VA-1807

INSTRUCTION MANUAL

Ver.1.1

2003.7.18

A S T R O D E S I G N , I n c .

Contents

CHAPTER1 CONCERNING THE VA-1807

1·1 Introduction

The VA-1807 is a protocol inspection video generator that is used to inspect the functionality of an HDCP supporting display monitor.

1·2 Features

VA-1807 in comparison to its big brother the VG-828D, is a lot smaller in physical size and is rather cost-effective and easy to operate.

1·3 Specification

1·3·1 Operating frequency

DVI single output 25.175-162.000MHz (fixed frequency)

1·3·2 Frequency accuracy

+/- 50ppm

1·3·3 Transmission distance

5m

1·3·4 Output signal

TMDS (analog signal is not output)

1·3·5 Output swing resistance

510 ohm

1·3·6 Output format

<PC system > (VESA compliant)

VGA	@ 59.94Hz, 60Hz
SVGA	@ 60.317Hz
XGA	@ 60.004Hz
SXGA	@ 60.020Hz
UXGA	@ 60.000Hz

<TV system> (EIA-CEA-861A compliant)

720 x 480i	@ 59.94/60Hz (Dotclock : 27MHz)
720 x 480p	@ 59.94/60Hz
720 x 576i	@ 50Hz (Dotclock : 27MHz)
720 x 576p	@ 50Hz
1920 x 1080i	@ 50/59.94/60Hz
1280 x 720p	@ 50/59.94/60Hz

1·3·7 Output pattern

Solid (black, white and gray)

Color bar (100%, 75% and SMPTE)

Gray scale (8 steps, 16 steps and 32 steps)

H ramp (0→FF, FF→0)

Burst (multi, 1 dot)

Cross and Dot

Chessboard

Window (one, four, nine, right scroll and left scroll)

Display position adjuster

1･4 Ratings

Supply Voltage	AC100 - 240V(50/60Hz)
Power consumption	10W
Weight	1.5kg
Operating temperature range	+5-40 degrees centigrade
Operating humidity range	30 – 80% (no condensation)
Outer dimensions	260(W) x 51(H) x 196.5(D)mm

1･5 Other functions

Performs HDCP encoding.

HDCP certified setting is provided.

When an HDCP certification error occurs, the content is verified

EDID contents (check sum, monitor name) can be shown.

Setting not to output signal except EDID compliant timing.

1･6 Input /Output IF

1･6･1 DVI Digital Serial Output

(1) Connector

Molex DVI-I(74320-1004, 24oin +5 terminal(analog)) or equivalent.

(2) Output

Fig.1 Pin layouts

Pin No.	In/output signal
1	TMDS DATA2-
2	TMDS DATA2+
3	TMDS DATA2(/4) GND
4	NC(TMDS DATA4-)
5	NC(TMDS DATA4+)
6	DDC CLK
7	DDC DATA
8	NC
9	TMDS DATA1-
10	TMDS DATA1+
11	TMDS DATA1(/3) GND
12	NC(TMDS DATA3-)

13	NC(TMDS DATA3+)
14	+5V
15	GND
16	SENSE
17	TMDS DATA0-
18	TMDS DATA0+
19	TMDS DATA0(/5) GND
20	NC(TMDS DATA5-)
21	NC(TMDS DATA5+)
22	TMDS CLK GND
23	TMDS CLK+
24	TMDS CLK-

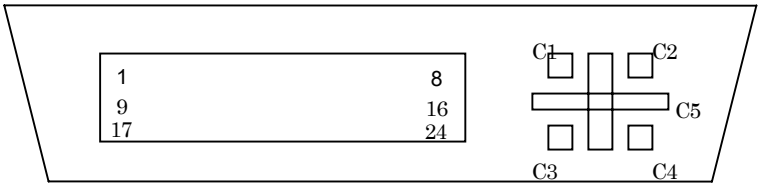


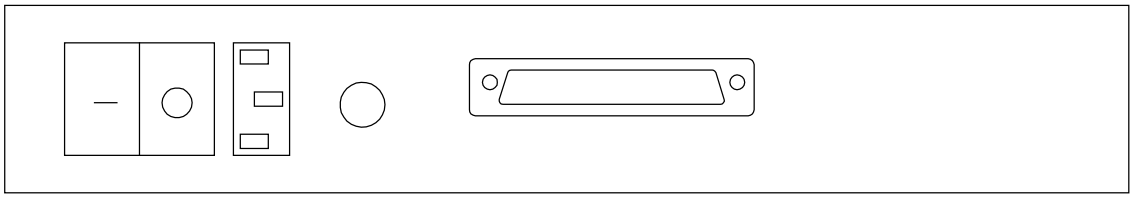
Fig.1. Pin Layouts

Since output mode is single link only, nothing connects to pins of TMDS DATA3 to 5+/-.

Additionally since there is no analog output, nothing connects to pins of C1-C5.

+5V(pin14) is max 0.5A.

1･7 External Look



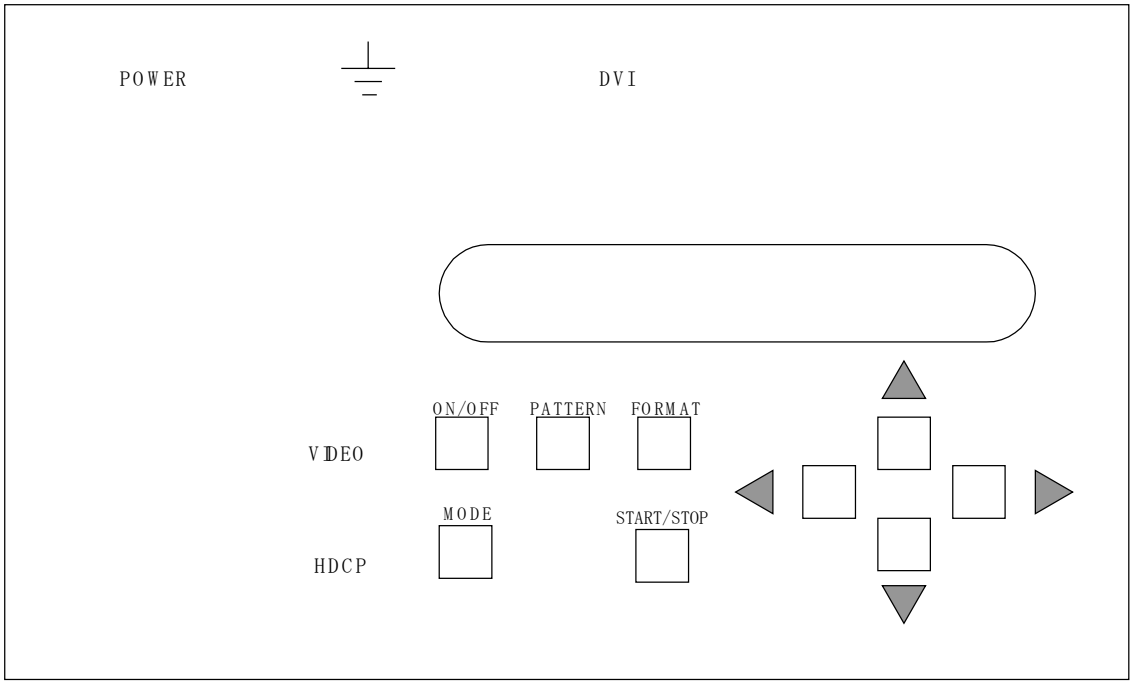


Fig.2. Outer look

1･7･1 External View Description

(1) VIDEO ON/OFF button

This button switches ON and OFF of TMDS output. When powering unit, the setting will be in the OFF position.

(2) PATTERN button

This button switches patterns. Please refer to “2･2 PATTERN Selection” when selecting patterns.

(3) FORMAT button

This button switches formats. Please refer to “2･3 FORMAT Selection”.

(4) HDCP MODE button

This button sets HDCP MODE. Please refer to ”2･4 HDCP MODE setting” about MODE description and setting.

(5) START/STOP button

This button switches START and STOP for HDCP certification. Please refer to “2･5 HDCP Certification start” about HDCP certification.

(6) CROSS button

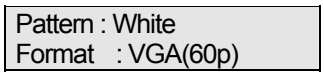
This button is used for switching patterns and formats, MODE setting and LCD display switching during HDCP certification. Please refer to “CHAPTER2 OPERATION” about operation.

(7) LCD display

While HDCP certification is not performed the PATTERN is shown in the upper line, and the FORMAT is shown

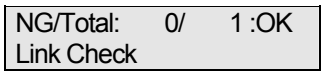
in the bottom line as the Fig.3 shows.

Fig.3.



While HDCP certification is performed the display will look like the below screen-shot. Please refer to"2･5 HDCP Certification Start" for details.

Fig.4.



CHAPTER2 OPERATION

2·1 VIDEO OUTPUT ON and OFF

The Video Output button will be set to the off position as soon as the video generator is powered on. By simply pressing the button, user will be able to turn it ON or OFF.

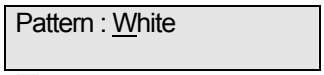
When the Video Output is ON, the button will light up and when the Video Output is OFF, the light will be off.

When starting the HDCP certification function the video output indicator will turn ON and will not be able to turn OFF during the process until it has completed the task.

2·2 PATTERN Selection

The button will automatically light up once user presses the PATTERN button. The LCD will appear as illustrated below and the cursor will indicate pattern name.

Fig.5.



By pressing the ▲ ,▼ , ◀ ,▶ buttons, pattern can be . Chart 3 shows the stored pattern matrix.

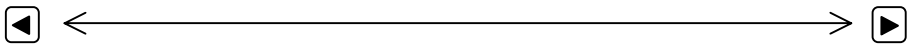
For up and down moving, use the buttons of ▲ and ▼ , and for right and left moving, use the buttons of ◀ and ▶ .

During the certification of HDCP, while displaying OK and NG sign, if pressing the PATTERN button, the selected pattern is shown. (Please refer to "2·5·4 Pattern output during HDCP certification")

Patterns can easily be selected by scrolling to the appropriate pattern you chose to display.

Chart 3 Pattern Matrix

▲	White solid (White)	Black solid (Black)	50% gray solid (Gray)		
	Color bar 100% (Colorbar 100%)	Color bar 75% (Colorbar 75%)	SMPTE Color bar (SMPTE Colorbar)		
	Gray scale 8 steps (Grayscale 8)	Gray scale 16 steps (Grayscale 16)	Gray scale 32 steps (Grayscale 32)		
	H ramp (0→FF) (H-Ramp (0→FF))	H ramp (FF→0) (H-Ramp (FF→0))			
	Multi burst (Multi Burst)	1 dot burst (1Dot Burst)			
	Cross & dot (Cross Dot) (*)	Chessboard (Checker) (*)			
	1 window (1 Window)	4 window (4 Window)	9 window (9 Window)	1window left scroll (Move Window L)	1 window right scroll (Move Window R)
▼	Display position adjuster (Disp. Position)				



*When selecting (Cross & Dot and Chess Board pattern) the 4:3 or 16:9 will automatically be selected to display the patterns with their appropriate aspect ratio for accurate display.

2·3 FORMAT selection

When pressing the FORMAT button, the LCD will display a similar illustration as the one shown below. Once the FORMAT button is pressed, the cursor will display the appropriate FORMAT similar to the one below.

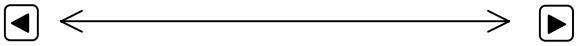
Fig.6.

Pattern : White Format : VGA(60p)

By pressing the ▲, ▼, ◀ and ▶ buttons, user will be able to select to desired pattern. Chart. 4 shows the stored internal pattern matrix. For up and down moving, use the buttons ▲ and ▼, and for right and left moving, use the buttons ◀ and ▶.

Chart. 4 Format Matrix

▲	VGA (60p)	VGA (59p)	
↑	SVGA		
	XGA		
	SXGA		
	UXGA		
	NTSC (59i)	NTSC (60i)	
	NTSC (59p)	NTSC (60p)	
	PAL		
	PAL(P)		
	1080 (60i)	1080 (59i)	1080 (50i)
▼	720 (60p)	720 (59p)	720 (50p)



2·4 HDCP MODE setting

2·4·1 Interval setting

When pressing the MODE button you will see it light up as soon as is pressed. The LCD will display the cursor in the position of interval value.

Fig.7.

Interval: 128V (100-150)

By pressing the ▲ and ▼ buttons, certification interval will be able to be set in the unit of V. The range setting is from 100 to 150V. As soon as you start up this function the default value will be at 128V.
It is very important that you NOTE that the setting cannot be operated during HDCP certification process.

2·4·2 Setting of EDID timing execution mode

When displaying Fig.7, press the MODE button and the LCD will prompt you to Fig. 8.

Fig.8.

EDID TimingMode :Disable

By pressing the buttons ▲ and ▼, you will have the ability to select "enable" and "disable" of EDID timing execution mode.

Disable (default)	EDID timing execution mode is disable.	Signal output and HDCP certification is possible in all timings.
Enable	EDID timing execution mode is enable.	Signal output and HDCP certification is possible only when EDID compliant timing is selected.

When powering VA-1807 by pressing POWER button and the MODE button simultaneously, the video generator will automatically start with EDID timing execution mode Enable mode. If VA-1807 is powered by powering the video generator and NOT pressing any other button. The unit then will start under the Disable mode, EDID will be executed when "Enable" is selected in Fig. 8 or when turning ON the VA-1807 by pressing the MODE button. If for some reason the VA-1807 is not connected to a monitor compliant to EDID, a "DDC ACK Error" will be shown on the LCD screen due to indetermination of monitor recognition.

2·5 HDCP certification start

2·5·1 Display of certification times

By pressing the START/STOP button, the HDCP certification will start and the START/STOP button will blink as an indication of function recognition. At that time if the VIDEO output is OFF it will automatically turn ON, and the VIDEO button will light up. Consequently the LCD will display the screen below in Fig. 9.

In Fig. 8 if the EDID Timing Mode is "Enable" and EDID compliant timing is not selected, HDCP certification will not be able to perform the function and will not start.

Fig.9.

NG/Total: 0/ 1 :OK Link Check

In the upper line the times of execution will be displayed as the denominator and the times of NG is also displayed as the numerator. The very right statement shows the latest certification result, OK or NG.

The bottom line shows the present HDCP certification status. Below you will see a list of display contents found in VA-1807.

Chart 3 Message list

Display message	Status	Description
Initialize	Status	Under execution of preprocess of starting link completion check.
Link Check	Status	Under execution of link completion check.
Not Receiver	Error	Repeater is connecting.
R0 Ready Error	Error	100ms has passed from the time of loading AKSV to the receiver until the time of completing preparation of transmitter RO. There is possibility that transmitter is broken.
Tx KSV Error	Error	KSV in transmitter has problem. There is possibility that transmitter is broken.
Rx KSV Error	Error	KSV of receiver does not include 20pcs of "0" and "1".
Link Check Error	Error	Under the process of "Initialize", the value does not match as a result of link completion check.

Encrypt. Error	Error	Encrypting is not completed.
Hot Plug Error	Error	The cable is not connected correctly, or the power of the receiver is OFF.
Ri Timeout Error	Error	It takes more than 250ms from the time that VA loads Ri of transmitter until the time it finishes loading Ri' of the receiver..
HDCP Error	Error	HDCP error other than the above ones.
I2C ACK Error Tx	Error	ACK does not come back from the transmitter.
I2C ACK Error Rx	Error	ACK does not comeback from the receiver.
I2C Line Error	Error	ACK does not come back from both transmitter and receiver.
DDC ACK Error	Error	During EDID reading, ACK does not come back.

When performing the HDCP certification function, if a Link Error prompts, the transmitter will not send the reset signal and the monitor will display the encoded image, as long as the STOP button on the front panel is not pressed.

2·5·2 Display of KSV and Ri

When performing the HDCP certification function and the (STOP button blinks), and if user is pressing the button ▼ , the LCD will display the information below.

Fig.10.

```
Tx :f0 8e 3c 74 5a :1234
Rx :2d 56 b1 a8 97 :1234
```

The upper line shows the transmitter status and the bottom line will show the receiver status. The left number will show KSV (5 byte) and the right number will show Ri (2 byte). Ri will be updated whenever certification is executed.

2·5·3 EDID display

When performing the HDCP certification function and the (START button blinks), and if user is pressing the button ▼ , the LCD will display the information below.

Fig.11.

```
EDID:Check Sum :OK(xx)
     :Name :AstroDesign
```

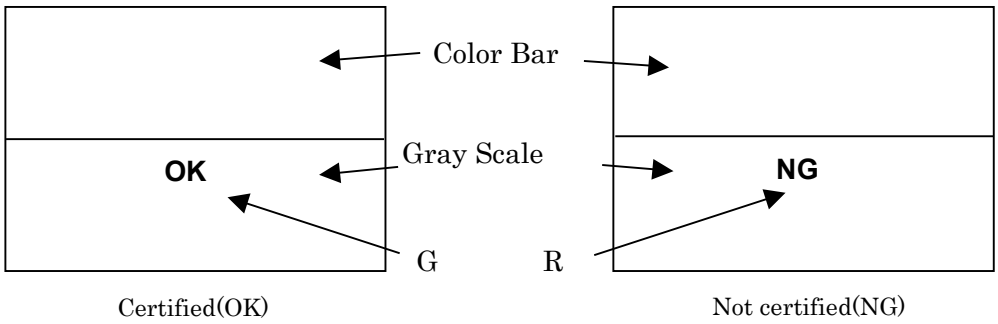
It will show EDID Block # 0 information. The upper line shows the check sum result. At the right of the result, the contents of check sum is shown with hex decimal number. The bottom line shows the "Monitor Name". If the connector is disconnected here, it leads to a hot plug error. If connecting the connector again, EDID is read again and display starts. If pressing the button ▼ again, the LCD will default back to the Fig.9.

2·5·4 Pattern output during HDCP certification

When the HDCP certification starts while the PATTERN button is light, certification will be carried out while at the same time showing the pattern. Essentially the certification result is not shown on the monitor.

When HDCP certification starts while the PATTERN button is off, the certification result will be displayed on the monitor. In this case, the selected pattern will not be displayed on the monitor.

Fig.12. Monitor status during the HDCP certification



When the first certification passes and certifications after the second or more times is NG, sandstorm like images will be displayed on the monitor.

When the first certification is NG, "NG" or pattern is displayed on the monitor without carrying out HDCP encoding or decoding.

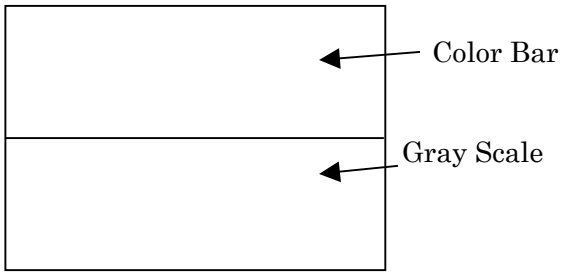
The first certification	After two or more times	Encode/decode	Monitor output
OK	OK	yes	"OK" or pattern display
OK	NG	yes	Sandstorm picture
NG		no	"NG" or pattern display

When the PATTERN button is pressed during the HDCP certification process, a pattern display and OK/NG display can be swapped. While showing the patterns (when the PATTERN button light is on), patterns can be switched by pressing the buttons ▲, ▼, ◀ and ▶. (Please refer to "2·2 PATTERN Selection").
In this case, the encoded picture will be an output.

2·6 HDCP certification closing

When the START/STOP button is pressed during the HDCP certification process the (START/STOP button blinks), then the HDCP certification closes and START/STOP button turns out. After closing, the transmitter resets, and the video signal will output without encoding. If the pattern is being displayed, the LCD prompts the pattern selecting screen.(Fig.5). If OK/NG is being displayed, the color bar and the gray scale are only displayed on the monitor. The LCD shows pattern and format. (Fig.3). If the PATTERN button is pressed at this stage, the selected pattern will be displayed.

Fig.13. Monitor output after HDCP certification closing



2·7 Certification re-start after hot-plug error

If the connector is pulled out or the receiver is turned out while the HDCP certification passes, it prompt a hot plug error. In this case, user must re-connect the connector or turn on the receiver and the certification re-starts automatically after reset of the HDCP certification function.

2·8 Status when turning on the power

When turning on the power, the status is like below.

Item	Default
Pattern	White
Format	VGA(60p)
Interval （note1）	128V
EDID Timing Mode （note2）	Disable

Note 1．Refer to the “2·4·1 Interval Setting”

Note 2．Refer to the “2·4·2 Setting of EDID timing execution mode”

The default setting of EDID Timing Mode is changed according to the following operation after turning on the VA-1807.

Operation	Default
Turn on without pressing other buttons.	Disable
Turn on pressing the MODE button.	Enable

2･9 HDCP sequence

Here shows the sequence of HDCP sequence.

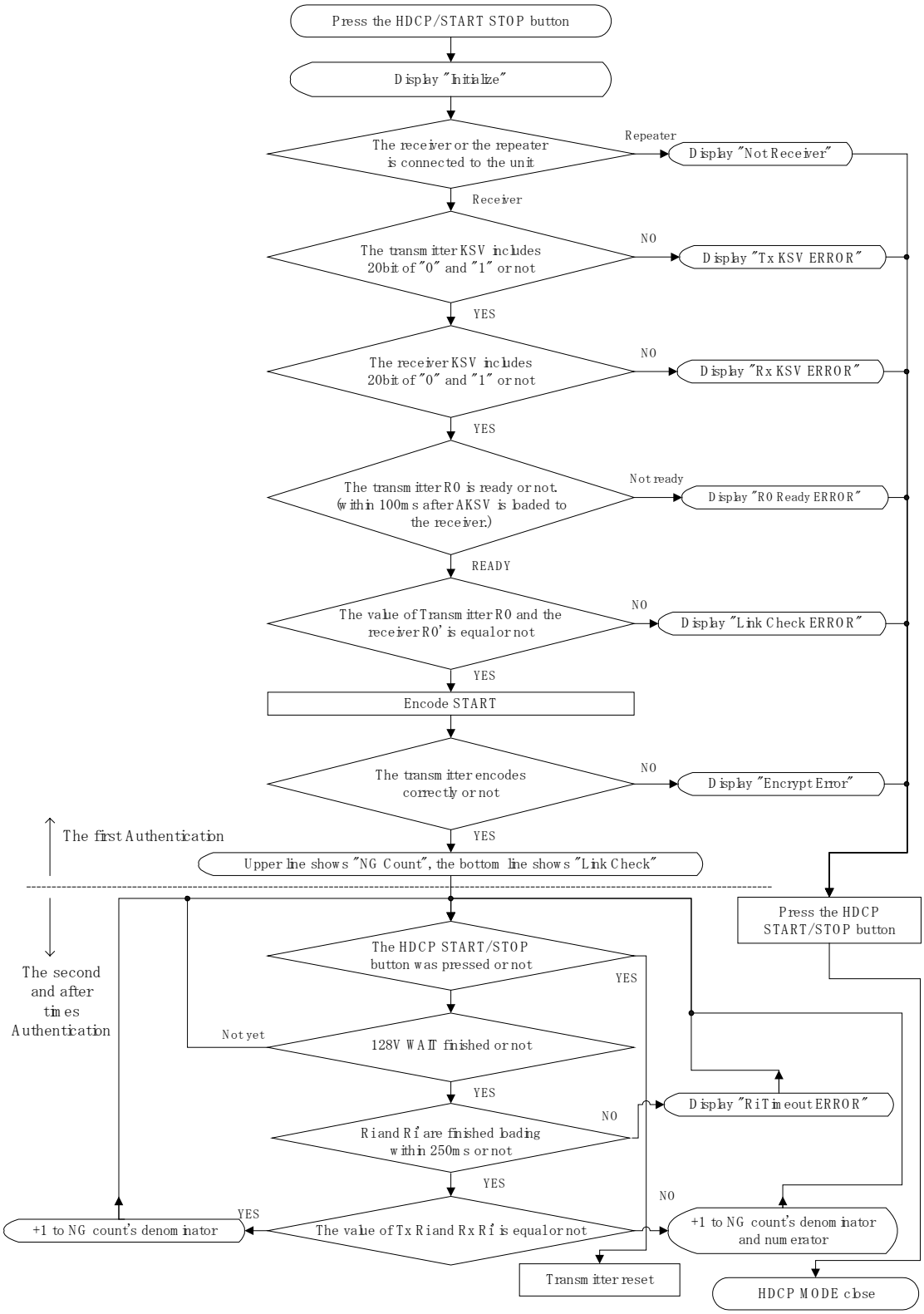


Fig.14. HDCP sequence