Title: Reducing video distortion using pair optimization

No: GEN18-1

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SUMMARY:

This Connectivity Information Sheet will explain how to reduce visible video distortion introduced by skew delay in the twisted pair cable.

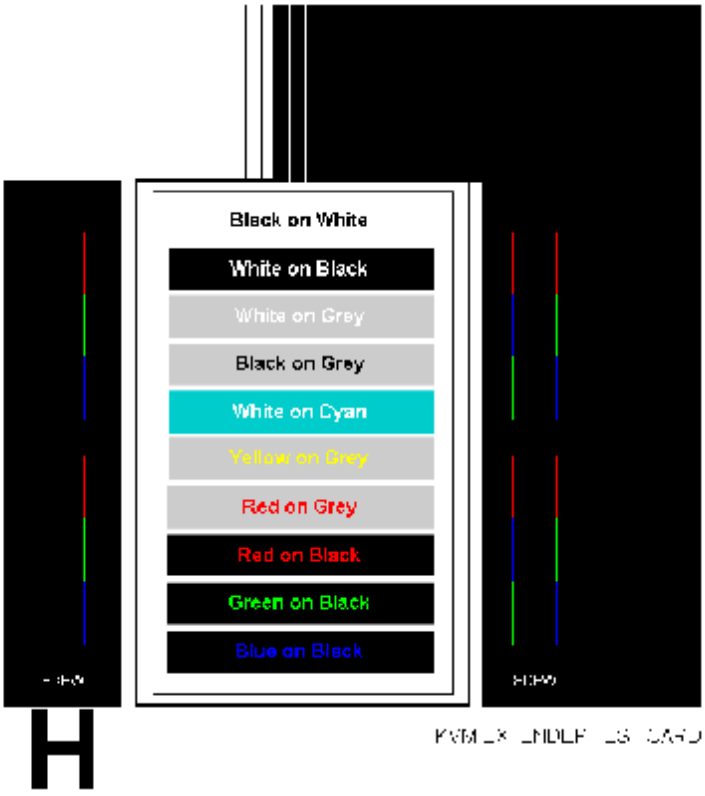
On many cables, the twist rates differ and this leads to each color arriving at a slightly different time and therefore spreading out on the screen. Skew becomes a major problem at high screen resolutions and with long CATx cables. To correct for skew, the ‘faster’ colors must be delayed to arrive at the same time as the slowest.

MORE INFORMATION:

Green Delay

Introducing delays in the video signals inevitably may cause some distortion at the high screen resolutions. For example, it may result in pixels being sampled twice on TFT screens.

The human eye is extremely sensitive to green distortion. To obtain optimal video performance it is best to ensure that no green delay is required. You can visually check the relative pair delays by viewing the test card (without any delays applied). The two color bars on the left require delaying, but the color bar on the right requires zero delay (slowest) and is the reference. Ideally, green should be the reference signal.



Cable Pinning/Pairing

The following table illustrates which RJ45 connector pins the extenders use for various signals. It also details the standard EIA-568B wiring scheme that is recommended for most installations.

Looking into the RJ45 socket on a Remote unit, Pin 1 is on the right and Pin 8 on the left.

Pin	Color (EIA-568B)	Signal
1	White/Orange	Red Video
2	Orange/White	
3	White/Green	Green Video
6	Green/White	
4	Blue/White	Blue Video
5	White/Blue	
7	White/Brown	Data/Keyboard and Mouse/Audio/Power
8	Brown/White	

Optimizing Pairs (General Solution)

Measure pair lengths with a LAN cabling tester (TDR) or view pairs by stripping back a small piece of cable and viewing how tightly pairs are twisted. The most tightly twisted pair is the slowest (longest) and the loosest pair the fastest (shortest). You can also check the relative delays using the test card above.

The table below shows the general solution for optimizing CAT5 cabling for video in order of pair length.

Pins	Pair	Signal
7 & 8	Shortest Pair	Data/Keyboard and Mouse/Audio/Power
4 & 5	3rd Longest Pair	Blue Video
1 & 2	2nd Longest Pair	Red Video
3 & 6	Longest Pair	Green Video

Some cables have a ‘3+1’ construction where three pairs closely match. The fourth pair should be used for data and the other pairs sorted as in the above table.

Other cables have a ‘2+2’ construction where there are two sets of dissimilar pairs. Put red and green on one set (tightest) and blue and data on the other. A suitable pair-swapping scheme is easily made using custom wired patch cables at each end.

COMMENTS:

Below is list of Minicom products that require using FTP shielded cable:

- VDT – Video/Data Transmitter when used to extend video and RS232.
- AVDS – Audio/Video Display System. Uses shield to deliver power to remote units.

Use of FTP cable with other Minicom products is recommended but not required.

While the UTP (Unshielded Twisted Pair) cables generally provide sharper video transmission, some Minicom products require use of FTP (Foil Shielded Twisted Pair) cables.
Use FTP cables in electromagnetic noisy environments to prevent EMI from entering the cable and inducing interference on the video signal.
CAT7 standard specifies skew delay no more then 15ns which greatly reduces the visible video delay. Use of CAT7 cables is recommended where applicable.
See Technical Information Sheet GEN17-1 for explanation how the twisted pair cable technology works.