:**

- Connect the PC to the Ethernet network switch/hub using a straight through cable

## 6.3 Connecting the Balanced/Unbalanced Stereo Audio Output

This section illustrates how to wire the devices to the balanced audio output:

- A balanced stereo output connection, see [Figure 6](#)
- An unbalanced stereo output connection, see [Figure 7](#)

L+ L- G R+ R-

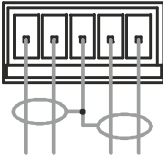


Figure 6: Balanced Stereo Audio Connection

L+ L- G R+ R-

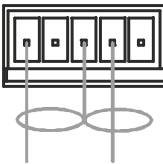


Figure 7: Unbalanced Stereo Audio Connection

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## 7 Operating the FC-340

In general operation, the video signal received on the SDI IN connector is output simultaneously on both SDI OUT connectors as well as the composite video ANALOG OUTPUT connector. The audio embedded in the SDI input signal is output on both AES/3id connectors simultaneously as well as on the balanced audio ANALOG OUTPUT.

When the **FC-340** is powered on, the following is displayed briefly:

FC340

KRAMER

The device then performs a self test. If the test is successful the Menu is displayed as shown below.

VIDEO OUT >

AUDIO OUT >

If there is no button activity for approximately 30 seconds, the display reverts to displaying the input status and output resolution similar to that shown below:

IN unlocked

OUT 1080p59.94

### 7.1 Changing the Output Resolution

**To change the output resolution:**

1. Press the Enter button to display the menu.  
The menu is displayed.
2. Using the up (▲) or down (▼) button, move through the menu options until the flashing cursor is on Video Out.



3. Press Enter.  
The Video Out options are displayed.
4. Using the up (▲) or down (▼) button, move through the Video Out options until the flashing cursor is on Resolution.
5. Press Enter.  
The Resolution options are displayed.
6. Using the up (▲) or down (▼) button, select the required output resolution.
7. Press Enter.  
The selected output resolution is saved.

**Note:** The CV output follows the frame rate of the selected resolution. For 50Hz resolutions the PAL standard is used, and for 59.94/60Hz resolutions NTSC is used.

## 7.2 Using the Menu

The menu is shown on the display when the Enter button is pressed. If there is no button activity for approximately 30 seconds, the display reverts back to the Input/Output display.

Navigation through the menu is performed as follows:

- Enter—display the menu or select a parameter/value
- Up (▲) or Right (▶)—scroll up through the parameter/value list
- Down (▼) or Left (◀)—scroll down through the parameter/value list
- ESC—Move to the first level menu

The main menu comprises six sections:

- Video Out (see [Section 7.2.1](#))
- Audio Out (see [Section 7.2.2](#))
- Status (see [Section 7.2.3](#))
- Comm Settings (see [Section 7.2.4](#))
- System (see [Section 7.2.5](#))

## 7.2.1 Video Out Sub-menu

The parameters in the Video Out sub-menu set the output video characteristics.

| Parameter    | Description                            | Options  |
|--------------|--|--|
| Resolution   | Sets the output resolution             | 1080p59.94, 1080p60, 1080p50, NTSC, PAL, 720p59.94, 720p60, 720p50, 1080i59.94, 1080i60, 1080i50<br>Default—720p/59.94 |
| Genlock Mode | Sets the source for the genlock signal | No Genlock, Input<br>Default—No Genlock  |

**Note:** The CV output frame rate follows the above settings (see [Section 7.1](#))

## 7.2.2 Audio Out Sub-menu

The parameters in the Audio Out sub-menu set the audio output characteristics.

| Parameter   | Description   | Options  |
|-------------|---|--|
| Embedding > | Sets the audio group to embed Group 1, Group 2, Group 3 and Group 4 | Off, Embedded input, AES input<br>Default—Embedded input   |
| AES Out 1   | Embeds the AES audio input 1  | Gr1 Pair1, Gr1 Pair2, Gr2 Pair1, Gr2 Pair2, Gr3 Pair1, Gr3 Pair2, Gr4 Pair1, Gr4 Pair2, AES In1, AES In2, Off<br>Default—Gr1 Pair1 |
| AES Out 2   | Embeds the AES audio input 2  | Gr1 Pair1, Gr1 Pair2, Gr2 Pair1, Gr2 Pair2, Gr3 Pair1, Gr3 Pair2, Gr4 Pair1, Gr4 Pair2, AES In1, AES In2, Off<br>Default—Gr1 Pair2 |

## 7.2.3 Status Sub-menu

The parameters in the Status sub-menu display the input conditions.

| Parameter     | Description   | Options                             |
|---------------|---|-------------------------------------|
| Video Input > | Displays the locked/unlocked status of the video format and genlock | Format Unlocked<br>Genlock Unlocked |
| Audio Input   | Displays the audio group status                                     | G1 G2 G3 G4                         |

## 7.2.4 Comm Settings Sub-menu

The parameters in the Comm Settings sub-menu set the network IP and display the serial communications values.

| Parameter |            | Description                     | Options  |
|-----------|------------|---------------------------------|--|
| NETWORK   | IP address | Sets the IP network address     | Any valid IP address<br>Default—192.168.001.039      |
|           | IP mask    | Sets the IP network mask        | Any valid subnet<br>Default—255.255.000.000          |
|           | IP gateway | Sets the IP gateway address     | Any valid gateway address<br>Default—000.000.000.000 |
|           | IP port    | Sets the IP port number         | Any valid TCP port<br>Default—05000                  |
| RS-232    | Baud       | Displays the baud rate          | 115200   |
|           | Parity     | Displays the parity bit setting | none   |

## 7.2.5 System Sub-menu

The parameters in the System sub-menu display the device versions and set the LCD display characteristics.

| Parameter | Description                 |
|-----------|-----------------------------|
| FIRMWARE  | The device firmware version |
| FPGA VER  | The device FPGA version     |
| S/N       | The device serial number    |

## 7.3 Resetting the Device to Factory Default Configuration

**To reset the device to the factory default configuration:**

1. Turn the device off.
2. Press and hold the Reset button on the rear panel of the device.
3. While holding the button depressed, turn the device on.
4. Hold the button depressed for 10 seconds and release the button.  
The configuration is reset to the factory default.

## 7.4 Locking and Unlocking the Front Panel

You can lock the front panel buttons to prevent unwanted key presses from changing the current configuration.

### To lock the front panel:

- Press and hold the Panel Lock button.  
The button lights, the Locked message is displayed briefly, and the front panel buttons are locked. Pressing any button causes the Locked message to display briefly and the Panel Lock button to flash

### To unlock the front panel:

- Press and hold the Panel Lock button.  
The button no longer lights and the front panel buttons are unlocked

## 7.5 Updating the Firmware Using the K-Upload Software

The **FC-340** uses a microcontroller that runs firmware located in flash memory.

The latest version of firmware and upgrade instructions (*Kramer K-Upload Guide*) can be downloaded from the Kramer Web site at

<http://www.kramerelectronics.com>.

## 8 Technical Specifications

|                        |               |   |  |              |                |  |
|------------------------|---------------|---|--|--------------|----------------|--|
| INPUTS:                | Digital Video | 1 SDI serial video, 75Ω on BNC connectors                                 | SD                                       | SMPTE-259M   | SMPTE-125M     | 480i–59.94   |
|                        |               |   |  |              | ITU-R BT.656-5 | 576i–50  |
|                        |               |   | HD                                       | SMPTE-292    | SMPTE-296M     | 720p–59.94/60/50   |
|                        |               |   |  |              | SMPTE-274M     | 1080i–59.94/60/50,<br>1080p–29.97/30/25,<br>23.98/24, 23.98sF/<br>24sF |
|                        |               |   | 3G                                       | SMPTE-424M   | SMPTE-296M     | 1080p–59.94/60/50  |
|                        |               | Max. input level:   | 800mVpp /75Ω                             |              |                |  |
|                        | Digital Audio | 2 AES-3id audio on BNC connectors   | Sample conversion rate: 48kHz            |              |                |  |
| OUTPUTS:               | Digital Video | 2 SDI video, 75Ω on BNC connectors  | SD                                       | SMPTE-259M   | SMPTE-125M     | 480i–59.94   |
|                        |               |   |  |              | ITU-R BT.656-5 | 576i–50  |
|                        |               |   | HD                                       | SMPTE-292M   | SMPTE-296M     | 720p–59.94/60/50   |
|                        |               |   |  |              | SMPTE-274M     | 1080i–59.94/60/50  |
|                        |               |   | 3G                                       | SMPTE-424M   | SMPTE-296M     | 1080p–59.94/60/50  |
|                        |               |   | Max. output level:                       | 800mVpp /75Ω |                |  |
|                        | Analog Video  | 1 Composite on a BNC connector, PAL/NTSC (according to output frame rate) |  |              |                |  |
|                        | Digital Audio | 2 AES-3id audio on BNC connectors   | Sample conversion rate: 48kHz            |              |                |  |
|                        | Analog Audio  | 2 Balanced stereo audio on a 5-pin terminal block                         | Bandwidth: 20kHz                         |              |                |  |
| POWER CONSUMPTION:     |               |   | 100-240V AC 50/60Hz 22VA                 |              |                |  |
| OPERATING TEMPERATURE: |               |   | 0° to +40°C (32° to 104°F)               |              |                |  |
| STORAGE TEMPERATURE:   |               |   | –40° to +70°C (–40° to 158°F)            |              |                |  |
| HUMIDITY:              |               |   | 10% to 90%, RHL non-condensing           |              |                |  |
| DIMENSIONS:            |               |   | 19" x 7.2" x 1U (W, D, H) rack mountable |              |                |  |
| WEIGHT:                |               |   | 1.6kg (3.53lbs) approx.                  |              |                |  |
| ACCESSORIES:           |               |   | Rack "ears"                              |              |                |  |

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## 9 Default Parameters

### 9.1 Default Communication Parameters

| RS-232                        |               |
|-------------------------------|---------------|
| Baud Rate                     | 115,200       |
| Data Bits                     | 8             |
| Stop Bits                     | 1             |
| Parity                        | None          |
| Command Format                | ASCII         |
| Example (Output 1 to Input 1) | #AV 1>1<CR>   |
| Ethernet                      |               |
| IP Address                    | 192.168.1.39  |
| Subnet mask                   | 255.255.255.0 |
| Default gateway               | 192.168.1.1   |
| TCP Port #                    | 5000          |
| UDP Port #                    | 50000         |
| Maximum UDP Ports             | 10            |
| Maximum TCP Ports             | 4             |

# 10 Kramer Protocol

The **FC-340** supports the Kramer Protocol 3000.

The Protocol 3000 RS-232 communication protocol lets you control the machine from any standard terminal software (for example, Windows® HyperTerminal Application).

## 10.1 Protocol 3000 Syntax

Host message format:

| Start | Address (optional)     | Body    | Delimiter |
|-------|------------------------|---------|-----------|
| #     | <i>Destination_id@</i> | message | <b>CR</b> |

Simple command (commands string with only one command without addressing):

| start | body                                   | delimiter |
|-------|--|-----------|
| #     | Command SP Parameter_1,Parameter_2,... | <b>CR</b> |

Commands string (formal syntax with commands concatenation and addressing):

# Address@ **Command\_1** Parameter1\_1,Parameter1\_2,... |Command\_2  
Parameter2\_1,Parameter2\_2,... |Command\_3 Parameter3\_1,Parameter3\_2,...  
|...**CR**

Device message format:

| Start | Address (optional) | Body    | Delimiter    |
|-------|--------------------|---------|--------------|
| ~     | <i>Sender_id@</i>  | message | <b>CR LF</b> |

Device long response (Echoing command):

| Start | Address (optional) | Body   | Delimiter    |
|-------|--------------------|--|--------------|
| ~     | <i>Sender_id@</i>  | <b>command</b> <b>SP</b> [ <i>param1 ,param2 ...</i> ] <b>result</b> | <b>CR LF</b> |

**CR** = Carriage return (ASCII 13 = 0x0D)

**LF** = Line feed (ASCII 10 = 0x0A)

**SP** = Space (ASCII 32 = 0x20)

## 10.2 Command Part Details

### Command:

Sequence of ASCII letters ('A'-'Z', 'a'-'z' and '-').

Command will separate from parameters with at least single space.

### Parameters:

Sequence of Alfa-Numeric ASCII chars ('0'-'9','A'-'Z','a'-'z' and some special chars for specific commands), parameters will be separated by commas.

### Message string:

Every command must to be entered as part of message string that begin with **message starting char** and end with **message closing char**, note that string can contain more then one command separated by pipe ("|") char.

### Message starting char:

'#' for host command/query.

'~' for machine response.

### Device address (Optional, for KNET):

KNET Device ID follow by '@' char.

**Query sign** = '?', will follow after some commands to define query request.

Message closing char =

Host messages - Carriage Return (ASCII 13), will be referred to by **CR** in this document.

Machine messages - Carriage Return (ASCII 13) + Line-Feed (ASCII 10), will be referred to by **CRLF**.

Spaces between parameters or command parts will be ignored.

### Commands chain separator char:

When **message string** contains more than one command, commands will be separated by pipe ("|").

### Commands entering:

If terminal software used to connect over serial \ ethernet \ USB port, that possible to directly enter all commands characters (**CR**) will be entered by Enter key, that key send also **LF**, but this char will be ignored by commands parser).

Sending commands from some controllers (like Crestron) require coding some characters in special form (like \X##).

Anyway, there is a way to enter all ASCII characters, so it is possible to send all commands also from controller.

(Similar way can use for URL \ Telnet support that maybe will be added in future).

### Commands forms:

Some commands have short name syntax beside the full name to allow faster typing, response is always in long syntax.

### Commands chaining:

It is possible to enter multiple commands in same string by '|' char (pipe).

In this case the **message starting char** and the **message closing char** will be entered just one time, in the string beginning and at the end.

All the commands in string will not execute until the closing char will be entered.

Separate response will be sent for every command in the chain.

### Input string max length:

64 characters.

### Backward support:

Design note: transparent supporting for protocol 2000 will be implemented by switch protocol command from protocol 3000 to protocol 2000, in protocol 2000 there is already such a command to switch protocol to ASCII protocol (#56 : H38 H80 H83 H81).



## 10.3 Kramer Protocol 3000 Commands

Full details for each command are presented in the Kramer Protocol 3000 document available for download from <http://www.kramerelectronics.com>.

| Command     | Cmd Short | Description                            | Permission       |
|-------------|-----------|--|------------------|
| #           |           | Protocol handshaking                   | End User         |
| BUILD-DATE? |           | Read device build date                 | End User         |
| ETH-PORT    | ETHP      | Change protocol Ethernet port          | Administrator    |
| ETH-PORT?   | ETHP?     | Get protocol Ethernet port             | End User         |
| FACTORY     |           | Reset to factory default configuration |                  |
| HELP        |           | List of commands                       | End User         |
| LDFW        |           | Load new firmware                      | User SW Internal |
| MODEL?      |           | Read device model                      | End User         |
| NET-DHCP    | NTDH      | Set DHCP mode                          | Administrator    |
| NET-DHCP?   | NTDH?     | Get DHCP mode                          | End User         |
| NET-GATE    | NTGT      | Set Gateway                            | Administrator    |
| NET-GATE?   | NTGT?     | Get Gateway                            | End User         |
| NET-IP      | NTIP      | Set IP address                         | Administrator    |
| NET-IP?     | NTIP?     | Get IP address                         | End User         |
| NET-MAC?    | NTMC?     | Read MAC address                       | End User         |
| NET-MASK    | NTMSK     | Set subnet mask                        | Administrator    |
| NET-MASK?   | NTMSK?    | Get subnet mask                        | End User         |
| PROT-VER?   |           | Read device protocol version           | End User         |
| RESET       |           | Reset device                           | Administrator    |
| SN?         |           | Read device serial number              | End User         |
| VERSION?    |           | Read device firmware version           | End User         |

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CE



**SAFETY WARNING**

Disconnect the unit from the power supply before opening and servicing



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