

SCART – What’s it all about?

Richard Watkinson

[Note: This article is based on one originally published by Archive Publications in *Living with Technology*, issue 1.3, August 2002. Richard and Archive Pubs have kindly given their permission to include it on the AVLine CD.]

The **SCART** connector (also known as **EURO-AV** or **PERITEL**) is a means of connecting audio-visual (AV) devices without using the aerial lead and radio frequency (RF) stages which lose display quality and rule out stereo sound.

The SCART connector was intended as a ‘universal port’ for AV equipment, including TVs, video recorders, DVD recorders/players and satellite/digital boxes. It is now regarded as the standard method for connecting AV equipment and most modern products have a minimum of two SCART sockets.

SCART is an acronym for *Syndicat des Constructeurs d’Appareils Radiorécepteurs et Téléviseurs*, the French organisation that set up the standard originally to prevent foreign TV imports. SCART connectors are not usually found in equipment outside Europe.

This article has been assembled from information I had to hand, information gleaned from the Web and various other contributors. It is given in good faith but is purely my interpretation of this information and I accept no responsibility for its accuracy.

The SCART Connector

The connector is a somewhat delicate, 21-pin plug and a mating socket.

Fig 1 shows the pins of a typical *socket*, bearing in mind that number 21 is not actually a pin but the metal shield. Note all the pins on the left are odd-numbered and those on the right even-numbered.

A full specification SCART cable has all 21 pins connected. Some of the pins are cross-connected; that is, IN pins at one end are connected to OUT pins at the other end, and *vice versa*. The cable wiring is totally symmetrical so that either end can be connected to any piece of AV equipment.

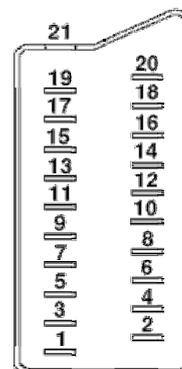


Fig 1 Connector

Audio

The pins allocated to audio (1, 2, 3, 4 and 6) permit two audio channels (stereo), usually called **Left** and **Right**. These are cross-wired so Left IN at one end of the cable is connected to Left OUT at the other end of the cable. Pin 4 is connected to the screening on the audio leads.

Video formats

Three different video formats are catered for in the SCART specification but not all may be present in your equipment. These are examined here in ‘quality’ order, with the highest quality (first choice if you have a choice) first.

The pins used depend on the video format; some are switched automatically within the AV unit when a particular format is selected, usually by the remote control/zapper.

‘RGB’

The first and best option for video is usually called **RGB** – Red/Green/Blue. There are three pins (15, 11 & 7), plus ground, allocated to this format (Fig 2).

If your viewer (TV set or monitor) has an RGB facility, then this is the best choice for displaying the video signal. The red, blue and green components are each handled

separately and the streams of analogue data are sent more or less directly to the three separate, RGB 'guns' of the display.

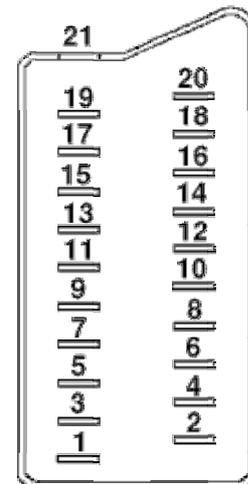
Most DVD recorders and players, Freeview, satellite, cable and other digital video equipment will have RGB available as an option. You may have to select RGB format with a physical switch or, more likely,

configure the AV unit's input/output via the on-screen menus, using the remote control.

However, although the SCART connectors on video recorders are generally wired for RGB IN and OUT, this is a 'link-through' facility *only*; VCRs *cannot* record RGB signals to video tape, nor can they output RGB signals from tape to TV etc.

Pin connections of SCART socket in RGB mode

No.	Name	Description
1	AOR	Audio out right
2	AIR	Audio in right
3	AOL	Audio out left + mono
4	A GND	Audio ground
5	B GND	RGB blue ground
6	AIL	Audio in left
7	B	RGB blue in
8	SWTCH	Audio/RGB/ switch / 16:9 aspect ratio (function switch)
9	G GND	RGB green ground
10	CLK OUT	Data 2: clock pulse out
11	G	RGB green in
12	DATA	Data 1: data out
13	R GND	RGB red ground
14	DATA GND	Data ground
15	R	RGB red in / chrominance
16	BLNK	Blanking signal
17	V GND	Composite video ground
18	BLNK GND	Blanking signal ground
19	V OUT	Composite video out
20	V IN	Composite video in / luminance
21	SHIELD	Ground/shield (chassis)



Pins 8 and 16 send control signals to the TV to select certain functions or inputs automatically.

I don't think pins 10 and 12 have a use yet - some sources have them listed as 'Reserved'.

Fig 2 Pin connections of SCART socket in RGB IN mode

‘S-video’

The second format is one in which the ‘luminance’ and ‘chrominance’ signals are available separately on two SCART pins (15 and 20), plus grounds.

This format is generally called **S-video** and may be selected either by a physical switch or via the on-screen display menus, again using the remote control.

The luminance stream of (analogue) data contains information about the brightness of the high-definition, monochrome display. The chrominance stream of data contains all the colour information, but at a lower definition (emulating the way in which the human eye perceives monochrome detail and colour).

Some video recorders have an option to record in the S-VHS format, in which the chrominance and luminance signals are recorded, separately, onto S-VHS tape.

Nearly all analogue and digital satellite equipment as well as some other video equipments will have an option to input and/or output (analogue) video in this S-video format. If your units will not accept RGB – but do have an S-video option, then this is the one to select.

Output connector		Input connector	
1	Audio right out	2	Audio right in
3	Audio left (or mono) out	6	Audio left (or mono) in
4	Audio return	4	Audio return
15	Chrominance out	15	Chrominance in
13	Chrominance return	13	Chrominance return
8	Video status out	8	Video status in
19	Luminance out	20	Luminance in
17	Luminance return	18	Luminance return
21	Shield	21	Shield

Fig 3 Pin Connections in S-video mode

‘Composite video’

The third and lowest quality format of the three is **composite video**, sometimes referred to in manuals and on-screen menus as simply ‘Video’ or, occasionally, ‘PAL’.

There is one IN pin (20) and one OUT pin (19) at each end of the SCART cable and they are cross-wired. The brightness and colour information has all been combined into a single data stream and has to be separated before display. It is the combining/separation process which results in the loss of quality. Nearly all modern AV equipments will accept this format.

If the TV has a SCART socket, then this ‘one pin’ format will be accepted through it. Unless otherwise stated, if the SCART socket does not have any markings and there is nothing in the handbook about formats, then it is likely that this is the only format available on that TV.

All video recorders with a SCART connector also have this ‘one pin’ format available. The better VCRs may *also* have the ‘two pin’ S-video recording/replay format (S-VHS).

Certainly all reputable units such as DVD players and satellite equipment will have a SCART socket with this ‘one pin’ format available, often *also* with RGB and/or S-video options.

Output connector		Input connector	
1	Audio right out	2	Audio right in
3	Audio left (or mono) out	6	Audio left (or mono) in
4	Audio return	4	Audio return
8	Video status out	8	Video status in
19	Composite video out	20	Composite video in
17	Composite video return	18	Composite video return
21	Shield	21	Shield

Fig 4 Pin Connections in composite video mode

‘Pin 8’

An important but little-understood function is the electrical switching and control of AV units operated via pin 8 of the SCART connectors and cabling. In a very simple setup, such as a VCR connected to a TV, there is little controlling to be done other than that within the VCR (selecting **Record** or **Replay**).

However, in a more complex arrangement, such as a ‘daisy-chain’ of three or more AV units, a number of digital switching signals have necessarily to be passed between units, and the majority is done via this pin. So often, the phrase “Pin 8 switching” is used with general reference to the overall controlling function of multiple AV units.

For example, if we have, say, a DVD player connected to a VCR – which, in turn, is connected to a TV – which has priority: the DVD player or the VCR? Typically, if the VCR is set to **OFF** or **Standby**, the DVD player will have switching priority and the video and audio output from the DVD player will be routed (“linked”) through the VCR to the TV.

(Note that the video from the DVD player linked through to the TV could be in the RGB format, although the VCR is not able to record RGB signals. In that event, the VCR would record the lesser-quality composite video signal, always available via the same SCART plug/socket.)

But if the VCR is set to **Record** or **Replay**, then switching signals passed through the ‘Pin 8’ link will cause the VCR to take priority.

In theory, the switching signals will have the same effects on different AV units, regardless of their type, manufacture, and so on. But this is too much to expect so often some trial-and-error is necessary to achieve the results you require. For example, in the above DVD→VCR→TV arrangement, it may be necessary to switch the VCR to **OFF**, and not to **Standby**, to give the DVD player priority.

Obtaining SCART cables

If you are buying a SCART cable, make sure it has all the connections you need. Some partially-wired connectors have pins omitted – but a complete set of pins is *not* a guarantee that they are all connected! Check the packaging details before buying.

There are also differences in the quality of cables. The better (but more expensive) ones have the various leads screened individually; hence the seven, separate **GND** pins in Fig 2. Cheaper cables tend to dispense with some of the screening which can lead to ‘crosstalk’ between signals.

Adaptor cables and plugs

On occasions, you may wish to connect one unit with a SCART socket to another which does not but, instead, has (typically) one or more ‘phono’ (RCA) sockets for composite video and mono/stereo audio, and sometimes also a 4-pin mini-DIN socket for S-video.

There are various solutions to this problem. Firstly, adaptor cables are available with a standard SCART plug at one end and, at the other, a range of phono/S-video plugs to meet your specific requirements. This is the simplest solution but the adaptor cables do tend to be expensive.

As an alternative, adaptor plugs are available, typically consisting of a moulded unit incorporating a SCART plug and RCA sockets for composite video and mono/stereo audio, perhaps also with a 4-pin mini-DIN socket for S-video. The two AV units can then be interconnected using separate or combined cables for the relevant video (composite or S-video) and audio links.

The significant problem here is that the one-way composite video, S-video and mono/stereo audio sockets in SCART adaptors can be **IN**, or **OUT**, *but not both*. For this reason, adaptors are available in both **IN** and **OUT** variants (*buyer beware*) or, more conveniently, are switchable **IN/OUT**.

As AV units have become more technically proficient, and especially since the introduction of satellite, cable and terrestrial digital TV transmissions, also ‘home cinema’ packages, the quality of connectors and interconnecting cables has become more important.

Manufacturers have responded by making available the same ranges of items for both video and audio use, but with (typically) oxygen-free copper (OFC) cables and gold-plated plugs, sockets and connector pins.

Making SCART cables

In a simple situation, it may be possible to take a DIY approach. I have wired a SCART plug to take the audio outputs from pins 1, 3 and 4 (screen) on my TV to a spare input on my Hi-Fi system, with no problem – except it occupies a SCART socket that I would prefer to use for a DVD player.

Note that if you are constructing a cable, you will have to cross-wire pins 1→2 and 3→6 for stereo audio, and 19→20 for composite video (possibly 17→18 as well). Inputs at one end go to outputs at the other (i.e. pin 1, Audio Out R goes to pin 2, Audio In R at the other end). It can get confusing and is *very* fiddly...

Anything requiring more connections will be even more tricky and it’s probably better to shell out for a suitable adaptor cable, if available, or use an appropriate adaptor plug.

Problems, problems...

Once you’ve got all your connectors pushed *firmly* into place, try to leave them undisturbed as SCART plugs are not the most robust of beasts.

If the colours on your display are wrong (RGB), or in monochrome only (S-video), or there is no sound, the connector may be faulty or – much more common – has become partly dislodged.

[Another reason for seeing only monochrome in a setup using S-video is that one or more AV units have not been correctly configured via the physical switch(es) or on-screen menus. In that event, you may see just the monochrome display and not the colour.]

The end bit

For further and more detailed information on things like signal levels, have a look at the very helpful Kevlar websites at <http://kevlar.20m.com/scart.html> or <http://kevlar.20m.com/sitemap.html> or try entering ‘SCART connections’ into Google for other useful links.

(Thanks to Gerald Fitton and Barry Smith, also Mick Evans on the Kevlar website, for information used in the preparation of this article.)

Richard Watkinson, rwatki@orpheusmail.co.uk
