Home Arcade System

Version 4.2

Instruction Manual ver. 0.2 DRAFT (23.04.2023)

By RGB, 2023

CAUTION!

**DO NOT ALLOW CHILDREN OR ANIMALS ANYWHERE NEAR YOUR ARCADE SETUP.**

THE EXPOSED 110/220VAC TERMINAL BLOCK ON THE ARCADE POWER SUPPLY POSES REAL DANGER IF ACCIDENTALLY TOUCHED.

NEVER LEAVE YOUR ARCADE SETUP UNATTENDED WHEN IT IS POWERED ON.

CARE, USE, SAFEGUARDS

The HAS, just like every other device with exposed electronic components, is ESD-sensitive and prone to physical damage. Improper handling can permanently damage the device. Below is a list of the most basic rules that can help you prevent damage:

- Please read this manual BEFORE you start setting up and using the HAS.
- Do not use the HAS without its acrylic glass covers.
- When connecting the HAS to a PCB game make sure the JAMMA connector is aligned correctly to avoid damage.
- Disconnect the HAS slowly and carefully, do not force it.
- Do not wear any clothing that conducts electrical charge when you hold or touch the HAS or your PCB game.
- Do not place the HAS on fabric, or any other fibrous surface, like carpets, etc. Place it on a clean dry table, wooden floor, cardboard, etc.
- It is a good practice to wear an antistatic wrist strap whenever you are handling the HAS or the PCB games in general. The end of the wrist strap should be attached to a good grounding point - the metal chassis of the PC, pipes, the radiator, etc.
- When not used, you should store your HAS in an antistatic bag.
- Do not keep the HAS in an antistatic bag when you are actually using it! The surface of the antistatic bag is conductive.
- Try to hold the acrylic case along its edges or at least near the bolts. Do not apply force directly to the center of the acrylic glass.
- Do not touch the contacts or surface mount components, especially the microcontroller.
- Never wipe the HAS PCB, wiping can induce ESD. Use clean canned compressed air and an ESD-safe soft bristle brush instead.
- Do not change jumper positions or use built-in switches while the HAS is powered ON.
- Never connect or disconnect cables, controllers, or adapters while the HAS is powered ON. This may result in a short circuit or inrush current and can damage or even destroy the HAS and your PCB game.
- Never leave your HAS set up unattended, especially when it is powered ON!
- Do not use JAMMA amplified audio for home equipment unless you know it can handle it.
- Make sure you read the PCB game instruction manual BEFORE you connect it to the HAS.
- Make sure you read the Power Supply Unit instruction manual BEFORE you connect it to the HAS.
- **Keep the HAS away from children and animals.**
- **Any modification to the HAS is at your own risk and responsibility, you will be liable for any damage incurred.**
- **Do not use cheap hardware with the HAS. Using subpar-quality hardware with the HAS (be it the power supply unit, controller adapters, audio/video cables, JAMMA harness extension, and so on) will most likely result in equipment damage or more serious implications.**
- **The HAS is not a toy. You must never give it to your children or allow them to use it.**
- **Non-adherence to the instructions may result in equipment damage or even more catastrophic failure, like electrocution or fire!**

ELECTROSTATIC
SENSITIVE DEVICE

Lead-free
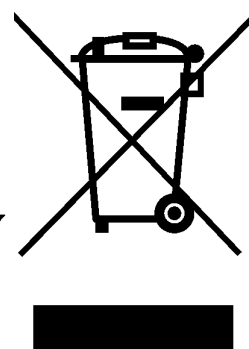
HAS V4 features

- JAMMA, JAMMA+, and CHAMMA compatible
- DB15 controller ports (NeoGeo compatible, extended to support buttons 5 and 6)
- Programmable button layout
- Programmable rapid-fire (VSync synchronized, 6 different rapid-fire rates)
- Buttons 1-6 on the JAMMA connector (buttons 4, 5, and 6 can be disabled)
- Buttons 4-6 on the "kick harness" connector
- Internal memory to store the button layout and rapid-fire settings
- RGB+CSync video output (75 Ohm impedance)
- Selectable video Low Pass Filter
- Video brightness regulation via one knob
- CSync buffer
- CSync regeneration (fixes video issues in the Taito F3 connected via the XRGB Mini)
- Selectable CSync level and impedance (~0.35Vp-p, 75 Ohm impedance or ~5Vp-p, high impedance, TTL)
- HSync and VSync outputs (~5Vp-p, high impedance, TTL)
- 8pin mini-DIN connector for audio and video output (XRGB Mini pinout)
- 3.5mm jack connector for audio output (it will override the 8pin mini DIN audio output)
- Audio attenuation
- JAMMA (mono audio) or MVS (stereo audio) compatible
- Test and Service buttons
- Voltmeter (selectable +5V/+12V measurement)
- 6pin power connector
- Acrylic glass case
- Modular build (the basic functionality can be expanded by using special modules)

Installation

❶ Remove the blue/white/transparent protective film from both sides of the acrylic glass covers.

❶ Assemble the acrylic glass case - the acrylic glass should cover the controller ports and the brightness regulation knob.
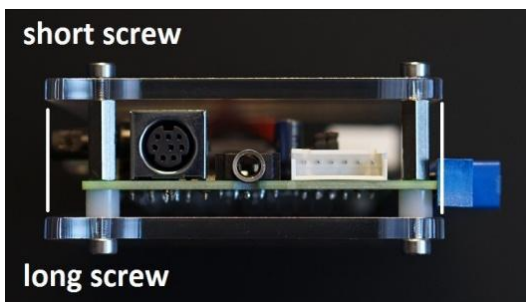
❷ Make sure that the power supply unit is disconnected from the electrical outlet. Attach the HAS power supply harness to the power supply unit.

❸ Double check if the HAS power supply harness is correctly attached to the power supply unit. Mixing GND, +5V, -5V, and +12V will permanently damage your HAS unit and your PCB game. Refer to your power supply instruction if in doubt.

❹ Plug in the JAMMA PCB to the HAS.

❺ Connect the HAS power supply harness, AV cable, controller, and kick harness to the HAS.

❻ Power on the HAS by connecting the power supply cable to the electrical outlet. If everything works correctly, a red LED will light up and two status LEDs on the HAS will blink rapidly for a second.
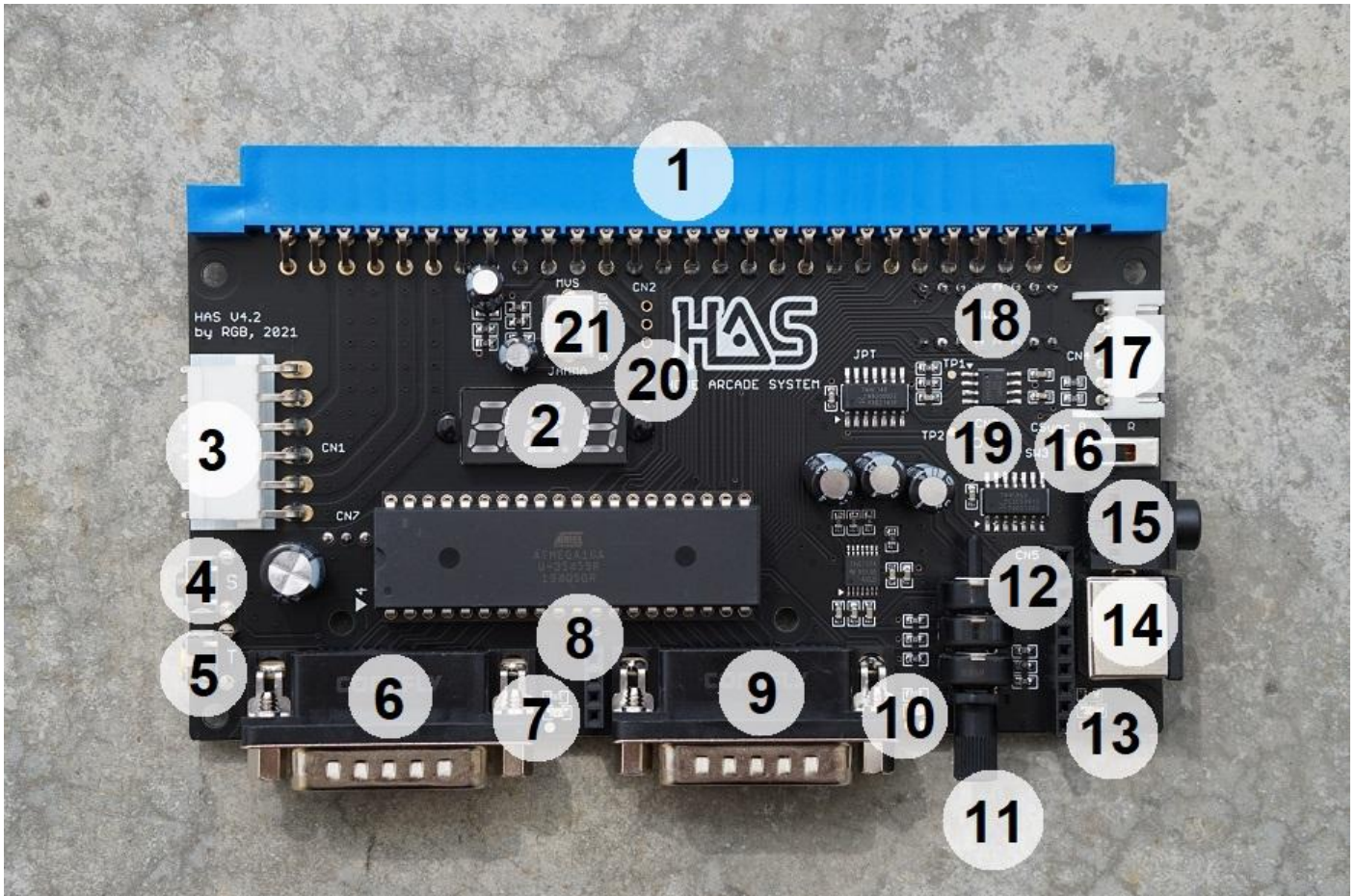
WARNING:

- **NEVER CONNECT OR DISCONNECT THE JAMMA PCB GAME WHILE THE HAS UNIT IS POWERED ON!**

- **NEVER CONNECT OR DISCONNECT THE HAS POWER SUPPLY HARNESS TO THE HAS UNIT WHILE THE POWER SUPPLY UNIT IS POWERED ON!**

- **NEVER CONNECT OR DISCONNECT ACCESSORIES LIKE CABLES, CONTROLLERS, ADAPTERS, OR OTHERS, WHILE THE HAS UNIT IS POWERED ON**

HAS V4.2 PCB

1. JAMMA connector.
2. Digital voltmeter.
3. Power supply connector (CN1).
4. SERVICE button.
5. TEST button.
6. Player 1 controller port.
7. Player 1 status LED.
8. AUX 1 connector (CN6)
9. Player 2 controller port.
10. Player 2 status LED.
11. Video brightness potentiometer (VR1).
12. AUX 2 connector (CN5).
13. Power ON/OFF status LED.
14. 8pin mini-DIN audio/video output.
15. 3.5mm audio jack audio output.
16. CSync mode switch (SW3).
17. Kick harness connector (CN4).
18. DIP switch (SW2).
19. AUX 3 connector (for advanced users only) (CN3).
20. AUX 4 connector (for advanced users only) (CN2).
21. JAMMA/MVS audio switch (SW1 AUDIO).
22. Voltmeter connector (CN7).
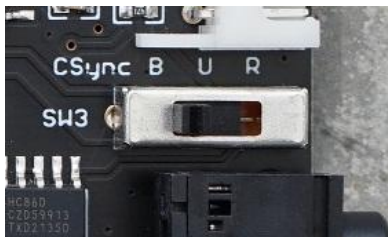
Main features

Video brightness

Potentiometer "VR1". Turn it clockwise to darken the displayed picture.

CSync processing

There are three CSync output signals to choose from, and you can switch between them using the switch marked as "SW3":

- **B - "Buffered" - Default setting.**
- **U - "Unprocessed"**
- **R - "Regenerated"**

Side note: The default setting is "Buffered" CSync (SW3 switch position "B"). It should be used at all times unless your setup requires the following:
- Regenerated CSync (SW3 switch position "R"). Use it to stabilize the displayed picture of the Taito F2/F3 when used with the XRGB Mini.
- Unprocessed CSync (SW3 switch position "U"). CSync is pulled directly from the PCB game via a 470R resistor. **Do not use it unless you know what you are doing!!!**

WARNING: Do not use the switch when the HAS is powered on to avoid damage!

CSync level and impedance

DIP switch "SW2", switch no. 1 allows you to change the CSync level and impedance. In general, the 75 Ohm CSync output should be used with consumer equipment (XRGB mini, OSSC, TVs, etc.) and the TTL with equipment that expects TTL signal levels.
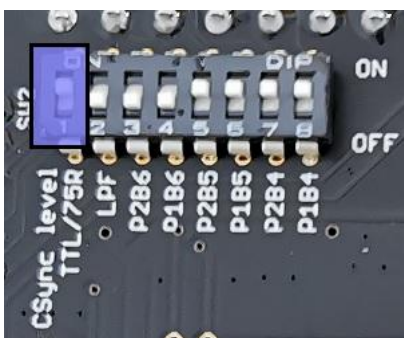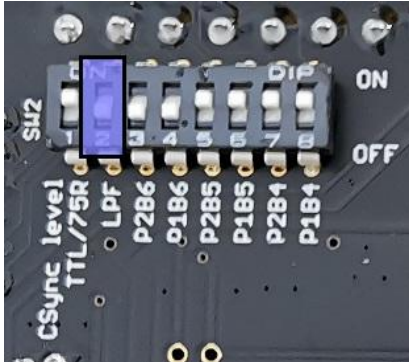
- **75R (~0.35Vp-p, 75 Ohm impedance) - Default setting.**
- **TTL (~5Vp-p, high impedance)**

WARNING: Using TTL with Scart equipment could cause damage to the equipment!

Video Low Pass Filter

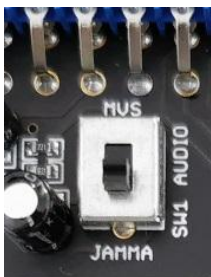DIP switch "SW2" switch 2 allows you to enable or disable the video Low Pass Filter

- **ON**
- **OFF – Default setting.**

Side note: The Low Pass Filter is especially helpful if your scaler does not apply any video filter. A good use case is the OSSC's HD15 input (AV3, RGBS).

Mono and stereo audio

Switch "SW1" allows you to switch audio between JAMMA (mono) and MVS (stereo).

- **JAMMA (mono audio) – Default setting.**
- **MVS (stereo audio) - Only stereo compatible NeoGeo MVS motherboards.**

Warning: Do not use this switch when the HAS is powered on. Before you switch to "MVS" (stereo audio), make sure your NeoGeo is the stereo version (usually these are MV-2, MV-4, MV6 motherboard versions). Do not leave the switch in the "MVS" position when you play the JAMMA games (mono audio) to avoid damage to the JAMMA game amplifier!

Enabling/disabling buttons 4, 5, and 6 on the JAMMA connector

Player 1 and Player 2 Buttons 4, 5, and 6 on the JAMMA connector can be enabled or disabled using DIP switch "SW2" switches 3-8.
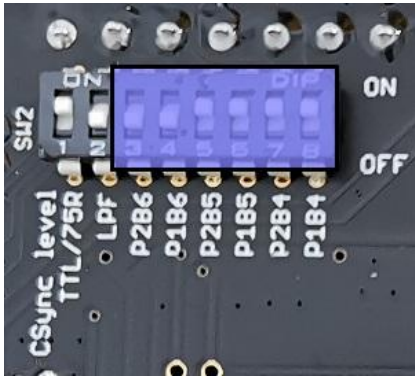
Note: Button 6 output via the JAMMA connector must be first enabled by cutting a trace on the HAS. Below is the instruction on where to cut, marked in red:

Controls - Operation

Button configuration mode

❶ Press and hold down two arbitrary buttons and the START button for 3 or more seconds. After 3 seconds an appropriate status LED on the HAS board will light up and buttons will no longer register – this means the HAS has entered the buttons remapping mode and you can release the buttons.

❷ Right after you release the last of the buttons held down, you can set a new button layout by pressing buttons.

❸ Each press of a button corresponds to the JAMMA button number. If you press a button once, it will be JAMMA button 1, twice - button 2, thrice - button 3, it works up to button 6. The seventh press sets the buttons as "START"; the eighth press disables the button; the ninth press starts the countdown over. No button press means the button will not be set.

Additionally, each press of a button is indicated by the status LED blink.

❹ To exit the button configuration mode and save your new layout, press the START button.

Side note: Every time you access this mode, your previous layout will be erased, and you will need to set your layout anew. This is an easy and fast way to reset your settings.

Rapid-fire configuration mode

❶ Press and hold down one arbitrary button and the START button for 3 or more seconds. After 3 seconds an appropriate status LED on the HAS board will light up and buttons will no longer register – this means the HAS has entered the rapid-fire configuration mode and you can release the buttons.

❷ Right after you release the last of the buttons held down, you can enable the rapid-fire feature by pressing buttons.

❸ Each press of a button corresponds to the rapid-fire rate.
- One press -> 1/2 of the game's VSYNC,
- Two presses -> 1/3 of the game's VSYNC,
- Three presses -> 1/4 of the game's VSYNC,
- Four presses -> 1/6 of the game's VSYNC,
- Five presses -> 1/8 of the game's VSYNC,
- Six presses -> 1/10 of the game's VSYNC,
- The seventh press disables rapid-fire; the eighth press starts the countdown over. No button press means the rapid-fire will not be set.

Additionally, each press of a button is indicated by the status LED blink.

❹ To exit the rapid-fire mode and save the settings, press the START button.

Side note: Just like in the button remapping mode, your previous rapid-fire settings are being erased the moment you access the rapid-fire mode. Consequently, if you want to reset all rapid-fire settings, just enter the rapid-fire mode and exit it without pressing any button.

Asynchronous rapid-fire mode

Press and hold down the Player 1 START button for 3 or more seconds while powering on the HAS. After 3 seconds the status LEDs will blink rapidly as a confirmation that the asynchronous rapid-fire is active. You can release the START button.

In the asynchronous mode, you enter the rapid-fire configuration mode as usual, but the button presses will correspond to the following rapid-fire rate:

- 1 press ~ 30Hz
- 2 presses ~ 20Hz
- 3 presses ~ 15Hz
- 4 presses ~ 12Hz
- 5 presses ~ 10Hz
- 6 presses ~ 7.5Hz

Button layout and rapid-fire settings reset

You can consider this a full device reset. It will erase the layouts for both Players 1 and 2. To do the reset, press and hold down both Player 1 and Player 2 START buttons while powering on the HAS.

Side note: Once you perform the full device reset, the button layout will be blank, and you will need to enter the button configuration mode and set your new button layout.

Connectors and pinouts

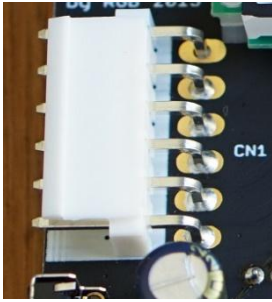## Power Supply connector

6pin JST VH series (CN1).

| |
|---|
| GND (black wire) |
| GND (black wire) |
| +5V (red wire) |
| +5V (red wire) |
| -5V (white wire) |
| +12V (yellow wire) |

Controller ports

Player 1 and Player 2 controller ports, DB15. NeoGeo compatible, extended to support buttons 5 and 6. The diagram shows the connector looking at the HAS.
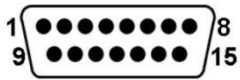
Pin	Description	Pin	Description
1	GND	9	N/C
2	Configurable button 6	10	Configurable button 5
3	Coin	11	Start
4	Configurable button 4	12	Configurable button 3
5	Configurable button 2	13	Configurable button 1
6	Right	14	Left
7	Down	15	Up
8	+5V	-	-

Audio and Video output

8pin mini-DIN connector.
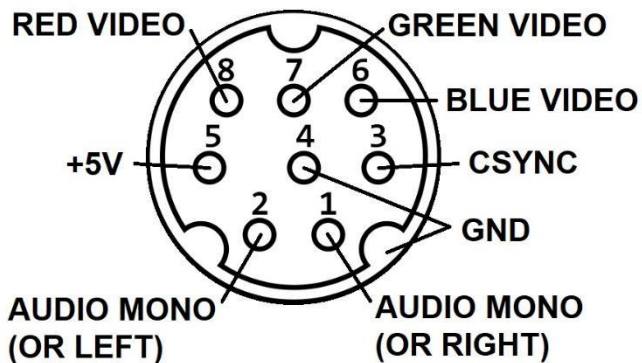
Side note: The connector has the same pinout as the XRGB mini and you can connect the HAS to the XRGB mini using an 8 pin mini-DIN cable. Pins of the cable must connect straight through end to end (1:1). When you connect the cable to the 3.5mm audio jack connector, it will override the audio that goes through the 8 pin mini-DIN.

WARNING: Incorrectly wired 8 pin mini-DIN cable or adapter will damage your equipment.

Kick harness connector

6pin JST XH series (CN5).

P1 button 4
P2 button 4
P1 button 5

P2 button 5
P1 button 6
P2 button 6

Voltmeter connector

3pin 2.54mm Gold Pin header (male) (CN7).

+5V	GND	+12V

Side note: The voltmeter's black wire must be connected to GND and the red wire to +5V or +12V. Some voltmeters come with orange and red wires. Orange is GND, and red should be connected to +5V or +12V.

AUX 1 connector

4pin 2.54mm Gold Pin header (female) (CN6).

GND
GND
+5V
+5V
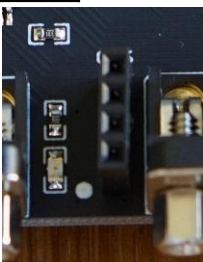
AUX 2 connector

10pin 2.54mm Gold Pin header (female) (CN5).

Mono audio (Left channel in the MVS mode)
Mono audio (Right channel in the MVS mode)
CSync

Blue
Green
Red
+5V
+5V
GND
GND

AUX 3 connector

2pin, 2.54mm pitch (CN3).

VSync	HSync

AUX 4 connector

6pin, 2.54mm pitch (CN2).

JAMMA #P (CSync)
JAMMA #12 (Red)
JAMMA #N (Green)
JAMMA #13 (Blue)
GND
+5V

Power

What power supply unit do you recommend?

Mean Well RT-65A
Mean Well RT-85A
Mean Well RT-125A
If your games don't require -5 V, then you could go for the Mean Well "RD" series:

Mean Well RD-65A
Mean Well RD-85A
Mean Well RD-125A
Excellent but may be difficult to obtain:

Mean Well MWP-606
Prima Power 42PP0606

Make sure you also buy or 3D print yourself a cover for your PSU. You can find sketches for the most popular power supplies on Thingverse, simply search for your PSU model.

How do I connect the PSU to the wall socket?

The easiest way is to use a computer power cable. Strip one end of the cable, then crimp pre-insulated fork terminals and attach them to the PSU terminal block. Make sure you use a cable with 3 wires (Earth, Live, Neutral).

Usually, the cable colors for America are as follows:
Ground (Earth) wire: green, or green with a yellow stripe
Neutral wire: white or gray
Single phase live wire: black
Canada:
Ground (Earth) wire: green, or green with a yellow stripe
Neutral wire: white
Single phase live wire: black
Europe:
Ground (Earth) wire: green with a yellow stripe
Neutral wire: blue
Single phase live wire: brown
To be 100% sure check continuity of the wire end and plug end.

How should I secure the stripped power supply wires?
Crimp M3.5 pre-insulated fork terminals.

Is it safe to keep the arcade power supply on my desk/floor/table?

Only if the 110/230 VAC terminals are covered. The covers can be 3D printed (search for your PSU model - https://www.thingiverse.com/), but you can also use a generous amount of insulation tape.

How do I power on/power off the HAS?

You power on/off the HAS by plugging in/unplugging the power cable from the wall socket or using a switch on the power strip (the recommended method).

Does the HAS provide -5 V?

Yes, it does, you just need a power supply that outputs -5 V.

Audio-Video

What audio/video cable should I buy?

This depends on your setup. The most common solution is to use an 8 pin mini-DIN to male Scart cable, but there are other ways, too. Please see the Setup examples page for recommendations.

Can I use the 8pin mini DIN to female Scart that is dedicated to the XRGB-mini Framemeister and plug it in to the HAS?

No, it won't work. The Scart head in the cable that goes into the XRGB is wired for "input". When you connect it to the HAS, you output the video signal, so the Scart should be wired for "output".

I have a Taito F3, but it doesn't sync with the XRGB mini.
Set the CSync to "Regenerated" on the HAS.

I connected the Taito F3 to the OSSC via Scart, but it doesn't sync, and the red led on the OSSC lights up.
Taito F3 won't work via Scart, use the HD-15 connector on the OSSC, set the CSync to "buffered" and CSync level to "TTL" on the HAS; set the OSSC to AV3 (RGBS) and set the H-PLL pre and post coast settings to 4.

I use the OSSC, and I can see that it syncs with the game/HAS, but I get no signal on my TV/monitor.

Your TV/monitor may be incompatible with the output produced by the OSSC. The OSSC does not use a frame buffer, which means that it cannot correct the frame timing. XRGB mini may provide better compatibility, but it also adds some lag because of the frame buffer.

I use the OSSC's HD-15 port, but it doesn't sync with the HAS.

Make sure the OSSC is set to AV3 (RGBS), the CSync on the HAS is set to buffered and the CSync level is set to TTL. It may also require tinkering with the OSSC's H-PLL pre and post-coast settings.

I use the CXA2075 based Composite Video/S-Video adapter, but I get a black screen.

Make sure the CSync on the HAS is set to buffered and the CSync level is set to TTL.

How do I wire a Scart cable for the HAS?

8 pin mini-DIN (XRGB mini pinout):
pin #1 - Audio - Right Channel (or leave unconnected if you use a 3.5 mm jack for audio)
pin #2 - Audio - Left Channel (or leave unconnected if you use a 3.5 mm jack for audio)
pin #3 - CSync
pin #4 - Ground
pin #5 - +5V
pin #6 - Blue
pin #7 - Green
pin #8 - Red
Male Scart connector:
pins #4, 5, 9, 13, 17, 18, 19, 21 - Ground
pin #2 - Audio - Right Channel
pin #6 - Audio - Left Channel
pin #7 - Blue
pin #8 - +5 V
pin #11 - Green
pin #15 - Red
pin #16 - +5 V through a 180 Ohm resistor
pin #20 - CSync

I bought a Scart cable from "XYZ", but it doesn't work.

Open the Scart hood and see if the CSync is wired to Scart pin #20. Some manufacturers wire it to pin #19, which is incorrect. If you are based in Europe and your TV accepts Scart, then additionally check if pins #8 and #16 are populated – these pins are responsible for putting the TV in the RGB input mode.

My BVM doesn't sync with the HAS, the screen is rolling or is shaky.

The BVM has a function called "VCR Mode" or "AFC Mode", enable or disable it to see if it helps. Some BVM monitors can be picky with the signal they receive.

The picture is overly bright on my PVM/BVM and isn't very stable.

This means that you are missing 75 Ohm signal termination on the RGBS signals on the PVM/BVM end. Enable termination to fix the issue. Some monitors may require external 75 Ohm caps to terminate the signals.

I bought an 8 pin mini-DIN to 8 pin mini-DIN cable and connected the HAS with the XRGB-mini, but it doesn't sync.

Make sure that in your cable pins connect straight through end to end. A cable with crossed wiring is incompatible and can cause damage to your equipment.

I see noise/diagonal lines/interference on the screen.

This is most likely some grounding issue. Make sure your PSU is properly grounded.

I see noise/diagonal lines/interference on the screen, but it disappears as soon as I disconnect the audio cable.

This is a grounding problem in your setup, you can fix this by using a 3.5 mm audio jack Ground Loop Isolator between the HAS and the 3.5 mm audio jack cable.

General

I connected the kick harness, but buttons 5 and 6 don't work.

It means that buttons 5 and 6 aren't set. Go into the HAS button reconfiguration mode and set a new button layout.

Buttons on my HAS no longer register, what should I do?

This means that the button layout isn't set. Go into the HAS button reconfiguration mode and set a new button layout.

How do I change the audio volume?

You have a volume potentiometer on your PCB game (or volume control in the game's test menu). For convenience, I suggest keeping the volume potentiometer somewhere in the middle and use your TV/speakers volume control instead.

I installed the plexiglass case, but I cannot fully plug in the HAS to my CPS-2, what is wrong?

You must have put the plexiglass case on backwards, turn it the other way around.

What connectors are installed on the HAS?

PSU connector – 6 pin JST VH
Kick harness – 6 pin JST XH
Controller ports – 15 pin male DSUB
AV – 8 pin mini DIN (XRGB mini pinout)
Audio – 3.5 mm stereo jack

I'm attempting to play Carnevil on a PVM, and it requires a CSync wire to be ran back to the gun I/O. I tried the ext sync out from the PVM, but it doesn't seem to like it. I'm guessing I'd be better off running CSync directly from the HAS somewhere. Any suggestions on where I could tap in?

You can tap it from CN2.

What is "CHAMMA"?

It's the "Chinese JAMMA" that breaks the real JAMMA standard. It accepts 6 buttons via the JAMMA edge. It's used in the multi game PCBs, like the Pandora's Box and similar.

*My HAS works fine with everything I've thrown at it
except the NeoGeo MV1C, PGM, Sega JVS I/O. Does
it mean that the HAS is incompatible with those
boards?*

The HAS is perfectly compatible with those PCBs.
Your problem is likely with the PSU. Power supplies operate in certain
conditions (specified in your PSU datasheet), for example, the PSU may
require a certain minimum load on the power rails (+5 V being the most
important), and if the PSU isn't sufficiently loaded, it may not work at all or
give other problems (high pitch hissing sound coming from the PSU being
one of the problems, and is a bad sign). The games listed (along with
many other modern PCB games, like the Cave games) put very little load
on the +5 V line, sometimes even less than 1 A.

*Does the HD-15 adapter PCB (or other HAS modules)
fit underneath the plexiglass case of the HAS, or does
this need to be removed to use it?*

All modules/adapters fit underneath the plexiglass case of the HAS, they
are supplied with extra spacers and bolts.

I get no audio with Power Instinct and Asura Blade.

Both Power Instinct and Asura Blade have the audio signals mixed up
from the factory. To make them work with the HAS you'd need to use an
adapter that fixes the speaker +/- wiring, or re-wire it on the PCB game
itself.

*Don't hesitate to reach out if you can't see the answer
to your question - https://rgbslab.com/pages/contact*