

VGA-SKEW-EQ Top View



1. VGA port - connect to VGA-SKEW-EQ Cable
2. VGA port—connect to the display
3. R - adjustment dial
4. G - adjustment dial
5. B - adjustment dial

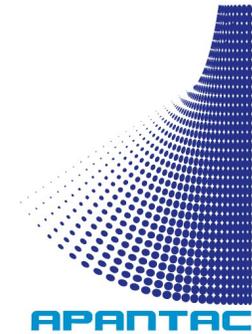
VGA-SKEW-EQ-CABLE



1. VGA port - connect to VGA-SKEW-EQ's "IN" port
2. VGA port - connect to the receiver's VGA out
3. DC 5V - connect to the DC 5C 5V power input on the MT Hood receiver
4. DC 5V - connect to the DC 5V power adapter

Specifications

FEATURES/ MODEL	VGA-SKEW-EQ
Input	DB15 Female
Output	DB15 Female
Adjustments	3 x dials
Max Resolution	2048x1536@60Hz
Power	5V 2A DC
Dimension (mm)	67 W x 37 x D 24 H



VGA-SKEW-EQ USER MANUAL

**Skew Equalization
Adjuster for
VGA-1-R, VGA-1-Ra,
KVM-1-R, KVM-1-Ru
KVM-2-Ru,
TSE-1-R, TSE-Ru**

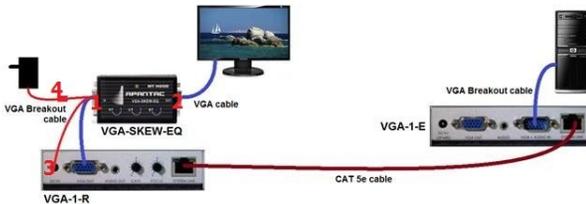


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Installation

1. The monitor should be connected to the VGA-1-R first, to ensure gain and focus is adjusted for the best result.
2. Connect VGA-SKEW-EQ-CABLBE (1) to VGA-SKEW-EQ's (1) VGA port.
3. Connect the CATx receiver's (i.e. VGA-1-R) output port to VGA-SKEW-EQ's (2) VGA port.
4. Connect VGA-SKEW-EQ-CABLE's (3) to the CATx receiver's (i.e. VGA-1-R) 5V power inlet.
5. Connect the 5V DC power adapter to VGA-SKEW-EQ-CABLE's (3)



SKEW ADJUSTMENTS

1. The total adjustment of skew is = 62ns.
2. Turn R, G, B dials all the way counter clockwise, this will set the delay adjustment to "0".
3. Now determine which color has the most delay. For example, if G has the most delay, then adjust R and B to match G by turning R and B dials clockwise, until all three colors are synced.

What is Skew?

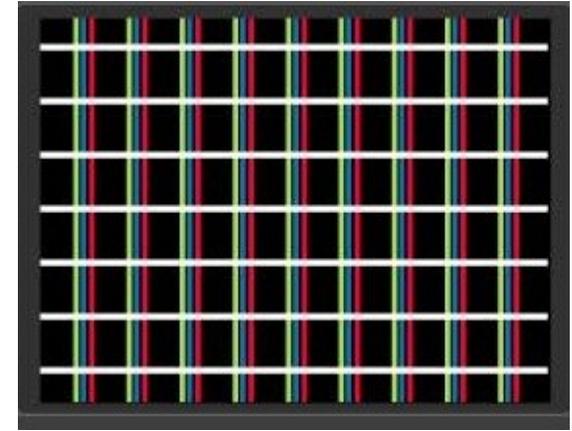
In twisted pair video systems, skew is a distortion in the image caused by the late arrival of one or more of the color signals. The delayed color signal is shifted to the right of the other colors in the image, resulting in very poor image quality that can cause viewer fatigue.

Interestingly, the source of skew is the cable itself. Data grade twisted pair cable was developed for computer networks where the main concern is not skew, but crosstalk. Ethernet networks consist of two signals, transmit and receive, running long distances in close proximity. To minimize the crosstalk between individual twisted pairs, the rate of twist is varied among the pairs of wires. This has a side effect of making the twisted pairs vary in length. The pairs with more twist per inch will have a longer length and signals sent down each pair will arrive at the receiver at different times. Computers have little trouble resolving this time differential, but high resolution video systems are less forgiving.

Skew is not a problem when twisted pair cable is used for composite video or S-video signals, because the signals are sent on a single pair of wires. High resolution video signals, on the other hand, are subject to skew, particularly at long distances, because the transmitter processes the signal and sends each color down a separate pair.

So, how much of a time delay is too much? The Cat 5e standard specifies a maximum delay skew limit of **45 nanoseconds** (ns) over the entire length of the cable used. This is not acceptable for analog RGB signals. For high resolution video transmission, skew delay must be as close to zero as possible. A typical 1024 x 768 signal with a refresh rate of 60 Hz (pixel clock of 65 MHz) showed the pixel duration to be approximately 15 ns. For an image running at 1280 x 1024 pixels, with a refresh rate of 60 Hz (pixel clock of 135 MHz), the pixel duration was approximately 8 ns. Depending on the resolution, the delay skew resulting from a length difference of three feet will most likely need compensation.

For example, imagine you're working with a brand of Cat 5e cables with a documented delay skew of 1.451 ns per foot. On a moderate cable run it wouldn't be unusual to find a difference of five feet between the shortest and longest wire pairs, resulting in a cumulative delay skew of 7.255 ns (5 feet x 1.451 ns). This would be very close to one pixel width off at the 1280 x 1024 rate and half a pixel width off at the 1024 x 768 rate.



Due to varying wire length, signals will arrive at the display at different times.

Two methods to compensate for Skew

1. Use low skew cables.
2. Use skew equalizers: i.e., Apantac's VGA-SKEW-EQ. Apantac's VGA-SKEW-EQ uses a time delay circuit on each color input that can be independently adjusted from 0 to 62 nanoseconds.